NATIONAL HEALTH LABORATORY SERVICE

NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

Pathology Division Surveillance Report

Demographic Data and Disease Rates for January to December 1991

Ntombizodwa Ndlovu

Tony Davies

Gill Nelson

Jill Murray

PO Box 4788
Johannesburg
2000

e-mail: jill.murray@nioh.nhls.ac.za

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National Institute for Occupational Health, PO Box 4788, Johannesburg, 2000, South Africa

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EXECUTIVE SUMMARY

During 1991, 3 289 cases came to autopsy at the NIOH. Of these, 65.2% were black men, 32.8% were white and 2.0% were coloured.

Overall disease rates (per 1000 autopsies) for 1991 are shown in Figure 1.

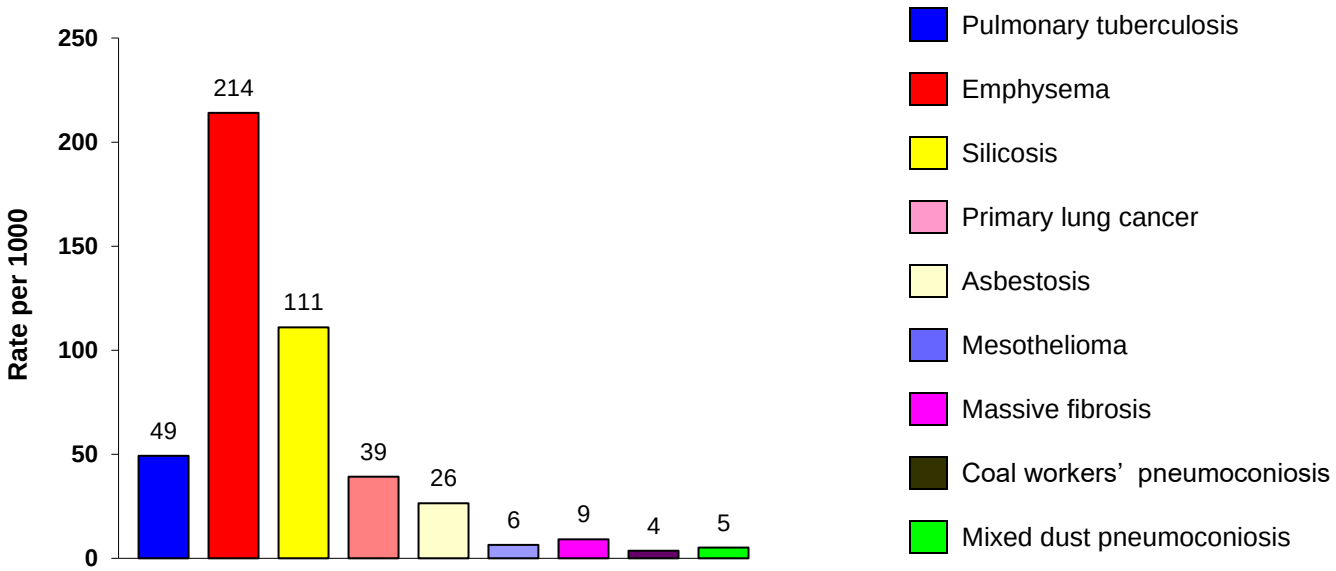

FIG 1 OVERALL DISEASE RATES FOR 1991

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

GLOSSARY

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

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 1991. 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 for 1991 is presented in Table 2-1.

TABLE 2-1 DISTRIBUTION OF AUTOPSIES BY YEAR AND POPULATION GROUP (1975-1991)

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
1989	2 138	65	1 090	33	60	2			3 288
1990	2 172	64	1 155	34	51	2			3 378
1991	2 143	65	1 080	33	66	2			3 289
Total	38 456	66	18 964	33	804	1	1		58 225

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 1991. Autopsies of only the cardio-respiratory organs comprised 87.2% of all examinations.

TABLE 2-2 NUMBER AND PROPORTION OF AUTOPSIES BY TYPE AND POPULATION GROUP (1991)

Autopsy type	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
Cardiorespiratory organs only	2 014	94.0	792	73.3	62	93.9	2 868	87.2
Full autopsy	114	5.3	276	25.6	3	4.5	393	11.9
Not stated	15	0.7	12	1.1	1	1.5	28	0.9
Total	2 143		1 080		66		3 289	

The age distributions of autopsies for 1991 are shown in Table 2-3 and Figure 2-1. The mean age at autopsy of black men was 37.0 years. The mean age of white men at autopsy was 60.5 years and for coloured men 60.1years

TABLE 2-3 NUMBER AND PROPORTION OF AUTOPSIES BY AGE AND POPULATION GROUP (1991)

Age group (years)	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
<20	6	0.3	2	0.2	0	-	8	0.2
20-29	413	19.3	38	3.5	3	4.5	454	13.8
30-39	762	35.6	89	8.2	1	1.5	852	25.9
40-49	472	22.0	121	11.2	6	9.1	599	18.2
50-59	298	13.9	190	17.6	20	30.3	508	15.4
60-69	78	3.6	283	26.2	19	28.8	380	11.6
70-79	8	0.4	268	24.8	11	16.7	287	8.7
80+	1	-	86	8.0	6	9.1	93	2.8
Unknown	105	4.9	3	0.3	0	-	108	3.3
Total	2 143		1 080		66		3 289	

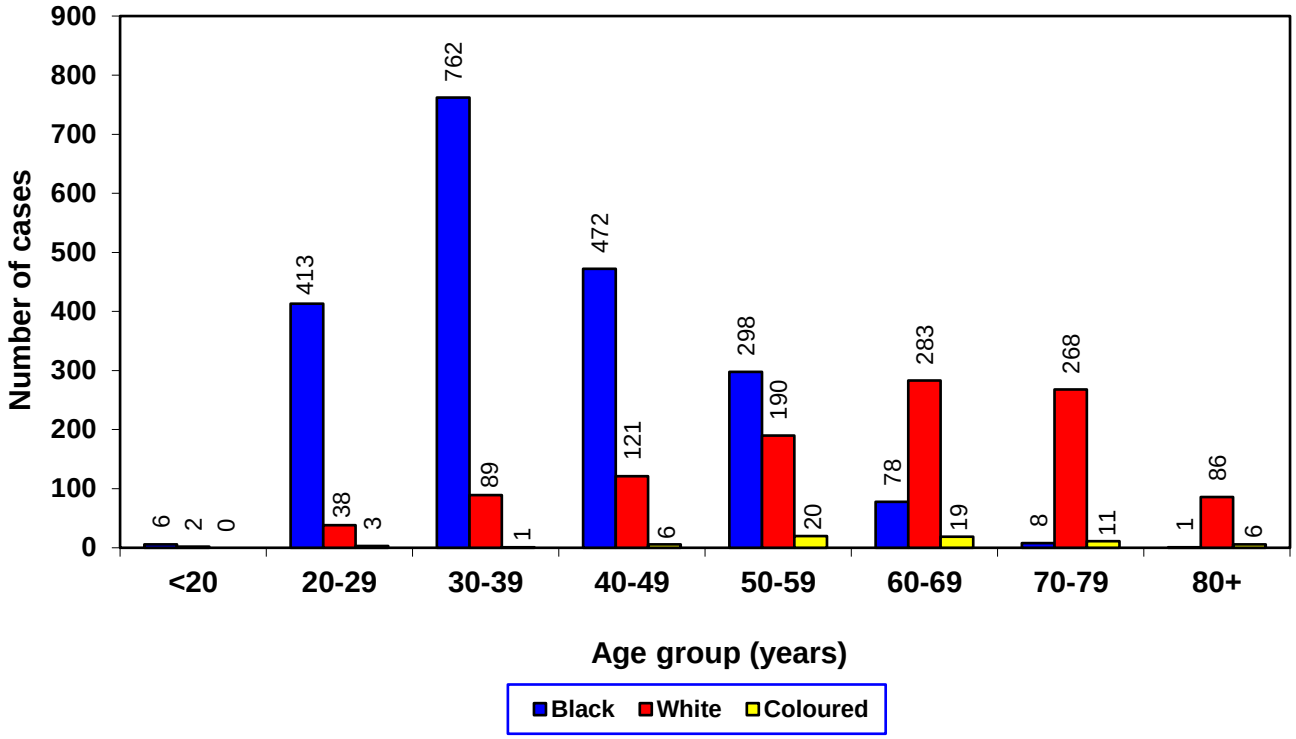

FIG 2-1 DISTRIBUTION OF AUTOPSIES BY AGE AND POPULATION GROUP (1991)

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 1991.

TABLE 2-4 NUMBER AND PROPORTION OF AUTOPSIES BY COMMODITY AND POPULATION GROUP (1991)

Commodity	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
Gold	1 683	78.5	831	76.9	4	6.1	2 518	76.6
Platinum	243	11.3	30	2.8	0	-	273	8.3
Coal	114	5.3	67	6.2	0	-	181	5.5
Asbestos	25	1.2	21	1.9	57	86.4	103	3.1
Iscor	1	-	51	4.7	1	1.5	53	1.6
Diamond	17	0.8	17	1.6	0	-	34	1.0
Copper	4	0.2	24	2.2	3	4.5	31	0.9
Other	2	0.1	5	0.5	0	-	7	0.2
Unknown	54	2.5	34	3.1	1	1.5	89	2.7
Total	2 143		1 080		66		3 289	

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

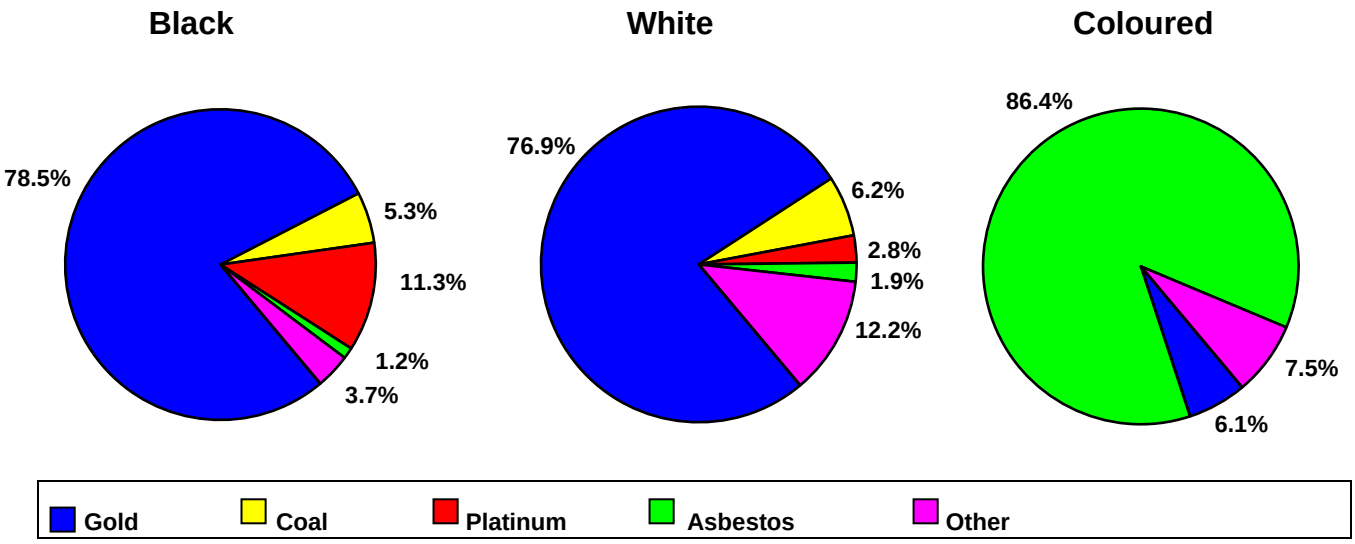

FIG 2-2 DISTRIBUTION OF AUTOPSIES BY COMMODITY AND POPULATION GROUP (1991)

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 (1991)

Years of service	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
<1	66	3.1	5	0.5	3	4.5	74	2.2
1-5	452	21.1	65	6.0	8	12.1	525	16.0
6-10	418	19.5	89	8.2	14	21.2	521	15.8
11-15	385	18.0	123	11.4	11	16.7	519	15.8
16-20	137	6.4	114	10.6	8	12.1	259	7.9
21-25	55	2.6	130	12.0	8	12.1	193	5.9
26-30	24	1.1	127	11.8	3	4.5	154	4.7
31-35	12	0.6	120	11.1	3	4.5	135	4.1
36-40	5	0.2	81	7.5	0	-	86	2.6
41+	1	-	45	4.2	1	1.5	47	1.4
Unknown	588	27.4	181	16.8	7	10.6	776	23.6
Total	2 143		1 080		66		3 289	

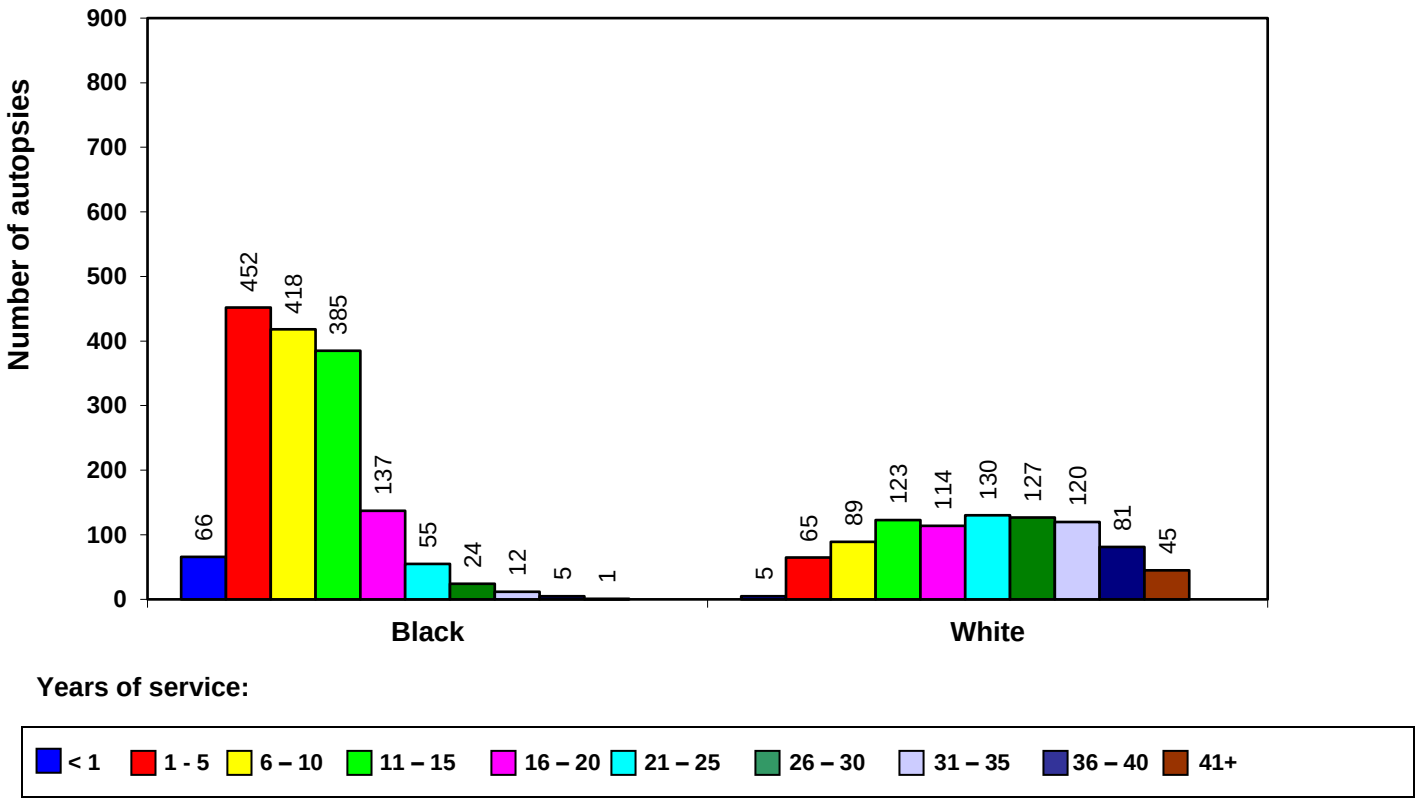

FIG 2-3 DISTRIBUTION OF AUTOPSIES BY YEARS OF SERVICE AND POPULATION GROUP (1991)

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 (1991)

Commodity	Black			White		
	N	Mean (years)	SD*	N	Mean (years)	SD*
Gold	1 592	38.2	10.3	831	61.7	15.4
Platinum	238	39.2	11.1	30	52.2	15.7
Coal	109	43.1	11.7	67	53.5	16.6
Asbestos	25	47.8	14.9	21	59.2	12.5
Iscor	1	63.0	-	51	59.1	13.0
Diamond	17	42.4	14.6	17	60.8	11.9
Copper	4	54.8	10.1	24	61.8	12.7
Other	2	60.5	0.7	5	60.4	12.2
Unknown	50	42.5	10.9	31	60.1	13.0
Total	2 038	38.9	10.7	1 077	60.7	15.3

* Standard deviation

TABLE 2-7 MEAN DURATION OF SERVICE BY COMMODITY AND POPULATION GROUP (1991)

Commodity	Black			White		
	N	Mean (years)	SD*	N	Mean (years)	SD*
Gold	1 285	9.8	6.9	696	24.0	11.3
Platinum	163	8.8	5.3	24	15.8	11.2
Coal	58	10.2	6.6	53	18.3	12.3
Asbestos	11	10.9	6.5	17	13.8	10.2
Iscor	1	19.8	19.8	41	23.0	11.2
Diamond	9	11.4	8.7	17	19.2	13.1
Copper	1	3.8	-	24	17.7	9.3
Other	2	28.0	0	5	15.3	11.7
Unknown	25	11.0	7.0	22	14.2	7.1
Total	1 555	9.8	7	899	22.7	11.5

* Standard deviation

SECTION 3 – ACTIVE TUBERCULOSIS

The distribution of active tuberculosis (TB) by anatomical site is presented in Figure 3-1 (n=211). Active pulmonary TB (PTB) was diagnosed in 4.9% (n=162) of all cases autopsied in 1991. Most of the men with PTB were black (83.3%; 135 cases), 14.2% (23 cases) were white and 2.5% (4 cases) were coloured.

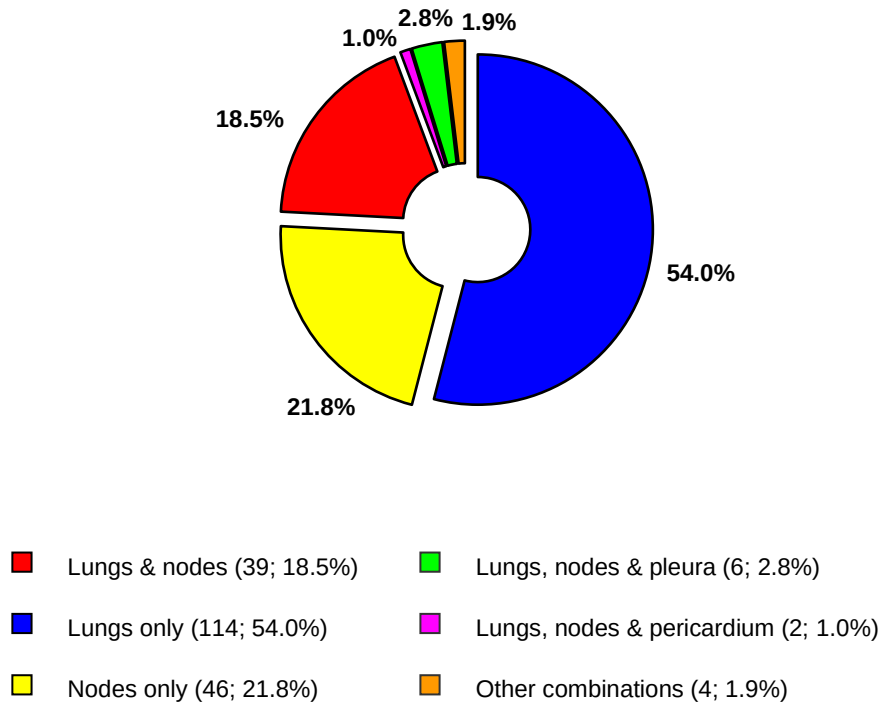

FIG 3-1 DISTRIBUTION OF ACTIVE TB BY SITE (1991)

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 (76.6% of all autopsy cases came from that commodity).

TABLE 3-1 NUMBER OF CASES AND PREVALENCE OF ACTIVE PTB BY COMMODITY AND POPULATION GROUP (1991)

Commodity	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	110	65	17	20	0	-	127	50
Platinum	11	45	1	33	0	-	12	44
Coal	8	70	0	-	0	-	8	44
Asbestos	3	120	2	95	4	70	9	87
Iscor	0	-	1	20	0	-	1	19
Diamond	1	59	1	59	0	-	2	59
Copper	0	-	1	42	0	-	1	32
Unknown	2	37	0	-	0	-	2	22
Total	135	63	23	21	4	61	162	49

The age distribution of cases with active PTB is shown in Table 3-2. Most of the cases were aged between 20 and 69 years (139 cases=89.1%).

TABLE 3-2 NUMBER OF CASES AND PREVALENCE OF ACTIVE PTB BY AGE AND POPULATION GROUP (1991)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
20-29	10	24	0	-	0	-	10	22
30-39	53	70	1	11	0	-	54	63
40-49	36	76	2	17	1	167	39	65
50-59	23	77	3	16	0	0	26	51
60-69	7	90	4	14	3	158	14	37
70-79	0	-	8	30	0	-	8	28
80+	0	-	5	58	0	-	5	54
Unknown	6	57	0	-	0	-	6	56
Total	135	63	23	21	4	61	162	49

SECTION 4 – SILICOSIS

Silicotic nodules were found in the lungs of 365 cases (11.1% of all autopsies), 93.2% of which came from the gold mining industry. Of all cases of silicosis, occasional silicotic nodules were found in 42.7% of cases, a few in 20.5%, a moderate number in 18.1%, a large number in 9.6% and in 9.0% of the cases severity was not stated.

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 (1991)

Commodity	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	175	104	165	199	0	-	340	135
Platinum	4	16	2	67	0	-	6	22
Coal	4	35	1	15	0	-	5	28
Asbestos	1	40	2	95	2	35	5	49
Iscor	0	-	1	20	0	-	1	19
Diamond	0	-	1	59	0	-	1	29
Copper	0	-	0	-	1	333	1	32
Unknown	4	74	2	59	0	-	6	67
Total	188	88	174	161	3	45	365	111

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 (1991)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
20-29	3	9	0	-	0	-	3	8
30-39	35	56	1	15	0	-	36	52
40-49	72	191	5	57	0	-	77	166
50-59	45	217	26	182	0	-	71	203
60-69	10	238	45	221	0	-	55	224
70-79	2	400	71	313	0	-	73	313
80+	1	1000	17	224	0	-	18	231
Unknown	7	77	0	-	0	-	7	77
Total	175	104	165	199	0		340	135

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 (1991)

Years of service	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
<1	3	52	0	-	0	-	3	50
1-5	24	64	0	-	0	-	24	58
6-10	15	45	3	48	0	-	18	45
11-15	51	160	12	148	0	-	63	158
16-20	26	215	10	119	0	-	36	176
21-25	12	286	32	291	0	-	44	289
26-30	4	211	38	336	0	-	42	318
31-35	2	182	33	337	0	-	35	321
36-40	2	400	19	284	0	-	21	292
41+	1	1000	6	143	0	-	7	159
Unknown	35	88	12	89	0	-	47	88
Total	175	104	165	199	0		340	135

SECTION 5 – OTHER PNEUMOCONIOSES

MASSIVE FIBROSIS

There were 30 (0.9%) cases of massive fibrosis (17 black and 13 white). Twenty four cases of massive fibrosis were from gold, one each from the platinum, asbestos, diamond and copper mining industries. For two cases the commodity was not known.

COAL WORKERS' PNEUMOCONIOSIS

There were 12 (0.4%) cases of coal workers' pneumoconiosis of which 10 cases were from the coal and two were from the gold mining industries.

MIXED DUST PNEUMOCONIOSIS

There were 17 (0.5%) cases of mixed dust pneumoconiosis. These cases came from the gold (n=14), coal (n=1) and platinum (n=2) mining industries.

ASBESTOSIS AND PLEURAL PLAQUES

There were 87 cases of asbestosis of which 44.8% (n=39) had slight, 50.6% (n=44) moderate and 4.6% (n=4) marked fibrosis. Of these, 57 (65.5%) had worked in the asbestos mining industry at some time in their lives. There were 27 cases that had asbestos plaques and 18 (66.7%) of these 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 (1991)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
30-39	2	3	0	-	0	-	2	2
40-49	15	32	2	17	2	333	19	32
50-59	14	47	9	47	6	300	29	57
60-69	8	103	7	25	7	368	22	58
70-79	1	125	1	4	6	545	8	28
80+	0	-	1	12	3	500	4	43
Unknown	2	19	1	333	0	-	3	28
Total	42	20	21	19	24	364	87	26

SECTION 6 – EMPHYSEMA

There were 704 cases of emphysema, the extent of which was mild in 68.6% (n=483), moderate in 25.9% (n=182) and marked in 5.5% (n=39). 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 (1991)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
20-29	7	17	0	-	0	-	7	15
30-39	44	58	4	45	0	-	48	56
40-49	63	133	21	174	2	333	86	144
50-59	64	215	77	405	6	300	147	289
60-69	17	218	160	565	6	316	183	482
70-79	4	500	154	575	5	455	163	568
80+	0	-	59	686	2	333	61	656
Unknown	9	86	0	-	0	-	9	83
Total	208	97	475	440	21	318	704	214

The majority of black and white men with emphysema were from the gold mining industry (73.6%, n=518) (Table 6-2).

TABLE 6-2 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY COMMODITY AND POPULATION GROUP (1991)

Commodity	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	140	83	378	455	0	-	518	206
Platinum	21	86	13	433	0	-	34	125
Coal	31	272	27	403	0	-	58	320
Asbestos	5	200	7	333	19	333	31	301
Iscor	1	1000	19	373	1	1000	21	396
Diamond	1	59	8	471	0	-	9	265
Copper	2	500	6	250	1	333	9	290
Other	1	500	1	200	0	-	2	286
Unknown	6	111	16	471	0	-	22	247
Total	208	97	475	440	21	318	704	214

TABLE 6-3 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY YEARS OF SERVICE AND POPULATION GROUP (1991)

Years of service	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
<1	5	76	1	200	1	333	7	95
1 – 5	23	51	15	231	3	375	41	78
6-10	26	62	28	315	7	500	61	117
11-15	33	86	46	374	4	364	83	160
16-20	17	124	55	482	2	250	74	286
21-25	6	109	58	446	3	375	67	347
26-30	8	333	67	528	1	333	76	494
31-35	2	167	76	633	0	-	78	578
36-40	3	600	49	605	0	-	52	605
41+	1	1000	29	644	0	-	30	638
Unknown	84	143	51	282	0	-	135	174
Total	208	97	475	440	21	318	704	214

SECTION 7 – MESOTHELIOMA

There were 21 cases of mesothelioma in 1991.

TABLE 7-1 NUMBER AND PROPORTION OF MESOTHELIOMA CASES BY AGE AND POPULATION GROUP (1991)

Age group (years)	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
30-39	0	-	1	10.0	0	-	1	4.8
40-49	2	33.3	1	10.0	1	20.0	4	19.0
50-59	3	50.0	2	20.0	2	40.0	7	33.3
60-69	1	16.7	1	10.0	2	40.0	4	19.0
70-79	0	-	4	40.0	0	-	4	19.0
Unknown	0	-	1	10.0	0	-	1	4.8
Total	6		10		5		21	

The distribution of mesothelioma by commodity and population group is presented in Table 7.2. Six (28.6%) had worked in the asbestos mining industry.

TABLE 7-2 NUMBER AND PROPORTION OF MESOTHELIOMA CASES BY COMMODITY AND POPULATION GROUP (1991)

Commodity	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
Gold	1	16.7	4	40.0	0	-	5	23.8
Asbestos	0	0.0	1	10.0	5	100.0	6	28.6
Diamond	1	16.7	0	0.0	0	-	1	4.8
Copper	1	16.7	0	0.0	0	-	1	4.8
Other	0	-	1	10.0	0	-	1	4.8
Unknown	3	50.0	4	40.0	0	-	7	33.3
Total	6		10		5		21	

SECTION 8 – PRIMARY LUNG CANCER

One hundred and twenty nine cases of primary lung cancer were found at autopsy, 27.1% of which were in black, 64.3% in white and 8.5% in coloured men. Most of the cases were squamous lung carcinomas (34.1%; n=44), followed by small cell lung carcinomas (24.0%; n=31), large cell lung carcinoma (16.3%; n=21), adeno carcinoma (14.0%; n=18), and broncho-alveolar carcinoma (11.6%; n=15).

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 (1991)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
30-39	3	4	0	-	0	-	3	4
40-49	8	17	3	25	0	-	11	18
50-59	14	47	11	58	6	300	31	61
60-69	8	103	35	124	3	158	46	121
70-79	1	125	28	104	1	91	30	105
80+	0	-	6	70	1	167	7	75
Unknown	1	10	0	-	0	-	1	9
Total	35	16	83	77	11	167	129	39

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 (1991)

Commodity	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	17	10	65	78	1	250	83	33
Platinum	7	29	1	33	0	-	8	29
Coal	5	44	3	45	0	-	8	44
Asbestos	4	160	1	48	9	158	14	136
Iscor	0	-	7	137	0	-	7	132
Copper	0	-	4	167	1	333	5	161
Other	0	-	1	200	0	-	1	143
Unknown	2	37	1	29	0	-	3	34
Total	35	16	83	77	11	167	129	39

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 (10.7%) overall. Black men had the highest proportion of unnatural causes of death (52.4%). In 24.8% of all cases, the cause of death was not stated.

TABLE 9-1 CLINICAL CAUSES OF DEATH BY POPULATION GROUP (1991)

System	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
Respiratory	178	8.3	124	11.5	0	-	302	9.2
Cardio-vascular	56	2.6	277	25.6	18	27.3	351	10.7
Central Nervous System	64	3.0	29	2.7	15	22.7	108	3.3
Gastro-intestinal	76	3.5	44	4.1	3	4.5	123	3.7
Genito-urinary	25	1.2	31	2.9	0	-	56	1.7
Haematological	12	0.6	11	1.0	0	-	23	0.7
Unnatural	1 123	52.4	202	18.7	6	9.1	1 331	40.5
Miscellaneous	121	5.6	51	4.7	6	9.1	178	5.4
Not stated	488	22.8	311	28.8	18	27.3	817	24.8
Total	2 143		1 080		66		3 289	

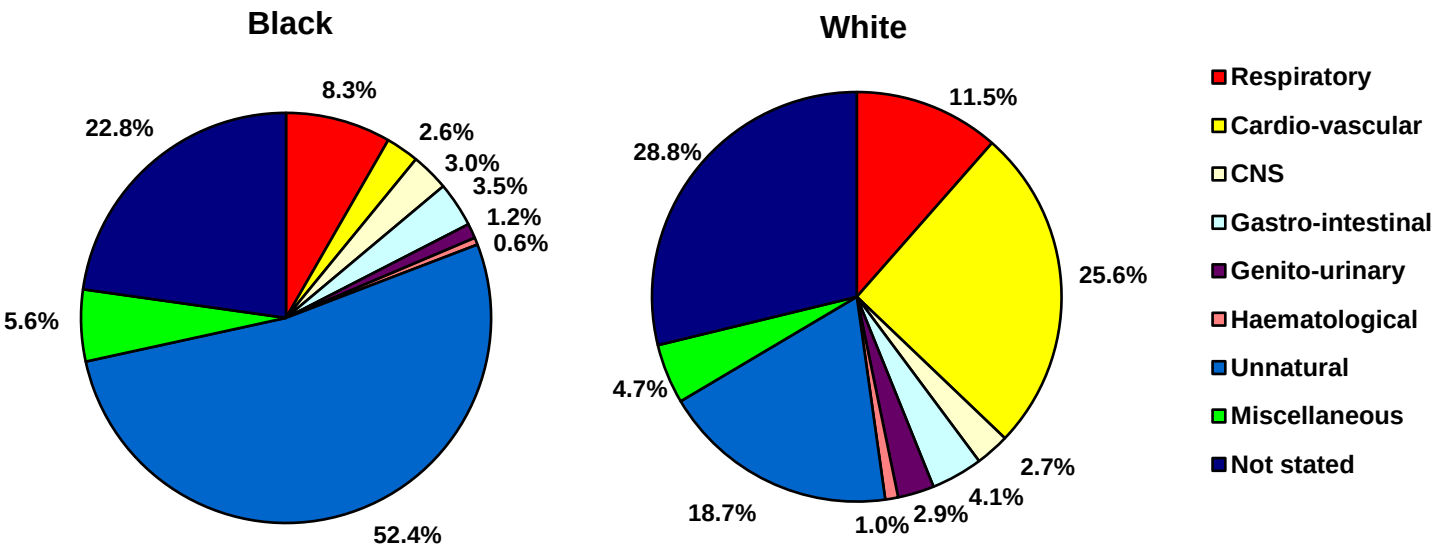

FIGURE 9-1 CLINICAL CAUSE OF DEATH AS STATED BY THE CLINICIANS WHO SUBMIT THE ORGANS OF THE DECEASED TO THE NIOH (1991)