

OCCUPATION AND MORTALITY

Liver Cancer Mortality in South Africa, 2011-2015

National Institute for Occupational Health

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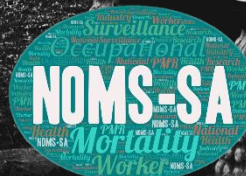
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Division of the National Health Laboratory Service

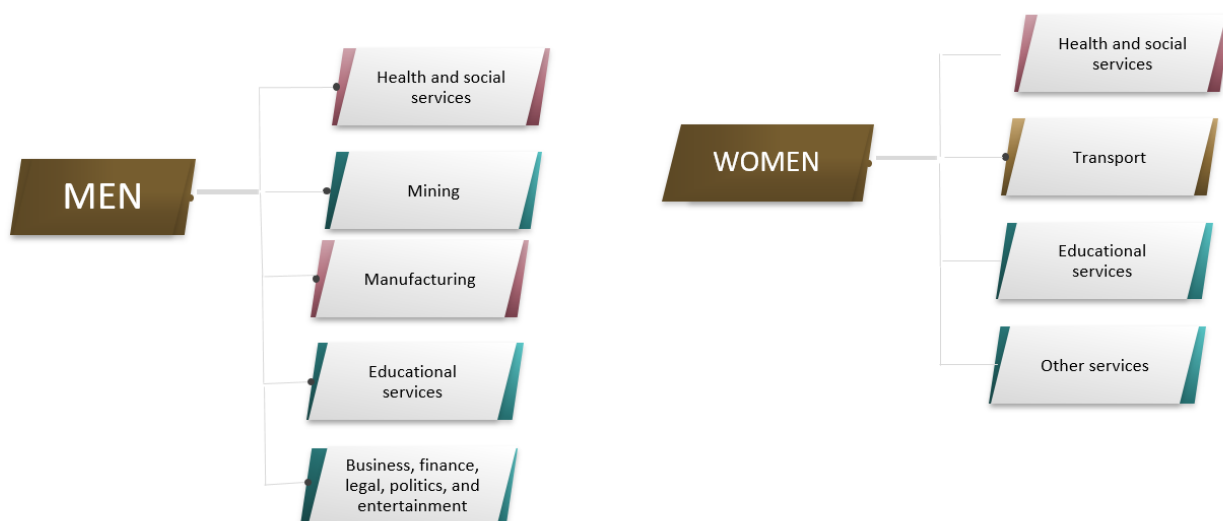


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Main points

- There were 5,637 reported deaths due to liver cancer from 2011 to 2015 in the 15 - 69 years age group.
- The main industries with significantly elevated proportionate mortality ratios (PMRs) for liver cancer-related deaths among men were mining, manufacturing, health and social services, educational services, and business, finance, legal, politics, and entertainment; and transport, health and social services, educational services, and other services among women.
- The major occupation groups with significantly elevated PMRs for liver cancer deaths among men were legislators, senior officials and managers, professionals, and technicians and associate professionals.



Introduction

The National Occupational Mortality Surveillance South Africa (NOMS-SA) is a nationwide, 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 well-being 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.

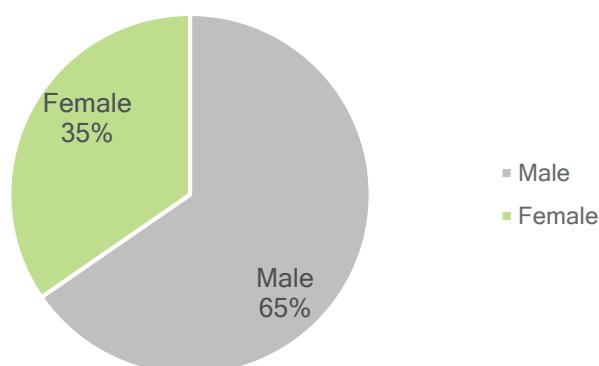
This report presents the analysis of deaths involving liver cancer in different occupation groups and industries among those aged 15 to 69 years in South Africa. This analysis includes deaths that were registered from 2011 to 2015 by the Statistics South Africa.

Occupation was defined using the South African Standard Classification of Occupations (SASCO). There are ten major occupation groups, which then divide into 42 sub-major groups. For further information on the breakdown of occupation groups, see Tables 1 and 2 in the Appendix section.

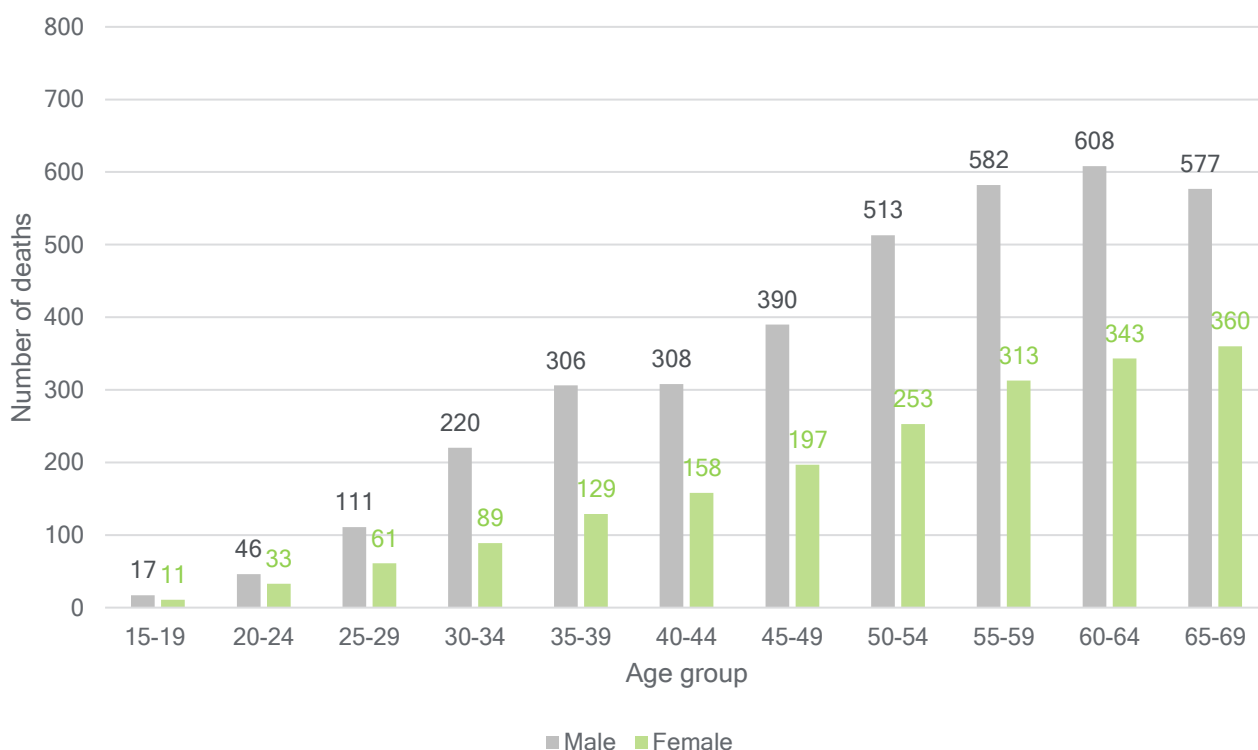
We calculated proportional mortality ratios for the population at risk of dying from liver cancer. The results of the analysis do not prove that the observed proportions of deaths involving liver cancer are caused by occupational exposure. The findings presented here should be interpreted considering the warnings in the strengths and limitations section.

Liver cancer mortality by sex and age

- There were 5,637 reported deaths due to liver cancer from 2011-2015 among 15 to 69-year-olds.
- Number of reported deaths due to liver cancer by sex:
 - Men (3,679) and Women (1,947).



- Mean age of death due to liver cancer: men (51.8 years), women (52.7 years).



Liver cancer mortality by sex and main industry

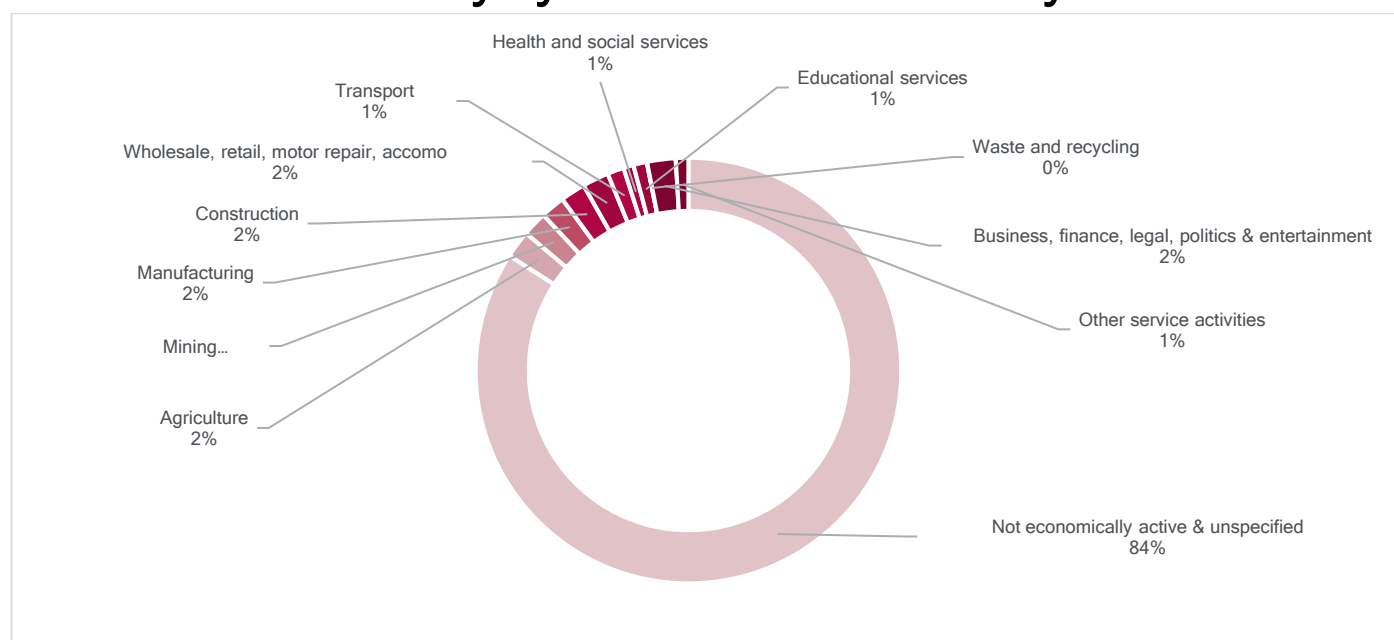


Figure 1. Percentage of liver cancer-related deaths by main industry.

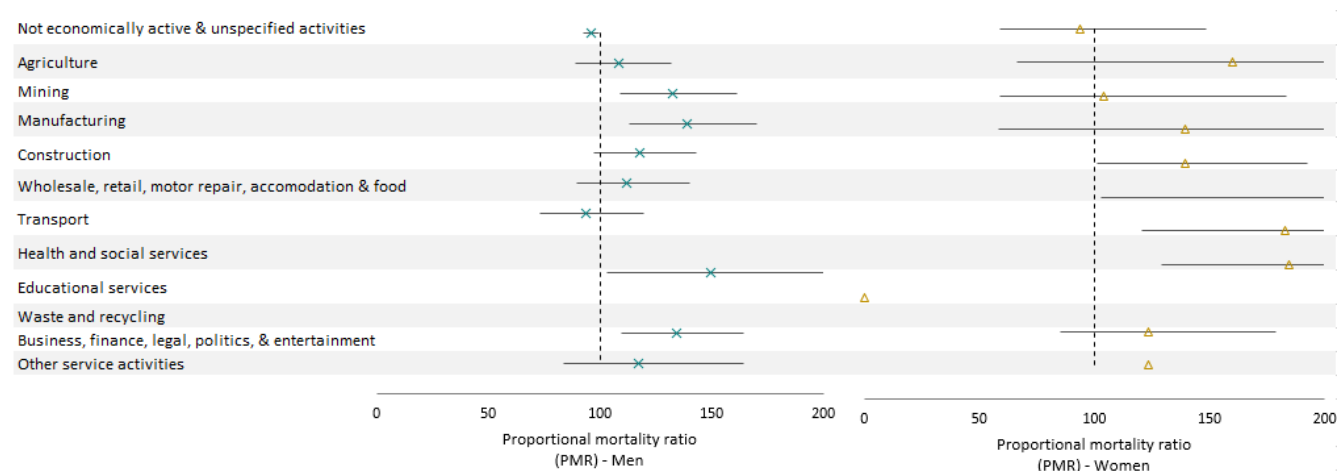


Figure 2. Liver cancer-related mortality by sex and main industry. Source: Statistics South Africa (See Appendix Tables 1 and 2)

- The main industries with significantly elevated PMRs for liver cancer-related deaths were mining, manufacturing, health and social services, educational services and business, finance, legal, politics, and entertainment in men; and transport, health and social services, educational services, and other services in women compared to the general population. Not being economically active seemed protective of men.

Liver cancer-related mortality by sex and major occupation

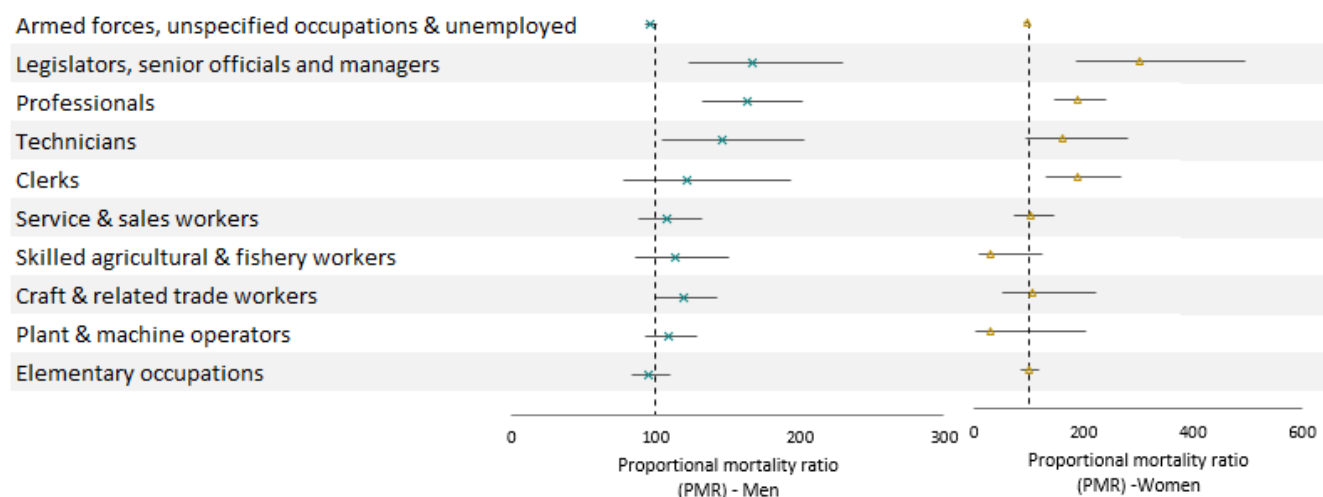


Figure 3. Liver cancer-related mortality by sex and major occupation. Source: Statistics South Africa. (See Appendix Tables 3 and 4)

- Men working as legislators, senior officials, managers, professionals and technicians had significant excess mortality due to liver cancer compared to the general population.
- Among women, working as legislators, senior officials and managers, and clerks showed significant excess mortality due to liver cancer compared to the general population.

Liver cancer-related mortality by sex and sub-major occupation



Figure 4. Liver cancer disease-related mortality by sex and sub-major occupation. Source: Statistics South Africa (See Appendix, Tables 5 and 6)

- Men and women who were not economically active had significantly increased PMR.
- Men employed in the following sub-major occupation groups had excess mortality due to liver cancer compared to the general population.
 - Administrative and commercial managers
 - Health professionals
 - Business and administration professionals
 - Science and engineering associate professionals
 - Health associate professionals
 - Numerical and material recording clerks
 - Subsistence farmers
 - Building and related trades workers
 - Stationary plant and machine operators
- Women employed in the following sub-major occupation groups had excess mortality due to liver cancer compared to the general population.
 - Administrative and commercial managers
 - Hospitality and retail services
 - Health professionals
 - Teaching professionals
 - Business and administration professionals
 - Health associate professionals
 - General and keyboard clerks

Measuring the data

- NOMS-SA uses mortality data with occupation information from Statistics South Africa, which is a South African national statistical entity responsible for recording vital events on an annual basis. The data brief includes only the working population (15 - 69 years).
- Deaths were defined using the International Classification of Diseases, 10th Revision (ICD-10). Deaths due to liver cancer disease include the following underlying cause of death code: C22.
- 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. Confidence intervals that do not include 100 indicate that a PMR is significant.

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

Strengths and limitations

- PMRs can only be calculated where data on occupation or industry are available; it is not a reflection of the 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. SASCO.
2. Statistics South Africa.

Appendix

Table 1 Liver cancer-related deaths by industry (men)

Men					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Not economically active & unspecified activities	2 965	733 993	95.78	92.39	99.29
Agriculture	99	21 634	108.50	89.10	132.13
Mining	101	18 064	132.57	109.08	161.12
Manufacturing	92	15 710	138.85	113.19	170.33
Construction	102	20 531	117.80	97.02	143.03
Wholesale, retail, motor repair, Accommodation & food	76	16 078	112.08	89.51	140.33
Transport	64	16 215	93.58	73.25	119.57
Health and social services	21	1 588	313.55	204.44	480.91
Educational services	28	4 439	149.56	103.26	216.61
Waste and recycling	1	105	225.81	-	-
Business, finance, legal, politics, & entertainment	94	16 612	134.17	109.61	164.23
Other service activities	34	6 866	117.41	83.89	164.32
Total	3 677	871 835			

Table 2 Liver cancer-related deaths by industry (women)

Women					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Not economically active & unspecified activities	1 762	618 321	95.61	91.25	100.18
Agriculture	18	6 557	92.10	58.03	146.18
Mining	5	1 067	157.22	65.44	377.73
Manufacturing	12	3 936	102.29	58.09	180.11
Construction	5	1 223	137.16	57.09	329.55
Wholesale, retail, motor repair, accomodation & food	37	9 064	136.96	99.23	189.02
Transport	7	1 106	212.34	101.23	445.42
Health and social services	22	4 108	179.68	118.31	272.88
Educational services	30	5 550	181.35	126.80	259.38
Waste and recycling	28	88	10 675.11	-	-
Business, finance, legal, politics, & entertainment	20	7 748	86.60	55.87	134.24
Other service activities	34	5 529	206.31	147.42	288.74
Total	1 980	664 297			

Table 3 Liver cancer-related deaths by major occupation (men)

Men					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Armed forces, unspecified occupations & unemployed	2 898	710 203	96.72	93.26	100.30
Legislators, senior officials and managers	39	5 520	167.46	122.35	229.20
Professionals	87	12 601	163.64	132.63	201.91
Technicians and Associate professionals	35	5 678	146.10	104.90	203.49
Clerks	18	3 488	122.31	77.06	194.14
Service & sales workers	93	20 458	107.75	87.93	132.03
Skilled agricultural & fishery workers	47	9 812	113.53	85.30	151.11
Craft & related trade workers	116	23 116	118.94	99.15	142.68
Plant & machine operators	151	32 749	109.28	93.17	128.18
Elementary occupations	192	47 653	95.50	82.90	110.01
Total	3 676	871 278			

Table 4 Liver cancer-related deaths by major occupation (women)

Women					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Armed forces, unspecified occupations & unemployed	1 658	584 122	96.83	92.28	101.60
Legislators, senior officials and managers	16	1 797	303.73	186.07	495.78
Professionals	62	11 172	189.31	147.60	242.82
Technicians and Associate professionals	13	2 714	163.40	94.88	281.41
Clerks	30	5 438	188.19	131.58	269.16
Service & sales workers	30	9 915	103.22	72.17	147.62
Skilled agricultural & fishery workers	2	2 163	31.54	7.89	126.12
Craft & related trade workers	7	2 255	105.89	50.48	222.12
Plant & machine operators	1	1 183	28.84	4.06	204.71
Elementary occupations	127	43 074	100.58	84.52	119.68
Total	1 946	663 833			

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

Men					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Occupations unspecified	2 578	647 593	94.39	90.81	98.10
Not economically active persons	321	63 166	120.49	108.00	134.42
Chief executives & senior officials	8	981	193.35	96.69	386.63
Administrative & commercial managers	7	693	239.49	114.17	502.37
Production & specialised services managers	6	863	164.84	74.06	366.92
Hospitality & retail services	18	2 983	143.07	90.14	227.08
Science & engineering professionals	11	2 132	122.33	67.75	220.89
Health professionals	15	1 198	296.87	178.97	492.43
Teaching professionals	25	4 136	143.31	96.84	212.10
Business & administration professionals	31	3 753	195.84	137.73	278.48
Information & Communication Professionals	1	169	0.00	-	-
Legal, social & cultural professionals	4	1 213	78.19	29.34	208.32
Science & engineering associate professionals	18	2 325	183.56	115.65	291.35
Health associate professionals	5	426	278.28	115.83	668.60
Business & administration associate professionals	7	1 748	94.95	45.26	199.17
Legal, social, cultural associate professionals	4	865	109.64	41.15	292.13
Information & communications technician	1	314	75.51	10.64	536.06
General & keyboard clerks	14	2 530	131.20	77.70	221.53
Customer services clerks	0	440	0.00	-	-
Numerical & material recording clerks	4	360	263.44	-	-
Other clerical support workers	0	158	0.00	-	-
Personal services workers	6	1 845	77.11	34.64	171.63
Sales workers	18	3 715	114.88	72.38	182.34
Personal care workers	1	180	0.00	-	-
Protective service workers & armed forces	68	14 718	109.54	86.37	138.94
Market-orientated skilled agricultural workers	4	1 846	51.38	19.28	136.89
Market-orientated skilled forestry workers	28	6 196	107.15	73.98	155.18
Subsistence farmers	15	1 770	200.93	121.13	333.30
Building & related trades workers	61	11 006	131.41	102.24	168.89
Metal, machinery & related trades workers	28	7 441	89.22	61.60	129.22
Handicraft & printing workers	3	534	133.20	42.96	413.01
Electrical & electronic trades worker	16	3 175	119.48	73.20	195.03
Food processing, wood working workers	8	960	197.58	98.81	395.09
Stationary plant & machine operators	68	12 707	126.88	100.04	160.92
Assemblers	0	69	0.00	-	-
Drivers & mobile plant operators	83	19 973	98.53	79.46	122.18
Cleaners & helpers	18	3 492	122.22	77.00	193.98
Agricultural, forestry & fishery labours	19	5 176	87.03	55.51	136.45
Labourers in mining, construction & manufacturing	17	4 177	96.50	59.99	155.23
Food preparation assistants	0	29	0.00	-	-
Street & related sales workers	1	275	86.22	12.14	612.09
Refuse workers & other elementary workers	137	34 480	94.21	79.68	111.38
Total	3 677	871 810			

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

Women					
Occupation	n	Total deaths	PMR	95% CI LL	95% CI UL
Occupations unspecified	1 403	522 883	91.59	86.93	96.52
Not economically active persons	255	61 703	141.08	124.78	159.50
Chief executives & senior officials	3	340	301.20	-	-
Administrative & commercial managers	3	307	333.58	107.58	1034.31
Production & specialised services managers	2	183	0.00	-	-
Hospitality & retail services	8	967	282.41	141.23	564.72
Science & engineering professionals	1	230	148.42	20.91	1053.68
Health professionals	22	3 301	227.51	149.80	345.52
Teaching professionals	28	5 590	170.99	118.06	247.64
Business & administration professionals	11	1 496	251.00	139.00	453.24
Information & Communication Technologist	0	34	0.00	-	-
Legal, social & cultural professionals	0	521	0.00	-	-
Science & engineering associate professionals	1	251	136.00	-	-
Health associate professionals	6	638	321.03	144.22	714.59
Business & administration associate professionals	6	1 189	172.26	77.39	383.44
Legal, social, cultural associate professionals	0	601	0.00	-	-
Information & communications technician	0	35	0.00	-	-
General & keyboard clerks	22	4 006	187.47	123.44	284.71
Customer services clerks	7	1 157	206.53	98.46	433.22
Numerical & material recording clerks	0	136	0.00	-	-
Other clerical support workers	1	139	0.00	-	-
Personal services workers	10	2 904	117.55	63.25	218.47
Sales workers	10	3 472	98.32	52.90	182.73
Personal care workers	4	864	158.04	59.31	421.09
Protective service workers & armed forces	6	2 675	76.57	34.40	170.43
Market-orientated skilled agricultural workers	0	135	0.00	-	-
Market-orientated skilled forestry workers	2	1 796	38.01	9.51	152.00
Subsistence farmers	0	232	0.00	-	-
Building & related trades workers	0	230	0.00	-	-
Metal, machinery & related trades workers	4	874	156.23	58.64	416.27
Handicraft & printing workers	1	100	341.36	-	-
Electrical & electronic trades workers	0	79	0.00	-	-
Food processing, wood working workers	2	972	70.24	17.57	280.86
Stationary plant & machine operators	0	925	0.00	-	-
Assemblers	0	17	0.00	-	-
Drivers & mobile plant operators	1	241	141.64	19.95	1005.58
Cleaners & helpers	83	28 641	98.93	79.78	122.67
Agricultural, forestry & fishery labours	5	1 225	139.33	57.99	334.76
Labourers in mining, construction & manufacturing	3	1 006	101.80	32.83	315.64
Food preparation assistants	0	77	0.00	-	-
Street & related sales workers	3	347	0.00	-	-
Refuse workers & other elementary workers	33	11 775	95.67	68.01	134.57
Total	1 946	664 294			