

Noise pollution and human health: A case study in Bangkok City, Thailand

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ABSTRACT

Nowadays noise pollution crisis is very persistent in Bangkok, the capital city of Thailand. Bangkok is a home to a lot of people and is a central hub for business and trade. From the study conducted on 13 main roads of Bangkok, it was measured that the noise levels have been ranging from 55 to 107 dB(A). It was also found that Ramkhamhaeng, Sathorn, Silom, Lat Phrao, Vibhavadi Rangsit and Lat Krabang road have average noise levels up to 70 dB(A). The major causes for these high levels were traffic, construction and airports, totaling up to 93.25%. Noise levels from traffic were found to be more than 90 dB(A), especially due to superbike/motorcycle, tuk-tuks and 10-wheeled truck. The traffic crisis significantly increases during the time of Songkran festival and new year festival occurred noise pollution crisis on roads. The study also found the construction of sky train and intersection bridges to be disturbingly loud. As aforementioned, one of the major sources of noise pollution in the city is airports. There are two airports located in Bangkok and each of them produce very high and deadly levels of noise. One is the Suvarnabhumi international airport situated near Lat Krabang and the other one is the Don Mueang airport which is located near Vibhavadi Rangsit road. The major health effects caused by noise pollution are negative social behavior and annoyance, with around 46.5% people affected in the city. Most people are aware of these causes and effects, and therefore are concerned with the regularity of noise pollution in the city. Currently the people of Bangkok are moderately satisfied with the enforcement of noise pollution regularity.

Key words : Noise, Pollution, Effects of noise pollution

Introduction

Currently Bangkok has a massive population of around 10.35 million, with the numbers quickly rising due to industrialization and modernization in the city. Due to this booming population the number of vehicles and transport facilities has substantially increased on the streets of Bangkok. As of 2020, there are more than 37 million registered cars and motorcycles in Thailand, out of which most of the vehicles were registered in Bangkok. The city has a vast range of transportation modes, from tuk-tuks to 10-wheeled vehicles. There is a wide use of superbikes, heavy bikes and bicycles as well in the city. All these vehicles are powered by diesel which

is extremely harmful to the environment and causes huge levels of noise pollution. Even the prime minister of Bangkok has asked the drivers to refrain from using diesel-powered vehicles and only use it in case of an emergency. In the urban areas of the city there is a common practice of horn-honking and customizing motorcycles' engine in order to produce more noise out of them. This poses harm and threat to those living in the area. Loud noises produced by vehicle's processes and automations can even hurt the driver of the vehicle (Kryter, 1982). Long exposure to boisterous sounds can lead to prolonged illnesses (Sheldon and Neil, 1981). That is why people who live near the roads and night markets get sick much often due to the consistent pollu-

tion and disturbance. Living around noise pollution can not only damage a person's physical health but also mental health. It has been proved that people who are affected by noise pollution tend to have more social conflicts at home and workplace (Eldred, 1990). This is one of the major reasons behind the frequent road rages that are happening in Thailand over minor issues, and in some cases, there are weapons involved too. These road rages create more noise pollution and the matter gets even worse; it is a never-ending vicious cycle. This cycle of loud noises also affects young children and causes learning anomalies in the students (Siddiqui, 2011). Though not all people are involved in road raging in Bangkok, many people in the city are partying and enjoying. These loud parties and functions create extreme levels of pollution and disturbances. Many teenagers and young adults tend to party at their homes with loud music, causing inconvenience to their neighbors and surroundings. Based on a study, out of all the complaints lodged nationwide in Thailand, 33% of the complaints were related to noise pollution. Most of the complaints were in regard to late night parties and loud music. Apart from parties and entertainment, there is a lot of industrialization and manufacturing happening in the city all the time too. And not just in Bangkok but in all the other cities as well. In fact, all of Thailand is rapidly progressing due to industrialization and modernization. This progress is, no doubt, benefiting the country but it is also causing harm to it. In Bangkok, there are a lot of construction sites and the levels of sound that are produced by these sites are extremely above par and possess a potential threat to the people of the city. Necessary procedures must be taken to safeguard the environment and the health of the people against noise pollution. All is not lost, because the law enforcement agencies take this matter very seriously and are adamantly strict against those who cause noise pollution. Even the laws overlooking and regulating noise pollution in the country are in accordance with the international standards (Krittika Lertsawat *et al.*, 2009). This shows that the authorities are making efforts to get rid of this aberration.

Materials and Methods

This study is carried out in several streets of Bangkok. Some of these streets have nightclubs, BTS stations, factories and airports. The study measures

how the streets are noise polluted due to these structures. The 13 streets that have been surveyed in this study are: Sathorn, Silom, Yaowarat, Khao San, Vibhavadi Rangsit, Lat Krabang, Ramkhamhaeng, Phanon Yothin, Lat Phrao, Bang Bua Thong, Rama 2, Petchaburi and Phet Kasem. The Sathorn street is one of the busiest streets of Bangkok, it consists of many skyscrapers and also a track for BTS transportation. Silom is a sub-district of Bangkok which is just as busy as the Sathorn street due to many big companies situated there. Both the streets lie parallel to each other and this sometimes cause a lot of traffic in the city. The Yaowarat road is very famous for its night festivities; at night there is a crowded food street and also many nightclubs. The Khao San road is filled with hotels, restaurants and bars to accommodate the tourists. According to a study, there are usually 40,000 to 50,000 tourists roaming around on the road on a daily basis. The Vibhavadi Rangsit road is a superhighway in Bangkok. Lat Krabang is a district which is located on the eastern side of Bangkok, it is situated around the Suvarnabhumi airport. Ramkhamhaeng is another road in Bangkok which is known for its night market and parties. Phahon Yothin is a primary road in Bangkok and is also one of the four crowded highways of the city. Lat Phrao road contains two MRT stations: Phahon Yothin and Lat Phrao stations. Bang Bua Thong is a district in Bangkok with many restaurants and hotels for the locals and as well as for the tourists. Rama 2 is a major road which starts in Bangkok and ends in Ratchaburi, making it easier for people to travel from north to south in Thailand. Petchaburi is also one of the important roads of Bangkok which passes through many notable attractions and places of the city. Phet Kasem is the longest highway in Thailand and it is also one of the four major highways in the country.

The noise pollution in these roads were measured using a USB Digital Sound Level Data Logger. The specific model that was used in this study was 'KC-330B'. The measurement range of the meter was 30-130dB(A). Its accuracy was 1.5dB(A) and its resolution was up to 0.1dB(A). the meter was operated in the fast mode. The meter detected and gave levels of noise pollution that were being produced in the roads. 400 people were interviewed and surveyed in order to get information on how many people are aware of the harmful effects of noise pollution in Bangkok. In this study, Yamane formula has been used to calculate the sample size. The

population size of the study is more than 3 million with the confidence level of 95% and the tolerance level of 5% as assumed by the Yamane formula (Yamane, 1967). After collecting the answers from all the participants, a generalization was made and the final conclusion was included in the study. The people were picked from all the aforementioned cities in order to produce a reliable and viable outcome.

Results and Discussion

This research is divided into 5 different studies regarding noise pollution in Bangkok. First study measures the noise level in 13 main roads of the city as shown in Table 1.

Table 1. Noise Level at different roads by dB(A)

Road	Min. value	Max. value	Avg. value
Sathorn	68.4	96.5	74.3
Silom	68.1	100.5	73.2
Yaowarat	56.2	90.7	68.5
Khao San	58.4	92.7	67.4
Vibhavadi Rangsit	60.2	105.2	71.2
Lat Krabang	61.4	106.6	70.5
Ramkhamhaeng	62.4	95.6	75.2
Phahon Yothin	55.6	95.2	68.3
Lat Phrao	67.2	96.3	71.6
Bang Bua Thong	49.5	102.4	68.7
Rama 2	54.4	101.9	68.5
Petchaburi	63.5	96.4	69.6
Phet Kasem	68.3	97.8	69.4

Table 1 shows that 6 roads have noise levels more than 70 dB(A) which are Sathorn, Silom, Vibhavadi Rangsit, Lat Krabang, Ramkhamhaeng and Lat Phrao. Ramkhamhaeng road averaged most with sound level of 75.2 dB(A) because of traffic crisis, construction, intersection bridge, BTS, and a lot of universities and hospitals. Vibhavadi Rangsit and Lat Krabang road produce maximum sound level more than 100 dB(A) due to the international airport. Roads leading outside of Bangkok are Bang Bua Thong and Rama 2; many trucks and heavy weight vehicles are passing through all the time, accounting for the high levels of noise. The traffic crisis significantly increases during the time of Songkran in May and near the time of new year preparations. Silom and Khao San have a lot of night clubs, during night time the maximum sound

Table 2. Causes of Noise pollution in Bangkok

Causes	Frequency	Percent
Traffic (cars, buses, motorbikes)	149	37.25
Construction	137	34.25
Night Clubs	12	3
Natural Sources	2	0.5
Markets	3	0.75
Airports	87	21.75
Schools	9	2.25
Not Given	1	0.25
Total	400	100.00

is more than 90 dB(A). In Yaowarat there are markets and also a 'China Town' which account for the noise levels. All the other roads are polluted solely because of high and congested traffic. Sathorn, Phahon Yothin, Lat Phrao, Petchaburi and Phet Kasem have traffic, a lot of schools and sky train.

In the second study it presents about the major causes of noise pollution as show in Table 2. 400 people were surveyed all around Bangkok and some common causes pointed out by the participants were put into Table 2. The number one cause of noise pollution according to the study was traffic due to cars, buses, motorcycles and the other modes of land transport (37.25%). Another study deduced that restriction on heavy weight vehicles should be made to reduce the levels of noise pollution (Amrutha, 2016). The second most cause with 34.25% of participants was the loud noise from constructions sites and activities. Airports were the third most cause of noise pollution in the city with 21.75% of participants. Then came the night clubs with only 3% of participants. 2.25% of participants believed that schools are also a cause of noise pollution in the city. The second least cause of noise pollution was markets with only 0.75% participants. Only 0.5% participants agreed that natural sources are also the cause of high levels of noise in the city. As the study predicted that traffic is the major cause of noise pollution in Bangkok, the results proved that prediction right.

The study also analyzed the various effects of noise pollution on the human health, as noise pollution is proven to be very harmful for the health (Vattanaprateep, 2020). Table 3 depicts the different effects that are dominant among the population of Bangkok. Total of major six effects were found out by the study that had the most effect in the city.

The results indicated that 46.75% of the population of Bangkok were affected by negative social

Table 3. Effects of noise pollution on the human health

Effects	Frequency	Percent
Sleep Disturbances and Cardiovascular Issues	54	13.50
Hearing Impairment	24	6.00
Interference with Spoken Communication and Mental Health	126	31.50
Unborn Babies	1	0.25
Negative Social Behavior and Annoyance	187	46.75
Diabetes among the affected	8	2.00
Total	400	100.00

behavior and annoyance due to the high noise levels. Around 31.50% of people were influenced by constant interference with spoken communication and mental health. The third most harmful effect that affected 13.50% of people of Bangkok because of noise pollution is disturbance in sleep and cardiovascular issues. The rest of the effects were hearing impairment, unborn babies and diabetes with percentages of 6%, 0.25% and 2% respectively.

The study also measured the awareness levels among the people in Bangkok regarding the high and unhealthy levels of noise pollution in the city. Table 4 below, shows the percentage of people that were aware of noise pollution and the percentage of people who were unaware and totally oblivious to the rising noise pollution in the city.

Table 4. Noise pollution awareness among respondents

Noise Pollution Awareness	Frequency	Percent
Yes	253	63.25
No	147	36.75
Total	400	100.00

The results were actually positive and indicated that many people in the city are aware of the noise pollution. 63.25% knew the harmful effects of noise pollution and the condition of noise pollution in the city. And the rest of which is 36.75%, were not aware of noise pollution and did not know that noise pollution is detrimental to Bangkok's progress and future. Hopefully, this percentage of people not aware of noise pollution will further decrease in the future.

Final survey was to measure the satisfaction of the people of Bangkok regarding the laws and regulations of noise pollution in the city.

From the table it can be observed that people are only moderately satisfied with the laws in the city,

Table 5. Noise Pollution Regularity

Level of Satisfaction	Frequency	Percent
Highly Satisfied	21	5.25
Satisfied	98	24.50
Neutral	171	42.75
Dissatisfied	102	25.50
Highly Dissatisfied	8	2.00
Total	400	100.00

i.e. 42.75%. Case of satisfied and highly satisfied totals up to only 29.75%. The table also shows that people in Bangkok who are dissatisfied with the regularity of noise pollution are more than those who are satisfied. This implies that the laws and regulations regarding noise pollution must be changed and altered in a way that will satisfy more people in the city.

Conclusion

Research deduced that noise pollution is a huge and constant problem in Bangkok. Out of the 13 roads that were studied it was found that Ramkhamhaeng road had most average noise level value, 75.2 dB(A) mainly due to high traffic, a lot of universities, many construction bridges and sky trains. Due to airplanes and other aeronautical activities a lot of noise pollution is produced and all the roads are affected by it. In Bang Bua Thong and Rama 2 road there are dangerous sound levels of more than 100 dB(A) mostly due to many trucks passing through on a daily basis. The traffic crisis significantly increases during the time of Songkran in May and near the time of new year. Night clubs are also a notable source of pollution affecting the people of Bangkok especially near Silom and Khao San road with noise levels of more than 90 dB(A). Another Study major causes of noise pollution, awareness and satisfaction of people in relation with the noise pollution regularity in the city. There are several reasons be-

hind the high average value such as to control the pollution levels in the city, traffic must be regulated and high levels of noise that is emitted from the vehicles must also be brought into account. Because there are many harmful effects that are caused by noise pollution on human health both physically and mentally. And to increase awareness among the rest, there should be programs and campaigns in the city.

References

- Kryter, K.D. 1982. Community Annoyance from Aircraft and Ground Vehicle Noise. *J Acoustical Society of America*. 72 : 1222-1245.
- Sheldon Cohen and Neil Weinstein, 1981. Nonauditory effects of noise on behavior and health. *J Social Issues*. 37: 36-70.
- Eldred, K.M. 1990. Noise at the Year 2000. In: B. Berglund and T. Lindvall (eds) *Noise as a Public Health Problem*. Vol 5. Stockholm.
- Siddiqui, N.A. 2011. Trends of Noise Level of a Developing City: A Case Study. *Pollution Research*. 30: 51-56.
- Krittika Lertsawat, 2009. Environmental Noise Regulations in Thailand. *J Inter-Noise*.
- Yamane, Taro, 1967. *Statistics, An Introductory Analysis*, 2nd Ed., New York: Harper and Row.
- Amrutha Preethi, P., Sravani, M., Ashok Kumar, M., Sowmya, P., Naga Siva, P. and Manasa, G. 2016. Noise Pollution and Its Impact on Human Health and Social Behavior using Systems Approach - A Case Study in Kurnool City. *Civil and Environmental Research*. 8 (7) : 70-80.
- Vattanaprateep, N. 2020. Noise Pollution and its Impact on Human Health in Thailand: A Review. *Pollution Research*. 39 : 20-24.