

# Self-reported work-related health problems from the Oslo Health Study

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<b>Background</b>	Lack of knowledge about the occurrence of work-related health problems in the general population makes it difficult to estimate the potential for their prevention in the workplace.
<b>Aims</b>	To examine the prevalence of self-reported work-related health problems among adult citizens of Oslo, Norway.
<b>Methods</b>	The study was part of the Oslo Health Study 2000–2001, in which all individuals in certain age cohorts were invited to a comprehensive health screening. All 30-, 40- and 45-year old subjects who attended the screening were asked if they had experienced any of 11 common health problems in the past month, and whether they considered these to be work-related. Of the 26 074 invitees in these age cohorts, 8594 (33%) answered the questionnaire.
<b>Results</b>	Nearly 60% of subjects reported one or more work-related health problems, most commonly reported were pain in the neck/shoulders (38%) and low back pain (23%). Neck/shoulder pain was most frequently attributed to working conditions, by 74% of subjects with this problem; followed by arm pain (72%), fatigue (51%) and low back pain (50%). Work-related fractions for eczema and asthma symptoms were 23 and 18%, respectively. There were marked gender differences, but small age differences.
<b>Conclusions</b>	A substantial proportion of common health problems in the Oslo population were attributed to working conditions. This implies a large preventive potential and call for increased preventive efforts targeted at known risk factors in the workplace.
<b>Key words</b>	Epidemiology; occupational health; prevalence; prevention; questionnaire; self-reported work-related symptoms.

## Introduction

There is a well-established relationship between certain working conditions and specific health problems [1–4]. Less is known about the occurrence of work-related health problems in the general population, and consequently the potential for their prevention at the work site. Such information may be obtained from several sources.

Risk ratios obtained from the epidemiological literature, combined with exposure prevalences, have been used to quantify the impact of working conditions on specific diseases, for example cancer [5], cardiovascular diseases [6], shoulder/neck conditions [7] and cause-specific mortality [8].

National registers of work-related diseases and injuries are another source for determining the health impact of

occupational exposure [9,10]. However, the Norwegian registers are far from complete [11–13]. Although notification is required by law, only 3% of Norwegian general practitioners and <25% of occupational physicians reported work-related diseases to the Labour Inspection Authority in 2003.

Population surveys comprise a third source. Statistics Norway runs regular surveys on perceived work exposure and work-related health problems in representative samples of the Norwegian population [14]. Their samples, however, are too small to give reliable information about work-related health problems in subgroups of the population [15]. The Oslo Health Study provided an opportunity to examine a larger, regional sample of selected age cohorts.

The aim of the present study was to examine the occurrence of work-related health problems and their impact on the total burden of ill-health among Oslo citizens. We focused on cohorts aged 30, 40 and 45 years. Compared to older cohorts, their occupational exposures are nearer in time, and their health problems are more likely to reflect conditions prevailing in today's working

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life, amenable to prevention. Results were compared with corresponding results from the smaller, national Survey of Living Conditions 2000, by Statistics Norway.

## Methods

The Oslo Health Study was conducted in 2000–2001 under the joint collaboration of the National Health Screening Service of Norway (now part of the Norwegian Institute of Public Health), the University of Oslo and the Municipality of Oslo. The study consisted of a central core project and 70 supplementary projects. All individuals in Oslo County born in 1970, 1960, 1955, 1940/41 and 1924/25 (40 888 in total) were invited by letter to attend a health screening.

The 26 074 citizens in the three youngest cohorts were selected for the present study (invitees). Of these, 10 711 attended a physical examination and/or filled in at least one questionnaire in the Oslo Health Study (attendees), and 8594 returned the questionnaire on work-related health problems (responders).

The main questionnaire was distributed with the letter of invitation, advising that it was available in 11 other languages. Two reminders were sent to non-responders, the second one inviting suburban citizens to mobile screening units in their neighbourhood. Assistance from field workers to complete the questionnaires was offered to citizens with poor Norwegian language skills. This main questionnaire was returned at the time of the health screening. Those unable to attend the screening were asked to return it by mail.

Supplementary questionnaires were distributed at the health screening with pre-stamped self-addressed envelopes. Attendees who did not return them were reminded once. All questionnaires were self-administered, and asked for information on health status, symptoms, diseases and various aspects of health behaviour [16].

One of the supplementary questionnaires included questions on work-related health problems, modified from questions used by Statistics Norway [14]. The introductory question, 'Have you experienced any of the following common health problems in the last month, and are they totally or partially caused by working conditions in your present or previous job?' was followed by a list of 11 commonly work-related health problems [1,13,14]:

- (i) eye symptoms with itchiness, soreness, redness or watering eyes
- (ii) nose symptoms with stuffiness, sneezing or running nose
- (iii) chest tightness, wheezing
- (iv) heavy breathing when walking up hills or climbing stairs
- (v) eczema, itching skin, skin rash
- (vi) impaired hearing

- (vii) pain in neck or shoulders
- (viii) pain in elbow, forearm, hand
- (ix) low back pain
- (x) extraordinary tiredness or fatigue and
- (xi) sleep disturbance, problems falling asleep.

Response categories were No, I have not experienced this; Yes, but not caused by work and Yes, totally or partially caused by work.

Data from Statistics Norway, Survey of Living Conditions 2000 were included for comparison. From a representative population sample of 4940 individuals aged 15–66 years, interviews were conducted with 3185 (64%) by telephone or in person [15]. Comparisons were restricted to the 1080 employed subjects aged 30–45 years: 523 women and 557 men.

From the Survey of Living Conditions 2000, the following questions were selected for analysis, corresponding to the questions in the Oslo Health Study: 'To what extent have you suffered from these common health problems? Have you in the last month suffered very much, suffered quite a lot, suffered somewhat, or not suffered from:

- (i) asthma or other airway problems?
- (ii) eczema or allergic skin rash?
- (iii) pain in neck, shoulders or upper back?
- (iv) pain in arms, wrists or hands?
- (v) low back pain?
- (vi) extraordinary tiredness or fatigue?

Confirmative answers led to a follow-up question: 'Is this totally or partially caused by your present job? Yes or No'. Only employed subjects were asked these questions. Comparisons of answers between the two surveys were therefore restricted to the 7640 employed responders in our study.

'Attendees' and 'responders' of the Oslo Health Study were compared with the 'invitees' on background variables, including socio-demographic characteristics based on public register data from Statistics Norway. The crude and adjusted odds ratios (ORs) for response among the invitees were estimated by logistic regression including all the socio-demographic variables as covariates.

Prevalences of self-reported 'health problems' and 'work-related health problems' were calculated as valid per cent, excluding missing answers. The 'work-related fraction' was calculated as the ratio between the two prevalences. Unstratified prevalences were adjusted for age and gender by direct standardization based on the distribution in the invited population. Data were otherwise stratified by gender and age, grouping subjects aged 40 and 45 years together. In our analyses of Statistics Norway, Survey of Living Conditions 2000, the first three response categories (suffered very much/suffered quite a lot/suffered somewhat) were grouped together as 'suffered'. Observed proportions were compared using the

chi-square test. A two-tailed  $P$ -value  $< 0.05$  was considered statistically significant. Analyses were performed using the statistical software SPSS 11.5 for Windows.

The study protocol was approved by the Regional Committee for Medical Research Ethics and the Norwegian Data Inspectorate.

## Results

Table 1 shows attendance and response according to selected background variables. A total of 8594 subjects returned the supplementary questionnaire on work-related health problems, representing 80% of those who attended the health screening, and 33% of the invited population. The response frequency was higher among females than among males, and increased with age. Individuals with low education, low income, disability benefit or of non-Western origin, were under-represented. The low response of subjects with low education, low income or disability benefit was partly due to low attendance. Subjects born in non-Western countries had a low response, despite near average attendance, due to failure to return the questionnaire. Adjusting for all background variables did not markedly change the overall pattern of response in most subgroups, but country of birth and low income became less important. Item response frequencies among the 8594 responders were 96–98%.

The prevalences of self-reported health problems in the past month, standardized by age and gender, are shown in Figure 1. Pain in the neck/shoulders and low back pain were most commonly reported, by 52 and 46% of subjects, respectively, followed by fatigue (39%), nose symptoms (36%) and sleep disturbance (30%).

While 85% of subjects reported one or more of the health problems listed, nearly 60% attributed one or more of them to present or previous jobs. The most frequently reported work-related health problem was pain in the neck/shoulders (38%), followed by low back pain (23%), arm pain (pain in elbow, forearm, hand) (20%) and fatigue (20%).

The work-related fraction of the total prevalence was highest for pain in the neck/shoulders (74%) and arm pain (72%), followed by fatigue (51%) and low back pain (50%). The work-related fractions for impaired hearing, eczema and asthma symptoms were 28, 23 and 18%, respectively.

In Table 2, the gender-specific prevalences of the health problems, the work-related health problems, and the work-related fractions are presented. In Table 3, the material is stratified according to age, using two age strata (30 and 40/45 years of age).

Women reported pain in the neck/shoulders, arms and lower back more frequently than men, but the fractions perceived as work-related were the same. Total prevalences of pain were higher in the oldest age group, but

the age difference for work-related pain was statistically significant for arm pain only.

Work-related respiratory symptoms were more frequent in men than in women, and more frequent in the oldest age group. Women reported eczema somewhat more often than men, but the work-related fractions were similar, and there were no age differences. Impaired hearing was more prevalent among men and in the oldest age group, and men had a higher work-related fraction.

Table 4 shows results from the Survey of Living Conditions 2000, compared with results among employed subjects in the Oslo Health Study. The mean age in the two surveys was 37.2 and 38.1 years, respectively. The prevalence estimates were similar or somewhat lower in the Survey of Living Conditions compared to the Oslo Health Study, while most work-related fractions were similar or higher. The gender differences in prevalence estimates were comparable in the two surveys.

## Discussion

In this study of 8594 Oslo citizens, aged 30, 40 and 45 years, self-reported work-related health problems were highly prevalent. Nearly 60% reported one or more work-related health problem, and a high proportion of reported health problems were attributed to working conditions.

The low attendance in the study is a matter of concern. In recent years, the response frequencies of population surveys have declined in Norway, as well as in other countries [17]. As it affects all projects in the Oslo Health Study, possible selection bias has been thoroughly examined. Sogaard *et al.* [17] found that self-rated health, mental health (Hopkins Symptom Check List), smoking and body mass index in the attendees differed only slightly from estimated prevalence values in the invitees, when weighted by the probability of attendance based on background variables. Estimates based on the assumption that the prevalences among non-attending individuals differed from those attending by no more than 50%, differed only moderately from observed values. Sogaard *et al.* concluded that self-selection according to socio-demographic variables had little impact on the prevalence estimates of these examined health-related variables. As we have similar outcome variables, we assume that their conclusion is valid also for this study.

Attendance according to disability benefit indicates that healthy persons were over-represented among attendees in the Oslo Health Study (Table 1). Among the responders of the supplementary questionnaire, 85% reported their present state of health to be very good or good, against 73% of those who answered the main, but not the supplementary, questionnaire. The response was also lower among individuals born in non-Western countries, a subgroup that reported higher frequencies of work-related health problems than individuals of

**Table 1.** Attendance (attended at screening and/or submitted at least one questionnaire) and response to supplementary questionnaire among invited subjects aged 30, 40 and 45 years ( $n = 26\ 074$ ) in the Oslo Health Study 2000–2001

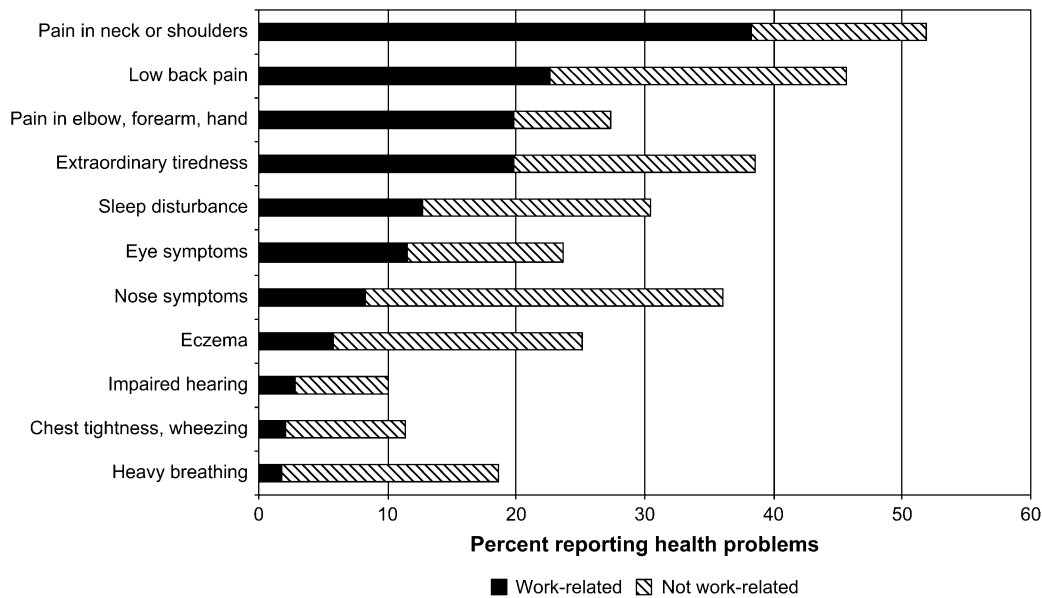
	Number invited <sup>a</sup>	Attendance (%) <sup>b</sup>	Responders		Crude OR	Adjusted OR	(95% CI)
			% attendees <sup>b</sup>	% invited <sup>b</sup>			
All	26 074	41	80	33			
Sex							
Women	12 810	46	81	38	1.00	1.00	
Men	13 264	36	79	28	0.65	0.64	(0.61–0.68)
Age							
45	6 763	47	80	37	1.00	1.00	
40	7 907	44	80	35	0.90	0.90	(0.84–0.97)
30	11 404	36	80	29	0.68	0.66	(0.62–0.72)
Marital status							
Married	10 264	46	78	36	1.00	1.00	
Unmarried/cohabitant	12 532	38	83	32	0.84	0.84	(0.78–0.90)
Widowed	130	47	79	37	1.06	1.12	(0.76–1.64)
Separated/divorced	3 052	37	79	29	0.76	0.71	(0.64–0.78)
Registered partnership	82	44	89	39	1.16	1.11	(0.68–1.81)
Country of birth							
Norway	20 214	42	85	36	1.00	1.00	
Western countries <sup>c</sup>	1 748	37	84	31	0.80	1.00	(0.89–1.12)
Non-Western	4 112	39	53	21	0.50	0.62	(0.56–0.68)
Region of residence							
Outer east	10 019	46	78	36	1.00	1.00	
Outer west	5 854	43	84	36	1.00	0.76	(0.71–0.82)
Inner west	3 886	36	85	30	0.76	0.66	(0.61–0.72)
Inner east	4 625	39	80	31	0.80	0.84	(0.78–0.92)
Education							
College/university	11 456	45	86	38	1.00	1.00	
Upper secondary	10 218	40	79	31	0.73	0.69	(0.65–0.74)
Lower secondary	2 671	32	67	22	0.44	0.43	(0.39–0.48)
Unknown	1 727	38	66	25	0.53	0.25	(0.21–0.31)
Total income (NOK)							
400 000+	4 500	38	84	32	1.00	1.00	
199 000–399 000	13 845	44	83	37	1.22	1.34	(1.24–1.46)
100 000–199 000	4 409	37	73	27	0.78	1.05	(0.94–1.17)
<100 000	2 855	29	69	20	0.53	0.72	(0.64–0.82)
Disability benefit							
No	24 756	41	81	33	1.00	1.00	
Yes	921	30	67	20	0.51	0.57	(0.47–0.68)
Single parent benefit							
No	25 208	40	81	33	1.00	1.00	
Yes	469	36	69	25	0.69	0.77	(0.61–0.96)
Rehabilitation benefit							
No	25 317	40	81	33	1.00	1.00	
Yes	360	40	71	28	0.82	0.80	(0.62–1.02)
Sickness benefit							
No	24 668	40	81	33	1.00	1.00	
Yes	1 009	40	77	30	0.91	0.82	(0.71–0.95)
Unemployment benefit							
No	24 913	40	81	33	1.00	1.00	
Yes	764	34	76	26	0.73	0.88	(0.74–1.05)

Association between socio-demographic variables and response among invited subjects as crude OR and adjusted for all variables in the table by logistic regression [95% confidence interval (CI) for the adjusted OR].

<sup>a</sup>The total number is <26 074 for some socio-demographic variables due to missing information.

<sup>b</sup>% represents valid per cent, excluding missing answers.

<sup>c</sup>Western countries (excluding Norway): Denmark, Greenland, Finland, Faeroe Islands, Iceland, Sweden, Belgium, France, Greece, Ireland, Italy, Malta, Netherlands, Portugal, Spain, Great Britain and Northern Ireland, Switzerland, Germany, Austria, Israel, Cyprus, Canada, United States, Australia, New Zealand.



**Figure 1.** Health problems experienced in the past month according to work-relatedness, as reported by citizens of Oslo aged 30, 40 and 45 years ( $n = 8594$ ). Prevalences adjusted for gender and age by direct standardization based on the distribution in the invited population. The Oslo Health Study 2000–2001.

**Table 2.** Prevalence of self-reported health problems in the past month and their work-relatedness; women ( $n = 4839$ ) and men ( $n = 3755$ ) aged 30, 40 and 45 years in the Oslo Health Study 2000–2001

Health problems	Self-reported health problems				Gender differences	Perceived as work-related				Gender differences	Work-related fraction <sup>a</sup>		
	Women		Men			Women		Men			Women	Men	
	<i>n</i>	% <sup>b</sup>	<i>n</i>	% <sup>b</sup>		<i>n</i>	% <sup>b</sup>	<i>n</i>	% <sup>b</sup>		%	Gender differences	
Pain in neck or shoulders	2844	61	1579	43	***	2111	45	1160	32	***	74	73	
Low back pain	2269	49	1583	43	***	1101	24	801	22	*	49	51	
Pain in elbow, forearm, hand	1418	31	878	24	***	1036	22	629	17	***	73	72	
Fatigue	2030	44	1232	34	***	981	21	676	18	**	48	55	***
Sleep disturbance	1504	32	1051	29	***	576	12	483	13		38	46	***
Eye symptoms	1213	26	781	21	***	598	13	372	10	***	49	48	
Nose symptoms	1759	38	1260	34	***	446	10	254	7	***	25	20	***
Eczema	1221	26	876	24	*	299	6	184	5	**	25	21	
Impaired hearing	389	8	422	12	***	86	2	133	4	***	22	32	**
Chest tightness, wheezing	526	11	417	11		76	2	90	2	**	14	22	**
Heavy breathing	966	21	607	16	***	67	1	80	2	*	7	13	***

<sup>a</sup>The fraction of the total prevalence represented by the work-related health problems.

<sup>b</sup>% represents valid per cent, excluding missing answers.

\* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

Western origin (not shown). Thus, the response was lower in subgroups with poorer health, which may imply that our prevalence estimates are conservative.

Self-administered questionnaires tend to be returned primarily by those who perceive the questions as relevant to their own situation [18]. However, the questions about work-related health problems were only a small part of the supplementary questionnaire. Bias due to selection

of individuals with self-perceived work-related health problems is therefore unlikely.

The prevalences of health problems in the Oslo Health Study were similar to, or somewhat higher than, the corresponding prevalences in the Survey of Living Conditions 2000. Socio-demographic differences among people living in the urban, more multicultural Oslo and a representative sample of the Norwegian population

**Table 3.** Prevalence of self-reported health problems in the past month by gender and age group (30 and 40/45 years) ( $n = 8594$ ) in the Oslo Health Study 2000–2001

Health problems	Self-reported health problems						Perceived as work-related					
	Women			Men			Women			Men		
	Age 30 years ( $n = 1855$ )	Age 40/45 years ( $n = 2984$ )	Age differences	Age 30 years ( $n = 1455$ )	Age 40/45 years ( $n = 2300$ )	Age differences	Age 30 years ( $n = 1855$ )	Age 40/45 years ( $n = 2984$ )	Age differences	Age 30 years ( $n = 1455$ )	Age 40/45 years ( $n = 2300$ )	Age differences
	% <sup>a</sup>	% <sup>a</sup>		% <sup>a</sup>	% <sup>a</sup>		% <sup>a</sup>	% <sup>a</sup>		% <sup>a</sup>	% <sup>a</sup>	
Pain in neck or shoulders	58	63 ***		39	45 ***		44	46		31	32	
Low back pain	46	50 *		38	46 ***		24	24		21	22	
Pain in elbow, forearm, hand	26	34 ***		20	27 ***		20	24 **		15	19 **	
Fatigue	45	43		32	35		22	20		19	18	
Sleep disturbance	28	35 ***		25	31 ***		12	12		12	14	
Eye symptoms	26	26		22	21		13	13		10	10	
Nose symptoms	39	37		36	33		10	9		7	7	
Eczema	26	26		24	24		6	6		5	5	
Impaired hearing	6	10 ***		9	13 ***		2	2		3	4 *	
Chest tightness, wheezing	9	13 ***		8	14 ***		1	2		2	3 **	
Heavy breathing	16	24 ***		12	20 ***		1	2 *		2	2	

<sup>a</sup>% represents valid per cent, excluding missing answers.

\* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

**Table 4.** Prevalence of self-reported health problems in the past month and their work-relatedness for employed women ( $n = 523$ ) and men ( $n = 557$ ) aged 30–45 years, Statistics Norway, Survey of Living Conditions 2000, and corresponding results from the Oslo Health Study (4167 women and 3473 men)—in brackets, as the questions are not identical

Health problems	Self-reported health problems				Perceived as work-related				Work-related fraction <sup>a</sup>			
	Women		Men		Women		Men		Women		Men	
	% <sup>b</sup>	(%)	% <sup>b</sup>	(%)	% <sup>b</sup>	(%)	% <sup>b</sup>	(%)	%	(%)	%	(%)
Pain in neck, shoulders or upper back	50	(61)	37	(42)	34	(48)	27	(32)	68	(79)	74	(76)
Low back pain	31	(47)	27	(42)	14	(24)	17	(22)	46	(51)	64	(51)
Pain in arms, wrists or hands	29	(30)	22	(23)	21	(23)	16	(18)	74	(77)	75	(75)
Extraordinary tiredness or fatigue	30	(43)	28	(33)	15	(22)	19	(19)	50	(52)	68	(57)
Eczema or allergic skin rash	16	(26)	11	(23)	5	(6)	3	(5)	35	(25)	33	(21)
Asthma or other airway problems	10	(11)	8	(10)	3	(2)	2	(2)	31	(14)	23	(23)

<sup>a</sup>The fraction of the total prevalence represented by the work-related health problems.

<sup>b</sup>% represents valid per cent, excluding missing answers.

could explain some of the observed differences. Omitting non-Western subjects in the Oslo Health Study reduced the differences between the two surveys (not shown). Varying distribution of industries and occupations and somewhat different design and questions could also have contributed to the differences between the two surveys. However, the overall consistency does not indicate a serious selection problem in the low attendance of the present study.

Musculoskeletal pain was the health problem most frequently perceived as work-related, with work-related fractions ranging from 49 to 74%, which is compatible with other studies [19,20]. The work-related fraction of asthma symptoms was 18% (age and gender standardized). An official statement of the American Thoracic Society, based on a review of 21 articles, concluded that 15% was a reasonable estimate of the occupational contribution to the population burden of adult asthma [21]. Our result is close to their conclusion, and emphasizes the importance of work in the causation or exacerbation of asthma.

In Norway, the employment level among women is high; in 2004, 81% of women and 87% of men aged 30–44 years were employed [22]. Work-related impaired hearing and respiratory symptoms were more frequent in men, compatible with men's work exposure [14]. Pain in the neck/shoulders, arms and lower back were more frequent in women. This is in accordance with other studies [19,23–25], and has been explained by risk factors, both at work and at home [26–29].

The prevalences of health problems were usually higher in the oldest age group, but for work-related health problems, there were only small prevalence differences. Reasons for this could be that the age interval is narrow and that subjects with work-related health problems may change to less harmful jobs or leave work, and thus non-persistent health problems may be reduced. However, for work-related respiratory symptoms and impaired

hearing, which tend to persist after exposure ceases, we found higher prevalences in the oldest age group. Work-related pain in the elbow/forearm/hand was also more prevalent in the oldest age group, which may suggest ongoing exposure or the persistence of pain after reduced exposure.

Our data reflect self-reported health problems and their perceived work-relatedness. We have no further information on the type, severity and work-relatedness of the health problems. People may vary as to what health problems they will report. Bjerkedal and Bakketeig [30] found acceptable agreement between patients' and physicians' reports of sickness, but some groups of diagnoses, especially mental and musculoskeletal disorders, tended to be under-reported by patients' compared to physicians' reporting based on their health records.

Attribution bias may influence reporting, i.e. the assessment of work-relatedness could reflect the attitudes and interests of the person who makes the assessment [31,32]. The responders in population-based surveys have nothing to gain or to fear by reporting their health problems as work-related. Thus, we do not believe that such interests have affected our results.

In a Norwegian study among employed patients in general practice, 40% of women and 54% of men reported their current illness to be work-related [33]. In another study, physical workload and psychological factors were assessed to have contributed to 48 and 32% of sickness certification cases, respectively [34]. These studies indicate that work-related health problems affect people's work and daily activities, and lead to the need for medical help and sick leave.

In this population-based study, a substantial proportion of 30-, 40- and 45-year old Oslo citizens reported work-related health problems in the past month. These results suggest a large potential for prevention by reduction of known risk factors in the workplace. Self-report

of work-related health problems may yield different prevalence estimates from data obtained by clinical examinations. This warrants further exploration.

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## Conflicts of interest

None declared.

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