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Assessing Impact of Public Transportation Services on Traffic Jam in Dhaka City

Md. Tanjil Mahmud Khan[1*]

[1]*Department of Civil Engineeirng, Daffodil International University, Bangladesh*
[*]*Corresponding Author: tanjildiu@gmail.com*

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Abstract

This study used JASP Software for descriptive analysis and Chi-square tests. I surveyed 100 people of different backgrounds and age for their opinions. It determined that 56% of respondents were dissatisfied with the public transportation service, and 69% used public transportation daily. According to this study, 82% of people regularly experience traffic jams because it is hard to get to places, especially in places like Mirpur. Even though 64% of those who responded used buses as public transport, but only 18% wanted more buses to help ease traffic. They would rather see digital transportation systems, awareness and safety improvements. Notably, 80% of those who answered think improving public transportation services could help reduce the traffic jams in Mirpur, Dhaka city.

Keywords: traffic jam, public transportation, traffic jam of dhaka city

1 Introduction

Traffic jams on roads are getting worse around the world. One toxic effect of traffic jams is that they hurt the economy and the quality of life in numerous cities [1]. There is a significant problem with traffic congestion, In the city of Makassar, Indonesia, when fire trucks are on route and face heavy traffic jams, then they are usually forced to reduce speed, hindering their ability to respond quickly and facing problem for traffic jam [2]. But it is not only impacting the general public but also negatively impacts the interests of commercial activity. Even though no statistics indicate the economic loss caused by traffic congestion in Hong Kong, there is some proof from countries in the United States and Europe that traffic congestion entails substantial financial damage. The United States of America, according to a report that

was published in 2014, spent 124 billion dollars in a single year due to traffic congestion [3].

The most crowded city in the world overall is Dhaka, the capital of Bangladesh. Dhaka has a population of more than twelve million, and the count is rising daily; much of Dhaka suffers from severe traffic jams most of the day [4]. Traffic jam is a prevalent issue in all cities in Bangladesh. Major metropolitan areas such as Dhaka, Chittagong, Khulna, and Rajshahi are confronting this issue, particularly in Dhaka, where it has become a significant challenge in addition to fundamental demand shortages [5]. Traffic jams are a big problem in Dhaka. According to the study of an author, most people drive in the city for more than two hours daily. And just because of traffic jams, they lose an average of one hour of work each day [6].

Nineteen million of Bangladesh's 55 million registered cars are in Dhaka. And, in Dhaka, there are more than five times as many cars on the road as lanes are not enough to meet the demand [7]. Another author from Bangladesh completed a survey in 2019 and suggested several steps to reduce traffic jams. These include executing traffic management strategies, strictly following traffic laws and rules, and inspiring people to use public transportation [8]. The highest traffic congestion in that region is caused by a combination of factors, including the signaling failure in the Dhaka traffic system and people's lack of awareness. This problem costs the economy a significant amount of money daily [9].

Overall, we are experiencing a massive problem due to traffic jams in Dhaka city. Researchers have suggested various solutions to the traffic congestion issues in Dhaka. Enhancing public transportation options is widely acknowledged as reducing traffic jams [10]. According to an author, Primary objective of the accessibility assessment for public transportation is to improve the connectivity between people and locations throughout the system, reducing traffic congestion on highways [11]. Therefore, I am eager to work on this matter by assessing the impact of public transportation accessibility on traffic jams in Mirpur 1 to 10 at Dhaka city, evaluating public transportation availability, accessibility, and usage, and analyzing commuter behavior and satisfaction. Then, finally, I want to share proposed recommendations to improve public transportation and reduce traffic jams.

2 Material and Methods

This study applied a quantitative research approach to look at the impact of public transportation networks on traffic jam in the Dhaka city of Bangladesh. Participants were asked about their own vehicle percentage, frequency of public transportation use, most often used public transportation, public transportation accessibility rate, satisfaction rate of using public transportation, what they are thinking about improving public transportation can help to lower traffic jam.

2.1 Instruments

At first, the primary instrument for data collection in this investigation was a structured survey. Only closed-ended questions were included in the survey to facilitate quantitative analysis that concentrated on the influence of public transport services on traffic congestion in the Mirpur region in Dhaka. Questions were formatted as yes/no options, Likert scales, and multiple-choice answers to ensure clarity and prevent opacity in the survey using google form. In addition, a pilot test was implemented with a limited number of individuals to verify the instrument's efficacy and implement any required modifications prior to its complete deployment.

2.2 Data Collection

To effectively administer the research's scope, I concentrated data collection on the Mirpur 2 and Mirpur 10 areas of Dhaka, Bangladesh. Then I developed a Google form and disseminated it online to residents of Mirpur 2 and 10. Data was collected through this form. In addition to the online distribution, I personally visited the region to distribute the Google Form to individuals. I conducted face-to-face interviews with people who lacked access to email addresses and social media. I manually completed the Google Form on their behalf. This method guaranteed inclusivity and a more thorough data collection process. A total of 105 participants, spanning a wide variety of ages and occupations, provided informed consent for data collection.

2.3 Survey Design

The survey questions were set up to get a wide range of information about how people use public transport and how that affects traffic in Dhaka city. Questions about age, occupation, and vehicle ownership helps to put answers in context because these

things often affect how people move. I have asked how frequently and which types of public transport peoples used most to find out how usually and how much people relied on it. To rate the quality of the service, people were also asked to rate how easy it was to use and how satisfied they were with the current public transport choices. Also, asked people about their experiences with traffic jams and their thoughts on possible solutions that can help to understand how they think better public transport could help ease traffic jam problem.

2.4 Data Analysis

At first, I remove the missing data from the structured questionnaire data set for correctness, and finally 100 samples were chosen from the 105 data sets. To maximize efficiency, data was entered into Microsoft Excel using coded values. The dataset was saved in .CSV format using Microsoft Excel and loaded these into JASP (0.18.3 version) software. Then the coded values were changed to string values for analytical clarity. And after that here, descriptive statistics and Chi-square tests were used. For this study, I have used here descriptive statistics and also Chi-square tests to understand the relationships and trends within the dataset. Here descriptive statistics provided an overview of the data distribution, allowing me to assess central tendencies and variability across responses. This initial analysis gave a clearer picture of general patterns in public transportation usage, satisfaction levels, and perceptions regarding traffic congestion. The Chi-square test was then employed to examine relationships between categorical variables, such as age, profession, vehicle ownership, and attitudes toward public transportation.

3 Results and Discussions

After analyzing 100 participants' data, including 10 professions and 7 age groups, from Fig. 1; it was found that 42% of participants are students and those aged between 21-25. This research study revealed a few crucial facts these are daily public transportation is used in Mirpur 1, 2, and 10 by 69% of people; here always and often – a total of 82% of people face traffic jams; using public transportation - dissatisfied and the very dissatisfied rate is 56%; study showed most using public transit by people - 64% is bus; having no own vehicle of people is 88%, in these areas public

transportation accessibility rate is very lower, research showed it is only 41%, and exactly 80% of people telling improving public transportation can help to reduce this traffic jam.

Research shows that people using public transportation daily have a satisfaction level of only 4.29%, a neutral level of 31.43%, and a dissatisfaction level of 37.14%, mentioned in Figs. 2 and 3. The very dissatisfied level is 27.14%. Then, for people who are using weekly public transportation, their satisfaction portion is 11.77%, neutral is 17.65%, dissatisfied is 52.94%, and very dissatisfied is 17.65%. After that, the third category is people who rarely use public transportation; their satisfaction rate is 7.69%, neutral is 23.08%, dissatisfied is 38.46%, and very dissatisfied is 30.77%. People with their own vehicles still use public transportation; the daily used percentage is 58.33%. On the other hand, people without an own vehicle use public transportation more than those with it; the daily use percentage is 71.59%. But in the third category, 'rarely,' people with a vehicle are using public transportation more than those without a vehicle; if we look at the daily using public transportation data, the percentage is 33.33%.

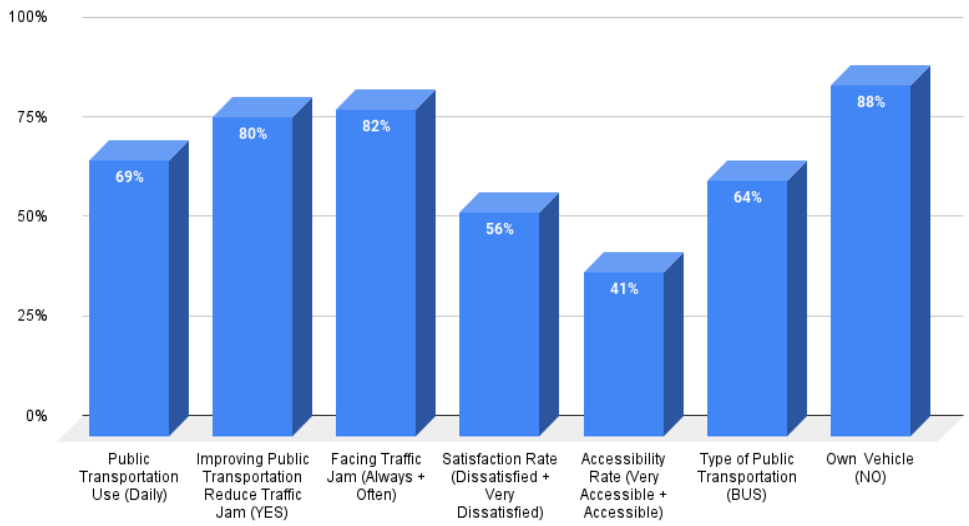

Figure 1. Important facts about public transportation.

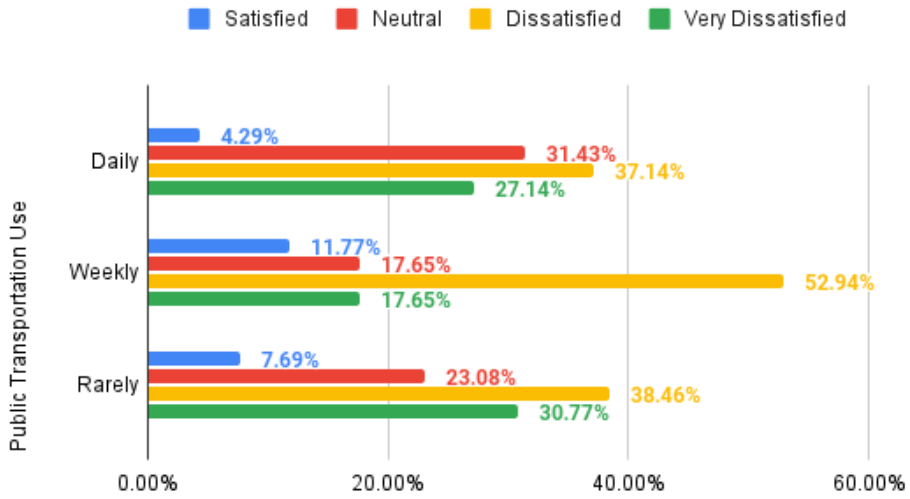

Figure 2. Public transportation use & satisfaction level.

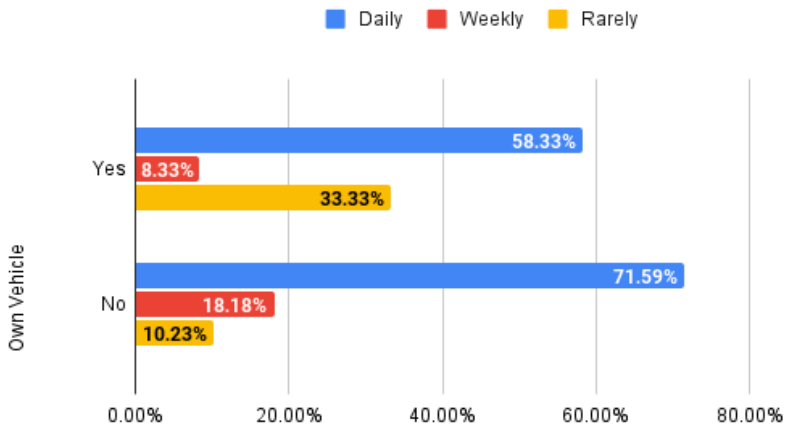

Figure 3. Own Vehicle & Public Transportation Using Ratio.

Now, the data on public transportation accessibility and their records of facing traffic jams, here analysis showed in Fig. 4; people who are in the ‘very accessible’ category face a very lowest amount of traffic jams daily than all others, which is 28.57%. The only category named ‘accessible’ here is that 2.94% of people never faced a traffic jam. In the ‘neutral’ category, 40.91% of people always face traffic jams.

But, in ‘inaccessible’ and ‘very inaccessible,’ people here interestingly always face 66.67% traffic jams and, in the category, ‘often’ for 33.33%.

This study showed that in Fig. 5; 80% of people say that improving public transportation may reduce traffic jams in Dhaka. Here 64% of people used the bus as a public transport and data says only 18% chose ‘more buses’ as an option that may reduce traffic jams, this was the lowest voted option. Then, the area with the highest improvement selected by participants is the digital transport service. Others are lower fares 23%, more routes 39%, better schedule 32%, improved safety 46%, and raising awareness campaigns 59%.

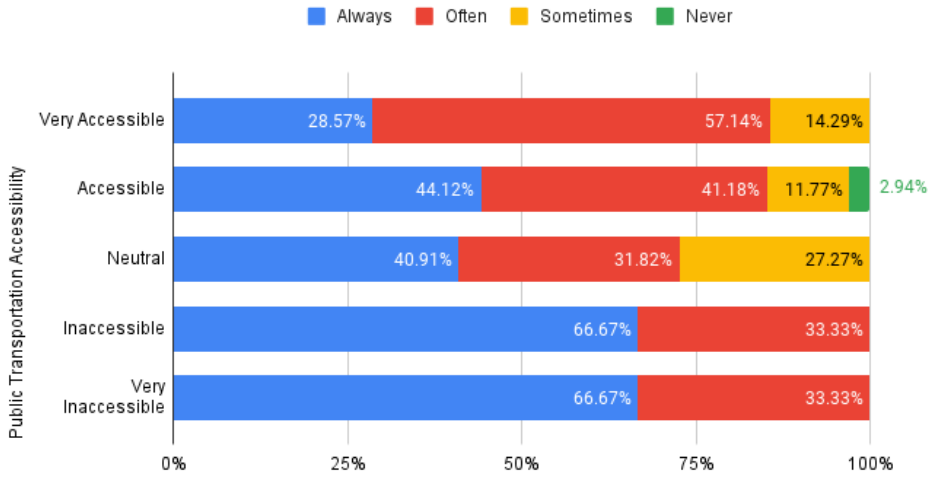

Figure 4. Public transportation accessibility and records of facing traffic jam.

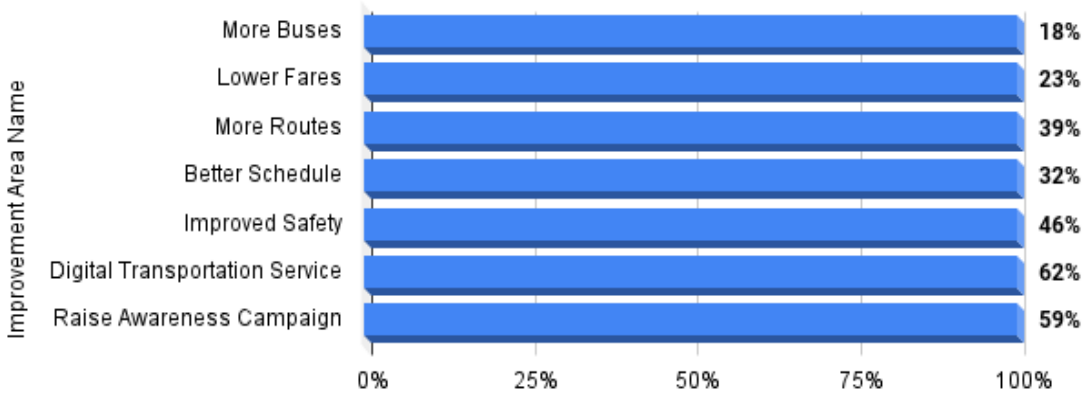

Figure 5. Most wanted improvement area.

4 Conclusion

In Mirpur-Dhaka, this research study illustrates that traffic jam is substantially exacerbated by inadequate public transportation and traffic management. In Mirpur, public transit is extensively utilized by most commuters, particularly students aged 21-25, with 69% using it daily. The public transportation system suffers from low accessibility (41%), high dissatisfaction rate (56%), and frequent traffic jams (82%). And 80% of participants believe that improving public transportation services can free up traffic jams. Here 64% of people who use public transit say they take the bus. We need digital transportation services, more lines, and better safety measures to reduce traffic jams. To fix the city's terrible traffic jam problems, we must also make public transportation more accessible. A future study may focus on more areas in dhaka city, using mixed methods, and longitudinal studies that can help to reach more better results.

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