



## Evaluating the noise pollution levels in Feni District Town, Bangladesh

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### Abstract

The aim of this study was to evaluate the noise pollution level in Feni District Town, Bangladesh. 7 different zones and 57 locations were selected in Feni District Town based on land use. The noise levels were determined by using a sound level meter (REED SD-4023) from January 01, 2021, to April 30, 2021. Multiple samples were collected from each sampling location. The noise level in every site has been recorded three times per day. The mean noise level and Leq of Feni District Town were determined to be 73.53 dBA and 90.41 dBA, respectively. The highest mean noise level was found in Mohipal (91.29 dBA), whereas the lowest mean noise level was discovered in Puraton Sunagaji Bus Stand (52.78 dBA). Furthermore, the mean noise level ranking of various land uses in Feni District Town was Road Intersection (79.69 dBA) > Residential Area (79.60 dBA) > Mixed Areas (75.99 dBA) > Commercial Area (73.53 dBA) > Industrial Area (72.40 dBA) > Silent Area (70.49 dBA) > Village Area (62.99 dBA). The noise level exceeded the standard limit in all locations. Consequently, people might have both physical and mental health problems, resulting in an unsustainable existence.

**Keywords:** Noise pollution, Feni District Town, land use, noise standard

### Introduction

The increase of harmful or unpleasant noises in the environment is referred to as noise pollution. These sounds can disrupt everyday activities, cause psychological stress, and lead to chronic health problems for both people and animals. Noise pollution in Feni City is escalating, attributable to the city's high population density and rapid development. Key causes encompass loudspeakers utilized at public events, construction noise, industrial noise, and severe traffic congestion. The incessant honking of vehicles, construction operations, and noise from markets and industries all add to a more disturbing environment. Persistent noise adversely affects individuals' quality of life and contributes to health issues like headaches, weariness, stress, hearing impairment, reduced occupational performance, and sleep disturbances [1, 2, 3]. Moreover, the neurological and auditory systems of urban residents, particularly youngsters, may be significantly compromised by extended exposure to elevated noise levels. Students who are stressed out seem to be more likely to do bad things like putting things off, smoking, drinking too much, and becoming addicted to drugs [4]. Motorized vehicles constitute the principal source of noise pollution in metropolitan environments [5].

The risk of illness due to noise and air pollution is significantly elevated for traffic police officers, particularly at crossroads with heavy vehicular traffic [6, 7, 8, 9, 10, 11, 12]. They frequently have auditory impairment and psychological issues [13, 14, 15, 16]. Noise pollution is a significant problem in the bustling metropolis, despite several governmental efforts to mitigate it. Coughing is a significant annoyance of the upper respiratory tract; hence, most traffic police officers use masks to shield themselves from the detrimental effects of air pollution. The majority of individuals remain oblivious to the effects of noise on their hearing, making this a slow process that requires time to manifest. The World Health Organization (WHO) systematically identified 25 risk variables contributing to the

worldwide disease burden associated with workplace noise [17].

Occupational hearing loss, either total or partial, may affect one or both ears due to employment-related factors [18]. It pertains to both traumatic auditory injury and noise-induced hearing loss (NIHL). Elevated levels of workplace noise remain a global issue. For instance, almost 30 million employees in the United States are exposed to dangerous noise levels [19]. Between 12% and 15% of the German workforce, or to 4 to 5 million persons, were subjected to noise levels deemed detrimental by the WHO [20].

Although nearly all professions entail exposure to noise, certain tasks—most notably piloting commercial airplanes, managing specialized materials, and conducting impact operations—are linked to very elevated noise levels. The professions most susceptible to noise-induced hearing loss (NIHL) include manufacturing, transportation, mining, construction, agriculture, and the military. The situation is improving in industrialized nations due to the implementation of preventative measures stemming from heightened public awareness of the risks. Research indicates that mean noise levels considerably exceed the occupational threshold advised in several industrialized nations, notwithstanding the limited data available for developing countries [21, 22, 23, 24].

Noise has both auditory and non-auditory health consequences. Various populations functioning in contexts characterized by loud, high-frequency noise have been extensively studied about these consequences [25, 26, 27, 28, 29]. The auditory impact of vehicular noise on traffic police personnel has not been examined in India [11]. The traffic police in Feni District Town are fundamentally in a same predicament. Withholding hearing protection devices from this set of workers may be one possible cause. Only at that point should traffic officers be concerned with understanding the health hazards. There has been minimal worry over the impact and possible harm of noise, as most individuals do not perceive it as a significant environmental

issue. Medical authorities assert that exposure to a sound level of 80 dBA for over 15 minutes may result in temporary or permanent hearing damage.

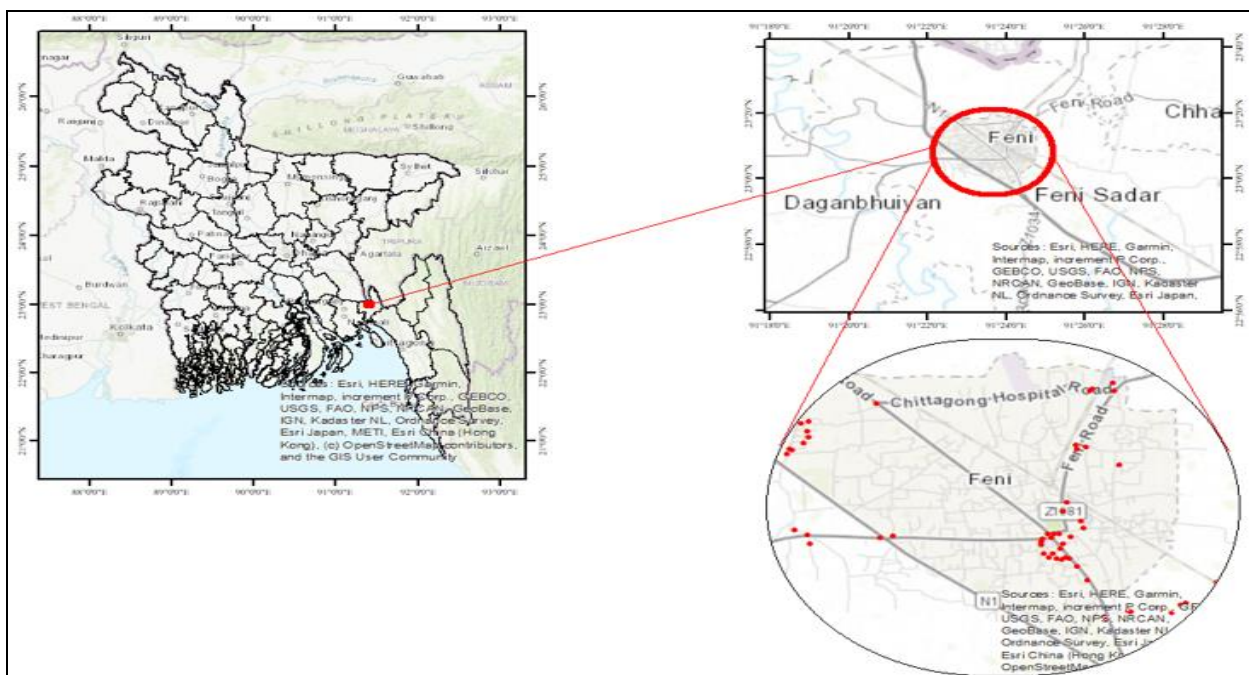
Noise pollution in our nation may currently appear to be a minor issue. Nevertheless, it is wise to consider the possibilities. Should the government neglect the public interest, noise issues may swiftly exacerbate [30]. This study assessed noise pollution levels across several places in Feni District Town to evaluate the overall severity of the issue, analyze the correlation between noise levels and diverse land uses, and explore the geographical distribution of noise levels throughout the city.

**Methodology**

**1. Study Area**

The investigation was conducted in Feni District Town

(Fig. 1). Factors for selecting Feni District Town encompass the town's substantial tourist influx, swift urban development, and the significant rise in industry and vehicle ownership in recent years. The ambient noise level in Feni District Town typically exceeds international norms by two to three times. This may adversely affect the environment and public health. This study focused on areas with very high traffic in the Feni District Town. A REED SD-4023, an instrument for quantifying ambient sound pressure levels, was employed to assess the noise levels in the specified region. We conducted the survey during the week. The city's most prominent junctions were the locations for the measurements. The noise level on the highway was assessed using A-weighting. 7 distinct zones and 57 sites were identified in Feni District Town based on land utilization.



**Fig. 1:** Study Area of Feni District Town.

**2. Data Collection**

Noise levels in Feni District Town had been measured with a sound level meter (REED SD-4023) from January 1, 2021, to April 30, 2021. Users may select a sample rate between 1 and 3,600 seconds and obtain triple range data with the SD series of sound level meters. Furthermore, users may swiftly and effortlessly generate an Excel file containing raw data from an SD card (up to 16 GB) by selecting a preferred sampling rate, without the need for software installation. An optional AC converter and tripod provide continuous long-term monitoring, while users can also acquire live measurement data using PC software.

**3. Measuring Procedure and Analysis**

The data recording function captures the most extreme values. To initiate the Data Record function, click the REC button once; a "REC" sign will appear on the screen. The "REC" indicator will be shown on the screen. 1. A "REC. MAX." indicator and the maximum amount will be shown with a single click of the REC button. To reset the maximum value, press and hold the Hold button once. The display will indicate a "REC." sign, and the memory operation will persist uninterrupted. Pressing the REC

button once again will display the minimum number along with the "REC. MIN." indication. To eliminate the minimum value, press and maintain the Hold Button once. The display will indicate a "REC." sign, and the memory function will operate continually. Pressing and holding the REC button for two seconds will terminate the memory recording feature. Subsequently, the display will revert to presenting the current reading. The data was taken from a roadside location at a height above 1.5 meters above ground level. During the measurement of the actual sound level, we ensured the removal of all noise filters. Data was collected every second for a total sample duration of 5 minutes per site. The data was stored on a microSD card. The acquired data were analyzed using IBM SPSS version 20 and Microsoft Excel version 2010. The data is presented in several tables and graphs compatible with many versions of ArcGIS 2.0. Using version 2.1, we produced a map illustrating the research area.

**Results and Discussion**

The mean noise level and Leq in Feni District Town were 73.53 dBA and 90.41 dBA, respectively

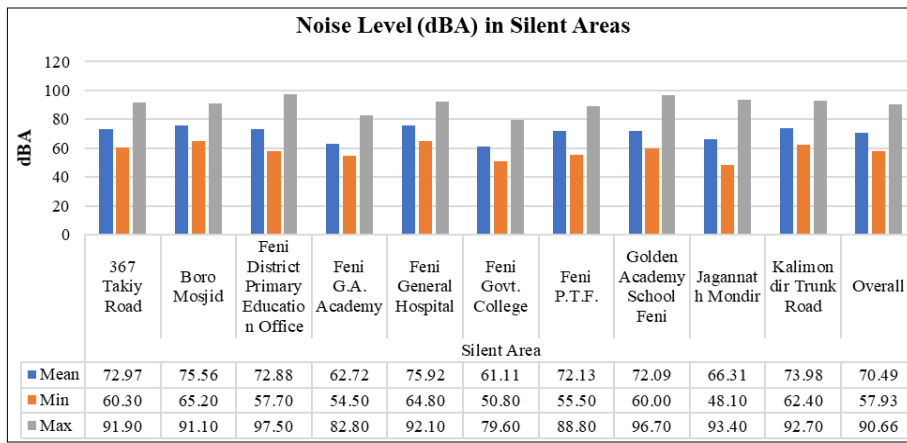


Fig. 2: Noise Level (dBA) in Silent Areas.

Analysis of data from 10 points in the silent area of Feni District Town shows that, as illustrated in Figure 2, the maximum noise recorded was 97.50 dBA at Feni District Primary Education Office, whereas the minimum noise level was recorded in the Jagannath Mondir, which was 48.10

dBA. Additionally, the mean noise level in the silent zone was found to be 70.49 dBA. The analysis also found that the highest mean noise level was 75.92 dBA in the Feni General Hospital, and the lowest mean noise level was 61.11 dBA in the area of Feni Govt. College.

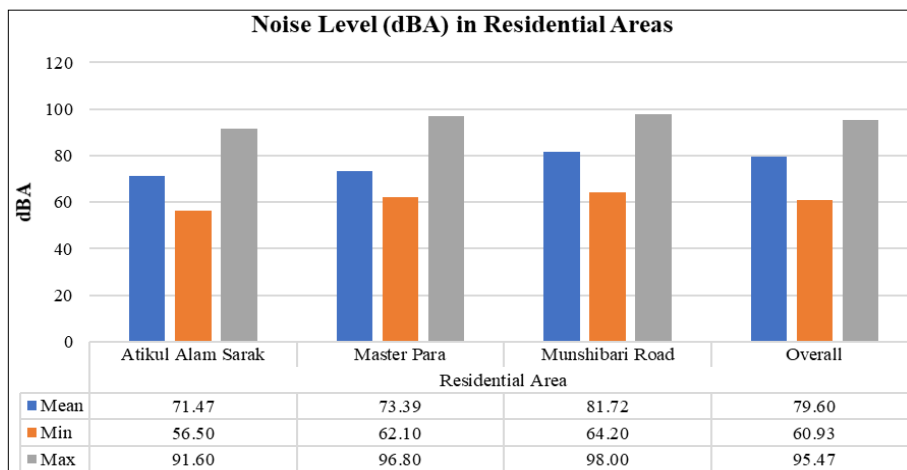


Fig. 3: Noise Level (dBA) in Residential Areas.

Figure 3 displays the noise levels at 3 locations in the residential area of Feni District Town. The mean noise level in the residential area was found to be 79.60 dBA. Furthermore, the maximum noise level was recorded at Munshibari Road, which was 98 dBA, and the minimum

noise level was recorded at Atikul Alam Sarak, which was 56.50 dBA. Moreover, the highest mean noise level was found to be 81.72 dBA in the Munshibari Road and the lowest mean noise level was 71.47 dBA in the Atikul Alam Sarak.

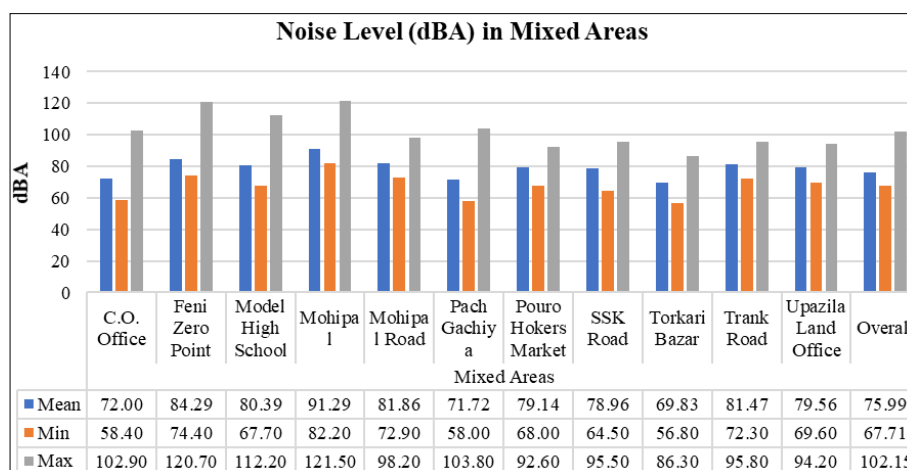


Fig. 4: Noise Level (dBA) in Mixed Areas.

Figure 4 illustrates the noise levels of 11 locations in the mixed areas of Feni District Town. The mean noise level in the mixed areas was recorded at 75.99 dBA. Furthermore, the maximum noise level was discovered to be 121.50 dBA at Mohipal and the minimum noise level was 56.80 dBA at

the Torkari Bazar area. Moreover, the highest mean noise level was reported at 91.29 dBA at Mohipal, whereas the lowest mean noise level was found to be 69.83 dBA at the Torkari Bazar area.

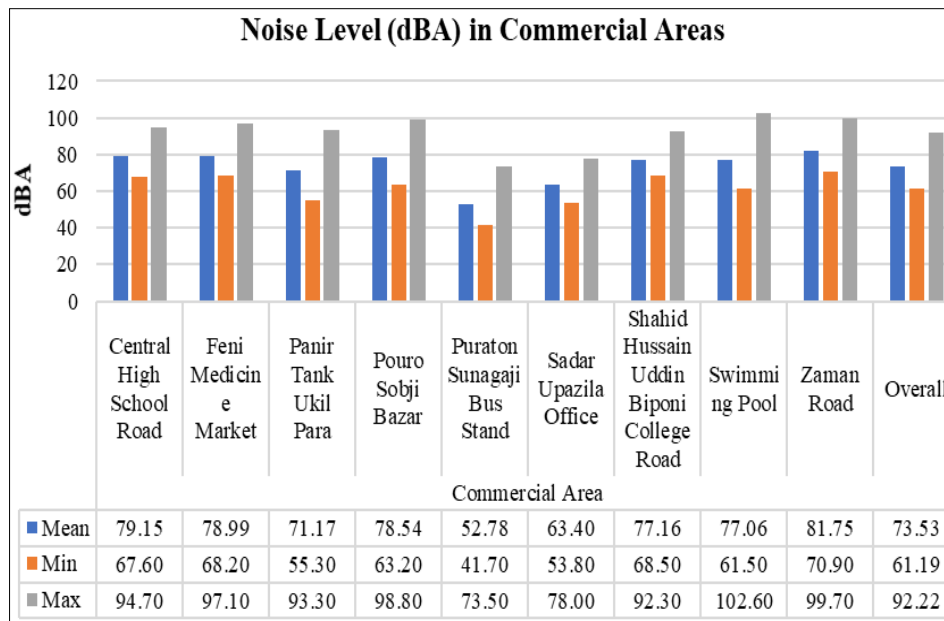


Fig. 5: Noise Level (dBA) in Commercial Areas.

Figure 5 explores the noise levels of 9 locations in the commercial area of Feni District Town. The mean noise level in the commercial area was found to be 73.53 dBA. The maximum noise level was found in Swimming Pool (102.60 dBA), while the minimum noise level was found in

Puraton Sunagaji Bus Stand (41.70 dBA). Moreover, the highest mean noise level was recorded in Zaman Road (81.75 dBA), whereas the lowest mean noise level was discovered in Puraton Sunagaji Bus Stand (52.78 dBA).

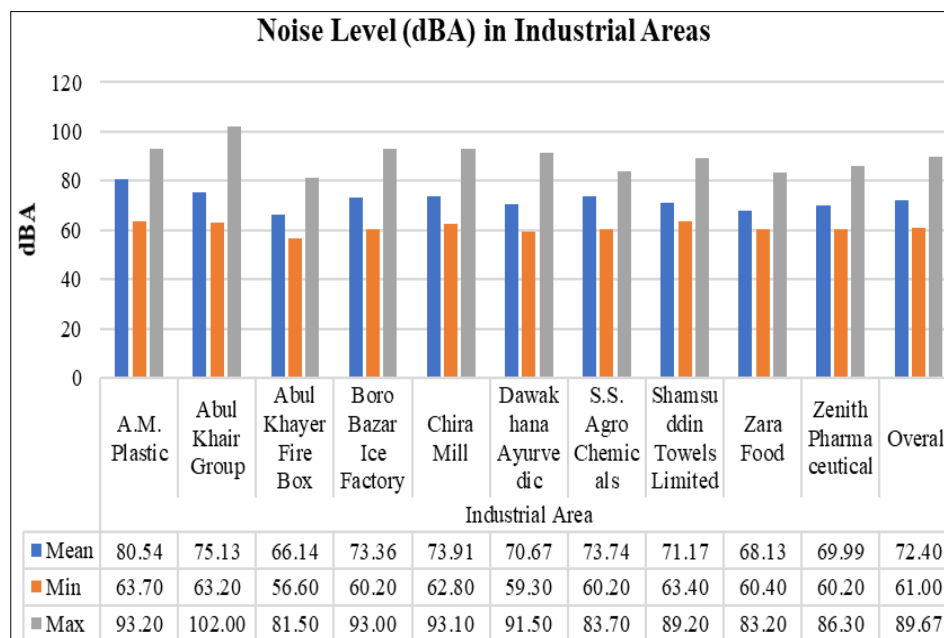


Fig. 6: Noise Level (dBA) in Industrial Areas.

Figure 6 depicts noise levels at 10 locations in the industrial area of Feni District Town. The mean noise level in the industrial area was found to be 72.40 dBA. Furthermore, the maximum noise level was found in Abul Khair Group (102 dBA) and the minimum noise level was identified in Abul

Khayer Fire Box (56.60 dBA). Moreover, the highest mean noise level was observed in A.M. Plastic (80.54 dBA) and the lowest mean noise level was observed in Abul Khayer Fire Box (66.14 dBA).

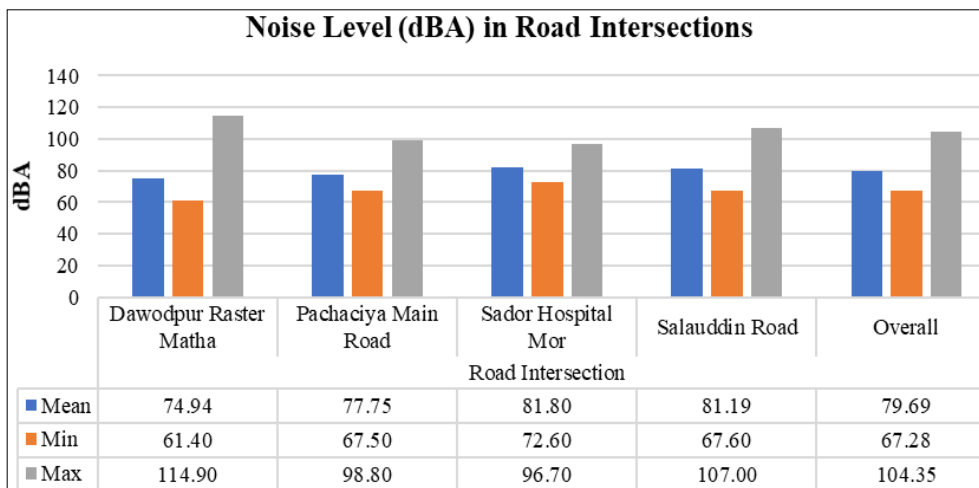


Fig. 7: Noise Level (dBA) in Road Intersections.

Figure 7 portrays the noise levels at 4 locations in the road intersection of Feni District Town. The mean noise level in the road intersection was found to be 79.69 dBA. Additionally, the maximum and minimum noise levels were recorded at Dawodpur Raster Matha (114.90 dBA and 61.40

dBA). Moreover, the highest mean noise level was found in Sador Hospital Mor (81.80 dBA), whereas the lowest mean noise level was found in Dawodpur Raster Matha (74.94 dBA).

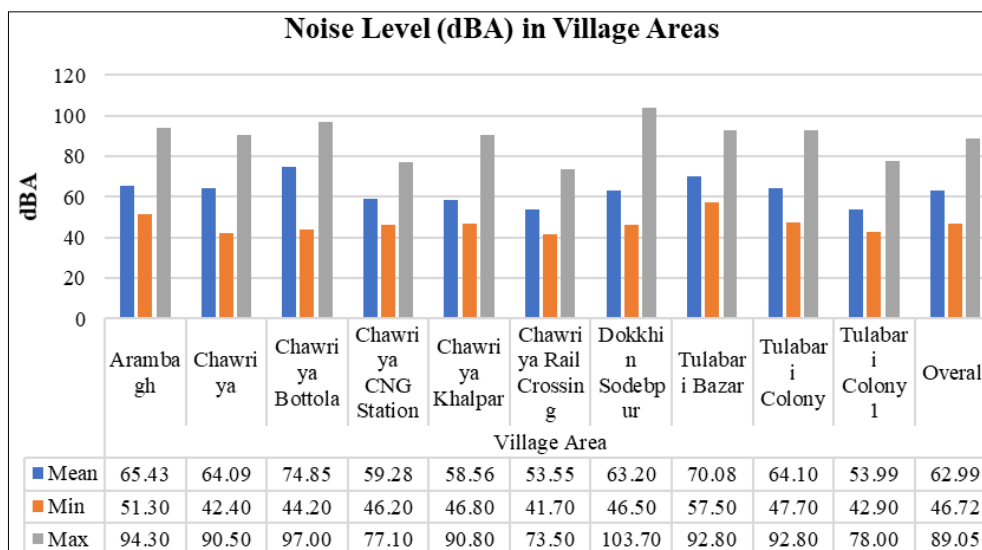


Fig. 8: Noise level (dba) in village areas.

Figure 8 denotes the noise levels at 10 locations in the village area of Feni District Town. The mean noise level in the village area was found to be 62.99 dBA. Furthermore, the maximum noise level was found in Dokkhin Sodebpur (103.70 dBA) and the minimum noise level was observed in

Chawriya Rail Crossing (41.70 dBA). Moreover, the highest mean noise level was reported in Chawriya Bottola (74.85 dBA), and the lowest mean noise level was found in Chawriya Rail Crossing (53.55 dBA).

Table 1: Dispersion Of Noise Quality In Different Land Use In Feni District Town

Land Use (N)	Mean	Minimum	Maximum	Standard Deviation	Range	Median
Silent Area (10)	70.49	48.10	97.50	8.34	49.40	71.20
Residential Area (3)	79.60	56.80	121.50	8.57	64.70	79.60
Mixed Areas (11)	75.99	56.50	98.00	7.91	41.50	76.50
Commercial Area (9)	73.53	41.70	102.60	10.71	60.90	75.20
Industrial Area (10)	72.40	56.60	102.00	7.36	45.40	71.80
Road Intersection (4)	79.69	61.40	114.90	7.04	53.50	79.50
Village Area (10)	62.99	41.70	103.70	11.36	62.00	62.00
Overall (57)	73.53	41.70	121.50	10.62	79.80	73.70

The subsequent Table 1 reveals the descriptive statistics for the noise quality in Feni District Town, which encompasses

7 different land uses. The highest noise level was recorded in the residential area (64.70 dBA), while the lowest level

was found in the mixed areas (41.50 dBA). From the comparison of mean, standard deviation, and coefficient of variation, it is observed that the highest variation was in the

residential area, which means that due to the neighborhood activities in this zone, the noise level varied a lot

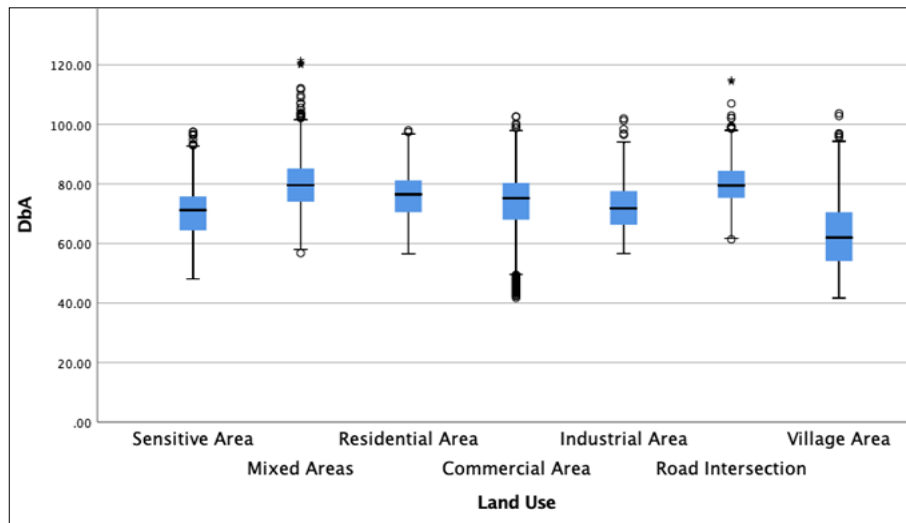


Fig. 9: Mean Noise Pollution in Feni District Town.

The whisker box plot (Figure 9) shows mean noise pollution in Feni District Town. A horizontal black line marks the median. The lower boundary of the box indicates the 25th percentile. The 75th percentile can be found at the box's

upper edge. The whisker represents the maximum (upper whisker) and minimum value (lower whisker). Points above the whiskers indicate outliers.

Table 2: Post-hoc Analysis

(I) Land Use	(J) Land Use	Mean Difference (I-J)	Standard Error	Sig.
Silent Area	Mixed Areas	-9.1095*	0.22382	0
	Residential Area	-5.4989*	0.32745	0
	Commercial Area	-3.0342*	0.23816	0
	Industrial Area	-1.9039*	0.23616	0
	Road Intersection	-9.1919*	0.29047	0
	Village Area	7.5063*	0.23708	0
Mixed Areas	Silent Area	9.1095*	0.22382	0
	Residential Area	3.6105*	0.3223	0
	Commercial Area	6.0753*	0.23102	0
	Industrial Area	7.2056*	0.22896	0
	Road Intersection	-0.0824	0.28464	0.772
	Village Area	16.6157*	0.22991	0
Residential Area	Silent Area	5.4989*	0.32745	0
	Mixed Areas	-3.6105*	0.3223	0
	Commercial Area	2.4648*	0.33242	0
	Industrial Area	3.5951*	0.33099	0
	Road Intersection	-3.6930*	0.37169	0
	Village Area	13.0052*	0.33165	0
Commercial Area	Silent Area	3.0342*	0.23816	0
	Mixed Areas	-6.0753*	0.23102	0
	Residential Area	-2.4648*	0.33242	0
	Industrial Area	1.1303*	0.24299	0
	Road Intersection	-6.1577*	0.29605	0
	Village Area	10.5405*	0.24389	0
Industrial Area	Silent Area	1.9039*	0.23616	0
	Mixed Areas	-7.2056*	0.22896	0
	Residential Area	-3.5951*	0.33099	0
	Commercial Area	-1.1303*	0.24299	0
	Road Intersection	-7.2880*	0.29444	0
	Village Area	9.4102*	0.24193	0
Road Intersection	Silent Area	9.1919*	0.29047	0
	Mixed Areas	0.0824	0.28464	0.772
	Residential Area	3.6930*	0.37169	0
	Commercial Area	6.1577*	0.29605	0
	Industrial Area	7.2880*	0.29444	0

	Village Area	16.6982*	0.29518	0
Village Area	Silent Area	-7.5063*	0.23708	0
	Mixed Areas	-16.6157*	0.22991	0
	Residential Area	-13.0052*	0.33165	0
	Commercial Area	-10.5405*	0.24389	0
	Industrial Area	-9.4102*	0.24193	0
	Road Intersection	-16.6982*	0.29518	0
* The mean difference is significant at the 0.05 level				

Table 2 represents significant differences in the 7 land uses observed in Feni District Town. The mean differences for particular land uses are notably lower, with a significance level of 0.05.

**Table 3:** Comply with Noise Standard <sup>[31]</sup>

Land Use (N)	Location	Standard (Day Time)	Within Standard (%)
Silent Area (10)	367 Takiy Road	50	0.00%
	Boro Masjid		0.00%
	Feni District Primary Education Office		0.00%
	Feni G.A. Academy		0.00%
	Feni General Hospital		0.00%
	Feni Govt. College		0.00%
	Feni P.T. F.		0.00%
	Golden Academy School Feni		0.00%
	Jagannath Mondir		100.00%
	Kalimondir Trunk Road		0.00%
Mean			10%
Residential Area (3)	Atikul Alam Sarak	55	0.00%
	Master Para		0.00%
	Munshibari Road		0.00%
Mean			0%
Mixed Areas (11)	C.O. Office	60	17.65%
	Feni Zero Point		0.00%
	Model High School		0.00%
	Mohipal		0.00%
	Mohipal Road		0.00%
	Pach Gachiya		47.06%
	Pouro Hokers Market		0.00%
	SSK Road		0.00%
	Torkari Bazar		35.29%
	Trank Road		0.00%
Upazila Land Office	0.00%		
Mean			9.09%
Commercial Area (9)	Central High School Road	70	1.04%
	Feni Medicine Market		0.78%
	Panir Tank Ukil Para		18.28%
	Pouro Sobji Bazar		31.46%
	Puraton Sunagaji Bus Stand		40.34%
	Sadar Upazila Office		1.04%
	Shahid Hussain Uddin Biponi College Road		1.04%
	Swimming Pool		5.09%
Zaman Road	0.00%		
Mean			11.01%
Industrial Area (10)	A.M. Plastic	75	1.93%
	Abul Khair Group		8.29%
	Abul Khayer Fire Box		13.82%
	Boro Bazar Ice Factory		10.89%
	Chira Mill		8.73%
	Dawakhana Ayurvedic		11.77%
	S.S. Agro Chemicals		6.36%
	Shamsuddin Towels Limited		12.33%
	Zara Food		12.38%
Zenith Pharmaceutical	13.49%		
Mean			10%
All Mean			9.28%

Table 3 demonstrates that 9.28% of areas in Feni District Town belonged to the noise standard among 5 land uses. 10% of the areas in the silent zone met the noise standard across 10 locations, none of the areas in the residential zone

met the noise standard in 3 locations, 9.09% of the areas in the mixed zone met the noise standard across 11 locations, 11.01% of the areas in the commercial zone met the noise standard across 9 locations, and 10% of the areas in the industrial zone met the noise standard across 10 locations.

Jagannath Mondir, located in the silent area, had 100% within the standard; however, no within-standard levels were found in the residential area. The mixed area's data represents the highest (47.06%) at Pach Gachiya, and in the commercial area, a 40.34% high intensity was found at Puraton Sunagaji Bus Stand. Furthermore, in the industrial area, Abul Khayer Fire Box had the highest, at 13.82% within the standard.

The present study examined 7 land uses, while only 5 were incorporated in the Sound Pollution (Control) Rules—2006. Hence, in the comparison of all land uses with noise standards, village areas and road intersections were excluded.

### Conclusions

Noise pollution levels are above national criteria in all regions assessed in this study, and this escalation substantially contributes to acute as well as chronic diseases. Consequently, individuals may have both physical and mental health problems, resulting in a diminished quality of life. The mean noise level and Leq of Feni District Town were measured at 73.53 dBA and 90.41 dBA, respectively. Feni District Town's mean noise level ranking was Road Intersection (79.69 dBA) > Residential Area (79.60 dBA) > Mixed Areas (75.99 dBA) > Commercial Area (73.53 dBA) > Industrial Area (72.40 dBA) > Silent Area (70.49 dBA) > Village Area (62.99 dBA). Nevertheless, the highest mean noise level was recorded at Mohipal (91.29 dBA), while the lowest mean noise level was observed at Puraton Sunagaji Bus Stand (52.78 dBA). The increasing volume of vehicles and visitors has been steadily elevating the noise levels in Feni District Town recently. Numerous individuals overlook the detrimental impacts of noise pollution on human health; hence, it is not regarded as a significant form of pollution. As in the remainder of Bangladesh, noise pollution is a considerable, although occasionally overlooked, concern in Feni. The government, media, and NGOs must unite to enhance living conditions in Bangladesh via coordinated initiatives. We cannot afford to squander time or resources in postponing measures to mitigate noise pollution, particularly when numerous sources are superfluous. Considering the severity and the human distress it causes, we can no longer disregard the issue of noise pollution. For the sake of our children's future and the health, well-being, and welfare of the public, we must all take this matter seriously and start addressing it. All individuals, including the general public, NGO personnel, and media representatives, bear the obligation to mitigate noise pollution. Further study is required to monitor noise pollution in Feni District Town to ensure sustainable living.

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