

Mortality among disability pensioners

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Ref.no.: 3

Track: Mortality - SUB-TRACK

Abstract:

Background: The aim of the study is to compare the rates of mortality among disability pensioners to the rates of mortality in the general population. The causes considered are musculoskeletal diseases, psychiatric disorders and a group of disability pensioners disabled due to other causes. Stratified analyses are carried out for gender and cause of disability. Fitting of a generalized linear model with Poisson-distributed response variables is the method used for these purposes. The data used in the analyses are provided by Statistics Norway and the Norwegian Labour and Welfare Service, and it covers the total number of disability pensioners and the total population of Norway in the period between 1992 and 2006.

Results and Conclusions: The results show significantly higher rates of mortality among disability pensioners than for the general population. The excess risk among disability pensioners is strongly age related. It is also shown that the risk of dying is significantly smaller for some age-groups of those disabled due to musculoskeletal disorders, than for the population in general. No significant difference from the general population is found for pensioners with psychiatric disorders in high age groups.

Keywords: Disability pension, mortality, musculoskeletal, Norway, diagnoses

Introduction

The demographic development in Norway has lately been under a governmental focus.

An increased number of old age pensioners is seen because of longevity. As a result of large birth cohorts after the Second World War this number will continue to increase. Unfor-

Unfortunately the development is not met with an increased number of workers. A high number of disability retirements also contributes strongly to this effect. Efforts are made in order to counteract these effects and redeem the economical implications. One of the political objectives is to strengthen incentives for working and thereby reduce the number of new retirements.

Mortality among disability pensioners may be seen as one of many measurements of the health-conditions of those who retires. In strategic work for reducing the number of new retirements, mortality is a strong indicator of the health conditions and should be considered. It is also natural to believe that mortality among disability pensioners to some extent reflects the consequences of being retired.

Seen from an insurer's point of view, knowledge of mortality among disability pensioners is also of great interest. Adverse selection is assumed to occur in an insurance portfolio. In order to determine the technical provisions for future payments, it is important that the estimates of mortality used for modeling are related to the actual rates of mortality. One possible way of handling this is to split the rates of mortality due to different causes of disability.

Some studies concerning this topic have been carried out, but there exists a limited number of cause-related studies. In this paper we will examine the internal impact the cause of disability has on the mortality by comparing death rates among different causes of disability. The disability pensioner's rates of mortality are compared to the general rates of mortality in the population.

The causes of disability considered are musculoskeletal diseases, psychiatric disor-

ders and a group of disability pensioners disabled due to other causes. The grouping is of equal size.

Data

The Norwegian Social Insurance Scheme provides all Norwegian residents with a disability benefit when working capacity is reduced by more than 50 percent. From January 1st 2004 disability benefits in Norway were split into time-limited disability benefit and disability pension. Only disability pension data is considered in this article.

The data used for the analyses are provided by Statistics Norway and the Norwegian Labour and Welfare Service. It covers the total number of disability pensioners and the total population of Norway in the period between 1992 and 2006.

To prohibit identification of individuals, an exact number of deaths between one and four is censored. The data is therefore given on an aggregated level. No reactivation is considered, which means that the individuals are assumed disabled throughout the study.

Methods

A generalized linear model with Poisson distributed response variables is used in order to fit the data. Age is used as the main explanatory variable, but both the time from first granting disability pension and year of pensioning are used as covariates. All results are provided with a 95 percent confidence interval (c.i.). Stratified analyses are carried out for each of the genders and cause of disability.

Results

From the top two plots of Figure 1 we see that psychiatric disorders are the main causes of new retirements for both men and women under 40 years. At higher ages musculoskeletal diseases and other causes are the most frequent cause of disability for women

and men respectively. By looking at the two bottom plots of Figure 1, we see that only a small part of the deaths occur from those disabled because of musculoskeletal diseases. As age increases the substantial part of the deaths of both men and women occur among those disabled due to psychiatric disorders. A smaller share of total deaths in the high

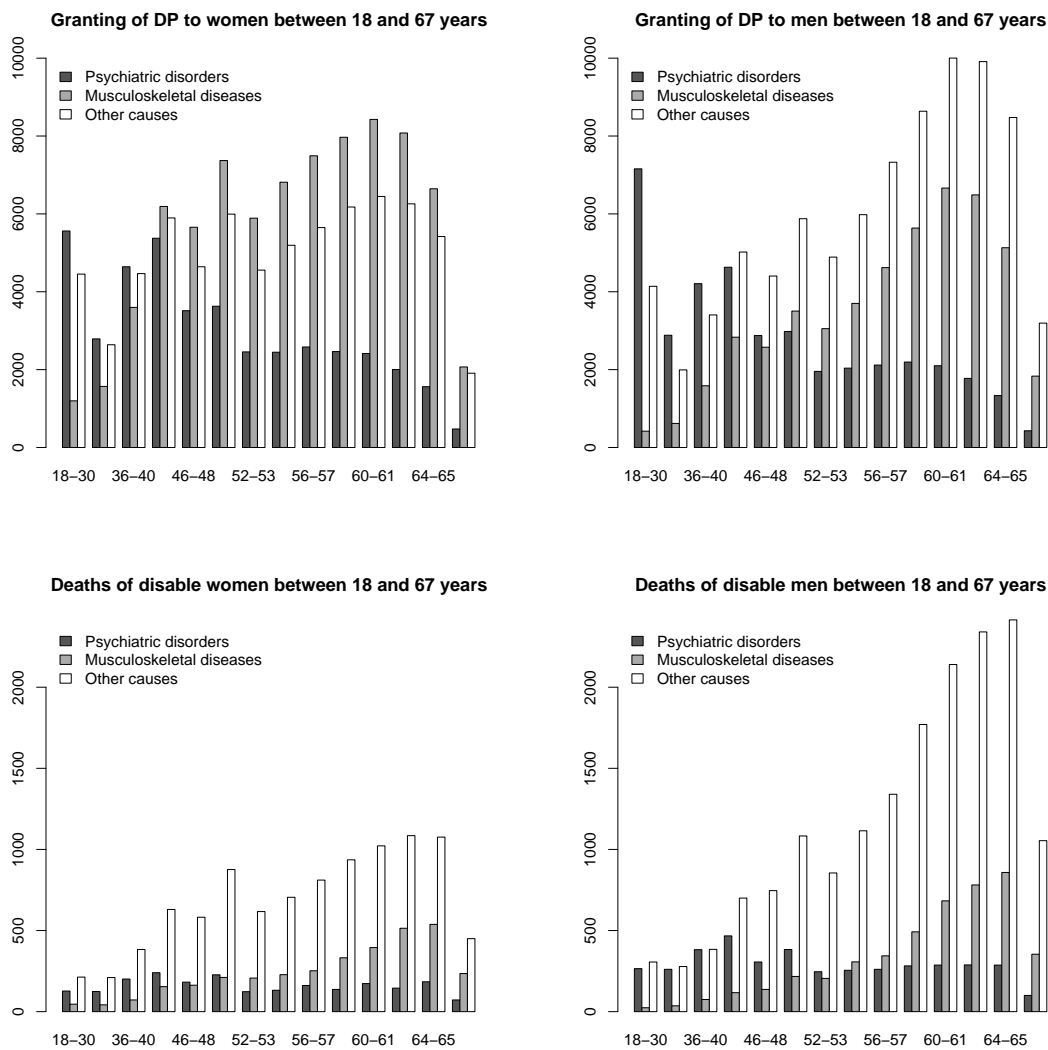


Figure 1: *Top: Number of new disability pensioners in each age group due to different causes of disability. Bottom: Number of deaths in each age group due to different causes of disability.*

age groups are related to psychiatric disorders.

Age related effects

We first consider the development of death rates with only one explanatory variable, namely age at the time of death. In general the disability pensioners have increased

rates of mortality in comparison to the general population. Those disabled due to other reasons have the highest excess rates of mortality. In the youngest age groups considered the rates are up to 24.24(20.24 - 29.03) and 13.07(11.24 - 15.19) times higher than for the general population for women and men respectively. A 95 percent confidence interval is shown in parentheses. Disability pension-

Age	Psychiatric disorders		Musculoskeletal diseases		Other	
	Relative risk (95% c.i.)					
17.5-22.5	9.19	(7.09 - 11.90)	1.76	(1.06 - 2.91)	24.24	(20.24 - 29.03)
22.5-27.5	5.34	(3.92 - 7.28)	8.10	(4.89 - 13.43)	9.70	(7.55 - 12.46)
27.5-32.5	8.60	(7.02 - 10.55)	7.20	(5.15 - 10.07)	19.16	(16.61 - 22.11)
32.5-37.5	5.39	(4.55 - 6.40)	2.68	(2.02 - 3.56)	14.13	(12.66 - 15.76)
37.5-42.5	3.58	(3.10 - 4.13)	1.79	(1.46 - 2.19)	9.87	(9.05 - 10.75)
42.5-47.5	2.62	(2.33 - 2.95)	1.19	(1.03 - 1.37)	8.37	(7.89 - 8.88)
52.5-57.5	1.90	(1.70 - 2.13)	1.00	(0.90 - 1.11)	5.13	(4.86 - 5.42)
57.5-62.5	1.40	(1.27 - 1.55)	0.80	(0.74 - 0.87)	3.76	(3.60 - 3.92)
62.5-67.5	1.10	(0.98 - 1.23)	0.67	(0.63 - 0.73)	2.54	(2.43 - 2.66)
67.5-72.5	1.06	(0.95 - 1.18)	0.71	(0.67 - 0.76)	1.71	(1.62 - 1.79)
72.5-77.5	1.16	(0.96 - 1.39)	0.84	(0.76 - 0.93)	1.37	(1.25 - 1.51)
77.5-82.5	0.83	(0.57 - 1.21)	0.78	(0.66 - 0.93)	1.13	(0.95 - 1.35)

Table 1: *Relative risk of dying as a disability pensioner due to different reasons compared to the mortality in the general population. Women.*

Age	Psychiatric disorders		Musculoskeletal diseases		Other	
	Relative risk (95% c.i.)					
17.5-22.5	5.09	(4.24 - 6.11)	8.86	(5.03 - 15.62)	13.07	(11.24 - 15.19)
22.5-27.5	3.97	(3.26 - 4.84)	7.49	(4.25 - 13.20)	6.69	(5.49 - 8.16)
27.5-32.5	6.99	(6.03 - 8.09)	4.87	(3.07 - 7.73)	13.04	(11.41 - 14.90)
32.5-37.5	7.49	(6.67 - 8.41)	3.06	(2.25 - 4.15)	10.71	(9.58 - 11.97)
37.5-42.5	5.43	(4.92 - 5.99)	2.43	(1.98 - 2.98)	7.74	(7.12 - 8.43)
42.5-47.5	3.83	(3.50 - 4.18)	1.42	(1.21 - 1.67)	6.39	(6.03 - 6.78)
52.5-57.5	2.94	(2.70 - 3.20)	1.40	(1.26 - 1.55)	4.38	(4.18 - 4.59)
57.5-62.5	1.95	(1.81 - 2.10)	1.00	(0.93 - 1.07)	2.98	(2.89 - 3.08)
62.5-67.5	1.39	(1.28 - 1.50)	0.80	(0.75 - 0.85)	1.96	(1.90 - 2.02)
67.5-72.5	1.07	(0.98 - 1.17)	0.77	(0.73 - 0.81)	1.48	(1.44 - 1.53)
72.5-77.5	1.10	(0.93 - 1.29)	0.90	(0.83 - 0.98)	1.24	(1.17 - 1.32)
77.5-82.5	1.07	(0.81 - 1.40)	0.78	(0.67 - 0.90)	0.98	(0.87 - 1.10)

Table 2: *Relative risk of dying as a disability pensioner due to different reasons compared to the mortality in the general population. Men.*

ers retired due to psychiatric disorders have up to 9.19(7.09-11.90) and 7.49(6.67-8.41) times higher rates of mortality for women and men respectively. This occurs at an age around 20 years for women and 30 years for men. Disability pensioners with musculoskeletal diseases have also elevated risks of dying compared to the general population. The excess risk is up to 8.10(4.89-13.43) and 8.8 (5.03-15.62) times higher than for the general population for women and men respectively.

The excess mortality decreases as age increases for all of the disability causes. For the disability pensioners with musculoskeletal diseases death-rates are significantly lower than for the general population

from the age of 55 for women and 60 for men. For those disabled due to psychiatric disorders no significant difference in death-rates from the general population is shown from ages beyond 60 years for women and 65 years for men. These results are shown in Table 1 and 2 for women and men respectively.

Effects related to year of disability

We compare changes in death-rates for different disability causes. They are further compared to the changes in the death-rates of the population seen from different years relative to 1992-1993. Results are adjusted for age effects. The relative risk of dying

Disability year	General population		Psychiatric disorders		Musculoskeletal diseases		Other	
	Relative risk (95% c.i.)							
92-93	1.00		1.00		1.00		1.00	
94-95	0.97	(0.96-0.98)	0.85	(0.75-0.97)	0.88	(0.80-0.97)	0.93	(0.87-0.99)
96-97	0.95	(0.94-0.96)	0.86	(0.75-0.97)	0.83	(0.75-0.92)	0.93	(0.87-1.00)
98-99	0.93	(0.92-0.94)	0.74	(0.64-0.84)	0.77	(0.69-0.86)	0.87	(0.81-0.93)
00-01	0.91	(0.90-0.92)	0.62	(0.52-0.72)	0.64	(0.56-0.74)	0.88	(0.81-0.95)
02-03	0.89	(0.88-0.91)	0.60	(0.49-0.73)	0.57	(0.48-0.68)	1.09	(1.00-1.19)
04-05	0.88	(0.86-0.90)	0.69	(0.52-0.93)	0.44	(0.33-0.60)	1.91	(1.73-2.10)

Table 3: *Relative risk of death for different disability years relative to disability in 1992-1993. Women.*

Disability year	General population		Psychiatric disorders		Musculoskeletal diseases		Other	
	Relative risk (95% c.i.)							
92-93	1.00		1.00		1.00		1.00	
94-95	0.96	(0.95-0.97)	0.91	(0.83-1.00)	0.90	(0.83-0.97)	0.87	(0.83-0.91)
96-97	0.93	(0.92-0.94)	0.94	(0.85-1.03)	0.90	(0.83-0.99)	0.87	(0.82-0.91)
98-99	0.90	(0.90-0.91)	0.82	(0.74-0.91)	0.74	(0.67-0.82)	0.82	(0.78-0.86)
00-01	0.88	(0.87-0.89)	0.76	(0.68-0.85)	0.74	(0.66-0.83)	0.79	(0.75-0.84)
02-03	0.85	(0.83-0.86)	0.80	(0.70-0.91)	0.61	(0.53-0.71)	0.87	(0.81-0.92)
04-05	0.82	(0.81-0.83)	0.72	(0.59-0.89)	0.74	(0.60-0.91)	1.20	(1.10-1.30)

Table 4: *Relative risk of death for different disability years relative to disability in 1992-1993. Men.*

decreases as time passes. For women in the general population the relative risk decreases by 12(10-14) percent over the twelve years we are considering. For men the corresponding result is 18(17-19) percent. The relative risk of dying decreases significantly faster for those disabled due to musculoskeletal diseases than for the general population. Results are listed in table 3 and 4. When discussing the changes in death-rates for different disability years, the change in the disability scheme in Norway should be considered. Elevated relative risks of death after the year of 2004 are shown for the group of other reasons for disability pension. This is

most likely a result of the shift in the disability regime, where some of the pensioners are provided with a time-limited disability benefit rather than a disability pension. It seems that those provided with a time-limited disability benefit have contributed a lower rate of mortality than the rest.

Effects of time from first granting disability

Here we consider the relative risks of dying in different years after first granting disability pension, relative to dying in the same year as pensioning. Results are adjusted for

Years from granting disability	Psychiatric disorders		Musculoskeletal diseases		Other	
	Relative risk (95% c.i.)					
0	1.00		1.00		1.00	
1	0.72	(0.57-0.91)	0.84	(0.67-1.05)	0.85	(0.79-0.92)
2	0.77	(0.63-0.95)	0.99	(0.81-1.20)	0.52	(0.48-0.55)
4	0.94	(0.77-1.15)	1.22	(1.00-1.49)	0.36	(0.33-0.39)
6	1.02	(0.83-1.26)	1.32	(1.08-1.61)	0.30	(0.27-0.33)
8	1.14	(0.92-1.42)	1.55	(1.26-1.90)	0.30	(0.27-0.33)
10	1.26	(1.01-1.57)	1.71	(1.39-2.11)	0.32	(0.29-0.35)
12	1.52	(1.18-1.95)	2.01	(1.60-2.54)	0.30	(0.26-0.35)

Table 5: *Relative risk of death different times from first granting disability relative to death in the year of granting disability pension. Women.*

Years from granting disability	Psychiatric disorders		Musculoskeletal diseases		Other	
	Relative risk (95% c.i.)					
0	1.00		1.00		1.00	
1	0.93	(0.79-1.10)	0.94	(0.77-1.13)	0.83	(0.77-0.88)
2	0.98	(0.85-1.14)	1.04	(0.87-1.24)	0.60	(0.57-0.64)
4	1.04	(0.89-1.21)	1.17	(0.99-1.39)	0.54	(0.50-0.57)
6	0.99	(0.85-1.16)	1.40	(1.17-1.66)	0.55	(0.51-0.58)
8	1.11	(0.94-1.30)	1.53	(1.28-1.83)	0.52	(0.48-0.56)
10	1.24	(1.05-1.46)	1.75	(1.46-2.10)	0.57	(0.53-0.62)
12	1.24	(1.01-1.52)	1.91	(1.56-2.34)	0.61	(0.55-0.67)

Table 6: *Relative risk of death different times from first granting disability relative to death in the year of granting disability pension. Men.*

age effects. For women disabled due to psychiatric disorders the rates of death are significantly reduced the first year after pensioning. For the following years the increase seems to be linear. No such significant reduction is found in the first year after disability pensioning of men for the mentioned cause. For those retired due to other reasons, relative risks are significantly decreasing the first years after pensioning for both genders. For women up to a 70(65-74) percent and men a 40(36-43) percent reduction compared to the year of pensioning. The death rates for this group are very high immediately after pensioning. Despite the considerable reduction, death rates stay in excess of rates from the other disability causes. A slight increase is in the following years shown for men, seemingly due to a general age effect. Results are listed in Table 5 and 6.

Discussion

Literature

Used as background information is Paulsboe's master thesis [4]. Paulsboe shows overall increased rates of mortality among the disability pensioners. For women and men over 60 and 65 years he shows decreased mortality among the disabled due to musculoskeletal disorders in comparison to the general population mortality. Unfortunately, no exact figures are listed in the thesis.

Karlsson et al. [3], a Swedish study also shows excess mortality among the disability pensioners. The excess mortality here decreases as age increases. Different causes of disability have not been considered in this study.

In [2], Gjesdal et al. investigate excess mortality after a long-term sickness absence.

This study also considers cause of sickness absence. Death rates are significantly lower for all of these groups than for the general population. For women with musculoskeletal diseases, the standardized mortality rates are lower than 1, but not significantly.

An article provided by Gjesdal et al. [1] shows excess mortality among all disability pensioners, with one exception for women disabled due to musculoskeletal disorders, where the increased mortality is shown to be insignificant. Constant hazard ratios are used throughout, so no age specific results are shown for the different disability causes.

Strengths and limitation of the study

While previous studies have shown differences between rates of death due to different disability causes, this study provides age specific death rates for the different causes. We have argued for this to be necessary by showing that the excess mortality is strongly age related.

Due to a limited number of deaths among the disability pensioners of young age, the data have been given on an aggregated level. This is to prevent identification of individuals. Because of this, effects from a single age-group will be counterbalanced by contributions from other age-groups. Results in the youngest age-groups are somewhat uncertain, which is reflected in the large confidence intervals observed. The uncertainty decreases as age increases.

The study also relies on a single data sample, and in order to confirm the results similar studies on related datasets are called for.

Conclusions

The study has shown excess rates of death for disability pensioners compared to the general population. It is also shown that the excess rates of death are strongly age related. Both year of disability pensioning and years from time of granting disability pension are significant explanatory variables for explaining the rates of death of the different disability causes. A limited number of observation in young ages and working with a single data sample of disability pensioners weakens the results.

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