

Analysis of Transit Equity in Manila City by Income Class and Accessibility

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Abstract: Transit Equity evaluation has no single correct methodology. It is generally best to consider a variety of issues and perspectives. A planning process should reflect each community's equity concerns and priorities so public involvement is important for transport equity planning. The objective of this study is to determine the Transit Equity in the City of Manila by income class and accessibility. Accessibility in this study refers to the ability of an individual to reach his desired services and activities. Accessibility is measured in terms of number of transfers made by the respondent, time travel and monetary value of the travel and then correlated to the income class. The desired services and activities can only be located in the city and they are the Hospital, Mall, Supermarket, City Hall, Park, Church, School and Work Place. The respondents are requested to answer a questionnaire to determine the transit equity in the city. There are no significant disparities in the affordability, transport network connectivity, geographic distribution of activities and ability to reach the desired services and activities of the Hospital, Mall, Supermarket, City Hall, Park and Church. A significant number of respondents, whose monthly income is less than P20000.00, take three to four kinds of public transportation system, travel longer and pay higher to reach their school and work place respectively.

Key words: Transit Equity, Manila City, Income Class, Accessibility

1. INTRODUCTION

1.1 Background of the Study

The City of Manila's economy is diverse and multifaceted. It has six congressional districts and an estimated population of 2 million.

The first district of the city covers the western portion of Tondo and is the most populated of the six districts. Most of the impoverished neighborhoods are located in this area. The eastern inland portion of Tondo comprises the second district of the city. Commercial and financial centers are located in the third district. It is composed of Binondo, Quiapo, San Nicolas and Santa Cruz. The fourth district is mainly a residential area (Sampaloc). Some of the most historically and culturally significant landmarks and institutions in the country are located in the fifth district. It is composed of Ermita, Malate, Intramuros and San Andres Bukid. The sixth district is host to the Malacañan Palace and Polytechnic University of the Philippines, and is composed of Pandacan, San Miguel, Santa Ana and Santa Mesa.

The City of Manila is served by different public transportation systems – light rail and commuter rail. There are two different rapid systems in the city namely: the Manila Light Rail Transit System or the LRT, and the Manila Metro Rail Transit System or the MRT. Philippine National Railways (PNR) operated two main-line railway lines in the city before. The northern line known as Northrail is currently closed. The southern line known as Southrail starts at Tutuban Station in Tondo, Manila, and is still functioning. These transit systems are major factors in evaluating Transportation Equity. Our transit systems influence virtually every aspect of community life. They are the means for moving people, goods and services throughout the city.

Transit equity refers to the distribution of impacts and whether that distribution is considered fair and appropriate. It has no single correct methodology. It is generally best to consider a variety of issues and perspectives. A planning process should reflect each community's equity

concerns and priorities so public involvement is important for transport equity planning (Litman 2013).

In this study, transit equity is measured by the number of transfers made by the respondents between home to onward destinations, the travel time and the amount of money they paid for the travel. Accessibility in terms of number of transfers a respondent made, time travel and monetary value of the travel is then being correlated to its income class.

Access to affordable and reliable transportation widens opportunity and is vital to addressing equal opportunity goals such as access to work, access to learning, access to healthcare, access to food shops and access to social, cultural and recreational activities. Providing equal access to transportation means providing all individuals living in the City of Manila with an equal opportunity to succeed.

1.2 Objectives

- To determine the difference in accessibility of the respondents with respect to their income class,
- To relate to transit equity the difference in accessibility of the respondents with respect to their income class.

1.3 Scope and Limitations

The study focuses its attention on the analysis of the transit equity in the City of Manila. The analysis of transit equity is based solely on population of different income classes in the city and accessibility.

The scopes of the study are:

- The study's gathered data are from the respondents surveyed from January to February.
- Only residents of the City of Manila are surveyed.
- A random survey of residents from the six congressional districts is done and residents are given survey questionnaire.
- The City of Manila is the survey site for the study
- A questionnaire checklist survey is used as the survey material
- The survey is taken during the months of January and February
- Income Class and Accessibility are the primary subjects for the study

The limitations of the study are:

- Variables Income Class and Accessibility are the only service characteristics fully tested in the study
- Variable Accessibility focuses on
 - Ability to Reach Desired Services and Activities,
 - Transport Network Connectivity,
 - Affordability, and
 - Geographic Distribution of Activities
- Desired Services and Activities are located only in the city.
- Desired Services and Activities considered in this study are Hospital, School, Supermarket, Mall, Work Place, Park, City Hall and Church.

2. METHODOLOGY

2.1 Area of Study and Respondents

The study focuses in the City of Manila. It has a diverse population and has different kinds of transport systems.

With 1, 652, 171 total population in the City of Manila, there will be 400 respondents using Slovin's Formula with confidence level of 95 percent.

2.2 The Instrument and Design

In this study, the instruments used are questionnaires which are necessary for descriptive method of research. The questionnaires used in this study are designed to consist of three (3) parts such as:

- Personal and Socio-Economic Characteristics
- Travel characteristics
- Stated Preference Survey

2.3 Survey Methodology

There are steps that the researcher followed in gathering the data for the study.

1. Determination of survey site

The survey sites are:

- Binondo
- Ermita
- Intarmuros
- Malate
- Paco
- Pandacan
- Port Area
- Quiapo
- Sampaloc
- San Andres
- San Miguel
- San Nicolas
- Santa Ana
- Santa Cruz
- Santa Mesa
- Tondo

2. Questionnaire construction for pilot testing

3. Questionnaire Validation

4. Construction of final questionnaire

5. Distribution of the survey questionnaire to the respondents

The survey instruments were distributed by the researcher personally at the survey sites. Respondents were chosen randomly with ages 18 years old and above. The survey was continued until the desired numbers of respondents were obtained. At each survey site, the questionnaires were given randomly.

6. All the copies distributed were then retrieved by the researchers immediately after the respondent answered the questionnaire.

2.4 Statistical Treatment of Data

The statistical methods used are the following:

1. Frequency and Percentage
2. Ranking
3. Weighted Mean
4. Correlation Analysis

Correlation analysis is concerned with the relationship of the changes of the given variables. The relationship can be computed and may be shown in a scatter diagram.

If y increases as x increases, the correlation is called positive or direct correlation. If y increases as x decreases, the correlation is negative or an inverse correlation. There are degrees of correlation between two variables. The value of r ranges from -1 to 1.

The degrees of correlation are the following:

1. Perfect correlation (positive and negative)
2. Strong positive/negative correlation
3. Some positive/negative correlation
4. Weak positive/negative correlation
5. No correlation

The formula for the correlation coefficient r is:

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[n(\Sigma x^2) - (\Sigma x)^2][n(\Sigma y^2) - (\Sigma y)^2]}}$$

Where: r = correlation coefficient

x = income class

y = average number of mode of transport, etc.

n = 5

3. RESULTS AND ANALYSIS

3.1 Profile of Samples

The respondents are diverse with about 44% aged 17 to 20 years old, 32.50% with ages from 21 to 30 years old, 21.75% with ages 31 to 60 years old and 1.75% with ages more than 60 years old. 41% of the respondents are female and 59% are male. 34.25% of the respondents are students while 51.50% of the respondents are working.

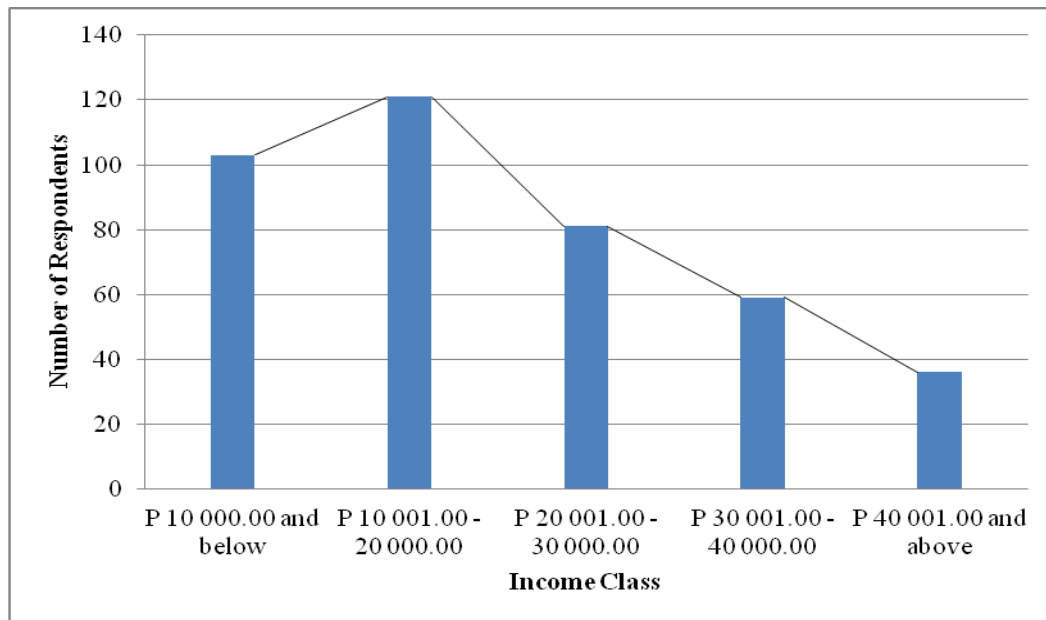


Figure 3.1.1 Number of Respondents According to Income Class

25.75% (103) of the total respondents belong to families with a monthly income of less than P10 000.00. 30.25% (121) of the total respondents belong to families with a monthly income of P10 001.00 to P20 000.00. 20.25% (81) of the total respondents belong to families with a monthly income of P20 001.00 to P30 000.00. 14.75% (59) of the total respondents belong to families with a monthly income of P30 001.00 to P40 000.00. The remaining 9% (36) of the total respondents belong to families with a monthly income of more than P40 000.00.

3.2 Trip Characteristics of the Respondents

Public Utility Jeepney (PUJ) is the most used mode of the respondents while FX, Buses and Philippine National Railways are seldom used. Seven percent (7%) of the respondents have cars but nine of the 7% do commute to get to their desired services and activities.

Hospitals, Supermarkets and Parks are the most accessible with 21.75%, 50.75% and 33% respectively of the total respondents who are walking to reach the said desired services and activities.

3.3 Ability to Reach Desired Services and Activities

Based on the gathered data, there are no disparities between the respondents' abilities to get to the Hospital, Supermarket, Mall, City Hall, Park and Church with respect to their income class.

TABLE 3.3.1 Summary of result from the data gathered (School)

Monthly Family Income	School					Mean
	Walk	1	2	3	4	
P10 000 and below	3	5	4	20	8	2.8378378
P10 001 - 20 000	5	7	3	23	5	2.6842105
P20 001 - 30 000	8	12	5	5	2	1.875
P30 001 - 40 000	2	9	3			1.25
P40 001 and above		8				1

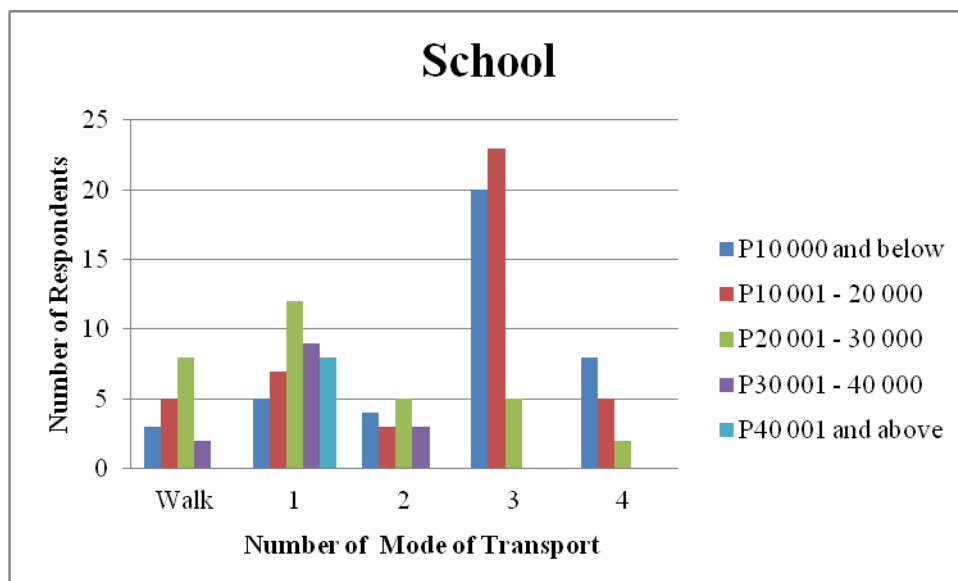


FIGURE 3.3.1 Bar Graph of Data Gathered (School)

A significant 40.88% of the respondents who are students with Monthly Family Income of less than P10 000.00 and P10 001.00 to P20 000.00 (20.44% in each income class) take three (3) to four (4) kinds of public transportation systems to get to school. 85.71% of these students live in Tondo, San Nicolas, Port Area, Sampaloc and San Andres which are all located in the farther part of the city. On the other hand, 27.01% of the students take less than three (3) kinds of public transportation systems to get to their school. They belong to families who have a monthly income of more than P20 000.00.

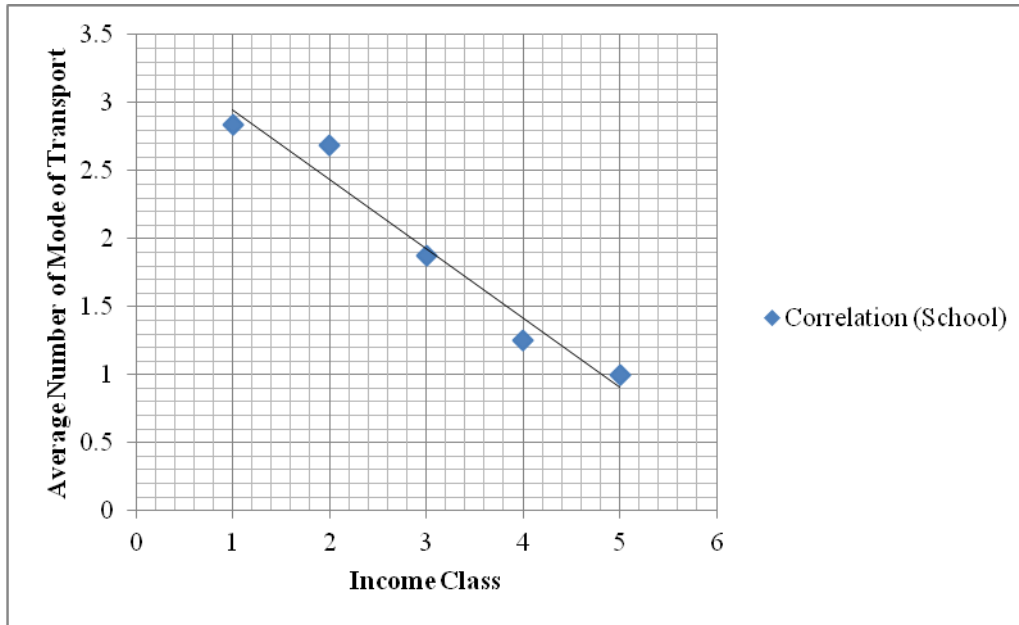


FIGURE 3.3.2 Correlation of Data (School)

As shown in the scatter diagram, the result r is equal to -0.98 which could be interpreted as: There is a strong negative correlation between income and accessibility. As income increases, the number of public transportation systems they take decreases.

TABLE 3.3.2 Summary of result from the data gathered (Work Place)

Monthly Family Income	Work Place					Mean
	Walk	1	2	3	4	
P10 000 and below	5	11	11	10	14	2.586957
P10 001 - 20 000	3	17	10	16	13	2.446429
P20 001 - 30 000	1	12	27	2		1.756098
P30 001 - 40 000		12	29			1.707317
P40 001 and above		13				1

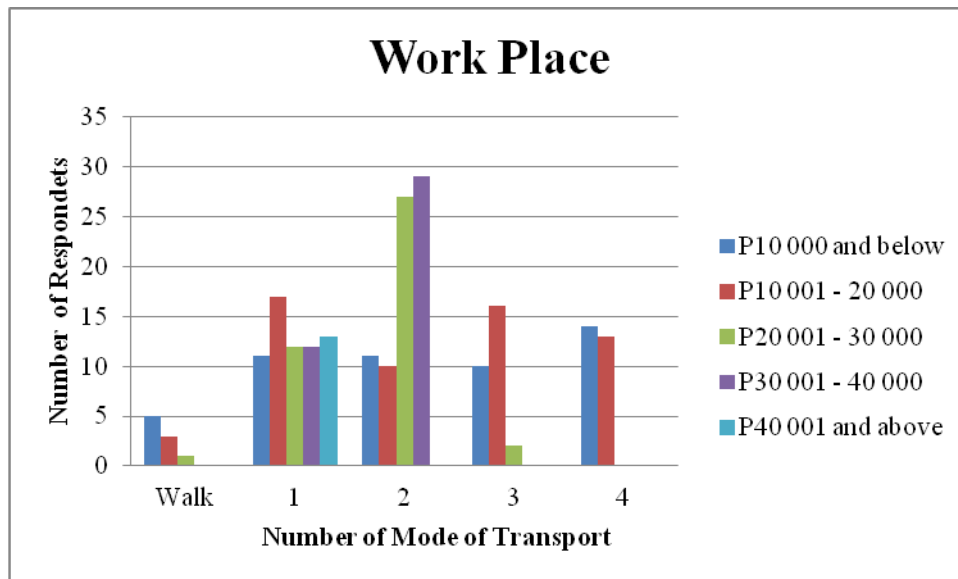


FIGURE 3.3.3 Bar Graph of Data Gathered (Work Place)

206 or 51.50% of the respondents are working. 25.73% of them who have a monthly Family Income of less than P20 000.00 take three (3) to four (4) kinds of public transportation systems to get to their work place. 45.15% of the respondents who are also working take less than three (3) transportation systems to get to their work place. They have a monthly income of more than P20 000.00.

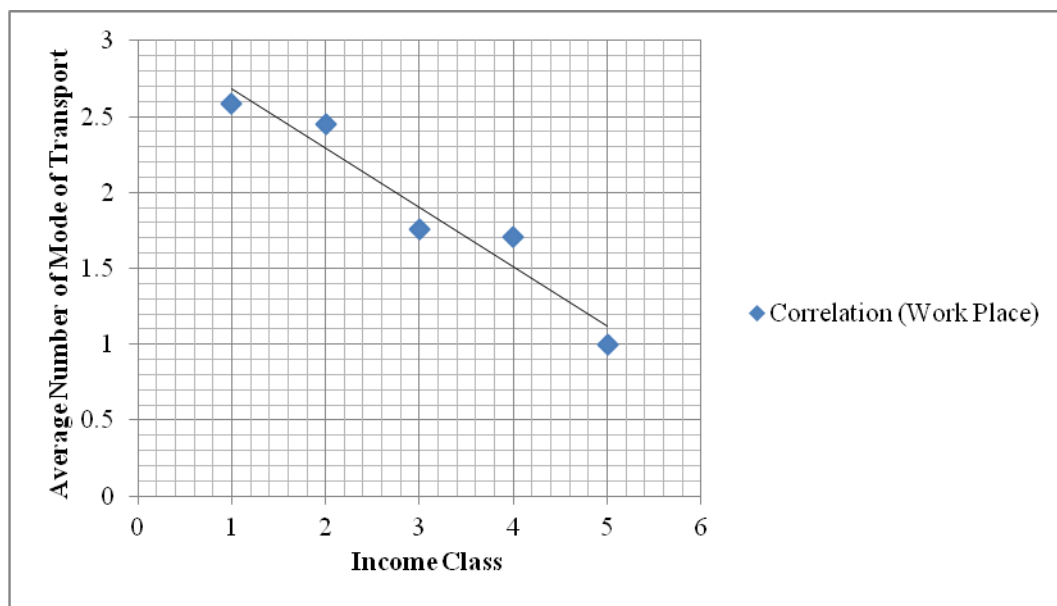


FIGURE 3.3.4 Correlation of Data (Work Place)

As shown in the scatter diagram, the result r is equal to -0.97 which could be interpreted as: There is a strong negative correlation between income and accessibility. As income increases, the number of public transportation systems they take decreases.

3.4 Transport Network Connectivity

There is also no significant difference in transport network connectivity among the respondents in their ability to reach the Hospital, Supermarket, City Hall, Mall and Park. They only differ in their ability to get to school and work place.

But an average of 267 or 66.75% of the total respondents answered that they don't use bus rapid transit to reach their desired services and activities. Bus transit is used as transit mode to reach the desired services and activities outside the city as well as the FX cars and light rail transits.

3.5 Affordability

There is no significant disparity among the expenses of the respondents to reach the Hospital, Supermarket, Mall, City Hall, Park and Church.

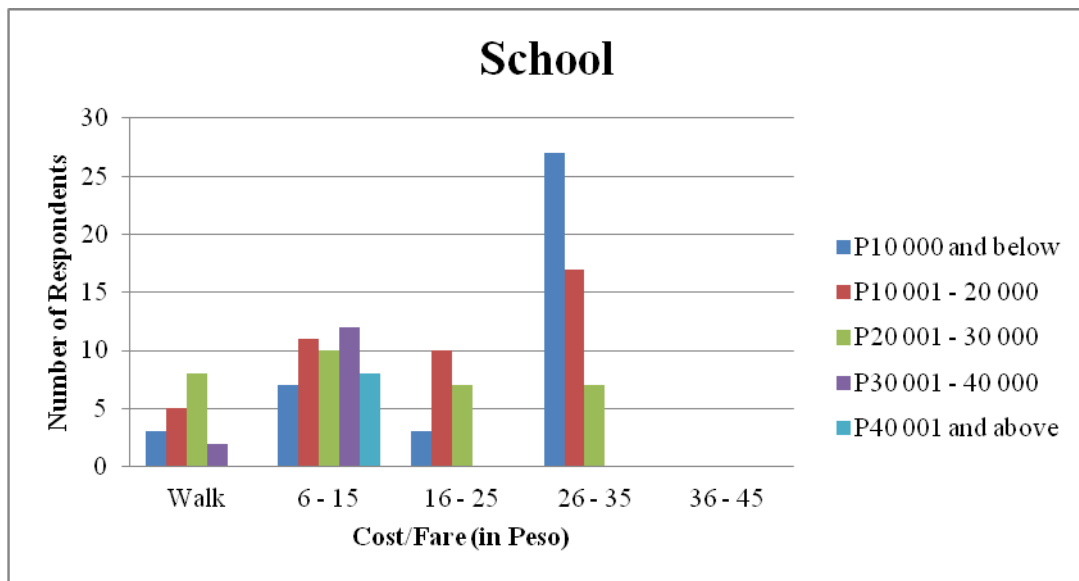


FIGURE 3.5.1 Bar Graph of Data Gathered (School)

41.61% of the respondents who are studying pay more than P16.00 to get to their respective schools while 14.60% of the respondents pay less than P16.00 to get to the school.

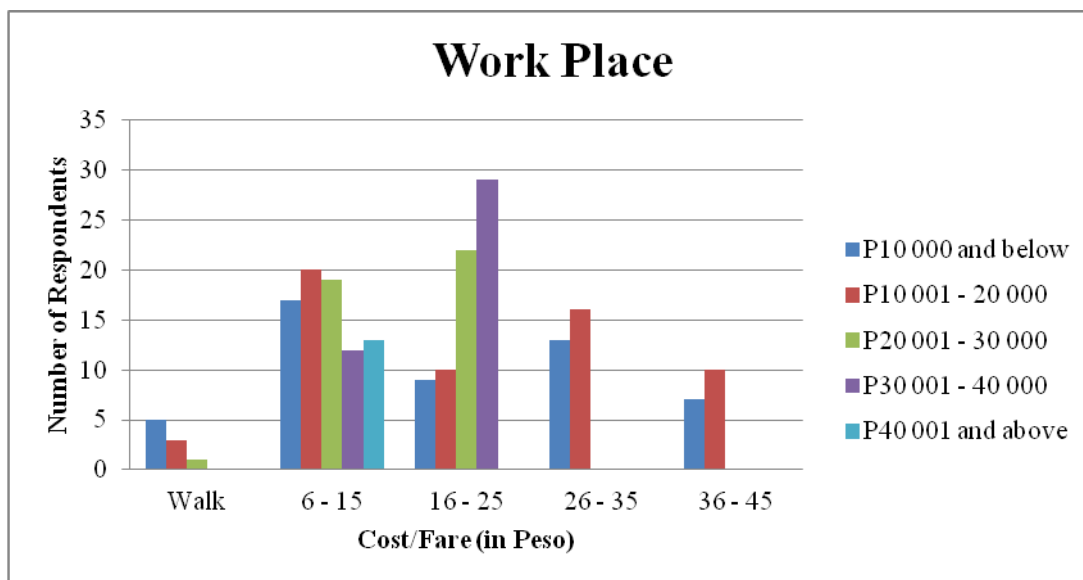


FIGURE 3.5.2 Bar Graph of Data Gathered (Work Place)

22.33% of the respondents who are working pay more than P26.00 to get to their respective work place while 46.12% of the respondents pay less than P26.00 to get to their work place.

3.6 Geographic Distribution of Activities

The Hospitals, Parks, Churches, Supermarkets and Malls are well distributed within the City of Manila. The City Hall is also accessible to the respondents.

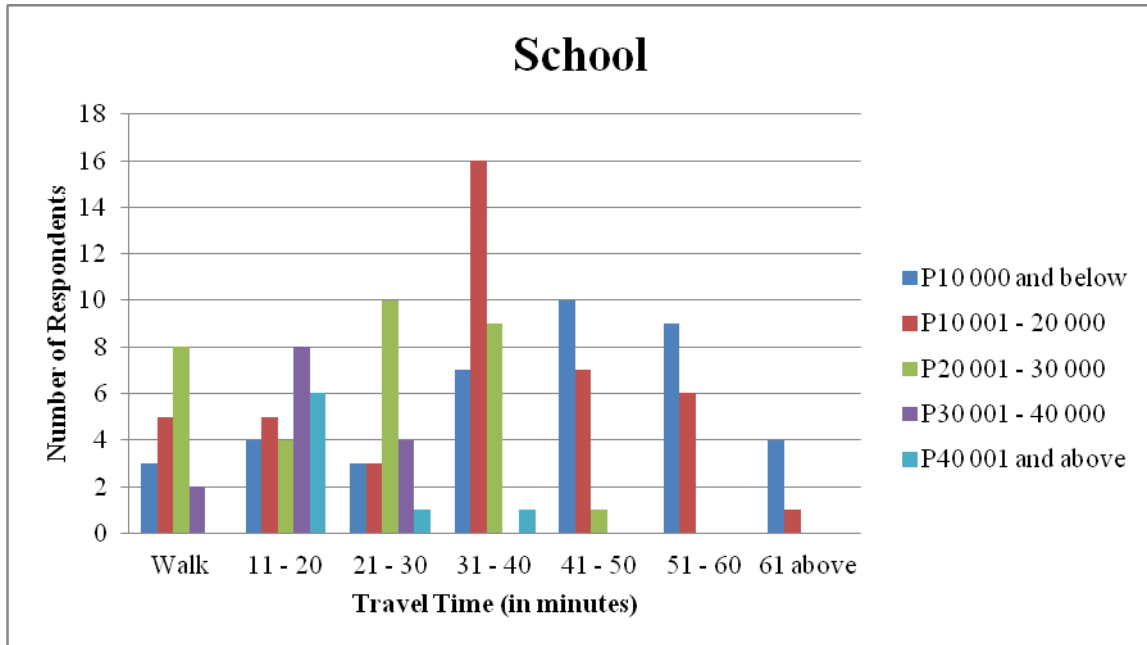


FIGURE 3.6.1 Bar Graph of Data Gathered (School)

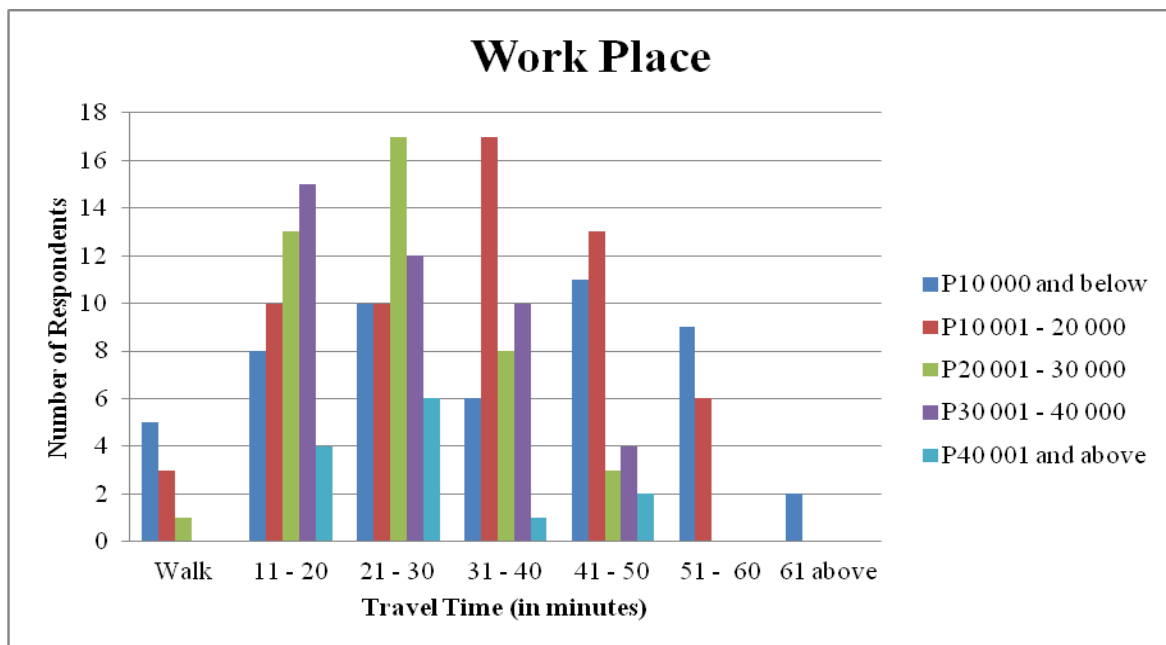


FIGURE 3.6.2 Bar Graph of Data Gathered (Work Place)

27.01% of the total number of respondents who are studying and 19.90% of the total number of respondents who are working travel more than 41 minutes to reach the school and their work place respectively

3.7 Factors Affecting the Respondents' Decision in Taking Public Transit

TABLE 3.7.1 Factors Affecting the Respondents Decision in Taking Public Transit

Factors Affecting the Respondents Decision	Weighted Mean	Rank
Cost / Fare	1.51	1
Travel Time	2.03	2
Comfort and Convenience	2.6	3
Type of Vehicle	3.86	4

Respondents were asked to rank the factors affecting their decisions in taking public transit. Affordability of the cost or fare is the major factor that affects their decision in taking a public transit followed by how fast they can get to reach their desired services and activities. It is not that important for most of the respondents how comfortable and convenient a public transit is.

4. CONCLUSION

The respondents' ability to reach their desired services and activities varies depending on their income class.

- The study focused on six distinct transport-related problems associated with low income and social exclusion in the city: access to work, access to learning, access to healthcare, access to food shops and access to social, cultural and recreational activities. The respondents' abilities to reach their desired services and activity only differ when it comes to access to work and learning. A significant share of Manila's workers and students whose monthly family income are less than P20 000.00 take three to four kinds of public transportation systems, pay more than P26.00 and travel longer to get to their destination.
- Respondents with a monthly income of more than P20 000.00 are located in areas where public services and jobs are accessible while a significant share of the respondents with a monthly income of less than P20 000.00 are living in the farther part of the city with work sites dispersed widely around the city. The results indicate that under current conditions, low-moderate income communities are significantly disadvantaged, but this can be changed with more transit-oriented transportation and effective land use planning.

5. RECOMMENDATIONS

Based on the data gathered and results analyzed, the researcher suggests measures that might help discuss the kind of accessibility problems associated with income class, including:

- Improving physical accessibility and availability by making wider network of train and bus routes, making more public transport physically accessible to people who are financially disadvantaged, more supple bus services whose routes adjust according to demand and other locations since PUJ is the only well distributed transit system in the city,
- Making travel more affordable by granting specialized public transport fares for particular groups,
- Reducing the need to travel by focusing shops, leisure facilities and offices in city centres or local centres and planning policies that promote development and services in suitable places.

ACKNOWLEDGMENT

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