



# OCCUPATION AND MORTALITY

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## Tuberculosis-related mortality in South Africa, 2013-2015

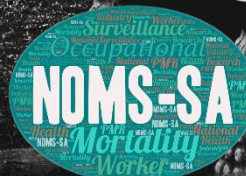
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**NATIONAL INSTITUTE FOR  
OCCUPATIONAL HEALTH**

Division of the National Health Laboratory Service



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## 1. Main points

- There were 114,706 reported deaths due to tuberculosis from 2013-2015.
- Main industries with significantly elevated PMRs for tuberculosis-related deaths are agriculture, mining, construction and retail.
- Major occupation groups with significantly elevated PMRs for tuberculosis-related deaths are skilled agriculture and fishery workers and elementary workers.
- Lower skilled (lower socio-economic) workers are particularly vulnerable and need special consideration.

## 2. Introduction

The National Occupational Mortality Surveillance South Africa (NOMS-SA) is a nation-wide, evidence-based surveillance system that measures primary and common risks associated with specific occupations and industries using mortality data from Statistics South Africa. NOMS-SA describes the relationship between work and wellbeing to inform policy development to improve worker safety and health. It can provide information for workplaces and educational activities. Surveillance of occupational mortality can enable research and prevention strategies.

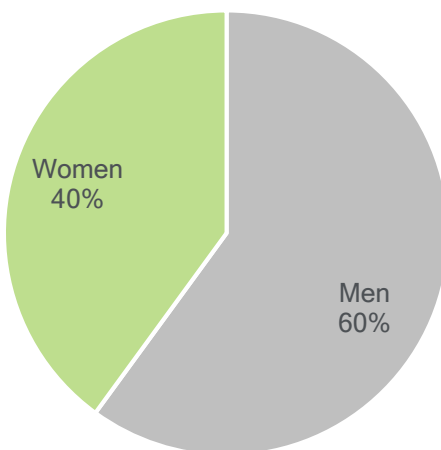
This report presents the analysis of deaths involving tuberculosis in different occupation groups and industries among those aged 15 to 65 years in South Africa. This analysis includes deaths that were registered from 2013 to 2015 by Statistics South Africa.

Occupation was defined using the South African Standard Classification of Occupations (SASCO). There are nine major occupation groups, which then divide into 42 sub-major groups. For further information on the breakdown of occupation groups, see Appendix A.

We calculated proportional mortality ratios for the population at risk of dying from tuberculosis. The results of the analysis do not prove that the observed risk of death involving tuberculosis is caused by occupational exposure. The findings presented here should be interpreted bearing in mind the warnings in the strengths and limitations section.

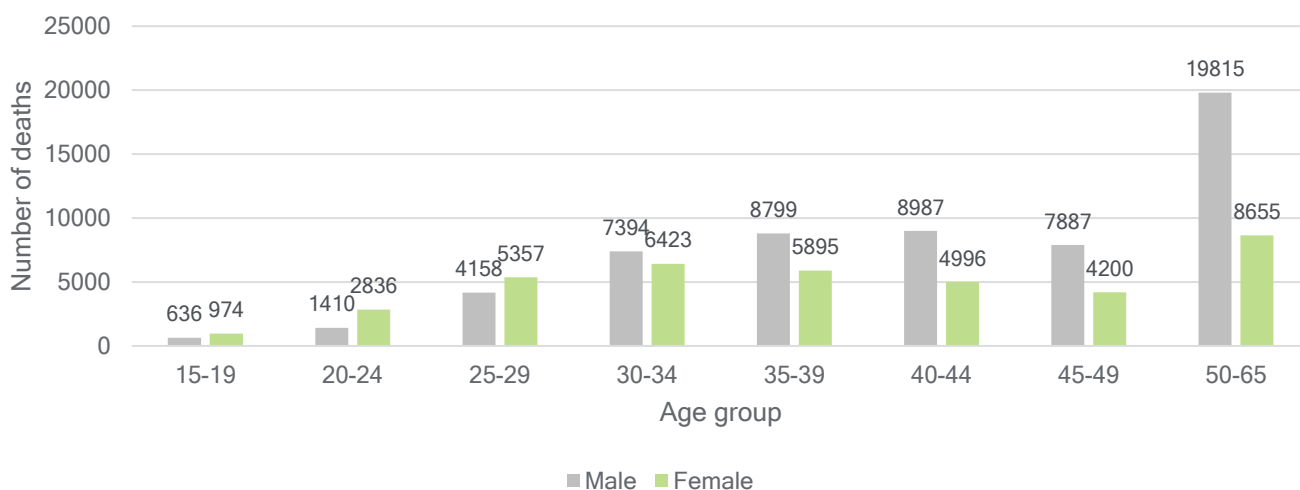
### 3. Tuberculosis-related mortality by sex and age

- There were 114,706 reported deaths due to tuberculosis from 2013-2015.
- Number of reported deaths due to tuberculosis by sex:
  - Men (68,538), Women (45,690), Unknown (7) and Unspecified (471).



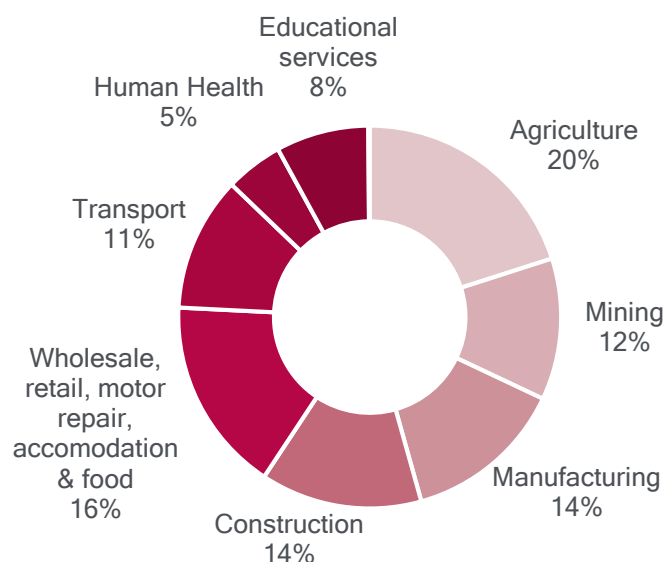
**Figure 1.** Percentage of deaths due to tuberculosis by sex.

- Mean age of death due to tuberculosis: men (50.1 years), women (43.9 years).

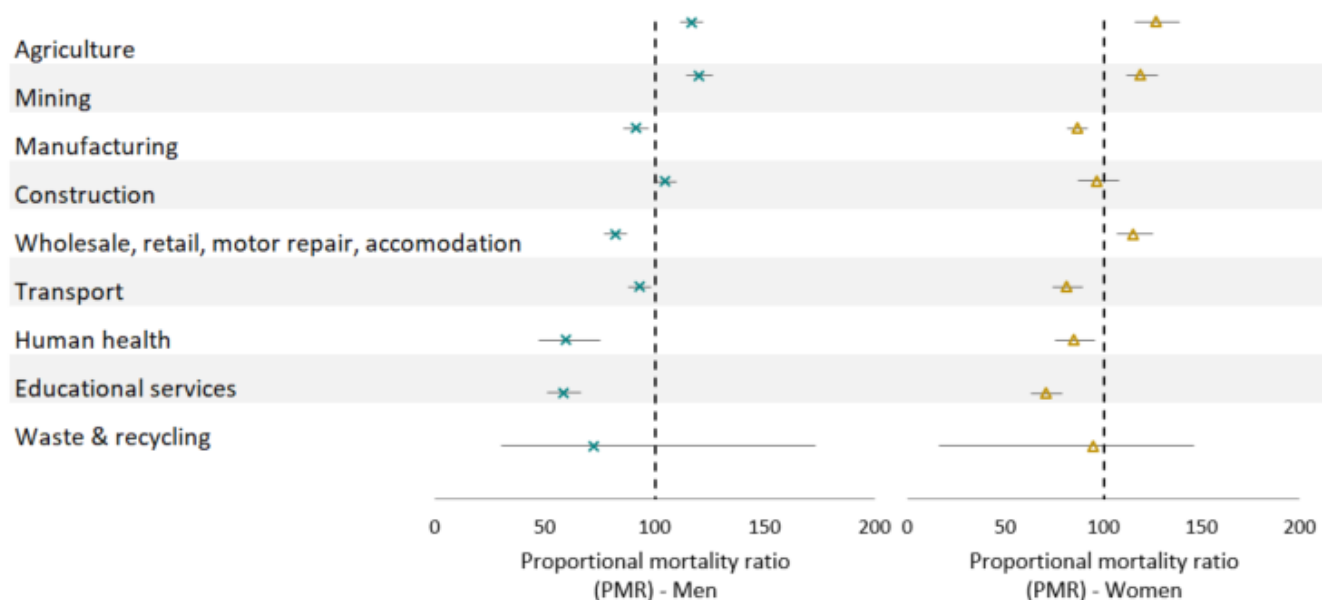


**Figure 2.** Tuberculosis-related mortality by sex and age

## 4. Tuberculosis-related mortality by sex and main industry



**Figure 3.** Percentage of tuberculosis-related deaths by main industry.

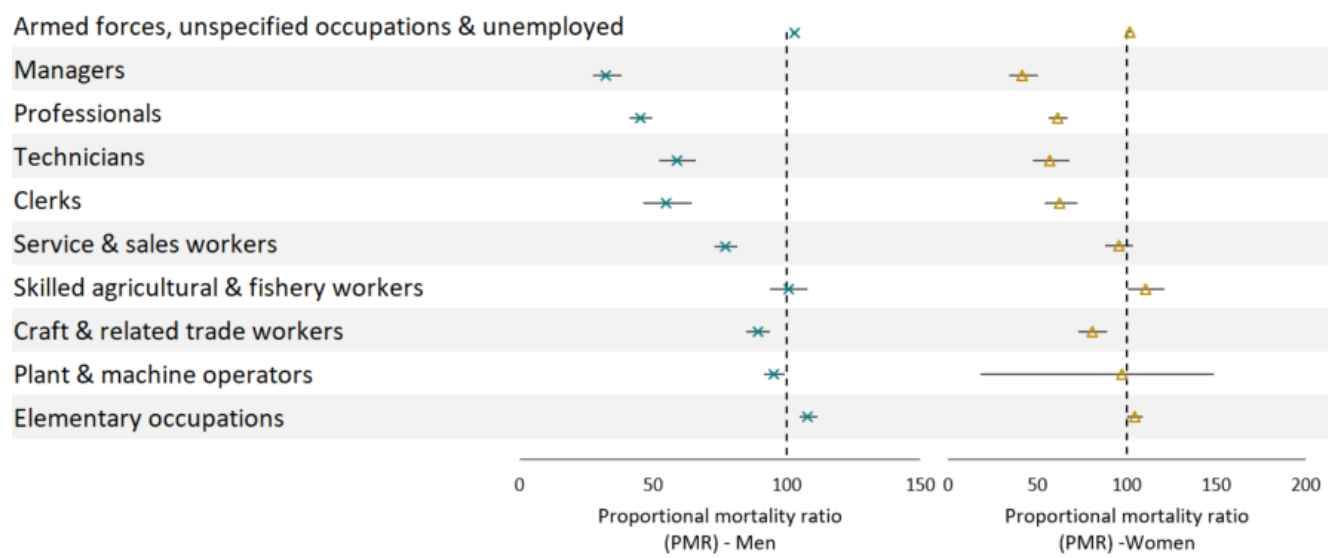


**Figure 3** Tuberculosis-related mortality by sex and main industry. Source: Statistics South Africa (See Appendix. Table 1 and 2)

- Main industries with significantly elevated PMRs for tuberculosis-related deaths are agriculture, and mining in men; and agriculture, mining, and wholesale, retail, motor repair and accommodation in women compared to the general population.



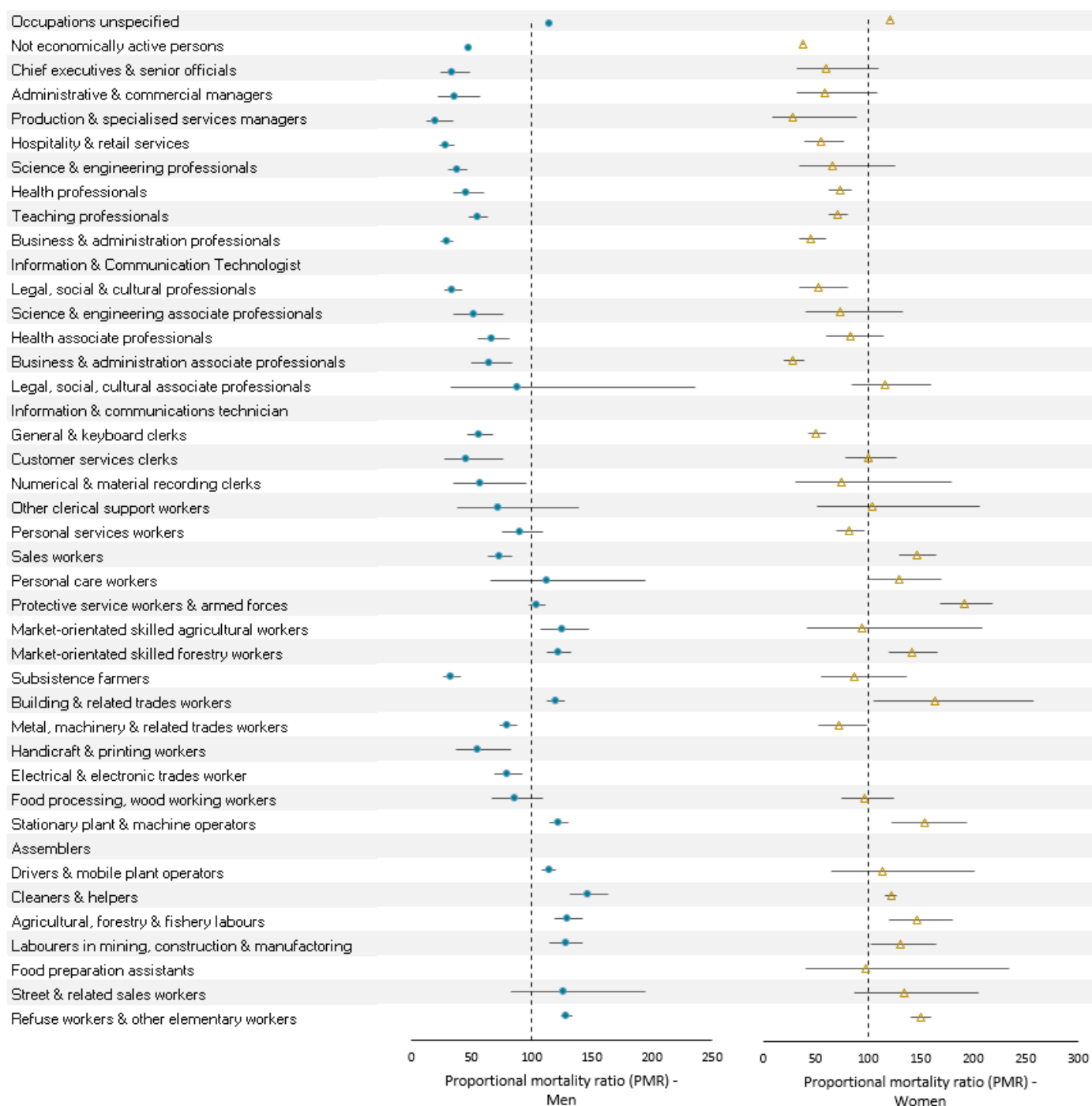
## 5. Tuberculosis-related mortality by sex and major occupation



**Figure 4.** Tuberculosis-related mortality by sex and major occupation. Source: Statistics South Africa. (See Appendix Table 3 and 4)

- Men working as elementary workers had excess mortality due to tuberculosis compared to the general population.
- Women working as skilled agriculture and fishery workers and elementary workers had excess mortality due to tuberculosis compared to the general population.

## 6. Tuberculosis-related mortality by sex and sub-major occupation



**Figure 5.** Tuberculosis-related mortality by sex and sub-major occupation. Source: Statistics South Africa (See Appendix, Tables 5 and 6)

- Men and women with unspecified specified occupations had significantly higher PMRs than the general population.
- Men employed in the following sub-major occupation groups had excess mortality due to tuberculosis compared to the general population:
  - Skilled agriculture and fishery workers: market-orientated skilled agriculture and forestry workers.
  - Plant and machine operators: stationary plant and machine operators and drivers and mobile plant operators.
  - Building and related trade workers
  - Elementary occupations: cleaners and helpers, agricultural, forestry fisheries labourers, labourers in mining, construction and manufacturing and refuse workers and other elementary workers.
- Women employed in the following sub-major occupation groups had excess mortality due to tuberculosis compared to the general population:
  - Service and sales workers: sales workers, protective service workers and armed forces.
  - Skilled agriculture and fishery workers: market-orientated skilled forestry workers.
  - Building and related trade workers
  - Plant and machine operators: stationary plant and machine operators
  - Elementary occupations: cleaners and helpers, agricultural, forestry and fishery labourers, labourers in mining, construction and manufacturing and refuse workers and other elementary workers.



## 7. Measuring the data

- NOMS-SA uses mortality data with occupation information from Statistics South Africa, which is a South African national statistical entity, who is responsible for recording vital events on an annual basis. The data brief includes only the working population (15+).
- Deaths were defined using the International Classification of Diseases, 10<sup>th</sup> Revision (ICD-10). Deaths due to tuberculosis include the following underlying cause of death codes: A15 to A19, B90, J90, J94, U51 and U52.
- The figures are based on proportional mortality ratios (PMRs). A simple and potentially useful way of portraying the burden of a specific disease within a population. PMRs are the ratio of the proportion of observed deaths in a specific occupation over the proportion of observed deaths in the total data. These were calculated to estimate where excess mortality by occupation is found. PMRs also provides a way to compare occupations. Confidence intervals that do not include 100 indicate that a PMR is significant.

$$\frac{(\text{Proportion of deaths from a particular cause in a specific group of workers})}{(\text{Proportion of deaths from that cause in the general population})} \times 100$$

## 8. Strengths and limitations

- PMRs can only be calculated where data on occupation or industry are available; it is not a reflection of length of employment.
- A statistically significantly elevated PMR cannot be interpreted directly as a causal relationship between the occupation and the cause of death.
- A lack of significantly increased PMRs may represent the selection of healthy workers for particular occupations and/or improved socioeconomic circumstances of selected workers than the general population.

## References

1. Statistics South Africa. South African Standard Classification of Occupations (SASCO). Pretoria: Statistics South Africa; 2012. Available from: [http://www.statssa.gov.za/classifications/codelists/SASCO\\_2012.pdf](http://www.statssa.gov.za/classifications/codelists/SASCO_2012.pdf). Date accessed 6 February 2021.

# Appendix

Table 1 TB-related deaths by industry (men)

Men					
Industry	n	Total deaths	PMR	95% CI LL	95% CI UL
Agriculture	1823	11723	116.6438	111.41	122.12
Mining	1537	9606	120.0176	114.16	126.17
Manufacturing	986	8089	91.43149	85.90	97.32
Construction	1577	11302	104.6623	99.62	109.96
Wholesale, retail, motor repair, accommodation	947	8671	81.92086	76.87	87.31
Transport	1127	9096	92.93668	87.67	98.52
Human health	70	884	59.39631	46.99	75.08
Educational services	209	2692	58.23511	50.85	66.69
Waste & recycling	5	52	72.12409	30.02	173.28
<b>Total</b>	<b>8281</b>	<b>62115</b>			

Table 2 TB-related deaths by industry (women)

Women					
Industry	n	Total deaths	PMR	95% CI LL	95% CI UL
Agriculture	484	3404	126.8825	116.0674	138.7054
Mining	76	571	118.7746	94.85978	148.7184
Manufacturing	201	2074	86.4835	75.317	99.30554
Construction	83	767	96.56699	77.87453	119.7462
Wholesale, retail, motor repair, accommodation	641	4968	115.139	106.5617	124.4066
Transport	56	615	81.25664	62.53313	105.5863
Human health	222	2340	84.66094	74.2255	96.56351
Educational services	264	3347	70.38728	62.38862	79.41142
Waste & recycling	5	47	94.9332	39.5132	228.0836
<b>Total</b>	<b>2032</b>	<b>18133</b>			

Table 3 TB-related deaths by major occupation (men)

Men					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Armed forces, unspecified occupations & unemployed	56911	380007	102.7747	101.93	103.62
Managers	137	2915	32.25253	27.28	38.13
Professionals	441	6681	45.29798	41.26	49.73
Technicians	274	3203	58.70504	52.15	66.08
Clerks	143	1794	54.70101	46.43	64.44
Service & sales workers	1298	11551	77.11464	73.03	81.43
Skilled agricultural & fishery workers	780	5325	100.521	93.71	107.83
Craft & related trade workers	1571	12108	89.04008	84.74	93.55
Plant & machine operators	2441	17587	95.24842	91.54	99.10
Elementary occupations	3992	25396	107.8716	104.58	111.27
<b>Total</b>	<b>67988</b>	<b>466567</b>			

Table 4 TB-related deaths by major occupation (women)

Women					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Armed forces, unspecified occupations & unemployed	40178	301539	101.3624	100.3761	102.3585
Managers	56	1030	41.36024	31.82984	53.74422
Professionals	492	6104	61.31727	56.13155	66.98209
Technicians	116	1557	56.67632	47.24633	67.98846
Clerks	232	2828	62.40808	54.87262	70.97837
Service & sales workers	680	5428	95.30185	88.4013	102.7411
Skilled agricultural & fishery workers	165	1139	110.2028	94.60745	128.3689
Craft & related trade workers	121	1144	80.46215	67.32994	96.15569
Plant & machine operators	84	656	97.41094	78.65608	120.6377
Elementary occupations	3059	22297	104.3675	100.7337	108.1324
<b>Total</b>	<b>45183</b>	<b>343722</b>			

Table 5 TB-related deaths by sub-major occupation (men)

Men					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Occupations unspecified	50963	457940	114.83171	113.83903	115.83304
Not economically active persons	5948	128362	47.81343	46.613617	49.044126
Chief executives & senior officials	32	964	34.252191	24.222167	48.435493
Administrative & commercial managers	18	519	35.78661	22.546895	56.80079
Production & specialised services managers	14	707	20.432619	12.101151	34.500183
Hospitality & retail services	73	2619	28.76092	22.865218	36.176805
Science & engineering professionals	79	2164	37.669101	30.21453	46.962874
Health professionals	51	1152	45.680738	34.716734	60.10732
Teaching professionals	167	3136	54.948499	47.215726	63.94771
Business & administration professionals	101	3586	29.062067	23.912624	35.320414
Information & Communication Technologist	0	121	*		
Legal, social & cultural professionals	43	1295	34.26211	27.960633	41.983749
Science & engineering associate professionals	93	1864	51.48165	34.506307	76.807997
Health associate professionals	24	371	66.750227	54.815352	81.283668
Business & administration associate professionals	99	1587	64.368544	49.298953	84.044572
Legal, social, cultural associate professionals	54	629	88.584662	33.246807	236.02996
Information & communications technician	4	201	*		
General & keyboard clerks	104	1913	56.096244	46.287644	67.98334
Customer services clerks	15	336	46.06461	27.770524	76.410093
Numerical & material recording clerks	15	270	57.324848	34.558874	95.088116
Other clerical support workers	9	128	72.551761	37.749299	139.43989
Personal services workers	113	1286	90.667761	75.401002	109.02565
Sales workers	192	2706	73.21311	63.556145	84.337391
Personal care workers	13	119	112.72281	65.45256	194.13193
Protective service workers & armed forces	980	9690	104.35607	98.022682	111.09867
Market-orientated skilled agricultural workers	145	1189	125.83503	106.93302	148.07826
Market-orientated skilled forestry workers	561	4731	122.35602	112.63851	132.91186
Subsistence farmers	74	2346	32.547612	25.91595	40.876257
Building & related trades workers	888	7651	119.75956	112.13604	127.90136
Metal, machinery & related trades workers	423	5453	80.042434	72.766702	88.045646
Handicraft & printing workers	23	430	55.19183	36.67615	83.055013
Electrical & electronic trades worker	174	2258	79.513474	68.534637	92.251054
Food processing, wood working workers	63	757	85.873683	67.083668	109.92675
Stationary plant & machine operators	1036	8728	122.47866	115.24296	130.16867
Assemblers	1	32	*		
Drivers & mobile plant operators	1404	12662	114.41428	108.58327	120.55841
Cleaners & helpers	323	2269	146.88703	131.71052	163.81227
Agricultural, forestry & fishery labours	447	3544	130.14552	118.62276	142.78758
Labourers in mining, construction & manufacturing	338	2721	128.17507	115.21353	142.5948
Food preparation assistants	2	19	*		
Street & related sales workers	21	171	126.71809	82.620493	194.35218
Refuse workers & other elementary workers	2860	22896	128.89077	124.25245	133.70224
<b>Total</b>	<b>67987</b>	<b>701522</b>			

\* PMRs cannot be calculated when n&lt;5

Table 6 TB-related deaths by sub-major occupation (women)

Women					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Occupations unspecified	36141	420566	120.9583255	119.7176594	122.2118489
Not economically active persons	4037	150379	37.78690466	36.63905058	38.97071952
Chief executives & senior officials	10	237	59.39110627	31.95530052	110.3824231
Administrative & commercial managers	10	240	58.64871744	31.55585927	109.0026428
Production & specialised services managers	3	147	28.72590242	9.264526123	89.06850267
Hospitality & retail services	33	848	54.77568893	38.94125612	77.04877543
Science & engineering professionals	9	193	65.63794283	34.15198097	126.1519659
Health professionals	171	3296	73.02619429	62.86145995	84.83457203
Teaching professionals	245	4861	70.94311017	62.59331504	80.40674755
Business & administration professionals	47	1466	45.12670755	33.90555526	60.06153619
Information & Communication Technologist	0	17	*		
Legal, social & cultural professionals	20	537	52.42343458	33.82108392	81.2574931
Science & engineering associate professionals	11	210	73.72981621	40.83114075	133.1357807
Health associate professionals	35	596	82.65926619	59.34847726	115.1260252
Business & administration associate professionals	31	1560	27.97092678	19.67087764	39.77314888
Legal, social, cultural associate professionals	38	460	116.2774572	84.60769517	159.8016235
Information & communications technician	1	25	*		
General & keyboard clerks	152	4219	50.71119251	43.2574578	59.44928752
Customer services clerks	67	946	99.69042034	78.46223895	126.6619464
Numerical & material recording clerks	5	94	74.87070311	31.1627671	179.8820421
Other clerical support workers	8	109	103.3078326	51.66334578	206.577954
Personal services workers	148	2542	81.95131563	69.75676126	96.2776656
Sales workers	249	2400	146.0353064	128.9775637	165.3489965
Personal care workers	52	565	129.5461936	98.71475498	170.0071714
Protective service workers & armed forces	231	1692	192.168138	168.9177948	218.6187269
Market-orientated skilled agricultural workers	6	90	93.8379479	42.15708189	208.8749997
Market-orientated skilled forestry workers	140	1396	141.1602368	119.6110756	166.5917003
Subsistence farmers	19	307	87.1134044	55.56513467	136.5738655
Building & related trades workers	19	163	164.0724856	104.6533518	257.2280779
Metal, machinery & related trades workers	39	758	72.42110755	52.91287094	99.12175858
Handicraft & printing workers	0	101	*		
Electrical & electronic trades workers	4	62	*		
Food processing, wood working workers	59	860	96.56579522	74.8176879	124.635672
Stationary plant & machine operators	72	660	153.5530057	121.8825171	193.4528931
Assemblers	0	12	*		
Drivers & mobile plant operators	12	148	114.1272339	64.81328834	200.9622696
Cleaners & helpers	1988	23003	121.6470724	116.4154194	127.1138334
Agricultural, forestry & fishery labours	93	890	147.0830756	120.0315993	180.2311331
Labourers in mining, construction & manufacturing	69	746	130.1907186	102.8266098	164.8369352
Food preparation assistants	5	72	97.7478624	40.68472372	234.8459994
Street & related sales workers	21	221	133.7509212	87.20591913	205.1387005
Refuse workers & other elementary workers	883	8288	149.9618267	140.389615	160.1867024
<b>Total</b>	<b>45183</b>	<b>635982</b>			

\* PMRs cannot be calculated when n<5