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Are elderly HUNT participants healthier than before?

ORIGINAL ARTICLE

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BACKGROUND

Since the number of elderly people will rise in the years to come, knowledge about their health trends is important for social planning. The objective of this study was to investigate trends in health development among elderly people over 70 years in Nord-Trøndelag county.

MATERIAL AD METHOD

In the Nord-Trøndelag Health Study (HUNT) we have collected health data over three rounds: HUNT1 (1984 – 86), HUNT2 (1995 – 97) and HUNT3 (2006 – 08). Using cross-sectional analyses, we have studied changes in self-reported health, level of functioning and the use of health services. The material includes 12 391 persons (85 % participation) in HUNT1, 11 069 (69.3 % participation) in HUNT2 and 8 194 in HUNT3 (54.7 % participation).

RESULTS

Subjective health and activities of daily living (ADL functions) were assessed as better in HUNT3 than in HUNT2. Self-reported physical activity increased from HUNT1 to HUNT3. The use of home-help services decreased from HUNT2 to HUNT3, while the use of nursing homes and home nursing services remained unchanged. The use of general practitioner services increased in all periods, while the use of outpatient services increased strongly from HUNT1 to HUNT2.

INTERPRETATION
It appears that the elderly inhabitants of Nord-Trøndelag county feel that their health has improved and that they have become more self-reliant and more physically active in the period from 1984 to 2008, but the findings need to be interpreted with some caution due to the decline in the participation rate from HUNT1 to HUNT3.

Main message

The participants of HUNT3 (2006 – 08) who were 70 years or older had a better ADL functioning than the participants of HUNT1 (1984 – 86) and HUNT2 (1995 – 97)

They were more physically active

They had better subjective health

The used home-based services more rarely, but saw their GP more frequently

The participation rate in the study fell from 83.4 % in HUNT1 to 54.6 % in HUNT3

Population prognoses indicate that the number of elderly people will increase strongly in the years to come, partly because of the large post-war cohorts and partly because of rising life expectancy. The mortality from a number of diseases is falling because of the improvement in treatment methods, and more people will thus be able to live with a disease (1). In addition, a healthier lifestyle and better treatment options give rise to changes in the ageing process (2), but theories differ regarding the effects of this.

'The compression hypothesis' (3) predicts that we will live more years in good health and functioning, because diseases will have a later onset and thus be compressed into our final years. According to 'the expansion hypothesis' (4) we will need to live longer with diseases and poor health than before, because more people will survive and grow old with diseases that previously would have had an early fatal outcome. The adherents of 'the equilibrium hypothesis' (5) claim that the population as a whole will have the same burden of disease, meaning that a smaller proportion will have serious diseases and functional impairment, while a larger proportion will have moderate or less serious ailments and disabilities (6).

The findings diverge when it comes to estimating which hypothesis is most likely (7). Poor self-reported health appears to be more closely related to serious functional impairment than to the number of diagnoses and slight functional impairment (8). This is in line with Peter F. Hjorth's definition of health as vigour to cope with the demands of everyday life (9).

To be able to plan health and care services it is crucial to obtain knowledge of what can be expected in terms of requirements for medical follow-up and practical assistance. Numerous studies indicate that elderly people today are in better health and physical shape than previously.

Swedish (10–12) and American (13, 14) studies indicate that the proportion of people with a diagnosed chronic disease is increasing, but that fewer have a subjective experience of having poor health. A study from England described minor functional impairment (15), but no change in self-reported health. A study from Spain (16) has described that serious functional impairment occurred at a later time, but that there was a significant loss of self-reliance among women. A larger group of people in need of assistance is expected in Spain, also among those older than 90 years (17), while a Danish study failed to show that the very oldest had any greater need of assistance in the last years of life (18). This study included everyone who was born in Denmark in 1905 and lived there in 1998, altogether 2 262 persons. This group was compared to the cohort who had been born ten years earlier. The results showed that the 1905 cohort was stronger and healthier (19).

Norway has not come as far as the other Scandinavian countries in research into the health of the elderly population. The objective of this study was to analyse changes in the health condition of the elderly in the period from 1984 – 86 to 2006 – 08. We have used data from the Nord-Trøndelag Health Study (HUNT). The Nord-Trøndelag Health Study is a collaborative project

undertaken by the HUNT Research Centre (Faculty of Medicine, Norwegian University of Science and Technology), Nord-Trøndelag County Administration, Central Norway Health Authority and the Norwegian Institute of Public Health.

Material and method

HUNT is a large population study which has been undertaken in three rounds – HUNT1 (1984 – 86), HUNT2 (1995 – 97) and HUNT3 (2006 – 08). All three studies have been conducted following largely the same pattern.

All people resident in Nord-Trøndelag county were invited. In HUNT1 the lower age limit was 20 years, whereas in HUNT2 and HUNT3 the limit was 13 years. There was no upper age limit.

In HUNT1, altogether 12 391 persons aged 70 or older (85 %) responded to questionnaire 1, in HUNT2 11 069 persons (69.3 %) and in HUNT3 8 194 persons (54.7 %) (Table 1). Everybody received a personal invitation by mail, accompanied by a questionnaire (Questionnaire 1) that included questions about self-reported health, lifestyle, diseases and the use of health services. The completed form was delivered upon attendance for the clinical examination, which included measurement of height, weight and blood pressure, a blood sample test and a urine sample test. The participants then received a second questionnaire (Questionnaire 2) with additional questions about lifestyle and various diseases, as well as activities of daily living (ADL). They were asked to complete the questionnaire and return it by mail. Women and men received different version of Questionnaire 2, and in HUNT2 and HUNT3 there were separate questionnaires for the group aged 70 years and older. The methods have been described in detail in previous articles (20–22).

Table 1

Participation rates in HUNT1, HUNT2 and HUNT3 for persons aged 70 years and older. The number that responded to Questionnaire 1 (sent before the examination and handed in upon attendance) and the number that responded to Questionnaire 2 (returned by mail after the examination). Figures in brackets indicate the percentage of respondents of the total number of people invited.

	Men				Women				Total			
	Questionnaire 1		Questionnaire 2		Questionnaire 1		Questionnaire 2		Questionnaire 1		Questionnaire 2	
Age (years)	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
HUNT1 70 – 79	4 006	(89.5)	3 610	(80.7)	4 841	(90.3)	4 277	(79.8)	8 847	(89.9)	7 887	(80.2)
80–89	1 327	(77.7)	1 086	(63.6)	1 860	(75.8)	1 421	(57.9)	3 187	(76.6)	2 507	(60.2)
90+	128	(62.4)	78	(38)	229	(59.9)	132	(34.6)	357	(60.8)	210	(35.8)
Total	5 461	(85.5)	4 774	(74.7)	6 930	(84.5)	5 830	(71.1)	12 391	(85)	10 604	(72.7)
HUNT2												
70–79	3 646	(77.2)	3 332	(70.5)	4 351	(76.7)	3 989	(70.3)	7 997	(76.9)	7 321	(70.4)
80–89	1 110	(60.9)	943	(51.8)	1 707	(56.3)	1 361	(44.9)	2 817	(58.1)	2 304	(47.5)
90+	90	(39.1)	52	(22.6)	165	(32.9)	87	(17.4)	255	(34.9)	139	(19)
Total	4 846	(71.5)	4 327	(63.8)	6 223	(67.6)	5 437	(59.1)	11 069	(69.3)	9 764	(61.1)
HUNT3												
70–79	2 667	(66.5)	2 365	(59)	3 087	(67.4)	2 785	(60.8)	5 754	(67)	5 150	(59.9)
80–89	953	(45.3)	802	(38.2)	1 335	(39.3)	1 120	(33)	2 288	(41.6)	1 922	(35)
90+	48	(21.1)	34	(14.9)	104	(15.7)	82	(12.4)	152	(17.1)	116	(13)
Total	3 668	(57.8)	3 201	(50.5)	4 526	(52.4)	3 987	(46.2)	8 194	(54.7)	7 188	(48)

Variables

For the purposes of this study we selected questions that had an identical wording or were comparable.

Subjective health was measured with the question 'How good is your health at the moment?', with four response alternatives: 'poor', 'not entirely good', 'good' and 'very good'. In the presentation we have merged those who answered 'good' and 'very good' and studied the proportion that these represent. In HUNT2 and HUNT3, the participants were asked whether they could cope with activities of daily life (ADL): 'Are you able, on a daily basis, with no help from others, to walk around indoors on the same floor level, go to the toilet etc.?' (23). The response alternatives were 'Yes'/'No', but in HUNT2 a further alternative was added: 'With some help'. We studied those who answered 'Yes', since we assumed that those who chose 'With some help' would otherwise have answered 'No'.

HUNT1 and HUNT2 included identical questions about physical activity. For frequency, the response alternatives were 'never' (0 points), 'less than once per week' (1 point), 'once per week' (2 points), '2 – 3 times per week' (3 points) and 'about every day' (4 points). For intensity, the response alternatives were 'I go slowly without becoming out of breath' (1 point), 'I go so hard as to become out of breath and sweaty' (2 points), 'I go nearly to the point of exhaustion' (3 points). For duration, the response alternatives were < 15 minutes (1 point), 15 – 29 minutes (2 points), 30 minutes – 1 hour (3 points), > 1 hour (4 points). For ease of comparison we calculated an index (24, 25) – the product of the responses gave an index for physical activity with the range 0 – 48 points.

HUNT2 and HUNT3 included questions about home-help services and home nursing, and whether the respondent had stayed in an institution at any time over the last year. All three HUNT studies asked whether the participants had seen a GP or a hospital doctor. The participants also reported any diseases they may have had. In HUNT1, they answered yes/no to questions regarding diabetes, cardiac infarction, angina pectoris (stable angina) or stroke/brain haemorrhage. The participants were also asked whether they suffered from any long-term disease, ailment or infirmities that constrained them in daily life, including mental disorders. HUNT2 included an additional question about asthma. We merged the variables cardiac infarction and angina pectoris into 'coronary disease', and chose to focus on these diseases because they were included in all three health studies.

Statistics

We have stratified the material into five-year age groups and sex. Nominal-level data have been tested for significance with a simple t-test, while for categorical data we have used proportions and estimated confidence intervals. A p-value < 0.05 was deemed statistically significant.

Ethics

HUNT is based on informed consent, and HUNT1, HUNT2 and HUNT3 have all been approved by the Norwegian Data Protection Authority. HUNT2 and HUNT3 were approved by the Regional Committee for Medical and Health Research Ethics (REK) (at the time when HUNT1 was conducted, the regional committees had not yet been established).

This study has been approved by the Regional Committee for Medical and Health Research Ethics.

Results

Subjective health

Subjective health improved gradually in the period from 1984 – 86 to 2006 – 08. In HUNT1, a total of 43.8 % of the women reported to be in good/very good health, in HUNT2 the proportion was 47.1 %, in HUNT3 rising to 53.6 %. The equivalent figures for men were 52.6 %, 54.4 % and 60.2 %. The same tendency was observed in nearly all age groups (Figure 1).

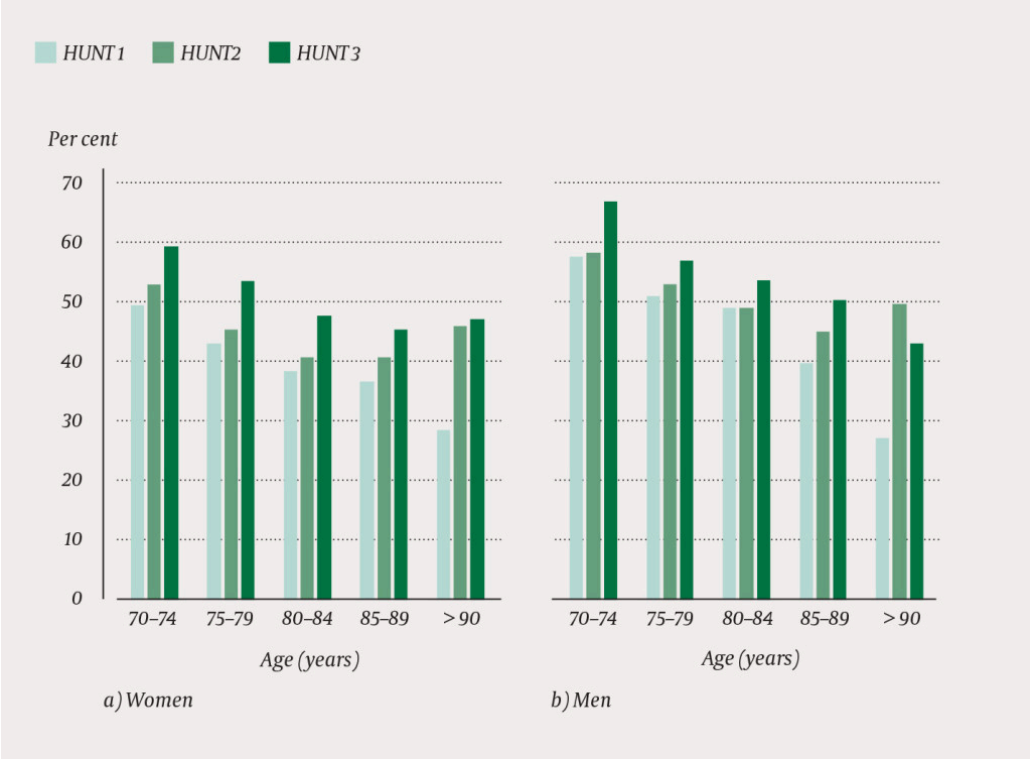


Figure 1 Subjective perception of health among participants aged 70 years or older in HUNT1, HUNT2 and HUNT3 in a) women and b) men. The proportion that answered 'good' or 'very good' to the question 'How is your health at the moment?'. Age distribution.

Activities of daily living (ADL functions)

HUNT2 and HUNT3 both included questions about a total of 16 different ADL functions. For nearly all functions there was improvement from HUNT2 to HUNT3, for both sexes (Figure 2). A high degree of coping was observed especially for the nine personal ADL functions that were assessed.

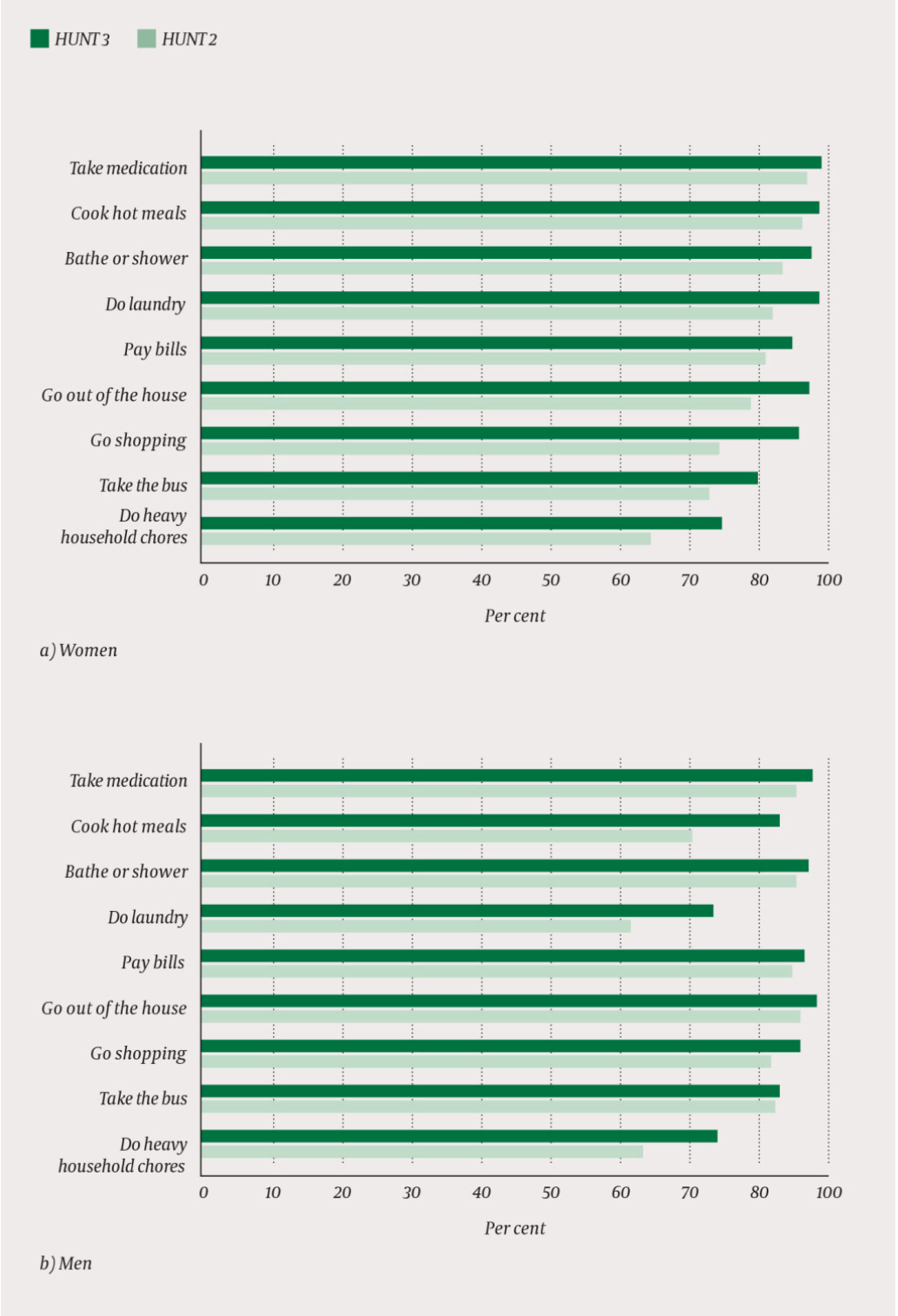


Figure 2 ADL functions in HUNT2 and HUNT3. Proportion of a) women and b) men 70 years and older who reported to be able to perform various daily activities without help

For the seven instrumental ADL functions (iADL) the scores were somewhat lower. In HUNT2, altogether 71 % of the men and 72 % of the women reported being able to cope with heavy household chores, compared to 83 % of both sexes in HUNT3. Only 79 % of the men in HUNT2 were able to cook hot meals, while 93 % reported being able to cope with this in HUNT3. The equivalent figures for women were 96 % and 98 % respectively. All these changes were statistically significant.

Physical activity

Both men and women reported higher levels of physical activity in HUNT3 than in HUNT1. This applied to all age groups. The index for physical activity rose from 4.09 to 8.38 for women and from 7.67 to 10.82 for men (Figure 3).

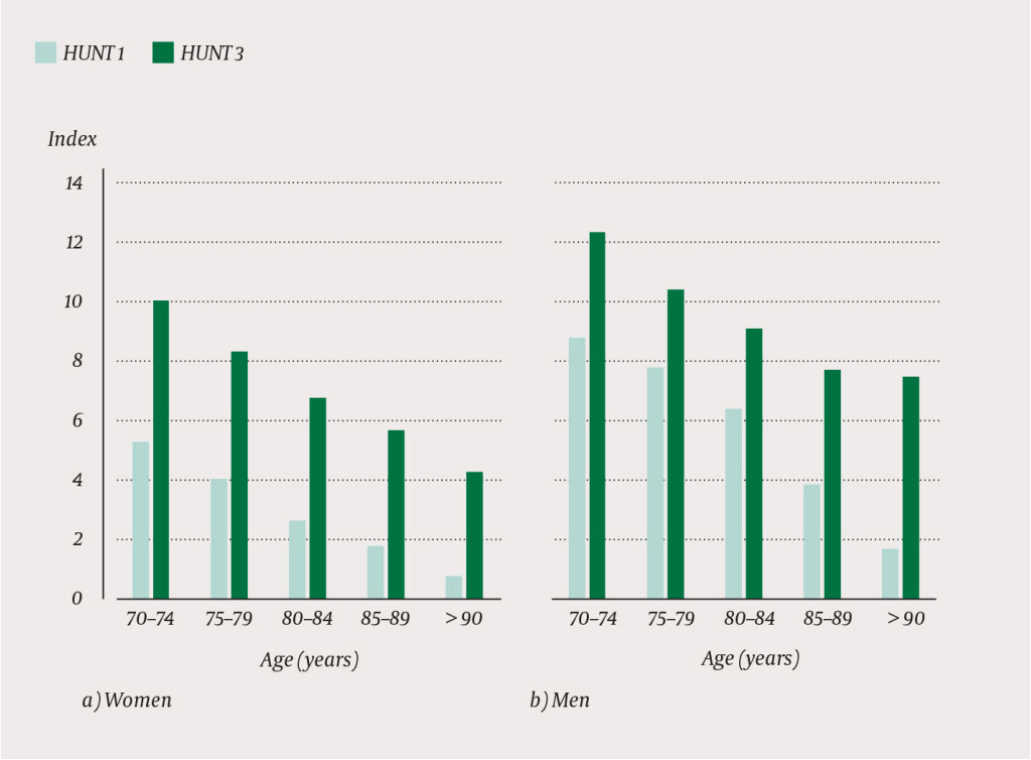


Figure 3 Self-reported physical activity in participants who were 70 years and older in HUNT1 and HUNT3 for a) women and b) men. Age distribution. Index: the product of frequency, intensity and duration

Use of municipal services

Significantly fewer received home-help services in HUNT3 than in HUNT2. A higher proportion of the women than of the men received these services, but a reduction was observed for both sexes and in all age groups (Table 2). The use of home nursing services remained virtually unchanged from HUNT2 to HUNT3, and was higher for women than for men.

Table 2

Municipal services. Number (n) and proportion (%) that report having received home-help services, home nursing services or having had stays in an institution over the last 12 months. *The change is statistically significant

	Women					Men				
	HUNT2		HUNT3		*	HUNT2		HUNT3		*
Age (years)	Number	(%)	Number	(%)		Number	(%)	Number	(%)	
Home help										
70–74	147	(9.5)	49	(4)	*	88	(6)	30	(2.74)	*
75–79	228	(17.9)	89	(8.7)	*	126	(12.1)	38	(4.71)	*
80–84	265	(35.6)	143	(21.8)	*	126	(24.2)	73	(14.09)	*
85–89	160	(54.8)	108	(40.6)	*	89	(42.8)	47	(29.56)	
90+	51	(68)	46	(59.7)		25	(51)	13	(41.94)	
70+	851	(21.7)	435	(13.4)	*	454	(13.8)	201	(7.71)	*
Home nursing										
70–74	49	(3)	33	(2.9)		25	(1.6)	21	(2.03)	
75–79	83	(6.3)	48	(5.1)		61	(5.6)	25	(3.29)	
80–84	95	(12.5)	85	(13.6)		36	(6.7)	38	(7.84)	
85–89	60	(21)	56	(22)		31	(15.2)	23	(14.38)	
90+	19	(27.9)	24	(32.9)		13	(28.9)	8	(25)	

	Women					Men				
	HUNT2		HUNT3		*	HUNT2		HUNT3		*
Age (years)	Number	(%)	Number	(%)		Number	(%)	Number	(%)	
70+	306	(7.5)	246	(8.1)		166	(4.9)	115	(4.66)	
Stay in an institution										
70–74	32	(2)	21	(1.8)		43	(2.9)	44	(4.3)	
75–79	65	(5.2)	49	(5.1)		42	(3.9)	53	(7)	
80–84	75	(10.3)	43	(6.8)		45	(8.4)	31	(6.4)	
85–89	41	(14.7)	18	(6.9)		22	(10.6)	14	(8.9)	
90+	11	(15.5)	8	(11)		13	(27.1)	5	(16.7)	
70+	224	(5.7)	139	(4.5)		165	(4.9)	147	(6)	

In HUNT2, altogether 5.7 % of the women reported to have stayed in a municipal institution during the last year, compared to 4.5 % in HUNT3, and the reduction was observed among the oldest participants. For men, there was an increase from 4.9 % in HUNT2 to 6 % in HUNT3.

Use of doctors and hospitals

There was a gradual and significant increase in the use of GP services from HUNT1 to HUNT3 for both sexes and all age groups (69.2 %, 84.0 %, 90.5 % for women in HUNT1, HUNT2 and HUNT3, and 64.5 %, 83.0 %, 91.0 % for men) (Table 3).

Table 3

Self-reported use of general practitioners and doctors in hospital outpatient clinics in HUNT1, HUNT2 and HUNT3. Participants in the age group 70 years and older, age distribution. Proportion (%) reporting to have used the services in question over the last 12 months

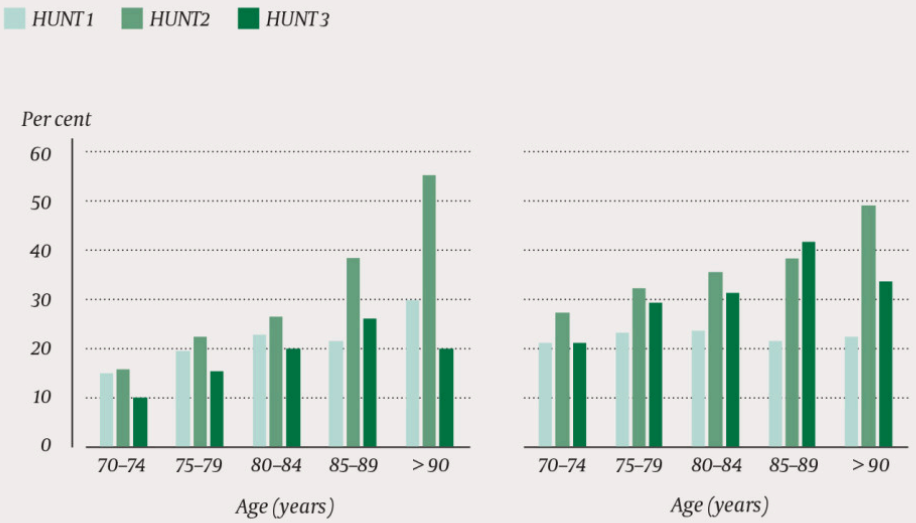
	Women			Men		
Age (years)	HUNT1	HUNT2	HUNT3	HUNT1	HUNT2	HUNT3
General practitioner 70–74	68.5	84.0	89.9	62.9	80.4	90.5
75–79	70.7	83.6	91.2	65.3	85.2	91.8
80–84	69.7	83.6	91.2	67.1	86.8	91.6
85–89	68.9	87.6	89.8	65.0	83.9	90.6
90+	62.3	81.3	88.5	64.8	76.1	81.3
70+	69.2	84.0	90.5	64.5	83.0	91.0
Outpatient clinic 70–74	12.2	44.1	35.8	13.7	45.2	38.2
75–79	13.2	48.6	35.4	13.1	49.7	38.0
80–84	10.6	49.7	34.3	12.9	48.3	36.3
85–89	8.0	45.9	31.1	12.3	48.0	25.3
90+	9.9	35.3	28.0	10.4	37.8	20.0
70+	11.8	46.5	34.8	13.2	47.1	36.8

There was a considerable increase in the use of hospital doctors (outpatient clinics) from HUNT1 to HUNT2, with a clear reduction from HUNT2 to HUNT3.

Diseases

In HUNT1, altogether 68 % of the respondents reported to suffer from a long-term disease (> 1 year), injury or infirmity of a kind that constrained them in daily life. The proportion increased with age, to more than 80 % in those 90 years or older. The proportion was considerably lower in HUNT2 and HUNT3.

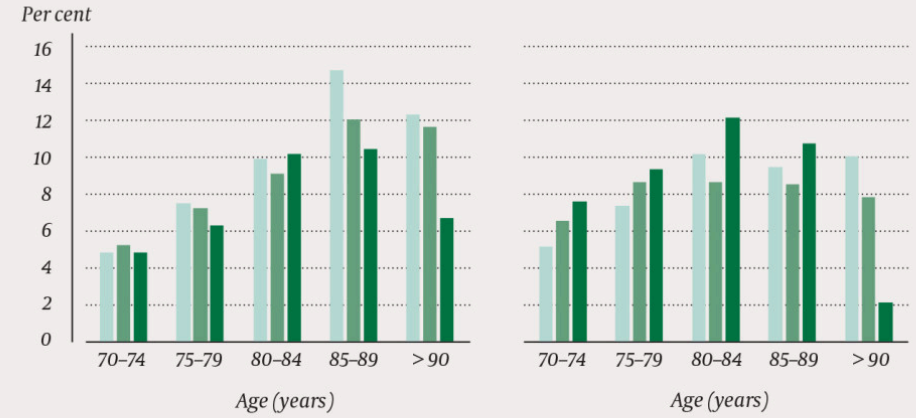
Self-reported coronary disease peaked in HUNT2; this applied to most age groups and both sexes (Figure 4). There was an increase in strokes among men from HUNT1 to HUNT3 in most age groups, whereas only minor changes were observed for women.



Coronary disease

a) Women

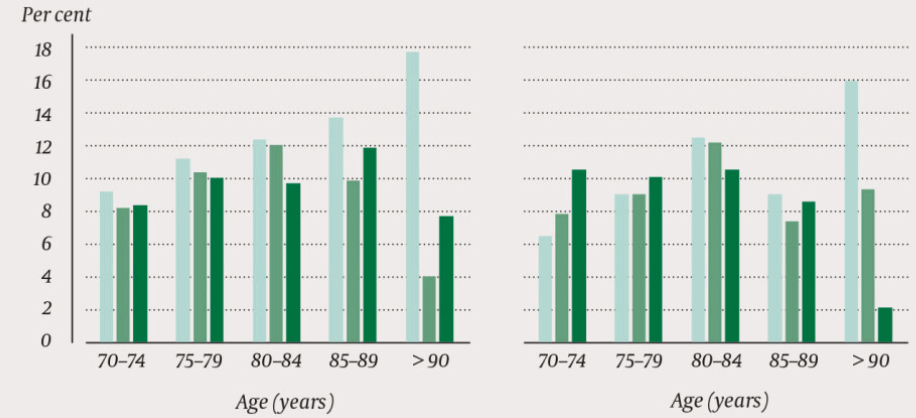
b) Men



Stroke

a) Women

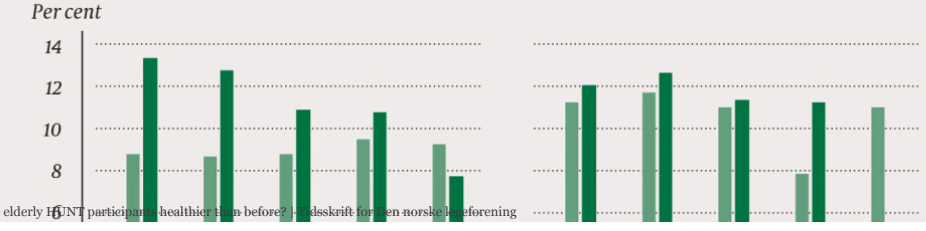
b) Men



Diabetes

a) Women

b) Men



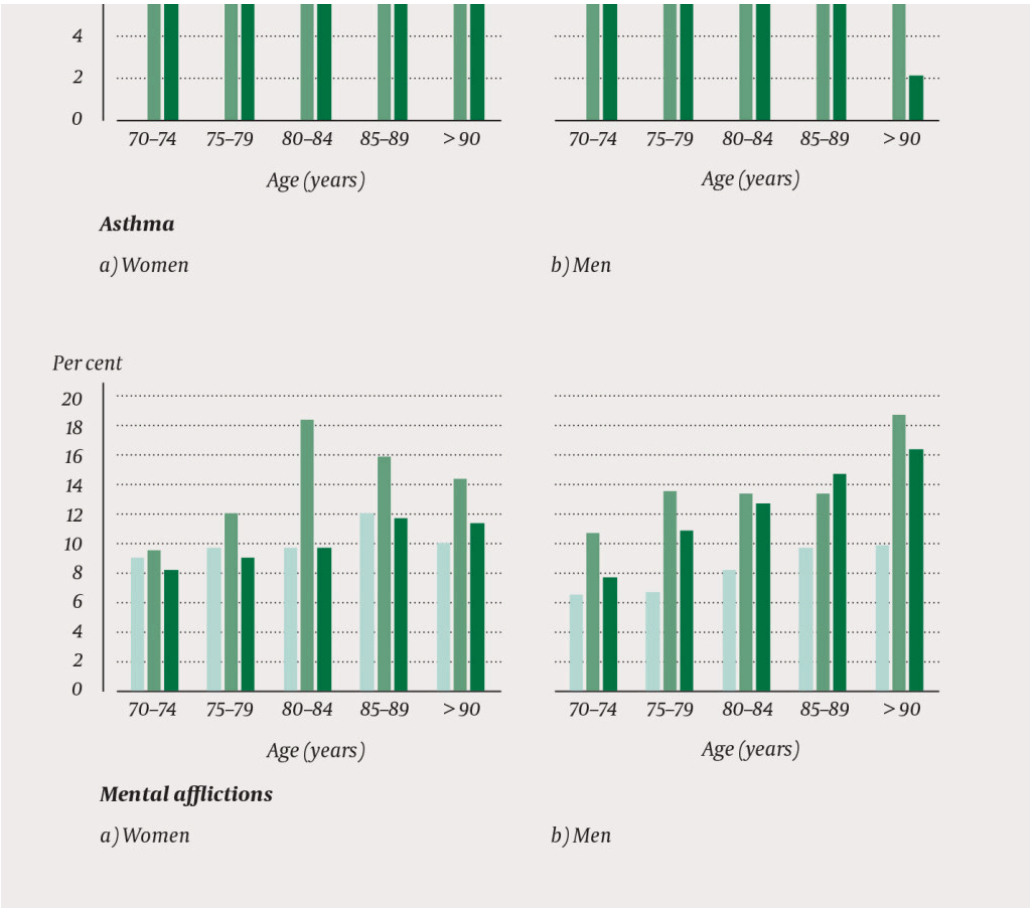


Figure4 Self-reported disease among participants 70 years and older in HUNT1, HUNT2 and HUNT3 in a) women and b) men. Age distribution.

The prevalence of diabetes fell among women and rose among men, but these changes were not statistically significant (Figure 4). Self-reported mental afflictions peaked in HUNT2, most markedly among women (9.6 %, 12.5 %, 9.1 % in women and 7.2 %, 12.2 % and 10.2 % among men in HUNT1, HUNT2 and HUNT3)

Discussion

Based on three sets of cross-sectional data from the HUNT studies conducted over the 20-year period from 1984 – 86 to 2006 – 08, this study shows that there has been a positive development in the level of functioning and subjective health of elderly people. This applies to both sexes and all age groups. The prevalence of self-reported diseases varied through the period, with no clear tendencies. There was a reduction in the use of home-help services, but a strong increase in the use of general practitioner services over the period.

A strength of this study lies in its large number of participants, which enables us to stratify by sex and five-year age groups. Because of the falling participation rate in the oldest age groups some reservations need to be made, however, especially when it comes to the very oldest participants. On the other hand, Danish studies of this age group have shown the same trends indicated by our material (18). The measurements have been undertaken according to the same model in all three studies. Moreover, the HUNT data are relevant for the rest of Norway, since Nord-Trøndelag county is to some extent representative of the country as whole, despite having no large city (21).

Those who participated in the HUNT studies needed to be sufficiently healthy to fill in a questionnaire and go to a field station for a clinical examination. Participation was therefore low for the county's least healthy inhabitants; this applies to all three studies. The declining participation rate nevertheless represents a challenge, since it has previously been shown that those who failed to attend HUNT3 had a somewhat less healthy lifestyle and somewhat poorer health than those who did attend (26). Some of the registered improvements in health condition shown by our data may thus be an effect of increasing selection.

It has been shown, however, that there was a considerable increase in overweight and obesity also among the older participants (27). Furthermore, it has been shown that the number of people who have never taken antihypertensive drugs has fallen, and that blood pressure has been reduced both among these and among those who do take such drugs (28).

The registered increase in physical activity is in line with results from Swedish studies, where an increased level of activity was found in all age groups. Our data are based on self-reporting, and there is reason to assume that for lifestyle factors in particular, people tend to report their own habits as more favourable than they truly are. Since we have analysed two cross-sections of the same population (HUNT1 and HUNT3), we can nevertheless highlight the *changes* over time. Evaluation studies have shown, however, that the HUNT questions tend to capture vigorous physical activity particularly well, while lighter activity is not recorded with equal reliability (25).

Improvement in ADL functioning is one of our main findings. The participants in HUNT3 reported a great degree of self-reliance, and compared to figures from Sweden (10), the HUNT participants had better ADL function scores. In Danish studies of the very elderly there was a clear positive development (29), and several other studies conducted before 2000 have come to the same conclusion (13, 15). A British study shows improvement in functioning from 1998 to 2008 (15).

In our material we found no clear tendencies in the development of self-reported disease. For both sexes, more coronary disease was reported in HUNT2 than in both HUNT1 and HUNT3. A Dutch study found less coronary disease, asthma and stroke, but a higher prevalence of diabetes in the period 1987 – 2001 (30), and Wolf and collaborators found a delayed onset of disease in elderly people in the period 1982 – 94 (31).

There was a marked decrease in the use of home-help services from HUNT1 to HUNT3, which is consistent with other findings from Norway (32). This is most likely due to the fact that home nursing was free of charge to the inhabitants in 1998, whereas the patient charges for home help were gradually increased in the 1990s (33). The increased use of general practitioner services is consistent with figures from Statistics Norway (34). The increase in the use of outpatient specialist health services in the period from HUNT2 to HUNT3 is consistent with findings made by Sintef (35).

The objective of this study was to investigate whether elderly people had experienced any gains in health and ADL functioning over the 20-year period from HUNT1 (1984 – 86) to HUNT3 (2006 – 08). Despite some weaknesses in the material, the data indicate that the older inhabitants of Nord-Trøndelag county were in better health and had better ADL functions at the time of HUNT3 than previously.

If elderly people feel that they have good functional capacity and fairly good health despite having multiple diagnoses, this could serve as a moderating factor when the grey tsunami arrives.

Our data will soon be ten years old, and social gradients in the development have not been investigated. Recent American studies indicate that health development remains unchanged for more disadvantaged social groups, but improves for the wealthier (36), and Krokstad and collaborators have shown that health prospects have a clear social gradient (37).

Conclusion

Our material indicates that Nord-Trøndelag inhabitants who were 70 years or older had better ADL functions and better subjective health at the time of HUNT3 (2005 – 07) than at that of HUNT2 (1995 – 97) and HUNT1 (1984 – 86), while the prevalence of various diseases showed no obvious tendency. The use of home-help services decreased during the period studied, while the use of general practitioner services increased.

The findings need to be interpreted with caution because of a likely selection effect caused by falling participation rates from HUNT1 to HUNT3.

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