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Status of Sound Pollution and its Impact on Human Health in Dhading Besi

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Abstract

This study focuses on noise status and its impact on human health, in Neelakantha Municipality Ward No. 3 of Dhading Besi. Eleven sites in three different areas were selected as high-traffic, commercial, and residential zones of Dhading Besi. The Sound Level Meter was used to measure with the replicate of five times at each location between 6 am to 7 pm in January 2023 A.D. The health impact of people was assessed among 102 respondents of different categories residing in the study area through a questionnaire-based survey. Result shows that most of the location's average sound level was above the sound level standard prescribed by the Government of Nepal and World Health Organization. From this study, the average sound level of Dhading Besi was measured as 68 dB (A) and that of commercial, high-traffic, and residential areas were 70 dB (A), 72 dB (A), and 63 dB (A) respectively. Average noise was maximum at Puchar bazaar 76 dB (A) in a high-traffic area and the minimum was observed at Ganesh Marg 61 dB (A) in a residential area. In high-traffic areas, the sound level was maximum in the afternoon non-peak hour (12 pm to 1 pm) at 76 dB (A). At all three-area; high-traffic, commercial, and residential area minimum sound level was observed at morning non-peak hour time 66 dB (A), 61 dB (A), and 56 dB (A) respectively. The primary health impacts of noise, as revealed by the questionnaire survey, are headache, irritation, and stress, followed by communication issues, sleep disturbances, and hearing issues. This study serves as a baseline of noise level in the growing suburbs of Dhading and helps to develop the environmental policy for controlling noise pollution.

Keywords: *Equivalent noise, Health impact, High traffic, Noise pollution, Prescribed limit.*

Introduction

Noise is an undesirable sound released into the environment, disturbing human and animal existence (Olayinka, 2012). The word noise comes from the Latin word 'Nausea' which means an unpleasant sound that annoys, and this conveys the same idea that acoustical energy could have negative effects on human health (Singh & Davar, 2004). Noise is defined as 'undesirable sound' and is perceived as an environmental stressor and nuisance. Exposure to continuous noise to 85-90 dB (A), particularly over a lifetime in industry settings, can lead to progressive loss of hearing with an increase in the threshold of hearing sensitivity (Singh & Davar, 2004). Throughout the world, noise pollution has gained global recognition as a significant urban issue, greatly affecting the overall quality of life (Piccolo et al., 2005). A sound above 65 dB (A) can be a noise and a sound above 100 dB (A) can cause hearing loss (Paudel, 2016). The prevalence of excessive noise in the environment leads to the phenomenon of noise pollution. This form of pollution is predominantly attributed to advancements in technology. While industrialization, scientific progress, and technological innovations have undoubtedly contributed to societal development, they have also become primary factors responsible for environmental degradation. Noise pollution, specifically, has emerged as a critical concern affecting the well-being of urban populations across the globe (Ozer et al*.,* 2009).

World Health Organization has prescribed the safe sound level for an urban city as 45 dB (A). In the

United States, a sound level of 65dB (A) at daytime and 55 dB (A) at nighttime in streets is prescribed (Shendell et al., 2009). Anyone crossing the limit is regarded as causing noise pollution. Day by day, noise pollution is on the rise, largely driven by the ever-increasing number of vehicles on the roads. The cacophony on the streets arises from various sources, such as screeching tires, squealing brakes, vehicles reviving their engines, and incessant horn honking. Additionally, the noise emanating from radios, televisions, and music systems adds to the overall urban noise burden, especially when these devices are played at high volumes. Even within homes, modern appliances like washing machines, vacuum cleaners, and mixer grinders contribute to the problem by generating noise pollution. Overall, the combined effect of vehicular noise and various household and entertainment devices has become a concerning issue, negatively impacting the tranquility and quality of life in urban areas Top of ForBotto(Pal & Bhattacharya, 2012).

Noise is sensitive because it may cause hyperacusis which means a hearing disorder. Major sources of noise pollution are traffic noise, construction sites, industry, consort, and restaurants (Wokekoro, 2020). Noise has four different effects on human health and comfort, depending on its volume and duration. Physical, physiological, psychological, and work performance are four major effects caused by sound pollution (Hunashal & Patil, 2012).The International Program on Chemical Safety (WHO, 1999) defines an adverse effect of noise as a change in an organism's morphology and physiology that impairs its ability to function, impairs its ability to compensate for additional stress, or increases an organism's susceptibility to the harmful effects of other environmental influences.

Human activities such as industrialization, urbanization, transportation, and the celebration of a range of holiday activities are the primary causes of noise at the global level (Chauhan & Pande, 2010). Road traffic noise is a major source of noise in urban areas. It produces disturbance and has an impact on more people than any other source of noise. Many researchers have measured sound levels in high-traffic, Campuses, and residential areas. (Murthy et al., 2007) have recorded traffic sound levels in different areas of Kathmandu. During the last one and a half decades, a 70-100 dB (A) range of sound level was observed in urban Kathmandu roads. The level of sound varies in different areas due to variations in traffic flow, crowds of people, and other processes. Mechanical processes like waving, blasting, pressing, drilling, cutting; metal chipping and reverting, etc. can pose a significant occupational health hazard (Joshi et al.*,* 2003).

In addition to better legislation and administration, noise pollution calls for action at the local level. By impairing living, social, working, and learning settings and causing associated real (economic) and intangible (well-being) losses, urban noise pollution has immediate and cumulative negative health impacts. Seven categories of harmful health consequences of noise pollution on people have been identified by the World Health Organization. They are hearing impairments, interference with spoken communication, sleep disturbance, cardiovascular disturbance, disturbance in mental health, impaired task performance and negative social behavior and annoyance reactions. In Nepal's cities, as in other nations, noise pollution is a growing problem that has the potential to be harmful to human health (Chauhan et al., 2021).

In Nepal, most of the noise research focuses on observing noise levels in different areas of Kathmandu. Very few studies have been conducted outside the Kathmandu valley (Pant, 2012) and (Paudel, 2016) have done the research about the Noise pollution in Pokhara valley and Birendranagar municipality respectively, and how they affect locals. However, there are very limited studies in the growing suburbs outside Kathmandu Valley (Neupane & Chauhan, 2024).

To collect the baseline information on the current state of noise pollution and its effect to the inhabitants of ward no. 3 of Neelakantha municipality of Dhading Besi this study has been conducted. Dhading Besi is one of the growing cities as the number of people as well as vehicles movement are increasing. Being a headquarter, it has a variety of facilities *i.e.* education, commerce, job opportunity, transportation services, business, along with the health facility which increase the settlement density, crowd of people, and traffic flow so Dhading Besi was chosen for monitoring ambient noise. Further, study related to noise pollution is lacking in this area hence this study has been conducted with the following objectives (i) examine the current state of noise pollution in Dhading Besi; (ii) compare the levels of noise pollution currently in place; and (iii) investigate the effects of noise pollution on human health.

Materials and Methods

Study sites

The study was conducted in Neelanakatha Municipality Ward No. 03, Dhading Besi (Headquarter of Dhading district) between latitudes 27°50’45.442" to 27°58’1.27" north and between longitudes 84°58’49.98" to 84°56’41.37" east which lies in Bagmati Province of Nepal (Fig. 1). It covers

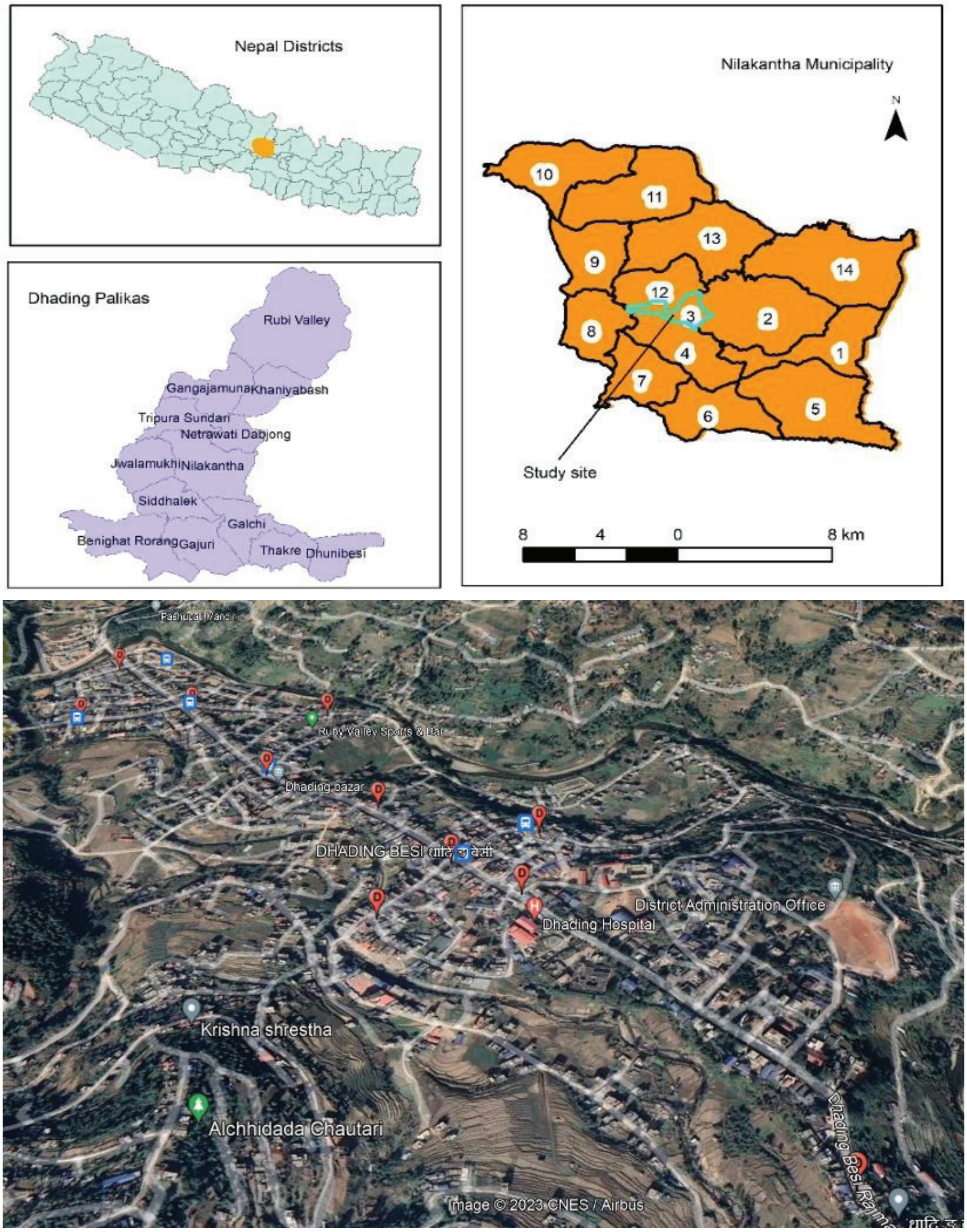

Figure 1: Map showing study site and sampling location

an area of 1926 km^2 and has a population of 12,004 (CBS, 2021).

The sampling sites for noise assessment were selected by first dividing the study area into three zones namely high-traffic, commercial, and residential zones and then selecting at least three sites from each zone. Altogether 11 sites were selected for noise measurement (table 1).

Table 1: Selected sites in different zones for noise level assessment in Dhading Besi

High-traffic	Commercial	Residential
Puchar Bazar	Mulchowk	Ganesh Marg
Bich Bazar	Shanta Bazar	Meelan Tole
Bus Park Chowk	Sugam Tole	Siran Bazar
	Campus Chowk	Tribeni Chowk

Methods

Noise measurement was done from 05/Jan/2023 to 16/Feb/2023 by using the Sound Level Meter of model SL-4012. Measurements were carried out on an A weighting scale in the selected high-traffic, commercial and residential areas at different hours of the normal working days. The sound level meter was placed above 0.5 m shoulder height and a distance of 1.5 m from the road. The sound level was measured for 10 minutes in every 30 seconds and carried 20 readings at each selected location and repeated that process five times a day during morning non-peak hour, morning peak hour, non-peak hour, evening peak hour, and evening non-peak hour) (table 2).The geographical coordinates of the measurement sites were taken using GPS.

Table 2: Time zone distributed for noise assessment

Hour	Time
Morning non-peak hour	6:00 am to 7:00 am
Morning peak hour	9:00 am to 10:00 am
Non-peak hour	12:00 pm to 1 pm
Evening peak hour	3:00 pm to 4:00 pm
Evening non-peak hour	6:00 pm to 7:00 pm

The measurements were carried out under normal atmospheric conditions, having no rainfall and no high wind speed. The maximum noise level (Lmax), the minimum noise level (Lmin), and the equivalent noise level (Leq) were employed as three different types of noise descriptors to evaluate noise pollution. For additional information on human health impact, a questionnaire survey was done among 102 people which was calculated through the sample size formula of Arkin and Colton (1963).

The noise level was measured by using an instrument called a sound level meter (SLM). This is an auto range, the sound level meter of mode SL-4012. It is used in acoustic measurement. The noise level will be measured in decibels (dB (A)). Decibel is used to express different quantities from each other and to measure noise level that gives more weight to the middle or high frequencies that the human ear perceives (Turkekul, 2012). Measurements from 30 to 130 dB (A) can be carried out with this instrument.

2.4 Data analysis

All the data collected were converted to MS Excel and analyzed in average, percentage, graphs, and pie charts. The questionnaire on human health was analyzed in a quantitative manner (graphs, percentages). The Leq was calculated by using the following formula:

$$Leq = 10\log_{10} [1/n\ (10^{L1/10} + 10^{L2/10} + 10^{L3/10} + ...+ 10^{Ln/10})]$$

Where $L_1, L_2, L_3, ..., Ln$ are the equivalent noise level readings given by the sound level reading at each interval, and n is the number of recordings for the given duration of time. Other descriptors, such as Lmax, Lmin were also computed.

Results and Discussion

Status of Noise level in Dhading Besi

The overall status of noise level in all the studied zones of Dhading Besi has been presented in Fig .2 below. Among 11 locations, the average noise level was highest in Puchar Bazar (75 dB (A)) and lowest at Ganesh Marg (59 dB (A)).

The average noise level ranged from 68 dB (A) to 75 dB (A) in high-traffic, 59 dB (A) to 65 dB (A) in residential and 69 dB (A) to 71 dB (A) in commercial zone as depicted in Fig. 2. The maximum (Lmax), minimum (Lmin) and average noise level for the three zones followed the order high traffic areas > commercial areas > residential areas. The average sound was measured as 72 dB (A), 70 dB (A), and 63.6 dB (A) in high-traffic, commercial, and residential zones, respectively. A similar pattern of noise was recorded by Chauhan and Bhatta (2019) and Chauhan et al. (2021). The maximum equivalent sound level was measured as 85.23 dB(A), whereas the minimum sound level was observed as 77.81 dB(A) in different wards of Kathmandu metropolitan city (Maharjan et al., 2021). Similarly, studies at different locations of Kathmandu inside the Ring Road, maximum noise (Lmax) was observed as 101.7 dB (A) at Chabahil while minimum was observed as 48.1 dB (A) to 68.0 dB (A) which could be due to the free flow of vehicles (Singh et al., 2022). Also, in Ahvaz city of Iran maximum sound level was observed to be 95.46 dB (A) and the minimum sound level as 57.25 dB (A) (Geravandi et al*.,* 2015). The authors have mentioned that Ahvaz city faced an increasing sound level due to the load of traffic flow. In general, the environment of the surroundings, the distance to the source, the density of the source's flow, and the types and circumstances of the sources affect the degree of noise.

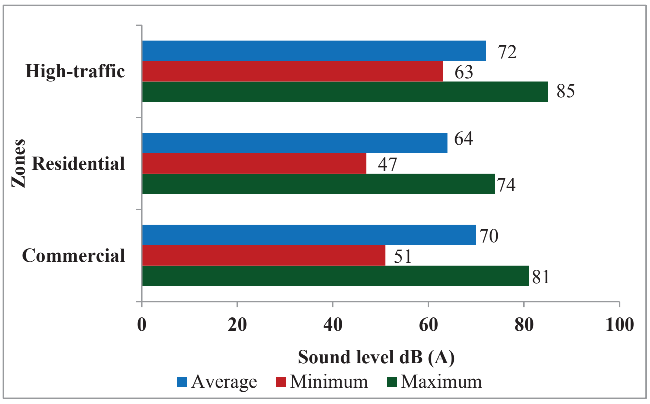

Figure 2: Minimum, maximum, and average noise level in three different zones

The average traffic noise in Dhading Besi was found to be 68 dB (A) among three different selected zones. Different studies have also reported average sound levels of Kathmandu metropolitan city as 76.3 dB (A) and 82.5 dB (A) respectively (Maharjan et al., 2021; Singh et al., 2022). However, the average noise level was marginally below 72.25 dB (A) in the city of India, Kolphur (Hunashal & Patil, 2012). They mentioned the rise in noise level was due to rapid population growth, business activities and industrialization. Similarly, during the daytime, the noise standard in major road arteries in Bangkok was observed as 79.2 dB (A), and in Minnesota as 70 dB (A) (Kudesia & Tiwari, 2007). The WHO (1999) recommends a guideline value of 55 dB (A) for noise in residential, institutional, and educational settings and 70 dB (A) for industrial, commercial shopping, and transportation sectors during the day (WHO, 1999).The National Ambient Sound Quality Standard of Nepal, (NASQS) 2012 states that during the daytime, the allowed noise levels are 55 dB (A) for residential areas and 65 dB (A) for commercial sectors. Thus, the present sound level in Dhading Besi was found to be above the permissible level of national and international standards.

Status of Noise Level in Commercial Areas

The status of the sound level measured in the commercial area is presented in Fig. 3 below. It indicates that among the commercial areas, Shanta Bazaar had the highest sound level of 71 dB (A), higher than the standard given by NASQS. This might be because of various activities such as business, restaurants, and shops. These areas are often bustling with people, vehicles, loud music, plus machinery work, which contributes to overall noise levels. Additionally, in this area, the movement of vehicles was found in large numbers for the delivery of goods. Mul Chowk and Sugam Tole have the same sound level of 70 dB (A) because all those locations have a high number of automobiles and people, also traffic management systems were also managed. Both locations are equal with the sound level prescribed by WHO. However, at Campus Chowk the lowest sound level was measured as 69 dB (A), among commercials, which might be because of the hospital area and the nearby high school. This sound level in this area meets the standard prescribed by WHO but it exceeds the national standard prescribed limit. In Mul chowk, the bazar area management was quite good. Finally, at Sugam tole 70 dB (A) noise level was observed, may be due to lower number of vehicles as well as slight movement of people.

The different zones, like high traffic, commercial, and residential areas, have been differentiated according to the land use type (Chauhan et al., 2021). The commercial area can be related to the busy area. The Commercial area had experienced a heavy crowd of people as well as more engagement of automobiles. Similarly, low levels of noise in the residential area are due to lower vehicle pressure than in other main roadside areas and lower crowds of people. These results suggest that the main sources of noise in Dhading Besi are automobiles, traffic, vehicular increment, and crowds of people. The various sound levels are also noticed at various times during the day. In commercial areas, sound levels are reported at their highest during the day (between 12 pm to 4 pm) i.e., 74 dB (A), and lowest at their morning non-peak hours (between 6 am to 7 am).This may be because of large number of people who live in these areas spend much of their daytime hours buying and selling items to support themselves.

The results show that at each location the average noise level at commercial zones comply with the international standard (WHO, 2018) but when compared to NASQS standard, four mentioned sites were above the prescribed standard. At Buspark Chowk maximum equivalent sound level of 70.01 dB (A) and the minimum equivalent sound level of 67.3 dB (A) was measured in Basnet chowk of the commercial area of Birendranagar municipality due to the busy traffic routes and also increasing number of buses, jeep with the crowded of people (Paudel, 2016). Also (Pant, 2012) measured 60 dB (A) of equivalent sound level at a day time in the commercial area of Pokhara Sub-Metropolitan city due to the number of road vehicles, pressing horns, and old vehicles, besides these loud speaker is also the source in this city.

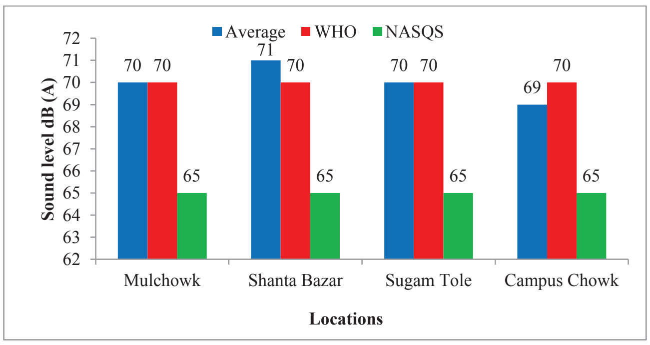

Figure 3: *C*omparison of sound level within the commercial area

Status of Noise Level in high-traffic areas

The average sound level inside the high-traffic region has been presented in Fig. 4 below. The highest noise level was observed at Puchar Bazar, i.e., 75 dB (A), which exceeded the WHO standard. Similarly, Bich Bazaar and Bus Park Chowk have sound pressure levels of 74 dB (A) and 68 dB (A), respectively. Due to their similar characteristics of traffic flow and population density, the two places, except Bus Park Chowk, have a slightly varied degree of sound, which is shown in Fig. 5.

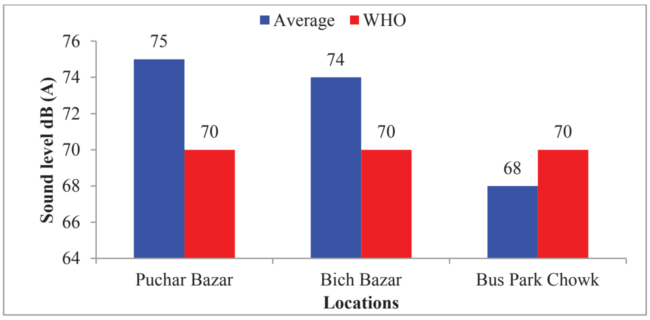

Figure 4: *Comparison of sound level within high traffic*

Due to the dense population, crowded environment, and high traffic flow, the high-traffic area experiences the highest sound intensity. Additionally, some automobile pressure horns also increase the noise level in this region. Similarly, in high-traffic areas, sound levels are reported to be highest in afternoon hours (between 12 pm to 1 pm) i.e., 76 dB (A), and lowest in morning non-peak hours (between 6 am to 7 am) i.e., 66 dB (A). The maximum sound level in the afternoon time might be due to maximum vehicle pressure, traffic flow in huge numbers, crowds of people, and unmanaged parking of automobiles to load the goods and passengers. The low level of sound was recorded in the morning hours, which may be because of less movement of vehicles and less mobility of people at that time.

There is variation in traffic noise standards in different countries so in Nepal. In Nepal, traffic noise standards have mentioned permissible level of 70 dB (A) (Sapkota, 1997). In the present, study it was found that variations in traffic sound levels in Dhading Besi might be due to the plying or more vehicles on the roads, using loudspeakers and unmanaged traffic system where average noise level exceeded the standard level (WHO, 2018) in all sites. According to research done by (Sapkota, 1997; Singh et al., 2022) noise levels in Kathmandu's high-traffic areas ranged from 65.1dB (A) to 74.5 dB (A) and 78.97 dB (A), respectively, which is due to the maximum number of vehicles. The average equivalent sound level of Kathmandu valley was calculated by (Chauhan et al., 2021) in which high traffic area was measured 73.2 dB (A).

Status of Noise Level in Residential Areas

The typical noise level in residential zones is presented in Fig. 5. Among the four locations of residential zone, Tribeni Chowk has the highest sound level, at a maximum of 65 dB (A), followed by Siran Bazar i.e., 64 dB (A), Ganesh Marg i.e, 59 dB (A), and Meelan Tole i.e, 64 dB (A). All these sites cross the standard of WHO and NASQS (annex I). Each of these four areas has a very similar sound level status which might be because of the similar mobility of people and similar population density.

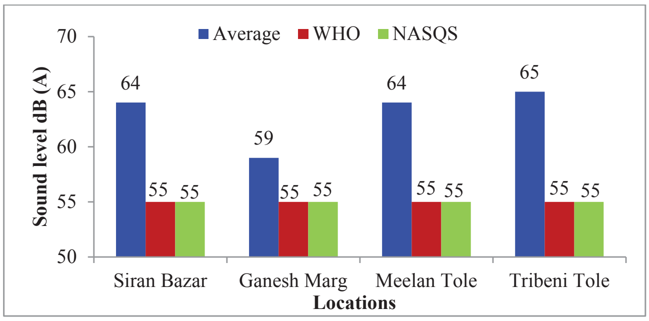

Figure 5: Comparison of sound level within residential areas

Due to the low vehicular movement and less population density residential areas might have low sound levels in comparison to other zones, Although the sound level in a commercial area is much higher than in a residential area but slightly lower than in a high-traffic area. The residential area is comparatively silent in comparison with other zones, like high-traffic areas and commercial areas. But at all the residential zones prescribed standard of noise level were above the standard of WHO and NASQS. According to (Chauhan et al., 2021) and (Singh et al., 2022) average sound level at residential areas of Kathmandu was measured 56.8 dB (A) and 74.52 dB (A), respectively. The average sound level was measured 58.9 dB (A) in Kolhapur city, Maharashtra, India (Mangalekar et al., 2012) and mentioned that transportation was the main cause of the increasing sound.

Temporal pattern of noise in Dhading Besi

The noise level measurement was done at five different hours i.e., Morning non-peak hour, morning peak hour, non-peak hour, evening peak hour and evening non-peak hour. It is evident from Fig. 6, that the temporal noise patterns are observed to be similar at the morning peak hour (9:00 am-10:00 am), non-peak hour (12: 00 pm- 1:00 pm), and evening- peak hour (3:00 pm-4:00 pm) which is also the highest sound level i.e. 71 dB (A). This might be because of the same flow of automobiles, unmanaged traffic, people and unmanaged parking system. At this time, traffic flow was high because of the high number of vehicles from the upper area of Dhading Besi who are engaged to drop people and take back the goods that are needed for their daily use. And the lowest during morning non-peak hour (6:00am-7:00am). However, the intensity of sound in the evening non-peak hour (6:00 pm- 7:00 pm) is also higher than in the morning non-peak hours, which may be due to extremely loud noise of vehicles and maximum people engagement for the grocery in the Puchar Bazar area. Puchar Bazar also consists of petroleum stations of automobiles.

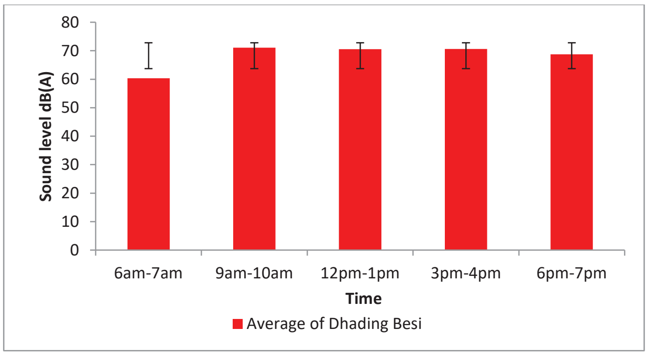

Figure 6: Overall temporal pattern of noise in Dhading Besi

Five separate times, namely morning non-peak, morning peak, non-peak, evening peak, and evening non-peak, were used to measure the noise level at different zones like high traffic, residential and commercial zones. Fig. 7 depicts three kinds of noise pattern which includes the highest noise level during non-peak hour (commercial and high-traffic) and morning peak-hour (residential), and the lowest noise level was during morning non-peak hour (commercial, residential and high-traffic). The average noise level during morning non-peak hour, morning-peak hour, non-peak hour, evening-peak hour, and evening non-peak hour were 61 dB (A), 71 dB (A), 71 dB (A), 71 dB (A), and 69 dB (A) respectively. The main cause of noise pollution was due to an increase in the number of automobiles, traffic flow, loudspeakers as well as vehicles.

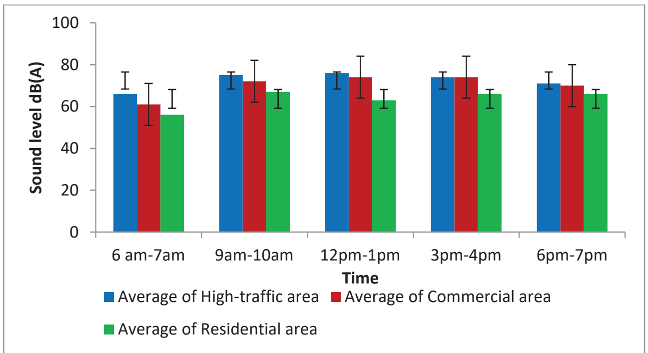

Figure 7: Temporal pattern of noise level in different zones

Effects on human health due to noise pollution

The effects of noise pollution on human health have been depicted in Fig. 8 below. The figure reveals that majority of respondents are affected by noise from traffic flow. Most respondents, 44% across all age groups, believe that the noise from automobiles has the biggest impact on their daily activities. Similarly, 20% of respondents across all age groups agree that loudspeaker noise has a great negative impact. Nearly 20% of respondents are affected by the noise of loudspeakers. Also, 12% of respondents claim that they are affected by the noise produced by the neighborhood, 10% by parties, 6% by industrial machinery, and 8% by commercial construction.

According to the survey, loudspeakers, neighborhood activities, parties, industrial machinery, and commercial construction are also significant sources of noise pollution. Besides this, automobiles and traffic flow are the main causes of noise pollution.

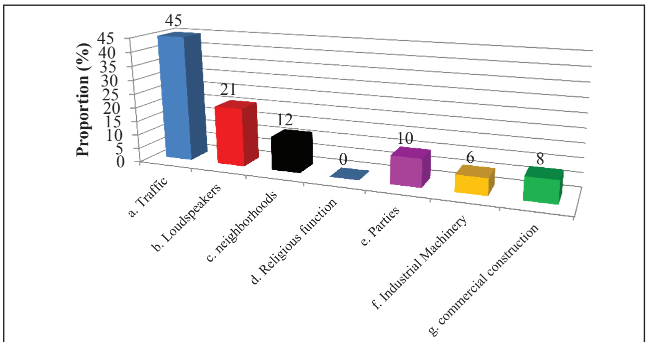

Figure 8: Major noise sources based on the perception of the respondent

The general health effects of noise pollution based on the perception of respondents is presented in Fig. 9 below. Among the various health effects, irritation is felt by a slightly higher percentage i.e. 27% of respondents followed by headaches (21%), stress (22%), loss of sleep (10%), and 10% reported to be affected by hypertension, respectively. Also, this survey has reported that 10% of respondents felt no disturbance. This survey results revealed that the overall impact of noise varies depending on the age group. More respondents faced irritation due to the loud noise. According to (Geravandi et al., 2015), the primary health impacts of the noise were anxiety, poor sleep, hypertension, hearing loss, mental health issues, depression, and myocardial infarction in the Ahvaz City of Iran. Due to noise exposure, millions of Americans have heart disease and hearing loss, among other detrimental health effects (Hammer et al., 2014).

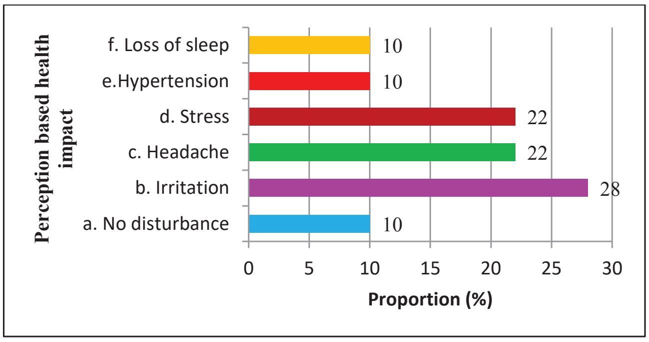

Figure 9: Health impact of noise as reflected by the perception of the respondents

Suggestion for Noise reduction by the respondents

The individual reactions to a set of potential solutions for noise predicted as suggested by responded have been shown in Fig. 10 below. The results show many respondents are worried about government commencement, education, and technological advancements. Monitoring noise levels could be undertaken by the environment section of the Nilakantha Municipality and empowering NGOs. Also, some of them believe that empowering police can reduce the noise level on some level.

But we know that a single measure can't help to reduce the noise level. Hence, strengthening the capacity of the local authorities for environmental pollution monitoring appears to be the best method as suggested by respondents. Also, education and awareness are the key points and the most efficient approach to eliminating noise. Through education, the flow of information about noise pollution among people could be effective as many people are unaware of environmental rules and regulations. They also mentioned that government efforts could help to reduce the increasing level of noise in the study area.

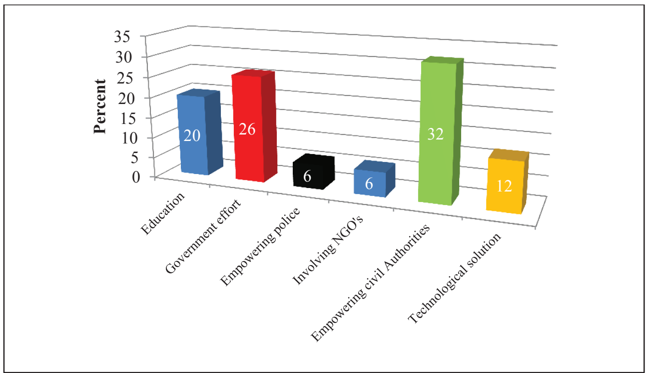

Figure 10 : Measures for controlling noise pollution as suggested by the respondents

Conclusion and Recommendations

The average level of sound in Dhading Besi was found to be 68 dB (A). Similarly at Commercial, High-traffic, and Residential area it was found to be 70 dB (A), 72 dB (A), and 63 dB (A) respectively. The sound level was exceeded according to the government of Nepal as well as the international standard of WHO guidelines. Maximum sound level was found at High-traffic area i.e., Puchar Bazaar of 86 dB (A) and the minimum was found at Residential area i.e., Ganesh Marg of 43 dB (A). The questionnaire survey reveals that improper communication, annoyance, and hearing problems were felt by most of the respondents. The survey identified traffic, and loudspeakers are the major sources of noise pollution. Empowering civil authorities would be the best method as suggested by respondents. Besides this government effort, education, and technological solutions can also play a significant role in the process of controlling excessive noise.

To reduce the noise pollution level and prevent the major effects on human health in the study area and other places, the following recommendations are suggested.

- Promoting public education and awareness about the impacts of noise pollution can encourage individuals to make conscious efforts to reduce their noise emissions.
- Since the transportation system is thought to be the main cause of noise pollution, technical plans like road maintenance, expansion of roads, repairing of engines, repairing of bad condition of vehicles, and limiting the speed of vehicles, etc. should be implemented.
- Tree planting and vegetation should be adopted along the roadside as a barrier to control noise.

Annex1: National Ambient Sound Quality Standard, 2012

S.N.	Areas	Noise level dB (A)	
		Day time	Nighttime
1	Industrial Area	75	70
2	Commercial Area	65	55
3	Rural Residential Area	45	40
4	Urban Residential Area	55	45
5	Mixes Residential Area	63	55
6	Peace Area	50	40

Source: CBS, 2019 (Ministry of Environment, Science and Technology, Nepal Gazette 2069/07/13).

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