

Study on Noise Pollution Generated From Vehicles in Gazipur City Corporation, Dhaka, Bangladesh

Rokhshana Parvin¹, Md. Tanvir Ahmed²

^{1,2}Lecturer, Dept. of Civil Engineering, World University of Bangladesh

Abstract

Gazipur city corporation has established on 16th January, 2013. It has a total 329.53 sq.km with a population of 6500000. About 75% of the garments of the country are located in this city corporation [1]. For this huge number of population and garment factories a huge number of vehicles moves in the city every day. This huge number of vehicles not only moves in the city they are responsible for the generation of noise pollution. The study shows the variation of noise level with traffic volume. To conduct the research noise level was measured along with traffic count. From the research, it has established that the level of noise pollution is not dependent on the traffic volume. Even the noise level has found maximum, when the traffic volume is minimum compare to the maximum traffic volume. Even it has also found that in off pick hour when the traffic volume is minimum, the noise level has no influence. That has happened due to reckless driving of the drivers and unawareness of the noise pollution.

Keyword: Noise Level, Traffic Volume, Reckless Driving, Off Pick Hour, Noise Pollution, Motorized Vehicles

1. Background

The word “noise” has attained from Latin word “nausea” which is known as seasickness [2]. Noise pollution refers unwanted or excessive sound that can have serious effects on health of human body, animal and environment. Noise pollution is common inside of industrial facilities and some other workplaces but it may also create from highway, railway, airway and from construction activities [3]. All types of noise are responsible for hearing loss, stress and high blood pressure [4]. A study of World Health Organization (WHO) says that noise pollution can be linked to health conditions such as cardiovascular disease, disturbance in sleep tinnitus, children’s cognitive impairment and annoyance [5].

Along with the increasing degree of air and water pollution, the inhabitants of Gazipur city are being exposed to high level of noise pollution. Its main reasons are urbanization and motorization. The hazard of noise pollution increased and exceeded its tolerable limit with the increasing number of motorized vehicles in the city. Although there are many other sources of noise, the level of noise pollution is very closely related with urbanization and motorization [6]. Most of the outdoor noise pollution is due to transportation system, including noise of motor vehicle, aircraft and rail [7]. This happens due to Poor urban planning like as side-by-side industrial [7].

The hearing ability of the inhabitants of Dhaka City has reduced during the last ten years. About five to seven percent of the patients admitted to the Bangabandhu Sheikh Mujibur Rahman Medical University (BSMMU) Hospital, Dhaka are suffering from permanent deafness due to noise pollution [8]. Gazipur is very near to Dhaka city and after establishment as city corporation the rate of motorization and urbanization has also increased. So, there is a great potentiality to occur noise pollution.

2. Research scope

With the information of a research published in Journal of Current and Advance Medical Research it has found that in Dhaka city 26.9% traffic police are facing different degree of hearing problem [9]. A study of 2014 says that in Gazipur city 3% people are suffering from more heart beat, 9% are suffering from drowsiness, 62% are suffering from headache, 26% are suffering from hearing problem [7]. From the same research it has found that in the industrial sector minimum noise level is 84.71 dB and maximum noise level is 105 dB, in the hospitals/clinics minimum noise level is 75 dB and maximum noise level is 89 dB and in the traffic places minimum noise level is 78 dB and maximum noise level is 107 dB which were crossed the standard level of noise. Permitted noise level for residential areas is 55 decibels at day and 45 decibels at night. In industrial areas, where the highest noise levels are permitted, the limit is 75 decibels at day and 70 decibels at night [10].

Noise produced from vehicles create disturbance to more people than from any other source of noise and has been increasing very fast over the last few decades. Transportation noise is a key problem in the cities of the world today [11]. To protect the inhabitants of Gazipur city from noise pollution it is now high time to identify the severity of noise pollution and take necessary steps to control those. And for this there is no alternative of efficient research work. The study aims to determine the level of noise pollution in Gazipur city Corporation and analyzing its level of severity.

3. Objectives

To proposed research objectives are –

1. To determine the level of noise due to vehicles in Gazipur city corporation.
2. To identify noise pollution at various public point and its level of severity.
3. To find the points of highest noise polluted area.

4. Methodology

4.1 Selection of study area

Gazipur city corporation has established in 2013 and the largest city corporation with 329.53 sq.km area [12]. Total 2.5 million people live in this city area and about 75% of total garments of the country is situated in this area [13]. The road network of this area is 1552.83 km [13]. In 2020 Gazipur Unnayan Kartripakkha has formed [14] . This is the fast-growing city corporation [1]. so, we have this area as our study area.

Figure 1: Study Area (Gazipur City)



4.2 Selection of specific route for data collection

The site selection has been done in such a way that almost all categories of noise affected areas could be represented in this study so that the scenario of noise pollution in Gazipur city could be reflected. The study location includes mainly Chandona Chowrasta, Board Bazar and Station Road Tongi. Fig. 1 and Fig. 2 shows the location map of the study area. Site location points has also shown in the map. The study areas are the most important parts in Gazipur city; all these areas constitute the major commercial, social, educational and other important establishments in the city.

Figure 2: Data collection points



4.3 Measurement of noise level

To measure the noise level, simple and easy to use low-cost digital noise meter has been used.

4.4 Traffic count

Along with measurement of noise, the no of traffic pass that specific point has counted to best identify the effect of noise with the traffic volume. All these data then analyzed to fulfill the objectives or to get the results.

5. Results

To obtain the results, data have been collected from the mentioned three points. At first the number of traffic moves in the study areas have recorded. In order to find the noise level only motorized vehicles (bus, car, autorickshaw, truck and motorcycle) has taken into consideration. These traffic data have been collected in three days from 8 am to 5 pm with being 15 minutes intervals. Noise level was also collected from the same points in the same days with the help of sound level meter. Actually, this research focused on the noise created by vehicles. So, the overall results have showed the level of noise with traffic volume at that time. Traffic volume in PCU was calculated by multiplying the collected data with the PCU factors as shown in below.

Traffic volume (PCU) = 3 x (number of buses + number of trucks) + number of cars + number of autorickshaws + 0.5 (number of motorcycles).

To measure the noise level at Gazipur city the most important and busy places of the city has chosen earlier and the noise level and traffic volume was recorded in those places. The noise level with respect to traffic volume and time at Chandona Chowrasta, Board bazar and Station road for three different days has presented graphically in the figure below.

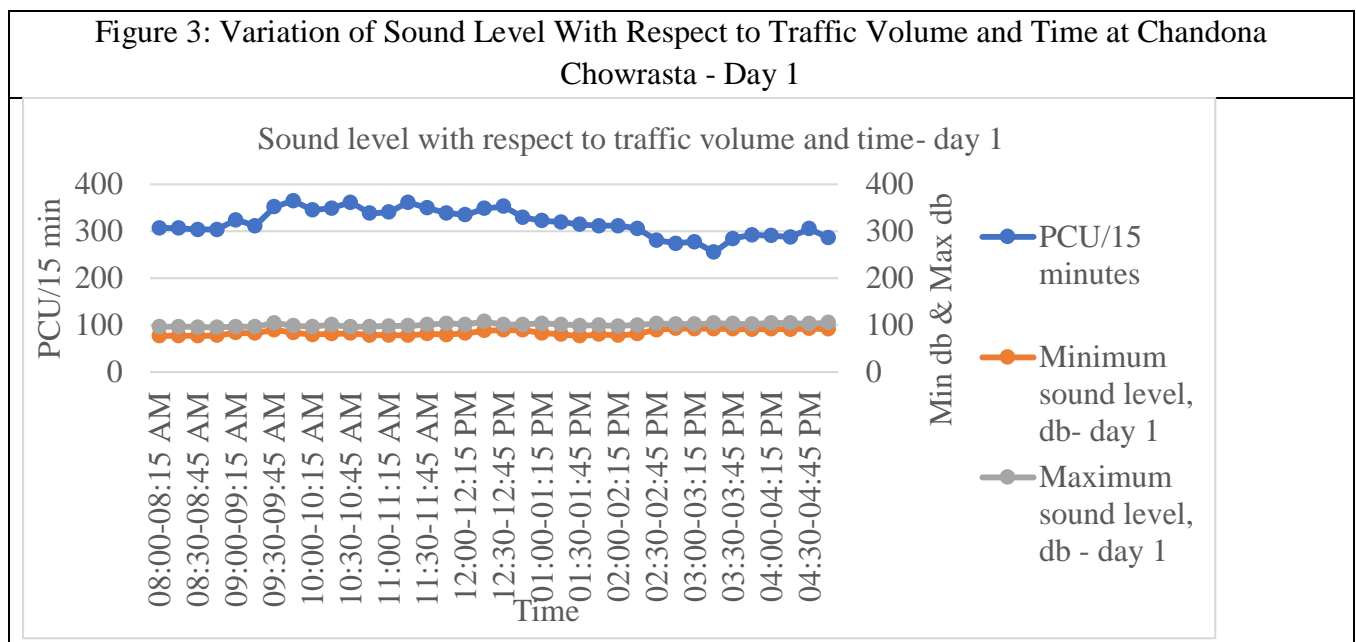


Figure 4: Variation of Sound Level With Respect to Traffic Volume and Time at Chandona Chowrasta - Day 2

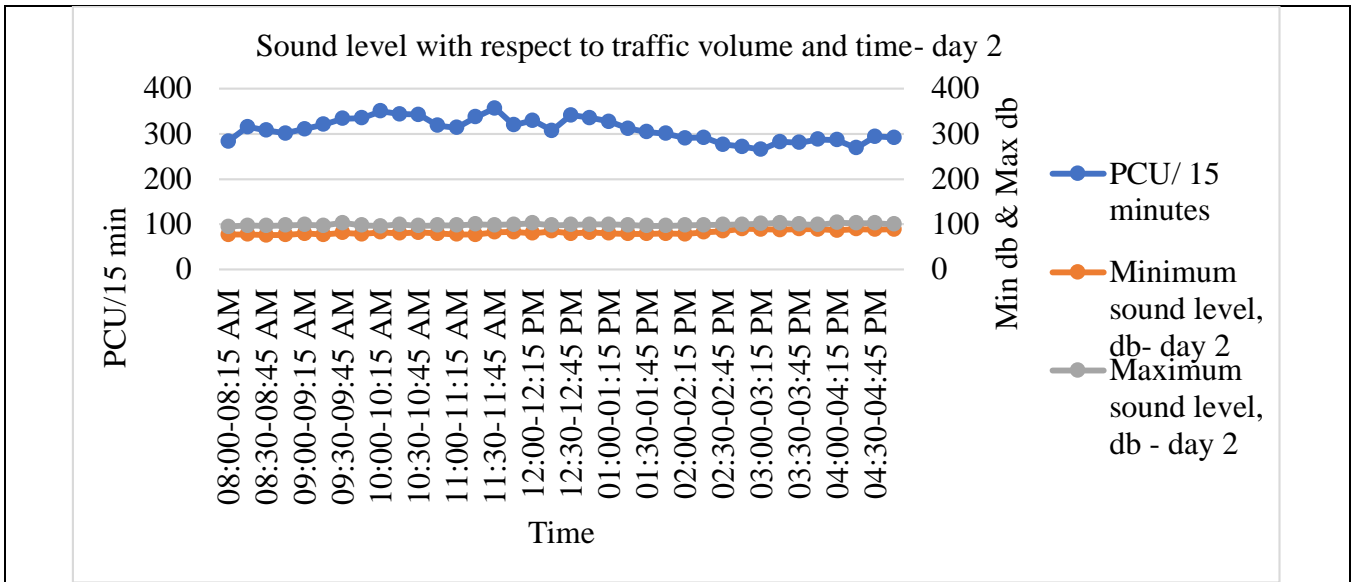


Figure 5: Variation of Sound Level With Respect to Traffic Volume and Time at Chandona Chowrasta - Day 3

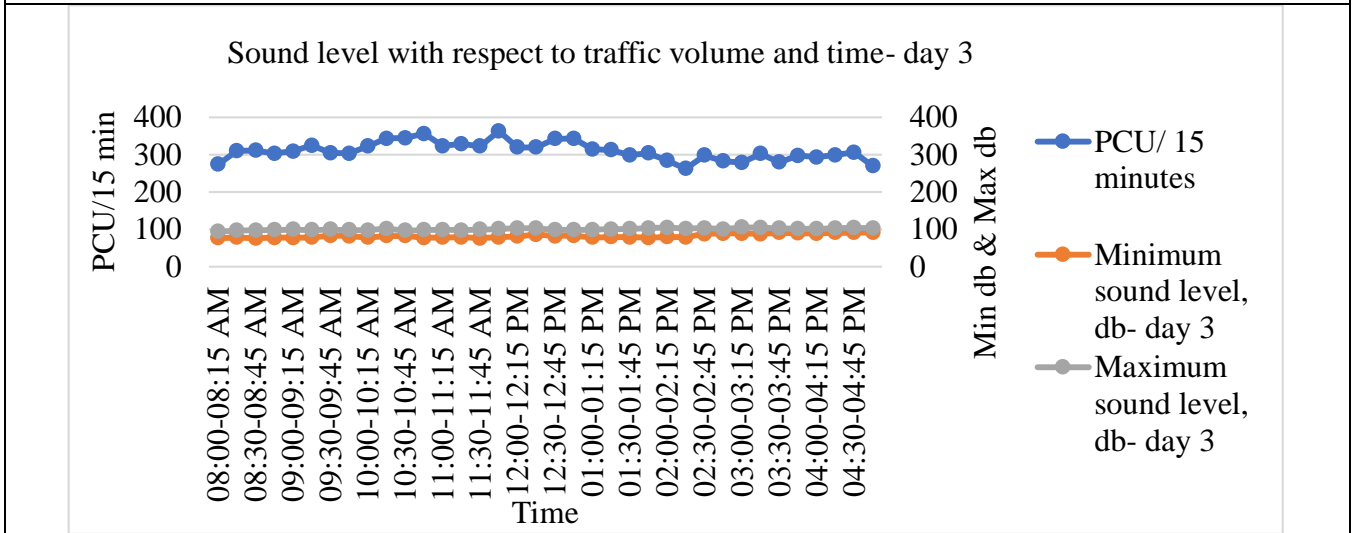


Figure 6: Variation of Sound Level With Respect to Traffic Volume and Time at Board Bazar - Day 1

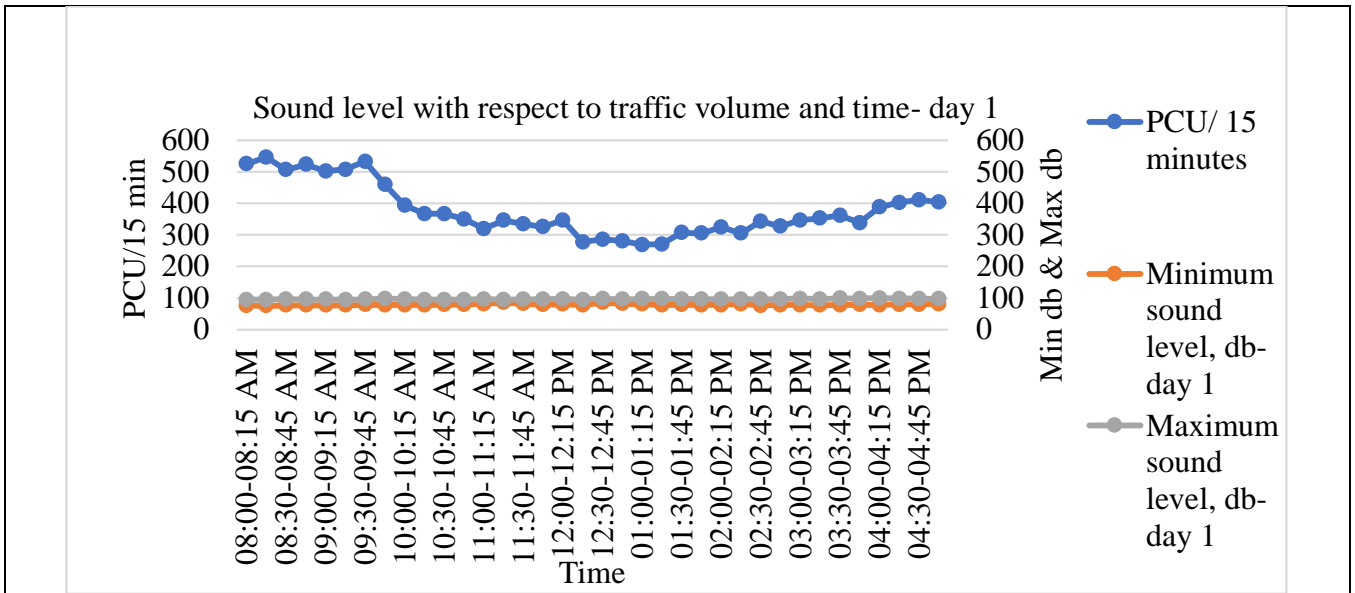


Figure 7: Variation of Sound Level With Respect to Traffic Volume and Time at Board Bazar - Day 2

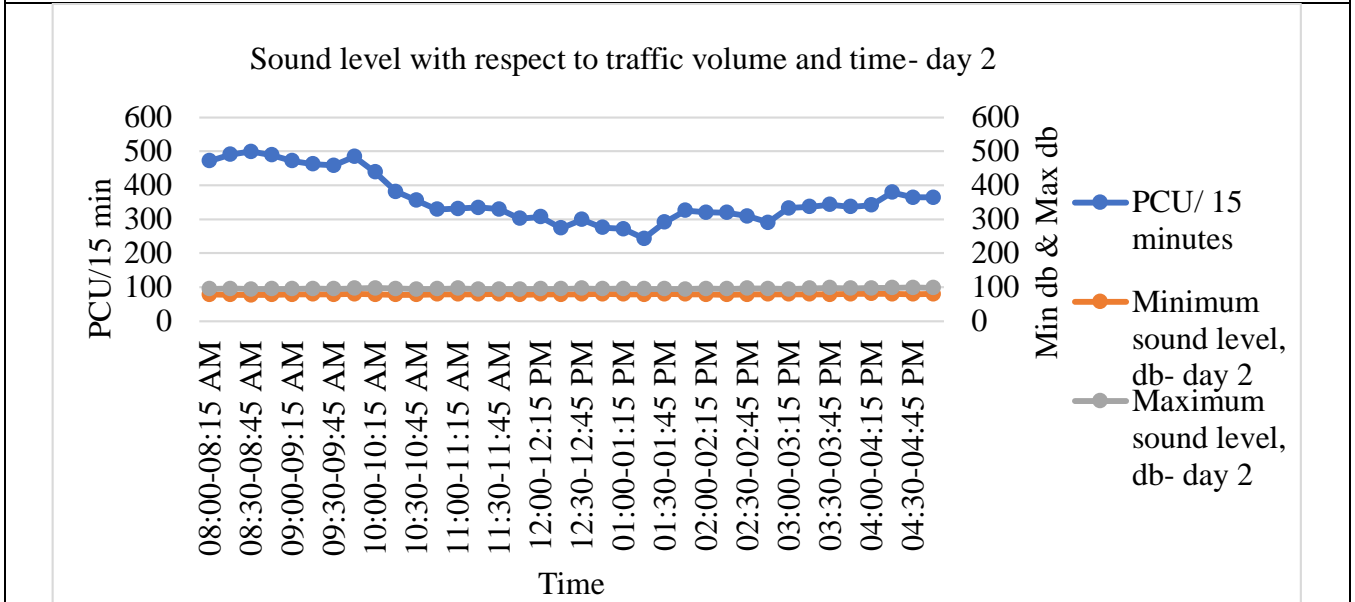


Figure 8: Variation of Sound Level With Respect to Traffic Volume and Time at Board Bazar - Day 3

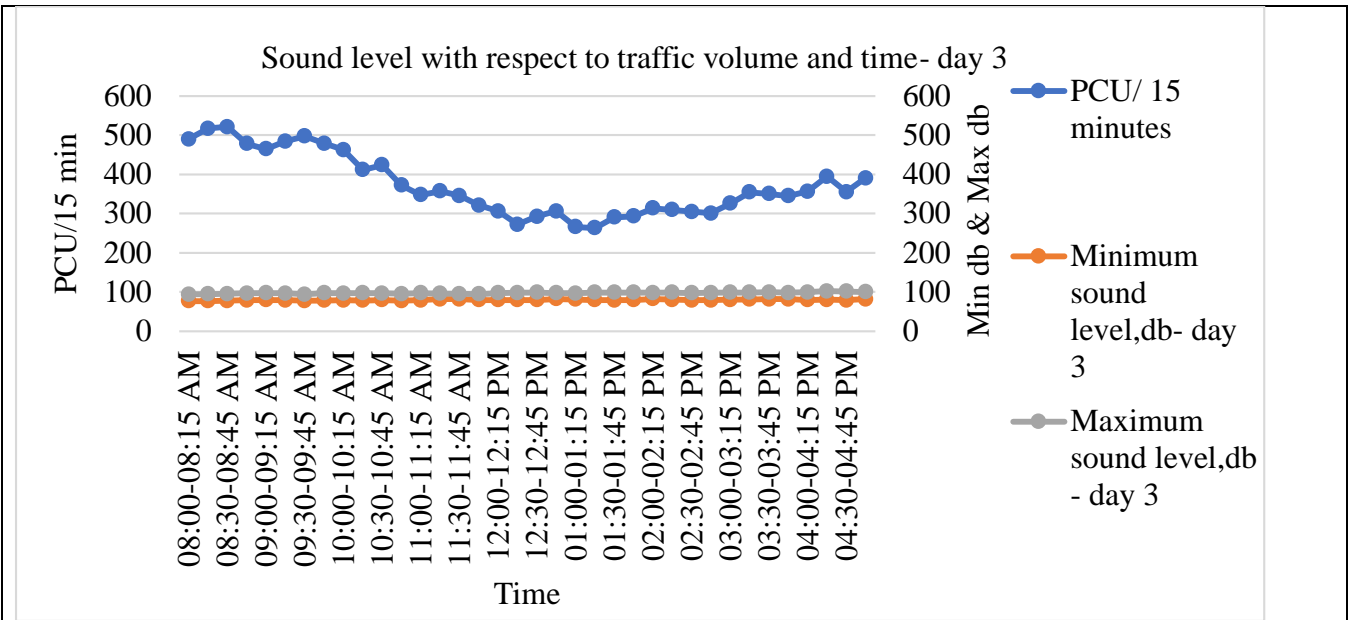


Figure 9: Variation of Sound Level With Respect to Traffic Volume and Time at Station Road - Day 1

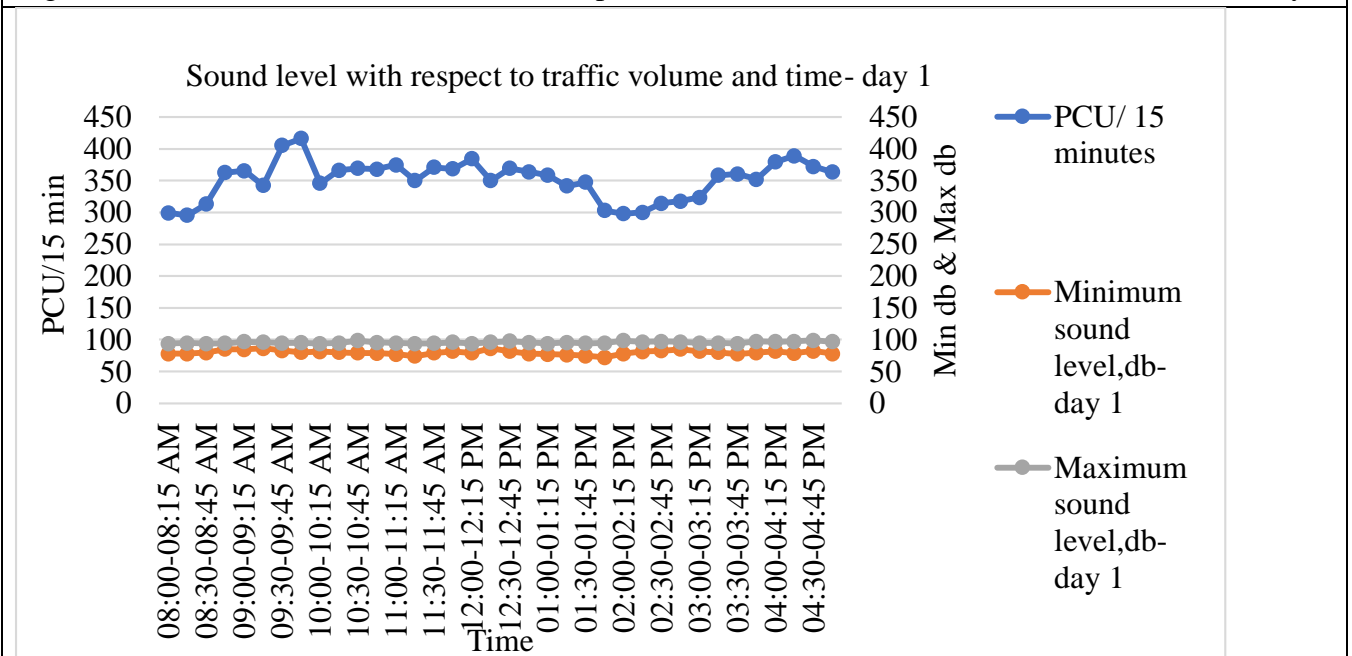


Figure 10: Variation of Sound Level With Respect to Traffic Volume and Time at Station Road – Day

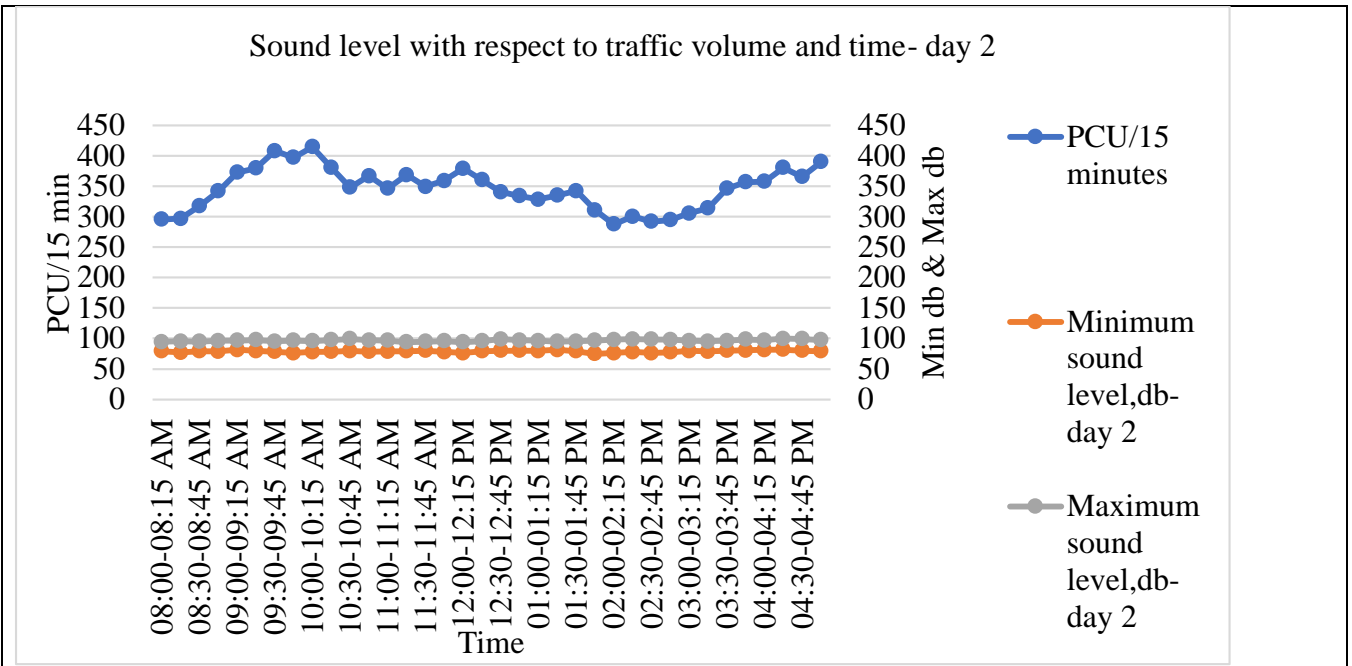
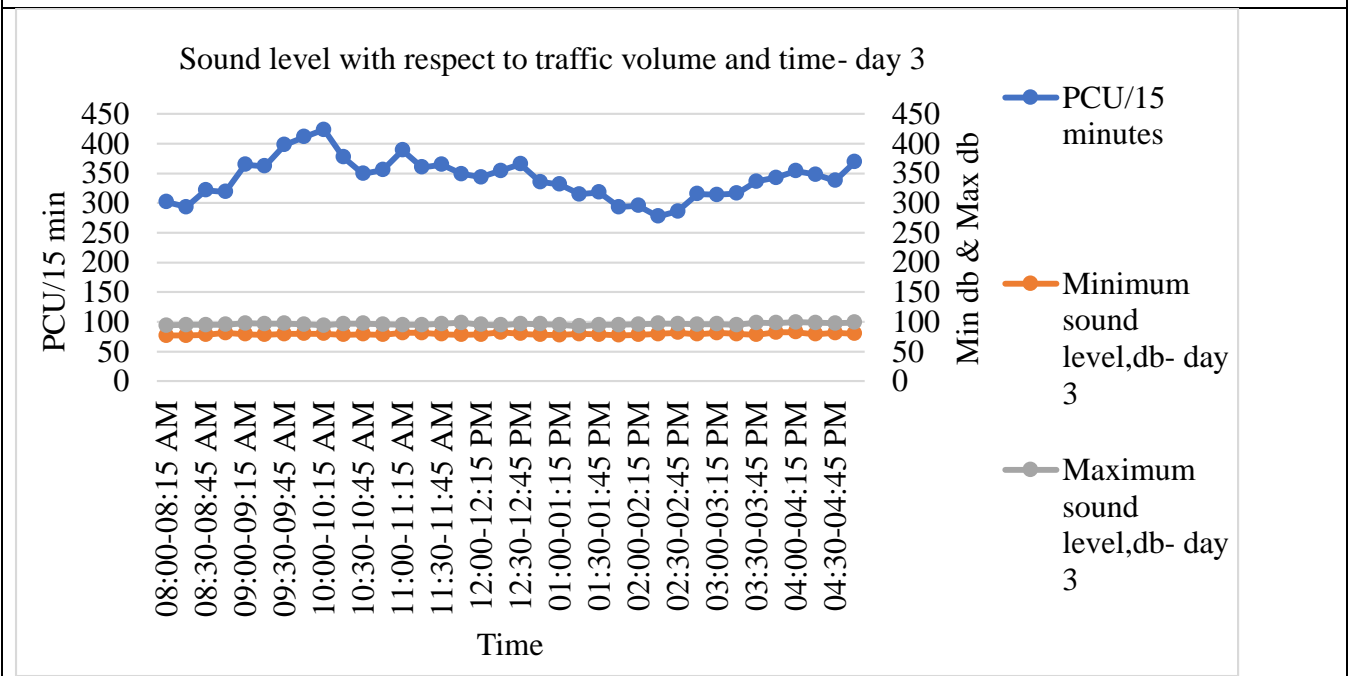


Figure 11: Variation of Sound Level With Respect to Traffic Volume and Time at Station Road - Day

3



In this research the noise level that generated from vehicles has counted. So along with the recording of sound level, the vehicle composition has also counted during the study at the same days. The percentage of different vehicle composition has presented in figure below for the same three points.

Figure 12: Percentage (%) of Vehicle Composition at Chandona Chowrasta at Different Days

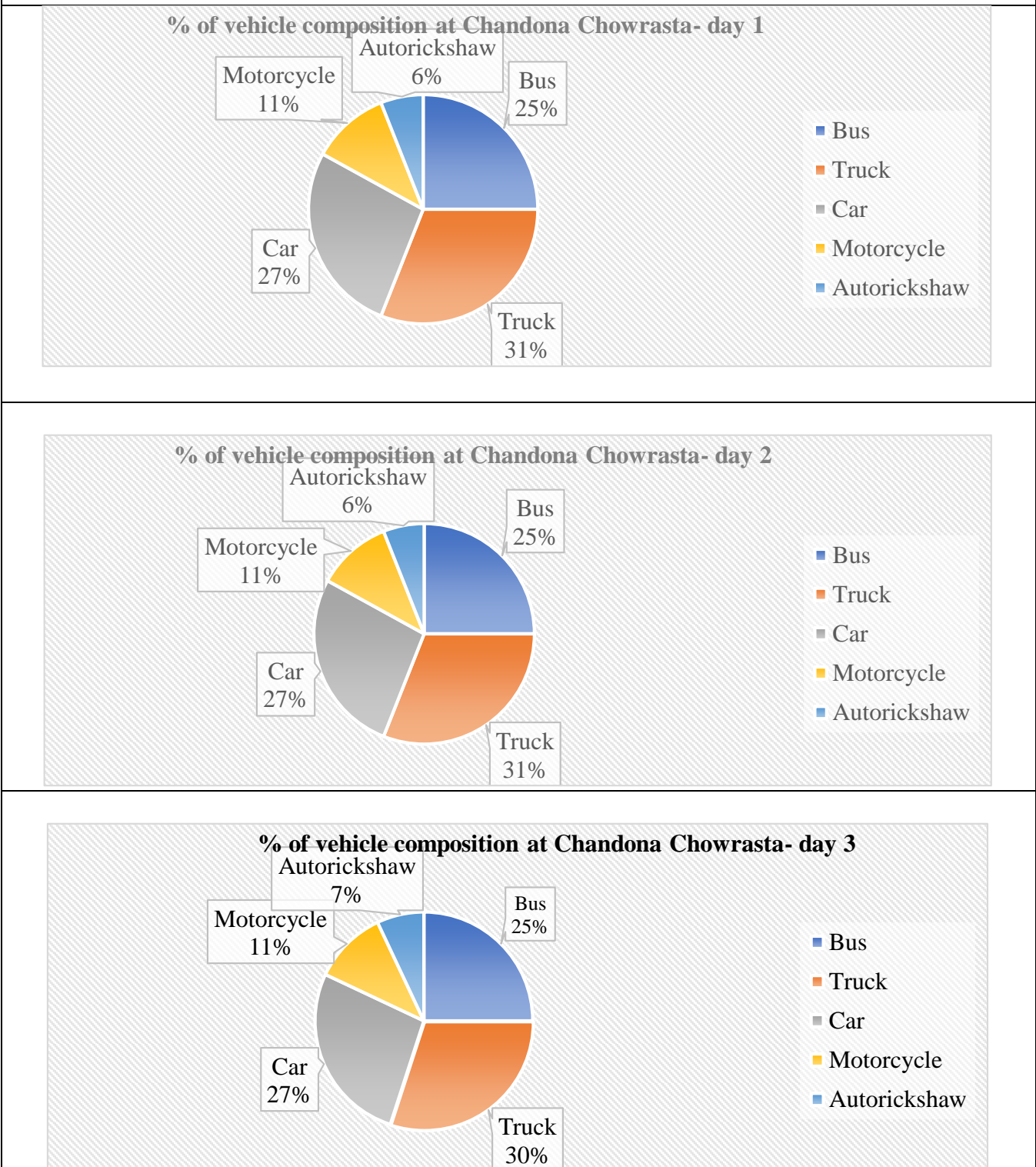
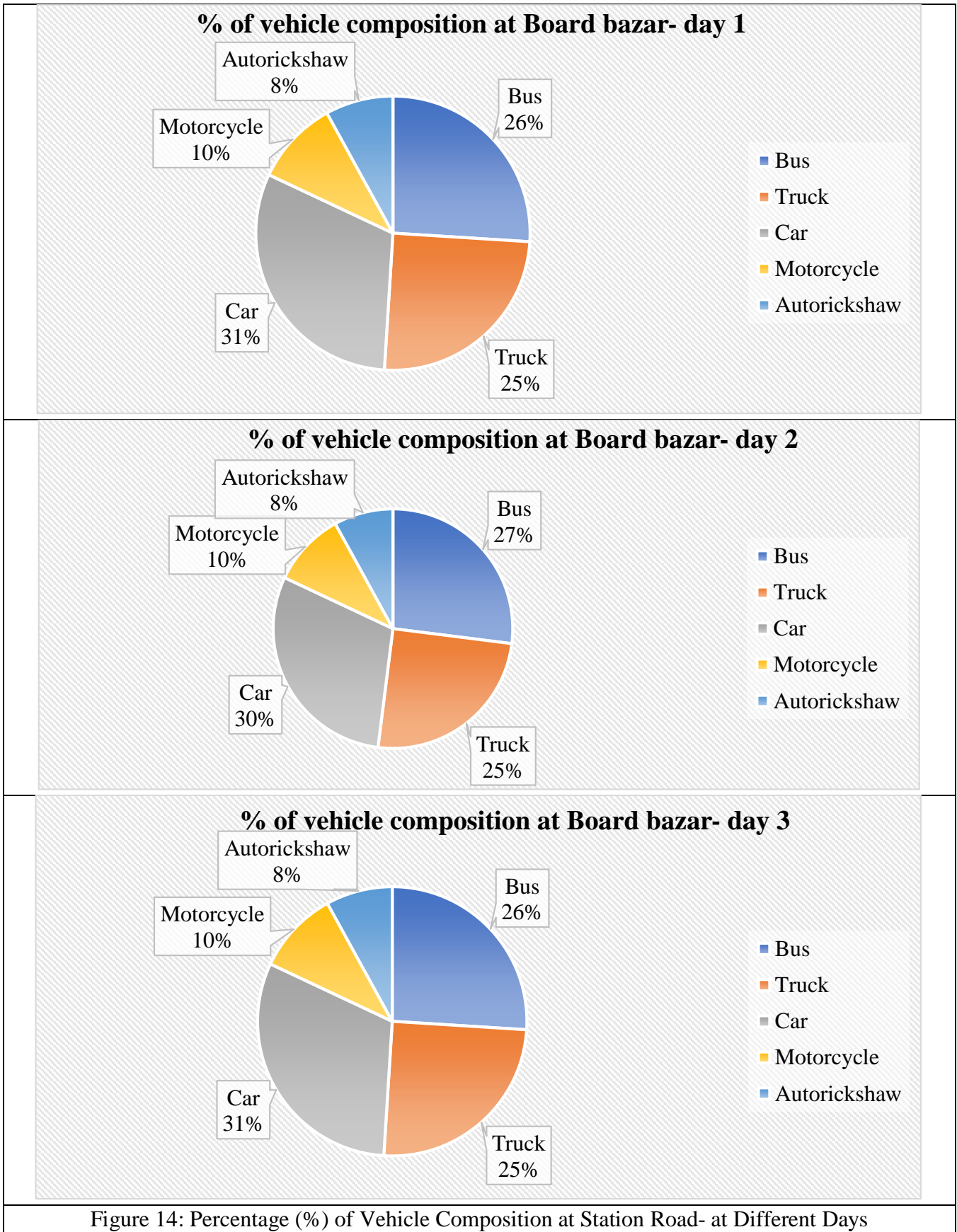
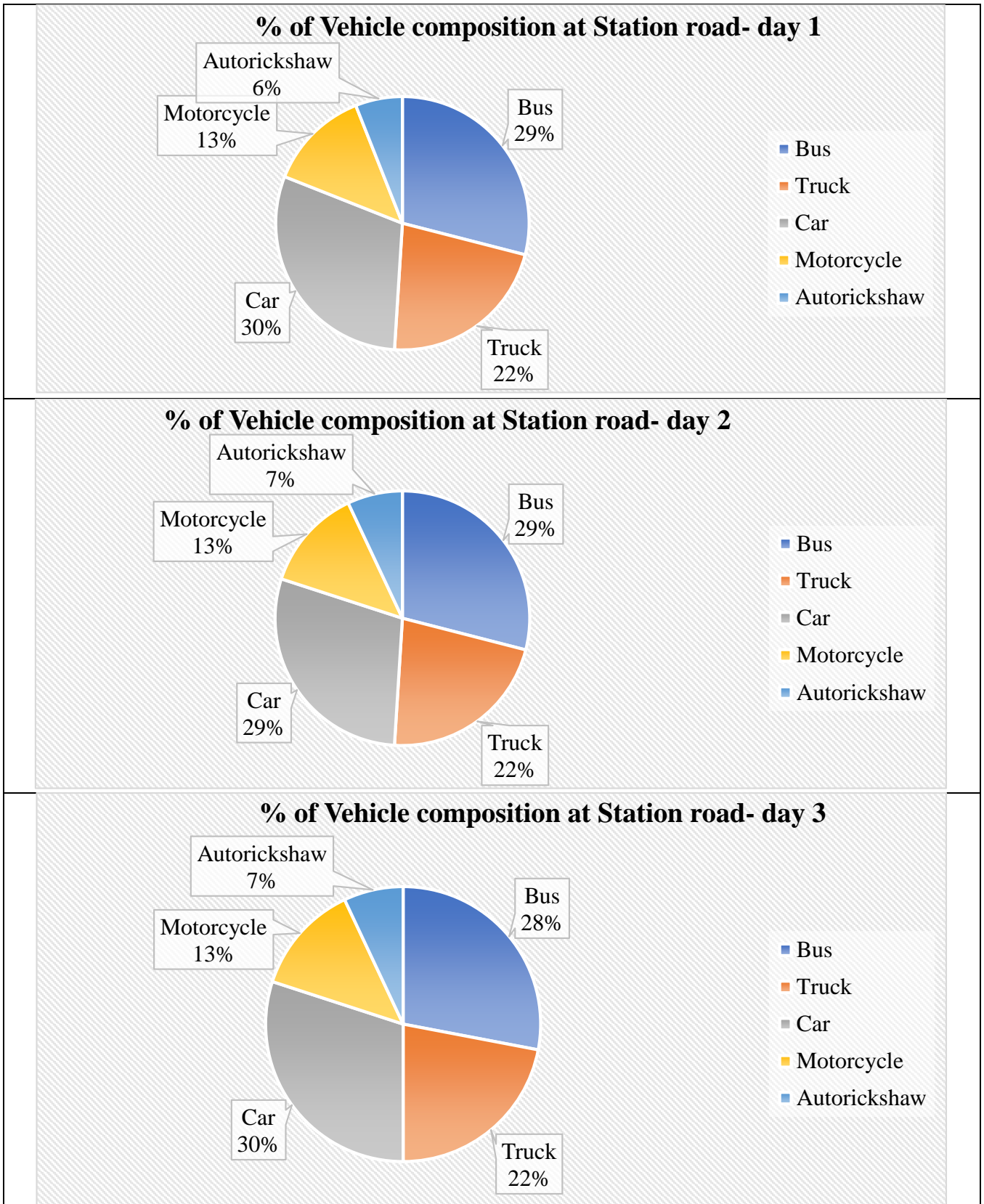


Figure 13: Percentage (%) of Vehicle Composition at Board Bazar at Different Days





6. Conclusions

The study shows that the noise level has no direct relationship with the traffic volume. At all the points the noise level is almost same at all the times in the studied three days. The minimum noise level found

71.9 dB at Station road and at that time the traffic volume was 348 PCU/15 min. The maximum noise level found 107.4 dB at Chandona Chowrasta and at the same time the traffic volume recorded was 298 PCU/15 min.

According to the World Health Organization (WHO), approximately 5.0% of the global population is affected by noise pollution. The recommended safe threshold for sound is 45 decibels (dB). Noise levels exceeding 65dB can lead to heart diseases, while levels exceeding 90dB may result in ulcers, hearing impairments, and alterations in the nervous system. Sound intensities exceeding 120dB can cause ear pain and a gradual deterioration of hearing capabilities.

The study areas were the mixed area. In Bangladesh, the Noise Pollution (Control) Rules 2006 says that the acceptable sound limit in the mixed areas 60dB for day and 50dB for night. The minimum noise level found in the study area is 71.9 dB which is higher than the recommended noise level and the inhabitants of this areas are highly susceptible to the noise problem related issues.

7. Acknowledgement

The authors extend their appreciation to their parents for their unwavering support and motivation. They also wish to express their gratitude to Prof. AFM Abdur Rauf and Engr. Rabindra Ranjan Saha, PEng. for their valuable guidance and inspiration.

References

1. Wikipedia contributors, "Gazipur," *Wikipedia, The Free Encyclopedia*, 14-Apr-2021. [Online]. Available: <https://en.wikipedia.org/w/index.php?title=Gazipur&oldid=1017721096>. [Accessed: 17-May-2021].
2. R. P. Sharma and S. K. Kacker, "Community Participation in Noise Control," in *Hearing Impairment*, Tokyo: Springer Japan, 2004, pp. 471–477.
3. R. E. Berg and J. A. Nathanson, "Noise pollution," *Encyclopedia Britannica*. 03-Nov-2020.
4. T. Carruthers, "Health effects of environmental noise pollution," *Org.au*, 30-Nov-2017. [Online]. Available: <https://www.science.org.au/curious/earth-environment/health-effects-environmental-noise-pollution>. [Accessed: 16-May-2021].
5. National Geographic Society, "Noise Pollution," *Nationalgeographic.org*, 16-Jul-2019. [Online]. Available: <https://www.nationalgeographic.org/encyclopedia/noise-pollution/>. [Accessed: 16-May-2021].
6. J. B. Alam, M. Jobair Bin Alam, M. M. Rahman, A. K. Dikshit, S. K. Khan, "Study on traffic noise level of Sylhet by multiple regression analysis associated with health hazards," *Iran. J. Environ. Health. Sci. Eng.*, pp. 71–78, 2006.
7. M. S. I. A. M. S. A. M. B. Latif, "A Study on Noise Pollution of Gazipur City Corporation," *J. Environ. Sci. & Natural Resources*, pp. 17–23, 2014.
8. K. Ahmed, *A Study on Noise Pollution in Dhaka City*. Bangladesh: Department of Environment, 1998.
9. A. Sharif, R. A. Khanam, M. M. Rahman, S. H. Rahman, M. Kamaruzzaman, and A. Ahmad, "Hearing status of the traffic police with or without use of sound protector in Dhaka metropolitan city," *J. Curr. Adv. Med. Res.*, vol. 4, no. 1, pp. 13–16, 2018.

10. *TheDailyStar.net*. [Online]. Available: <https://www.thedailystar.net/law-our-rights/news/looking-the-noise-pollution-control-rules-1847602>. [Accessed: 16-May-2021].
11. T. Aftab, F. Bashir, and T. Shafiq, “Road traffic noise pollution a hazard,” *Bangladesh j. sci. ind. res.*, vol. 42, no. 4, pp. 435–440, 1970.
12. “Gazipur City Corporation,” *Devex.com*. [Online]. Available: <https://www.devex.com/organizations/gazipur-city-corporation-126567>. [Accessed: 17-May-2021].
13. *Gov.bd*. [Online]. Available: <http://gcc.gov.bd/site/page/0f4394e7-0406-422e-9e43-f2ec6455ecb9/>. [Accessed: 17-May-2021].
14. P. A. E. Desk, “Gazipur Unnayan Kartripakkha Bill passed in parliament,” *Prothomalo.com*, 09-Sep-2020. [Online]. Available: <https://en.prothomalo.com/bangladesh/parliament/gazipur-unnayan-kartripakkha-bill-passed-in-parliament>. [Accessed: 17-May-2021].