



# NATIONAL INTEGRATED PROGRAMME ON ENVIRONMENT AND HEALTH IN THE SLOVAK REPUBLIC

ENVIRONMENTAL  
HEALTH STATUS OF THE  
ŽIAR BASIN



WORLD HEALTH ORGANIZATION  
REGIONAL OFFICE FOR EUROPE

EUROPEAN CENTRE FOR ENVIRONMENT AND HEALTH  
BILTHOVEN DIVISION

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Environmental pollution in some regions of Central- and Eastern Europe has reached the point where the data are sufficient to indicate that the health of their inhabitants has deteriorated. In line with the recommendations stemming from the WHO European Charter for Environment and Health, the WHO Regional Office for Europe, through the European Centre for Environment and Health, fosters the dialogue between the respective national authorities responsible for environmental management and public health administration at the national, regional and local level.

Through a Trust Fund arrangement with the Government of The Netherlands, technical assistance activities are carried out by the European Centre for Environment and Health in the form of National Integrated Programmes on Environment and Health with Poland, the Czech Republic, the Slovak Republic and Hungary.

The National Integrated Programmes are addressed to:

- \* establish more reliable linkages between environmental factors and the health of affected population groups;
- \* improve the quality of monitoring data on food and soil contamination through interlaboratory tests and unified analytical methods; and
- \* train chronic disease epidemiologists to deal with the major environmental health problems arising from exposure to environmental contamination.

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# Program S I P E H - W H O : ŽIAR BASIN

## I. GENERAL INFORMATION

### 1. Study goals

- 1.1 To determine most important pollution factors affecting public health

The source of unique population exposure in the Žiar Basin is mainly ZSNP Žiar nad Hronom (Slovak National Uprising Works). This plant processes bauxite and produces aluminium ingots, aluminium profiles, castings and packaging as well as building components. The production proceeds in related stages, where aluminium oxide is produced with a by-product of gallium. Aluminium oxide with the addition of fluorosalts, to allow melting, is then electrolysed and aluminium is produced, however, because of out-dated technology (Sjöderberg electrolyzers) there is a massive leakage of fluorides and tar substances into the work and life environment which are absorbed and then emitted into the atmosphere. Part of these substances leak into environment through windows and skylights from three 300 m long halls (combined spot and linear source).

The composition and amount of emissions from ZSNP for years 1990 -1991 is given in tables no. 4.1 - 17/9.

Another source of air pollution is the plant that produces polystyrene beads (perlit) in Lehôtka pod Brehy (197 t/year, ZTS Hliník nad Hronom - heat station /53 t/year/, ČSAD (Bus Transportation) - heat station /20 t/year/ and Restaurants - heat station /25 t/year/.

During 1991 the total amount of all emissions from registered sources in the exposed area was  $9.437 \text{ t/year}^{-1}$ , out of this amount  $6.142 \text{ t/year}^{-1}$  of  $\text{SO}_2$ . The plant of ZSNP is located in the river Hron valley with frequent temperature inversions and windless days.

Prevailing direction of winds is northwestern, which causes the greatest exposure in the area east of Žiar nad Hronom /Ladomerská Vieska, Šašovské Podhradie/ and Lovča, which are closest to pollution sources.

Mean levels of F in air are in the range of 2,9 - 6,8  $\mu\text{g}/\text{m}^3$ , where daily concentrations =  $5\mu\text{g}/\text{m}^3$  and yearly concentrations =  $1\mu\text{g}/\text{m}^3$ .

Mean values of  $\text{SO}_2$  do not exceed daily concentrations  $/150\mu\text{g}/\text{m}^3$ .

Values over daily limits occur only rarely and are of seasonal nature. The change of fuel use (to gas) and increasing intensity of car traffic cause  $\text{NO}_x$  values increase - 12% samples in NATIONAL REFERENCE

So far we have not possessed sufficient data on environment

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pollution by tar substances and CO.

Fall dust is decreasing lately, with values under daily concentrations /ranging up to 50% of daily limit/.

Mean fall dust value in 1991 was  $5,5 \text{ g/m}^2$  / 30 days.

MAC is exceeded in 10 - 13% and this occurs only seasonally.

We define the environment pollution by metals according to their amount in fall dust and we found higher concentrations of Pb and Mn in comparison to the former control area of Nitra. Cd, Ni and Cr values are comparable to those of the control area. On the whole we did not find excessive pollution of Žiar Basin by metals. Objective data on pollution by Al and Hg however are not available.

When estimating combined effects of air pollutants we find that there is excessive air pollution with possible negative influence on public health, especially exceeded yearly concentrations of fluor and over 10% occurrence of daily concentrations  $\text{NO}_x$  and fall dust over daily limit.

We consider as serious the shift in pH of fall dust toward alkalic area which may cause irritations of the respiratory tract.

Because of long term exposure to ZSNP emmissions (which was over 20 000 t/year -1 before 1985) the most important source of pollutants is the food chain (see Tab. 4.2.4).

Drinking water for Žiar nad Hronom comes from underground resources (80%) outside the Žiar Basin and also from underground resources in the Žiar Basin (20%). According to longitudinal laboratory studies it is clear that the town is supplied by uncontaminated drinking water which does not represent any risk to consumers health. The situation in the suburbs - Šašovské Podhradie and Lovča - supplied from public and private wells. These water sources are not of the quality required by the CSN standard. Fluor content in drinking water within the district as well as the monitored area is given in Tab. 4.2.3.

Considering prevailing winds direction and location of town related to ZSNP, we may assume a certain degree of negative influence from the area of Horná Nitra ( e.g.  $\text{SO}_2$  emmissions from Nováky power station in 1991 =  $85.246 \text{ t/year}^{-1}$ ,  $\text{As} 4 \text{ t/year}^{-1}$ ,  $\text{NO}_2 7.666 \text{ t/year}^{-1}$  ).

We find necessary to report the following data in regard to long term negative impact from environment:

From 1953 the ZSNP produced 2 mil. tons of aluminium but at the same time 5 mil. tons of brown sludge were produced, contaminating air, water resources, soil and landscape.

Each year the Žiar metallurgical giant recieves 600 000 tons of primary raw materials (bauxite, coke), 350 000 tons of coal,  $170 \text{ mil.m}^3$  of natural gas, 1300 GWh electric power,  $14 \text{ mil.m}^3$  water.

Each year 66 000 tons of silvery aluminium leave the plant, together with 315 000 tons of solid waste and sludge, from which only 85 000 tons get further treatment, there is more waste polluting water resources. Each year there was an increase by 13 000 tons of emmissions from

which the most unique and in the vicinity of ZSNP the most devastating is fluor, which occurs in more than 400 compounds and its yearly amount emmited into environment was 90 tons a year.

In the Žiar Basin further 50 000 tons of coal are burned, 19 mil. m<sup>3</sup> of natural gas and 36 tons of fuel oils. 38 t/year of solid domestic and industrial waste is produced, 2,384.413 m<sup>3</sup> liquid, untreated waste (mainly sewage) and 44 000 tons of organic fertilizers are used here.

#### **1.2 To evaluate the size and location of population exposed to the known levels of pollution factors**

The territory of Žiar nad Hronom and neighbouring villages of Ladomerská Vieska and Lutila, which used to be part of the town until 1991, was determined as the monitoring area.

Population in the exposed area by 31.12.1991: 21.504 (19.249 Žiar nad Hronom + 827 Lad. Vieska + 1077 Lutila + 351 Šašovské Podhradie). It is obvious from this distribution, that 2 255 people live in rural type of residence. A wider area of interest is formed by another 10 rural communities with a population of 9 230. Total area of interest in the Žiar Basin is 10 km<sup>2</sup>.

The wider area of interest consists of the following villages: Lovča, Dolná Trnávka, Lehôtka pod Brehy, Hliník nad Hronom, Sklené Teplice, Dolná and Horná Ždáňa, Prestavlkы, Lovčica-Trubín and Stará Kremnička.

Sklené Teplice are a health resort and Hliník nad Hronom is mainly industrial. Remaining vilages are mostly agricultural.

#### **1.3 Health problems that may occur in relation to exposed environment**

Considering the known toxicity of pollutants and the character of air pollutants as well as the overall exposure of life and work environment in the area of the Žiar Basin which is similar to other industrial areas, an increased incidence was expected of upper respiratory tract diseases, pneumonias, inflammations of the middle ear and tonsillitis caused by the attack on the immunity system and the overall immunocompetence of the organism.

Also an increased incidence of malignant diseases was expected, mainly of the respiratory tract and skin, job-related diseases, higher incidence of allergic and chronic respiratory diseases and congenital defects.

Specifically, changes were expected in deciduous dentition such as stained teeth enamel, changes in hemoglobin content values and an impact on growth.

In professionally exposed workers from the ZSNP Plant a higher incidence of locomotor diseases was expected.

We assumed that increased morbidity would correlate with the basic demographic data characterizing health condition among the population. So far the retrospective analyses and prospective longitudinal studies results had confirmed these assumptions (under conditions of lower statistical data validity).

Differences between results from the Žiar Basin and from control areas (Nitra, Banská Bystrica) allow to form a hypothesis that the overall health condition of population in the exposed area of Žiar nad Hronom is of worse quality than it is in control areas.

Concrete knowledge of this issue is provided in a survey of studies and research projects given under point 6. of the present study.

We are fully conscious of the fact that apart from environment, the health condition is also influenced by life style, way of life, social status, health consciousness, daily schedule, nutrition and active exercise.

#### 1.4 Priorities in environment monitoring and health condition monitoring - phase ii. of the present project

##### Priorities in environment monitoring

- a/ Continue monitoring basic air pollutants /SO<sub>2</sub>, NO<sub>2</sub>, F, fall dust, sedimentation dust, metal content in dust including Al and Hg.
- b/ Introduce monitoring of CO, O<sub>3</sub> concentrations. This is possible only if adequate analysers are provided.
- c/ Objectivize polycyclic aromatic hydrocarbons by measuring their content in air within the residential environment of Žiar nad Hronom.
- d/ Estimate air mutagenity regarding the presence of other polluting substances in air in mixtures that cannot be detected by chemical analyses.
- e/ Monitoring foreign substances in agricultural products from the Žiar Basin.

##### Priorities in health monitoring

- a/ Comtinue the biological and genetic monitoring of workers exposure under higher risk conditions to genotoxic substances in electrolysis department also of children and other population groups.
- b/ Analyze incidence of tumors in relation to exposure to genotoxic substances using epidemiological methods (Kohort s study).
- c/ Implement follow-up study of mortality by age, diagnoses and region, standardization of mortality data.
- d/ Screening health coniditon of the population by standard WHO method which is part of the CINDI project. This should be supplemented by selective examinations according to conclusions of Phase I.. of the present project.
- e/ Prospective study monitoring morbidity in children according to registered groups.

f/ Introduce objectivization methods and BET for Al in all workers of the ZSNP Plant as well as mutagenic activity of urine (Ames test).

## 2. Methods

Phase I. of the study was performed according to SIPEH methodology, Phase, EPB, draft 20.06.1992.

In monitoring environmental components in the laboratories of SIHE Banská Bystrica and IHE Žiar nad Hronom the following standard methods are used:

spectrophotometric, chromatographic, potentiometric, radiation, electrochemical, titration and gravimetric.

## II. RANGE OF STUDY

### 3. Sociodemographic data with health care infrastructure

- 3.1 Population and its territorial distribution
- 3.2 Population by towns and villages, by sex and age in five year age intervals
- 3.3 Employment by industrial groups
- 3.4 Average monthly salary
- 3.5 Consumption of alcohol and cigarettes - estimated by SIHE Banská Bystrica
- 3.6 Health care infrastructure

### 4. Environmental data analysis

- 4.1 Air pollution
- 4.2 Drinking water supply and quality
- 4.3 Living conditions

### 5. Vital statistics

- 5.1 Death rate and causes of death
- 5.2 Infant death rate
- 5.3 Natality and mortality of premature infants (with birth weight under 2 500 g)
- 5.4 Morbidity of hospitalized patients (not estimated)
- 5.5 Selected infectious diseases incidence
- 5.6 Job-related diseases
- 5.7 Selected diseases incidence:
  - tumors
  - chronic bronchitis
  - bronchial asthma

**6. Other data**

- Results of so far conducted studies monitoring health condition in relation to work environment

**7. Data analysis and evaluation**

(Will be performed by SIHE, Banská Bystrica, evaluation by coordinator).

**8. Recommendation**

(SIHE and coordinator).

### 3. Sociodemographic data and health care infrastructure

#### 3.1 Population and its territorial distribution

##### 3.1.a Residents population by age

Towns villages	Total res.pop.	Approximate age									
		absolute						percentage			
		0 - 14	males	females	males	females	not avail.	0 - 14	prod. age	over prod.age	
District total	94 017	23 339	27 728	25 228	6 248	11 462	12	28,4	56,3	18,8	
Žiar nad Hronom - exp. area	21 504	5 792	6 491	6 317	1 057	1 847	0	26,9	59,6	13,5	
Ladomer	355	38	135	66	60	56	0	10,7	56,6	32,7	
Lutila	1 077	223	313	288	96	157	0	20,7	55,8	23,5	
Šašovské Podhradie	351	62	103	84	35	67	0	17,7	53,8	29,1	
Vieska	472	77	125	130	52	88	0	16,3	54,0	29,7	
Žiar nad Hronom - town	19 249	5 392	5 815	5 749	814	1 479	0	28,0	60,1	11,9	
Rural area - total	2 255	400	676	568	243	368	0	17,7	55,2	27,1	

##### 3.1.b Basic population data

Town, village	Residents				Persons present		Econom. active persons					
	total	males	females	abs.	per 1000 resi- dents	total	total			males	females	nonresi- dents
							abs.	%				
District total	94017	45867	48150	51,2		91786	976	45284	48,2	23968	21316	15883
Žiar nad Hronom - exp.area	21504	10510	10994	51,1		20633	959	11095	51,6	5630	5465	995
Ladomer	355	215	140	39,4		347	977	115	32,4	57	58	0
Lutila	1077	518	559	51,9		1052	977	511	47,4	271	240	44
Šašovské Podhradie	351	175	176	50,1		339	966	161	45,9	88	73	13
Vieska	472	216	256	54,2		444	941	228	48,3	111	117	10
Žiar nad Hronom - town	19249	9386	9863	51,2		18451	959	10080	52,4	5103	4977	928
Rural area - total	2255	1124	1131	50,2		2182	965	1015	45,0	527	488	67

3.2 Population distribution by sex and age in five year age intervals

Age	District Žiar nad Hronom			Exposed area Žiar nad Hronom total		
	Males	Females	Total	Males	Females	Total
0 - 1	704	695	1 399	163	169	332
2 - 4	2 803	2 736	5 539	684	665	1 349
5 - 9	4 012	3 573	7 585	946	894	1 840
10 - 14	4 148	3 927	8 085	1 082	1 020	2 102
15 - 19	3 788	3 642	7 430	869	808	1 677
20 - 24	3 284	3 040	6 324	700	729	1 429
25 - 29	3 433	3 333	6 766	878	890	1 768
30 - 34	3 969	3 496	7 195	949	952	1 901
35 - 39	3 726	3 581	7 307	898	961	1 859
40 - 44	3 331	3 194	6 525	777	772	1 549
45 - 49	2 466	2 531	4 997	510	595	1 105
50 - 54	2 166	2 560	4 726	490	626	1 116
55 - 59	2 219	2 512	4 731	509	539	1 048
60 - 64	2 008	2 436	4 444	384	438	822
65 - 69	1 797	2 579	4 376	303	401	704
70 - 74	926	1 346	2 272	146	175	321
75+	1 507	2 844	4 361	232	362	594
total	45 847	48 205	94 052	10 520	10 996	21 516
0 - 5	4 233	4 206	8 439	1 019	1 011	2 030
6 - 14	7 254	6 905	14 159	1 856	1 737	3 593
product.	28 112	25 377	53 489	6 580	6 333	12 913
over product.	6 248	11 717	17 963	1 065	1 915	2 980
Percentage of population:						
0 - 5	9,2 %	8,7 %	9,0 %	9,7 %	9,2 %	9,4 %
6 - 14	15,8 %	14,3 %	15,1 %	17,6 %	15,8 %	16,7 %
product over product.	61,3 %	52,6 %	56,9 %	62,5 %	57,6 %	60,0 %
mean age	16,6 %	24,3 %	19,1 %	10,1 %	17,4 %	13,9 %
	33,1 %	36,2 %	34,7 %	31,2 %	33,2 %	32,2 %

3.3 and 3.4 Economically active population according to industrial groups

Industrial group	District Žiar n. Hr.			Exposed area Žiar n.Hr.			Average monthly salary in district in 1991 in CS crowns
	Males	Females	Total	Males	Females	Total	
Agriculture - cooperatives	2 494 948	1 383 588	3 877 1 536	380 117	216 63	596 180	3 524 3 410
Forestry and Water Management	869	292	1 151	93	36	129	3 933
Industry - labourers	13 058 9 949	8 300 5 133	21 358 15 082	3 539 2 578	1 953 1 141	5 492 3 719	3 918 -
Construction - labourers	1 892 1 486	370 105	2 262 1 591	336 254	125 35	461 289	3 813 -
Transportation and Communications - labourers	1 484 937	830 172	2 314 1 109	316 178	248 56	564 234	3 824 -
Trade and other manufact. activities	776	2 945	3 721	162	722	884	3 609
Science, research and development	77	47	124	14	18	32	3 858
Public utilities	680	657	1 337	195	244	439	2 655
Education, culture and health serv.	1 198	4 951	6 149	251	1 333	1 584	3 569
Other nonmanufacturing activities	706	854	1 560	212	347	559	-
Active without specified group	1 027	942	1 969	214	238	452	-
Total	24 251	21 571	45 822	5 712	5 480	11 192	3 734

3.6 Health care infrastructure in absolute and relative numbers per 10 000 population in the area covered by Žiar nad Hronom Hospital

No	Indicator	1986	1987	1988	1989	1990	1991	SR 1989	ČSFR 1989
1.	Number of doctors total	119,80	118,81	117,59	114,68	115,39	121,52	-	-
	per 10 000 population	32,1	31,7	31,2	30,4	30,6	32,2	35,3	37,0
2.	Number of doctors under Ministry of Health	117,80	116,81	155,59	112,68	113,39	119,52	-	-
	per 10 000 population	31,6	31,1	30,7	29,9	30,1	31,7	32,2	32,6
3.	Number of ambulatory doctors	80,10	80,98	76,25	79,82	76,69	72,14	-	-
	per 10 000 population	21,5	21,6	20,2	21,2	20,3	19,1	18,5	19,4
4.	Number of nurses and other staff	419,09	435,69	443,02	434,75	431,38	402,77	-	-
	per 10 000 population	112,4	116,1	117,6	115,4	114,4	106,8	-	-
5.	Number of nurses in ambulatory service	121,05	118,38	134,40	132,91	134,92	122,05	-	-
	per 10 000 population	32,5	31,5	35,7	35,3	35,8	32,4	-	-
6.	Number of hospital beds total	235	235	235	235	235	235	-	-
	per 10 000 population	63,0	62,6	62,4	62,4	62,3	62,3	112,9	126,2
7.	Out of this beds								
	intern.dpt. absol.	60	60	60	60	60	60	-	-
	per 10 000 population	12,46	12,42	12,38	12,38	12,37	12,37	11,9	16,2
	pediatrics absol.	55	55	55	55	55	55	-	-
	per 10 000 population	8,59	8,57	8,56	8,56	8,57	8,44	8,7	8,8
	obstetrics absol.	50	50	50	50	50	50	-	-
	per 10 000 population	10,46	10,41	10,38	10,38	10,37	10,36	9,9	10,5
	surgery absol.	65	65	65	65	65	65	-	-
	per 10 000 population	13,60	13,54	13,50	13,50	13,78	13,46	9,9	13,1

#### 4. Environmental data analysis

##### 4.1 Air pollution

4.1.1  $\text{SO}_2$ , 24-hour means MAC =  $150 \mu\text{g} \cdot \text{m}^{-3}$   
 Value recommended by WHO =  $125 \mu\text{g} \cdot \text{m}^{-3}$

Area year	Place of measurement	Arithmet. mean	Value range		% samples over MAC
			min.	max.	
Žiar n. Hronom 1991	Etapa	22,25	0,00	269,00	2,17
	OHS	22,78	0,00	157,82	0,5
	nám. Moyses	15,93	0,00	110,94	0,0
	Lad. Vieska	4,12	0,00	8,24	0,0
SMHÚ	Lad. Vieska	42,83	1,00	149,00	0,0

4.1.2  $\text{NO}_2$ , 24-hour means MAC =  $100 \mu\text{g} \cdot \text{m}^{-3}$   
 Value recommended by WHO =  $150 \mu\text{g} \cdot \text{m}^{-3}$

Area year	Place of measurement	Arithmet. mean	Value range		% samples over MAC
			min.	max.	
Žiar n. Hronom 1991	Etapa	30,94	2,23	111,94	4,65
	OHS	37,73	2,23	251,76	10,55
	nám. Moyses	39,91	4,95	196,70	15,21
	Lad. Vieska	33,92	14,60	91,35	0,00

4.1.3 Fluorides, 24-hour means MAC =  $5 \mu\text{g} \cdot \text{m}^{-3}$   
 Value recommended by WHO =

Area year	Place of measurement	Arithmet. mean	Value range		% samples over MAC
			min.	max.	
Žiar n. Hronom 1991	Etapa	1,91	0,00	4,68	0,00
	OHS	2,62	0,00	15,91	8,79
	nám. Moyses	2,67	0,68	6,14	10,52
	Lad. Vieska	4,03	0,70	10,60	17,39
SMHÚ	Lad. Vieska	2,46	0,30	10,60	7,71

4.1.4 Fall dust, 24-hour means MAC =  $150 \mu\text{g} \cdot \text{m}^{-3}$   
 Value recommended by WHO =

Area year	Place of measurement	Arithmet. mean	Value range		% samples over MAC
			min.	max.	
Žiar n. Hronom 1991	Etapa	46,16	3,40	208,03	1,06
	OHS	43,61	4,65	194,71	1,55
	nám.Moyses	31,33	3,28	100,28	0,00
SMHÚ	Lad. Vieska	65,92	4,00	295,00	4,50

4.1.5 Sedimentation dust, monthly means  
 acceptable limit =  $12,5 \text{ g} \cdot \text{m}^{-2} / 30 \text{ days}$

Area year	Place of measurement	Arithmet. mean	Value range		% samples over MAC
			min.	max.	
Žiar n. Hronom 1991	PNZP	4,59	2,35	7,70	0,00
	NsP	3,17	0,92	5,60	0,00
	OHS	4,01	2,30	7,02	0,00
	Čer.st.vody	11,38	6,90	15,90	50,00
	Lad.Vieska	4,24	2,75	7,55	0,00
	H.Opatovce	18,25	13,09	22,86	100,00
	Lutila	3,76	1,31	8,04	0,00
	Total	7,00	0,92	22,86	25,35

#### Metal content in fall dust:

4.1.6 Pb = yearly means MAC =  $0,5 \mu\text{g} \cdot \text{m}^{-3}$

Area year	Place of measurement	Arithmet. mean	Value range		% samples over MAC
			min.	max.	
Žiar n. Hronom 1991	Etapa	0,054	0,014	0,1183	0,00
	OHS	0,068	0,024	0,102	0,00
	nám.Moyses	0,039	0,011	0,102	0,00

4.1.7 Cd - yearly mean values

Area year	Place of measurement	Arithmet. mean	Value range		% samples over MAC
			min.	max.	
Žiar n. Hronom 1991	Etapa	0,0003	0,0005	0,009	
	OHS	0,0055	0,0009	0,018	
	nám.Moyses	0,0095	0,0004	0,027	

4.1.8 Mn - yearly mean values

Area year	Place of measurement	Arithmet. mean	Value range		% samples over MAC
			min.	max.	
Žiar n. Hronom 1991	Etapa	0,0359	0,013	0,066	
	OHS	0,037	0,012	0,025	
	nám.Moyses	0,016	0,008	0,024	

4.1.9 Ca - mean yearly values

Area year	Place of measurement	Arithmet. mean	Value range		% samples over MAC
			min.	max.	
Žiar n. Hronom 1991	Etapa	6,88	1,918	18,4	
	OHS	5,78	2,96	15,4	
	nám.Moyses	4,97	1,41	13,7	

4.1.10 Pb content in fall dust  
mean yearly value - ( $\mu\text{g} \cdot \text{m}^{-2}$  / 1 month)

Area year	Place of measurement	Arithmet. mean from all measurements
Žiar n. Hronom 1991	PNZP	2,35
	NsP	1,83
	OHS	0,92
	Čerp.st.vody	2,13
	Lad.Vieska	1,12
	H.Opatovice	7,67
	Lutila	0,685

4.1.11 Cd content in fall dust  
mean yearly value - ( $\mu\text{g} \cdot \text{m}^{-2}$  / 1 month)

Area year	Place of measurement	Arithmet. mean from all measurements
Žiar n. Hronom 1991	PNZP	0,06
	NsP	0,2
	OHS	0,07
	Čerp.st.vody	0,09
	Lad.Vieska	0,045
	H.Opatovice	0,105
	Lutila	0,19

4.1.12 Cu content in fall dust  
 mean yearly value - ( $\mu\text{g} \cdot \text{m}^{-2}$  / 1 month)

Area year	Place of measurement	Arithmet. mean from all measurements
Žiar n. Hronom 1991	PNZP	5,82
	NsP	4,51
	OHS	3,91
	Čerp.st.vody	3,42
	Lad.Vieska	2,905
	H.Opatovice	12,44
	Lutila	4,645

4.1.13 Cr content in fall dust  
 mean yearly value - ( $\mu\text{g} \cdot \text{m}^{-2}$  / 1 month)

Area year	Place of measurement	Arithmet. mean from all measurements
Žiar n. Hronom 1991	PNZP	0,24
	NsP	0,765
	OHS	0,165
	Čerp.st.vody	0,68
	Lad.Vieska	0,305
	H.Opatovice	1,295
	Lutila	0,16

4.1.14 Mn content in fall dust  
 mean yearly value - ( $\mu\text{g} \cdot \text{m}^{-2}$  / 1 month)

Area year	Place of measurement	Arithmet. mean from all measurements
Žiar n. Hronom  1991	PNZP	2,24
	NsP	0,88
	OHS	1,675
	Čerp.st.vody	6,575
	Lad.Vieska	1,94
	H.Opatovice	9,56
	Lutila	1,18

4.1.15 Ni content in fall dust  
 mean yearly value - ( $\mu\text{g} \cdot \text{m}^{-2}$  / 1 month)

Area year	Place of measurement	Arithmet. mean from all measurements
Žiar n. Hronom  1991	PNZP	0,275
	NsP	0,165
	OHS	0,345
	Čerp.st.vody	0,505
	Lad.Vieska	0,285
	H.Opatovice	1,01
	Lutila	0,17

4.1.16 Ca content in fall dust  
mean yearly value - ( $\mu\text{g.m}^{-2}$  / 1 month)

Area year	Place of measurement	Arithmet. mean from all measurements
Žiar n. Hronom 1991	PNZP	42,185
	NsP	44,825
	OHS	68,64
	Čerp.st.vody	42,805
	Lad.Vieska	38,655
	H.Opatovice	38,5
	Lutila	45,53

4.1.17 Composition and amount of emmissions according  
to ZSNP data

Emmission type	1991 t/year	1990 t/year
solid pollutants	1 729	1 886
- fly ash	285	98,16
F	768,8	847,4
SO <sub>2</sub>	5 547	6 556
NO <sub>x</sub>	1 092	1 119
tars	768,7	787,8
HG	0,13	0,14
CO	932	840
perchlorethylene	7	15,7
NH <sub>3</sub>	7	14,9
organ.substances	18,9	49,8
gas pollutants total	9 142	10 231

## 4.2 Drinking water supply and quality

### 4.2.1 Drinking water supply

No.	Town village	Water supplies	Population	% of total population supplied from public water system
1.	Žiar n/Hr. - town	JHW + AWS	20 268	99,93
2.	Žiar n/Hr. - Šaš.Podhr.	private wells 1 public well		
3.	Žiar n/Hr. - Šašov-Pila	local water supply private well	346	9,25
4.	Lad.Vieska	JHW+AWS	814	66,58
5.	Lutila	AWS,priv.w.	1 083	58,54

### 4.2.2 Drinking water quality

No	Town, village	Water supplies	Number examined samples						
			Total	contaminated					
				phys.chem		bacteriol		total	
				No.	%	No.	%	No.	%
1.	Žiar n/Hr. - town	JHW + AWS	61	3	4,91	0	-	3	4,91
2.	Žiar n/Hr. - Šaš.Podhr.	private wells 1 public well		water quality documented in text					
3.	Žiar n/Hr. - Šašov-Pila	local water supply private well	9	0	-	7	77,77	7	77,77
4.	Lad.Vieska	JHW+AWS	19	0	-	1	5,26	1	5,26
5.	Lutila	AWS,priv.w.	20	0	-	2	10,00	2	10,00

Note:JHW = Joint Hron Waterworks (Pohronský skupinový vodovod)  
AWS = Auxiliary Water Supplies (Doplňujúce vodné zdroje)

4.2.3 F content in drinking water - 1991 in mgF/I.

	Mean	Scatter
District	0,09	0,00 - 0,83
PSV - Žiar nad Hronom	0,05	0,047 - 0,054
Hliník nad Hronom	0,08	0,04 - 0,15
Lovčica - Trubín	0,05	0,04 - 0,07
Lovča+/-	0,45	0,22 - 0,83

Note: +/- wells - the upper water horizon  
 - higher values

4.2.4 F content in food - mg.kg<sup>-1</sup>

Food	Number of samples	Scatter	% samples over MAC
bread	5	1,30 - 1,80	0
grain	12	2,60 - 42,00	100
potatoes/1991/	13	1,50 - 4,10	30
milk	18	0,13 - 0,52	0
beef-Lovč.Tr.	5	3,25 - 6,25	100
pork-Lovč.Tr.	5	4,00 - 7,00	100
meat products-Lovč.Tr.	6	4,13 - 5,00	100
beef+pork meat-not Lovč.Trubín	5	0,50 - 0,95	0
vegetables	28	0,201 - 1,212	0

Note: grain - extreme value - rye  
 meat - expected difference between beef and pork meat  
 not found  
 vegetables - over 1,0 mg.kg<sup>-1</sup> only parsley,  
 lowest values in tomatoes

**Commentary to tables 4.2 - Drinking water supply and quality in 1987 - 1991**

No data available separately on population of Šašov - Píla and Šašovské Podhradie.

Water quality is estimated over the last five year period (1987 - 1991) according to results from the IHE Žiar nad Hronom.

Chemical contamination in the public waterworks was caused by higher iron content /SEŠ 1,26 - 1987, OHS Etapa 0,41 - 1989, NsP 0,91 - 1989/ in water supplied by an auxilliary water source near Hron which is no longer used.

Bacteriological contamination of water for the part of town Šašov - Píla depends on the disinfection procedure. When this is performed properly, the quality of water is satisfactory.

Quality of water from the public well and random samples of water from private wells in Šašovské Podhradie show bacteriological contamination.

The most serious shortcomings in drinking water supplies in the town of Žiar nad Hronom are frequent defects in the public supply network which cause water loss and consequently shortage of water.

For the future growth of the town it will be necessary to complete the water resources and prevent water losses.  
The shortage of water does not show in Lutila and Ladomerská Vieska.

In Šašov - Píla and Šašovské Podhradie the shortage of water is apparent only in dry periods during the summer months.

#### 4.3 Living conditions

##### 4.3.1 Housing (according to census in 1991)

		District Žiar n/Hr.	Exposed area total
Number of flats	Total	29 986	7 021
	Housing cooperatives	5 547	2 123
Size of perm. inhabited flats	1 room	3 539	887
	2 rooms	10 546	2 823
	3 rooms	10 117	2 508
	4 rooms	3 726	551
	5+ rooms	2 058	252
Number of inhabitants in flats		93 304	21 246
Average number of persons per flat		3,11	3,03
Average space in $\text{m}^2$ from the whole space per flat		72,7	67,3
Average living space in $\text{m}^2$ per flat		45,9	41,2
Average space in $\text{m}^2$ per person		14,7	13,6

4.3.2 Living conditions (according to census in 1991)

		District Žiar n/Hr.	Exposed area total
Number of flats total		29 986	7 021
number of flats equipped	by gas from public supply	11 641	6 158
	water supply	in the flat	27 784
		in the house	248
		outside	-
		not installed	1 954
	sewage	public	15 540
		septic	9 450
	WC	private	24 213
		shared	109
	bathroom (shower)	private	29 045
		shared	90
heating facilities	central heating	total	20 637
		in the house using solid fuel	12 951
	central heating within house	solid fuel	288
		gas	68
		other	8
	stove	solid fuel	7 736
		electric	653
		gas	213
	combined or other		383
			14

## 5. Vital statistics

5.1.1 Mortality by causes of death ( according to XVII. classes of International Classification in absolute and relative numbers per 1 000 population in the district of Žiar n/Hr. and the exposed area of Žiar nad Hronom.

	1985				1987				1988				1989				1990				
	distr. ZH		exp.area ZH		distr. ZH		exp. area ZH		distr. ZH		exp.area ZH		distr. ZH		exp.area ZH		distr. ZH		exp.area ZH		
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.
I Inf. & par. dis.	2	0,02	-	-	4	0,04	2	0,10	1	0,01	-	-	5	0,05	1	0,01	1	0,01	-	-	0
II Tumors	190	2,02	25	1,16	194	2,06	35	1,63	173	1,84	38	1,77	221	2,35	43	2,00	179	1,90	40	1,86	21
III Endocr.glands dis.	5	0,05	1	0,05	8	0,09	1	0,05	7	0,07	2	0,10	16	0,17	3	0,14	15	0,16	2	0,10	1
IV Blood & bl.tis.dis.	-	-	-	-	-	-	-	-	2	0,02	-	-	-	-	-	-	-	-	-	-	
V Mental diseases	1	0,01	1	0,05	-	-	-	-	-	-	-	-	-	-	-	-	1	0,01	1	0,05	1
VI Neurol.& sens. dis.	4	0,04	2	0,10	9	0,10	3	0,14	7	0,07	-	-	8	0,09	3	0,14	10	0,11	3	0,014	1
VII Circul.syst. dis.	625	6,65	61	2,84	599	6,37	57	2,65	612	6,51	66	3,07	689	7,33	87	4,05	655	6,97	88	4,09	636
VIII Respirat.dis.	94	1,00	10	0,47	68	0,72	8	0,37	68	0,72	14	0,65	77	0,82	11	0,51	61	0,65	6	0,28	6
IX GIT dis.	45	0,48	5	0,23	37	0,39	5	0,23	50	0,53	5	0,23	60	0,64	12	0,56	54	0,57	3	0,14	5
X Urin.& genit. dis.	20	0,21	5	0,23	20	0,21	2	0,10	20	0,21	3	0,14	13	0,14	1	0,01	23	0,24	3	0,14	28
XI Compl.pregnant,birth	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
XII Skin dis.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
XIII Muscl.& bones dis.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
XIV Congenit.defects	10	0,10	1	0,05	7	0,07	-	-	4	0,04	1	0,05	5	0,05	-	-	5	0,05	-	-	-
XV Perinat.per.dis.	18	0,19	1	0,05	5	0,05	1	0,05	5	0,05	1	0,05	3	0,03	-	-	4	0,04	1	0,05	1
XVI Insuf.charact.cond.	15	0,16	1	0,05	18	0,19	6	0,27	27	0,29	1	0,05	23	0,24	2	0,02	28	0,30	5	0,23	4
XVII Injuries & toxicic.	86	0,91	17	0,79	77	0,82	13	0,60	66	0,70	10	0,10	72	0,77	16	0,74	64	0,68	13	0,60	9
Total :		1115	129	6,00	1046	183	8,51	1042	11,09	141	6,56	1192	179	8,33	1100	165	7,67	117			
			11,86			11,13											11,70				

5.1.2 Total mortality rate per 1 000 population for exposed area of Žiar Basin in 1991

Year	Žiar n. Hronom						Rural population						Exposed area					
	males		females		total		males		females		total		males		females		total	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
1991	75	7,99	57	5,7	132	6,85	17	15,1	17	15,1	34	15,0	92	8,7	74	6,7	166	7,7

Rural area:

Year	Lutila						Lad.Vieska						Šaš.Podhradie					
	males		females		total		males		females		total		males		females		total	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
1991	7	13,5	5	8,9	12	11,1	10	23,2	8	22,4	18	21,7	0	0	4	22,7	4	11,3

5.1.3 Mortality analysis by age groups in exposed area Žiar Basin in 1991

Age group	males		females		total	
	abs.	%	abs.	%	abs.	%
0	2	2,1	5	6,7	7	4,2
1 - 4	1	1,08	1	1,3	2	1,2
5 - 9	0	0	0	0	0	0
10 - 14	0	0	0	0	0	0
15 - 19	1	1,08	0	0	1	0,6
20 - 24	0	0	0	0	0	0
25 - 34	4	4,3	1	1,3	5	3,0
35 - 44	5	5,4	2	2,7	7	4,2
45 - 54	4	4,3	5	6,7	9	5,4
55 - 64	20	21,7	4	5,4	24	14,4
65 - 74	23	25,0	15	20,2	38	22,8
75+	32	34,7	41	55,4	73	43,9
Total	92		74		166	

5.1.4 Premature deaths and deaths in productive age in Žiar Basin area in 1991

Year	premature deaths						deaths in productive age					
	males (1-69)		females (1-70)		total		males		females		total	
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
1991	46	48,9	33	44,5	79	47,5	22	23,9	8	10,8	30	18,0

## 5.2 Infant death rate in Žiar Basin

		Number live births	Number infant deaths(7 days)		Number infant deaths(28 days)		Number infant deaths(1 year)		Number cong.dev. def.	
			abs.	abs.	prom.	abs.	prom.	abs.	prom.	abs.
1	Žiar n. Hronom - dist.	1 624	18	11,0	22	13,0	28	17,2	40	24,6
1	Žiar n. Hronom - town	307	1	3,2	1	3,2	2	6,5	10	32,5
9	Rural area	30	0	0	0	0	0	0	0	0
8	Š.Podhradie	3	0	0	0	0	0	0	0	0
5	Lad.Vieska	7	0	0	0	0	0	0	0	0
	Lutila	10	0	0	0	0	0	0	0	0
	Exp. area	327	1	3,0	1	3,0	2	6,1	10	3,1
1	Žiar n. Hronom - dist.	1 508	8	5,3	9	5,9	16	10,61	59	39,1
1	Žiar n. Hronom - town	329	0	0	0	0	1	3,0	18	54,7
9	Rural area	26	0	0	0	0	0	0	0	0
8	Š.Podhradie	3	0	0	0	0	0	0	0	0
7	Lad.Vieska	8	0	0	0	0	0	0	0	0
	Lutila	15	0	0	0	0	0	0	0	0
	Exp. area	355	0	0	0	0	1	2,8	18	50,7
1	Žiar n. Hronom - dist.	1 412	9	6,3	10	7,1	15	10,6	54	38,2
1	Žiar n. Hronom - town	318	1	3,0	0	0	1	3,0	17	53,4
9	Rural area	30	0	0	0	0	0	0	0	0
8	Š.Podhradie	8	0	0	0	0	0	0	0	0
8	Lad.Vieska	8	0	0	0	0	0	0	0	0
	Lutila	14	0	0	0	0	0	0	0	0
	Exp. area	348	1	2,3	0	0	1	2,3	17	48,8
1	Žiar n. Hronom - dist.	1 358	4	2,9	5	3,7	15	11,0	26	19,1
1	Žiar n. Hronom - town	285	0	0	0	0	4	13,8	12	42,1
9	Rural area	22	0	0	0	0	0	0	0	0
8	Š.Podhradie	5	0	0	0	0	0	0	0	0
9	Lad.Vieska	5	0	0	0	0	0	0	0	0
	Lutila	12	0	0	0	0	0	0	0	0
	Exp. area	307	0	0	0	0	4	13,0	12	39,0
1	Žiar n. Bronom - dist.	1 394	6	4,3	9	6,5	16	11,5	42	30,1
1	Žiar n. Bronom - town	260	1	3,8	1	3,8	2	7,5	10	38,4
9	Rural area	23	0	0	0	0	0	0	0	0
9	Š.Podhradie	6	0	0	0	0	0	0	0	0
0	Lad.Vieska	8	0	0	0	0	0	0	0	0
	Lutila	9	0	0	0	0	0	0	0	0
	Exp. area	283	1	3,5	1	3,5	2	7,1	10	35,5
1	Žiar n. Bronom - dist.	1 344	8	5,9	10		20	14,9	49	36,4
1	Žiar n. Bronom - town	315	4	12,6	1		6	18,9	16	50,7
9	Rural area	15	0	0	0		1	6,6	1	66,6
9	Š.Podhradie	2	0	0	0		0	0	0	0
1	Lad.Vieska	3	0	0	0		0	0	0	0
	Lutila	10	0	0	0		1	10,0	1	100,0
	Exp. area	330	4	12,1	1		27	21,2	17	51,5

5.3 Some indicators of obstetric-gynaecologic care (incl. number of premature infants with birth weight under 2 500 g)

						2	1	303	.	.
1 9 8 5	Žiar/Hr.- distr.	1604	1624	67	4,1	5	2	303	.	.
	Žiar nad Hronom	290	307	13	4,2	1	1	92	248	26
	Rural area	23	20	1	5,0	0	0	5	14	1
	Šaš.Podhradie	5	3	0	0	-	-	1	3	-
	Ladomer.Vieska	7	7	1	14,2	-	-	2	3	-
	Lutila	11	10	0	0	-	-	2	8	1
1 9 8 7	Exp. area	313	327	14	4,3	1	1	97	262	27
	Žiar/Hr.- distr.	1480	1488	43	2,9	6	3	396	.	.
	Žiar nad Hronom	307	329	11	3,3	1	1	86	254	26
	Rural area	30	26	0	0	-	-	7	19	6
	Šaš.Podhradie	5	3	0	0	-	-	2	4	1
	Ladomer.Vieska	9	8	0	0	-	-	1	8	3
1 9 8 8	Lutila	16	15	0	0	-	-	4	7	2
	Exp. area	337	355	11	3,1	1	1	93	273	32
	Žiar/Hr.- distr.	1397	1406	39	2,4	4	1	308	.	.
	Žiar nad Hronom	293	318	13	4,0	2	-	98	259	19
	Rural area	32	30	0	0	-	-	8	17	2
	Šaš.Podhradie	12	8	0	0	-	-	4	2	-
1 9 8 8	Ladomer.Vieska	11	8	0	0	-	-	3	4	-
	Lutila	9	14	0	0	-	-	1	11	2
	Exp. area	325	346	13	3,7	2	-	106	276	21
	Žiar/Hr.- distr.	1349	1354	37	2,7	2	-	299	.	.
	Žiar nad Hronom	261	285	7	2,4	-	-	76	258	27
	Rural area	27	22	1	4,5	-	-	4	24	2
1 9 8 9	Šaš.Podhradie	5	5	0	0	-	-	1	4	1
	Ladomer.Vieska	9	5	1	20,0	-	-	-	8	1
	Lutila	13	12	0	0	-	-	3	12	-
	Exp. area	288	307	8	2,6	-	-	80	282	29
	Žiar/Hr.- distr.	1342	1357	68	5,1	3	1	240	.	.
	Žiar nad Hronom	239	260	14	5,3	-	-	80	279	40
1 9 9 0	Rural area	21	23	1	4,3	-	-	4	21	2
	Šaš.Podhradie	7	6	0	0	-	-	1	3	-
	Ladomer.Vieska	5	8	1	12,5	-	-	1	8	1
	Lutila	9	9	0	0	-	-	2	10	1
	Exp. area	260	283	15	5,3	-	-	84	318	42
	Žiar/Hr.- distr.	1260	1270	46	3,6	2	1	164	.	.
1 9 9 1	Žiar nad Hronom	297	315	13	4,1	-	-	93	272	22
	Rural area	16	15	0	0	-	-	2	15	3
	Šaš.Podhradie	3	2	0	0	-	-	-	1	-
	Ladomer.Vieska	4	3	0	0	-	-	1	4	-
	Lutila	9	10	0	0	-	-	1	10	3
	Exp. area	313	330	13	3,9	-	-	95	287	25

## 5.5 Selected infectious diseases incidence

### 5.5.1 Selected infectious diseases incidence in the period of 1981 - 1991 in the town and district of Žiar nad Hronom per 100 000 population

year	1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		199
	dg	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M
002	0	0	0	0	5.3	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
003	47.1	51.3	52.5	60.7	32.1	32.7	38.3	46.7	38.3	56.0	56.2	93.3	29.8	14.0	30.7	32.7	100.2	60.7	118.1	205.4	92.8
004	51.3	60.6	792.0	1269	57.8	79.3	6.4	18.7	37.2	46.7	56.2	135.4	39.4	23.3	159.9	32.7	37.9	37.3	31.6	60.7	17.9
005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
008	32.1	79.3	23.5	42.0	58.9	177.4	69.2	140.0	164.8	191.4	115.7	149.4	148.1	130.7	82.6	107.4	61.2	93.3	30.6	32.7	52.8
009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1	4.7	11.6	0	3.1	14.0	39.3
070	101.6	56.0	38.5	28.0	49.3	37.3	58.6	65.3	17.0	14.0	29.7	32.7	36.1	18.7	39.2	23.3	73.8	84.0	38.9	9.3	24.2
033	0	0	3.2	0	0	0	0	0	2.2	0	0	0	0	0	2.1	0	0	0	0	0	1.0
055	37.4	0	0	0	0	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
056	153.0	284.7	2.1	9.3	0	0	57.5	70.0	648.8	378.1	3.2	4.6	2.1	0	0	0	0	0	0	0	6.3
072	429.2	261.4	127.5	298.5	107.1	149.4	190.7	270.7	414.7	382.7	525.6	774.8	228.1	182.0	251.0	98.0	380.9	280	147.7	200.7	9.4
TBC	42.4	.	58.8	.	53.5	.	51.2	.	42.5	.	57.2	.	39.1	.	47.5	.	38.2	.	44.3	.	40.1

Legend: O = district Žiar nad Hronom  
N = town Žiar nad Hronom

5.5.2 Selected inf. diseases incidence in 1991 in urban and rural population of exposed area Žiar Basin per 100 000 population

year dg	1 9 9 1					
	Exposed area	Žiar n/Hr. town	Rural popul.	Lutila	Ladomerská Vieska	Šašovské Podhradie
002	0	0	0	0	0	0
003	111,6	93,5	266,1	278,6	362,8	0
004	55,8	62,3	0	0	0	0
005	0	0	0	0	0	0
008	60,5	67,5	0	0	0	0
009	23,3	25,9	0	0	0	0
070	9,3	10,4	0	0	0	0
033	0	0	0	0	0	0
055	0	0	0	0	0	0
056	9,3	10,4	0	0	0	0
072	0	0	0	0	0	0
011	32,5	20,8	133,0	92,8	241,8	0

## 5.6 Job-related diseases

#### 5.6.1 Selected confirmed job-related diseases over the period of 1985 - 1991 in the district Žiar nad Hronom, ZSNP and Žiar Basin area

Note: no.1 - intoxications + plumbism

3 - inf. hepatitis + varicella + scabies

4 - zoonoses - trichophytias + noduli mulgentium

8 - other - diseases from overload + tumors + erysipeloid +

vocal chords insufficiency + bronchial asthma + rhinitis  
alergica + fluorosis

5.6.2 Confirmed job-related diseases incidence over the period of 1981 - 1991 in district Žiar nad Hronom, ZSNP and Žiar Basin

		1985	1987	1988	1989	1990	1991											
1	Hypacusis	12	3	2	9	2	2	15	4	3	11	3	2	17	2	2	18	4
2	Vasoneurosis	7	-	-	5	-	-	5	3	1	12	2	-	26	2	1	29	1
3	Plumbism	11	-	-	1	-	-	2	-	-	1	-	-	2	-	-	1	-
4	Intoxications	-	-	-	1	-	-	-	-	1	1	1	-	-	-	-	1	-
5	Silicosis	4	-	-	3	-	-	4	1	1	4	-	1	6	-	-	2	-
6	Dermatitis	10	3	4	8	1	-	6	-	1	15	2	4	7	-	1	5	2
7	Dis. from overload	-	-	-	3	1	1	-	-	-	4	-	1	1	-	-	6	1
8	Trichophytias	4	-	-	13	-	1	12	-	-	5	-	-	4	-	-	2	-
9	Tumors	2	-	-	1	-	-	4	1	1	2	-	-	1	-	-	1	-
10	Noduli mulgen.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	Malaria trop.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	Inf.hepatitis	-	-	-	2	-	-	1	-	-	3	-	1	1	-	-	1	-
13	Varicella	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
14	Erysipeloid	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
15	Scabies	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
16	Vocal chords insuf.	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	2	-
17	Bronchial asthma	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
18	Rhinitis alergica	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
19	Fluorisis	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1	1	-
20	Total	53	6	6	46	4	4	51	10	7	61	8	10	67	4	5	70	9
																		7

Commentary to the job-related diseases incidence study in the district of Žiar nad Hronom in 1985 and 1987 - 1991

The table presents a survey of job-related diseases incidence for the district (column 1), ZSNP Žiar nad Hronom (column 2) and the area of Žiar nad Hronom, i.e. Žiar nad Hronom, Lutila, Ladomerská Vieska and Šašovské Podhradie (column 3).

The sum of diseases for the district includes only those patients who have permanent residence in the district and had acquired the disease in one of the factories, enterprises or other organizations operating within the district territory.

In column 2 only those cases were included that actually originated in ZSNP Žiar nad Hronom.

The sum of diseases for the area of Žiar nad Hronom concerns only those patients whose permanent residence is in Žiar nad Hronom, Lutila, Ladomerská Vieska or Šašovské Podhradie and who worked in factories, enterprises and organizations within district territory with the exception of one case of malaria (acquired during medical service abroad).

It is obvious from the survey, that the greatest changes occurred in diseases caused by noise - hypacusia, where in 1990 and 1991 the number of confirmed job-related diseases increased to 17 and 18 in comparison with average 11 and 12 cases in preceding years and similarly there was an increase in confirmed job-related diseases from vibrations up to 26 and 29 in 1990 and 1991 compared to average 5 - 7 cases in the preceding period.

This was caused by the attenuation programme in the mining industry, which had impact on 3 ore mines within the district (B.Štiavnica, Kremnica and Hodruša-Hámre) and also on a construction firm for the mining industry Banské stavby Prievidza which worked for these mines.

When the workers were discharged from work, they underwent preventive medical examinations when leaving, so that they could "gain" at least something for all those years of working in mines in a situation of lost social security feeling and the negative economic impact associated with it. They were willing to let themselves be examined especially with regard to possible damage to their health caused by working conditions (noise, vibrations) and they reported symptoms of damage from vibrations. They were reexamined in Žiar nad Hronom, Martin and Banská Bystrica and their job-related diseases were confirmed.

Higher incidence of these two job-related diseases in 1990 and 1991 actually influenced the overall incidence in the district to 67 and 70 compared to 53 cases in 1985 as the number of persons exposed to excessive noise did not increase significantly in 1990 and 1991 (3978, 3870) compared to 3734 in 1985. Similar is the comparison of the number of persons exposed to vibrations which was 1219 in 1985 and in 1990 and 1991 the numbers were 1581 and 1481.

The situation is stabilised in other job-related diseases, e.g. in plumbism since 1985 when 11 cases were reported due to unfavourable hygienic conditions; since then only 1 - 2 cases have been recorded each year, also in trichophytia the situation has been stabilised with the exception of years 1987 and 1988 when the unfavourable situation in agricultural enterpri-

ses of Nová Baňa was solved by issuing regulations and for example diseases from overload decrease to 6 in 1991 was influenced by complex medical examination of workers from SMZ state enterprise in Banská Belá (from workplaces registered for their risk to health) at the Clinic of Professional Medicine in Bratislava.

Monitoring work environment conditions is still the focus of attention, namely objectivization of individual risk factors in the work environment, preventive hygienic supervision is performed when judging projects for new enterprises, working conditions are monitored within the regular hygienic supervision, especially in new private firms and companies - this takes the form of expert reports which serve as basic references for decision making of the administration organs which are competent to decide about such activities.

## 5.7 Selected diseases incidence

Legend to tab. 5.7.a (tumors)

Disease group	Dg.- statist. number
LUNGS	162
GIT	151
	153
	154
SKIN	172 173
BREAST	174
GENITALS	180
	182
	183
PROSTATE	185
BLADDER	188
KIDNEY	189
THYROID	193

5.7 a/1 Most frequent tumors incidence by dg. in district Žiar n.Hr.  
in 1988 - 1991

Year dg	162		151		172		188		189		193		total	
			153	154	173	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.
1988	64	67,5	48	50,7	44	46,4	14	14,8	14	14,8	0	0	184	194,2
1989	59	62,3	66	69,6	53	55,9	5	5,3	12	12,7	2	2,1	197	207,9
1990	49	51,7	51	53,8	58	61,2	7	7,4	8	8,4	3	3,2	176	185,7
1991	54	56,9	89	93,9	40	42,2	9	9,5	17	17,9	4	4,2	213	224,8

5.7 a/2 Most frequent tumors incidence by dg. in exposed area of Žiar Basin in 1988 - 1991

Year dg	162		151		172		188		189		193		total	
			153	154	173	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.
1988	16	74,4	9	41,9	12	55,8	3	13,9	4	18,6	0	0	44	204,6
1989	11	51,2	11	51,2	11	151,2	1	4,7	0	0	1	4,7	35	162,8
1990	8	37,2	9	41,9	16	74,4	2	9,3	3	13,9	1	4,7	39	181,4
1991	12	55,8	7	32,5	8	37,2	2	9,3	3	13,9	0	0	32	148,8

5.7 a/3 Most frequent tumors incidence by dg in women in the exposed  
area of district Žiar nad Hronom per 100 000 population

dg	District		Exp.area		ZH urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhradie	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
174	26	53,9	4	36,5	5	45,5	0	0	0	0	0	0	0	0
180														
182	39	80,9	10	90,9	9	91,3	1	91,7	0	0	1	280,9	0	0
183														
172	14	29,9	3	27,3	3	30,4	0	0	0	0	0	0	0	0
173														
151														
153	49	401,8	3	27,3	3	30,4	0	0	0	0	0	0	0	0
154														
162	6	12,4	2	18,2	1	10,1	1	91,7	1	178,9	0	0	0	0
188	1	2,1	0	0	0	0	0	0	0	0	0	0	0	0
189	6	12,4	2	18,2	0	0	0	0	2	357,8	0	0	0	0
193	2	4,1	0	0	0	0	0	0	0	0	0	0	0	0

5.7. a/4 Most frequent tumors incidence by dg in men in the exposed area of district Žiar nad Hronom per 100 000 population

dg	District		Exp.area		ZH urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhradie	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
162	48	104,5	10	95,1	9	95,9	1	85,9	0	0	1	212,3	0	0
185	21	45,7	7	66,6	5	53,3	2	162,8	0	0	0	0	2	1142,9
151														
153	40	87,1	4	38,1	5	31,9	0	0	0	0	0	0	0	0
154														
172	22	56,6	5	47,5	3	47,5	1	85,9	1	193,1	0	0	0	0
173														
188	8	17,3	2	19,0	2	19,0	0	0	0	0	0	0	0	0
189	11	23,8	1	9,5	1	9,5	0	0	0	0	0	0	0	0
193	2	4,3	0	0	0	0	0	0	0	0	0	0	0	0

5.7. a/5 Most frequent tumors incidence by dg in women of urban and rural population in the Žiar Basin in 1990 per 100 000 population

dg	District		Exp.area		ZH urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhradie	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
174	14	28,9	2	18,2	1	10,1	1	91,7	0	0	1	280,9	0	0
180														
182	17	35,1	3	27,3	3	30,4	0	0	0	0	0	0	0	0
183														
172	37	76,3	9	81,9	9	91,3	0	0	0	0	0	0	0	0
173														
151														
153	22	45,4	3	27,3	3	30,4	0	0	0	0	0	0	0	0
154														
162	5	10,3	0	0	0	0	0	0	0	0	0	0	0	0
188	0	0	0	0	0	0	0	0	0	0	0	0	0	0
189	5	10,3	2	18,2	2	18,2	0	0	0	0	0	0	0	0
193	2	4,1	0	0	0	0	0	0	0	0	0	0	0	0

5.7. a/6 Most frequent tumors incidence by dg in men of urban and rural population in the Žiar Basin in 1990 per 100 000 population

dg	District		Exp.area		ZH urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhradie	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
162	44	95,0	8	76,1	7	74,6	1	85,9	1	193,1	0	0	0	0
185	14	30,2	2	19,0	2	21,3	0	0	0	0	0	0	0	0
151														
153	29	62,6	6	57,1	3	31,3	3	257,7	2	386,1	1	212,3	0	0
154														
172	21	42,2	7	66,6	6	63,9	1	85,9	0	0	1	212,3	1	571,4
173														
188	7	15,1	2	19,0	1	10,7	1	85,9	1	193,1	0	0	0	0
189	3	6,5	1	9,5	1	10,7	0	0	0	0	0	0	0	0
193	1	2,2	1	9,5	1	10,7	0	0	0	0	0	0	0	0

5.7. a/7 Most frequent tumors incidence by dg in women of urban and rural population in the Žiar Basin in 1989 per 100 000 population

dg	District		Exp.area		ZH urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhradie	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
174	32	66,0	4	36,4	4	40,6	0	0	0	0	0	0	0	0
180														
182	21	43,3	5	45,5	5	50,7	0	0	0	0	0	0	0	0
183														
172	30	61,9	8	72,8	7	70,9	1	91,7	1	178,9	0	0	0	0
173														
151														
153	24	49,5	4	36,4	4	40,6	0	0	0	0	0	0	0	0
154														
162	8	16,5	1	9,1	1	10,1	0	0	0	0	0	0	0	0
188	2	4,1	0	0	0	0	0	0	0	0	0	0	0	0
189	2	4,1	0	0	0	0	0	0	0	0	0	0	0	0
193	1	2,1	1	9,1	1	10,1	0	0	0	0	0	0	0	0

5.7. a/8 Most frequent tumors incidence by dg in men of urban and rural population in the Žiar Basin in 1989 per 100 000 population

dg	District		Exp.area		ZH urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhradie	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
162	51	110,1	10	95,3	9	95,9	1	85,9	1	193,1	0	0	0	0
185	23	49,7	4	38,1	4	42,6	0	0	0	0	0	0	0	0
151 153 154	42	90,7	7	66,6	7	74,6	0	0	0	0	0	0	0	0
172 173	23	49,7	3	28,5	3	31,9	0	0	0	0	0	0	0	0
188	3	6,5	1	9,5	1	10,7	0	0	0	0	0	0	0	0
189	10	21,6	0	0	0	0	0	0	0	0	0	0	0	0
193	1	2,2	0	0	0	0	0	0	0	0	0	0	0	0

5.7. a/9 Most frequent tumors incidence by dg in women of urban and rural population in the Žiar Basin in 1988 per 100 000 population

dg	District		Exp.area		ZH urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhradie	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
174	23	47,5	5	45,5	4	40,6	1	91,7	1	178,9	0	0	0	0
180 182 183	19	32,9	3	27,3	2	20,3	1	91,7	0	0	1	280,9	0	0
172 173	20	41,3	6	54,6	5	50,7	1	91,7	1	178,9	0	0	0	0
151 153 154	15	30,9	1	9,2	1	10,1	0	0	0	0	0	0	0	0
162	4	8,3	2	18,2	2	20,3	0	0	0	0	0	0	0	0
188	3	6,2	0	0	0	0	0	0	0	0	0	0	0	0
189	7	14,4	2	18,2	2	20,3	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0	0	0	0	0	0

5.7.a/10 Most frequent tumors incidence by dg in women in the exposed area of district Žiar nad Hronom per 100 000 population in 1991

dg	District		Exp.area		ZH urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhradie	
	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
162	60	129,6	14	133,2	13	138,5	1	85,9	1	193,1	0	0	0	0
185	17	36,7	3	28,5	3	31,9	0	0	0	0	0	0	0	0
151														
153	33	71,3	8	76,1	8	85,2	0	0	0	0	0	0	0	0
154														
172	24	51,8	6	57,1	5	53,3	1	85,9	0	0	1	212,3	0	0
173														
188	11	23,8	3	28,5	3	31,9	0	0	0	0	0	0	0	0
189	7	15,1	2	19,0	2	21,3	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0	0	0	0	0	0

5.7. a/11 Tumors incidence in the exposed area of district Žiar nad Hronom in 1991 per 100 000 population

District						Exposed area					
abs.			rel.			abs.			rel.		
males	females	total	males	females	total	males	females	total	males	females	total
202	157	359	440,0	235,0	381,3	39	40	79	371,0	365,3	367,3

5.7 a/12 Number of tumor diseases by dg in the exposed area of  
 Žiar Basin by workplace in 1991

Dg	Number of tumor diseases		Employees of ZSNP in exp.area		Employed elsewhere		Total	
	Males	Females	Males	Females	Males	Females	M+F	ZSNP
162	10	2	9	0	1	2	12	9
151								
153	4	3	4	1	0	2	7	5
154								
172	5	3	2	0	3	3	8	2
173								
188	2	0	0	0	2	0	2	0
189	1	2	0	0	1	1	3	0
193	0	0	0	0	0	0	0	0
174	-	4	-	2	-	2	4	2
185	7	-	5	-	2	-	7	5
180								
182	-	10	-	5	-	5	10	5
183								

5.7 a/13 Number of tumor diseases by dg in the exposed area of  
 Žiar Basin by workplace in 1990 (in abs.numbers)

Dg	Number of tumor diseases		Employees of ZSNP in exp.area		Employed elsewhere		Total	
	Males	Females	Males	Females	Males	Females	M+F	ZSNP
162	8	0	1	0	7	0	8	1
151								
153	6	5	5	1	1	4	11	6
154								
172	7	9	5	4	2	5	16	9
173								
188	2	0	1	0	1	0	2	1
189	1	2	0	1	1	1	3	1
193	1	0	1	0	0	0	1	1
174	-	2	-	0	-	2	2	0
185	2	-	2	-	0	-	2	2
180								
182	-	3	-	1	-	2	3	1
183								

5.7 a/14 Number of tumor diseases by dg in the exposed area of  
 Žiar Basin by workplace in 1989 (in abs. numbers)

Dg	Number of tumor diseases		Employees of ZSNP in exp.area		Employed elsewhere		Total	
	Males	Females	Males	Females	Males	Females	M+F	ZSNP
162	10	1	5	0	5	1	11	5
151								
153	7	4	2	2	5	2	11	6
154								
172	3	2	0	0	3	2	5	0
173								
188	1	0	0	0	1	0	1	0
189	0	0	0	0	0	0	0	0
193	0	1	0	0	0	1	1	0
174	-	4	-	3	-	1	4	3
185	4	-	4	-	0	-	4	4
180								
182	-	5	-	2	-	0	5	2
183								

5.7 a/15 Number of tumor diseases by dg in the exposed area of  
 Žiar Basin by workplace in 1988 (in abs.numbers)

Dg	Number of tumor diseases		Employees of ZSNP in exp.area		Employed elsewhere		Total	
	Males	Females	Males	Females	Males	Females	M+F	ZSNP
162	14	2	8	1	6	1	16	9
151								
153	8	1	6	1	2	0	9	7
154								
172	6	6	3	3	3	3	12	6
173								
188	3	0	3	0	0	0	3	3
189	2	2	2	2	0	0	4	4
193	0	0	0	0	0	0	0	0
174	-	5	-	3	-	2	5	3
185	3	-	2	-	1	-	3	2
180								
182	-	3	-	1	-	2	3	1
183								

5.7.b/1 Selected nonspecific respiratory diseases incidence in 1980  
 - 1990 in district Žiar nad Hronom per 100 000 population

year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
dg											
Chron. bronchitis	15,9	135,7	-	90,9	90,6	190,3	139,9	138,5	111,9	92,9	104,5
Bronchial asthma	15,9	12,7	-	9,6	10,6	14,8	31,8	14,8	17,9	26,4	14,7
Bronchiectasias	2,1	1,1	-	7,4	0	2,1	0	3,1	2,1	2,1	1,5
Sarcoidosis	4,2	7,2	-	2,1	5,3	3,1	3,1	4,2	4,2	5,2	2,1
Pneum. fibrosis	0	1,1	-	1,7	4,2	2,1	1,6	2,1	9,5	2,1	8,4
Inflam. fibrosis	380,0	371,0	-	349,8	313,6	426,4	510,0	491,8	405,5	378,0	366,4
Total incid. nospec. resp.dis.	629,0	607,4	-	-	-	708,2	775,1	729,8	656,9	589,0	580,8

5.7 b/2 Bronchial asthma incidence in the exposed area of Žiar  
 Basin and district in 1991

District		Exp.area		Urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhr.	
abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
16	16,8	0	0	0	0	0	0	0	0	0	0	0	0

5.7.b/3 Chronic bronchitis incidence in the exposed area of Žiar  
 Basin and district in 1991

District		Exp.area		Urban pop.		Rural pop.		Lutila		L.Vieska		Š.Podhr.	
abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.	abs.	rel.
82	86,6	18	83,7	15	77,9	3	133,0	1	92,9	1	102,9	1	284,9

## 6. Other information

Special studies of health condition and its relationship to environmental factors in the Žiar Basin are given in the list of literature, references and other materials in Appendix 1.

A summary of current knowledge is included in the report under point 15 of appendix 1. This is appendix 2.

It was not possible to obtain all sociodemographic data by communities in the exposed area by September 15, 1992.

Modernization of Al production in ZSNP will eliminate by 31.12 1994 the specific excessive pollution by fluor in the Žiar Basin area. Its effect is given by differences in fluor concentrations in air in 1989 and after the modernization (see maps in the distribution study which is part of the programme).

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