

The Oslo Health Study: Reminding the non-responders – effects on prevalence estimates

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ABSTRACT

Background: Low response rates in population studies may lead to serious selection bias. Most surveys try to increase attendance by sending one or more reminders, but we do not know whether these efforts actually lead to less bias. In the Oslo Health Study we have previously shown that sociodemographic background variables are distributed differently in attendees and non-attendees. The aim of this study is to investigate the effect of sending reminders to increase the rates of attendance in the Oslo Health Study, on the distribution of demographic variables and on the prevalence estimates of selected variables.

Methods: The analyses were based on linkage between data from public registers in Statistics Norway and data from the Oslo Health Study, a cross sectional population-based survey inviting all citizens in five age-groups 30-76 years old. Demographic variables from public health registers were compared in persons attending directly without reminders (n=12,495), in all participants attending after up to two reminders (n=18,769) and in the total invited population (n=40,874). Prevalence estimates were compared in the two groups of participants attending directly (n=12,495) and after one or two reminders (n=6,274) and in the combined group of all participants.

Results: By means of two reminders the attendance rate increased from 28% to 42% in men and from 33% to 49% in women. When comparing participants attending directly with the sample including all participants and the total invited population, the percentage in the 30 year olds increased from 20% to 22% and 28%. The sample included successively more unmarried persons, 28% and 29% versus 35% in the total population, more persons born in non-western countries, 9%, 10% and 12%, respectively, citizens living in the inner east district, 13%, 14% and 16%, with lower secondary education, 14%, 15% and 17% and persons in the lowest income category, 9%, 10% and 12%. When comparing the sample attending directly with the sample including all participants, the prevalence of diabetes in age group 75-76 years, increased from 8 to 9% in men and from 4 to 6% in women. Similarly, there was an increase in percent daily smokers, 14% vs. 16% in men and 16% vs. 17% in women, and symptoms of anxiety/depression (HSCL), 4% vs. 5% in men and 11% vs. 12% in women. The prevalence of good self-reported health decreased (70% vs. 67% in men, 60% vs. 57% in women) in 75-76 year olds. There was no change in the other age groups. Persons born in non-western countries returned the first supplementary questionnaire (57% of those attending) to a lesser extent than did persons born in Norway (87%).

Conclusions: When including participants attending after reminders the sociodemographic distribution moved somewhat towards the distribution in the target population. The estimated prevalence figures showed small changes in the oldest age group and almost no change in the other groups. Increasing attendance through reminders had only minor effects on prevalence estimates and conclusions.

Key words: Reminder, epidemiological studies, health surveys, non-response, response bias, self-selection, bias, response rate

INTRODUCTION

The decrease in rates of attendance in health surveys during the last decades is a major concern. A low response rate may lead to serious selection bias. An indication of selection bias is that attendees often differ from the non-attendees in the distribution of demographic variables¹⁻¹². In the Oslo Health Study

we have previously shown that sub-groups like young age-groups, unmarried, those not born in Norway, inner city dwellers, persons with unknown or lower secondary education, low income groups and receivers of disability benefit were underrepresented among the attendees¹³.

In the Oslo Health Study different efforts were made to increase the response rates¹⁴ and up to two

reminding letters were sent. We do not know whether these efforts make the results more representative for the target population, whether the participants attending after reminders are similar to the participants attending directly (hesitant) or whether they are more like the non-attendees.

Several studies have demonstrated only moderate changes in prevalence estimates and sociodemographic distribution when comparing results of increasing the response rates in the range from around 30% to 70%^{11,15-19}. In our study the attendance rates increased from about 30% to 46% after two reminders. The advantage of our study is that we have almost complete information from public health registers for the whole invited population. The aim of the present analyses is to investigate the effect of sending reminders to increase the attendance rates in the Oslo Health Study on the distribution of demographic variables and on the prevalence estimates of selected variables. We also study if the group responding to a supplementary questionnaire is representative for the invited population.

METHODS

The Oslo Health Study (The acronym for the Norwegian title of the study is HUBRO, meaning "eagle owl"), a joint collaboration between the Oslo City Council, the University of Oslo and the National Health Screening Service, Oslo (now Norwegian Institute of Public Health), was conducted in Oslo from May 2000 to September 2001. The study has previously been described in more detail^{13,14}. The aims of HUBRO were to identify health needs within the community and determine the priorities in the health sector, monitor the developments and trends of diseases and their associated risks, estimate the prevalence and later the incidence of chronic diseases, identify social and geographical differences in health and associated risk factors for disease, and to initiate research in order to further investigate the aetiology of major health problems.

An invitation letter, an information brochure and the main questionnaire were sent to Oslo citizens born in the following years: 1924, 1925, 1940, 1941, 1955, 1960 and 1970, two weeks prior to the appointment at the screening station. At the screening station a simple clinical examination was conducted and the main questionnaire was handed in. The participants were given two supplementary questionnaires, which they were instructed to fill in at home and return by mail in pre-addressed pre-stamped envelopes. Through linkage of the health survey data to public registries covering the total population, it has been possible to compare the rates of attendance in sociodemographic sub-groups¹³.

From the clinical examination and the main questionnaire we have used the following variables to study the effect of sending reminders on prevalence estimates:

- *Diabetes*: Have you or have you had diabetes?
- *Body mass index*: Body weight (kilogram)/(height (meter))²
- *Self-evaluated general health status*: How would you describe your present state of health? (poor, not very good, good, very good)
- *Self-reported daily smoking*: Have you smoked or do you smoke daily? (yes – now, yes – earlier, never)
- *Mental distress*: Below is a list of various problems. Have you suffered from any of the following during the last week (including today)? (Put a cross for every problem). The 10 items asked are quoted in Strand et al., 2003²⁰. These 10 items are an abridged version of the Hopkins Symptom Checklist (HSCL)²¹. The average score in the HSCL-10 is calculated by dividing the total score on number of items answered (ranging between 1.00 'not at all' and 4.00 'extremely')²⁰.

RESULTS

Reminders

In men 28% attended directly without any reminder, increasing to 42% after two reminders (Table 1). The corresponding percentages for women were 33% and 49%. Participants attending after one or two reminders differed significantly from participants attending directly in the distribution of age, marital status, country of birth, education and total income ($p < 0.001$) and region of residence ($p = 0.01$). When comparing participants attending directly with the sample including all participants and the total invited population, the percentage in the 30 year olds increased from 20%, to 22% and 28% (Table 1). The sample included successively more unmarried persons, 28% and 29% versus 35% in the total population, more persons born in non-western countries, 9%, 10% and 12%, respectively, citizens living in the inner east district, 13%, 14% and 16%, with lower secondary education, 14%, 15% and 17% and persons in the lowest income category, 9%, 10% and 12%.

Supplementary questionnaire

Of those who attended at the screening station, 84% returned the first supplementary questionnaire (37% of the invited population). Persons born in non-western countries returned this questionnaire (57%) to a lesser extent than did persons born in Norway (87%). Thus, of all the invited, the response rate to the questionnaire was only 22% in persons born in non-western countries compared with 40% in those born in Norway. Similarly, persons with low education returned the supplementary questionnaire to a lesser extent than persons with high education. The distribution of the other sociodemographic variables in responders to the supplementary questionnaire was similar to the distribution in the group including all attendees.

Table 1. Sociodemographic variables in participants attending directly, all participants and all invited persons to the Oslo Health Study 2000-2001.

	Attended directly			All participants			All invited		
	Response men 28%, women 33%			Response men 42%, women 49%			n	Percent	95% CI
	n	Percent	95% CI	n	Percent	95% CI	n	Percent	95% CI
Sex									
Men	5577	44.6	43.8–45.5	8406	44.8	44.1–45.5	19839	48.5	48.1–49.0
Women	6918	55.4	54.5–56.2	10363	55.2	54.5–55.9	21035	51.5	51.0–51.9
	12495	100.0		18769	100.0		40874 ¹	100.0	
Age, years									
75-76	2608	20.9	20.2–21.6	3583	19.1	18.5–19.7	6730	16.5	16.1–16.8
59-60	3205	25.7	24.9–26.4	4469	23.8	23.2–24.4	8072	19.7	19.4–20.1
40+45	4173	33.4	32.6–34.2	6601	35.2	34.5–35.9	14668	35.9	35.4–36.4
30	2509	20.1	19.4–20.8	4116	21.9	21.3–22.5	11404	27.9	27.5–28.3
	12495	100.0		18769	100.0		40874	100.0	
Marital status									
Unmarried	3514	28.4	27.6–29.2	5494	29.4	28.8–30.1	14067	34.6	34.1–35.0
Married	6208	50.1	49.2–51.0	9328	50.0	49.3–50.7	18083	44.4	43.9–44.9
Widowed	887	7.2	6.7–7.6	1240	6.6	6.3–7.0	2545	6.3	6.0–6.5
Separated/divorced	1740	14.0	13.4–14.7	2547	13.6	13.2–14.1	5900	14.5	14.2–14.8
Reg. partnership	38	0.3	0.2–0.4	52	0.3	0.2–0.4	111	0.3	0.2–0.3
	12387 ²	100.0		18661	100.0		40706	100.0	
Country of birth									
Norway	10663	85.3	84.7–86.0	15809	84.2	83.7–84.8	33519	82.0	81.6–82.4
Western countries	696	5.6	5.2–6.0	1023	5.5	5.1–5.8	2422	5.9	5.7–6.2
Non western	1136	9.1	8.6–9.6	1937	10.3	9.9–10.8	4933	12.1	11.8–12.4
	12495	100.0		18769	100.0		40874	100.0	
Region of residence									
Outer east	5689	46.5	45.6–47.4	8403	45.7	45.0–46.5	16696	42.8	42.3–43.3
Outer west	3362	27.5	26.7–28.3	5076	27.6	27.0–28.3	10167	26.1	25.6–26.5
Inner west	1554	12.7	12.1–13.3	2397	13.0	12.6–13.5	5939	15.2	14.9–15.6
Inner east	1622	13.3	12.7–13.9	2498	13.6	13.1–14.1	6215	15.9	15.6–16.3
	12227	100.0		18374	100.0		39017	100.0	
Education									
Lower secondary	1713	14.2	13.5–14.8	2672	14.8	14.2–15.3	6766	16.9	16.6–17.3
Upper secondary	5379	44.5	43.6–45.4	7811	43.1	42.4–43.8	16808	42.0	41.6–42.5
College/university	4780	39.5	38.7–40.4	7265	40.1	39.4–40.8	14906	37.3	36.8–37.8
Unknown	216	1.8	1.6–2.0	364	2.0	1.8–2.2	1504	3.8	3.6–3.9
	12088	100.0		18112	100.0		39984	100.0	
Total income (NOK)									
< 100 000	1104	9.1	8.6–9.7	1722	9.5	9.1–9.9	5014	12.5	12.2–12.8
- 199 000	2674	22.2	21.4–22.9	4072	22.5	21.9–23.1	9490	23.6	23.2–24.0
- 399 000	6578	54.5	53.6–55.4	9573	52.9	52.2–53.6	19473	48.5	48.0–49.0
400 000+	1716	14.2	13.6–14.8	2734	15.1	14.6–15.6	6178	15.4	15.0–15.7
	12072	100.0		18101	100.0		40155	100.0	
Disability³									
yes	682	7.1	6.6–7.7	1040	7.1	6.7–7.5	2689	8.0	7.7–8.3
no	8866	92.9	92.3–93.4	13609	92.9	92.5–93.3	30918	92.0	91.7–92.3
	9548	100.0		14649	100.0		33607	100.0	
Single parent³									
yes	104	1.1	0.9–1.3	168	1.1	1.0–1.3	469	1.4	1.3–1.5
no	9444	98.9	98.7–99.1	14481	98.9	98.7–99.0	33138	98.6	98.5–98.7
	9548	100.0		14649	100.0		33607	100.0	
Rehabilitation³									
yes	129	1.4	1.1–1.6	191	1.3	1.1–1.5	451	1.3	1.2–1.5
no	9419	98.6	98.4–98.9	14458	98.7	98.5–98.9	33156	98.7	98.5–98.8
	9548	100.0		14649	100.0		33607	100.0	
Sickness³									
yes	408	4.3	3.9–4.7	647	4.4	4.1–4.7	1441	4.3	4.1–4.5
no	9140	95.7	95.3–96.1	14002	95.6	95.3–95.9	32166	95.7	95.5–95.9
	9548	100.0		14649	100.0		33607	100.0	
Unemployment³									
yes	207	2.2	1.9–2.5	343	2.3	2.3–2.3	891	2.7	2.7–2.7
no	9341	97.8	97.5–98.1	14306	97.7	97.7–97.7	32716	97.3	97.3–97.3
	9548	100.0		14649	100.0		33607	100.0	

¹ Numbers differ slightly from the official numbers due to updating of data register with respect to number of deaths before screening² The sub totals are not the same due to incomplete registration in the official registers³ Social security benefits for age groups < 70 years

Prevalence estimates

In the oldest age group of men, participants attending after one or two reminders reported significantly more diabetes, daily smoking, symptoms of anxiety/depression (HSCL ≥ 1.85) and less often good or excellent health compared to those attending directly (Table 2). The same was seen in elderly women except for the percentage reporting symptoms of anxiety/depression which did not differ significantly. The prevalence estimates for the sample attending directly, however, differed only moderately from the estimates based on the sample including all participants. In the younger age groups the prevalence estimates were almost the same if we included participants attending after reminders or not (Table 2).

DISCUSSION

We attempted to increase the response rate in HUBRO, by carrying out resource-demanding "reminder-rounds". By sending two reminders the response rates showed a relatively greater increase among young persons compared with older cohorts, among unmarried individuals, persons born in non-western countries, inner-city dwellers and among persons with lower secondary education and in the lowest income category, compared with other groups. The distribution of sociodemographic variables, however, changed very little when we included persons participating after reminders. The distribution moved somewhat against the distribution for the total invited population, but still it was closer to the distribution for the initial participants than to the distribution for the total invited population. Thus, increasing the attendance rate from 30% to 46% through two reminders had little impact on the sociodemographic distribution. We reached, however, to a certain extent relatively more persons with diabetes, poor self-reported health and symptoms of anxiety/depression and more daily smokers in the oldest age groups. In the younger age groups the prevalence estimates showed almost no change. Overall the prevalence estimates changed very little after the reminder rounds. But of course, increasing the sample size has impact on the precision of the

estimates, making it possible to do different subgroup analyses.

The general validity of this finding is supported by several other studies. Increasing the attendance rate from 60% to 70% did not have a large impact on the prevalence figures in a previous Norwegian study¹⁵. Comparing two parts of the same Dutch survey (attendance 45% and 24% of the total sample), gave small differences in the distribution of sociodemographic variables and prevalence figures¹¹. Comparing response rates of 40% and 49% in a randomised trial comparing the effect of length of questionnaire on response, gave no difference in the proportion who claimed to have good health/excellent health¹⁶. A multicentre osteoporosis study comparing samples with response rate categories of <50%, 50-60% and >60% suggests no major influence of response on the observed differences in risk factors of osteoporosis between responders and non-responders¹⁷. Finally, two non-response analyses of public opinion polls comparing response rates of about 60-70% with corresponding polls of 30-40% (less attempts to reach the respondents) produced almost similar results^{18,19}.

It is not obvious that an even higher response rate in HUBRO would have prevented selection bias. In the Dutch Amenities and Services Utilisation Survey, a study attempting to reach just about everybody, late responders differed from "pursuable non-responders" – and both groups differed from real refusers²². Results from the Leiden study of older persons showed that increasing the response rate from 74% to 87% did actually introduce a bias in the prevalence estimates²³. These additional responders had poorer health, whereas the remaining non-responders had equal or better health than the originally 74% responders, but had somewhat poorer mood. That those who actively refused to participate are similar to respondents in most respects, are supported by findings from the previously mentioned Dutch survey²². Those refusing were only slightly less lower class and slightly more inner city dwellers than the responders.

From the present analyses we conclude that increasing attendance through reminders had only minor effects on prevalence estimates and conclusions.

REFERENCES

1. Belsby L, Vedø A. Non-response analysis of the Norwegian Health Survey 1995 [Frafallsanalyse av Helseundersøkelsen 1995] (in Norwegian). 3/98. 1998. Oslo, Statistics Norway. Notater.
2. Berglund G, Nilsson P, Eriksson KF, Nilsson JA, Hedblad B, Kristenson H, Lindgarde F. Long-term outcome of the Malmö preventive project: mortality and cardiovascular morbidity. *J Intern Med* 2000; **247**: 19-29.
3. Boström G, Hallqvist J, Haglund BJ, Romelsjö A, Svanström L, Diderichsen F. Socioeconomic differences in smoking in an urban Swedish population. The bias introduced by non-participation in a mailed questionnaire. *Scand J Soc Med* 1993; **21**: 77-82.
4. Hoeymans N, Feskens EJ, Van Den Bos GA, Kromhout D. Non-response bias in a study of cardiovascular diseases, functional status and self-rated health among elderly men. *Age Ageing* 1998; **27**: 35-40.

Table 2. Prevalence estimates (%) in participants who attended directly, with one or two reminders and in all attendees. P-value for equality between groups of attendees. The Oslo Health Study 2000-2001.

	Attended directly			Attended with one or two reminders			p-value	All attendees		
	n	%	95% CI	n	%	95% CI		n	%	95% CI
Men (age)										
Diabetes										
75-76	87	7.7	6.2-9.3	45	12.3	8.9-15.7	0.01	132	8.9	7.4-10.3
59-60	78	5.4	4.2-6.6	41	6.7	4.7-8.7	0.25	119	5.8	4.8-6.8
40-45	29	1.6	1.0-2.2	23	2.2	1.3-3.0	0.29	52	1.8	1.3-2.3
30	3	0.3	0.0-0.6	5	0.7	0.1-1.4	0.17	8	0.4	0.1-0.8
Daily smoking										
75-76	154	13.6	11.6-15.6	86	22.9	18.7-27.2	0.00	240	15.9	14.1-17.7
59-60	365	24.8	22.6-27.0	177	28.4	24.8-31.9	0.09	542	25.9	24.0-27.8
40-45	574	31.6	29.4-33.7	354	32.6	29.8-35.4	0.56	928	32.0	30.3-33.7
30	266	24.1	21.5-26.6	149	21.1	18.1-24.1	0.14	415	22.9	21.0-24.8
BMI \geq 30										
75-76	118	11.4	9.5-13.4	42	13.1	9.4-16.8	0.42	160	11.8	10.1-13.5
59-60	267	18.4	16.4-20.4	112	19.1	15.9-22.3	0.71	379	18.6	16.9-20.3
40-45	250	13.7	12.1-15.3	158	15.4	13.2-17.6	0.22	408	14.3	13.0-15.6
30	122	11.0	9.1-12.8	78	11.3	8.9-13.7	0.83	200	11.1	9.7-12.6
HSCL \geq 1.85										
75-76	39	3.5	2.4-4.6	28	7.9	5.1-10.7	0.00	67	4.6	3.5-5.7
59-60	100	7.3	5.9-8.6	49	8.5	6.2-10.8	0.36	149	7.6	6.5-8.8
40-45	190	11.1	9.6-12.5	93	9.1	7.4-10.9	0.11	283	10.3	9.2-11.5
30	63	5.9	4.5-7.3	41	6.0	4.2-7.8	0.91	104	5.9	4.8-7.0
Good/excellent health										
75-76	772	69.7	67.0-72.4	202	59.1	53.9-64.3	0.00	974	67.2	64.8-69.6
59-60	1077	73.7	71.5-76.0	428	69.7	66.1-73.3	0.06	1505	72.5	70.6-74.5
40-45	1462	80.3	78.5-82.2	858	79.5	77.1-81.9	0.60	2320	80.0	78.6-81.5
30	989	89.3	87.5-91.2	649	91.9	89.9-93.9	0.07	1638	90.3	89.0-91.7
Women (age)										
Diabetes										
75-76	64	4.5	3.4-5.5	48	8.5	6.2-10.8	0.00	112	5.6	4.6-6.6
59-60	45	2.7	1.9-3.5	20	3.3	1.9-4.8	0.42	65	2.9	2.2-3.6
40-45	42	1.8	1.3-2.4	30	2.3	1.5-3.2	0.32	72	2.0	1.6-2.5
30	7	0.5	0.1-0.9	6	0.7	0.1-1.3	0.58	13	0.6	0.3-0.9
Daily smoking										
75-76	227	15.5	13.7-17.4	115	19.9	16.6-23.2	0.02	342	16.8	15.2-18.4
59-60	413	24.3	22.2-26.3	164	26.9	23.4-30.5	0.19	577	25.0	23.2-26.7
40-45	754	32.7	30.8-34.7	434	33.2	30.7-35.8	0.78	1188	32.9	31.4-34.4
30	317	23.1	20.8-25.3	190	21.7	19.0-24.4	0.46	507	22.5	20.8-24.3
BMI \geq 30										
75-76	235	16.1	14.2-18.0	95	19.0	15.6-22.4	0.14	330	16.9	15.2-18.5
59-60	291	17.0	15.2-18.8	120	20.7	17.4-23.9	0.05	411	17.9	16.3-19.5
40-45	281	12.1	10.8-13.5	199	16.0	14.0-18.1	0.00	480	13.5	12.4-14.6
30	119	8.6	7.1-10.1	81	9.9	7.9-12.0	0.29	200	9.1	7.9-10.3
HSCL \geq 1.85										
75-76	154	11.5	9.8-13.2	75	14.6	11.5-17.6	0.07	229	12.3	10.8-13.8
59-60	246	15.7	13.9-17.5	84	15.2	12.2-18.2	0.81	330	15.5	14.0-17.1
40-45	295	13.4	11.9-14.8	167	13.4	11.5-15.3	0.96	462	13.4	12.3-14.5
30	126	9.5	7.9-11.0	103	12.3	10.1-14.5	0.04	229	10.6	9.3-11.9
Good/excellent health										
75-76	861	59.9	57.3-62.4	266	48.9	44.7-53.1	0.00	1127	56.9	54.7-59.0
59-60	1131	66.0	63.7-68.2	356	60.0	56.1-64.0	0.09	1487	64.5	62.5-66.4
40-45	1797	77.8	76.1-79.5	1011	77.9	75.7-80.2	0.91	2808	77.8	76.5-79.2
30	1207	87.3	85.6-89.1	728	83.2	80.7-85.7	0.01	1935	85.7	84.3-87.2

5. Jackson R, Chambless LE, Yang K, Byrne T, Watson R, Folsom A, Shahar E, Kalsbeek W. Differences between respondents and nonrespondents in a multicenter community-based study vary by gender and ethnicity. The Atherosclerosis Risk in Communities (ARIC) Study Investigators. *J Clin Epidemiol* 1996; **49**: 1441-6.
6. Jacobsen BK, Thelle DS. The Tromsø Heart Study: responders and non-responders to a health questionnaire, do they differ? *Scand J Soc Med* 1988; **16**: 101-4.
7. Korkeila K, Suominen S, Ahvenainen J, Ojanlatva A, Rautava P, Helenius H, Koskenvuo M. Non-response and related factors in a nation-wide health survey. *Eur J Epidemiol* 2001; **17**: 991-9.
8. Launer LJ, Wind AW, Deeg DJ. Nonresponse pattern and bias in a community-based cross-sectional study of cognitive functioning among the elderly. *Am J Epidemiol* 1994; **139**: 803-12.
9. Osler M, Schroll M. Differences between participants and non-participants in a population study on nutrition and health in the elderly. *Eur J Clin Nutr* 1992; **46**: 289-95.
10. Reijneveld SA, Stronks K. The impact of response bias on estimates of health care utilization in a metropolitan area: the use of administrative data. *Int J Epidemiol* 1999; **28**: 1134-40.
11. Van Loon AJ, Tjihuis M, Picavet HS, Surtees PG, Ormel J. Survey non-response in the Netherlands. Effects on prevalence estimates and associations. *Ann Epidemiol* 2003; **13**: 105-10.
12. Wilhelmsen L, Tibblin G, Werkö L. A primary preventive study of Gothenburg, Sweden. *Prev Med* 1972; **1**: 153-60.
13. Sjøgaard AJ, Selmer R, Bjertness E, Thelle D. The Oslo Health Study: The impact of self-selection in a large, population-based survey (Submitted).
14. Sjøgaard AJ, Selmer R. Norwegian Institute of Public Health. The Oslo Health Study. <http://www.fhi.no/tema/helseundersokelse/oslo/index.html> (Electronic Citation).
15. Lund E, Gram IT. Response rate according to title and length of questionnaire. *Scand J Soc Med* 1998; **26**: 154-60.
16. Iglesias C, Torgerson D. Does length of questionnaire matter? A randomised trial of response rates to a mailed questionnaire. *J Health Serv Res Policy* 2000; **5**: 219-21.
17. O'Neill TW, Marsden D, Silman AJ. Differences in the characteristics of responders and non-responders in a prevalence survey of vertebral osteoporosis. European Vertebral Osteoporosis Study Group. *Osteoporos Int* 1995; **5**: 327-34.
18. Keeter S, Miller C, Kohut A, Groves RM, Presser S. Consequences of reducing nonresponse in a national telephone survey. *Public Opin Q* 2000; **64**: 125-48.
19. Curtin R, Presser S, Singer E. The effects of response rate changes on the index of consumer sentiment. *Public Opin Q* 2000; **64**: 413-28.
20. Strand BH, Dalgard OS, Tambs K, Rognerud M. Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25 SCL-10, SCL-5 and MHI-5 (SF-36). *Nord J Psychiatry* 2003; **57**: 113-8.
21. Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH, Covi L. The Hopkins Symptom Checklist (HSCL): a self-report symptom inventory. *Behav Sci* 1974; **19**: 1-15.
22. Stoop I, Louwen F. Late response and very late response. A study of non-response using frame and wave data. Oslo, Norway. 12. International Workshop on Household Survey Nonresponse. 12-9-2001.
23. der Wiel AB, van Exel E, de Craen AJ, Gussekloo J, Lagaay AM, Knook DL, Westendorp RG. A high response is not essential to prevent selection bias: results from the Leiden 85-plus study. *J Clin Epidemiol* 2002; **55**: 1119-25.