Working life expectancies of aging Finnish workers in the municipal sector

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Citation

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Abstract

We estimated the future duration that a worker of a given age would spend in different states of occupational health. We used data from questionnaire surveys of 6257 aging Finnish municipal workers in 1981, 1985, and 1992. Work ability was assessed by self-rated scoring. Complementary information was obtained from disability and mortality registers. We first estimated age-specific transition probabilities between different occupational health states. We then summed up the probabilities to calculate working life expectancies. We estimated that the remaining working life expectancy for a 49-year-old workers was 9 years for both men and women up to the statutory retirement age of 63 years. Transition from poor to good work ability increased working life expectancy of a 45-year person by 4 years for both genders. For all female and male cohorts aged 45 to 51 years in 1981, persons initially in a state of worse than average work ability left work force due to disability or death earlier than those with a better initial capacity for work. The study indicates that the work ability of aging Finnish workers deteriorates prematurely. This unfavorable upshot can lead to significant socioeconomic consequences for the society because of a looming labor force shortage that could undermine the sustainability of a welfare state.

INTRODUCTION

Health problems related to capacity for work increase naturally as a population ages. Study results show that aging Finnish workers' work ability deteriorates prematurely.[1] This development can cause serious social and economical consequences because of a looming labor force shortage. Thus, it is important to examine the development of work ability at relatively early ages when is still possible to intervene in the process of human resources in relation to work. The International Labor Office defines an aging person as an individual who is 45 years or older.[2] (The age limit of 45 years is, of course, arbitrary; in other studies an aging person has been defined as being 50- or 55-years old.) The need for early preventive measures has been stressed by the low labor force participation rate in the age groups of 55-years and older and by the untimely exit of aging workers from worklife.[3] In this study, we considered the measurement of the quality of work life taking into account the proportion of life years that a person spends with a given capacity for work. The aim of the study was to quantify how long a 45-year-old municipal worker, on the average, continues in work life, and what is the evolution of his/her capacity for work. For the assessment we developed a novel statistic that we call working life expectancy (WLE). This indicator corresponds conceptually to life expectancy, which is used in demography, in the sense that it measures the time that a person of given age is expected to be working in the future assuming that disability, morbidity and mortality prevail at the current level. WLE a statistical abstraction based on age-specific mortality rates as well as on prevalence rates of health and on work ability states. Estimates of WLEs were derived using epidemiologic research data and population statistics.

The estimation of a WLE requires usually that data on a population's transition from one work ability state to another are available. Such information can be extracted from epidemiologic cohort studies. For example Valkonen et al.[4] computed the life expectancy for able-bodied and disabled persons in Finland by applying Sullivan's[5] prevalence-based method to the data of the 1986 nationwide Survey of Living Conditions[6] conducted by Statistics Finland. This method produces life expectancy adjusted by health state expressed as a weighted index. However, it is basically based on a traditional period life table and cannot be used to estimate the WLEs between different health states.

Recently Davis et al.[7,8,9] developed a method based on a stochastic process for the analysis of Australian health survey data. This new procedure makes it possible to estimate transition probabilities from one health state to another as the study cohort ages. However, longitudinal studies are often expensive and typically suffer from loss of information because of incomplete follow-up. For these reasons independent sequential cross-sectional surveys of the cohort is an easier and cheaper alternative approach for the computation of WLEs. Using a regression model for the probabilities we can reconstruct relevant parts of the underlying longitudinal process.

DATA AND METHODS

The data analyzed in this study originated from cross-sectional surveys of aging municipal workers conducted by the Finnish Institute of Occupational Health in 1981, 1985, and 1992.[10] The total cohort consisted of a representative sample of "active" (i.e. full-time) workers employed in the municipal sector. The sample size was 6,257, and the age range was 45-58 years at the start of the follow-up (Table 1). Seven birth cohorts aged 45 to 51 years in 1981 were included in the analysis. Older birth cohorts (aged 52 to 58 in 1981) were excluded because of an incomplete 11 year follow-up period. At time of the third survey when the persons were 55-69 years old, 18% of them were still working, 5% did not respond to the questionnaire but were not on pension, 30% were on disability pension, 41% belonged to the group 'other alive' (students, conscripts, unemployed, old-age retirees etc.), and 6% had died. Information on disability was obtained from the Finnish Centre for Pensions and mortality data were extracted from the cause of death register kept by Statistics Finland.

Table 1

The original Finnish cohort of 6,257 municipal employees by gender, employment or work ability status in the survey years 1981, 1985, and 1992.

Employment or work ability status	1981 Age: 45-58		1985 Age: 49-62		1992 Age: 56-69	
	Men	Women	Men	Women	Men	Women
Active employee	3,460	2,797	2,685	2,001	669	432
Work ability:						
Excellent	640	464	268	208	81	61
Good	976	690	701	525	154	78
Fair	972	778	1,048	750	262	172
Poor	369	362	358	274	123	85
No information on work ability	503	503	310	244	49	36
No response but no information on pension	-	-	215	257	152	162
On disability pension	-	-	246	298	947	906
On old-age pension or other alive state	-	-	289	174	1,573	1,022
Deceased	-	-	25	67	119	275
Total	3,460	2,797	3,460	2,797	3,460	2,797

Source: Data of the follow-up study[10]

The determination of work ability status was based on self-perceived assessments of the workers using a work ability index.[11] The index consists of seven items that measure subjective estimation of present work ability compared with the lifetime best, perceived work ability in relation to both physical and mental demands of the work, number of diagnosed diseases, subjective estimation of work impairment due to disease, sickness absence during the past year, own prognosis of work ability after two years, and psychological resources. We classified the index into four categories: 1 = excellent, 2 = good, 3 = fair, and 4 = poor work ability. These categories comprised 21%, 33%, 32%, and 14%, respectively, of those who responded to the inquiry in 1981 (Table 1).

For the estimation of WLEs we applied the methodology developed by Davis et al.[7,8] We first estimated the transition probabilities of moving from one occupational health state to another. We considered two different state spaces with four states in each: ('excellent or good work ability', 'fair or poor work ability', 'on disability pension or dead', 'retired or other alive') and ('employed', 'on disability pension', 'retired or other alive', 'dead').

Of importance are the probabilities that an individual is in work-health state i at a subsequent age x, written $p_i(x)$. The expectations of interest are of the form (defined here for age range 16-63 years)

$$e_i(x) = \sum_{x=16}^{63} p_i(x)$$

If state 1 is 'employed', then e $_1$(x) yields the working life expectancy. We are also interested in transitions from a work-health state to another and the corresponding probabilities and expectancies. The statistical details have been presented in a previous article. [12]

RESULTS

Table 1 shows changes in the distributions of the female and male cohorts at entry as well as during the successive 4-year and 7-year follow-up periods, respectively. In the period 1981-1985, the distributions shifted markedly towards worse capacity for work. In 1981, for example, 21% of the respondents were in excellent work ability, whereas in 1985 the corresponding figure was only 12%. During the latter period, 1985-1992, the shift in the distributions was slightly more lopsided towards poor work ability because of the longer follow-up. In 1985, for example, 15% of the women were in the poor work ability class, whereas in 1992 the corresponding figure had risen to 21%. The trends were similar for both genders.

Figure 1a

Probability distribution of work-health states for female workers at different ages.

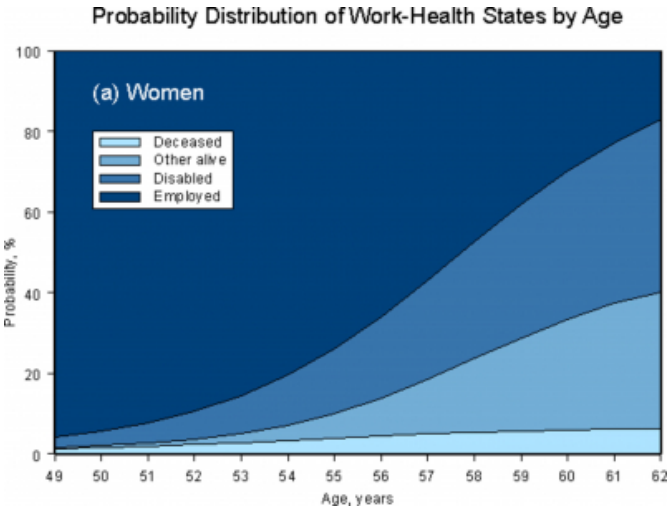


Figure 1b

Probability distribution of work-health states for male workers at different ages.

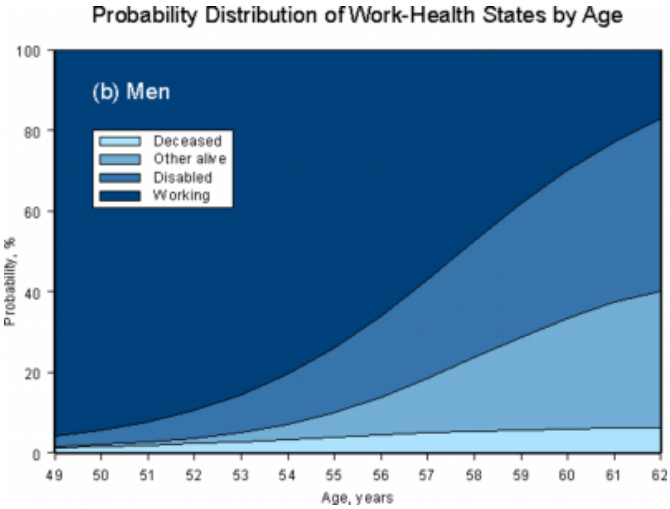


Figure 1 presents the distribution of estimated probabilities of being at a given age in one of the four states: (1) either 'working', (2) 'on disability pension or otherwise outside the work force', (3) 'other alive state (retired etc.)', or (4) 'deceased'. The employment rate decreased monotonously with age for both genders in the age interval 49-62 years. The gender gap among the proportion of workers remaining employed was in favor of women for ages 45-59 years, after which it favored men. Men were more prone than women to leave for a disability pension, especially at the older ages, 60-62 years. To counterbalance this development, women tended to retire more often than men at ages 58-62 years.

Table 2

Estimated probabilities, at age x, for staying employed (state 1), p1(x), or moving from that state to the state of being on disability pension (state 2), p2(x), old-age pension or other alive (state 3), p3(x), or dead (state 4), p4(x).

Age, years x	Women				Men			
	$p_1(x)$	$p_2(x)$	$p_3(x)$	$p_4(x)$	$p_1(x)$	$p_2(x)$	$p_3(x)$	$p_4(x)$
49	98.00	1.52	0.08	0.40	95.69	2.72	0.18	1.40
50	97.09	2.31	0.16	0.43	94.23	3.74	0.36	1.67
51	95.73	3.47	0.32	0.48	92.19	5.12	0.69	2.00
52	93.69	5.13	0.62	0.56	89.38	6.95	1.28	2.39
53	90.70	7.45	1.18	0.67	85.55	9.34	2.27	2.84
54	86.40	10.57	2.21	0.82	80.44	12.35	3.84	3.36
55	80.42	14.53	4.02	1.024	73.90	15.99	6.19	3.92
56	72.45	19.18	7.08	1.29	65.94	20.14	9.43	4.48
57	62.45	24.04	11.88	1.63	56.90	24.58	13.52	5.01
58	50.91	28.27	18.81	2.02	47.37	29.009	18.19	5.45
59	38.86	30.88	27.81	2.45	38.10	33.11	23.00	5.78
60	27.67	31.21	38.23	2.900	29.75	36.77	27.49	6.02
61	18.40	29.26	49.01	3.34	22.68	39.95	31.20	6.18
62	11.54	25.65	59.03	3.78	17.01	42.79	33.91	6.30

Table 2 gives the following numerical results. Of the 60-year-old female and male workers 28% and 30%, respectively, remained actively engaged in work life. At the age of 62 years only 12% of women and 17% of men continued working. This finding indicates that most municipal workers left work life before the statutory retirement age. A man ran a 43% risk of retiring prematurely on a disability pension; for a woman, the risk was only 26%. A man's corresponding probability to retire on an old-age pension or similar pension was 34%, whereas; for women it was much greater, 59%. A man's risk of dying before the age of 63 years was 6.3%; for a woman the risk was 3.8%. In general, men's death risk was two- to fourfold women's rate, and the rate was accentuated in the younger age groups.

Figure 2a

Expected number of years of remaining work life spent in different work-health states for women at different ages.

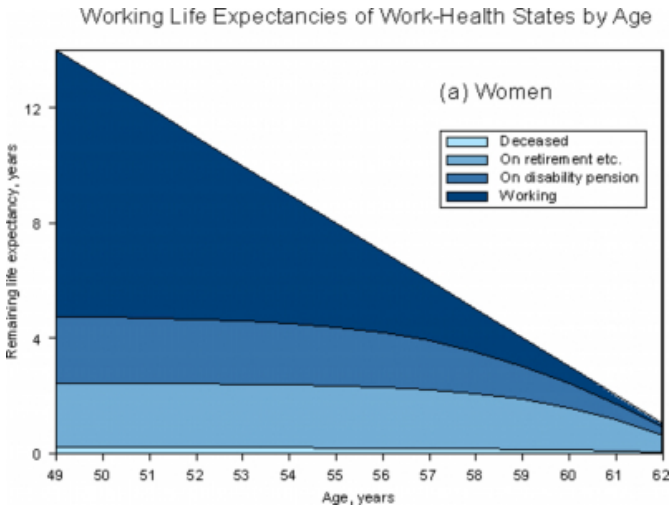


Figure 2b

Expected number of years of remaining work life spent in different work-health states for men at different ages.

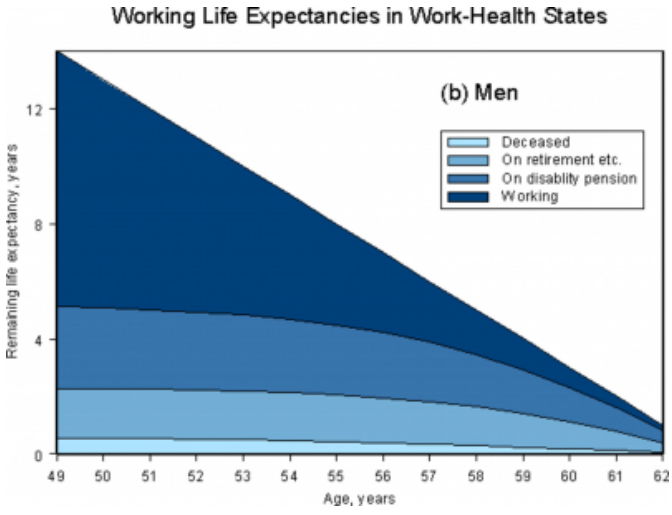


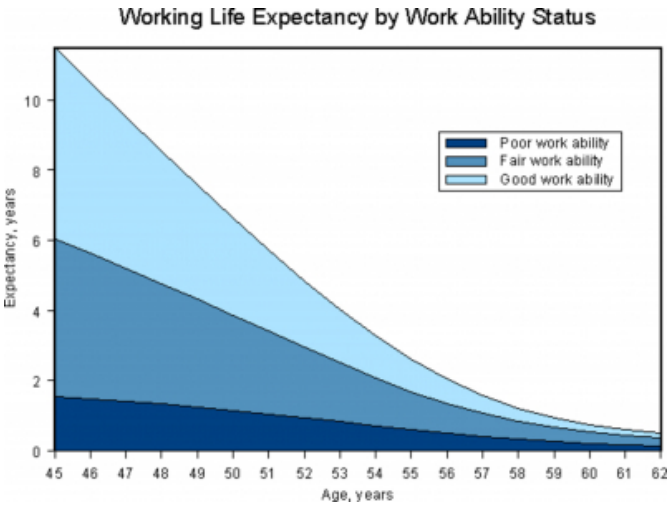
Table 3

Expected number of years of remaining work life up to age 63 years at age x, spent working (state 1), e1(x), disability pension (state 2), e2(x), on old-age pension or 'other alive' (state 3), e3(x), or being deceased (state 4), e4

Age, years	Women				Men			
x	$e_1(x)$	$e_2(x)$	$e_3(x)$	$e_4(x)$	$e_1(x)$	$e_2(x)$	$e_3(x)$	$e_4(x)$
49	9.24	2.33	2.20	0.22	8.89	2.83	1.72	0.57
50	8.26	2.32	2.20	0.21	7.93	2.80	1.71	0.55
51	7.29	2.30	2.20	0.21	6.99	2.76	1.71	0.54
52	6.33	2.26	2.20	0.20	6.07	2.72	1.70	0.52
53	5.40	2.21	2.19	0.20	5.18	2.64	1.69	0.49
54	4.49	2.14	2.18	0.19	4.32	2.55	1.67	0.46
55	3.63	2.03	2.16	0.18	3.52	2.42	1.63	0.43
56	2.82	1.88	2.120	0.17	2.78	2.26	1.57	0.39
57	2.10	1.69	2.05	0.16	2.12	2.06	1.47	0.35
58	1.47	1.45	1.93	0.14	1.55	1.82	1.34	0.30
59	0.96	1.17	1.74	0.12	1.08	1.53	1.16	0.24
60	0.58	0.86	1.46	0.10	0.69	1.20	0.93	0.18
61	0.30	0.55	1.08	0.07	0.40	0.83	0.65	0.12
62	0.12	0.26	0.59	0.04	0.17	0.43	0.34	0.06

The distribution of the expected duration of remaining work life in the states of being 'employed', 'on disability pension', 'other alive', and 'dead' is depicted in Figure 2. Numerical results are given in Table 3. Consider a worker who enters employment at the age of 49 years. This individual has at most 14 years of remaining work life before the statutory retirement age of 63 years. The study estimated that a male worker is an active employee for 8.9 years, and a female worker for 9.2 years, on average. Women were expected to be working longer than men at the ages of 45-58 years, after which the difference was in favor of men. At all ages a man's expected duration of being on disability pension was longer than that of a woman, although the difference diminished with age. To counterbalance this trend, women stayed consistently longer than men in the 'other alive' state, most likely as students in the younger age groups, as house wives in the middle age groups, and as retirees in the older age groups.

Figure 3



The WLE of 45-year-old men having excellent or good work ability was estimated to be 5.5 years, 4.5 years with fair work ability, and 1.5 years with poor work ability (Figure 3). The WLEs in the respective work ability classes for women were estimated to be longer: 5.6 ('excellent or good'), 5.0 ('fair'), and 1.6 ('poor') years. Thus, the effect of a transition at the age of 45 years from the initial state of 'poor' to 'good' work ability was estimated to be, on average, 4 years of gained active work life for both genders.

For all female and male cohorts, aged 45 to 51 years in 1981, the persons initially in a state of worse than average work ability left the work force due to disability or death sooner than those with better initial capacity for work. For example, we estimated that a 45-year-old individual in a 'poor/fair state was affected by disability or death 2.2 years sooner than an individual in a 'good/excellent' state. For detailed results of these conditional WLEs that depend on the initial work ability state, see Nurminen et al.[12]

DISCUSSION

What sort of picture do the estimated WLEs paint of an aging municipal worker's ability to cope with major changes that occur in relevant work-related functions during the course of work life? Is working 6 years in the age interval of 45-62 years with 'poor or fair' work ability (see Figure 3) a large or small fraction of the maximum WLE? Answers to these questions depend, of course, on what kind of population is selected as a referent population to which the estimates are compared. But, if we consider the expectancies as percentages of future working life up to age 63 years, then, for example, a 45-year-old female worker was employed 70% of the maximum time of 17.5 years. The corresponding male figure was 66%. But, more than a half of

this work time was spent with 'poor/fair' work ability for both genders. Thus — taking into account the previously lower retirement age in the municipal sector — we have to verify that the WLE of 12 years with 'good/excellent' work ability cannot be regarded as a satisfactory result. One has to remember, though, that this result reflects working conditions mainly in the 1980s.

The present study demonstrates that the work ability of an aging Finnish worker deteriorates prematurely (i.e. before the statutory retirement age), and this can lead to far-reaching socioeconomic consequences. Thus, it is important to examine the development of work ability already before the age of 45 years, when it is still possible to intervene in the process by promoting work ability. Greater labor flexibility and concerted effort are needed to encourage higher labor force participation of older workers, particularly skilled people. Especially aging male workers would need more flexible working time arrangements. Free time is appreciated clearly more when one ages, and particularly men tend to retire early in order to gain time for their own activities. Older workers have the potential to make a continuing social and economic contribution to Finland. The extent of this contribution will depend on the ability of older workers to continue to work, and their interest in doing so. It will also be influenced by the changing nature of work and the attitudes of employers towards the value of older age workers.

If the employment rate declines, this scenario entails risks because of the effects of population aging. The present working-aged population, especially the large age cohorts born in 1945-1949 (relatively the largest in Europe), will be reaching retirement age in the years 2005-2014, as younger and smaller cohorts are joining the labor force. The inevitable consequence will be a steady shrinkage of the working-aged population starting in 2005. Hence Finland faces a future of dwindling numbers of employed who will have to pay for the increased costs of health care and social security of the expanding retired population.

The young may resent the tax burden imposed on them to pay for pension and health expenditure on the elderly. Priority should be given to curbing the burden of taxation on the working population. On the other hand, there is a looming intergenerational conflict if baby-boomers must prepare themselves to give way economically to the succeeding generations. It could be reasoned that the generations now approaching retirement age do not have an automatic right to expensive social welfare subsidised by younger workers. Thus the future economic success of all developed countries depends on how they can cope with the high level of the economic dependency ratio. The countries that will do worst are those where the population is aging the fastest, and where governments have made the most generous promises, for example, regarding the reduction of unemployment.[13] Here we are looking mainly at Europe, and especially at Finland, to find this combination of problems.

We conclude that WLE is an appropriate and readily interpretable measure to describe statistically the way in which a population's working capacity develops in different initial states and how it affects premature mortality, disability, and old-age retirement. Summary measures of working population health[14] provide useful information for evaluating the labor force potential and the factors affecting retirement, as well as for assessing the need for a program to encourage employees to continue in work life.

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