ANALYZING ATTITUDINAL PERCEPTIONS TOWARDS BICYCLE COMMUTING IN DHAKA, BANGLADESH

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ABSTRACT

According to the Bangladesh Road Transport Authority (BRTA), more than ten thousand private passenger cars have been registered per year in Dhaka city in recent years. This clearly indicates the increasing dependency on personal motorized vehicles in Dhaka. In addition, with continuous population growth, daily travel demand is also increasing proportionately. As a result, the existing road infrastructure is failing to serve this increasing demand resulting in severe traffic congestion in every major road network. Bicycle commuting has already been established as a regular mode of transport in many parts of the world. However, in Dhaka, bicycle commuting is rarely in practice. Although 51% of vehicles are non-motorized in Dhaka city, bicycle commuting contributes only 2% (STP, 2005). This study primarily focuses on understanding the barriers and driving forces to bicycle commuting in Dhaka city through a public opinion survey. Results indicate that age, gender, income group, and employment status have a significant impact on attitudinal perception towards bicycle commuting. As expected, attitudinal variations are found between the responses of younger vs older, male vs female participants. Countable differences are observed between the attitudes of employees and students, especially toward the potential barriers. Also, the attitudes of people of various income groups are not always the same. Most importantly, the results turn out a brief quantitative dataset to understand public opinions or attitudes. The outcome of the study will help a diverse group of stakeholders including the city planners and traffic engineers to better understand the traffic behavior and design associated policy instruments.

Keywords: *Bicycle commuting, Travel behaviour, Attitudinal perception, Questionnaire survey, Transport policy.*

1. INTRODUCTION

The number of registered private passenger cars per year in Dhaka city has been over ten thousand and the average travel speed has plummeted to 4.5 km/hr (Bangladesh Road Transport Authority, 2020, Yeung, 2023), The current population of Dhaka metropolitan area is over 23 million (Bangladesh Bureau of Statistics, 2022) and the number is rising constantly each year. The increasing population and private vehicles along with the decreasing mean travel speed indicate that the travel demand in the city is also on the rise. Walking, bicycling, and hiking collectively known as active travel or non-motorized transport (NMT) has become prominent all over the globe in the last decade because of its social, individual, environmental, and health benefits (Tao et al., 2020). Bicycle commuting is viewed as one of the best transportation modes in terms of sustainability and an alternative solution around the world (Basu & Vasudevan, 2013; Dey et al., 2014). The utilization of public bicycles rather than motor vehicles has modified society's environmental and financial benefits (Wang et al., 2020). Because of those benefits, many countries have initiated and launched various programs to encourage the usage of bicycles (Wood et al., 2014). Cycling for commuting can reduce the excessive pressure on our road transport infrastructure. Therefore, understanding the current travel behaviour and the perception towards bicycle commuting is an elementary task.

There is not much literature available relating to the attitudinal perception of people towards bicycle commuting in Dhaka city. Hossain (2023) tried to analyze current and potential bike users' opinions in Dhaka city through an online survey. In total, 140 respondents (55 students and 85 job holders) participated in the survey and answered the questions about trip purpose, length, frequency of bicycle usage, challenges faced, and reasons behind using bicycles as a mode of transport. The absence of a dedicated bike lane is the biggest threat to cycling in Dhaka according to the respondents. The survey shows that 33.3% of the respondents commute by bicycle regularly because of health benefits whereas 26.8% commute to save their time. Although the asked questions seem to get the perceptions of people's attitudes, the low number of responses makes the data insignificant. Moreover, all the respondents didn't answer all five questions.

Shioma et al. (2017) conducted a questionnaire survey on office-going bicycle users in Dhaka aiming to investigate their sociodemographic characteristics and explore the problems they faced. All 300 respondents were who travelled five days a week. Variables considered for sociodemographic information were age, occupation, educational qualification, number of family members, monthly household income, number of cycles in the household, number of cycle users in the household, and year of adopting cycling as a regular mode. Other questions of the survey deal with the problems that respondents face while cycling along with information on the availability of parking facilities, safety on the road, availability of repair shops, etc. Results show that the age group 26 to 30 is the major portion (34%) of bicycle users. The survey also concluded that higher educational degree holders are more interested in bicycle commuting. This paper also identified that the absence of separate lanes, speedy vehicles, and inadequate parking facilities are the major problems faced by the respondents while cycling. However, the paper doesn't investigate any positive drivers that would motivate people to bicycle commuting as the survey was conducted to people who at that time been commuting by bicycle.

Thus, we focus on understanding both the barriers and driving forces to bicycle commuting through a public opinion survey. The next section designs the survey and discusses the data collection procedure. Section 3 illustrates the results in charts and interprets them. The last section concludes the paper by providing guidelines for future research and policymaking.

2. SURVEY DESIGN AND DATA COLLECTION

2.1 Survey Design

The survey was designed to understand people's attitudes to bicycle commuting by analyzing the barriers and positive drivers of bicycling. Unlike other questionnaire surveys, this survey asked for opinions from respondents on statements whether they agree or not at a 5-point Likert scale. To understand respondents' perceivness as the barriers to bicycle commuting, they were asked whether unfavorable road conditions and lack of secure and sufficient bike parking and storage are stopping them from bicycle commuting. They were also asked whether the unwillingness of their own or family and friends abstained them from bicycle commuting. Furthermore, they were enquired about their fear of bicycling beside motorized vehicles which may result in them avoiding it.

To investigate what would drive them to commute by bicycling daily, respondents were asked to give their opinion on several policies and amenities. They were asked whether they would commute by bicycle if separate bike lanes or wide footpaths with provision for bicycles were provided. They were asked whether they agreed that bike sharing or rental services would motivate them to bicycle commuting. They were also asked about actions on choosing bicycle commuting when provided with special incentives. They were also enquired about their choice of commuting if they would get or access an electric bike.

For sociodemographic information age, gender, employment or student status, and household income are considered as variables.

2.2 Data Collection

Both public opinions and sociodemographic information have been collected via a single Google Form over one month. We took three measures to collect our samples. Firstly, the Google Form link was spread throughout Dhaka city among the employees, university students, and graduates via social media. Secondly, pamphlets with QR codes directing to Google Form were posted in different public spaces and universities. Thirdly, the forms were filled out by volunteers visiting some private offices and asking the employees about their opinions. After collecting the data all the responses have been compiled and sorted. Finally, we received 300 valid responses for further analysis.

3. RESULTS AND DISCUSSION

The survey results depict the findings on both probable barriers and driving forces to bicycle commuting with several sociodemographic characteristics. For better understanding and critical evaluation, the results are presented in three charts for each case.

It is found that the major portion of the respondents (88%, 265 of 300) are in the age groups of betwee18 to 34. Also, it is seen that out of these 265 people, 183 are male and 82 are female. The opinions of 265 respondents on barriers and driving forces are illustrated with age and gender distribution as charts in Section 3.1 and Section 3.2 respectively.

After observing their occupational status, it is noticed that 293 out of 300 respondents are either employed or student. To evaluate the public thoughts regarding barriers and driving forces with employment and student data, these 293 opinions are illustrated in Section 3.1 and Section 3.2. Similarly, to display public opinions with household income, 274 responses with a monthly income within 149,999 BDT per month are selected.

3.1 Barriers to Bicycle Commuting

Figure 1 indicates the public opinions on probable barriers with age and gender distribution. The chart shows that more than 59% of males and females of considered age groups disagree that their self-

unwillingness is obstructing them to commute bicycle. It indicates that people wish to bicycle daily but some other factors are stopping them. Maximum respondents of all categories have admitted that their fear of bicycling beside motorized vehicles is discouraging them from commuting but elder females agreed on this the most (86%). A total of 60% of elder males agreed that the lack of sufficient and secure parking and storage is a reason why they are not commuting by bicycle whereas younger males and females mostly disagree. Surprisingly, most of the elder females (45%) have neutral opinions on this.

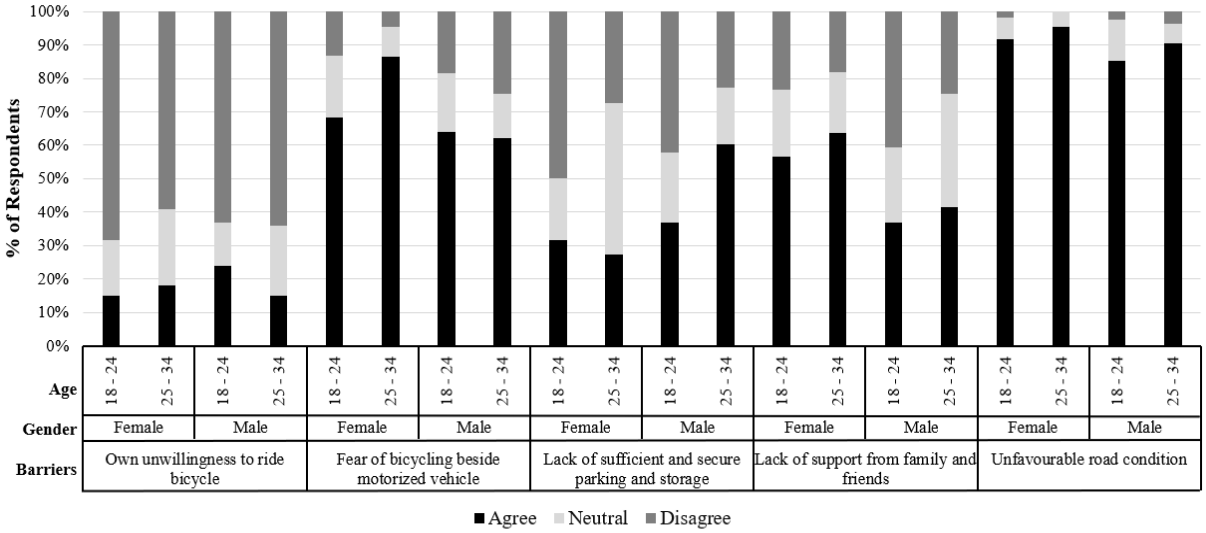

Figure 1: Distribution of barriers according to gender and age.

Only the younger males in most responses (60%) disagree that their cause for not commuting by bicycle is the lack of support from family and friends whereas respondents of other categories mostly agree. More than 85% of respondents of each category think that unfavorable road condition is a deterrent to bicycling for them.

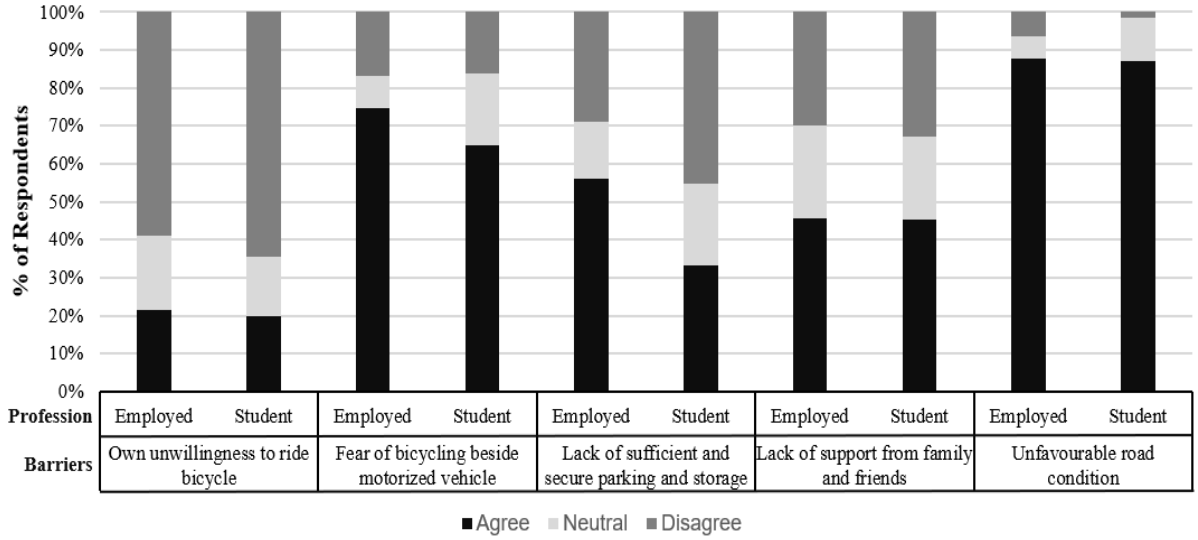

Figure 2: Distribution of barriers according to profession.

Figure 2 displays public responses on barriers to bicycle commuting along with their employment or studentship status. The chart shows that most of the employees (59%) and students (65%) disagree that their reluctance is keeping them apart from bicycle commuting. The fear of bicycling beside

motorized vehicles and unfavorable road conditions are demotivating to bicycle commuting to most of them. Around 45% of the employees and students admit and around 30% of them deny that lack of support from family and friends is a reason for them to avoid bicycle commuting. Unfavorable road condition is a concern for bicycle commuting for approximately 87% of the employees and students. The majority of employees (56%) find the lack of sufficient and secure parking and storage a barrier to them. However, most of the students (45%) disagree with this. This indicates that parking facilities in educational institutions are better than in offices on average.

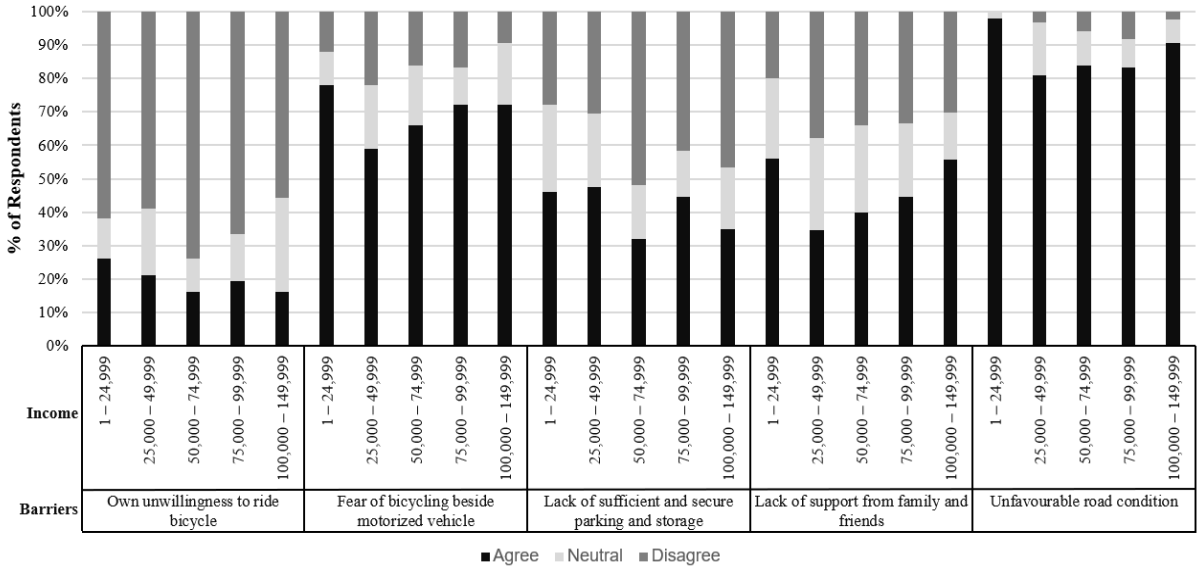

Figure 3: Distribution of barriers with household income.

Figure 3 tries to investigate any relationship between public opinions on barriers to bicycle commuting and respondents' household income. The majority of respondents from all income groups state that their unwillingness is not the main reason why they don't commute by bicycle. More than 80% of respondents from all income groups agree that unfavorable road condition is a major deterrent to bicycle commuting. People with household incomes below 25,000 BDT agree in high numbers that their fear of bicycling beside motorized vehicles, and lack of support from family and friends are barriers to commuting. Respondents with household incomes of 25,000-149,999 tend to agree on these more as their income increases. It is hard to conclude any relation between people's income and their opinions on the lack of parking facilities.

3.2 Driving Forces to Bicycle Commuting

Figure 4 illustrates the people's responses about probable driving forces to bicycle commuting with age and gender distribution. More than 72% of all considered genders and age groups agree that the provision of separate bike lanes will encourage them to commute by bicycle whereas younger females top the chart with 90%. This can be an indicator that younger females are quite interested in bicycling with a focus on rider safety. The chart also shows that at least 71% of younger females, younger males, and elder males think that they will be encouraged to commute by bicycle if there is bike share or rental service available. Though most of the elder females (54%) also feel positive about these services, a significant portion (41%) of them responded neutrally. The chart also depicts that more than 73% of respondents of each category declare the wide footpath with provision for bicycling as a positive driving force. More than 59% of respondents of each category agree that the arrangement of special incentives will motivate them to commute by bicycling. At least 67% of respondents of each category find the availability of electric bikes a driving force to bicycle commuting.

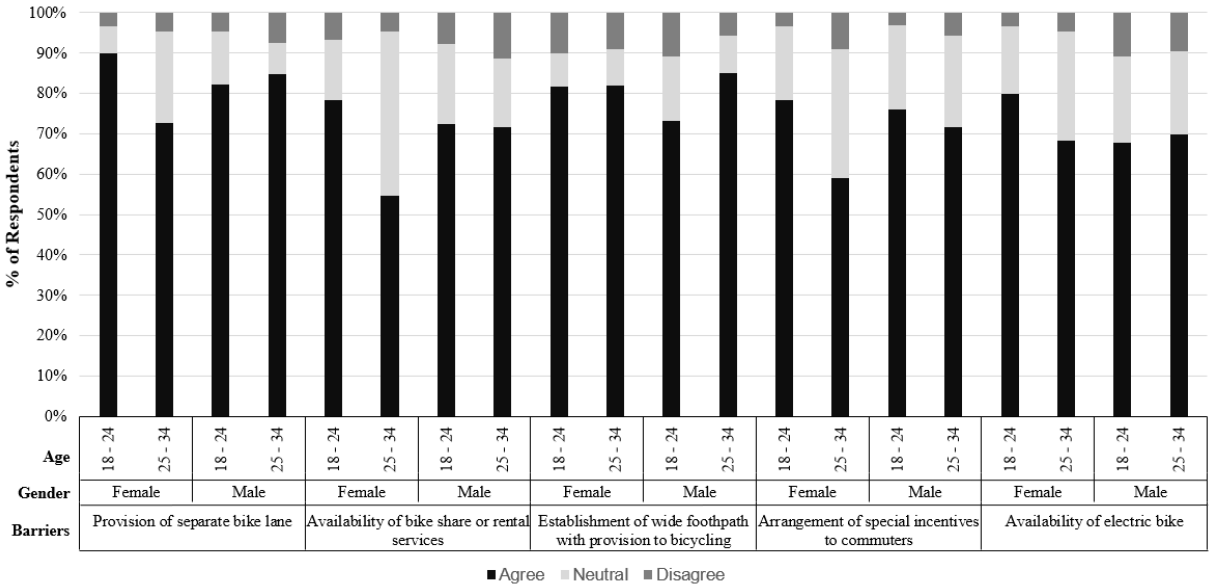

Figure 4: Distribution of driving forces according to gender and age.

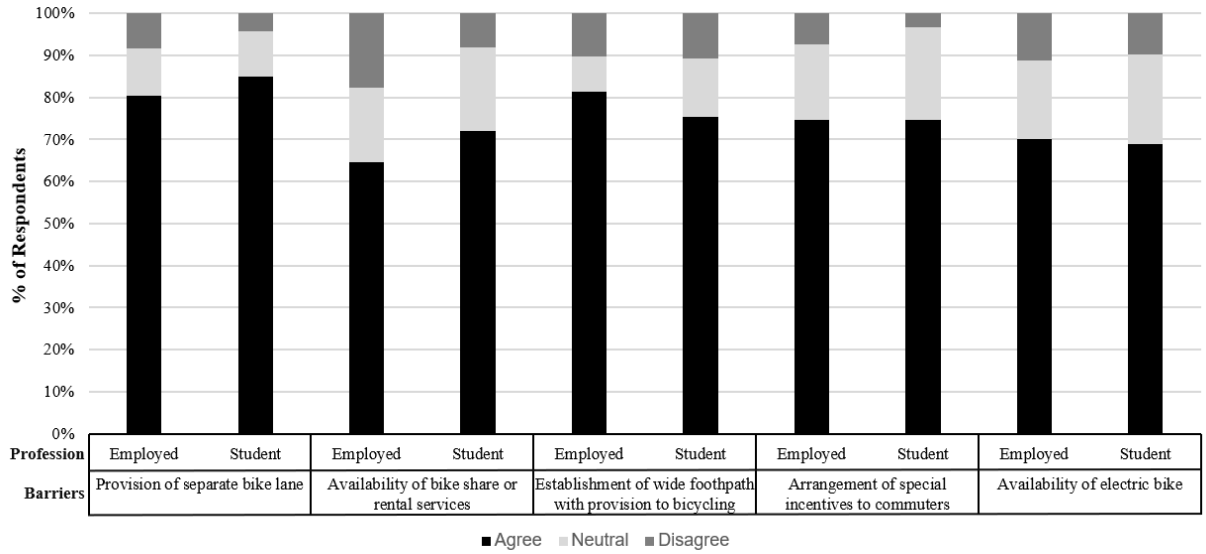

Figure 5: Distribution of driving forces according to profession.

Figure 5 shows that most of the employees and students agree that all probable factors they were asked will drive them to commute by bicycle and the percentages range between 65 to 85. Those who don't agree are found responding neutral mostly whereas few also disagree. This indicates that there is no significant difference in opinion between employees and students in terms of accepting the beneficial policies or amenities.

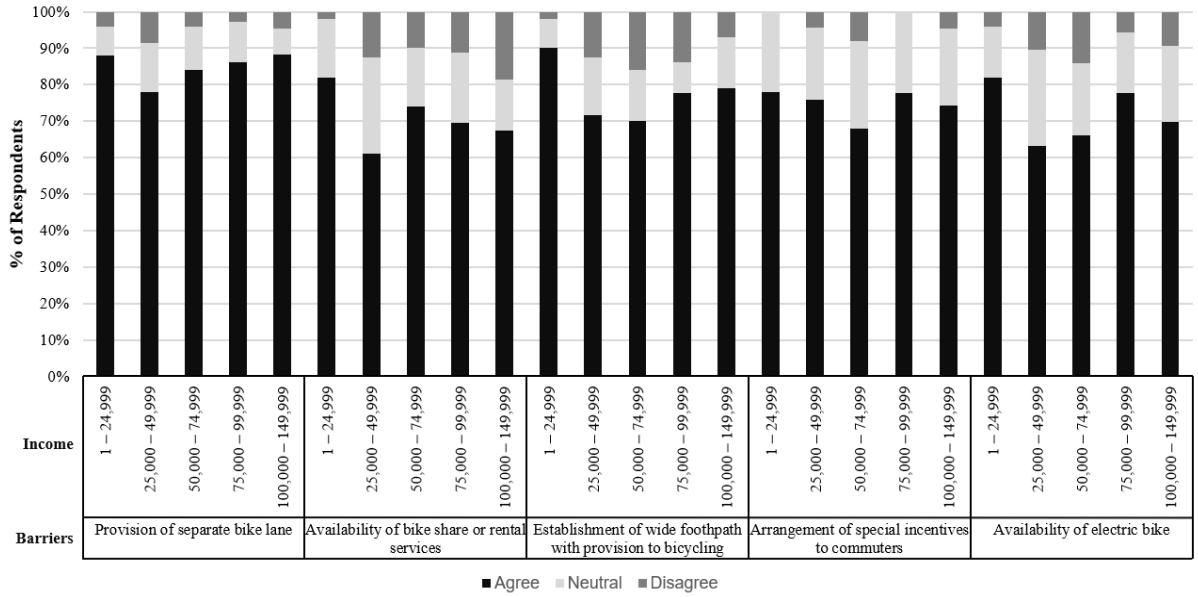

Figure 6: Distribution of driving forces with household income

Figure 6 shows that the majority of people of all income groups admit that the provision of separate bike lanes, wide footpaths with provision for bicycling, availability of bike share or rental services, special incentives to commuters, and the availability of electric bikes can drive them to commute by bicycle. Especially, the lower-income (below 25,000 BDT) group agrees in high numbers.

4. CONCLUSIONS

In this paper, we tried to understand people's attitudes towards probable barriers and motivators for bicycle commuting. The results show that people's attitudes to one parameter can differ from other parameters vastly. Gender as a demographic variable is found very significant in terms of people's perceptions of the barriers and driving forces to bicycle commuting. There is some variation between the most popular opinions of youngsters and elders too. Most of the employees and students with various household incomes are found to have similar perceptions towards all probable driving forces whereas there are variations towards the barriers. As the study provides quantitative values of all the opinions of the respondents, the outcomes of this study provide a good dataset for future research. The dataset will also be beneficial to the decision-makers of diverse sectors. The results of this study can help them to prioritize the barriers to solve. Likewise, these will also enable them to decide the necessary tasks for implementing policies and provide facilities to boost bicycle commuting. Furthermore, policymakers can use the results of the study to make transport policies more acceptable to the public.

In the Revised Strategic Transport Plan, (2015) some policies were proposed to acknowledge bicycling as a mode of transport in Dhaka. In addition, separate lanes and crossings are proposed within Dhaka city in order to make the journey safe. Moreover, it was also suggested to make bicycles affordable to the poorer sections of society. Unfortunately, there was no specific budget or funding plan. (Alam, 2018)

This clearly shows that a lot of work from the government's end is yet to be done to establish bicycling as a daily commuting mode in Dhaka city. The outcomes of this study seem quite relevant to making the proposed policies substantial. As the government has already decided to increase bicycling, the goal of reducing the travel demand for motorized vehicles through bicycle commuting seems not impossible to achieve.

REFERENCES

Alam, N. E. (2018, Oct,). Final report on sustainable urban transport index (SUTI) for Dhaka, Bangladesh. United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP).https://www.unescap.org/sites/default/files/SUTI%20Mobility%20Assessment%20Report%20-%20Dhaka.pdf

Bangladesh Bureau of Statistics and Informatics Division, Ministry of Planning Population & Housing Census, 2022, Preliminary Report to Government of The People's Republic of Bangladesh, N.D.

Bangladesh Road Transport Authority. (2023), Number of registered motor vehicles in Dhaka . Bangladesh Road Transport Authority. Retrieved Oct 30, 2023, from http://www.brta.gov.bd/site/page/74b2a5c3-60cb-4d3c-a699-e2988fed84b2/Number-of-registered-Vehicles-in-Whole-BD

Basu, S., & Vasudevan, V. (2013). Effect of bicycle friendly roadway infrastructure on bicycling activities in urban India. Procedia-Social and Behavioral Sciences, 104, 1139-1148.

Dey, D., Akter, S., & Siddique, M. A. (2014). A Study on Identifying The Possibility Of Bicycle As A Potential Transportation Mode In Dhaka. In 2nd International Conference on Advances in Civil Engineering.

Hossain, N. N. (2023). TRANSFORMING DHAKA, BANGLADESH INTO A CYCLING CITY by. World Transport Policy and Practice, 28(1), 37-59. https://static1.squarespace.com/static/619593021331d42c0b62a1c6/t/648b49c364a63f1755d63465/1686849997674/WTPP28.1-rev2+June+2023-8.9MB.pdf

RSTP. The Project on the Revision and Updating of the Strategic Transport Plan for Dhaka, Prepared by ALMEC Corporation. Oriental Consultants Global Co. Ltd, Kathahira & Engineers International submitted to Dhaka Transport Coordination Authority, Tejgaon, Dhaka, Bangladesh; 2015. Available from: http://www.dtca.gov.bd

Shioma, S., Tokey, A. I., & Akther, M. S. (2017). An explorative study on office going bicycle users of Dhaka city. Journal of Bangladesh Institute of Planners, 10, 55-70. https://www.bip.org.bd/admin/uploads/bip-publication/publication-21/paper/20200224224929.pdf

STP, S. T. P. (2005). Urban Transport Policy: The Strategic Transport Plan (STP) for Dhaka. Dhaka Transport Coordination Board (DTCB), Dhaka.

Tao, T., Wu, X., Cao, J., Fan, Y., Das, K., & Ramaswami, A. (2020). Exploring the nonlinear relationship between the built environment and active travel in the Twin Cities. Journal of Planning Education and Research, 0739456X20915765

Wang, Z., Xue, M., Zhao, Y., & Zhang, B. (2020). Trade-off between environmental benefits and time costs for public bicycles: An empirical analysis using streaming data in China. Science of the total environment, 715, 136847.

Woodcock, J., Tainio, M., Cheshire, J., O'Brien, O., & Goodman, A. (2014). Health effects of the London bicycle sharing system: health impact modelling study. Bmj, 348.

Yeung, P. (2023, Mar 24,). Air pollution casts a pall over booming Bangladesh megacity. Bloomberg. https://www.bloomberg.com/news/features/2023-03-24/runaway-air-pollution-casts-a-pall-over-dhaka-s-boom