

## ASPECTS REGARDING THE IMPACT OF POLLUTION ON THE HEALTH OF THE INHABITANTS OF WESTERN REGION, ROMANIA

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### Abstract

*The present work aims to present aspects related to the main sources of environmental pollution that exist in the Western Region, as well as the impact of pollution on the health of the inhabitants, in order to ensure a healthy living environment for all the inhabitants of the region. Industrial activities located in this delimited area, sometimes very close or even in human settlements, lead to the appearance of intense sources of environmental pollution with effects on the health of the inhabitants. The short- and medium-term effects of air pollution are detrimental to human health and harm ecosystems and the economy. Long-term pollution affects the environment through: the effect of greenhouse gases, the destruction of the ozone layer, the presence of heavy metals, dust and suspended particles. The greenhouse gases specified in one of the annexes to the Kyoto Protocol are: carbon dioxide, methane, nitrous oxide. Heavy metals (mercury, cadmium, lead) are now well ahead of well-known pollutants such as carbon dioxide and sulfur and are predicted to be considered more dangerous than nuclear and solid waste. Heavy metal contamination is associated with their widespread use in industrial production, coupled with poor cleaning systems, as a result of which heavy metals enter the environment. Among all pollutants, suspended particles, nitrogen oxides, especially nitrogen dioxide, and ozone pose the highest risk to human health. Air pollution is potentially the most serious short- and medium-term health problem. Polluted air is the most difficult to avoid, and its effects penetrate everywhere and harm the health of the population. The Western Region has numerous sources of pollution such as the steel industry, the electricity and thermal energy production industry, the construction materials industry and the extractive industry.*

**Key words:** Western Region, pollution, heavy metals, disease, gas emissions

### INTRODUCTION

This region analyzed in this study is situated in the Western part of Romania. Due to its location, the region has a strategic position in Europe, being the main gateway to Romania from Hungary and Serbia.

The Western Region analysed in this paper consists of the following counties: Arad, Timis, Caras-Severin and Hunedoara Map 1 [23].

To assess the level of air pollution at the local level, we analysed several pollutant emissions and were thus able to identify the air quality. [18]

At the Western Region level, there are air quality monitoring stations in each county, distributed as follows: Arad-4, Caras-Severin-4, Hunedoara-21, and Timis-4 [11].



Map 1. Location of the analyzed region  
Source: Personal processing after <https://www.google.com/search?q=regiunea+de+vest> [23].



Map 2. The situation of suspended particles in the region

Source: Personal processing after <https://www.google.com/search?q=regiunea+de+vest> [23].

Suspended particles are a complex mixture of very small particles and liquid droplets. Larger particles are generally filtered out of the nose and throat and do not cause problems. Particles smaller than about 10 micrometres, called  $PM_{10}$ , and particles smaller than 2.5 micrometres ( $PM_{2.5}$ ) can enter the respiratory tract and deep into the lungs and cause health problems [1], [7].

The situation of the suspended particles in the studied region is shown in Map 2.

Hunedoara County has the largest share of regional  $CO_2$  and  $N_2O$  emissions - 47.2% for  $CO_2$  and 56.7% for  $N_2O$ ; for  $CH_4$ , Timiș County has the highest contribution with 61.5%. The contribution of the energy sector to greenhouse gas emissions is significant, with 4.7% of total  $CO_2$  emissions coming from this sector [9], [22].

In this context, the present work analyzes the main sources of environmental pollution existing in the Western Region, as well as the impact of pollution on the health of the population, in order to ensure a healthy living environment for all the inhabitants of the region.

## MATERIALS AND METHODS

In order to carry out the study proposed in this article, we studied and analysed the information available in specialised databases. In addition to studying the literature, we also consulted works specifically dedicated to this subject. To better understand the effects of pollution, we contacted people specialised in this field who have direct contact with the

places affected by pollution in the region analysed.

These people explained the problems from their point of view. In addition to the experts, we also met with the local authorities [15], [19].

As a result of these discussions, we were able to analyse the pollution problem more accurately because they gave us up-to-date data. The national statistics also helped, because they are up-to-date.

In this way, we were able to centralise the obtained data, process it and present the pollution situation in both tabular and graphical form. Finally, we were able to present some important conclusions of the study [2].

## RESULTS AND DISCUSSIONS

Pollution is a worrying phenomenon that affects us every day, and studies show that prolonged exposure to pollution can cause various serious diseases [8].

The WHO (World Health Organization) draws attention to the fact that pollution makes this global warming crisis, in reality, a crisis with health implications [4], [14].

Air pollution is represented by the presence of harmful gases in the air and suspended particles (PM).

Chronic or recurrent inflammation of the airways generated by long-term exposure to atmospheric pollutants and, even more so if associated with unhealthy habits such as smoking, lead to damage to the cells that cover our respiratory system [9].

The main greenhouse gases tracked in this paper are: carbon dioxide ( $CO_2$ ), methane ( $CH_4$ ), nitrogen dioxide ( $NO_2$ ), sulphur dioxide ( $SO_2$ ), ammonia ( $NH_3$ ) and ozone ( $O_3$ ), and the main heavy metals are: Mercury (Hg), Cadmium (Cd) and Lead (Pb) [13].

Toxic metals come from the combustion of coal, fuels, household waste, etc. and from certain industrial processes.

They are generally found in particulate form (except for mercury which is gaseous).

Metals accumulate in the body and cause short- and/or long-term toxic effects [9],[14].

The main greenhouse gas emissions at the level of the Western Development Region are presented by county in Table 1, respectively Figure 3 [12].

Table 1. The situation of greenhouse gas emissions

County	CO <sub>2</sub> , t/year	CH <sub>4</sub> , t/year	N <sub>2</sub> O, t/year
Arad	2,884.62	38,133.92	1,278.92
Caraş Severin	2,603.38	25,195.11	209.53
Hunedoara	5,803.00	76,307.65	2,045.35
Timiș	998.67	223,172.24	72.04
<b>Western Region</b>	<b>12,289.67</b>	<b>362,808.92</b>	<b>3,605.84</b>

Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [9], [13]

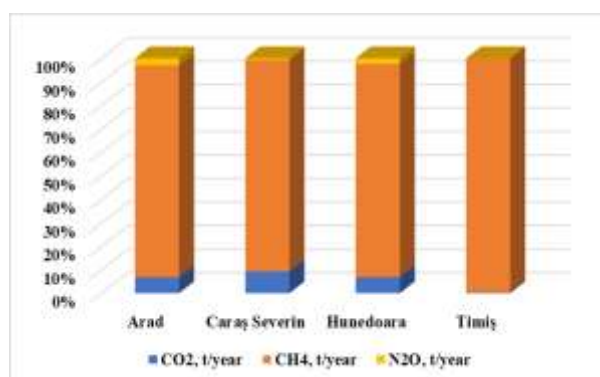


Fig. 3. The situation of greenhouse gas emissions

Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [19], [13].

*Carbon dioxide* (CO<sub>2</sub>) is a chemical compound resulting from the oxidation of carbon. On the other hand, it is a by-product in industrial processes such as the production of cement, steel, ammonia, methanol, ethylene, acetic acid, acrylic acid and other organic compounds. Carbon dioxide is essential for our survival because it is assimilated by plants in the process of photosynthesis, which in turn produce oxygen, which sustains life.

Carbon dioxide is an inert gas that can cause the elimination of oxygen (thus causing suffocation and death), it is a colorless gas, also present in the earth's atmosphere in a concentration of approximately 0.04% necessary to maintain the balance of the biosphere and one of the most important gases with an effect greenhouse [13], [14].

*Methane* (CH<sub>4</sub>) is a greenhouse gas with a fairly large weight, contributing to the warming of the Earth's atmosphere. It is a colorless and odorless gas, soluble in organic solvents and insoluble in water.

Cooking with natural gas emits nitrogen dioxide, carbon monoxide, carbon dioxide and unburned methane that can linger indoors for hours after the stove is used. More than 700,000 children in the EU had asthma symptoms in the last year due to cooking with methane gas, and for adults, cooking with methane gas can have a negative impact on the brain, respiratory and nervous systems [13].

*Nitrous oxide* (N<sub>2</sub>O), also known as laughing gas, is a dangerous chemical. It is a colorless gas with a sweet smell. N<sub>2</sub>O is an oxidizer that can support combustion under certain conditions, but is stable at room temperature and has a mild anesthetic effect. and can make people laugh. In high concentrations it can cause suffocation [13].

From Figure 3 it can be seen that the emissions of CH<sub>4</sub> are considerably higher than those of CO<sub>2</sub> and N<sub>2</sub>O in all counties of the western region, reaching the maximum value in Timiș county. As a result of the presence of certain pollutant emissions in the air, as a result of some chemical reactions, the pH of the air, precipitation and, sometimes, the soil changes [20].

*Nitrogen dioxide* (NO<sub>2</sub>) is a chemical generated by engines, especially diesel engines. Exposure to it reduces resistance to infection and is associated with an increase in chronic respiratory diseases and premature aging of the lungs. For example, nitrogen dioxide pollution caused 49,000 premature deaths in the EU in 2020 [19], [1].

*Sulphur dioxide* (SO<sub>2</sub>) is a colorless, bitter, non-flammable gas with a pungent odor that irritates the eyes and respiratory tract. Depending on the concentration and exposure period, sulphur dioxide has different effects on human health [10].

Exposure to a high concentration of sulphur dioxide over a short period of time can cause severe breathing difficulties. People with asthma, children, the elderly and people with

chronic respiratory diseases are particularly affected [14].

Long-term exposure to a low concentration of sulfur dioxide can result in respiratory tract infections.

Ozone (O<sub>3</sub>) is a highly oxidizing, highly reactive gas with a suffocating odor. It concentrates in the stratosphere and provides protection against life-damaging UV radiation. Ground level ozone causes respiratory irritation and eye irritation. High concentrations of ozone can cause reduced respiratory function.

Sulphur dioxide can potentiate the dangerous effects of ozone [10], [18].

Ammonia can be found in the air as a toxic gas with a pungent smell, liquid aerosols (NH<sub>3</sub>) or solids (ammonium sulfate, ammonium chloride, etc.). Ammonia in relatively high concentrations is a strong irritant of the eyes and upper respiratory tract, the effect also depending on the salt formed. Due to its characteristic smell, it represents a discomfort factor [11].

Gas emissions with an acidifying effect from the studied region are highlighted both at the regional and county level in Table 2.

Table 2. Emissions of gases with acidifying effect

County	SO <sub>2</sub> , t/year	NO <sub>2</sub> , t/year	NH <sub>3</sub> , t/year
Arad	13,715.32	9,999.09	4,624.97
Caraş Severin	19,857.78	3,884.71	5,951.73
Hunedoara	54,073.21	14,800.89	877.28
Timiș	3,973.56	1,380.56	9,295.63
<b>Western Region</b>	<b>91,619.87</b>	<b>30,065.25</b>	<b>20,749.61</b>

Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [19], [13].

Analyzing Figure 4, it can be seen that the largest amounts of SO<sub>2</sub> and NO<sub>2</sub> came from Hunedoara County, while Timiș County had the lowest values for both gases.

Regarding NH<sub>3</sub> emissions, they showed the highest values in Timiș county and the lowest in Hunedoara County.

It should be mentioned that the higher values of the concentrations recorded for the NH<sub>3</sub> indicator in Caraş-Severin County are not

justified by the specifics of the economic activities in the area and it is assumed that they are of cross-border origin [17], [16].

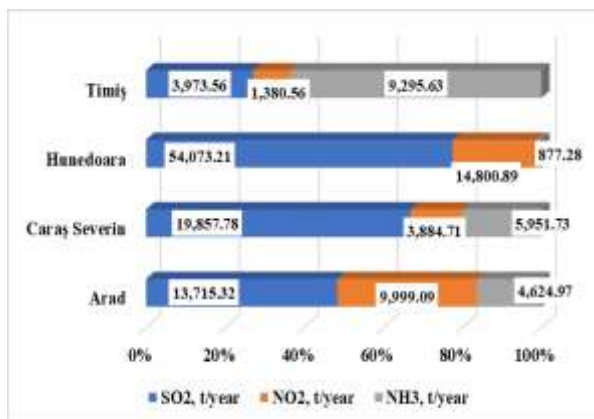


Fig. 4. Situation of gases with acidifying effect

Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [19], [13].

If these chemical compounds appear in large quantities in the air, the pH of the precipitation decreases, they become acidic and become extremely harmful to the environment.

In the West Region, precipitation are collected in 37 sampling points. The lowest pH measured in the West Region was 4.9 and was recorded in Arad County. Emissions of heavy metals: mercury and cadmium come from various industrial processes and road traffic, for lead (Table 3)

Table 3. Heavy metal emissions

County	Mercury, kg/year	Cadmium, kg/year	Lead, kg/year
Arad	63.32	12.93	35,412.65
Caraş Severin	11.04	86.75	18,303.28
Hunedoara	407.36	411.22	7,546.49
Timiș	12.57	31.81	223.82
<b>Western Region</b>	<b>494.29</b>	<b>542.71</b>	<b>61,486.24</b>

Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [19], [13].

In case of exposure to high concentrations, they can affect the nervous system, kidney, liver and respiratory functions.

One of the most used and at the same time dangerous heavy metals is mercury. It is used

in amalgam fillings, mercury in thermometers and even insecticides used to preserve grains, real sources of poisoning with mercury preparations. Unfortunately, mercury crosses the placental barrier and that is why doctors in many countries call the attention of pregnant women to completely avoid tuna, considered to be one of the most contaminated fish with mercury. We are born without cadmium in the body because cadmium does not cross the placental barrier. At humans, cadmium accumulates predominantly in the kidneys and in smaller amounts in the liver and other organs. Studies by American doctors have proven the link between cadmium accumulation and cardiovascular diseases [21].

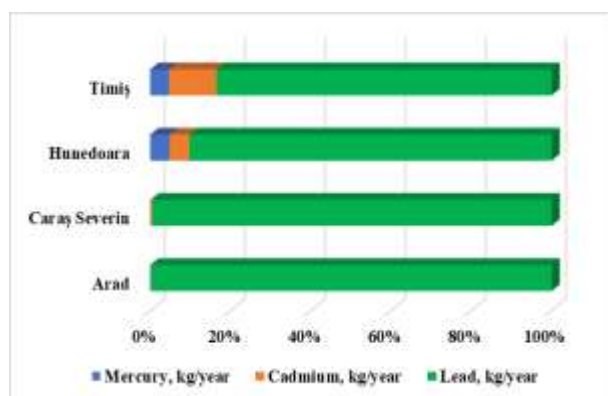


Fig. 5. The situation of heavy metals

Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [19], [13].

Lead is one of man's old enemies. Since lead is present everywhere in nature and therefore also in many of the ingredients that make up our food, limit-admissible concentrations have been established for lead. Lead poisoning leads to the development of nephritis, the blocking of the activity of red blood cells and the disruption of the conductivity of nerve impulses. Sources of lead poisoning can be gasoline, foods and beverages stored in containers containing lead, or lead-containing paints [21].

To a large extent, mercury and, to a lesser extent, cadmium emissions also come from the waste treatment and storage activity. 82.4% of mercury emissions and 75.7% of cadmium emissions are found in Hunedoara

County, while 57.6% of lead emissions come from Arad County. In the West Region there is a background pollution monitoring station, located in the Semenic mountain area, Caraș-Severin County (Figure 5) [20], [17].

Particulate matter is dust suspended in the air from the use of chemicals or the burning of fuels. For the indicators of suspended and sedimentable particles, frequent exceedances of the maximum admissible concentrations are recorded, which is not the case for the other pollutants [6].

The sources of atmospheric pollution with analyzed pollutants are:

- road traffic in all counties of the West Region,
- steel and metallurgical industries (in Caraș-Severin and Hunedoara Counties)
- thermal power plants that use solid fuels (throughout the region)
- the cement industry (in Hunedoara County),
- household waste dumps (throughout the region)
- landfills for tailings (Caraș-Severin and Hunedoara Counties), etc. [9], [16].

In Table 4 we have presented data on the concentrations determined for suspended particles in the counties of the analyzed Region and the localities where the highest values are recorded.

Table 4. Concentrations determined for suspended powders

County	Specification			
	Arad	Caraș Severin	Hunedoara	Timiș
City	Arad	Reșița	Chișcădag	Timișoara
Annual average concentration, mg/mc	0.1897	0.1599	0.0688	0.0712
Maximum annual concentration, mg/mc	0.3000	0.3488	0.407	0.441
% of annual averages concentrations	200	232.5	271.3	294
<b>Exceeded frequency, %</b>	<b>89.91</b>	<b>44.12</b>	<b>14.53</b>	<b>7.51</b>

Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [19], [13].

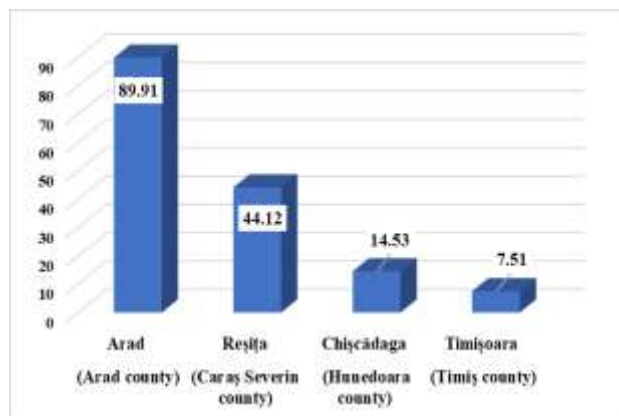


Fig. 6. Overtaking frequency of suspension powders (%)  
Source: Processed based on <http://statistici.insse.ro>, Regional Action Plan for Environment 2019-2023 [19], [13].

Figure 6 highlights the frequency of exceeding concentrations in percentage. Table 4 also illustrates the fact that, although the highest average annual concentrations are recorded in the counties of Arad (0.1897mg/cm) and Caraș-Severin (0.1599mg/cm), the highest values of the maximum annual concentration were measured in Timiș County (0.441mg/cm) and Hunedoara (0.407mg/cm) [19], [18]. A comparison between the average annual concentration and the maximum annual concentration of the counties in the studied area can be seen in Figure 9.

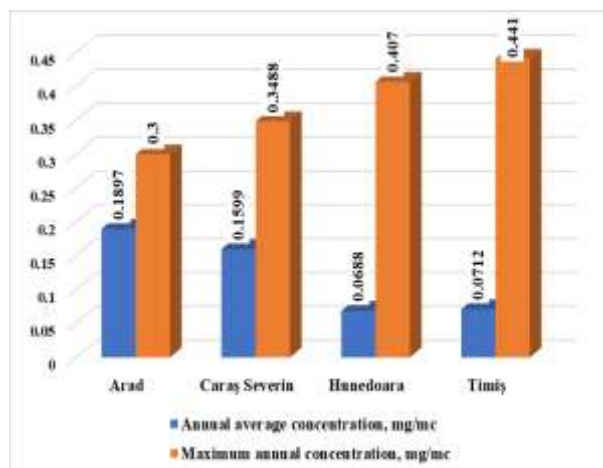


Fig. 7. Annual average concentration and annual maximum concentration (mg/mc) in Western Region  
Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [19], [13].

There are 26 large combustion plants in the West Region. The amount of gas emitted by them is shown in Table 5.

Table 5. The quantity of gases emitted by large combustion installations

County	Sulphur dioxide, t	Nitrogen oxides, t	Powders, t
Arad	105.551	643.279	358.411
Caraș Severin	16.401	209.221	3.117
Hunedoara	38,449.833	10,850.330	11,257.851
Timiș	2,333.122	956.703	120.051
<b>Western Region</b>	<b>40,904.907</b>	<b>12,659.533</b>	<b>11,739.430</b>

Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [19], [13].

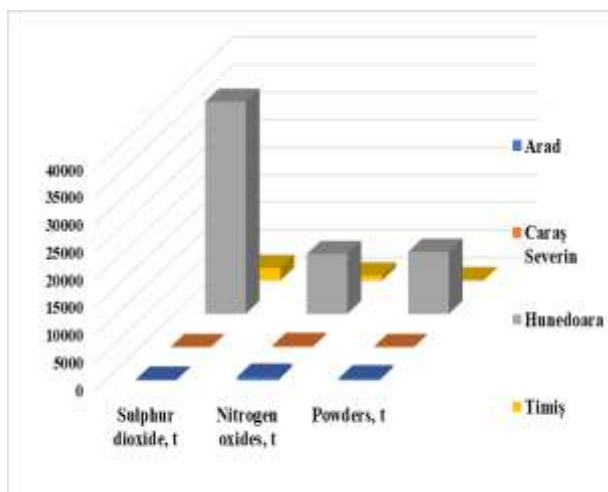


Fig. 8. The quantity of gases emitted by large combustion installations

Source: Processing and centralization according to the data from the authorities, <http://statistici.insse.ro> and Regional Action Plan for Environment 2019-2023 [19], [13].

Hunedoara County [3] has the main share of emissions from large combustion plants: 94% for SO<sub>2</sub>, 85.7% for NO<sub>2</sub> and 95.9% for dust, values that can be observed in Table 5, respectively Figure 8.

Caraș-Severin County records the lower values for sulfur dioxide, nitrogen oxides and dusts.

Table 6 highlights the evolution of the number of illnesses by disease class in our country starting from 1992 until 2021.

To better highlight the evolution of these illnesses over time, at the national level, we have created Figure 9 below.

Table 6. Number of illnesses, by disease classes at the national level

	1992	2000	2010	2018	2019	2021
Tumors	45	40,689	68,349	96,996	108,141	85,552
Diseases of the circulatory system	413	678,398	884,666	816,231	872,278	788,682
Respiratory diseases	6,79	6,749,24	6,870,81	5,138,29	4,938,59	4,127,67
Congenital malformations, deformities and abnormalities	8	0	9	7	6	5
	3	6,896	6,733	9,963	12,025	9,960
<b>TOTAL</b>	<b>7,259</b>	<b>7,475,223</b>	<b>7,830,567</b>	<b>6,061,487</b>	<b>5,931,040</b>	<b>5,011,869</b>

Source: Processing of the authors according to the received data and after <http://statistici.insse.ro> [13].

The lungs are permanently affected by the existing atmospheric pollution, that's why out of the total number of existing diseases at the national level of 5,011,869, the largest number is owned by respiratory diseases - 4,127. 675 [1], [5] (Table 6).

Statistics from Romania show that, annually, 10,770 Romanians are killed by bronchopulmonary cancer, this disease occupying the first place in the hierarchy of types of cancer in Romania.

Table 7. The situation of deaths in the analyzed region caused by pollution

Specification	1990	2000	2010	2018	2019	2021
<b>Tuberculosis</b>						
Western Region	184	248	152	91	136	93
Arad	49	55	26	26	25	20
Caras-Severin	35	48	48	16	25	20
Hunedoara	34	41	39	14	41	14
Timis	66	104	39	35	45	39
<b>Tumors</b>						
Western Region	3,543	4,056	4,665	4,691	4,689	4,696
Arad	1,099	1,143	1,200	1,067	1,044	1,079
Caras-Severin	599	643	689	739	685	700
Hunedoara	750	912	1,168	1,235	1,250	1,235
Timis	1,095	1,358	1,608	1,650	1,710	1,682
<b>Diseases of the circulatory system</b>						
Western Region	15,949	15,989	14,579	12,874	12,771	14,220
Arad	4,571	4,342	3,662	3,360	3,240	3,567
Caras-Severin	3,142	2,937	2,755	2,439	2,343	2,651
Hunedoara	3,372	3,811	3,383	3,511	3,443	3,936
Timis	4,864	4,899	4,779	3,564	3,745	40,66
<b>Respiratory diseases</b>						
Western Region	2,001	977	1,244	1,704	1,690	4,001
Arad	501	205	422	452	508	1099
Caras-Severin	460	254	138	221	241	621
Hunedoara	401	268	385	354	340	1,087
Timis	639	250	299	677	601	1,194
<b>Congenital malformations, deformities and abnormalities</b>						
Western Region	141	72	54	25	15	15
Arad	25	8	13	5	7	5
Caras-Severin	24	16	9	-	2	2
Hunedoara	38	21	13	5	1	4
Timis	54	27	19	15	5	4
<b>TOTAL</b>						
Western Region	<b>25,944</b>	<b>24,626</b>	<b>24,064</b>	<b>23,718</b>	<b>23,497</b>	<b>27,375</b>
Arad	<b>7,250</b>	<b>6,559</b>	<b>6,133</b>	<b>5,903</b>	<b>5,872</b>	<b>6,926</b>
Caras-Severin	<b>4,941</b>	<b>4,514</b>	<b>4,294</b>	<b>4,174</b>	<b>4,014</b>	<b>4,703</b>
Hunedoara	<b>5,665</b>	<b>5,964</b>	<b>5,784</b>	<b>5,934</b>	<b>5,885</b>	<b>7,093</b>
Timis	<b>8,088</b>	<b>7,589</b>	<b>7,853</b>	<b>7,707</b>	<b>7,726</b>	<b>8,653</b>

Source: Processing of the authors according to the received data and after <http://statistici.insse.ro> [13].

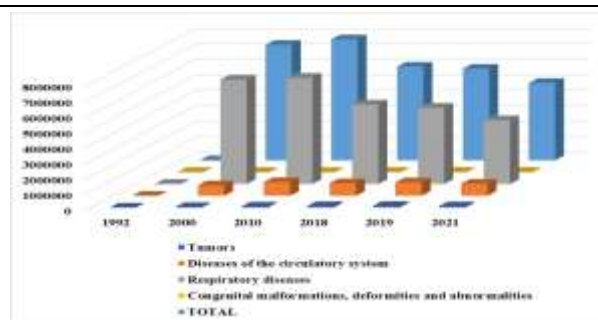


Fig. 9. Number of illnesses, by disease classes at national level

Source: Processing of the authors according to the received data and after <http://statistici.insse.ro> [13].

It is worrying that most of the patients who lost their lives after diagnosis came from Hunedoara County, from localities with major industrial pollution: Hunedoara and Simeria [1].

Based on the analyzed data, we managed to centralize the situation of deaths caused by pollution in the studied area, a situation presented in detail in Table 7.

As can be seen from Figure 10, the evolution of the death situation was presented between 1990-2021, both at the level of the region and at the level of the region's component counties.

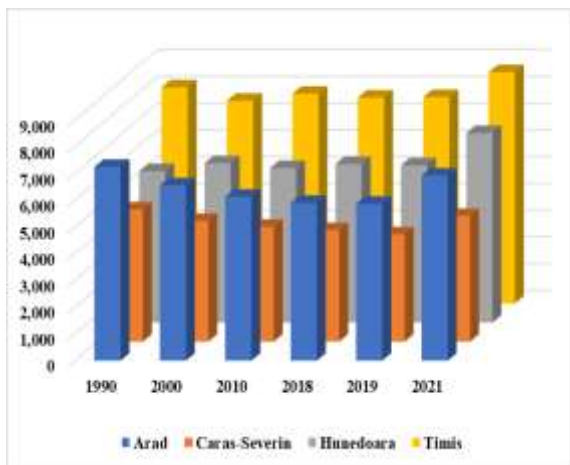


Fig. 10. The situation of deaths in the counties of the analyzed region caused by pollution (total)

Source: Processing of the authors according to the received data and after <http://statistici.inssse.ro> [13].

Having the number of inhabitants of the region and the registered deaths, we managed to present the percentage of deaths from the number of inhabitants of the analyzed region for the years 2019 and 2021. Figure 10 highlights the deaths registered at the level of the area, in the period 1990-2021. [17], [3].

The counties of the region do not have an approximately equal number of inhabitants. The closest numerically are the counties of Arad and Hunedoara, as shown in the Table below. Caraș-Severin County has the fewest inhabitants, while Timiș is the most populated county in the region. The population of Timiș County is more than double that of Caraș-Severin County according to the centralized data in the table.

Tabel 8. Percentage of deaths registered in the analyzed region in 2019 and 2021

	Number of persons		Number of deaths		% deaths of total inhabitants	
	2019	2021	2019	2021	2019	2021
West region	2,000,653	1,982,659	23,497	27,375	1.17	1.38
Arad	470,558	466,820	5,872	6,926	1.24	1.48
Caraș-Severin	317,265	310,073	4,014	4,703	1.26	1.51
Hunedoara	455,939	445,141	5,885	7,093	1.29	1.59
Timiș	756,891	760,625	7,726	8,653	1.02	1.13

Source: Processing of the authors according to the received data and after <http://statistici.inssse.ro> [13].

In the analyzed years, a decrease in the number of inhabitants is observed in each county, but also in the entire region. Although the population has decreased, the same cannot be said about deaths caused by pollution. As shown in Table 8, the number of deaths caused by pollution increased in the analyzed years.

Both at the level of the region and at the level of the counties, an increase in the percentage of deaths among residents due to pollution is observed in the analyzed years.

### CONCLUSIONS

In connection with greenhouse gas emissions, the county most affected by their effects is Hunedoara, followed by Arad, Caraș Severin and Timiș. Among the greenhouse gases mentioned in the paper, the one that most affects all counties in the region is methane.

Heavy metal emissions are also problematic in the study area. Lead emissions have very high values in the counties of Arad, Caraș-Severin and Hunedoara. Mercury and cadmium emissions have low values in the counties of Arad, Caraș-Severin and Timiș; only in Hunedoara do these two elements have high values. The frequency of exceeding the concentration determined by suspension powders registers high values in the counties of Arad and Caraș-Severin.

Another important category refers to the gases emitted by large combustion plants that affect Hunedoara County the most. Timiș County is affected to a very small extent by sulphur dioxide, on the other hand, Arad and Caraș-Severin counties do not have problems with gases emitted by large combustion plants.

Even if the frequency of overtaking is the lowest at the sampling point in Timișoara (Timiș County), some maximum values were recorded here, the reason being the existence of heavy, particularly intense traffic, in the conditions of a damaged roadway, in an industrial area. Carbon dioxide, dust in suspension, nitrogen dioxide are atmospheric pollutants that can generate severe pathology of the respiratory tract. The greatest risk of developing bronchopulmonary cancer if there



is a long exposure to atmospheric pollutants is represented by active smokers and the elderly. At the national level, the number of respiratory diseases registered huge increases from 1992 to 2010. After 2010, a visible decrease is observed at the country level from 6,870,819 cases to 4,127,676 cases, i.e. a decrease of 60.07% of respiratory diseases.

Respiratory diseases at the regional level doubled from 1990 to 2021, although the year 2000 saw a reduction in the occurrence of these diseases by about 50% compared to 1990. In the Western Region as a whole, the problems related to the registered cases of tuberculosis had a significant decrease after the year 2000. Tumors caused by pollution have increased considerably in the region from 1990 to 2021. Malformations and other medical problems recorded in the studied region were constant during the analyzed period.

Looking at deaths caused by pollution in the analyzed region, an increase of over 1,028 deaths in 2021 compared to 2019 can be observed in Hunedoara County. In Arad and Hunedoara counties, counties with numerically similar populations, the percentage of deaths caused by pollution increased from 2019 to 2021. In Arad County, an increase of 0.21% is recorded, and in Hunedoara County, an increase of 0.30%.

In Caraș-Severin County, the increase in deaths due to pollution increased by 0.25% in the analyzed period. The smallest increase in deaths can be observed in Timiș county, of only 0.11% in 2021 compared to 2019.

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