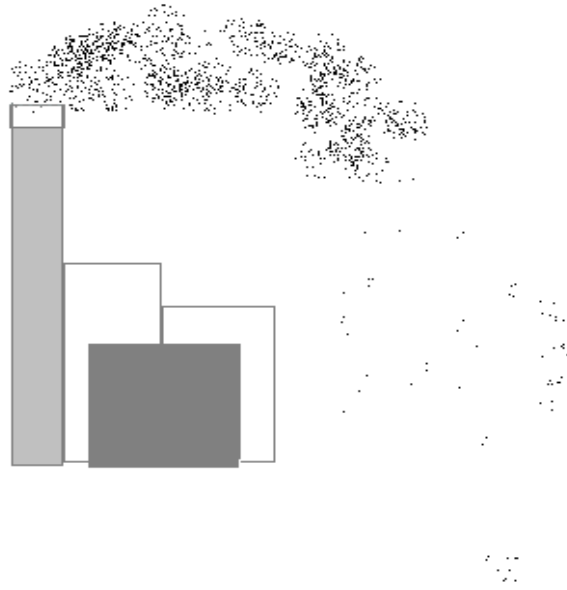


Mispelstraat:
 living
 under the smoke
 of a waste incinerator



Report on the health impact of the
 MIWA-waste incinerator in
 Sint-Niklaas
 Belgium

**RESEARCH INTO THE HEALTH EFFECTS CAUSED BY THE
WASTE INCINERATOR IN SINT-NIKLAAS (BELGIUM)**

**"De Mispelstraat" (Medlarstreet) :
living under the smoke of a
waste incinerator**

Table of contents

1	History and problems outline of the MIWA-waste incinerator in Sint-Niklaas (Belgium)	3
2	Fall-out pattern of the waste incinerator's toxical substances	3
3	Exposure data	3
4	The health research in the "Medlarstreet" in Sint-Niklaas	3
4.1	Research place and research method	3
4.2	Response	4
4.3	Registration of the reported health complaints	4
4.4	Survey of health complaints with children between 2 and 9 years	8
4.5	Base of comparison of registered health complaints	9
4.6	Cause of death and age of decease	9
4.7	Comparison of death cause to the results of the Seveso-report	12
4.8	Survey of the registrated cancer occurences	13
4.9	Study of the cancer occurrence with the 145 inhabitants living in "Medlarstreet" form before 1978	15
4.10	Survey of the cancer occurrences over a period of 10 years (1988-1997) with the inhabitants of "Medlarstreet" living there from before 1978	16
4.11	Acute complaints	17
5	General findings	19
5.1	Setting up a registration point	19
5.2	Assessments about 200 reports of health complaints around the waste incinerator in Sint-Niklaas	19
5.2.1	Survey of reported cancer occurrence with children	19
5.2.2	Reproduction complaints	20
5.2.3	Survey of reports of children with congenital defects	20
5.2.4	Other complaints	20
6	Disease image around waste incinerators	20
7	Method to trace environment health complaints and to fix them : "the seven steps plan"	21
7.1	First step : observations of inhabitants	22
7.2	Second step : searching sources which can cause health damage	22
7.3	Third step : study of the effects of health threatening sources	22
7.4	Fourth step : starting a reporting point	22
7.5	Fifth step : indicating all dates on a map	23
7.6	Sixth step : the scientific research : marking out a location and posing the questions	23
7.7	Seventh step : processing and analysing of registered health complaints	24
8	The end	24

1. History and problems outline of the MIWA-waste incinerator in Sint-Niklaas (Belgium)

Since more than 20 years, the city of Sint-Niklaas (40,000 inhabitants) has a waste incinerator owned by the government (a cooperation between 5 towns). This waste incinerator with a 55,500 tons per year capacity was built amidst streets where people live. It is less than 2 kilometers from the town centre. There is no heavy industry in the neighbourhood. From 1977 till 1988 the waste incinerator operated with a limited filter installation (only with a badly maintained electro filter). It's the only source of industrial dioxin emission in the neighbourhood. During 21 years, the ashes were stored and transported in open containers. Until now the waste incinerator is working without nitrogen filter.

2. Fall-out pattern of the waste incinerator's toxic substances

In a June 1993 state report (OVAM : MIE/MT/9304) the results are found of a research into the fall-out pattern in the immediate surroundings of the incinerator in Sint-Niklaas (see annex 1). We also collected statistical data concerning dominant wind directions in Belgium (see annex 2). The most polluted soil samples were situated within 200 meters of the incinerator and in the direction of the most dominant wind direction, i.e. between north and northeast and up to a distance of 4 kilometers.

3. Exposure data

In a February 1998 document (1998/DIA/R20), "preposition about dioxin norms in air and deposition" of the VITO (Flemish Institute for Technological Research), it was calculated that a perpetual exposition in the surroundings of the waste incinerator constitutes 5.5 to 12.3 pg. TEQ/day/kg body weight and for children 17.7 to 32 pg TEQ/day/kg. In this calculation breast feeding wasn't included. For the other toxic substances (f.e. PAH's, PCB's, chrome 6, lead, fine dust, NOx, ...) no exposure data were calculated.

4. The health research in the "Medlarstreet" in Sint-Niklaas

4.1 Research place and research method

The health research was undertaken in "Medlarstreet". "Medlarstreet" is situated within a distance of between 300 to 900 meters of the waste incinerator and laterally in the dominant wind direction. In this street, compared to all other surrounding living areas, the highest dioxin concentrations were measured. The health research was managed by a doctor anaesthetist and a doctor internist, pathologist and cancer specialist of the Catholic University of Louvain.

In January 1998 a questionnaire (see annex 3) was sent to all families in "Medlarstreet". One week later this questionnaire was brought together after a door-to-door collection. The collection and immediate control on the spot was done by 2 persons, who collaborated closely together.

4.2 Response

In total questionnaire were distributed among 145 families.
 88 families filled in the forms, i.e. 60,7%.
 32 families refused to participate.
 7 promised to send the questionnaire, but they didn't keep their promise.
 In 18 families at least 3 times no one was at home.
 In total we received data of 281 persons (136 male and 145 female).

Table 1

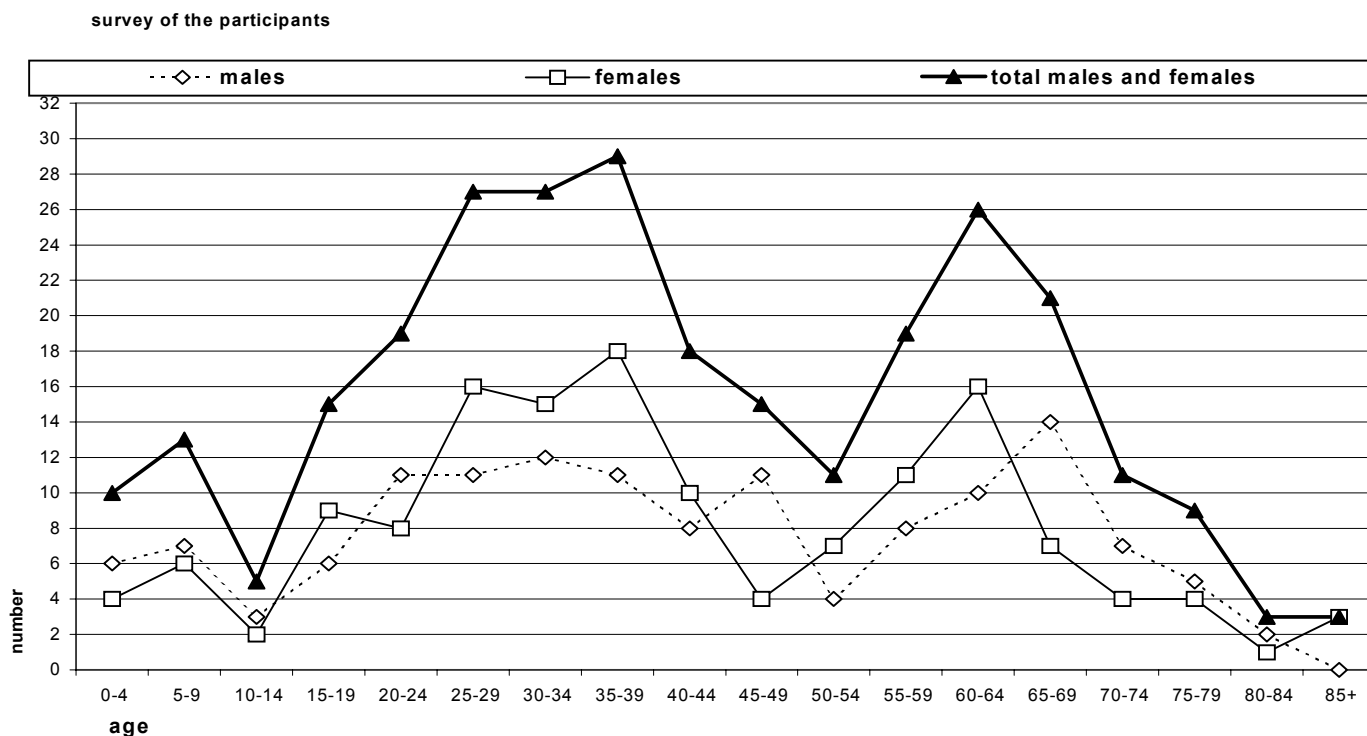


Table 1 reflects a street where an older generation of first inhabitants is succeeded by a younger generation.

4.3 Registration of the reported health complaints

In collaboration with the Saint Luke Hospital in Ghent all complaints and diseases were coded with the international ICD-9-CM code.

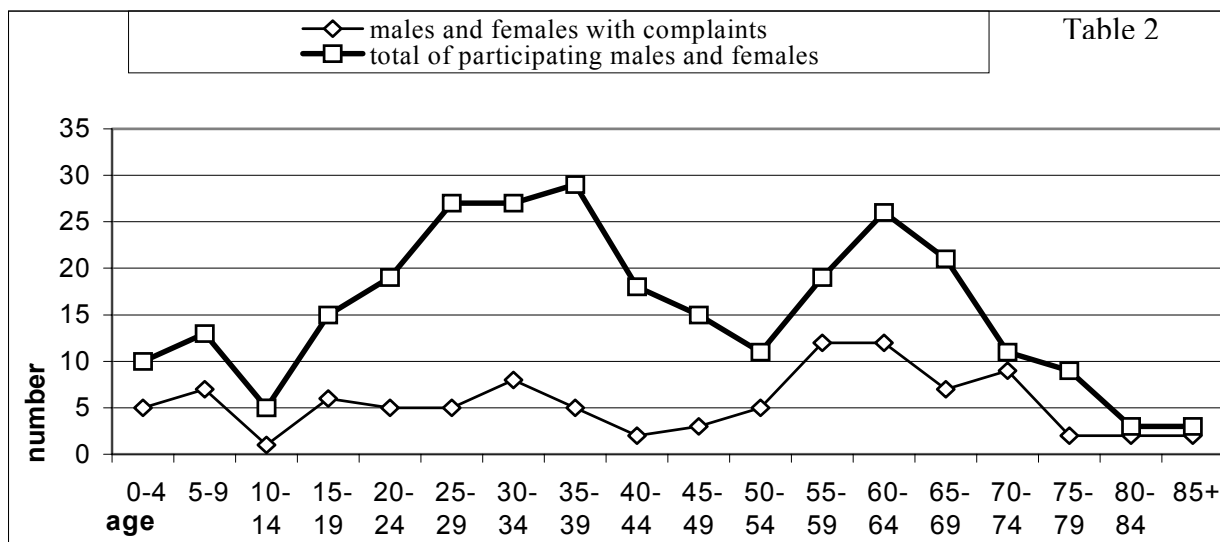
From the 281 persons, there are 98 persons (35%) talking about complaints or diseases (52 males and 46 females).

Table nr. 2 shows the total amount of males and females with complaints compared to the total amount of participants.

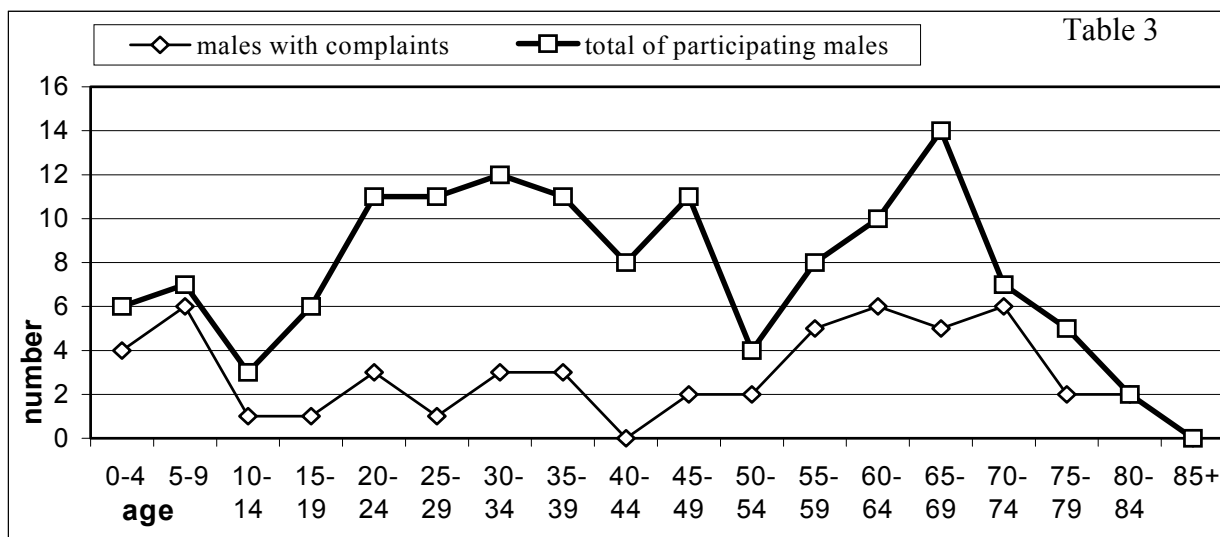
Table nr. 3 shows the total amount of males with complaints compared to the total amount of participating males.

Table nr. 4 shows the total amount of females with complaints compared to the total amount of participating females.

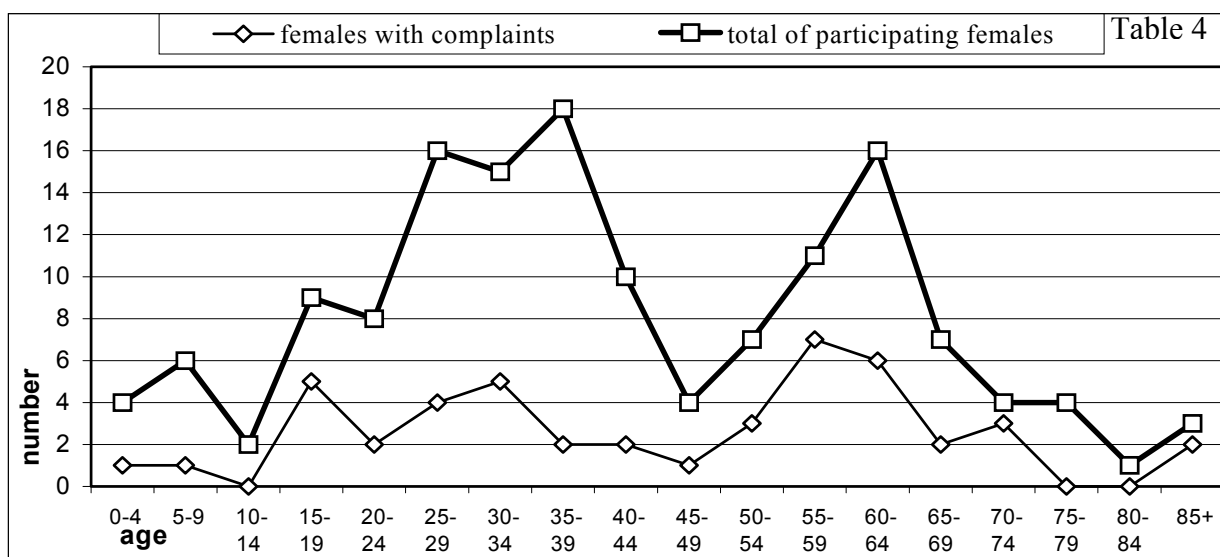
Amount of males and females with complaints compared to the total amount of participants



Amount of males with complaints compared to the total amount of participating males



Amount of females with complaints compared to the total amount of participating females

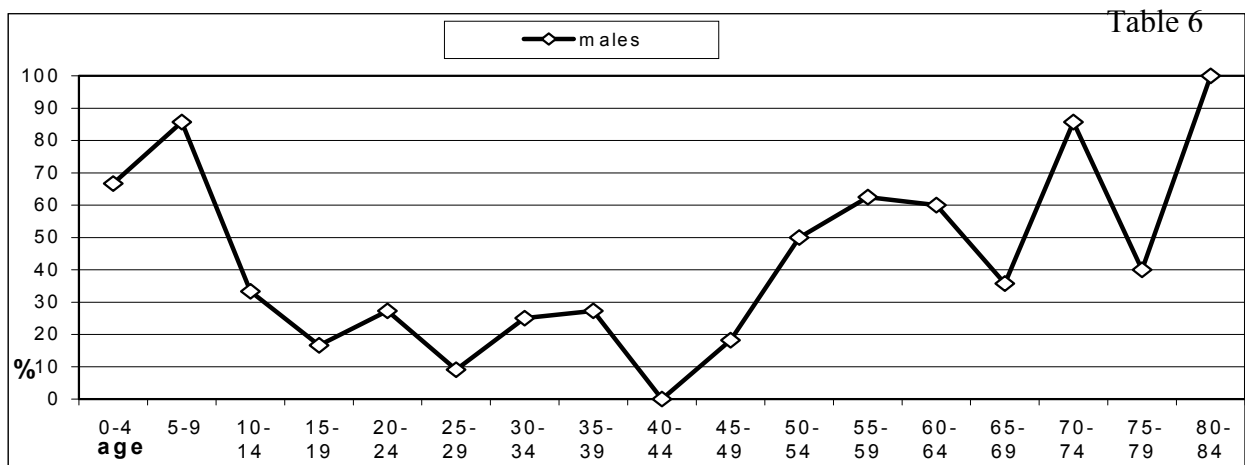


Tables 5, 6 and 7 presents the percentage of people with complaints compared to the total amount of participants.

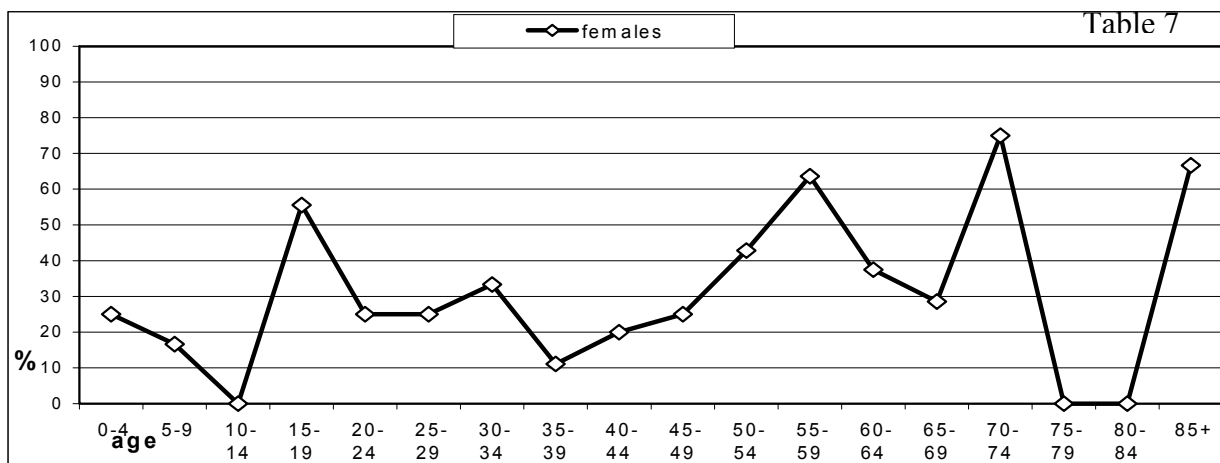
Complaints and diseases occurring to all participants, expressed in per cent compared to the total amount of participants.



Complaints and diseases occurring to males, expressed in per cent compared to the total amount of males.



Complaints and diseases occurring to females, expressed in per cent compared to the total amount of females



At a young age (2-9 years) boys are very sensitive to health problems (table nr. 6), for girls the sensitive age for health problems is situated a little bit later (15-19 years) (table nr. 7). At a later age females are however more sensitive to health problems (50-54 years) than males (only from 55 years onwards). This can be explained : cancer more often occurs in females at an earlier age than in men.

98 out of 281 persons reported complaints and/or diseases. Table nr. 8 gives a survey of all registered complaints and diseases. One person can have several complaints and/or diseases.

Table 8

1419	tongue cancer	4019	hypertension	71500	arthrose
1490	throat cancer	41091	coronary	7245	pain in the back
1490	throat cancer	4140	heart condition	7245	pain in the back
1539	intestine cancer	4140	heart condition	7290	rheumatism
1539	intestine cancer	41410	aneurysm of the heart	7290	rheumatism
1539	intestine cancer	4275	cardiac arrest	7290	rheumatism
1539	intestine cancer	42789	heart rhythm disturbance	7291	muscular pain
1552	liver cancer	42789	heart rhythm disturbance	73027	osteomyelitis
1629	lung cancer	4289	heart decompensation	73300	descaling of the bone
1629	lung cancer	4289	heart decompensation	7337	sudekadrofia
1629	lung cancer	4409	arteriosclerosis	7793	allergy to cow's milk
1629	lung cancer	4549	varicoses vein	7804	dizziness
1629	lung cancer	4549	varicoses vein	78052	insomnia
1739	skin cancer	4589	low blood pressure	7807	tiredness
1739	skin cancer	460	cold	7807	tiredness
1749	breast cancer	460	cold	7807	tiredness
1749	breast cancer	460	cold	7807	tiredness
1749	breast cancer	4659	infection of the upper bronchial tubes	7807	tiredness
1749	breast cancer	4659	infection of the upper bronchial tubes	7807	tiredness
185	cancer of the prostate	4660	bronchitis	7807	tiredness
185	cancer of the prostate	4660	bronchitis	7807	tiredness
1889	cancer of the kidney	4660	bronchitis	7807	tiredness
1889	cancer of the kidney	4660	bronchitis	7807	tiredness
1898	urinary tract cancer	4739	sinusitis	7807	tiredness
1970	lung to intestine cancer	47412	polypi	7821	rash developing
1983	metastasis of cerebral cancer	4778	dust allergy	7821	rash developing
1985	bone cancer	4778	dust allergy	7834	locomotor disturbances
1985	bone cancer	4778	dust allergy	7840	headache
1990	anaplastic carcinoma	4778	dust allergy	7840	headache
2019	hodgkin	4779	allergy via nose	7840	headache
20280	lymph cancer	4779	allergy via nose	7840	headache
20300	illness of Kaler	4779	allergy via nose	7840	headache
20890	leukaemia	4779	allergy via nose	7840	headache
20890	leukaemia	4779	allergy via nose	78601	hyperventilation
2163	misdividing of embryonic cells	49390	asthma	78601	hyperventilation
2357	lung tumour	49390	asthma	78609	respiratory disturbances
2360	tumour womb	49391	asthma and bronchitis	78609	respiratory disturbances
2367	tumour bladder	49391	asthma and bronchitis	78609	respiratory disturbances
2367	tumour bladder	501	asbestose	78609	respiratory disturbances
2409	enlarged thyroid gland	5128	blowout of the lung	78703	sickness
24290	a fast-acting thyroid gland	53019	non-closing stomach valve	78791	diarrhoea
2449	slow thyroid gland	53100	gastric bleeding	78791	diarrhoea
2563	hormonal complaints	53190	stomach ulcer	78901	stomachache
2720	high cholesterol level	5368	stomach complaints	7992	nervousness
2749	gout	5368	stomach complaints	9953	other allergy
2989	dementia	5373	stenosis of the gastric exit	9953	other allergy
30015	overstrained	5641	intestine complaints	9953	other allergy
3004	depression	5641	intestine complaints	E8190	traffic accident
3051	heavy smoker	585	insufficient action of the kidney	E9589	suicide
3089	stress	5941	kidney stone	V4501	pacemaker placed
3089	stress	600	prostate enlargement	V4581	bridging of the heart
31401	hyperactive	6210	uterine polyps		
31401	hyperactive	6272	advanced menopause		
317	light mental defectiveness	64003	imminent abortion		
34610	migraine	64403	imminent premature		
36100	coming loose of the retina	64423	early delivery		
		65653	developmentally retarded fetus		
		6929	skin allergy		
		6929	skin allergy		
		6929	skin allergy		
		6929	skin allergy		
		6929	skin allergy		
		6929	skin allergy		
		6961	skin disease		
		6989	itchiness		
		6989	itchiness		

As stated earlier, the high amount of boys with complaints is prominent (table 9 and 10).

4.4 Survey of health complaints with children between 2 and 9 years

Table 9

m/f	birth year	start residence	complaint 1	since	complaint 2	since	complaint 3	since	complaint 4	since
m	1989	1989								
f	1989	1989								
m	1989	1989	78609	1993	49390	1993				
f	1989	1992								
f	1989	1995								
m	1990	1990	78791	1995	7834	1990	317	1990		
f	1990	1990	31401							
f	1990	1992								
m	1991	1991	460	1991						
f	1991	1992								
m	1992	1992	78791	1995						
m	1992	1993	47412		460		9953		31401	1992
m	1992	1995	7821	1995						
m	1994	1994	4660	1996						
m	1994	1997	2163	1996	5373	1996	7793	1996		
f	1995	1995								
m	1995	1997	53019	1995	4659	1996	6929	1995		
f	1996	1996	4778	1996						

start residence = the first year that the child was living in "De Medlarstreet".

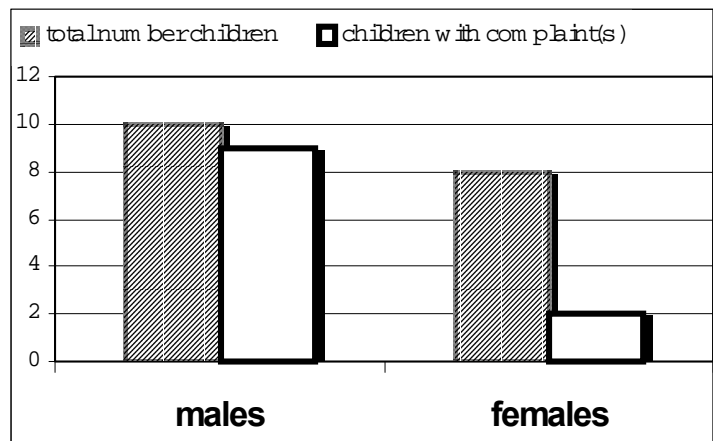
explanation of the codes :

2163	misdividing of embryonic cells
31401	hyperactive
31401	hyperactive
317	light mental defectiveness
460	colds
460	colds
4659	infection of the upper bronchial tubes
4660	bronchitis
47412	polypi
4778	dust allergy
49390	asthma
53019	non-closing stomach valve
5373	stenosis of the gastric exit
6929	skin allergy
7793	allergy to cow's milk
7821	rash developing
7834	motorical disturbances
78609	breathing disturbances
78791	diarrhoea
78791	diarrhoea
9953	other allergy

Survey of children from 2 to 9 years old

Table 10

	total number	total number with complaint(s)	% with complaint(s)
male	10	9	90
females	8	2	25
total m+f	18	11	61



9 boys out of 10 between 2 and 9 years old have 1 of more complaints : misdividing of embryonic cells, hyperactivity, light mental defectiveness, colds, bronchitis, dust allergy, skin allergy, allergy to cow's milk, non-closing stomach valve, stenoses of the gastric exit, breathing disturbances, diarrhoea, infections of the bronchial tubes, asthma, motorical disturbances, polypis, other allergies. (table nr. 10)

4.5 Base of comparison of registered health complaints

In fact all stated health complaints should be compared to health complaints of a corresponding control group in the countryside. The authorities made this impossible because they didn't want to do a scientific research and financially they didn't support further research. So this research was totally financed by ourselves.

In Belgium we only have at our disposal statistical data concerning cause of death and age of decease and cancer occurrences. The statistical data concerning cause of death and age of decease were taken from the book "Health indicators 1995" by the Ministry of the Flemish Community. For the calculation of cancer occurrences we had to base ourselves on statistical data of the national cancer register. We took the average yearly Belgian cancer occurrence data during the 1990-1992 data. Derived from these statistical data we made several statements.

4.6 Cause of death and age of decease

Table 11 gives a survey of the 21 deceased persons.

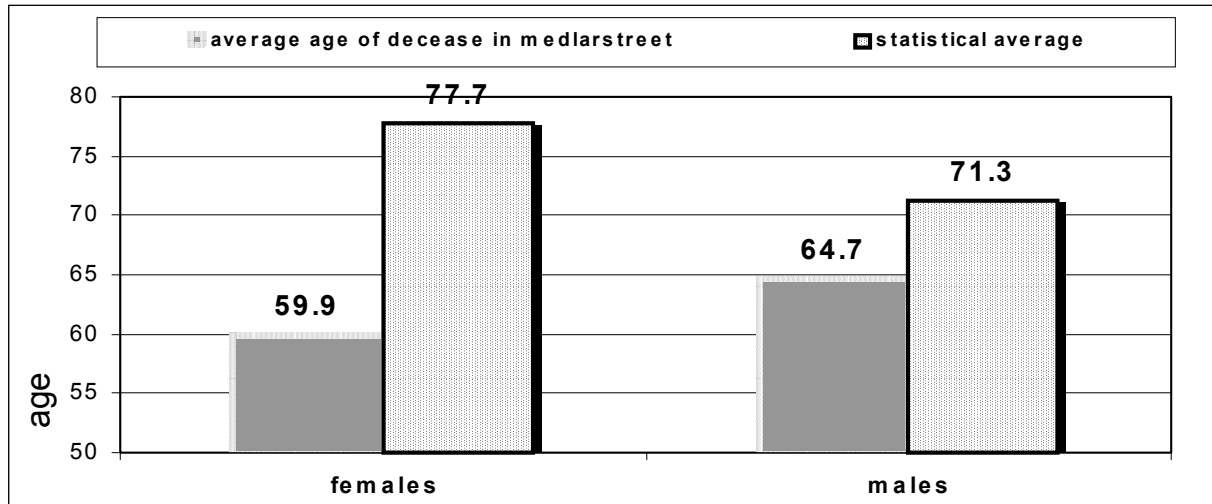
Table 11

age by death	m/f	cause of death	date of death	period of habitation	habitation		description complaint	other reported complaints
					from	till		
53	m	1490	1991	50	1941	1991	throat cancer	
51	m	1539	1989	29	1960	1989	intestine cancer	
68	m	1539	1991	14	1977	1991	intestine cancer	lungcancer
60	f	1539	1994	36	1958	1994	intestine cancer	
50	f	1552	1979	6	1973	1979	liver cancer	stomachache
86	f	1629	1992	32	1960	1992	lungcancer	
60	m	1629	1993	29	1964	1993	lungcancer	
59	m	1629	1996	33	1963	1996	lungcancer	bone cancer
65	m	1629	1996	34	1962	1996	lungcancer	brain tumo psoriasis
70	m	1889	1994	33	1961	1994	cancer of the kidney	stone in the bladder
59	m	1889	1995	27	1968	1995	cancer of the kidney	bone cancer
51	f	1898	1981	31	1950	1981	urinary tract cancer	
69	f	1990	1995	59	1936	1995	tumour bladder	anaplastic carcinoma
16	f	20890	1982	16	1966	1982	leukaemia	
62	f	20890	1987	10	1977	1987	leukaemia	
82	m	4140	1994	34	1960	1994	heart condition	
59	m	4275	1981	10	1971	1981	cardiac arrest	blood vessels
86	f	4289	1983	54	1929	1983	heart decompensation	
82	m	53100	1980	51	1929	1980	gastric bleeding	
68	m	E8190	1987	10	1977	1987	traffic accident	
59	f	E9589	1991	32	1959	1991	suicide	

All deceased persons lived in "Medlarstreet" at the moment the waste incinerator was activated in 1977 and they still lived there at their moment of death.

The deceased female had an average of 59.9 years (the average age in case of decease of Belgium female is 77.7 years), the deceased male had an average decease age of 64.7 years (the average decease age of Belgium male is 71.3 years). See table nr. 12.

Table 12



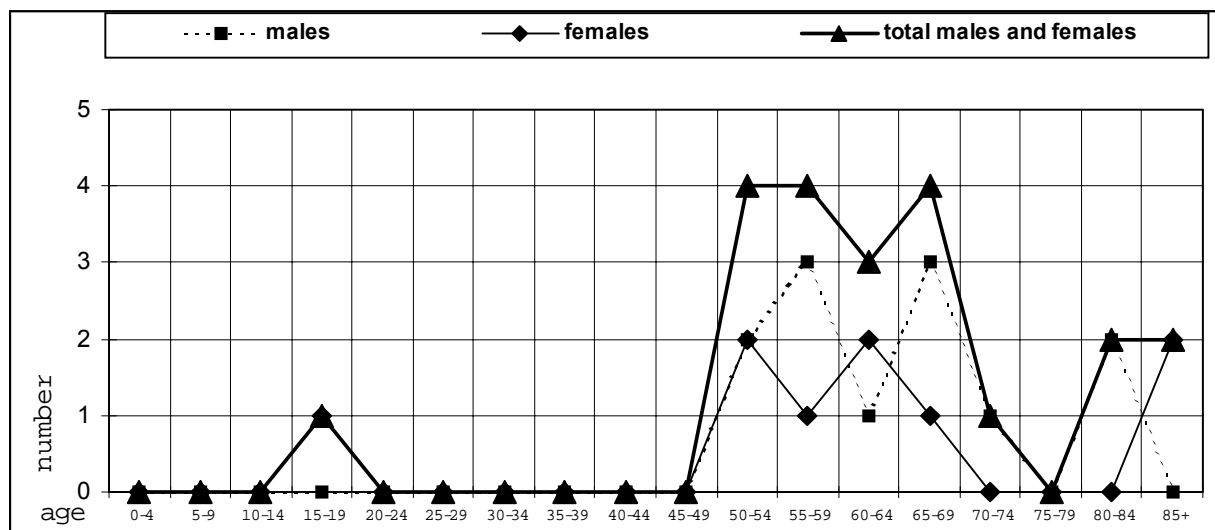
data of death

Table 13

	number	Medlarstreet average period of habitation	Medlarstreet average age of death date	Belgium average age of death date
females	9	30.7	59.9	77.7
males	12	29.5	64.7	71.3
total	21	30	62.6	74.4

The deceased persons lived averagely for 30 years in "Medlarstreet" (table 13)
16 of the 21 deceased died before teh age of 75. One child died at the age of 16 of leukaemia
(table 14).

Table 14



Our data are following the same trend as the data of the district of Sint-Niklaas. According to this data the general SMR (Standardized Mortality Rate) between 1994 and 1996 is 102.8 for males and 107.2 for females. This means that males in the Sint-Niklaas district die averagely 2.8% more than the Belgian average, so live expectancy is shorter, for females it is 7.2% more.

Order in numbers of death cause

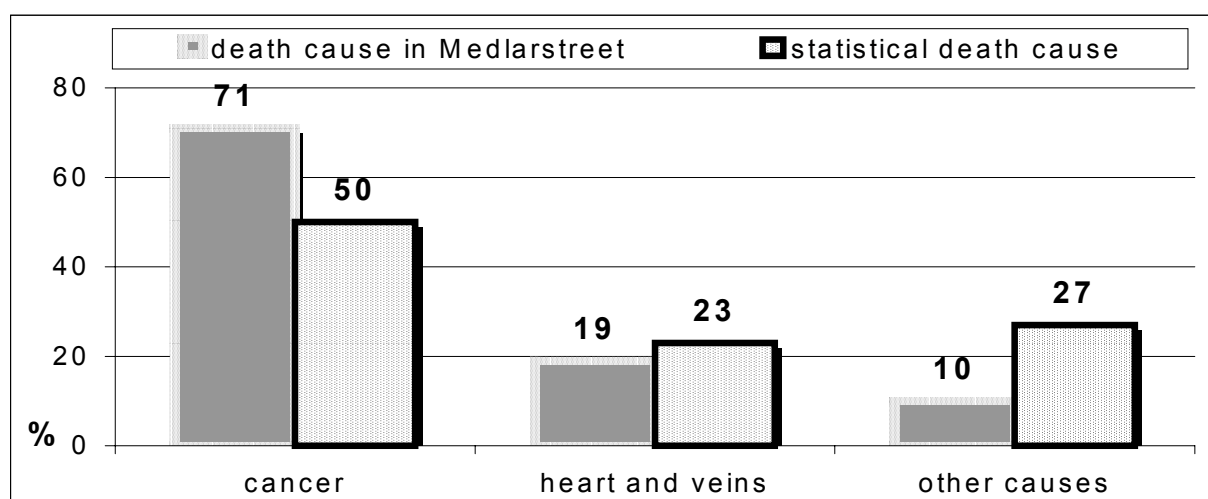
Table 15

	cancer	heart and veins	other causes
females	7	1	1
males	8	3	1
total	15	4	2
%	71	19	10
% statistically	50	23	27

From the 21 deceased 15 died of cancer, i.e. 71%. (Belgiums average is 50%) (table 16).

Death cause in "Medlarstreet" (m/f), expressed in % and classified according to cancer, heart and vein diseases, and other causes

Table 16



Proportional death figure in numbers - m/f

Table 17

males		sorts of complaints	females	
statistically	medlarstreet		medlarstreet	statistically
1.1	2	intestine cancer	1	0.64
1.98	3	lung cancer	1	0.4
1.87	3	ather cancer	5	3.44
2.97	3	heart and vein	1	1.52

statistical death figure for age between 45-64 years in Belgium

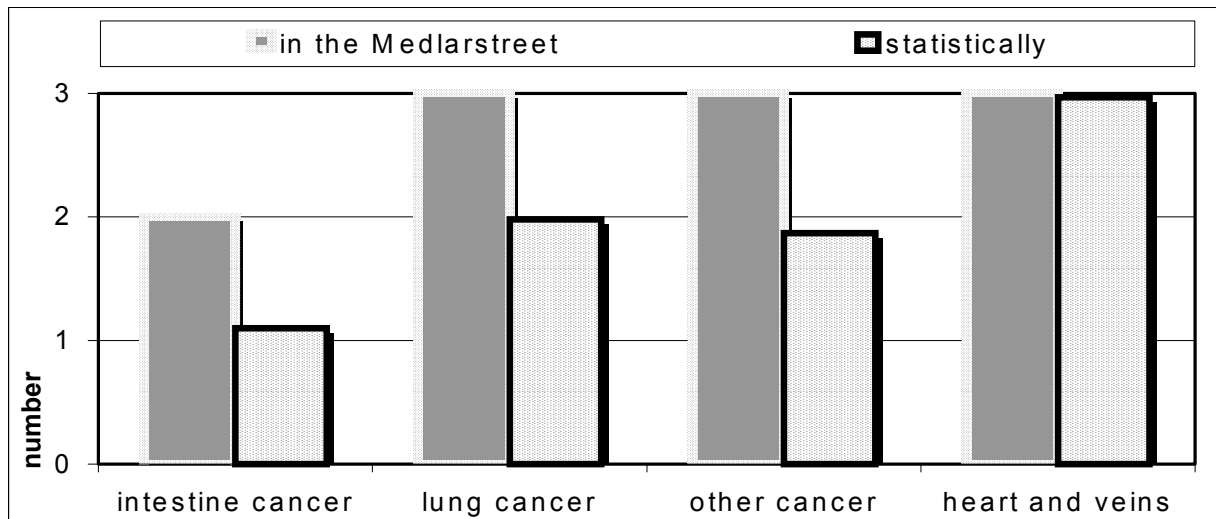
Looking at the Sint-Niklaas district data, we see that the cancer SMR (Standardized Mortality Rate) between 1994 and 1996 is 112.08 for males and 105.32 for females. It means that in the Sint-Niklaas district males die 12.08% more of cancer and females die 5.32% more, compared to the Belgiums average.

It's very remarkable that as far as the women's death cause is concerned, no one died of breast cancer or cervical cancer, however these cancers constitute 21% of death causes in Belgiums females.

Other causes of cancer death in females, than breast cancer, lung cancer, colorectal cancer and cervical cancer are only 22% in Belgium. Our research showed data of 55%. Examples are liver cancer, urinary tract cancer, bladder cancer and 2 leukaemia.

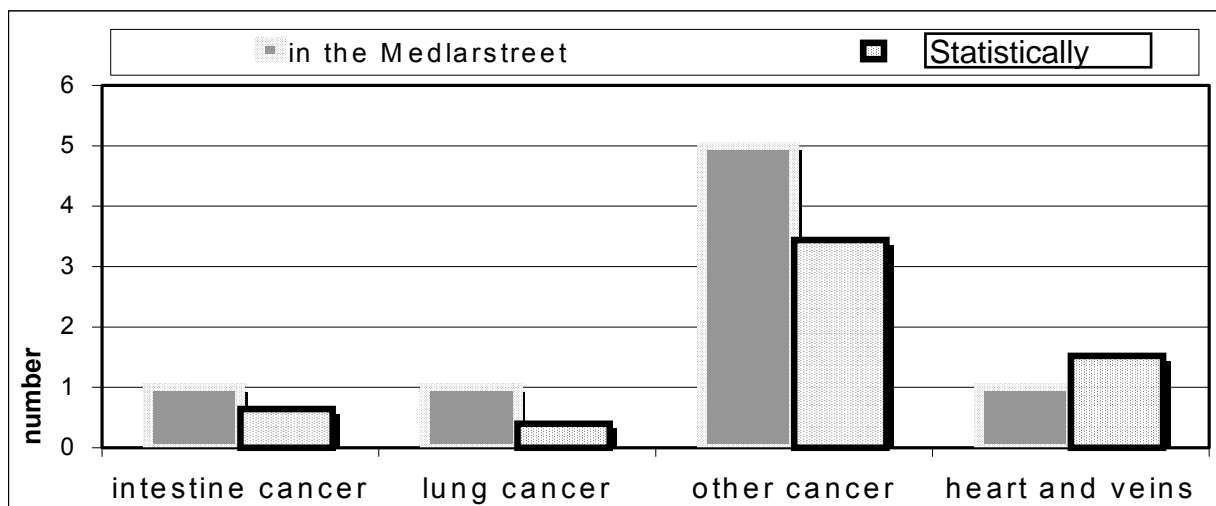
Proportional mortality rate for males in "Medlarstreet", according to cancer sorts and heart and vein diseases, calculated according occurrence between the age of 45 and 64 years.

Table 18



Proportional mortality rate for females in "Medlarstreet", according to cancer sorts and heart and vein diseases, calculated according occurrence between the age of 45 and 64 years.

Table 19



Death cause for heart and vein diseases approaching the statistical average data. Death cause for intestine cancer, lung cancer and other kinds of cancer are proportional increased in "Medlarstreet", for males and for females. (tabel 16-18-19)

4.7 Comparison of death cause to the results of the Seveso-report.

Very striking is the resemblance of our situation with the Seveso-report about health complaints 15 years after the accident (table 20 + 21). In Seveso there were increasing death occurrences caused by intestine cancer, lung cancer, liver cancer, 6 times more leukaemia and Hodgkin, and twice more soft tissue sarcoma. There were also decreasing death causes : breast cancer, cervical cancer and ovary cancer. This decreasing is blamed to the fact that TCDD (dioxin) is renowned for its powerful anti-oestrogene effects.

	Females	Seveso	Medlarstreet
Zone A	digestion system	slightly increased	increased
Zone B	Hodgkin and leukaemia	x 6	strongly increased
	breath systems	decreased	?
	breast cancer	decreased	none
	uterine cancer	decreased	none
	ovary cancer	decreased	none

? = not representative because of too low numbers

data of the Seveso research :

	persons	area	distance in m	µg TCDD/m ²
Zone A	750	87 ha	0-526	15,5 - 580
Zone B	5.000	270 ha	526-927	< 50

Our research showed an increasing death cause of cancer in men, this for all kinds of cancer. Also in Seveso this was stated. (table 21)

Table 21

	Male	Seveso	Mispelstraat
Zone B	rectum cancer	x 3	increased
	lung cancer	slightly increased	increased
	leukaemia	increased	?

? = not representative because of too low numbers

4.8 Survey of the registrated cancer occurences

Survey of the cancer occurences (33 occurences with 145 persons who have been living in "Medlarstreet" from before 1978)

Table 22

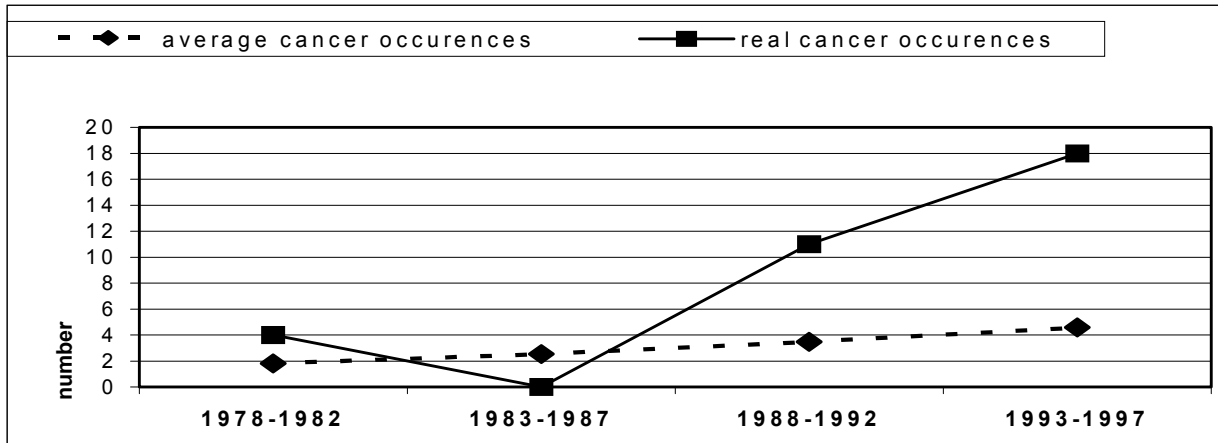
M/F	year of birth	start of habitation	year of death	age by occurrence	complaint 1 ICD-9-CM	group	nr. cancer	description	since	Complaint 2	description	since	complaint 3	since	complaint 4	since
m	1924	1961		73	1419	1	141	tongue cancer	1997	600		1997				
m	1924	1961		64	1490	1	148	throat cancer	1988	600		1997				
m	1938	1941	1991	53	1490	1	148	throat cancer	1991							
m	1923	1977	1991	65	1539	2	153	intestine cancer	1988	1970	lung to intestine cancer	1988				
m	1920	1975		75	1539	2	153	intestine cancer	1995							
m	1938	1960	1989	51	1539	2	153	intestine cancer	1989							
f	1934	1958	1994	57	1539	2	153	intestine cancer	1991							
f	1929	1973	1979	50	1552	2	155	liver cancer	1979	78901		1979				
m	1933	1964	1993	59	1629	3	163	lung cancer	1992							
m	1937	1964		60	1629	3	163	lung cancer	1997							
m	1937	1963	1996	58	1629	3	163	lung cancer	1995	1985	bone cancer	1995				
m	1931	1962	1996	65	1629	3	163	lung cancer	1996	1983	metastasis of cerebral cancer	1996	6961	1988		
f	1906	1960	1992	86	1629	3	163	lung cancer	1992							
m	1923	1936		73	1739	5	191	skin cancer	1996							
f	1944	1966		52	1739	5	191	skin cancer	1996							
f	1936	1970		61	1749	4	170	breast cancer	1997							
f	1944	1966		46	1749	4	170	breast cancer	1990							
f	1940	1965		52	1749	4	170	breast cancer	1992							
f	1939	1965		56	1749	4	170	breast cancer	1995							
m	1926	1950		70	185	4	177	prostat cancer	1996	2749		1981	7290	1997	4409	1998
m	1923	1936		70	185	4	177	prostat cancer	1993							
m	1936	1968	1995	58	1889	4	180	kidney cancer	1994	1985	bone cancer	1994				
m	1924	1961	1994	65	1889	4	180	kidney cancer	1989	5941		1989				
f	1930	1950	1981	49	1898	4	180	urinary tract canc	1979							
m	1976	1976		17	2019	6	201	hodgkin	1993							
f	1925	1961		72	20280	6	200	lymph cancer	1997							
f	1943	1974		54	20300	6	203	illness of Kaler	1997							
f	1925	1977	1987	56	20890	6	204	leukaemia	1981							
f	1966	1966	1982	15	20890	6	204	leukaemia	1981							
m	1930	1958		64	2357	3	163	lung tumour	1994							
f	1939	1974		54	2360	4	173	tumor womb	1993	7291		1993	7807	1993		
m	1932	1958		63	2367	4	181	tumour bladder	1995	5128		1996				
f	1926	1936	1995	66	2367	4	181	tumour bladder	1992	1990	anaplastic carcinoma	1995	3051	1994		

145 of the 281 participants (52%) lived in "Medlarstreet" before 1978 : 68 males (average age 55.1 years) and 77 females (average age 52.4 years). These 145 persons, who were living in "Medlarstreet" before 1978, showed 33 cancer occurrences (18 males and 15 females). This is on average 1 out 4.4 persons. 29 of the 33 cancer occurrences appeared during the last 10 years (table 23+24+25)

General cancer occurrences with the 145 participants who lived in "Medlarstreet" before 1978.

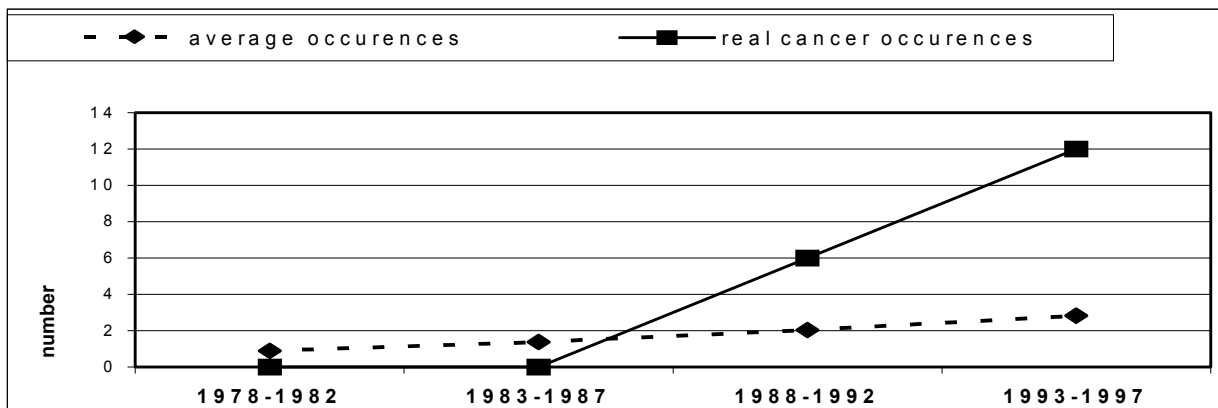
This in comparison to the expected cancer occurrences in relation to age and number.

Table 23



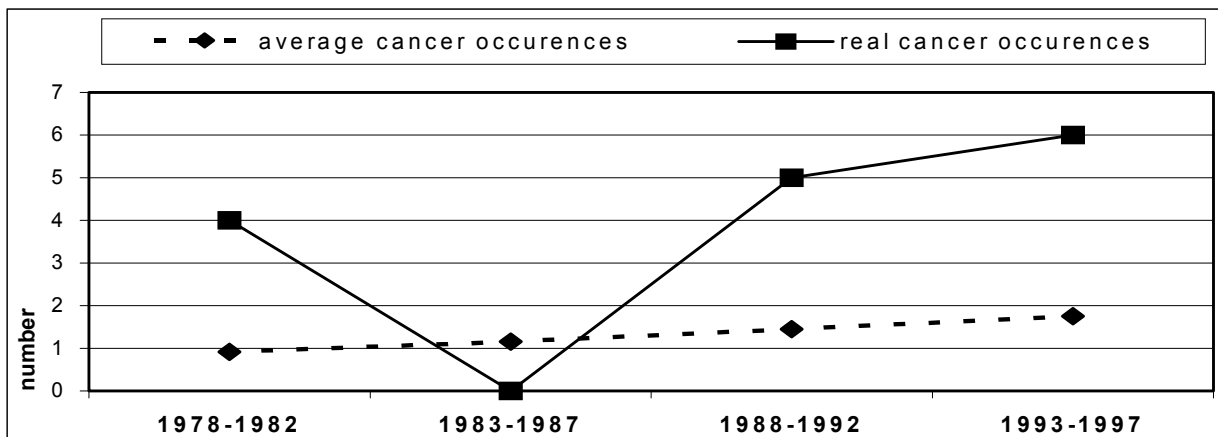
for males

Table 24



for females

Table 25



Also striking is the fact that 4 cancer occurrences, dating from the period of the first 5 years after starting up the waste incinerator, all occurred to females. All these women died because of these cancers (table 25). In 1979, a 50 year-old female died because of liver cancer and in the same year a 49 old-female died of urinary tract cancer. In 1981 a 15 year-old young girl because of leukaemia and a 56 year-old female died also because of leukaemia.

4.9 Study of the cancer occurrence with the 145 inhabitants living in "Medlarstreet" from before 1978

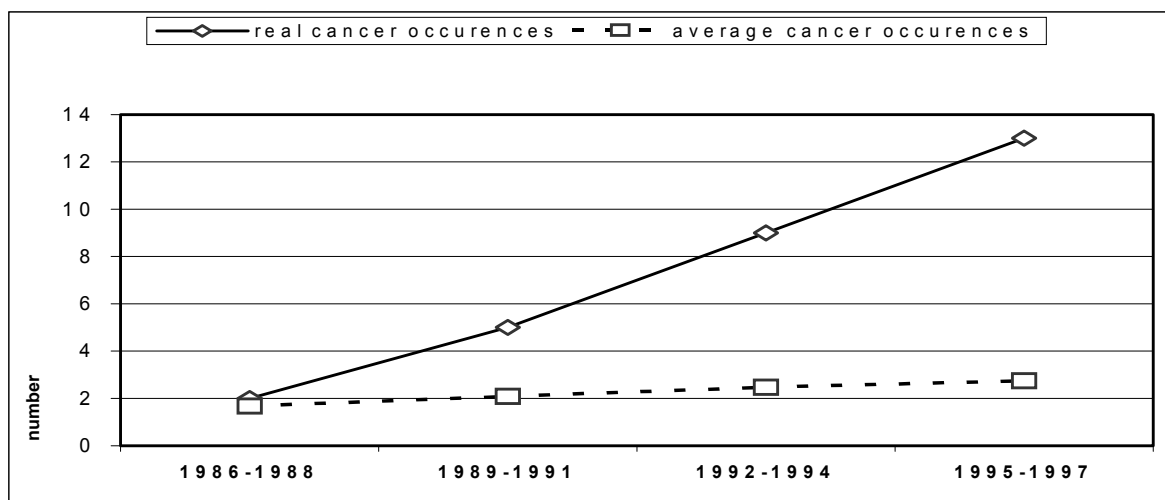
For the group of 145 inhabitants of "Medlarstreet" living there from before 1978, the change of cancer occurrence has for the last 3 years increased to **4.8 times more than** the Belgian average (table 26).

General cancer occurrences with the 145 participants who lived in "Medlarstreet" before 1978.

This in comparison to the expected cancer occurrences in relation to age and number.

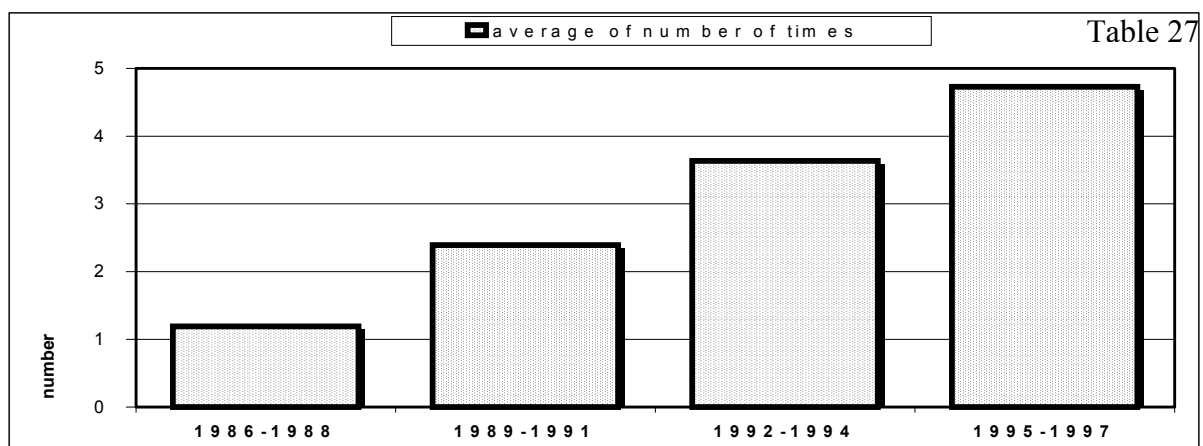
Cancer occurrences of the last 12 years, per 3 years.

Table 26



Very striking is the increasing link to cancer occurrences. While in the period of 1986-1988 the cancer occurrence was more or less equal to normal occurrence expectations, during the period of 1995-1997 the occurrence was 4.8 times more than the normal occurrence expectations. (table 27)

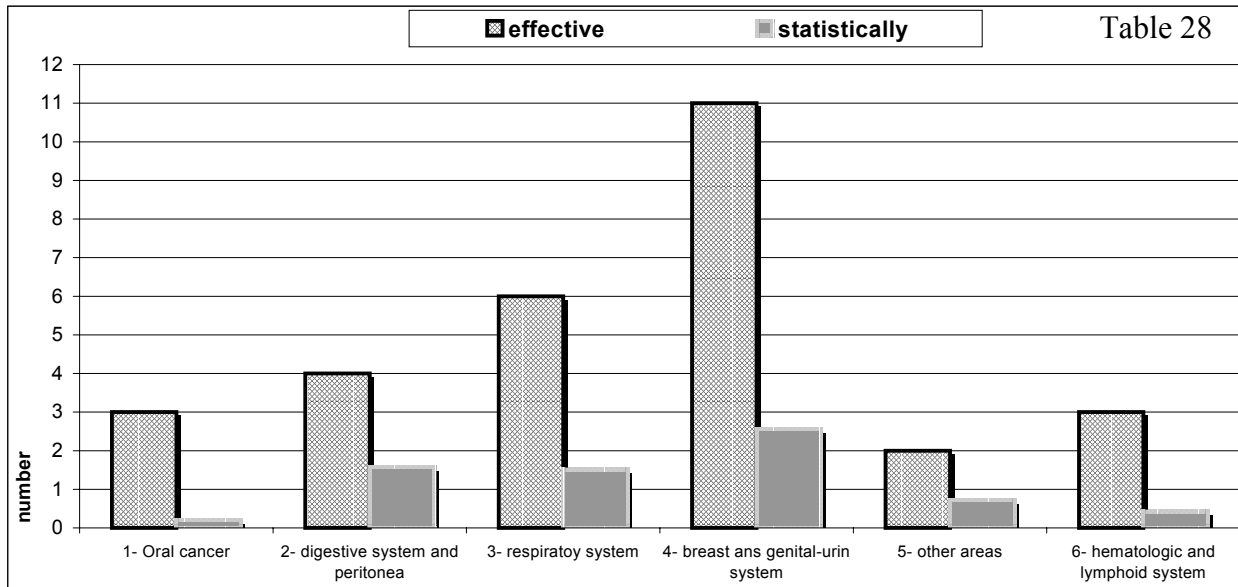
Number of times that cancer occurrence is found more than the average in Belgium



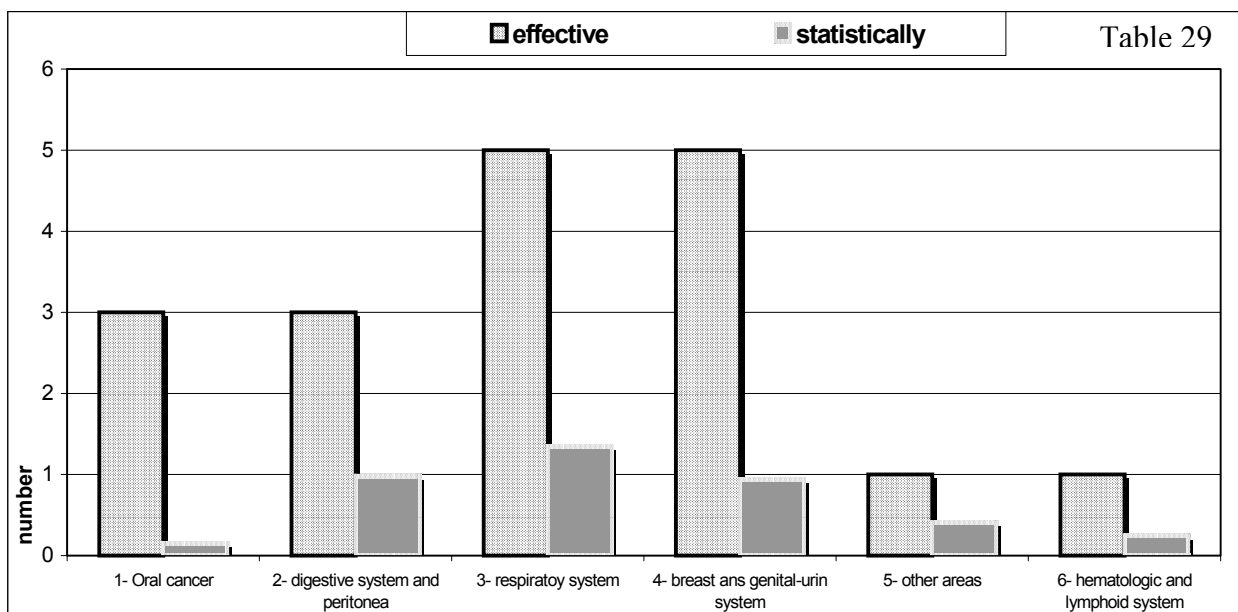
4.10 Survey of the cancer occurrences over a period of 10 years (1988-1997) to the inhabitants of "Medlarstreet" living there from before 1978.

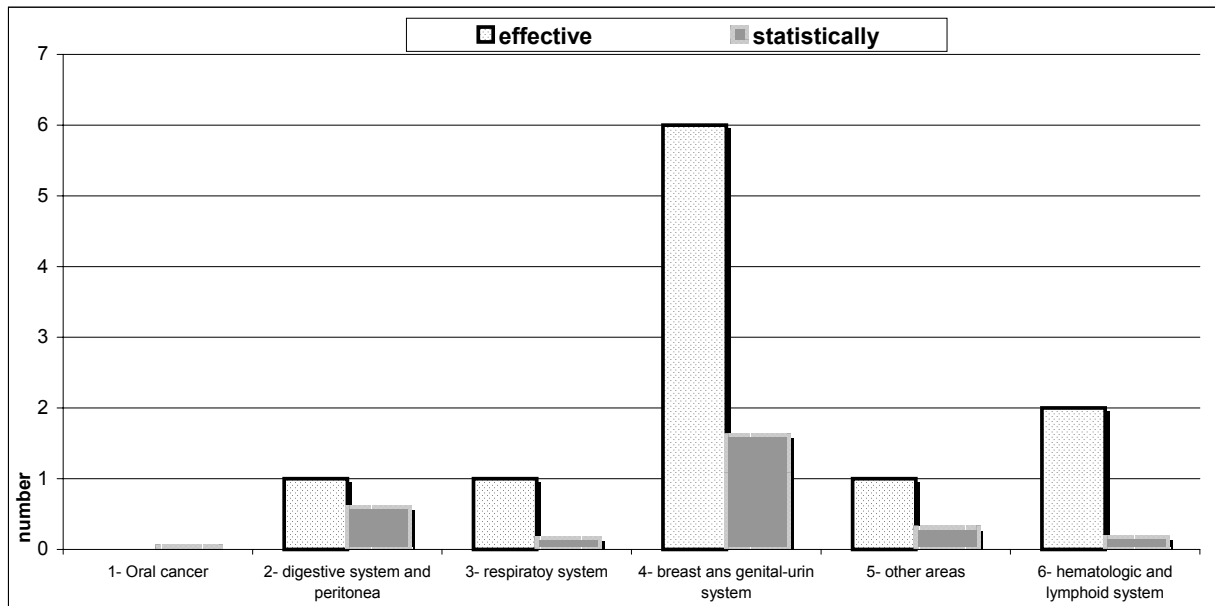
When we divide cancer occurrence in 6 main groups, we see an almost parallel increase of all these groups, males and females. Except for the group mouth and pharynx cancers in males (19 times more than the expected occurrence) and the group of lymph and blood system in females (11 times more than the expected occurrence) (table 28-31).

**Concerning the 145 participants who lived in "Medlarstreet" before 1978.
Division of 29 cancer occurrences from 1988 till 1997 into the 6 cancer groups.
This in comparison with the normal statistical number of cancer occurrences in Belgium**



For males

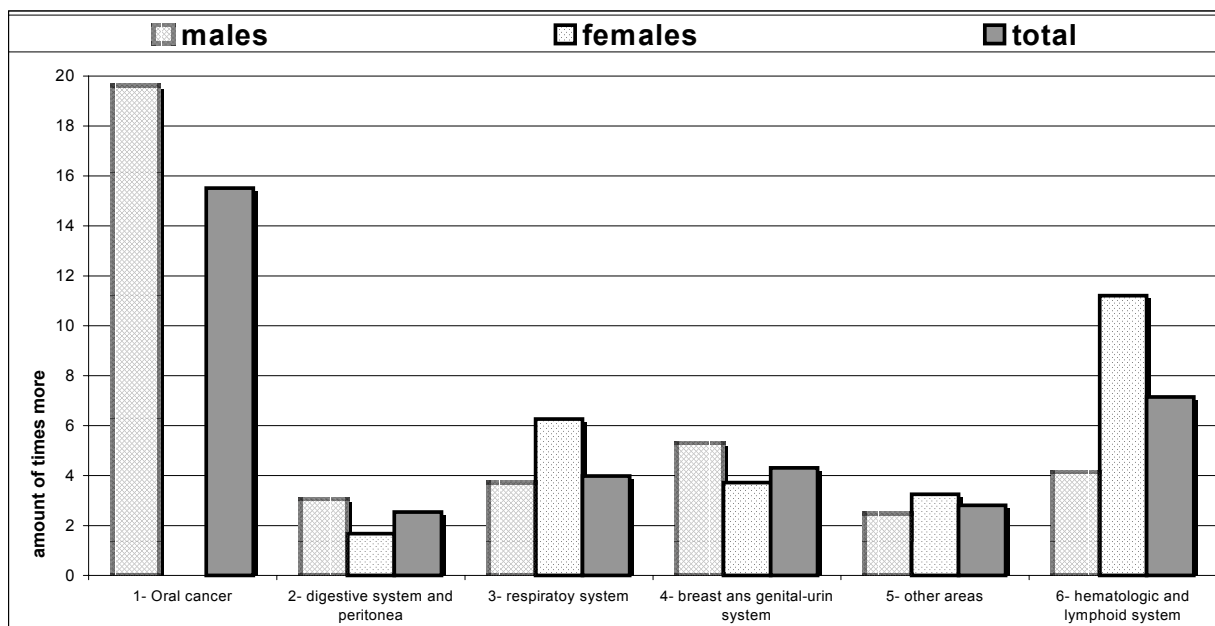




Cancer occurrence in 145 persons living in "Medlarstreet" from before 1978. Divided by cancer occurrence group.

Amount of times that every cancer group is more than the Belgian average.

Table 31



4.11 Acute complaints.

- Complaints which should disappear in case of a clear living environment (like allergies, eczema, respiratory complaints and infections of the bronchial tubes) haven't disappeared yet (table 32).
- Also people having lived for less than the last 5 years in "Medlarstreet" have complaints about allergies, long lasting colds, eczemas, etc., diseases they didn't have before (table 33).

M/F	° year	start habitation	end habitation	complaint 1	since	recovered	complaint 2	since	recovered	complaint 3	since	recovered	complaint 4	since	recovered
m	1971	1974		78609	1996	now									
f	1977	1977		9953	1980	now									
m	1992	1995		7821	1995	now									
m	1962	1995		7821	1995	now	4660	1995	yes						
f	1939	1974		2360	1993	yes	7291	1993	yes	7807	1993	yes			
m	1925	1961		2409	1987	1987	42789	1987	1996	V4501	1996		heart rhythm disturbances	recovered by pacemaker	
f	1930	1960		78609	1997	now	3089	1997	now						
m	1924	1960		2989	1996	now	4289	1988	yes	V4581	1988	yes	recovered by heart bridging		
f	1982	1982		7840	1995	now									
m	1992	1992		78791	1995	now									
m	1990	1990		78791	1995	now	7834	1990	now	317	1990	now			
m	1952	1990		7840	1995	now	7807	1995	now	6989	1995	now			
f	1964	1978		7840	1995	now	5641	1995	now	78601	1995	now			
f	1983	1983		49391	1987	now									
f	1967	1993		7807	1993	now	78052	1993	now						
m	1992	1993		47412	1997	yes	460	1995	yes	9953	1995	now	31401	1992	now
m	1994	1994		4660	1994	now									
m	1996	1996		4660	1996	now									
f	1976	1982		4739	1986	now							operated in 1986 for sinusitis, regained after operati		
f	1980	1982		4779	1993	now									
f	1953	1953		7807	1990	1994									
m	1942	1981		4019	1985	now	7807	1985	now	7804	1985	now			
f	1965	1965	1989	4779	1985	now	4778	1985	now						
m	1963	1989		6929	1991	now	9953	1991	now						
m	1984	1984		460	1984	1990									
m	1991	1991		460	1991	1998									
m	1978	1988		6929	1978	now	4778	1978	now	4779	1978	now			
f	1981	1988		6929	1981	now	4778	1981	now	4779	1981	now			
f	1971	1971	1997	6929	1977	now									
m	1926	1959		4659	1983	now	42789	1997	yes						
m	1964	1966		4779	1974	now									
m	1989	1989		78609	1993	now	49390	1993	now						
f	1964	1966		3004	1995	1997	64403	1989	1989						
f	1996	1996		4778	1996	now									
m	1964	1996		49391	1997	now	78609	1997	now						
f	1970	1996		78601	1997	now	7992	1997	now						
m	1959	1959		30015	?	now									
f	1937	1963		6989	1993	now									
m	1995	1997		53019	1995	n.t.	4659	1996	?	6929	1995	now			
f	1963	1963	1984	7807	?	now	4589	?	now	64423	?	n.t.	65653	?	n.t.
f	1967	1967	1992	7807	1988	now	78703	1988	yes	64003	1993	n.t.	7245	1995	n.t.
f	1990	1990		31401	?	now									
m	1937	1965		5641	1983	now	7840	1983	now						
f	1928	1961		7807	?	now	5368	?	now						
m	1943	1966		5368	1989	now									
m	1982	1982		7840	1988		7807	1988							
f	1938	1964		7245	1978		4660	1978		7807	1978				
f	1969	1969		73300	1992	now	34610	1987	now	7807	1987	now	7840	1987	now
f	1969	1994		24290	1997	now	3089	1997	now						

30015	overstrained
3004	depression
3089	stress
31401	hyperactive
34610	migraine
4019	hypertension
42789	heart rhythm disturbance
4289	heart decompensation
4589	low blood pressure
460	cold
4659	infection of the upper bronchial tubes
4660	bronchitis
4739	sinusitis
47412	polypis
4778	dust allergy
4779	allergy via nose
49390	asthma
49391	asthma and bronchitis

5368	stomach complaints
5641	intestine complaints
6929	skin allergy
6989	itchiness
7804	dizziness
78052	insomnia
7807	tiredness
7821	rash development
7840	headache
78601	hyperventilation
78609	respiratory disturbances
78703	sickness
78791	diarrhoea
7992	nervousness
9953	other allergies

M/F	° year	start habitation	end habitation	complaint 1	since	recovered	complaint 2	since	recovered	complaint 3	since	recovered	complaint 4	since	recovered
m	1962	1995		7821	1995	now	4660	1995	yes						
m	1992	1995		7821	1995	now									
m	1992	1993		47412	1997	yes	460		yes	9953	1993	now	31401	1992	now
f	1967	1993		7807	1993	now	78052	1993	now						
m	1994	1994		4660	1994	now									
m	1996	1996		4660	1996	now									
f	1996	1996		4778	1996	now									
m	1964	1996		49391	1997	now	78609	1997	now						
f	1970	1996		78601	1997	now	7992	1997	now						
m	1994	1997		2163	1996	yes	5373	1996		7793	1994	1996			
m	1995	1997		53019	1995	yes	4659	1996	?	6929	1995	?			
m	1976	1993	1996	36100	1997	yes									
f	1969	1994		24290	1997	now	3089	1997	now						

2163	dermoidcyst
24290	a fast-acting thyroid gland
31401	hyperactive
36100	rectina loosening
460	cold
4660	bronchitis
4660	bronchitis
4660	bronchitis
47412	polypis
4778	dust allergy
49391	asthma and bronchitis

53019	reflux, non-closing stomach valve
6929	skin allergy
7793	allergy to cow's milk
78052	insomnia
7807	tiredness
7821	rash development
7821	rash development
78601	hyperventilation
9953	other allergies

5 General findings

5.1 Setting up a registration point

At the end of 1997 we were setting up a registration point. As a result of this registration point we have registered 200 reports of neighbours of the waste incinerator with health complaints. Because of these assessments we could make some conclusions.

5.2 Assessments about 200 reports of health complaints around the waste incinerator in Sint-Niklaas.

5.2.1 Survey of reported cancer occurrence with children.

Very striking is the high amount of young people with cancer in group 6 (leukaemia and gland cancer).

8 young people up to the age of 17, with a cancer occurrence of group 6, live at less than 1 kilometer from the waste incinerator (table 34).

Table 34

kind of complaint	year of decease	age	occ. year	description
leukaemia		3	1997	leukaemia on 3-years age, is recovering
bone cancer		12	1992	7 years ago bone cancer, is now 17 years old and cured
leukaemia	87	13	1987	was 13 years old when she died
leukaemia		15	1987	it happened 12 years ago, was at that time 15 years old, now cured
leukaemia		16	1982	died in 1982, was at that time 16 years old
Hodgkin	85	kind	1985	girl died 14 years ago caused by illness of Hodgkin
leukaemia	?	17	?	died caused by leukaemia
Hodgkin		17	1992	7 years ago, now cured, was at that time 17 years old
leukaemia	82	26	1982	died caused by leukaemia
Non Hodgkin		27	1997	Since 25-8-1997

5.2.2 Reproduction complaints

A lot of young people (mainly women) who used to live in the neighbourhood of the waste incinerator, have problems with fertility, problems with pregnancy and problems with birth. Their children have a low birth weight, threatened premature during the pregnancy, children born with serious complaints, etc. Because of lack of time we couldn't investigate this any further.

5.2.3 Survey of reports of children with congenital defects

Children with congenital defects like : born without small brains, a half diaphragm, heart defects (also Steiner-disease), dwarf growth (life ability or not), embryonic defects, autism, double urethra, non closing stomach valve (table 35).

Table 35

kind of complaint	year of decease	birth date	description
embryonic deviation	1996	1996	heart defect + closed ear way caused by an embryonic process, not hereditary
mutation	1995	1995	Only lived a few days
mutation		1996	achondroplasia, dwarf
heart defect		1996	
mutation		1995	
misdividing of embryonic cells		1995	pylorusstenose (stenosis exit of stomach) and misdividing of embryonic cells
reflux		1996	non-closing of the stomach valve and not descending of the testicle
mutation		1989	autism, congenital defect
half diaphragm		1985	child born with a half diaphragm, non hereditary, congenital
double urethra		1983	born with double urethra and non descending of the testicle
child is handicapped		1983	looking like a child of 5 years younger, retarded
mutation	1986	1986	the parents are chromosomal ok thanathofore dwarf, child was born dead
congenital defects		1986	child born with a kind of spot on her head, a spot who may not be exposed to the sunlight, otherwise it might become a cancer spot. It was operated.
heart defect		1997	child born with the illness of Steiner
reflux		1991	non-closing of the stomach valve and glue ear

5.2.4 Other complaints.

- A lot of people in the immediate surroundings of the waste incinerator have complaints about chronic fatigue, headache and diarrhoea.
- Decease caused by heart and vein complaints abnormally occurs more in older people, mainly in the area where most fall-out of the waste incinerator is taking place. Also in Seveso an increased mortal rate was observed, a rate about heart and vein complaints, particularly heart attacks. Mainly in older people, and most of all in the most polluted area.
- A lot of different rare complaints are situated in the surrounding area of the waste incinerator (e.g. retina loosening, bone cancer in youngsters, males with breast cancer, ALS (deterioration of nerve extremity), decreasing of white blood cells which can't be explained, Kalher disease).

6 Disease image around waste incinerators

As a result of our own observations and findings of other waste incinerators action committees in Belgium we are able to outline a pattern of health complaints.

From the beginning of the waste incinerator activities people in the neighbourhood got problems with breathing, eczema and allergies.

Already after a few years of activity the following complaints were observed :

- alternations in the immunity system, becoming ill at a higher rate, e.g. children with chronic colds, bronchitis, allergies and other diseases
- effects on reproduction : e.g. infertility, increasing of spontaneous abortions, higher mortality during birth, etc.
- complaints about insomnia, fatigue, disturbed hormones activities, etc.
- cancer in female (leukaemia, urinary tract cancer, liver cancer).

After a 5 years activity of the waste incinerator the first cancers occur in youngsters till the age of 28. It's a group 6 cancer : blood and gland cancer e.g. leukaemia, Hodgkin and Non Hodgkin. It's striking that all these youngsters live within a maximum distance of 1,5 kilometers of the waste incinerator, and this in all wind directions.

Also an acute decreasing of white blood cells in children is frequently occurring.

Mothers get children with low birth weight and menacing premature.

Also congenital defects are demonstrating themselves (embryopathies, foetopathies and mutations), this within a radius of 7 kilometers in all wind directions around the incinerator.

Deceasing at an earlier age also quickly starts after the onset of the incinerator's activity.

Also the increasing of the death cause because of cancer is quickly shown.

10 years after the incinerator's activity no clear increasing of cancer can be observed, unless in youngsters. But after 13 years the occurrence of cancer is twice as more than anywhere else, and this increasing is reaching 5 times more than anywhere else after the 20 years' activity of the waste incinerator. The increasing of the cancer occurrence is general, i.e. for all kinds of cancer. This curve perfectly matches with the Seveso observations after the dioxine disaster. These cancers mainly, but not exceptionally are situated in the dominating wind directions and in the immediate neighbourhood of the incinerator. Cancer occurrence decreases when the distance from the incinerator increases.

Also endometriosis and other womb or cervix complaints are showing themselves after a 10 years' period. Also soft tissue sarcoma (very often and widespread) occurs.

Many years after their birth many complaints are stated in a lot of children. This includes : hyperactivity, disturbances of behaviour, growth retardation, disturbances of brain development, heart defects, learning problems, concentration disturbances, allergies, asthma, various sorts of mutations (autism, dwarf growth, etc.), mental defectiveness, motorical disturbances, etc.

Lots of people in the immediate surroundings of the incinerator complain about chronic fatigue, insomnia, hyper ventilation, breathing problems, stress, stomach complaints, allergies and hormonal complaints.

7 Method to trace environment health complaints and to fix them : "the seven steps plan".

To come to this conclusions of environment health complaints, we have taken the following indispensable steps to come to a good vision of health effects.

7.1 First step : observations of inhabitants

Because of own subjective observations, of people themselves, in a certain surrounding area, health problems feel like abnormal. This means for example : an accidental problem of health without cause, a clear problem of health concerning environment, obviously more than normal existence of a health complaint and health complaints which exist in the environment of other similar kinds of pollution sources.

7.2 Second step : searching sources which can cause health damage

After this we have made a study of the source of pollution. We, the neighbours, know the place very well and we also know what are the possible existing sources of pollution, now and in the past. We concluded that the waste incinerator of Sint-Niklaas is the only industrial polluter during the last 21 years in this neighbourhood. All other sources of pollution are also existing in every place in Belgium (traffic, home heating systems, agriculture, and so on). This conclusion was confirmed by a investigation of the soil for dioxin. This investigation was done by the government in the year 1993, concerning the study of dioxin falling down-pattern of a waste incinerator.

7.3 Third step : study of the effects of health threatening sources.

We have also made a study to find out : what toxic substances are liberated from the waste incinerator, in what amounts (now and in the past), the place where they fall out and what substances can cause health complaints to neighbours. We have done this by studying literature and through talks with several scientists.

7.4 Fourth step : to start a reporting point

In the area of the waste incinerator we have distributed information mainly through the regional press about the possible effects of these toxic substances to the neighbours. At the same time we called these neighbours to report their health complaints, possibly caused by these toxic substances, to a regional reporting point.

This reporting point is manned by a manager of the reporting point, who knows the problems. In this way the reporter can also get some answers to questions concerning this subject. Reports can be done by everybody by means of a call but it can also be done by a chance meeting between the conductor and the neighbours (anonymous reports can be done but they can not be mentioned by the registration of people with complaints because of the fact that we don't know it concerns the same person or several persons).

We think it's important that the manager of the reporting point himself has been staying in the same regio for several years.

In this way the neighbours can get more information about the relevant problem. Besides, they can also be reassured when they are, whether or not undeserved, worried about something (f.e. breastfeeding a baby when the mother is just living in this area). Neighbours themselves can also give information about the source (or sources) of pollution. If they want so, neighbours can also be brought into contact with each other. In this way neighbours with health complaints can be referred to specialized persons or services of self-help groups.

This method of working can be a cross-fertilization as well as for the reporter as for the manager. All effects of the toxic substances are not known as well as the effects of a mix of these toxic substances. The manager registers carefully all complaints and reports observations.

Adjustments about source of pollution and health complaints can always be taken on. For example we were forgotten to take into consideration the effects of noise by the neighbours caused by the waste incinerator. Because of the reports of the neighbours we found that Low Frequent Noises are influencing the neighbours' health.

7.5 Fifth step : indicating all dates on a map

We have set out all the registered dates on a map. On the same map we have also measured the graduation of pollution of the soil and the dominating wind directions. In this way the relationship between health complaints and the waste incinerator became in this case very clear. Most health complaints came from habitants who were living in the most dominating wind direction and on the most polluted soil.

7.6 Sixth step : the scientific research : marking out a location and posing the questions

All this preparatory work is necessary to mark out the best-considered location where a scientific health research can take place. Only in this way we can mark out a place where most health complaints appear. In our case it was in "Medlarstreet".

In this kind of a health investigation it is important that the participants get the opportunity to report all kind of health complaints (also animals and plants) as well as any kind of other observations. Also important is to look for the moment when the complaints started, if the complaints already stopped and since when they have stopped. In fact all habitants, who lived during the period of pollution within the located place of investigation, should be interrogated. But because of the governmental privacy law of persons we could not have at our disposal the addresses of the former inhabitants. So we asked also to the habitants themselves what habitants lived before them and for how long and if possible also the complaints from these former habitants (these former habitants were mostly the children of the habitants at this moment). So we could not interrogate most habitants who hadn't lived anymore in "Medlarstreet" at the moment of the investigation.

Also important to know is how long the habitants of the located place have been living there, and where they had lived before.

7.7 Seventh step : processing and analysing the registered health complaints

Now it's time to process the dates. Each health complaint gets a ICD-9-CM code. You can find the method to process the dates from the investigation in this report. We just worked out the method of analysing just after the inventory of all complaints. This method is not the same as those who were to be applied by most official health researches. Usually the questioning of habitants happened as "previously worked out methods of analysing".

The investigation worked out in this report clearly shows that this method (previously worked out methods of analysing) is not always the right way of working to locate health complaints related to environment. Our research and our results clearly show the effects of health endangerment caused by pollution.

8. The end

We hope, by means of this report, we can give support to findings and analyses of health complaints caused by pollution. We think that for the moment, we can have a clear insight into health complaints caused by pollution, we can convince the governments that they have to take very urgent and necessary measures to protect the future of our children from all this calamity. A safe environmental neighbourhood is hereby essential.

We want to dedicate this report to all deceased children caused by cancer. As well as to the numerous children who have numerous serious health complaints caused by the waste incinerator in Sint-Niklaas. A society which does not take care of its children is less than primitive and underdeveloped.

We are grateful to the following persons and private institutions for their loyal and unselfish co-operation and efforts. This report couldn't be realized without them.

The 281 participants of the health research in "Medlarstreet"
The 200 people who had the courage and power to report their health complaints
All cooperators of the study group of the waste incinerator in Sint-Niklaas
Our doctors-companions : doctor Marc Ringoir en doctor Karl Geboes
The administration of "Sint-Lucas" hospital in Ghent (Belgium)
Dr. Guy Magnus VLAM/WVMG (a doctors' environment organisation)
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And lots of other people who did their contribution each in their own way.

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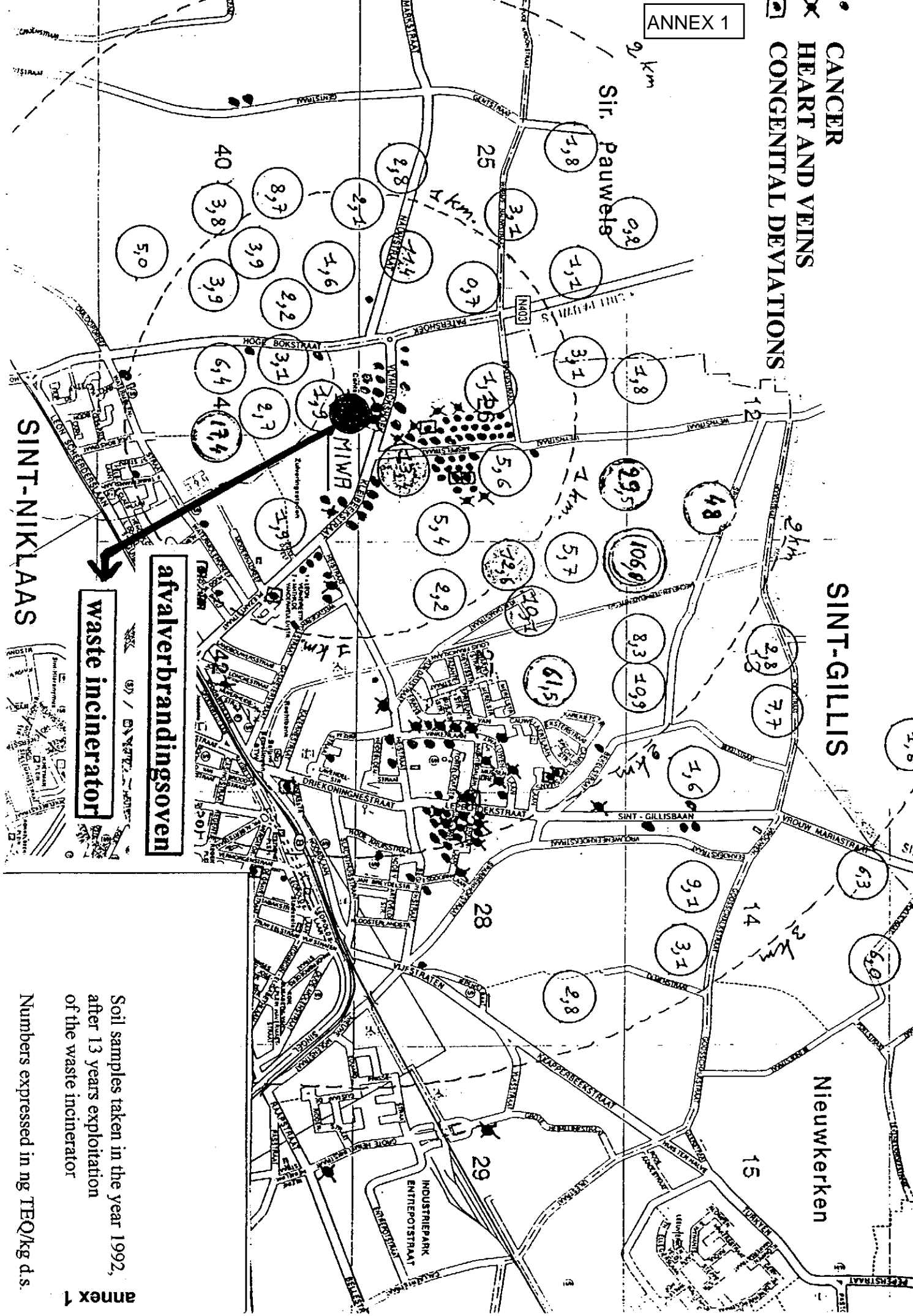
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CANCER
 HEART AND VEINS
 CONGENITAL DEVIATIONS

ANNEX 1

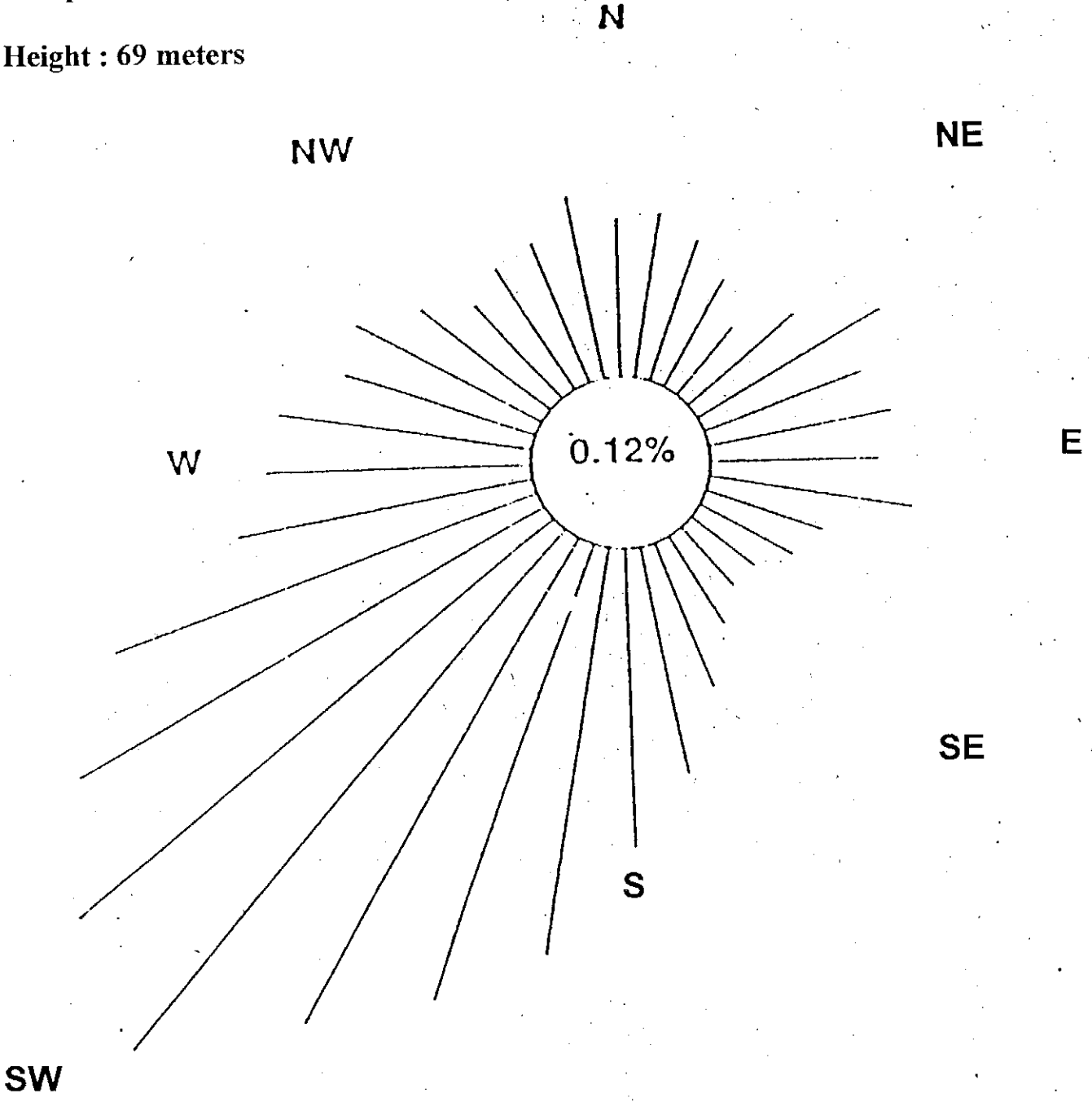


Soil samples taken in the year 1992,
 after 13 years exploitation
 of the waste incinerator

Numbers expressed in ng TEQ/kg d.s.

Compass card of Belgium

Height : 69 meters



QUESTIONNAIRE

GENERAL SITUATION

1. Address

.....street nr.
 postal code : district :
 tel. nr.

2. Name, sex and birth date of the residents (if applicable also for the ex-residents and for the in the mean time deceased persons)

name	first name	sex	brith day	death date (if applicable)
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.....

3. How long have the mentionend persons lived in the address mentione under 1.

if allyear(s)
 if different, please mention below

.....

4. Give name and address of the persons who were part of your family, and who don't live here anymore. Since when don't these persons live anymore on the address mentioned under 1 ?

.....

5. If you haven't lived for the last 20 years on the address under nr. 1 :

5.1. Give name and adress (possibly phone nr.) of the former residents.

.....

5.2. Where and how long did the persons mentioned under nr. 2 stay before there lived here.

If all, write below "all"

name and first name	former address	how many years
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.....

For all :

6. Do the person(s), who resident here or have resided here, have health complaints? (also irregularities with pregnancy, or 'serious health complaints and deviations with newlyborns')

First Name:	yes / now (if not apply : cross out)
First Name:	yes / now
First Name:	yes / now
First Name:	yes / now

7. If there are one or several persons with health complaints, please fill in accompanying form.

REPORTING HEALTH COMPLAINTS

Date :

Name and first name :
.....

Report of health complaint(s)
Please specify the health complaints as exactly as possible. If it concerns a deceased person, please mention the cause of death.

.....
.....
.....
.....
.....
.....

When did each complaint occur? (date).
.....
.....
.....

Can you tell something about the cause of each health complaint? Do you have conjectures?
.....
.....
.....

Have you recovered from one or more health complaints, if so state which and when?
.....
.....

Which occupations were in successively and when?
.....
.....

In connection to exposure:

What is your present occupation?
.....

Kinds of leisure activities?

Do you smoke?

Did you ever stop smoking, if so, when?

Are you bothered by smoking of other persons?

Have any building materials in your house been used which can be cause health complaints?
Which?

.....
Are there to report particular health complaints concerning plants and animals ?
.....
.....