

A STUDY ON THE EFFECT OF AUTOTRANSPORT POLLUTION ON CHILDREN'S AND ADOLESCENTS' HEALTH

T. Yanakieva¹, T. Turnovska², S. Mladenova¹

*Regional Inspectorate for Public Health Protection and Control -Haskovo¹,
Medical University –Plovdiv²*

Reviewed by: Assoc. Prof. B. Varbanova, MD, PhD

INTRODUCTION

Pollution produced by auto transport is one of the main risk factors for health in urbanized areas. Its complex effect, including high levels of noise and more than 200 kinds of atmosphere pollutants, is aetiologically related to hearing loss, sleeping disorders, cardio-vascular, psychic and psychological effects, reduction of work capacity (10). Numerous studies have shown that practically there are no organs or systems in the human body that are spared the detrimental effect of noise (1,3); 12-15% of the employed population in Germany and other developed countries are exposed to noise levels of over 85 dB/A which is the cause for hearing reduction and hearing loss in 20% of them. Noise with intensity of 80/A dB may increase social aggressiveness in people. (10).

On the other hand, it is recognized that the number of deaths caused by the air pollution from the autotransport in the European region is equal to the number of fatalities caused by car accidents on roads. Motor vehicle traffic is an important factor in polluting the atmospheric air with NO₂. This pollutant has a strong irritating effect on the respiratory mucous membranes and leads to an increased risk of respiratory diseases (9). Furthermore, nitrogen dioxide initiates the formation of ozone in the tropospheric layer which intensifies even more its well manifested oxidizing property.

Children and adolescents are the most vulnerable to the unfavorable health effects caused by auto transport. With this study we set the **objective** to analyze the effect of pollution produced by auto transport on children's and adolescents' health in the town of Haskovo.

MATERIAL AND METHODS

In the month of December, 2005 we surveyed 352 parents of children, from 0 to 7 years old, and students aged 8 to 17, distributed in 3 groups:

1. Residing in proximity to control point 1 (CP 1) reporting the pollution from heavy auto traffic (the crossroad of Bulgaria Blvd. and Saedinie Blvd.).
2. Residing in proximity to control point 2 (CP 2), located in an area where there is a regulation enforced to insure protection from noise – near the Aleko Konstantinov school.
3. Residing in proximity to control point 3 (CP 3), located in an area with light traffic – apartment block 29 in the Orfei residential district.

The survey form which we created for this purpose included the following questions:

1. Sex, age, place of residence, how long have you lived in this home;
2. Has the child/student been sick over the last 12 months;
3. If the answer is 'yes', how many times has he/she been sick and what types of sickness;
4. Is there a registered case of bronchial asthma or other allergic conditions;
5. Type of heating in the home;
6. Are there pets in the home where the child/student lives;
7. Does traffic noise affect the child/student in any way, what is your opinion about its effect;
8. Does anybody smoke in the home where the children/students live.

Primary data obtained by Regional Inspectorate for Protection and Control of Public Health has been used for an estimate of the noise levels, and for the air pollution – data by Regional Environment and Water Inspectorate in the town of Haskovo.

RESULTS

The structure and intensity of transport traffic at the control points are represented in table 1, and the average levels of noise – in table 2:

The highest noise levels at CP 1 vary around 90.2 dB/A, at CP 2 – around 78.67 dB/A, and at CP 3 – around 79 dB/A; the lowest levels range around 60.08 dB/A at CP 1, around 42.7 dB/A at CP 2 and 43.6 dB/A at CP 3.

The data on the quality of atmospheric air for the year 2005 shows that the latter vary in the admissible average yearly concentrations. Only for the NO₂ index for the month of

Address for correspondence:

T. Yanakieva, Regional Inspectorate for Public Health Protection and Control -Haskovo.

E-mail: tanya316@abv.bg

Table 1. Structure and intensity of transport traffic at the control points

Control points	Time	Number of motors per hour	Cars (%)	Lorries (%)		Motorcycles (%)
				Petrol engines	Diesel engines	
CPI	8.00	2332	85.76	0.34	12.87	1.03
	13.00	2220	86.49	0.72	11.71	1.08
	16.00	2380	89.08	0.34	10.08	0.50
CP II	10.00	24	100	0	0	0
	12.00	46	95.65	0	4.35	0
	15.00	40	90	0	10	0
CP III	9.00	87	86.21	0	13.79	0
	11.00	104	80.77	0	19.23	0
	15.00	49	99.51	0	0.49	0

February, 2005 it is reported that 2.6% of the samples have exceeded the limit of admissible concentration, and the reported maximum one-time concentration is $375.90 \mu\text{g}/\text{m}^3$, with a standard admissible level of $200 \mu\text{g}/\text{m}^3$.

Table 2. Average hour's levels of noise

Control points	Hygiene limits dB (A)	Established levels dB (A)
CPI	60	70.6
CP II	45	54.7
CP III	55	58.9

The information about the heating in the homes of the people who participated in the survey is presented in table No. 3.

Table 3. Type of heating

Control points	Electricity	Central heating	Firewood, coals	Naphtha	Gas
CPI	114	29	77	0	1
CP II	9	7	26	0	1
CP III	48	13	65	1	1

ANALYSIS

The surveyed children and students have been subjected to the constant impact of pollution produced by auto transport through their entire lives so far. This has taken its toll in regards of their health status. The percentage of children and adolescents who have been sick over the last 12 months is

highest among those residing in proximity to CP 1 – 47.8%, followed by the share of those residing in proximity to CP 3 (an area inside the neighborhood) – 27.3%, and lowest – among those residing in the area which is with strengthened protection against noise – CP 2 – 7.63%. The frequency of respiratory disorders and diseases is also the highest in the group of those residing near CP 1 – 94 %, compared with 12.84% for those residing near point CP 2 and 57.7% for individuals residing near CP 3. We believe this is related to the negative effect of air pollution caused by the heavy motor vehicle traffic at CP 1, which confirms the findings of J. R. Stedman, E. Linehan, K. King (7) and U. Gehring et al. (9). Similar interrelation is found also in children and teenagers who have had the flu – 25.60% at CP 1, 1.99% at CP 2 and 12.22% at CP 3. If we assume that flu is the primary cause for the higher frequency of respiratory diseases in people residing near CP 1, the following supposition can be made – that its origin and spread is related to the immunosuppressive effect of both noise and air pollutants from auto transport (8). The facts showing bronchial asthma (9.85% in those residing near CP 1, 2.15 % in those residing near CP 2 and 3.08 % in those residing near CP 3) and symptoms indicative of other allergic disorders (18.06% in residents near CP 1, 7.23% in residents near CP 3 and 5.07% in residents near CP 2) also support this supposition. In the group of allergic disorders skin allergies are predominant (8.25% at CP 1, 5.7% at CP 2 and 2.3 % at CP 3) and also ophthalmic allergies (4.62% at CP 1, 1.23% at CP 2, 1.54% at CP 3). We should point out, however, that these findings could be interpreted by taking into consideration also the highest frequency of pets in the homes of those surveyed, residing near CP 1(13.6%), compared with 3.41% for those residing near CP 2 and 5.4% for those near CP 3. We should not overlook also the fact that the percentage of passive smokers is highest among those residing near CP 1 – 32.6%, compared to 6.46% for those near CP 2

and 23.7% for CP 3. The difference in home heating is also evident: 21.9% of those residing in homes near CP 1 use wood and coal which is a prerequisite for the increase of air pollutants in their homes, compared to, respectively, 7.24% of those residing near CP 2 and 18.5% of those residing near CP 3. Therefore, we think that the reported higher morbidity rate in children and adolescents residing in the proximity of CP 1 is the result of the complex impact of pollution caused by motor vehicle traffic and the unhealthy living conditions.

A large number of the surveyed individuals report unpleasant odor emitted by auto transport – fig. 1

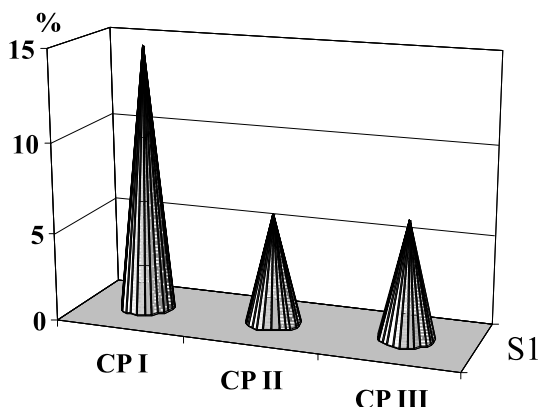


Fig. 1. Percentage of those who replied 'yes' to the question: "Do you sense an unpleasant odor from the passing motor vehicles?"

The irritating effect of noise is reported by 17.53 % of children and teenagers residing in homes near CP 1, and by 0.57% for CP 2 and 2.84% for CP 3. This result is correlated to the replies to the question "Does noise coming from the street interfere with your preparing the lessons?" - fig. 2.

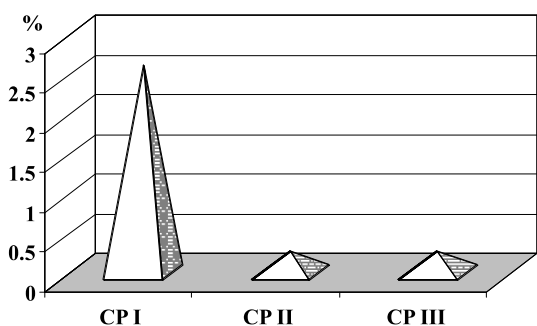


Fig. 2. Percentage of those who replied 'yes' to the question: "Does noise coming from the streets interfere with your preparing your lessons?"

Keeping in mind the presented findings, however, it is difficult to account for the better grades of students residing near CP 1. 28.4% of those residing near CP 1 have excellent grades, and 4.83% for those residing near CP 2 and 9.09% for those residing near CP 3. Probably this is determined to a great extent by individual factors for the families and students, including the fact that a great number of the surveyed students residing near CP 1 study in one of the best schools in town.

CONCLUSION

1. Pollution produced by heavy auto transport traffic contributes to a higher general and respiratory sickness rate in children and adolescents.
2. Noise produced by auto transport has a well manifested irritating effect on children and adolescents, and probably it hinders their successful preparation for school.
3. Children and teenagers residing in proximity to heavy motor vehicle traffic sense unpleasant odors from the exhaust gases.

LITERATURE

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