

THE POTENTIAL HEALTH RISKS CAUSED BY DECADES OF HEAVY METAL POLLUTION IN REȘIȚA CITY, CARAȘ-SEVERIN COUNTY, ROMANIA

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ABSTRACT

There is growing concern about the effects of environmental contaminants on human health. In heavily industrialized area an increasing number of nose, throat and ears diseases caused especially by particulate matter were found. Respiratory system is the main gate of entry to the air pollutants in the body and the children are especially affected. In Reșița town, Caraș-Severin County, Romania, the level of particulate matter carrying heavy metals and many substances is often exceeded. The potential health risk caused by decades of pollution in this town was investigated. Most affected are children aged 7-11 years with relatively high frequencies of pharyngitis, laryngitis, tracheitis, bronchitis and pneumonia. Almost 50% of medical investigated children had respiratory diseases. Effect on children's health of each sterile dump in part, as source of pollution, is not obvious but can be assumed a cumulative effect.

INTRODUCTION

Results from epidemiological studies during the last decades have consistently shown that moderate and low concentrations of atmospheric pollutants such as ambient particles can have both short- and long-term effects on health. Ambient particles are a mixture with various physical properties including heavy metals, polycyclic, aromatic hydrocarbons, carbonaceous material, sulphates and nitrates [1, 2].

Many researchers have investigated the link between outdoor air pollution and respiratory disease and have demonstrated that exposure to major air pollutants, especially suspended particulate matter, are related to immunity response [3] and respiratory prevalence [4]. Children younger than 15 years inhale more air, and therefore more pollutants. They breathe faster than adults and tend to breathe more through the mouth, bypassing the natural filter, the nose. Particulate matter is carrying toxic metals from industrial processes and combustion of coal, fuel, garbage. Metals accumulate in the body and cause toxic effects of short or long time. Long exposure to high concentrations may affect the nervous system, kidney functions, liver, respiratory [5]. Anthropogenic activities release large amounts of heavy metals into atmospheric and hydrologic systems that can be transported for hundreds of kilometers in relatively short times. [6, 7].

Assessment of long term effects of pollution on human health strongly depends on epidemiologic studies [8]. What we know so far, in Reșița town (Caras Severin County Romania), there were no epidemiological studies done, no data on correlations between air pollution and population health status although the heavy industry has been active for

Three clusters could be seen clearly on age categories. It is surprising the cluster 1 (in the left of each figure) which include distinguished group of children aged 3-7 years with low incidence of respiratory diseases (0.27) although strong nearby source of pollution; cluster 2 include children with 8-10 and 12-13 years (incidence 0.35).

Table 1. Children diagnosed with respiratory disease in 2009

Age	No. of children medical tested	Number of children with:			No of sick children	Percent of sick children, %
		Pharyngitis, laryngitis	Tracheitis, bronchitis, pneumonia	Asthma, allergic rhinitis		
3-7	144	40	20	5	65	45,13
7-8	164	73	35	10	118	71,95
8-9	166	58	25	7	90	54,22
9-10	134	47	37	8	92	68,65
10-11	192	62	53	4	119	61,98
11-12	149	40	22	4	66	44,29
12-13	132	28	18	3	49	37,12
13-14	137	23	9	4	36	26,27
14-15	136	44	17	2	63	46,32
15-16	110	26	11	2	39	35,45
16-17	95	29	18	3	50	52,63
17-18	83	18	10	2	30	36,14
18-19	79	19	10	2	31	39,24
Total	1721	507	285	56	848	49,27

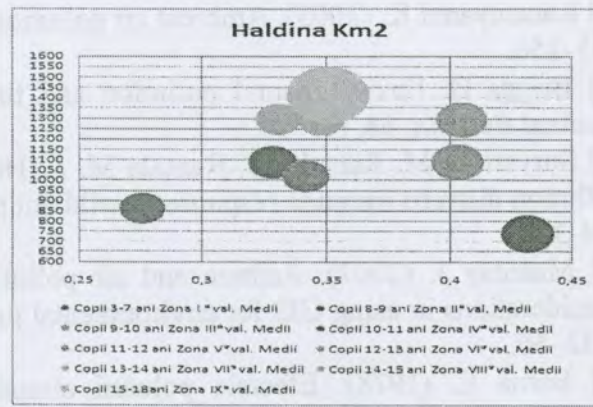
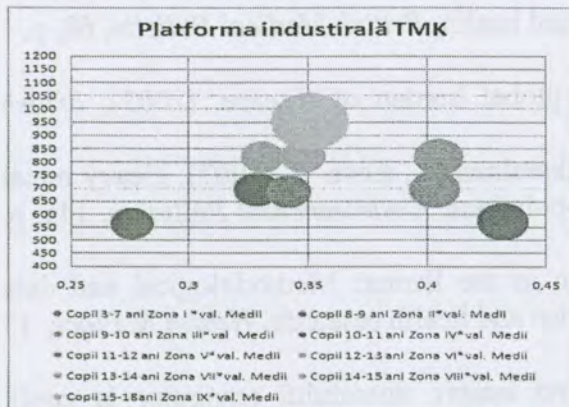
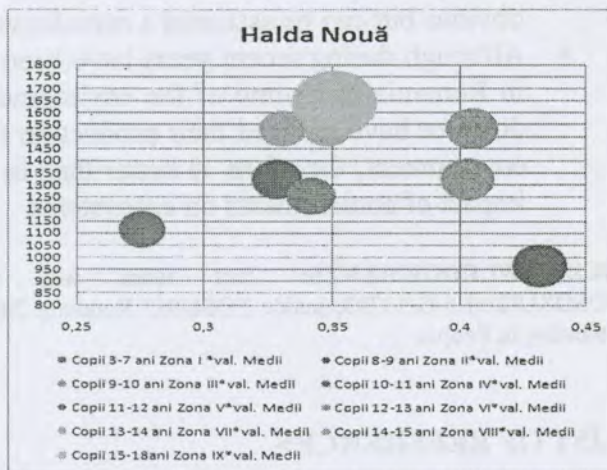
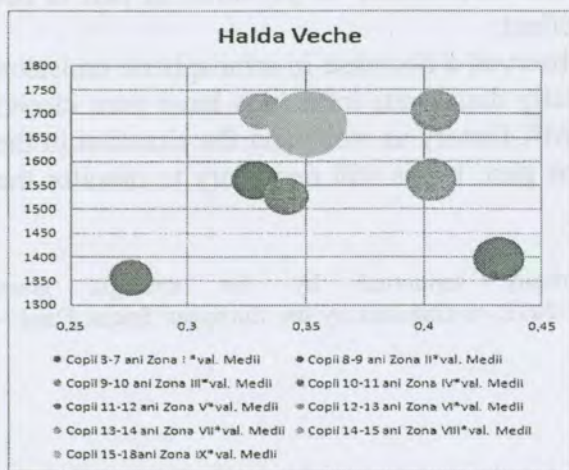


Figure 2. The incidence of respiratory diseases (Ox axis) at children by age, correlated with distance from polluting sources (Oy axis): in top left- Old Dump, bottom left- TMK industrial platform, top right New Dump, bottom right – Haldina Dump. With different colors were represented: children by age: 3-7 years, 8-9, 10-11, 12-13, 14-15, 16-18 years old.

Decrease of the disease incidence is associated more strongly with subject age (negative correlation, respectively high age, low incidence); relative distance from pollution source appears to have less influence. Frequency, distribution, the share of the population is similar to the identification of the data recorded for New Dump, Old Dump, Haldina Dump and TMK Platform. Differences are recorded only by different relative distances from one site to another. This surprising similar distribution in the four representations may indicate concomitant influence of the four sources of pollution placed close to residential areas.

CONCLUSIONS

- Resita is an old city where heavy industry has produced numerous tailings deposits. The city has developed over time near sterile dumps and the population's health is possible to be affected;
- Our study indicates an increased incidence of respiratory diseases in children aged between 8 and 11 years and declining once out of adolescence;
- in 2009, almost 50% of medical investigated children had respiratory diseases;
- Effect on children's health of distance from each source of pollution in part is not obvious but can be assumed a cumulative effect;
- Although during recent years have been observed a decrease in atmospheric emission in Romania and some of the environmentally dangerous industries have been closed down or have reduced their production (TMK factory as well) and the situation in the environment, therefore, is better than in the past, but is still necessary to monitor the impact of contaminants on ecosystems.

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