From Desk to Decline? A Census-Linked Study on Occupation and Dementia Mortality in Belgium (1991-2020)

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Background

Previous research into the association between occupation and dementia-related mortality has focused on two main areas: occupational exposure to specific agents and occupational socioeconomic position (SEP). The former investigates the impact of exposure to various agents, including metals (1, 2), and Extremely Low-Frequency Magnetic Fields (3), both of which have been linked to dementia mortality. The latter uses occupation as an indicator of SEP, often categorizing diverse groups into a limited number of categories (e.g. non-manual, manual, self-employed, and unemployed) (4). Studies on occupational SEP have found an inverse association with dementia mortality (5, 6), consistent with findings on dementia incidence (7, 8, 9, 10).

The mechanisms underlying the relationship between SEP and dementia are not fully understood, but the cognitive reserve hypothesis provides one explanation. This hypothesis suggests that activities like education and complex occupational tasks enhance resilience within neuronal networks, thereby influencing dementia risk (11). This cognitive reserve hypothesis has stimulated studies examining the impact of occupational task complexity on dementia incidence, with findings indicating that higher task complexity in occupations may reduce dementia risk (12, 13, 14). However, SEP also affects other dementia risk factors, such as depression, stress, and vascular conditions, which in turn influence lifestyle behaviours (15).

While research on occupational SEP and task complexity has yielded valuable insights, the broad classification of occupations may oversimplify their complex nature. Work environments and activities vary widely beyond complexity, including factors such as physical activity, stress levels, social demands, and exposure to hazardous substances (16). Existing research helps identify high-risk groups but does not provide detailed comparisons of mortality rates across different occupations, limiting its usefulness for informing policy decisions (4).

To address this gap in the literature, this study aims to examine the association between occupational SEP and dementia mortality from a broader perspective. This involves analysing both heterogeneous groups and specific occupational sectors within these categories. The analysis utilizes comprehensive data from the Belgian census of 1991, linking specific occupations to cause-specific mortality during the follow-up period of 1991-2020.

Data

The data were obtained through a record linkage between the Belgian 1991 census and register information on emigration and mortality for the period 1991-2020. Initially, a link was established between the census and register data on deaths and emigrations. Subsequently, cause-specific mortality data were added using anonymous individual linkage with death certificates. This unique database provides nationwide, individually linked data on all-cause and cause-specific mortality, emigration, and background characteristics of all individuals legally residing in Belgium at the time of the 1991 census. The study includes all individuals aged 35-70 during the 1991 census.

Variables

Dementia mortality was defined using the International Classification of Diseases (ICD). For the period 1991-1997, the ICD-9 codes 290 and 331.0 were used. For the subsequent period, the ICD-10 codes F01-F03 and G30 were employed. Occupational groups were categorised using the 1-digit and 2-digit codes from the International Standard Classification of Occupations (ISCO-88) as recorded in the 1991 census. Educational attainment was categorised using the International Standard Classification of Education: lower secondary education or less (ISCED 0-2, 'low'), higher secondary education (ISCED 3-4, 'mid') and tertiary education (ISCED 5-6, 'high').

Statistical analyses

Both absolute and relative measures were calculated. First, directly age-standardised mortality rates by occupational group were computed, using the Belgian population at the 2001 census as the standard population. Second, mortality rate ratios (MRR) were calculated using Poisson regression with the log of person-time as the offset. To assess the net effect of occupational group on dementia mortality, Poisson models were adjusted for educational attainment.

Preliminary results

Table 1 presents the age-standardised mortality rates by 1-digit ISCO-88 codes. The findings indicate that, for both men and women, dementia mortality is highest among unskilled manual workers. Among men, the lowest dementia mortality rates were observed in service and sales workers, while among women, the lowest rates were found in agricultural and fishery workers.

Table 1 age-standardised dementia mortality rates by 1-digit ISCO-88 groups for men and women, Belgium 1991-2020

ISCO	Occupational group	MEN			WOMEN		
		PY	N	ASMR (95% CI)	PY	N	ASMR (95% CI)
1-2	Managers and professionals	327752	4295	31.9(29.1-34.7)	204053	1800	36.2(31.8-40.6)
3-4	Intermediate white-collar workers	289177	3178	28.4(23.1-33.8)	210394	1451	35.2(26.9-43.7)
5	Service and sales workers	67385	674	23.6(19.8-27.3)	91004	864	41.7(29.0-54.4)
6	Agricultural and fishery workers	38569	812	30.7(22.8-38.5)	15924	328	27.3(23.3-31.2)
7-8	Skilled manual workers	339043	3256	35.6(27.0-44.3)	47784	317	45.8(23.5-68.1)
9	Unskilled manual workers	97958	1186	41.0(20.3-61.7)	93023	964	62.9(40.3-85.6)

Source: statistics Belgium

Table 2 displays the age-standardised mortality rates by 2-digit ISCO-88 codes. Teachers had the lowest dementia mortality rates for both men and women. For men, the highest dementia mortality rates were found among extraction and building trades workers, while for women, the highest rates were among machine operators and assemblers.

Table 2 age-standardised dementia mortality rates by 2-digit ISCO-88 groups for men and women, Belgium 1991-2020

ISCO	Occupational group	MEN			WOMEN		
		PY	N	ASMR (95% CI)	PY	N	ASMR (95% CI)
11	Legislators/senior officials/managers	4795	101	23.5(0-.)	1067	9	12.2(0-.)
12	Corporate managers	118059	1538	32.6(26.6-38.6)	30503	386	37.5(28.2-46.9)
13	Managers of small enterprises	55827	935	32.6(26.6-38.6)	33242	558	37.9(32.0-43.7)
21	STEM professionals	24802	223	35.2(19.7-50.6)	1796	3	17.4(0.0-.)
22	Life science/health professionals	22115	290	29.7(23.6-35.7)	36484	231	31.0(18.1-43.8)
23	Teaching professionals	56734	562	22.7(17.6-27.9)	76791	420	25.3(16.1-34.6)
24	Other professionals	4542	671	32.2(27.1-37.3)	2417	198	38.6(17.3-59.8)
31	STEM associate professionals	88513	868	23.2(19.2-27.2)	11486	70	125.5(119.7-131.2)
32	Life science/health associate professionals	6976	62	23.9(15.7-32.1)	11539	60	26.7(13.7-39.6)
33	Teaching associate professionals	5385	40	14.6(9.0-20.2)	9261	58	41.2(15.8-66.6)
34	Other associate professionals	4619	603	26.9(19.7-34.1)	24554	216	32.6(18.6-46.6)
41	Office clerks	137775	1560	36.0(17.3-54.7)	139653	931	35.5(22.3-48.6)
42	Customer service clerks	4338	55	33.4(0-.)	13901	122	36.5(22.4-48.6)
51	Personal/protective services workers	40374	402	23.0(18.2-27.8)	51347	463	38.6(21.4-55.8)
52	Models/salespersons/demonstrators	14731	193	25.5(19.4-31.6)	38961	402	44.4(26.0-62.7)
61	Skilled agricultural/fishery workers	38381	809	30.8(22.8-38.8)	13475	263	27.2(22.9-31.5)
71	Extraction/building trades workers	951	1009	45.5(23.2-67.9)	1105	16	42.3(13.1-71.6)
72	Metal/machinery/related trades workers	86923	685	25.5(20.4-30.7)	7131	40	25.5(8.7-42.2)
73	Precision/handicraft/related trades workers	15245	186	43.0(19.2-66.7)	2616	24	134.0(118.1-149.9)
74	Other craft/related workers	30729	364	28.7(15.9-41.6)	17933	125	28.9(19.5-38.2)
81	Stationary-plant/related operators	1502	123	23.9(0-.)	1247	11	11.0(0-.)
82	Machine operators/assemblers	25185	230	19.8(12.0-27.5)	16131	89	134.6(115.2-154.0)
83	Drivers/mobile plant operators	70841	662	28.5(22.5-34.6)	1621	13	30.2(0-.)
91	Sales/services elementary occupations	46065	662	40.9(18.1-63.8)	8477	917	63.3(40.6-86.0)
92	Agricultural/fishery/related labourers	188	4	19.4(0.5-38.4)	2449	65	27.1(18.2-35.9)
93	Mining/constructions/transport workers	51893	533	35.5(24.5-46.5)	8253	49	28.7(0-.)
110	Armed forces	1228	82	7.3(0-.)	696	1	10.0(0-.)
	Missing	4795	834		49580	665	

Source: statistics Belgium

Conclusion and further research

This study provides a nuanced understanding of the relationship between occupational socioeconomic position (SEP) and dementia-related mortality. Our findings reveal that unskilled manual workers have the highest dementia mortality rates across both genders, with variations observed in the lowest mortality rates among service, sales, agricultural, and fishery workers, depending on gender. Additionally, the detailed analysis by 2-digit ISCO-88 codes underscores the critical role of occupation in dementia mortality, with teachers showing the lowest rates and extraction/building trades and machine operators/assemblers showing the highest rates.

Further research will disaggregate mortality into three groups (10 years) to rule out selection-effects and examine temporal changes in the occupation-dementia mortality relationship. Additionally, we will differentiate between dementia mortality and general mortality and explore alternative occupational categorisations to assess their impact on the findings.

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