NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

Division of the National Health Laboratory Service

Pathology Division Surveillance Report

Demographic Data and Disease Rates for January to December 2018

Ntebogeng Kgokong
Lucia Mhlongo
Naseema Vorajee
Deepna Govind Lakhoo
Jessica Linden
Casey McCusker
Delerise Fassom
Jill Murray
Ntombizodwa Ndlovu
Anita Gildenhuys

PO Box 4788
Johannesburg
2000

e-mail: anitag@nioh.ac.za

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Tiyane Maluleke
Tsabeng Mogaki
Wilson Mashele
Zekhethelo Maseko

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

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EXECUTIVE SUMMARY

The NIOH examined the cardiorespiratory organs of 775 deceased individuals. Of these, 57.5% were black, 41.4% were white, 0.8% were coloured and 0.3% were submitted without information on their population group. Of the cases submitted, 61.9% (n=480) were ex-miners, 37.7% (n=292) current miners and 0.4% (n=3) cases could not be classified.

The overall disease rates (per 1000 autopsies) for 2018 are shown in Figure 1.

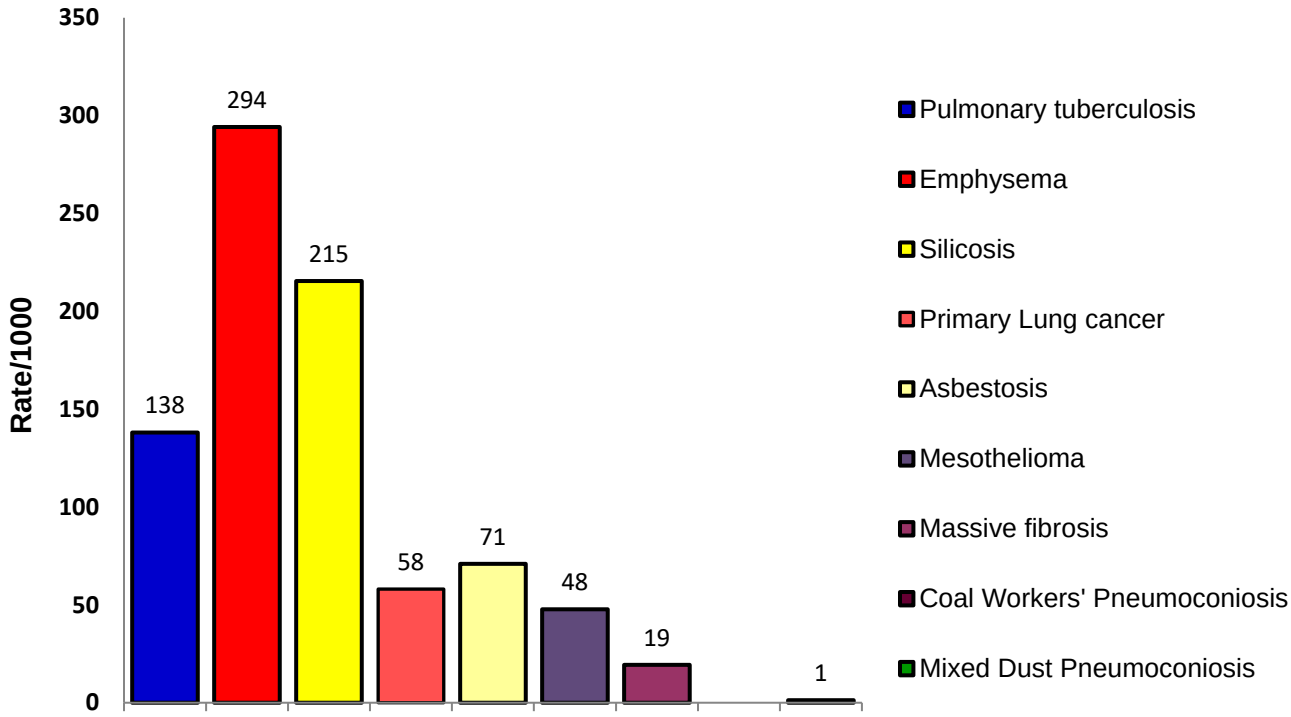


FIG. 1 OVERALL DISEASE RATES FOR 2018

The overall rate of pulmonary tuberculosis (PTB) decreased, from 155/1000 in 2017 to 138/1000 in 2018. The rate in black gold miners decreased from 240/1000 in 2017 to 216/1000 in 2018. In black platinum miners, the PTB rate decreased from 166/1000 in 2017 to 143/1000 in 2018.

In black gold miners, the rate of silicosis decreased from 370/1000 in 2017 to 328/1000 in 2018. However, the rate in white gold miners has continued to increase and in 2018 was 296/1000.

The organs of 40 women were submitted for examination mostly with a history of working in the gold (15) and asbetos (18) mines.

Some cases were received with incomplete exposure information. Active follow-up of cases received has improved the completeness of information obtained. However, in 2018 information could not be obtained for the following: mine type (commodity) 10 (1.3%), duration of service 21 (2.7%) and last mine worked 10 (1.3%).

Since 2010, the province or foreign country from which the organs were sent has been recorded on the PATHAUT database. Table 1-1 shows the distribution of cases by province and population group. Most cases originated from the North West (30.6%), Gauteng (25.3%) and Free State (18.1%) provinces. Twelve cases were received from Lesotho

TABLE 1-1 DISTRIBUTION OF AUTOPSY CASES BY PROVINCE AND POPULATION GROUP (2018)

Province	Black		White		Coloured		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%
Eastern Cape	10	2.2	4	1.2	0	-	0	-	14	1.8
Free State	95	21.3	44	13.7	0	-	1	50.0	140	18.1
Gauteng	37	8.3	159	49.5	0	-	0	-	196	25.3
Kwazulu-Natal	0	-	7	2.2	0	-	0	-	7	0.9
Limpopo	5	1.1	2	0.6	0	-	0	-	7	0.9
Mpumalanga	12	2.7	30	9.3	0	-	0	-	42	5.4
North West	167	37.4	69	21.5	1	16.7	0	-	237	30.6
Northern Cape	109	24.4	2	0.6	5	83.0	0	-	116	15.0
Western Cape	0	-	4	1.2	0	-	0	-	4	0.5
Lesotho	11	2.5	0	-	0	-	1	50.0	12	1.5
Total	446		321		6		2		775	

The Pathology Division had many outreach activities and continues to engage with stakeholders. These include occupational health units on the mines, union representatives, undertakers and occupational and environmental health university students (Appendix 2).

Four journal articles using autopsy data were published and research findings were presented at a number of conferences (Appendix 2). There is one ongoing PhD study utilising the PATHAUT data (registered with the University of the Witwatersrand).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

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 1cm 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 dust pneumoconiosis	Lung fibrosis caused by simultaneous exposure to multiple dust types
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, interpretation and dissemination of information related to adverse health outcomes for action
Environmental asbestos exposure	Non-occupational asbestos exposure. Cases with such exposure are examined by the NIOH but are not submitted to the MBOD for compensation

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. Approval to retrospectively review routinely collected autopsy data for reporting on disease prevalence's, time trends and associated factors was obtained from the Human Research Ethics Committee (Medical) at the University of the Witwatersrand (Clearance number M170879).

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 Enterprise Guide v7.1.

This report describes autopsy cases examined during the year 2018. This report along with previous reports can be accessed at https://www.nioh.ac.za/pathology-disease-surveillance-reports/

Since 2005, gender has been recorded on the PATHAUT database. To maintain consistency with previous reports, the term 'men' and all data refers to both men and women throughout this report, with the exception of Section 10 which reports findings in women only.

Many of the cases had "mixed" exposures in that they had been employed in mining 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. In Appendix 1, however, the cases are listed according to the most recent (last) mine at which the miners worked.

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 numbers of autopsies performed annually since 1975 are presented in Table 2-1.

TABLE 2-1 DISTRIBUTION OF AUTOPSIES BY YEAR AND POPULATION GROUP (1975-2018)

Year of autopsy	Black		White		Coloured		Indian		Unknown		Total
	N	%	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
1992	2 144	66	1 049	32	70	2					3 263
1993	1 863	65	956	33	65	2					2 884
1994	1 737	61	1 021	36	94	3					2 852
1995	2 830	71	1 059	27	99	2			12	0.3	4 003
1996	2 154	67	960	30	56	2			69	2.1	3 239
1997	2 223	69	897	28	70	2			18	0.6	3 208
1998	1 977	69	836	29	49	2	1		17	0.6	2 880
1999	1 656	65	832	33	29	1			12	0.5	2 529
2000	1 798	69	761	29	41	2			8	0.3	2 608
2001	1 690	67	813	32	13	1			13	0.5	2 529
2002	1 677	67	763	30	50	2			28	1.1	2 518
2003	1 536	66	745	32	23	1	1		13	0.6	2 318
2004	1 428	69	596	29	22	1	1		8	0.4	2 055
2005	1 274	68	562	30	22	1			18	1	1 876
2006	1 165	68	535	31	11	1			9	0.5	1 720
2007	1 144	66	539	31	21	1			20	1.2	1 724
2008	1 185	69	556	32	11	1			48	2.7	1 800
2009	1 138	68	500	29	16	1			8	0.5	1 662
2010	960	64	521	35	15	1			6	0.4	1 502
2011	847	64	453	34	11	1			18	1.4	1 329
2012	706	61	445	38	7	1			6	0.5	1 164
2013	744	63	421	35	7	1			16	1	1 188
2014	627	59	432	41	5	1	1		1		1 066
2015	539	59	358	39	9	1			3		909
2016	521	61	323	38	6	1					850
2017	473	59	313	39	9	1	1	0.1	5	0.6	801
2018	446	58	321	41	6	0.7			2	0.3	775
Total	74 938	66	36 531	32	1 641	1	5		359		113 477

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 miners autopsied are retired. The number of autopsies has decreased steadily over the years, probably reflecting the concomitant decrease in the number of miners employed in the industry. In 1994, there were around 344 000 people employed in the gold mining industry compared to approximately 100 189 in 2018 (Minerals Council South Africa).

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 may be undertaken on men who die in close proximity to Johannesburg.

Table 2-2 shows the distribution of autopsies by population group for 2018. The vast majority (97.8%) of autopsy examinations were performed on the cardio-respiratory organs only.

TABLE 2-2 NUMBER AND PROPORTION OF AUTOPSIES BY TYPE AND POPULATION GROUP (2018)

Autopsy type	Black		White		Coloured		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%
Cardio-respiratory organs only	446	100	304	94.7	6	100	2	100	758	97.8
Full autopsy	0	-	17	5.3	0	-	0		17	2.2
Total		446		321		6		2		775

The age distribution of cases for 2018 is shown in Table 2-3 and presented graphically in Figure 2-1. The mean age at autopsy of black men was 53.8 years, similar to that in 2017 (53.2 years). The mean age of white men at autopsy was 68.4 years in 2018, similar to 67.6 years in 2017.

TABLE 2-3 NUMBER AND PROPORTION OF AUTOPSIES BY AGE AND POPULATION GROUP (2018)

Age group (years)	Black		White		Coloured		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%
20-29	9	2.0	0	-	0	-	0	-	9	1.2
30-39	65	14.6	2	0.6	0	-	0	-	67	8.6
40-49	92	20.6	6	1.9	0	-	0	-	98	12.6
50-59	140	31.4	74	23.1	0	-	0	-	214	27.6
60-69	78	17.5	85	26.5	3	50.0	0	-	166	21.4
70-79	47	10.5	100	31.2	2	33.3	0	-	149	19.2
80+	13	2.9	54	16.8	1	16.7	0	-	68	8.8
Unknown	2	0.4	0	-	0	-	2.0	100	4	0.5
Total	446		321		6		2		775	

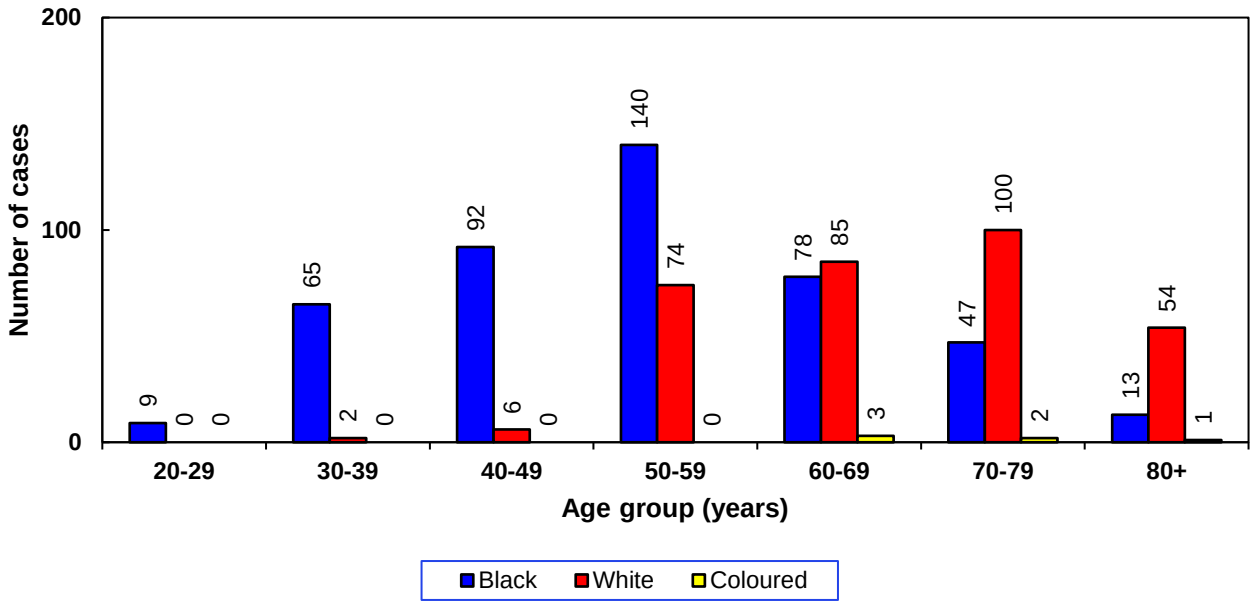


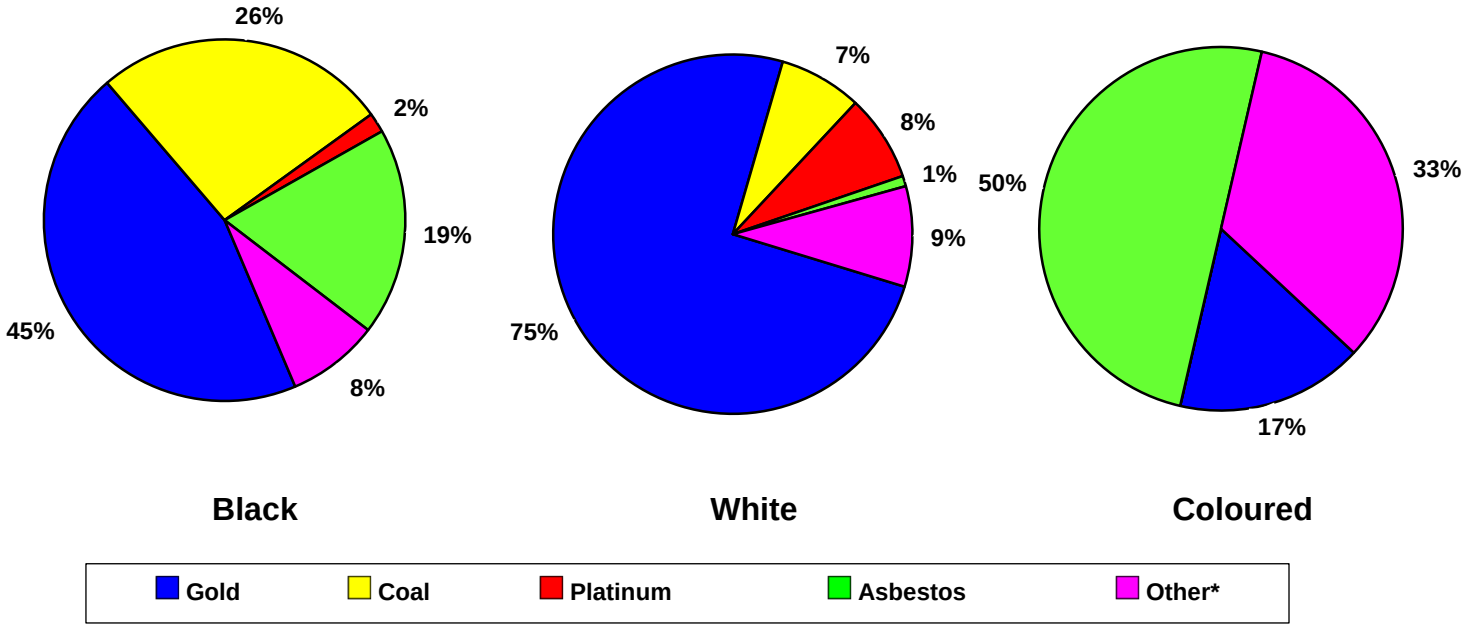
FIG 2-1 DISTRIBUTION OF AUTOPSIES BY AGE AND POPULATION GROUP (2018)

There are men who 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). Cases were placed in categories according to the commodity in which they had worked for the longest duration (most exposure).

Table 2-4 and Figure 2-2 show the distributions of autopsies by commodity and population group for 2018. The majority of autopsies (57.4%) were on men from the gold mining industry, which was more than in 2017 (52.3%). The proportion of autopsies from the platinum mining industry increased over the years, from 8.3% in 1999 to 23.1% in 2017, but decreased to 18.5% in 2018.

TABLE 2-4 NUMBER AND PROPORTION OF AUTOPSIES BY COMMODITY AND POPULATION GROUP (2018)

Commodity	Black		White		Coloured		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%
Gold	204	45.7	240	74.8	1	16.7	0	-	445	57.4
Platinum	119	26.7	24	7.5	0	-	0	-	143	18.5
Coal	8	1.8	25	7.8	0	-	0	-	33	4.3
Asbestos	84	18.8	3	0.9	3	50.0	0	-	90	11.6
Iscor	0	-	3	0.9	0	-	0	-	3	0.4
Diamond	4	0.9	2	0.6	0	-	0	-	6	0.8
Copper	0	-	2	0.6	1	16.7	0	-	3	0.4
Manganese	11	2.5	3	0.9	1	16.7	0	-	15	1.9
Industry	1	0.2	2	0.6	0	-	0	-	3	0.4
Other*	14	3.1	10	3.1	0	-	0	-	24	3.1
Unknown	1	0.2	7	2.2	0	-	2	100	10	1.3
Total	446		321		6		2		775	



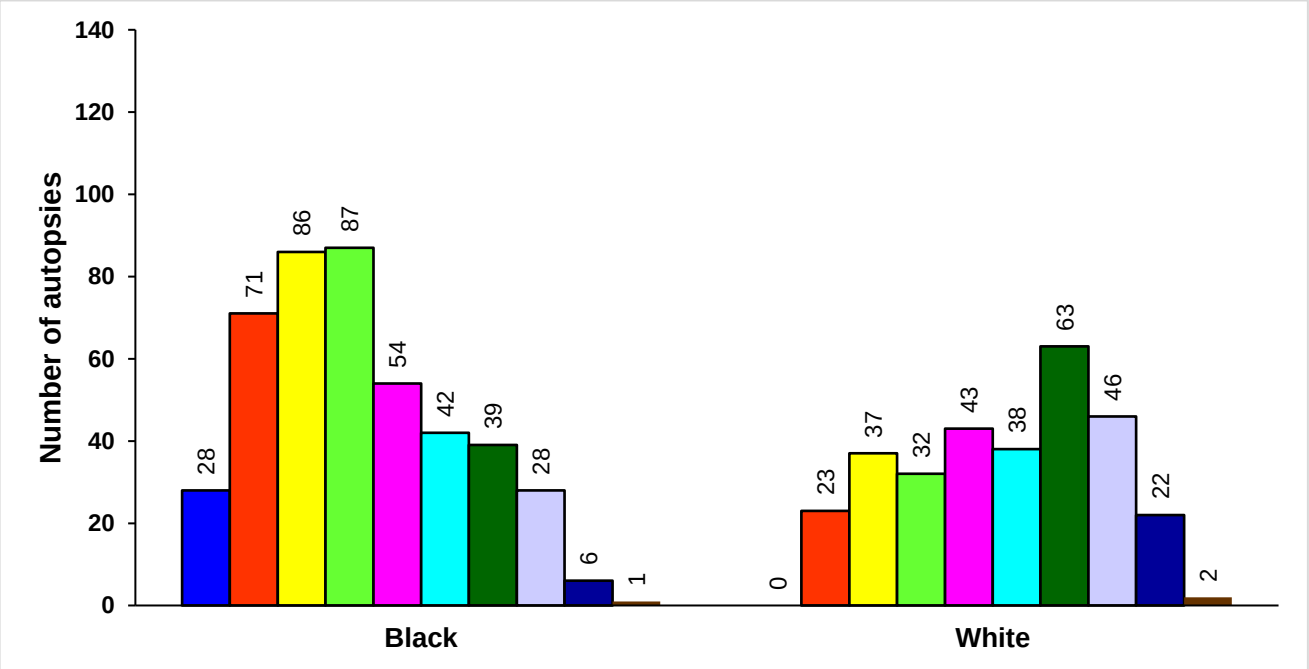
*Includes cementation, chrome, copper, diamond, environmental asbestos, industry, iron, lime, manganese, railways, phosphate, silicon smelters, steel, uranium, vanadium, as well as cases where service histories could not be obtained

FIG 2-2 DISTRIBUTION OF AUTOPSIES BY COMMODITY AND POPULATION (2018)

Detailed information about the years in mining service by population group is shown in Table 2-5 and displayed graphically in Figure 2-3. In 2018, the duration of service was obtained for all but 2.7% (n=21) of cases. This figure is an improvement to that of 2017 (4.4%). An improvement in obtaining service history may be attributable to active case-follow up.

TABLE 2-5 NUMBER AND PROPORTION OF AUTOPSIES BY YEARS OF SERVICE AND POPULATION GROUP (2018)

Years of service	Black		White		Coloured		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%
<1	28	6.3	0	-	0	-	0	-	28	3.6
1-5	71	15.9	23	7.2	2	33.3	0	-	96	12.4
6-10	86	19.3	37	11.5	2	33.3	0	-	125	16.1
11-15	87	19.5	32	10.0	1	16.7	0	-	120	15.5
16-20	54	12.1	43	13.4	1	16.7	0	-	98	12.6
21-25	42	9.4	38	11.8	0	-	0	-	80	10.3
26-30	39	8.7	63	19.6	0	-	0	-	102	13.2
31-35	28	6.3	46	14.3	0	-	0	-	74	9.5
36-40	6	1.3	22	6.9	0	-	0	-	28	3.6
41+	1	0.2	2	0.6	0	-	0	-	3	0.4
Unknown	4	0.9	15	4.7	0	-	2	100	21	2.7
Total	446		321		6		2		775	



Years of service:

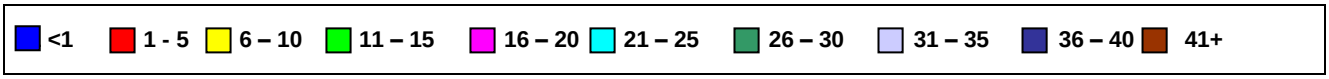


FIG 2-3 DISTRIBUTION OF AUTOPSIES BY YEARS OF SERVICE AND POPULATION GROUP (2018)

The mean age and duration of service by commodity and population group are shown in Tables 2-6 and 2-7.

TABLE 2-6 MEAN AGE BY COMMODITY AND POPULATION GROUP (2018)

Commodity	Black			White		
	N	Mean (Years)	SD*	N	Mean (Years)	SD*
Gold	204	49	11	240	68	11
Platinum	119	49	10	24	66	9
Coal	8	49	11	25	67	12
Asbestos	84	69	10	3	72	14
Iscor	0	-	-	3	71	2
Copper	0	-	-	2	84	4
Manganese	10	64	13	3	74	4
Industry	1	67	-	2	70	8
Other	18	66	7	12	69	10
Unknown	0	-	-	7	73	12
Total	444	54	13	321	68	11

* Standard deviation

TABLE 2-7 MEAN DURATION OF SERVICE BY COMMODITY AND POPULATION GROUP (2018)

Commodity	Black			White		
	N	Mean (Years)	SD*	N	Mean (Years)	SD*
Gold	204	17	10	238	23	10
Platinum	119	15	8	23	18	9
Coal	8	16	10	23	20	11
Asbestos	84	6	7	3	9	4
Iscor	0	-	-	3	20	3
Copper	0	-	-	1	20	-
Manganese	10	10	6	3	31	4
Industry	1	5	-	0	-	-
Other	16	23	11	12	21	12
Total	442	15	10	306	22	10

*Standard deviation

SECTION 3 – ACTIVE TUBERCULOSIS

The distribution of active tuberculosis (TB) by anatomical site is presented in Figure 3-1 (n=133). Active pulmonary TB (PTB) was diagnosed in 13.8% (n=107) of all cases autopsied in 2018, compared to 27.4% (n=472) in 2007 when the rate was at its peak. Most of the men with PTB were black (n=75; 70.1%) and 30 (28.0%) were white.

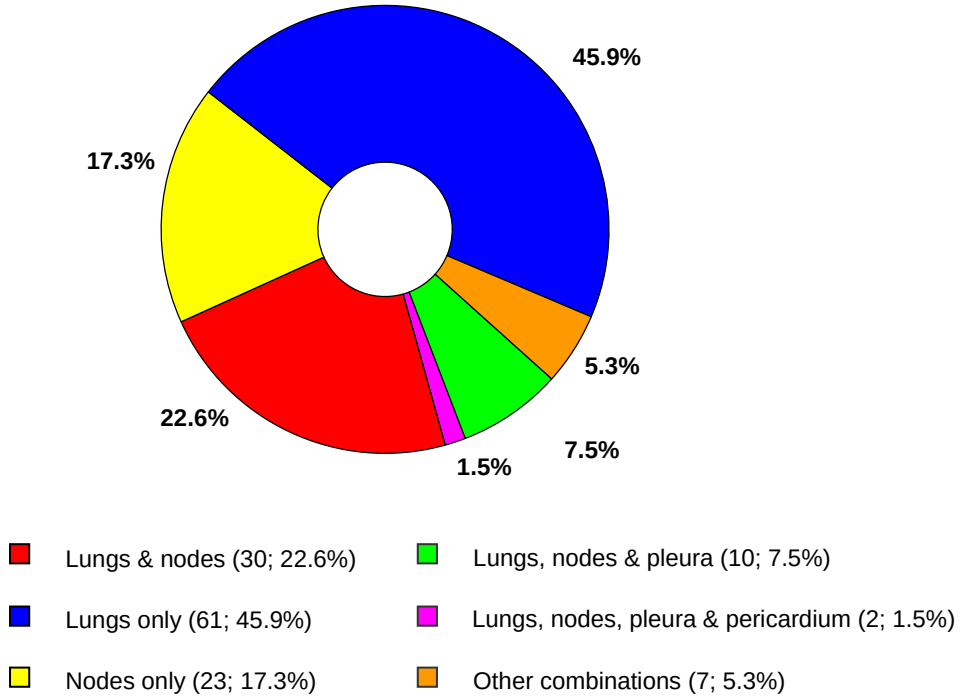


FIG 3-1 DISTRIBUTION OF ACTIVE TB BY SITE (2018)

Disease rates in subsequent tables and figures are expressed per 1000 miners.

In 2018, the overall PTB rate was 138/1000. In black miners, PTB rates increased from the early 1990s and peaked at 368/1000 in 2007, but have since declined annually to 168/1000 in 2018 (Fig 3-2). The rate in white miners is much lower than that in black miners, 93/1000 (2018), but did increase slightly compared to 2017 (86/1000).

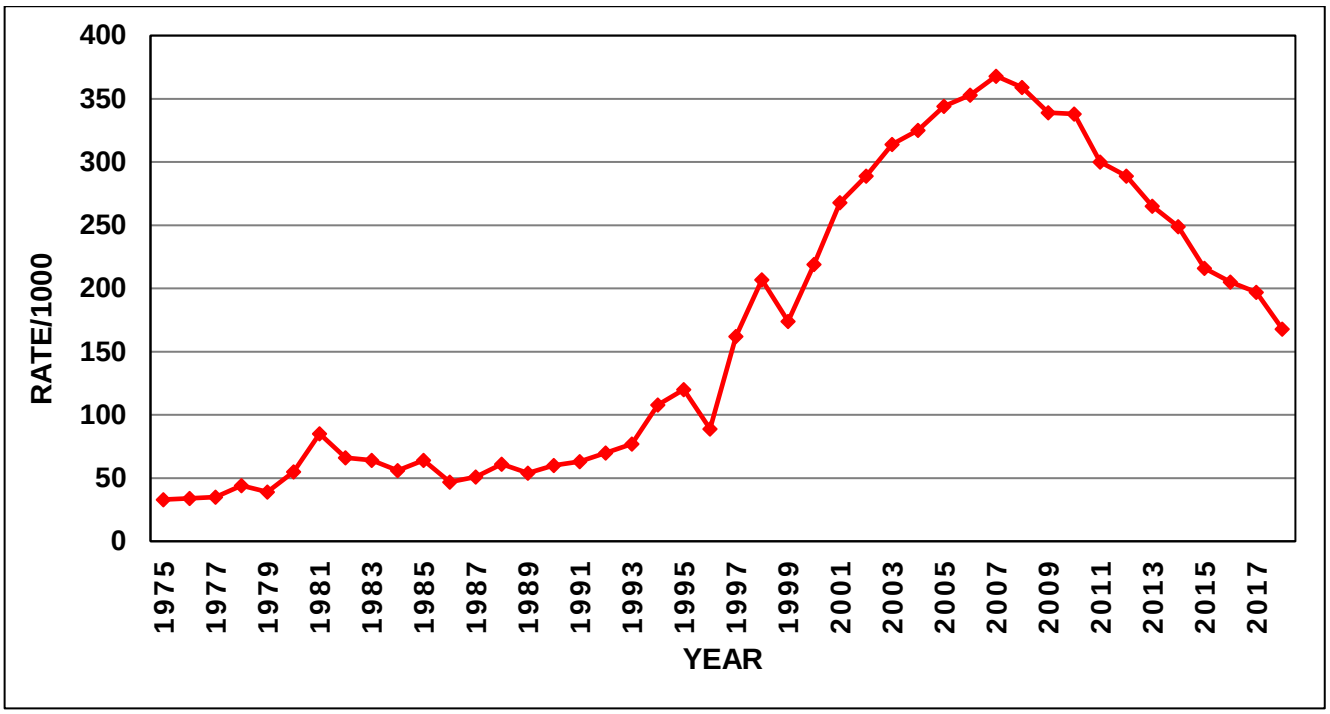


FIG 3-2 ACTIVE PTB RATES IN BLACK MINERS AT AUTOPSY (1975-2018)

The distribution of active PTB cases by commodity is shown in Table 3-1. Most cases of active PTB (65.4%) were from the gold (57.4% of all autopsy cases came from that commodity) and platinum (18.7%) mining industries.

TABLE 3-1 NUMBER OF CASES AND PREVALENCE OF ACTIVE PTB BY COMMODITY AND POPULATION GROUP (2018)

Commodity	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Gold	44	216	26	108	0	-	0	-	70	157
Platinum	17	143	3	-	0	-	0	-	20	140
Coal	0	-	1	-	0	-	0	-	1	29
Asbestos	7	83	0	-	0	-	0	-	7	78
Manganese	3	-	0	-	0	-	0	-	3	-
Other	4	-	0	-	1	-	0	-	5	-
Unknown	0	-	0	-	0	-	1	-	1	-
Total	75	168	30	93	1	-	1	-	107	138

Note: rates have not been calculated where there are fewer than 6 cases

The age distribution of cases with active PTB is shown in Table 3-2. Most of the PTB cases (n=39; 36.4%) were in the age group 50-59 years, followed by those in the 60-69 year age group (n=19; 17.8%).

TABLE 3-2 NUMBER OF CASES AND PREVALENCE OF ACTIVE PTB BY AGE AND POPULATION GROUP (2018)

Age group (years)	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	%	N	Rate
20-29	1	-	0	-	0	-	0	-	1	-
30-39	8	123	0	-	0	-	0	-	8	119
40-49	18	196	0	-	0	-	0	-	18	184
50-59	28	200	11	149	0	-	0	-	39	182
60-69	11	141	7	82	1	-	0	-	19	114
70-79	8	170	8	80	0	-	0	-	16	107
80+	1	-	4	-	0	-	0	-	5	-
Unknown	0	-	0	-	0	-	1	-	1	-
Total	75	168	30	93	1		1		107	138

Note: rates have not been calculated where there are fewer than 6 cases

SECTION 4 – SILICOSIS

Silicotic nodules were found in the lungs of 167 cases (21.5% of all autopsies), 83.2% of which came from the gold mining industry. Of all cases with silicosis, occasional silicotic nodules were found in 91 (54.5%), a few in 33 (19.8%), a moderate number in 38 (22.7%) and a large number in 5 (3.0%) cases.

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 (2018)

Commodity	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
Gold	67	328	71	296	1	-	139	312
Platinum	9	76	4	-	0	-	13	91
Coal	0	-	5	-	0	-	5	-
Asbestos	5	-	0	-	0	-	5	-
Copper	0	-	1	-	0	-	1	-
Unknown	0	-	1	-	0	-	1	-
Other	2	-	1	-	0	-	3	-
Total	83	186	83	259	1		167	215

Note: rates have not been calculated where there are fewer than 6 cases

The rate of silicosis in black gold miners is presented in Fig 4-1. Silicosis rates in black gold miners increased over the years from 39/1000 in 1975 and peaked at 416/1000 in 2016. Since then the rate decreased to 370/1000 in 2017 and 328/1000 in 2018. The rate in white gold miners however has increased from 233/1000 in 2017 to 296/1000 in 2018.

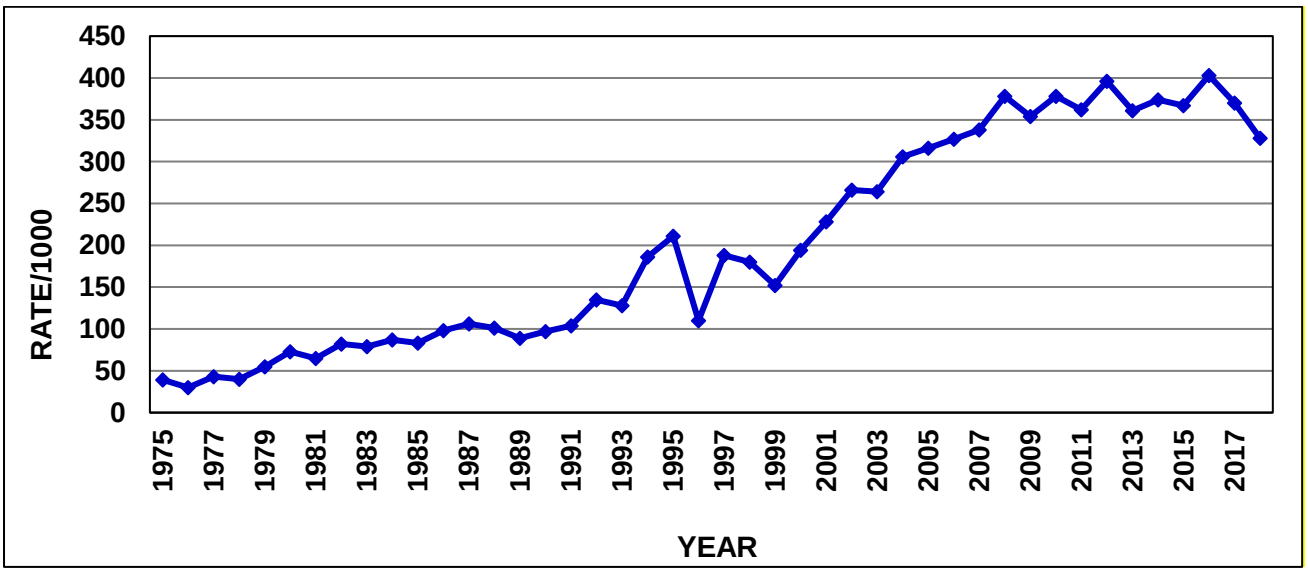


FIG 4-1 SILICOSIS IN BLACK GOLD MINERS AT AUTOPSY (1975-2018)

Silicosis in gold miners is shown in the following tables, 4-2 and 4-3. The rate of silicosis in gold miners in 2018 (312/1000) is higher than that of 2017 (294/1000). The age distribution of silicosis differed between the black and white men (Table 4-2). In black men, silicosis was diagnosed in one man aged in the 30-39 year age category (Table 4-2).

TABLE 4-2 NUMBER OF CASES AND PREVALENCE OF SILICOSIS IN THE GOLD MINING INDUSTRY, BY AGE AND POPULATION GROUP (2018)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
30-39	1	-	0		0	-	1	-
40-49	7	123	1		0	-	8	129
50-59	41	532	11	200	0	-	52	394
60-69	14	700	13	203	0	-	27	321
70-79	4	-	31	431	0	-	35	449
80+	0	-	15	349	1	-	16	364
Total	67	328	71	296	1		139	312

Note: rates have not been calculated where there are fewer than 6 cases

TABLE 4-3 NUMBER OF CASES AND PREVALENCE OF SILICOSIS IN THE GOLD MINING INDUSTRY BY YEARS OF SERVICE AND POPULATION GROUP (2018)

Years of service	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
<1	1	-	0	-	0	-	1	-
1-5	1	-	0	-	0	-	1	-
6-10	5	-	5	-	0	-	10	172
11-15	8	170	2	-	0	-	10	143
16-20	8	348	12	343	1	-	21	356
21-25	12	571	8	276	0	-	20	400
26-30	17	607	18	383	0	-	35	467
31-35	12	632	18	450	0	-	30	508
36-40	3	-	8	381	0	-	11	440
41+	0	-	0	-	0	-	0	-
Unknown	0	-	1	-	0	-	1	-
Total	67	328	71	296	1	-	139	312

Note: rates have not been calculated where there are fewer than 6 cases

SECTION 5 – OTHER PNEUMOCONIOSES

MASSIVE FIBROSIS

There were 15 (1.9%) cases of massive fibrosis: nine in black and six in white miners. Thirteen were from the gold mining industry and two from the platinum industry.

COAL WORKERS' PNEUMOCONIOSIS

There were no cases of coal workers' pneumoconiosis in cases examined in 2018.

MIXED DUST PNEUMOCONIOSIS

There was one case of mixed dust pneumoconiosis, which was from the gold mining industry.

ASBESTOSIS AND PLEURAL PLAQUES

There were 55 cases of asbestosis. Of these, 38.2% (n=21) had slight, 27.3% (n=15) had moderate and 34.5% (n=19) had marked fibrosis. Forty-nine (89.1%) had worked in the asbestos mining industry at some time in their lives.

There were 23 cases with asbestos plaques and of these 10 had asbestosis. However, 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 (2018)

Age group (years)	Black		White		Coloured		Total	
	N	Rate	N	Rate	N	Rate	N	Rate
50-59	3	-	0	-	0	-	3	-
60-69	18	231	1	-	0	-	19	114
70-79	23	489	2	-	1	-	26	174
80+	4	-	2	-	0	-	6	88
Unknown	1	-	0	-	0	-	1	-
Total	49	110	5	-	1	-	55	71

Note: rates have not been calculated where there are fewer than 6 cases

SECTION 6 – EMPHYSEMA

There were 228 cases of emphysema, the extent of which was mild in 76.3% (n=174), moderate in 20.6% (n=47) and marked in 3.1% (n=7) cases. The overall rate of emphysema decreased from 311/1000 in 2017 to 294/1000 in 2018. 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 (2018)

Age group (years)	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
30-39	3	-	0	-	0	-	0	-	3	-
40-49	8	87	1		0	-	0	-	9	74
50-59	26	186	22	297	0	-	0	-	48	211
60-69	24	308	33	388	2	-	0	-	59	347
70-79	23	489	58	580	0	-	0	-	81	653
80+	3	-	24	444	0	-	0	-	27	360
Unknown	0	-	0	-	0	-	1	-	1	-
Total	87	195	138	430	2		1		228	294

Note: rates have not been calculated where there are fewer than 6 cases

Most of the men with emphysema were from the gold mining industry (n=147, 59.0%) (Table 6-2).

TABLE 6-2 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY COMMODITY AND POPULATION GROUP (2018)

Commodity	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Gold	38	186	99	413	0	-	0	-	137	308
Platinum	12	101	9	375	0	-	0	-	21	147
Coal	3	-	11	440	0	-	0	-	14	412
Asbestos	21	250	1	-	0	-	0	-	22	244
Iscor	0	-	2	-	0	-	0	-	2	-
Copper	0	-	1	-	1	-	0	-	2	-
Manganese	2	-	3	-	1	-	0	-	6	400
Industry	1	-	2	-	0	-	0	-	3	-
Other	10	714	8	800	0	-	0	-	18	750
Unknown	0	-	2	-	0	-	1	-	3	-
Total	87	195	138	430	2		1		228	294

Note: rates have not been calculated where there are fewer than 6 cases

TABLE 6-3 NUMBER OF CASES AND PREVALENCE OF EMPHYSEMA BY YEARS OF SERVICE AND POPULATION GROUP (2018)

Years of service	Black		White		Coloured		Unknown		Total	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
<1	6	214	0	-	0	-	0	-	6	214
1-5	12	169	6	261	0	-	0	-	18	188
6-10	11	128	15	405	1	-	0	-	27	216
11-15	18	207	17	531	1	-	0	-	36	300
16-20	10	185	19	442	0	-	0	-	29	296
21-25	11	262	13	342	0	-	0	-	24	300
26-30	8	205	30	476	0	-	0	-	38	373
31-35	6	214	23	500	0	-	0	-	29	392
36-40	2	-	7	318	0	-	0	-	9	321
41+	1	-	1	-	0	-	0	-	2	667
Unknown	2	-	7	467	0	-	1	-	10	526
Total	87	195	138	430	2		1		228	294

Note: rates have not been calculated where there are fewer than 6 cases

SECTION 7 – MESOTHELIOMA

There were 37 cases of mesothelioma in 2018.

TABLE 7-1 NUMBER AND PERCENTAGE OF MESOTHELIOMA CASES BY AGE AND POPULATION GROUP (2018)

Age group (years)	Black		White		Total	
	N	%	N	%	N	%
50-59	10	33.3	3	42.9	13	35.1
60-69	16	53.3	0	0.0	16	43.2
70-79	3	10.0	3	42.9	6	16.2
80+	1	3.3	1	14.3	2	5.4
Total	30		7		37	

The distribution of mesothelioma by commodity and population group is presented in Table 7-2. Twenty-four (64.9%) of the cases had worked in asbestos mines at some stage in their careers. Twenty of the cases had the longest service in asbestos (most exposure) and four had mixed exposures that included asbestos.

TABLE 7-2 NUMBER AND PERCENTAGE OF MESOTHELIOMA CASES BY COMMODITY AND POPULATION GROUP (2018)

Commodity	Black		White		Total	
	N	%	N	%	N	%
Asbestos	19	63.3	1	14.3	20	54.1
Gold	3	10.0	3	42.9	6	16.2
Platinum	4	13.3	0	0.0	4	10.8
Iscor	0	0.0	1	14.3	1	2.7
Manganese	1	3.3	0	0.0	1	2.7
Other	3	10.0	2	28.6	5	13.5
Total	30		7		37	

SECTION 8 – PRIMARY LUNG CANCER

Forty-five cases of primary lung cancer were found at autopsy, 48.9% (n=22) of which were in black miners and 51.1% (n=23) were white miners. Most of the cases were adenocarcinoma (n=22; 48.9%), followed by those with squamous cell carcinoma (n=12, 26.7%), small cell carcinoma (n=8; 17.8%) and large cell carcinoma (n=3; 6.7%).

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

TABLE 8-1 NUMBER AND PROPORTIONOF PRIMARY LUNG CANCER CASES BY AGE AND POPULATION GROUP (2018)

Age group (years)	Black		White		Total	
	N	Rate	N	Rate	N	Rate
40-49	1	-	0	-	1	-
50-59	8	57	5	-	13	61
60-69	9	115	5	-	14	84
70-79	4	-	10	100	14	94
80+	0	-	3	-	3	-
Total	22	49	23	72	45	58

Note: rates have not been calculated where there are fewer than 6 cases

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 AND PROPORTION OF PRIMARY LUNG CANCER CASES BY COMMODITY AND POPULATION GROUP (2018)

Commodity	Black		White		Total	
	N	Rate	N	Rate	N	Rate
Gold	5	-	18	75	23	52
Platinum	8	67	1	-	9	63
Coal	0	-	1	-	1	-
Asbestos	7	83	1	-	8	89
Iscor	0	-	1	-	1	-
Manganese	1	-	0	-	1	-
Other	1	-	1	-	2	-
Total	22	49	23	72	45	58

Note: rates have not been calculated where there are fewer than 6 cases

SECTION 9 – CLINICAL CAUSES OF DEATH

Table 9-1 and Figure 9-1 show the clinical cause of death as stated in the accompanying documents submitted with the cardio-respiratory organs, by population group. Diseases of the respiratory system were the most frequent (14.6%). The proportion of unnatural deaths (8.1%) was similar to that in 2017 (8.0%). The clinical cause of death was not stated for 20.4% of the cases.

TABLE 9-1 CLINICAL CAUSE OF DEATH BY POPULATION GROUP (2018)

System	Black		White		Coloured		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%
Respiratory	51	11.4	60	18.7	2	33.3	0	-	113	14.6
Cardio-vascular	12	2.7	31	9.7	0	-	0	-	43	5.5
Central Nervous System	9	2.0	8	2.5	0	-	0	-	17	2.2
Gastro-intestinal	9	2.0	5	1.6	0	-	0	-	14	1.8
Genito-urinary	2	0.4	1	0.3	0	-	0	-	3	0.4
Haematological*	3	0.7	3	0.9	0	-	0	-	6	0.8
Unnatural	51	11.4	12	3.7	0	-	0	-	63	8.1
Miscellaneous	238	53.4	116	36.1	4	66.7	0	-	358	46.2
Not stated	71	15.9	85	26.5	0	-	2	100.0	158	20.4
Total	446		321		6		2		775	

*Data for the metabolic system included in the haematological system

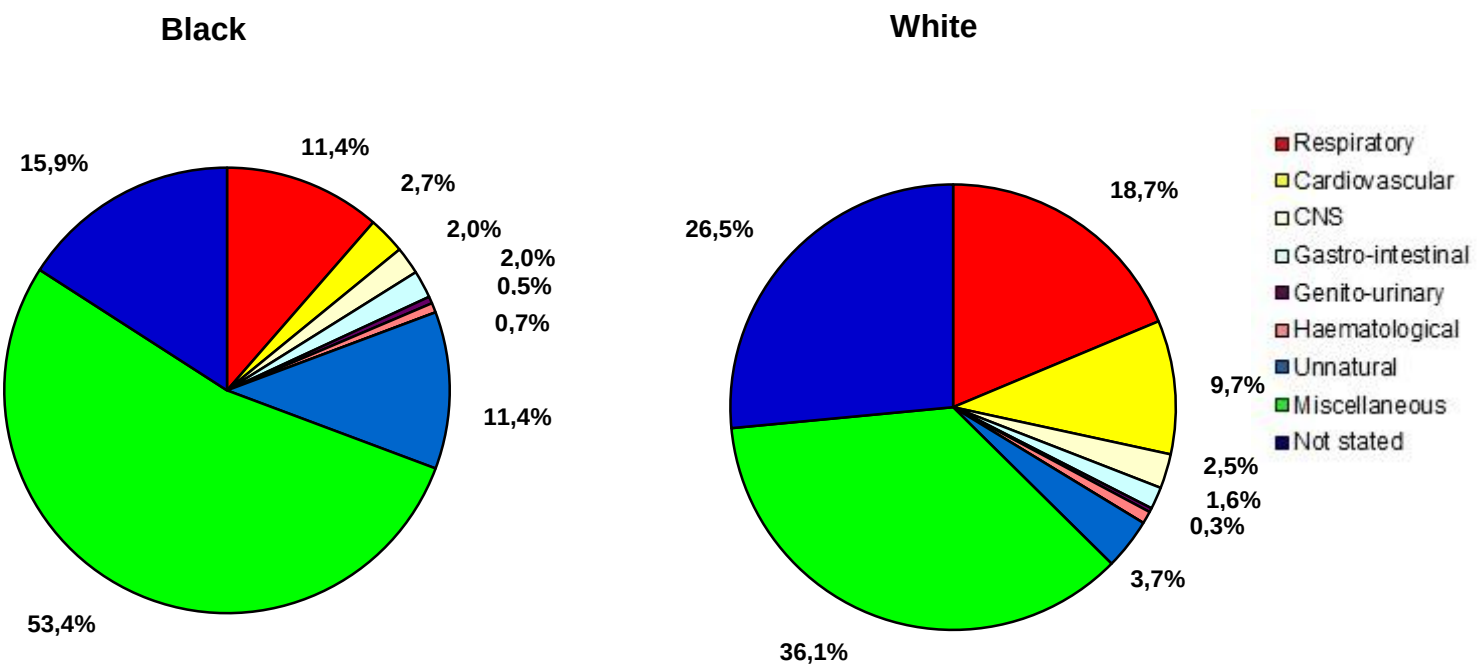


FIG 9-1 CLINICAL CAUSES OF DEATH (2018)

SECTION 10 – AUTOPSY FINDINGS IN WOMEN

Of the 775 cases examined in 2018, 40 (5.2%) were women compared to 42 (5.2%) in 2017, 38 (4.5%) in 2016 and 25 (2.8%) in 2015. There were 38 (95.0%) black, one white (2.5%) and one coloured (2.5%) women. On average, the women were younger than the men (54.9 years and 60.3 years, respectively).

TABLE 10-1 NUMBER AND PROPORTION OF AUTOPSIES IN WOMEN BY AGE AND POPULATION GROUP (2018)

Age group (years)	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
20-29	1	2.6	0	-	1	-	1	2.5
30-39	12	31.6	0	-	0	-	12	30.0
40-49	6	15.8	0	-	0	-	6	15.0
50-59	3	7.9	0	-	0	-	3	7.5
60-69	6	15.8	0	-	1	100	7	17.5
70-79	6	15.8	1	100	0	-	7	17.5
80+	4	10.5	0	-	0	-	4	10.0
Total	38		1		2		40	

Table 10-2 summarises the distribution of autopsies in women by commodity and population group. Most of the women (n=18, 45%) had been exposed to asbestos on the mines.

TABLE 10-2 NUMBER AND PROPORTION OF AUTOPSIES IN WOMEN BY COMMODITY AND POPULATION GROUP (2018)

Commodity	Black		White		Coloured		Total	
	N	%	N	%	N	%	N	%
Gold	15	39.5	0	-	0	-	15	37.5
Platinum	4	10.5	0	-	0	-	4	10.0
Coal	1	2.6	0	-	0	-	1	2.5
Asbestos	17	44.7	0	-	1	100	18	45.0
Manganese	1	2.6	0	-	0	-	1	2.5
Other	0	-	1	100	0	-	1	2.5
Total	38		1		1		40	

Ten women had asbestos-related diseases: five had asbestosis and five had mesothelioma (Table 10-3).

TABLE 10-3 NUMBER AND PROPORTION OF DISEASES IN WOMEN (2018)

Disease	N	%
PTB	5	12.5
Silicosis	1	2.5
Emphysema	2	5.0
Asbestosis	5	12.5
Mesothelioma	5	12.5
Primary lung cancer	1	2.5
No lung disease	25	62.5

APPENDIX 1: DISTRIBUTION OF AUTOPSIES ACCORDING TO THE LAST MINE WHERE THE DECEASED WORKED (2018)

Commodity	Last mine worked	Black	White	Coloured	Unknown	Total
Asbestos	Asbestos Mine	3		1		4
	Cape Blue	8				8
	Gefco	54		1		55
	Koegas			1		1
	Penge Asbestos	2	1			3
	Pomfret Asb Mine	7				7
	Wandrag Asbestos Mine	2				2
Total from asbestos		**76**	**1**	**3**	**0**	**80**
Cementation	Cementation		3			3
Total from cementation		**0**	**3**	**0**	**0**	**3**
Chrome	Dilokong chrome mine		1			1
	Samancor Western Chrome		1			1
	Western Chrome		1			1
Total from chrome		**0**	**3**	**0**	**0**	**3**
Coal	Arnot Colliery		1			1
	Bosjesspruit Colliery		1			1
	Coal Mine		4			4
	Douglas Colliery		2			2
	Kroonfontein Coal		1			1
	Landau Colliery		1			1
	Longridge collieries		1			1
	Matla Coal	6				6
	Natal Anthracite coll		1			1
	New Denmark		1			1
	Optimum Colliery		1			1
	Samrec Annesley Mine		1			1
	Sasol Coal Mine	2	2			4
	Savemore Colliery		1			1
	Sigma Colliery		1			1
	Spingfield Colliery		2			2
	Transvaal Navigation Colliery		1			1
	Waterpan GM		1			1

Commodity	Last mine worked	Black	White	Coloured	Unknown	Total
Coal (contd)	Welgedacht		1			1
	Witbank Collieries		2			2
Total from coal		**8**	**26**	**0**	**0**	**34**
Copper	Copper Mine		2			2
	O`Kiep Copper		1	1		2
	Prieska	1				1
	Tsumeb Copper Mine		1			1
Total from copper		**1**	**4**	**1**	**0**	**6**
Diamond	Boart Drilling Diamond		1			1
	Cullinan Diamond mine		2			2
	Diamond Mine		2			2
	Finch Diamond Mine	1				1
Total from diamond		**1**	**5**	**0**	**0**	**6**
Gold	Angilon GM	1				1
	Anglo American GM		1			1
	Anglo Gold Ashanti	33	13			46
	Barberton GM	1				1
	Beatrix Gold	51	4			55
	Blyvoorquizicht		10			10
	Bracken Mines		1			1
	Buffelsfontein Gold		10			10
	Crown Mines		1			1
	Daggasfontein		1			1
	Doornfontein		2			2
	Driefontein Cons GM	24	9			33
	Durban Roodepoort Deep		3			3
	East Driefontein		4			4
	Eastern Transvaal Consolidated		1			1
	East Rand Gold and Uranium		1			1
	East Rand Prop		6			6
	Evander GM	4	2			6
	Freddies Gold	0	1			1
	Free State Geduld	2	3			5
	Gencor	11				11
	Goldfields	0	4			4

Commodity	Last mine worked	Black	White	Coloured	Unknown	Total
Gold (contd)	Gold mine		3			3
	Grootvlei prop		4			4
	Harmony	35	26			61
	Hartebeesfontein	1	4			5
	J.I.C. Gold Mine	2	1			3
	Joel	5	0			5
	Kloof	6	12			18
	Leeudorn		2			2
	Leslie		1			1
	Loraine		1			1
	Luipaardsvlei Estate GM		1			1
	Masimong	3				3
	Pamodzi	1	1			2
	President Brand		2			2
	President Steyn	2	5			7
	Primrose GM		1			1
	Randfontein		8			8
	Rand Uranium Gold Mine		2			2
	Saaiplaas GM		1			1
	SA Land		1			1
	Simmer and Jack GM	6				6
	South Deep GM		3			3
	State GM		1			1
	St Helena		1			1
	Stilfontein		3	1		4
	Tautona GM	1	1			2
	Tshepone GM	5	3			8
	Vaal Reefs	3	25			28
	Ventersport		3			3
	Vlakfontein		1			1
	Welkom GM		1			1
	West Driefontein	1	8			9
	West Rand Consolidation	1	1			2
	West Witwatersrand	1				1
	Western Areas	2	3			5
	Western Deep Levels	1	9			10
	Western Holdings	1				

Commodity	Last mine worked	Black	White	Coloured	Unknown	Total
Total from gold		**204**	**216**	**1**	**0**	421
Iron	Beeshoek	1		**1**		2
	Iron Ore Mine	2				2
	Sishen Iron Mine	6				6
Lead and minerals	Blackmountain	1				1
Lime	Lime Acres	1				1
Manganese	Associated Manganese	4	2			6
	Hotazel Manganese Mine	1	2			3
	Manganese mine	1				1
	S A Manganese	1				1
Total from iron, lime and manganese		**18**	**4**	**1**	**0**	**23**
Platinum	Amadelbult Platinum (Rustenburg)	1	1			2
	Anglo American Platinum	1				1
	Atok Platinum		1			1
	Bafokeng	2				2
	Eastern Platinum	26				26
	Impala Platinum	49	12			61
	Karee Platinum	27				27
	Kroondal Mine	1	1			2
	Lonmin Platinum	3	5			8
	Northam Platinum	1	1			2
	Rustenburg Platinum	5	2			7
	San Labour Hire		1			1
	Townlands Plat Mine		1			1
	Unknown Platinum	1	3			4
	Union Platinum		1			1
	Western Platinum	14	5			19
	Wildebeesfontein	1				1
Total from platinum		**132**	**34**	**0**	**0**	**166**
Shaft sinkers	Shaft sinkers	1	3			4
Silicon	Delmas silica		1			1
	Silicon smelters	2				2
Steel	Highveld Steel and Vanadium		2			2
Steel & Iron	Iscor		4			4

Commodity	Last mine worked	Black	White	Coloured	Unknown	Total
Uranium	Shiva Uranium Mine		1			1
Vanadium	Highveld Steel and Vanadium		2			2
Total for shaft sinkers, silicon, steel, steel&iron, uranium & vanadium		**3**	**13**	**0**	**0**	**16**
Non-miner	Environmental	2				2
	Chamber of Mines		1			1
	Industry		4			4
	Transnet		1			1
Total for non-miners		**2**	**6**	**0**	**0**	**8**
Unknown		1	7		2	10
TOTAL		**446**	**321**	**6**	**2**	**775**

APPENDIX 2: PUBLICATIONS AND ACTIVITIES EMANATING FROM PATHAUT DATA OR AUTOPSY SERVICE (2018)

Journal articles

Ehrlich R, Murray J, Rees D. Subradiological silicosis. American Journal of Industrial Medicine 2018; 6: 877-885

Kgokong N. Vorster T. Vorajee N. Lakhoo, D. Murray J. Ndlovu N. Phillips JI. Autopsy findings in miners – a cause for concern, Occupational Health Southern Africa 2018; 24: 20-21

Mabila SL, Almberg KS, Friedman L, Cohen R, Ndlovu N, Vorajee N, Murray J. Occupational Emphysema in South African Miners at Autopsy; 1975-2014. International Archives of Occupational and Environmental Health 2018; 9: 981–990

Ndlovu N, Musenge E, Park SK, Gilder-Brown B, Richards G, Murray J. Four decades of pulmonary tuberculosis in deceased South African miners: trends and determinants. Occupational and Environmental Medicine 2018; 75:767–775

Reports

Kgokong N, Vorajee N, Lakhoo D, Linden J, Fassom D, Murray J, Ndlovu N. Pathology Division Surveillance Report: Demographic data and disease rates for January to December 2017. NIOH Report 1/2018, ISSN 1812-7681. National Institute for Occupational Health, National Health Laboratory Services, South Africa. https://www.nioh.ac.za/pathology-disease-surveillance-reports/

Congresses

Kgokong N, Vorster T, Benya A, Vorajee N, Kisting S, Phillips JI. Women in South African Mines. PHASA Conference, 10-12 September 2018, Parys, South Africa

Mthombeni J , Ndlovu N , Nieuwoudt S, Murray J. Factors influencing consent for autopsies for compensation purposes amongst south african miners. ICOH Conference, 30 April – 4 May 2018, Dublin.

Ndlovu N, Phillips JI, Kgokong N, Vorster T, Murray J.Occupational lung diseases in deceased south african women in mining. ICOH Conference, 30 April – 4 May 2018, Dublin.

Murray J, Ndlovu N, Richards GA. Evaluation of autopsy data for occupational lung disease surveillance in South African miners. European Respiratory Society International Congress, 15 –19 September 2018. Paris.

Degrees

Ndlovu Ntombizodwa, PhD (ongoing), School of Public Health, University of the Witwatersrand. Evaluation of autopsy data for occupational lung disease surveillance.

Outreach Programme Activities

ACTIVITY	DATE	VENUE	PERSON
A safety seminar for prosectors and forensic pathology officers was hosted at the NIOH. One hundred and eight (108) persons from the prosectors and Forensic Officers profession attended the seminar	28 February 2018	NIOH Tony Davies Lecture theatre	Mr. D. Afrika
A panel discussion of the Mine Health and Safety Council was hosted in March. The purpose of the seminar was to prevent occupational diseases by promoting a health culture in the South African Mining Industry.			Dr N Vorajee
A safety seminar for prosectors and forensic pathology officers was conducted	13 March 2018	Mpumalanga Forensic Pathology Services	Mr D Afrika
A safety seminar for prosectors and forensic pathology officers was conducted	16 March 2018	Limpopo Forensic Pathology Services	Mr D Afrika
A safety seminar for prosectors and forensic pathology officers was conducted	22 March 2018	Potchefstroom Hospital	Mr D Afrika
The NIOH conducted a training workshop to the NEPAD OEHS delegates from Malawi. The purpose of the workshop was to gain insight into occupational health and relevant services including the various aspects of health and safety in the workplace.	5 May 2018	NIOH	Prof JI Phillips Ms. JN Buthelezi
The Pathology Division hosted a group of OCSA students to highlight the OEHS services provided by the NIOH	18 May 2018	NIOH Pathology Division	Prof JI Phillips Ms. T Vorster
The Pathology Division was requested to give a presentation to the nurses from One Stop Sub-bureau. The presentation covered the procedures on transporting and requesting of red boxes, which are used by the pathologists for the removal of the cardio respiratory organs	24 May 2018	Sunnyside Park Hotel Parktown	Ms. JN Buthelezi
The NIOH hosted delegates from the Mozambican Department of Labour. The purpose of the visit was to gain insight into the occupational health services and to understand the post-mortem processes	7 June 2018	NIOH	Dr N Vorajee

ACTIVITY	DATE	VENUE	PERSON
The NIOH hosted a group of Wits doctors studying towards their postgraduate diploma in Occupational Health. The purpose of the visit was to gain insight of what the NIOH does and to understand the post-mortem processes.	18 June 2018	NIOH	Dr N Vorajee
The Pathology division hosted an information session on the 12th of July 2018, with a delegation from the Village Main Reef.	12 July 2018	NIOH	Dr N Vorajee Mr D Afrika
The Pathology Division presented at the Mine Health and Safety Council tripartite meeting. The presentation focussed on the impact of Silicosis and Tuberculosis on miners, prevention and the compensation process.	24 July 2018	Klerksdorp Casino	Mr D Afrika
The Pathology Division held prosector training for removal of cardiorespiratory organs with special attention to removal of tumour-laden organs that get stuck to the rib cage, and safety in the mortuary.	30-31 July 2018	Kuruman	Mr D Afrika Mr G Rani
The lab manager attended Professional Board for Medical Technology: Prosectors Task Team, as a member.	18 July 2018	Emperors Palace	Mr D Afrika
The Pathology Division attended a meeting with the Medical Bureau of Occupational Diseases (MBOD). The purpose of the meeting was to discuss issues about the Mineworkers Compensation system.			Dr N Vorajee Ms J Buthelezi
The Pathology Division attended a the NUM training workshop and gave a presentation on post-mortem services for deceased workers entitled “occupational lung diseases, compensation and social protection	2 August 2018	Midrand	Dr N Vorajee
The NIOH hosted a Women’s Month edition of their monthly Research Forum. The August Forum entitled “Women in Mining” emphasised the challenges faced by women who mine.	15 August 2018	NIOH Tony Davies Lecture theatre	Ms N Kgokong
The NIOH hosted delegates from the Office of the Premier in the Northern Cape.	23 August 2018	NIOH B5B boardroom	Prof JI Phillips
Mr D Afrika gave two presentations to two groups at Harmony Gold Mines refining plants, in Orkney	21 August 2018	North West Orkney	Mr D Afrika

ACTIVITY	DATE	VENUE	PERSON
The Pathology Division held prosector training for removal of cardiorespiratory organs	27 August 2018	Doves funeral parlour Pretoria	Mr D Afrika Mr G Rani
The Pathology and Occupational Health sections hosted NUM representatives from the Free State branch office	31 August		Mr D Afrika
The Pathology Division presented at a tripartite meeting. The delegates were a varied group comprised of union representatives, mining engineers, mining bosses and occupational doctors and nurses.	6 September 2018	Welkom Oppenheimer Golf Club	Mr D Afrika
The NIOH received a group of students from the University of Limpopo	17-18 September 2018	NIOH Pathology Division	Dr N Vorajee
The Pathology Division to the Mine Health and Safety Council (MHSC) at the Merafong Regional Tripartite Forum on silicosis and tuberculosis and the autopsy process and compensation	20 September	Kloof Country club Glenharvie	Mr D Afrika
The HOD attended the Black Lung Congress. The purpose of this congress was to provide a review on the prevalence, severity, and spectrum of coal mine dust lung disease (CMDLD), current treatment modalities, and update on compensation programmes for patients	26-28 September 2018	Chicago, USA	Dr N Vorajee
The Pathology Division presented at the North-West Regional Tripartite Forum on silicosis, tuberculosis, the autopsy and compensation processes	27 September 2018	Rustenburg Golf Club	Mr D Afrika
The NIOH had an exhibition at the Mine Health and Safety Council Summit.	18-19 October	Lake Hotel Benoni	Mr D Afrika Ms JN Buthelezi
The NIOH hosted a group of students from the Tshwane University of Technology who were studying towards a Bachelor Degree in Environmental Health.	23 October 2018	NIOH Tony Davies Lecture theatre	Prof JI Phillips
The NIOH conducted a workshop for the COSATU Alliance. The workshop was on “Prevention of Occupational Diseases”.	31Oct- 1Nov 2018	NIOH Tony Davies Lecture theatre	Dr N Vorajee
The Pathology Division presented to shop stewards and safety personnel on silicosis, tuberculosis, the autopsy and compensation processes	31 October 2018	Driefontein	Mr D Afrika

ACTIVITY	DATE	VENUE	PERSON
The Pathology Division received an invitation from Dr Khanyile Baloyi, who is the Deputy Head of the Health Department of the Minerals Council South Africa, to give a presentation on post mortem process	2 November 2018	Minerals Council Johannesburg CBD	Dr N Vorajee
A representative from NIOH Pathology Division presented at the AMCU Health and Safety Representatives Presentation meeting	8 November 2018	MBOD Braamfontein	Ms J Buthelezi
Various NIOH departments including the Pathology Division hosted Professor Mlisana, who is an AARQA Executive on the 14th November 2018.	14 November 2018	NIOH	Dr N Vorajee Pathology staff
A representative from the Pathology Division attended the Limpopo tripartite forum meeting as per their request that a presentation on the autopsy process and its importance, TB and silicosis	20 November 2018	Bolivia Lodge Limpopo	Mr D Afrika
A representative from the Pathology Division was Invited to present on silicosis, and TB and also to explain the autopsy compensation process to the Western Cape regional tripartite meeting	27-28 November 2018	Litsatsi Lodge Vanrynsdorp Western Cape	Mr D Afrika