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A Study of Noise Pollution across G.T. Road and Other Sensitive Places of Burdwan Town, West Bengal

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ABSTRACT

Burdwan town is located in the state of West Bengal serves as an administrative center for various economic activities. Bardhaman railway junction and Grand Trunk Road (NH-2) help this place to emerge as an urban space. Currently, it has been growing very fast as it has become the educational, medical and business hub of its surrounding districts. So, the mobility of goods and passengers is quite high and thus transportation plays a crucial role in the region. But the transportation system creates several problems in both the urban lifestyle and for the surrounding environment. Urban sprawl, unplanned road networks, and the rapid growth of private vehicle have complicated the situation more. A large number of students and people commute daily to fulfill their needs, resulting in high internal mobility of the town leading to congestion and frequent accidents. This research paper highlights the noise pollution of the town and the adverse impact of traffic on human health. The data sources are mainly primary in nature. Observation has given the concept regarding most congestion areas of the town. Field survey has been done at major road junctions by the sound meter to know the noise level. Various cartographic techniques have been used to represent noise related issues. On the basis of emerging problems transport authority has taken some big projects to reduce this problem which can lead the town towards a sustainable transport system.

KEYWORDS: Urban Sprawl, Road Network, Internal Mobility, Noise Pollution, Sustainable Transportation System.

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INTRODUCTION

At present, "Sound is an integrated part of the modern urban society"[1]. Noise pollution is considered as a major problem now a day in urban environments which affects human behavior, well-being, productivity, and health[2]. Noise is the third most hazardous type of pollution right after air and water pollutions[3]. The people who exposed to high-level noise may be affected in one or more of three ways: health, performance, and comfort[4]. "In India, the transportation sector is growing rapidly at more than 7.50% per annum and the number of vehicles on Indian roads is increasing at a very fast rate and this has lead to overcrowded roads and noise pollution" [5]. Recognizing noise pollution as an important issue, the European Commission adopted the European Noise Directive (END), which requires major cities to establish a noise management policy. The END defines environmental noise as *"unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic, and from sites of industrial activity"*[6]. Singh and Davar explained that "the noise is an unwanted sound that may cause some psychological and physical stress to the living and non-living objects exposed to it"[7]. The disproportional growth of personalized vehicles in Burdwan leads to road congestion, reduction in vehicles speed, increase in accidents, and emission of pollutants. As it is one of the main regional centers in West Bengal, a large number of surrounding people came to fulfill their various economic and social activities in this town. They depend on the transportation system of this town to meet their daily needs. "The increase in population and in a number of vehicles has led to the appearance of a new component in urban life: the noise"[8]. "Road traffic is one of the most widespread sources of noise"[9]. So the dramatic growth of the internal population, as well as daily commuters and immigration, make this town populous. This huge population and vehicles create noise pollution in the town. According to Regecová, V., & Kellerová, E. "Road traffic noise is frequent, unavoidable and continuously increasing environmental factor of modern life"[10]. Maschke et. All Said "Noise impact is treated as a stress inductor and in consequence, the role of noise plays a risk factor for human health"[11]. Due to the facilities of both economic and social activities in the region, the city changes its structure significantly during the past few years. Here are some causes of this phenomenon:

a. Migration of the people of surrounding districts to this town in search of jobs, educational and medical facilities and other industries.
b. Development of real estate sector for civil construction to build new residential complexes for the new inhabitants in the town.

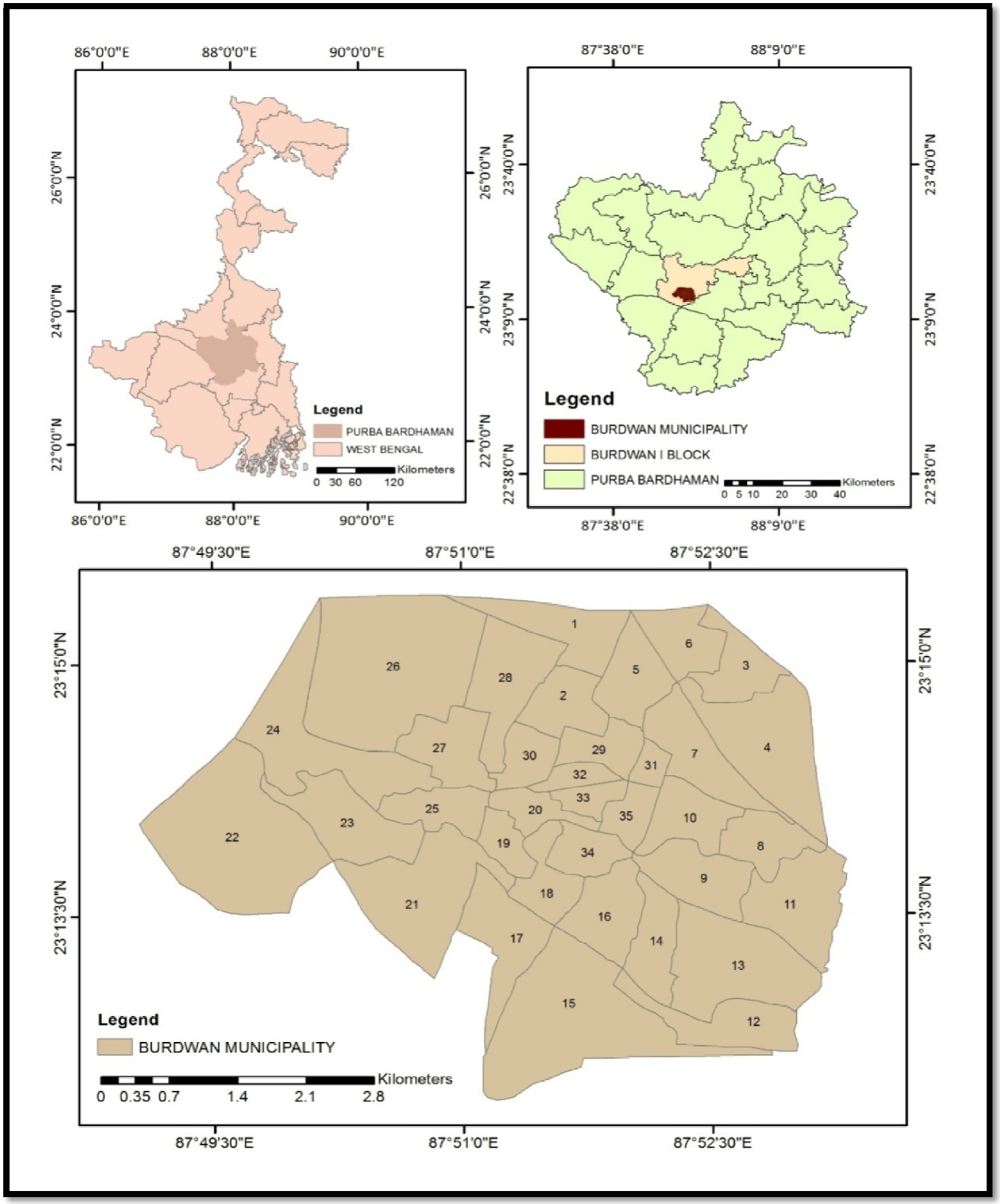
"Noise pollution is distinguished from other pollution types due to its source and diffusion characteristics which can adversely affect public health and environmental quality all year and day long, in an urban environment"[12]. "Noise intensities above 55 dB are high enough to cause

annoyance, aggressive behavior and sleep disturbance. Routine exposure to 65 dB can result in hypertension and to noise above 75 dB can lead to increased stress levels, increased heart rates and potential hearing loss"[13]. Sound is essential to our daily lives, but noise is not. Noise can be defined as sounds that are loud, annoying and harmful to the ear. It is a source of irritation and stress for many people and can even damage our hearing if it is loud enough. Kanjo describes environmental noise is unwanted sound from different sources, among road and rail traffic, construction work, aircraft, sports events, leisure parks, and homes, etc. Each has different characteristics and poses specific problems[9]. "Exposure to noise constitutes a health risk. There is sufficient scientific evidence that noise exposure can induce hearing impairment, hypertension, and ischemic heart disease, annoyance, sleep disturbance and decreased school performance"[14]. Noise pollution, in recent times, has been well recognized as one of the major factors that impact the quality of life in urban areas across the globe. Because of the rapid increase in Industrialization, urbanization and other communication and transport systems, noise pollution has reached a disturbing level over the years. General public prefers to live in places far away from the noisy urban environment[15]. The main aim is to show the noise levels of different time periods across the old G.T. Road which is passed through the middle of the town and the most vulnerable zone for noise pollution.

THE STUDY AREA

The Burdwan town has been considered as my study area. Burdwan is an old town of West Bengal in eastern India. It has been an average elevation of 40 meters (13ft). The city is situated a little less than 100 km north – West of metropolitan Kolkata on the Grand Trunk Road (NH-2) and Eastern Railway. It is the administrative headquarter of Purba Burdwan District situated in the Burdwan –I block. The entire administration is run by the urban local body (Burdwan Municipality) having an area of 23.04 km^2 and 35 wards are becoming the focal point of future urban expansion of West Bengal. The physical, as well as urban characteristics of this town, are blessed with high potentiality. The chief rivers are the Damodar and the Banka River. **Geographical location:** Burdwan town is located between 23° 12 ´N to 23° 15´N and 87° 49´E to 87 °53´E.

Map 1: Location map of Burdwan Municipality



Source: Prepared by the author, 2019

REVIEW OF LITERATURE

Passchier-Vermeer, W., & Passchier, W. F. (2000)[16] they all agree about the noise is a potential hazard to health, communication, and enjoyment of social life and is becoming an

unjustifiable interference and imposition upon human comfort, health, and quality of modem life. They carried out their study about traffic noise and found that it creates very high environmental noise. Based on their research, they suggested that there is an urgent need to set up noise standards to control noise pollution in the city. They have given some valuable suggestion to check noise pollution like planting trees on both sides of the road, ban of hydraulic horns and high sound producing vehicles, improvement of roads, traffic, and parking system, etc.

J. K. Datta, S. Sadhu, S. Gupta, R. Saha, N. K. Mondal and B. Mukhopadhyay (2006)[17] surveyed the noise level in the 17 different important locations in the urban area on the basis of zone specific. They measure the noise level with 30 minutes duration during some specified time around 6.00am, 10.00am, 1.00pm, 4.00pm, and 6.00pm. They observed that the main contributors to noise are transportation system, community, and religious activities. After collected and tabulated of data, they found that sound level lies within the range of 64-85dB or above in different time at different places in the town. They said that noise pollution adversely affects our environment as well as human beings and it causes both pathological and psychological disorders in human beings. They suggest that various technological methods and public awareness are very essential to check noise pollution in Burdwan town.

Murthy, V. K., Majumder, A. K., Khanal, S. N., & Subedi, D. P. (2007)[18] shows the annoyance reactions suffered by the citizens due to the urban noise. They have done the questionnaire survey of the urban population about environmental noise pollution. Their subjective analysis reflects an increase of the urban noise level which mainly generated by the neighborhood of the interviewed people.

D. Banerjee & S. K. Chakraborty & S. Bhattacharyya & A. Gangopadhyay (2008)[19] perform their study to investigate the road traffic noise and its impacts on the local community of Asansol city of West Bengal by monitoring and modeling. The attitudinal response of the local population regarding vehicular noise has been collected and presented in their paper. They find out the relationship between traffic noise and annoyance using correlation, linear and multiple linear regressions analysis. The main direct impacts that can be linked by the local population to traffic noise are Speech Interference during day time and Sleep Disturbance during night time.

Srimanta Gupta, Chitralekha Ghatak (2011)[20] focused on the traffic noise assessment and its negative health effect on roadside residents. Five different locations were selected along a National Highway of Burdwan having a day time Leq level of 60 to 89.5 dBA. Assessment of health effects among the 52 peoples of 10 families residing in the study areas for a long time was conducted through a questionnaire-based survey. Responses from the people were collected for analysis and the outcome revealed that 53%, 36%, 40% of people were suffered from headache, anxiety and high

blood pressure whereas 36%, 15%, 67% and 61% of people were suffered from hearing disability, cardiovascular diseases, irritability, and insomnia respectively. They have suggested the immediate intervention of the management and the system designers to make effective plans to curb the adverse effects of noise in order to ensure health, safety and to enhance efficiency and comfort of the residents of the area.

Riya Banerjee (2012)[21] try to analyze the environmental degradation in terms of pollution (air, noise, water, land, etc.) over the Bardhaman district. As the Burdwan town is not an industrial area; therefore, noise mainly arises from the transportation system. Various types of vehicle, automobile, cycle, rickshaw, etc. create tremendous noise at various points of the town. There is a close positive correlation between traffic congestion and noise level. She shows both the day time noise level (61.70-70.40 dB) and the night time noise level (58.78-61.33 dB) in Burdwan Municipality High School (Boys) have exceeded the corresponding tolerance limits stipulated i.e. (50 dB) and (40 dB) respectively. The important places like Burdwan Hospital, Kalibazar, Ranjganj Bazar, Barddhaman C.M.S. High School (Day) and Barddhaman Municipal High School (Boys), have crossed the specified limit of MOEF (Ministry of Environment and Forest, 2005) (>61.07 dB at day and >58.78 dB at night).

Naba Kumar Mondal (2013)[22] measured vehicle origin noise in 12 different locations during three different specified times i.e. 7:30-8:30 a.m., 1:30-2:30 p.m. and 4:00-5:00 p.m. to evaluate the noise pollution levels in Burdwan town. Out of these twelve locations the highest Leq value recorded at Golapbag, G.T. road bypass and Curzon gate due to road traffic noise. The most important source of community noise is road traffic at the studied sites. The noise levels of all the twelve places were found to be beyond the permissible limit (70 dB (A)) in his study during both morning and afternoon time. He carried out a questionnaire survey based on public health among 180 local inhabitants and the majority of the respondents (81%) irritated with air-horn along with other symptoms (headache 66%; mental stress 12%; annoyed 77%; and sleep loss 33%. So, the present status of noise pollution in the town potentially poses a severe health risk to the residents according to him.

Arnab Banerjee and Buddhadev Mukhopadhyay (2016)[23] assess the noise pollution and its trend on long term scale; they collected noise data from various places of the town by sound level meter with duration of 30 minutes/location during specified time like 6.00am, 10.00am, 1.00pm, 4.00pm, and 6.00pm during 2002, 2008 and 2014. Noise levels in all these zones differ significantly at their peak hours. The ranges are between 64-85dB or above at different time at different places. This study reveals the alarming situation of the increasing level of noise pollution in the town. They suggested that under this critical circumstance of the town, various technological methods should be adopted to control this pollution for acoustic welfare of the people as well as for the society.

STATEMENT OF THE PROBLEM

It has been observed that due to the rapid rate of urbanization as well as industrialization in the Burdwan town, the transportation system faces huge problems and for this phenomenon, noise pollution is coming up as an alarming issue due to heavy traffic. Due to disproportional growth of personalized vehicles and mixed type of traffic particularly leg-pulling rickshaw and eco-rickshaw, by-cycle, bus, truck, etc. collectively created several implications like road congestion, reduction in vehicle speed which leads to noise pollution. Moreover, Traffic noise is a serious problem in the central area of the town and there is an immense implication on human health for the effects of accommodating increasing traffic volumes. As it is one of the main regional centers in West Bengal, a large number of people came from various purposes on a daily basis. Internal growth of population, as well as daily commuters and immigration, makes this town populous. All these peoples depend on the internal transportation modes of the town. So, the internal mobility of the town is very high during the day time. However, parking difficulties are also most vulnerable problems in transport sector due to lack of adequate open space. Pick hour crowding of the public sector is a very serious problem for creating noise in the town.

AIMS AND OBJECTIVES OF THE STUDY: The present study is aimed at the following objectives:

- To examine the noise pollution in some vulnerable places and across the G.T. Road which crosses through almost the middle of the town and connects two bus stand of Burdwan town.
- To analyze the major problems related to noise pollution due to the transportation system in the town.
- To find out the adverse impacts of noise pollution on city life.

METHODOLOGY

The research has been performed in Burdwan town and consisted of two phases: a pilot survey, and the main survey. Initially, some literature has been reviewed to understand the various aspects of noise pollution. The data sources are both the primary and secondary by visiting the field. Observation has given the concept regarding most congestion areas and many other problematic things related to the transportation system. Values of noise levels have collected through the use of sound meter at the morning, noon, and evening across the old G.T. road and other vulnerable areas of the town. However, Noise levels have been measured at a different road junction where traffic congestion is high. After that, values are tabulated and analyzed to show the noise pollution along this road. To show the most vulnerable areas of the town a buffer map has prepared across the G.T. road between two bus stand. Various cartographic techniques such as bar diagram and line diagram

have been used to represent noise pollution. ARC - GIS 10.5 version software has been used for location map making. This study aimed at quantifying noise pollution from urban traffic in the town of Burdwan, West Bengal.

DATABASE: This study is mainly based on primary survey. All the data collected by the researcher. For other noise pollution issues, various secondary sources have been used.

Sources of primary data: The main primary sources of data are

- Observation of the study area and Taking photographs.
- Personal survey to get sound level at the major road conjunctions of the roads by Sound Meter.

Sources of secondary data: Secondary data and its information collected from a variety of sources such as-

- Transport related issues from the Burdwan Municipality
- For other information, various types of books, journals, research papers, records, newspapers, websites, etc. have been analyzed.

RESULTS AND DISCUSSION

Problems related to Noise Pollution: Noise pollution is distinguished from other pollution categories due to its source and diffusion characteristics, which can adversely affect public health and environmental quality in the urban environment. "There has been a considerable increase in noise from manmade sources during the last 100 years, which is now doubling after every ten years"[24]. "Major cities like Mumbai, Delhi, Kolkata, and Chennai are listed among the noisiest cities in India"[25]. "Many surveys addressing the noise pollution problems have been conducted for several cities of the world"[26 &27] and "have clearly shown the scale of discomfort that noise causes in people's lives"[28]. "At present, noise pollution is considered as one of the key problems of urban communities that have numerous hazards effects on the urban environment and may result in a lot of costs on the society"[29]. The operation of motor vehicles is one of the major problematic issues in the town. "Traffic noise is considered a major source of environmental noise pollution"[30]. Traffic noise is a serious problem along the G.T. Road and the central area of the town. As a result, it creates an adverse effect on human health. A rapidly increasing number of different types of vehicles make the roads of the town very congested during the pick hour. High level of noise affects human health and well-being physically, mentally and socially. It has been found that traffic noise is now a major environmental problem caused by traffic in urban areas which is caused by the high decibel of sound.

Table 1: "The noise level in decibel (db) at different stations in Burdwan town, 2015"

S. No.	Name of the stations	Latitude & Longitude (GPS Reading)	Noise Level (dB)			Average Noise Level (dB)
			9:00-11:00 (a.m.)	12:00-2:00 (p.m.)	3:00-5:00 (p.m.)	
1.	Sadarghat	23°13′33″N 87°5′25″E	81.5	79.1	86.5	82.36
2.	Vivekananda college more	23°13'36''N 87°51'24''E	96.4	84.7	89.6	90.23
3.	Birhata bridge	23°14'00''N 27°51'53''E	99.3	80.2	87.9	89.13
4.	Goda health center	23°3'14''N 87°50'50''E	71.3	67.4	76.7	71.80
5.	Curzon gate	23°14'25''N 87°52'03''E	111.9	87.9	90.8	96.86
6.	Tinkonia	23°14'48''N 87°52'09''E	96.4	88.5	93.6	98.36
7.	Bigbazar	23°14'48''N 87°51'46''E	86.0	84.2	91.8	87.33
8.	Rail station	23°15'1''N 87°52'5''E	101.9	100.2	101.0	101.03
9.	College more	23°15'8''N 87°51'54''E	84.3	95.0	89.6	89.64
10.	Golapbag	23°15'26''N 87°51'00''E	86.5	92.0	95.7	91.4
11.	Medical more	23°14'42''N 87°51'27''E	84.0	81.7	83.6	83.10
12.	Raj college	23°14'24''N 87°51'54''E	92.4	86.4	95.7	91.5
13.	Rajbati	23°14'43''N 87°51'6''E	77.9	75.4	75.3	76.2
14.	Rathtala	23°14'23''N 87°50'04''E	83.4	76.2	79.3	79.6
15.	Kalnagate	23°11'57''N 88°05'00''E	84.5	86.7	85.4	85.53

Source: Primary Survey, 2015.

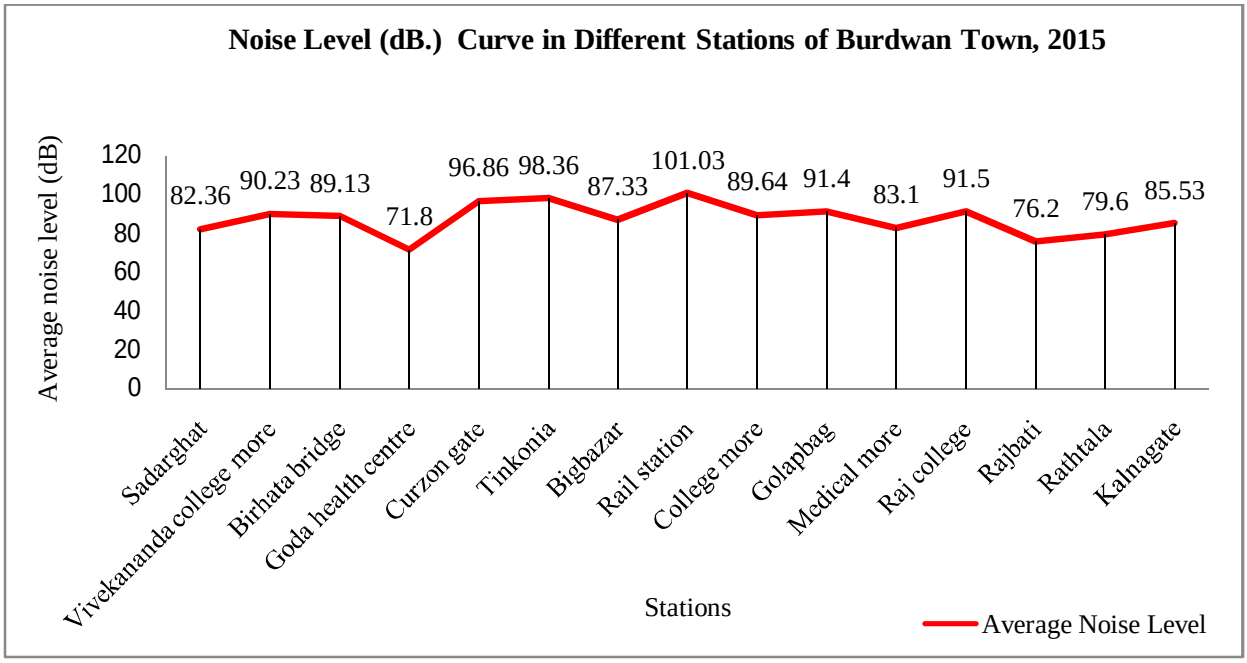


Figure 1 : Noise level curve in different stations of Burdwan town, 2015

In this figure, the noise levels of fifteen stations of Burdwan town presented by a line graph. From this graph, it has been shown that the lowest noise level is found in the area of Goda health center (71.8 dB). The main cause behind this is it is not near to old G.T. road and being a health sensitive area, a limited number of vehicles are allowed in this area. On the other hand, the maximum average noise value has been found at the rail station (101.03 dB). The main reason is Burdwan rail station is the main center of transportation and it is situated near to the old G.T. road. Other stations noise values ranges between 80-100 dB which is exceeding than the critical limit of the noise. So, the level of noise pollution is high along with these stations in the town.

Table 2: Noise levels (dB) near Burdwan Railway Station (2015)

Place	Time	Noise level (dB)	Average noise level (dB)
Burdwan rail station	7:00 a.m.	96.1	**101.32**
	9:00 a.m.	98.4	
	11:00 a.m.	106.2	
	1:00 p.m.	100.5	
	3:00 p.m.	98.4	
	5:00 p.m.	103.9	
	7:00 p.m.	105.7	

Source: Primary Survey, 2015.

Here, the sound level has been collected in a day by a two-hour interval of Burdwan rail station, as it is one of the crowded and busiest stations of the Burdwan town.

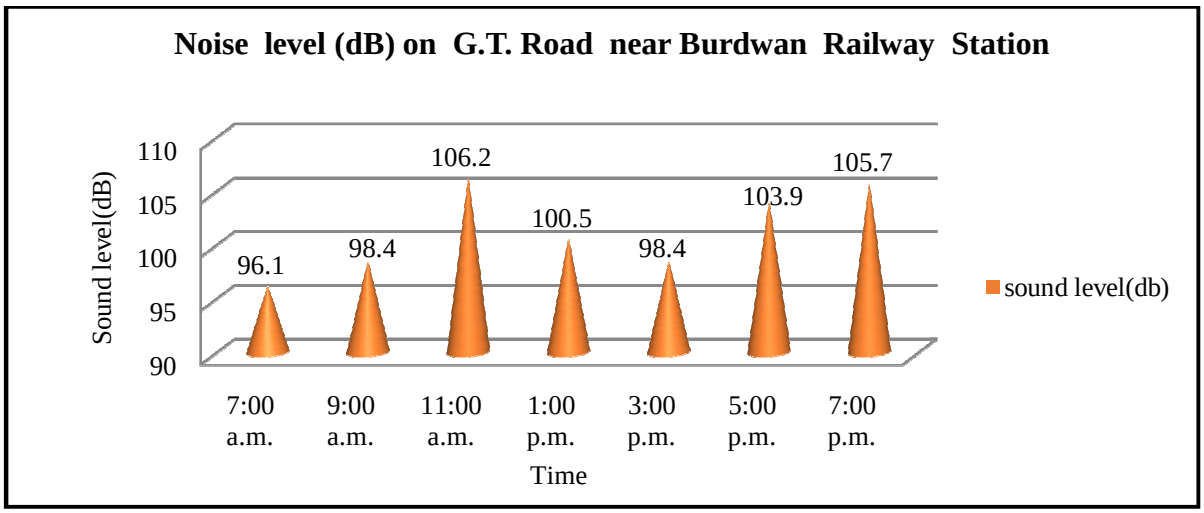


Figure 2: Noise level on G.T. Road near Burdwan Railway Station

From the above diagram we can understand that the maximum sound occur at Burdwan rail station at 11:00 a.m. (106.2 dB) and 7:00 p.m. (105.7 dB) because of in 9:00 am to 11:00 a.m.; it is office and school, college and university time and at 5:00 p.m. to 7:00 p.m.; it is the returning home time of these people. This station is a very high sound level is and its average sound level is 101.32 dB The range of the sound level throughout the day is 96.1 dB to 106.2 dB So, it has become of the most vulnerable area of the town where the noise level is always high due to traffic.

Here, the data has been collected at fifteen different stations for noise reading. From the above table, we understand that the highest noise level (104.9 dB) found in the Curzon gate, as it is the heart of the town and most of the markets, shopping mall, different offices are there. After Curzon gate rail station had a high noise level (103.43 dB) because of the rail junction and mass movement of people. The lowest noise level (72.9 dB) found in Goad health center; because it is situated at the margin of the town.

G.T.Road is the major and busiest road in Burdwan town. So the data has been taken the sound reading of major stations along G.T.Road; between two new bus stands i.e. Uttara and Purbasa. All the commuters of the town depend on this road. It is observed that the mixed type of transportation mode plays in this road, which leads to congestion and then noise pollution.

Table 3: The noise level (dB) at different stations in Burdwan town (2018)

S. No.	Name of the Stations	Latitude & longitude(G.P.S.reading)	Noise Level (dB)			Average Noise Level (dB)
			9-11 (a.m.)	12-2(p.m.)	3-5 (p.m.)	
1.	Sadarghat	23°13′33″N 87°5′25″E	90.4	85.2	86.0	87.2
2.	Vivekananda college more	23°13'36''N 87°51'24''E	98.5	92.4	84.0	91.63
3.	Birhata bridge	23°14'00''N 27°51'53''E	98.4	82.4	89.6	90.13
4.	Goda health center	23°3'14''N 87°50'50''E	70.5	68.7	79.5	72.9
5.	Curzon gate	23°14'25''N 87°52'03''E	106.5	102.4	105.8	104.9
6.	Tinkonia	23°14'48''N 87°52'09''E	86.1	84.5	80.7	83.77
7.	Bigbazar	23°14'48''N 87°51'46''E	89.4	85.6	93.4	89.47
8.	Rail station	23°15'1''N 87°52'5''E	102.4	106.4	101.5	103.43
9.	College more	23°15'8''N 87°51'54''E	86.5	85.3	87.9	86.57
10.	Golapbag	23°15'26''N 87°51'00''E	97.4	96.7	99.8	97.97
11.	Medical more	23°14'42''N 87°51'27''E	85.4	86.4	80.4	84.06
12.	Raj college	23°14'24''N 87°51'54''E	90.4	87.5	93.4	90.43
13.	Rajbati	23°14'43''N 87°51'6''E	80.4	76.5	83.4	80.1
14.	Rathtala	23°14'23''N 87°50'04''E	87.5	82.4	83.4	84.43
15.	Kalnagate	23°11'57''N 88°05'00''E	90.4	86.7	95.4	90.83

Source**:** Primary Survey, June 2018.

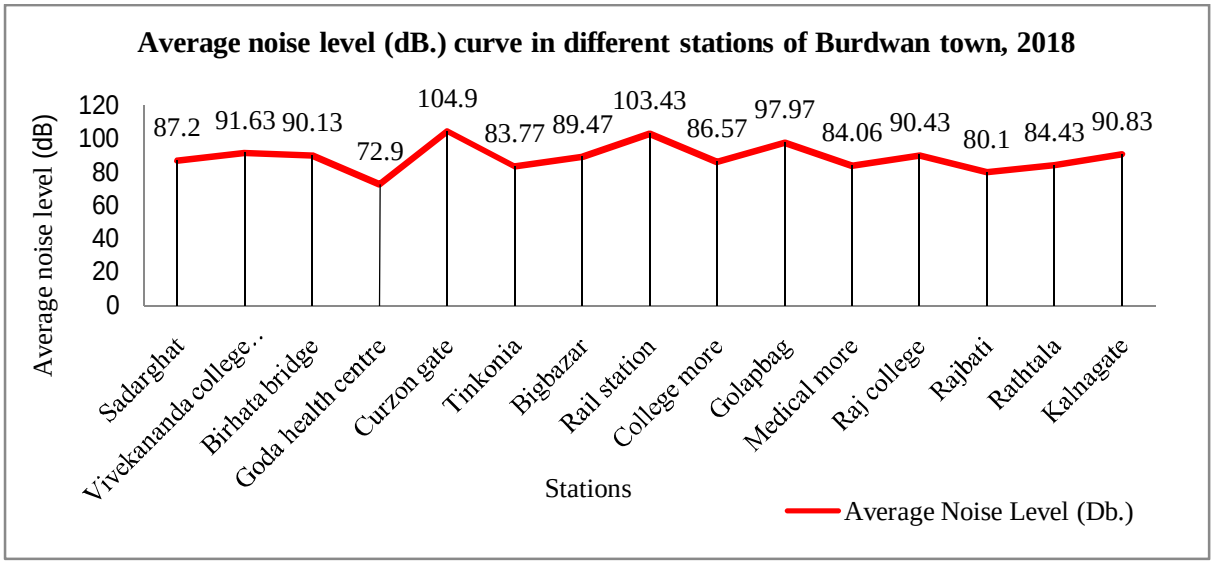


Figure 3: Average noise level curve in different stations of Burdwan town, 2018

Table 4: Sound level along G.T. Road between two new bus stands of the town

Name of the station	Noise level (dB)
Uttara Bus-stand	85.20
Golapbag	97.97
College more	86.57
Station	103.43
Tinkonia	83.77
Curzongate	104.90
Ranigunjmore(near G.T. Road)	107.10
Birhata bridge	90.13
Purbasa bus stand	103.10

Source: Primary survey, June 2018.

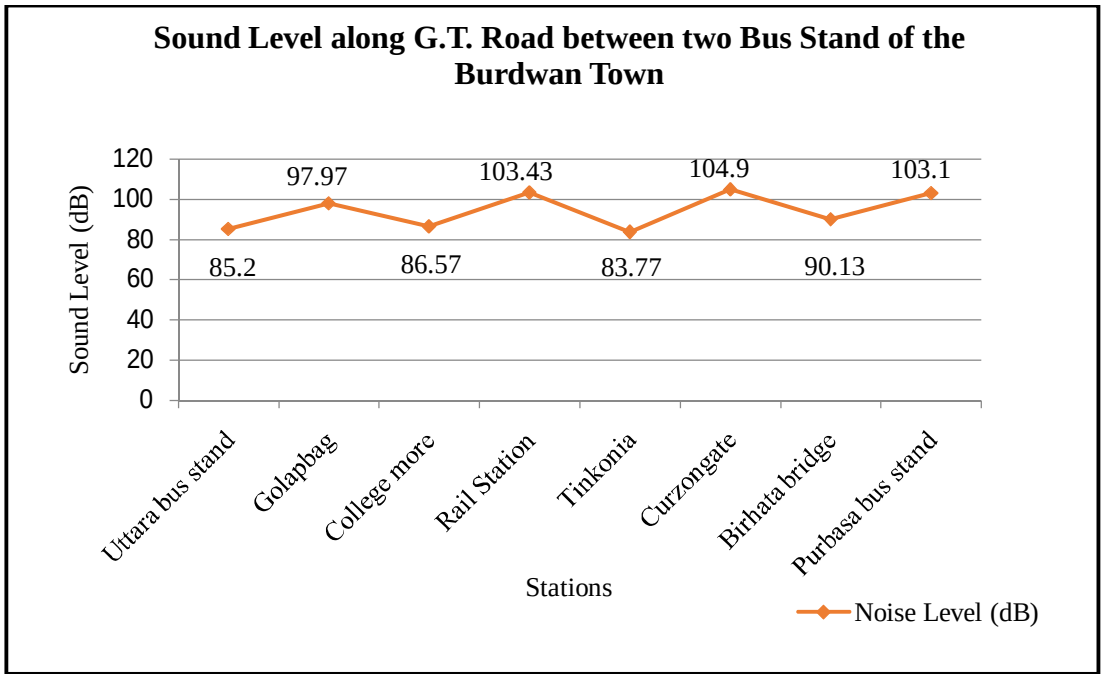
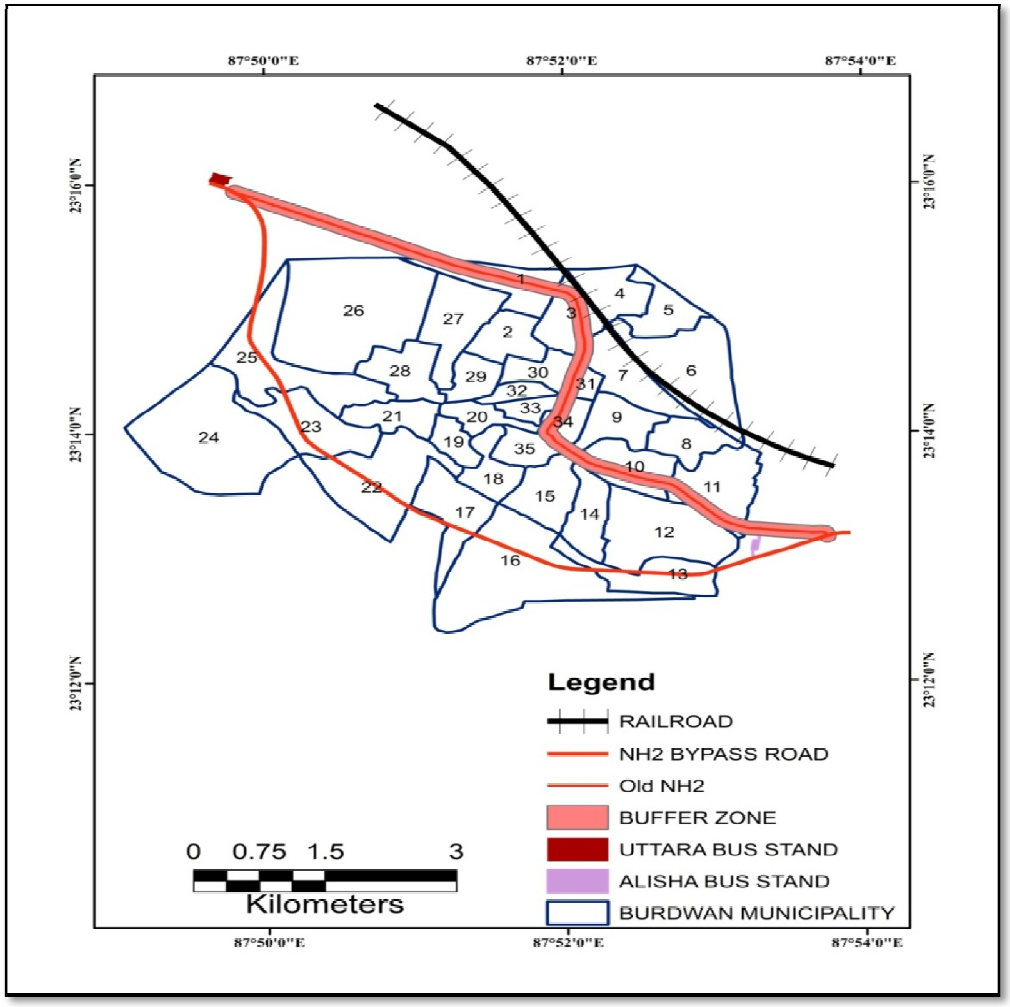


Figure 4: Sound level along G.T.Road between two bus stand of the Burdwan town

From the above diagram these all stations have a high sound level. Maximum sound level occurs in Ranignj more (107.10 dB), Curzon gate (104.90), rail station (103.43 dB) and Purbasa bus stand (103.10 dB) because these stations are very busy. The lowest sound found in Uttara bus stand (55.20 dB) and surprisingly it is within the sound limit (65 dB) because here only S.B.S.T.C. bus enter to the stand and line bus or town service bus are generally not entered in the stand. But now the situation has been changed. Now all the buses enter the bus stand. So the sound level also gradually increases.

Map 2: Noise Buffer Zone across the Old G.T. Road through the Town



Source: Prepared by the author, 2019

This map shows the most noise polluted zone of the town. The old G.T. road which almost flows through the middle of the town is mainly a commercial zone. There are numerous shops are situated along the opposite side of this road between two bus stand of the town. As a result, a huge number of people gather to buy various things. Moreover, the heavy pressure of traffic has been found along this road. Therefore, the level of noise is always high along this road.

A comparative map has been prepared of these fifteen stations by three years interval, i.e. 2015 and 2018.

Table 5: Comparative analysis of noise level (dB) at different places of Burdwan town in 2015 and 2018

S. No.	Stations	Average Noise Level (dB)	
		2015	2018
1	Sadarghat	82.36	87.2
2	Vivekananda college more	90.23	91.63
3	Birhata bridge	89.13	90.13
4	Goda health center	71.8	72.9
5	Curzon gate	96.86	104.9
6	Tinkonia	98.36	83.77
7	Bigbazar	87.33	89.47
8	Rail station	101.03	103.43
9	College more	89.64	86.57
10	Golapbag	91.4	97.97
11	Medical more	83.1	84.06
12	Raj college	91.5	90.43
13	Rajbati	76.2	80.1
14	Rathtala	79.6	84.43
15	Kalnagate	85.53	90.83

Source: Primary survey, 2015 and June 2018

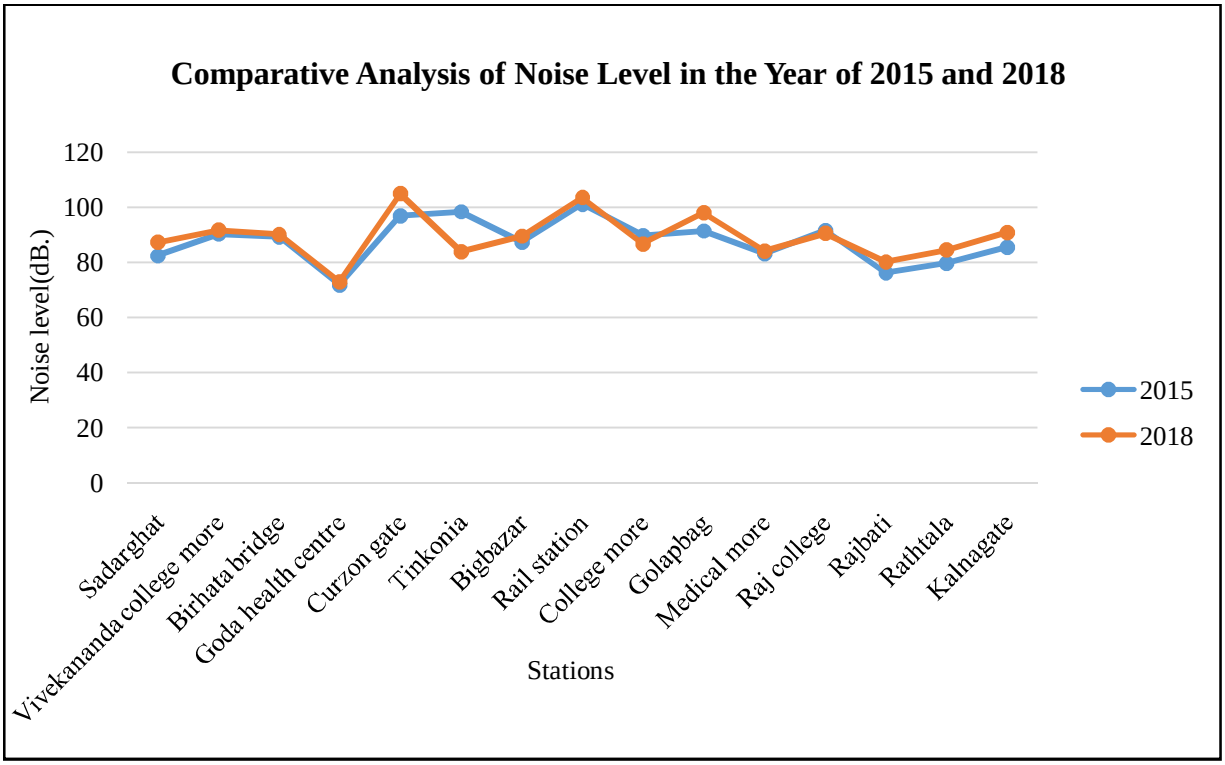


Figure 5: Comparative analysis of noise level of 2015 and 2018

From the above comparative map, we can easily interpret the result. Here the noise level curve from 2015 to 2018 frequently increases in nature for the growth and development of town and vehicles. The high noise level always found in the Curzon gate, Rail station, Raj College, Kalnagate because of the daily mass movement have been found and these places are the important nodes of the transport network of the town. The lower noise levels found in Goda health center, Medical more,

etc., as these are comparatively restricted zone and hospitals are there. So, the trend of noise pollution in the town is gradually increasing and the peoples in the town are affected by this.

Sources of Noise:

"Noise is one of the environmental problems that create discomforts in daily life. Noise pollution has become a major concern for communities living within the city"[31]. "The heterogeneous nature of traffic, continuously plying on roads, develops an interrupted traffic flow conditions which is responsible for traffic congestion and leads to noise pollution"[32]. "The road transport system consists of trucks, buses, mini-buses, cars, taxis, auto-rickshaws and bicycles, besides thousands of pedestrians"[33] and this phenomenon help to create noise. "Noises are caused by traffic, road works, factories, and also by people"[34]. "The chief sources of traffic noise are the motors and exhaust systems of automobiles. Besides this, noise can be generated by commercial activity, construction, religious activities, festivals, etc."[35]. However, "Major source of noise pollution in the transportation sector is frequent use of the horn in vehicles"[36]. Gangwar et al. described that "the increasing number of vehicles, musical instruments, small scale industries, and urbanization and human activities are the main sources of noise pollution"[37].

Possible implications for human health:

Noise is considered a serious threat to environmental health. "It has a significant impact on the quality of life"[38]. Road traffic is the main source of noise in urban areas, accounting for about 80% of total noise pollution. "In today's world, city noises represent a great problem everywhere and it is considered as the real nuisances for city dwellers. Noise contributes greatly to diminishing city dwellers' quality of life. In particular exposure of people to noise levels above 65 dB can cause severe health problems. Noise is a product of urbanization, industrialization, and motorization. Gradually it becomes an environmental nuisance that affects human health and wellbeing."[39]. "Traffic-related noise pollution accounts for nearly two-thirds of the total noise pollution in an urban area. The increasing rate of noise pollution is causing adverse impacts on human health such as insomnia, hearing loss, reducing efficiency, sexual impotency, cardiovascular, respiratory and neurological damages and shortening the period of human life"[40]. "Exposure to noise constitutes a health risk. There is sufficient scientific evidence that noise exposure can induce hearing impairment, hypertension, and ischemic heart disease, annoyance, sleep disturbance and decreased school performance"[41]. However, the effects of noise on human health and comfort are mainly divided into four categories depending on its duration and volume. They are – (i) **physical effects** such as permanently damaging to hearing. "A sudden loud noise can cause severe damage to the eardrum"[42]; (ii) **physiological effects**, such as increased blood pressure, irregularity of heart rhythms and ulcers;

(iii) **psychological effects**, such as going to sleep late, irritability and stress; "Noise is a problem especially for patients who need rest"[42] . "It can create a disturbance of people's rest, sleep, work, and communication"[43]. "The effects of excessive noise could be so severe that either there is a permanent loss of memory or a psychiatric disorder"[44], and (iv) **effects on work performance**, such as "reduction of productivity and misunderstanding what is heard"[45]. "Because of noise pollution, people cannot concentrate on their work. Hence they spent more time for completing the work and they experience exhaustion"[36]. Therefore, assessing the problem and programming actions for controlling noise and its adverse effects have become an issue of immediate concern for the community.

CONCLUSION

Recently, Burdwan town faces a lot of transportation problems and noise pollution is one of them. "Traffic noise is considered as one of the most intrusive types of noise pollution and has become an issue of immediate concern for public administrations and authorities" [46]. During the study, it was found that traffic noise is the major source of environmental noise pollution. It is found that the noise levels are exceeded to the permissible limit of 55 dB for all the stations. Maschke, et. All wrote that "the sound level category of 66–70 dB (A) is to be regarded as the threshold of health impairments"[11]. Most of the stations have the noise level ranging between 80-100 dB which is far greater than the critical limits. So, it is very essential to check the noise at its source area. "Noise abatement is less of a scientific problem but primarily a policy problem"[10]. "The establishment of a noise policy is very complicated"[47]. That's why "it cannot be tackled by institutions alone"[48] and "needs the participation of the general public"[49]. Therefore, it is suggested that the government should take necessary measures to check the noise levels in these areas. The government should be implemented the abatement policies properly in order to improve the present status of human health and environment of the Burdwan town.

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