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Understanding Passenger Demand for the Indian Railways: Issues and Perceptions in a Socio-Demographic Framework

A Report for the Indian Railways

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Background

- Indian railways (IR) is the largest national transport network in the country. Railways has currently 1,14,500 kilometres (km) of track covering a distance of 65,000 km and connecting 7,500 stations. It is the world's fourth largest rail transportation network after USA, Russia, and China. Railways in India has emerged as prominent mode of transport meeting the needs of all classes of passengers.
- IR has sixteen zones across the country and 67 divisions across the zones. Data for 2010–11 shows that 95 per cent of the rail passengers travel in the non-reserved category (both suburban and non-suburban services), while only five per cent travel on reserved tickets. A review of passengers' traffic across zones in 2010-11 shows that Northern railway tops in carrying both reserved and non-reserved categories of passengers (17.9% of total passengers nationwide), followed by Southern railway (10.5%).
- The computerised reservation system of the IR can store information on the demographic profile of passengers such as gender and age. But it can do so only for 5 per cent of the passenger traffic in aggregate, while 95 per cent remains unaccounted. One of the objectives of the present study by the National Council of Applied Economic Research (NCAER) aims to fill this gap with a sample survey of the passengers covering both suburban as well as non-suburban trains. The study has also conducted a sample survey of a small sample of households in the catchment area of Mumbai and Kolkata. One of the crucial aspects of the study is to find out passenger's (as well as household's) readiness to pay higher fare for travelling by train. This assumes importance, given the substantial gap between revenue of the IR from passenger travel and the cost of providing this service.
- NCAER carried out the sample surveys (with reference period 2011–12) in different locations among a sample of households and passengers to understand their transportation requirements. The survey has specifically attempted to capture the proportion of expenditure by passengers for meeting their normal transportation requirements and the relative position of the railways in meeting the travel requirements. This report is an attempt to assess the perception of the general passengers (both suburban and non-suburban) through a sample survey.

Household Survey

- To achieve one of the key objectives of the study we have identified urban areas from where a large proportion of passengers avail the suburban rail services. The household survey was conducted in the catchment area of Mumbai and Kolkata, which account for a significant share of suburban passenger services in this segment. Five suburban stations were identified randomly based on geographical dispersion and importance. The survey was attempted in two stages. The first stage attempted a general listing. In each of the selected area, we have listed 1000 households to get the proportion of users of service and non-users. Listing of households was done randomly in selected wards (maximum two) of the assigned areas within a radius of 1 to 10 km of the

railway station. In the cases where wards are bigger and sufficient to cover the stipulated distance range, a single ward was chosen.

- After the listing, we identified households who are users of the services for detailed interviews on issues relating to train services.
- The final household survey was based on stratification of the households based on listing data. The survey was conducted during February–March 2012 with the reference period for 2011–12.
- The survey in two cities of Mumbai and Kolkata together provided the socio-economic profile of the users.
- Within each stratum of the sample, households were selected randomly and the final survey was carried out using a structured questionnaire.
- Apart from understanding the general socio economic profile of the passengers, the basic objective of the survey was also to decipher household perceptions about willingness to pay, expectations about the quality of services and other travel related factors.
- While analysing the survey results, we have examined the survey responses by classifying the households in terms of their monthly per capita expenditure (MPCE) quintiles. We have also estimated monthly per capita income (MPCI) of the households. However, we used MPCE more often since the coefficient of variation for MPCE is less than that for MPCI. The reported average yearly expenditure and average yearly income of the sample households is given in Table 1. (based on catchment area survey)

Table 1: Average Yearly Expenditure (Rs/ household) of the MPCE and MPCI Households

MPCE Quintiles	Yearly Expenditure	Yearly Income
Q1 (Bottom)	39,327.6	47,112.4
Q2	60,438.7	78,530.9
Q3	76,063.9	1,09,826.4
Q4	1,02,867.4	1,56,722.7
Q5 (Top)	1,43,875.7	2,26,029.3
Total	84,484.0	1,23,589.1

- Average annual expenditure for bottom quintile (Q1) is Rs 39,327.6 as against Rs 143,875.7 for top quintile (Q5). In terms of income, average annual income is Rs 47,112.4 and **R**s 226,029.3 for bottom and top quintiles, respectively.
- As may be expected, the households from the lowest quintiles spend more on basic needs like food and clothing. Their expenditure on food is the highest (65.3%) followed by clothing (8.8%). The expenditure on education, fuel, and lighting and communication is relatively much less as compared to food expenditure. The proportion of expenditure on food goes down with higher quintiles. Middle and upper quintiles spend more on education, transport and communication. The transportation expenditure is proportionally more for the higher quintile households compared with the lower ones.

- NSS 66th round (2009–10) consumer expenditure data reveals the following consumption expenditure pattern for the following comparable items:

Table 2: A Comparison of the Household data of NCAER with All-India Results from NSSO

Item groups	NSS 66th Round (% of total expenditure)	NCAER Railway survey of households in the catchment areas of Mumbai and Kolkata (% of total expenditure)
Food	39.2	39.1
Clothing*	6.4	8.1
Fuel and lighting	7.7	6.7
Medical#	5.3	6.1
Conveyance/transportation	6.2	7.4
Education	8.7	10.0
Source: NSS KI (66/1.0): Key Indicators of Household Consumer Expenditure in India, 2009–10, p. 94		

*Clothing includes footwear; # Medical includes institutional and non-institutional facilities

- The survey data shows that average transportation expenditure across various modes is the highest on buses, followed by train, taxi, and others. The spending on air travel is the least, since very few households reported travel by air. The households' annual average transport expenditure is Rs 6225.5, with Q1 averaging Rs 1771.5 compared to Rs 11,907.3 in Q5. Annual expenditure on train travel shows an increasing trend with MPCE Quintiles. The average expenditure on train travel in Q1 is Rs 413.8 per household compared to Rs 2437.3 in Q5.
- In the aggregate, 16 per cent of the sample households belong to SC, 6 per cent to ST, 10.5 per cent to OBCs and 67.4 per cent to the general category. As regarding activity or occupational status, agriculture is seen to be predominant for the lowest quintile, while households belonging to the top quintiles are more engaged in the modern sector.
- The findings of the households' survey contours various aspects related to demand for travel by train and other modes and their general opinions linked to willingness to pay higher fare for railway travel and the quality of service.
- It has been observed that train travel is one of the dominant modes of transportation and households spend around Rs 1464 on an average for transportation by train in a year at 2011–12 prices. It may be observed that higher spending on train travel is done more by households in the higher MPCE quintiles. The current survey has shown a very clear trajectory of substitution when compared with MPCE quintile clusters for both train and bus services.
- A more general viewpoint may be observed if we consider the proportional expenditure on train and bus to total transport expenditure by quintiles. While spending proportion for train is almost stable, the spending proportion of bus is observed to go down from lower quintiles to higher ones.
- The response related to the purpose of travel shows that work related travel dominates the overall travel demand of the sample households. In Mumbai, work related travel is

74 per cent, while in Kolkata it is 34 per cent. Education and business are the next important purposes but much lower in importance than work or socialisation.

- The quintile distribution of travel purpose shows households belonging to the upper quintiles (58 and 59 per cent respectively for $Q_5$and Q_4) undertake work-related travel more than their lower counterparts. On the other hand, the lower quintile households travel most (36%) for socialisation (meeting friends / relatives / attending social / religious functions, etc.) purpose.
- The frequency of travel shows that members of the households undertake mostly daily travel by train in Mumbai (72%), while it is far less in Kolkata (27.4%). Combining both on averages, the daily travel is little over 50 per cent, followed by weekly travels. Travel as per requirement stand out to be around 12 per cent. The seasonality of travel varies from month to month. It is observed that 71.4 per cent household revealed highest frequency of travel in October, followed by September (70.8%). The lowest frequency can be observed in April (59.5 %).
- Distribution of the respondents in terms of the frequency of travel by quintiles shows that daily travellers are less in Q1 and the proportion goes up for the other categories of infrequent travels.
- Distribution of the classes of travels by train shows that most of the family members take ordinary/general class (89%), followed by sleeper (6%), AC III tier (3%) and AC II tier (2%), respectively. By places, households from Kolkata avails general class travel more than Mumbai (over 90% against 87%), while in other categories of travel, Mumbai is ahead of Kolkata.
- The survey has also observed that lower quintiles households seldom travel by AC class, while only 1.7 per cent of them travel by sleeper class. On the other hand, 6 per cent households in Q_5 travel in AC II tier and over 9 per cent travel in AC III tier. Both Q_3 and Q_4 have almost equal share for travellers by sleeper Status (7.6%).
- The travel demand of the sample households by train is high and the response linked to their willingness to pay more for the services provided by IR are varied and sometimes mutually inclusive. The analyses of the sample response shows that when train tickets are not available, more than 50 per cent of the commuters are affected and the journey expenditure goes up by 10 to 20 per cent.
- It is also revealed that majority of the households (55%) are ready to pay more for a reduced journey time and faster trains. By location, the sample shows that around 71 per cent of households in Kolkata are willing to pay more, but only 39 per cent of households in Mumbai favour the same. It may also be noted that even for the lowest quintile, the readiness to pay is more than 52 per cent for quicker train services, while 56 and 57 per cent, respectively, of Q4 and Q5 are ready to pay more.
- The survey sought to understand the reactions to higher passenger fares. Among those who are affirm the readiness to pay, more than 81 per cent are willing to pay around 5 per cent higher fare than usual, while more than 18 per cent are ready to pay 5 to 10 per cent higher fare than the present rate. In Kolkata, 94 per cent of the households favour increase in fare by 1 to 5 per cent, but 39.3 per cent of households in Mumbai favour 5 to 10 per cent increase in fare. On the other hand, only 1 per cent of the sample households favoured 10 to 20 per cent hike in fare.

Suburban Passenger Survey

- Railways meet the travel needs of the millions of suburban/non-suburban passengers every year. The sample survey of railway passengers is intended to provide the socio-economic profile of the users of railway services, their pattern of usage, expectations of services from the railways and their willingness to pay for better services.
- The suburban passenger surveys were done at selected stations where passengers were approached for information as they awaited their trains or alighted from trains. The surveys were carried out continuously for more than four weeks so that information on different variety of traffic is captured. Several parameters were considered for undertaking the sample survey. The approach to sampling was to obtain a random sample, wherever possible with suitable stratification. This was done to reduce the bias linked to the estimation of the parameters of interest as much as possible. The guidelines indicated the sample size numbers and the interviewers were instructed to make every effort to get that much response. However, in the sample surveys it is often difficult to reach the exact numbers for several reasons. In some instances, we had to discard some responses because of inconsistencies or other limitations of information received. The questionnaires meant for the passengers were extremely focused, short, and code-based to elicit main socio-economic characteristics of the passengers and some reaction to the prevailing fares. A total of 11 stations in the neighbourhood of Mumbai, Kolkata and Chennai with suitable geographical distributions were chosen that covered 5093 suburban passengers.
- Income and expenditure are the two indicators with which the other socio-economic variables are often closely linked. The low income earners typically stay put in lower expenditure range and vice versa. It may be observed that expenditure-wise the highest concentration is in the monthly expenditure range of Rs 5,000–10,000 (34%). Monthly spending of Rs 10,000 to Rs 20,000 is reported to be 23.3 per cent while monthly income of the same range consists of 44.7 per cent of the passengers.
- The age distribution starts with youth (18–25), career intensive and settlement age (25–35), mid-career age (35–45), peak working to retirement age (45–60) and the older ages beyond 60. It may be noted that career intensive and settlement age have the highest concentration (37.6%) as suburban passengers, followed by youth (24.5%) and mid-career age groups (17.7%). Distribution of ages by income shows that young and old are the one with poor income but career-intensive and middle-aged people are more in the higher ones.
- Distribution of respondents by expenditure and age group shows that old passengers (>60 years) are in the lowest spending range (29.1%), followed by the younger group (27.6%), probably due to lower and unstable income at that period of life. However, the spending pattern varies and in the same age group there are passengers who are in the higher spending range.
- Overall gender distribution in the suburban train clearly shows that male groups are the dominant ones with 88 per cent share while females account for only 12 per cent of travellers.

- Gender distribution of the income earning passenger shows that only 7 per cent of income earning passengers is female.
- Profile of the suburban passengers in terms of activity status shows that around 42 per cent of them have regular jobs, followed by 20 per cent with own account employment. Around 16 per cent are students while 11 per cent are casual labour. Passengers having regular jobs are in the higher and steady spending ranges, followed by own account workers.
- Distribution of the sectoral engagement of the sample suburban passengers shows that most of them belong to the modern sector (48.6%), followed by engagement with the traditional services (25.9%). The sample passengers engaged in industry is 21.7 per cent while in agriculture it is only 4 per cent.
- Distribution of respondents by income and engagement to sectors clearly shows that agricultural labours are the lowest income earners while the highest income earners are mostly engaged in the modern sector. Distribution of respondents by expenditure and engagement to sectors too shows that passengers engaged in agriculture have the lowest ability to spend while the highest spending groups are mostly engaged to the modern sector.
- Distribution of the educational profile from the sample suburban passengers shows that over 48 per cent have passed higher secondary and over 23 per cent are graduates. While around 11 per cent passed secondary, 4 per cent have obtained professional graduation and 3 per cent are post-graduates.
- Transport expenditure is one of the important components of overall expenditure. For the suburban passengers this is linked to the distance one travels to reach the destination. Though no definite pattern can be discerned, the passengers belonging to higher spending strata spend relatively more on transportation than their lower counterparts.
- It is revealed that over 65 per cent of suburban passengers spend less than 10 per cent on transportation, while a little over 26 per cent spend between 10 and 15 per cent. Only 5 per cent spends over 15 per cent.
- It may also be observed that overall 23.3 per cent of the suburban passengers spend less than 10 per cent of the total transportation expenditure on train travel followed by 22 per cent by passengers spending between 10 to 20 per cent. By age group, spending on train travel is higher for career-intensive as well as mid-career age groups. Distribution of respondent spending on train travel by gender shows that females spend less on train travel out of total transportation expenditure than their male counterparts. The distribution of respondent spending on train travel out of total transportation expenditure shows that the sample passengers with Higher Secondary are the highest qualitative spenders, followed by passengers with Graduation.
- The distribution of spending for train travel by activity status shows that unemployed, regular job holders are proportionally the higher spenders compared with other groups in the activity status.
- Distribution of the suburban passengers by frequency of travel shows that around 57 per cent of the sample passengers travel daily, 16 per cent at least 3 times a month and

13 per cent travels 3 times a week. While occasional commuters are 9 per cent, 5 per cent of the passengers travel less frequently.

- It is interesting to note that when train services are affected, 76 per cent of the commuters avail bus services. Therefore, buses are the first best substitution in the event of disruption of train services. Only 3 per cent drives by own vehicles while 12 per cent of the commuters would not make the trip. It is also observed that when train services are affected, most of the commuters from the lower spending capability prefer travelling by bus, which is the cheapest second-best option. The passengers with higher affordability prefer hired (reserved) travel
- Distribution of travel time for the suburban passengers shows that 59 per cent of them travel during official peak hours. While 14 per cent travels during afternoons, 26 per cent of the suburban passengers have no fixed time for travel. It is revealed that only 1 per cent travels at night.
- Distribution of travel time by age-groups shows that younger (58%), career-intensive (63%) and mid-career (60%) age-groups travel mostly during peak hours, which goes down slowly in the upper age-groups and depletes drastically in the age-groups above 60.
- Distribution of the suburban travel by purpose shows that work-related travel is the most important purpose (70%), followed by attending educational institutions (13%), socialisation (10%) and personal business (3%).
- Distribution of the reasons for train travel shows that 73 per cent of the suburban passengers travel chiefly due to economic reasons, 16 per cent travel due to convenience and to avoid traffic congestion in the road.
- Distribution of the reasons for opting train travel by activity status shows that economic reasons are the most dominant factor for almost all categories with variation and it is the highest for own account workers (almost 80%), followed by regular salary earners (76%). While 17 per cent of housewives accord convenience as the major factor for travelling by train, a little over 21 per cent of the passengers with business says that they travel by train to avoid traffic congestion in the roadways.
- Around 73 per cent of the suburban passengers affirmed that train travel is economically cheap. It is observed that the chief consideration for train travel is its cheaper fare compared with other modes of travel (63%), while affordable monthly pass scheme is second in importance (33%).
- It may be noted that around 57 per cent of the passengers agree to pay a higher fare than the one they are paying now for faster train services.
- Distribution of agreement/disagreement on increasing fare for faster train services by activity status show that except own account workers, majority of passengers agree to increase in the existing passenger fare for faster train services.
- Distribution of agreement/disagreement on increasing fare for faster train services by expenditure status show that 67 per cent of the passengers even from the lowest expenditure profile agree to increase in the existing passenger fare for faster train services. The lowest agreement (43%) surfaces in the monthly expenditure status of Rs 20,000 to Rs 30,000. However, the percentage of passengers in this expenditure group was relatively small in the total sample (less than 3%). The percentage of

passengers in Rs10000-20000 expenditure per month was 23.3 and their disagreement to raising fare for faster services is significant. More than 55 per cent of the respondents in the lowest expenditures categories expressed agreement for higher fares if services are faster.

- Distribution (%) of passengers on the extent of agreement to higher fare shows that majority of them (78%)find reasons for increase of 1 to 5 per cent in fares, but it is also interesting to note that around 20 per cent agreed for a 10 per cent hike in the existing fare.
- Distribution (%) of passengers on the extent of agreement to higher fare critically shows that 23 and 24 per cent of the passengers with lowest and lower expenditure profile prefer 6 to 10 per cent hike in existing fare for faster commuting facilities.
- The distribution of passengers willing to pay for more frequent passenger services shows that out of the total sample passengers, 54 per cent are willing to pay more.
- Distribution by expenditure status shows that more than 65 per cent of passengers with the lowest expenditure status are willing to pay more for higher frequency of passenger services. The result is startling and shows that poor passengers are in dire need of better services for which they are even ready to spend more.
- Seventy seven per cent of the passengers willing to pay more for frequent passenger services by IR (54.5%), have favoured 1 to 5 per cent increase in the existing passenger fare, while 20 per cent accepted a 6–10 per cent increase in the same. Around 3 per cent of the suburban passengers are ready to pay even 10 per cent over and above the existing fare.

Non-Suburban Passenger Survey

- The passengers' survey at suburban level was extended to cover non-suburban passengers as well. The survey followed two strategies. The station-based survey was aimed at passengers at entry and exit at the stations on a random basis, while on-board survey selected passengers on a random basis in a running train. The objective of the survey was almost the same as the survey of suburban passengers, in which, apart from general profiling, the questionnaire was designed to know the willingness of passengers to pay higher fare and their general views regarding the passenger services of IR. The non-suburban passenger survey covered 15 major stations spread across the country, covering a total of 15069 passengers. On an average in each station we had identified three trains that pass through the station in a day for the survey of passengers who may be using that station for departure. It was attempted to include trains that cover at least two or three railway zones.
- It was observed that more than 50 per cent of the sample passengers of non-suburban travel are concentrated in the travel distance of up to 300 km.
- The income profile non-suburban passenger shows that more than 76 per cent of them reported monthly incomes in the range of Rs 5,000 to Rs 20,000. A little over 13 per cent is earning even less than Rs 5,000. On the other hand, the high income passenger earning monthly income over Rs 20,000 is 11 per cent. Distribution in terms of expenditure shows that the highest concentration (32.3%) is in the monthly

expenditure range of Rs 3,000 to Rs 5,000. It may be observed that more than 60 per cent of the sample passengers belong to the lower affordability range of up to Rs 5,000.

- Distribution of the age-group shows the highest concentration of non-suburban travel in the 26–35 age-groups. Next comes the younger group ranging from 18 to 25 years (28.8%). The mid-career age group of 36 to 45 years is third in importance (21.4%). It may also be noted that only 2.2 per cent of the older age group above 60 years travel by non-suburban trains.
- Gender distribution of the age group shows that female participation as passenger is more in the younger age groups compared to the older ones. Almost 15 per cent female passengers are in the 18–25 age-group, which comes down to 12 per cent in the next upper age group, i.e., 26–35 and then settles to 10–11 per cent in the other higher age groups.
- Distribution of sample passengers by educational status shows a very high level of concentration of those who have passed Higher Secondary (39.3%), followed by Graduates (25.9%) and those in Secondary level (12%). Professional graduates come next with 7.4 per cent.
- Distribution of the sample passengers by activity status shows that the highest concentration is with regular job holders (35%), followed by casual labour (17%) and own account workers (15.7%). Student group comes next in importance (14.7%), while around 6 per cent of housewives travel as passengers of non-suburban trains.
- Distribution of income by activity status shows that the lowest income is concentrated in casual labour and the highest income with regular salary earners. Distribution of expenditure by activity status also shows that the lowest expenditure is more concentrated with casual labour status and vice versa though with variation.
- Distribution of transportation expenditure among expenditure status shows very high concentration on below 10 per cent for passengers with lower expenditure profiles. Approximately 43 per cent of passengers, whose monthly expenditure ranges from Rs 5,000 to Rs 10,000 spend 10 to 15 per cent for transportation. It is interesting to note that around 27 per cent of the passengers of the highest monthly spending group with over Rs 30,000 a month spend over 25 per cent on transportation.
- Distribution of transportation expenditure among income Status shows very high concentration on below 10 per cent for passengers with the lowest income profiles. Around 53 per cent of passengers, whose monthly income ranges from Rs 5,000 to Rs 10,000 spend 10 to 15 per cent on transportation. It is interesting to note that around 18 per cent of the highest monthly income group with income over Rs 40,000 spend over 25 per cent on transportation.
- Further, distribution of transportation expenditure for train travel shows high concentration on below 10 per cent level for passengers with lower expenditure status. Overall, it may be noted that 49 per cent passengers spend less than 10 per cent out of total transportation expenditure, 26 per cent spend 10 to 15 per cent, 17 per cent spend 20 to 30 per cent.
- Distribution of the preference pattern of the alternative mode of transportation shows that when train services are affected, majority of the non-suburban passengers mostly

prefer bus services (67.6%). Around 3 per cent drive by own vehicles, while a little over 2 per cent go by reserved vehicle. It is also observed that only 0.3 per cent of the passengers in higher spending range prefer air travel. Around 0.4 per cent prefers to go by other modes.

- Distribution of alternative mode of transportation when train services are affected by expenditure class shows that passengers with lower expenditure profile mostly prefer travel by bus. However, it is interesting to observe that 50 per cent of the highest spending group prefers air travel in such an event.
- Distribution of passengers by class of travel shows that a little over 79 per cent of the non-suburban passengers in our sample travel by general class, 18 per cent by sleeper class, 1.1 per cent by AC II tier, 1.4 per cent by AC III tier and only 0.2 per cent by AC Chair Car.
- It would be interesting to observe the distribution of classes of travel by activity status of the passengers. Over 90 per cent of casual labour travel by general class and only 9 per cent travel by sleeper class. While employers, retired and regular salary earners travel relatively more in AC class.
- A sizeable section of the richer spending groups prefer to travel by AC class in comparison to the others (see Table 4.16 in the main report).
- The reasons for travelling by train is mostly its economy (63.6%) compared with other modes of travel. A little over 18 per cent of passengers cited convenience as one of the factors, while 14 per cent shows preference for travelling by train.
- Economic reason for travelling by train is dominant for casual labours (68.3%), followed by housewives (67.9%) and own account workers (67.7%). Convenience of travel by train is observed to be the most prominent for employers (46%).
- Economic reason for travelling by train is dominant for the lowest expenditure class (68.1%), followed by the next lowest monthly expenditure class (67.9%). Convenience of travel by train is observed to be the most for the highest expenditure class (32%).
- Distribution of the meaning of economic cheapness of train travel by the non-suburban passengers' show that low fare compared to other modes of transport (95%) is the main reason for travelling by train. Only 4 per cent of the passengers say that the reason for their travel is the unchanged rate compared to other mode.
- Willingness to pay is an important consideration. It is important to note that majority of passengers are ready to pay more for faster train services, which calls for better maintenance of track and surveillance to ensure speedy navigation. It may be observed that 52 per cent of the sample passengers are willing to pay more while a sizeable 48 per cent is reluctant to pay more.
- The distribution of agreement or disagreement to increased fare by activity class show that the proportion of disagreement is more for casual labours (20.3%), unemployed (3.9%), students (15.1%), housewives (5.8%), retired (2.1%) and others (1.7%), while agreement is more for own account workers (17.1%), regular salary/wage earners (37.2%) and employers (5.6%).
- The distribution of agreement/disagreement to increased fare by expenditure status show that the proportion of disagreement is more for passengers with the lowest

expenditure profile (57%), as well as the next lowest (51.4%), while agreement is more for passengers who spends monthly Rs 20,000 to Rs 30,000 (70%), followed by passengers whose monthly spending ranges between Rs 10,000 to Rs 20,000 (65.5%).

- Distribution of willingness to share percentage increase in the fare shows that 75 per cent of the sample passengers agree to 1 to 5 per cent increase in the current fare, while 24 per cent agrees to 6 to 10 per cent increase of the same.
- Distribution of the willingness to share percentage increase in the fare shows that 78.5 per cent of the sample passengers having the lowest spending profile agree to 1 to 5 per cent increase in the current fare, while 36 per cent of passengers with the highest spending profile agree to 6 to 10 per cent, and 28 per cent agrees to even more than 10 per cent increase of the same.
- It is important to note that there is a trade-off in the agreement/disagreement to fare hike against increasing the frequency of train services. It may be observed that 49.7 per cent of the sample passengers are willing to pay more while it is still important to note that a sizeable 50.3 per cent is not willing to pay more for higher frequency railway service.
- Distribution of the proportion on agreement/disagreement on increasing fare for increased frequency of railway service by activity status shows that disagreement is more for casual labours (59.5), unemployed (58%), retired (58%), housewives (57.5%), students (51.3%) and others (51.4%), while agreement is from employers (58%), own account workers (54.3%) and regular job holders (53.6%).
- Distribution of the proportion on agreement/disagreement on increasing fare for increased frequency of railway service by expenditure shows that disagreement is more for the lowest spending group (57.8%), followed by the next lowest spending group (53.4%). The agreement is more for the highest spending groups and it is observed to be the highest for passengers whose monthly spending ranges from Rs 20,000 to Rs 30,000 (67.3%).
- Distribution of willing passengers to share percentage increase in the fare shows that around 70 per cent of the passengers agree to 1 to 5 per cent increase in the current fare, while 29 per cent agree to 6 to 10 per cent increase.
- Around 83 per cent of sample passengers from casual labour category agree to 1 to 5 per cent increase in the current fare, while 41 per cent of the retired agree to 6 to 10 per cent increase.
- Distribution of the willingness to share percentage increase in the fare by expenditure status shows that passengers with the lowest spending profile (74.4%) agree to 1 to 5 per cent increase in the current fare, while 35 per cent of the of the highest spending group agree to pay even more than 10 per cent of the existing fare.
- Distribution of the willingness to pay more for better service quality inside the train shows that majority of passengers (52.4%) agree to pay more.
- Distribution of the willingness to pay more for better service quality inside the train by activity status shows that majority of passengers who are employers (61%), own account workers (58%), regular job holders (55%), unemployed (52%), and students (51%) agree to pay more. The disagreement is observed to be more from casual labours (57%) followed by retired (56%).

- Distribution of the willingness to pay more for better service quality inside the train by expenditure status shows that majority of passengers from the monthly spending groups above Rs 5,000 agree to pay more. The disagreement is observed to be more from the lowest (56%) and next to the lowest (52%) spending groups.
- Distribution of rates by which passengers agree for a hike in the existing fare for better facilities inside the train is given in Figure 4.46. It may be noted that 67 per cent of the passengers agree to 1 to 5 per cent increase on the current rate, around 30 per cent to 6 to 10 per cent increase. Only a little over 3 per cent of the passengers agree for increase of 10 per cent above the current fare.
- When train tickets are not available, the impact on travel expenditure of the passengers is an important consideration for their perception about dependability on this mode. The impact of travelling expenditure of the passengers who prefer to stay put and decide not to travel in such an event would be insignificant. However, it may be observed that 67 per cent of the passengers are affected and they have to compensate the travel need by paying more on other modes. Moreover, a sizeable 37 per cent of the passengers say that the non-availability of tickets escalates travelling expenditure by more than 30 per cent.
- Opinions on performance indicators are important gauge of passengers' perceptions about the quality of services on various performance indicators. The opinions are varied and if we dissect the opinions carefully, we can observe that facilities for lady passengers, catering, water, security, and safety of luggage and passengers along with availability of trains and train tickets are all areas of concern and they need urgent attention. In all these indicators, the percentage distribution of bad and very bad is not insignificant if proportionally distributed among large numbers of non-suburban passengers.

Factors Affecting Demand for Train Travel

- Estimation of the Demand Function for the Indian railways has obviously beset with pitfalls and limitations. Indian railways set tariff for the passenger service based on certain norms and principles, which is well beyond the purview and rationale for market mechanism. The functional relation linking demand and prices, in a commonplace scenario for the railways, would reflect consumption points rather than functional demand in true sense of the term. Though railways expand passenger services in different scale and magnitudes, the considerations for its expansion is not strictly in accordance with demand-supply law and in general one may assume a fixed supply quotient for the provision of generalised service The preliminary estimate using railways data satisfies demand relation, which, as mentioned gives us consumption points in standard setup. On the other hand, simple estimation using dummy variable for factoring in petrol and diesel prices shows that railway passenger service is indeed cross price sensitive. However, the estimation has the limitation of relatively constrained supply of services.
- The estimated econometric model clearly shows that rail travel in India has the usual demand relation (significant with negative sign of the coefficient) but the sensitivity

to fare is in-elastic (i.e., not more than 1). In contrast to the popular note, a 1 per cent increase in railway earnings per passenger km would reduce demand for passenger km by 0.44 per cent and vice versa. It has already been noted from the survey that price of the competitive mode is an important criterion for travel by the railways in India and price freeze for several years have virtually no role to play in this consideration. Similarly, income is statistically significant in influencing demand for railway travel and implies that a 1 per cent increase per capita income would translate into 0.67 per cent increase in demand for passenger km. It may be noted further that the positive income effect outweighs the negative substitution effect. The policy implication is crucial: railways can accommodate increase in passenger fare to meet its cost of operations, thereby enhance the viability of its services as well as improve the quality of services.

- The second motivation of this exercise is to use the estimated function to derive projected demand for the Indian railways for 2020. Using the demand function and applying the growth assumptions, the Indian railway is predicted to touch 2035.7 billion of passenger kilometres in the FY 2019-20 as compared to 12th Five Year Plan estimates (Working Group) of 1760.4 billon passenger kilometres by 2016-17.
- From the Logit analysis on responses to the questions on paying more for better services by the railways observed that for suburban as well as non-suburban passenger that there are subclasses of passengers who are willing to pay more for better range of services. Moreover, the count analyses clearly points out that there are rooms for better service provisions to the satisfaction of passengers classified by age, gender, education, expenditure and distance travelled.
- The survey clearly brings out the fact that travel demand by railway is ubiquitous and significant proportion of respondents expect an efficient and well-maintained railway service for which they are willing to pay a higher fare.
- Distribution of the distance from home to railway station for non-suburban travel brings out the crucial fact that on an average 32 per cent of the passengers have to travel more than 5 km to reach station, while a little over 21 per cent travel 3 to 5 km.

Concluding Observations

- The household survey clearly brings out the fact that travel demand by railway is ubiquitous across different categories of households and significant proportion of respondent expects an efficient and well-maintained railway service for which they are willing to pay more.
- The survey has also brought out some crucial facts about passenger travel. First, railways should consider redefining the sub-urban travel as it may be observed that a large number of passengers travelling in non-suburban train travel just the distance range covered for suburban travel. Second, people from the informal sector travel through railways (own account worker/casual labourers etc.) and their aspirations on service quality and corresponding willingness to share the burden of cost of the railways assumes immense importance.

- A large number of non-suburban passengers travel in the general category (79%), followed by the sleeper class (18%). It may be presumed that a relative crowding out is taking place for higher class travellers with higher expenditure profiles, who agree to pay more for better service quality. To strike a balance, the railways should enhance service quality of overall passenger travel.
- It is important to note that railway has a big task ahead to improve the quality of service, especially with regard to frequency and safety and security of passengers and luggage. Railway is the first best option compared with other modes of transportation in terms of affordable rate structure.

1. General Overview and the Context of the Present Study

1.1: Introduction

Indian railways (IR) is the largest national transport network in the country. Founded during the colonial period, the IR system traversed a long way to find its prominence among travellers in India. Its presence in areas across the country has made it indispensable among all classes of passengers.

Over the years, all the previous 42 railway companies were brought under exclusive government control. Railways in India became a state-owned enterprise under the Ministry of Railways. Railways has currently 1,14,500 kilometres (km) of track covering a distance of 65,000 km connecting 7,500 stations. It is world's fourth largest rail transportation network after USA, Russia, and China. Railways in India has emerged as prominent mode of transport meeting the needs of all classes of passengers, especially from the lower income groups. For long distance non-suburban journey within the country, railways is often the only option. Even for suburban transport for short to medium distance travel, railways has played the pivotal role and become a lifeline for linear city like Mumbai.

Demand for railway services is growing over time and massive investments are needed for their expansion. The average income of the Indian consumer has also risen. Demand for improved services is expected to rise with the rise in income. It is this challenge of meeting the rising demand that is facing the Indian railways at present.

1.2 Present Railway Network: Structure and Pattern of Railway Transportation Demand

IR has sixteen zones across the country and 67 divisions across the zones. Data for 2010–11 shows that 95 per cent of the total passengers travel is in the non-reserved category (both suburban and non-suburban services), while only five per cent travel on reserved tickets. As almost 100 per cent of the suburban services are in the non-reserved category, excluding them from the proportion for reserved passengers for the non-suburban services turns out to be a mere 10.5 per cent. It may be noted that North-Eastern railway zone carries the highest number of non-reserved passengers (94.8%) in the year 2010-11.

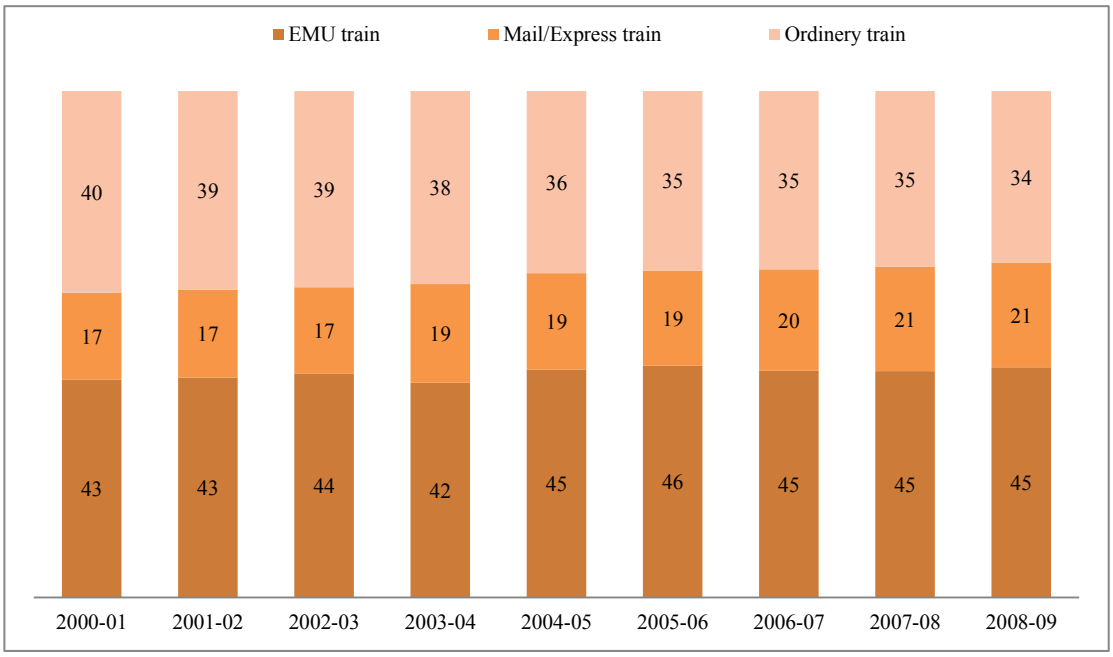
A review of passengers' traffic across zones shows that Northern railway tops in carrying both reserved and non-reserved categories of passengers, followed by Southern railway (Table 1.1). Among the other zones, Central, South Central and Western are also important in carrying both the reserved and non-reserved categories of passengers.

Table 1.1: Reserved and Non-reserved Passengers across Zones of the IR in FY 2010–11

Railway Zones	Reserved	Non-reserved	Total
Northern	19.9	17.7	17.9
Southern	13.4	10.1	10.5
South Central	8.7	9.9	9.8
Western	9.4	9.6	9.6
East Central	4.1	7.1	6.8
North Eastern	3.2	6.9	6.5
Central	9.5	5.7	6.1
North Central	4.1	4.8	4.8
South Western	4.8	4.7	4.7
Eastern	4.4	4.5	4.5
North Western	3.2	4.1	4.0
South Eastern	4.2	3.5	3.5
West Central	3.4	3.5	3.5
South East Central	1.9	3.4	3.3
Northeast Frontier	2.6	2.3	2.3
East Coast	3.0	2.1	2.2
All Zones	100	100	100
Source: Indian Railways			

It may also be noted that the rolling stocks of IR is weighed in favour of ordinary/passenger trains rather than mail/express ones. The combined share of EMU and ordinary trains is almost over 80 per cent from 2001 to 2009.

Fig 1.1: Share (%) of EMU, Mail and Ordinary Train in the Total Rolling Stocks of the Indian Railways



Source: CMIE

The computerised reservation system of the IR can store information on the demographic profile of passengers such as gender and age. But it can do so only for 5 per cent of the passenger traffic in aggregate, while 95 per cent remains unaccounted. One of the objectives of the present study by NCAER aims to fulfil this gap with a sample-based survey of the passengers from both the suburban as well as non-suburban trains. The present study also aims at examining responses of the passengers regarding their level of willingness to increasing rates for passenger travel in the railways which may be necessary given the substantial gap between revenue from passenger travel and the cost of providing this service.

IR meets a range of passenger transportation demands such as to go to work every day in sub-urban and urban areas and for short and relatively longer journeys for vacation, pilgrimage, visiting relatives, attending interviews, official, business, and personal needs using non-suburban services. There are also different classes of travel, namely air-conditioned and general with different types of trains such as passenger, fast, superfast, non-stop, and so on for which tariffs vary. Further, tariffs also vary because of the various concessions provided to select passengers: students, senior citizens, employees, and so on.

NCAER carried out sample surveys (with reference period 2011–12) in different locations in different types of cities and towns to draw a sample of households and passengers to understand their transportation requirements. The survey has specifically captured the proportion of expenditure by passengers for meeting their normal transportation requirements and the relative position of the railways in meeting similar requirements. This has provided an insight into the extent to which railway travel is attractive to passengers and why. Are there other non-monetary benefits that the other transport modes provide although they may be more expensive? Further, the survey has also examined whether passengers are willing to pay more for the increased tariff and to what extent? The above issues were examined in the context of the cost of alternative mode of transport for the relevant distance and services.

IR has desisted from increasing the fare for a long time to provide passenger services at extremely low cost. It has now opened several avenues to provide better service facilities and assess the requirement of funds to do so. This report is an attempt to decipher what lies in the perception of the general passengers (both suburban and non-suburban) through a sample survey all over India. A small sample of households' survey was also carried out in the catchment area of Mumbai and Kolkata to understand general perception and expectation from the railways. The household survey is also important to decipher demographic and socio-economic characteristics of sample located in the main urban centres of India. However, one should keep in mind that the survey of households is scientific but pilot in nature; the results derived are representative of the major suburban areas of the country, but may not be generalised for the catchment areas of railways for the entire country.

1.3. Objectives of the Present Study

This study provides an analysis of the implications of increase in tariff rates for passengers travel from the perspective of travelling public. Given the variation in the passenger traffic carried by the railways, the study undertook a number of sample surveys of passengers or potential passengers. The survey was intended to capture the following:

1. The proportion of expenditure by passengers for meeting their normal transportation requirements and the relative position of the railways in meeting similar requirements. This was assumed to help us understand the extent to which railway travel is attractive to passengers and the reasons thereof. Are there other non-monetary benefits that other transport modes provide although they may be more expensive?
2. The study has examined whether passengers are willing to pay for the increased tariff and to what extent.
3. The above issues have also been examined in the context of the cost of alternative mode of transport for the relevant distances and services.

In this assessment NCAER considered various types of travellers mentioned earlier as well as different types of services.

1.4. Approach and Methodology

The study is based on a set of surveys of passengers and households. The surveys attempted to provide a socio-economic profile of the users of railway services, their pattern of usage, expectations of improved services from the railways, and their willingness to pay more for better services.

The basic purpose of the current survey aims at

- Deciphering social and demographic profile of passengers at both the suburban and non-suburban train services as well as the sample non-users from the households in the catchment area of two major zones of Indian railways, viz. Mumbai and Kolkata.
- Estimating the extent of the willingness to pay more for passenger service at suburban and non-suburban levels and subsequently estimating the demand functions.
- Understanding the performance of passenger service both for suburban and non-suburban train services.
- Household survey in the catchment area of Mumbai and Kolkata to gauge the substitution effect and the importance of railways and other modes of travel in a general framework.

Essentially three sets of surveys was carried out by NCAER,

1. Passengers were contacted for information both at the stations and also on-board. The survey was carried out continuously for a month so that sufficient variety of traffic is captured.
2. Survey of passengers travelling on the main routes of railway services for the non-suburban services to cover a wide range of passengers. Passengers using sub-urban railway various were surveyed separately in the selected stations.

The Third set of surveys focused on suburban transport services. The respondents would be members of sample households in the catchment area of suburban railways. The sample households and members may or may not be users of train service. The idea would be to assess the alternatives people utilise for their transportation needs; the costs they incur; the

difficulties they face; and the role railways play, and scope for improvement in services while being able to charge the tariff required to meet the costs.

Passenger surveys pose many practical difficulties. In the case of suburban (urban) services, the second survey above the passenger surveys were to be done at stations where passengers were interviewed as they awaited for or alighted from trains. The rate of response was expected to be extremely low. For this reason, households in the 'catchment area' of suburban trains were also separately contacted.

While profiling of commuters was to be based on the passenger/household survey, the estimation of demand function for railways is captured through secondary data analysis, in which passenger demand is essential as a function of the cost of travel, substitutes, preference, and income. We can control the data with factors like average lead distance or petrol/diesel price index.

1.5 Structure of the Report

Following this introductory section, Section 2 provides data analysis for the household survey undertaken in the catchment areas of two of the most important urban centres of India, Mumbai and Kolkata. Household survey, though taken as supplement to suburban passenger survey, provides a description of the pattern of travel demand and perceptions regarding service provision and willingness to pay. Section 3 provides the analysis of the suburban passenger survey. The findings of the survey results for the non-suburban passengers are provided in Section 4. The time series analysis for price and demand sensitivity along with the analysis of the cross-price sensitivity through dummy variable treatment of the exogenous shock is explained in Section 5. This has been done by factoring in petrol and diesel price hike using daily data of earnings and passenger kilometre. This section also documents some of the international and national studies on various aspects linked to railway passenger demand. Apart from econometric explanation of price-demand relationship, a separate segment is added to analytically explain the probabilistic relation linking willingness to pay with age, gender, expenditure etc. A section on count outcome model is also added to explain the preferences for ranking performance indicators by different unit level variables. However, Section 5 is the technical update and skipping the same would not affect the flow and findings of the report. Finally, Section 6 concludes. Annexes compile some of the important data and related indicators linked to the survey.

2. Survey of Potential Rail user Households

To achieve one of the key objectives of the study we have identified urban areas from where bulk of passengers comes to avail the suburban rail services. The household survey was conducted in the catchment area of Mumbai and Kolkata, which account for a significant share of suburban passenger services in this segment. Five suburban stations were identified randomly based on geographical dispersion and importance. In Mumbai, three stations were chosen from Western Railway suburban services while two stations are chosen from the Central Railway section. They are: Borivali (Mumbai suburban district), Virar (Thane district) and Nalasapora (Thane district) from the Western Railway side; and Wadala (Greater Mumbai district) and Kurla (Mumbai suburban district) from the Central Railway side. In Kolkata, the following five stations were identified: Bardhaman (Bardhaman district), Panskura (Medinipur district), Laxmikantapur (South 24 Parganas district), Barrackpur (North 24 Parganas district) and Krishna Nagar (Nadia district), based on geographical dispersion as well as in consultations with the Railway Board officials.

The survey was attempted in two stages. The first stage attempted a general listing. In each of the selected area, we have listed 1000 households to get the proportion of users of service and non-users. It may be mentioned that we could hardly find any non-user of train services in the catchment area of Mumbai. Listing of households was attempted randomly in selected wards (maximum two) of the assigned areas within a radius of 1 to 10 km of the railway station. In the cases where wards are bigger and sufficient to cover the distance range stipulated, we have chosen a single ward, e.g., Wadala and Kurla in Mumbai (see Annex 2 for detailed ward-wise listing pattern).

After the listing, we identified households which are users of the services and a sample of approximately 300 households in each ward was selected randomly to get detailed responses of users to issues relating to train services.

Despite the survey being pilot in nature, we adopted scientific principles to distribute even the small samples for listing and household survey. The final household survey was based on stratification of the listing data. The sampling error of the total listing at 95 per cent confidence intervals stand out to be 2.5 per cent and accordingly the overall sampling error of the household survey is estimated to be 3.96 per cent.

The two cities combined provided us one estimate of the socio-economic profile of the users. The sampling design was based on stratification of the listing data. The survey was conducted during February–March 2012 with the reference period for 2011–12.

Within the stratified range, households were selected randomly through a technical process and accordingly the field investigators carried out the final survey with a structured questionnaire.

Apart from the general profiling of the socio-economic status, the basic objective of the survey was to decipher household perception about willingness to pay, expectation about the quality of services and other travel related factors.

2.1 Households: Profile of the Expenditure Status

The household survey focussed on members of the sample households in the catchment area of the selected centres. The sample households and members need not necessarily be users of train services. The idea was to assess the alternatives people utilise for their transportation needs; the costs they incur; the difficulties they face; the role railways play; and the scope for improvement in services while being able to charge the tariff required to meet the costs.

While analysing the survey results, we apportioned the households in terms of monthly per capita expenditure (MPCE) quintiles. We have also estimated monthly per capita income (MPCI) of the households. However, we used MPCE more often since the coefficient of variation for MPCE is less than that for MPCI. MPCE is arrived at by dividing the reported total yearly expenditure by 12 and the respective household sizes. The reported average yearly expenditure and average yearly income is given in Table 2.1

Table 2.1: Average Yearly Expenditure of the MPCE and MPCI Households

MPCE Quintiles	Yearly Expenditure	Yearly Income
Q1 (Bottom)	39,327.6	47,112.4
Q2	60,438.7	78,530.9
Q3	76,063.9	1,09,826.4
Q4	1,02,867.4	1,56,722.7
Q5 (Top)	1,43,875.7	2,26,029.3
Total	84,484.0	1,23,589.1

It is observed from the Table that average annual expenditure for bottom quintile (Q1) is Rs 39,327.6 as against Rs 143,875.7 for top quintile (Q5). In terms of income, average annual income is Rs 47,112.4 and Rs 226,029.3 for bottom and top quintiles, respectively.

The expenditure on major heads by MPCE quintiles are given in Table 2.2

Table 2.2: Expenditure on Major Heads by MPCE Quintiles

	Food	Medical	Transport	Communication	Education	Fuel & Lighting	Clothing	Festivals	Others
Q1	65.3	6.1	4.5	1.8	2.7	1.5	8.8	3.8	5.5
Q2	49.4	5.5	6.3	7.4	8.4	3.2	8.0	6.5	5.3
Q3	42.6	5.6	6.7	8.4	9.8	6.3	8.1	6.4	6.0
Q4	35.9	5.9	8.4	8.8	11.2	6.4	8.2	7.4	7.8
Q5	28.0	6.7	8.3	9.1	11.8	9.9	7.9	6.9	11.5
Total	**39.1**	**6.1**	**7.4**	**8.0**	**10.0**	**6.7**	**8.1**	**6.6**	**8.2**

Table 2.2 shows that households from the lowest quintiles spend more on basic needs like food and clothing. Their expenditure on food is the highest (65.3%) followed by clothing (8.8%). They spend very less on education, fuel, and lighting and communication. The proportion of expenditure on food goes down with higher quintiles. Middle and upper quintiles spend more on education, transport and communication. The transportation

expenditure is proportionally more for the higher quintile households compared with the lower ones.

NSS 66th round (2009–10) consumer expenditure data reveals the following consumption expenditure pattern for the following comparable items:

Table 2.3: A Comparison of the Household data of NCAER with All-India Results from NSSO

Item groups	NSS 66th Round (% of total expenditure)	NCAER Railway survey of households in the catchment areas of Mumbai and Kolkata (% of total expenditure)
Food	39.2	39.1
Clothing*	6.4	8.1
Fuel and lighting	7.7	6.7
Medical#	5.3	6.1
Conveyance/transportation	6.2	7.4
Education	8.7	10.0
Source: NSS KI (66/1.0): Key Indicators of Household Consumer Expenditure in India, 2009–10, p. 94		

*Clothing includes footwear; # Medical includes institutional and non-institutional facilities

The average transportation expenditure on various modes shows that expenditure on buses is the highest, followed by train, taxi, and others. The spending on air travel is the least, since very few households reported travel by air. It can be seen that households' annual average transport expenditure is Rs 6225.5, which is very low in Q1 (Rs 1771.5) compared to Rs 11907.3 in Q5. Annual expenditure on train shows an increasing trend with MPCE Quintiles. Expenditure on train in Q1 is Rs 413.8 compared to Rs 2437.3 in Q5.

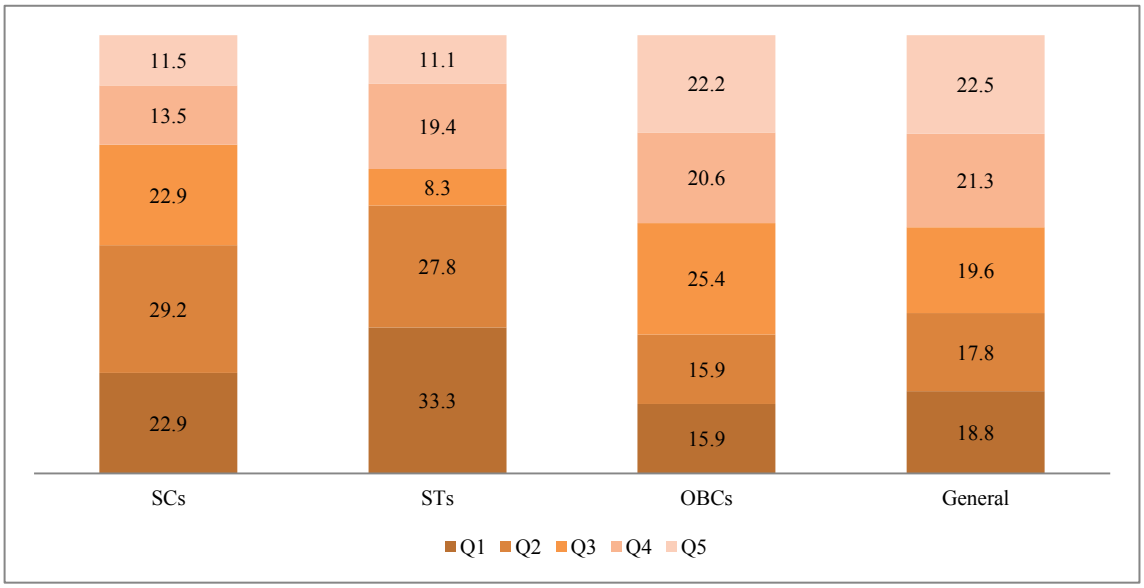
Table 2.4: Distribution of Average Yearly Household Expenditure (Rs) on Various Modes of Transportation by MPCE Quintiles

MPCE Quintiles	Train	Bus	Car	Taxi	Air	Others	Total transport
Q1 (Bottom)	413.8	921.1	0.0	10.0	0.0	426.7	1771.5
Q2	1098.1	1397.1	0.0	428.3	0.0	859.2	3782.7
Q3	1201.7	1727.7	183.3	921.5	69.2	975.0	5078.4
Q4	2174.4	2131.8	779.8	1847.2	256.3	1418.0	8607.5
Q5 (Top)	2437.3	2618.1	1943.3	2720.0	632.5	1556.1	11907.3
Total	1463.9	1758.5	581.0	1184.3	191.5	1046.4	6225.5

2.2 Socio-Economic Profile by MPCE Quintiles

The socio-religious profile revealed through the household survey in the catchment area of Mumbai and Kolkata shows a mixed pattern. In aggregate, 16 per cent of the households belong to SC, 6 per cent to ST, 10.5 per cent to OBCs and 67.4 per cent to the general category. The following figure shows the distribution of quintiles among different social categories. While more of ST belongs to the lowest quintile (33.3%), more of top quintiles belong to the general category (22.5%).

Fig 2.1: Socio-Economic Status of the Households by Quintiles (%)



2.3 Sectoral Engagement and the Work Profile

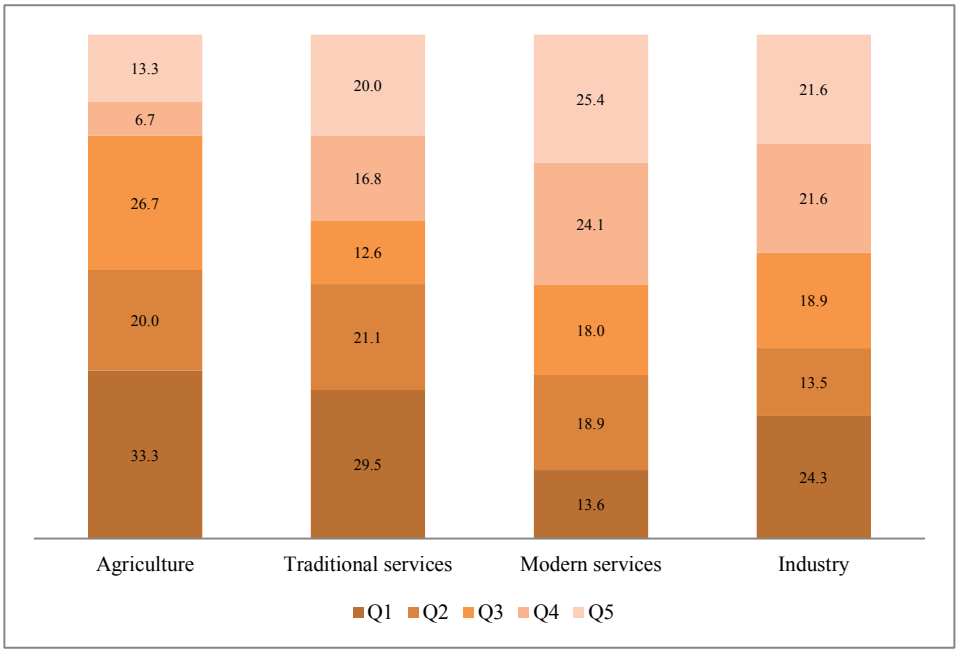
It would be interesting to know the work profile of the households by quintiles. It may be mentioned that the modern sector includes IT, ITES and entertainment, while traditional sector is linked to the activities like trading, artisanship and other forms of traditional work activities. The detailed description is given in the Table below:

Table 2.5: Definition of the Sector of Engagement of the Respondent

Sector	Definition
Agriculture sector	Activities pertaining to agriculture, livestock (dairy, poultry etc.), fishery, and forestry.
Traditional services	Trade, artisanship, etc., for example activities of carpenter, barber, blacksmith, etc.
Modern services	Hotels and restaurants, banking and insurance, computer related activities, legal activity, accounting and book keeping, research and development, public administration and defence, and education and health. Modern service sector in broad sense requires educated and technical people to run the business and aided services such as information technology, education and health, hotel and restaurants, banking, finance, etc.
Industry	Manufacturing, mining, electricity, gas, and water supply units.

Agriculture is seen to be predominant for the lowest quintile, while households belonging to the top quintiles are more engaged in the modern sector.

Fig 2.2: More of Bottom Quintiles in Agriculture while more of Top Quintiles are engaged in the Modern Sector

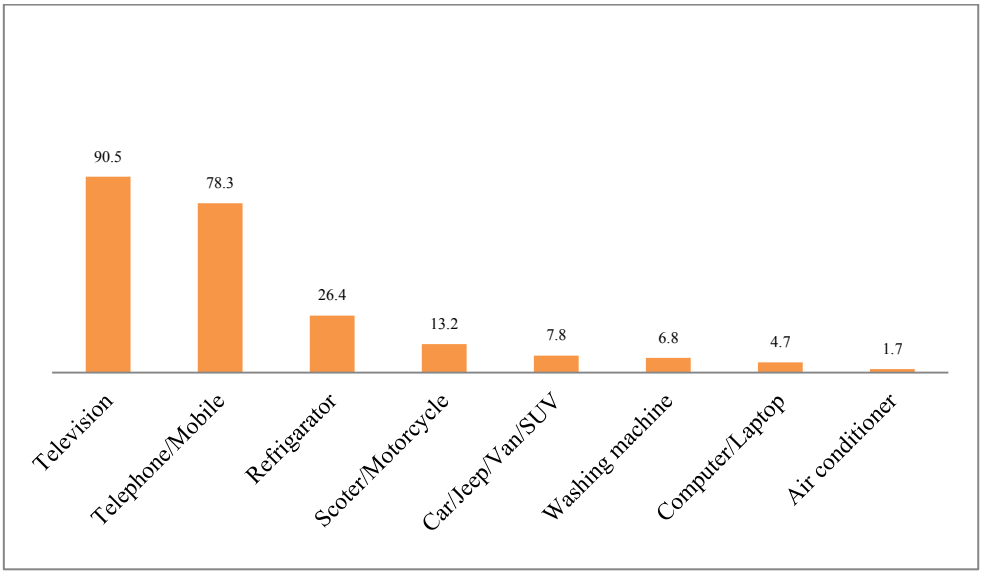


2.4 Asset Ownership Pattern

Accommodation pattern shows that 83.6 per cent of the households have their own house, while 16.4 per cent stay in rented ones.

The aggregate asset ownership pattern of the households is shown in Figure 2.3. Television has the highest penetration (90.5%), followed by telephone/mobile (78.3%).

Fig 2.3: Ownership of Assets (% of Household Owning)



Asset ownership among quintiles too shows a distinct pattern. Television is a dominant product for all the quintiles followed by telephone, AC, computer, and washing machine. Motorcycle and car have 25 per cent of ownership and are mostly concentrated in the higher quintiles (Table 2.6).

Table 2.6: Distribution of the Ownership of Assets by Quintiles of household expenditure

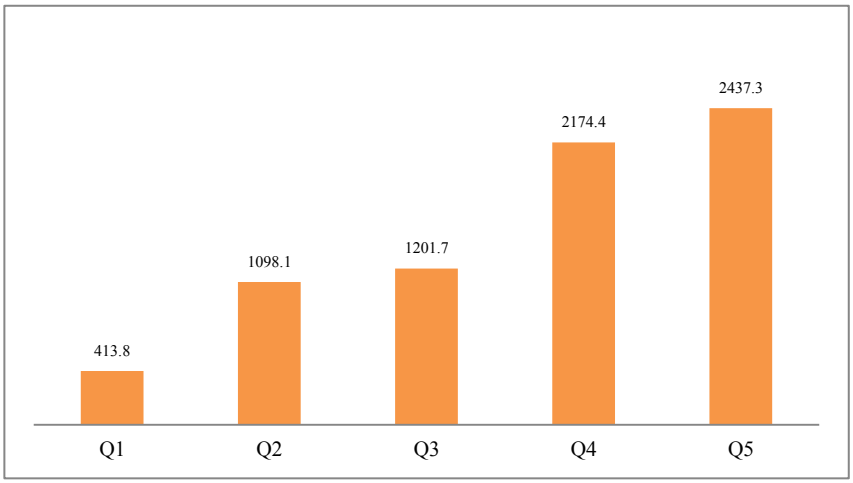
Asset	Q_1	Q_2	Q_3	Q_4	Q_5	Total
Telephone/mobile	64.2	72.5	84.2	82.4	88.3	78.3
Scooter/motorcycle	4.2	6.7	11.7	17.6	25.8	13.2
Washing machine	0.0	0.8	2.5	9.2	21.7	6.8
Refrigerator	8.3	10.0	21.7	40.3	51.7	26.4
Car/van/SUV	0.0	0.0	3.3	10.9	25.0	7.8
Air conditioner	0.0	0.0	0.0	2.5	5.8	1.7
Computer	0.0	0.0	0.8	9.2	13.3	4.7
Television	85.8	90.0	92.5	89.1	95.0	90.5

2.5 Travel Demand: Substitution with Other Mode, Purpose, and Frequency

The findings of the households' survey contours various aspects related to demand for travel by train and other modes and their general opinions linked to willingness to pay higher fare for railway travel and the quality of service.

It has been observed that train travel is one of the dominant modes of transportation and households spend around Rs 1464 on an average for transportation by train in a year at 2011–12 prices. Apart from the general distribution by locations, we have also apportioned household MPCE in quintiles. Q1 shows the lowest 20 per cent of the expenditure group, while Q5 is the highest 20 per cent of the expenditure group. The average spending by quintiles, however, differs and is shown in Figure 2.4.

Fig 2.4: Ownership of Assets (% of Household Owning)



It may be observed that higher spending on train travel is done more by households in the higher MPCE quintiles.

It would also be interesting to see the link between train and bus travel. It is known that train travel is cheaper and better and almost indispensable among the lowest quintiles households. However, buses are equally important and the second-best option given the fact that these days long-distance bus services are available relatively at cheaper rates and its connectivity is more compared with the availability and the frequency of the train services at regular intervals. The current survey has shown a very clear trajectory of substitution when compared with MPCE quintile clusters for both train and bus services. The monthly per capita expenditure on train services have been apportioned in terms of quintiles. The lowest quintiles show the lowest 20 per cent of the expenditure on train services while the highest quintile shows the highest one. Similarly the monthly per capita expenditure on bus services too has been apportioned in terms of bus quintiles. The lowest bus quintiles denote the lowest 20 per cent of the MPCE bus expenditure and it goes on increasing. The relation between train and the bus quintiles are shown in Table2.7.

Table 2.7: Distribution of Respondents by Expenditure class and Mode of Transport (%)

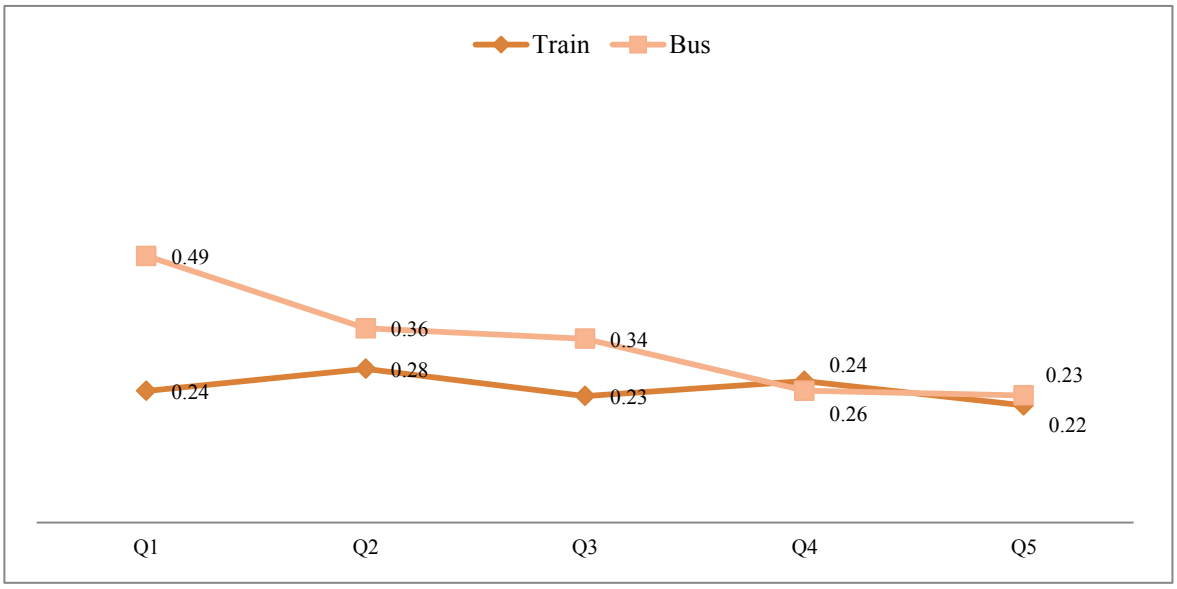
Train Quintiles	MPCE_Bus Q1	MPCE_Bus Q2	MPCE_Bus Q3	MPCE_Bus Q4	MPCE_Bus Q5
MPCE_Train Q1	49.6	28.1	18.2	3.3	0.8
MPCE_Train Q2	30.8	36.7	20.8	10.0	1.7
MPCE_Train Q3	11.5	24.6	23.0	30.3	10.7
MPCE_Train Q4	1.6	9.0	14.8	45.9	28.7
MPCE_Train Q5	0.9	6.1	13.2	30.7	49.1

The MPCE bus quintile as per cent share for the total of train MPCE quintile shows high concentration in the diagonal common quintiles and decreasing otherwise. For instance, concentration of low with low and high with high shows high degree of substitutability

between the options for households at the similar spending strata. Higher MPCE train quintiles have lower share in the lowest MPCE of the bus quintiles and vice versa.

A more general viewpoint may be observed if we consider the proportional expenditure on train and bus to total transport expenditure by quintiles. While spending proportion for train is almost stable, the spending proportion of bus is observed to go down from lower quintiles to higher ones.

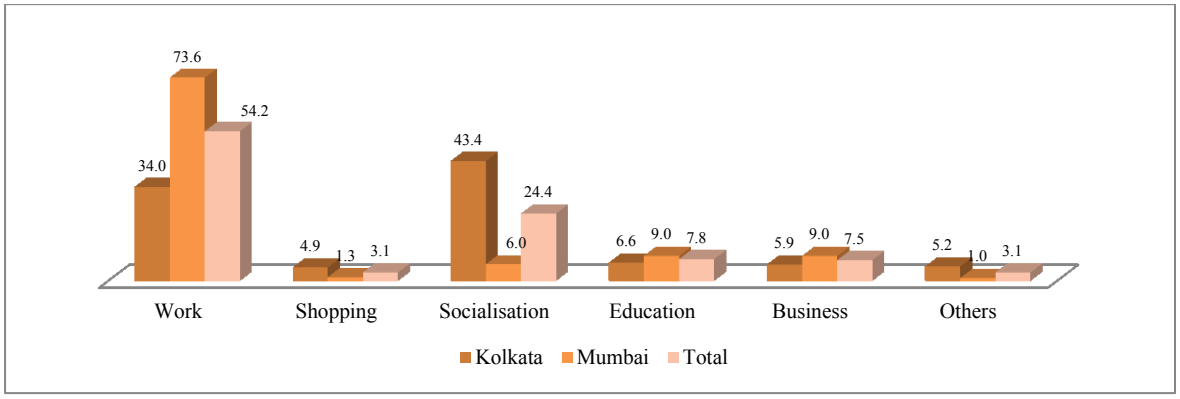
Fig 2.5: Proportion of Expenditure on Train and Bus to Total Transport Expenditure by MPCE Quintiles



As already mentioned, railway travel is one of the dominating modes as 98 per cent of the household/family members travelled by train during 2011–12.

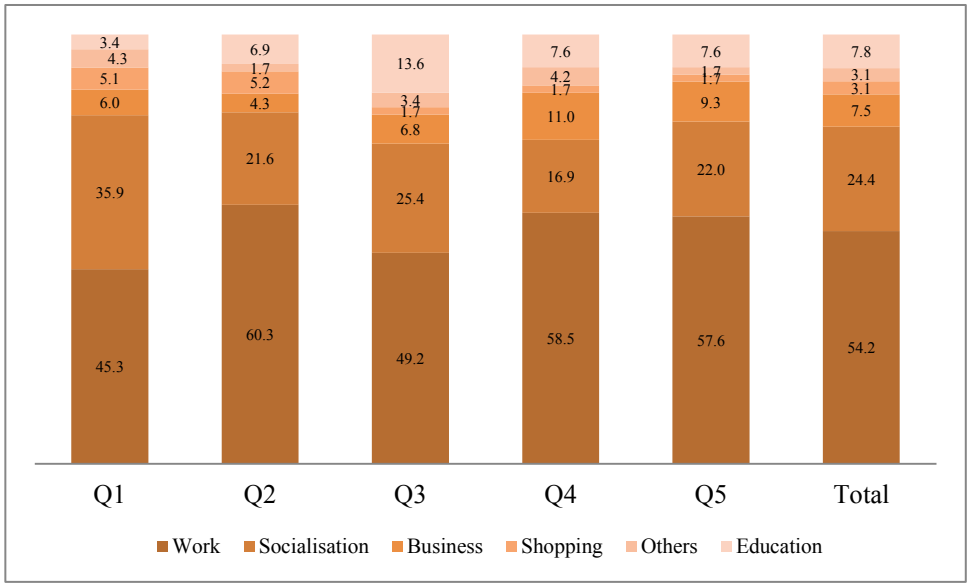
The response related to the purpose of travel shows that work related travel dominates the overall travel demand of the sample households. In Mumbai, work related travel is 74 per cent, while in Kolkata it is 34 per cent. Among the purposes, socialisation comes next with Kolkata dominating the scenario (43%). In all, 24.4 per cent travels to meet friends, relatives or attend social/religious functions. Education and business are the next important purposes but much lower in importance than work or socialisation.

Fig 2.6: Distribution (%) of Respondents by Purpose of Travel by Places



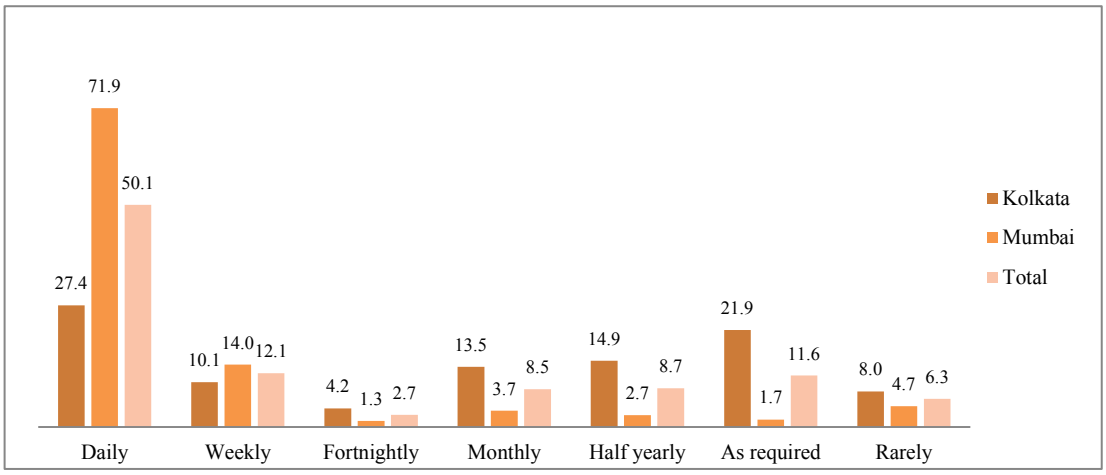
The quintile distribution of travel purpose shows households belonging to the upper quintiles (58 and 59 per cent respectively for $Q_5$and Q_4) undertake work-related travel more than their lower counterparts. On the other hand, the lower quintile households travel most (36%) for socialisation (meeting friends / relatives / attending social / religious functions, etc.) purpose.

Fig 2.7: Distribution (%) of Respondents by Purpose of Travel by MPCE Quintiles



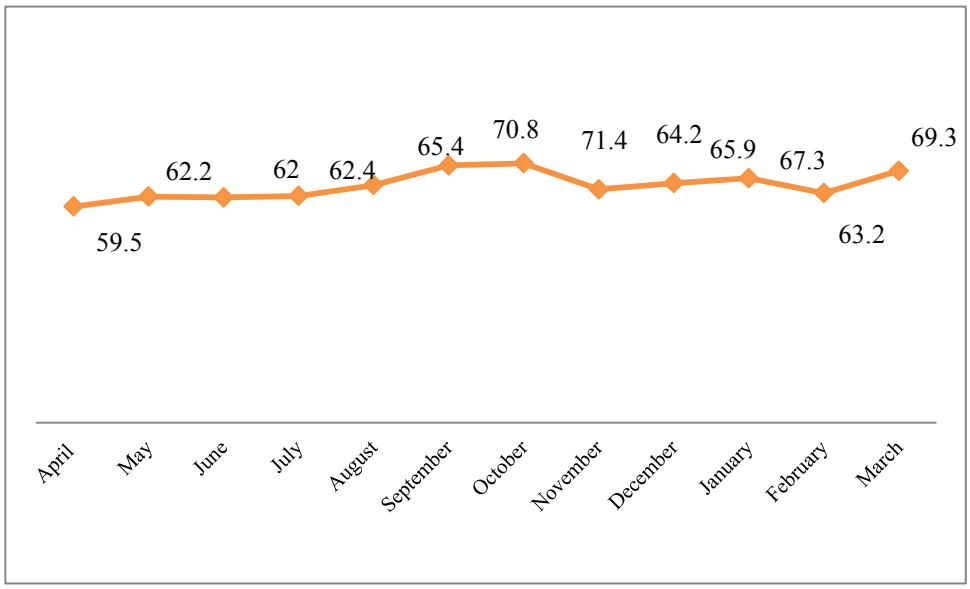
The frequency of travel shows that members of the households undertake mostly daily travel by train in Mumbai (72%), while it is far less in Kolkata (27.4%). Combining both on averages, the daily travel is little over 50 per cent, followed by weekly travels. Travel as per requirement stand out to be around 12 per cent. All these facts points out the dominant presence of IR among the households in the catchment area of two of the busiest suburban centres of the country.

Fig 2.8: Distribution (%) of Respondents by Frequency of Travel by Places



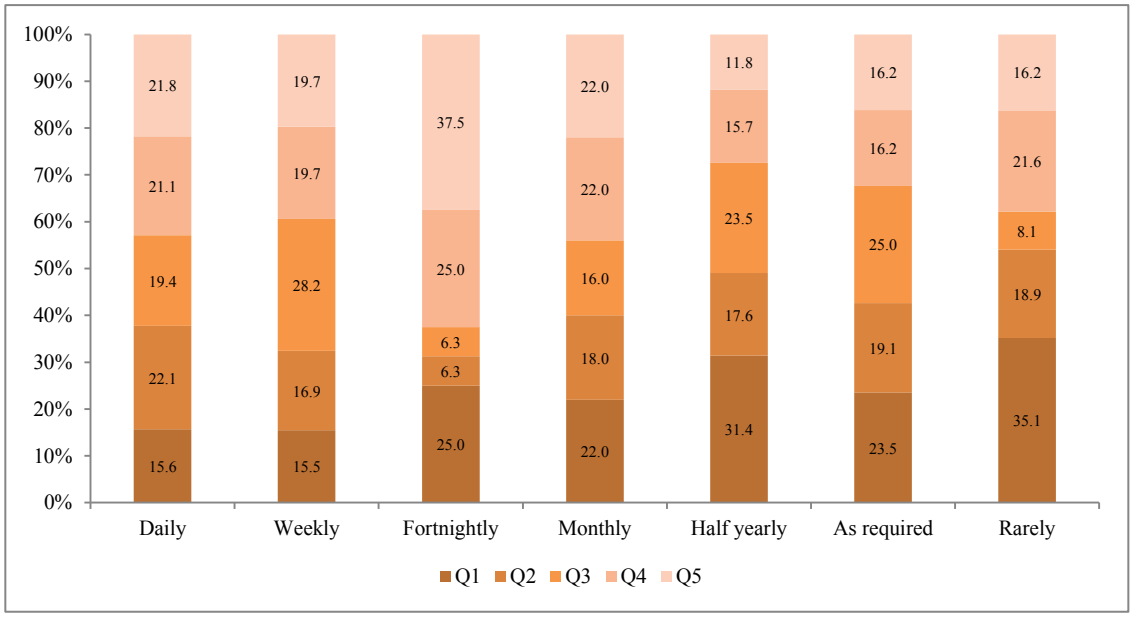
The seasonality of travel varies from month to month. It is observed that 71.4 per cent household revealed highest frequency of travel in October, followed by September (70.8%). The lowest frequency can be observed in April (59.5 %).

Fig 2.9: Distribution (%) of Respondents by Seasonality of Train Travel by the Sample Households (Reference Year 20011-12)



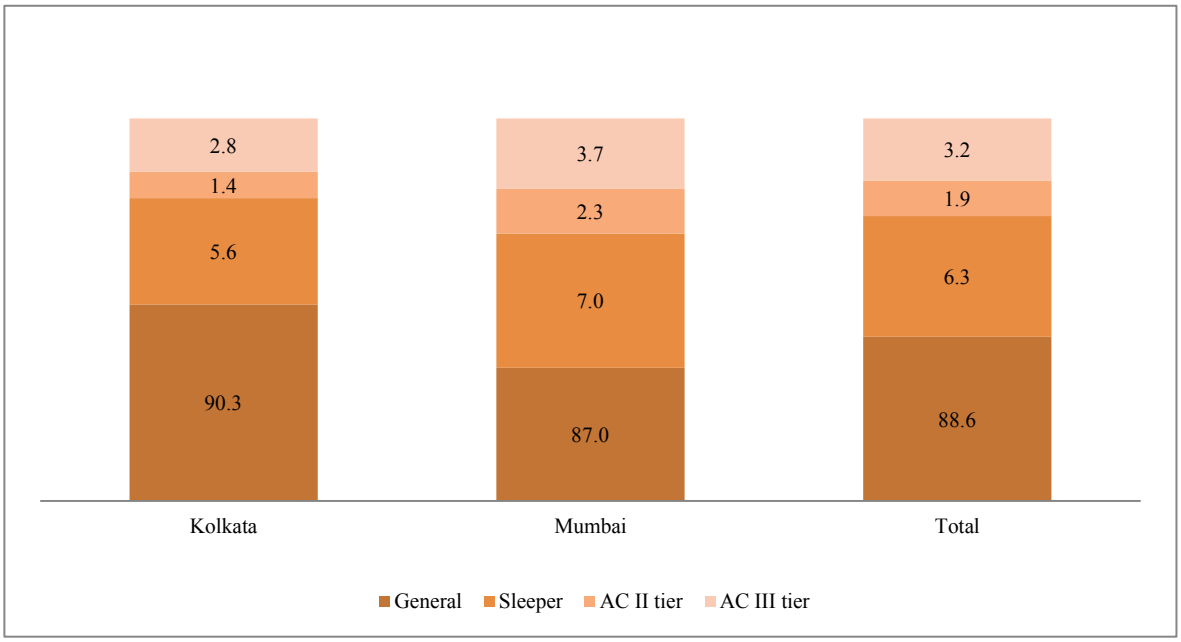
Distribution of the respondents in terms of the frequency of travel by quintiles shows that daily travellers are less in Q1 and the proportion goes up for the other categories of infrequent travels.

Fig 2.10: Distribution (%) of Respondents by Frequency of Travel by Quintiles



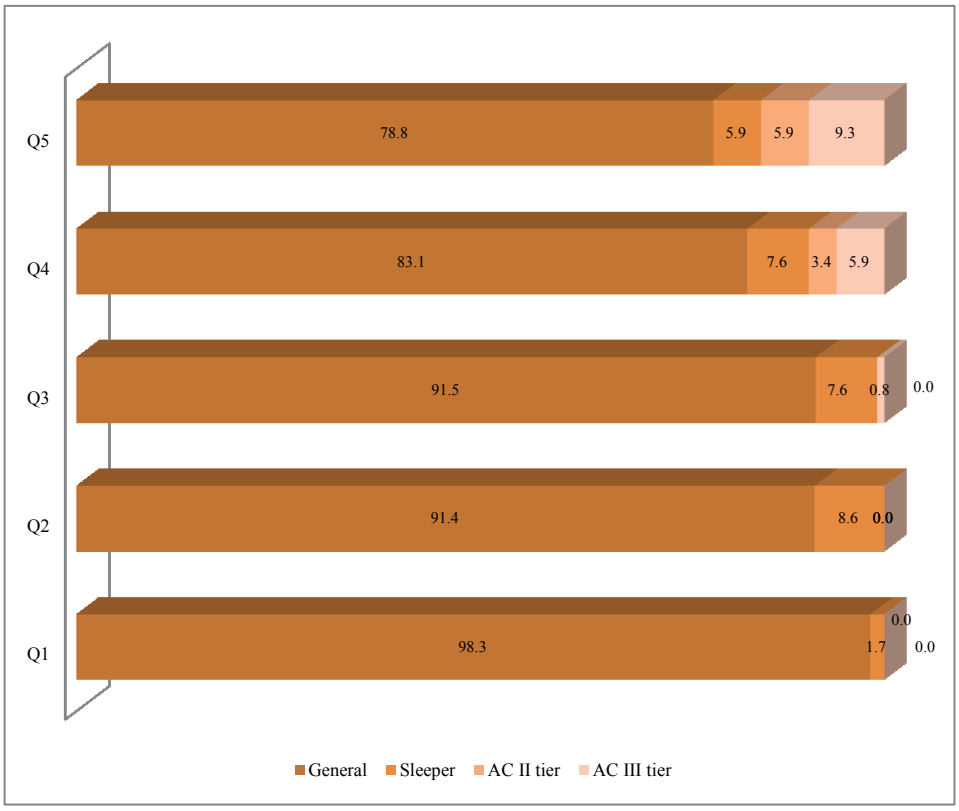
Distribution of the classes of travels by train shows that most of the family members take ordinary/general class (89%), followed by sleeper (6%), AC III tier (3%) and AC II tier (2%), respectively. By places, households from Kolkata avails general class travel more than Mumbai (over 90% against 87%), while in other categories of travel, Mumbai is ahead of Kolkata.

Fig 2.11: Distribution (%) of Passengers by Classes of Travel



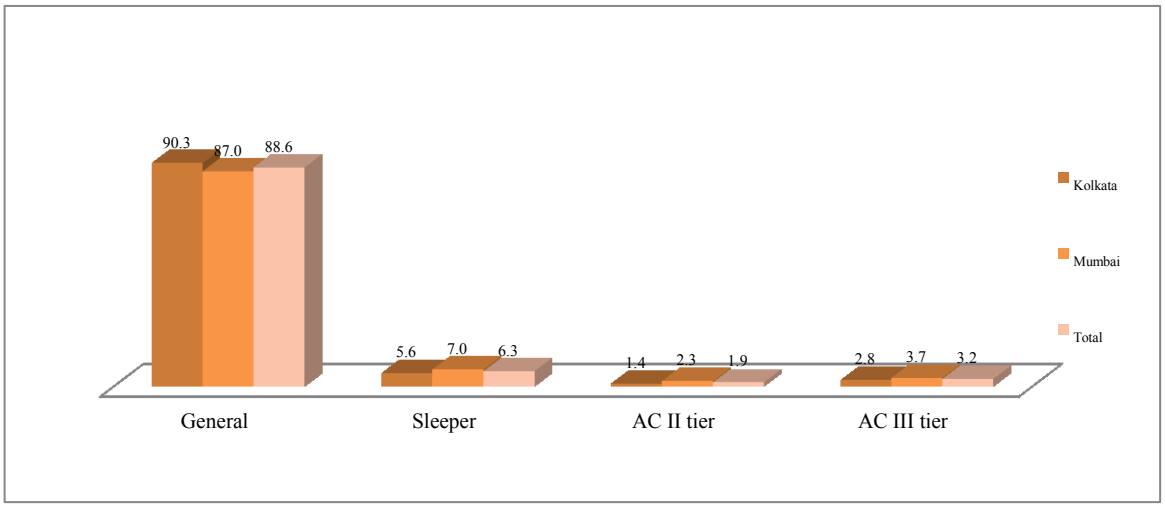
In MPCE quintiles, the distribution of travel by classes is as follows (Figure 2.12).

Fig 2.12: Distribution (%) of the Classes of Train Travel by MPCE Quintiles



The distribution clearly shows that lower quintiles households seldom travel by AC class, while only 1.7 per cent of them travel by sleeper class. On the other hand, 6 per cent households in Q5 travel in AC II tier and over 9 per cent travel in AC III tier. Both Q3 and Q4 have almost equal share for travellers by sleeper Status (7.6%).

Fig 2.13 Distribution (%) of Respondents by Class in which the Family Members usually Travel

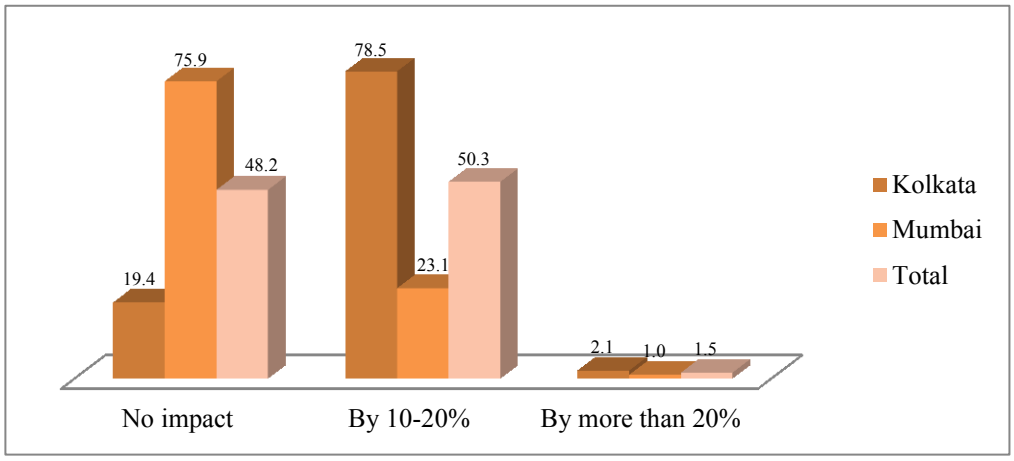


Distribution (%) of Respondents by Class in which the Family Members usually Travel

2.5.1 Travel Demand and Willingness to Pay: A Detailed Scrutiny

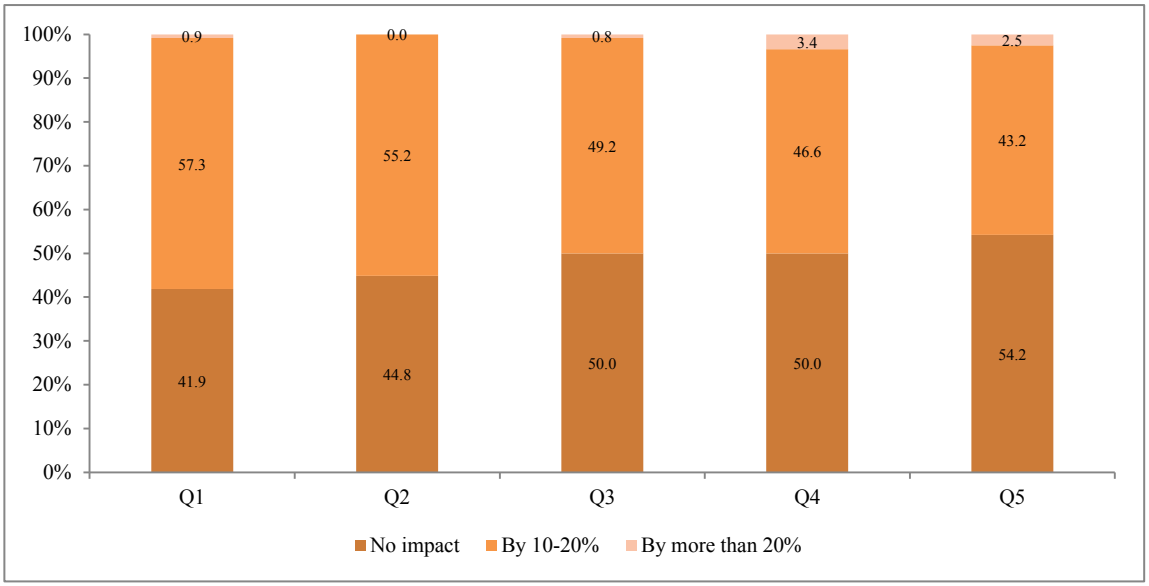
The travel demand of the sample households by train is high and the response linked to their willingness to pay more for the services provided by IR are varied and sometimes mutually inclusive. The analyses of the sample response shows that when train tickets are not available, more than 50 per cent of the commuters are affected and the journey expenditure goes up by 10 to 20 per cent. The impact on journey expenditure when train services are not available is depicted below. It is interesting to take note of the variation in terms of the responses of the households by places. In Kolkata, non-availability of the train services enhances the cost of travel by 10 to 20 per cent while in Mumbai, only 23 per cent of the households accept the same.

Fig 2.14: Impact on Journey Expenditure when Train Tickets are not available (%)



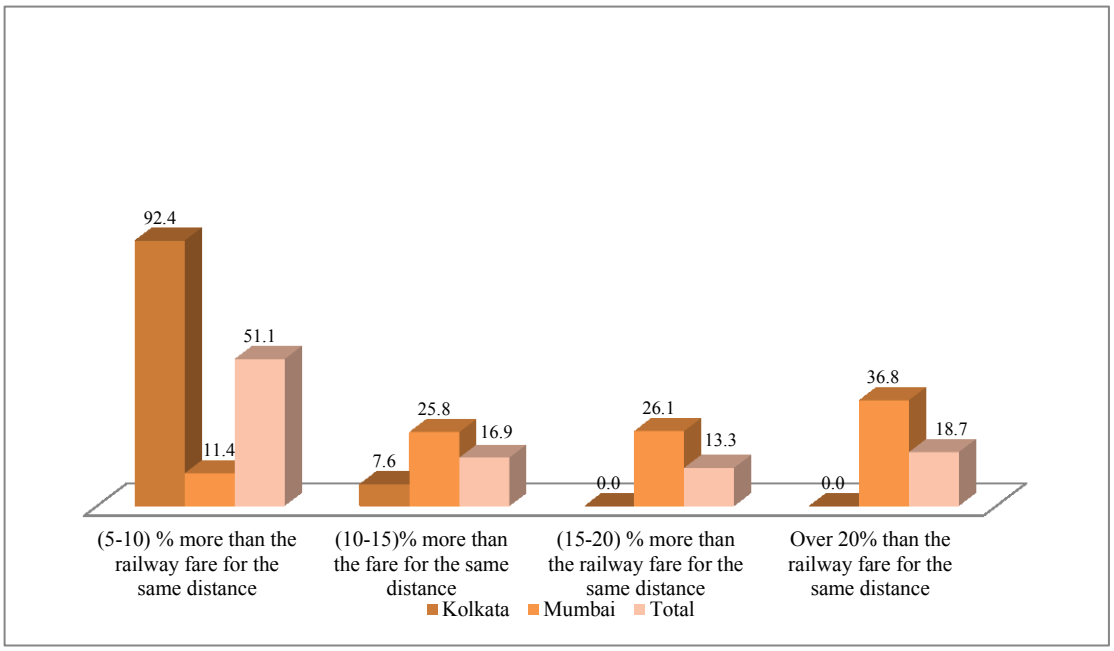
The impact on journey expenditure by quintiles when train tickets are not available shows that it hurts more the lowest quintile households (58%) than the upper ones. Non-availability of train tickets creates least impact (Figure 2.15) for Q5 (43.2%).

Fig 2.15: Impact on Journey Expenditure (% percentage over the present situation), when Train Tickets are not available



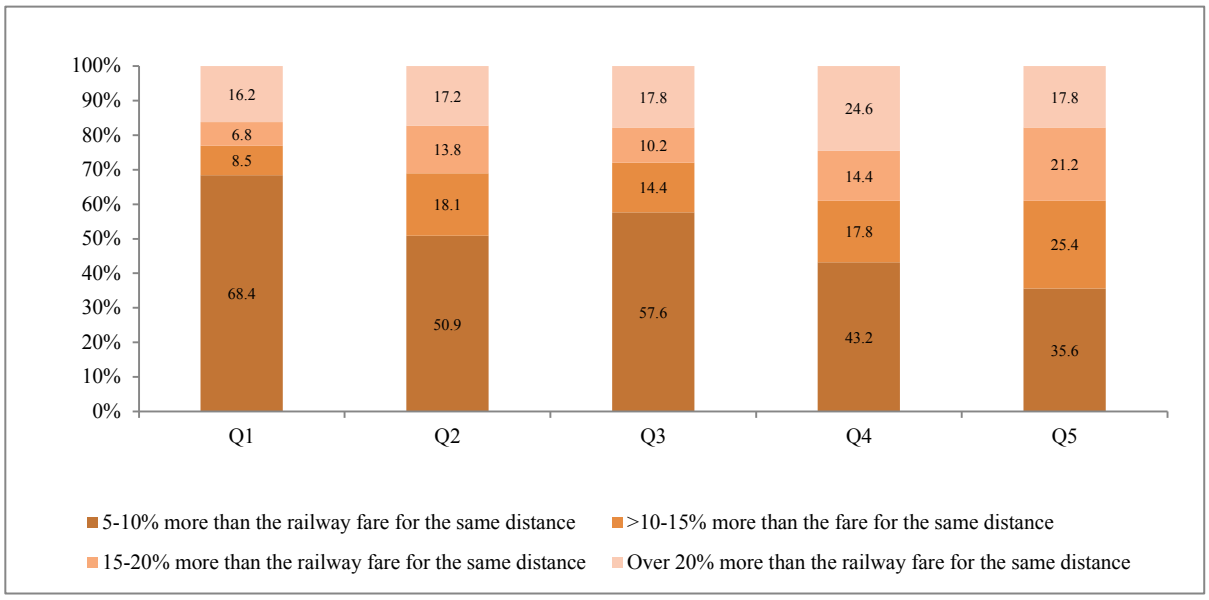
Put differently, the general expenses on travel go up in proportion for almost all the travellers and significantly, 49 per cent says that the expenses go up by more than 10 per cent when train services are disrupted.

Fig 2.16: Increase in Travel Expenditure when Train Services are disrupted (% over the present situation)



Disruption of train services affects journey expenditure cutting across MPCE quintiles. For households from the lowest quintiles 68.4 per cent pay 5 to 10 per cent more than the railway fare to travel the same distance, while 25 per cent of Q4 households pay more than 20 per cent for travelling the same distance. The expenditure variation is more pronounced for upper quintiles as more modes of transportation are affordable for them.

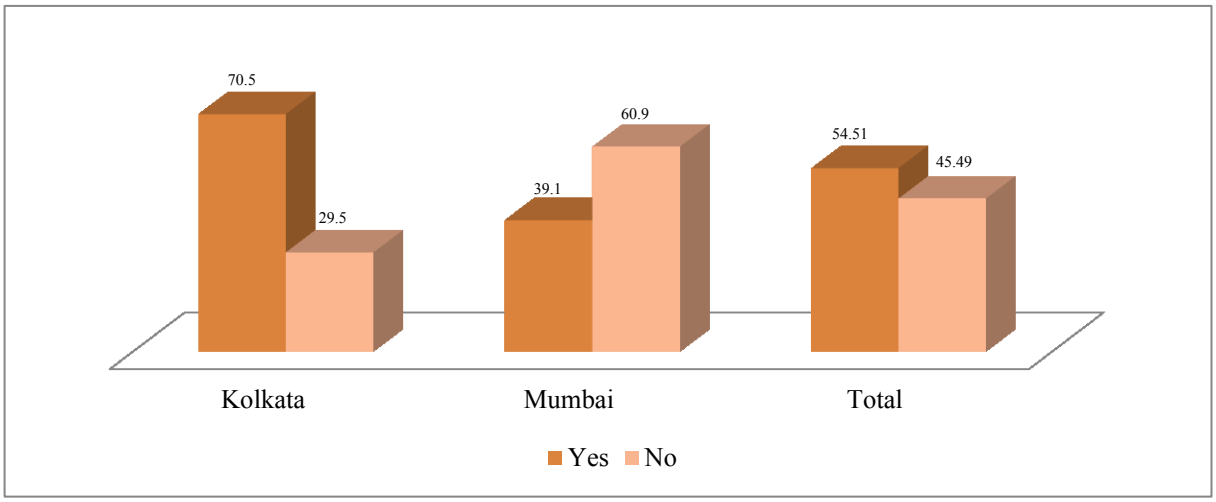
Fig 2.17: Distribution (%) of Respondent by Impact on Journey expenditure (by MPCE Quintiles) when Train Services are disrupted (% over the present situation)



It is also revealed that majority of the households (55%) are ready to shell out more for a reduced journey time and faster trains. By location, the sample shows that around 71 per cent

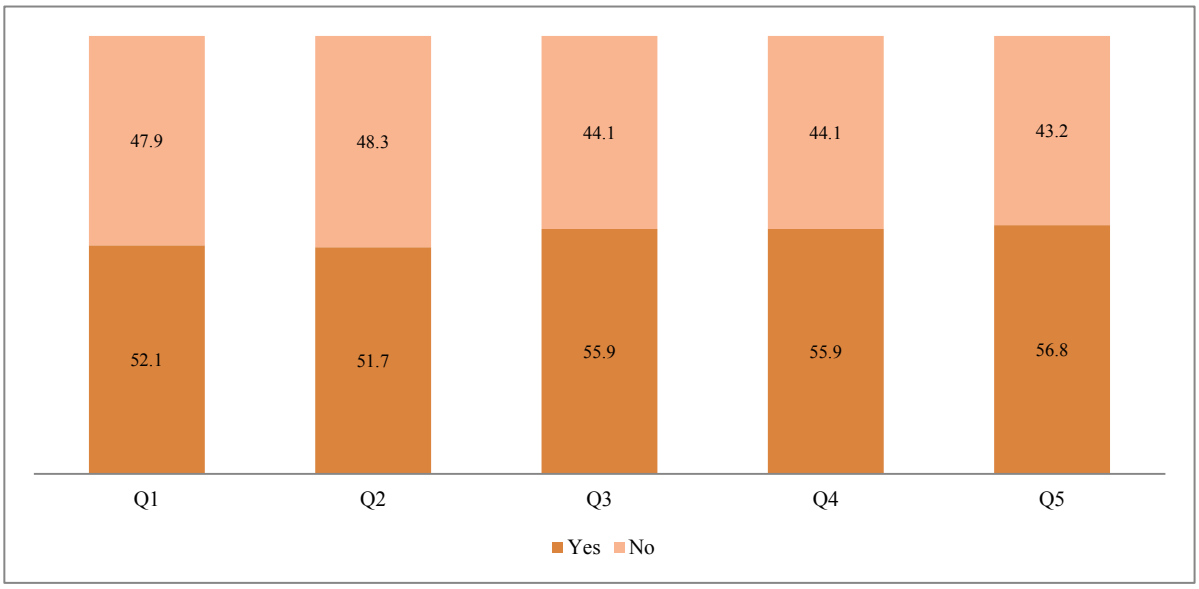
of households in Kolkata are willing to pay more, but only 39 per cent of households in Mumbai favour the same.

Fig 2.18: Distribution (%) of Respondent by Willingness to Pay for Faster Train Service and Reduction of Journey time by 10-20%



In MPCE quintiles, the proportions are as follows:

Fig 2.19: Distribution (%) of the Respondents by the Readiness to pay more for Faster Train Travel by MPCE Quintiles

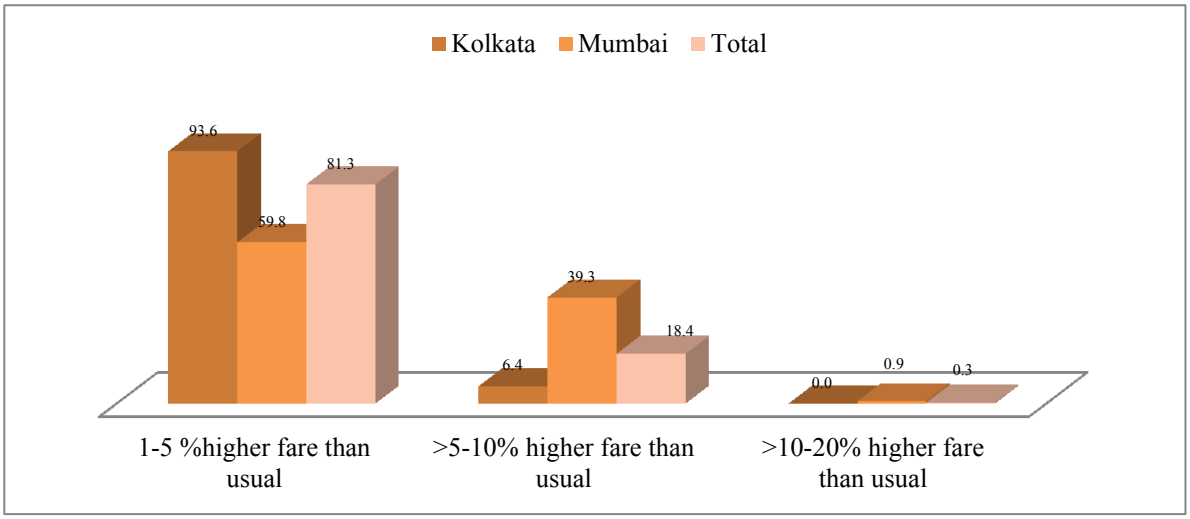


It may be noted that even for the lowest quintile, the readiness to pay is more than 52 per cent for quicker train services, while 56 and 57 per cent, respectively, of Q4 and Q5 are ready to pay more.

Among those who are affirmative on the readiness to pay, more than 81 per cent are willing to pay around 5 per cent higher fare than usual, while more than 18 per cent are ready to shell out 5 to 10 per cent higher fare than the existing one. In Kolkata, 94 per cent of the

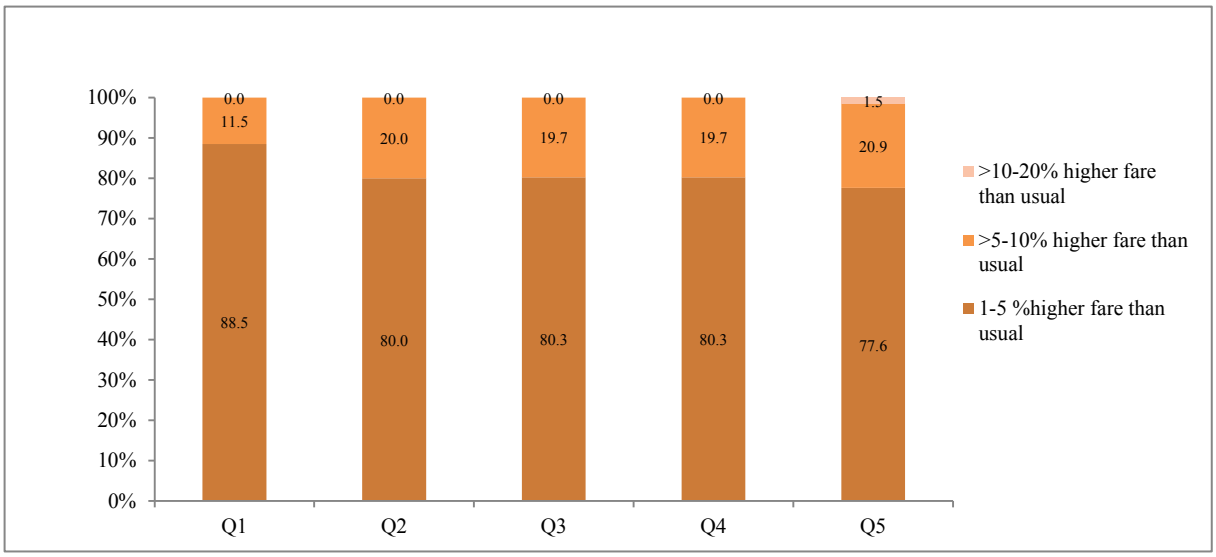
households favour hike in fare by 1 to 5 per cent, but 39.3 per cent of households in Mumbai favours 5 to 10 per cent increase in fare. On the other hand, only 1 per cent of the sample households favoured 10 to 20 per cent hike in fare.

Fig 2.20: Distribution (%) of the Respondents by the Extent to which the Travelling Households Agree for Higher Fare



Among quintiles, majority of the respondents favour 1 to 5 per cent increase in fare. While 1.5 per cent of Q5 is ready to pay more than 10 per cent of the existing fare, 21 per cent of the households from Q5 are willing shell out 5 to 10 per cent increase in fare.

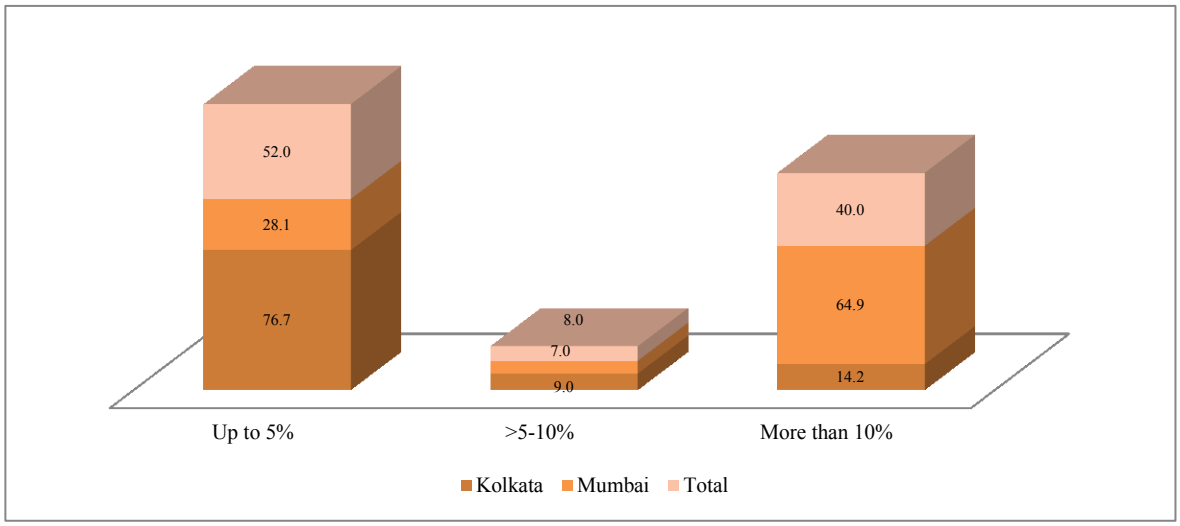
Fig 2.21: Distribution (%) of the Respondents by Degree of Willingness to pay for 10-15% quicker Train Services by MPCE Quintiles



Distribution of willingness to pay for overall betterment of train services show that around 77 per cent in Kolkata are willing to pay up to 5 per cent more than the usual fare, while only 28 per cent of the sample households in Mumbai agree to that. Overall 52 per cent of the sample households are willing to pay 5 per cent more than the existing fare. Only 8 per cent in average agree for 5 to 10 per cent increase in fare but it is extremely important to note that 40

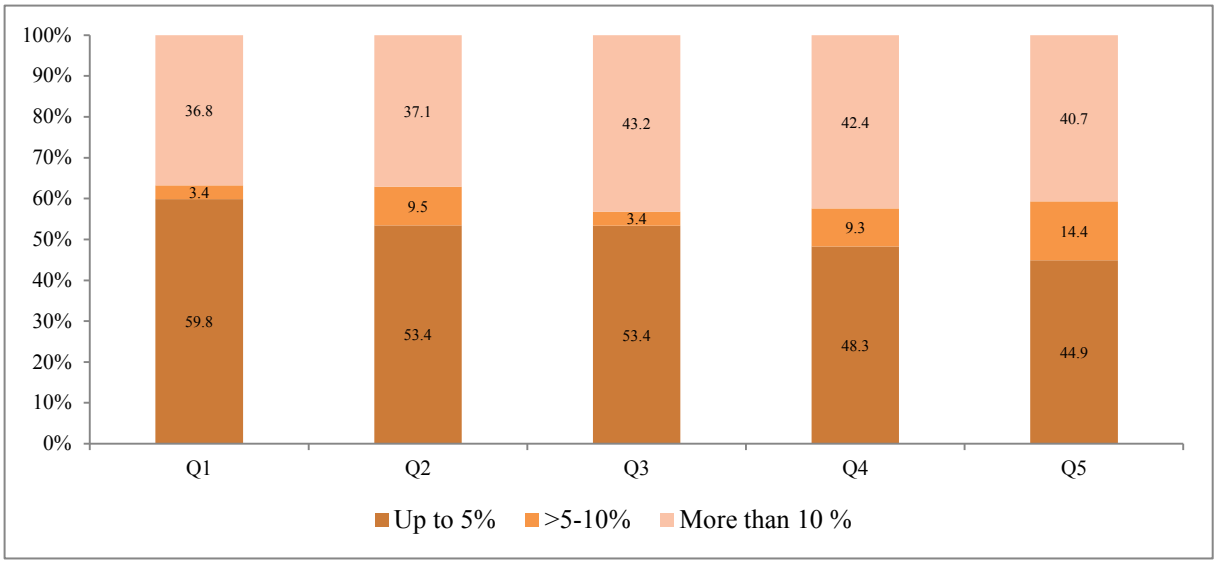
per cent of the sample households are ready to spend even more than 10 per cent for the overall betterment of train services (Figure 2.22).

Fig 2.22: Distribution (%) of the Respondents by Willingness to pay for Overall Betterment of the Train Services



Distribution of the overall willingness to pay by MPCE quintiles clearly shows that while 60 per cent of the lowest quintile households prefer 5 per cent hike in railway fare, around 41 per cent of the highest quintile households prefer fare to be raised even more than 10 per cent for better services (Figure 2.23).

Fig 2.23: Distribution (%) of the Respondents by the Willingness to pay for Better Train Services by Quintiles



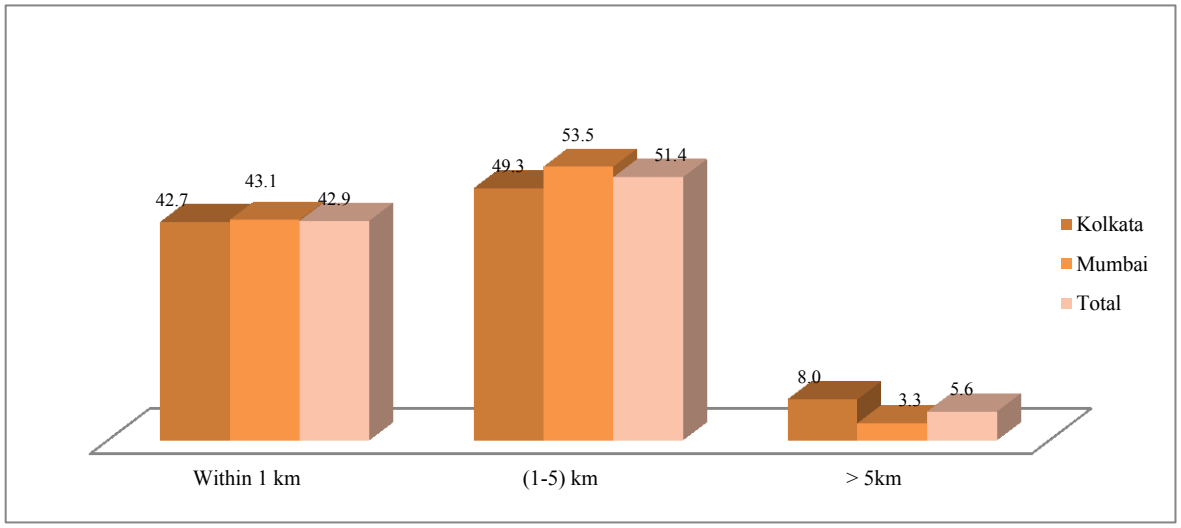
2.6 Travel Demand: Related Indicators

2.6.1 Distance to the Railway Station

One of the important indicators of the provision of facility by IR is the distance of the nearest railway station from the households. We have observed that over 51 per cent of commuters

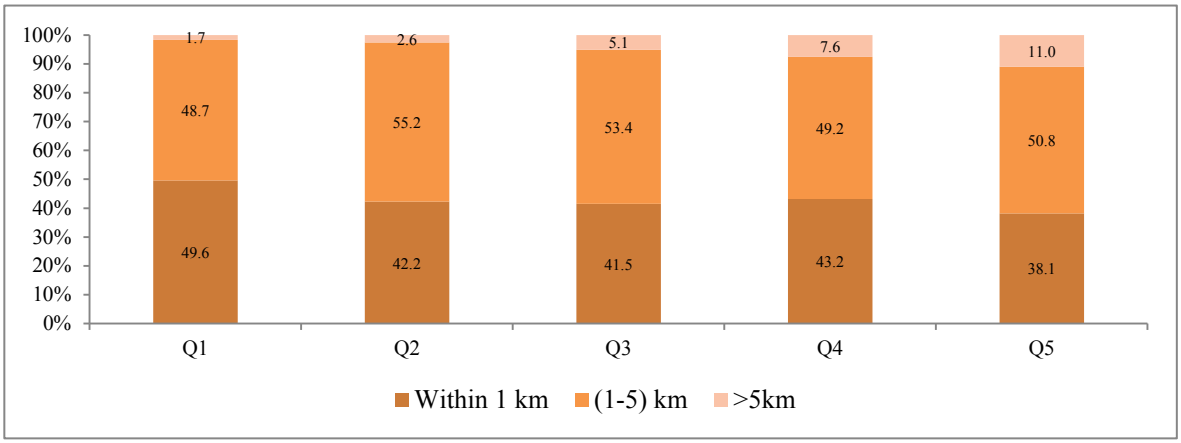
cover 1 to 5 km to reach the nearest railway station, while around 6 per cent cover more than that (Figure 2.24).

Fig 2.24: Distribution (%) of Respondents by Distance to the Nearest Railway Station



The observation on the distance to the nearest station shows that approximately 8 per cent from Q4 covers more than 5 km to reach the nearest railway station, while around 11 per cent from Q5 travels the same.

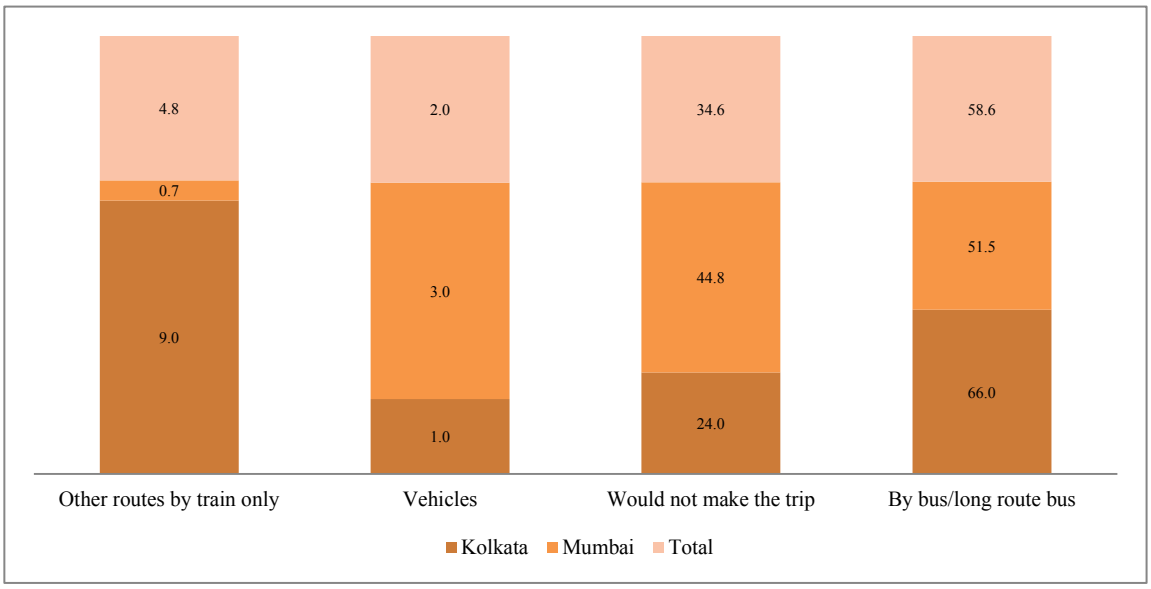
Fig 2.25: Distribution (%) of Respondents by Distance to the Nearest Railway Station by MPCE Quintiles



2.6.2 Extent of Substitution to Other Modes

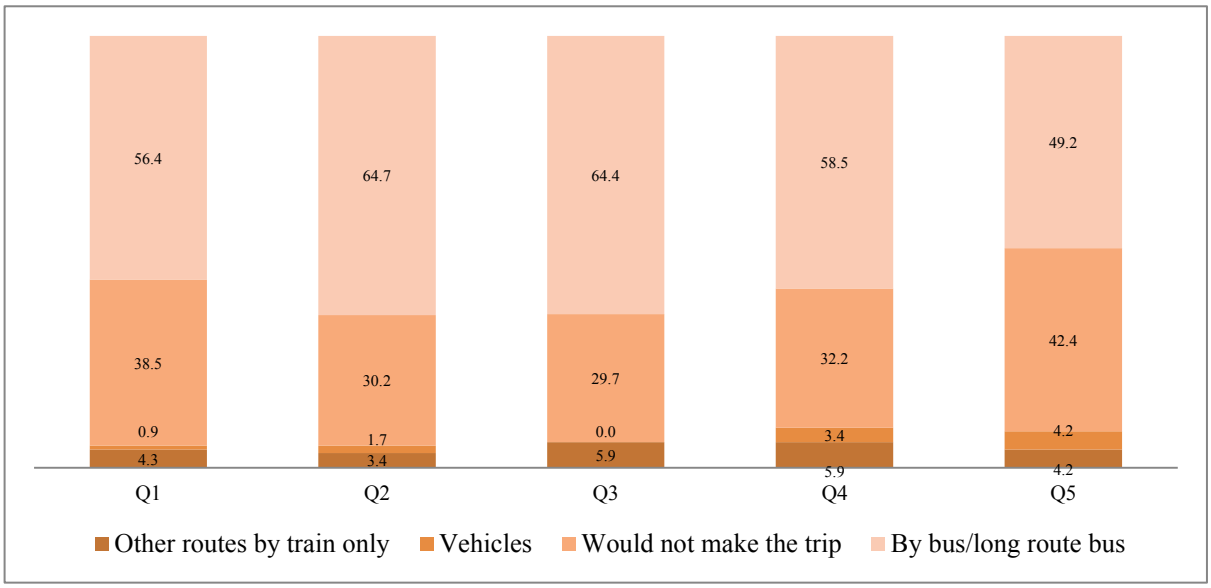
It is also interesting to note the degree of substitutability with other modes of transport when train services are disrupted. During such an event, around 35 per cent of the households prefer to stay back, while around 59 per cent of the households avail bus. Only 5 per cent try to take diverted routes by train and 2 per cent use own other vehicles. Bus is the preferred substitution both in Mumbai and Kolkata, but the substitution intensity is observed to be more in Mumbai than in Kolkata (66% compared to 52%).

Fig 2.26: Distribution (%) of Respondents by Utilisation of Other Modes when Train Services are disrupted



The degree of substitutability by bus is more for households belonging to Q2 and Q3, followed by Q4 and Q1. A little over 42 per cent of households from the top quintiles prefer to stay back, while more than 49 per cent undertakes travel by bus. Travel by own or other vehicles is the highest by Q5 (4.2%), followed by Q4 (3.4%)).

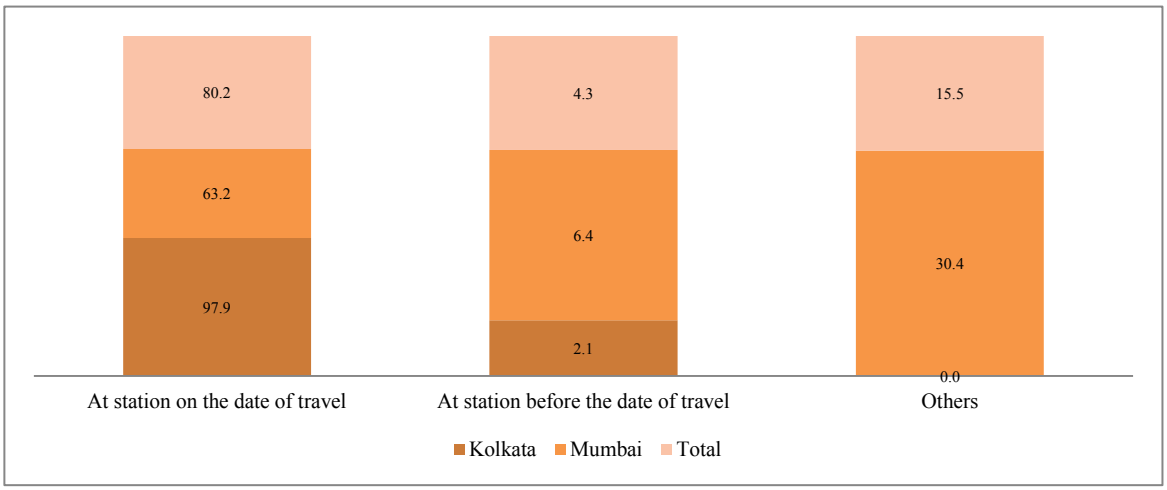
Fig 2.27: Distribution (%) of the Respondents by Degree of Substitutability of Transportation Modes when Train Services are disrupted (by Quintiles)



2.6.3 Purchase of Train Tickets

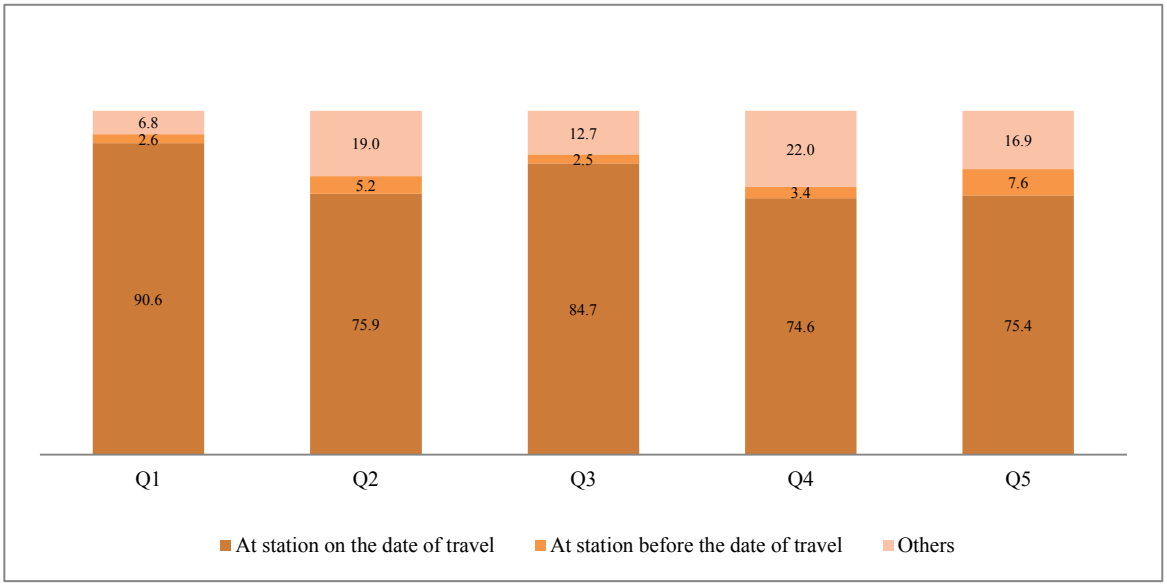
Purchase of train tickets shows a mixed pattern. While a little over 80 per cent households purchase train ticket on the date of travel, only 4 per cent household purchase tickets in advance. On an average 15.5 per cent households procure tickets by other means, such as e-ticketing (Figure 2.28).

Fig 2.28: Distribution (%) of Respondents by the Purchase of Train Tickets: Mixed Pattern



It may be observed that 91 per cent households from the lowest quintiles purchase train tickets on the day of travel, while for other quintiles, this percentage is less (Figure 2.29).

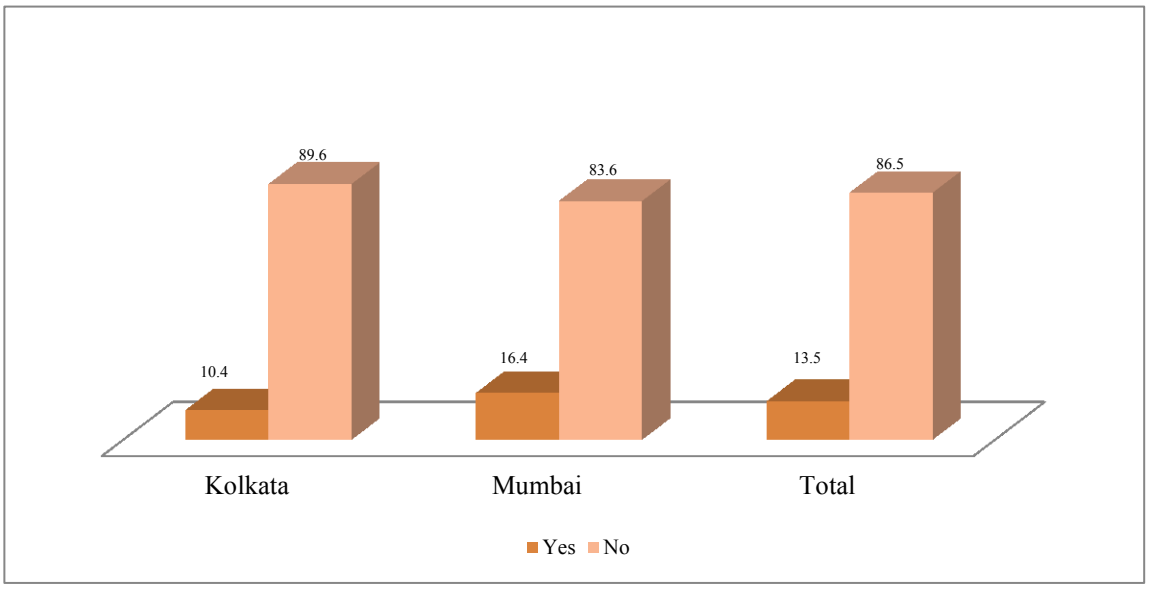
Fig 2.29: Distribution (%) of the Purchase of Train Tickets by Quintiles



2.6.4 Use of Internet

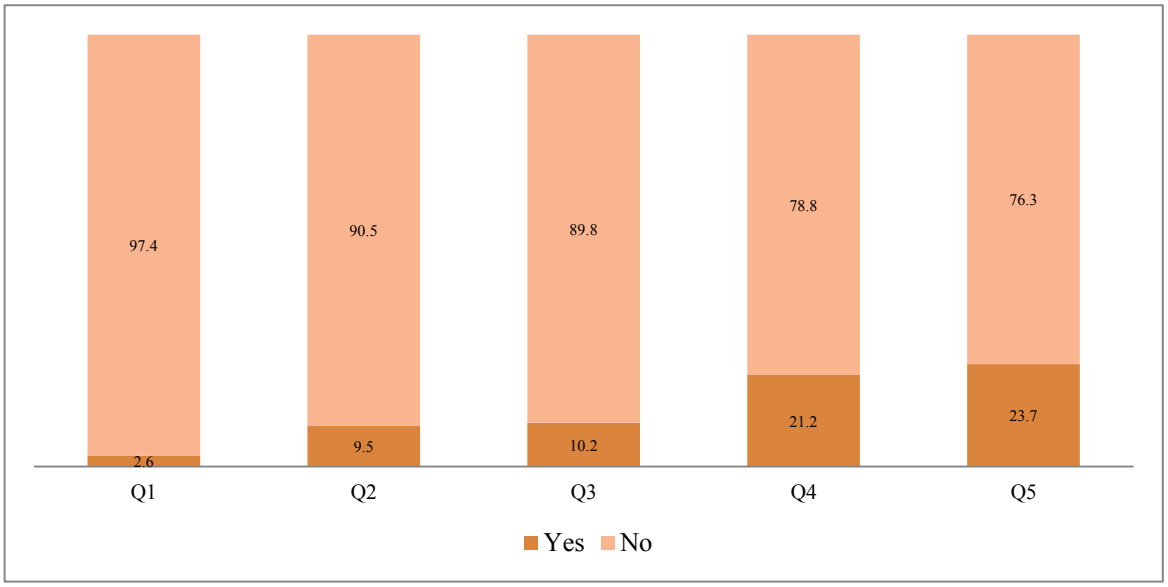
Use of Internet to purchase train ticket is still very low as per the present survey. It is observed that 86.5 per cent household remain away from the Internet facility. By location, use of Internet to purchase train tickets is more in Mumbai (16.4%) than in Kolkata (10.4%) (Figure 2.30).

Fig 2.30: Distribution (%) of the Respondents by Use of Internet to Purchase Train Tickets



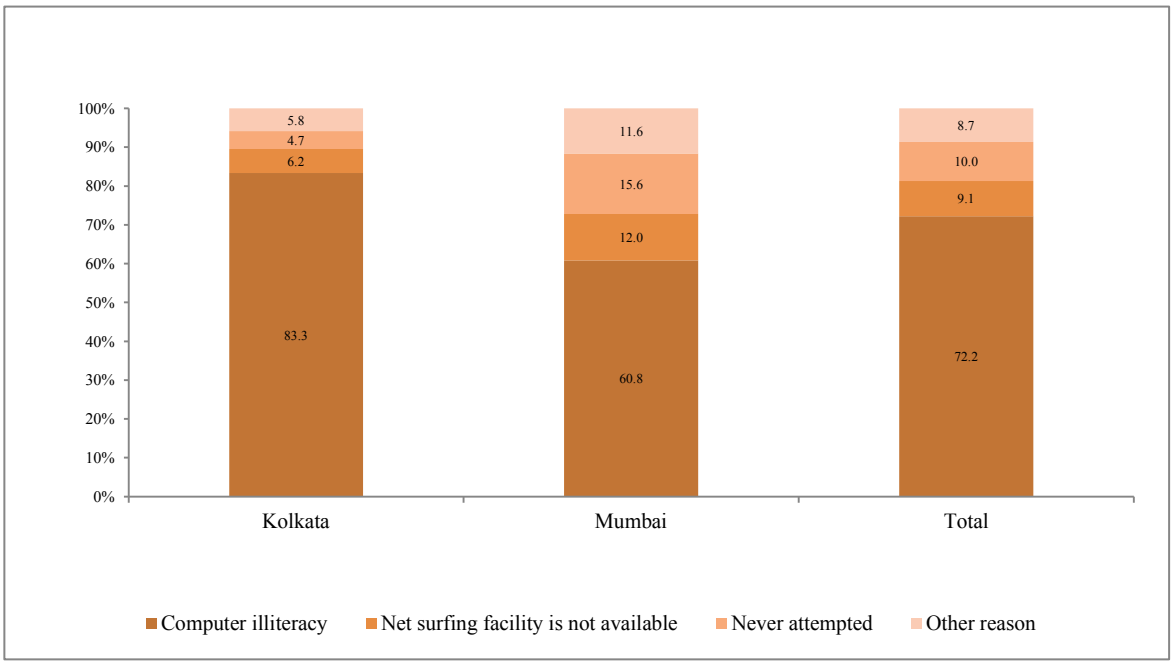
Overall 13.5 per cent uses Internet for booking railway tickets. It is interesting to note that Internet users increase with increase in MPCE quintiles. It is observed that top MPCE quintile groups have the highest representation (23.7%) in this regard compared to the lowest MPCE quintiles (2.6%) (Figure 2.31).

Fig 2.31: Use of Internet for Booking Railway Tickets by MPCE Quintiles (%of Respondents)



Reasons for not using Internet for booking railway tickets are varied. Computer illiteracy (72.2%) is the major hurdle. It is observed that computer illiteracy is more pronounced in Kolkata (83.3%) than in Mumbai (60.8%) (Figure 2.32).

Fig 2.32: Distribution (%) of Respondents by Reasons for not using Internet for Booking Railways Ticket.



2.6.5 Overall Implications

The NCAER household survey clearly brings out the fact that travel demand by railway is almost ubiquitous and respondents are eager to see an efficient and well-maintained railway service for which they are willing to pay more. It is also important to note that households belonging to even the lowest expenditure quintiles are ready to spend more. This is a clear indication of the fact that there is lot of scope for improvement in the present services of the railways. This is possible only if efficiency is raised through increased revenue as well as better management of the operations.

3. Passenger Survey: Objectives, Methodology and Sample Selection

3.1 Context and Background

Railways meet the travel needs of the millions of suburban/non-suburban passengers every year. Who are these passengers in terms of their socio-economic profile? The sample survey of railway passengers by NCAER is intended to provide the socio-economic profile the users of railway services, their pattern of usage, expectations of services from the railways and their willingness to pay for better services.

To be precise, the basic objectives of the suburban/non-suburban passenger survey by NCAER were:

- Deciphering social and economic profile of the passengers both of the suburban and non-suburban train services.
- Estimating the extent of willingness to pay for railway passenger service.
- Understanding perceptions of performance of the passenger service both for suburban and non-suburban segments.

The passenger surveys pose many practical difficulties. In the case of suburban services, the passenger surveys were done at selected stations where passengers were approached for information as they awaited their trains or alighted from trains. However, the rate of response was low. Responses might have been better in off-peak hours. For this reason, an attempt was also made to contact households in the 'catchment area' of the major suburban stations to complement the station based survey of the suburban passengers and their perceptions. In case of long distance routes, the surveys were conducted both in the trains and at the stations. The surveys were carried out continuously for more than four weeks[1] so that information on different variety of traffic is captured.

Keeping in mind the duration of the study, several parameters were considered for undertaking the sample survey. We first note that the approach to sampling was to obtain a random sample, wherever possible with suitable stratification. This was done to reduce the bias linked to the estimation of the parameters of interest as much as possible. The guidelines indicated the sample size numbers and the interviewers were instructed to make every effort to get that much response. However, in the sample surveys it is often difficult to reach the exact numbers for several reasons. In some instances, we had to discard some responses because of inconsistencies or other limitations of information received

[1]Initially we thought to carry out the survey within three weeks but later it was extended to four weeks to meet the full sample coverage and variations in traffic flows.

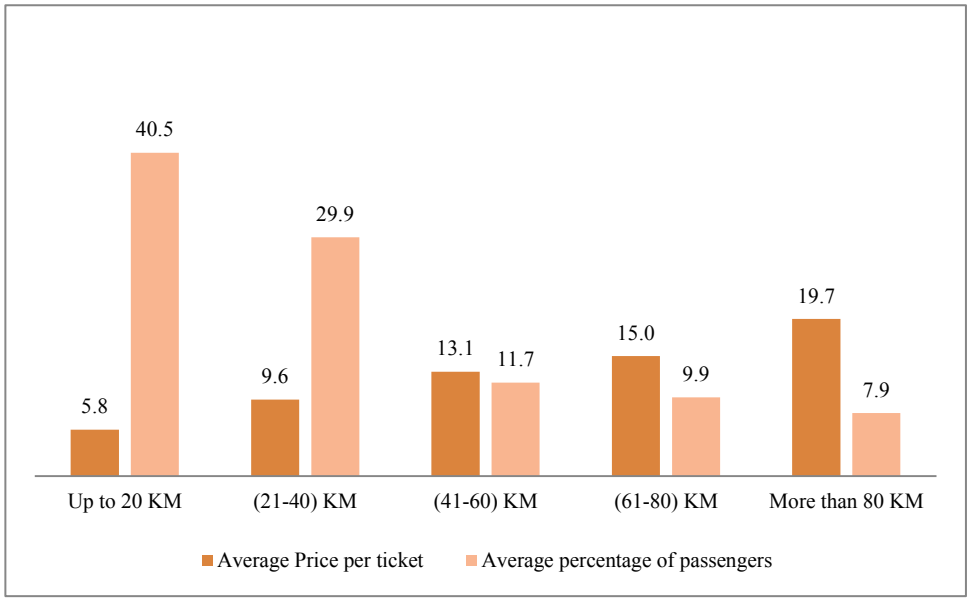
3.2 Suburban Services: Station-based Survey

The station-based survey of the suburban passengers was carried out in different time slots in each station so as to cover different sections of passengers. The sampling approach used is one of 'quota sample' approach although we do cover a variety of travel conditions in terms of time of travel and geographical location of stations. The interviewers were assigned a quota of passengers they would interview in a given time slot and station and they were instructed to complete this quota depending on the responsiveness of passengers. The questionnaires meant for the passengers were extremely focused, short, and code-based to elicit main socio-economic characteristics of the passengers and some reaction to the prevailing fares.

3.2.1 Background and General Scenario to the Overall Passenger Survey by NCAER

Results of the random sample survey of suburban passengers are described in section 3.2.2 onwards. It would be instructive to discuss the general scenario of suburban travel (combining Mumbai, Kolkata, and Chennai), before going into detailed profile of the passengers. NCAER covered a total sample of 5092 suburban passengers spreading across 11 stations. It may be observed from Figure 3.1 that for a distance of up to 20 km, the average price per ticket is Rs 5.8 (as stated by the passengers). It is observed that around 41 per cent of the passengers travel in the same distance range. The average price of ticket for the next distance range (21–40 km) is Rs 9.6. Around 30 per cent of the passengers travel in this range. The other distance ranges may be interpreted similarly.

Fig 3.1: Suburban Travel: Distribution of Reported Average Price per Ticket (Rs.) and Passengers (%) Travelled with respect to the Distance Range

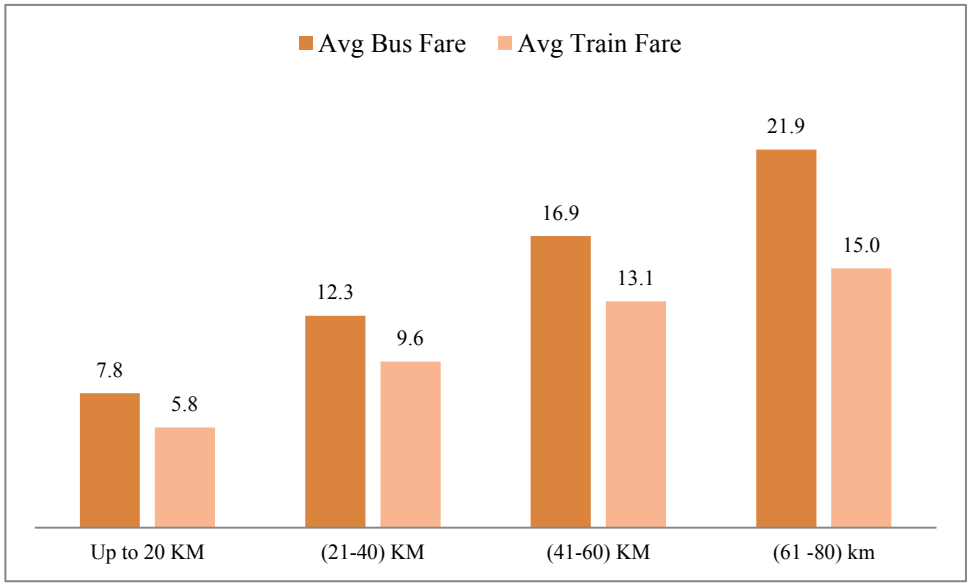


It may be noted that bus fare in the comparable distance in the cities are given in Figure 3.2. The average bus fare was computed using official bus fares in stages using the following formula:

$\bar{U} = \Sigma P_i X_i / \Sigma X_i$

Where P_i is the price per km distance ranges and X_i is the corresponding distance. The weighted average bus fares ($\bar{U}$) were estimated for the three cities in the comparable distance cluster where suburban passenger survey took place. It may be noted that average bus fare is higher than the reported average train fare at all the places and all the distance-ranges.

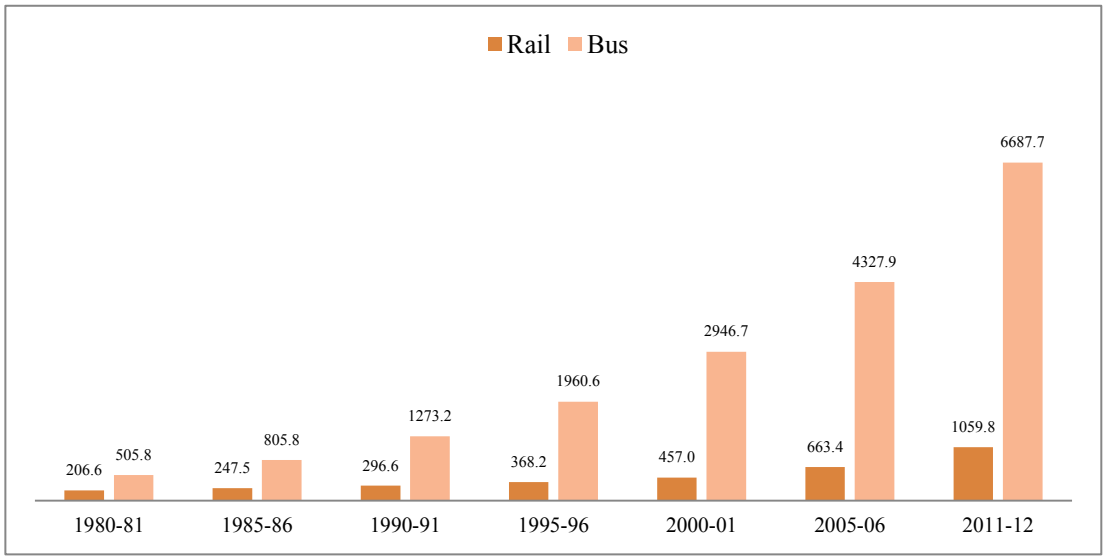
Fig 3.2: Comparison of Average Fare (Rs.): Bus vs. Train for Suburban Travel in Comparable Distance



Source: Official data for local bus rates in Mumbai, Chennai, and Kolkata.

Despite higher bus fares, bus passenger traffic is more compared with rail passengers due to several factors such as connectivity, convenience of last mile reach, higher road length, and density along with better managerial efficiency of bus transportation over time. Figure 3.3 gives aggregate passenger kilometre for rail and bus in India.

Fig 3.3: Passenger Kilometres (billion): Rail and Bus



Sources: CIRT, Pune; Indian Railways, and interpolating growth estimates by NCAER

In this respect, it would also be interesting to have an international comparison by which one can compare (despite methodological issues) some of the key parameters of efficiency and connectivity. The Table below gives one such comparison:

Table 3.1 An International Comparison of some of the Parameters reflecting Efficient Utilisation and Connectivity of the Railways System (data pertains to 2008)

	(PKM+NTKM) per Employee	Route KM per Million Population	Route KMs per Square Kilometre Area
USA	15.3	747.4	23.6
China	1.6	45.5	6.4
Germany	0.7	410.5	94.9
France	2.1	466.5	54.2
Russia	2.6	598.1	4.9
India	0.9	55.2	19.3
Japan	2.2	157.5	53.0

Original source: UIC Paris, re-quoted from Indian Railways Vision Document, 2010

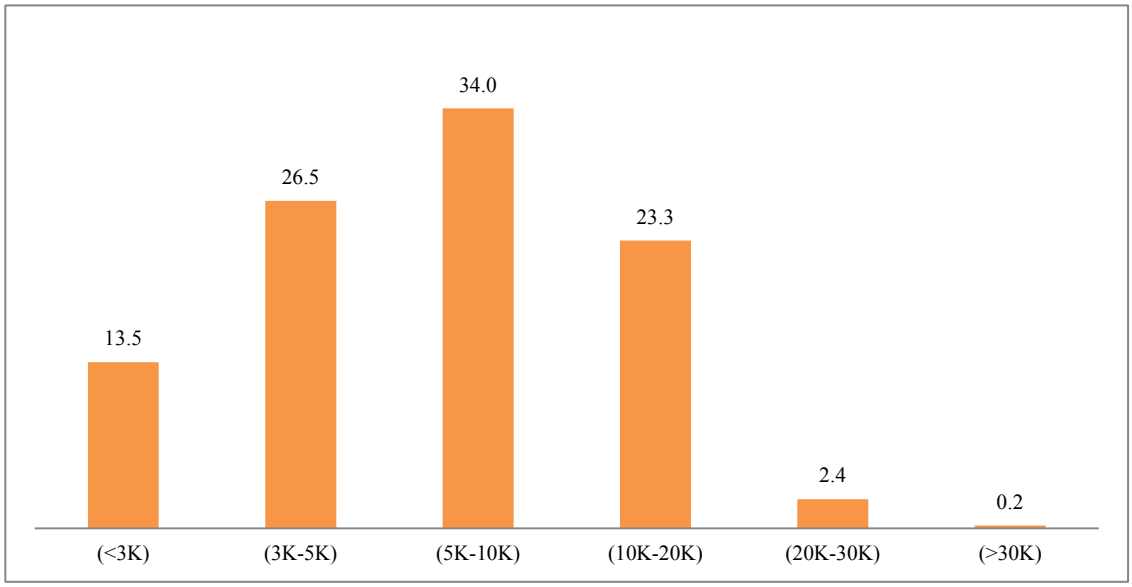
It may be observed that India lags far behind from the countries like the USA, Germany, France, Russia and Japan in terms coverage and connectivity (Route KM per Million Population, Route KMs per Square KM) and efficiency [(PKM+NTKM) per employee]. As a corollary, one may observe that the major challenges of the Indian railways are supply constraint and connectivity. IR needs massive investment in easing capacity constraint, modernisation and expansion of track and rolling stocks along with setting up heavy haul dedicated fright corridors.

3.2.2 Income, Expenditure and Demographic Profile of the Suburban Passengers

Income and expenditure are the two indicators with which the other socio-economic variables are often closely linked. Figure 3.4 gives the distribution of income and expenditure in a two-way representation. The low income earners typically stay put in lower expenditure range and vice versa.

It may be observed that around 13.5 per cent of low-income suburban passengers belong to the lowest expenditure strata (<Rs.3K). It may also be observed that expenditure-wise the highest concentration is in the monthly expenditure range of Rs 5,000–10,000 (34%). Monthly spending of Rs 10,000 to Rs 20,000 is reported to be 23.3 per cent while monthly income of the same range consists of 44.7 per cent of the passengers.

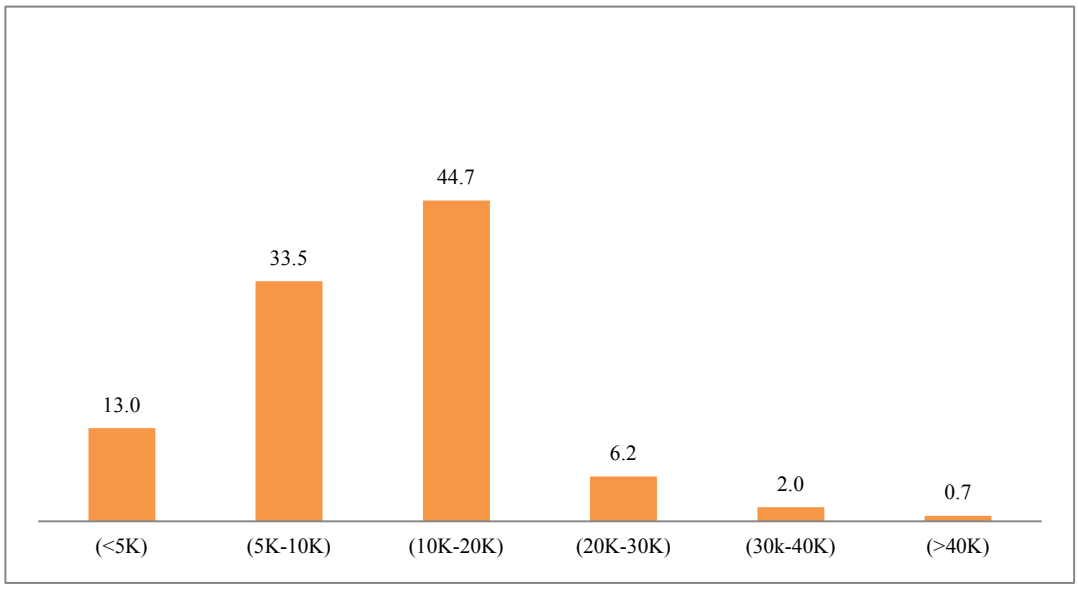
Fig 3.4: Distribution (%) of the Passenger by Monthly Income in Rs. '000



Note: K=1000

Both the distribution of income as well as expenditure shows variation in skewness in the upper ranges. The skewness is 0.096 for expenditure and 0.436 for income, implying more skewness in income distribution than expenditure.

Fig 3.5: Distribution (%) Of Income-Earning Passengers by Total Monthly Income (Rs.'000)



Note: K=1000

In order to get more details, we took cross-tabulation of data on passenger's income and expenditure. The income–expenditure trajectory clearly shows the relation between earnings and ability to spend. The distribution of income and expenditure in Table 3.2 shows that 54.4 per cent of sample suburban passengers who spend less than Rs 3000 per month earn less than Rs 5000 in the same time span, 37.4 per cent of the passengers who spend less then Rs 3000 per month 81.1 per cent come from the category on passengers who earn Rs 5000-10000 per month. Those who spend more than Rs 30000 per month earn more than Rs 30000 per month.

Table 3.2: Distribution (%) of Monthly Income and Expenditure (per month)

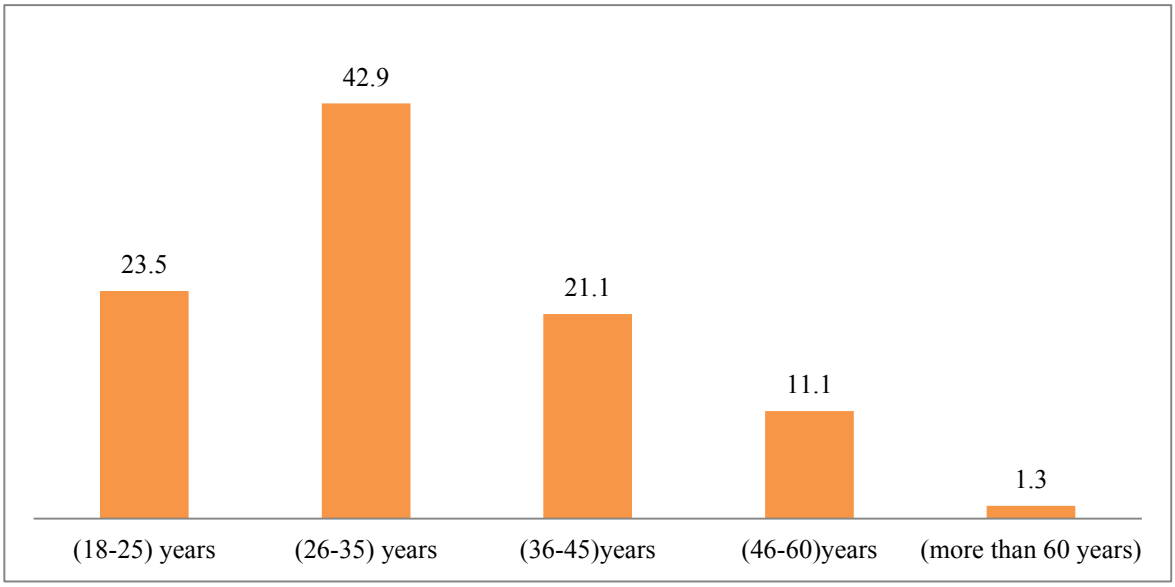
	Income range					
Expenditure range	**<5000**	**5000-10,000**	**10,000-20,000**	**20,000-30,000**	**30,000-40,000**	**>40,000**
<3,000	54.4	37.4	8.1	0.0	0.0	0.0
3,000-5,000	21.2	50.1	26.2	2.5	0.0	0.0
5,000-10,000	0.0	44.4	51.9	2.8	0.8	0.0
10,000-20,000	0.0	0.0	81.1	14.8	3.9	0.1
20,000-30,000	0.0	0.0	0.0	47.3	31.2	21.5
>30,000	0.0	0.0	0.0	0.0	11.1	88.9
Total	13.0	33.5	44.7	6.2	2.0	0.7

3.2.3 Age-distribution of the Sample Passengers

The age distribution starts with youth (18–25), career intensive and settlement age (25–35), mid-career age (35–45), peak working to retirement age (45–60) and the older ages beyond 60. It may be noted that career intensive and settlement age have the highest concentration

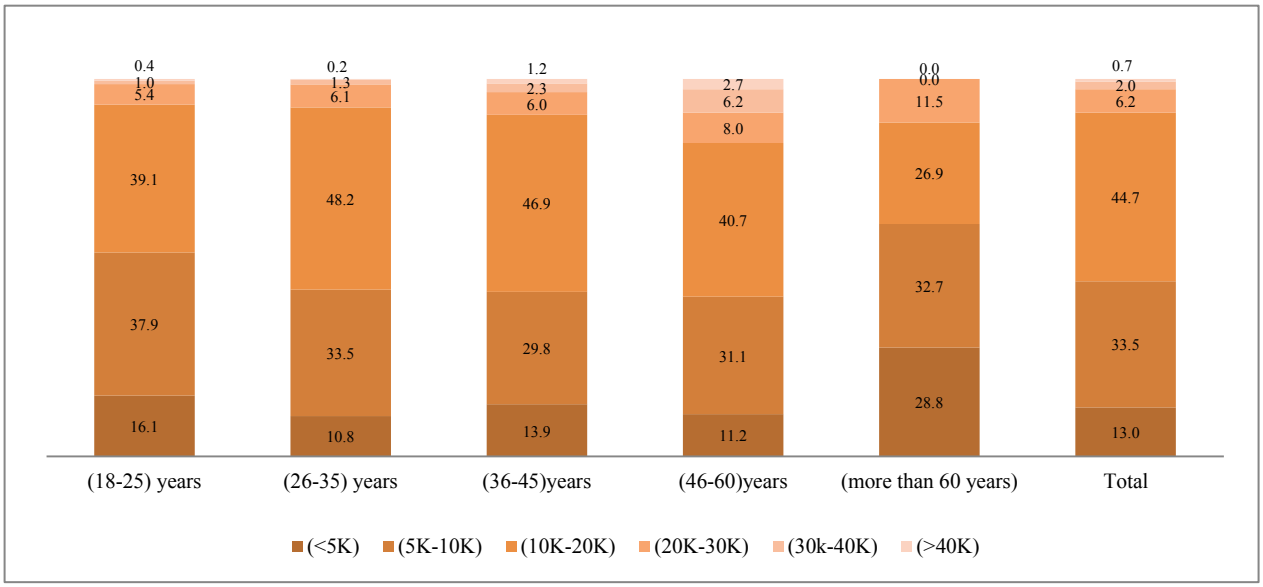
(37.6%) as suburban passengers, followed by youth (24.5%) and mid-career age groups (17.7%) (Figure 3.6).

Fig 3.6: Age-Profile of the Suburban Passengers (%)



Distribution of ages by income shows that young and old are the one with poor income but career-intensive and middle-aged people are more in the higher ones. Figure 3.7 shows the sample distribution by age groups and income level.

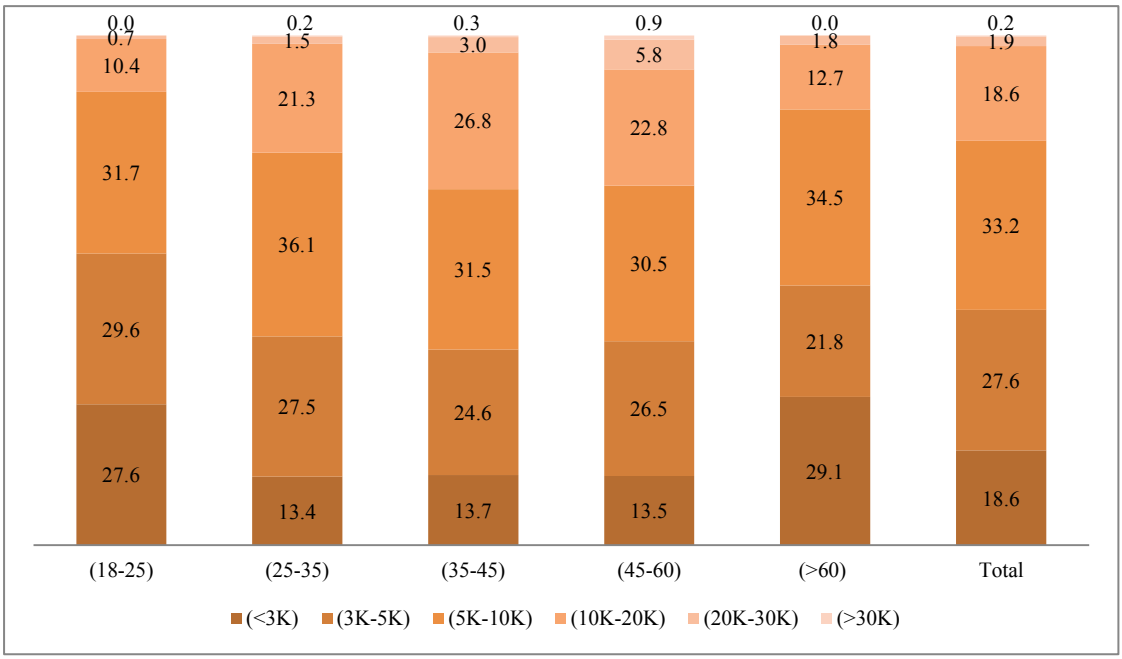
Fig 3.7: Distribution (%) of Respondents by Income by Age-Group and Income Level



Note: K=1000

Distribution of respondents by expenditure and age group shows that old passengers (>60 years) are in the lowest spending range (29.1%), followed by the younger group (27.6%), probably due to lower and unstable income at that period of life. However, the spending pattern varies and in the same age group there are passengers who are in the higher spending range (Figure 3.8).

Fig 3.8: Distribution (%) of Respondents by Expenditure and by Age Groups



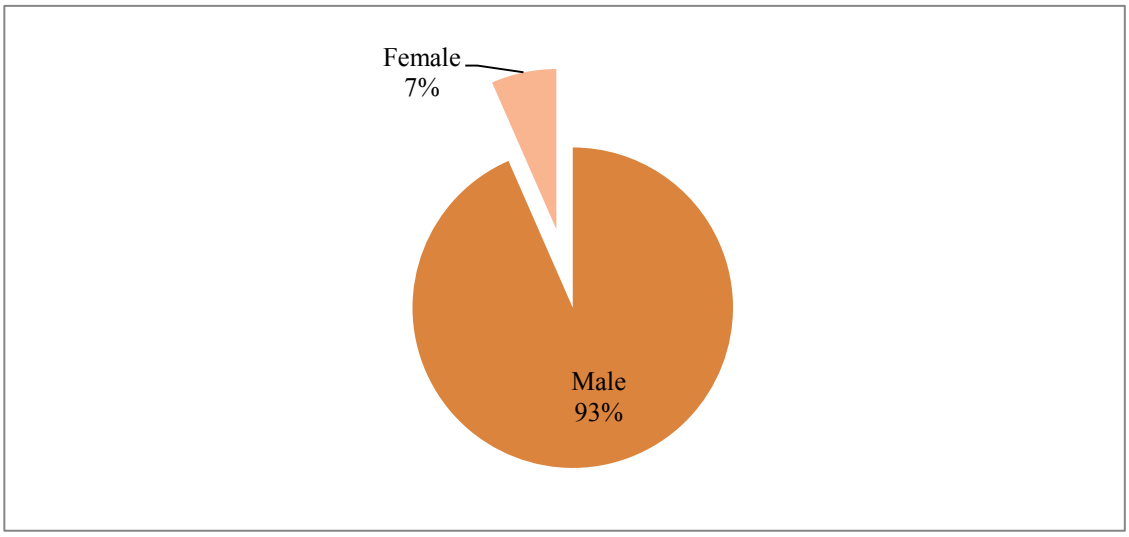
Note: K=1000

3.2.4 Gender Distribution of the Sample Passengers

Overall gender distribution in the suburban train clearly shows that male groups are the dominant ones with 88 per cent share while females account for only 12 per cent of travellers.

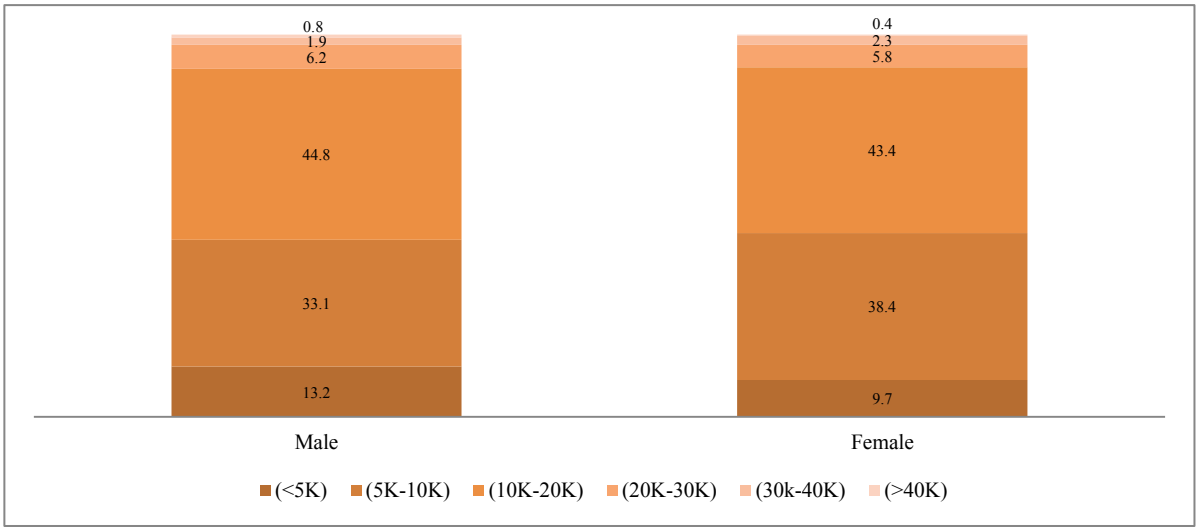
Gender distribution of the income earning passenger shows that only 7 per cent of income earning passengers is female.

Fig 3.9: Gender Distribution (%) of the Income Earning Passengers



Distribution of income range by gender shows that both male and female passengers have similar income profile.

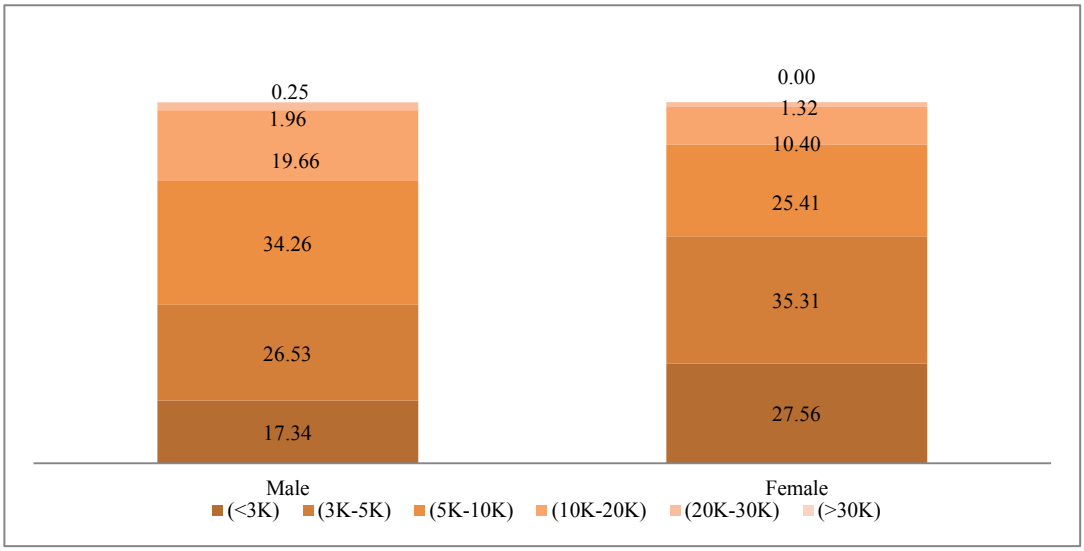
Fig 3.10: Distribution (%) of Income by Gender



Note: K=1000

Distribution of expenditure by gender shows that women's groups are more in the lower spending groups compared to their male counterparts.

Fig 3.11: Distribution (%) of Expenditure by Gender

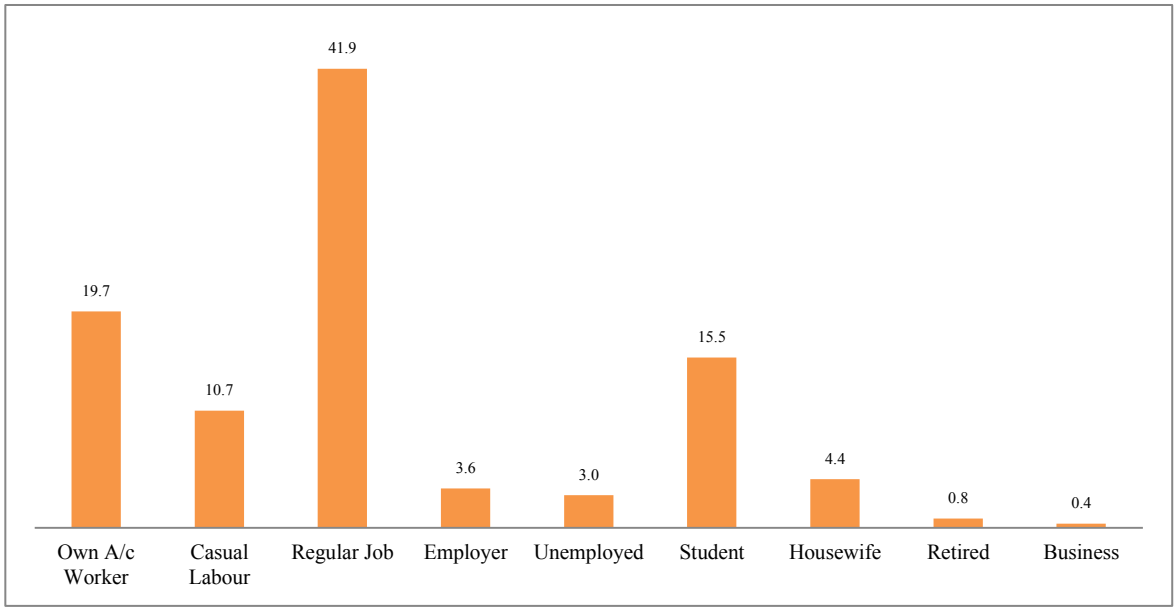


Note: K=1000

3.2.5 Distribution of Activity Status of the Sample Passengers

Profile of the suburban passengers in terms of activity status shows that around 42 per cent of them have regular jobs, followed by 20 per cent with own account employment. Around 16 per cent are students while 11 per cent are casual labour.

Fig 3.12: Distribution (%) of the Respondents by Activity Status



Distribution of respondent by expenditure and activity status is given in Table 3.3. Passengers having regular jobs are in the higher and steady spending ranges, followed by own account workers.

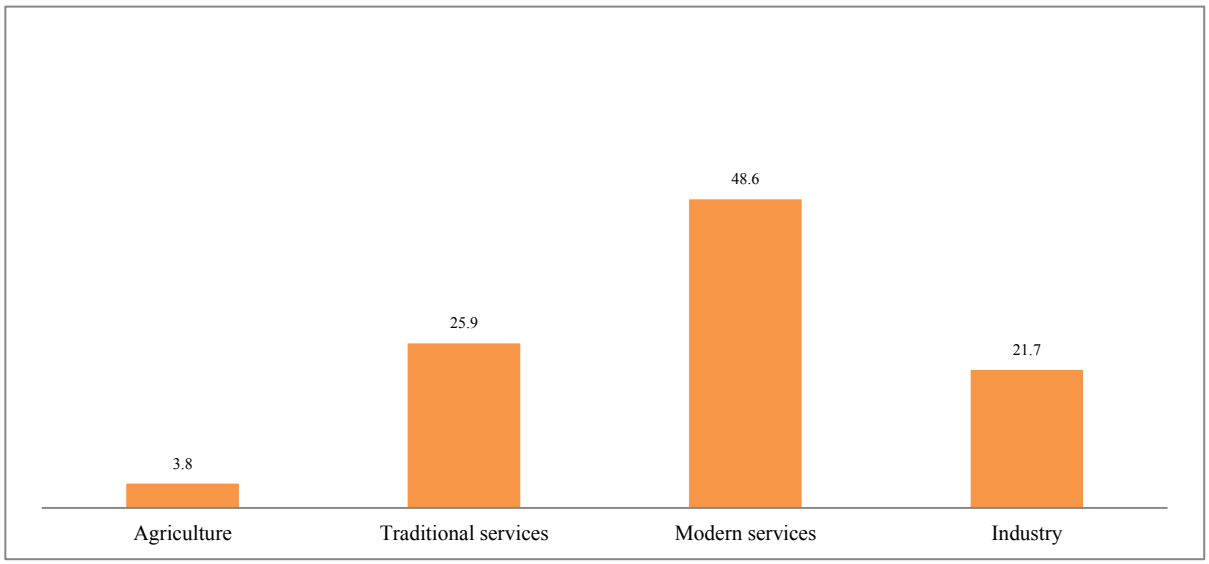
Table 3.3: Distribution (%) of Respondent by Expenditure and Activity Status (Rs)

	<3,000	**3,000-5,000**	**5,000-10,000**	**10,000-20,000**	**20,000-30,000**	**>30,000**
Own account worker	14.0	25.2	38.1	20.5	1.9	0.3
Casual labour	25.0	40.1	28.9	5.9	0.2	0.0
Regular salary/wages	9.6	24.5	34.1	29.1	2.5	0.3
Employer	17.6	19.2	25.3	28.0	9.9	0.0
Unemployed	40.4	25.8	21.9	9.9	0.7	1.3
Student	37.9	28.6	33.5	0.0	0.0	0.0
Housewife	24.4	43.1	25.3	6.2	0.9	0.0
Retired	30.2	16.3	37.2	14.0	2.3	0.0
Business	15.8	36.8	42.1	5.3	0.0	0.0
Total	18.6	27.6	33.2	18.6	1.9	0.2

3.2.6 Distribution of Sectoral Status of the Sample Passengers

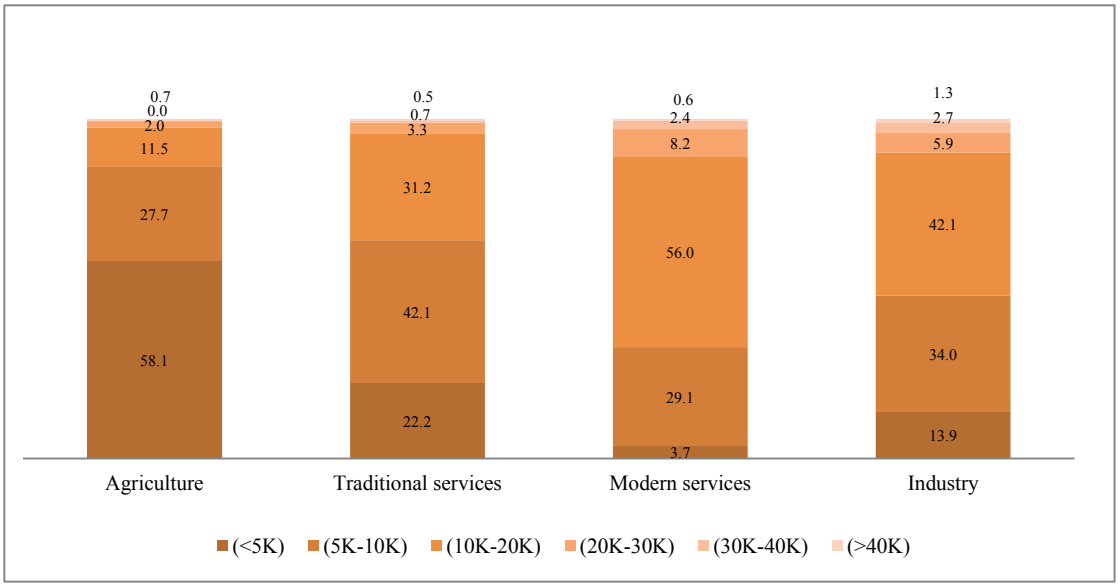
Distribution of the sectoral engagement of the sample suburban passengers shows that most of them belong to the modern sector (48.6%), followed by engagement with the traditional services (25.9%). The sample passengers engaged in industry is 21.7 per cent while in agriculture it is only 4 per cent.

Fig 3.13: Sectoral Engagement of the Suburban Passengers (Except Student, Unemployed, Housewife and Retired)



Distribution of respondents by income and engagement to sectors clearly shows that agricultural labours are the lowest income earners while the highest income earners are mostly engaged in the modern sector (Figure 3.14).

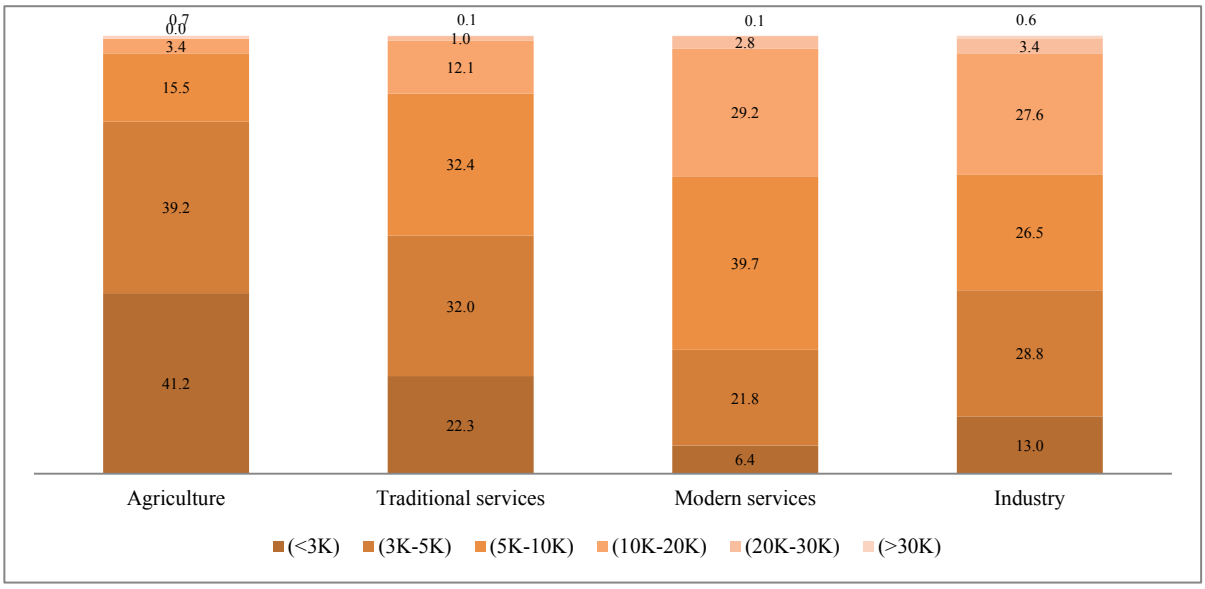
Fig 3.14: Distribution (%) of Income Range of the Suburban Passengers by Sectors



Note: K=1000

Distribution of respondents by expenditure and engagement to sectors too shows that passengers engaged in agriculture have the lowest ability to spend while the highest spending groups are mostly engaged to the modern sector.

Fig 3.15: Distribution (%) of the Expenditure Profile of the Suburban Passenger Linked to Engagement in Different Sectors

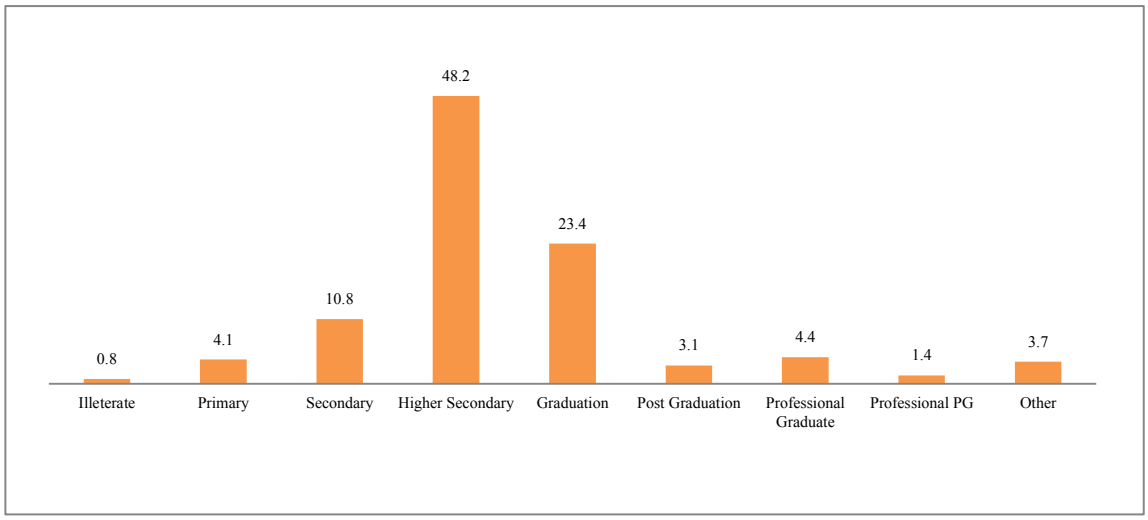


Note: K=1000

3.2.7 Distribution of Educational Status of the Sample Passengers

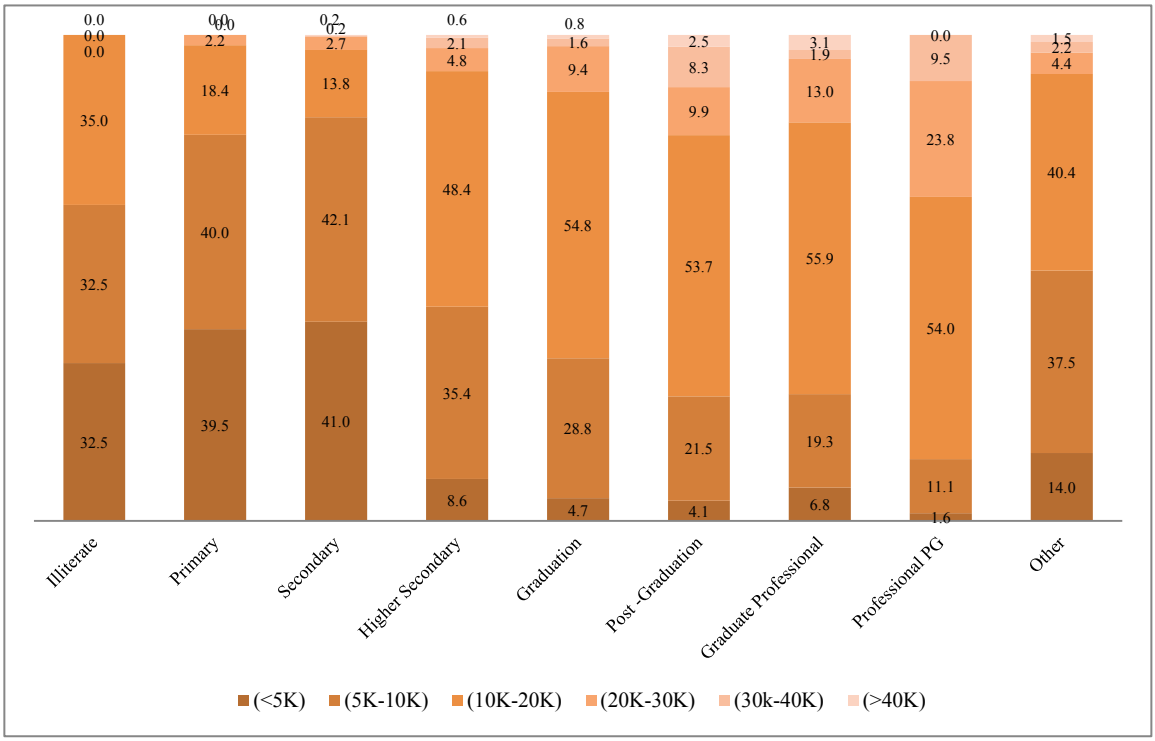
Distribution of the educational profile from the sample suburban passengers shows that over 48 per cent have passed higher secondary and over 23 per cent are graduates. While around 11 per cent passed secondary, 4 per cent have obtained professional graduation and 3 per cent are post-graduates.

Fig 3.16: Educational Profile of the Suburban Passenger (%)



Distribution of income ranges by educational status clearly shows that there is hardly any difference in earning capacity for the illiterate, or those with primary or even secondary education. The reasons for income mismatch could be many. A little educated passenger might have not utilised his/her skill to earn more despite having better capabilities. On the other hand, a marked shift is noted for the passengers having passed higher secondary and onwards.

Fig 3.17: Distribution (%) of Respondents by Income and Educational Status



Note: K=1000

Table 3.4: Distribution (%) of Respondents by Expenditure and Educational Status

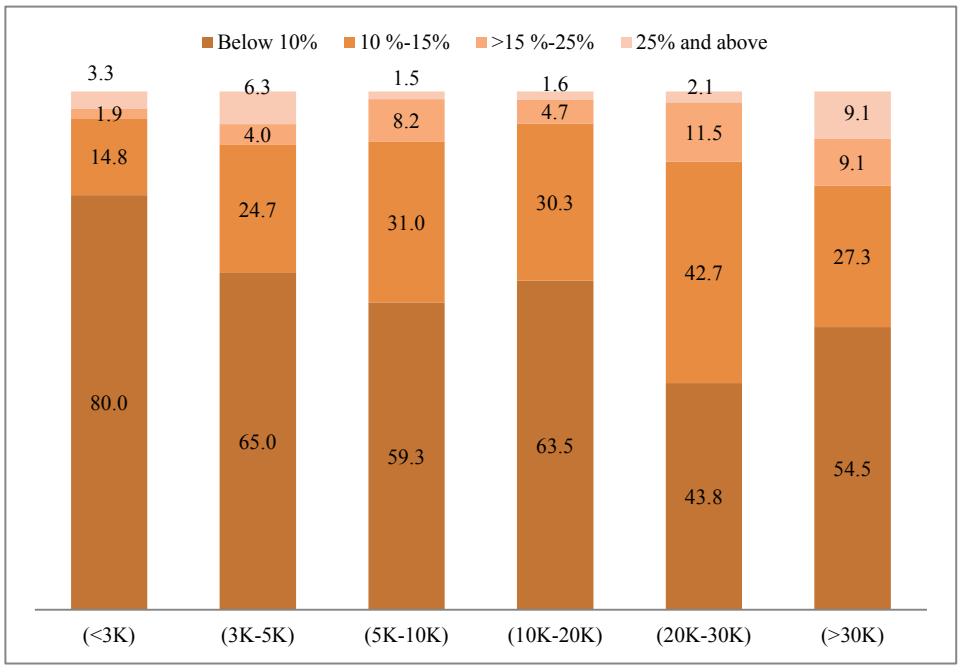
Education Status	<3,000	3,000—5,000	5,000—10,000	10,000—20,000	20,000—30,000	>30,000	Total in terms of Educational Status
Illiterate	23.8	31.0	23.8	21.4	0.0	0.0	100
Primary	28.5	39.1	22.7	9.2	0.5	0.0	100
Secondary	28.1	37.6	28.5	5.3	0.5	0.0	100
Higher Secondary	15.3	27.3	34.6	20.8	1.7	0.3	100
Graduation	16.8	23.5	34.1	23.0	2.7	0.0	100
Post-Graduation	17.8	17.2	38.9	22.3	3.8	0.0	100
Graduate Professional	27.9	22.1	31.9	13.3	4.0	0.9	100
Professional PG	12.3	15.1	38.4	31.5	2.7	0.0	100
Other	23.7	34.7	32.1	8.4	0.5	0.5	100
Total in terms of expenditure range	18.6	27.6	33.2	18.6	1.9	0.2	100

3.2.8 Transport Expenditure on railway only and Spending for Train travel: A Detailed Description

Transport expenditure is one of the important components of overall expenditure. For the suburban passengers this is linked to the distance one travels to reach the destination. Usually in prominent urban centres, the radius of distribution of the core and the periphery controls to some extent the magnitude of transportation expenditure. In the absence of decentralised planning, most of the official and commercial activities are centred in the core of the cities and that influences, to some extent the range of expenditure on transportation.

Figure 3.18 shows the distribution of responding passengers by their transportation spending among different expenditure groups. Though no definite pattern can be discerned, the passengers belonging to higher spending strata spend relatively more on transportation than their lower counterparts.

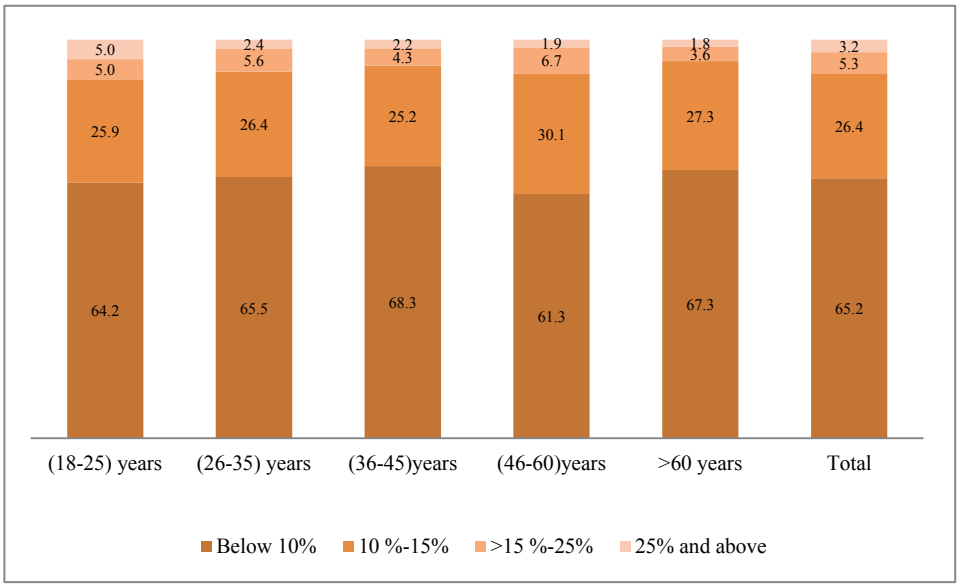
Fig 3.18: Distribution (%) of Respondents by Transport Expenditure by Expenditure Groups



Note: K=1000: Expenditure is for per month basis

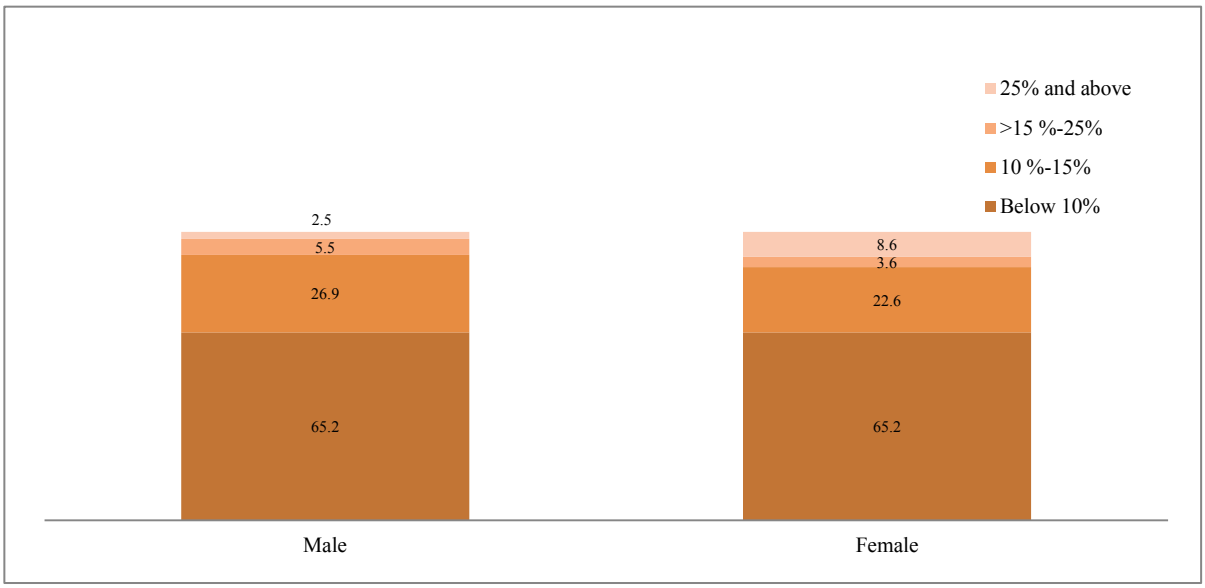
It is revealed that over 65 per cent of suburban passengers spend less than 10 per cent on transportation, while a little over 26 per cent spend between 10 and 15 per cent. Only 5 per cent spends over 15 per cent. The age group distribution of transport spending shows a concentration of spending below 10 per cent, which is also the highest for the mid-career age groups. However, it may be observed that the variation in this range is not much across age groups.

Fig 3.19: Distribution (%) of Passengers by Transport Expenditure and Age Groups



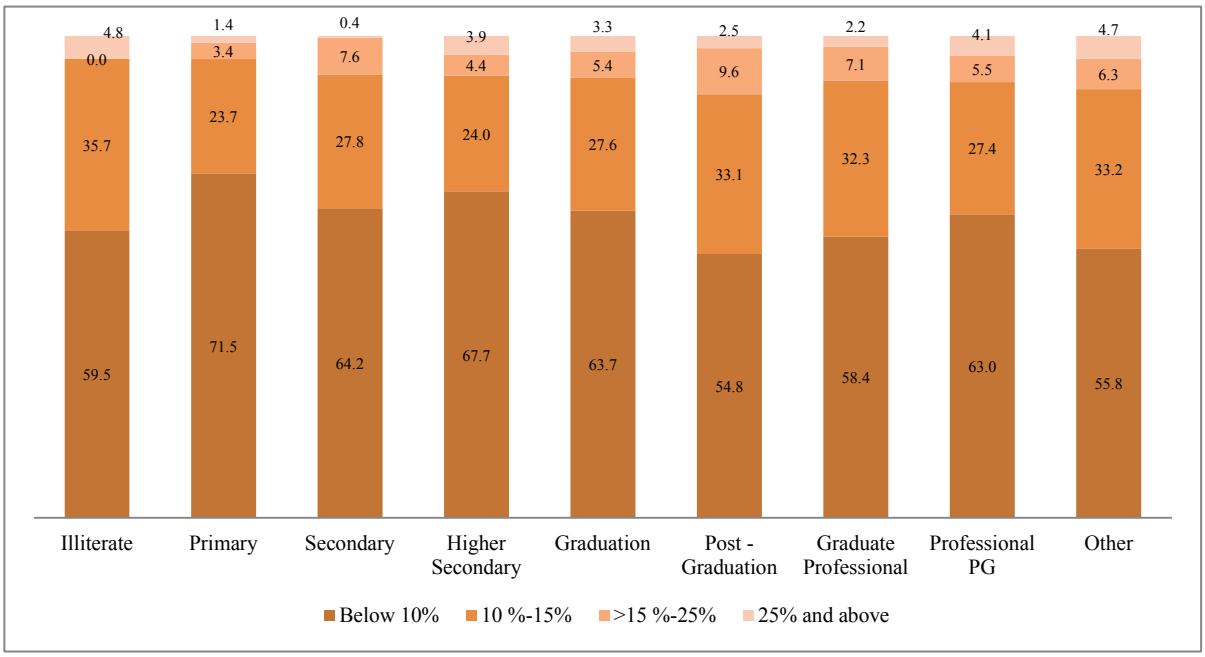
Distribution of respondent by transport expenditure and gender shows that there is not much variation among male and females when transport expenditure is relatively low. But there are differences with respect to transport spending are10 to 15 per cent of total in which male proportion is greater (26.9%) as compared with their female counterparts (22.6%).

Fig 3.20: Distribution (%) of Transport Expenditure by Gender



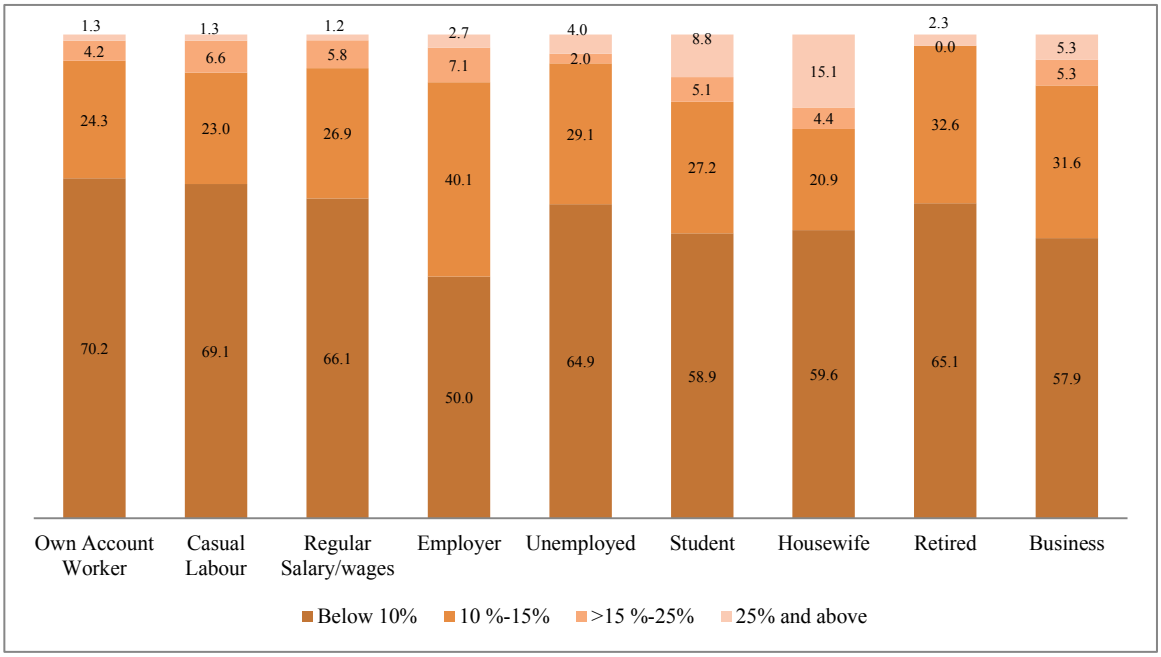
Distribution of respondent by transportation expenditure and educational status shows that the dominant spending pattern for transportation is less than 10 per cent. However, 32 to 33 per cent of those who have completed post-graduation and passengers who also typically fall in other categories in terms of educational achievement spend in the range of 10 to 15 per cent on transportation.

Fig 3.21: Distribution (%) of Transport Expenditure of the Respondents by Educational Status



Distribution of respondent by transport expenditure and activity status too shows that spending on transport is below 10 per cent for almost all the passengers, except employers and business people, who typically spend more (Figure 3.22).

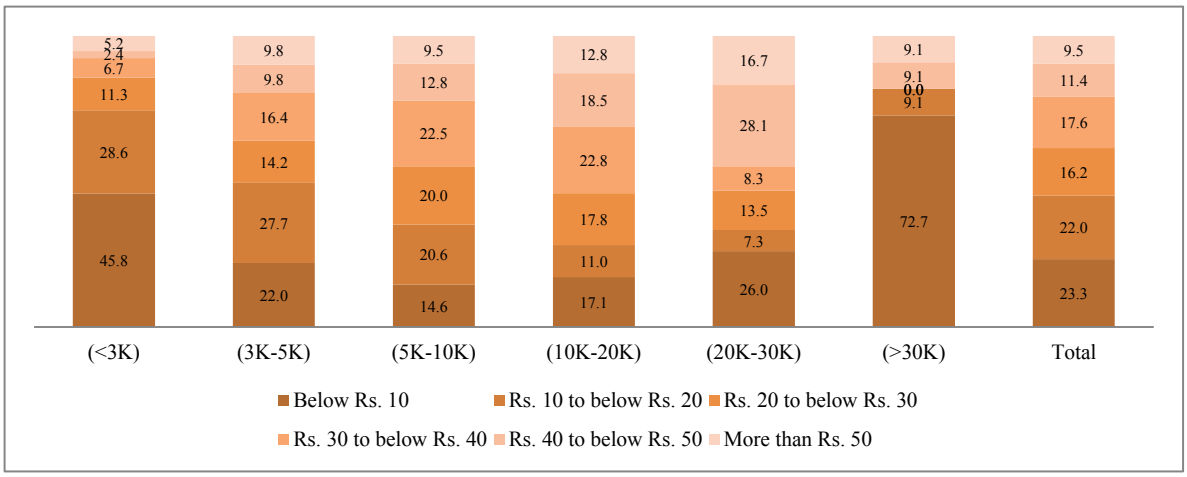
Fig 3.22: Distribution (%) of Transport Expenditure of the Respondents by Activity Status



Distribution of respondent by spending on travelling by train out of total transportation expenditure by expenditure groups and the total is represented in the following chart. For the

sample suburban passengers, the passengers with highest affordability (72.7%) spend much less on train out of total transportation expenditure, followed by the passengers in the poorest spending strata (45.8%). The spending on train journey is the highest for the middle spending groups who need to travel for the purpose of attending work or educational institutions. It may also be observed that overall 23.3 per cent of the suburban passengers spend less than 10 per cent of the total transportation expenditure followed by 22 per cent by passengers spending between 10 to 20 per cent.

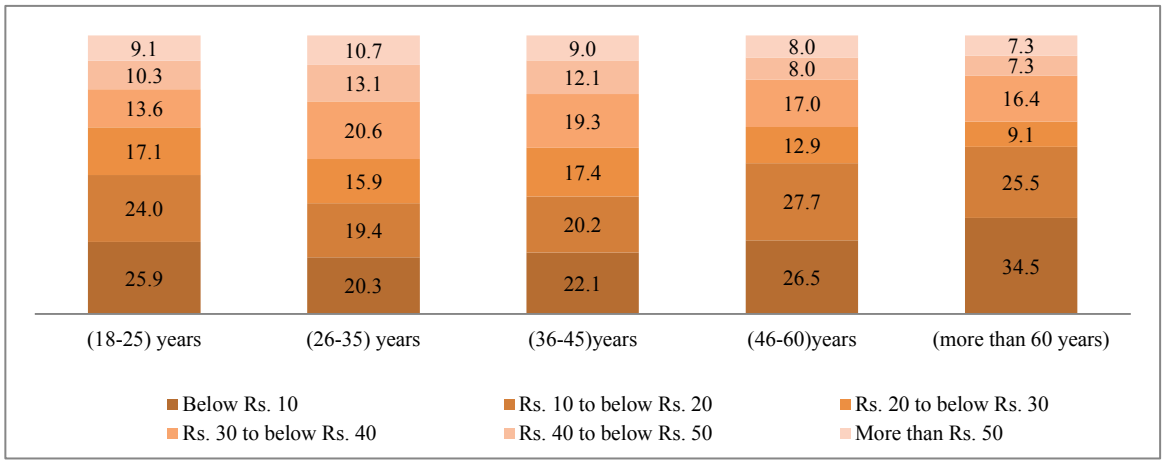
Fig 3.23: Distribution (%) of Respondents by Spending on Train Travel out of Total Transportation Expenditure by Expenditure Groups



Note: K=1000

Figure 3.24 depicts the spending on train journeys by the sample suburban passengers out of total transportation expenditure by age groups. By age group, spending on train travel is higher for career-intensive as well as mid-career age groups.

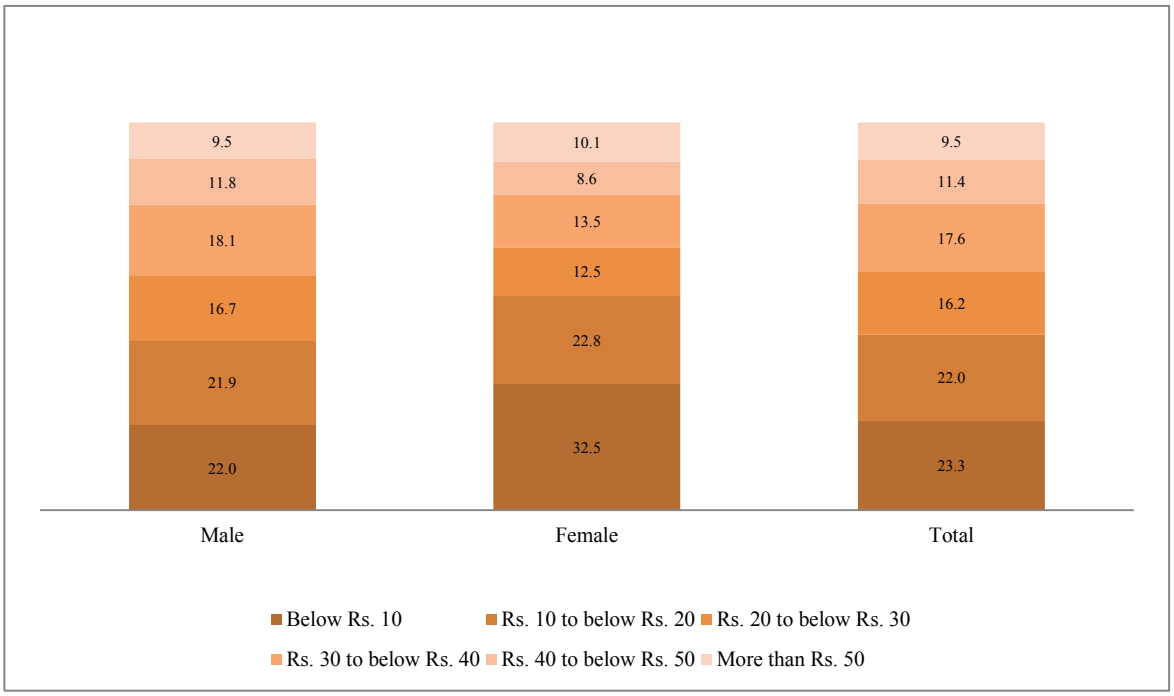
Fig 3.24: Distribution (%) of Respondents by Spending on Train Travel out of Total Transportation Expenditure and Age Group



Distribution of respondent spending on train travel by gender shows that females spend less on train travel out of total transportation expenditure than their male counterparts. The

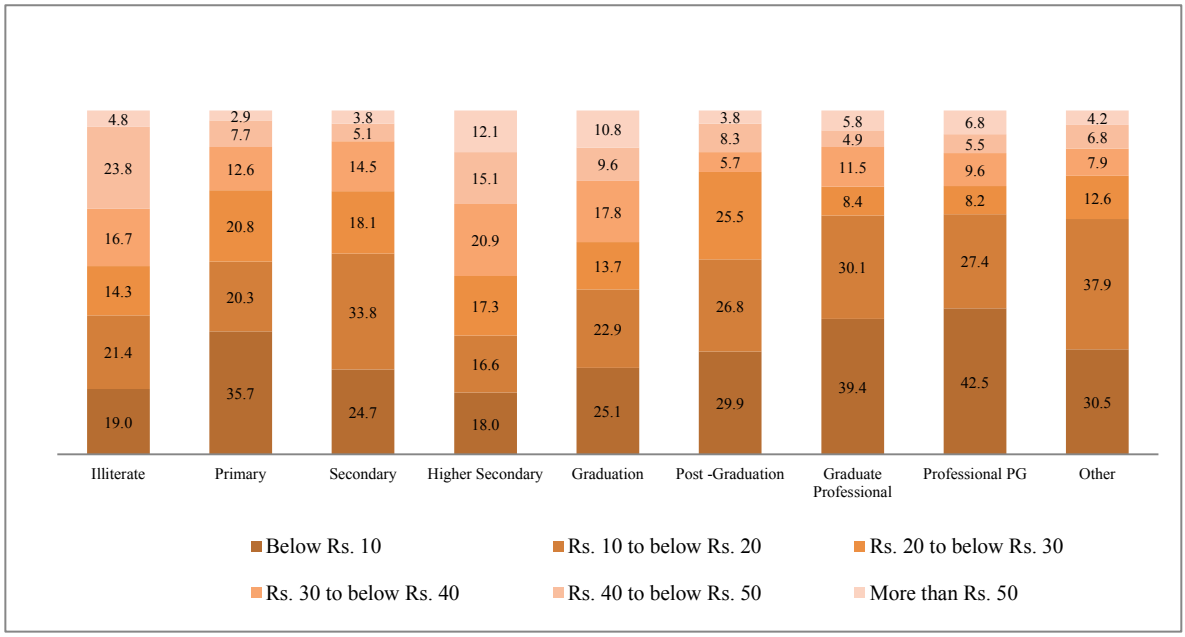
observed spending pattern shows that male passenger spends more on train in 20 to 30 per cent and 30 to 40 per cent as well as 40 to 50 per cent range.

Fig 3.25: Distribution (%) of Respondents Spending on Train Travel out of Total Transportation Expenditure by Gender



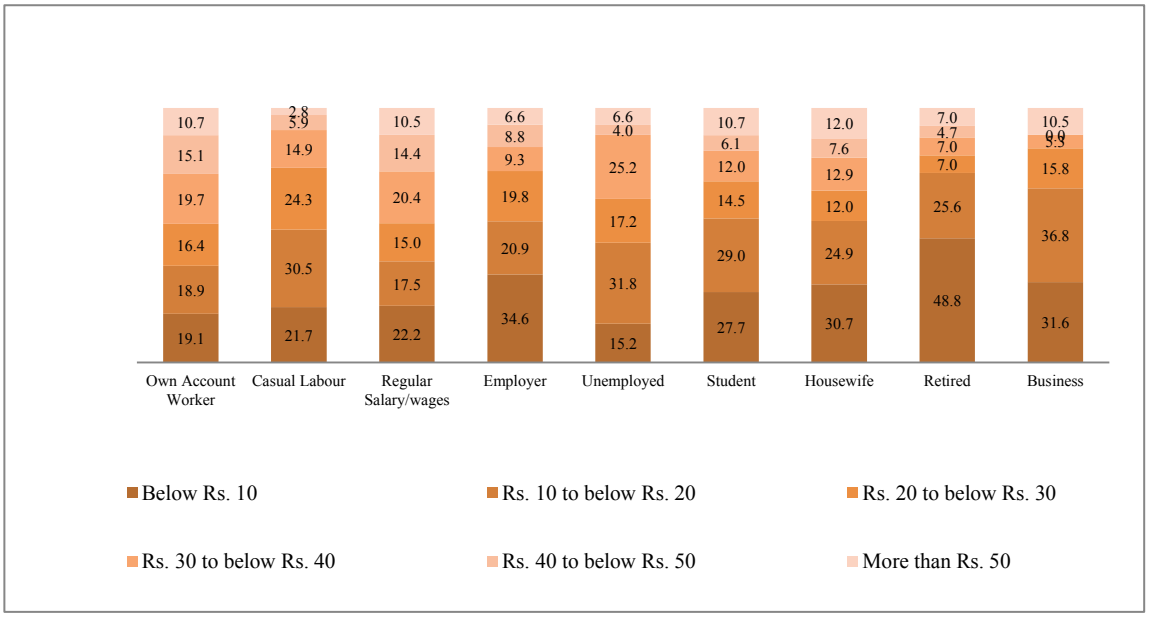
The distribution of respondent spending on train travel out of total transportation expenditure shows that the sample passengers with Higher Secondary are the highest qualitative spenders, followed by passengers with Graduation.

Fig 3.26: Distribution (%) of Respondents by Spending on Train Travel out of Total Transportation Expenditure and Educational Status



The distribution of spending for train travel by activity status shows that unemployed, regular job holders are proportionally the higher spenders compared with other groups in the activity status.

Fig 3.27: Distribution (%) of Respondents by Spending on Train Travel out of Total Transportation Expenditure and Activity Status

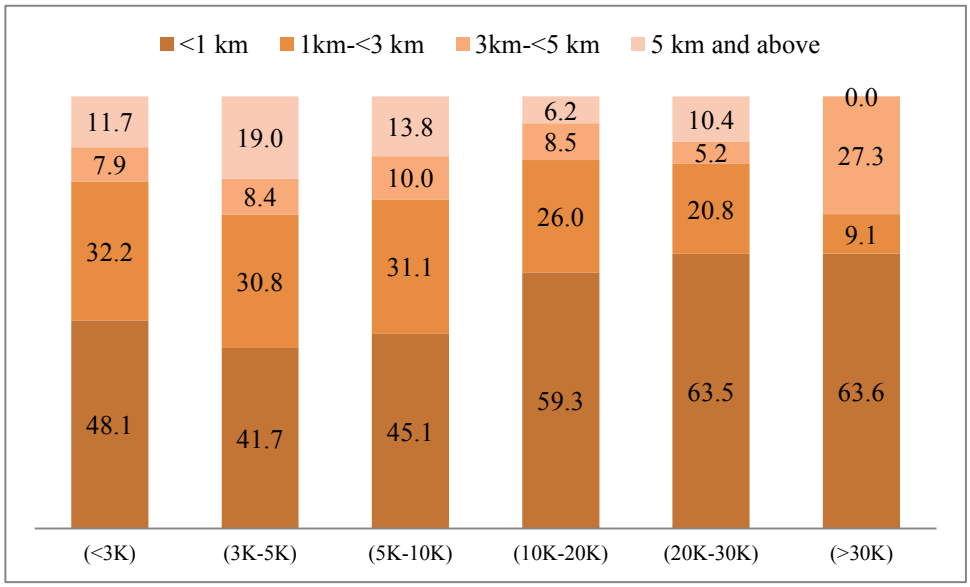


3.2.9 Travel Demand for Train

3.2.9.1 Distance to station and last mile reach

Distance to station is one of the important considerations for travelling by train. It may be observed that a passenger, whose spending capacity is relatively less, travels more to reach the station. While on an average 12, 19, and 14 per cent, respectively, of passengers with lower spending ability have to travel more than 5 km, the percentage is less for the higher income passengers.

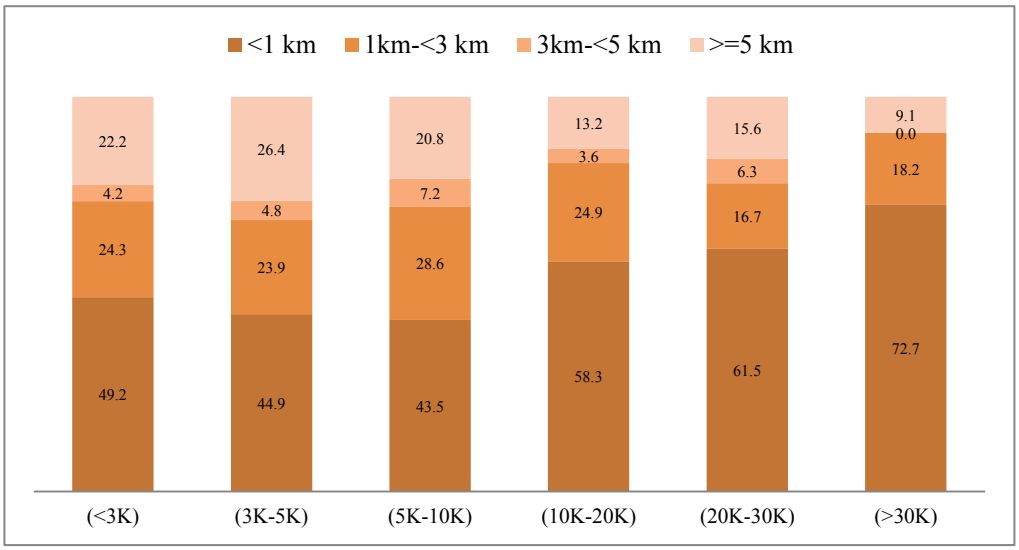
Fig 3.28: Distribution of Respondents by Distance to Railway Station



Note: K=1000

Distribution of respondent by distance to destination after reaching station also shows that passengers with lower ability to spend travel more to reach the final destination than the higher income counterparts. Passengers spending Rs 3,000 to Rs 5,000 monthly (26.4%) are seen to be travelling more than or equal to 5 km on an average to reach the final destination after reaching station, while it is only 9 per cent for the passengers spending more than Rs 30,000 in a month.

Fig 3.29: Distribution (%) of Respondents by Destination to the Final Work/Places after Reaching Station

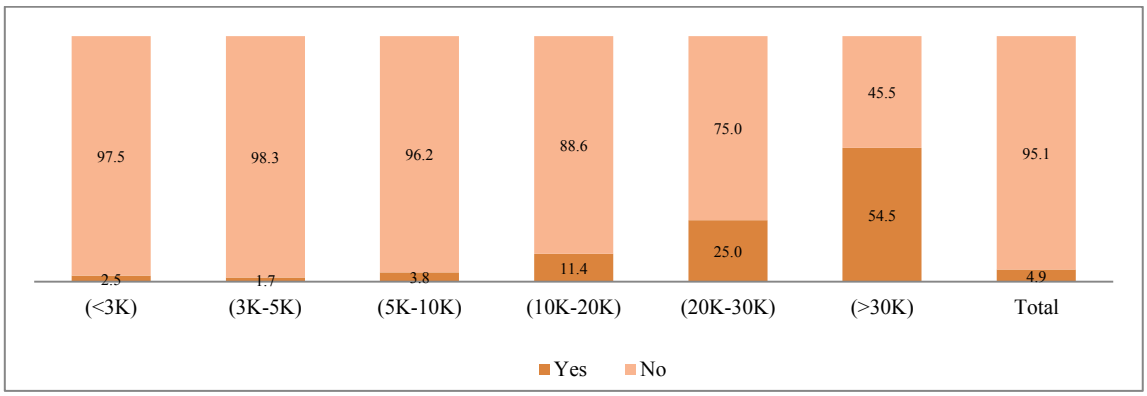


Note: K=1000

3.2.9.2 Railway concessions and compensations

In the event of increase in the passenger fare, all sections of travellers are affected. In such case, the total distribution of respondents in such that 95 per cent of passengers do not get any travel related compensation from its employers, while 5 per cent are compensated. It is, however, interesting to observe that passengers in the higher affordable groups are more compensated by employers than the lower income passengers. While 54.5 per cent of the sample passengers who spend more than Rs 30,000 a month are compensated by the employers, only 1.7 per cent of the sample passengers who spend Rs 3,000 to Rs 5,000 a month are compensated.

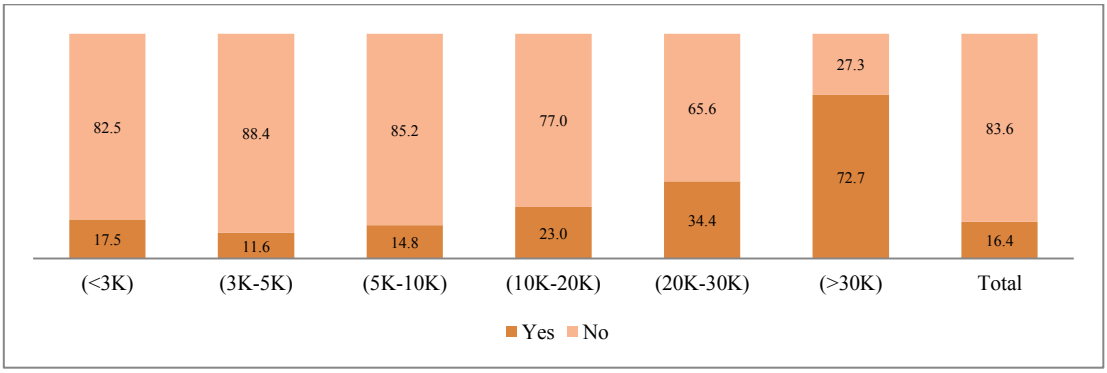
Fig 3.30: Distribution (%) of Responses Related to Employer's Compensation in the Event of Increase in Journey Fare by Expenditure Groups and Total



Note: K=1000

The distribution of sample passengers having availed railway concessions is shown in Figure 3.31. The total distribution says that 16.4 per cent of the sample passengers have availed railway concessions during the reference period while 83.6 per cent have not. It is also interesting to note that passengers with higher affordability could avail increasingly more of concession facility than their poorer counterparts. Almost 73 per cent of the highest affordable suburban passengers have obtained railway concession while less than 20 per cent could avail the same for the passengers in the lower affordable ranges.

Fig 3.31: Distribution (%) of Sample Passengers having obtained Railway Concession for the Journey



Note: K=1000

The distribution of the type of concessions availed by 16.5 per cent of the sample passengers shows that MST (Monthly Season Ticket) is the dominant form of concessions (80.8%) for all groups apportioned by the range of monthly expenditure, followed by student concession (14.2%). Only 2.7 per cent of those who availed railway concessions are railway employees.

Table 3.5: Distributions of Respondent by Type of Railway Concessions by Expenditure Categories and Total

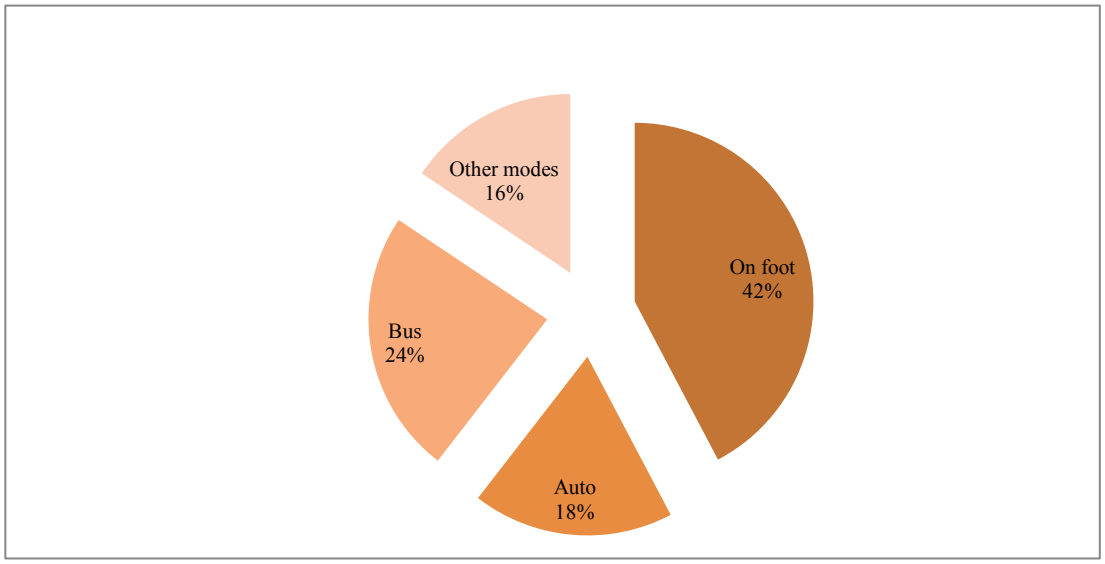
	Railway employee	Student concession	Government concessions	MST
(<3K)	1.2	40.6	0.6	57.6
(3K-5K)	0.6	12.3	3.7	83.4
(5K-10K)	2.8	12.7	2.4	82.1
(10K-20K)	6.0	0.0	2.3	91.7
(20K-30K)	0.0	0.0	0.0	100.0
(>30K)	0.0	0.0	12.5	87.5
Total	2.7	14.2	2.3	80.8

Note: K=1000

3.2.9.3 Distribution of mode to reach station

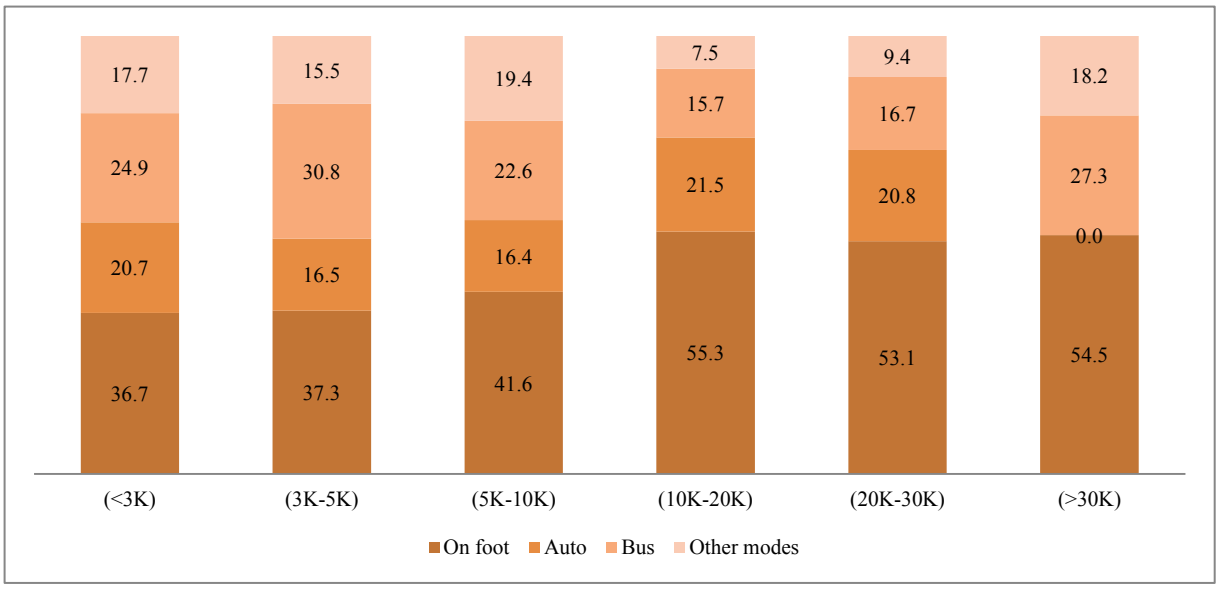
Distribution of the modes of travel shows that 42 per cent of the sample passengers travels on foot to reach station, 24 per cent take buses, 18 per cent autos and 16 per cent other modes (cycle rickshaws, shared 3-wheelers, motor cycles, etc.).

Fig 3.32: Distribution (%) of Respondents by Modes of Travel to reach Railway Station



Distribution of the modes to reach station by expenditure categories shows that the higher affordable section starting from the passengers who spend Rs 10,000 to Rs 20,000 monthly reaches station mostly by foot (55.3%). Except for a few, buses are the second best dominant option for most of the expenditure categories.

Fig 3.33: Distribution (%) of Respondents by the Modes of Travel to reach Railway Station by Expenditure Status

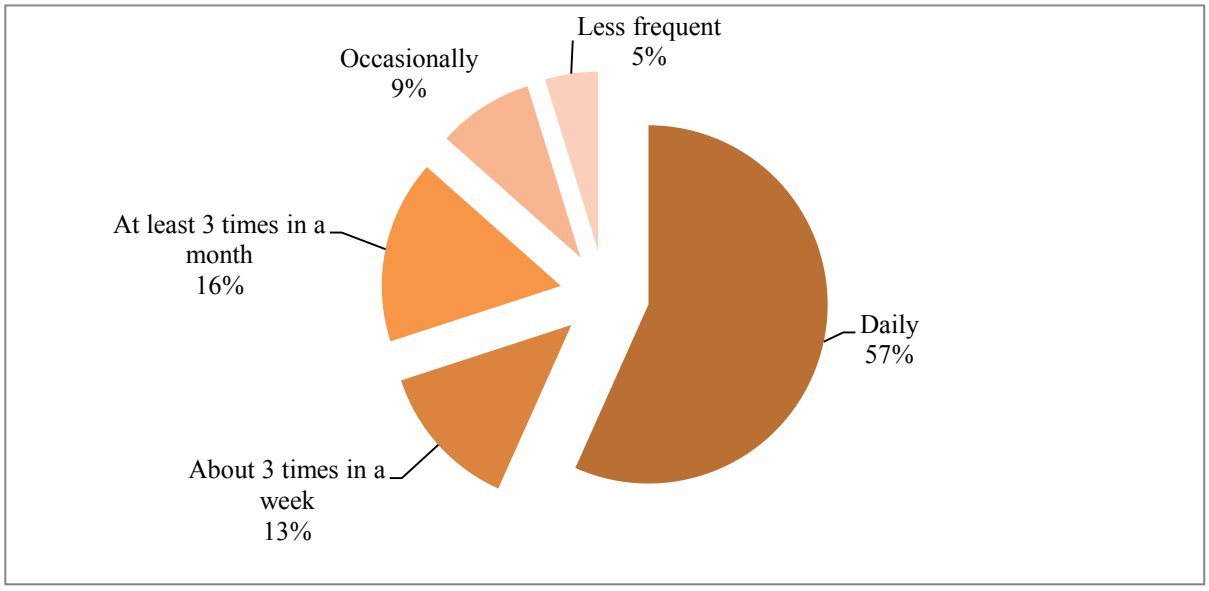


Note: K=1000

3.2.9.4 Frequency of travel

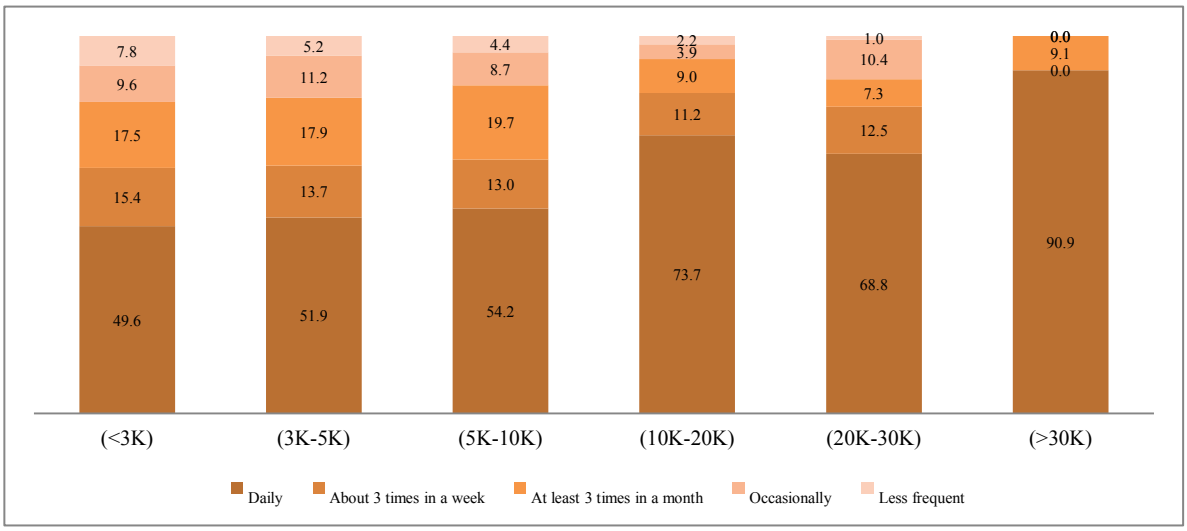
Distribution of the suburban passengers by frequency of travel shows that around 57 per cent of the sample passengers travel daily, 16 per cent at least 3 times a month and 13 per cent travels 3 times a week. While occasional commuters are 9 per cent, 5 per cent of the passengers travel less frequently.

Fig 3.34: Distribution (%) of Suburban Passengers by Frequency of Travel



Distribution of the frequency of travel by expenditure category shows that most passengers from higher and the highest expenditure category take the benefit of daily suburban services. While 91 per cent of the passengers who spend more than Rs 30,000 a month travels daily, 49.6 per cent of the passengers with lowest spending ability travels daily.

Fig 3.35: Distribution (%) of Respondents by Frequency of Travel and Expenditure Status



Note: K=1000

3.2.9.5 Purchase of Train Tickets

The distribution of the purchase of train tickets shows that most of the passengers (75.5%) purchase tickets at stations on the day of travel. A little above 17 per cent purchase tickets at stations before the day of travel, while only 4 per cent bought tickets at other ticketing centres of the railways. The distribution of the pattern of the purchase of train tickets by expenditure category reveals somewhat more interesting aspects. While only 1 per cent of the passengers in the monthly expenditure range of Rs 20,000 to Rs 30,000 purchase tickets through travel agents, it is startling to note that a little above 9 per cent of the passengers in the highest expenditure category (> 30,000) did not have tickets with them

Table 3.6: Distribution of Respondent by the Purchase of Train Tickets and Other Aspects

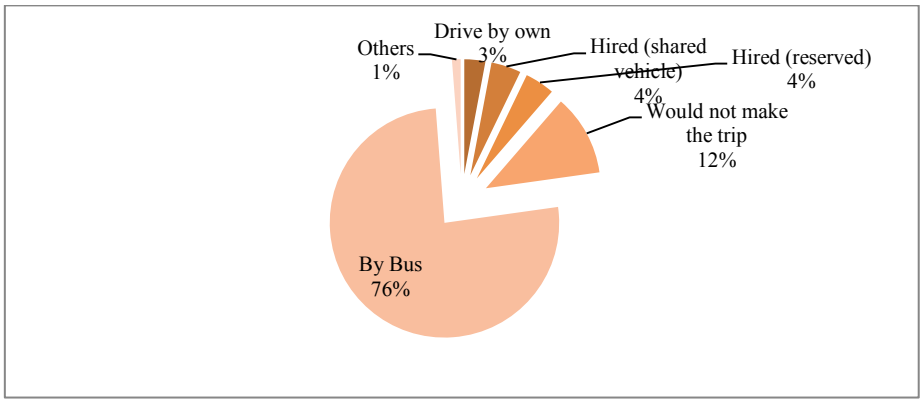
	At Station on the date of travel	At station before the date of travel	At other ticketing centre by railway	Bought for me by someone else	On the train itself	Through travel agent	I don't have ticket with me	Coupons
(<3K)	83.0	13.0	1.1	0.5	0.5	0.0	0.0	1.9
(3K-5K)	76.4	17.9	2.5	0.4	0.0	0.0	0.0	2.9
(5K-10K)	76.7	16.4	4.2	0.2	0.2	0.0	0.1	2.3
(10K-20K)	67.6	19.7	9.4	0.6	0.2	0.0	0.0	2.4
(20K-30K)	54.2	29.2	7.3	2.1	0.0	1.0	0.0	6.3
(>30K)	27.3	36.4	27.3	0.0	0.0	0.0	9.1	0.0
Total	75.5	17.1	4.2	0.4	0.2	0.0	0.0	2.5

Note: K=1000

3.2.9.6 Alternative Mode of Transportation when Train Services are affected

It is interesting to note that when train services are affected, 76 per cent of the commuters avail bus services. Therefore, buses are the first best substitution in the event of disruption of train services. Only 3 per cent drives by own vehicles while 12 per cent of the commuters would not make the trip.

Fig 3.36: Distribution (%) of Respondents by Modes of Transportation when Train Services are affected



It is observed that when train services are affected, most of the commuters from the lower spending capability prefer travelling by bus, which is the cheapest second-best option. The passengers with higher affordability prefer hired (reserved) travel

Table 3.7: Distribution of Respondent by Mode of Travel when Train Services are affected by Expenditure Status

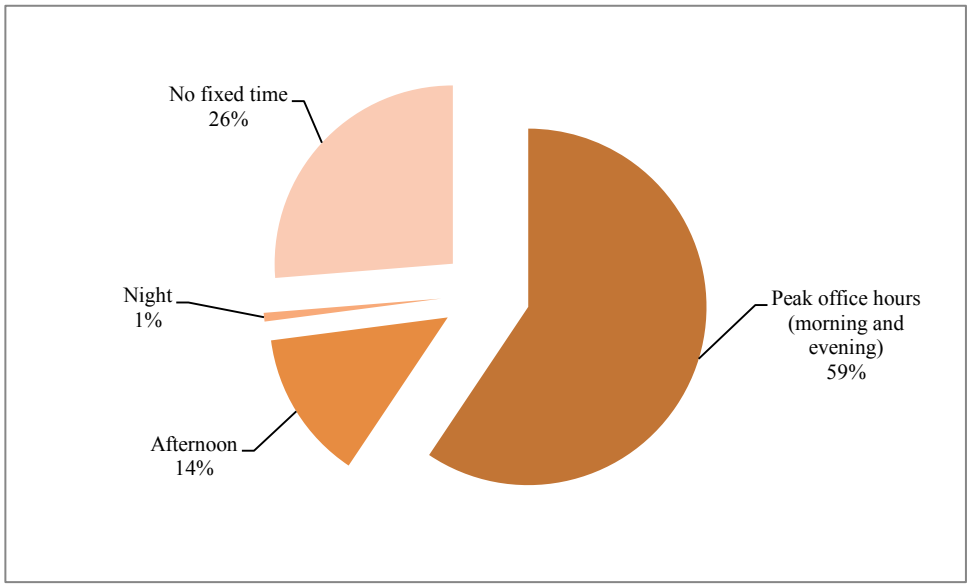
	Drive by own	Hired (shared vehicle)	Hired (reserved)	Would not make the trip	By Bus	Others
(<3K)	0.8	7.3	0.0	6.7	82.8	2.4
(3K-5K)	1.4	4.0	0.1	8.5	84.0	2.0
(5K-10K)	2.8	3.0	0.7	16.3	76.8	0.5
(10K-20K)	7.8	4.0	13.7	11.5	62.9	0.1
(20K-30K)	2.1	1.0	63.5	15.6	16.7	1.0
(>30K)	0.0	0.0	100.0	0.0	0.0	0.0

Note: K=1000

3.2.9.7 Distribution of Travel Time by Suburban Passengers

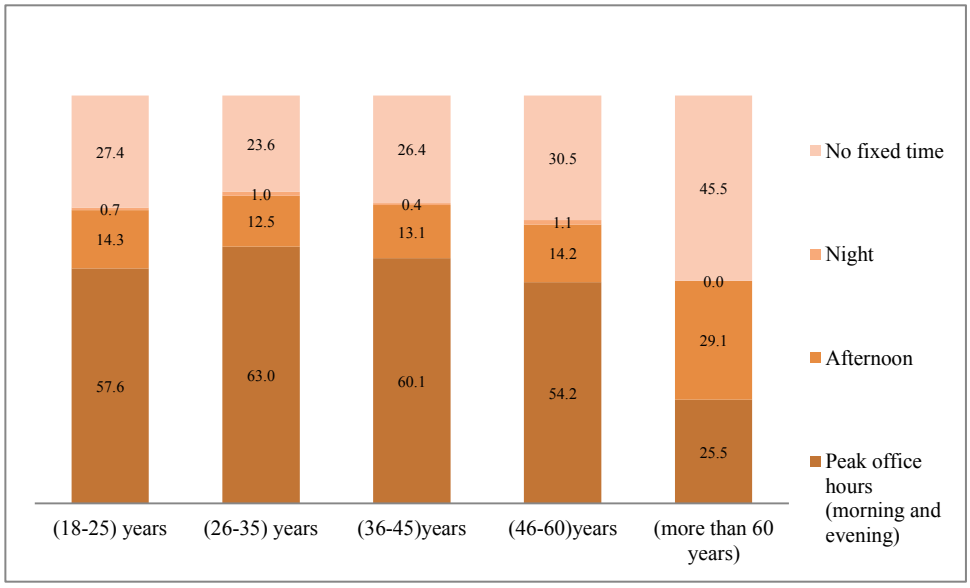
Distribution of travel time for the suburban passengers shows that 59 per cent of them travel during official peak hours. While 14 per cent travels during afternoons, 26 per cent of the suburban passengers have no fixed time for travel. It is revealed that only 1 per cent travels at night.

Fig 3.37: Distribution (%) of Travel Time for the Suburban Passengers



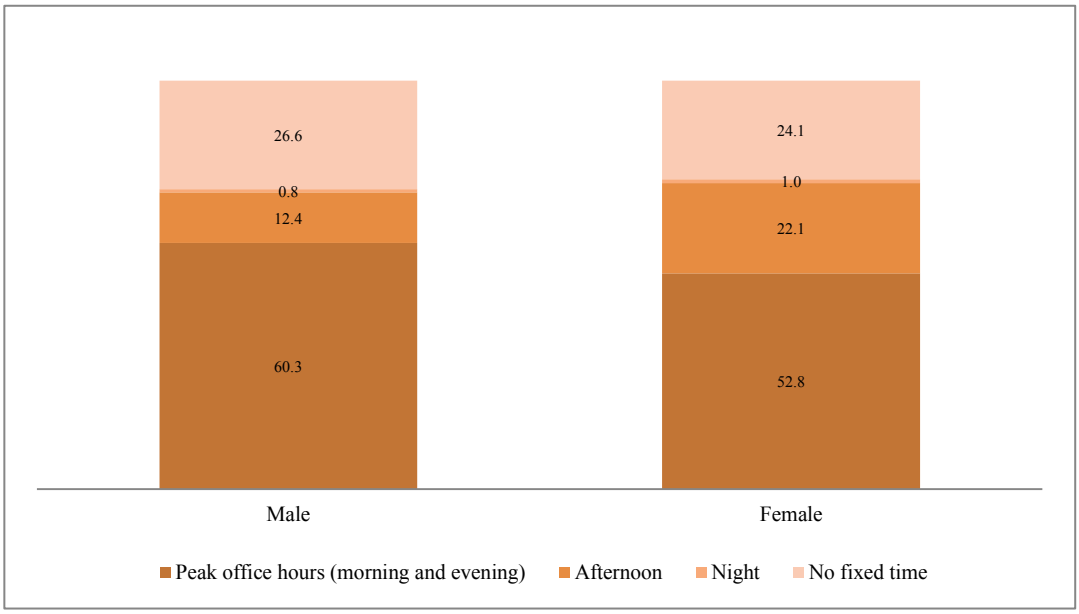
Distribution of travel time by age-groups shows that younger (58%), career-intensive (63%) and mid-career (60%) age-groups travel mostly during peak hours, which goes down slowly in the upper age-groups and depletes drastically in the age-groups above 60.

Fig 3.38: Distribution (%) of Respondents by Travel Time and Age-Group



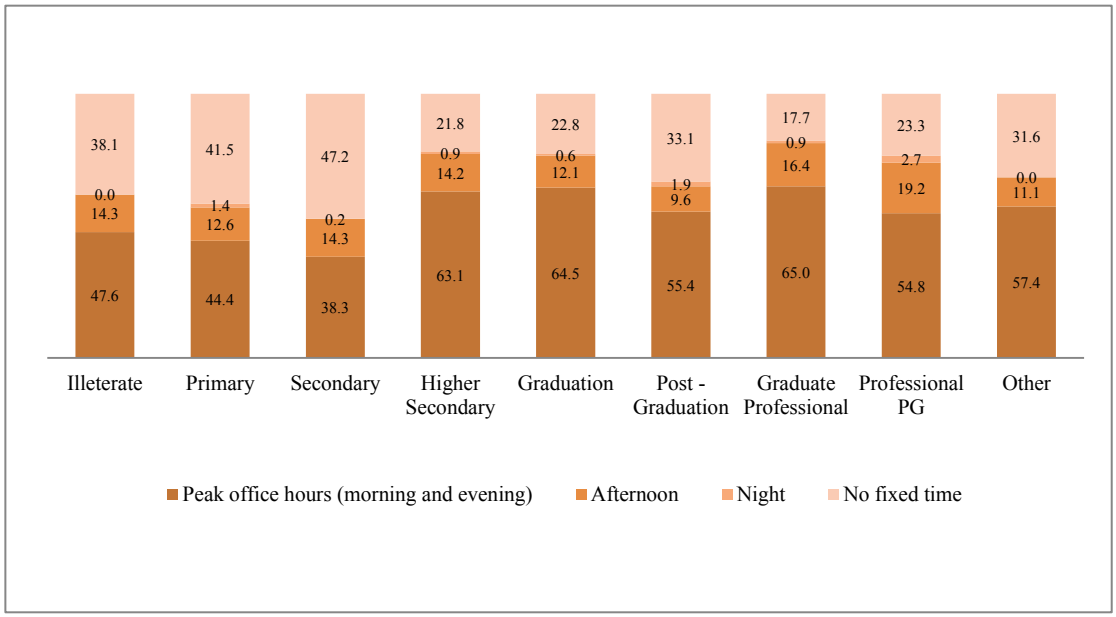
Distribution of travel time by gender shows that peak office hours travel by male passenger is more (60.3%) than female (52.8%). On the other hand, female group prefer travel more during off-peak hours.

Fig 3.39: Distribution (%) of Respondents by Travel Time and Gender



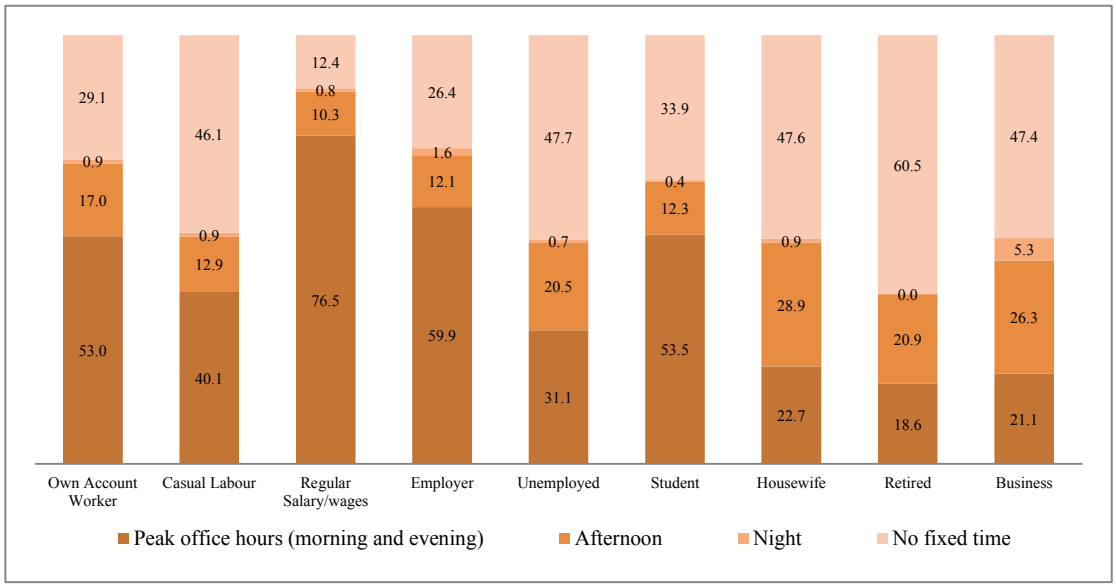
Distribution of travel time by educational status shows that up to Secondary level, the peak hour travel is less, which goes up from Higher Secondary onwards. It is seen that Graduate Professionals travel the most (65%) during peak hours, followed by Graduates (64.5%) and Higher Secondary level (63.1%).

Fig 3.40: Distribution (%) of Respondents by Travel Time and Educational Status



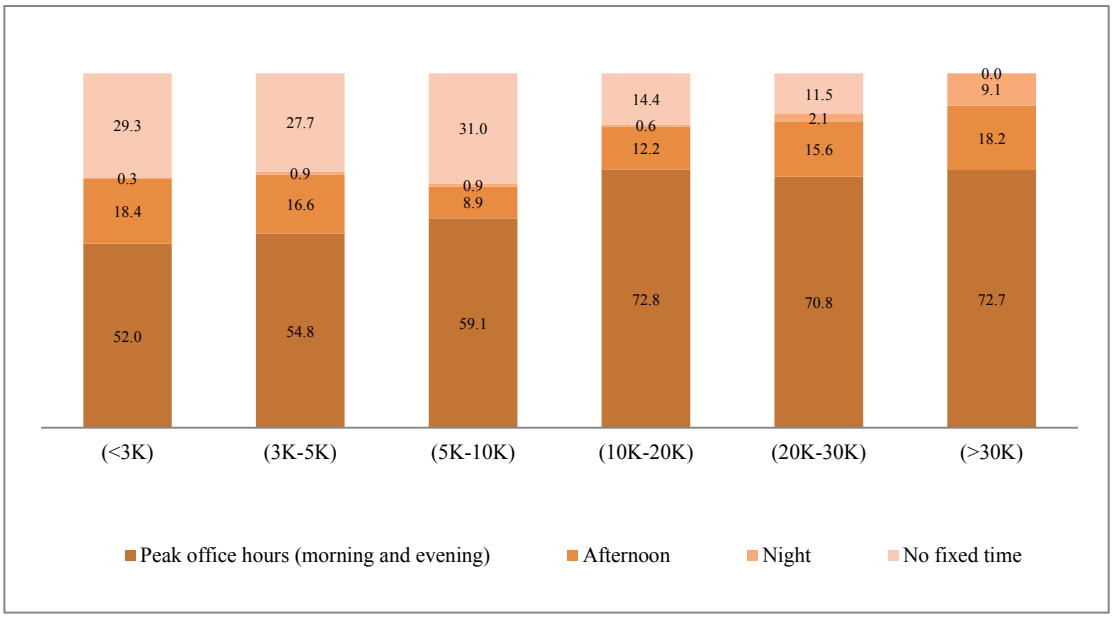
Distribution of travel time by activity status shows that while regular salary earners travel most (76.5%) during peak office hours, retired persons mostly travel as and when required (60.5%). While the unemployed, housewives, business and casual labours mostly travel as per requirement, employers, own account workers, and students mostly travel during peak hours.

Fig 3.41: Distribution (%) of Respondents by Travel Time and Activity Status



The distribution of travel time by expenditure groups shows a clear demarcation. The groups with higher expenditure capability typically travels more during official hours compared with the groups having lower capability. It is observed that 52 per cent of the lowest monthly spending group (<Rs 3,000) travels during peak hours, while around 73 per cent of the highest monthly spending group (>Rs 30,000) travels by train during the same time span.

Fig 3.42: Distribution (%) of Respondents by Travel Time and Expenditure Status

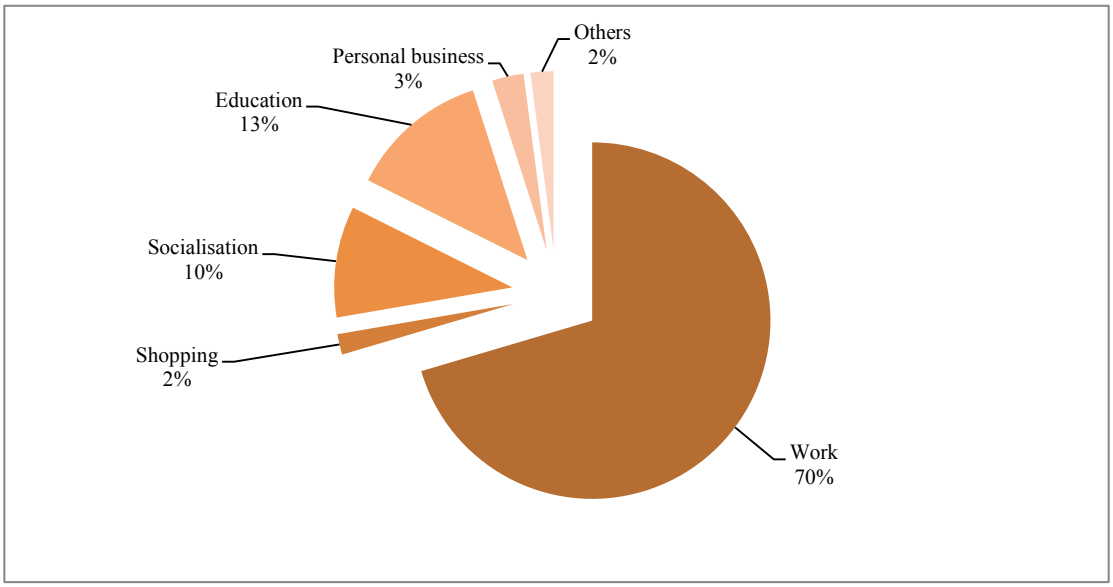


Note: K=1000

3.2.9.8 Purpose of Suburban Travel

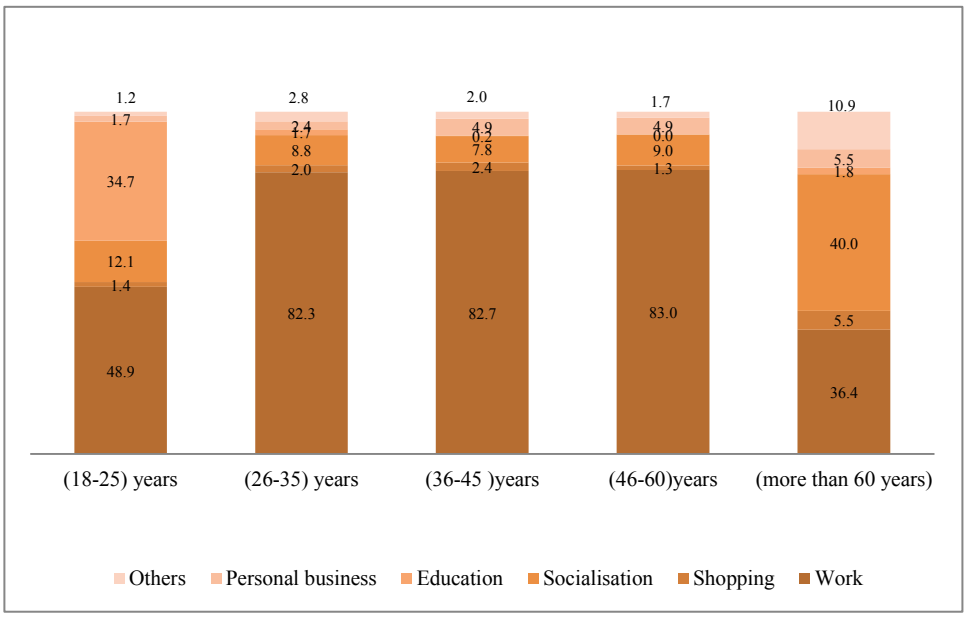
Distribution of the suburban travel by purpose shows that work-related travel is the most important purpose (70%), followed by attending educational institutions (13%), socialisation (10%) and personal business (3%).

Fig 3.43: Distribution (%) of the Suburban Travel by Purpose



Distribution of the purpose of train travel by age group is shown in the following graph. It may be noted that work-related travel is more for the age group ranging from 26 to 60, i.e., the major working age and low in other age-groups. While education is an important purpose of travel for the 18–25 age-group, socialisation (attending friends' /relatives' or social/religious functions, etc.) is important for the older age groups above 60.

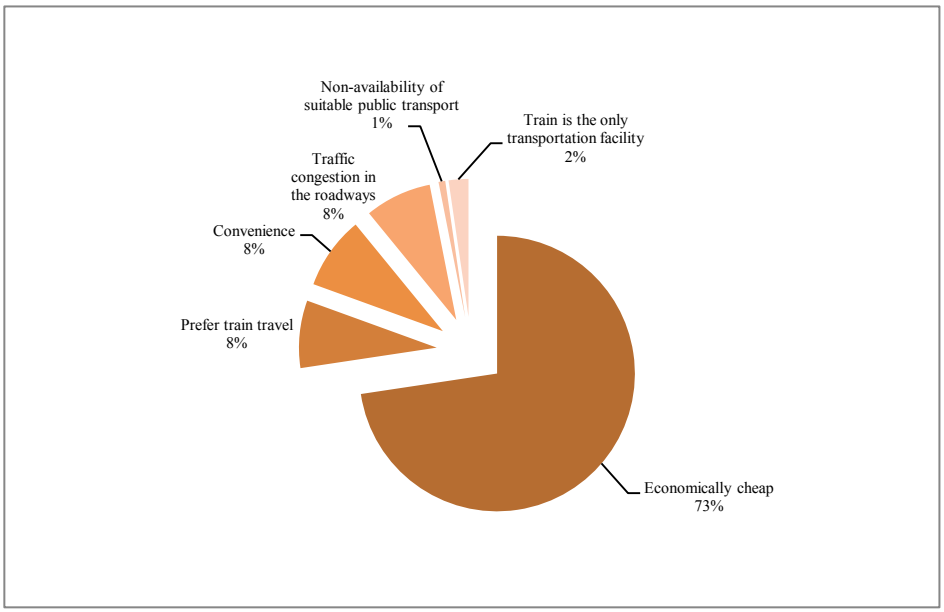
Fig 3.44: Distribution (%) of Respondents by the Purpose of Train Travel and Age-Groups



3.2.9.9 Distribution of Suburban Travel by Reason

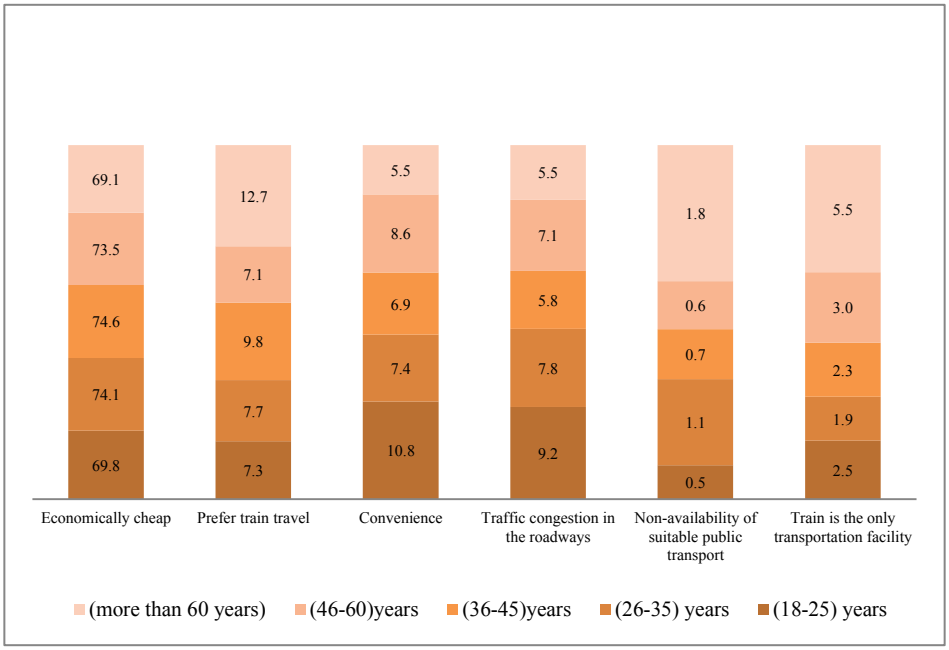
Distribution of the reasons for train travel shows that 73 per cent of the suburban passengers travel chiefly due to economic reasons, 16 per cent travel due to convenience and to avoid traffic congestion in the road.

Fig 3.45: Distribution (%) of the Respondents by Reason for Train Travel



Distribution of the respondent by reasons for train travel by age groups show that majority of them prefers train travel due to the prevailing cheaper rate compared with other modes of transport. Convenience and other factors have little importance.

Fig 3.46: Distribution (%) of Respondents by the Reasons for Travelling by Train and Age-Group



Distribution of the respondent by reasons for train travel by gender too shows that economic reasons are the most important factor of travel across gender. However, for female passengers, convenience is the second-most important factor (12.4%) for travelling by train.

Fig 3.47: Distribution (%) of Respondents by Reasons for Train Travel and Gender

Distribution of the reasons for opting train travel by activity status shows that economic reasons are the most dominant factor for almost all categories with variation and it is the highest for own account workers (almost 80%), followed by regular salary earners (76%). While 17 per cent of housewives accord convenience as the major factor for travelling by train, a little over 21 per cent of the passengers with business says that they travel by train to avoid traffic congestion in the roadways.

Table 3.8: Distribution (%) of the Respondents by Reason for Train Travel and Activity Status

	Economically cheap	Prefer train travel	Convenience	Traffic congestion in the roadways	Non-availability of suitable public transport	Train is the only transportation facility
Own Account Worker	79.7	6.5	4.9	6.0	0.5	2.5
Casual Labour	71.0	13.2	6.3	6.3	0.6	2.8
Regular Salary/wages	76.0	5.5	8.9	7.0	0.8	1.7
Employer	59.9	14.3	11.0	11.5	1.6	1.6
Unemployed	63.6	15.9	7.3	6.6	2.6	4.0
Student	66.5	8.3	10.7	12.1	0.5	1.8
Housewife	55.6	10.7	16.9	9.3	1.3	6.2
Retired	55.8	14.0	14.0	7.0	0.0	9.3
Business	57.9	10.5	10.5	21.1	0.0	0.0

Distribution of respondents by reasons for opting train travel and educational status too shows that economic reasons are the most dominant factor for almost all the categories with

variation and it is the highest for the illiterate (83.3%), followed by the passengers with Higher Secondary background (75%).

Table 3.9: Distribution (%) of Respondent by Reasons for Train Travel and Educational Status

	Economically cheap	Prefer train travel	Convenience	Traffic congestion in the roadways	Non-availability of suitable public transport	Train is the only transportation facility
Illiterate	83.3	2.4	7.1	4.8	0.0	2.4
Primary	66.2	7.7	10.6	9.7	1.0	4.8
Secondary	70.6	12.2	5.8	7.3	0.5	3.6
Higher Secondary	74.9	7.3	8.4	7.2	0.8	1.5
Graduation	73.8	7.6	9.0	7.0	0.7	1.9
Post -Graduation	66.9	10.8	8.9	10.2	1.9	1.3
Graduate Professional	61.1	6.2	11.5	13.7	1.3	6.2
Professional PG	64.4	9.6	8.2	13.7	1.4	2.7
Other	68.4	5.8	10.5	10.0	0.5	4.7

Distribution of train travel by expenditure status shows that economic reasons are the most important factor for all the groups albeit with variations. It is observed that other factors combined are important for the passengers whose monthly expenditure ranges from Rs 20,000 to Rs 30,000.

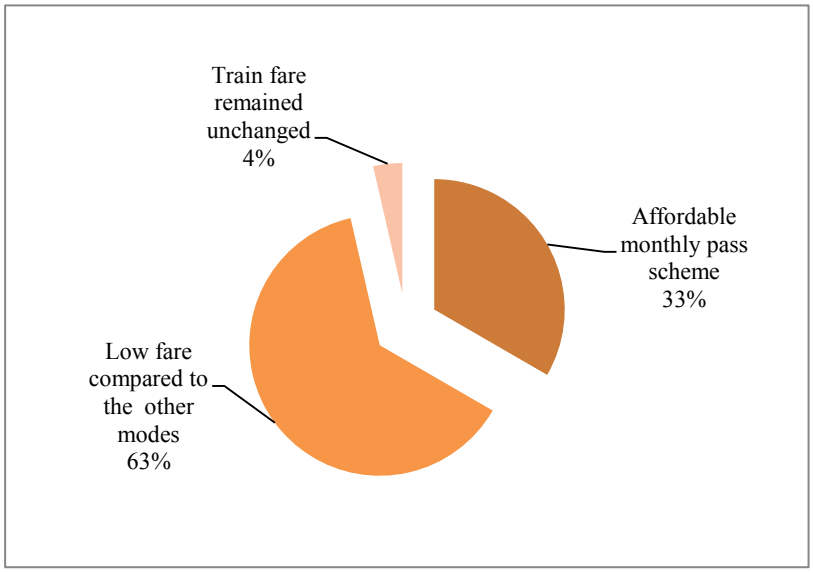
Table 3.10: Distribution (%) of Respondent by Reasons for Train Travel and Expenditure Status

Monthly Expenditure Status (Note: K=Rs. 1000)	Economically cheap	Prefer train travel	Convenience	Traffic congestion in the roadways	Non-availability of suitable public transport	Train is the only transportation facility
(<3K)	68.4	7.1	9.5	9.7	0.6	4.7
(3K-5K)	71.7	5.1	11.1	8.1	0.9	3.1
(5K-10K)	73.2	10.1	7.0	7.7	0.7	1.3
(10K-20K)	79.0	8.1	6.5	5.1	0.8	0.4
(20K-30K)	55.2	15.6	10.4	12.5	2.1	4.2
(>30K)	72.7	18.2	0.0	9.1	0.0	0.0

3.2.9.10 Factors Defining Economic Cheapness of Suburban Travel by Train

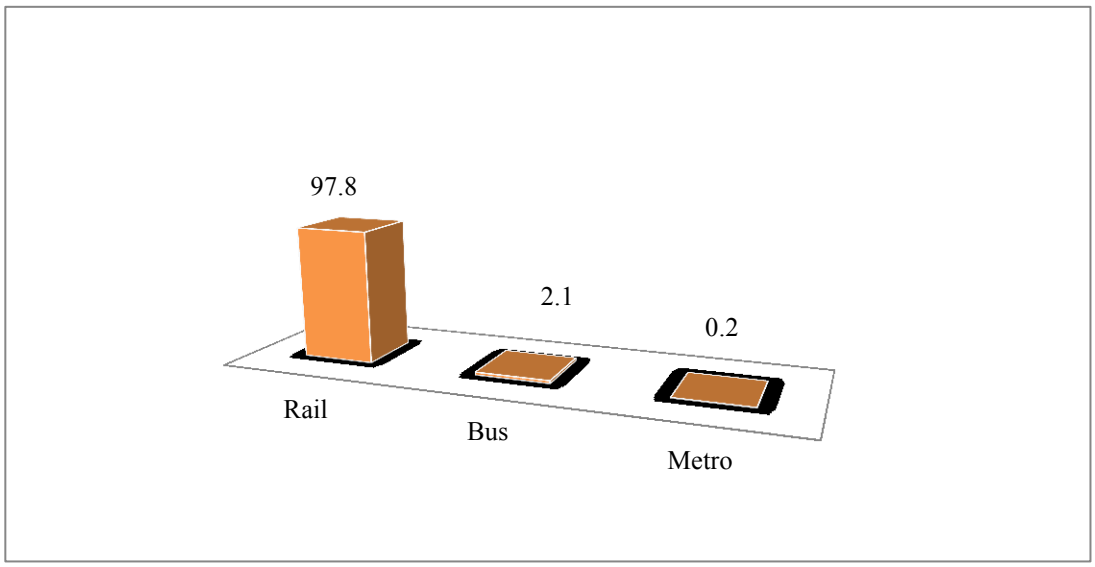
It has already been noted that around 73 per cent of the suburban passengers affirmed that train travel is economically cheap. It is observed that the chief consideration for train travel is its cheaper fare compared with other modes of travel (63%), while affordable monthly pass scheme is second in importance (33%).

Fig 3.48: Distribution (%) of Respondents by Reasons who affirmed Economically Cheap Train Travel



Distribution of the opinion regarding the cheapest mode of transport is heavily loaded in favour of railways. Most of the passengers (97.8%) feel that train journey is cheaper than other comparable modes.

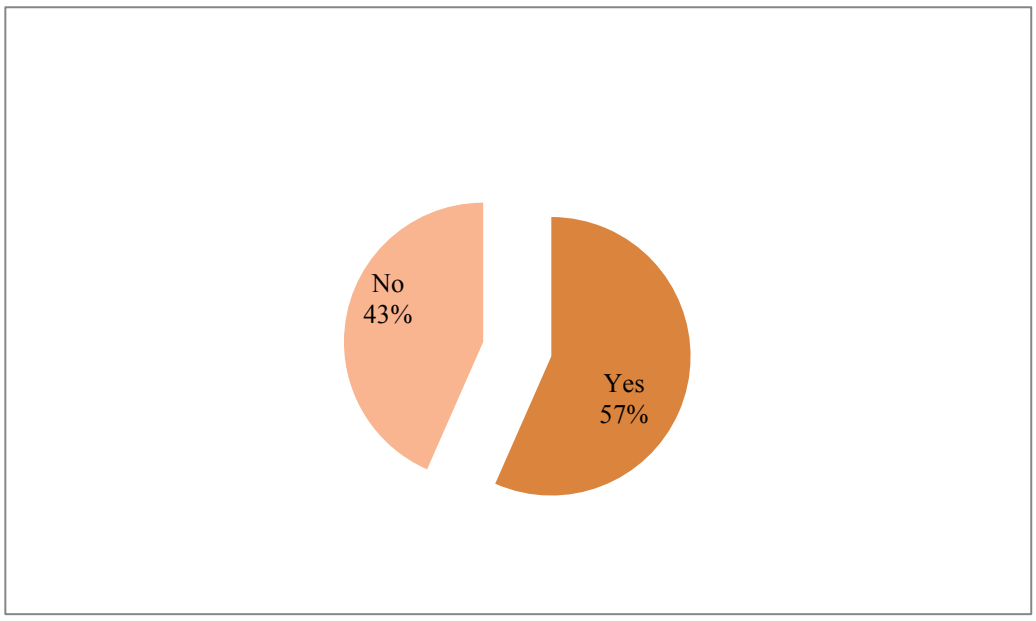
Fig 3.49: Distribution (%) of Opinion of the Suburban Passengers Related to the Cheapest Mode of Transport



3.3. Willingness to Pay: Reasons and Extent[2]

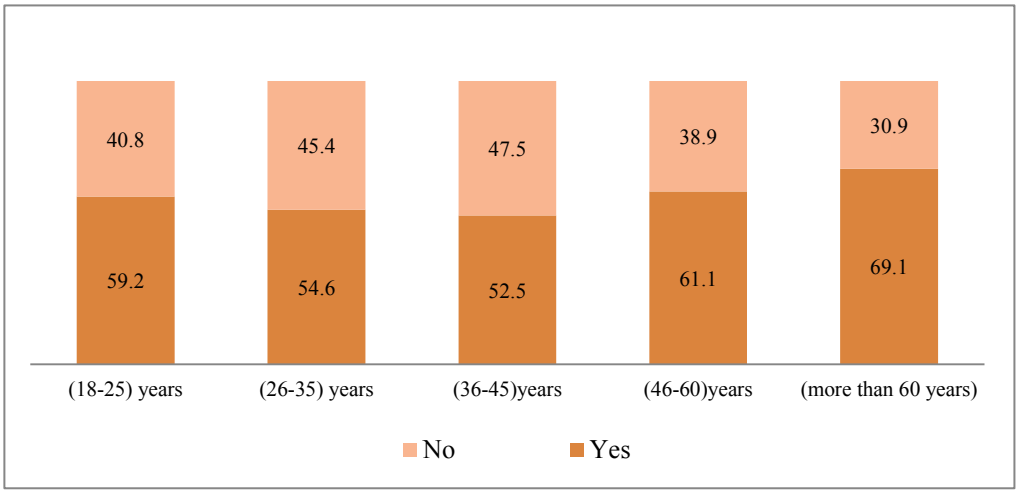
Distribution of the passengers who agree to pay higher fare than the existing one is shown in Figure 3.50. It may be noted that around 57 per cent of the passengers agree to pay a higher fare than the one they are paying now for faster train services.

Fig 3.50: Distribution (%) of the Passengers Who Agree to Pay Higher Fare for Faster Train Services



Distribution of agreement/disagreement on increasing fare for faster train services by age-groups show that more than 60 per cent agree from the higher age-groups, while more than 55 per cent of the age group ranging from 18 to 45 agree for higher fare.

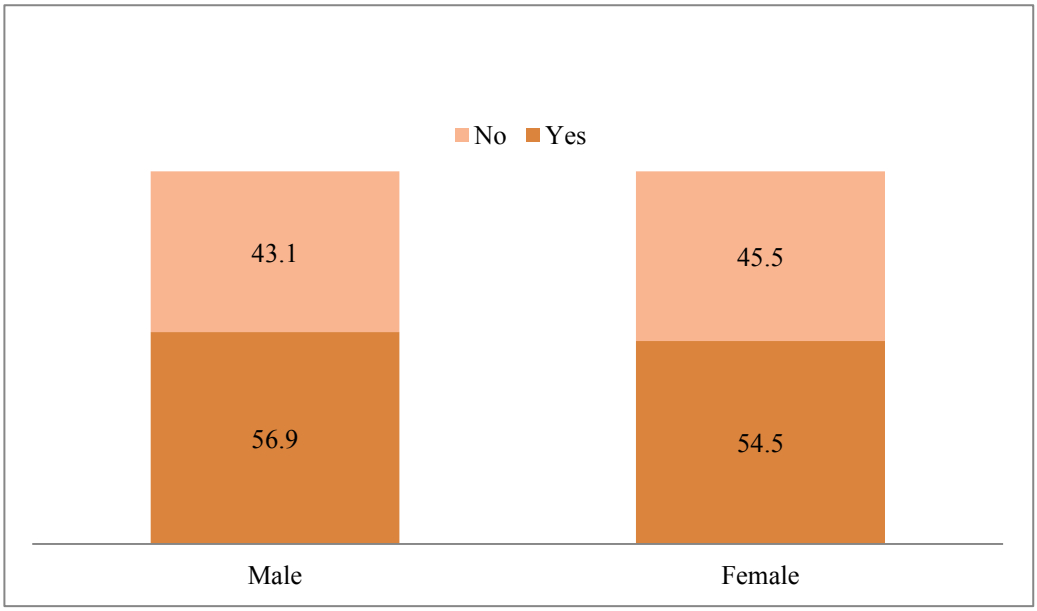
Fig 3.51: Distribution (%) of Agreement/Disagreement on Increasing Fare for Faster Train Services by Age-Groups



[2] See Section 5.4 for technical update on willingness to pay by suburban passengers

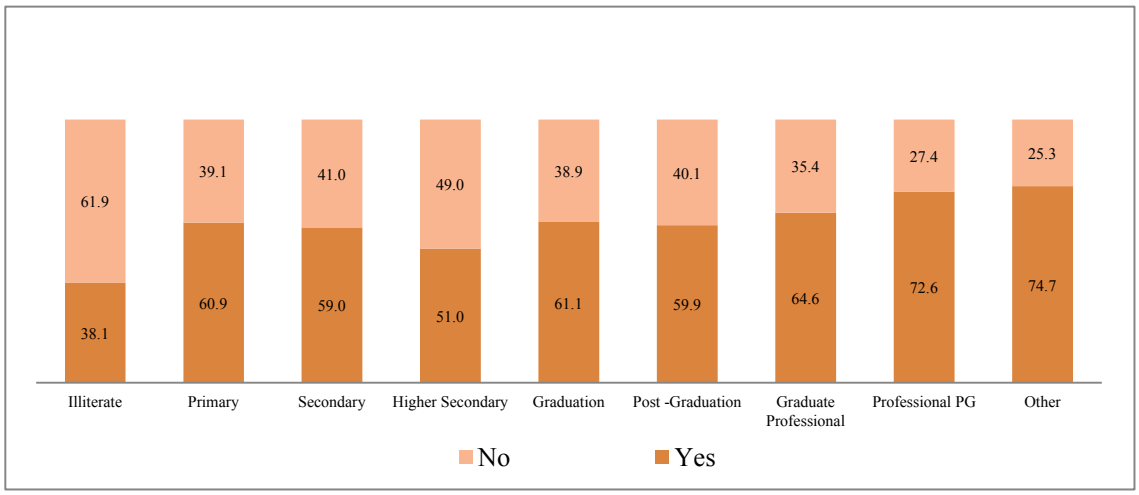
Distribution of agreement/disagreement on increasing fare for faster train services by gender too show that around 57 per cent of male passengers and 55 per cent of female passengers agree for increase in existing passenger fare for faster train services.

Fig 3.52: Distribution (%) of Agreement/Disagreement on Increasing Fare for Faster Train Services by Gender



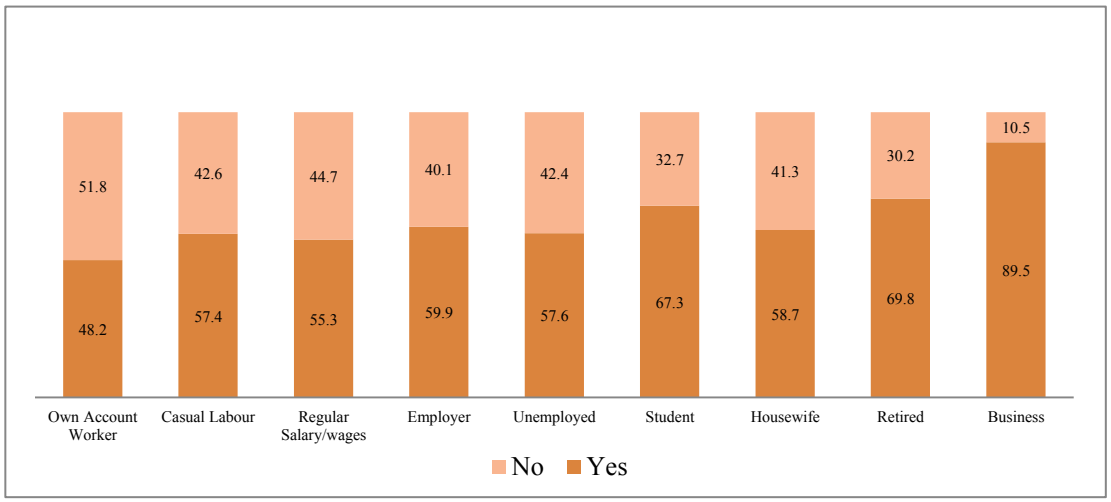
Distribution of agreement/disagreement on increasing fare for faster train services by educational status show that except illiterate, majority of passengers with other educational background agree for increase in existing fare.

Fig 3.53: Distribution (%) of Agreement/Disagreement on Increasing Fare for Faster Train Services by Educational Status



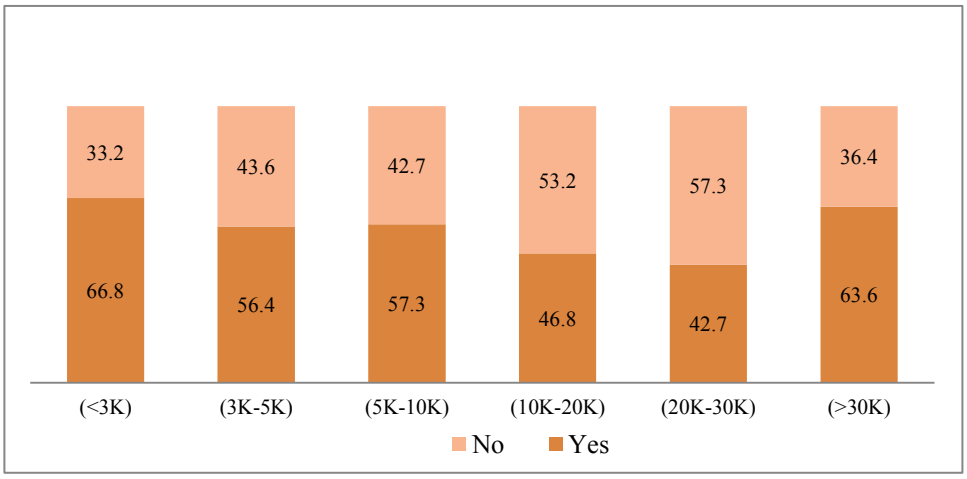
Distribution of agreement/disagreement on increasing fare for faster train services by activity status show that except own account workers, majority of passengers agree to increase in the existing passenger fare for faster train services.

Fig 3.54: Distribution (%) of Agreement/Disagreement on Increasing Fare for Faster Train Services by Activity Status



Distribution of agreement/disagreement on increasing fare for faster train services by expenditure status show that 67 per cent of the passengers even from the lowest expenditure profile agree to increase in the existing passenger fare for faster train services. The lowest agreement (43%) surfaces in the monthly expenditure status of Rs 20,000 to Rs 30,000. However, the percentage of passengers in this expenditure group was relatively small in the total sample (less than 3%). The percentage of passengers in Rs10000-20000 expenditure per month was 23.3 and their disagreement to raising fare for faster services is significant. More than 55 per cent of the respondents in the lowest expenditures categories expressed agreement for higher fares if services are faster.

Fig 3.55: Distribution (%) of Agreement/Disagreement on Increasing Fare for Faster Train Services by Expenditure Status

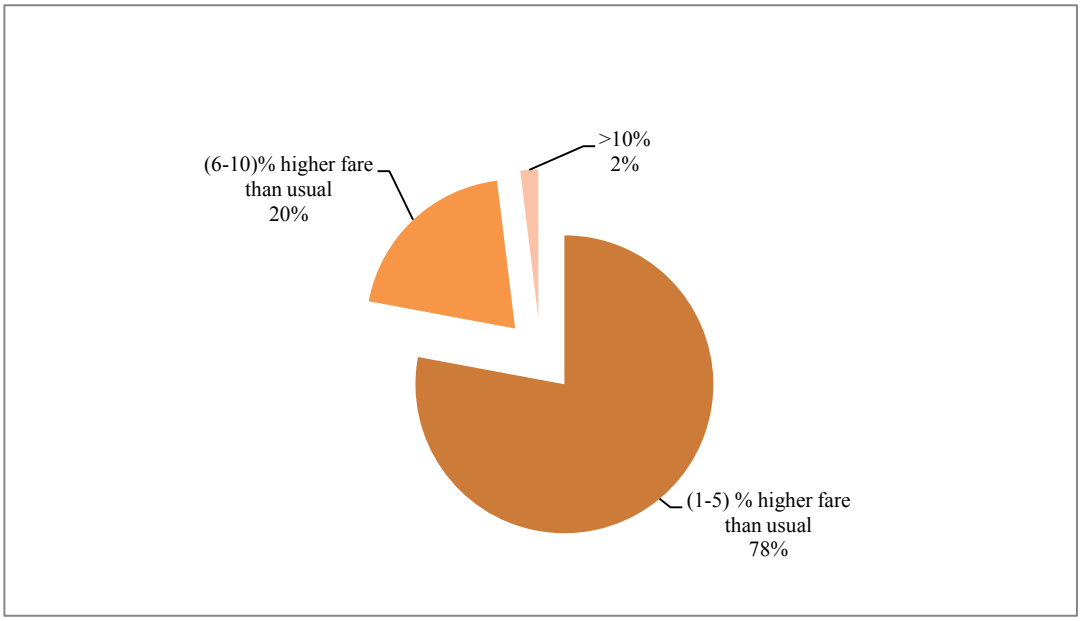


Note: K=1000

3.3.1 Extent of Agreement on Increased Fare

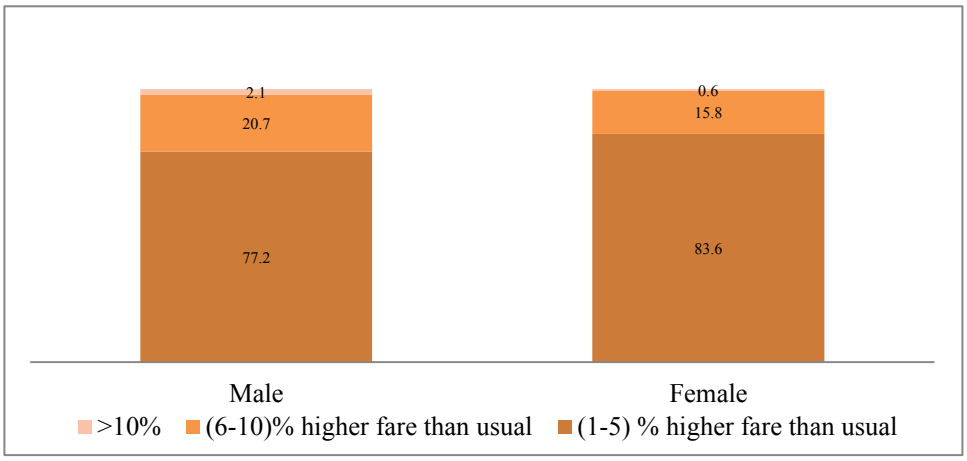
Distribution (%) of passengers on the extent of agreement to higher fare shows that majority of them (78%)find reasons for increase of 1 to 5 per cent in fares, but it is also interesting to note that around 20 per cent agreed for a 10 per cent hike in the existing fare.

Fig 3.56: Distribution (%) of Passengers Regarding the Extent of Agreement to Higher Fare



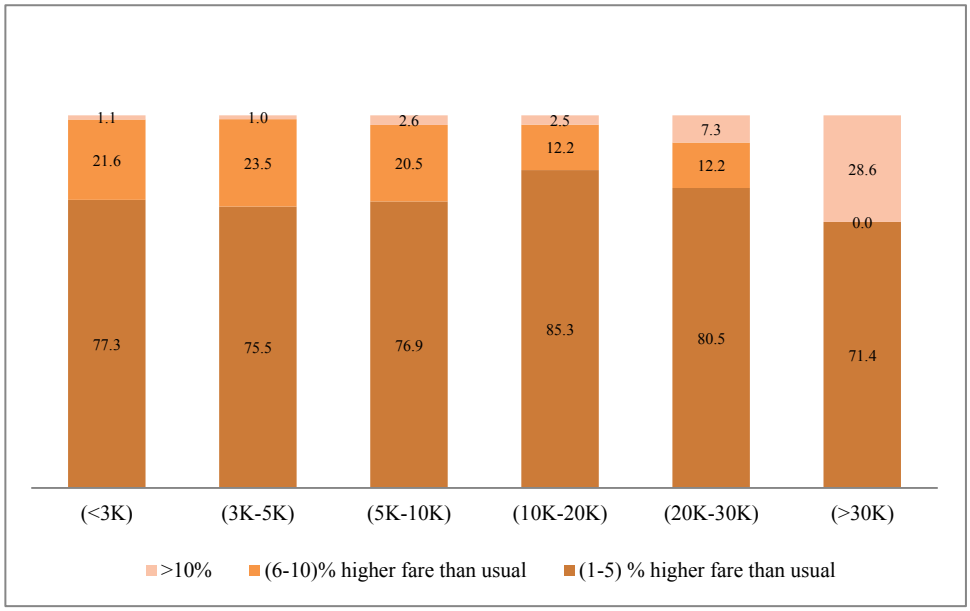
Distribution (%) of passengers on the extent of agreement to higher fare by gender shows that majority of female passengers (84%) prefer 1 to 5 per cent hike in fare, while for the same percentage hike, the proportion of male passengers is 77 per cent. It is also to be noted that around 21 per cent of male and 16 per cent of female passengers favour 6 to 10 per cent hike in existing fare for faster train services.

Fig 3.57: Distribution (%) of Passengers Regarding the Extent of Agreement to Higher Fare by Gender



Distribution (%) of passengers on the extent of agreement to higher fare critically shows that 23 and 24 per cent of the passengers with lowest and lower expenditure profile prefer 6 to 10 per cent hike in existing fare for faster commuting facilities.

Fig 3.58: Distribution (%) of Passengers Regarding the Extent of Agreement to Higher Fare by Expenditure Status

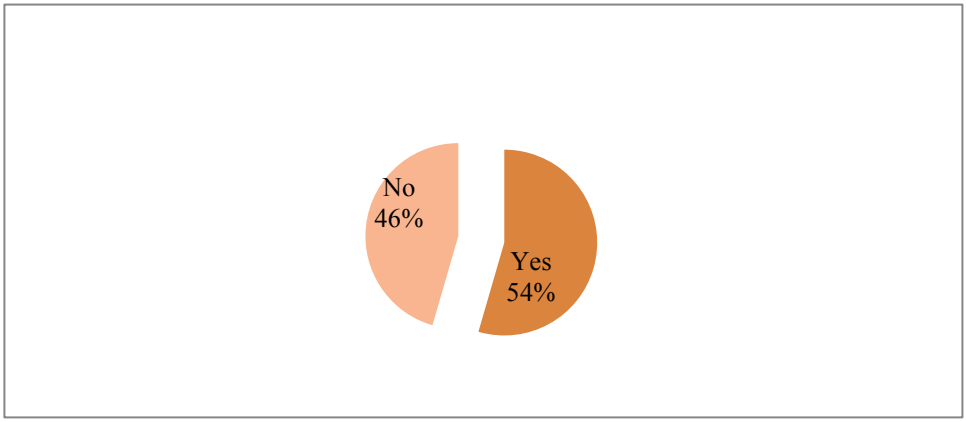


Note: K=1000

3.3.2 Willingness to Pay: Frequent Travel Services

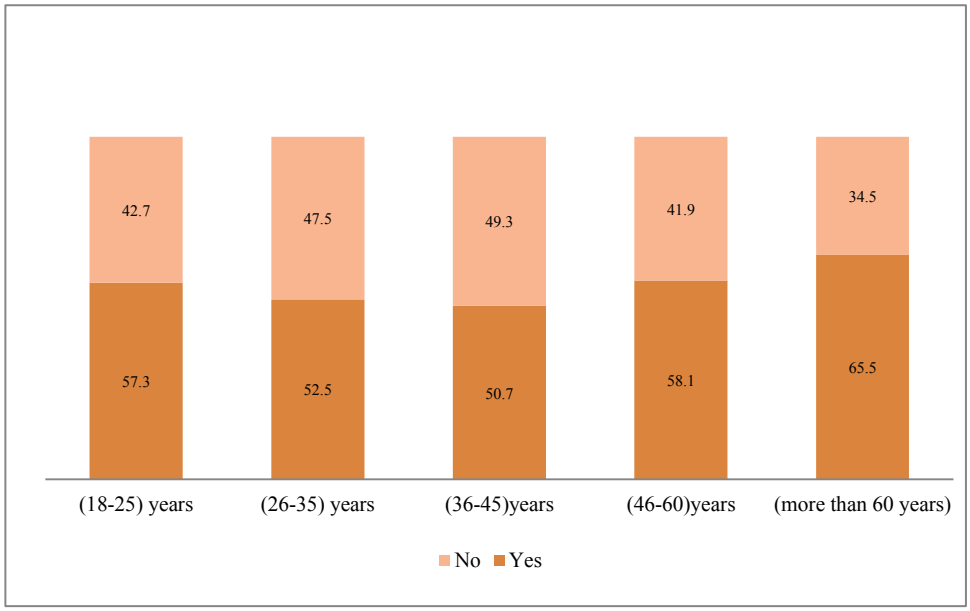
The distribution of passengers willing to pay for more frequent passenger services is shown in Figure 3.59. It is observed that out of the total sample passengers, 54 per cent are willing to pay more.

Fig 3.59: Distribution (%) of Passengers Willing to Pay for Higher Frequency in the Passenger Services



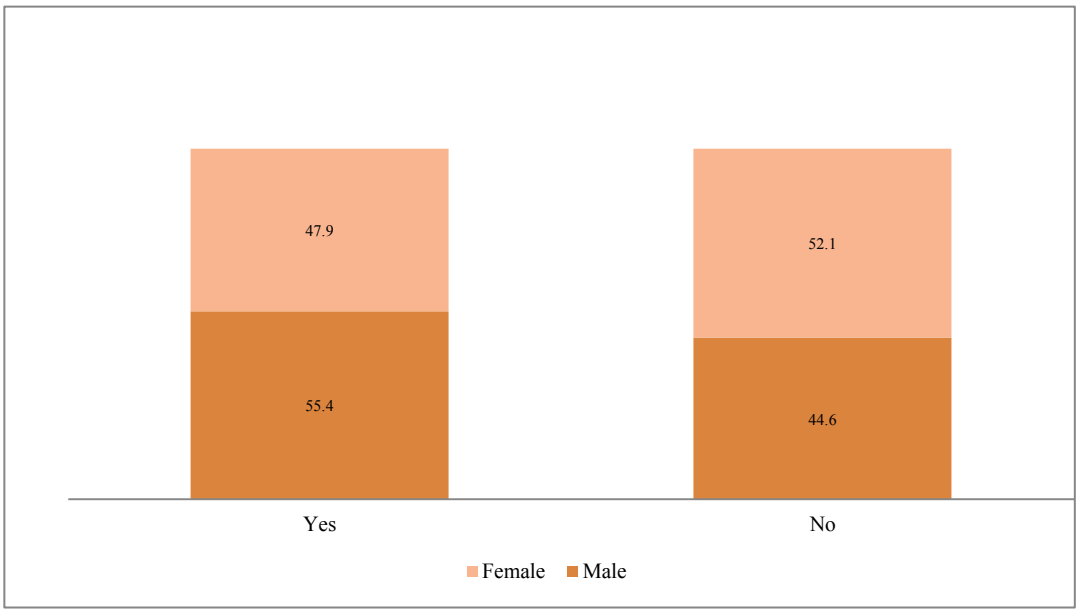
Distribution of willingness to pay by age group shows that relatively older passengers are more agreeable (66%) to pay higher fare than younger ones for higher frequency of passenger services.

Fig 3.60: Distribution (%) of Passengers Willing to Pay More for Higher Frequency of Passenger Services by Age-Group



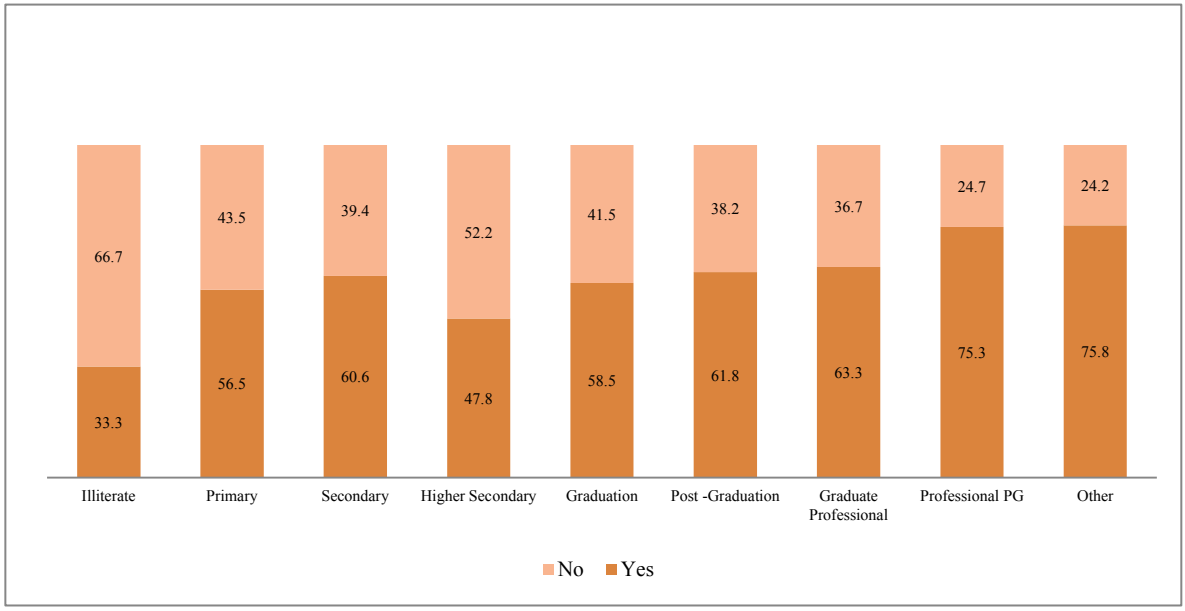
Distribution of willingness to pay by gender shows that over 55.4 per cent of the male passengers agree to pay higher fare than females for higher frequency of the passenger services.

Fig 3.61: Distribution (%) of Passengers Willing to Pay More for Higher Frequency of Passenger Services by Gender



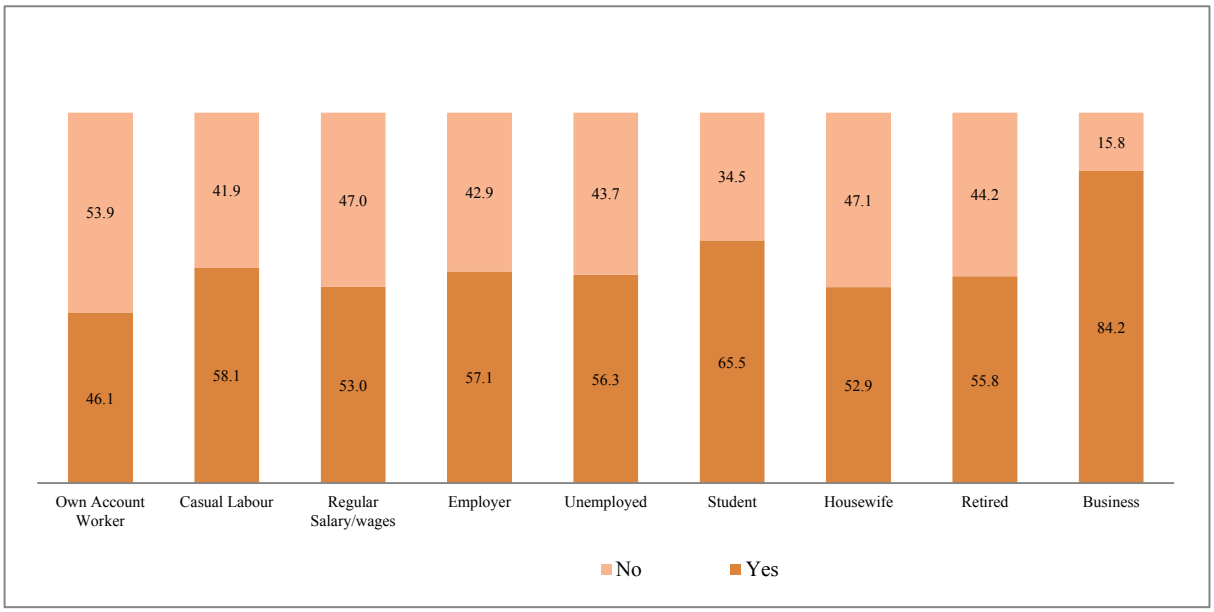
Distribution of passengers agreeable to pay more for higher frequency of train services by educational status show variations. While less of illiterate and Higher Secondary are willing to pay more, more of other groups (including Primary) are agreeable to higher fare for higher frequency of passenger services.

Fig 3.62: Distribution (%) of Passengers Willing to Pay More for Higher Frequency of Passenger Services by Educational Status



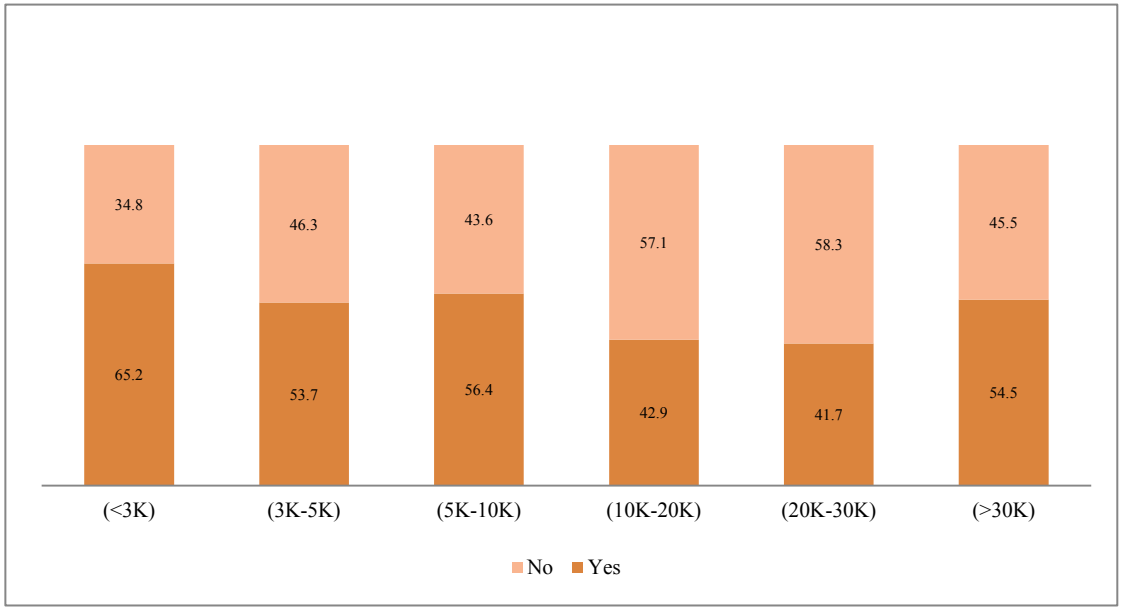
Distribution of passengers agreeable to pay more for higher frequency of train services by activity status show business (84.2%), followed by students (65.5%) are willing to pay more. However, it is interesting to note even passenger belonging to casual labour group (58.1%) are agreeable to higher fare for higher frequency of passenger services.

Fig 3.63: Distribution (%) of Passengers Willing to Pay More for Higher Frequency of Passenger Services by Activity Status



Distribution by expenditure status shows that more than 65 per cent of passengers with the lowest expenditure status are willing to pay more for higher frequency of passenger services. The result is startling and shows that poor passengers are in dire need of better services for which they are even ready to spend more.

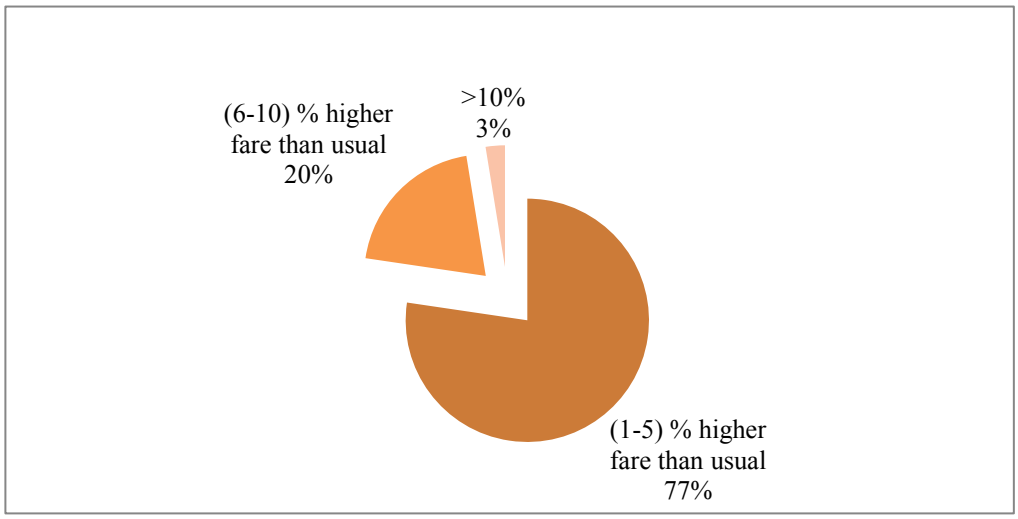
Fig 3.64: Distribution (%) of Passengers Willing to Pay More for Higher Frequency of Passenger Services by Expenditure Status



3.3.3 Extent of the Willingness to Pay for Frequent Travel Services

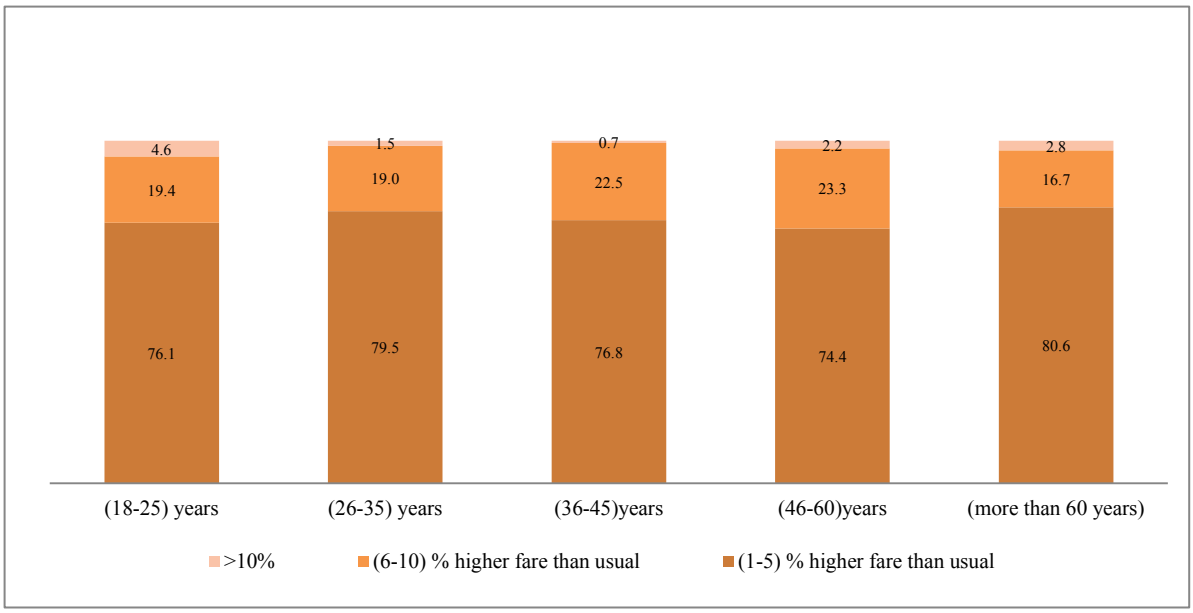
Seventy seven per cent of the passengers willing to pay more for frequent passenger services by IR (54.5%), have favoured 1 to 5 per cent increase in the existing passenger fare, while 20 per cent accepted a 6–10 per cent increase in the same. Around 3 per cent of the suburban passengers are ready to pay even 10 per cent over and above the existing fare.

Fig 3.65: Distribution (%) of the Extent of the Willingness to Pay for Higher Frequency Passenger Services



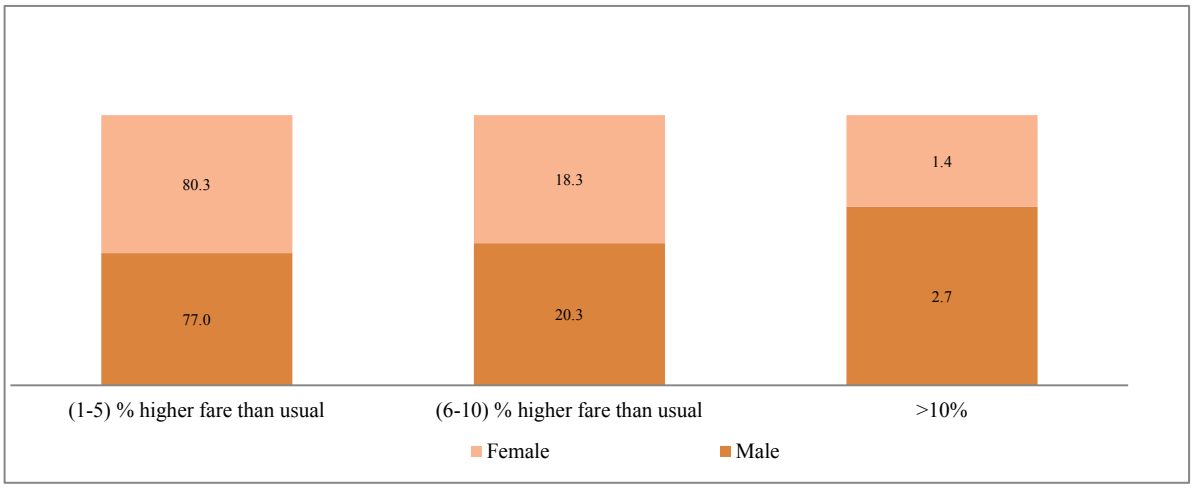
Passengers willing to pay more for frequent passenger services by age groups show diverse variations. While 81 per cent of the older age group (more than 60 years) agree 1 to 5 per cent hike, around 5 per cent of the younger age group even approve over 10 per cent increase in fare.

Fig 3.66: Distribution (%) of the Extent of the Willingness to Pay for Higher Frequency Passenger Services by Age Groups



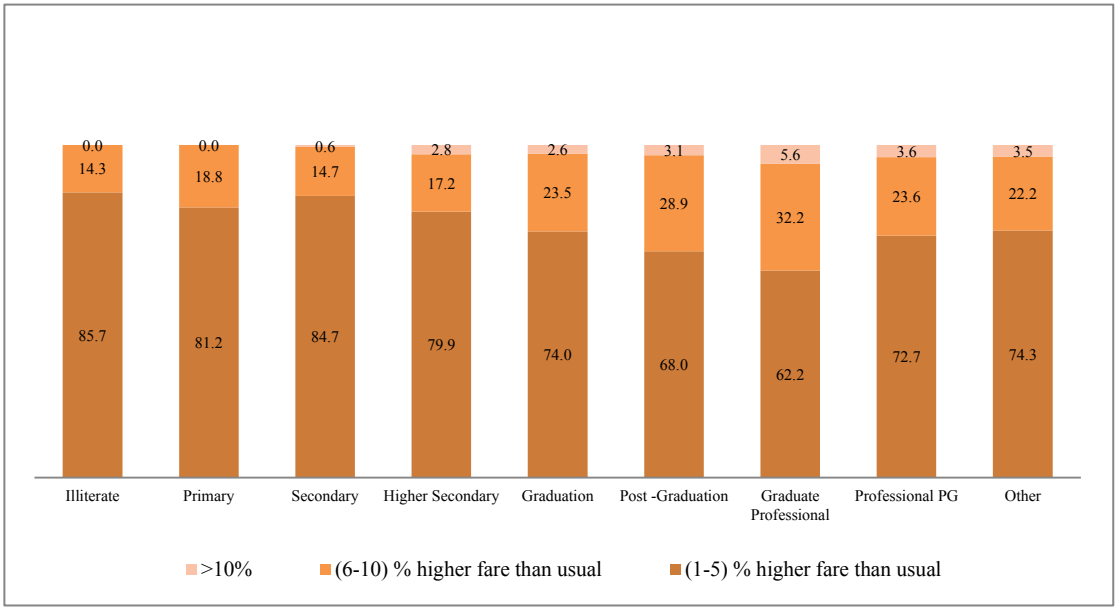
Passengers willing to pay more for frequent passenger services by gender, too show variations. While 80 per cent of female passengers agree to 1 to 5 per cent hike, around 20 per cent of the male passengers approve 6 to 10 per cent increase in fare.

Fig 3.67: Distribution (%) of the Extent of the Willingness to Pay for Higher Frequency Passenger Services by Gender



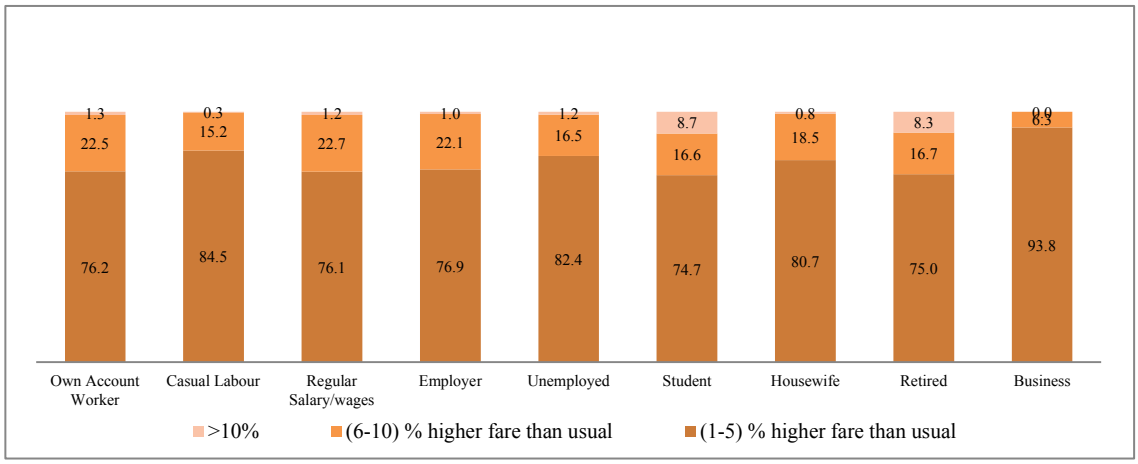
Passengers willing to pay more for frequent passenger services by educational status show different variations. While 87 per cent of passengers with no formal education agree to 1 to 5 per cent hike, a little over 32 per cent of the graduate professionals approve 6 to 10 per cent increase in fare.

Fig 3.68: Distribution (%) of the Extent of the Willingness to Pay for Higher Frequency Passenger Services by Educational Status



Passengers willing to pay more for frequent passenger services by activity status too show variations. While 84.5 per cent of casual labours agree to 1 to 5 per cent hike, 23 per cent of the regular job holders approve 6 to 10 per cent increase in fare.

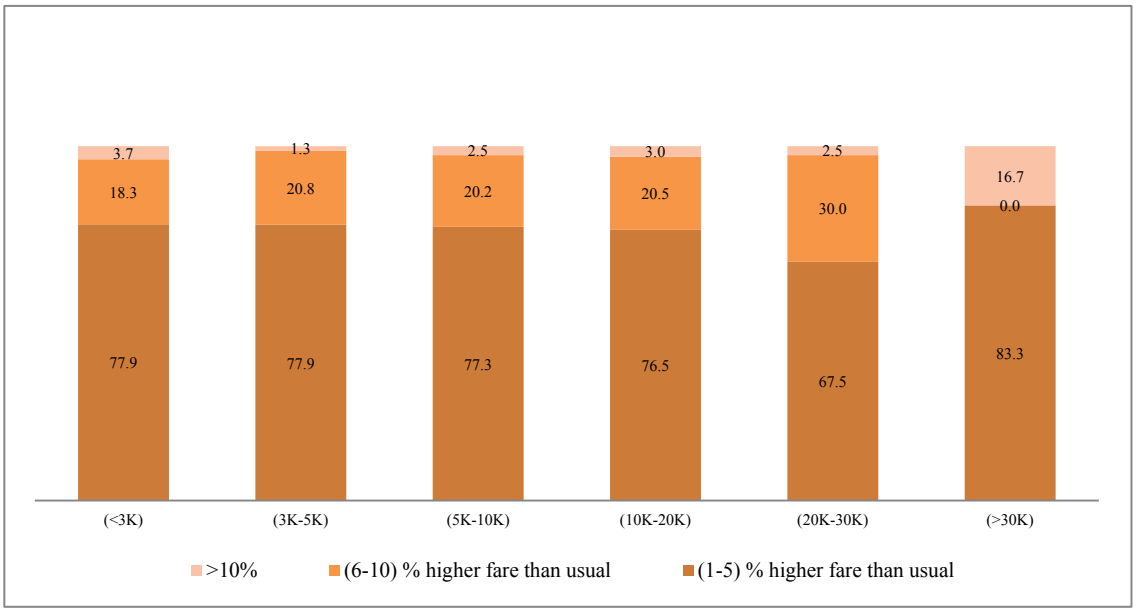
Fig 3.69: Distribution (%) of the Extent of the Willingness to Pay for Higher Frequency Passenger Services by Activity Status



Passengers willing to pay more for frequent passenger services by expenditure status show while 78 per cent of the passengers with lowest monthly expenditure agree to 1 to 5 per cent

hike, 17 per cent of the passengers with highest monthly spending capability approves even more than 10 per cent increase in fare.

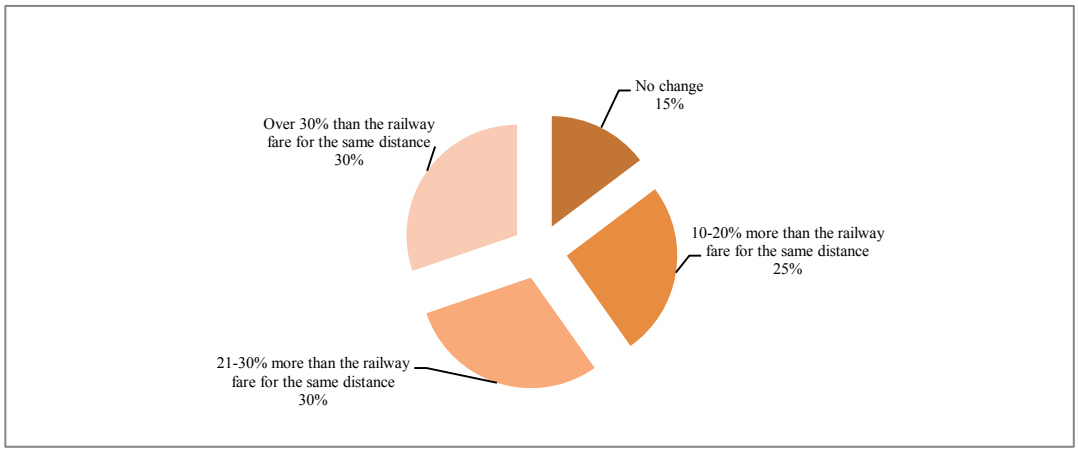
Fig 3.70: Distribution (%) of the Extent of the Willingness to Pay for Higher Frequency Passenger Services by Expenditure Status



3.3.4 Impact of Non-availability of Train Services

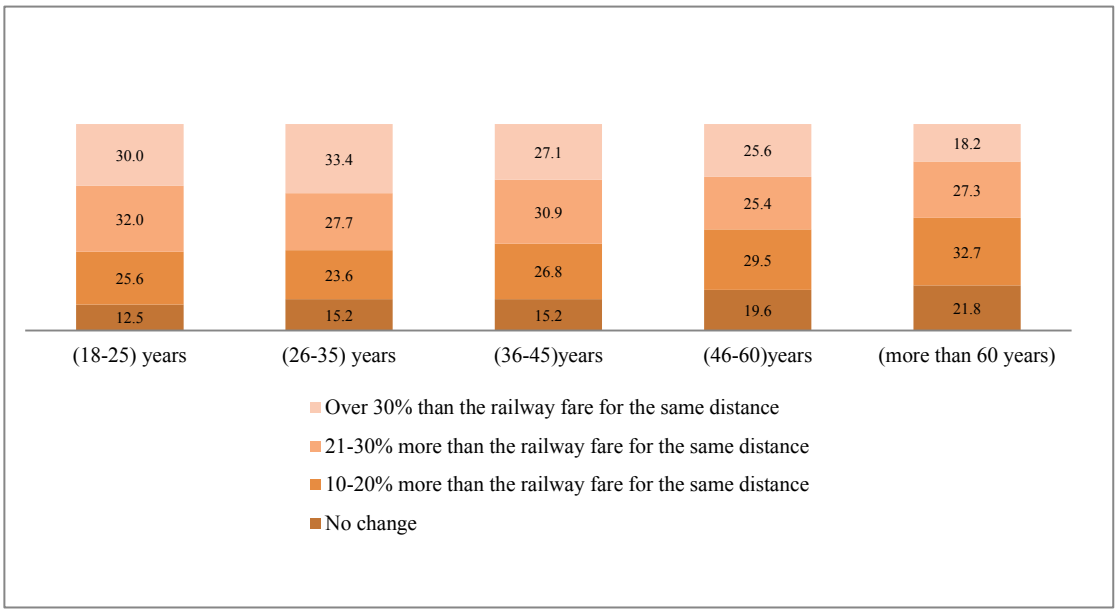
Distribution of the responses of passengers in the event of non-availability of train services show that 85 per cent of passengers are affected and have to pay varied amount to avail other forms of transportation services. Around 25 per cent of the sample passengers pay 10 to 20 per cent more, while 30 per cent pay 20 to 30 per cent more and another 30 per cent of the passengers pay even more than 30 per cent.

Fig 3.71: Distribution (%) of Passengers Regarding Impact on their Transportation Expenditure when Train Services is not Available



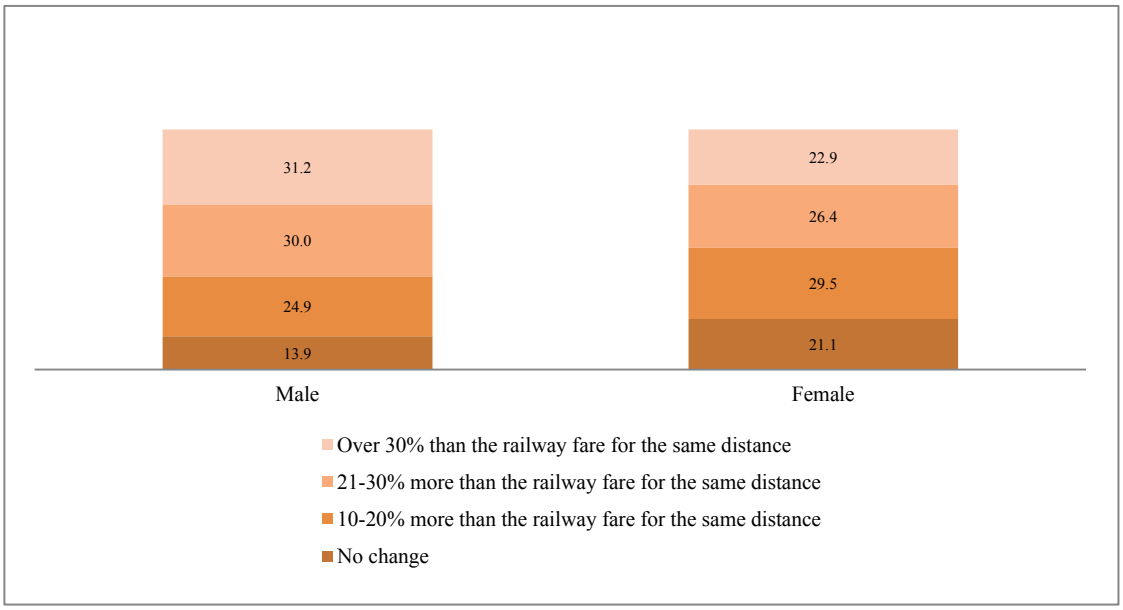
Distribution by age groups shows that the impact of non-availability of train services is more for the younger age groups than the older ones. It is observed that over 33 per cent of the 26–35 age-group pay more than 30 per cent for the same distance they travel by train.

Fig 3.72: Distribution (%) of Passengers by Age-Groups Regarding Impact on their Transportation Expenditure when Train Services are Disrupted



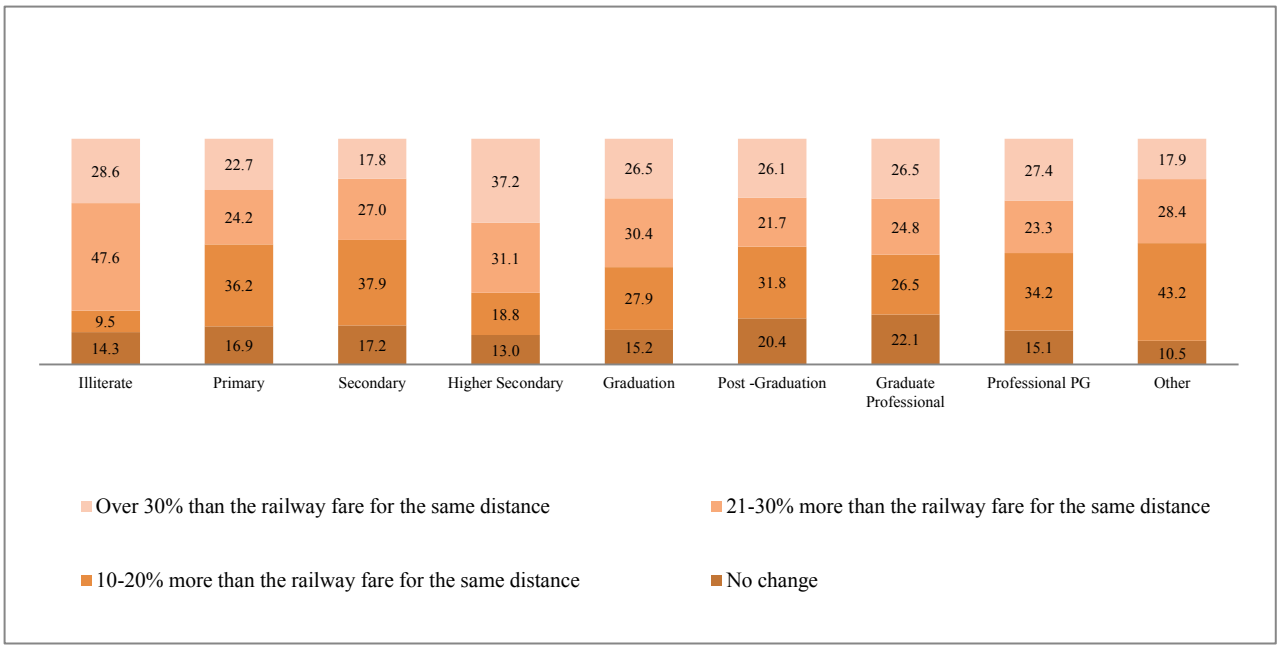
Distribution by gender shows that the impact of non-availability of train is more for the male passengers than the female ones. Around 86 per cent of the male passengers have to pay more in varied amounts to cover the same distance by train.

Fig 3.73: Distribution (%) of Passengers by Gender Regarding Impact on their Transportation Expenditure when Train Services are not available



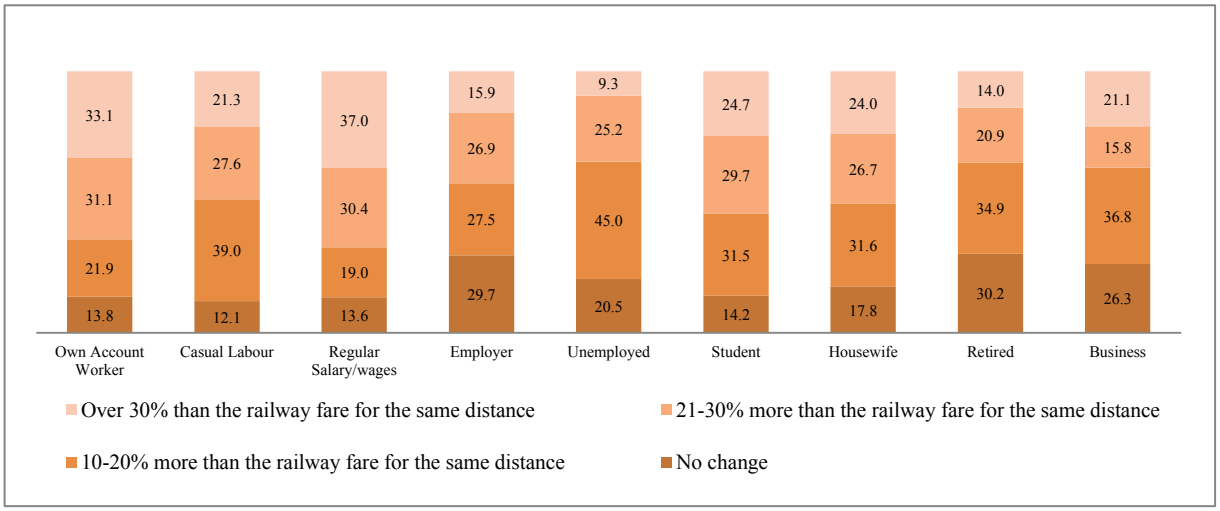
Distribution by educational status shows that the impact of non-availability of train services is relatively less for post-graduate and professional degree holders. It may be observed that the illiterate passengers and those with Higher Secondary seem to have the highest impact.

Fig 3.74: Distribution (%) of Passengers by Educational Status Regarding Impact on their Transportation Expenditure when Train Services is not available



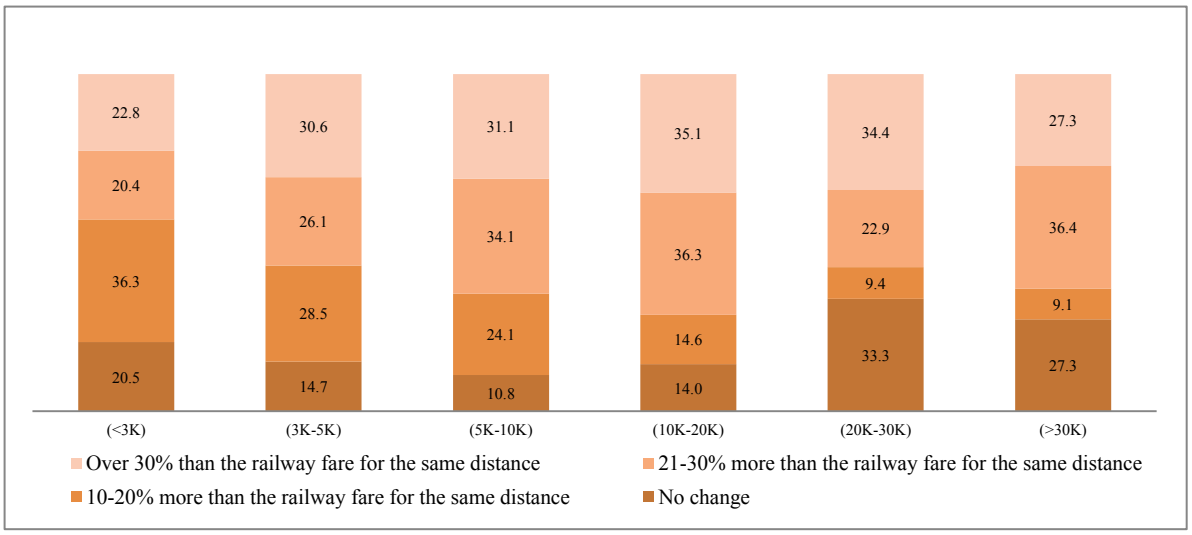
Distribution by activity status shows that non-availability of railway passenger services have the sharpest impact on own account workers, casual labour, regular job holders, and students compared with passengers associated with other activities. Employers, business people and retirees are observed to have been least impacted.

Fig 3.75: Distribution (%) of Passengers by Activity Status Regarding Impact on their Transportation Expenditure when Train Services is not available



Distribution by expenditure status shows that non-availability of railway passenger services has the harshest impact on middle class passengers (monthly spending ranging from Rs 3,000 to Rs 20,000) and relatively less for the well-to-do segments.

Fig 3.76: Distribution (%) of Passengers by Expenditure Status Regarding Impact on their Transportation Expenditure when Train Services is not available



3.3.5 Distribution of the Response of the Suburban Passengers on Service Indicators[3]

The quality of services is an important consideration for travel. Figure 3.77 elaborates the distribution of passengers' responses on various service indicators. It may be noted that passengers are mostly satisfied with overall services but have shown steep dissatisfaction with regard to frequency of the availability of trains and safety/security of railway passenger services for suburban travel.

Fig 3.77: Overall Distribution (%) of the Passenger's Responses on Service Indicators

[3] See Section 5.5 for technical update on suburban passengers' response on performance indicator

3.3.6 Overall Implications of the finding from the Suburban Survey

It is important to note that railway has a big task ahead to improve the quality of service, especially with regard to frequency and safety and security of passengers and luggage. Passengers are willing to accommodate higher fare as they want a vibrant and better railway service. Railway is the first best option compared with other modes of transportation in terms of affordable rate structure. General passengers are least bothered about insulation of rate; rather they compare the same in a comparative framework with other modes.

4. Non-Suburban Services: Station Based /On-board Survey

4.1 General Objective of the Survey of Non-suburban Passengers

The passengers' survey initiated by NCAER at suburban level was extended to cover non-suburban passengers as well. The survey followed two strategies. The station-based survey was aimed at passengers at entry and exit at the stations on a random basis, while on-board survey selected passengers on a random basis in a running train. The objective of the survey was almost the same as the survey of suburban passengers, in which, apart from general profiling, the questionnaire was designed to know the willingness of passengers to pay higher fare and their general views regarding the passenger services of IR.

4.2 Background Context to the Non-suburban Survey

As already mentioned, IR has 16 zones with 67 divisions. The zones and their headquarters and divisions are given in Table 4.1.

Table 4.1: Railway zones, Headquarters and Divisions

Railway Zones	Headquarters	Divisions
Northern	Delhi	Ambala, Delhi, Firozpur, Lucknow, Moradabad
Southern	Chennai	Chennai, Madurai, Palghat, Tiruchirapalli, Trivandrum
South Central	Secundrabad	Guntakal, Guntur, Hyderabad, Nanded, Secundrabad, Vijayawada
Western	Mumbai	Ahmedabad, Baroda, Bhavnagar, Mumbai, Rajkot, Ratlam
East Central	Hajipur	Danapur, Dhanbad, Mugalsarai, Samastipur, Sonpur
North Eastern	Gorakhpur	Izzatnagar, Lucknow, Varanasi
Central	Mumbai	Bhusawal, Mumbai, Nagpur, Pune, Solapur
North Central	Allahabad	Agra, Allahabad, Jhansi
South Western	Hubli	Bangalore, Hubli, Mysore
Eastern	Kolkata	Asansol, Howrah, Malda, Sealdah
North Western	Jaipur	Ahjmer, Bikanir, Jaipur, Jodhpur
South Eastern	Kolkata	Adra, Chakradharpur, Karagpur, Ranchi
West Central	Jabalpur	Bhopal, Jabalpur, Kota
South East Central	Bilaspur	Bilaspur, Nagpur, Raipur
Northeast Frontier	Guwahati	Alipurduar, Katihar, Lumding, Rangia, Tinsukia
East Coast	Bhubaneswar	Khurda Road, Sambalpur, Waltair
Source: Indian Railway		

For FY 2010–11, the top 20 stations in terms of number of passengers dealt with and total earnings are as follows (Table 4.2):

Table 4.2: Percentage distribution of the top 20 stations of the Indian Railways on the basis of number of passengers dealt and total earnings

Time period :- 01-04-2010 to 31-03-2011			
Sno.	**Station**	**Total Passengers (%)**	**Total Earning (%)**
1	New Delhi	15.11	19.05
2	Howrah	9.84	9.47
3	Chennai Central	8.35	7.28
4	Bangalore Central	5.93	5.28
5	Secundrabad Jn.	5.70	5.00
6	Mumbai Chhatrapati Shivaji Terminus	5.33	5.52
7	Delhi	5.05	3.68
8	Nizamuddin	5.02	7.01
9	Chennai Egmore	4.60	3.13
10	Ahmedabad	4.58	4.11
11	Pune	4.03	3.48
12	Lokmanya Tilak Terminus (Kurla)	3.53	4.15
13	Patna Jn.	3.35	3.38
14	Bandra Terminus	3.11	3.04
15	Lucknow	2.98	2.51
16	Jammu Tawi	2.92	3.57
17	Mumbai Central	2.70	3.65
18	Surat	2.68	2.03
19	Varanashi Junction	2.60	2.32
20	Jaipur	2.59	2.34
Source: Indian Railway			

The list of top 20 stations include two stations in Chennai (Chennai Central, Chennai Egmore), three stations in Delhi (New Delhi, Delhi, Nizamuddin), and four stations in Mumbai (Mumbai Chhatrapati Shivaji Terminus, Lokmanya Tilak Terminus, Bandra Terminus, and Mumbai Central). The survey was decided to be conducted on only one station representing a particular geographical location. While selecting the sample stations, we have attempted to ensure at least one headquarters or division of each of the zones is included for the sake of representativeness of the entire country.

Keeping in view the sampling strategy of representing at least one division of each of the 16 zones, the following 15 stations (non-suburban train services) was part of the station-based survey (Table 4.3).

Table 4.3: Station-based Survey Covering Non-suburban Train Services: A Sample of 15 Stations

S no.	Station
1	New Delhi
2	Howrah
3	Chennai Central
4	Bangalore Central
5	Secundrabad Jn.
6	Mumbai Chhatrapati Shivaji Terminus
7	Ahmedabad
8	Jammu
9	Patna Jn.
10	Lucknow
11	Bhopal
12	Jaipur
13	Guwahati
14	Bilaspur
15	Bhubaneswar
Source: NCAER survey for Indian railways, 2012	

The list of twenty trains selected randomly by the railway board officials for the on-board survey is the following (Table 4.4):

Table 4.4: List of Trains for the On-board Survey Covering at least Three Zones

Patronised		**Poorly patronised**	
Train number	Train name	Train number	Train name
2308	Jodhpur Howrah Express	58113	Tata Bilaspur Passenger
11015	Kushinagar Express	13251/52	Islampur Rajender Nagar Bihar Express
12296	Patna- Chennai Express	18209/10	Dalli Rajhara Raipur Express
12138	Punjab Mail	59803	Nagda Kota Passenger
12622	Tamil Nadu Express	14323/24	Rohtak New Deli Express
12780	Goa Express	58221/58222	Chirmiri Chandia Road Passenger
12321	Howrah Mumbai Superfast	13409/10	Bhagalpur Maldatowm Int Exp
12863	Howrah Bangalore Express	58835	Nagpur Rmo Chhindwara Passenger
12142	Rjpb- Cstm Express	51445/46	Miraj Pandharpur Passenger
18237	Chattisgarh Express	59459	Veraval Passenger
16381	Kanyakumari Express	52575	Agartala Dharma Nagar Passenger
12149	Pune-Patna Express	58832	Chinddwara Nagpur Passenger
11071	Kamyani Express	19328	Chittaur Ratlam Exp
16032	Andaman Express	54701/02	Bhatinda Lalgarh Passenger
15609	Awadh Assam Express	13421/22	Nabadip Dham New Farakka Exp
22308	Bkn Hwh Express	19572	Porbandar Rajkot Express
2618	Nzm Ers Mangla Express	13233/34	Rajgariha Express
12515	Tvc-Ghy	13053/54	Howrah Siuri Express
11020	Bbs-Bct	53140	Chittranjan Kolkata Passenger
12163	Dr-Ms	53046	Mayurakshi F Passenger

While carrying out the survey, however, the given list of trains was not always strictly maintained and sometimes some deviation took place depending on the availability and coverage of trains. The coverage of passengers per day distributed over the train timings and sample across class of travel was based on information on distribution of tickets by class in the station. We have a sample of 7500 passengers in the station-based survey for the non-suburban travel. The range of information collected includes socio-economic characteristics of the passengers and their responses to services and tariff. The sample design is multi-stage random. The stages are (a) stations, (b) trains as reflected by coverage, and finally (c) passengers.

4.3 Non-Suburban Services: On-board Passenger Survey

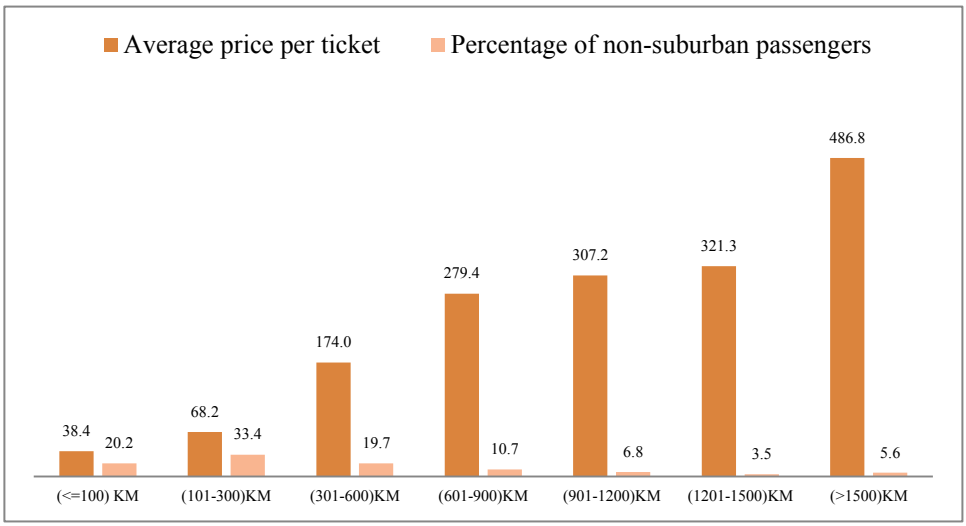
In order to supplement the station-based survey, NCAER has also covered passengers of one train per station in a day. The interviewers and a supervisor travelled in the train for a reasonable distance and tried to interview the passengers on a range of services, tariffs, and their socio-economic backgrounds. Facilitation of the survey by the railway officials was very critical for the conduct of the survey.

On an average in each station we had identified three trains that pass through the station in a day for the survey of passengers who may be using that station for departure. It was attempted to include trains that cover at least two or three railway zones. Sections starting from 4.4 elaborate the survey findings for the non-suburban passengers. The analysis combines both the results for station-based and on-board survey.

4.4 Survey of Non-suburban Passengers: General Profiles

Reported average price per ticket and the percentage of sample passengers covering range of distances are elaborated in Figure 4.1. It may be noted that more than 50 per cent of the sample passengers of non-suburban travel is concentrated in the distance up to 300 km. It may be noted that the minimum distance recorded in the non-suburban travel is 3 km, while the maximum is 3352 km, with an average distance of 476 km per passenger.

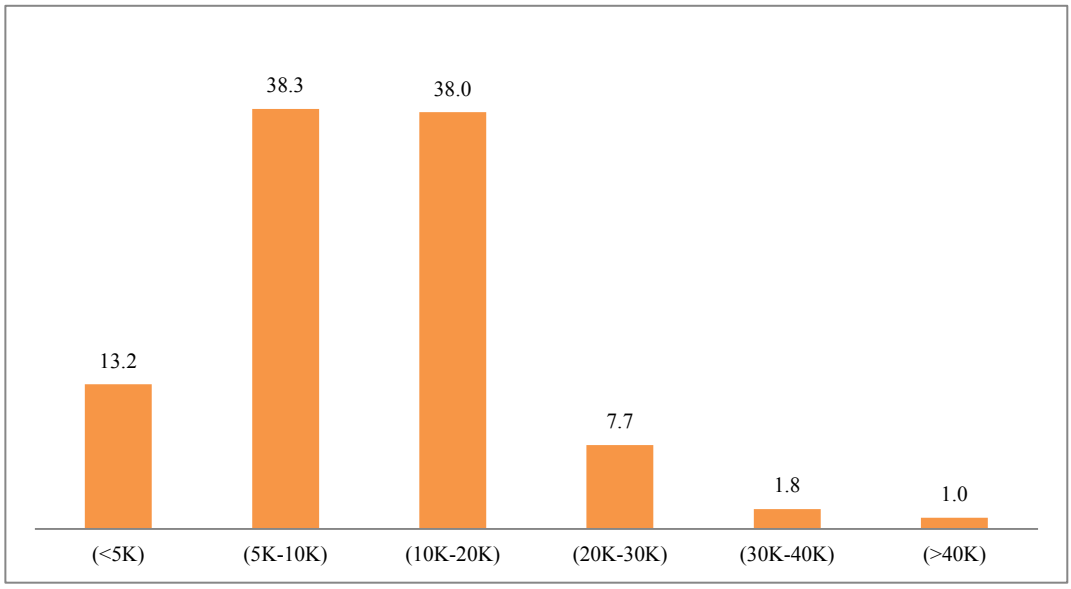
Fig 4.1: Reported Average Price per Ticket and Percentage of Sample Passengers Travelled with respect to Distance Range



4.5 Income and Expenditure Profile: A Detailed Observation

The income profile of non-suburban passengers is given in Figure 4.2. It may be noted that more than 76 per cent of the sample passengers reported monthly incomes in the range of Rs 5,000 to Rs 20,000. A little over 13 per cent is earning even less than Rs 5,000. On the other hand, the high income passenger earning monthly income over Rs 20,000 is 11 per cent.

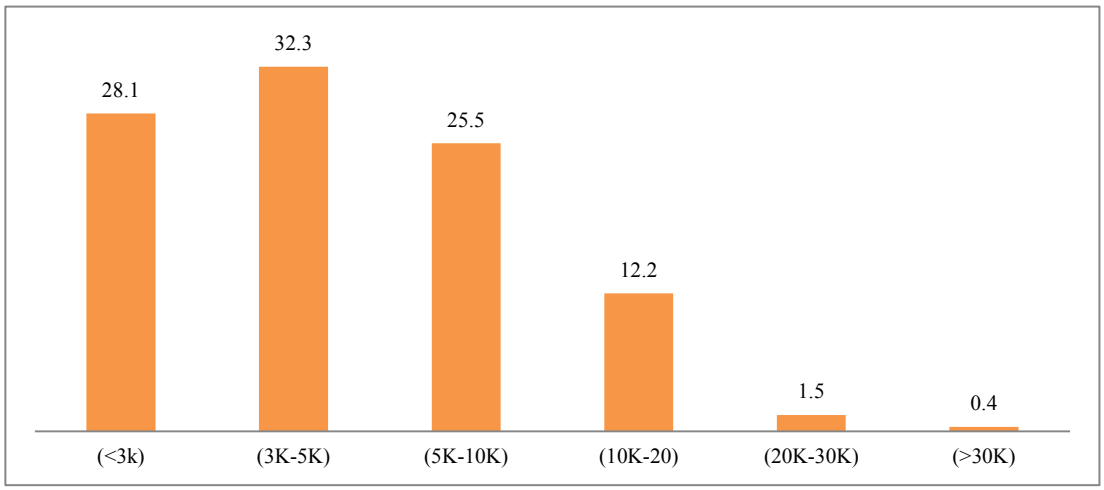
Fig 4.2: Distribution (%) of the Monthly Income Profile of the Sample Non-Suburban Passengers



Note: K=1000

Distribution in terms of expenditure shows that the highest concentration (32.3%) is in the monthly expenditure range of Rs 3,000 to Rs 5,000. It may be observed that more than 60 per cent of the sample passengers belong to the lower affordability range of up to Rs 5,000.

Fig 4.3: Distribution (%) of the Monthly Expenditure Profile of the Sample Non-Suburban Passengers



Note: K=1000

Income–expenditure trajectory and profile of the non-suburban passengers show equivalence of the range-based pattern. Concentration is observed high with high and vice versa in a systematic fashion. Around 63 per cent of passengers earning less than Rs 5,000 per month spend less than Rs 3,000 per month. Similarly, around 49 per cent of passengers with income over Rs 40,000 per month spend more than Rs 30,000 during the same time span

Table 4.5: Income-Expenditure Trajectory and Profile of the Non-Suburban Passengers

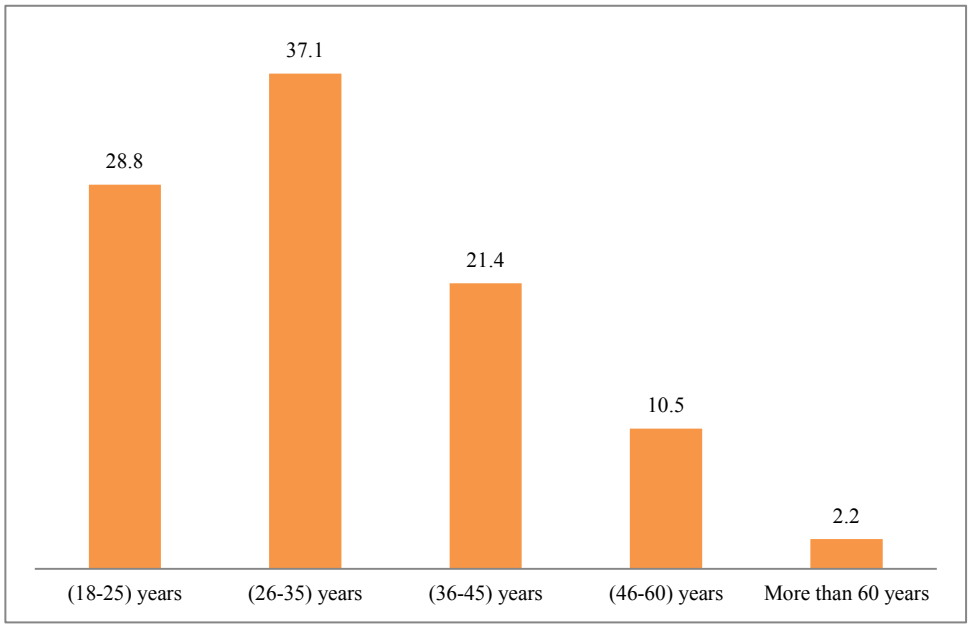
	(<3k)	**(3K-5K)**	**(5K-10K)**	**(10K-20)**	**(20K-30K)**	**(>30K)**
(<5K)	62.8	37.2	0.0	0.0	0.0	0.0
(5K-10K)	21.9	42.9	35.2	0.0	0.0	0.0
(10K-20K)	9.6	25.8	36.0	28.6	0.0	0.0
(20K-30K)	0.0	21.5	19.6	47.8	11.1	0.0
(30K-40K)	0.0	12.4	14.8	41.0	31.9	0.0
(>40K)	0.0	0.0	0.0	7.6	43.2	49.2

Note: K=1000

4.6 Distribution of Age and Gender Profile

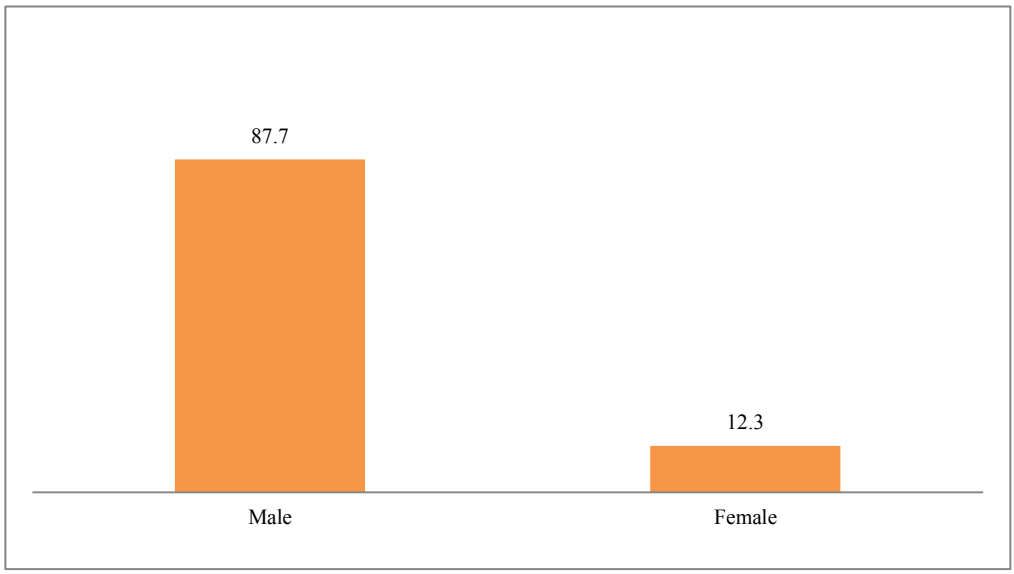
Distribution of the age-group shows the highest concentration of non-suburban travel in the 26–35 age-groups. Next comes the younger group ranging from 18 to 25 years (28.8%). The mid-career age group of 36 to 45 years is third in importance (21.4%). It may also be noted that only 2.2 per cent of the older age group above 60 years travel by non-suburban trains.

Fig 4.4: Distribution (%) of Age Group of the Non-Suburban Passengers



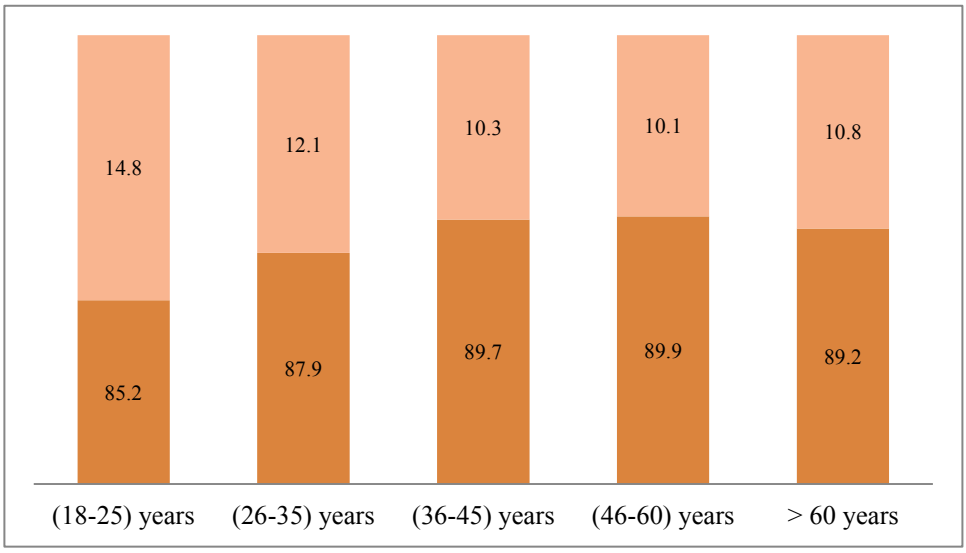
Distribution of the sample passenger by gender shows that male passengers dominate (87.7%), while only 12.3 per cent of female passengers travel by non-suburban trains.

Fig 4.5: Distribution (%) of the Sample Non-Suburban Passengers by Gender



Gender distribution of the age group shows that female participation as passenger is more in the younger age groups compared to the older ones. Almost 15 per cent female passengers are in the 18–25 age-group, which comes down to 12 per cent in the next upper age group, i.e., 26–35 and then settles to 10–11 per cent in the other higher age groups.

Fig 4.6: Gender Distribution (%) of the Age Groups



It may be observed that very low monthly income is concentrated more for the younger and the older age groups. Income in the range of Rs 10,000 to Rs 20,000 is concentrated more for age groups ranging from 26 to 45 years.

Table 4.6: Distribution of income of the non-suburban passengers by age-groups

	(18-25) years	(26-35) years	(36-45) years	(46-60) years	>60 years
(<5K)	19.8	12.8	9.8	11.4	16.8
(5K-10K)	42.4	37.1	37.2	36.2	49.3
(10K-20K)	29.9	40.7	40.7	37.2	27.5
(20K-30K)	6.2	7.2	8.8	9.6	4.4
(30K-40K)	1.2	1.4	2.3	3.1	1.7
(>40K)	0.5	0.8	1.1	2.5	0.3

Note: K=1000

As like income, expenditure too is concentrated more for the younger and the older age groups. Monthly expenditure in the range of less than Rs 5,000 to Rs 10,000 is concentrated more for the youngest and oldest age groups.

Table 4.7: Distribution of expenditure of the non-suburban passengers by age-groups

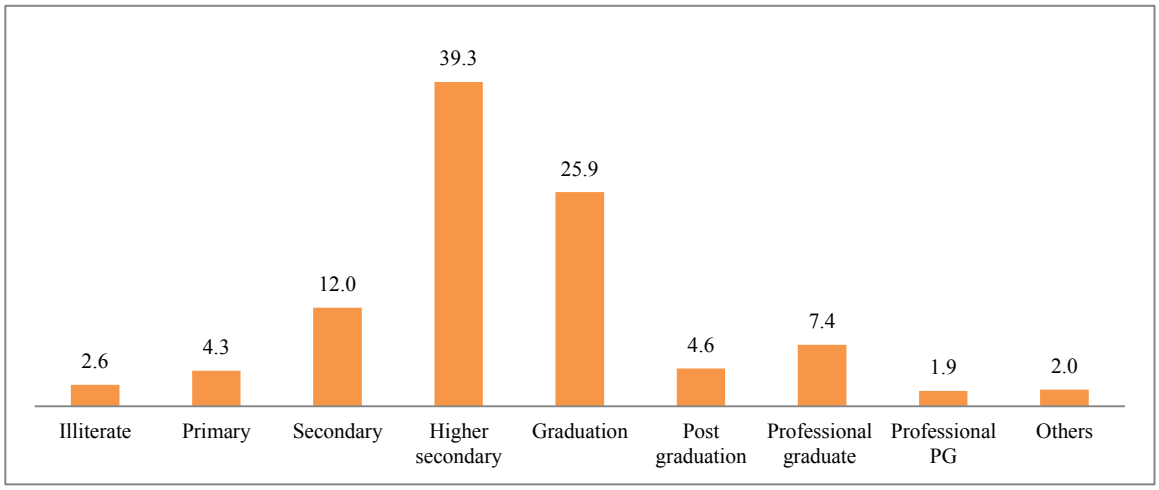
	(18-25) years	(26-35) years	(36-45) years	(46-60) years	>60 years
(<5K)	47.9	23.7	14.4	17.4	28.4
(5K-10K)	33.8	34.7	27.9	28.0	34.1
(10K-20K)	13.5	27.5	34.6	32.2	28.1
(20K-30K)	4.2	12.6	20.2	17.1	9.0
(30K-40K)	0.4	1.1	2.3	4.2	0.0
(>40K)	0.1	0.4	0.5	1.1	0.3

Note: K=1000

4.7 Distribution of Education, Activity and Sectoral Engagement Profiles

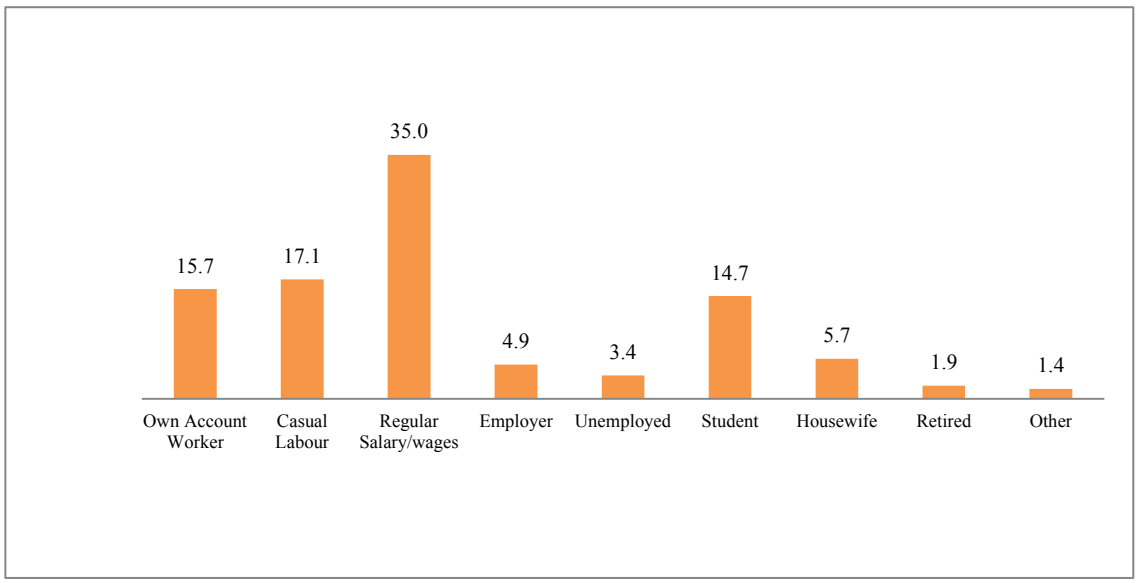
Distribution of sample passengers by educational status shows a very high level of concentration of those who have passed Higher Secondary (39.3%), followed by Graduates (25.9%) and those in Secondary level (12%). Professional graduates come next with 7.4 per cent linked to non-suburban travel.

Fig 4.7: Distribution (%) of Sample Passengers by Educational Status



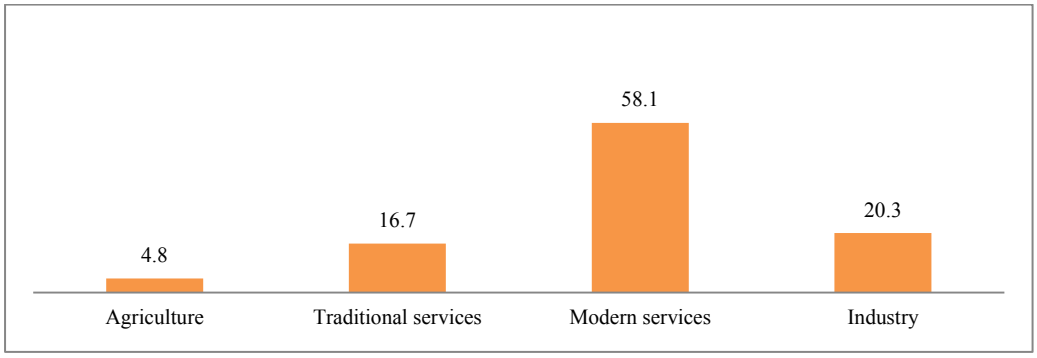
Distribution of the sample passengers by activity status shows that the highest concentration is with regular job holders (35%), followed by casual labour (17%) and own account workers (15.7%). Student group comes next in importance (14.7%), while around 6 per cent of housewives travel as passengers of non-suburban trains.

Fig 4.8: Distribution (%) of the Sample Non-Suburban Passengers by Activity Status



Distribution of passengers with regard to engagement to different sectors is given in Figure 4.9. It may be noted that out of the total number of passengers surveyed (passengers of 18 years and above), 74 per cent reported engagement to work as well as in sectors, while 26 per cent did not report so.

Fig 4.9: Distribution (%) of Sample Passengers by Sectoral Engagement



Distribution of income by educational status show that the lowest income is more concentrated in the lowest educational status and vice versa albeit with variation, depending on individual skill and earning capabilities.

Table 4.8: Income of the Non-suburban Passengers by Educational Status

	(<5K)	(5K-10K)	(10K-20K)	(20K-30K)	(30K-40K)	(>40K)	Total
Illiterate	46.0	44.1	9.0	1.0	0.0	0.0	100
Primary	39.4	51.1	9.0	0.5	0.0	0.0	100
Secondary	26.4	57.7	14.5	1.1	0.2	0.1	100
Higher secondary	12.7	44.0	38.6	3.8	0.5	0.4	100
Graduation	3.9	27.0	54.8	11.0	2.4	0.9	100
Post-graduation	2.6	18.5	50.4	20.0	6.0	2.6	100
Professional graduate	3.5	16.3	39.9	26.5	8.9	4.9	100
Professional PG	2.2	13.0	37.8	26.5	10.8	9.7	100
Others	5.5	30.5	41.4	15.0	2.7	5.0	100
Total	13.2	38.3	38.0	7.7	1.8	1.0	100

Note: K=1000

Distribution of expenditure by educational status too shows that the lowest expenditure is more concentrated in the lowest educational status and vice versa though with variation.

Table 4.9: Expenditure of the Non-suburban Passengers by Educational Status

	(<3k)	(3K-5K)	(5K-10K)	(10K-20)	(20K-30K)	(>30K)	Total
Illiterate	52.6	36.7	8.7	2.0	0.0	0.0	100
Primary	29.6	43.5	24.1	2.8	0.0	0.0	100
Secondary	20.7	34.0	38.6	6.6	0.1	0.1	100
Higher secondary	30.8	32.0	27.2	9.5	0.5	0.1	100
Graduation	24.6	30.1	24.0	19.0	1.9	0.4	100
Post-graduation	19.3	33.9	19.2	20.6	5.8	1.2	100
Professional graduate	31.5	32.2	15.7	14.4	4.7	1.4	100
Professional PG	29.2	28.5	15.7	17.8	5.3	3.6	100
Others	37.7	26.8	17.5	13.2	3.3	1.3	100
Total	28.1	32.3	25.5	12.2	1.5	0.4	100

Note: K=1000

Distribution of income by activity status shows that the lowest income is concentrated in casual labour and the highest income with regular salary earners.

Table 4.10: Distribution of Income of the Non-suburban Passengers by Activity Status

	Own Account Worker	Casual Labour	Regular Salary/wages	Employer	Retired	Other
(<5K)	15.5	55.4	19.6	2.5	3.5	3.5
(5K-10K)	21.4	31.3	38.6	3.6	3.3	1.8
(10K-20K)	22.1	8.5	58.8	7.7	1.7	1.2
(20K-30K)	17.4	0.0	62.8	15.7	1.3	2.8
(30K-40K)	21.4	0.0	54.3	21.0	2.4	1.0
(>40K)	30.5	0.0	40.7	23.7	0.0	5.1

Note: K=1000

Distribution of expenditure by activity status also shows that the lowest expenditure is more concentrated with casual labour status and vice versa though with variation. It may also be noted that in the expenditure stream, more non-income earning categories are also included. For example students, housewives or unemployed do not earn, but still spend income of relatives.

Table 4.11: Expenditure of the Non-suburban Passengers by Activity Status

	Own Account Worker	Casual Labour	Regular Salary/wages	Employer	Unemployed	Student	Housewife	Retired	Other
(<3k)	9.2	19.2	18.5	3.8	6.0	32.8	6.3	2.0	2.2
(3K-5K)	14.4	21.3	35.0	3.9	3.2	13.3	5.7	2.0	1.3
(5K-10K)	19.7	16.6	43.3	4.1	2.6	4.8	6.2	2.1	0.7
(10K-20)	24.5	5.2	52.9	10.3	0.0	0.0	4.3	1.3	1.5
(20K-30K)	20.5	0.0	55.5	19.1	0.0	0.0	1.8	0.5	2.7
(>30K)	43.3	0.0	43.3	6.7	0.0	0.0	3.3	0.0	3.3

Note: K=1000

4.8 Transportation Expenditure and Spending on Train Travel

Distribution of transportation expenditure among expenditure status shows very high concentration on below 10 per cent for passengers with lower expenditure profiles. Approximately 43 per cent of passengers, whose monthly expenditure ranges from Rs 5,000 to Rs 10,000 spend 10 to 15 per cent for transportation. It is interesting to note that around 27 per cent of the passengers of the highest monthly spending group with over Rs 30,000 a month spend over 25 per cent on transportation.

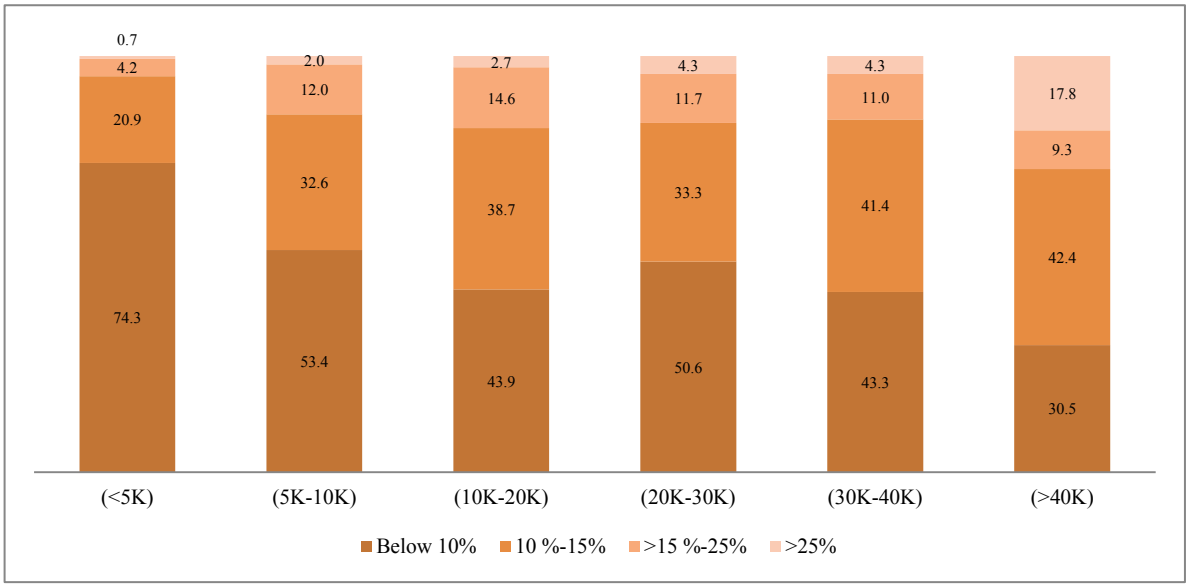
Table 4.12: Distribution of the Passengers by Percentage of Transportation Expenditure among Expenditure Status

	(<3k)	(3K-5K)	(5K-10K)	(10K-20)	(20K-30K)	(>30K)
Below 10%	84.3	55.9	33.4	35.3	36.8	23.3
10 %-15%	12.2	35.8	42.8	33.5	43.2	36.7
>15 %-25%	2.3	6.2	21.1	25.4	14.1	13.3
>25%	1.2	2.1	2.7	5.8	5.9	26.7

Note: K=1000

Distribution of transportation expenditure among income status shows very high concentration on below 10 per cent for passengers with the lowest income profiles. Around 53 per cent of passengers, whose monthly income ranges from Rs 5,000 to Rs 10,000 spend 10 to 15 per cent on transportation. It is interesting to note that around 18 per cent of the highest monthly income group with income over Rs 40,000 spend over 25 per cent on transportation.

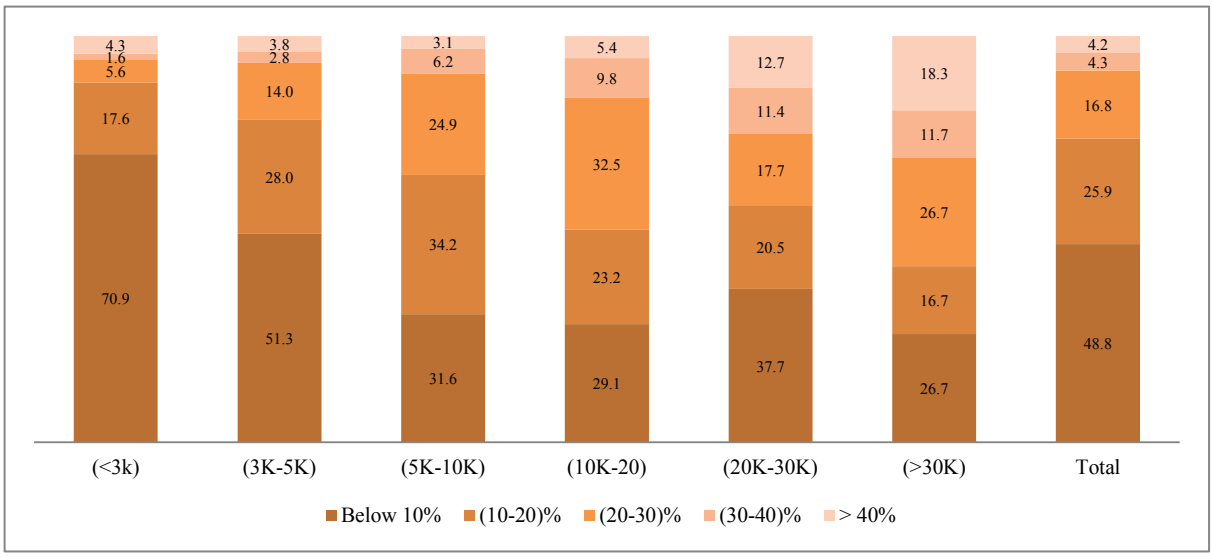
Fig 4.10: Distribution (%) of Passengers by Transportation Expenditure by Income Groups



Note: K=1000

Further, distribution of transportation expenditure for train travel shows high concentration on below 10 per cent level for passengers with lower expenditure status. Overall, it may be noted that 49 per cent passengers spend less than 10 per cent out of total transportation expenditure, 26 per cent spend 10 to 15 per cent, 17 per cent spend 20 to 30 per cent.

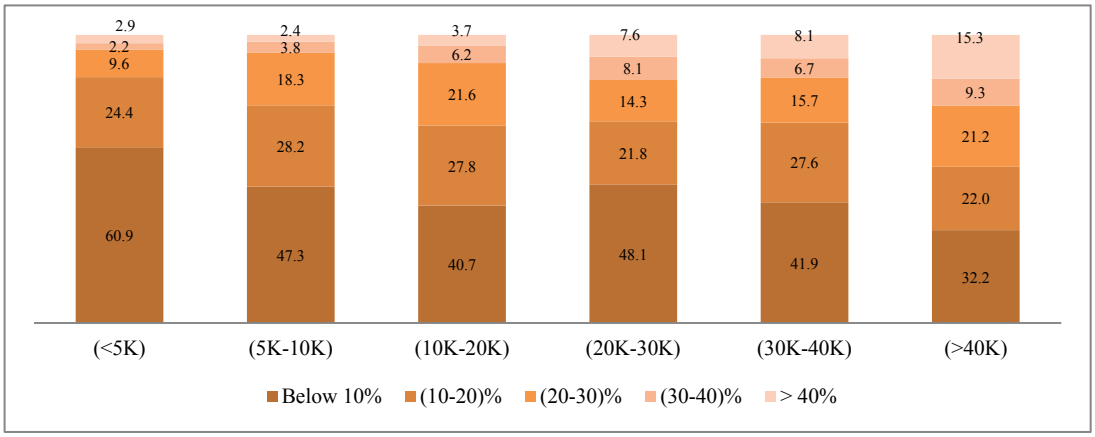
Fig 4.11: Distribution (%) of passengers by Transport Expenditure on Train Travel by Expenditure Status



Note: K=1000

In terms of income Status, the scenario is more or less similar with that of expenditure. Around 61 per cent of the lowest earning passengers (less than Rs 5,000 a month) spend less than 10 per cent on train travel. However, 24.4 per cent of them also spend between 10 to 15 per cent of the total transportation expenditure on train travel. On the other hand, more than 15 per cent of the highest income earning passengers (above Rs 40,000) spends over 25 per cent on train travel out of the total transportation expenditure.

Fig 4.12: Distribution (%) of passengers by Spending on Train out of Total Transportation Expenditure and Income Status

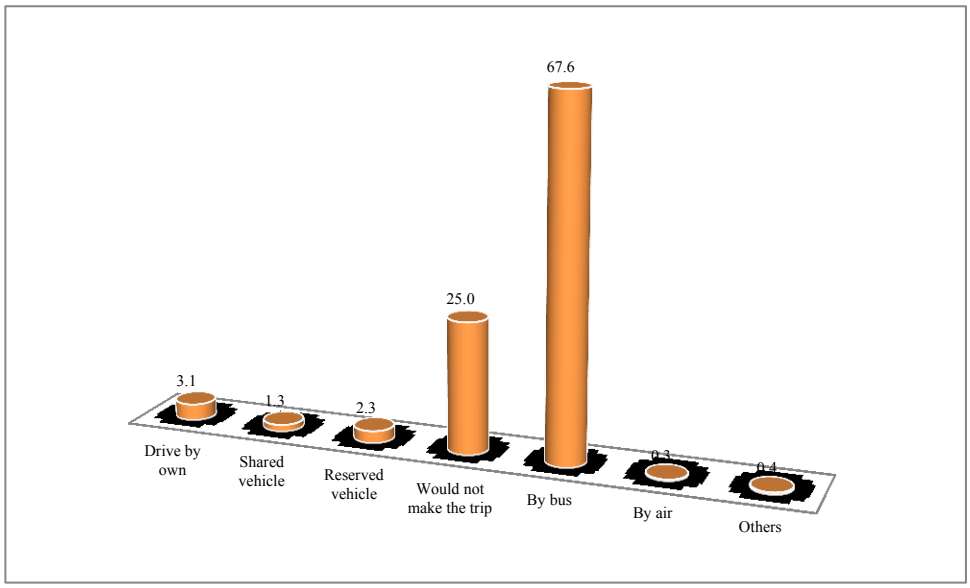


Note: K=1000

4.9 Distribution of Alternative Mode of Transportation without the Availability of Train Services

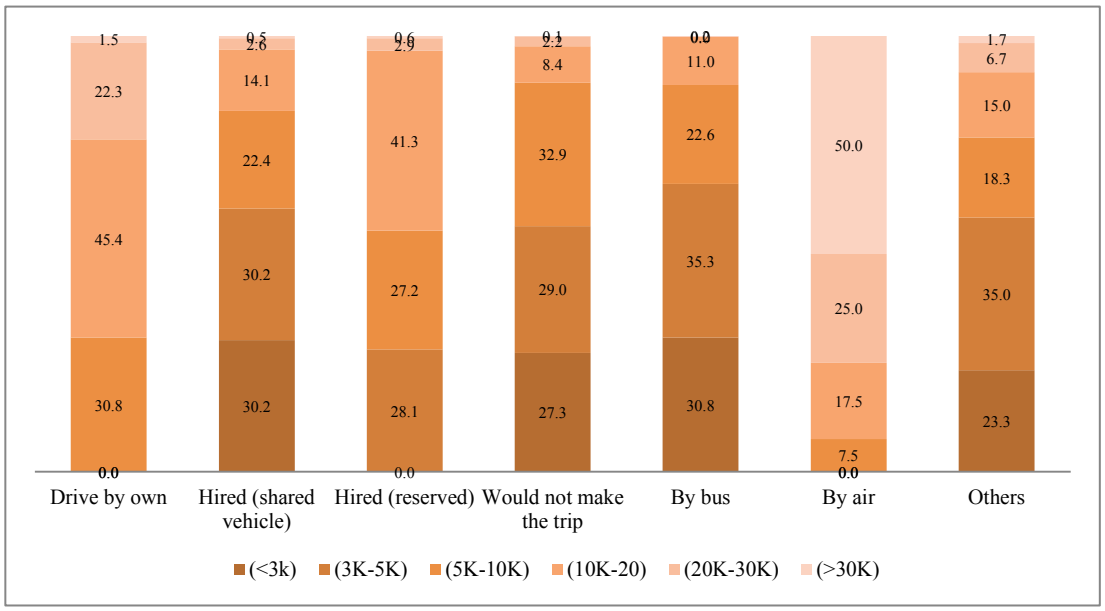
Distribution of the preference pattern of the alternative mode of transportation shows that when train services are affected, majority of the non-suburban passengers mostly prefer bus services (67.6%). Around 3 per cent drive by own vehicles, while a little over 2 per cent go by reserved vehicle. It is also observed that only 0.3 per cent of the passengers in higher spending range prefer air travel. Around 0.4 per cent prefers to go by other modes.

Fig 4.13: Distribution (%) of Passengers by Alternative Mode of Transportation when Train Services is not available



Distribution of alternative mode of transportation when train services are affected by expenditure class shows that passengers with lower expenditure profile mostly prefer travel by bus. However, it is interesting to observe that 50 per cent of the highest spending group prefers air travel in such an event.

Fig 4.14: Distribution (%) of the Preference Pattern of Alternative Mode of Transportation when Train Services is not available by Expenditure Status



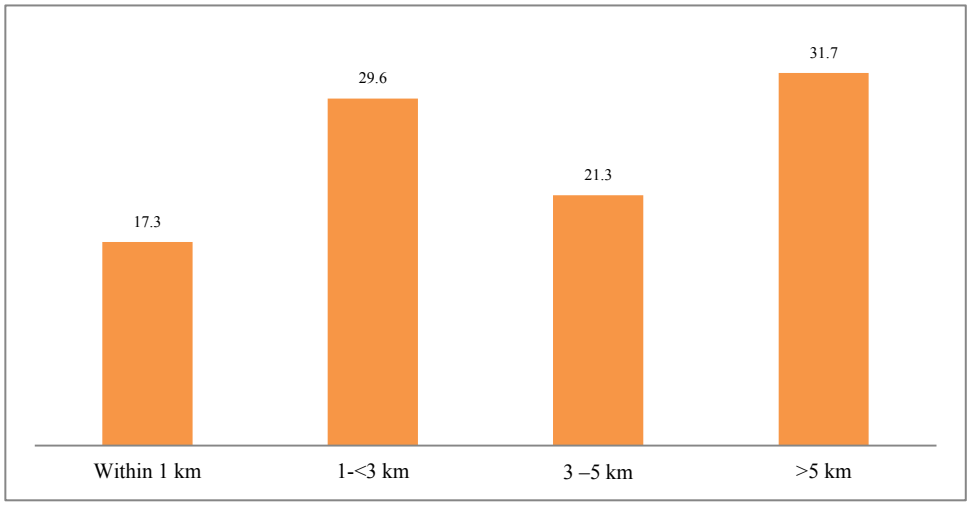
Note: K=1000

4.10 Travel Demand for Non-suburban Services: Related Factor

4.10.1 Distance to Railway Station

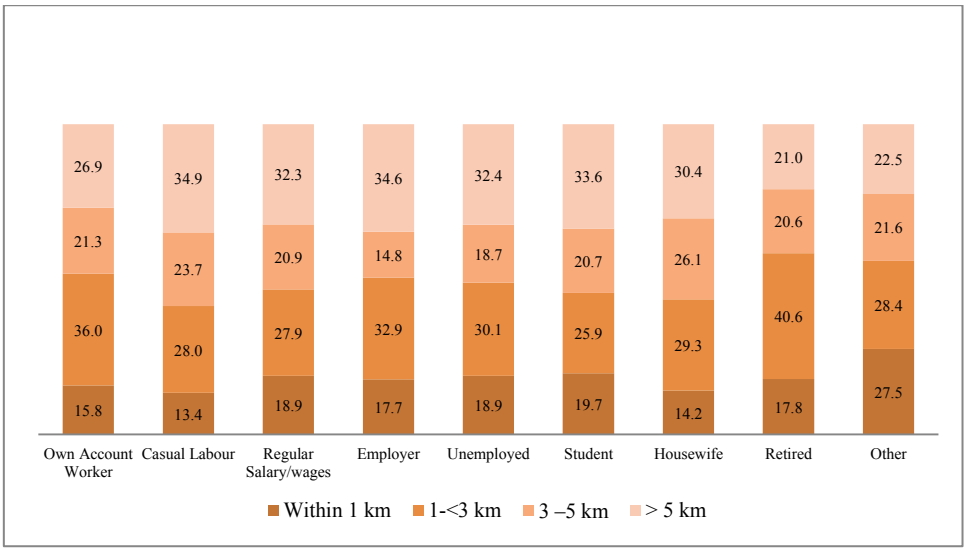
Distribution of the distance to railway station for non-suburban travel brings out the crucial fact that on an average 32 per cent of the passengers have to travel more than 5 km to reach station, while a little over 21 per cent travel 3 to 5 km.

Fig 4.15: Distribution (%) of Passengers by Distance to Railway Station for the Non-Suburban Travel



The distribution of the distance to the railway station by activity status shows that 35 per cent of casual labour travels more than 5 km to reach station. The proportion of passengers with different activity status nearer to station is less than the other range of distances.

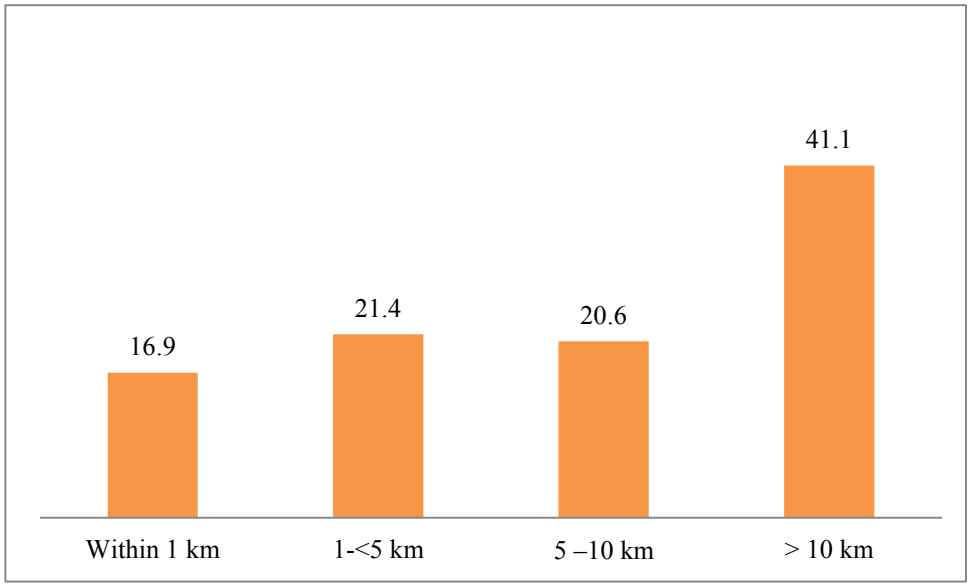
Fig 4.16: Distribution (%) of Passengers by Distance to the Station and Activity Status



4.10.2 Convenience of Last Mile Connectivity

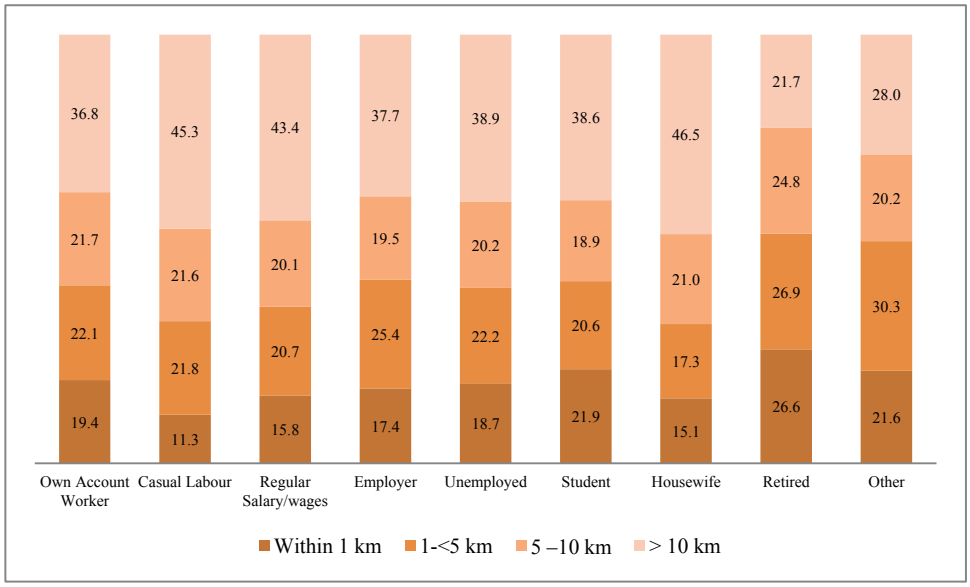
The convenience of the last mile connectivity is another important consideration of opting for a particular mode of transportation. The survey reveals that more than 41 per cent of the non-suburban passengers travel more than 10 miles to reach the desired destination after reaching station.

Fig 4.17: Distribution (%) of Passengers by Convenience of the last mile Connectivity after Reaching Destination Station



Distribution of the distance to final destination after reaching station shows that more of the casual labourer (45.3%) and housewives (46.5%) travel more than 10 miles to reach final destination.

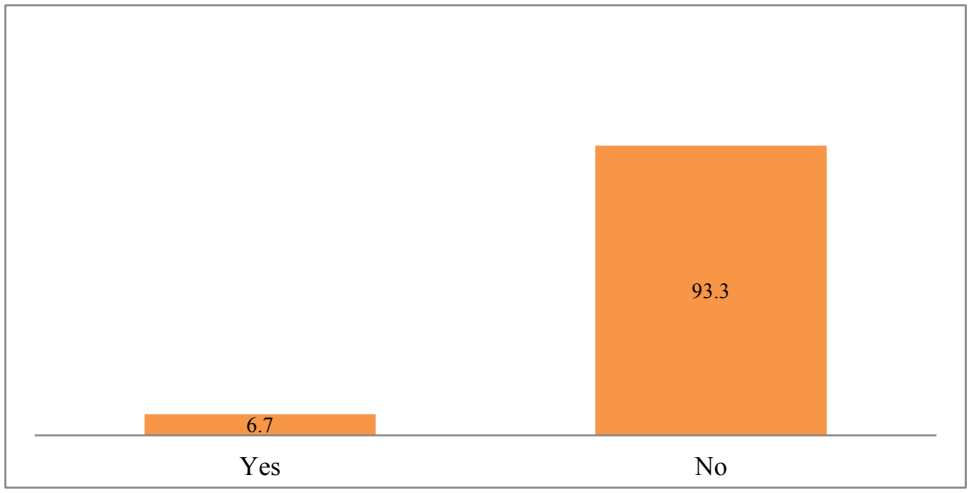
Fig 4.18: Distribution (%) of Passengers by Distance to the Final Destination after Reaching the Terminal Station and Activity Status



4.10.3 Sponsorship of Railway Travel

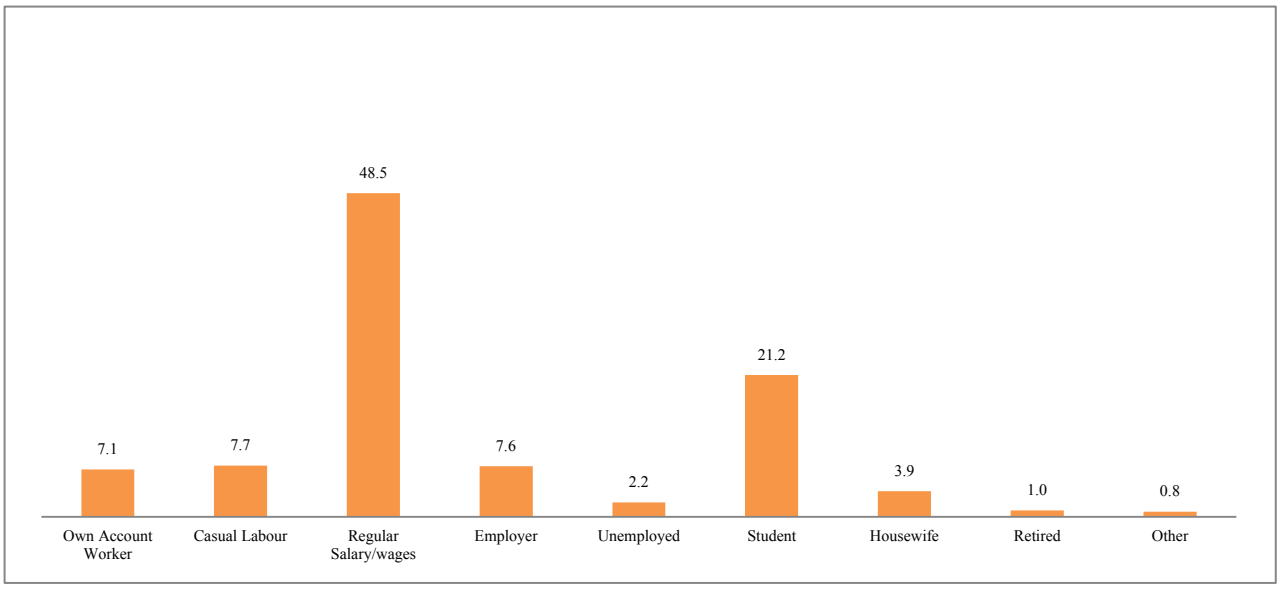
Distribution of the sponsorship of non-suburban travel by sample passengers on the basis of payment by employers or others show that only 7 per cent get sponsorship.

Fig 4.19: Distribution (%) of Passengers by Availability of Financial Support for the Non-Suburban Railway Travel



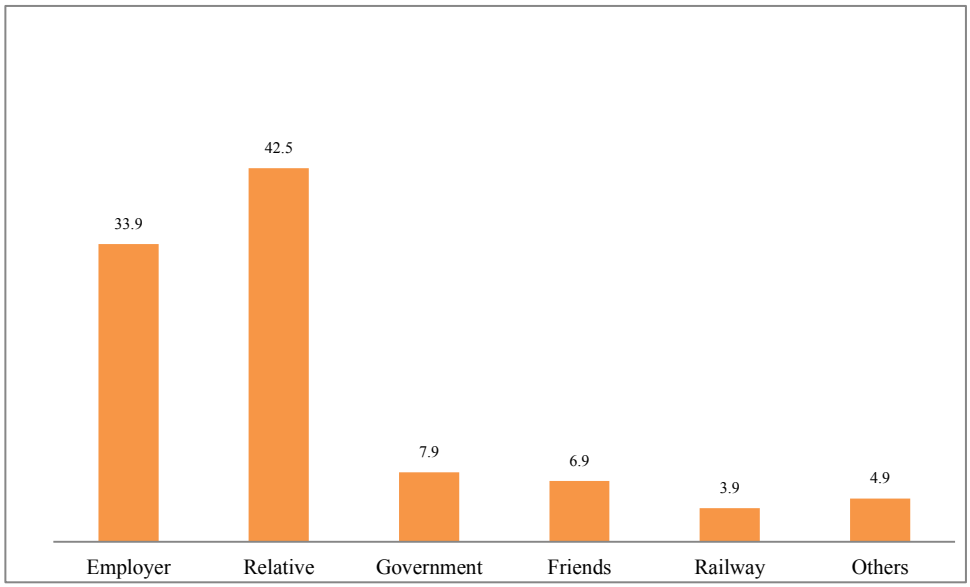
Further distribution of sample non-suburban passengers, who said 'yes' to the query on sponsorship, shows that only regular salary/wage earners (48.5%) and students (21.2%) get majority of sponsorship.

Fig 4.20: Distribution (%) of Passengers by Availability of Financial Support for Railway Travel and Activity Status



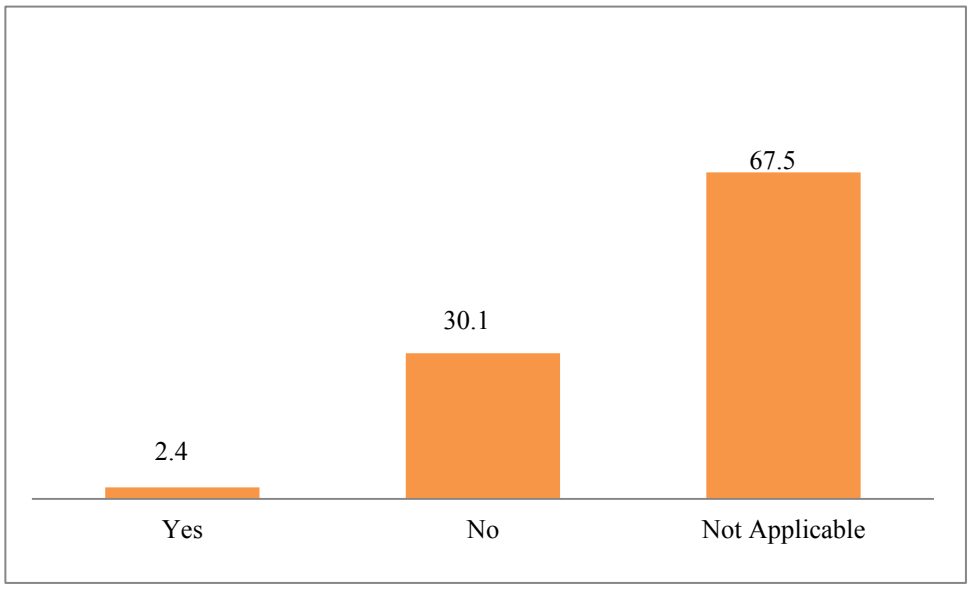
Distribution of the sponsors of railway journey shows that majority of sponsorships come from relatives (42.5%), followed by employer (40%). Only 8 per cent sponsorship comes from government and 4 per cent from the railways.

Fig 4.21: Distribution (%) of Passenger by Availability of Financial Support to the Non-Suburban Journey



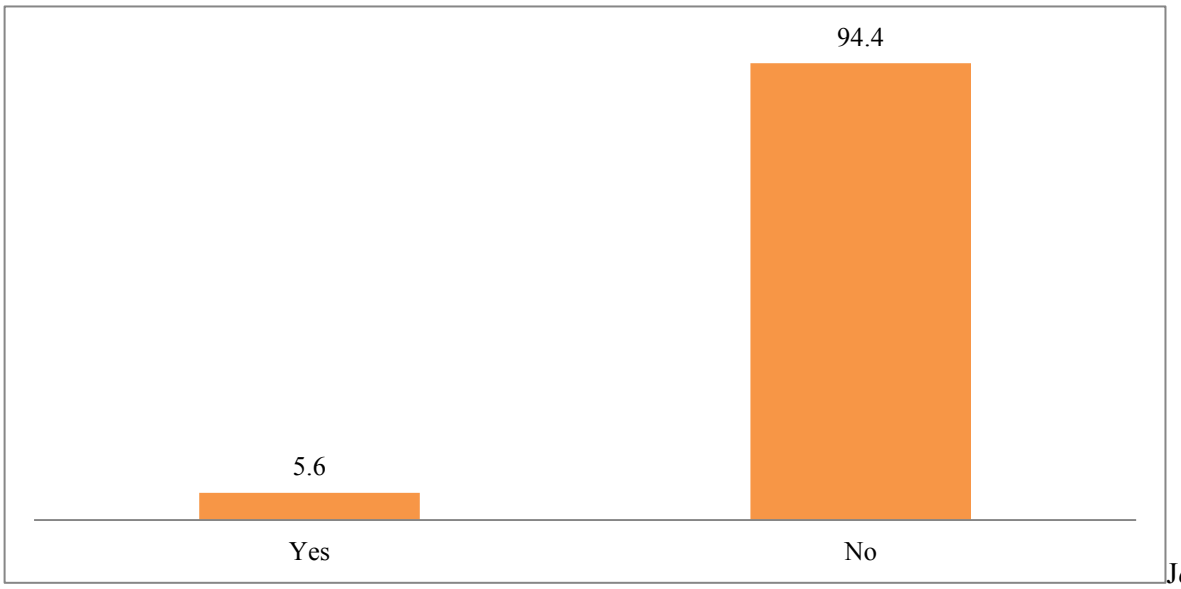
The analysis of sample passengers revealed that only 2.4 per cent of non-suburban passengers expect to get compensated for increase in railway passenger fares.

Fig 4.22: Distribution (%) of Passengers who expect to get compensated for increase in Railway Fares



4.10.4 Distribution of Passengers Who Got Sponsorship for the journey

Fig 4.23: Distribution (%) of Passengers who got Railway Concession for this Journey



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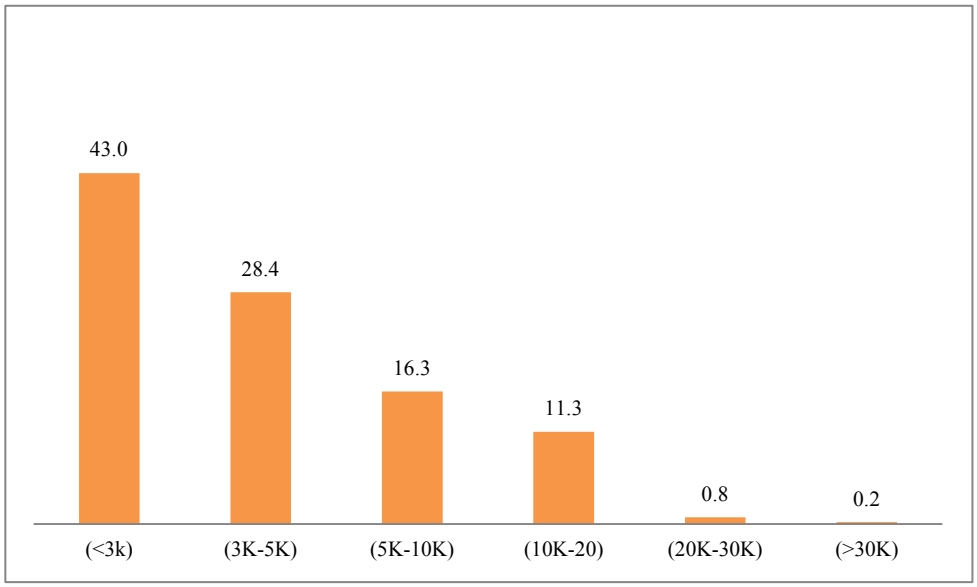
The data shows that among the sample passengers, only 6 per cent got some kind of railway concession for the journey.

However, it is still interesting to note that railway concession is mostly availed by the passengers with the poorest (43%) and poorer (28.4%) expenditure profile and it goes down precipitously for higher sections.

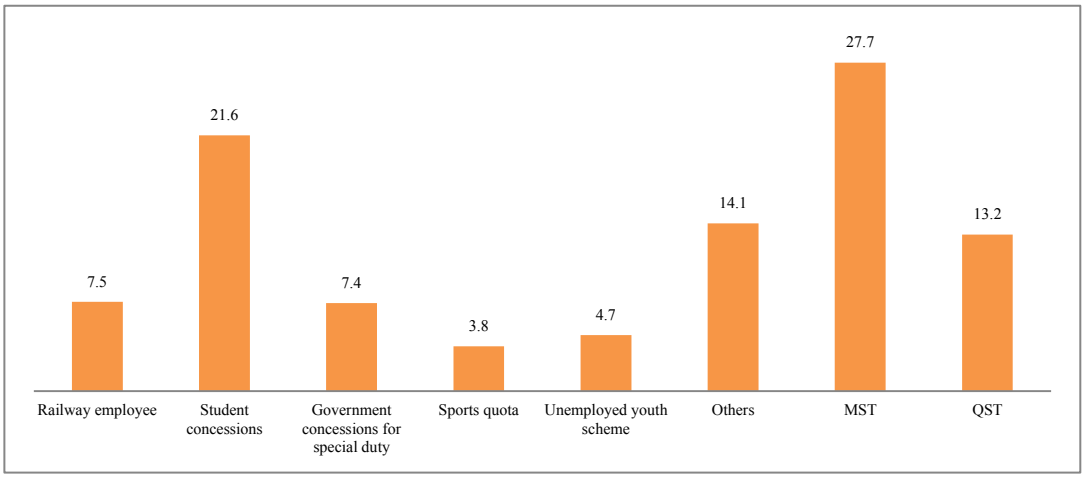
Fig 4.24: Distribution (%) of Railway Concession by Expenditure Status



Note: K=1000

Distribution of the type of concessions received by non-suburban passengers show a very high proportion of them (27.7%) avail Monthly Season Ticket (MST), which is, in fact, a concession by railways for purchasing travel ticket for the duration of a month. The second-most important concession is for students (21.6%). Sports quota and unemployed youth scheme attracted lower level of concessions.

Fig 4.25: Distribution (%) of the Type of Concessions among Passengers who received the same



It would be interesting to see the distribution of concessions among activity status. The student community avails 86 per cent of concessions while the unemployed get cent per cent of the concessions for unemployed youth scheme. Table 4.13 describes the distribution.

Table 4.13: Distribution of Types of Concessions availed by Passengers by Activity Status

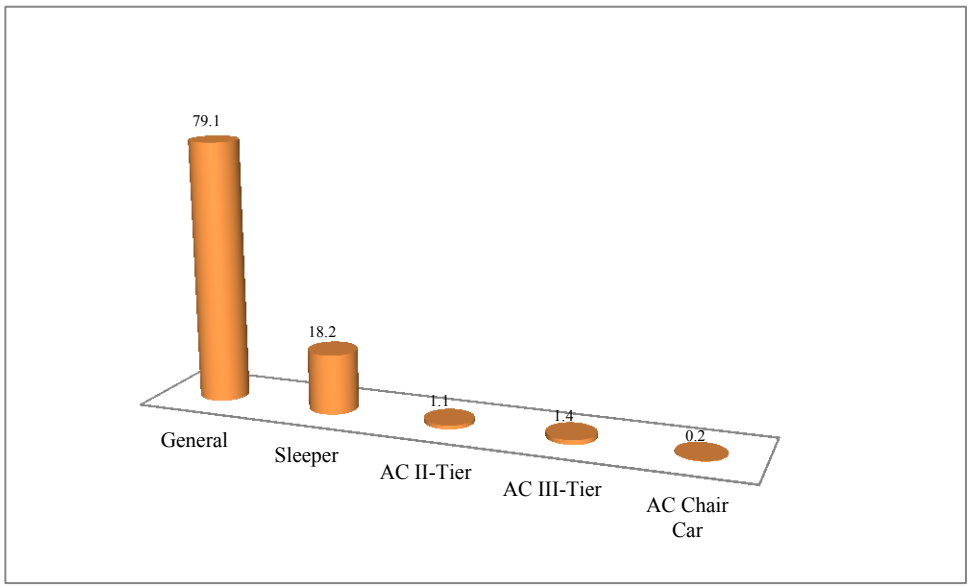
	Railway employee	Student concessions	Government concessions for special duty	Sports quota	Unemployed youth scheme	Others	MST	QST
Own Account Worker	0.0	0.0	0.0	0.0	0.0	12.7	87.3	0.0
Casual Labour	0.0	0.0	0.0	0.0	0.0	39.1	9.4	51.6
Regular Salary/wages	18.7	0.0	20.0	8.9	0.0	14.0	37.8	0.6
Employer	0.0	0.0	0.0	0.0	0.0	14.7	13.2	72.1
Unemployed	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
Student	0.0	85.5	0.0	1.9	0.0	9.3	3.3	0.0
Housewife	0.0	0.0	0.0	0.0	0.0	10.0	30.0	60.0
Retired	8.1	0.0	0.0	0.0	0.0	16.1	50.0	25.8
Other	0.0	0.0	0.0	0.0	0.0	18.2	81.8	0.0

Note: QST (Quarterly Season Ticket)

4.11 Distribution of Passengers by Class of Travel

Distribution of passengers by class of travel shows that a little over 79 per cent of the non-suburban passengers in our sample travel by general class, 18 per cent by sleeper class, 1.1 per cent by AC II tier, 1.4 per cent by AC III tier and only 0.2 per cent by AC Chair Car.

Fig 4.26: Distribution (%) of Sample Non-Suburban Passengers by Class of Travel



Distribution of classes of travel by age group shows that high concentration of passengers in general (unreserved) class across age group. Sleeper class comes next, in which the aged above 60 have slightly an upper edge (22%) followed by the 36–45 years age group (21.4%)

Table 4.14: Distribution of Passengers by Class of Travel and Age-group

	General	Sleeper	AC II-Tier	AC III-Tier	AC Chair Car
(18-25) years	80.7	16.4	1.4	1.5	0.0
(26-35) years	79.0	18.5	0.8	1.5	0.2
(36-45) years	76.5	21.4	1.0	1.0	0.2
(46-60) years	81.9	15.1	1.1	1.7	0.3
> 60 years	71.3	21.9	4.8	1.8	0.3

It would be interesting to observe the distribution of classes of travel by activity status of the passengers. Over 90 per cent of casual labour travel by general class and only 9 per cent travel by sleeper class. While employers, retired and regular salary earners travel relatively more in AC class.

Table 4.15: Distribution of Passengers by Class of Travel and Activity Status

	General	Sleeper	AC II-Tier	AC III-Tier	AC Chair Car
Own Account Worker	79.3	18.3	1.3	0.7	0.4
Casual Labour	90.4	9.1	0.3	0.1	0.0
Regular Salary/wages	76.2	20.8	0.9	1.9	0.1
Employer	56.0	35.3	2.7	5.6	0.4
Unemployed	75.8	22.0	1.6	0.6	0.0
Student	81.8	15.9	0.9	1.2	0.1
Housewife	81.5	16.5	1.2	0.7	0.1
Retired	67.5	22.7	5.9	3.5	0.3
Other	74.8	19.7	1.8	3.7	0.0

Distribution of passengers by class of travel with respect to expenditure status of the passengers is given in Table 4.16. A sizeable section of the richer spending groups prefer to travel by AC class in comparison to the others.

Table 4.16: Distribution of Passengers by Class of Travel and Expenditure Status

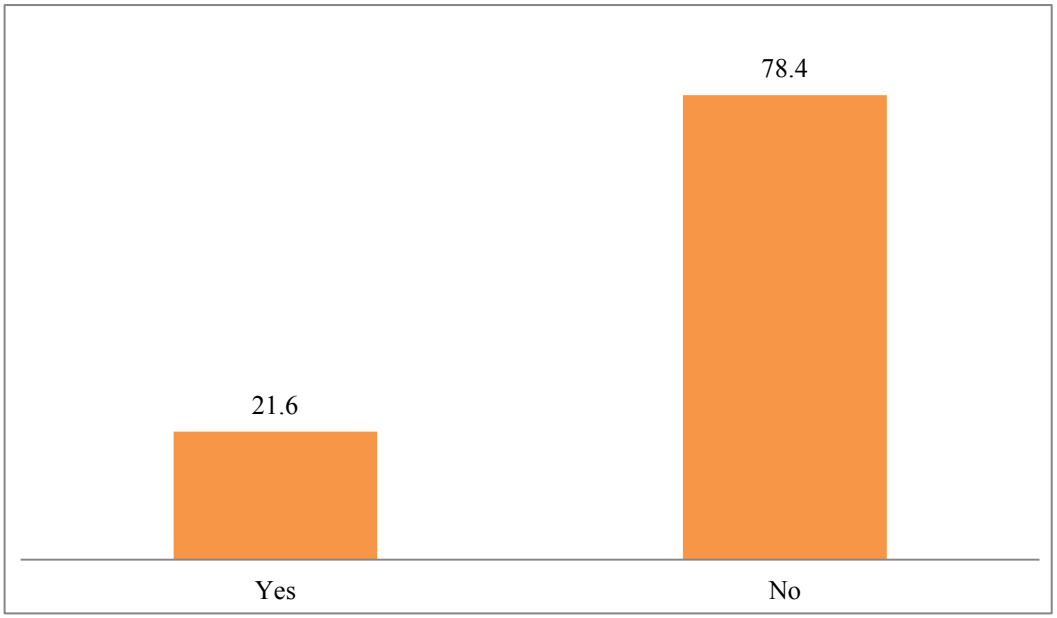
	General	Sleeper	AC II-Tier	AC III-Tier	AC Chair Car
(<3k)	84.8	12.9	1.1	1.2	0.1
(3K-5K)	85.1	13.5	0.6	0.8	0.0
(5K-10K)	78.2	19.7	1.0	1.0	0.1
(10K-20)	57.2	38.0	1.3	3.1	0.4
(20K-30K)	48.2	31.4	10.0	9.1	1.4
(>30K)	36.7	28.3	18.3	10.0	6.7

Note: K=1000

4.12 Passengers' Travel: Use of Internet and the Distribution of the Reasons for Non-usage

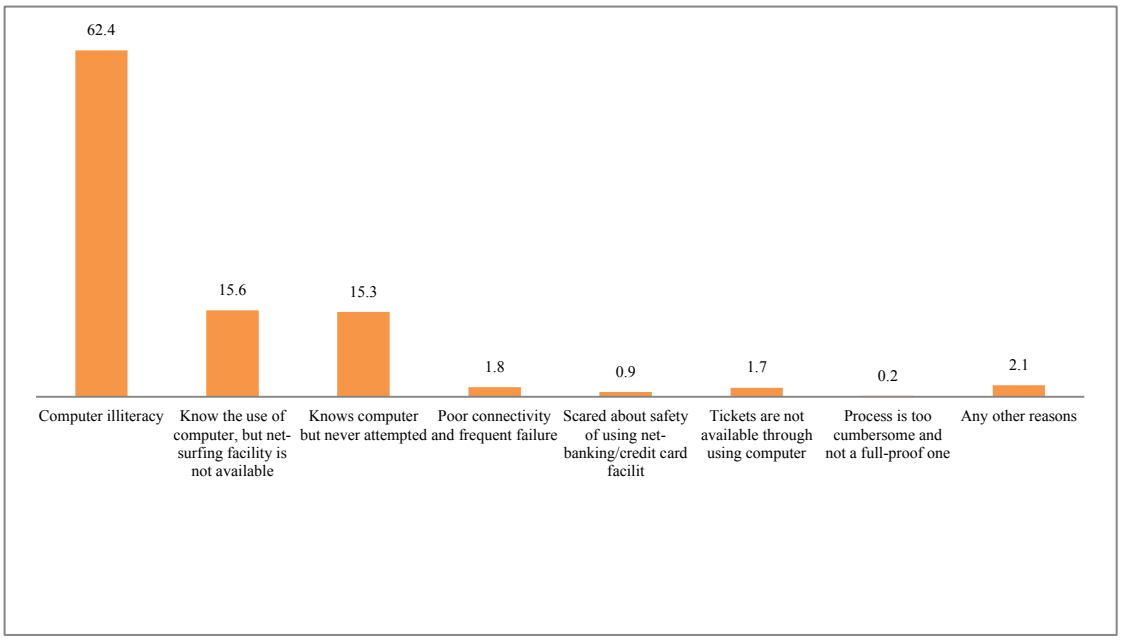
Distribution of the use of Internet for booking railway ticket has shown sizeable penetration among sample passengers. About 22 per cent of the non-suburban passengers use Internet to book railway tickets.

Fig 4.27: Distribution (%) of passengers by usage of internet for booking railway ticket



Among the 78.4 per cent non-users of Internet for booking tickets, 62.4 per cent said that they are not familiar with computer operation, 15.6 per cent say they can but surfing facility is not available, whereas a similar percentage (15.3%) say that despite knowing they never attempted. Around 2 per cent of the non-users cited safety and security as the chief reason for not booking by Internet.

Fig 4.28: Distribution (%) of Passengers by Reasons for not using Internet for Booking Railway Ticket



It may be noted that computer illiteracy is more for the older age groups than the younger ones. While 53.2 per cent of the sample passengers in the younger age group of 18–15 years have computer illiteracy, more than 79 per cent of those above 60 years are in the same category.

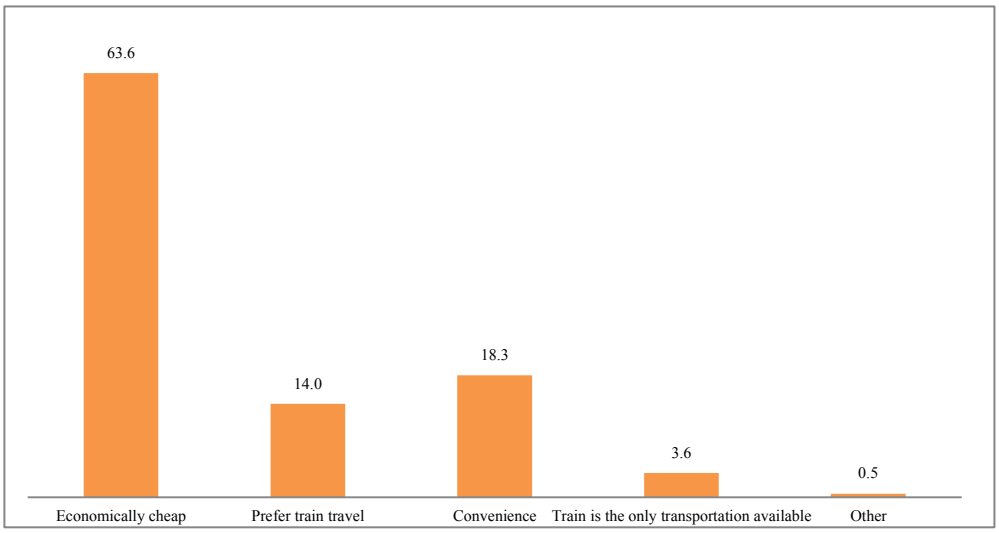
Table 4.17: Non-usage of Internet by Age-group (% of ranges)

	Computer illiteracy	Know the use of computer, but net-surfing facility is not available	Knows computer but never attempted	Poor connectivity and frequent failure	Scared about safety of using net-banking/credit card facilities	Tickets are not available through using computer	Process is too cumbers ome and not a full-proof one	Any other reasons
(18-25) years	53.2	20.4	19.6	1.7	1.0	1.2	0.2	2.5
(26-35) years	62.0	16.3	14.1	2.1	0.9	1.9	0.2	2.4
(36-45) years	68.1	11.3	14.8	1.9	0.6	1.8	0.1	1.5
(46-60) years	72.2	11.2	11.4	0.7	1.1	1.7	0.1	1.6
> 60 years	79.3	8.0	7.6	1.1	1.1	0.7	0.4	1.8

4.13 Travel Demand: Reasons for Travelling by Train

The reasons for travelling by train is mostly its economy (63.6%) compared with other modes of travel. A little over 18 per cent of passengers cited convenience as one of the factors, while 14 per cent preferred travelling by train.

Fig 4.29: Distribution (%) of Passengers by Reasons for Travelling by Train



Economic reason for travelling by train is dominant for casual labours (68.3%), followed by housewives (67.9%) and own account workers (67.7%). Convenience of travel by train is observed to be the most prominent for employers (46%).

Table 4.18: Distribution (%) of Passengers by Reasons for Travelling by Train and Activity Status

	Economically cheap	Prefer train travel	Convenience	Train is the only transportation available	Other
Own Account Worker	67.7	13.2	15.0	3.7	0.3
Casual Labour	68.3	16.0	8.7	6.5	0.5
Regular Salary/wages	62.7	14.3	19.2	3.3	0.4
Employer	38.7	11.5	46.0	2.3	1.5
Unemployed	58.2	11.4	25.3	4.1	1.0
Student	63.5	12.9	20.5	2.5	0.6
Housewife	67.9	16.4	13.3	2.0	0.5
Retired	60.8	13.6	23.4	2.1	0.0
Other	67.0	6.9	25.2	0.0	0.9

Economic reason for travelling by train is dominant for the lowest expenditure class (68.1%), followed by the next lowest monthly expenditure class (67.9%). Convenience of travel by train is observed to be the most for the highest expenditure class (32%).

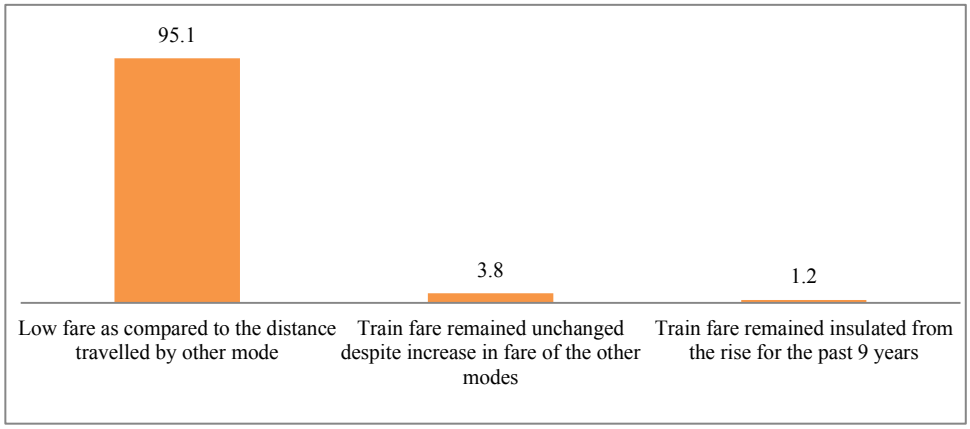
Table 4.19: Distribution (%) of Passengers by Reasons for Travelling by Train and Expenditure Status

	Economically cheaper	Prefer train travel	Convenience	Train is the only transportation available	Other
(<3k)	68.1	13.0	15.6	2.6	0.8
(3K-5K)	64.6	14.7	16.9	3.3	0.5
(5K-10K)	62.3	14.2	18.4	4.8	0.3
(10K-20)	55.3	13.4	26.2	4.6	0.5
(20K-30K)	50.9	16.8	27.7	3.6	0.9
(>30K)	38.3	23.3	31.7	3.3	3.3

Note: K=1000

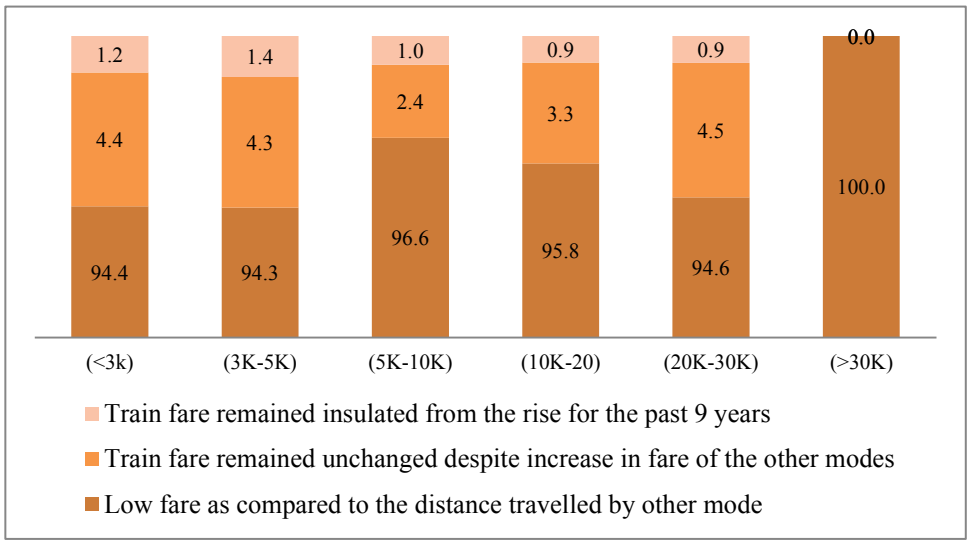
Distribution of the meaning of economic cheapness of train travel by the non-suburban passengers' show that low fare compared to other modes of transport (95%) is the main reason for travelling by train. Only 4 per cent of the passengers say that the reason for their travel is the unchanged rate compared to other mode.

Fig 4.30: Dissecting further: Distribution (%) of Passengers by the Meaning of Economic Cheapness



Distribution of the meaning of economic advantage of train travel by the non-suburban passengers show that the highest spending class accord low fare compared to other mode of transport (100%) as the chief reason for travelling by train, while 4.4 per cent of the passengers of the lowest expenditure class say that the reason for their travel is the unchanged rate compared to other modes.

Fig 4.31: Dissecting further: Distribution (%) of passengers by the Meaning of Economic Advantage of the Train Travel and Expenditure Status

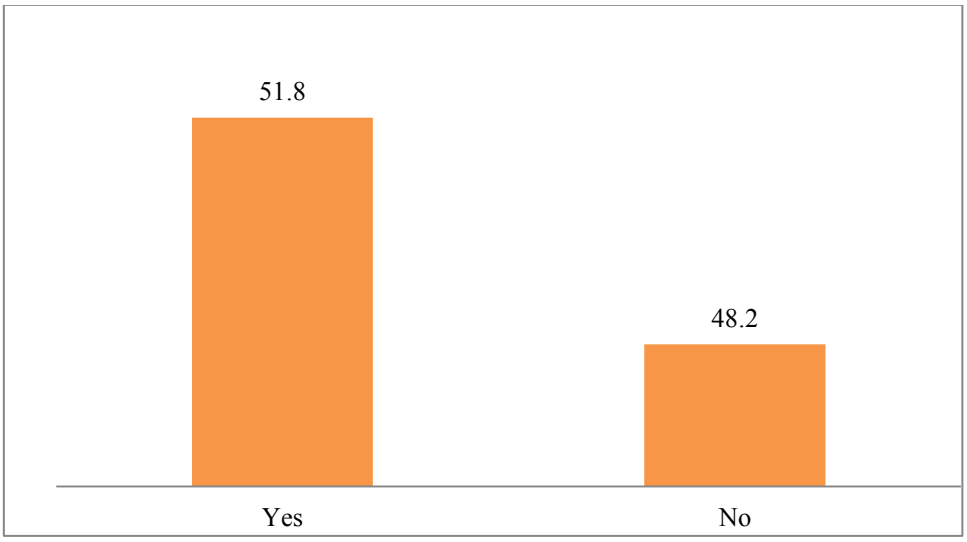


4.14 Distribution of the Extent and Willingness to Pay for the Range of Service [4]Conditions for Non-suburban Travel

4.14.1 Faster Train Services

Willingness to pay is an important consideration. It is important to note that majority of passengers are ready to pay more for faster train services, which calls for better maintenance of track and surveillance to ensure speedy navigation. It may be observed that 52 per cent of the sample passengers are willing to pay more while a sizeable 48 per cent is reluctant to pay more.

Fig 4.32: Distribution (%) of the Willingness to pay for Faster Train Services

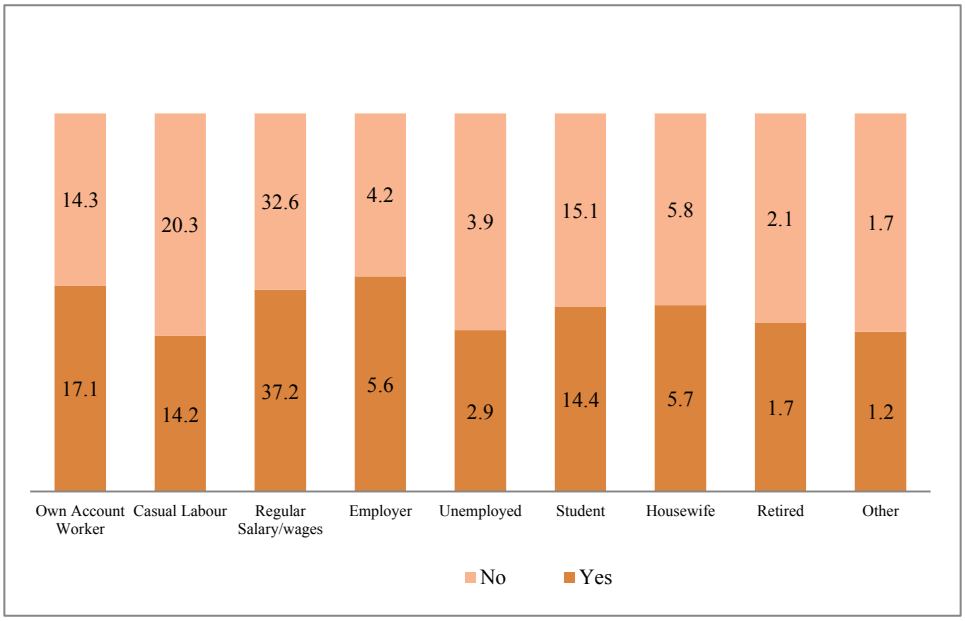


The distribution of agreement or disagreement to increased fare by activity class show that the proportion of disagreement is more for casual labours (20.3%), unemployed (3.9%),

[4] See Section 5.4 for technical update on willingness to pay by non-suburban passenger

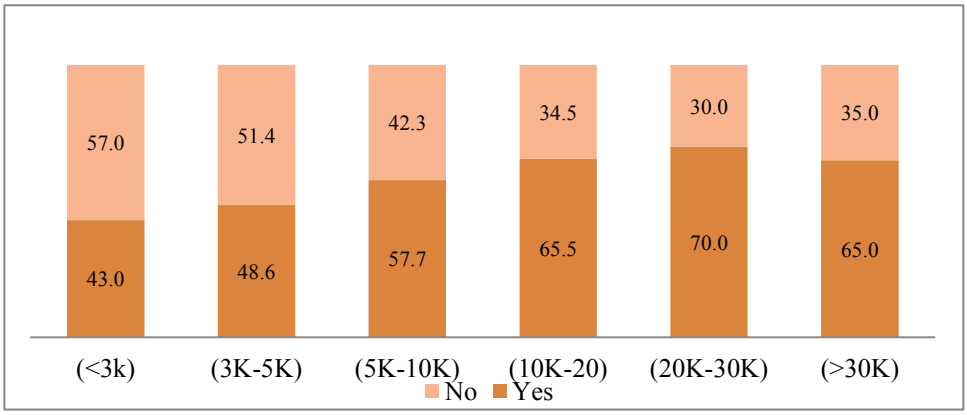
students (15.1%), housewives (5.8%), retired (2.1%) and others (1.7%), while agreement is more for own account workers (17.1%), regular salary/wage earners (37.2%) and employers (5.6%).

Fig 4.33: Distribution (%) of Passengers by Willingness to pay for Faster Train Services and Activity Status



The distribution of agreement/disagreement to increased fare by expenditure status show that the proportion of disagreement is more for passengers with the lowest expenditure profile (57%), as well as the next lowest (51.4%), while agreement is more for passengers who spends monthly Rs 20,000 to Rs 30,000 (70%), followed by passengers whose monthly spending ranges between Rs 10,000 to Rs 20,000 (65.5%).

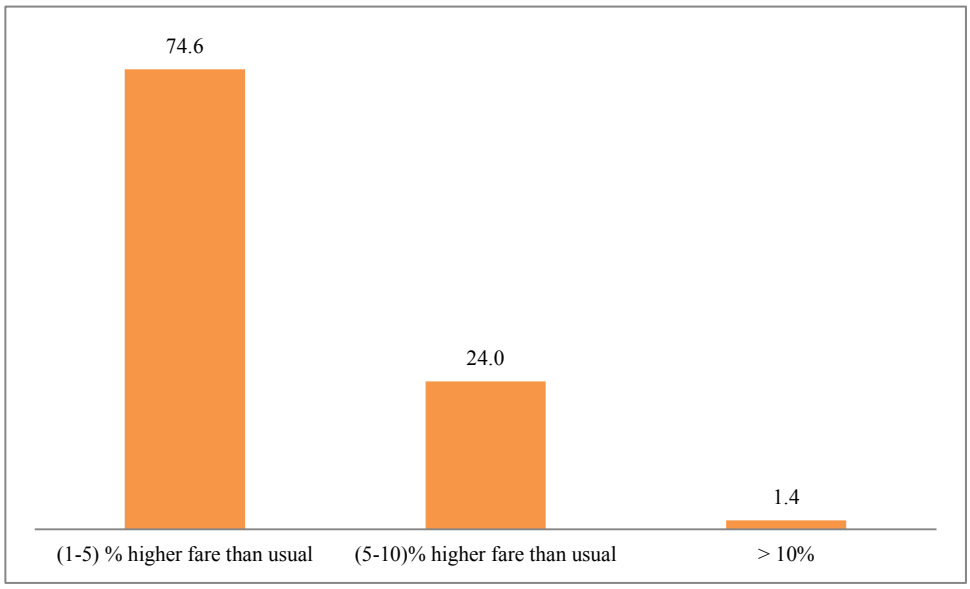
Fig 4.34: Distribution (%) of Passengers by Willingness to pay for Faster Train Services and Expenditure Status



Note: K=1000

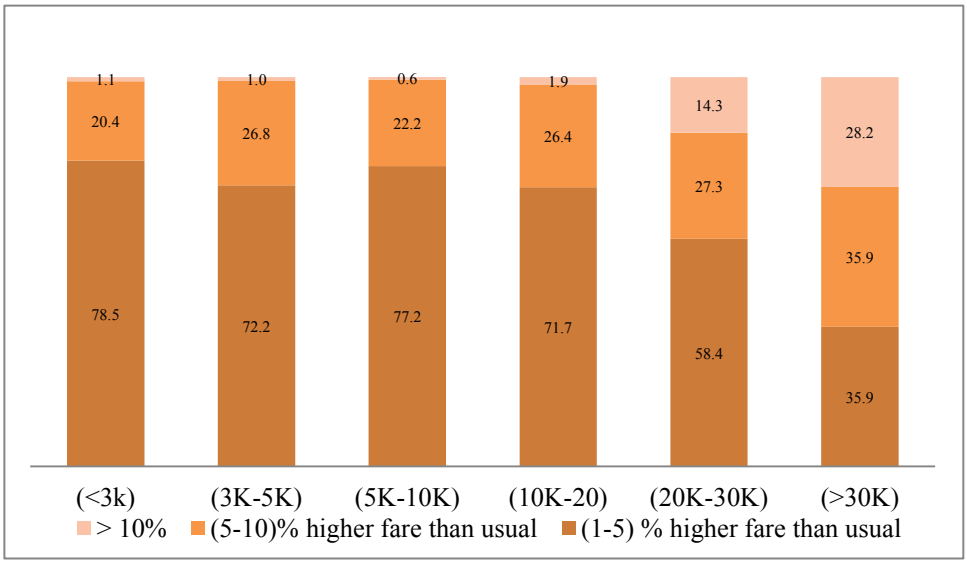
Distribution of willingness to share percentage increase in the fare shows that 75 per cent of the sample passengers agree to 1 to 5 per cent increase in the current fare, while 24 per cent agrees to 6 to 10 per cent increase of the same.

Fig 4.35: Distribution (%) of Passengers by Rates in which they are Willing to pay more for Faster Train Services



Distribution of the willingness to share percentage increase in the fare shows that 78.5 per cent of the sample passengers having the lowest spending profile agree to 1 to 5 per cent increase in the current fare, while 36 per cent of passengers with the highest spending profile agree to 6 to 10 per cent, and 28 per cent agrees to even more than 10 per cent increase of the same.

Fig 4.36: Distribution (%) of Passengers by Rates by which they are Willing to pay more for Faster Train Services and Expenditure Status



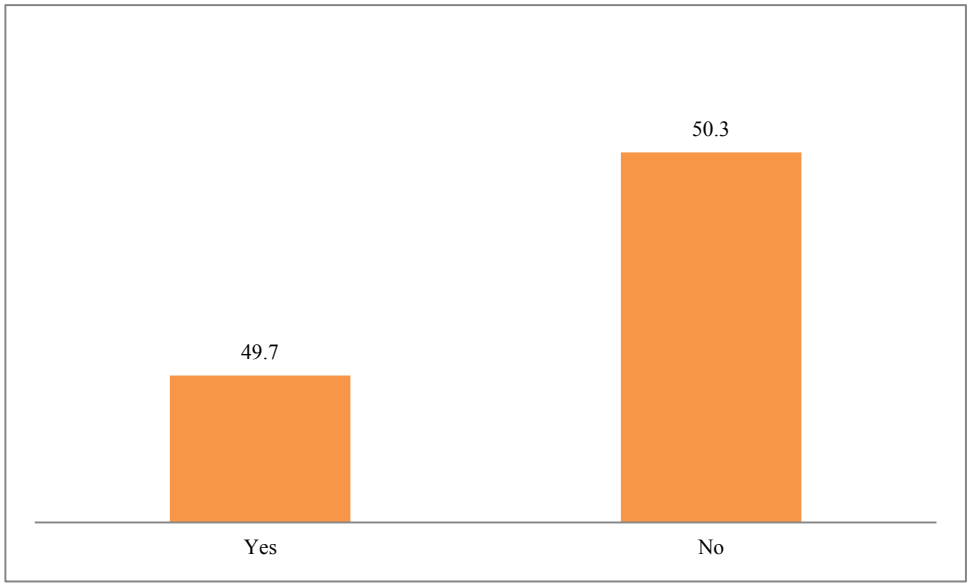
Note: K=1000

4.14.2 Willingness to Pay: Higher Frequency

It is important to note that there is a trade-off in the agreement/disagreement to fare hike against increasing the frequency of train services. It may be observed that 49.7 per cent of the

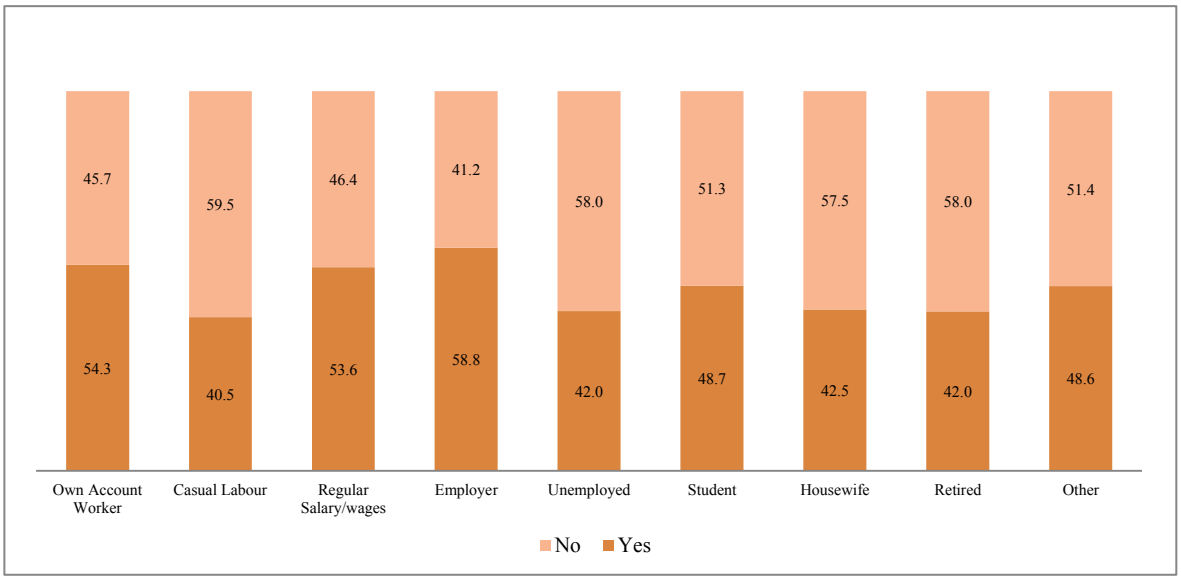
sample passengers are willing to pay more while it is still important to note that a sizeable 50.3 per cent is not willing to pay more.

Fig 4.37: Distribution (%) of Willingness to pay for Higher Frequency Train Services



Distribution of the proportion on agreement/disagreement on increasing fare for increased frequency of railway service by activity status shows that disagreement is more for casual labours (59.5), unemployed (58%), retired (58%), housewives (57.5%), students (51.3%) and others (51.4%), while agreement is from employers (58%), own account workers (54.3%) and regular job holders (53.6%).

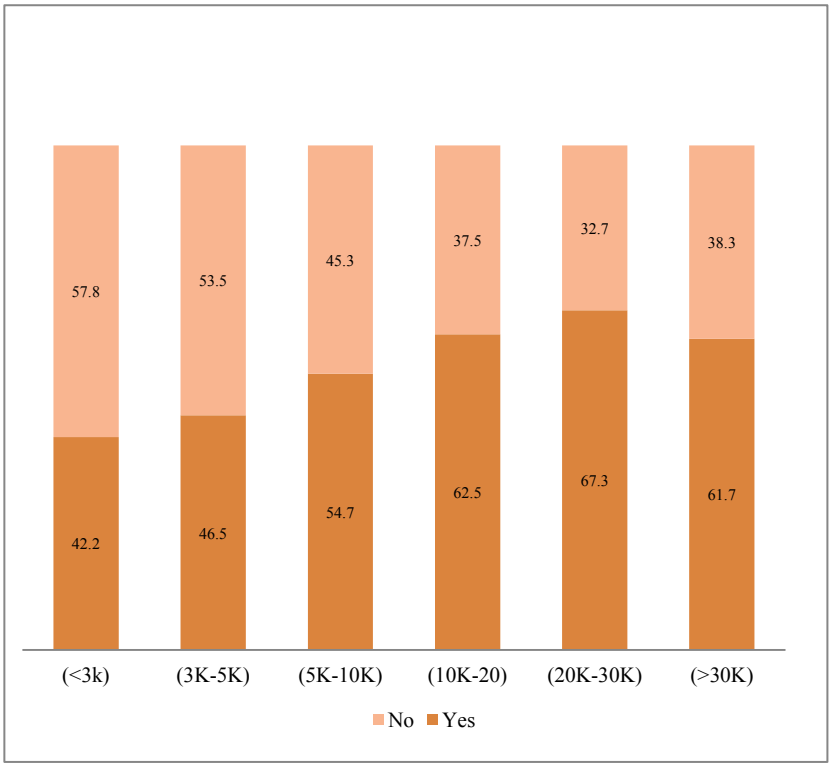
Fig 4.38: Distribution (%) of Passengers by Willingness to pay for Higher Frequency Train Services and Activity Status



Distribution of the proportion on agreement/disagreement on increasing fare for increased frequency of railway service by expenditure shows that disagreement is more for the lowest

spending group (57.8%), followed by the next lowest spending group (53.4%). The agreement is more for the highest spending groups and it is observed to be the highest for passengers whose monthly spending ranges from Rs 20,000 to Rs 30,000 (67.3%).

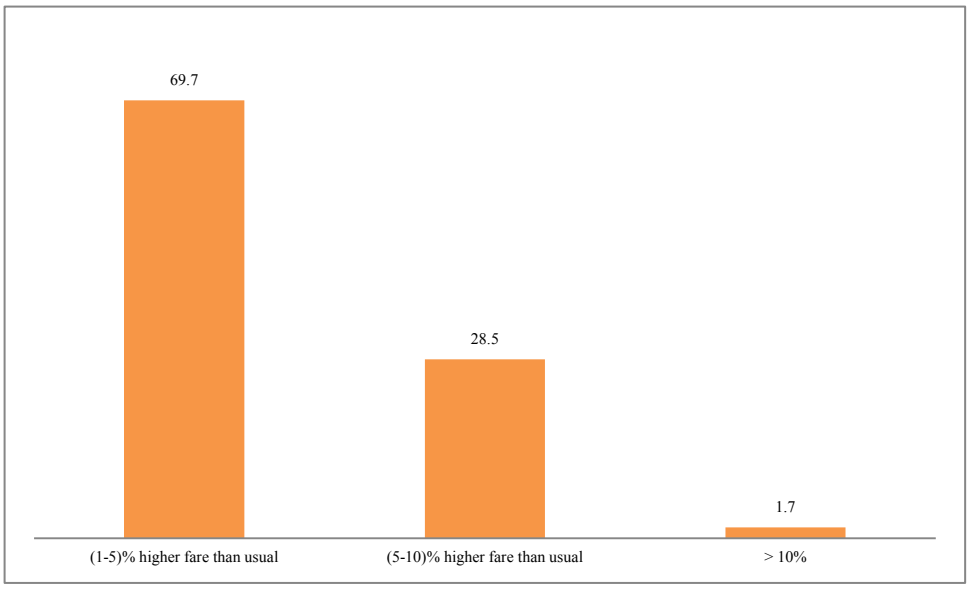
Fig 4.39: Distribution (%) of Passengers by Willingness to pay for Higher Frequency Train Services and Expenditure Status



Note: K=1000

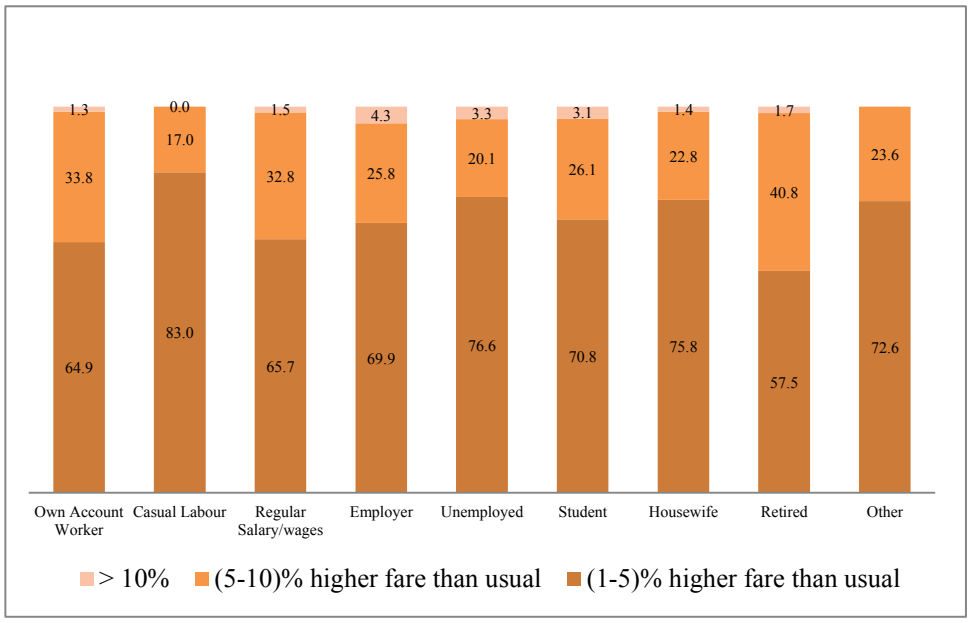
Distribution of willingness to share percentage increase in the fare shows that around 70 per cent of the sample passengers agree to 1 to 5 per cent increase in the current fare, while 29 per cent agree to 6 to 10 per cent increase.

Fig 4.40: Distribution (%) of Passengers by Rates by which they are willing to pay more for Higher Frequency Train Services



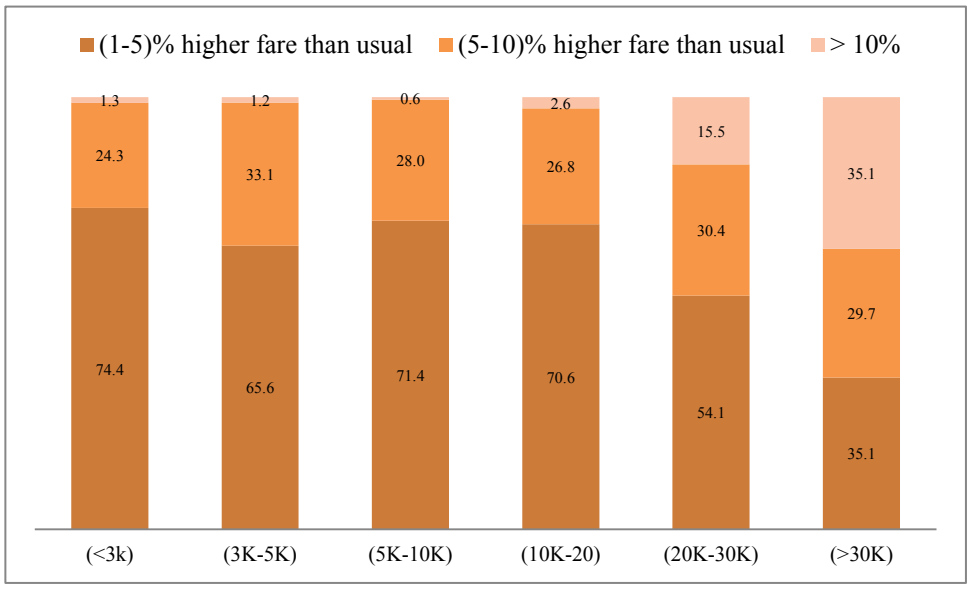
Distribution of the willingness to share percentage increase in the fare by activity status shows that 83 per cent of sample passengers from casual labour category agree to 1 to 5 per cent increase in the current fare, while 41 per cent of the retired agree to 6 to 10 per cent increase.

Fig 4.41: Distribution (%) of Passengers by Rates by which they are willing to pay more for Higher Frequency Train Services and Activity Status



Distribution of the willingness to share percentage increase in the fare by expenditure status shows that passengers with the lowest spending profile (74.4%) agree to 1 to 5 per cent increase in the current fare, while 35 per cent of the of the highest spending group agree to pay even more than 10 per cent of the existing fare.

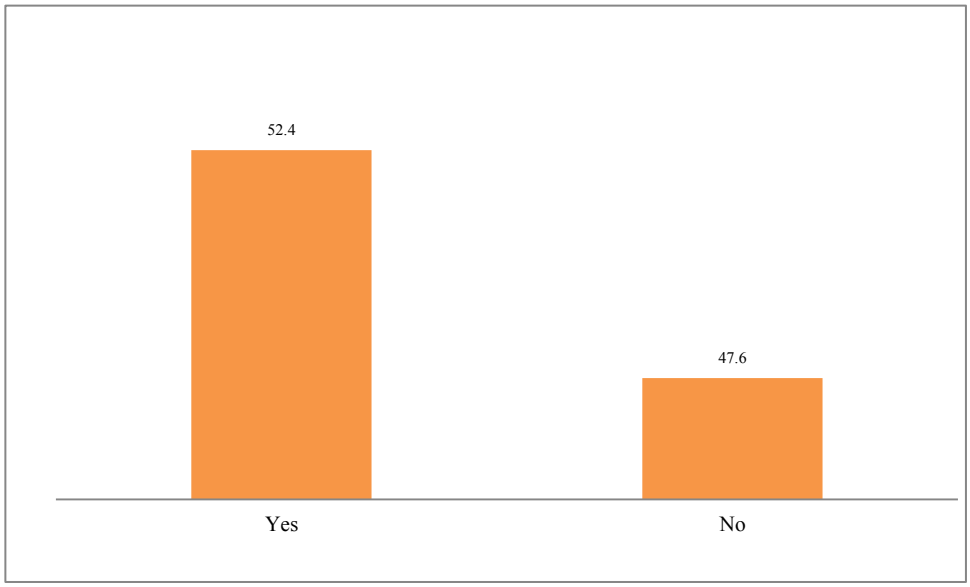
Fig 4.42: Distribution (%) of Passengers by Rates by which they are willing to pay more for Higher Frequency Train Services and Expenditure Status



4.14.3 Willingness to Pay: Better Service Quality on Board

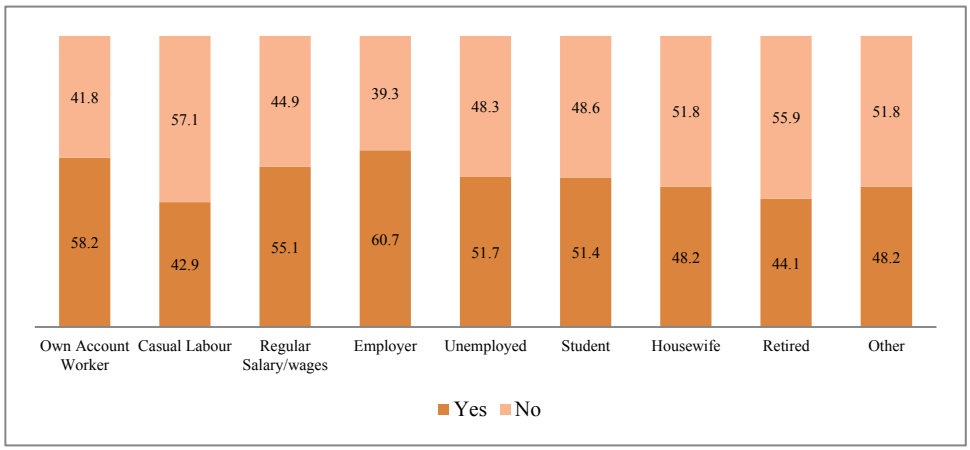
Distribution of the willingness to pay more for better service quality inside the train shows that majority of passengers (52.4%) agree to pay more.

Fig 4.43: Distribution (%) of the willingness to pay more for better Service Quality inside the Train



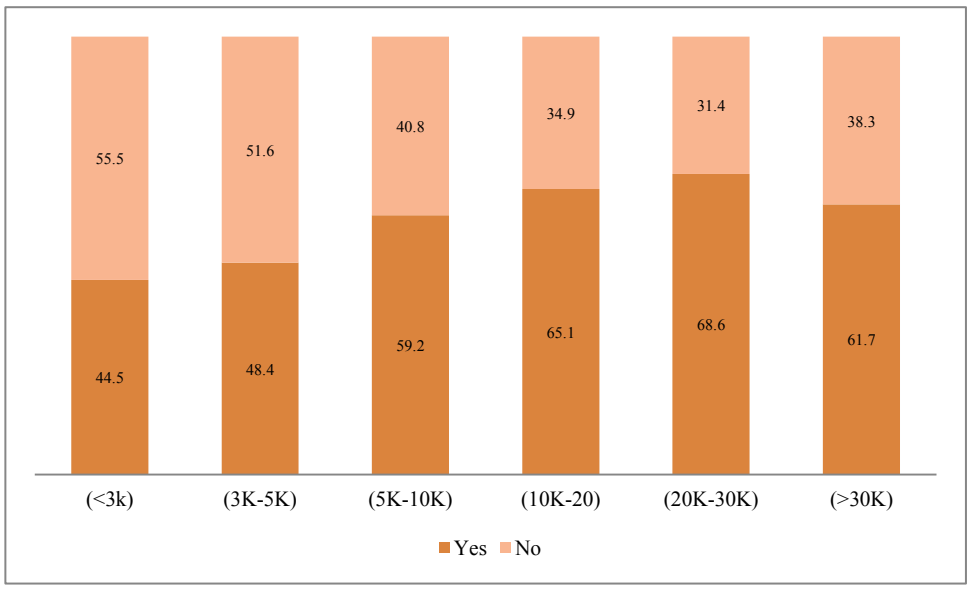
Distribution of the willingness to pay more for better service quality inside the train by activity status shows that majority of passengers who are employers (61%), own account workers (58%), regular job holders (55%), unemployed (52%), and students (51%) agree to pay more. The disagreement is observed to be more from casual labours (57%) followed by retired (56%).

Fig 4.44: Distribution (%) of the willingness to pay more for better Service Quality inside the Train by Activity Status



Distribution of the willingness to pay more for better service quality inside the train by expenditure status shows that majority of passengers from the monthly spending groups above Rs 5,000 agree to pay more. The disagreement is observed to be more from the lowest (56%) and next to the lowest (52%) spending groups.

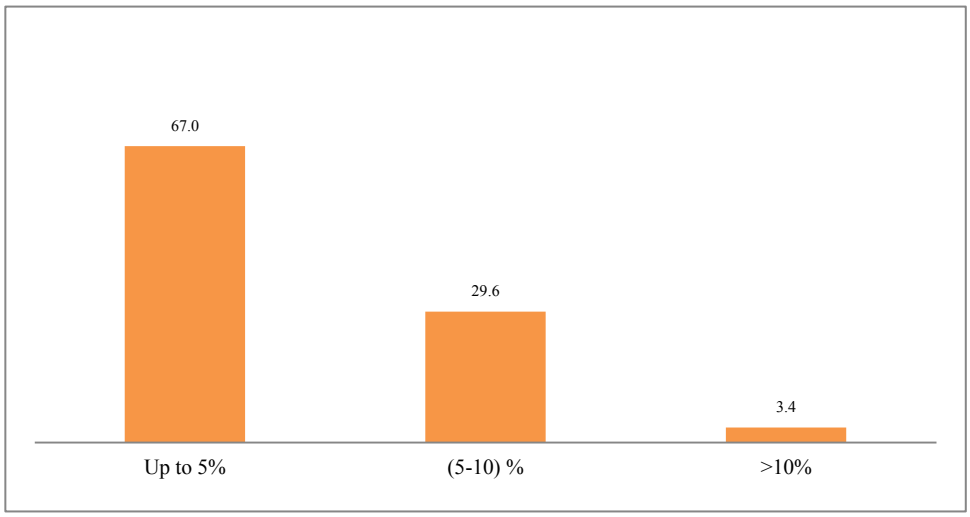
Fig 4.45: Distribution (%) of the willingness to pay more for better Service Quality inside the Train by Expenditure Status



Note: K=1000

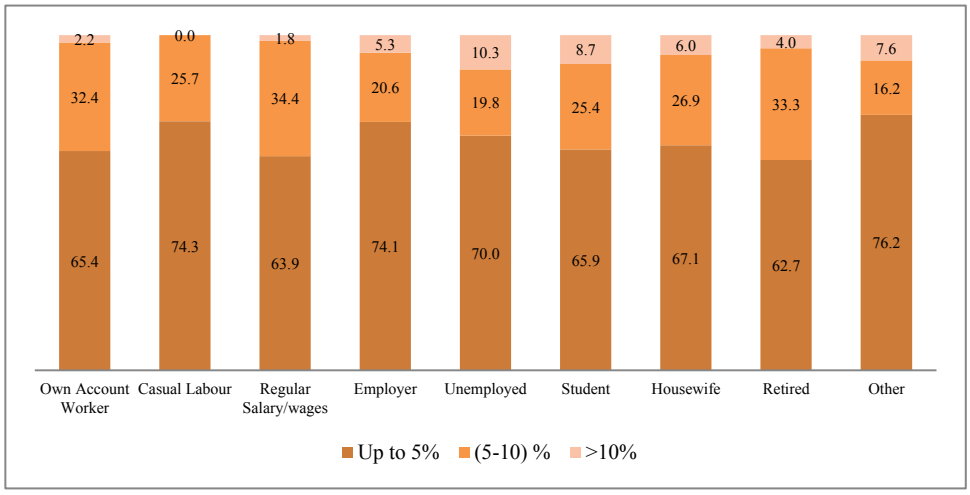
Distribution of rates by which passengers agree for a hike in the existing fare for better facilities inside the train is given in Figure 4.46. It may be noted that 67 per cent of the passengers agree to 1 to 5 per cent increase on the current rate, around 30 per cent to 6 to 10 per cent increase. Only a little over 3 per cent of the passengers agree for increase of 10 per cent above the current fare.

Fig 4.46: Distribution (%) of Rates by which Passengers are willing to pay more for Better Facilities inside the Train



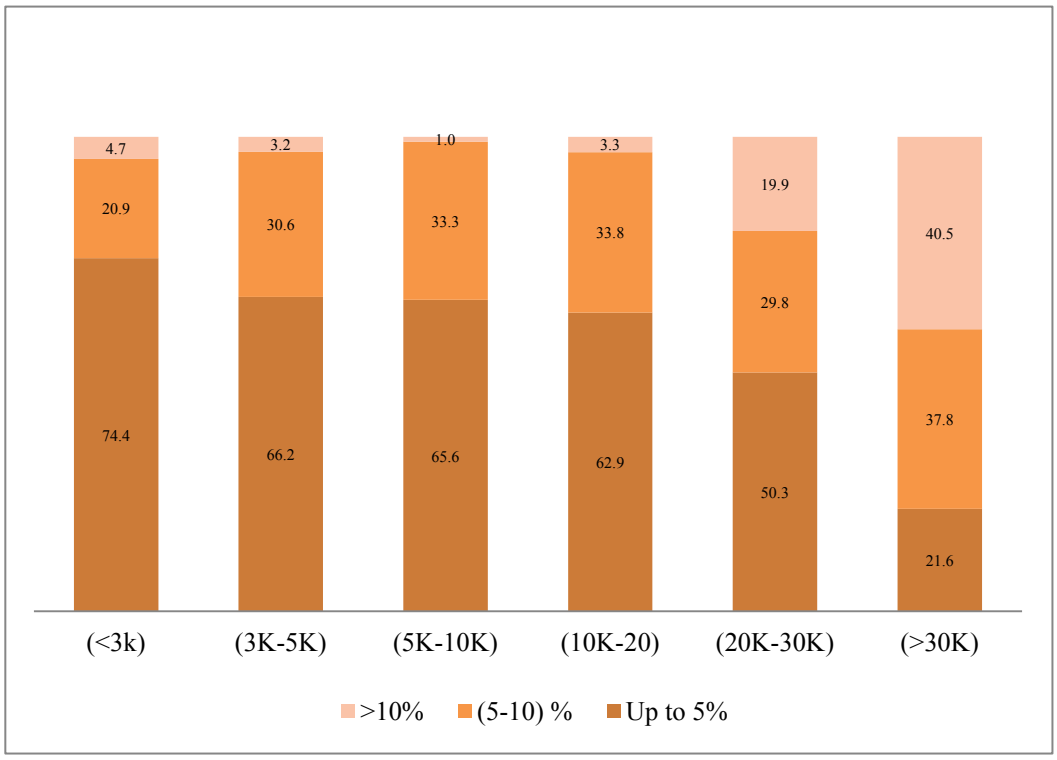
Distribution of the rates by which passengers agree to a hike in the existing fare for better facilities inside the train by activity status is given in Figure 4.47. Interestingly, it may be noted that a little over 10 per cent of the unemployed agrees to more than 10 per cent increase in the existing fare, followed by students (9%) and housewives (6%). This points out to the exclusive preference pattern of the younger generation for better facilities inside the train.

Fig 4.47: Distribution (%) of Rates by which Passengers are willing to pay more for Better Facilities inside the Train by Activity Status



Distribution of the rates by which passengers agree for a hike in the existing fare for better facilities inside the train by activity status is given in Figure 4.48. It may be observed that 41 per cent of the highest spending group (>30,000) agree to more than 10 per cent increase in the existing fare, followed by passengers (20%) with monthly spending of Rs 20,000 to Rs 30,000.

Fig 4.48: Distribution (%) of Rates by which Passengers are willing to pay more for Better Facilities inside the Train by Expenditure Status

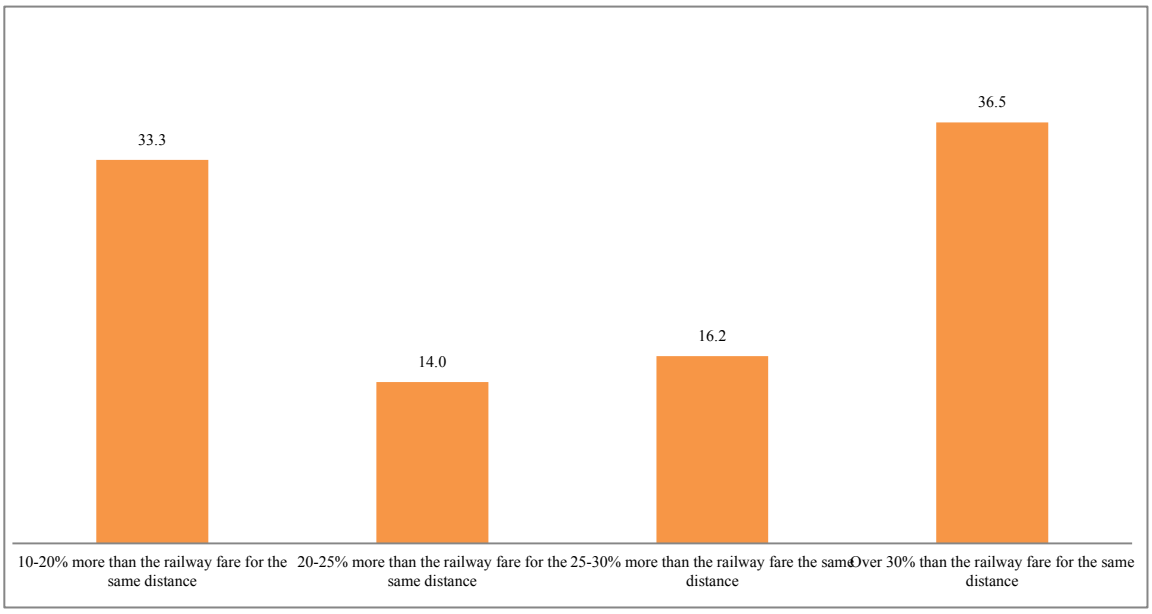


Note: K=1000

4.14.4 Impact on Travelling Expenditure when Train Tickets Are Not Available

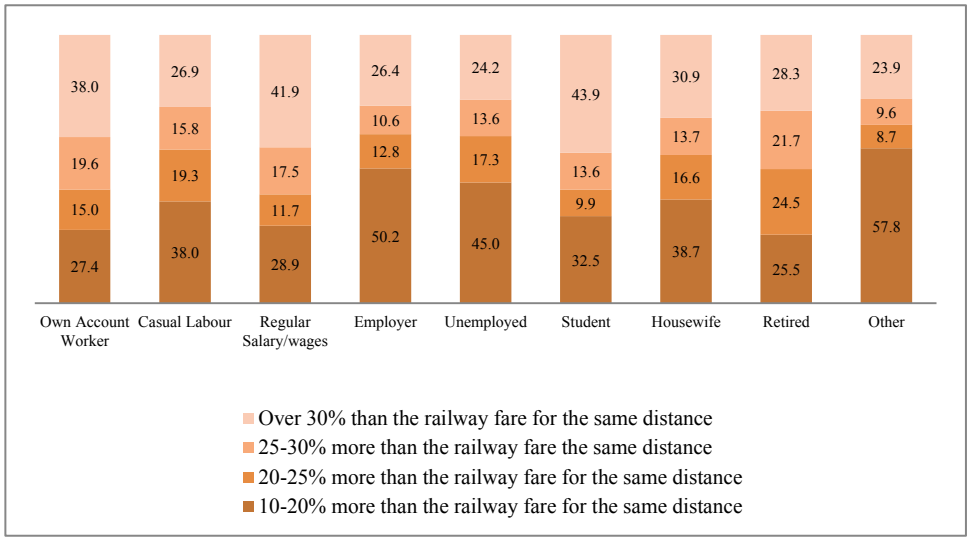
When train tickets are not available, the impact on travel expenditure of the passengers is an important consideration for their perception about dependability on this mode. The impact of travelling expenditure of the passengers who prefer to stay put and decide not to travel in such an event would be insignificant. However, it may be observed that 67 per cent of the passengers are affected and they have to compensate the travel need by paying more on other modes. Moreover, a sizeable 37 per cent of the passengers say that the non-availability of tickets escalates travelling expenditure by more than 30 per cent.

Fig 4.49: Distribution (%) of the Impact on the Travelling Expenditure in the event of Non-Availability of Train Ticket



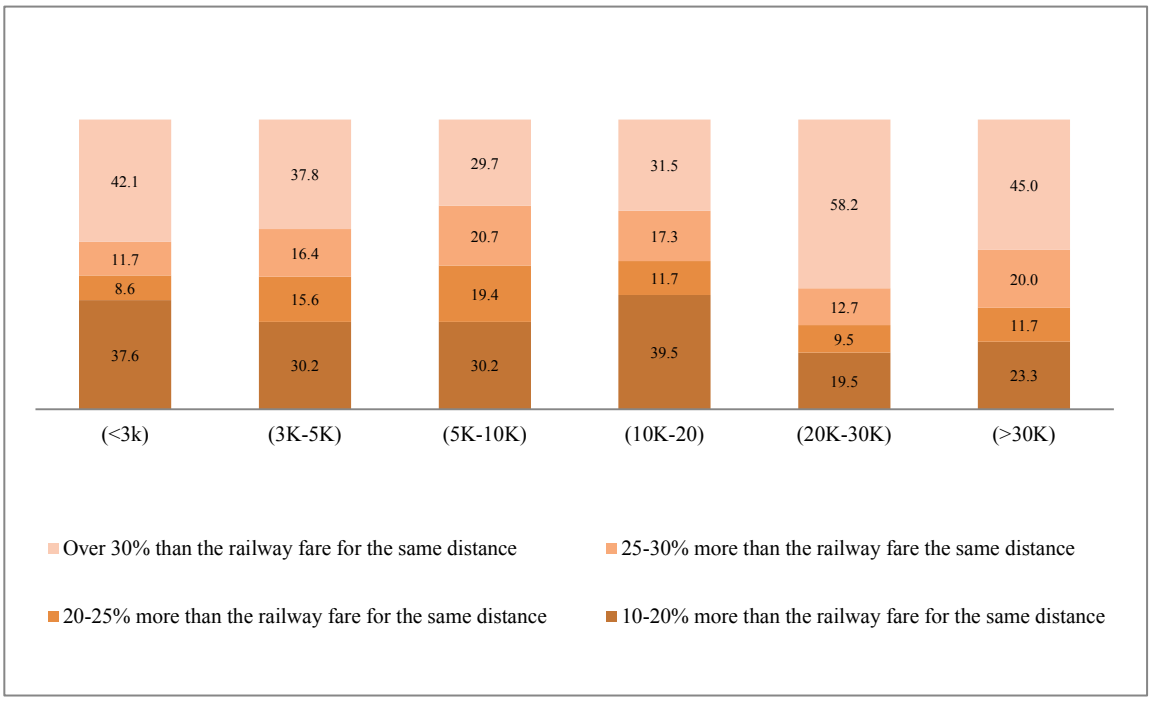
Distribution by activity status shows that non-availability of tickets affects all sections of passengers across activity status as shown in Figure 4.50. It is interesting to note that 44 per cent of the passengers belonging to student community say the non-availability of train tickets increases their travel expenditure by more than 30 per cent.

Fig 4.50: Distribution (%) of the Impact on the Travelling Expenditure in the event of Non-Availability of Train Ticket by Activity Status



Distribution by activity status shows that non-availability of tickets affects all sections of passengers across expenditure status as shown in Figure 4.51. It may be noted that 42 per cent of passengers even in the lowest spending group spends more than 30 per cent of the current fare to travel the same distance by other modes.

Fig 4.51: Distribution (%) of the Impact on the Travelling Expenditure in the event of Non-Availability of Train Ticket by Expenditure Status



Note: K=1000

4.15 Opinions on Performance Indicators[5]

Opinions on performance indicators are important gauge of passengers' perceptions about the quality of services on various performance indicators. The opinions are varied and if we dissect the opinions carefully, we can observe that facilities for lady passengers, catering, water, security, and safety of luggage and passengers along with availability of trains and train tickets are all areas of concern and they need urgent attention. In all these indicators, the percentage distribution of bad and very bad is not insignificant if proportionally distributed among large numbers of non-suburban passengers.

[5] See Section 5.5 for technical update on performance indicator by the non-suburban passenger

Table 4.20: Opinion on the Performance of Non-suburban services

	Excellent	Very good	Good	Bad	Very bad
Overall service	2.1	10.0	81.9	5.4	0.6
Timely reach to destination	0.6	12.6	65.0	20.8	0.9
Availability of Number of trains	0.7	9.4	59.7	27.7	2.5
Availability of Train Tickets	3.1	17.6	53.0	22.7	3.6
Duration of travel	1.2	11.1	66.5	18.7	2.5
Frequency of train services	0.8	8.8	55.6	32.0	2.7
Connectivity	1.7	15.9	58.7	21.5	2.2
Last mile reach	1.9	14.1	62.4	19.2	2.5
Catering service	1.1	6.8	50.2	35.8	6.1
Toilet facility	1.3	6.0	41.5	39.1	12.1
Adequate water	0.6	5.8	59.4	29.3	4.8
Facilities for ladies passenger	0.3	8.3	48.1	37.8	5.4
Waiting room facility	0.9	14.6	58.8	22.9	2.8
Security and safety	0.6	10.0	55.4	30.0	4.0
Strict vigil by railway staff	1.0	9.9	54.6	29.6	4.9
Cost of travel	10.0	25.1	58.2	5.7	1.0

For further details on preference pattern and count outcomes, please see section 5.5.

4.16 Concluding comments

The observed data of the non-suburban passenger shows that a large number of passengers travel in the general category (79%), followed by the sleeper class (18%).It may be presumed that a relative crowding out is possible for higher class travellers with higher expenditure profiles, who agree to pay more for better service quality. To strike a balance, the railways should enhance service quality of overall passenger travel and resort to a minor increase in rates, which is generally acceptable given the excess demand at the existing rate, to cover the cost of operations for better facilities.

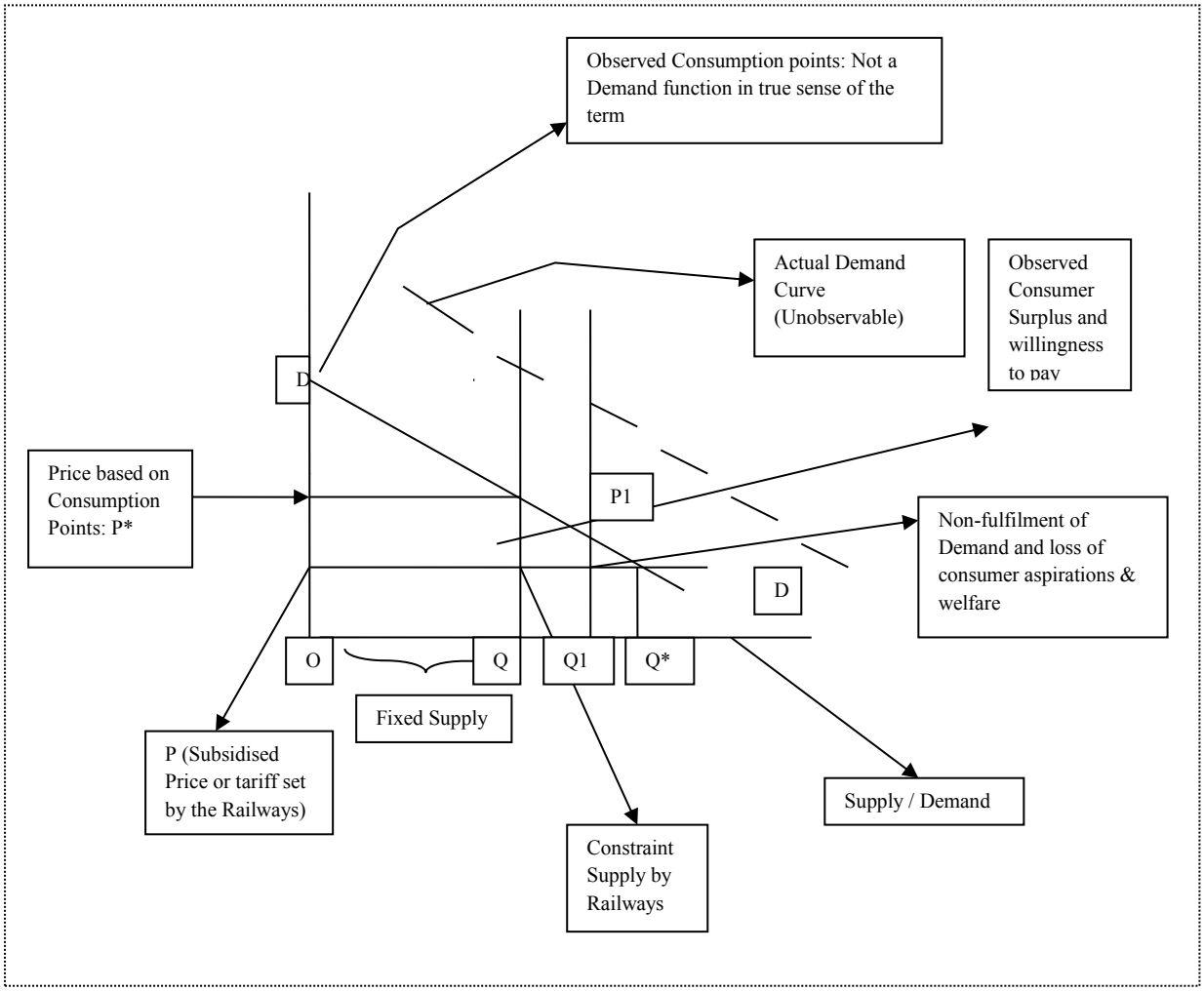
5. Further Analysis of Factors Affecting Demand for Rail Passenger Services

5.1 Modelling Passenger Demand for Railways in India

Estimation of the Demand Function for the Indian railways based on available information has significant limitations. Indian railways set tariff for the passenger service based on certain norms, rather than market mechanisms. As a result the combination of observed prices and volumes of traffic may not capture a demand relationship. The Fig 5.1 below illustrates the conceptual relationship of demand. The horizontal axis measures supply of passenger services and its consumption, whereas the vertical axis the price (tariff) charge by railways/notional price based on interaction with supply and demand. Though railways expand passenger services in different scale and magnitudes, the considerations for its expansion is not strictly in accordance with demand-supply law and in general one may assume a fixed supply quotient (OQ in Fig 5.1 below) for the provision of generalised service (*a la* supply constraint regime reflected in Table 3.1 above). The interaction with the observed consumption point (DD) and Q gives quasi-equilibrium price at P*. However, railways set price at P, which is less than P* and at this price, the theoretical willingness to pay would be the shaded area referring to the difference of (P*-P). The data on Passenger Kilometre (PKM) and average earnings per PKM form the Indian railways are all observable entity and a functional relation using GDP deflator gives observed consumption points DD. The interaction with the DD and railway price P gives another quasi-equilibrium requirement of railway passenger service at Q*, which is unattainable given the resource constraint and results in loss of consumer aspiration and welfare in theoretical jargon. On the other hand, if railways can increase the supply of service to say Q1, the price would converge towards the notional equilibrium price P*, but still there will be excess demand for railway service. In effect, due to absence of true market mechanism, the actual demand curve is unobservable. May be dotted line in the chart, above DD, but really one can make guess only.

The current estimation of demand or observed consumption point for the railway service in India is an attempt to simplify the difficult and complex scenario to check whether the estimated consumption follows economic rationale of negative own price sensitivity or whether income sensitivity to railway passenger service follow standard normal goods assumptions (unlike Mexican case, where the Metro rail service is termed inferior). The model is also extended to examine if there is any existence of cross price sensitivity. The preliminary estimate using railways data satisfies demand relation, which, as mentioned gives us consumption points in standard setup. On the other hand, simple estimation using dummy variable for factoring in petrol and diesel prices shows that railway passenger service is indeed cross price sensitive. The second motivation of this exercise is to use the estimated function to derive projected demand for the Indian railways for 2020. Before we take up the estimation, a brief literature survey is attempted below regarding estimation of railway passenger demand in India, UK and Mexico.

Fig 5.1: Observed Consumption Points and Quasi Equilibrium: Willingness to Pay for Consumer Surplus and Excess Demand



5.1.1: Finding from an India-based Study

A growing number of vehicular movement such as by cars and two wheelers result in increased traffic congestion, air pollution and accidents. This has become a major concern for urban areas in India. Investments in high capacity rail-based mass transit systems are being promoted to arrest this trend. Suburban railway travel assumes critical significance in this regard.

Urban transport situation in most Indian metropolitan cities is rapidly deteriorating because of the increasing travel demands coupled with inadequate transport system. Indian cities of all sizes face the crisis of urban transport. To solve the problem, international policies and results of research are of critical interest. In most metro as well as class 1 cities in India, the number of two-wheelers and cars continue to rise. Despite construction of a host of flyovers and roads, the routes continue to face congestion, especially during peak hours.

The main aim of the paper by S. Singh (2000) is to forecast the level of rail- as well as road-based passenger mobility in India up to 2015–16. The forecasting is based on estimation of S-shaped growth curves using annual data of the level of passenger mobility from 1950–51 to

1995–96. It is found that road transport will play an extremely dominant role in India in providing passenger mobility in the coming years. According to the author, by the end of 2015–16, road share in passenger movement will touch 95 per cent as against 5 per cent for rail. Passenger mobility in India heavily relies on rail and road. Passenger travel by air and water is negligible in comparison to rail and road.

Time series data from 1950–51 to 1995–96 were used for estimating rail- and road-based passenger mobility as well as growth models for transportation demand. Data were taken from Statistical Abstract India; CSO, GoI. Data from CMIE and CIRT were also used to estimate passenger data from roadways transportation. It may be noted that bus population went up from 344.11 in 1950–51 to 448.970 in 1995–96 representing an average annual growth rate of 5.87 per cent. Also, there is noticeable change in productivity of bus operation. This was brought about by various factors, important among them being road improvement, better buses and better maintenance along with improved managerial effort. Occupancy (ratio of number of passengers to the seats offered) has also gradually risen from around 45 per cent in 1950–51 to 85 per cent in 1995–96.

The passenger-kilometres accounted for by these modes of transport are calculated after making reasonable assumptions regarding their average annual utilisation and average occupancy. Surface-based long-distance passenger mobility mainly depends on rail. IR system is the second largest in the world under a single management. It had played a dominant role in providing passenger mobility from the second half of nineteenth century to early 1950s.

5.1.2 Findings from a Mexico City-based Study

In Mexico City metro, consisting of 11 lines and 177 km of passenger track, is treated as an inferior good as it provides services to the central and northern areas of Mexico City with 164 stations, and to the poorest.

The authors used time series co-integration techniques to estimate whether the metro facility is perceived as a normal or inferior good. Mexico City metro mainly serves the low income sectors of the population, and the paper by Amado Crotte, Robert B. Noland, and Daniel J. Graham (2009) attempts to separate the overall income effect into two uncorrelated components: a vehicle stock effect for medium/high income and minimum wage effect for low income. The time series co-integration results show that minimum wage elasticities are positive while vehicle stock elasticities are negative. These results suggest that for the majority of metro users, whose salaries are based on low multiples of the minimum wage, the Mexico City metro is perceived as a normal good. However, for middle/high income earners, who can afford to buy a private vehicle when their incomes increase, the Mexico City metro is perceived as an inferior good.

When vehicle stock and income are included among the explanatory variables, the income coefficient will tend to be positive. However, with the use of aggregate data, correlation between these variables usually generates statistically insignificant estimates that suggest that

income elasticities for rail tend to be positive regardless of the specification of the demand model, while bus income elasticities tend to be negative.

In Mexico City basically metro fare is cheap and affordable than buses, especially for long journeys. The 2007 Mexico City Metropolitan Area Origin–Destination Survey provided by the Mexico City ministry of transport (SETRAVI) shows that the average income of metro users is less than two daily minimum wages and 15 per cent lower than bus users and nearly 70 per cent lower than car users. Users over 60 years and people with disabilities travel free and in 2005 represented 5.9 per cent of all passengers.

The Mexico City metro provided data on the total number of annual metro passengers single ticket fares and train distance operated for the whole network for the period 1980–2005.The National Institute of Statistics, Geography and Informatics (INEGI) provided a vehicle stock for Mexico City measured as the total number of registered automobiles.

5.1.2.1 Model and Estimation using Vehicle Stock and Petrol Price

Basic variables to estimate the data are: M – metro patronage per capita, W – real minimum wage, P –real single metro fares, KMPP – vehicle km travel led per passenger (a proxy for service equality), V – vehicle stock per capita, and PGAS – real petrol price. All variables are expressed in logarithmic form and the subscript 't' denotes time. The error term, e, is IID (0, σ2) and by equation

$$\ln M_t = \alpha + \beta_1 \ln W_t + \beta_2 \ln P_t + \beta_3 \ln KMPP_t + \beta_4 \ln V_t + \beta_5 \ln PGAS_t + e_t$$

The two-stage Engle and Granger method of estimating the co-integrating regression and a Static Ordinary Least Square Approach were used to obtain the long run elasticities. The authors also used the dynamic OLS (DOLS) estimator that adds leads and lags of the differenced independent variables and the fully modified OLS (FMOLS) estimator that applies semi-parametric adjustments to OLS estimator to correct for endogeneity and serial correlation in the errors to account for possible endogeneity of the quality of service variable.

Negative relationship between patronage and minimum wages between 1980 and 1988 show that low income earners, who somehow managed to own a vehicle, shifted to public transport when their incomes decreased in real terms. However, for the rest of the series there seems to be a positive relationship between these variables, as real minimum wages decrease, so does patronage.

The relationship between vehicle stock and patronage is less ambiguous, for most of the series the association is negative. There is no clear cut relationship between fares and patronage. The same holds good for patronage per capita and distance per passenger. This may be the result of line extensions and construction of new lines. Fuel prices and patronage do not show a consistent trend for the whole series, although between 1992 and 2000 the association has been clearly negative, which may be counter-intuitive.

The paper by Parry et al. (2010) uses an analytical-simulation model to examine the optimal pricing of passenger transportation system in Mexico City with the model incorporating travel by auto, microbus, public bus and rail, as well as externalities from local and global air

pollution, traffic congestion, and road accidents. An increase in gasoline prices put up higher tax to control the microbus and autos externalities. It is observed that fuel taxes help to internalise pollution and accident externalities by reduction in automobile congestion. On the other hand, fare subsidies provided to public bus and rail reduced negative externalities.

5.1.2.2 Observations from the Analytical Model

Government sets fuel prices, public transit fares and mileage toll for private buses and autos subject to a budget constraint. Model implicitly encompasses long-run, policy-induced changes in vehicle fuel economy and vehicle fleet composition. The authors employed a representative agent framework to approximate an aggregation over many urban households that in practice have very different demands for travel, valuation of health risks and time to focus on economic efficiency.

For the household utility in the model represents an aggregation over all individual in the Mexico City metropolitan area with the assumption that utility function is quasi-concave and increasing in consumption of a general good and utility from passenger miles travel (auto, mini bus, public bus and rail) and decreasing in vehicle time spent in all modes, which implicitly lower utility by reducing time variable for work and leisure and decreasing index of externalities which include local pollution, road accident, harmful impact on human health, etc.

5.1.2.3 Household Constraints, Optimisation and Welfare Effects

Agent's budget constraint equates income with spending on auto taxes capital, fuel, transit fare and the general market goods and government spending agents want to maximise utility subject to budget constraint and production function. As government charged gasoline excise tax from private vehicle operators (difference between the government fuel price and the unit production cost of the fuel) and the difference between fare for the public bus and rail charged to passengers and the marginal cost to government agency of supplying passenger miles, where these price wedges can be negative if transit fares are subsidised.

Welfare gain increase if rise in the gasoline tax which imply decrease in gasoline demand for use and accident cost per mile and pollution cost per unit of fuel depends on the time per mile auto at free-flowing traffic speeds and parameter.

The welfare effect of an increase in the gasoline tax into the reduction in gasoline use, at times, and marginal external cost of passenger travel for those modes finally divert passengers to public bus and rail transport and similarly with the toll for autos. The main difference is the former targets the congestion and accident externalities more directly because all the behavioural response to the tax comes from reduced mileage. Increased auto travel in response to higher microbus toll can significantly affect the optimal microbus toll, given that autos absorb a significant portion of diverted microbus passengers and autos have significant external costs.

The fare of public bus and train depends on the marginal cost of supplying passenger mile plus external cost per passenger mile for bus travel and cross price effects among fuels and other transit modes. But for the optimal fare for rail, external cost does not exist.

It is observed that higher prices of fuel reduced congestion externalities by 48 per cent. Reduced accidents contribute 7 per cent to the optimal tax of the automobile. An increased price of gasoline by $4.76 per gallon which would reduce gasoline use and generate welfare gains of $84.0 per capita. Basically public bus and rail substitute passengers in large amount from autos and microbus. Therefore, public bus subsidised by 7.3 cents per passenger mile and rail is 11.4 cents per passenger mile because they reduced negative externalities.

However, this may not be a very realistic policy. The most important source of efficiency gains under higher fuel taxes comes from reduced road congestion. However, a far more efficient and direct way to reduce road congestion is to impose a mileage toll on auto travel but it does not work in Mexico City. And finally, although the treatment of public bus and rail is highly rudimentary, the results do at least suggest that any welfare gains from reforming fares for these transit modes are likely to be modest compared with the larger gain from reforming auto taxation. Increasing public bus and rail transport services for the passengers would help reduce the congestion and external impact of other modes of transport.

5.1.3 Literature from a UK-based study

Britain's national rail system was 'privatised' according to the 1993 Railways Act. Most of the organisational and ownership changes were implemented by 1997. A welfare analysis suggests that although consumers seem to have gained as a result of privatisation, for many years this was offset by increase in costs. Overall the loss in welfare since the reforms were introduced far exceeds the net receipts from the sale of rail businesses. Thus although the reforms have had advantages in terms of lower fares and better service levels than otherwise would have been the case, this appears to have been offset by increased infrastructure and train operation costs.

This consists of the development of a simple econometric model of rail demand and extrapolative models of key variables such as fares, train travel distance and costs. The Office of the Rail Regulator (ORR) was established to regulate rail track and competition between operators. ORR retained responsibility for determining track access and charges and became responsible for safety regulation. There had been a trend for real mean fares (measured by revenue per passenger km) to increase, particularly for London and the South East. This cost explosion has been accompanied by an increase in government support. In welfare terms, privatisation has been a policy failure.

Users have been clearly benefited due to regulated fares that are lower, but perhaps also due to innovations introduced by the private sector, such as new services and tickets and changes to retail distribution (in particular telesales and web-based sales). Further analysis to break down the benefits to users by service group would be useful, but it seems likely that London and South East commuters would have been the big winners from fares regulation.

The big loser has been the government (and ultimately the taxpayer) as costs have increased dramatically. In 2008–09, train travel distance increased by 39 per cent indicating a unit cost increase of around 54 per cent. These costs reflected the large increase in unit operating costs between 1994–95 and 1996–97. It seems that measurable transaction costs only explain a part of the cost increases since privatisation.

The conclusion of this paper by John Preston and Dawn Robins (2012) is thus that privatisation package has been welfare negative and that the most likely cause has been the complex and fragmented nature of the supply-side arrangements. This view would see the welfare losses from 2000 onwards as reflecting the failure of governmental intervention and the privatisation process has exhibited features of both market and regulatory failure transactions and indirectly through losses of scale efficiencies. This has been exacerbated by the need to rectify under-investments in infrastructure which has arguably been a long-standing area of regulatory failure. The benefits that have accrued to consumers and others as a result of private sector initiatives do not seem to have been sufficient to outweigh these cost increases.

The estimates model for forecasting railway demand and explaining the high levels of growth in the 1990s in Great Britain. The key driver of demand is found to be GDP, but variations in car timing fuel costs, car ownerships, population, and a post-privatisation time trend also made significant contributions. The time trend represents the net effect of increases in car ownership, improvements to the road network, falling real motoring costs, changes in demographic factors and land use, and trends in marketing.

The fare and service quality changes have themselves been the cause of large variations in demand. In all cases the actual net growth exceeded the forecasted growth substantially. Petrol and oil price index increased by 23.2 per cent in real terms between 1990 and 1998. This concluded that the cross-elasticities of rail demand with respect to car costs were 0.1 and 0.3 for inter-urban business and leisure trips and 0.25 and 0.35 for suburban business and leisure trips. The fuel cost increases would, therefore, be expected to increase business and leisure rail trips by 2.1 per cent and 6.5 per cent, respectively, in the inter-urban market and by 5.4 per cent and 7.6 per cent in the suburban market. Business travel forms around 40 per cent and 15 per cent, respectively, of trips on London and non-London inter-urban flows while a figure of around 10 per cent can be taken as broadly representing suburban flows (ATOC, 2002). Therefore, the projection expects rail demand growth of around 4.7 per cent, 5.8 per cent and 7.4 per cent on these three sets of flows. Fuel price increases would, therefore, have contributed to the strong demand growth of the 1990s but not to the differential growth rates across routes.

However, a number of other unaccounted factors could have influenced rail demand between 1990 and 1998. There have been gradual improvements to stations, on-board facilities, rolling stock, and information and booking systems. But these are offset by the increased crowding resulting from demand growth and by perceptions of worsening reliability in Great Britain.

5.2 Multivariate Model of Demand or Consumption for Passenger Service in Indian Railways

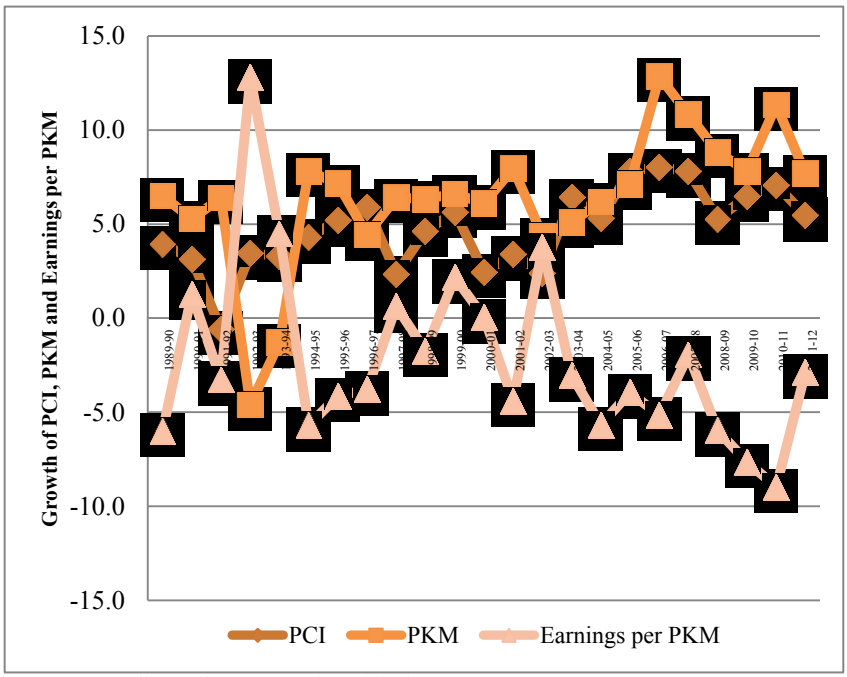
While the profiling of commuters as well as spending pattern and willingness to pay for better services is based on the passenger survey, the estimation of the demand function for railway is captured through secondary data analysis, in which passenger demand is estimated as a function of price of travel, price of substitutes, preference and income. Due to formidable aggregation problem, the prices of substitutes were not directly included in the time series model to estimate demand function for the Indian railways. However, an attempt has been made to examine the relationship between prices of substitutes to rail travel and consumption of rail travel separately by including exogenous shock through analysing hike in petroleum and diesel prices.

The demand or consumption function for railways is derived in a multivariate regression framework using data from 1989–90 to 2011–12. The model assumed that the demand for railway travel is reflected in the passenger kilometre, which is the number of passenger multiplied by average lead distance in kilometres travelled by passenger.

Due to multiplicity of rates for different classes of travel, we have arrived at a price figure from the average revenue per passenger km, deflating it with the GDP deflator[6]. It may be observed that the percentage variation of average prices per passenger km has a declining trend as can be noted from the following figure. The growth of per capita income in India also showed wide variations. It is observed to have a substantial drop in per capita income during the economic crisis period in 1990-92, 1997-98, 2000-01, 2008-09, 2002-03 and 2011-12. The growth of passenger kilometre has shown a perceptible decline in 1992-93, possibly as a consequence of steep decline in income level due to severe economic crisis in the early 1990s. The decline in growth is also noted in 2002-03, 2007-09 and also in the recent years.

[6]It would have been better if we could deflate it by the railway GDP deflator. However, we had to drop the idea since railway GDP deflator is available up to 2008 at the time of calculation.

Fig 5.2: Growth (%) of per capita income (PCI), Passenger Kilometre (PKM), Earning per PKM (deflated by GDP deflator)



Source: CSO, Indian Railways Annual Statistical Statements

5.2.1 The Econometric Model

Considering all the above aspects and assuming the average earnings (deflated) per passenger km as a surrogate for railway fare, the simple demand model for the railway travel is:

$$\Delta\log(PKM) = C + \alpha\,[\Delta\log(DEPKM)] + \beta\,[\Delta\log((PCI(-1))]^{7} + \varepsilon$$

Where PKM is passenger km

- DEPKM is average earnings of railway per passenger km deflated by the GDP deflator with base 2004–05=100. This is a proxy for average fare per passenger km.
- PCI (-1) is per capita income at constant 2004–05 prices with one year lag
- Δ is the difference operator, α, β are the coefficients of average earnings and PCI.
- ε is the residual term.

The basis of using the first order difference operator is to take care of the non-stationarity of the series which can lead to estimation of spurious relationships.

The estimated model is given in the following table.

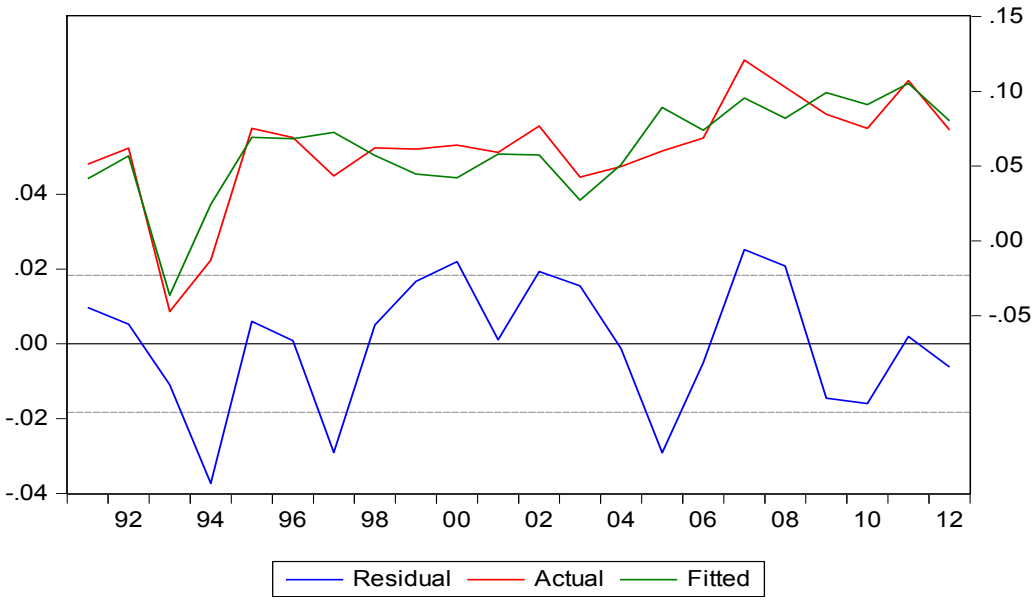
[7] We also included PKM(-1) as one of the explanatory variables, but it came insignificant

Table 5.1: Results of the Estimated of Demand Function for the Railway Passenger service

Dependent Variable: D(LOG(PKM))				
Method: Least Squares				
Date: 08/13/12 Time: 13:42				
Sample (adjusted): 1991 2012				
Included observations: 22 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.021122	0.010482	2.014969	0.0583
D(LOG(DEPKM))	-0.444447	0.101672	-4.371396	0.0003
D(LOG(PCI(-1)))	0.675308	0.234826	2.875781	0.0097
R-squared	0.764252	Mean dependent var		0.061397
Adjusted R-squared	0.739437	S.D. dependent var		0.035868
S.E. of regression	0.018309	Akaike info criterion		-5.036708
Sum squared resid	0.006369	Schwarz criterion		-4.887929
Log likelihood	58.40379	Hannan-Quinn criter.		-5.001660
F-statistic	30.79735	Durbin-Watson stat		1.584938
Prob(F-statistic)	0.000001			

Plot of residual, actual and fitted series is shown in the graph below. The convergence of the residual series to E (ε) =0 shows that the model is in the accepted range and with first difference, converges to the equilibrium.

Fig 5.3: Plot of Residual, Actual and Fitted Series of the Estimated Model



The adjusted R^2 is 74 per cent and the DW statistic is 1.6, which is well within the range. The coefficient of the deflated fare and per capita income are all statistically significant at 1 per cent level.

The model clearly shows that rail travel in India has the usual demand relation (significant with negative sign of the coefficient) but the sensitivity to fare is in-elastic (i.e., not more than 1). In contrast to the popular note, a 1 per cent increase in railway earnings per passenger km would reduce demand for passenger km by 0.44 per cent and vice versa. It has already been noted from the survey that price of the competitive mode is an important

criterion for travel by the railways in India and price freeze for several years have virtually no role to play in this consideration. Similarly, income is statistically significant in influencing demand for railway travel and implies that a 1 per cent increase per capita income would translate into 0.67 per cent increase in demand for passenger km. It may be noted further that the positive income effect outweighs the negative substitution effect. The policy implication is crucial: railways can accommodate increase in passenger fare to meet its cost of operations, thereby enhance the viability of its services as well as improve the quality of services.

The result is extremely important in view of the current volume growth of IR. One option for the railways would be to expand the present infrastructure base to accommodate higher volume growth and stem the negative substitution effect through rational pricing and improvement in the quality of passenger services.

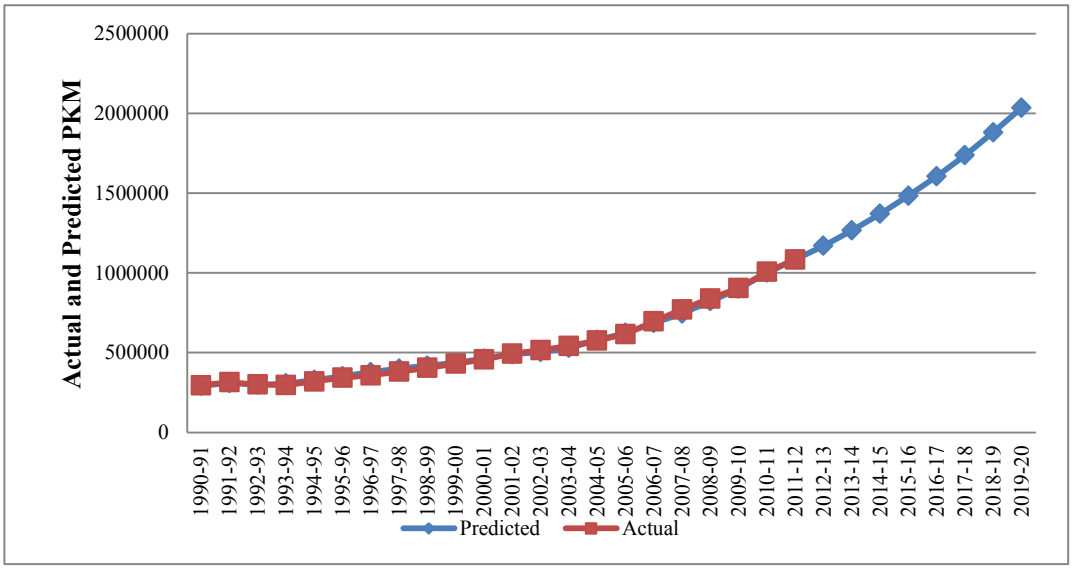
One of the chief motivations of framing a functional consumption relation is to predict the passenger kilometre in this framework for 2020. The following assumptions were made while framing a predicted version of the model.

Assumption 1: Per Capita Income will grow at the rate 0.059544 till FY 2019-20 (based on average growth rate of the PCI from 2002 to 2012)

Assumption 2: Deflated earnings per passenger kilometre will grow at the rate -0.04166 till FY 2019-20 (based on average growth rate of the railway earnings per PKM, i.e., DEPKM from 2002 to 2012)

Using the demand function and applying the growth assumptions, the Indian railway is predicted to reach upto 2035683 million of passenger kilometre in the FY 2019-20.

Fig 5.4: Actual and Predicted Passenger Kilometre (PKM) in Million by 2020



5.3 Exogenous Shock: A Dummy Variable Model to Capture the Impact of Fuel Price Hike on the Demand for Railway Travel

The exogenous shock model is basically intended to capture cross-price sensitivity in an indirect way using the daily data of earnings and passenger km from IR. In this model, dummy variables are introduced for petrol as well as diesel prices. The scenarios were divided into two. The dummy variables for the price of petrol and diesel take the value of 1when it goes up with a lag of one day, otherwise 0. The duration is from 1 April 2007 to 31 March 2012.

The daily data of passenger earnings and passenger km are sourced from CRS, Ministry of Railways.

The model is:

$$\text{Log (ER)} = \alpha + \beta * D\_P_1 + \mu * D\_D_1 + \partial * \text{Log (PKM (-1))}$$

Earning per day from passenger services is denoted by ER, which is the dependent variable. The independent variables are as follows:

- D_P_1 is the dummy of petrol prices
- D_D_1 is the dummy of diesel prices
- PKM is the passenger km with a lag

In this specification, α is the constant term, β and μ are the coefficients of dummies of petrol and diesel and ∂ is the coefficient of the PKM variable. One argument of including a lagged PKM would be that in the railways, passenger's travel is generally pre-paid.

5.3.1 Dummy Variable Descriptions

Starting date of the model using daily data of earnings from passenger services and passenger km is 1 April 2007. Dummies for petrol and diesel were used when the price of petrol or diesel went up with a day's gap, i.e. on 16 February 2008, the diesel price dummy takes the value of 1 (diesel prices increased), but 0 from 7 December 2008 (with a day's lag), when the price of diesel decreased (decrease in price is considered as no-change).

As per information received from the Ministry of Petroleum and Natural Gas, the date of increment/decrement for petrol and diesel prices are the following (Table 5.2)

Table 5.2: Date of increase of Petrol and Diesel Price

Date	Month	Year	Petrol Price	Diesel Price
15	2	2008	Decreased	Increased
5	6	2008	Increased	Increased
6	12	2008	Decreased	Decreased
29	1	2009	Decreased	Decreased
27	2	2010	Increased	Increased
1	4	2010	Increased	Increased
26	6	2010	Increased	Increased
1	7	2010	Increased	Increased
20	7	2010	No Change	Decreased
7	9	2010	Increased	Increased
21	9	2010	Increased	No Change
17	10	2010	Increased	No Change
2	11	2010	Increased	Increased
9	11	2010	Increased	No Change
16	12	2010	Increased	No Change
15	1	2011	Increased	No Change
15	5	2011	Increased	No Change
25	6	2011	No Change	Increased
1	7	2011	Increased	Increased
16	9	2011	Increased	No Change
1	10	2011	No Change	Decreased
4	11	2011	No Change	Increased
16	11	2011	Decreased	No Change

The dummy variable was used as per the dates and increment of the prices of petrol and diesel.

The result of the estimated model is given below:

Table 5.3: Results of the Exogenous Shock Model using Daily Data of Earnings (ER) and Passenger Kilometre: ER as Dependent Variable

Dependent Variable: LOG(ER)				
Method: Least Squares				
Sample (adjusted): 2 1827				
Included observations: 1826 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.938573	0.314603	9.340587	0.0000
D_P1	0.048280	0.006257	7.715879	0.0000
D_D1	0.050778	0.006433	7.893295	0.0000
LOG(PKM(-1))	0.774781	0.018217	42.53049	0.0000
R-squared	0.615470	Mean dependent var		16.44238
Adjusted R-squared	0.614837	S.D. dependent var		0.195138
S.E. of regression	0.121105	Akaike info criterion		-1.382122
Sum squared resid	26.72242	Schwarz criterion		-1.370052
Log likelihood	1265.877	Hannan-Quinn criter.		-1.377670
F-statistic	972.0842	Durbin-Watson stat		1.802956
Prob(F-statistic)	0.000000			

All the estimated variables are significant at 1 per cent level, with R^2 of 61 per cent and DW statistic of 1.80.

The result clearly shows that exogenous shock with respect to petrol and diesel has a positive impact on earnings for passenger services. The impact of diesel is more compared with petrol.

In order to decipher an estimated level of impact on PKM, petrol and diesel dummies are included as independent variables.

The model is as follows:

$$\text{Log (PKM)} = \alpha + \beta * D\_P_1 + \mu * D\_D_1$$

Where

- PKM is the passenger km
- D_P_1 is the dummy of petrol prices
- D_D_1 is the dummy of diesel prices

In this specification, α is the constant term, β, μ are the coefficient of dummies relating to petrol and diesel.

The detailed estimation output is given in the table below:

Table 5.4: Results of the Exogenous Shock Model using Daily Data of Earnings and Passenger Kilometre (PKM): PKM as Dependent Variables

Dependent Variable: LOG(PKM)				
Method: Least Squares				
Sample: 1 1827				
Included observations: 1827				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.26752	0.006118	2822.330	0.0000
D_P1	0.055809	0.007928	7.039572	0.0000
D_D1	0.110078	0.007855	14.01317	0.0000
R-squared	0.168653	Mean dependent var		17.35837
Adjusted R-squared	0.167741	S.D. dependent var		0.170507
S.E. of regression	0.155551	Akaike info criterion		-0.882051
Sum squared resid	44.13346	Schwarz criterion		-0.873003
Log likelihood	808.7538	Hannan-Quinn criter.		-0.878714
F-statistic	185.0142	Durbin-Watson stat		0.574564
Prob(F-statistic)	0.000000			

Despite R^2 of 17 per cent and low DW-statistic, the value of co-efficient are statistically significant at 1 per cent level and shows that diesel has more cross-price impact than petrol on passenger km travelled in the railways. From the result it may be observed that a 1 per cent hike in the prices of diesel can create an impact of 0.1 per cent increase in passenger km, while for petrol the impact is .05 per cent.

The results are extremely important and points to the fact that railways in India has ample scope to act as a corporation in which the cost of operations can be factored in to provide better services in a demand sensitive scenarios as it is observed that the hike in diesel and petrol prices can bring in shift in the earnings through increased commuting by railways.

5.4: Logistic Analysis of responses to Questions on Willingness to Pay

This section discusses the understanding of the nature of willingness to pay by different variables using data from the sample survey of travelling suburban and non-suburban passengers. Logistic regression analysis on response data reveals that the passengers with higher levels of education are willing to pay more for better train services and the same is true for higher age, expenditure and passengers having occupations other than being unemployed. This apart, men are significantly more likely to pay higher for better services than women .

In this section we analyse the survey responses on willingness to pay through (i) a general discussion of the extent of their willingness to pay by different segments of the travelling passengers (ii) the determination of the influence of variables such as age, gender, education level, activity and expenditure status on these attributes.

5.4.1: Data

Results presented here are primarily based on information collected in the sample survey of passengers. A total of 20161 passengers were canvassed for responses across different regions in the country's rail network.

5.4.2: Methodology

Logit approach was used to determine the influence of the explanatory variables – 'level of education', 'gender', 'age group', 'activity status', and 'expenditure status' on three different dependent variables *viz.* 'Are you willing to pay for faster train services and are you willing to pay for the availability of more trains?' The basic model is:

$$L_i = \ln(\frac{P_i}{1-P_i}) = \beta_1 + \beta_i X_i .....$$

Where

$$P_i = E(Y = 1/X_i) = \frac{1}{1+\{\exp-(\beta_1 + X_i\beta_i)\}} = \frac{1}{1+e^{-Z_i}}, Z_i = \beta_1 + X_i\beta_i$$

L is the logit, Pi is the probability of willingness to pay and (1-Pi) is the probability of not willing to pay. As Z varies from -∞to ∞ (P goes from 0 to 1), the logit L goes from -∞ to ∞.

Definitions of variables used in logistic regression is narrated in Table 5.5.

Table 5.5: Definitions of variables used in logistic regression

Characteristics/ Variables	Definitions/ Responses
Dependent Variables	
Are you willing to pay more for faster train services?	
Will you pay more when more trains are provided?	
Explanatory Variables	
Level of Education	1 if Up to Primary 2 if Up to Matriculate 3 if Up to Higher Secondary 4 if Up to Graduation 5 if Post Graduate 6. Professional Degree 7. Professional PG
Gender	1 if Male 2 if Female
Age Group	1 if age >=18 & <=25 2 if age >=25 & <=35 3 if age >=35 & <=45 4 if age >=45 & <=60 5 if age >=60
Expenditure Status	1 if expenditure (per month) <=3K 2 if expenditure >=3K & <=5K 3 if expenditure >=5K & <=10K 4 if expenditure >=10K & <=20K 5 if expenditure >=20K & <=30K 6 if expenditure >=30K

5.4.3: Results

For comparing the understanding of willingness to pay among different educational categories 'illiteracy' level has been set as control. In the cases of gender and age group, female and 18-35 years group served as controls. In expenditure groups, the lowest expenditure is taken as control. The following few tables gives detailed results for the suburban and non-suburban services.

Table 5.6: Willingness to pay when the Travel Time is decreased by 10-20 % (Suburban)

Dependent variable: Are you willing to pay for faster train services (Suburban)? Independent variables: Expenditure group, Occupation group, Age group, Gender, Education level No. of observations = 5092 , LR chi2(36)= 914.25, Log likelihood = -3027.9106						
	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Expenditure group (Compared with the lowest monthly expenditure group, i.e., <3K)						
(3K-5K)	0.77	0.08	-2.65	0.01	0.64	0.93
(5K-10K)	0.82	0.08	-1.94	0.05	0.68	1.00
(10K-20K)	0.91	0.11	-0.74	0.46	0.72	1.16
(20K-30K)	0.82	0.21	-0.78	0.44	0.50	1.35
(>30K)	2.02	1.36	1.04	0.30	0.54	7.56
Occupation group (Compared with the unemployed)						
Own Account Worker	1.59	0.31	2.41	0.02	1.09	2.33
Casual Labour	1.31	0.26	1.32	0.19	0.88	1.94
Regular Salary/wages	2.24	0.42	4.28	0.00	1.55	3.25
Employer	1.50	0.37	1.68	0.09	0.93	2.42
Student	1.76	0.35	2.82	0.01	1.19	2.60
Housewife	2.14	0.53	3.06	0.00	1.31	3.49
Retired	1.18	0.54	0.36	0.72	0.48	2.91
Business	6.46	5.03	2.40	0.02	1.40	29.69
Age group (Compared with the age-group 18-25)						
(25-35)	1.05	0.09	0.51	0.61	0.88	1.24
(35-45)	0.88	0.09	-1.23	0.22	0.72	1.08
(45-60)	1.18	0.15	1.30	0.19	0.92	1.52
(>60)	1.82	0.72	1.51	0.13	0.84	3.94
Gender (Compared with the female counterpart)						
Male	1.27	0.15	2.03	0.04	1.01	1.60
Education level (Compared with illiterate)						
Primary	1.59	0.63	1.16	0.25	0.73	3.46
Secondary	1.31	0.50	0.70	0.48	0.62	2.75
Higher Secondary	1.95	0.73	1.79	0.07	0.94	4.05
Graduation	2.04	0.77	1.89	0.06	0.97	4.28
Post-Graduation	1.24	0.51	0.53	0.60	0.55	2.78
Graduate Professional	1.77	0.71	1.42	0.16	0.80	3.91
Professional PG	2.61	1.23	2.05	0.04	1.04	6.55
Other	2.23	0.92	1.96	0.05	1.00	4.99

Table 5.7: Willingness to pay when Train Service Increased by say Adding Two More Train (Suburban)

Dependent variable: Will you ready to pay when more trains are provided (Suburban)? Independent variables: Expenditure group, Occupation group, Age group, Gender, Education level No. of observations = 5092 , LR chi2(36)= 1170.32, Log likelihood = -2923.7216						
	Odds Ratio	Std. Err.	Z	P>|z|	[95% Conf.	Interval
Expenditure group (Compared with the lowest monthly expenditure group, i.e., <3K)						
(3K-5K)	0.69	0.07	-3.68	0.00	0.57	0.84
(5K-10K)	0.80	0.08	-2.20	0.03	0.65	0.98
(10K-20K)	0.86	0.11	-1.18	0.24	0.68	1.10
(20K-30K)	1.02	0.28	0.08	0.93	0.60	1.75
(>30K)	1.93	1.37	0.92	0.36	0.48	7.77
Occupation group (Compared with the unemployed)						
Own Account Worker	1.52	0.30	2.12	0.03	1.03	2.23
Casual Labour	1.26	0.26	1.14	0.26	0.85	1.89
Regular Salary/wages	2.22	0.42	4.18	0.00	1.53	3.22
Employer	1.44	0.35	1.50	0.13	0.89	2.32
Student	1.61	0.32	2.35	0.02	1.08	2.39
Housewife	2.10	0.53	2.97	0.00	1.29	3.43
Retired	0.50	0.23	-1.52	0.13	0.20	1.22
Business	3.70	2.46	1.96	0.05	1.00	13.63
Age group (Compared with the age-group 18-25)						
(25-35)	1.06	0.09	0.69	0.49	0.89	1.27
(35-45)	0.89	0.09	-1.12	0.26	0.72	1.09
(45-60)	1.17	0.15	1.19	0.23	0.90	1.51
(>60)	2.83	1.15	2.56	0.01	1.28	6.27
Gender (Compared with the female counterpart)						
Male	1.53	0.18	3.55	0.00	1.21	1.94
Education level (Compared with illiterate)						
Primary	1.73	0.73	1.30	0.20	0.76	3.94
Secondary	1.77	0.72	1.42	0.16	0.80	3.92
Higher Secondary	2.30	0.92	2.09	0.04	1.05	5.03
Graduation	2.48	1.00	2.26	0.02	1.13	5.47
Post-Graduation	1.88	0.82	1.44	0.15	0.80	4.41
Graduate Professional	2.05	0.88	1.68	0.09	0.89	4.74
Professional PG	3.88	1.94	2.70	0.01	1.45	10.35
Other	2.77	1.21	2.34	0.02	1.18	6.50

Table 5.8: Willingness to pay when the Travel Time is decreased by 10-20 % (Non-Suburban)

Dependent variable: Are you willing to pay for faster train services (Non-Suburban)? Independent variables: Expenditure group, Occupation group, Age group, Gender, Education level No. of observations = 15069 , LR chi2(40) = 3463.96, Log likelihood = -8703.5569						
	Odds Ratio	Std. Err.	z	P>z	[95% Conf.	Interval]
Expenditure group (Compared with the lowest monthly expenditure group, i.e., <3K)						
(3K-5K)	0.97	0.05	-0.50	0.61	0.88	1.08
(5K-10K)	1.03	0.06	0.54	0.59	0.92	1.16
(10K-20)	1.36	0.10	4.04	0.00	1.17	1.58
(20K-30K)	2.46	0.42	5.29	0.00	1.76	3.44
(>30K)	2.24	0.68	2.65	0.01	1.23	4.08
Occupation group (Compared with the unemployed)						
Own Account Worker	1.30	0.15	2.27	0.02	1.04	1.64
Casual Labour	0.80	0.09	-1.96	0.05	0.63	1.00
Regular Salary/wages	1.55	0.17	3.90	0.00	1.24	1.93
Employer	1.60	0.22	3.44	0.00	1.23	2.10
Student	1.19	0.14	1.45	0.15	0.94	1.50
Housewife	1.26	0.18	1.57	0.12	0.95	1.67
Retired	1.14	0.25	0.62	0.54	0.75	1.74
Other	1.05	0.20	0.27	0.78	0.73	1.52
Age group (Compared with the age-group 18-25)						
(26-35) years	1.04	0.06	0.77	0.44	0.94	1.16
(36-45) years	1.13	0.07	2.01	0.05	1.00	1.28
(46-60) years	1.16	0.09	1.96	0.05	1.00	1.35
More than 60 years	0.84	0.15	-0.96	0.34	0.58	1.20
Gender (Compared with the female counterpart)						
Male	1.27	0.09	3.21	0.00	1.10	1.47
Education level (Compared with illiterate)						
Primary	1.79	0.28	3.68	0.00	1.31	2.43
Secondary	1.58	0.22	3.25	0.00	1.20	2.09
Higher Secondary	2.50	0.33	6.81	0.00	1.92	3.25
Graduation	2.95	0.41	7.84	0.00	2.25	3.87
Post-Graduation	3.04	0.49	6.95	0.00	2.22	4.17
Graduate Professional	3.49	0.53	8.19	0.00	2.59	4.71
Professional PG	3.11	0.60	5.88	0.00	2.13	4.54
Other	3.79	0.72	7.01	0.00	2.61	5.50

Table 5.9: Willingness to pay when Train Service Increased by say Adding Two More Train (Non-Suburban)

Dependent variable: Will you ready to pay when more trains are provided (Non-Suburban)? Independent variables: Expenditure group, Occupation group, Age group, Gender, Education level No. of observations = 15069 , LR chi2(40) = 3093.37, Log likelihood = -8898.0743						
	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Expenditure group (Compared with the lowest monthly expenditure group, i.e., <3K)						
(3K-5K)	0.96	0.05	-0.80	0.42	0.87	1.06
(5K-10K)	1.03	0.06	0.53	0.60	0.92	1.16
(10K-20)	1.37	0.10	4.20	0.00	1.18	1.59
(20K-30K)	2.27	0.38	4.86	0.00	1.63	3.16
(>30K)	2.18	0.67	2.53	0.01	1.19	3.99
Occupation group (Compared with the unemployed)						
Own Account Worker	1.24	0.14	1.88	0.06	0.99	1.56
Casual Labour	0.81	0.09	-1.83	0.07	0.65	1.01
Regular Salary/wages	1.45	0.16	3.38	0.00	1.17	1.80
Employer	1.55	0.21	3.25	0.00	1.19	2.03
Student	1.04	0.12	0.37	0.71	0.83	1.31
Housewife	0.96	0.14	-0.28	0.78	0.73	1.27
Retired	1.09	0.23	0.38	0.70	0.71	1.66
Other	1.11	0.20	0.56	0.58	0.77	1.59
Age group (Compared with the age-group 18-25)						
(26-35) years	0.95	0.05	-0.90	0.37	0.86	1.06
(36-45) years	1.10	0.07	1.56	0.12	0.98	1.25
(46-60) years	1.07	0.08	0.90	0.37	0.92	1.24
More than 60 years	0.70	0.13	-1.89	0.06	0.49	1.01
Gender (Compared with the female counterpart)						
Male	1.18	0.09	2.26	0.02	1.02	1.37
Education level (Compared with illiterate)						
Primary	1.40	0.21	2.24	0.03	1.04	1.89
Secondary	1.11	0.15	0.79	0.43	0.85	1.45
Higher Secondary	1.95	0.25	5.22	0.00	1.52	2.51
Graduation	2.26	0.30	6.16	0.00	1.74	2.92
Post-Graduation	2.16	0.33	4.98	0.00	1.60	2.92
Graduate Professional	2.75	0.41	6.86	0.00	2.06	3.67
Professional PG	2.45	0.47	4.73	0.00	1.69	3.56
Other	2.33	0.43	4.60	0.00	1.63	3.34

5.4.4: Interpretation of the Logistic result and Conclusion

Logit analysis on responses to the questions relates to interest in paying more for better services by the railways. It may be observed from the results that for suburban passenger, the likelihood of willingness to pay for faster train service in the expenditure group "(>30K)" is 2.02 times higher compared to the lowest (<3K) expenditure group. For business category passenger, the willingness to pay is 6.46 times higher than the unemployed one. When it comes to age group, older people are (>60years) more willing pay compared to younger (18-

25) age group. Likelihood of willingness to pay for male is higher than female. Willingness of educated people is more compared to illiterate people.

In suburban, likelihood of willingness to pay when train service is increased by say adding two more train in the expenditure group "(>30K)" is 1.93 times higher compared to the lowest (<3K) expenditure group. For the business category, the willingness to pay is 3.7 times higher than unemployed people. When it comes to age group, older people are (>60 years) more willing to pay compared to (18-25) years age group. Likelihood of willingness to pay for males (1.53 times) is higher than female. Willingness of educated people is more compared to illiterate people.

In Non-suburban, likelihood of willingness to pay when the travel time is decreased (by 10-20%) is 2.46 times higher in the expenditure group "(20K-30K)" compared to the lowest (<3K) expenditure group. Whereas willingness to pay in (>30K) expenditure group is 2.24 times more than (<3K) group. The willingness to pay of the employer category is 1.60 times higher than the unemployed passenger. As per the age-group is concerned, willingness is higher in (46-60) year's age group compared to (18-25) years. Males are more willing to pay (1.27 times higher) compared to female. It is also observed that the likelihood of willingness to pay increases with the increase in the level of education.

Likelihood of willingness to pay when train service is decreased by say adding two more train for the non-suburban travel is 2.27 times higher for the expenditure group "(20K-30K)" compared to the lowest (<3K) one, whereas willingness to pay is 2.18 times for the highest expenditure group (>30K) compared with the lowest one. The employer category's willingness to pay is 1.55 times higher than the unemployed passenger. Willingness is higher in (46-60) year's age group compared to (18-25) years. Males are more willing to pay (1.18 times higher) compared to female. It is observed that the likelihood of willingness to pay increases with increase in the level of education.

5.5: Count Outcomes Regression for Performance Indicators (based on Unit Level Data)

Count outcomes analyses scientifically the assignment of ordered preferences for different preference indicators by age-groups, gender, expenditure status and distance[8]. The method adopted by count outcome analysis is a little complicated but handy in explaining a particular order of preference by the explanatory groups.

In many contexts the dependent variable is a nonnegative integer or count which we wish to analyse in terms of a set of covariates. More specifically, count models are employed when Y takes integer values that represent the number of events that occurs. The software (EViews) provides support for the estimation of several models of count data. We have estimated the count outcomes using Quadratic Hill Climbing method that reports Quasi- Maximum Likelihood (QML) estimators. The QML estimators are robust in the sense that they produce

[8] Preference ranking for Performance Indicator: 1=Very Bad, 2=Bad, 3=Good, 4=Very Good and 5=Excellent.
Age-group: 1= 18-25, 2= 26-35, 3=36-45, 4= 46-60, 5=>60. Gender: 1=Male, 2=Female. Education: 1=Illiterate, 2=Primary, 3=Secondary, 4=Higher Secondary, 5=Graduate, 6= Post-Graduate, 7=Professional Graduate, 8= Professional PG. Expenditure (Monthly): 1=(<3K), 2=(3K-<5K), 3=(5K-<10K), 4=(10K-20<K), 5=(20K-<30K), 6=(>30K). Distance (used in the estimation for the non-suburban travel): 1=(<100KM), 2=(100KM-<300KM), 3=(300KM-<600KM), 4=(600KM-<900KM), 5=(900KM-<1200KM), 6=(1200KM-<1500KM), 7= (>1500KM).

consistent estimates of parameters with a correctly specified conditional mean, even if distribution is incorrectly specified. For QML count models, all that is required for consistency is a correct specification of the conditional mean m (x_i, β).

The log likelihood for the normal distribution is given as:

$$\ell(\beta)=\sum_{i=1}^{N}\frac{1}{2}\left(\frac{y_i-m(x_i,\beta)}{\sigma}\right)-\frac{1}{2}\log(\sigma^2)-\frac{1}{2}\log(2\pi)$$

For fixed σ^2 and correctly specified m_i, maximizing the normal log likelihood function provides consistent estimates. It may be noted that maximizing the normal log likelihood for a fixed σ^2 is equivalent to minimizing the sum of squares for the non-linear regression model: y_i =m (x_i, β) + €. By default, we have also used the Huber / White (QML) standard Errors to compute the robust quasi-Maximum likelihood (or pseudo-ML) in which the variance QML (β) = $\hat{H}^{-1}$ $\hat{g}\hat{g}^{-1}$ $\hat{H}^{-1}$. Where inverse of the Hessian $\hat{H}^{-1}$ is used to form co-efficient covariance, ($\hat{g}\hat{g}^{-1}$) is the estimated inverse of the scores $\hat{g}$ and $\hat{H}$ is the gradient (or score) and the log likelihood evaluated at the ML estimates. It may be noted that Huber/ White standard errors are not robust to heteroskadasticity of binary dependent variable models.

Table 5.10: Count Regression Model: Preference for various performance indicators (Suburban)

Performance Indicator	C	Age	Gender	Education	Expenditure	Log likelihood
Train Tickets	1.142 (***)	-0.018 (***)	-0.003 (###)	0.002 (###)	0.001 (###)	-6381.918
Timely Arrival	1.055 (***)	-0.001 (###)	-0.013 (###)	0.007 (***)	-0.002 (###)	-5760.419
Duration of Travel	1.003 (***)	-0.008 (***)	-0.011 (###)	0.010 (***)	0.008 (###)	-6197.423
Cost of Travel	1.292 (***)	-0.006 (***)	-0.027 (***)	0.005 (***)	-0.004 (###)	-6336.531
Safety	0.910 (***)	-0.002 (###)	0.007 (###)	0.010 (***)	-0.012 (***)	-6659.949
Connectivity	1.081 (***)	-0.007 (***)	-0.002 (###)	0.008 (***)	-0.010 (***)	-6292.913
Frequency of Train	0.989 (***)	-0.008 (***)	-0.014 (###)	0.012 (***)	0.001 (###)	-6398.250
Strict Vigil	1.035 (***)	0.000 (###)	-0.024 (###)	0.005 (***)	-0.017 (***)	-6489.713
Overall Service	1.166 (***)	-0.010 (***)	-0.040 (***)	0.000 (###)	0.003 (###)	-6106.110

Note: (***) significant at 1% level, (###) Not significant.

Table 5.11: Interpretation of the Results and Significance for Suburban travel

Performance Indicators	Results	Implication/Insight
Availability of train tickets	For this performance indicator, age group is the only variable observed to be significant. The relation is seen to be inversely related with age.	The higher the age, the more is the dissatisfaction with respect to the availability of train tickets by the suburban passengers
Timely arrival of train	Only education is observed to be significant.	For suburban travel, level of satisfaction goes up with the level of education and vice versa.
Duration of Travel	Age group and education are the variables observed to be significant. Age is seen to be inversely related, while education is positive.	The higher the age, the more is the dissatisfaction with respect to the duration of travel while higher educated passengers are relatively satisfied compared with the lower ones.
Cost of Travel	Age group, Gender and education are the variables observed to be significant. While Age and Gender are observed to be inversely related, education is positive.	The higher the age, the more is the dissatisfaction with respect to the cost of travel. The same is true with the female passengers compared to the male counterpart. Higher educated passengers are relatively satisfied compared with the lower ones.
Safety	Education and expenditure are the variables observed to be significant. While education is positive, expenditure is negatively significant.	As regards safety in the suburban train, more educated passengers are relatively satisfied compared with the less educated ones. However, the higher expenditure group is less satisfied than the lower ones.
Connectivity	Age, education and expenditure are the variables observed to be significant. While education is positive, age and expenditure is negatively significant.	The higher the age, the more is the dissatisfaction with respect to connectivity while higher educated passengers are relatively satisfied compared with the lower ones. On the other hand, higher expenditure group is less satisfied than the lower ones.
Frequency of Train	Age group and education are the variables observed to be significant. While Age is observed to be inversely related, education is positive.	The higher the age, the more is the dissatisfaction with respect to the frequency of train services. On the contrary, higher educated passengers are relatively satisfied compared with the lower ones.
Strict Vigil	Education and expenditure are the variables observed to be significant. While education is positive, expenditure is negatively significant.	Higher educated passengers are relatively satisfied with the type of vigilance available for the suburban travel, compared with the lower ones. On the other hand, higher expenditure group is less satisfied than the lower ones.
Overall Service	Age group and Gender are the variables observed to be negatively significant.	The higher the age, the more is the dissatisfaction with respect to the overall service provided by railways for suburban travel. The same is true with the female passengers compared to the male counterpart.

Table 5.12: Count Regression Model: Likelihood to attach better preference for various performance indicators (Non-suburban)

Performance Indicator	C	Age	Gender	Education	Expenditure	Distance	Log likelihood
Availability Train	1.037 (***)	-0.010 (***)	-0.014 (***)	0.009 (***)	-0.013 (***)	0.004 (***)	-17176.650
Train Tickets	1.046 (***)	0.002 (###)	0.034 (***)	-0.010 (***)	0.025 (***)	-0.007 (***)	-18772.450
Duration Travel	1.013 (***)	0.002 (###)	0.019 (***)	0.006 (***)	0.001 (###)	-0.002 (***)	-17086.390
Cost of Travel	1.180 (***)	-0.005 (***)	0.024 (***)	0.011 (***)	0.001 (###)	-0.011 (***)	-18331.760
Train Service	1.006 (***)	-0.013 (***)	-0.012 (***)	0.014 (***)	-0.017 (***)	0.005 (***)	-173.140
Connectivity	1.029 (***)	0.004 (***)	0.016 (***)	-0.002 (***)	0.014 (***)	0.000 (###)	-17751.500
Waiting Room	1.098 (***)	-0.004 (***)	-0.019 (***)	-0.001 (###)	-0.002 (###)	0.000 (###)	-17631.970
Facility Ladies	1.055 (***)	-0.009 (***)	-0.062 (***)	0.012 (***)	-0.032 (***)	0.002 (###)	-17741.270
Strict Vigil	0.969 (***)	-0.005 (***)	0.016 (***)	0.022 (***)	-0.024 (***)	-0.006 (***)	-17901.500
Catering Service	0.986 (***)	0.008485 (***)	0.021 (***)	0.001 (###)	-0.019 (***)	-0.012 (***)	-17985.710
Safety Security	0.993 (***)	-0.001 (###)	-0.025 (***)	0.011 (***)	-0.015 (***)	-0.011 (***)	-17622.470
Reach Destination	1.029 (***)	0.000 (###)	0.019 (***)	0.013 (***)	-0.007 (***)	-0.008 (***)	-16692.350
Overall Service	1.086 (***)	-0.004 (***)	0.019 (***)	0.008 (***)	-0.004 (***)	-0.002 (***)	-15715.300

Note: (***) significant at 1% level, (###) Not significant

Table 5.13: Interpretation of the Results and Significance for Non-Suburban travel

Performance Indicators	Results	Implication/Insight
Availability of Train	Age, Gender, Education, Expenditure and Distance are the variables observed to be statistically significant. While age, gender and expenditure is negatively significant, education and distance are the variables significant with a positive co-efficient	The higher the age, the more is the dissatisfaction with respect to the availability of train by the non-suburban passengers. Female are not happy compared to males and highly affordable people too are unhappy compared with lower affordable passengers. However, more educated passenger are happy compared with lower ones and the passengers who travelled longer distance are happy than the passengers who travelled shorter distances.
Availability of train tickets	Gender, Education, Expenditure and Distance are the variables observed to be statistically significant. While gender and expenditure is positively significant, education and distance are the variables significant with a negative co-efficient	Female passengers are happy compared to males and highly affordable people too are happy compared with lower affordable passengers. However, more educated passenger are unhappy compared with lower ones and the passengers who travelled longer distance are unhappy than the passengers who are travelling shorter distances.
Duration of Travel	Gender, Education and Distance are the variables observed to be statistically significant. While gender and expenditure is positively significant, distance is the significant variable with a negative co-efficient	Female passengers are happy compared to males and so is The passengers who travelled longer distance are unhappy than the passengers who are travelling shorter distances.
Cost of Travel	Age, Gender, Education and Distance are the variables observed to be statistically significant. While age and distance are negatively significant, gender and education are the significant variables with a positive co-efficient	The higher the age, the more is the dissatisfaction with respect to cost of travel. The same is true with longer distance passengers. On the other hand, higher educated passengers are relatively satisfied compared with the lower ones. Similarly, female passengers are relatively more satisfied compared with the male counterpart. It is important to note that expenditure variable is insignificant in this estimation.
Train Service	Age, Gender, Education, Expenditure and Distance are the variables observed to be statistically significant. While age, gender and expenditure are negatively significant, education and distance are the variables significant with a positive co-efficient.	The higher the age, the more is the dissatisfaction with respect to train service. Female are not happy compared to males and highly affordable people too are unhappy compared with lower affordable passengers. However, more educated passenger are happy compared with lower ones and the passengers who travelled longer distance are happy than the passengers who are travelling shorter distances.
Connectivity	Age, Gender, Education and Expenditure are the variables observed to be statistically significant. While age, gender and	Higher aged passenger showed more satisfaction than the lowed aged ones with respect to connectivity. Female passenger is more inclined to say well but that does

	expenditure are positively significant, education shows an inverse ordering	not hold good for the highly educated passenger. Generally, highly affordable passengers are happy with the level of connectivity offered by the railway travel
Waiting Room	Age and Gender variable is observed to be significant with negative co-efficient.	The higher the age, the more is the dissatisfaction with respect to the availability of waiting room facility by the non-suburban passengers. Female are not happy compared to males.
Facility Ladies	Age, Gender, Education and Expenditure are the significant variables. Except education, all other coefficients are negative.	Importantly, female passengers are not happy with the facility provided to them by the Indian railways and so is the case with the elderly people.
Strict Vigil	Age, Gender, Education, Expenditure and Distance are the significant variables. Age, expenditure and distance are the variables with negative co-efficient.	It is important to note that passenger with older age attach lower ratings and so is the passenger who travels longer distance.
Catering Service	Age, Gender, Expenditure and Distance are the significant variables. Age and gender is having positive coefficient while expenditure and distance are the variables with negative co-efficient.	It is important to note that passengers travelling increasingly far are dissatisfied with the available catering service.
Safety Security	Gender, Education, Expenditure and Distance are the significant variables. Except education, all the variables are significant with negative co-efficient.	It is important to note that female passengers, highly affordable and long-distanced passengers have the likelihood of assigning lower rating for the security and safety offered to the non-suburban passengers.
Overall Service	All the variables observed to be statistically significant. While age, expenditure and distance travelled are negatively significant, gender and education are the variables significant with a positive co-efficient	Older age-groups, increasingly higher affordable groups and distance travellers are not satisfied with the overall service provision for the non-suburban travel.

5.6 Findings

The estimated econometric model clearly shows that rail travel in India has the usual demand relation (significant with negative sign of the coefficient) but the sensitivity to fare is in-elastic (i.e., less than 1). A 1 per cent increase in railway earnings per passenger km would reduce demand for passenger km by 0.44 per cent and vice versa. It has already been noted from the survey that price of the competitive mode is an important criterion for travel by the railways in India and price freeze for several years have virtually no role to play in this consideration. Similarly, income is statistically significant in influencing demand for railway travel and implies that a 1 per cent increase per capita income would translate into 0.67 per cent increase in demand for passenger km. It may be noted further that the positive income effect outweighs the negative substitution effect. The policy implication is crucial: railways can accommodate increase in passenger fare to meet its cost of operations, thereby enhance the viability of its services as well as improve the quality of services.

Using the demand function and applying the growth assumptions mentioned above, the Indian railway is predicted to touch 20, 35, 683 million of passenger kilometre by the FY

2019-20. The Working Group of the Planning Commission estimated 17, 60, 393 million of passenger kilometre by 2016-17[9]. Given the fact that IR would need a drastic increase in operational and investment cost to handle such a gigantic increase in passenger traffic, Indian railways would need to increase its revenue stream.

From the Logit analysis of responses to the questions on paying more for better services by the railways observed that for suburban as well as non-suburban passenger that there are subclasses of passengers who are willing to pay more for better range of services. Moreover, the count analyses clearly points out that there is need for better service provisions to the satisfaction of passengers differentiated by age, gender, education, expenditure and distance travelled.

[9] The implicit growth rate of forecasting of the WG (Planning Commission) for PKM is 10. 17% per annum while for NCAER it is 8.23 per annum.

6. Concluding Observations

Indian railways is the largest transport network in India. IR system traversed a long way to root its prominence among travelling passengers in India. It includes all classes of passengers. Given the prediction that IR would be catering to serve 2036 billion passenger kilometres by 2020, it has the vital role to play in the network mode of transportation. The present NCAER survey report is based on the survey of two distinct categories of passengers—suburban and non-suburban. To bridge the survey gap of detailed profiling, a household survey was attempted in a scientific two-stage way to capture detailed responses with proper distribution framework. The household survey focused on members of the sample households in the catchment area of the selected centres. The sample households and household members may or may not be the users of the train service. The idea was to assess the alternatives people utilise for their transportation needs; the costs they incur; the difficulties they face; and the role railways play and scope for improvement in services while being able to charge the tariff required to meet the costs. While analysing the data of the survey, we have apportioned the households in terms of monthly per capita expenditure (MPCE) quintiles. We have also estimated monthly per capita income (MPCI) of the households. The MPCE is arrived at by dividing the reported total yearly expenditure by 12 and the respective household size. It has been observed that expenditure on food item goes down with higher quintiles. Middle and upper classes of people spend more on better education, transport and communication. Upper class also uses the mode of transportation for travel by air. The income, expenditure and demographic profile also shows that low income earners typically stay put in lower expenditure range and vice versa. The survey at suburban level was extended to cover non-suburban passengers as well. The survey followed two strategies. The station-based survey was aimed at passengers at entry to and exit from the stations on a random basis, while on-board survey selected passengers on a random basis inside the compartment of a running train. The objective of the survey was the same like the survey of suburban passengers, in which, apart from general profiling, the questionnaire was designed to know the willingness to pay for higher fare and their general views regarding the passenger services of IR.

The passengers, who are willing to pay a little higher fare, also demands proportionate increase in the quality of services they receive at stations and on-board. IR meets a range of passenger transportation demand: the demand for transport services to go to work every day in sub-urban and urban areas for short and relatively longer journeys for vacation, pilgrimage, visiting relatives, attending interviews, official work, business, and personal needs using non-suburban services. There are also different classes of travel, *viz*. air-conditioned and general with different types of trains such as passenger, fast, superfast, non-stop, and so on for which tariffs vary. Further, tariffs also vary because of various concessions provided to select passengers such as students, senior citizens, employees, and so on.

Travel demands of the sample households by train are high and the responses linked to their willingness to pay more for services provided by IR that are varied and sometimes mutually inclusive. The analysis of the sample response shows that when train tickets are not available,

more than 50 per cent of the commuters are affected and the journey expenditure goes up by 10 to 20 per cent. The impact is seen more pronounced for the non-suburban passengers. Distribution of the preference pattern of the alternative mode of transportation shows that when train services are affected, the non-suburban passengers mostly prefer bus services (67.6%). Around 3 per cent drive by own vehicles, while a little over 2 per cent go by reserved vehicles. Only 0.3 per cent of the passengers in higher spending range prefer air travel. Around 0.4 per cent prefers to go by other modes.

The survey clearly brings out the fact that travel demand by railway is almost universal. The respondents are willing to pay more for an efficient and well-maintained railway service[10]. It is also important to note that some of the sample proportion of households belonging to even the lowest expenditure quintiles is ready to spend more, which indicates a clear message to improve the present services of the railways, which is possible if efficiency be raised through improved revenue as well as efficient management of the cost of operations.

Distribution of the distance from home to railway station for non-suburban travel brings out the crucial fact that on an average 32 per cent of the passengers have to travel more than 5 km to reach station, while a little over 21 per cent travel 3 to 5 km.

The reasons for travelling by train is mostly its economical rate (63.6%) compared with other modes of travel. A little over 18 per cent of the passengers cited convenience as one of the factors, while 14 per cent preferred travelling by train due to general preference. Economic reason for travelling by train is dominant for casual labours (68.3%), followed by housewives (67.9%) and own account workers (67.7%). Convenience of travel by train is observed to be the most for employers (46%). Provision of fast/express train are also the demand of passenger, because passengers can reach their destinations fast and comfortably. Indian railways has also schemes for senior citizens, who get 60 per cent deduction in the fares.

Responses on performance indicators are an important gauge of the passengers' perceptions about the quality of services on various performance indicators. Opinions are varied and if we dissect the responses carefully we observe that facilities for lady passengers, catering, water, security, and safety of luggage and passengers along with availability of trains and tickets are all areas of concern which need urgent attention. In all these indicators, the percentage distribution of bad and very bad is not insignificant if proportionally distributed among large number of non-suburban passengers. To strike a balance, the railways should enhance services quality of passenger travel and resort to a minor increase in rates which is generally accepted to cover the cost of improved services and facilities.

Indian railway can also think of a corporatised model such as those pursued in Britain and other countries. Initially it would enhance the cost of railways but in due course it would improve the services quality with more flexible and adaptable railway passenger system.

The demand or consumption model suggests that demands could increase from investment to improve station facilities. However, station improvements would normally exhibit diminishing returns to investment expenditure. Passenger expectations on station facilities

[10] 52.4% of the non-suburban and 43.4% of the suburban passengers are ready to pay for better services

would adjust upwards as incremental improvements to facilities are made. Therefore, total long-term values for demand uplifts would need detailed justification.

The survey has also brought out some crucial fact about passenger travel. First, railways should consider redefining the coverage of sub-urban travel as it may be observed that a large number of passengers travelling in non-suburban train to travel just the distance range covered for suburban travel. Second, lots of people from the informal sector travels through railways (own account worker/casual labourers etc.) and their aspirations on service quality and corresponding willingness to share the burden of cost of the railways assumes immense importance.

Annex 1: Validation Plan for Data-entry: Suburban/Non-Suburban Questionnaire

Variables	Points to be checked and validated
Age	Whether the respondent is above 18 years of age or not? In case of gap please fill up either by calling the respondent through his mobile number or otherwise
Gender	Actual
Activity status	Please check the others response and code that separately Cross tab with age to see the age group of students
Educational qualification	To mention only the completed course
Sector of engagement	In case of students, housewives, retired persons, unemployed youth the sector of engagement would be nil. Otherwise it needs to be filled up with appropriate sector category
Monthly income	In case of students, housewives, unemployed youth monthly income of the respondent can be nil. However in some cases the students have expressed that they are earning money by taking tuitions. Thus the income of the students can be something or nothing. Just make a cross tab with the Q6 and see any issues……
Monthly expenses	Generally, where there is income ….there is expenditure. However though, students, Housewives and unemployed youth have no regular income they spend money by taking money from their parents or husbands. Just make a cross tab with the Q6 and see any issues…… Also make a cross tab with the Q9 to see the income expenditure gap……..whether the low income people are spending higher amount money
Transport expenditure	Those who have expressed their monthly expenditure, they can express their monthly transport expenses.
Monthly Expenses on train travel	Those who have expressed their monthly expenditure and their monthly transport expenditure, they can express their monthly transport expenses.
Nearest railway station	Check whether 100% responses are coming. Nothing to be cross checked
Work place from the reaching station	Check whether 100% responses are coming. Nothing to be cross checked
Destination	Check whether 100% responses are coming. Check the names.
Distance	Please cross check with the Location and the destination(Q15)
Fare	Please cross check with distance(Q16) Please check; as many respondents have said their Monthly pass amount. In some cases; people have mentioned their expense for their long journey along with the local journey. Suppose the person is traveling to Ahmadabad but locally he is travelling from Kurla to Mumbai CST then instead of telling the fare for the local travel he has mention the travel fare for the total journey.
Compensation by employer	This question is applied only for employees (regular salary/wages holder- option no-3 in Q6). Please cross tab Q18 (compensation by employer) with Q6 (activity status). While doing analysis please take the number of employees (regular salary/wages holder- option no-3 in Q6) as universe. Otherwise the percentage calculation would be wrong.
Railway concession	Check whether 100% responses are coming MST/QST are coming under concession
Type of concession	Cross tab with Q6 to see abnormalities Yes response in Q19= All response in Q20 Option 7 stands for MST (during coding)
Number of times takes train	Cross tab with Q6
Distance of travel by that day	Check whether 100% responses are coming If response is blank then just double the distance mentioned in Q16
How to go to the station	Check whether 100% responses are coming
From where did you purchase ticket	Cross tab with Q20 (option 7)

	MST (option 7)of Q20 Vs. Option 2,3 of Q24 (others wrong)
If train services not available	Cross tab with Q9 (Monthly income) to see abnormalities
Normal time of travel	Cross tab with Q6 (occupation of the respondent) to see abnormalities
Purpose of travel	Cross tab with Q6 (occupation of the respondent) Cross tab with Q26 (normal time of travel) Q6 Vs Q26 VS Q27
Reason of travel by train	Check whether 100% responses are coming
Why economically cheap	Economically cheap response in Q28= All response in Q29
Cheapest mode	Check whether 100% responses are coming
Intention to pay If travel time reduced	Check whether 100% responses are coming
Intention to pay In %	Yes response in Q31= All response in Q32 Cross tab with Q9 (Monthly income) to see abnormalities
Intention to pay If frequency of train service increased	Check whether 100% responses are coming
Intention to pay In %	Yes response in Q33= All response in Q34 Cross tab with Q9 (Monthly income) to see abnormalities
If train tickets not available	Cross tab with Q9 (Monthly income) to see abnormalities In our assumption in most cases option 1 (no change) should come
If train services not available	Cross tab with Q9 (Monthly income) to see abnormalities In our assumption in most cases option 4/5 should come Cross tab with Q30
Train service quality evaluation	Check whether 100% responses are coming

Annex 2: Distribution of the proportion of the listing household to the estimated actual household

Catchment area of Kolkata	Estimated household number in 2011	Percentage distribution of listing	Distribution of listing sheets as per household distribution of the first ward number	Distribution of listing sheets as per household distribution of the second ward number
Bardhaman (Ward 28 &31)	1864	10.7	43%	57%
Barrackpur (Ward 9 & 16)	1480	13.5	39%	61%
Laxmikantopur (Ward 8 & 14)	653	30.6	40%	60%
Krishna Nagar (Ward 2& 9)	2072	9.7	42%	58%
Panskura (Panskura -1)	2089	9.6	100%	-
Average for the selected Catchment area of Kolkata suburban	8158	12.3		
Catchment area in Mumbai				
Borivali (Ward 1566 & 1771)	2356	8.5	45%	55%
Virar (Ward No.1 & 16)	763	26.2	24%	76%
Nalasapora (Ward No. 13 & 25)	1428	14.0	43%	57%
Wadala (Ward No. 310)	5780	3.5	100%	-
Kurla (Ward No. 1976)	4929	4.1	100%	-
Average for the selected Catchment area of Mumbai suburban	15256	6.6		
Overall Average (Kolkata+Mumbai)	*23414*	*8.54*		

Annex 3: Comparable indicators derived from the survey results for households, suburban passengers and non-suburban passengers

Age Group			
	Households	Suburban	Non suburban
Up to 25 years	28.4	34.5	28.8
(26-35) years	32.1	37.6	37.1
(36-45) years	20.2	17.7	21.4
(46-60) years	13.9	9.1	10.5
above 60 years	5.5	1.1	2.2
Gender			
	Households	Suburban	Non suburban
Male	70.6	88.1	87.75
Female	29.4	11.9	12.25
Activity Status			
	Households	Suburban	Non suburban
Own account worker	27.2	19.7	15.7
Casual wage labour	14.2	10.7	17.1
Regular salary/wages	17.7	41.9	35.0
Employer	2.7	3.6	4.9
Unemployed	2.9	3.0	3.4
Student	10.3	15.5	14.7
Housewife	23.3	4.4	5.7
Retired	1.4	0.8	1.9
Others	0.3	0.4	1.4

Frequency of travel			
	Households	Suburban*	Non suburban
Daily	50.1	56.7	5.6
Weekly	12.1		3.3
Fortnightly	2.7		2.5
Monthly	8.5		7.3
Half yearly	8.7		15.1
As and when required	11.6		48.4
Rarely/occasionally	6.3		17.8

Note: *For suburban passengers, question pattern were different and not exactly comparable

Use of Internet for booking your railway ticket (%)		
	Households	Non suburban
Yes	13.5	21.6
No	86.5	78.4
Reasons for non-usage of internet (%)		
	Households	Non suburban
Computer illiteracy	72.2	62.4
Knows computer but net surfing facility is not available	9.1	15.6
Knows computer but never attempted	10.0	15.3
Poor connectivity and frequent failure	2.6	1.8
Scared about safety of using net banking/credit/debit card	2.2	0.9
Ticket is not available through using computer	0.2	1.7
Process is cumbersome and not a full proof one	2.6	0.2
Any other reasons	1.2	2.1

Note: For suburban passengers, this question was not asked

The preference for the mode of travel when train services are not available (%)			
	Households	Suburban	Non suburban
Other routes by train only	4.8	3.0	3.1
Drive by own vehicle	1.5	4.2	1.3
Ride in a vehicle with others	0.5	4.2	2.3
Would not make the trip	34.6	11.4	25.0
By bus	58.6	76.0	67.6
By air	0.0	0.0	0.3
Others		1.2	0.4

Reasons for choosing travel by train (%)		
	Suburban	Non suburban
Economically cheap	72.6	63.6
Prefer train travel	7.2	14.0
Convenience	8.5	18.3
The meaning of “Economically Cheap" (%)		
	Suburban	Non suburban
Low fare compared to the distance travelled by other modes	63.1	95.1
Train fare remained unchanged despite increase in fare of the other modes	3.3	3.8
Train fare remained insulated from the rise in the prices of petrol and diesel	0.3	1.2

Response related to willingness to pay more for faster train services that would reduce the duration of travel by 10 to 20 per cent (%)		
	Suburban	Non suburban
Yes	54.5	49.7
No	45.5	50.3

If the travel time for this journey is reduced by 10-20% by increasing the speed of the train, would you be willing to pay more for this convenience?		
	Suburban	Non suburban
Yes	56.6	51.8
No	43.4	48.2
If 'yes', how much would you be willing to pay?		
	Suburban	Non suburban
(1-5) % higher fare than usual	77.9	74.6
(6-10)% higher fare than usual	20.1	24.0
(11-20) % higher fare than usual	1.6	1.2
(21-30)% higher fare than usual	0.3	0.2

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