

## Asbestos as an Environmental hazard – the Example of the Szczucin Community

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### Abstract

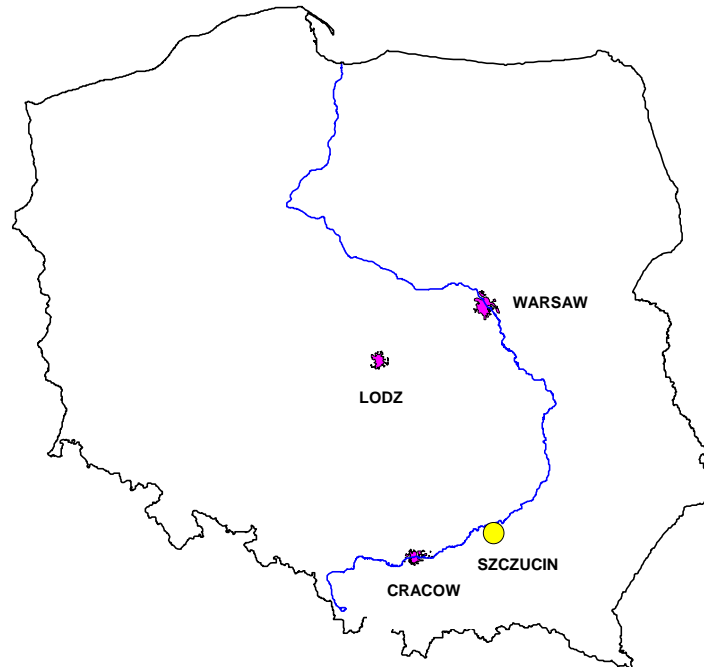
*This paper presents data on the incidence of mesotheliomas and cause-specific mortality among inhabitants in the asbestos contaminated area in the vicinity of an asbestos-cement plant.*

*In 1959, an asbestos-cement factory was founded in a rural area of Southeast Poland. Apart from chrysotile asbestos, crocidolite was used till 1985 chiefly for the manufacture of pressure pipes. The blue asbestos made up 15% of the mean annual tonnage of the processed asbestos. It was found that soon after asbestos production had started the process waste was made available to the local community. For over thirty years asbestos waste of all kinds, both wet - process sludge - and dry from pipe and sheet grinding, were exploited for the hardening of roads, paths, farmyards and sports fields and as construction material components. This has contributed to the scattering of asbestos emission sources over the area and to the ubiquity of asbestos waste containing large amounts of blue asbestos, visible to the naked eye. The contaminated area covers about 12,000ha and has a population of 14,000.*

*The project was a combination of a cohort study and epidemiological observation of all cancer cases. In the period 1987-2004 among the population of the Szczucin district, 58 cases of pleural mesothelioma were recorded. The risk of mesothelioma is 125 times as high as for the general population of Poland. The general mortality and mortality from asbestos-related diseases in the Szczucin district was compared with mortality of the population of a neighbouring district which was free of asbestos. The cohort consisted of people who inhabited these districts for at least 3 years between 1975 and 2002.*

*The health of the district inhabitants, which reflects the ecological hazard over this territory, requires immediate extensive activities to improve the environment and prevent adverse health effects.*

Szczucin is a small town (about 14 thousand inhabitants) in Southeast Poland. In 1959, an asbestos-cement plant was opened in Szczucin. It operated up to 1997.



From 1959, when the production started, till 1993 about 370,000 tonnes of asbestos were processed including 65,000 tonnes of crocidolite (blue asbestos). Over the period 1959-1985, the plant processed about 70% of the total crocidolite used at that time in the Polish asbestos-cement industry.

Assuming dust emission from the plant ventilation system of 50g per 1 tonne of asbestos processed, the total emission for the period of 1959-1996 was estimated to be ca. 17.5 tonnes of asbestos, including 3.2 tonnes of blue asbestos.

Soon after the plant had been established, the production waste was made available for use by the population, which was in agreement with legal regulations on asbestos-cement waste then in force. For more than 30 years, all types of asbestos-cement waste was used by the inhabitants to pave local roads, farmyards, sports fields, and also as an additive to construction materials in the individual farmsteads. During the period when Portland cement was available only with utmost difficulty, the asbestos-cement waste was highly valued by the district's population as the material for building construction. Estimated total volume of asbestos waste and asbestos-contaminated soil is 0.8-1.0 million m<sup>3</sup>, of which 330,000 m<sup>3</sup> on roads. Approximately, the surface of 65.5 km of roads, 8.6 ha of farmyards, 28.6 ha of driveways is contaminated with asbestos waste\*.

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\* Estimates: Institute of Environmental Protection, Warsaw

Sources of asbestos dust emission in the Szczucin District are as follows:

- roads, farmyards, plaza paving built of, or hardened with, asbestos waste
- dwelling houses, farm buildings and tool sheds in which asbestos products or waste was used as construction and finishing materials
- clothing, carpeting, blankets, mats and covers made of cloth contaminated with asbestos fibres
- heaps of asbestos waste in residential areas
- farmland on which fine-grain asbestos waste was used

The asbestos-cement waste widely used by the inhabitants of the district contain considerable amounts of easily visible crocidolite asbestos. The widespread use of asbestos waste in roads, farms and houses, and its use to improve soil and manufacture clothes means that the inhabitants of the district of Szczucin are exposed to asbestos dust released from a huge collective source.

The number of respirable fibres per unit volume of air present in the atmosphere of the district has been found to be quite high – from 5 to 50 fibres/l. The analysis of the measurements shows that over half (55%) of the district's inhabitants are environmentally exposed to high and very high asbestos fibre concentrations, that is above 10 fibres/l.

In the late 1980s, the first cases of pleural mesothelioma, the cancer specific to asbestos dust exposure, were noted both among workers of the asbestos-cement plant and in district inhabitants not employed in the plant.

Over the period 1987-2003, 55 cases of pleural mesothelioma were recorded, including 28 among Szczucin plant workers (occupational and environmental exposure) and 27 among Szczucin inhabitants (environmental exposure). These cases are presented in Table 1 and Table 2. It is worth stressing that in seven cases with short or very short duration of occupational exposure (the shadowed items in Table 1) pleural mesothelioma was a consequence of environmental exposure rather than of employment in the asbestos-cement plant.

**Table 1. Cases of pleural mesothelioma among inhabitants of Szczucin – workers  
in the asbestos-cement plant**

No.	Year of death or diagnosis	Initials	Duration of exposure (years))	Latency period (years)	Age at death or diagnosis	Gender
1.	1987	Sz.F.	12	27	68	M
2.	1988	K.M.	26	27	54	M
3.	1991	M.E.	19	26	60	F
4.	1991	N.J.	13	20	64	M
5.	1992	S.J.	21	33	72	M
6.	1992	L.R.	22	25	53	F
7.	1992	K.I.	19	33	73	M
8.	1993	D.S.	15	32	82	M
9.	1994	R.S.	3.5 months	35	80	M
10.	1994	C.T.	5	32	69	M
11.	1995	K.A.	3	12	31	M
12.	1995	T.R.	15	36	69	M
13.	1996	H.F.	24	37	65	M
14.	1996	W.M.	11	34	70	M
15.	1997	C.S.	23	32	66	M
16.	2000	Cz.S	5 months	18	41	M
17.	2000	K.E.	26	32	66	M
18.	2000	Ł.H.	12 months	28	50	M
19.	2001	R.B.	17	42	63	F
20.	2001*	B.S.	27	39	67*	M
21.	2001*	S.T.	18	41	81*	M
22.	2002	P.J.	3	11	38	M
23.	2002	Ch.J.	2	14	44	M
24.	2002*	R.H.	17	39	79*	M
25.	2002	G.M.	24	35	62	M
26.	2002	Ś.M.	13	38	80	M
27.	2003*	K.M.	28	36	58*	M
28.	2003*	Z.J.	14	39	84*	M

\* alive on 30 September 2004

**Table 2. Cases of pleural mesothelioma among Szczucin inhabitants not employed in the plant**

No.	Year of death or diagnosis	Initials	Year of birth	Age at death or diagnosis	Gender
1.	1989	S.K.	1961	28	M
2.	1992	G.J.	1950	42	M
3.	1992	L.Zb.	1945	47	M
4.	1993	K.J.	1962	31	F
5.	1993	P.M.	1938	55	F
6.	1995	K.M.	1939	56	M
7.	1995	P.G.	1919	76	F
8.	1995	K.S.	1959	36	M
9.	1997	N.D.	1956	41	F
10.	1998	Sz.Z.	1936	62	F
11.	1998	G.J.	1929	69	F
12.	1999	T.J.	1965	34	M
13.	1999	Ł.A.	1933	66	M
14.	2000	P.S.	1930	70	F
15.	2000	F.J.	1944	56	F
16.	2001	R.W.	1958	43	M
17.	2001	K.M.	1953	48	F
18.	2001	S.Z.	1930	71	F
19.	2001	Cz.W.	1942	59	F
20.	2001	U.N.	1947	54	F
21.	2001	F.T.	1958	43	M
22.	2002	J.Z.	1960	42	F
23.	2003	Ch.K.	1937	66	F
24.	2003	P.C.	1949	54	F
25.	2003*	H.N.	1922	81*	F
26.	2003*	D.T.	1958	45*	F
27.	2003*	M.I.	1956	47*	F

\*alive on 30 September 2004

**Table 3. Characteristics of pleural mesothelioma cases in the Szczucin population**

	Workers of Szczucin asbestos-cement plants	Szczucin inhabitants not employed in the plant
Number of cases	28	27
Males	26	9
Females	2	18
Age at first exposure	33.7±8.4	13.5±12.5
Latency period	30.5±8.7	38.8±4.8
Age at death	63.9±13.9	52.7±14.1
Exposure duration	15.0±8.9	-

**Pleural mesothelioma among Szczucin inhabitants  
(occupational or environmental exposure) in 2000-2003**

Year	No. of cases
2000	5
2001	10
2002	6
2003	7
	<hr/>
	28

Mean number of cases yearly:  $\approx 7$  per 14,000 inhabitants  
i.e., 500 cases per 1 million inhabitants

The incidence risk: 125 times as high as for the general population of Poland

The risk of asbestos-related diseases, and of malignant tumours in particular, was assessed by observing the deaths among the inhabitants of the Szczucin district and comparing them with the mortality recorded for the same period of time among the inhabitants of the reference (asbestos-free) district.

Results of observation revealed that in Szczucin:

- the rate of deaths from asbestos-related cancers (i.e. respiratory and gastrointestinal) is more than twice as high
- non-cancerous respiratory diseases in males are four times more frequent

- respiratory cancers appear in younger age groups and the mean age at death from those cancers is by 3 years less

Since the mid 1990s, as a consequence of the magnitude of health hazards from environmental asbestos pollution, projects on health protection for the inhabitants of the town and district of Szczucin have been started.

### **Conclusions**

- The results of the observation of Szczucin inhabitants exposed to asbestos dust point to a serious risk of death from asbestos-related diseases, and from pleural mesothelioma in particular.
- The crocidolite-containing asbestos-cement waste used to pave farmyards, roads, sports grounds are particularly dangerous to children and juveniles who are exposed to particularly high quantities of asbestos dust when they play or simply stay in the open air.
- The health of the district inhabitants, which reflects the ecological hazard over this territory, requires immediate extensive activities to improve the environment and prevent adverse health effects.