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*The evaluation of noise level in different points of urban area*

Environmental threat resulting from the effect of noise and vibrations on ecosystem, especially on human beings, is one of the important problems of the environment protection. This threat from noise and vibrations in Poland is widespread and therefore described as common health hazard. Extremely rapid development of road transport exerts an important effect on acoustic climate of the environment. The result of this rapid development of road transport is the appearance of new areas affected by arduous and upsetting noise, continuous increase in traffic intensity, extending rush hours until late evening or early night. The effect of noise on human body is very complex. Its direct effect may result in impairment or hearing loss, it affects general health, functions of particular organs and systems, emotional and somatic condition and mental health. Harmful effect of noise causes disturbances in general health and functioning of human body. Intensive noise results in feeling of insecurity, confusion, makes communication difficult, and contributes to discomfort at work and disturbs people at rest. (2,3,4,9,10)

The aim of this study was the evaluation of inhabitants' exposure to noise at different points of the town.

#### METHODS

Measurements of noise level were carried out in the following points situated along busy streets: Litewski Square, Krakowska Gate, Main Post Office in Krakowskie Przedmieście Street, Saski Park, the university campus UMCS (near Chatka Żaka), Jaczewskiego Street close to hospital PSK-4, in Chodźki Street near student hostels. The measurements were taken using an electronic noise meter produced by ELBRO.

#### RESULTS

The analysis of obtained values of the mean noise level revealed that in morning hours between 9 a.m. to 10 a.m. the highest exposure to noise was at Litewski Square and near the university campus UMCS – 57.7 dB. The lowest exposure at that time was in Saski Park – 43.5 dB. At noon between 12

a.m. and 1 p.m. the highest value of noise level was found in Jaczewskiego Street (66.4 dB), and the lowest near the university campus UMCS (48.5 dB). In the early afternoon between 3 p.m. and 4 p.m. the highest noise level was near Krakowska Gate (74.4 dB) and in Jaczewskiego Street (71.9 dB) (Table 1).

Noise level (dB/A)			
Measuring point	time (hours)		
	9 a.m. – 10 a.m.	12 a.m. – 1 p.m.	3 p.m. – 4 p.m.
1. Krakowska Gate	56.1	61.9	74.4
2. Litewski Square	57.7	56.3	63.5
3. Jaczewskiego Str.	55.3	66.4	71.9
4. Chodźki Str.	49.7	54.5	53.4
5. Saski Park	43.5	49.8	51.3
6. UMCS (Chatka Żaka)	57.7	48.5	63.5
7. Main Post Office	53.5	57.8	64.2

Comparative distribution of noise level at the studied points in the city of Lublin is presented in Figures 1 and 2.

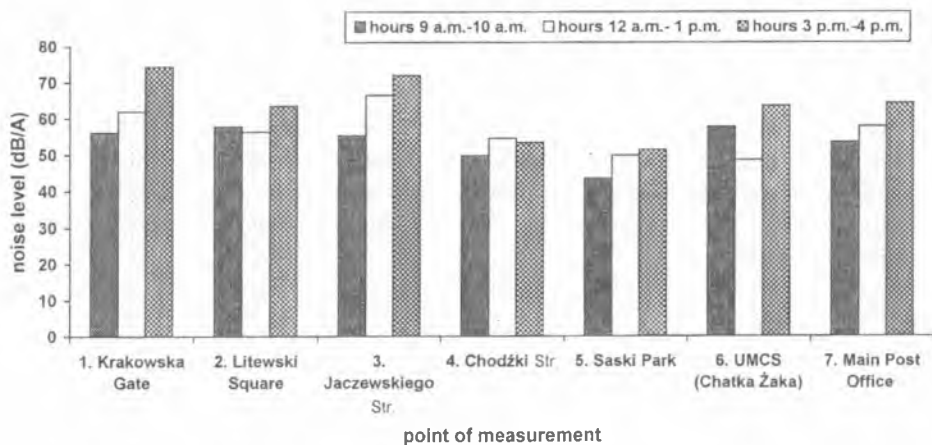


Fig. 1. Distribution of intensity of noise in selected points of urban area of Lublin

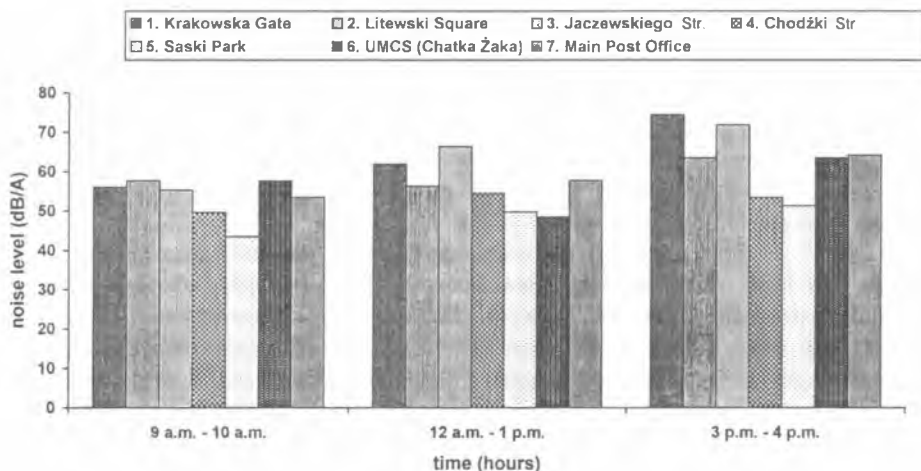


Fig. 2. Comparative distribution of noise level in selected points

At all the studied points of the urban area of Lublin there was a tendency towards the increase in noise level during the day except the university campus UMCS, where the decrease in noise level was observed between 12 a.m. and 1 p.m. as compared with morning and afternoon hours of the day.

## DISCUSSION

Since 1980 a rapid development of road transport has been observed in Poland, that resulted in continuous increase in noise level and growing health risk in the population living close to main road transport routes (1,4, 7, 12).

K u c h a r s k i et al. in their study on measurement of acoustic climate, performed by Voivodship Inspectorate for Environmental Protection and Government Monitoring of Environment, analysed industrial and traffic noise in 1998 including some data of 1997. For statistical analysis a standard noise level of 60 dB (for the day) was accepted introduced as a maximum permissible level. Exceeding this level results in significant decrease in the quality of human environment and the increase in arduousness of noise. Stretches of roads at which noise level exceeded 70 dB at daytime was 735 km, at night it was 21 km. The analysis of arduousness of noise revealed that 32,000 people during the day and 6,000 people at night in Poland are exposed to very high noise caused by heavy traffic. It constitutes 20% at day and 4% at night of the population living close to the measuring points (5,6). The evaluation of acoustic climate in the city of Lublin reveals that the present climate is formed by road traffic noise rather than by railway noise.

Working on the project called "Acoustic plan of Lublin" Lublin Foundation for Protection of Natural Environment carried out the evaluation of arduousness of traffic routes in relation to traffic junctions and cross-roads of the highest intensity of traffic – over 300 vehicles per hour. The length of analysed streets was 160km out of the total length of all streets in the town, which constitutes 43% of the length of all streets. The level of traffic noise emission on the stretches of almost 10% of the length of streets is higher than 75 dB. The distribution of high level of traffic noise affects over (67,000) inhabitants (16.8 %) and creates unfavourable acoustic conditions at their home environment. The Government Monitoring of Environment studied subjective feelings and the effect of high

noise level on general health and well being of inhabitants of the buildings situated in Narutowicza Street and Piłsudskiego Street, where the noise level in the environment was about 75 dB. The studies reveal that these inhabitants complain more often than others that noise makes concentration difficult, disturbs everyday activities, causes excessive irritability and insomnia, disorders in cardiovascular system, dysfunction in some organs and systems (8,11).

Our own results reveal that the noise level at measuring points is variable. The lowest noise level under 45 dB was found in Saski Park and the highest above 70 dB near Krakowska Gate and in Jaczewskiego Street.

It has been proved that excessive noise is a causative factor increasingly threatening to human environment. Noise exceeding maximum permissible level disturbs everyday life and functioning, and affects general state of health. The system of acoustic monitoring of the environment is extremely important in the evaluation of acoustic climate. It enables the recognition of acoustic environmental hazards, helps in the development of a strategy for limiting health hazards from noise and contributes to protection of general health of the population and protection of the environment.

## CONCLUSIONS

1. In the selected measuring points in the city of Lublin the noise level was variable.
2. The lowest noise levels were monitored at points further from traffic routes (Saski Park, Chodźki Street).
3. The highest noise level was found near Krakowska Gate and in Jaczewskiego Street.

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### SUMMARY

The aim of the study was measuring noise intensity in the selected points of traffic routes in the city of Lublin. Investigations were carried out at 11 points located in the centre of the city and at escape roads. Noise value levels showed variable intensity, the highest being observed in the morning and afternoon hours. The highest mean level of noise intensity was recorded at the crossing of Solidarności Avenue and Sikorskiego Street, and the lowest in Narutowicza Street.

#### Ocena natężenia hałasu w różnych punktach aglomeracji miejskiej

Przeprowadzone badanie poziomu intensywności hałasu w punktach o różnym stopniu zróżnicowania natężenia hałasu służy ocenie ekspozycji na hałas populacji ludzi. Pomiar natężenia hałasu dotyczyły różnych punktów Lublina w porze dziennej. Intensywność hałasu w badanych punktach pomiarowych była zmienna. Najmniejsze natężenie hałasu wystąpiło w Ogrodzie Saskim – poniżej 45 dB. Najwyższy poziom hałasu zanotowano przy Bramie Krakowskiej i na ul. Jaczewskiego.

