



**NATIONAL HEALTH
LABORATORY SERVICE**

NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

Pathology Division Surveillance Report

Demographic Data and Disease Rates for January to December 1988

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NIOH Report 21/2011

http://www.nioh.ac.za/publications/publications_pathaut_reports.htm

ACKNOWLEDGEMENTS

We thank all the staff members of the NIOH Pathology Department, for their invaluable contribution to the autopsy service.

We also thank Lizet Vermaak for collating and Prof Tony Davies for editing the manuscript.

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ISSN 1812-7681

EXECUTIVE SUMMARY

During 1988, 3 760 cases came to autopsy at the NIOH. Of these, 67.0% were black men, 31.0% were white and 2.0% were coloured.

Overall disease rates (per 1000 autopsies) for 1988 are shown in Figure 1.

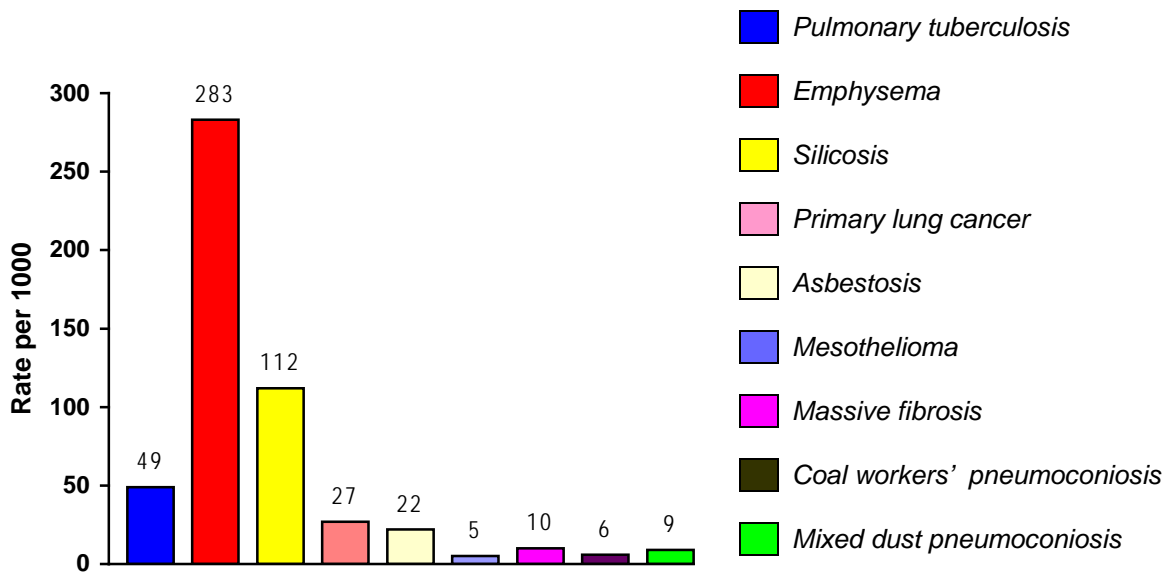


FIG 1 OVERALL DISEASE RATES FOR 1988

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GLOSSARY

Asbestosis	<i>Lung fibrosis caused by asbestos fibres</i>
Coal workers' pneumoconiosis	<i>Lung fibrosis caused by exposure to coal dust</i>
Emphysema	<i>Lung disease caused by the destruction of the alveolar walls</i>
Massive fibrosis	<i>Lung fibrosis caused by exposure to dust and measuring more than 1 cm in diameter</i>
Mesothelioma	<i>A malignant tumour of the pleural cavity of the lungs</i>
Miner	<i>A person who has worked in a controlled mine or works</i>
Mixed exposures	<i>The multiple dust types to which a miner may be exposed, having worked in several mining commodities in his lifetime</i>
Prevalence	<i>The number of cases in a defined population at a given time</i>
Silicosis	<i>Lung fibrosis caused by inhalation of silica dust; detected by the presence of silicotic nodules in the lung tissue</i>
Surveillance	<i>The ongoing and systematic collection, analysis and interpretation of data related to adverse health outcomes</i>

SECTION 1 – BACKGROUND

The Occupational Diseases in Mines and Works Act, 1973 (Act 78 of 1973) requires that the cardio-respiratory organs of a deceased person who has worked at a controlled mine or a controlled works be examined for the presence of occupational disease, regardless of the clinical cause of death and provided that the next of kin agrees. These examinations are performed by pathologists at the National Institute for Occupational Health (NIOH). A detailed report on each case examined is sent to the Medical Bureau for Occupational Diseases (MBOD). Cases certified as having a compensable disease are then referred to the Compensation Commissioner's office, where the payment for compensation is managed.

Since 1975, the pathological findings from the autopsy examinations have been recorded on the computerised PATHAUT database. PATHAUT comprises data from autopsy examinations and clinical files which include occupational histories. The database is unique and provides an important resource for both surveillance and research. These data are the only comprehensive surveillance data on occupational lung disease in the South African mining industry.

The data presented in this report summarise the PATHAUT system surveillance results, i.e. the results of the systematic collection, collation, and analysis of the pathology findings in the cardio-respiratory organs of mine workers. Data from PATHAUT are exported into, and analysed, using SAS v9.1.

This report describes autopsy cases examined during the year 1988. This and other annual reports can be accessed at www.nioh.ac.za.

Many of the cases had "mixed" exposures in that they had been employed in more than one commodity. For simplicity, cases are categorised according to the commodity in which most years of service were recorded, i.e. the commodity in which the miners had worked for the longest period.

All disease rates reported in this document are expressed per 1000. In all calculations, the denominators used are the total numbers of autopsies in specific commodities, age groups or population groups. Some of these rates must be viewed with caution, as the denominators are very small. This applies, for example, to those commodities where few workers are employed (such as manganese mining), and to the older age groups in some instances.

SECTION 2 – DEMOGRAPHIC DATA

The number of autopsies performed since 1988 is presented in Table 2-1.

TABLE 2-1 DISTRIBUTION OF AUTOPSIES BY YEAR AND POPULATION GROUP (1975 - 1988)

Year of autopsy	Black		White		Coloured		Unknown		Total N
	N	%	N	%	N	%	N	%	
1975	2 190	71	854	28	32	1			3 076
1976	2 335	68	1 072	31	27	1			3 434
1977	2 351	69	1 039	30	33	1			3 423
1978	2 245	67	1 090	32	32	1			3 367
1979	2 118	66	1 026	33	45	1			3 189
1980	2 338	64	1 274	35	46	1			3 658
1981	2 209	66	1 117	33	33	1			3 359
1982	2 312	63	1 302	36	44	1	1		3 659
1983	2 096	65	1 109	34	41	1			3 246
1984	1 966	64	1 098	36	28	1			3 092
1985	2 275	64	1 200	34	66	2			3 541
1986	2 456	68	1 125	31	45	1			3 626
1987	2 594	68	1 168	30	78	2			3 840
1988	2 518	67	1 165	31	77	2			3 760
Total	32 003	66	15 639	32	6 27	1	1		48 270

It is important to note that a referral bias exists: there is a low autopsy rate for black men who have left employment at the mines, whereas the majority of white retired miners come to autopsy.

The pathologists at the NIOH perform two types of autopsy examinations. For men dying distant from Johannesburg, the cardio-respiratory organs are removed locally, preserved in formalin and sent to the NIOH. Full autopsies are undertaken on men who die close to Johannesburg.

Table 2-2 shows the distribution of autopsies by population group for 1988. Autopsies of only the cardio-respiratory organs comprised 87.5% of all examinations.

TABLE 2-2 NUMBER AND PROPORTION OF AUTOPSIES BY TYPE AND POPULATION GROUP (1988)

Autopsy type	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
<i>Cardio-respiratory organs only</i>	2374	94.3	839	72.0	77	100.0	3290	87.5
<i>Full autopsy</i>	128	5.1	309	26.5	0	-	437	11.6
<i>Not stated</i>	16	0.6	17	1.5	0	-	33	0.9
<i>Total</i>	2 518		1 165		77		3 760	

The age distribution of autopsies for 1988 is shown in Table 2-3 and Figure 2-1. The mean age at autopsy of black men was 45.8 years. The mean age of white men at autopsy was 56.5 years.

TABLE 2-3 NUMBER AND PROPORTION OF AUTOPSIES BY AGE AND POPULATION GROUP (1988)

Age group (years)	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
<20	13	0.5	2	0.2	0	-	15	0.4
20-29	633	25.1	76	6.5	0	-	709	18.9
30-39	774	30.7	85	7.3	1	1.3	860	22.9
40-49	537	21.3	135	11.6	13	16.9	685	18.2
50-59	297	11.8	223	19.1	15	19.5	535	14.2
60-69	96	3.8	312	26.8	21	27.3	429	11.4
70-79	14	0.6	257	22.1	25	32.5	296	7.9
80+	1	0.0	67	5.8	1	1.3	69	1.8
<i>Unknown</i>	153	6.1	8	0.7	1	1.3	162	4.3
<i>Total</i>	2 518		1 165		77		3 760	

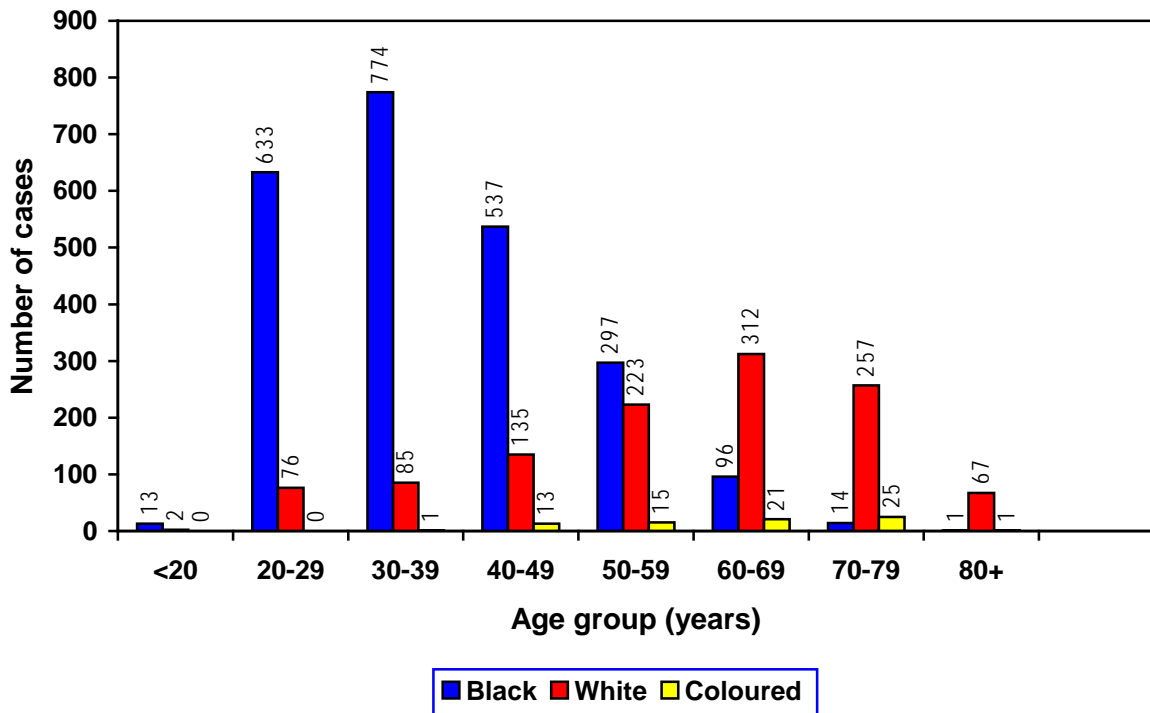


FIG 2-1 DISTRIBUTION OF AUTOPSIES BY AGE AND POPULATION GROUP (1988)

Cases were placed in categories according to the commodity in which they had worked for the longest duration (most exposure). Many men worked in a number of different mining commodities during their lifetimes and had “mixed” exposures. This was not taken into account in the analysis of exposure type (commodity).

Table 2-4 and Figure 2-2 show the distribution of autopsies by commodity and population group for 1988.

TABLE 2-4 NUMBER AND PROPORTION OF AUTOPSIES BY COMMODITY AND POPULATION GROUP (1988)

Commodity	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
Gold	1 905	75.7	864	74.2	4	5.2	2 773	73.8
Platinum	217	8.6	36	3.1	1	1.3	254	6.8
Coal	255	10.1	66	5.7	0	-	321	8.5
Asbestos	26	1.0	31	2.7	69	89.6	126	3.4
Iscor	1	0.0	74	6.4	0	-	75	2.0
Diamond	26	1.0	12	1.0	2	2.6	40	1.1
Copper	11	0.4	28	2.4	1	1.3	40	1.1
Other	11	0.4	4	0.3	0	-	15	0.4
Unknown	66	2.6	50	4.3	0	-	116	3.1
Total	2 518		1 165		77		3 760	

NOTE: This table shows only those commodities where a total of 10 or more cases were received

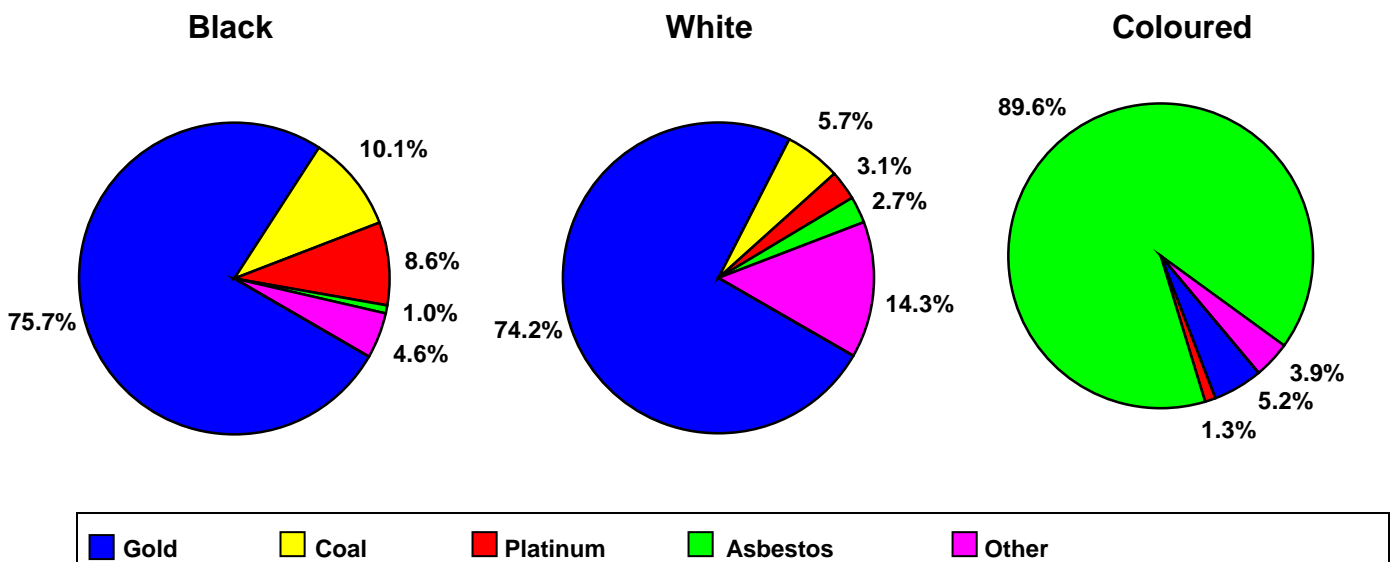
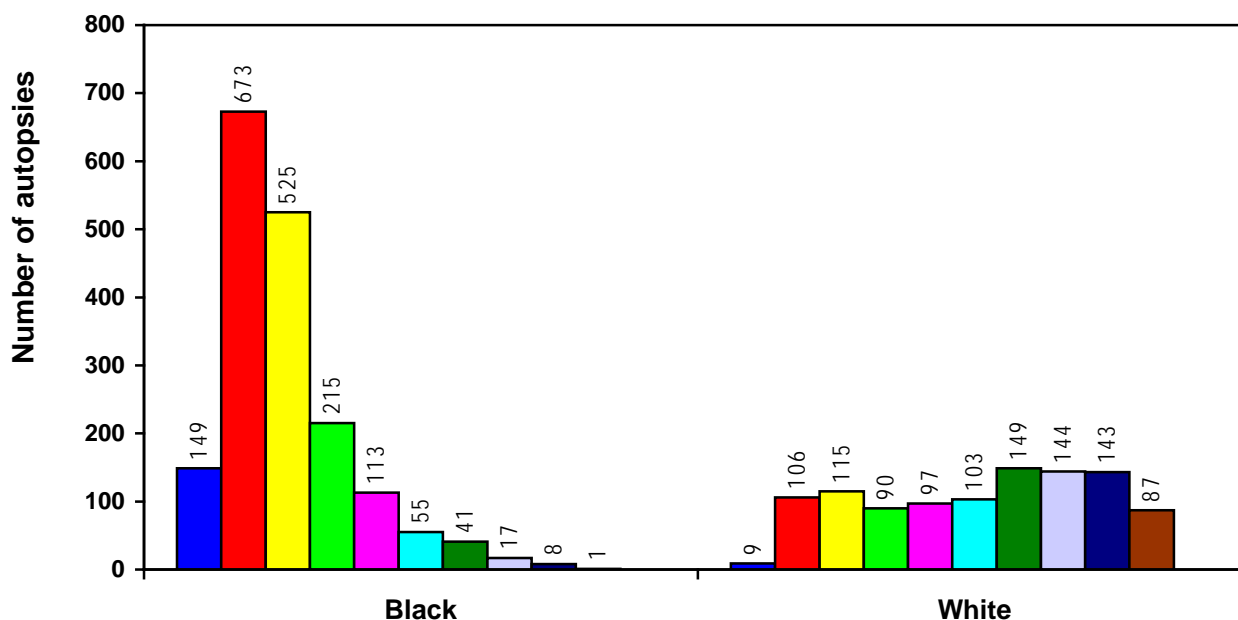


FIG 2-2 DISTRIBUTION OF AUTOPSIES BY COMMODITY AND POPULATION GROUP (1988)

Detailed information about the years in mining service by population group is presented in Table 2-5 and Figure 2-3.

TABLE 2-5 NUMBER AND PROPORTION OF AUTOPSIES BY YEARS OF SERVICE AND POPULATION GROUP (1988)

Years of service	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
<1	149	5.9	9	0.8	0	-	158	4.2
1-5	673	26.7	106	9.1	11	14.3	790	21.0
6-10	525	20.8	115	9.9	17	22.1	657	17.5
11-15	215	8.5	90	7.7	11	14.3	316	8.4
16-20	113	4.5	97	8.3	11	14.3	221	5.9
21-25	55	2.2	103	8.8	5	6.5	163	4.3
26-30	41	1.6	149	12.8	4	5.2	194	5.2
31-35	17	0.7	144	12.4	4	5.2	165	4.4
36-40	8	0.3	143	12.3	1	1.3	152	4.0
41+	1	-	87	7.5	1	1.3	89	2.4
Unknown	721	28.6	122	10.5	12	15.6	855	22.7
Total	2 518		1 165		77		3 760	



Years of service:

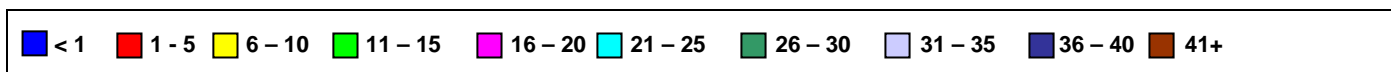


FIG 2-3 DISTRIBUTION OF AUTOPSIES BY YEARS OF SERVICE AND POPULATION GROUP (1988)

The mean age and duration of service by commodity type and population group for those cases for which information was available are shown in Tables 2-6 and 2-7.

TABLE 2-6 MEAN AGE BY COMMODITY AND POPULATION GROUP (1988)

Commodity	Black			White		
	N	Mean (years)	SD*	N	Mean (years)	SD*
Gold	1 803	37.3	11.0	861	59.9	15.8
Platinum	213	37.4	11.2	36	50.6	15.8
Coal	221	40.1	12.5	66	55.5	16.0
Asbestos	25	49.4	13.7	31	49.0	15.1
Iscor	1	56	-	73	56.2	14.1
Diamond	24	42.2	11.0	11	56.3	14.4
Copper	10	49.0	10.3	28	54.1	14.5
Other	11	45.0	10.6	4	59.5	11.4
Unknown	57	56.0	44.4	44	56.5	15.7
Total	2 365	38.0	11.4	1 154	58.8	15.7

* Standard deviation

TABLE 2-7 MEAN DURATION OF SERVICE BY COMMODITY AND POPULATION GROUP (1988)

Commodity	Black			White		
	N	Mean (years)	SD*	N	Mean (years)	SD*
Gold	1 409	8.2	7.1	817	25.6	12.8
Platinum	162	5.7	4.9	31	12.9	9.4
Coal	153	8.7	7.2	58	24.6	15.0
Asbestos	17	13.4	9.4	20	11.8	7.1
Iscor	0	-	-	52	19.3	11.8
Diamond	18	13.0	9.6	12	16.8	10.7
Copper	1	6.0	-	27	13.7	8.1
Other	11	15.0	9.1	3	10.0	6.6
Unknown	26	10.5	7.0	23	15.1	9.7
Total	1 797	8.2	7.1	1 043	23.9	13.1

* Standard deviation

SECTION 3 – ACTIVE TUBERCULOSIS

The distribution of active tuberculosis (TB) by anatomical site is presented in Figure 3-1 (n=247). Active pulmonary TB (PTB) was diagnosed in 4.9% (185) of all cases autopsied in 1988. Most of the men with PTB were black (82.7%; 153 cases), 10.8% (20 cases) were white, and 6.5% (12 cases) were coloured.

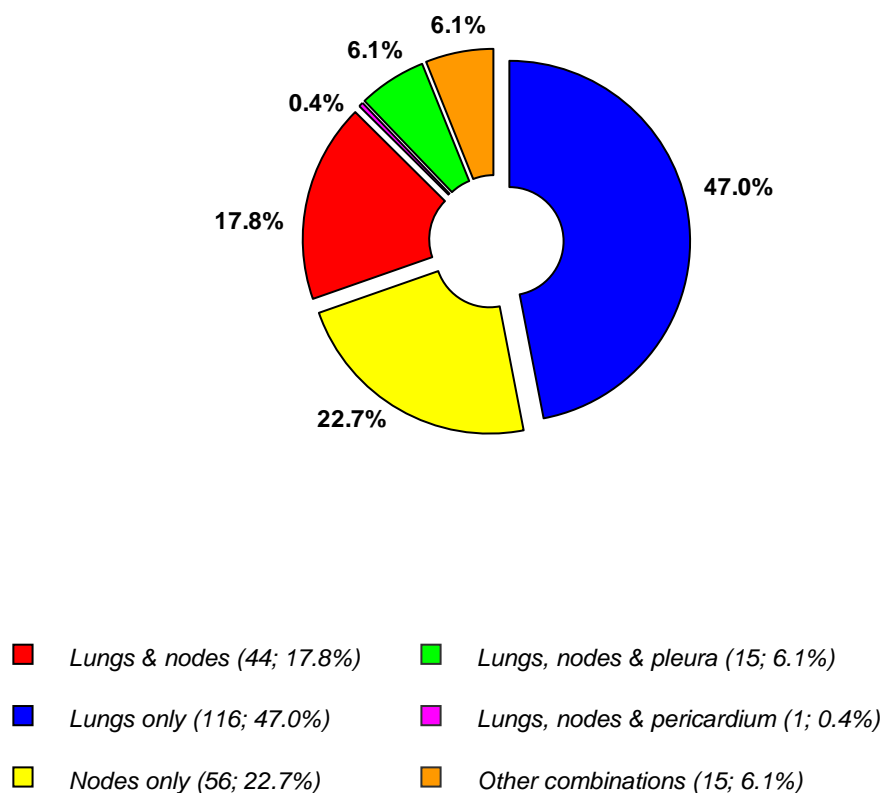


FIG 3-1 DISTRIBUTION OF ACTIVE TB BY SITE (1988)

The distribution of active PTB cases by commodity is shown in Table 3-1. The rates in this and subsequent tables and figures are expressed per 1000. The majority of active PTB cases (78.4%) came from the gold mining industry (73.8% of all autopsy cases came from that commodity).

TABLE 3-1 NUMBER OF CASES AND PREVALENCE OF ACTIVE PTB BY COMMODITY AND POPULATION GROUP (1988)

Commodity	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	129	68	16	19	0	-	145	52
Platinum	7	32	0	-	0	-	7	28
Coal	9	35	0	-	0	-	9	28
Asbestos	4	154	3	97	12	174	19	151
Isacor	0	-	1	14	0	-	1	13
Copper	1	91	0	-	0	-	1	25
Unknown	3	45	0	-	0	-	3	26
Total	153	61	20	17	12	156	185	49

The age distribution of cases with active PTB is shown in Table 3-2. Most of the cases were between 30-59 years (119 cases=64.3%).

TABLE 3-2 NUMBER OF CASES AND PREVALENCE OF ACTIVE PTB BY AGE AND POPULATION GROUP (1988)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
20-29	11	17	0	-	0	-	11	16
30-39	41	53	2	24	0	-	43	50
40-49	44	82	4	30	3	231	51	74
50-59	34	114	1	4	2	133	37	69
60-69	10	104	6	19	1	48	17	40
70-79	2	143	5	19	6	240	13	44
80+	1	1 000	2	30	0	-	3	43
Unknown	10	65	0	-	0	-	10	62
Total	153	61	20	17	12	156	185	49

SECTION 4 – SILICOSIS

Silicotic nodules were found in the lungs of 410 cases (10.9% of all autopsies), 92.9% of which came from the gold mining industry. Of all cases of silicosis, occasional silicotic nodules were found in 45.3% of cases, a few in 26.1%, a moderate number in 18.4% and a large number in 10.2%.

The distribution of cases with silicosis by commodity and population group is presented in Table 4-1.

TABLE 4-1 NUMBER OF CASES AND PREVALENCE OF SILICOSIS BY COMMODITY AND POPULATION GROUP (1988)

Commodity	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	192	101	189	219	0	-	381	137
Platinum	1	5	2	56	0	-	3	12
Coal	5	20	6	91	0	-	11	34
Asbestos	3	115	2	65	1	14	6	48
Diamond	1	38	0	-	0	-	1	25
Copper	0	-	2	71	1	-	3	75
Unknown	3	45	2	40	0	-	5	43
Total	205	81	203	174	2	26	410	109

Although the silicosis rates increased with increasing age in both black and white men, the age distribution of cases with silicosis differed between the two population groups (Table 4-2).

TABLE 4-2 NUMBER OF CASES AND PREVALENCE OF SILICOSIS IN THE GOLD MINING INDUSTRY, BY AGE AND POPULATION GROUP (1988)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
20-29	6	12	0	-	0	-	6	10
30-39	30	49	1	19	0	-	31	47
40-49	85	216	6	63	0	-	91	185
50-59	45	218	33	226	0	-	78	222
60-69	14	226	59	244	0	-	73	240
70-79	3	429	73	349	0	-	76	350
80+	0	0	17	288	0	-	17	283
Unknown	9	88	0	-	0	-	9	87
Total	192	101	189	219	0		381	137

Silicosis was diagnosed in men who were young (<40 years) and in men who were exposed to silica for a few years (< 10 years) (Table 4-3).

TABLE 4-3 NUMBER OF CASES AND PREVALENCE OF SILICOSIS IN THE GOLD MINING INDUSTRY, BY YEARS OF SERVICE AND POPULATION GROUP (1988)

Years of service	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
<1	6	47	0	-	0	-	6	44
1-5	19	36	1	14	0	-	20	34
6-10	55	137	5	67	0	-	60	126
11-15	31	180	7	132	0	-	38	168
16-20	13	143	14	203	0	-	27	169
21-25	17	395	19	244	0	-	36	298
26-30	11	355	33	260	0	-	44	278
31-35	5	313	40	317	0	-	45	317
36-40	1	250	46	354	0	-	47	351
41+	0	-	24	296	0	-	24	293
Unknown	34	69	0	-	0	-	34	62
<i>Total</i>	192	101	189	219	0		381	137

SECTION 5 – OTHER PNEUMOCONIOSES

MASSIVE FIBROSIS

There were 36 (1.0%) cases of massive fibrosis (16 black, 19 white and 1 coloured). Most cases of massive fibrosis were from the gold mining industry (n=27) and the remaining cases were from the coal (n=1) and asbestos (n=3) mining industries as well as from ISCOR (n=1). In 4 cases, the commodity was not stated.

COAL WORKERS' PNEUMOCONIOSIS

There were 23 (0.6%) cases of coal workers' pneumoconiosis of which 19 cases were from the coal mining industry. Three cases were from the gold mining industry and for one case the commodity was not stated.

MIXED DUST PNEUMOCONIOSIS

There were 33 (0.9%) cases of mixed dust pneumoconiosis. These cases came from the gold (n=28), coal (n=1) and asbestos (n=1) mining industries. One case was from ISCOR and for two cases the commodity was not stated.

ASBESTOSIS AND PLEURAL PLAQUES

There were 84 cases of asbestosis of which 52.4% (n=44) had slight, 39.3% (n=33) moderate and 8.3% (n=7) marked fibrosis. Of these, 39 (46.4%) had worked in the asbestos mining industry at some time in their lives. There were 38 cases with asbestos plaques and of these 21 (55.3%) had asbestosis. Note that the parietal pleura (the site where plaque formation usually occurs) is seldom submitted with the lungs. The distribution of asbestosis by age and population group is shown in Table 5-1.

TABLE 5-1 NUMBER OF CASES AND PREVALENCE OF ASBESTOSIS BY AGE AND POPULATION GROUP (1988)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
20-29	1	2	0	-	0	-	1	1
30-39	5	6	0	-	0	-	5	6
40-49	11	20	1	7	4	308	16	23
50-59	9	30	6	27	7	467	22	41
60-69	7	73	2	6	16	762	25	58
70-79	0	-	2	8	12	480	14	47
80+	0	-	1	15	0	-	1	14
<i>Total</i>	33	13	12	10	39	506	84	22

SECTION 6 – EMPHYSEMA

There were 1 064 cases of emphysema, the extent of which was mild in 73.1% (n=778), moderate in 24.4% (n=260) and marked in 2.4% (n=26). The distribution of emphysema by age and population group is presented in Table 6-1.

TABLE 6-1 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY AGE AND POPULATION GROUP (1988)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
20-29	13	21	1	13	0	-	14	20
30-39	82	106	12	141	0	-	94	109
40-49	124	231	38	281	7	538	169	247
50-59	102	343	128	574	8	533	238	445
60-69	36	375	214	686	13	619	263	613
70-79	6	429	195	759	16	640	217	733
80+	0	-	48	716	0	-	48	696
Unknown	20	131	1	125	0	-	21	130
Total	383	152	637	547	44	571	1 064	283

The majority of black and white men with emphysema were from the gold mining industry (70.3%, n=748) (Table 6-2).

TABLE 6-2 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY COMMODITY AND POPULATION GROUP (1988)

Commodity	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	250	131	498	576	1	250	749	270
Platinum	33	152	12	333	1	1 000	46	181
Coal	63	247	34	515	0	-	97	302
Asbestos	10	385	16	516	40	580	66	524
Diamond	10	385	8	667	1	500	19	475
Copper	3	273	7	250	1	1 000	11	275
Isacor	1	1 000	36	486	0	-	37	493
Other	2	182	2	500	0	-	4	267
Unknown	11	167	24	480	0	-	35	302
Total	383	152	637	547	44	571	1 064	283

TABLE 6-3 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY YEARS OF SERVICE AND POPULATION GROUP (1988)

Years of service	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
<1	8	54	2	222	0	-	10	63
1-5	51	76	22	208	7	636	80	101
6-10	72	137	41	357	11	647	124	189
11-15	42	195	46	511	8	727	96	304
16-20	25	221	59	608	6	545	90	407
21-25	13	236	62	602	3	600	78	479
26-30	13	317	88	591	1	250	102	526
31-35	5	294	101	701	1	250	107	648
36-40	5	625	100	699	0	-	105	691
41+	1	1 000	63	724	1	1 000	65	730
Unknown	148	205	53	434	6	500	207	242
<i>Total</i>	383	152	637	547	44	571	1 064	283

SECTION 7 – MESOTHELIOMA

There were 19 cases of mesothelioma in 1988

TABLE 7-1 NUMBER AND PROPORTION OF MESOTHELIOMA CASES BY AGE AND POPULATION GROUP (1988)

Age group (years)	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
30-39	2	40.0	1	11.1	1	20.0	4	21.1
40-49	2	40.0	3	33.3	1	20.0	6	31.6
50-59	1	20.0	4	44.4	1	20.0	6	31.6
60-69	0	-	1	11.1	2	40.0	3	15.8
<i>Total</i>	5		9		5		19	

The distribution of mesothelioma by commodity and population group is presented in Table 7.2. Ten (52.6%) had worked in the asbestos mining industry.

TABLE 7-2 NUMBER AND PROPORTION OF MESOTHELIOMA CASES BY COMMODITY AND POPULATION GROUP (1988)

Commodity	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
<i>Asbestos</i>	2	40.0	3	33.3	5	100	10	52.6
<i>Gold</i>	1	20.0	2	22.2	0	-	3	15.8
<i>Diamond</i>	0	-	1	11.1	0	-	1	5.3
<i>Copper</i>	2	40.0	0	-	0	-	2	10.5
<i>ISCOR</i>	0	-	1	11.1	0	-	1	5.3
<i>Unknown</i>	0	-	2	22.2	0	-	2	10.5
<i>Total</i>	5		9		5		19	

SECTION 8 – PRIMARY LUNG CANCER

One hundred and three cases of primary lung cancer were found at autopsy, 28.2% of which were in black, 67.0% in white and 4.9% in coloured men. Most of the cases were squamous lung carcinomas (29.1%; n=30), followed by small cell lung carcinoma (28.2%; n=29), adeno carcinoma (20.4%; n=21), large cell lung carcinoma (14.6%; n=15) and broncho-alveolar carcinoma (7.8%; n=8)

The distribution of primary lung cancer by age and population group is presented in Table 8-1.

TABLE 8-1 NUMBERS OF CASES AND PREVALENCE OF PRIMARY LUNG CANCER BY AGE AND POPULATION GROUP (1988)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
20-29	2	3	0	-	0	-	2	3
30-39	4	5	0	-	0	-	4	5
40-49	6	11	2	15	0	-	8	12
50-59	8	27	11	49	1	67	20	37
60-69	5	52	32	103	0	-	37	86
70-79	1	72	21	82	4	160	26	88
80+	0	-	2	30	0	-	2	29
Unknown	3	20	1	125	0	-	4	25
Total	29	12	69	59	5	65	103	27

The distribution of primary lung cancer by commodity and population group is presented in Table 8-2. The majority of cases came from the gold mining industry.

TABLE 8-2 NUMBER OF CASES AND PREVALENCE OF PRIMARY LUNG CANCER BY COMMODITY AND POPULATION GROUP (1988)

Commodity	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	20	10	52	60	1	250	73	26
Platinum	3	14	3	83	0	-	6	24
Coal	4	16	2	30	0	-	6	19
Asbestos	1	38	4	129	3	43	8	63
Diamond	1	38	0	-	1	500	2	50
Copper	0	-	3	107	0	-	3	75
Iscor	0	-	3	41	0	-	3	40
Unknown	0	-	2	40	0	-	2	17
Total	29	12	69	59	5	65	103	27

SECTION 9 – CLINICAL CAUSES OF DEATH

Table 9-1 and Figure 9-1 show the clinical causes of death as stated in the accompanying documents submitted with the cardio-respiratory organs, by population group. Diseases of the cardio-vascular system were the most frequent (11.9%) overall. Black men had the highest proportion of unnatural causes of death (57.9%). In 14.0% of all cases, the cause of death was not stated.

TABLE 9-1 CLINICAL CAUSES OF DEATH BY POPULATION GROUP (1988)

System	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
Respiratory	228	9.1	140	12.0	24	31.2	392	10.4
Cardio-vascular	106	4.2	325	27.9	16	20.8	447	11.9
Central Nervous System	100	4.0	41	3.5	7	9.1	148	3.9
Gastro-intestinal	152	6.0	60	5.2	5	6.5	217	5.8
Genito-urinary	33	1.3	33	2.8	0	-	66	1.8
Haematological	14	0.6	5	0.4	0	-	19	0.5
Unnatural	1 458	57.9	223	19.1	10	13.0	1 691	45.0
Miscellaneous	169	6.7	72	6.2	11	14.3	252	6.7
Not stated	258	10.2	266	22.8	4	5.2	528	14.0
Total	2 518		1 165		77		3 760	

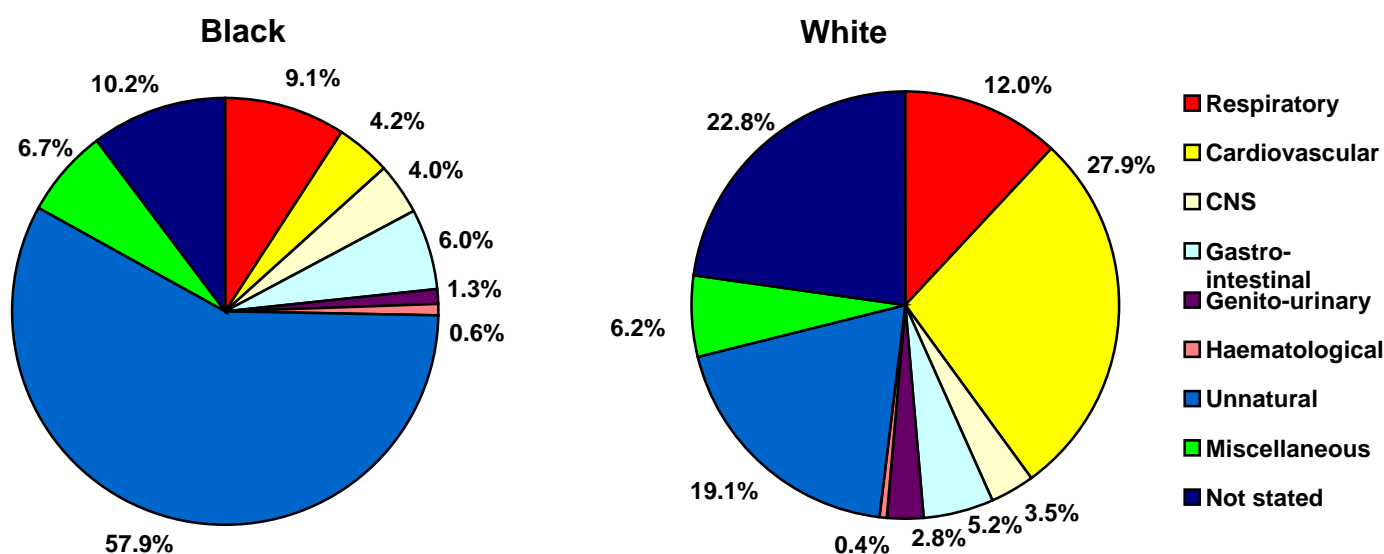


FIGURE 9-1 CLINICAL CAUSE OF DEATH AS STATED BY THE CLINICIANS WHO SUBMIT THE ORGANS OF THE DECEASED TO THE NIOH (1988)