



Noise Pollution Measurement in High-traffic Streets of Durres Municipality

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Urban noise;
Dogana street;
Equivalent noise level



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Abstract: *The inspection of noise pollution in urban areas can affect positively the health and welfare of residents. This paper analyzes the noise pollution in high-traffic streets of different areas in Durres Municipality. Measurements carried out by using TESTO 816-1 supply were investigated and compared to see the highest equivalent noise level during morning and night time. The results were evidenced and conclusions were reported. It was found a difference between the average equivalent noise levels of areas/streets monitored. During morning the highest value was observed in the industrial area (Dogana street) with $\langle Leq \rangle = 61.02$ dB followed by the commercial area (Adria street) with $\langle Leq \rangle = 59.04$ dB and the residential area (Stefan Kaculini - Glaukia street) with $\langle Leq \rangle = 57.6$ dB. The highest equivalent noise level during the night was observed in the commercial area (Egnatia street) with $\langle Leq \rangle = 52.04$ dB. The findings achieved by this study showed also that noise pollution levels noticed were higher than permissible levels and most of this pollution was caused by vehicle traffic.*

1. INTRODUCTION

In the last three decades, environmental pollution has gained worldwide attention and noise pollution in cities has been a worldwide problem. According to WHO guidelines 40% of the population that lives in European countries are exposed to equivalent sound pressure levels of more than 55 dB (A) during the daytime, and also about 20% of this population is exposed to levels above 65 dB (A) (Ehrampoush et.al, 2012).

Noise pollution is the set of undesirable sounds produced by industry, machinery, equipment and propagating through the environment. Exposure to excessive noise can seriously damage animal and human hearing and is an important factor in reducing the health and life quality of residents of large cities (Afsharnia et.al, 2016).

Excessive sound is an outcome of many variable factors, yet is connected to quick economic development, growing industry and application of different means of transport (Jablonska, 2020).

Road transport is one of the main sources of environmental pollution. With the increase in the number of vehicles and the speed of their movement through the streets of industrial cities, the world community identified noise as one of the main factors that aggravate the living standards of people in cities. Emotional and physical stress associated with constant noise discomfort leads to noise stress (Lezhneva, 2019).

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The impact of transport noise on a person can be considered in various aspects, in particular, in relation to Berg et.al (2004):

- drivers;
- employees of administrative and office buildings, hospitals, schools and other facilities with special requirements regarding noise levels located near roads;
- residents of buildings located near highways with significant traffic intensity.

Traffic is a significant part of the urban environment contributing to about 55 % of total urban noise (Pandya et.al, 2002).

Noise pollution has many health effects and additional costs on society (Lercher, 1996; Martin et.al, 2006; Omidvari et.al, 2009; Singh and Kaur, 2013). The need for studies regarding urban noise pollution and its consequences on the environment has motivated various researchers on the traffic noise problem in several countries (Pathak et.al, 2008; Zannin et.al, 2003; Banerjee, 2009; Al-Mutairi et.al, 2011; Kalaiselvi and Ramachandraiah, 2010; Reddy and Ramachandraiah, 1995; Vidya Sagar and Nageswara Rao, 2006; Singh et.al, 2013).

2. MATERIALS AND METHODS

Based on the measurements of the noise level in Durres Municipality and type of areas (residential, commercial, industrial), 8 high traffic streets were analyzed.

In the commercial area:

- Taulantia street,
- Egnatia street,
- Adria street,
- Deshmoret street,
- Dyrrah boulevard,

In the industrial area:

- Dogana street (along Durres port).

In the residential area:

- Aleksander Goga street,
- Stefan Kaculini - Glaukia street.

The sound level meter (TESTO 816-1) was used to measure the minimal noise level L_{\min} and maximum noise level L_{\max} in the areas mentioned above during morning time (6:00 am to 10:00 am) and night time (10:00 pm to 06:00 am) from February 2019 to December 2020. The time of each measurement was 15 min. The parameter L_{eq} (equivalent continuous noise level) was calculated and used to analyze the situation in the high traffic streets mentioned above.

3. RESULTS AND DISCUSSION

The purpose of this study was to identify the highest average equivalent noise level in the high traffic streets of Durres Municipality and to make a comparison between results and standard levels.

Table 1 shows the average equivalent noise level $\langle L_{eq} \rangle$ calculated for different streets of Durres Municipality during morning and night.

Table 1. Average equivalent noise level $\langle L_{eq} \rangle$ in different streets of Durres Municipality during morning and night time and different months

Area	Street	$\langle L_{eq} \rangle$ (dB) morning time (6:00 to 10:00)	$\langle L_{eq} \rangle$ (dB) night time (22:00 to 6:00)	Month measurement
Commercial	Taulantia	55.1	47.65	September
	Egnatia	57.1	52.04	February, May
	Adria	59.04	48.2	July, August, September
	Deshmoret	55.2	50.62	March, August
	Dyrrah Boulevard	54.25	43.55	February, May
Industrial	Dogana	61.02	46.85	July, September
Residential	Aleksander Goga	57.35	47.8	August, November
	Stefan Kaculini- Glaukia	57.6	48.15	July, August, October

Source: Own research.

Referring to the results in table 1 it was observed that during the morning the highest $\langle L_{eq} \rangle$ was in the industrial area (Dogana street) followed by the commercial area (Adria street) and residential area (Stefan Kaculini- Glaukia street).

Dogana street had the highest average equivalent noise level (notable during summer). This street begins from the port of Durres entrance and ends at Dajlani bridge.

High noise levels in this street were due to:

- the landing of more migrant ships;
- passage of high tonnage vehicles;
- passing cars on the adjacent road that takes to the beach.

Adria street (in the commercial area) had the highest average equivalent noise level (during summer time). This street begins at 26 Nentori square and ends at Dajlani bridge.

High values of the noise level in this segment were because:

- this is a road with a large load of cars entering and leaving Durres;
- adjacent to this road is the rail transport;
- there are a series of bars, shopping centers, gas station where people use cars to go there;
- there is a big interurban bus station where buses enter and leave it;
- near this road is the rustic market where people go shopping using their cars, transport goods etc.

Glaukia street (in the residential area) had the highest average equivalent noise level (during summer-autumn). This segment extends along with the large industrial market of Durres Municipality.

This street had high values levels because of:

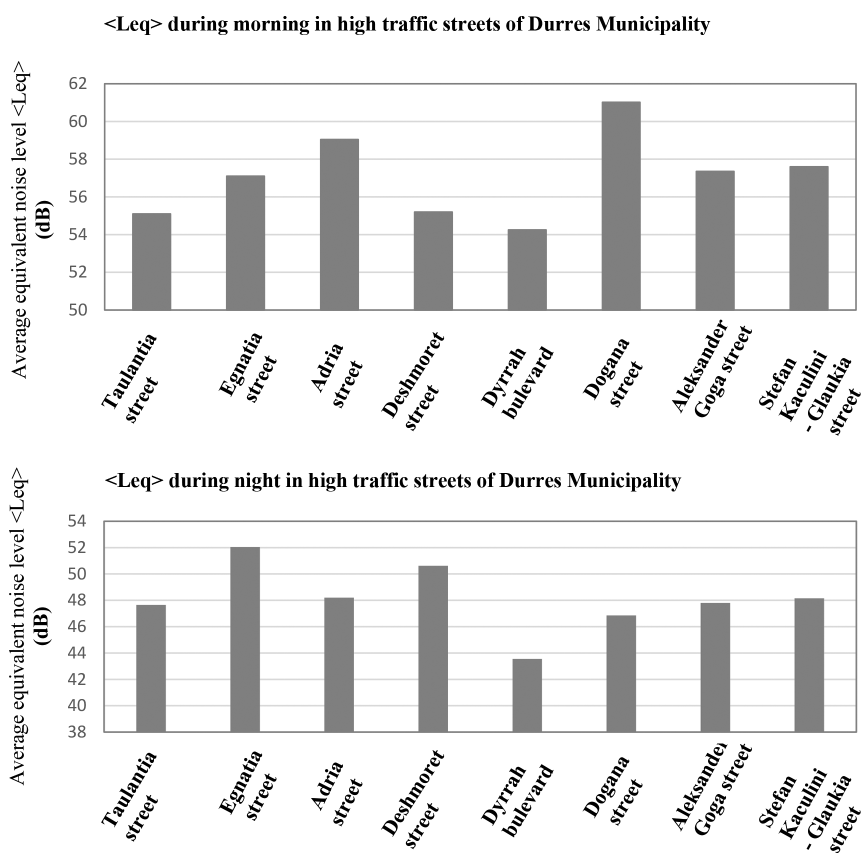
- the fact that is a road which allows the passage of cars that enter or leave Durres;
- passing cars that transport goods in the large industrial market and numerous business activities along the way;

During the night, Egnatia street (in the commercial area) had the highest level of $\langle L_{eq} \rangle$ compared to other streets. This is because it is the main road and there are a lot of cars that pass there.

Finally, we can see in table 1 that almost all the streets taken into consideration, during the morning had $\langle L_{eq} \rangle$ value greater than 55 dB. Referring to Charan (2017) “If a study area has a L_{eq} greater than 45 and 55 dB it can cause sleep disturbance (if windows are open) and serious annoyance for residents living near this area”.

During the night almost all the streets had $\langle L_{eq} \rangle$ greater than 45 and 50 dB. This means that residents living along these roads have sleep disturbance (if windows are open) and moderate annoyance.

$\langle L_{eq} \rangle$ values presented in table 1 for different streets were used to plot the following graphs.



Graph 1. Average equivalent noise level display during morning and night for high traffic streets of Durres Municipality

Source: Own research.

4. CONCLUSION

This study gives Durres Municipality residents and certain structures interested an important view of the most noise polluted streets.

It was shown that during the morning the highest polluted streets in Durres Municipality were Dogana street (in the industrial area), followed by Adria street (in the commercial area) and Stefan Kaculini- Glaukia street (in the residential area).

It was evidenced that the average equivalent noise level calculated for these regions can cause sleep disturbance and serious annoyance to residents.

In conclusion, we must say that road transport is one of the leading reasons for environmental pollution. With the elevation in the number of vehicles and their circulation with high speed through the streets of Durres Municipality, noise is identified as one of the main factors that make worse the living standards of people in this city. Emotional and physical stress related to periodic noise discomfort leads to noise stress.

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