

Original article

## Traffic Noise Pollution in Urban Areas. Case Study – Bistrita Town

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### Abstract

Traffic noise pollution has become the most serious and pervasive type of noise pollution. Noise is a disturbance to the human environment that is escalating at such a high rate that it will become a major threat to the quality of human lives. The present study provides an evaluation of noise pollution in Bistrita. The measurements were made with the 2250 Controller Integrating Sound Level Meter (Bruel & Kjaer). Equivalent noise levels ( $L_{eq}$ ) were measured in 9 points (each point measured during 30 min). The measurements realized in different spots indicated that the highest values of the continuous equivalent acoustic level ( $Leq$ ) appear on the 1st and 2nd category roads, where the heavy traffic is intense. The most noise-polluted points in Bistrita were Auto bridge and Han Road crossing: Calea Moldovei - Năsăudului St. - 1 Decembrie (intense traffic). The highest recorded  $Leq$  values were between 83 - 84 dB(A). The evolution of the traffic volume values in Bistrita is continuously increasing and there is a higher expectation for state and local government to reduce noise levels. The Directive on Environmental Noise (2002/49/EC) developed a new framework for noise policy, based on shared responsibility between the EU, national and local level, and including measures to improve the accuracy and standardisation of data to help improve the coherency of different actions. In order to reduce the noise pollution it is necessary to diminish the noise level at the sources and to apply a combination of strategies that include noise barriers, lower vehicle noise levels and better urban planning.

*Keywords:* noise, pollution, traffic, road, health

### 1. Introduction

The escalating problems of air and noise pollutions caused by traffic are receiving top priority attention and resources from governments, the private sector and the public all over the world as they struggle to control these negative environmental concomitants of transport systems. The latest studies have shown that more than 20% of the world population lives under unacceptable noise levels and near 60% of the European

population is exposed to worrying noise levels during the day, according to Rivas et al. (2003) [1]. Road traffic noise is one of the most widespread and growing environmental problems in urban areas.

Traffic noise is one of the most commonly experienced contributors, to about 80% from noise pollution according to Samaris (1998) [4]. It has become a serious problem now because of inadequate urban planning in the past.

The impact of road traffic noise on the community depends on various factors such as road location and design, land use planning measures, building design, vehicle standards and driver behavior. Noise pollution can be defined as intrusive parasite description and also in management of the

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noise that disrupts, distracts, or detracts from regular functioning. Although many people mainly think of noise pollution as a problem of the big cities, noise pollution can also be found in suburban neighborhoods at levels that can have a negative impact according to Scott (2007) [5]. Perhaps the most serious problem created by sound pollution is the impact on health, because it can trigger the body's stress response one of its major health effects is chronic stress and the high levels of stress hormones that go with it. As a result, noise pollution has also been linked with health problems such as heart disease, high blood pressure, and stroke. It's also been linked with musculoskeletal problems.

## 2. Material and methods

The measurements were taken accordingly to the SR ISO-1996 - 1, 2 and 3 standard regulations, and the values were reported to the STAS 10144-80 and STAS 11336/1, 2 - 80 standard regulations.

Romanian standard STAS 10009-88 "Urban acoustics" established the admissible limits of the noise level in urban environment, differentiated on zones and functional endorsements, technical category of streets established on the base of the technical settlements [2, 3].

Admissible limits are established for noise level of the street (table 1) and in underground road passages, noise level inside and at the limit of functional zones of the urban environment.

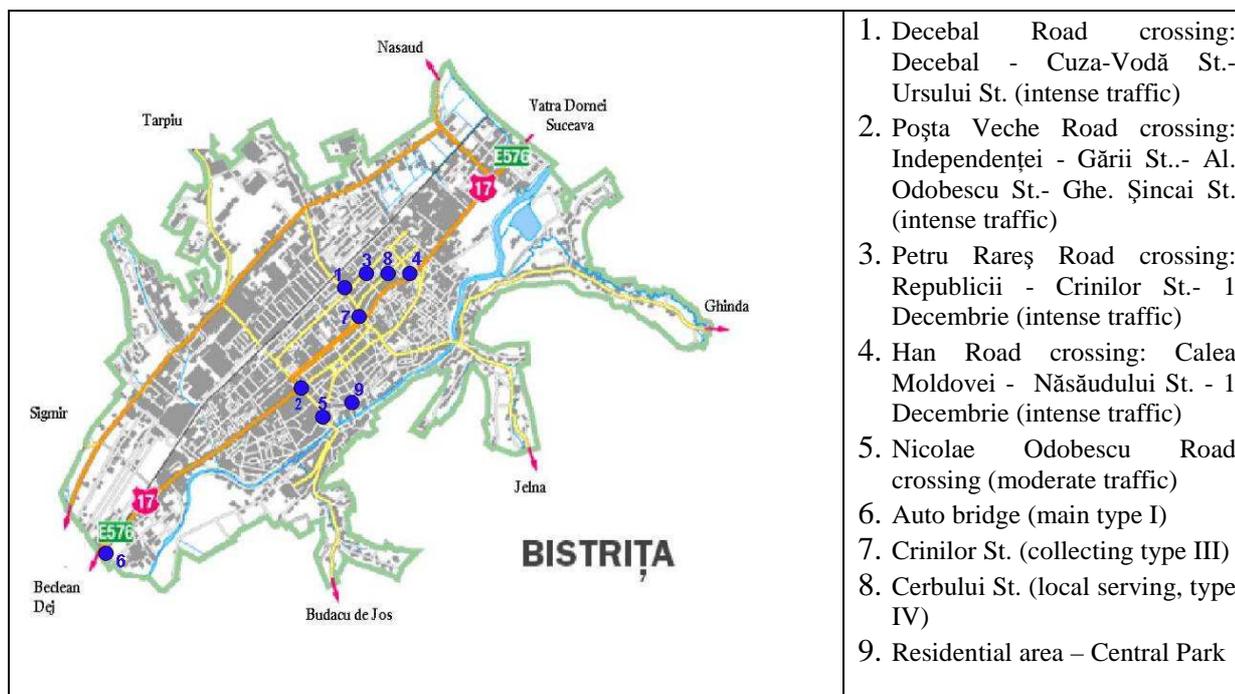
Two types of data were collected: traffic noise levels and traffic flow variables.

A pre-requisite to the start of the monitoring of traffic noise and flow variables was the identification of representative sample roadway sites.

The sites were selected such that a representative sample of each roadway classes: intense traffic streets, medium traffic streets and low traffic streets (residential areas) were included in the monitoring sample (fig.1).

Table 1

Street type (according to STAS 10144-80)	Leq (dB)	Cz(dB)	L <sub>10</sub> (dB)
I – main	75 -85	70 – 80	85 – 95
II – linking	70	65	75
III – collecting	65	60	75
IV – local serving	60	55	70



Some of the data concerning the equivalent noise level in all points of measurement are presented in table 2.

The maximum measured values were recorded in Auto bridge and Han Road crossing: Calea Moldovei - Năsăudului St. - 1 Decembrie (intense traffic). The highest recorded Leq values

were between 83 - 84 dB(A), due to the intense and heavy road traffic within the area. A direct correspondence between the intensification of the auto traffic expressed by the number of vehicles and intensity of the measured noise was recorded. These data can serve to the design of the strategies of urban development.

Table 2. The results of the determination of the noise level

Measurement point	Data	Hour	Lech dB(A)	Maximum noise level STAS 10009/88	No. of vehicles			
					<2,5 tons	2,5 - 3,5 tons	> 3,5 tons	buses
1	01.06. 2007	7:00-7:30	<b>72</b>	70	370	13	0	5
2		10:10-10:40	<b>81</b>	75	380	35	0	5
3		7:35-8:05	73	75	294	11	0	4
4		8:50-9:20	<b>83</b>	75	307	26	12	6
5		10:45-11:15	<b>67</b>	65	190	12	0	0
6		7:00-7:30	<b>84</b>	75	155	30	18	3
7	02.06. 2007	8:10-8:40	<b>73</b>	70	186	0	0	0
8		8:50-9:20	61	65	32	0	0	0
9		10:10-10:40	<b>62</b>	45	5	0	0	0
1	01.06. 2007	13:15 -13:45	<b>76</b>	70	452	26	0	3
2		14:00-14:30	<b>78</b>	75	489	37	0	2
3		14:45-15:15	<b>79</b>	75	356	24	0	2
4		15:30-16:00	<b>81</b>	75	351	8	6	2
5		16:10-16:40	65	65	168	2	0	1
6		13:00 -13:30	<b>81</b>	75	251	26	21	2
7	02.06. 2007	13:50-14:20	<b>73</b>	70	205	0	0	0
8		14:45-15:15	61	65	26	0	0	0
9		15:35-16:05	62	45	2	0	0	0
1	01.06. 2007	22:50-23:20	68	70	11	0	0	0
2		22:10-22:40	73	75	28	0	0	0
3		00:05-00:35	68	75	21	0	0	0
4		00:45-01:15	67	75	5	6	1	0
5		22:10-22:40	<b>67</b>	65	14	0	0	0
6		00:30-01:00	72	75	13	4	2	0
7	02.06. 2007	23:40-00:10	63	70	10	0	0	0
8		00:20-00:50	63	65	5	0	0	0
9		22:50-23:20	<b>56</b>	45	1	0	0	0

#### 4. Conclusions

The maximum noise levels are especially determined by the heavy traffic, technical status of the vehicles and quality of the rural surface (road situation). The measurements performed emphasize values of the equivalent noise levels between 61 – 84 dB(A).

There is an urgent need for:

- a comprehensive urban land-use planning and management.
- for improving the urban public's education concerning daily travel and its impact on human health and the environment.

The following measures will be taken with the aim of reducing the noise level produced by different sources:

- reducing noise at source by design and fabrication of silencing devices.
- blocking the ways of noise propagation by creating vegetation buffer zones in different parts of the city.
- rehabilitation of the networks of ways with intense traffic;
- supplying affluent traffic on the main urban roads through the improvement of the traffic lights cycles in crossing roads;

- reduction of traffic density in residential areas giving preferences to mass public transport system.
- the implementation of the technical measures for noise levels;
- performing special isolation for buildings against one or more types of environmental noise combined with ventilation or conditioned air facilities, in order to maintain high values of the isolations against environmental noise;
- realization of noise maps in urban areas, an important factor in establishing the future strategy of town development.

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