

**Ischemic stroke in a general population:  
Time trends in incidence, case fatality  
and the impact of risk factors.**

*The Tromsø Study*

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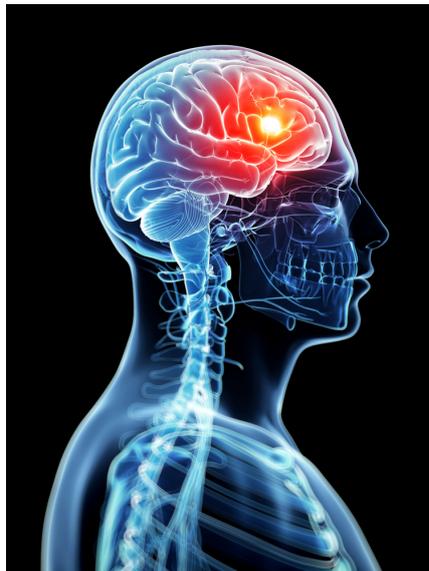
**Anne Merete Vangen-Lønne**

*A dissertation for the degree of Philosophiae Doctor – October 2017*



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and the impact of changing risk factors.

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Philosophiae Doctor  
October 2017



*"When we try to pick out anything by itself,  
we find it hitched to everything else in the universe".*

*John Muir (1838–1914)*

*Scottish-American glaciologist and environmental philosopher,  
and an early advocate for the preservation of wilderness in the United States.*

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## Summary

Cerebral stroke is a clinical syndrome caused by lack of blood supply to the brain. About 80–85% of the strokes are ischemic, due to a reduction or complete blockage of blood flow to the brain, while approximately 15% are a result of hemorrhage. The impact of stroke as a global health problem will most likely increase in coming years due to ongoing demographic changes, including aging population and health transitions in developing countries.

Lack of national data regarding time trends in incidence and case fatality of ischemic stroke (IS) in Norway represented a main motivation for this study. Data from the population-based Tromsø Study, following >40,000 attendees from six surveys through 2012, provided an excellent opportunity to reveal time trends of IS and assess the potential mechanisms behind these trends.

We found that the overall age- and sex adjusted incidence of IS in persons aged  $\geq 30$  years declined with 27% from 1995–2012. The time trends differed by age, with increasing IS incidence in women aged 30–49 years, a non-significant rising trend among the youngest men, and declining incidence in women aged 50–74 years and men aged 65–74 years. In men aged 50–64 years, the IS incidence in 2012 did not differ from the incidence two decades earlier. The IS incidence also remained stable in persons aged 75 years and older. The age-adjusted 30-days case fatality decreased in men aged 30–84 years while no significant decline was found in women aged 30–84 years or in attendees  $\geq 85$  years.

Overall, the combined changes in seven cardiovascular risk factors, the systolic blood pressure (SBP), total cholesterol, HDL- cholesterol, daily smoking, physical activity, diabetes and body mass index accounted for 57% (95% CI 28–100) of the decrease in IS incidence from 1995 through 2012, with decreasing blood pressure and decline in smoking prevalence as the most important contributors. The increasing diabetes prevalence contributed negatively, as did the change in body mass index, although not significant.

We found that a feasible joint hypothetical intervention on six metabolic and lifestyle risk factors (SBP, total cholesterol, weight, physical activity, smoking and alcohol intake) would reduce the 18-year stroke risk in our population by 19% (1995–2012). A combination of more intensive interventions would reduce the estimated 18-years stroke risk by 55%. Blood pressure reduction and quitting smoking significantly reduced the risk when applied separately.

## Sammendrag

Hjerneslag er et klinisk syndrom forårsaket av manglende blodtilførsel til hjernen. Omlag 80-85% av hjerneslagene er iskemiske, dvs. forårsaket av en redusert eller blokkert blodtilførsel til hjernen, mens ca. 15% er forårsaket av blødning. På grunn av demografiske endringer, som en aldrende befolkning og endringer i helsetilstand i utviklingsland, vil konsekvensene av hjerneslag som et globalt helseproblem sannsynligvis øke i årene som kommer.

Mangelen på nasjonale data vedrørende tidstrender i insidens og letalitet av iskemiske slag (IS) i Norge var en hovedmotivasjon for denne studien. Data fra den populasjonsbaserte Tromsøundersøkelsen, der >40,000 deltakere fra seks tverrsnitts-undersøkelser ble fulgt opp med registrering av førstegangs IS til og med 2012, ga oss en unik mulighet til å avdekke tidstrender i insidens av IS, og mulige mekanismer som kunne forklare disse tidstrendene.

Vi fant at insidensen av IS blant personer  $\geq 30$  år falt med 27% fra 1995–2012. I de yngste aldersgruppene (30-49 år) fant vi en økende insidens av IS blant kvinner og en ikke signifikant økende trend blant menn. I samme periode var det en signifikant nedgang i insidens hos kvinner i alderen 50-74 og hos menn i alderen 65-74 år. Blant menn 50-64 år var insidensen i 2012 ikke forskjellig fra tyve år tidligere. Blant personer 75 år og eldre holdt IS insidensen seg også uendret. Aldersjustert 30-dagers letalitet av IS fra 1995–2012 falt blant menn i alderen 30-84 år, mens det ikke var signifikant endring over tid hos kvinner eller blant personer  $\geq 85$  år.

Endringer i syv kardiovaskulære risikofaktorer, systolisk blodtrykk, total kolesterol, HDL kolesterol, daglig røyking, fysisk aktivitet, diabetes og kroppsmasseindeks, forklarte samlet sett 57% (95% CI 28–100) av reduksjonen i IS insidens fra 1995 til og med 2012, med fallende blodtrykk og redusert prevalens av daglig røyking som de viktigste bidragsyttere. Den økende prevalensen av diabetes bidro negativt, dvs. motvirket fallet i insidens av IS. Det samme gjorde økningen i kroppsmasseindeks, men ikke signifikant.

Vi fant at en hypotetisk, men gjennomførbar kombinert endring av seks kardiovaskulære risikofaktorer (systolisk blodtrykk, total kolesterol, vekt, fysisk aktivitet, daglig røyking og alkoholinntak) kunne ha redusert risikoen for hjerneslag i vår populasjon med 19% i perioden 1995–2012. En mer intensiv kombinert endring av de samme risikofaktorene kunne ha endret den estimerte 18-årige risikoen for hjerneslag med 55%. Reduksjon av blodtrykk og røykestopp ville hver for seg ha ført til signifikant reduksjon i forekomsten av IS.

## List of papers

This thesis is based on the following papers:

- I. Vangen-Lønne AM, Wilsgaard T, Johnsen SH, Carlsson M, Mathiesen EB.  
Time trends in incidence and case fatality of ischemic stroke:  
The Tromsø study 1977–2010. *Stroke*. 2015;46: 1173–1179.
- II. Vangen-Lønne AM, Wilsgaard T, Johnsen SH, Løchen ML, Njølstad I, Mathiesen EB.  
Declining incidence of ischemic stroke: What is the impact of changing risk factors?  
The Tromsø study 1995–2010. *Stroke*. 2017;48: 544–550.
- III. Vangen-Lønne AM, Ueda P, Gulayin P, Wilsgaard T, Mathiesen EB, Danaei G.  
Hypothetical interventions to prevent stroke: An application of the parametric  
g-formula to a healthy middle-aged population. (Submitted)

## **Abbreviations**

AF: Atrial fibrillation

BMI: Body mass index

BP: Blood pressure

CVD: Cardiovascular disease

DBP: Diastolic blood pressure

GBD study: Global Burden of Disease Study

HDL: High density lipoprotein

HT: Hypertension

ICH: Intracerebral hemorrhage

IRR: Incidence rate ratio

IS: Ischemic stroke

LDL: Low density lipoprotein

PA: Physical activity

PAR: Population attributable risk

RCT: Randomized clinical trial

SAH: Subarachnoid hemorrhage

SBP: Systolic blood pressure

# 1. Introduction

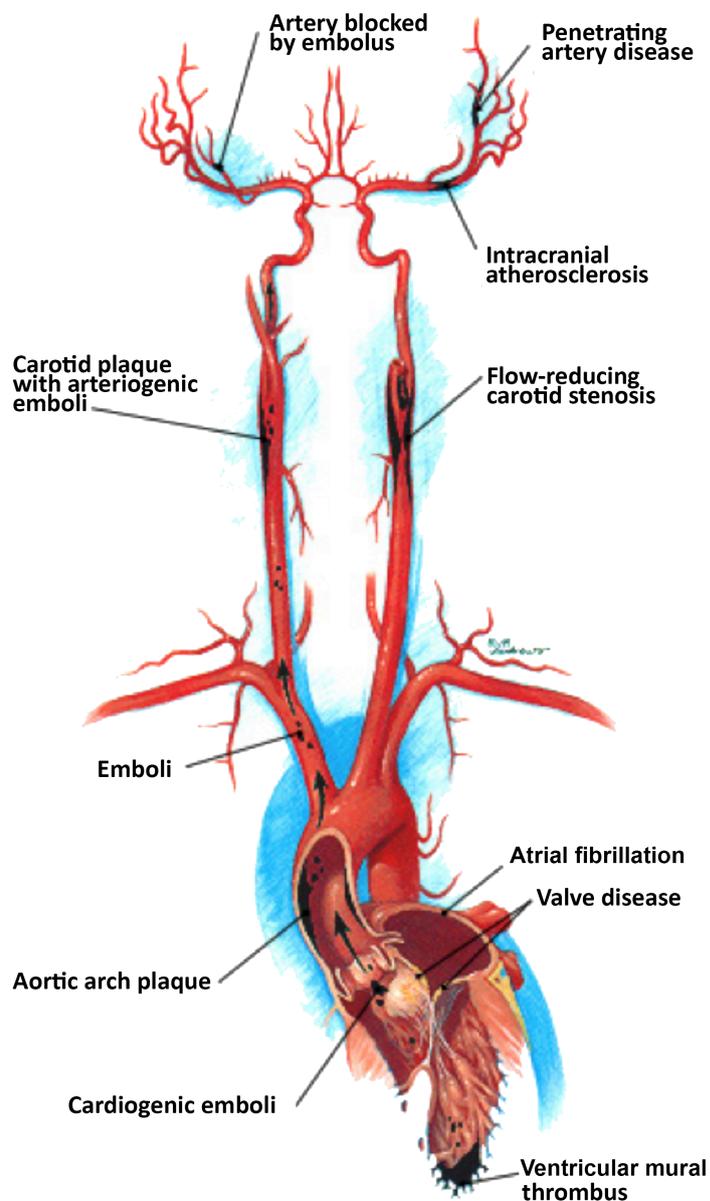
## 1.1 What is stroke?

More than 2400 years ago, the physician Hippocrates of Cos (460–370 BC) presented the Greek term “apoplexy” (from “apoplessein”: “to strike down and incapacitate”) to describe an acute, non-traumatic brain injury associated with a sudden paralysis or impaired speech. The Swiss pathologist Johan Jacob Wepfer (1620–1695) discovered in the mid-1600s that patients who died with apoplexy could have a bleeding in the brain as well as an obstruction in one of the brain’s blood vessels (1). However, the term “stroke” was probably first introduced into medicine in 1689 by William Cole (1635–1716) in his book “A Physio-Medical Essay concerning the Late Frequencies of Apoplexies”.

Cerebral stroke is a clinical syndrome, defined by the World Health Organization (WHO) as “rapidly developing clinical signs of focal or global disturbance of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin” (2). Generally, a stroke is caused by lack of blood supply to the brain. This depletion of sufficient blood supply can, as discovered in the mid-1600s, be caused by different mechanisms, which all lead to an injured brain tissue and where the neurological deficits reflect the cerebral area involved. Ischemic strokes are caused by a reduction or complete blockage of blood flow to the brain, and account for about 80–85% of all stroke cases globally. Approximately 15% of the strokes are hemorrhagic, either as intracerebral hemorrhage (ICH, approximately 10–12%) or subarachnoid hemorrhage (SAH, approximately 3%). Although ischemic stroke (IS) is the dominating pathological type of stroke worldwide, the proportional frequency of ICH vs. IS tend to be noticeably greater in low-and middle income countries than in high-income countries (3).

## 1.2 Ischemic stroke

The arterial occlusion preceding an IS can be caused by several mechanisms: by atherothrombosis (extra or intracranial); by embolism (cardiogenic or artery to artery embolism); by small vessel disease; by non-atherosclerotic abnormalities (dissection, artery diseases, vasculitis, coagulopathy, metabolic diseases with arteriopathy) or by decreased perfusion due to systemic hypotension (Figure 1).



**Figure 1** Patophysiological mechanisms for ischemic stroke

*From Hart RG, Benavante O. Am Fam Physician 1999; 2475–82.*

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Several classification systems for subtyping of IS exist, based on etiology, clinical manifestations, localization or combinations of these. Which one to use depends on the purpose of subclassification (e.g. clinical decision-making or description of patient characteristics in an epidemiological study). The frequently used TOAST classification (Trial of ORG 10172 in Acute Stroke Treatment) denotes five subtypes of ischemic stroke: large-artery atherosclerosis, cardioembolism, small-vessel occlusion, stroke of other determined etiology, and stroke of undetermined etiology (4). Other classification systems are the Causative Classifications System (5) and the Oxfordshire Community Stroke Project (OCSP) Subtype Classification (6).

## **1.3 Epidemiology**

### **1.3.1 The burden of stroke in numbers**

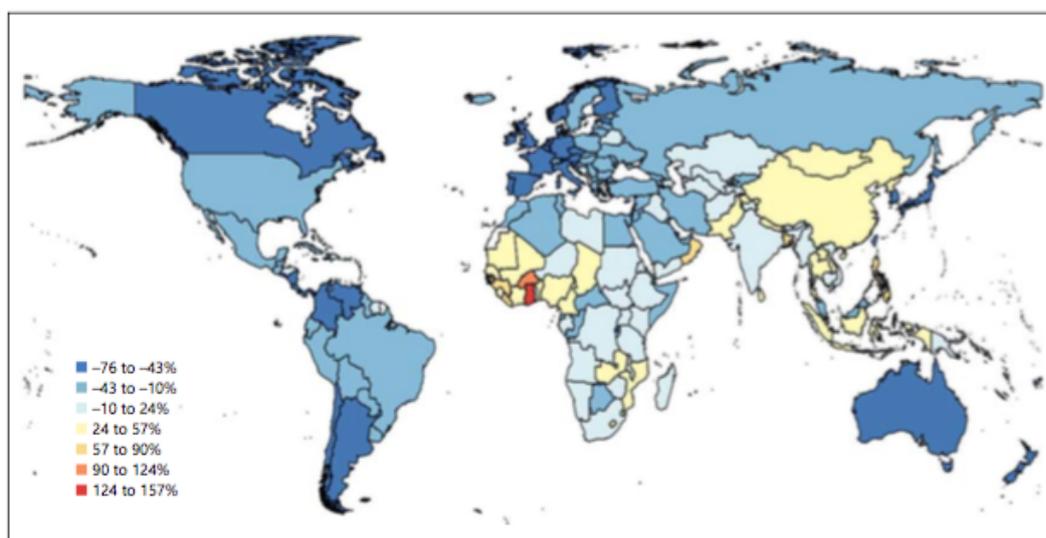
Stroke is the second leading cause of death worldwide and a frequent cause of adult disability in most regions. Worldwide, during the last decades, the age-standardized stroke mortality rates have declined, as a result of declining stroke incidence as well as reduced case fatality (7). Despite this global decrease in age-standardized stroke mortality, the absolute numbers of people who experience a stroke every year, live with the consequences of stroke or die from their stroke, is increasing. In 2013, there were globally 10.3 million new strokes (67% were IS), 6.5 million deaths from stroke (51% from IS) and nearly 25.7 million who had survived a stroke (71% with IS) (8). The incidence rate of stroke increases markedly with age (9). Worryingly, the impact of stroke as a global health problem is likely to further increase in coming years due to ongoing demographic changes, including aging of the population and health transitions observed in developing countries (8). In the absence of effective clinical or public health interventions, it is estimated that in 2030, 23 million people will have a first ever stroke, including 7.8 million fatal strokes (10).

### 1.3.2 Geographical variation in stroke burden

The largest stroke burden is carried by countries with low and middle income (developing countries). In 2010, more than 71% of the global stroke deaths and 69% of all incident strokes took place in developing countries (11). There are considerable geographical variations with regard to stroke incidence, prevalence and mortality rates due to differences in prevalence of risk factors and access to appropriate health care (including primary prevention, acute treatment of strokes and secondary prevention given). Moreover, comparison of estimates from different studies are often complicated by heterogeneity in study designs and types of population. A major challenge in stroke epidemiology is also the lack of good-quality epidemiological studies from low-income countries (12).

Changes in stroke burden over the last decades differ substantially by country income level. A 42% reduction in age-adjusted stroke incidence rate (1.1% annual reduction) was found in high-income countries (1970-2008) while there was a 100% increase in countries with low and middle income (3). The percentage decline in age-standardized mortality rate was nearly twice as large in developed compared to developing countries from 1990 to 2010 (11), (Figure 2 shows mortality decline from 1990 to 2013).

**Figure 2. Percent change in age-standardized ischemic stroke mortality rate (1990-2013)**



*From Feigin V, Mensah GA, Norrving B et al. Neuroepidemiology. 2015;45:230–236.  
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### 1.3.3 Incidence

Incidence is defined as the number of new cases of a disease that occur over a specified period of time. In 2010, the worldwide incidence rate for stroke (age-adjusted) was 258 per 100,000 person-years; 217 per 100,000 person-years in high-income countries (11). In a population-based European register study, the risk of stroke (age standardized) varied more than 2-fold between the European populations, with higher incidence rates observed in eastern, and lower rates in southern European countries (13).

With the exception of estimations from the Innherred study, covering the years 1994-96 (14), complete national data on stroke incidence in Norway or estimates based on data from well-defined Norwegian cohorts were lacking until 2012-2013. At this time, the Norwegian Patient registry became person-specific, and the Norwegian Cardiovascular Disease Registry was established as a national register. Furthermore, there are no studies of how the stroke incidence and case fatality *have changed over time* in Norway. The lack of national data regarding time trends in incidence and case fatality of ischemic stroke represents a main motivation for this study.

### 1.3.4 Time trends in incidence

The Global Burden of Disease (GBD) Study revealed a 13% significant reduction of IS incidence (age-standardized) in high-income countries from 1990–2010, driven by a significant IS incidence decline among those <75 years (15). No significant change in the overall incidence if IS was found in persons aged  $\geq 75$  years. Time trends of stroke incidence differ in direction and steepness also among high-income populations, as well as across the different age groups. However, possible diverging trends across age may not be acknowledged in age-unstratified analyses.

While a downward trend in age-adjusted stroke incidence is shown for middle aged and slightly older in several high-income populations (16–18), other studies found no decline in incidence

with time (19). From studies which include younger age groups, worrying reports have risen about an increasing incidence of stroke at younger age (17, 20, 21), while stable incidence rates among the youngest ones are reported in other studies (19). Many studies of stroke incidence have not included the eldest ones; but among the limited number of studies, both a stable time trend (22) and a decreasing trend (17, 20, 23) is reported.

A decrease in stroke incidence in both sexes has been demonstrated in many high-income populations the last decades (16, 18). Some studies have revealed relatively stable male/female ratios of incidence decline over time, suggesting that primary preventive measures have been equally effective in men and women (24). Other studies from developed countries reported an overall significant IS incidence decline in men only (25), or a steeper incidence decline in men for IS (26). Contrary, the worldwide data from the GBD study revealed a significant decrease of IS in women from 1990 to 2013, while no significant change in IS incidence was detected in men (27).

### **1.3.5 Case fatality**

Early case fatality is defined as the proportion of cases with an event (here: IS) followed by death within 30 days (28 days to 1 month), irrespective of the reason of death. A systematic review based on population-based studies (published 1970–2008) from high-, middle- and low-income countries found that early (21 days to 1 month) stroke case fatality differed substantially among countries and study periods (3), as was previously reported in the MONICA study (28). In 2000–2008, case fatality for IS ranged from 13–23% in high income countries (3). A Norwegian population-based study reported 11% case fatality (30 days) for IS in 1994–96 (14).

The case fatality increases steeply with advancing age (29), and comparison of populations with different age profiles may be challenging. A systematic review of studies on stroke in the very old reported a three time odds for death within 30 days after stroke in persons aged  $\geq 80$  years

compared to those < 80 years (29). Moreover, the case fatality depends on the severity of the events, comorbidity and treatment given (19). In terms of sex differences in case fatality, conflicting results are reported; of increased risk in women (24, 30) as well as no difference between men and women (31, 32).

### **1.3.6 Time trends in case fatality**

In a Swedish cohort in the MONICA study, 28-days case fatality after stroke declined significantly from 20% in 1985 to 12% in 1998 (both for men and women, first-ever and recurrent stroke), without concurrent change in the distribution of stroke subtypes during this period (for IS; 18%–12%) (33). In Oxford Vascular study, the 30-day incident stroke case fatality was not significantly different in 2002–2004 compared to 1981–1984 (17% vs. 18%) (34), while a national-wide Finnish register study found a significant 28-days case fatality reduction of incident stroke from 1999 to 2007 ( for IS: 13% to 10%) (35). A nationwide registry-based study from Scotland, looking at all first hospitalizations for stroke, showed decreasing case fatality for *all age groups* (men and women separately) from 1986 to 2005 (<55, 55–64, 65–74, 75–84, 85+, adjusted for comorbidity and admission year), but a steeper decline in men than in women, resulting in an increasing difference in case fatality across sex with time (24). This is in contrast to studies reporting similar decline in case fatality across sex (i.e. no interaction between sex and year) during comparable study periods (26).

## 1.4 Risk factors for ischemic stroke

The risk factors for stroke are traditionally classified as non-modifiable and modifiable risk factors, and overlap with the risk factors for cardiovascular disease (CVD). Several studies have estimated population-attributable risks (PARs) for the associations of IS with cardiovascular risk factors (36-38). With approximately 75% of strokes being first-ever events (39), primary prevention directed towards modifiable risk factors is particularly important to reduce the burden of stroke. Although most risk factors perform an independent effect, significant interactions between individual risk factors exist, which must be considered when predicting the overall risk. While a risk factor traditionally is defined as a factor *associated* with a pathological medical condition (40), the levels of evidence supporting a causal relationship between these risk factors and subsequent stroke risk vary substantially between the risk factors. IS and ICH share several of their most important risk factors, despite diverse underlying pathogenesis, but the relative impact of a common risk factor on risk of IS vs. ICH differ (41). Correspondingly, the associations between well known risk factors for IS and the different subtypes of IS vary, and are still debated (42).

**Table 1. Non-modifiable and modifiable risk factors for ischemic stroke**

<b>Non-modifiable risk factors</b>	<b>Modifiable risk factors</b>
Age	High blood pressure
Male gender	Diabetes
Race	Smoking
Genetics (mono- or polygenic)	Atrial fibrillation
Low birth weight	Dyslipidemia
Previous TIA or stroke	Obesity
Heart disease	Physical inactivity
	Alcohol
	Unhealthy diet
	Illicit drug use

### 1.4.1 Non-modifiable risk factors

The risk of stroke more than doubles for each successive 10 years after age 55 (9), and the effect of **ageing** seems to carry the same risk in women as in men (43).

**Male sex** generally carries about 1.3 times the stroke risk compared to females at the same age, but this risk difference tends to decrease with age (44). However, slightly higher stroke risk in women aged 35–44 compared to equally aged men has been reported, with oral contraceptive use and pregnancy as possible contributors (9). Among the eldest ( $\geq 85$  years), some studies found higher stroke incidence in women compared to men (45), but male and female rates in the eldest age category are not directly comparable when the age band is open ended (44). Women are on average 4 years older than men when they get their first stroke, but longer life expectancy in women results in a higher lifetime risk for stroke (31,44).

Stroke incidences differ by **ethnicity**; e.g. African American show a nearly twice times higher risk for stroke than European Americans (46). However, some of this difference may be related to disparities in management of modifiable risk factors.

Twin studies have revealed nearly a five times higher stroke prevalence in monozygotic as compared to dizygotic twins, which strongly support **genetic factors** related to stroke risk (47). Several established stroke risk factors (as hypertension and diabetes) provide both genetic and behavioral components (48). Moreover, various genetic diseases show association with stroke (49).

**Low birth weight** is found to be associated with increased risk of stroke in adult life, and higher risk of vascular disease in adulthood seems to remain even after adjustment for socioeconomical factors in childhood (50).

Although being non-modifiable, these factors identify those at highest risk of stroke who may benefit most from rigorous prevention or treatment of the modifiable risk factors.

### 1.4.2 Modifiable risk factors

**Hypertension** (HT) is regarded as the single most important treatable risk factor for IS (42,51) and stroke in general (36, 38). The relationship between blood pressure (BP) and cardiovascular risk is “continuous, consistent, and independent of other risk factors”(51). Hence, there is no “threshold” for BP; a significant proportion of all strokes happen in persons with normal BP or “mild” hypertension. Both systolic (SBP) (52) and diastolic blood pressure (DBP) (53) is of importance for stroke risk; but prospective studies have shown SBP to be a better predictor for CVD risk, especially in middle-aged and older adults in whom most cardio-vascular disease occur (52). In INTERSTROKE, being hypertensive (defined as self-reported HT or BP  $\geq 140/90$  mmHg) gave an odds ratio (OR) of 2.21 for IS (age- and sex matched) in sub-analyses on data from Western Europe, USA and Australia (41). From BP level of 115/75 mmHg, the risk of death from stroke doubles for each increment of 20/10 mmHg (52).

Having **diabetes** more than doubles the risk for stroke; the estimated risk for IS in diabetic persons is 1.8 to 5-fold compared to non-diabetics (48). Individuals without diabetes, but with an elevated fasting blood glucose, do also carry an excess risk for stroke (54). Diabetes is found to increase the risk for IS for all age groups, but age-specific risk for IS in diabetics vs. non-diabetics is most prominent in those aged <65 years compared to elder ones (55). While some studies have suggested a higher proportion of lacunar strokes in diabetic IS patients (56), this is not confirmed by others (57). The effect of diabetes may in part be mediated through other risk factors such as HT and lipid alterations (55, 58). Potentiating effects of diabetes with other risk factors on stroke risk is also suggested (55, 58).

**Cigarette smoking** is an independent risk factor for stroke, especially IS; and is associated with approximately a doubling of risk (59,60). Smoking likely contributes to higher stroke risk through both acute effects (aggregation of blood platelets / thrombus generation) and long-term effects (increased burden of atherosclerosis) (61). Moreover, a strong dose-response relationship has been shown between number of cigarettes and risk of IS (59, 61). Cigarette

smoking may also potentiate the effect of other risk factors for stroke (61, 62). In a pooled analysis of prospective data (3.9 million individuals; >42,000 strokes from 81 cohorts worldwide), the excess stroke risk by smoking was similar by sex, while in Western cohorts, smoking was a stronger risk factor for stroke in women than in men (60). Smoking cessation have been shown to reduce the stroke risk by 50% by the first year after cessation, reaching the stroke risk of never-smokers within 2–5 years (63, 64).

**Atrial fibrillation** (AF) alone is associated with an overall 4 to 5-times excess risk of IS (65), by embolism of thrombi developed in the left atrial appendage. However, among persons with AF, the absolute stroke risk differs 20-fold, depending on age and associated cardiovascular risk factors (66). IS associated with AF tend to be larger and more disabling than other IS, with a higher case fatality (67). The incidence of AF increases with age, and is higher in men than in women in all age groups (68). Diabetes, hypertension, smoking and obesity are modifiable risk factors that contribute to the development of AF (68). A recent review reported the prevalence of AF in adult population (>20 years) to be between 2.5% and 3.5%; ranging from 0.1% in adults <55years to 10% or more in persons aged 80 years and older (68). In The Tromsø population, the point prevalence of AF at the end of 2007 was 2.2% in women and 3.3% in men (mean age 57 years) (69). About 25% of IS among those ≥80 years are due to AF (65) (66). In the Framingham Heart Study, both prevalence and incidence of AF (age-adjusted and sex stratified) showed a roughly four times increase from 1958–2007. However, the incidence of AF in the Framingham Heart Study electrocardiograms (ECGs) did not change significantly across time, leading to the conclusion that enhanced detection may be part of the explanation behind increasing trends in AF prevalence and incidence (70).

The associations between **dyslipidemia** and stroke incidence are complex. Several large, observational studies have found high **total cholesterol** to be a significant risk factor for IS (71,72) while other studies have shown only a weak (73), or no association (74). This relationship also seems to differ by subtype of IS, with strongest associations for

atherosclerotic subtypes (especially large artery atherosclerosis) (75). Conversely, an inverse relationship between cholesterol level and ICH risk is found (76). Some studies have shown associations between increased **low-density lipoprotein cholesterol (LDL)**, and higher risk of IS (71), while no significant association was found in others (73). Despite relatively sparse epidemiological findings regarding novel levels of LDL and risk of IS, primary stroke prevention trials have demonstrated risk reduction of incident stroke ranging from 11%–40% in high-risk populations when receiving statin treatment (75). In a meta-analysis, an estimated 21% risk reduction of stroke was found with each 1 mmol/L reduction in LDL (77). Regarding **high-density lipoprotein cholesterol (HDL)**, a systematic review reported a reduced risk of IS ranging from 11–15% for each 10mg/dL ( $\approx 0.26$  mmol/L) increase in HDL (78). Studies evaluating **triglycerides** vs. IS risk have shown mixed results (73, 75).

High **body-mass index (BMI)** is an important risk factor for stroke, and increased BP, cholesterol and glucose partly mediates its effects. In a meta-analysis of 97 prospective cohorts (1.8 million individuals; >31,000 strokes), about three quarters of the effect BMI exerted on stroke risk was mediated by these three metabolic risk factors, with BP as the most important mediator, accounting for two thirds of excess risk (79). In this study, each 5 kg/m<sup>2</sup> increase of BMI was associated with a 4% higher risk of stroke, while persons with obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) showed a 14% excess risk of stroke compared to normal-weighted (BMI  $\geq 20$  to  $< 25$  kg/m<sup>2</sup>) (79).

Several studies have reported a beneficial effect of regular **physical activity (PA)** on stroke risk, but studies comparing the effects of vigorous and lower levels of PA are limited (48). Even if the types and frequency of exercise necessary to prevent stroke are not fully established, meta-analyses conclude that regular PA reduces stroke risk by 25–30% when compared to least active persons (48,80). In INTERSTROKE, PA (defined as regularly moderate or strenuous leisure-time PA  $\geq 4$  hours per week) was associated with 27% reduced risk for stroke in Western populations (41). The protective effect of PA on stroke risk is partly mediated through declining BP, and by controlling other cardiovascular risk factors as diabetes and high BMI (81).

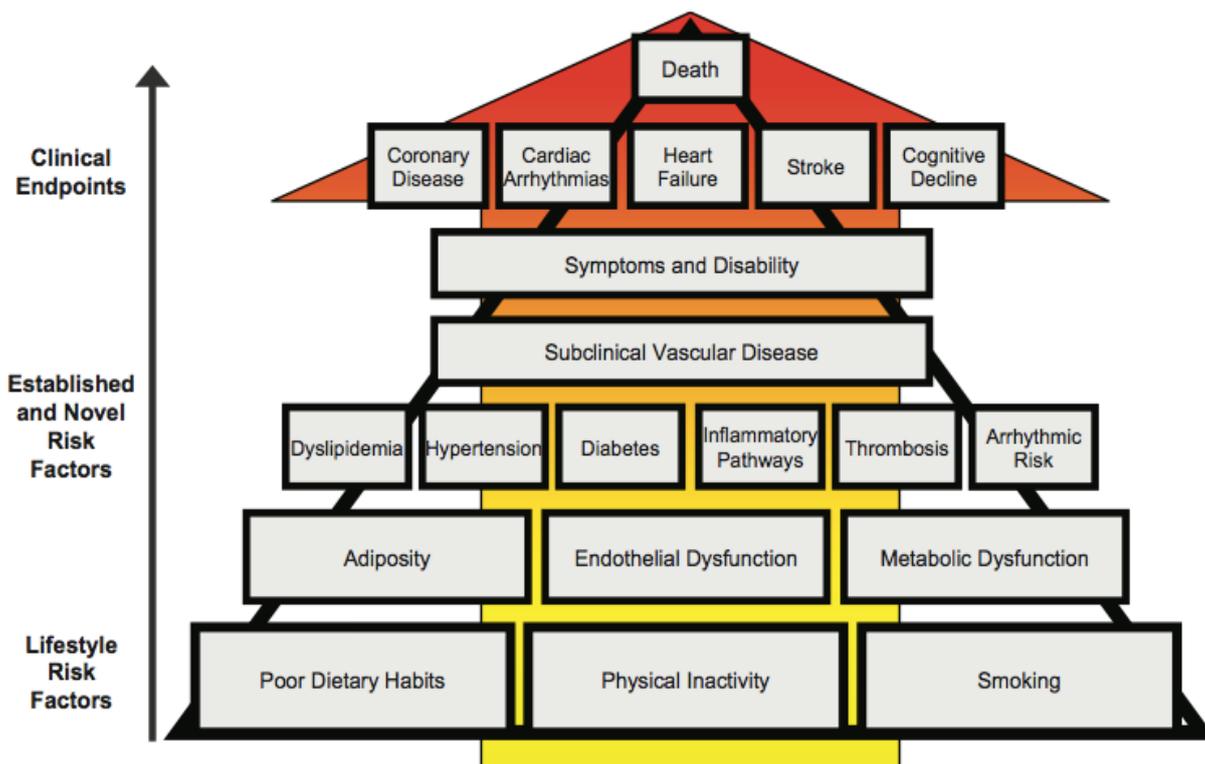
The impact of **diet** patterns on the risk of stroke have been assessed in recent years, as opposed to earlier research which focused on the impact of individual nutrients or food groups. High adherence to a Mediterranean diet (high intake of olive oil, fruit, nuts, vegetables and cereals; moderate intake of fish and poultry; low intake of dairy products, red meat, processed meats and sweets; and wine in moderation) was related to a 39% reduction of incident strokes in the PREDIMED trial (Prevencion con Dieta Mediterranea) (82). The Dietary Approach to Stop Hypertension (DASH) diet (a diet rich in fruits, vegetables and low-fat dairy products; low in saturated and total fat) significantly reduced blood pressure among persons with hypertension (SBP  $\geq$ 140 mmHg and/ or DBP  $\geq$ 90 mmHg) as well as among non-hypertensive (83). The beneficial effects of these dietary patterns on stroke risk have later been confirmed in meta-analyses for a Mediterranean (84) as well as for a DASH type of diet (85).

Several studies report a protective effect of light to moderate **alcohol consumption** on the risk of IS (86, 87), while others (88) claim that this finding could be due to e.g. residual confounding or contamination of the teetotaler group by ex-drinkers. A high consumption of alcohol (87) as well as binge drinking (89) have been associated with higher risk of stroke. The Scandinavian pattern of drinking is commonly characterized by low rates of abstinence and fairly high rates of binge drinking (90); 23% of male drinkers and 12% of female drinkers reported binge drinking ( $\geq$ 6 units of alcohol in one occasion) at least once a month in a national survey in 2012 (91).

**Drug abuse** (cocaine, amphetamines, heroin) may cause stroke through several pathogenetic mechanisms, e.g. by embolization after i.v. drug injection (infectious, air, talkum); by hypersensitivity reactions; by vasculitic-like changes ; by induced vasospasm (especially cocaine), or by altered cerebral autoregulation / hypertensive crisis (66).

### 1.4.3 Modifiable risk factors include both metabolic and lifestyle risk factors

Metabolic risk factors as hypertension, diabetes and dyslipidemia, being traditional major foci for practice guidelines and clinical research, are strongly influenced by lifestyle factors, and act as intermediate factors between lifestyle factors (e.g. diet, physical inactivity, adiposity, smoking) and ischemic stroke. Generally, risk factors can be characterized as proximal or more distal causal factors in relation to an outcome (here: IS). As illustrated in figure 3, lifestyle factors also influence IS risk through other novel risk factors, as altered endothelial function, inflammation/oxidative stress, thrombosis/coagulation, arrhythmia and other pathways (92).



**Figure 3. The relations of lifestyle, established metabolic risk factors and novel risk factors on cardiovascular disease.** Lifestyle factors influence disease risk through established cardiovascular risk factors (e.g. hypertension, diabetes) as well as through their effect on other novel risk factors (e.g. endothelial dysfunction, inflammatory pathways).

*From Mozaffarian D, Wilson PWF, Kannel WB. Circulation. 2008;117:3031–3038.*

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#### **1.4.4 Observed time trends in risk factors vs. time trends in stroke incidence**

Changes in stroke incidence mirror the changes in risk factors over time, and the implementation of primary prevention (7, 93). The American Heart Association/American Stroke Association proposed that 20–40% of the decrease in first-ever stroke incidence is attributed to the improvement of risk factor control (7). Nevertheless, at population level, a combined risk score of trends in systolic BP, daily cigarette smoking, serum cholesterol and body mass index explained only a small proportion of stroke incidence decrease between 1982 and 1995 (94). Most studies on the relationship between changes in risk factors over time and alterations of stroke incidence have based their estimates on ecological data or mathematical modeling of aggregated data (19, 94, 95). Fewer studies used individual person data from repeated surveys to assess how the changing trends in IS incidence are associated with changes in modifiable cardiovascular risk factors (16, 18, 34); some of these studies were limited to subgroups of age (16) or did not study out-of-hospital strokes (18).

#### **1.4.5 "What if...?" Estimating the effect of risk factor change on future stroke risk**

In a public health perspective, an important question is: What would be the impact of a *change* in risk factor exposition in a population, on the subsequent population risk of first-ever stroke?

*Randomized clinical trials* (RCTs) have shown that treatment of hypertension reduces the risk of first-ever stroke by 35–40% (51, 96), and that usage of statin in low-risk, healthy individuals reduces stroke incidence by 24% (97). In contrast, only a few RCTs have evaluated the effect of lifestyle improvement on first-ever stroke risk (82, 98). However, clinical trials often have short follow-up time and limited generalizability. Therefore, evidence for long-term effect of interventions on stroke prevention may best be derived from prospective observational studies.

Several *prospective observational studies* have assessed the long-term associations between lifestyle risk factors and stroke risk in healthy populations (37, 99, 100) and found that 35–55%

of events were attributable to unhealthy lifestyle (i.e. smoking, heavy or irregular drinking, unhealthy diet and physical inactivity). Similarly, meta-analyses of observational studies have reported lower risk of stroke with lower levels of BP and serum cholesterol (52, 101, 102).

However, these observational studies cited above either used only baseline values of risk factors or used updated values of risk factors during follow-up (37) without appropriately adjusting for time-varying confounding. Furthermore, these observational studies estimated *the lifelong impact* of risk factors, (i.e. what would the stroke risk be if these risk factors were erased); whereas of more interest (and closer to real-life scenario) is the potential impact of a *change in risk factor in midlife or later* as an intervention.

Therefore, there is a need for reliable estimates of the potential impact of interventions on risk factors initiated in midlife or later (as in the clinical trials) over a long period of time in healthy populations (as in the observational studies).

A particular methodological challenge is to estimate the unbiased effect of a time-varying exposure in the presence of time-varying confounders if those confounders are affected by prior exposure (103). For example, if the effect of long-term weight loss is of interest, prior physical activity should be adjusted as a time-varying confounder but future physical activity can be affected by weight loss. In such cases, conventional regression models fail to adjust for confounding and may indeed introduce bias. G-methods, including the parametric g-formula, have been developed to handle such situations.

## 2. Aims of the thesis

The aims of the thesis were:

- To investigate age- and sex-specific trends in incidence and case fatality of first-ever ischemic stroke in a general Norwegian population
- To estimate the impact of changing risk factor levels across time on the concurrent change in ischemic stroke incidence
- To assess the effects of risk factor interventions (separate and combined) on the subsequent population risk of stroke and ischemic stroke

### 3. Study population and methods

#### 3.1 The Tromsø Study cohort

The Tromsø Study is a single-center population-based health study, conducted in the municipality of Tromsø, Norway. Tromsø is located at 69° N and is a center of education, research, administration and fishing related activities. The Tromsø population is dominated by Caucasians of mainly Norwegian origin (including a Sami minority), and may be considered representative of a Northern European, white, urban population (104). From 1974 to 2012 the number of inhabitants increased from 42,200 to 68,000. Seven cross-sectional screening surveys (Tromsø 1–7) have been carried out so far; the first one in 1974, followed by repeated surveys with 6–7 years interval (1979–80, 1986–87, 1994–95, 2001, 2007–08 and 2015–16). Total birth cohorts and additional random samples of inhabitants in Tromsø were invited to surveys by written invitations sent by mail, and the attendance rate ranged from 65% to 77% (Table 2). The initial main focus in 1974 was cardiovascular diseases, but the study has expanded throughout the years to include other research areas and health aspects. In this study, data from Tromsø 1 (1974) to Tromsø 6 (2007–08) is used.

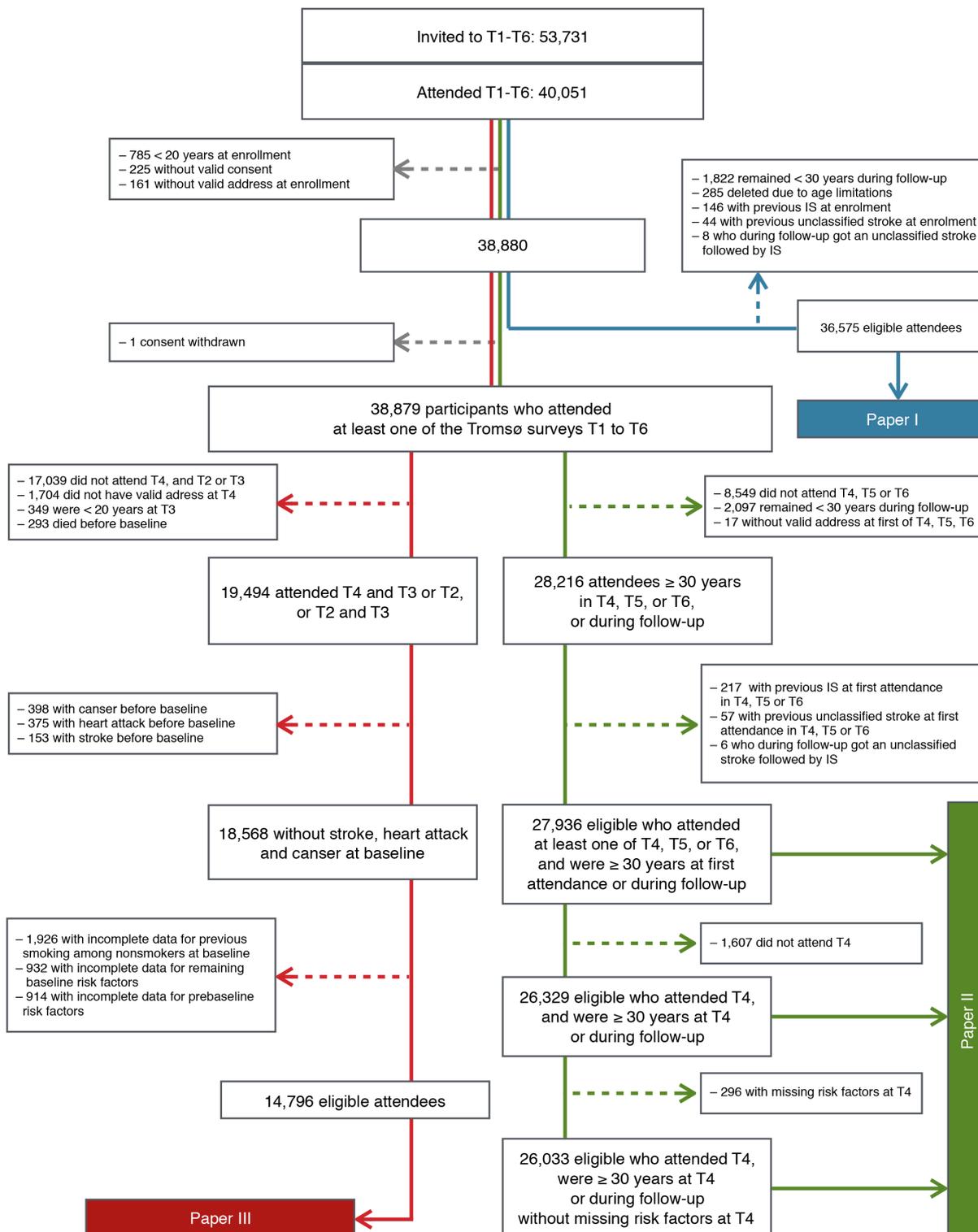
**Table 2. Year of screening, age, number and attendance rate of eligible participants. The Tromsø Study.**

Year of screening	Age group	Participants men, n	Attendance rate, %	Participants women, n	Attendance rate, %
1974	20–49	6 595	74.4	–	–
1979–80	20–54*	8 477	73.8	8 144	81.8
1986–87	20–61†	10 413	71.7	10 189	79.1
1994–95	25–97	12 865	69.6	14 293	74.9
2001	30–89	3 511	75.7	4 619	80.8
2007–08	30–87	6 054	62.9	6 930	68.4

\*20–49 years in women

†20–56 years in women

**Figure 4. Flowchart of the study population**



### **3.1.1 Paper I study population**

In Paper I we investigated the age- and sex-specific time trends in incidence and case fatality of IS. Of the 38,880 men and women who attended at least one of the studies Tromsø 1–6 and were aged  $\geq 20$  years, registered as inhabitants in Tromsø at the date of enrollment and had valid informed consent to medical research; we excluded 1,822 participants who remained  $< 30$  years during the entire follow-up period. (Participants who were enrolled at an age younger than 30, but became 30 years during follow-up, were followed from age 30 and onwards). Moreover, we excluded 146 with previous IS and 44 with previous unclassified stroke at time of inclusion; and 8 who after enrollment got an unclassified stroke followed by an IS. The analyses were stratified by gender and age (30–49, 50–64, 65–74, 75–84 and 85 years and older). Because the oldest birth cohorts were included in the study at a later point of time than the younger ones, the time periods for the trend analyses and incidence rates were different for each age group (see Table 1 and detailed description in Paper I). Thus for men, age-specific trends for the age groups 30–49, 50–64, 65–74, 75–84 and  $\geq 85$  years could be estimated for the time periods 1974–2010, 1989–2010, 1995–2010, 1995–2010 and 1995–2010, respectively. As lack of access to computed tomography (CT) before 1977 made it more difficult to rule out hemorrhage, onset of follow-up for men aged 30–49 years was set to January 1st, 1977. For women, analyses for the corresponding age groups were done for the time periods 1980–2010, 1994–2010, 1995–2010, 1995–2010 and 1995–2010. Due to age limitations, we had to exclude another 285 subjects from the trend analyses. Hence the total number of persons included in the analyses on incident ischemic stroke was 36,575; 18,367 women and 18,208 men.

### **3.1.2 Paper II Study population**

In Paper II we estimated the impact of changing risk factor levels across time on the concurrent change in ischemic stroke incidence. In the time between writing Paper I and Paper II, one participant withdrew the consent to research, leaving 38,879 participants aged  $\geq 20$  years who

had attended at least one of the studies Tromsø 1–6 with valid consent and valid address in Tromsø at enrolment. Of these, we excluded 10,663 who did not attend any of the surveys Tromsø 4, Tromsø 5 or Tromsø 6 or who remained <30 years during the entire follow-up period, leaving 28,216 persons who attended at least one of the surveys Tromsø 4–6 and were aged  $\geq 30$  years at survey date or during follow-up. (Participants who were enrolled at an age younger than 30, but became 30 years during follow-up, were followed from age 30 and onwards). Further, we excluded 217 with previous IS at baseline (the first survey the person participated in out of Tromsø 4–6); 57 with previous unclassified stroke at time of inclusion; and 6 who after enrollment got an unclassified stroke followed by an IS, leaving 27,936 persons (14,697 women and 13,239 men) eligible for the background analyses in Paper II (see Figure 4 and detailed description in Paper II). Included in the main analysis in Paper II, however, were those out of the 27,936 who had attended Tromsø without missing risk factors; who were 30 years or older at Tromsø 4 or became 30 years during follow-up. Hence, we excluded 1,607 who did not attend Tromsø 4, and 296 with missing risk factors for at least one of the variables at Tromsø 4, leaving 26,033 persons who were included in the main analysis in Paper II.

### **3.1.3 Paper III Study population**

In paper III we assessed the effect of risk factor intervention on the subsequent population risk of stroke and IS. We chose Tromsø 4 (1994–95) as baseline in order to have complete pre-baseline data on the selected covariates. From the 38,879 participants aged  $\geq 20$  years who had attended at least one of the studies Tromsø 1–6 with valid consent and valid address in Tromsø at enrolment, we excluded 17,039 who did not attend baseline and at least one of the prior surveys Tromsø 2 or Tromsø 3; 1,997 without valid address at baseline and 349 who were <20 years in Tromsø 3. Participants who were 25 years or older at Tromsø 4 and had attended at least one prior cycle were eligible for our study ( $n=19,494$ ). We excluded 4,698 participants who at baseline had experienced cancer, heart attack or stroke or had incomplete pre-baseline or baseline covariate data after carrying data one cycle forward (see Figure 4 and detailed

description in Paper III). After exclusions, our cohort included 14,796 persons (7,547 women and 7,249 men.)

#### **3.1.4 Ethics**

The Tromsø Study was approved by the Norwegian Data Inspectorate and recommended by the Regional Committee of Research Ethics. In Tromsø 4, 5, and 6, each participant signed a written informed consent.

### **3.2 Physical measurements, blood samples and questionnaires**

Each Tromsø survey applied a standardized protocol with physical measurements, blood samples and self-administered questionnaires. Blood pressure (BP) was measured by trained personnel with an automatic device ("Dinamap") from 1986 and onwards (Tromsø 3), and by stethoscope and mercury sphygmomanometer ("ERKA-meter") in the two earliest surveys.

Validation studies have shown systematic slightly lower blood pressure values when measured with Dinamap as compared to ERKA-meter (Details in supplement, Paper III). Hence, in paper III, because some participants contributed with pre-baseline data from Tromsø 2; Dinamap measurements were transformed to ERKA-meter values in accordance with previously validated methods (105). Hypertension was defined as systolic BP (SBP)  $\geq 140$  mmHg and/or diastolic BP (DBP)  $\geq 90$  mmHg and/or use of BP-lowering medication. Body Mass Index (BMI) was calculated as weight divided by the square of height ( $\text{kg}/\text{m}^2$ ). Overweight was defined as  $\text{BMI} \geq 25$  to  $< 30 \text{ kg}/\text{m}^2$  and obesity as  $\text{BMI} \geq 30 \text{ kg}/\text{m}^2$ .

Non-fasting blood samples were analyzed for serum total cholesterol and high-density lipoprotein cholesterol by standard methods at the University Hospital of Northern Norway. Hyperlipidemia was defined as total cholesterol/HDL ratio  $> 5$ .

In all Tromsø Surveys, a questionnaire was enclosed in the invitation. In Tromsø 2–6, the participants were given a second questionnaire and asked to return it by mail in a pre-

addressed stamped envelope; approximately 90% did so. The questionnaires include questions regarding a wide range of diseases and symptoms, socio-economic status, lifestyle aspects and use of medication. In our study, we used this self-reported information regarding prevalent cancer and CVD, cardiovascular symptoms, family history of coronary heart disease, race, education and employment. Moreover, diabetes was self-reported by questionnaire, as were smoking, alcohol consumption and leisure-time physical activity (PA). In paper II attendees were defined as physically active if they reported performance of strenuous physical activity (i.e. became breathless and sweaty) at least one hour/week. In paper III, where we wanted to assess one feasible and one intensive PA intervention, participants were categorized according to PA as: 'sedentary'; 'intermediate physically active' (some light PA and /or vigorous PA less than 3–4 hours per week) and 'highly physically active' (vigorous PA several times or  $\geq 3$ –4 hours per week) (Details in supplement, Paper III).

### **3.3 Ascertainment of endpoints**

First-ever ischemic stroke was the primary endpoint in Paper I and II. In Paper III, first-ever stroke was the primary endpoint, but separate analyses were performed for first-ever ischemic stroke. Stroke was defined according to the WHO definition ("rapidly developing clinical signs of focal or global disturbance of cerebral function, with symptoms lasting  $\geq 24$  hours or leading to death, with no apparent cause other than vascular origin") (2). Hence, silent infarcts discovered only by radiological imaging were not included. A stroke was classified as an ischemic stroke when computed tomography (CT), magnetic resonance imaging (MRI) and/or autopsy had ruled out intracerebral and subarachnoid hemorrhage. If imaging or autopsy had not been conducted in the acute stage, the stroke was categorized as unclassified. The unique national identification number was used to link each participant to the discharge diagnosis registry at University Hospital of North Norway (the only hospital serving Tromsø) and to the National Causes of Death Registry and the Population Registry of Norway. An independent endpoint committee adjudicated all possible hospitalized and out of hospital events using medical

records, autopsy reports and death certificates. Information from additional sources (records from nursing homes, general practitioners, and ambulance services) was used for validation. Participants were followed until the first-ever IS event (Paper I, II, III) or first-ever stroke (Paper III), emigration from Tromsø, death, or administrative end of follow-up, whichever happened first. End of follow-up was 31.12.2010 in Paper I, and 31.12.2012 in Paper II and III. The endpoint registry was updated through 2012 after the publication of Paper I. Hence, we repeated the main analyses in paper I with end of follow-up 31.12.2012, these additional analyses are referred separately.

### **3.4 Statistical analyses**

The analyses in paper I were performed using STATA, version 12 and 13 (Stata Corp LP Texas, USA), while STATA 13 and SAS 9.4 (SAS Institute, Cary, NC) were used for the analyses in paper II and III. Additionally, in paper III we applied the parametric g-formula (<http://www.hsph.harvard.edu/causal/software>) to estimate the 18-years cumulative risk of stroke under different hypothetical interventions.

#### **3.4.1 Paper I**

Sex-specific crude incidence rates (per 1,000 person-years) were calculated for the age groups 30–49, 50–64, 65–74, 75–84 and 85 years and older by dividing the number of all events in the period of time by the corresponding person-years at risk. Time trends in incidence rates were estimated by taking into account the possibility of non-linearity. In each sex and age strata, calendar year was fitted by second-degree fractional polynomials and regressed on the incidence of stroke in Poisson regression models. The stratified analyses were age-adjusted by including age as a continuous variable in the models. Of the forty-four models fitted and compared for each stratum, the best fractional polynomial model of degree 2 was compared with the best model of degree 1, and the model with the best likelihood ratio test statistic for the fractional polynomial term was selected. The p-value of the selected model represents the

p-value for the time trend.

Incidence rate ratio (IRR) was defined as the incidence rate in the last year of follow-up divided by the incidence rate in the first year. For all age groups, except women aged 30–49 years, IRR was calculated from start of follow-up (see 3.1.1) through Dec.31 2010. In women aged 30–49 years, IRR was calculated from 1989, when the first stroke occurred in this stratum. Additional analyses were done with a combined endpoint of ischemic and unclassified stroke.

Crude case fatality rates were calculated for the time periods 1995–2000, 2001–2005 and 2006–2010. Logistic regression was used to estimate age-adjusted odds ratios (OR) for case fatality in the period 2001–2005 and 2006–2010, using 1995–2000 as the reference. Possible non-linear time trends of case fatality from 1995 to 2010 were assessed in separate sex-specific logistic regression models by including fractional polynomials of calendar year, with age included as a covariate. Age-adjusted ORs for case fatality were estimated for the years 2003 and 2010, using 1995 as the reference. Trends across age and sex were compared by including two-way interaction terms between time and age and time and sex. A probability value of  $<0.2$  was considered statistically significant for tests of interaction, while a two-sided level of significance of  $P < 0.05$  was used for all other analyses.

### **3.4.2 Paper II**

Descriptive baseline characteristics were presented as means (95% CI) or frequencies (%) for the study participants with or without incident IS during follow-up;  $P$ -values for baseline differences were estimated by linear and logistic regression for continuous and categorical variables, respectively. Age- and sex-adjusted means or prevalences of risk factors *over time* were estimated by generalized estimating equations (GEE), accounting for dependencies between repeated observations.

Hazard ratios (HR) of IS were estimated for the different cardiovascular risk factors with Cox proportional hazards regression. For attendees who participated in more than one survey and

who were still free of IS, cardiovascular risk factors were updated at the date of subsequent examinations (106). HRs were adjusted for age and sex in model 1 and additionally adjusted for systolic BP, cholesterol, HDL, daily smoking, BMI, diabetes and physical activity in model 2. The proportional hazard assumption was verified by visual inspection of Schoenfeld residuals and log minus log survival plots.

Incidence analyses were based on the participants of Tromsø 4 in 1994–95 (n=26,329). Time trends in incidence were standardized by age and sex using the Tromsø population in 2007 as the standard population. Linear time trends were estimated by Poisson regression.

The proportion of the IS incidence decline explained by the change in each risk factor over time (SBP, daily smoking, diabetes, BMI, total cholesterol, HDL cholesterol, physical activity) could be estimated among those who attended Tromsø 4 in 1994–95 without missing values of risk factors (n=26,033), by the expression  $(\beta_0 - \beta_1)/\beta_0$ . The  $\beta$ s are time trend coefficients from Poisson regression models, where  $\beta_0$  is adjusted for age and sex and the  $\beta_1$  additionally adjusted for risk factors added to the model as time-dependent covariates. End of follow-up was defined to 2001 for those who did not attend the 2001 survey and to 2007 for those who did not attend the 2007–08 survey. Individuals who had an IS event were censored from the analyses at the time of their event. One thousand bootstrapped samples were selected to estimate 95% confidence interval for the explained decline. We performed supplemental Poisson regression analyses stratified by sex and by age group (baseline age <60 years and  $\geq 60$  years, this cut-off was chosen to get sufficient power in both groups). A two-sided level of  $P < 0.05$  was considered statistically significant.

### 3.4.3 Paper III

We applied the parametric g-formula to estimate the 18-years cumulative risk of stroke under different hypothetical interventions (107). The parametric g-formula represents a generalization of standardization for time-varying exposures and confounders, and the analytical steps of this method are described in paper III.

This method can be described as constructing a hypothetical RCT based on data from a prospective cohort study, where the control group and the treatment group consists of the same individuals. Our cohort under the "natural scenario" represents the "control group" (with the risk factor distribution and concurrent stroke incidence we observed in "real life", i.e. no intervention), and each hypothetical intervention (separate or combined) applied on this cohort defines a new "treatment group".

The models included the following potential baseline confounders: age (continuous and quadratic), sex, marital status, education, work-time physical activity, night- or shiftwork, former smoking and family history of coronary heart disease in parents or siblings, as well as pre-baseline HDL cholesterol and diabetes mellitus, and the pre-baseline values of six selected intervention variables: smoking, physical activity, alcohol use, BMI, systolic BP and total cholesterol.

We evaluated six feasible and six intensive hypothetical interventions, and their combination. The feasible interventions were: 13% of smokers quit smoking (108); all participants were somewhat physically active (some light PA and /or vigorous PA <3–4 hours per week); 20% of alcohol drinkers quit drinking (109); all overweight or obese participants lost weight by 10% every 6 years; all participants maintained systolic blood pressure (SBP) <140 mmHg (51); and all maintained total cholesterol <6.22 mmol/L (110). The intensive interventions were: all smokers quit smoking; all participants performed vigorous PA  $\geq 3$ –4 hours per week; all drinkers quitted alcohol; all participants had normal body mass index (i.e. <25 kg/m<sup>2</sup>); all maintained SBP <120

mmHg (111) and total serum cholesterol <5.18 mmol/L (110).

We compared the estimated stroke risks under different hypothetical interventions with the 18-years stroke risk under no intervention to calculate the population risk ratios and the population risk differences. Subgroup analyses were done for men and women, for participants aged <55 vs. ≥55 years at baseline, and for participants with highest attained baseline education level ≤10 and >10 years. We conducted sensitivity analyses in which we varied the ordering of the time-varying covariates in our model, and excluded attendees with diabetes at baseline. Separate analyses were done with ischemic stroke as endpoint. We used nonparametric bootstrapping with 500 samples to estimate the 95% confidence intervals. The proportion of participants who were hypothetically intervened on in any period were also computed, as well as the average proportion of attendees intervened on, in each 6-years period.

## 4. Main results

### 4.1 Time trends in incidence and case fatality of first-ever ischemic stroke.

#### The Tromsø Study 1977–2010 (paper I)

Among 36,575 attendees aged  $\geq 30$  years there were 1,214 first-ever ischemic strokes within a total follow-up time of 611,176 person-years. The overall age- and sex-adjusted incidence declined by 24% from 1995 through 2010 (IRR 0.76, 95% CI 0.62–0.92;  $p$  for trend  $< 0.001$ ). In women aged 30 to 49 years, the incidence increased significantly from 1980 to 2010 (IRR: 2.69, 95% CI 1.04–6.99;  $p$  for trend 0.003). In men aged 30–49 years, there was a non-significant, rising trend from 1977 to 2010. Men aged 50–64 years had similar incidence in 2010 compared to 1989. From the mid-1990s to 2010, the incidence declined significantly in women aged 50–74 years and in men aged 65–74 years, but remained stable in those aged  $\geq 75$  years. Despite this indication of interaction of age by different shapes of the curves, we did not reveal any statistical significant interaction by age ( $P=0.87$ ). This may be due to that our test for interaction lack power. There was no significant interaction by sex. Mean age at IS onset was approximately 4 years higher in women aged 30–84 years compared to men. In the combined endpoint analyses where 77 unclassifiable strokes were included, time trends remained fundamentally unchanged, but the IRRs were no longer significant in women aged 30–49 and men aged 50–64 years.

Between 1995 and 2010, the mean crude case fatality for IS in persons aged 30–84 years was 7%, and 20% in participants  $\geq 85$  years. The age-adjusted case fatality decreased significantly in men aged 30 to 84 years from 1995 to 2010, whereas there was no significant change in women ( $p$  for interaction =0.007). Age-adjusted case fatality of IS was higher for women than men through the whole period.

## 4.2 Declining incidence of ischemic stroke: What is the impact of changing risk factors? The Tromsø Study 1995–2012 (paper II)

There were 1,226 first-ever IS (45% in women) during 367,636 person-years of follow-up among 27,936 attendees  $\geq 30$  years followed through 2012. Mean observation time was 12.8 years (SD 6.0). Several cardiovascular risk factors changed favorably across the three surveys Tromsø 4–6. Systolic and diastolic BP, total cholesterol, proportions of hypertension, hyperlipidemia, and daily smoking declined, and the proportion of participants who reported  $\geq 1$  hour strenuous physical activity per week enlarged. However, the prevalence of obesity and diabetes mellitus increased substantially from Tromsø 4 (1994–95) to Tromsø 6 (2007–08). While the diabetes prevalence increased with 100% among attendees aged  $\geq 30$  in this period, the prevalence of overweight and obesity combined increased from 51% to 61%.

In Cox proportional hazard regression, hypertension was the strongest risk factor for IS, with 92% increased hazard (multi-adjusted) in hypertensive participants. Diabetes was associated with 80%, and daily smoking with 71% higher IS risk. Obese attendees had 28% higher hazard for IS compared to those normal weighted. The risk of IS was 28% increased in attendees with hyperlipidemia, while HDL was protective for IS, with 22% reduced HR per 1 mmol/l increase in mean HDL. Associations that were significant in the age- and sex-adjusted model remained significant in the multivariate model, except for overweight and physical activity.

Overall, the combined change in seven cardiovascular risk factors (systolic blood pressure, daily smoking, diabetes, BMI, total cholesterol, HDL, physical activity) accounted for 57% (95% CI 28–100%) of the decrease in IS incidence from 1995 through 2012 in those who attended Tromsø 4 without missing risk factors (n=26,033). The most important contributors were decreasing mean systolic blood pressure and smoking prevalence, accounting for 26% (95% CI 15–56) and 17% (95% CI 8–41) of the observed decline, respectively. Changing levels of HDL contributed with 2% (95% CI 0.3–7), while reduction of total cholesterol and increase in physical activity were associated with 12% and 5% of the declining IS incidence (not significant). In contrast, the

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increasing diabetes prevalence contributed negatively with 4% increase in risk, (95% CI –10 to –1), as did the change in BMI over time, which was associated with 5% increasing risk, though not significant. The sex-stratified analyses revealed that the reduction in SBP and decreasing prevalence of daily smoking contributed most to the declining IS incidence in both women and men. Age-stratified analyses (baseline age <60 years and ≥60 years) showed no differences in risk factor contribution to the IS incidence reduction (p=0.58), and hence no significant interaction by age in the fully adjusted model.

### **4.3 Hypothetical interventions to prevent stroke: An application of the parametric g-formula to a healthy middle-aged population (paper III)**

Among the 14,796 eligible participants (mean age at baseline 46.1 years, 51% women) there were 871 deaths and 524 cases of stroke during 18-years follow-up (399 IS, 61 ICH, 33 SAH and 31 unspecified strokes). Of the 6,917 participants who were not eligible through all 18 years of follow-up, 68% (n=4,718) were not invited to a later survey due to logistics; 21% (n=1,425) moved out of Tromsø, and 11% (n=774) had missing data on two subsequent surveys. The simulated 18-years risk of stroke under no intervention was 5.50% (95% CI 5.03– 5.99) and similar to the observed risk at 5.89%.

Even *feasible reductions* substantially reduced the stroke risk. Specifically, reducing SBP to <140 mmHg was estimated to lower the 18-years population risk of stroke by 15% (95% CI 10–20), compared to "no intervention". Smoking cessation in 13% of smokers would reduce the risk by 2% (95% CI 0–4), and quitting drinking in 20% of drinkers would reduce risk by 8% (95% CI –1 to 14); whereas increasing physical activity, reducing body-mass index or lowering total cholesterol to <6.22 mmol/l did not substantially alter the population stroke risk. The 18-years risk of stroke would be reduced by 19% (95% CI 8–30) when all six feasible interventions were applied. Maintaining adherence to the strategy of feasible reduction of SBP in this particular population would require changing the SBP of an average of 31% of participants in each period,

while adherence to a strategy with joint feasible interventions would require risk factor changes of an average of 80% of the attendees in each period.

Under *more intensive interventions*, lowering SBP to <120 mmHg would reduce this population's 18-year stroke risk by 32% (95% CI 22–40), quitting drinking by 25% (95% CI –2 to 45) and quitting smoking by 9% (95% CI 1–17). The other intensive interventions did not change the stroke risk substantially when applied separately. Combining all the intensive interventions would reduce the estimated 18-years risk of stroke by 55% (95% CI 32–72).

In sub-group analyses, the estimated impact of an intensive combined intervention on all six risk factors did not differ significantly by the selected subgroups in multiplicative or additive scale. The estimates of relative risks and risk differences did not change materially in any of the sensitivity analyses conducted.

For IS, the observed 18-years risk was 4.55% and the simulated risk under no intervention was 4.23% (95% CI 3.80–4.67). Separate intensive interventions on SBP and alcohol drinking reduced the risk of ischemic stroke. If all drinkers had quit alcohol, the 18-years IS risk would be reduced by 32% (95% CI 3–54), nearly as much as lowering SBP to <120 mmHg (35% (95% CI 25–44)). The 18-year risk of ischemic stroke would be reduced by 64% (95% CI 39–79) under the intensive joint intervention on all risk factors, while a more feasible combined intervention would give an estimated 24% (95% CI 9–35) IS incidence decline. Separate feasible interventions on SBP reduced the risk of IS with 18% (95% CI 12–23). The risk reduction by quitting alcohol in 20% of drinkers was 10% (95% CI 1–17), while smoking cessation in 13% of smokers would reduce the IS risk by 2% (95% CI 0–4).

## **5. Discussion**

### **5.1 Methodological considerations**

The renowned epidemiologist Kenneth Rothman has written that “The objective of an epidemiological study is to obtain a valid and precise estimate of the frequency of a disease or of the effect of an exposure on the occurrence of a disease in the source population of the study” (112). Essential to epidemiological studies is accuracy in measurements. Accuracy is defined as the degree to which a measurement, or estimate based on measurements represent the true value of the attribute being measured (113). Threats against accuracy in estimations are random errors (lack of precision) and systematic errors (bias). If not recognized, errors will generate false knowledge. Precision, as a measure of random error, refers to the magnitude of differences between repeated measurements (reliability, reproducibility). Precision is expressed through the confidence interval and depends of the study size and the study efficiency. Systematic errors in estimates (systematic deviations from the truth) are commonly referred to as bias. Bias can occur at every step of the research process, with weakening of a true association or production of a false association as consequence. The opposite of bias is validity, so that an estimate with little systematic error may be described as valid (112). Moreover, validity refers to how the study results apply to the target population. Validity can be separated into two components: Internal and external validity, where the former is a prerequisite for the latter.

#### **5.1.1 Internal validity**

Internal validity (or lack of systematic error) refers to the inference drawn from the sample to the source population, i.e. whether the results of a study are representative, true or valid for the population under study (112). Three types of errors may threaten the internal validity of an epidemiological study: selection bias, information bias (= measurement bias) and confounding. Any observed association might also occur by chance alone.

## **Selection bias**

Selection bias is defined as “a systematic error that results from procedures used to select study subjects, and from factors that influence study participation” (112). Hence, this type of bias can also occur if many attendees are lost to follow-up. The common consequence of selection bias is that the association between exposure and outcome is different for those who participate and for all those who should have been theoretically eligible for study, including those who did not participate (112). In a population survey, selection bias can be a problem especially if the participation rate is low.

The design of the Tromsø Study, with invitation of total birth cohorts and random samples ensures a representative study population. Despite a lower attendance rate in the sixth survey, the participation rates to the Tromsø Study surveys have generally been high (Table 1). In the Tromsø Study, a higher proportion of non-attendees belonged to the youngest age group or was  $\geq 80$  years; a higher proportion was single and the proportion of men was higher compared with attendees. Legal restrictions have precluded analyses of mortality and morbidity among non-attendees. However, healthy persons may generally be more prone to attend population studies than the less healthy ones (known as healthy participant bias or non-response bias)(114). We cannot exclude that a healthy participant bias may have affected our estimates in paper I, II and III, diluting the true associations between risk factors and outcome, even if a high participation rate minimize its impact on the risk estimates.

The loss to follow-up in the Tromsø Study is negligible due to usage of the unique personal identity number to search official health registries. Selective survival, especially among the eldest ones, may also be a source of selection bias, with higher representation during follow-up of attendees with a more favorable risk factor profile compared to deceased persons from the same birth cohort. Lower mortality was previously demonstrated among subjects who were consistent attendees in the three surveys Tromsø 2, 3 and 4, compared to those who were invited to all three surveys, but only attended Tromsø 4 (104). In the main analysis in paper II,

the associations between trends in IS incidence and trends in risk factors were based on participants with updated risk factors. In paper III, the eligible participants were those with complete baseline and pre-baseline data. The criteria of subsequent attendance in paper III and the use of data only from the years with updated risk factors (in the main analysis paper II, and in paper III) could also introduce healthy participant bias as well as survival bias (due to higher contribution from consistent attendees).

### **Information bias and misclassification**

An important source of error in cohort studies is information bias (measurement bias); defined as “an error that arises from systematic differences in the way that information on exposure or disease is obtained from the study groups” (115). Information bias may distort an effect estimate when exposure status or disease status is incorrectly measured or classified (113).

Thorough validation of measurement methods and questionnaires are crucial to minimize measurement error in the exposure variables. For discrete variables, measurement error is usually named misclassification (112). Classification error (of exposure or outcome variables) that depends on the actual value of other variables is called differential misclassification, while non-differential misclassification is classification error not dependent on the values of other variables. Non-differential misclassification will most often weaken a true association, (although with more than two levels in the exposure or the disease variable, the direction of the bias may be more difficult to interpret) (112). Differential misclassification is more serious, and can alter the estimates in any direction.

In a prospective cohort study, the level of exposure is registered prior to the registration of outcome status, and the classification errors of exposure tend to be non-differential.

The physical measurements (blood pressure, height, weight) were performed by standard protocol in the Tromsø surveys to minimize measurement error (see 3.2). Non-fasting blood lipids were registered. The effect of non-fasting condition on total and HDL cholesterol is

negligible, while triglyceride levels vary substantially throughout the day (116). The questionnaire instrument is subjective and imprecise and some misclassification may exist. This will probably be most pronounced in the self-reported lifestyle variables. HbA1C was introduced as an additional diagnostic test for diabetes during the study period, and the proportion with unrecognized diabetes may have been higher in the earliest phase of our study (117). Nevertheless, self report on well defined medical conditions often have a high positive predictive value (118). The validity of the physical activity questions is discussed in paper II and III (supplements). A meta-analysis revealed that the validity of self-reported smoking were generally high (119). However, for smoking (120) and alcohol consumption (121), an under-report must be expected, while over-reporting is more liable with regard to physical activity (122). As a result of some non-differential misclassification of these exposure variables, the effect estimates in paper II and III could be diluted or underestimated.

Several steps were taken to ensure an accurate classification of the outcome variables IS and stroke (Details in 3.3). However, despite a thorough case ascertainment, we cannot exclude that some IS (or in paper III: strokes) remained unidentified, due to sparse symptomatology leading to non-detection, non-referral (or both).

The amount of misclassification of IS over time, due to non-detection, is difficult to assume. The definition of IS in our study is based on the clinical stroke definition by WHO (2) and exclusion of hemorrhage. The considerable improvements in radiological imaging the last decades include gradual implementation of CT and MRI modalities with increasing sensitivity for small ischemic lesions (123). Despite that the IS endpoint classification in our study is based on a clinical stroke definition (i.e. silent cerebral infarcts are not included in the IS endpoint), the enhanced options to verify a small ischemic lesion by imaging could still lead to information bias by changing the proportions of misclassified IS with time. Under the assumption that radiological confirmation of ischemia (in the clinical setting) may lead to a higher awareness of clinical signs/ more thorough clinical examination), fewer of the IS cases with only minimal

clinical signs would (wrongly) be classified as “not IS” in the latest period, compared to the earliest years of our study. This represents a source for potential differential misclassification of those IS with only sparse clinical signs. Furthermore, improved treatment options for stroke may have lowered the threshold for referral of stroke patients to hospital, leading to increased detection rate in the latter part of the follow-up period.

### **Confounding**

When an association between an exposure and an outcome is distorted due to the effect of a covariate related to both the exposure and the outcome, this is called confounding (114). Most simply, confounding can be defined as a “mixing” of effects. Hence, a confounder is a factor which is associated both with the exposure (causally or non-causally) and the outcome variable (causally), and which accounts for some of the relationship observed between the exposure and the outcome. To be a confounder, this factor must not be an intermediate factor between these two.

Confounding can also be considered in terms of the counterfactual ideal (114). Counterfactual means “contrary to the fact”, a logic expressing of what has not happened but could, would or might have happened under differing conditions (124). In a cohort study, the ideal comparison group should consist of exactly the same persons as in the exposure group, *had they not been exposed* to the risk factor of interest. Because it is not possible in real life for the same individual to be exposed and unexposed simultaneously, the obvious comparison group (reference group) in a cohort study will consist of *other persons*, namely those not exposed to the risk factor of interest. Confounding can be viewed as a failure of the comparison group to reflect the counterfactual experience of the exposed group (115).

Confounding may under- or overestimate the association under study, it may change the direction of an effect, or it may obscure a true causal relationship (114). If sufficient information about possible confounders is available, confounding can (partly) be accounted for

in the statistical analyses. Strategies that can be used to minimize bias due to confounding are stratification and multivariate adjusted models with inclusion of potential confounders.

In paper I, we performed age-and sex stratified analyses of time trends in incidence and case fatality of IS. Moreover, the stratified analyses were age-adjusted by including age as a continuous variable in the regression models.

In paper II (main analysis), the association between changes over time in levels or prevalence of each risk factor (updated values) vs. time trends in incidence of the outcome (IS) ("explained decline of IS incidence") was assessed in an age-and sex adjusted Poisson regression model for each risk factor separately. Moreover, a multi-adjusted Poisson model estimated the joint effect of the observed risk factor change on the concurrent 18-years risk of IS. Separate sex stratified analyses were done, as well as analyses stratified on baseline age <60 and >60 years. Due to relatively few number of IS in the youngest age group (30–49 years), and additionally the prerequisite of using updated risk factor values in the main analysis, we did not have sufficient power to run separate analyses for explained decline for the youngest age group.

In the background analysis in paper II, the associations between the different risk factors (updated values) and the outcome (IS) were assessed in a multivariate adjusted Cox regression model, but also shown in an age-and sex adjusted model.

In paper III, in a framework of counterfactual consideration of confounding, we applied (by parametric g-formula) hypothetical interventions on the sample of eligible attendees, using the identical sample under no intervention (i.e. the "natural scenario") as the comparison group. Thus, the analyses in paper III are performed in a (hypothetical) setting where the exposure group and the comparison (reference) group consist of the same individuals (see 3.4.3). In addition to reduce the possibilities for confounding by ensuring an identical exposure and comparison group, the parametric g-formula is found to appropriately adjust for time dependent confounding. For example, if the effect of long-term weight loss is of interest, prior

physical activity should be adjusted as a time-varying confounder, but future physical activity can be affected by weight loss. Hence, a particular methodological challenge is to estimate the unbiased effect of a time-varying exposure in the presence of time-varying confounders if those confounders are affected by prior exposure (103). In such cases, conventional regression models fail to adjust for confounding and may indeed introduce bias. G-methods, including the parametric g-formula, have been developed to handle such situations (107) .

### **5.1.2 External validity**

The external validity of a study refers to whether the study findings are valid for people outside the study population, i.e. the generalizability of the results. The age and sex distribution of the Tromsø Study mirror the Tromsø population in general. The Tromsø population is not substantially different from other Western populations with regard to risk factor levels and incidence of cardiovascular diseases. Our results are therefore likely applicable to other Western populations, however, generalizability may be restricted to ethnicity, as the Tromsø population consists of mainly Caucasians (104, 125).

## 5.2 Discussion of main results

### 5.2.1 Time trends in incidence and case fatality of first-ever ischemic stroke

The overall age-and sex adjusted incidence of IS declined with 24% from 1995–2010; this decline was driven by the changing incidences across time among the middle-aged and elderly, in whom the vast majority of ischemic strokes occur. The age-stratified analyses, however, revealed different time trends across the predefined age groups.

The increasing incidence of IS among women aged 30–49 years in our cohort is worrying. Although these findings must be interpreted with caution due to the low number of endpoints in this age group, they are in line with other studies reporting an increase in incidence for the youngest age groups (17,20,21). In a prospective, population-based study from Dijon the incidence of first-time IS among men and women <55 years increased significantly from 1994–2002 to 2003–2011 (21). A significant increasing IS incidence in persons aged 20–44 years was also reported in the retrospective, population-based Greater Cincinnati/Northern Kentucky Stroke Study between 1993 and 2005 (20), while a continuous rising incidence of IS in people aged 18–44 years was found in a nationwide Swedish study from 1987 to 2010 (17).

Similarly, increasing incidence was revealed in a register based study among Dutch men and women aged 35–64 years from 1997 to 2005 (22). A rise in hospitalization rate for acute IS in people <45 years of age from 1995 to 2008 was also discovered in a study based on administrative data from USA (126). Even if some of these referred trends were rather weak and even if stable IS time trends in younger age groups are reported in other studies (19), a recent editorial in *Journal of the American Heart Association* proclaimed the large amount of evidence regarding increasing incidence of IS in young adults, but stated that the reasons for this trend are probably multiple (127) (see 5.2.2).

The declining IS incidence from the mid-1990s among women aged 50 to 74 and men aged 65–74 years are in line with findings from other high-income populations (16–18). The decrease is explained by the combined effect of reduction in risk factor levels and improved primary prevention (16, 34, 93).

The rising trend among men aged 50–64 years from 1989 to early 2000, followed by a decline until 2010, is difficult to interpret. Rosengren et al. found an increase in the IS incidence in people aged 45 to 64 years, from the late 1980s, to the late 1990s, followed by a decline to 2010 (17). In the ARIC cohort, no decline in stroke incidence was found from 1987 to 2011 in the age group 45–64 years in contrast to decreasing incidence in those >65 years (18).

We found no significant change in incidence over time among participants aged 75–84 and ≥85 years, which was also reported in the Global Burden of Disease Study (1990–2010) (15), and in the Netherlands from 1997 to 2005 (22). In contrast, studies from Sweden showed a significant declining trend of IS in subjects aged 75–84 from the mid-1990s to 2010, and a reduced stroke incidence in women ≥85 years old (17, 23).

Paper I was written when the endpoint registry was updated through 2010. When updated through 2012, 164 IS were added, and the main analyses in paper I were repeated with end of follow-up set to 31.12.2012 (Table 3). The overall age- and sex-adjusted incidence decline from 1995 through 2012 was 27% (95% CI 13%–39%) and similar in men and women. The increasing trend in IS incidence among the youngest women (30–49 years) persisted through 2012 and the corresponding P-value for this rising time trend was strengthened (IRR 2012 vs. 1980: 3.29, 95% CI 1.19–9.09; p for trend 0.0007), as compared to the original analyses with end of follow-up 31.12.2010 (IRR 2.69, 95% CI 1.04–6.99; p for trend 0.0033). In men aged 30–49 years, a non-significant, rising trend was found from 1977 to 2012; in men aged 50–64 years, the IS incidence in 2012 was not significantly different from that in 1989. The incidence decline was significant through 2012 also in women aged 50–64 and men aged 65–74 years. Women 65–74

years showed a significant declining time trend (non-linear). Among attendees aged 75–84 and ≥85 years, the incidence remained stable also after the end-point registry was updated through 2012.

**Table 3. Age-adjusted incidence rate ratio (IRR) of ischemic stroke by age group and sex. The Tromsø Study**

Age group (y)	Period	No. of ischemic strokes	IRR* (95% CI)	p value time trend <sup>†</sup>
<b>Men</b>				
30–49	1977 – 2012	63	4.18 (0.43–40.31)	0.152
50–64	1989 – 2012	225	1.55 (0.90–2.68)	<0.0001
65–74	1995 – 2012	219	0.56 (0.37–0.85)	0.0082
75–84	1995 – 2012	211	0.86 (0.54–1.38)	0.173
≥ 85	1995 – 2012	72	0.92 (0.44–1.95)	0.832
≥ 30 <sup>‡</sup>	1995 – 2012	744	0.73 (0.58–0.93)	0.0089
<b>Women</b>				
30–49	1980 – 2012	31	3.29 (1.19 –9.09)	0.0007
50–64	1994 – 2012	86	0.42 (0.21–0.85)	0.019
65–74	1995 – 2012	116	0.55 (0.31–1.01)	0.049
75–84	1995 – 2012	228	0.83 (0.54–1.28)	0.397
≥ 85	1995 – 2012	127	1.34 (0.64–2.81)	0.432
≥ 30 <sup>‡</sup>	1995 – 2012	575	0.72 (0.55–0.95)	0.018
All ≥ 30 <sup>‡</sup>	1995 – 2012	1319	0.73 (0.61–0.87)	0.0004

CI: Confidence Interval; IRR: Incidence Rate ratio

\* Incidence rate ratio (IRR) is calculated from start of follow up (year) until 2012 except for women aged 30–49 years, where IRR is calculated from 1989 to 2012.

† P-values are for time trends using fractional polynomials.

‡ Estimated from 1995 to ensure that the whole age span was represented.

**Table 4. Odds ratios for 30-days case fatality (CF) of ischemic stroke according to calendar year by sex and age group\*. The Tromsø Study 1995–2012**

	1995-2000	2001-2006	2007-2012	1995-2012	p-value time trend†
<b>Men</b>					
30-84 years					
Ischemic strokes, n	201	248	223	672	
30-days CF, n (%)	18 (8.9)	10 (4.0)	10 (4.5)	38 (5.7)	
Odds Ratio (95%CI)‡	1.00	0.40 (0.18-0.89)	0.44 (0.20-0.99)		
Odds Ratio (95%CI)§	1.00	0.45 (0.22-0.93)	0.31 (0.11-0.90)		0.035
≥ 85 years					
Ischemic strokes, n	14	28	30	72	
30-days CF, n (%)	3 (21.4)	7 (25.0)	2 (6.6)	12 (16.7)	
Odds Ratio (95%CI)‡	1.00	1.24 (0.26-5.82)	0.28 (0.04-1.96)		
Odds Ratio (95%CI)§	1.00	n.a. <sup>  </sup>	n.a. <sup>  </sup>		0.027
<b>Women</b>					
30-84 years					
Ischemic strokes, n	144	155	149	448	
30-days CF, n (%)	13 (9.0)	9 (5.8)	18 (12.1)	40 (8.9)	
Odds Ratio (95%CI)‡	1.00	0.59 (0.24-1.43)	1.32 (0.62-2.82)		
Odds Ratio (95%CI)§	1.00	1.17 (0.88-1.66)	1.60 (0.56-4.56)		0.384
≥ 85 years					
Ischemic strokes, n	16	57	54	127	
30-days CF, n (%)	2 (12.5)	12 (21.0)	16 (29.6)	30 (23.6)	
Odds Ratio (95%CI)‡	1.00	1.69 (0.33-8.56)	2.31 (0.46-11.74)		
Odds Ratio (95%CI)§	1.00	1.46 (0.87-2.47)	3.11 (0.66-14.66)		0.149

CI: Confidence Interval

\* Adjusted for age using logistic regression models.

† P-values for time trends using fractional polynomials.

‡ Age-adjusted odds ratios comparing the periods 2001-2006 and 2007-2012 with 1995-2000.

§ Age-adjusted odds ratios comparing 2003 (middle year in period 2001-2006) and 2012 with 1995.

<sup>||</sup> n.a.: Not applicable due to low number of ischemic strokes.

Between 1995 and 2010, the age-adjusted case fatality declined in men aged 30–84 years while no significant time trend was found in women aged 30–84 or in attendees aged  $\geq 85$  years. Due to relatively few endpoints, we did not have the power to stratify in smaller age groups. When the endpoint registry was updated through 2012, the results were essentially unchanged (Table 4). In high-income countries, trends in IS case fatality have either declined (3, 22) or remained stable (128) during the last decades. Declining case fatality has been viewed as a measure of treatment effect for hospitalized strokes (19, 23). It may also reflect a real decrease in stroke severity with time, as well as increased detection of less severe strokes due to improved imaging of ischemic lesions by CT or MRI (19, 129). Some studies showed an equal decline in case fatality for men and women with time (26, 130), while different time trends with a steeper decrease in men than women were revealed by others (24). Compared to men, the lack of reduction in case fatality among women in our study is noteworthy. Whether the reasons are due to sex-differences in stroke severity, comorbidity or treatment effects over time still remains an open question.

### **5.2.2 The impact of risk factor change on ischemic stroke incidence**

In paper II, we sought to answer the following question: "To which degree could changes in risk factors across time explain the changing incidence of ischemic stroke?"

We found that changes in cardiovascular risk factors accounted for 57% of the decrease in incidence of IS from 1995 to 2012. The concept of explained decline used in our analysis reflects both the proportion of the decline in risk for IS that can be attributed to specific risk factors (the population-attributable risk: PAR) and the change of each particular risk factor in this cohort during the time-period of interest. We were not able to find other studies estimating the impact of risk factor contribution to changing stroke incidence by similar methodology as in our study. Several studies have estimated population-attributable risks for the association of IS with established as well as potential risk factors (36-38). However, with PAR as effect estimate, the dimension of time is not included. A large case-control study from 22 countries found that hypertension, current smoking, abdominal obesity, diet and physical activity accounted for 82% of the global risk of IS (PAR 82%; 95% CI 73–87) (36). In contrast to these high values of combined PAR, the population-based Rotterdam Study reported a total PAR of 55% (95% CI 41–68) for the combined risk factors hypertension, smoking, diabetes, atrial fibrillation, coronary disease, overweight/obesity and total cholesterol/HDL (38). The differences in the combined PAR estimates may partly be explained by differences in selection of risk factors, in the populations under study and in study design.

We did not have the statistical power to run separate Poisson analyses for those aged 30 to 49 years. Hence, we cannot causally assess to which degree changing risk factors in the youngest age group can explain the increasing IS incidence in the youngest women, and the lack of decline among the youngest men. However, the background analyses revealed some risk factor patterns, by which hypotheses regarding possible causes for increasing IS in the youngest age group can be generated. This will be briefly discussed in the latest paragraph in this chapter.

Decline in systolic blood pressure contributed most to the decreasing stroke incidence in our study. Hypertension is the single most important treatable risk factor for IS, with estimated PAR between 26% and 33% (36,38,131). However, there is no “threshold” for BP and a significant proportion of all strokes happen in persons with normal BP or “mild” hypertension. Globally, BP levels have decreased the last decades, with the most pronounced decline in Western countries and in high-income groups (132). A recent study from the Tromsø Study cohort demonstrated a secular decrease in the entire range of BP distribution, indicating a mass-population effect rather than a treatment effect of individuals with hypertension (133).

We found that decreasing prevalence of daily smoking contributed second most to the observed IS risk reduction. The estimated multi-adjusted PARs of daily smoking for IS vary from 12% to 21% (36, 131), and the prevalence of daily smoking in attendees  $\geq 30$  years decreased by 34% in our study from Tromsø 4 (1994–1995) to Tromsø 6 (2007–2008).

The concurrent 100% increase in diabetes prevalence contributed negatively to the decline in IS incidence. The prevalence of diabetes has increased steadily the last decades, both in developed countries and globally (134). However, (as discussed in 5.1.1) this increase might have been influenced by changing criteria for diabetes in the time period (117).

The estimated contribution of the change in BMI on the declining incidence of IS was negative, reflecting the increasing BMI in our cohort, however statistically non-significant. While both elevated blood pressure, cholesterol and glucose mediate the effects of elevated BMI, the effect of the BMI increase on IS incidence during the study period mirrors the divergent time trends in these mediators in our cohort. Additionally, an elevated BMI seem to mediate its effect on atherosclerosis through an inflammatory pathway (135).

Although baseline cholesterol levels were associated with increased risk of IS in our cohort, changes in total cholesterol level did not contribute significantly to the decline in incidence of

IS, despite decreasing total cholesterol during the observation period. In most, but not all observational studies, there is an association between higher total cholesterol levels (and higher LDL cholesterol) and IS, but the associations seem to differ with the subtype of IS, and different cohorts may have different IS subtype distribution (75). In our study, we had regretfully no information regarding the distribution of IS subtypes.

Our results are in line with other studies from high-income countries. In a cohort of 9,152 persons aged  $\geq 55$  years from the Framingham study, the age-adjusted incidence of first-ever stroke declined significantly between 1950 and 2004, concurrent with an overall reduction in prevalence of risk factors (16). Similar diverging trends as in our study were observed, with a decline in systolic BP, total cholesterol, prevalence of hypertension and daily smoking, while mean BMI and diabetes prevalence (in women) increased significantly over time.

In the OXVASC study the age-standardized incidence of first-ever IS fell by 27% ( $p=0.0002$ ) from 1981 to 2004, simultaneously with significant reductions in the premorbid levels of systolic BP, cholesterol and the proportions of smokers (34).

The Atherosclerosis Risk in Communities Study found a significant decrease in stroke incidence from 1987–2011 with an age-adjusted decrease in stroke risk by 24% (95%CI 13–34%) per 10 years. However, the results were not consistent for participants aged  $< 65$  years. Concomitantly the age-adjusted rates of diabetes increased, as did the rate of hypertension, while the prevalence of current smoking declined, resulting in a relatively small effect on the IS risk estimates when adjusting for time-varying risk factors and demographic variables (18).

The main analysis in paper II was performed on the entire age-span, i.e. on eligible attendees aged 30 years and older. However, eligible were those who had attended Tromsø 4 without missing risk factors ( $n=26,033$ ) (see 3.1.2); moreover, only updated risk factors contributed in the analysis (see 3.4.2). As a consequence, data from consistent attendees with complete risk

factor registration contributed to a larger degree in the main analysis in paper II than was the case in a background analysis (Poisson analysis applied on the sample of 26,329 attendees in paper II), in which there was no additional criteria with regard to risk factors (5.1.1, Figure 2).

Table 5 shows the percentage decline in IS incidence across different subsamples. The non-significant difference in IS risk decline from 1995 through 2012 (37% (95% CI 19–52) vs. 26% (95% CI 11–39) is probably a result of healthy participant bias as well as survival bias, affecting our analysis when only updated risk factor values contributed as in the main analysis in paper II.

**Table 5. Percentage decline in incidence\* of ischemic stroke from 1995–2012, by sample and Poisson regression model characteristics**

	Poisson regression model (power)	Number of eligible attendees	Incidence rate ratio (95% CI) 2012/1995	% decline IS incidence (95% CI) 1995-2012	P-value time trend
<b>Paper I updated analyses<sup>†</sup></b>	fractional polynomial (3)	32,327	0.727 (0.608-0.869)	27% (13-39%)	0.0004
<b>Paper II (cohort in Figure 1)</b>	fractional polynomial (3)	26,329	0.737 (0.611-0.889)	26% (11-39%)	0.0014
<b>Paper II (cohort in Figure 1)</b>	linear	26,329	0.747 (0.619-0.903)	25% (10–38%)	0.0025
<b>Paper II (cohort in Table 4)</b>	linear	26,033	0.628 (0.484-0.813)	37% (19–52%)	<0.001

CI: Confidence Interval. \*Age- and sex-adjusted <sup>†</sup>Total number of eligible attendees in the updated analyses was 36,574 (after one person withdrew consent) whereas 32,327 attendees could be followed from 1995 (all age groups included).

Generally, the search for possible explanations behind the increasing incidence of IS in young adults is complicated by the fact that the underlying cause of "young stroke" despite thorough investigations remains undetermined in about one third of the cases (127). A higher proportion of IS in young adults is thought to be caused by more "rare" etiologies compared to those associated with the traditional cardiovascular risk factors seen in older stroke patients, which may explain why IS incidence in this age group is less influenced by changes in CVD risk factor levels. However, results from other previous studies indicate that the role of traditional vascular risk factors in the young may have been underestimated (136).

A study from Greater Cincinnati/Northern Kentucky Stroke Study suggested that diabetes may particularly increase the risk of IS in the young (55). The 15 Cities Young Stroke Study, which included 3944 European patients with first ever IS aged 15–45 years, revealed high frequencies of well documented vascular risk factors; as 49% were current smokers, 46% had dyslipidemia and 36% were hypertensive (136).

Among 4,467 prospectively recruited European TIA or IS patients (Stroke in Young Fabry Patients Study, median age 47 years), the most frequent well-documented modifiable risk factor was smoking (56%), followed by physical inactivity (48%), hypertension (47%), dyslipidemia (35%) and obesity (22%) (137).

In our study, systolic and diastolic blood pressure changed favorably across time both in the youngest age group and among those aged  $\geq 50$  years, as did the prevalence of smoking. The use of BP lowering drugs increased similarly in both groups (with 150% and 131% from Tromsø 4 to Tromsø 6, respectively). However, while the prevalence of overweight and obesity increased generally, there was an augmented ascent in obesity prevalence among those aged 30–49 compared to those aged  $\geq 50$  years (118% increase vs. 42% increase of obesity prevalence, respectively). Concomitantly, the diabetes prevalence rose with 171% in the age group 30–49 years, and with 76% in those aged  $\geq 50$  years.

### 5.2.3 Hypothetical interventions to prevent stroke

In paper III, we wanted to assess the effects of particular interventions on the subsequent risk of stroke and IS. Hence, we sought to answer research questions as: "What would be the 18-years population risk of stroke (compared to what happened in "real life") if everyone with a systolic blood pressure of  $\geq 140$  mm Hg were "placed" at a systolic blood pressure  $< 140$ ?" Or: "What would be the effect on the 18-years population risk of stroke, compared to the 18-years stroke risk observed in our cohort, if everyone who smoke daily, quitted smoking?" Or "What if all feasible interventions were applied jointly?" This approach contrasts the main analysis in paper II, where we estimated the impact of concurrent risk factor trends on the already observed decline in ischemic stroke risk.

We found that a combination of feasible modification of lifestyle and metabolic risk factors (smoking, alcohol use, physical activity, BMI, SBP and total cholesterol) could prevent 19% of all strokes observed during 18 years of follow-up. Solely reducing SBP to  $< 140$  mmHg in all attendees with SBP  $\geq 140$  mmHg would reduce the 18-year population risk of stroke by 15%. A more intensive combined intervention resulted in a 55% reduction in stroke risk, whereas reducing SBP to  $< 120$  mmHg alone would reduce the risk by almost a third.

The results from our hypothetical interventions on SBP are in line with the strong, graded and independent relationship between SBP and stroke risk. A recent meta-analysis of randomized trials found that 10 mmHg reduction in SBP reduced the risk of stroke by 27% (138). There was no evidence that the proportional effects were weaker in trials that included persons with lower SBP ( $< 130$  mmHg) at baseline, or in trials including high-risk populations. In comparison, the estimated 32% reduced stroke risk in our study, under the intensive intervention on SBP was due to a 21 mmHg average reduction in SBP by the end of follow-up. The smaller effect size in our study may be due to residual confounding, model misspecification or to differences between the study populations.

We did not observe a significant effect of reducing serum total cholesterol on the 18-years population risk of stroke. While some studies found total cholesterol to be a risk factor for IS (71), this was not supported by others (73, 74) (see 1.4.2). Moreover, the relationship between cholesterol level and risk of hemorrhagic stroke seem to be inverse (76).

The significant risk reduction for stroke by smoking cessation in our study is consistent with the prior evidence linking smoking to stroke (60, 61). Smoking cessation was also associated with a considerable decline in stroke risk among 117,000 participants in the Nurse Health Study, with the excess risk among former smokers disappearing 2–4 years after quitting (63).

We did not find a significant effect for physical activity or weight loss. The questionnaires on physical activity were not consistent across surveys in our study and therefore we had to define rather broad categories, which limited our ability to define appropriate interventions (e.g. separating moderate from vigorous activity). Previous analyses of prospective studies using parametric g-formula that investigated effect of weight loss did not find an impact on CHD (139) and death (140), which may be due to either residual confounding by undiagnosed diseases at baseline or irreversibly increased risk due to weight gain.

The estimated benefits of abstinence in our study combines both the accepted positive effect of alcohol cessation in those with heavy or binge drinking and the presumed negative effects of quitting drinking among light to moderate drinkers. Information on amount of alcohol and drinking pattern were not consistently reported across the surveys, limiting the analyses to use vs. no use. Hence, we were not able to estimate the effect of regular low to moderate drinking, which is a limitation. Neither did we have access to consistent data on diet, and detailed data on use of BP-lowering drugs, statins and aspirin were insufficient in the earliest rounds of the study.

In this study, we applied the parametric g-formula to adjust for time-varying confounding by major risk factors for stroke and to simulate long-term interventions on lifestyle and metabolic

risk factors. Importantly, as for other observational studies, the validity of our results relies on the assumptions of no residual confounding, no measurement error and no model misspecification. We included all presumed important fixed and time-varying confounders that were available to us, but despite adjustment for a large number of potential confounders, the possibility of residual confounding cannot be logically excluded. Some measurement error is expected, especially for self-reported lifestyle variables, and may have contributed to bias. We were able to reproduce the observed risk factor patterns and stroke risk with the parametric g-formula, which indicates that under no intervention, the models were not grossly misspecified.

## 6. Conclusions and implications for further research

We found that the overall age- and sex adjusted incidence of ischemic stroke declined with 27% from 1995–2012 in this large, general Norwegian cohort of men and women aged  $\geq 30$  years. This decline was driven by the changing incidences across time among the middle-aged and elderly, which is in line with that reported from several other high-income countries the last decades. The age-stratified analyses revealed different time trends across the predefined strata, with increasing incidence in women aged 30–49 years, a non-significant rising trend among the youngest men (30–49 years), and declining incidence in women aged 50–74 and men aged 65–74. In men aged 50 to 64 years, the ischemic stroke incidence in 2012 was not significantly different from the incidence two decades earlier. The incidence also remained stable in persons aged 75 years and older. The increasing trend in ischemic stroke incidence among the youngest women adds to the worrying reports about an increasing incidence of stroke at younger age.

Mean crude case fatality for ischemic stroke in persons aged 30–84 years (1995–2012) was 7%, and 21% in participants  $\geq 85$  years. Age-adjusted case fatality was higher for women than men through the whole period. Between 1995 and 2012, the age-adjusted case fatality decreased in men aged 30–84 years while no significant decline was found in women aged 30–84 or in attendees  $\geq 85$  years.

Our results showed that changes in seven cardiovascular risk factors (systolic blood pressure, total cholesterol, HDL, daily smoking, physical activity, diabetes and BMI) accounted for 57% (95% CI 28–100) of the decrease in ischemic stroke incidence from 1995 through 2012, with decreasing mean systolic blood pressure and decline in smoking prevalence as the most important contributors. The increasing diabetes prevalence contributed negatively, as did the change in BMI, although not significant.

We found that a feasible joint hypothetical intervention on six metabolic and lifestyle risk factors (systolic blood pressure, total cholesterol, weight, physical activity, smoking and alcohol intake) would reduce the 18-year stroke risk in our population by 19%. A combination of more intensive interventions would reduce the estimated 18-years stroke risk by 55%. Blood pressure reduction and quitting smoking significantly reduced the risk when applied separately.

While an ischemic stroke could be caused by several pathological mechanisms, there is a need for future studies that include subclassification of ischemic strokes. Ideally, separate time trends should be presented for each subtype of ischemic stroke across age, to assess potential differences in time trends for the different pathological subtypes by age groups. This calls for studies with a high number of endpoints. Moreover, there is an urgent need for further research to explore the impact of risk factor change on the disquieting change in incidence of ischemic stroke among the youngest ones. To explore the possible reasons behind the divergent time trends of case fatality in men and women, future studies should, in addition to sub-classification of ischemic strokes, include information regarding severity of the stroke events, the patients comorbidity and the treatment given.

The Tromsø Study represents a valuable source for exploring the impact of lifestyle and more distal variables (ecological variables) on the long-term risk of stroke. The newly completed Tromsø 7 survey includes extended data on diet, physical activity and socioeconomic status, with possibilities for an even more comprehensive approach in future projects.

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## Appendix 1a

Questionnaire 1, the 2<sup>nd</sup> Tromsø Study 1979–80

English version



**A**

Do you have, or have you had:

Yes No

- A heart attack? ..... 33
- Angina pectoris (heart cramp)? ..... 34
- Any other heart disease? ..... 35
- Hardened arteries in the legs? ..... 36
- A cerebral stroke? ..... 37
- Diabetes? ..... 38
- Are you being treated for:
- High blood pressure? ..... 39
- Do you use:
- Nitroglycerine? ..... 40

**B**

Do you have get or discomfort in the chest when:

Yes No

- Walking up hills or stairs, or walking fast on level ground? 41
- Walking at normal pace at level ground? ... 42
- If you get pain or discomfort in the chest when walking, do you usually:
- 1 Stop? ..... 43
- 2 Slow down? ..... 44
- 3 Carry on at the same pace? ..... 45
- If you stop or slow down, does the pain disappear:
- 1 Within 10 minutes? ..... 46
- 2 After more than 10 minutes? ..... 47
- Do you get pain in the calf while:
- Walking? ..... 48
- Resting? ..... 49
- If you get pain in the calf, then:
- Does the pain increase when you walk faster or uphill? ..... 50
- Does the pain disappear when you stop? .... 51
- Do you usually have:
- Cough in the morning? ..... 52
- Phlegm chest in the morning? ..... 53

**C**

Exercise and physical exertion in leisure time. If your activity varies much, for example between summer and winter, then give an average. The question refers only to the last twelve months:

Yes

- Tick "Yes" beside the description that fits best:
- 1 Reading, watching TV, or other sedentary Activity? ..... 54
  - 2 Walking, cycling, or other forms of exercise at least 4 hours a week? ..... (include walking or cycling to place of work, Sunday walk/stroll, etc.)
  - 3 Participation in recreational sports, heavy gardening, etc.? ..... (note: duration of activity at least 4 hours a week)
  - 4 Participation in hard training or sports competitions, regularly several times a week? ..... 55

**D**

Do you smoke daily at present? ..... 52

If the answer was "Yes" in the previous question, then:

Do you smoke cigarettes daily? ..... 53 (hand-rolled or factory made)

If you do not smoke cigarettes at present, then: Have you previously smoked cigarettes daily? 54

If "Yes", how long is it since you stopped:

Yes No

- 1 Less than 3 months? ..... 55
- 2 3 months to 1 year? ..... 56
- 3 1 to 5 years? ..... 57
- 4 More than 5 years? ..... 58

For those who smoke or have smoked previously:

- How many years altogether have you smoked daily? ..... 59-60 No. of years
- How many cigarettes do you smoke, or did you, smoke daily? Give number of cigarettes per day (hand-rolled or factory made) 61 No. of cigarettes
- Do you smoke tobacco products other than cigarettes daily?
  - Cigars or cigarillos? ..... 62
  - A pipe? ..... 63
- If you smoke a pipe, how many packs of tobacco (50 grams) do you smoke per week? 64 No. of tobacco packs
- Give the average number of packs per week. .... 65

**E**

Do you usually work shifts or at nights? 66

Can you usually come home from work:

Every day? ..... 67

Every weekend? ..... 68

Are there periods during which your working days are longer than usual? ..... 69 (e.g. fishing season, harvest)

Yes No

During the last year, have you had: Tick "Yes" beside description that fits best

- 1 Mostly sedentary work? ..... 70 (e.g. office work, watchmaker, light manual work)
- 2 Work that requires a lot of walking ..... (e.g. shop assistant, light industrial work, teaching)
- 3 Work that requires a lot of walking and lifting? (e.g. postman, heavy industrial work, construction)
- 4 Heavy manual labour? ..... (e.g. forestry, heavy farm-work, heavy construction)

During the last 12 months, have you had to move for work reasons? ..... 71

Is housekeeping your main occupation? ..... 72

Have you within the last 12 months received unemployment benefit? ..... 73

Are you at present on sick leave, or receiving rehabilitation allowance? ..... 74

Do you receive a complete or partial disability pension? ..... 75

**F**

Have one or more of your parents or sisters or brothers had a heart attack (heart wound) or angina pectoris (heart cramp)? 76

Are two or more of your grandparents of Finnish origin? ..... 77

Are two or more of your grandparents of Sami origin? ..... 78

Yes No Don't know



## Appendix 1b

Questionnaire 2, the 2<sup>nd</sup> Tromsø Study 1979–80

English version



TR - II

ADDITIONAL QUESTIONS FOR PERSONS ATTENDING THE MASS X-RAY EXAMINATION IN TROMSØ

LABEL

Together with the invitation to attend you received a questionnaire from the National Mass Radiography Service. You delivered this questionnaire at the examination.

Cardiovascular diseases are, however, a complex group of diseases. The causes are still partly unknown. In Tromsø we are therefore trying to obtain a more complete description of factors which may be of importance for the course of these diseases, such as diet, psychological pressure ("stress"), social conditions, and occurrence of disease in relatives. We hope you will take the trouble to complete this questionnaire as well, and return it to the Tromsø Board of Health in the enclosed envelope.

All information in connection with the mass x-ray examination will be treated as strictly confidential.

I YOUR OWN DIET

1. What type of bread do you usually eat?  
Tick the most appropriate box.

- White bread (e.g. French bread) ..... 1
- Ordinary bread (light texture) ..... 2
- Whole meal (brown) bread ..... 3
- Home-made (brown) bread ..... 4

YES









3. How many slices of bread do you usually eat **daily**?  
Tick the most appropriate box.

- Less than two slices ..... 1
- 2-6 slices ..... 2
- 7-12 slices ..... 3
- 13 or more slices ..... 4

YES









2. What type of butter or margarine do you usually eat?  
Tick the most appropriate box.

- Butter ..... 1
- Ordinary margarine ..... 2
- Plant margarine ..... 3
- Soft margarine spread ..... 4

YES









4. What type of milk do you usually drink?  
Tick the most appropriate box.

- Do not drink milk ..... 1
- Full cream milk: ordinary type or curdled ..... 2
- Skimmed milk: ordinary type or curdled ..... 3
- Mixture of full cream and skimmed milk ..... 4

YES









5. The drawings below show cubes of butter or margarine (actual size).  
Tick the box above the cube which best resembles the amount you spread on a slice of bread.  
If in doubt, try buttering a slice.

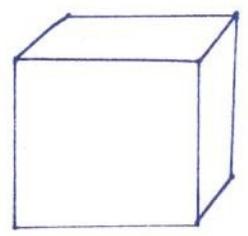
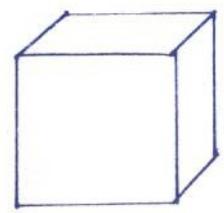
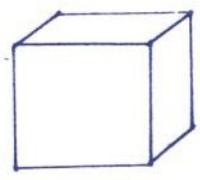
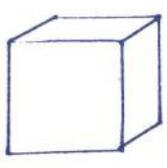
Do not use butter or margarine .....

1.

2.

3.

4.



6. How many glasses/cups of milk do you usually drink daily?

Tick the most appropriate box.

- Do not drink milk, or drink less than 1 glass/cup ..... 1
- 1-2 glasses/cups..... 2
- 3-4 glasses/cups..... 3
- 5 or more glasses/cups..... 4

YES

7. How many cups of coffee do you usually drink daily?

Tick the most appropriate box.

- Do not drink coffee, or drink less than 1 cup..... 1
- 1-4 cups..... 2
- 5-8 cups..... 3
- 9 or more cups..... 4

YES

8. Are you a teetotaler?

If "No",

— How often do you usually drink beer?

Tick the most appropriate box.

- Never or just a few times a year..... 1
- Once or twice a month..... 2
- About once a week..... 3
- 2-3 times a week..... 4
- More or less daily..... 5

YES No

— How often do you usually drink wine?

Tick the most appropriate box.

- Never or just a few times a year..... 1
- Once or twice a month..... 2
- About once a week..... 3
- 2-3 times a week..... 4
- More or less daily..... 5

— How often do you usually drink spirits?

Tick the most appropriate box.

- Never or just a few times a year..... 1
- Once or twice a month..... 2
- About once a week..... 3
- 2-3 times a week..... 4
- More or less daily..... 5

9. Approximately how often during the last 12 months have you drunk so much wine, beer or spirits that you got drunk?

Tick the most appropriate box.

- Have never been drunk, or have not been drunk during the last year ..... 1
- A few times during the last year ..... 2
- Once or twice a month ..... 3
- Once or twice a week ..... 4
- 3 or more times a week ..... 5

YES

10. How often does your main meal consist of fish or fish dishes?

Tick the most appropriate box.

- Less than once a week..... 1
- Once or twice a week..... 2
- 3-4 times a week..... 3
- 5-6 times a week..... 4
- 7 times a week..... 5

YES

11. How often do you eat fruit or vegetables?

Tick the most appropriate box.

- Never eat fruit or vegetables..... 1
- A few time a year..... 2
- Once or twice a month..... 3
- About once a week..... 4
- 2-3 times a week..... 5
- More or less daily..... 6

YES

12. How many times a month do you eat boiled or fried sausages, meat balls, other processed meat, etc.?

Tick the most appropriate box.

- Never or less than once a month..... 1
- Once or twice a month..... 2
- 3-4 times a month (up to once a week)..... 3
- 5-8 times a month (up to twice a week)..... 4
- More than 8 times a month (more than twice a week)..... 5

YES

13. Have you made any changes in your diet during the last 5 years as regards the following food items?

Tick each item in the appropriate box.

- Ordinary margarine or butter
- Skimmed milk .....
- Lean meat .....
- Full cream milk .....
- Soya margarine (soft) .....
- Fatty meat .....

As before	More now	Less now
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. Do you have, or have had you the skin disease psoriasis? .....

YES	No
<input type="checkbox"/>	<input type="checkbox"/>

19. Have you had allergy-induced eczema on your hands during the last 12 months? ....

20. Have you been on sick leave, or been unable to work due to allergic eczema on your hands at any time during the past 3 years? ....

21. Have you ever had arthritis? (chronic rheumatoid arthritis) .....

II OWN ILLNESSES PAST AND PRESENT

14. Have you ever had?

- Sudden paralysis or numbness on one side of your face or body, in your hand or foot .....
- Sudden loss of ability to speak .....
- Sudden loss of eye sight, complete or partial, or sudden onset of double vision

YES	No
<input type="checkbox"/>	<input type="checkbox"/>

22. Have you suffered from back pain during the past 12 months lasting for more than 4 weeks? .....

If yes, did the back pain improve if you exercised? .....

YES	No
<input type="checkbox"/>	<input type="checkbox"/>

15. Have you had a peptic ulcer?.....

Do you often have a gnawing pain in the upper part of your stomach? .....

Do you suffer much from heartburn or regurgitation of gastric juices? .....

Do you suffer much from wind and rumbling in your stomach? .....

Do you often get cramps in your stomach? .....

Have you ever had your large intestine x-rayed? .....

Have you ever had gallstones? .....

<input type="checkbox"/>	<input type="checkbox"/>

23. Have you suffered from morning stiffness in your back lasting more than 30 minutes? .....

24. Have you suffered from pains lasting more than 3 months, in the joints listed below during the last 3 years?

- Knees .....
- Elbows .....
- Innermost finger joints .....
- Other joints .....

If yes, did you suffer from stiff joints in the mornings lasting more than 30 minutes? .....

YES	No
<input type="checkbox"/>	<input type="checkbox"/>

16. Have you had kidney stones or stones in the urinary tract? .....

If yes, how many times? .....

and, when did you have the last attack? ...

YES	No
<input type="checkbox"/>	<input type="checkbox"/>
no. of times	<input type="text"/>
Year	<input type="text"/>
YES	No

25. Have you had any infectious disease during the past 14 days? (influenza, common cold, vomiting, diarrhoea, etc.)

YES	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

17. Have you ever had cancer? .....

If yes, in what year was the disease discovered? .....

<input type="checkbox"/>	<input type="checkbox"/>
Year	<input type="text"/>

26. Have you taken iron tablets during the past 14 days? .....

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

27. How often do you take painkillers such as Globoid, Novid, Dispril, Albyl, etc.? Tick the most appropriate box.

YES No

- 1-3 times a week ..... 1
- 1-3 times a month ..... 2
- Seldom or never ..... 3

Have you used such painkillers during the last 14 days?.....

YES No

28. Have you changed the amount of physical exercise you take in leisure time during the last five years? Tick the most appropriate box.

YES

- As before ..... 1
- More than before ..... 2
- Less than before ..... 3

### III ILLNESS IN PARENTS AND SIBLINGS

29. Have any of these relatives had:

- Cerebral stroke or brain haemorrhage .....
- Diabetes .....
- Arthritis (chronic rheumatoid arthritis) .....
- Cancer .....
- Kidney stones or stone in urinary tract.....
- Psoriasis .....
- Peptic ulcer .....
- None of the above mentioned illnesses .....

mother	father	sister	brother
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### IV SOCIAL CONDITIONS AND PSYCHOLOGICAL PRESSURE ("STRESS")

30. How many years of education have you had? (including primary and secondary schools)

no. of years

31. How was your family's financial situation when you were growing up? Tick the most appropriate box.

YES

- Very good ..... 1
- Good ..... 2
- Poor ..... 3
- Very poor ..... 4

32. Do you suffer from sleeplessness? If yes, at what time of the year do you suffer from sleeplessness? Tick the most appropriate box.

YES No

- No particular time ..... 1
- Especially during the polar night ..... 2
- Especially during the midnight sun season ..... 3
- Especially in spring and autumn ..... 4

What form does your sleeplessness take?

- Difficult to fall asleep at night? ..... 1
- Wake up a lot during the night? ..... 2
- Wake up very early in the morning? ... 3

33. Have you had difficulty sleeping in the past couple of weeks? Tick the most appropriate box.

YES

- Not at all ..... 1
- No more than usual ..... 2
- Rather more than usual ..... 3
- Much more than usual ..... 4

34. Have you felt unhappy and depressed during the last couple of weeks? Tick the most appropriate box.

YES

- Not at all ..... 1
- No more than usual ..... 2
- Rather more than usual ..... 3
- Much more than usual ..... 4

35. Have you felt unable to cope with your difficulties during the last couple of weeks? Tick the most appropriate box.

YES

- Not at all ..... 1
- No more than usual ..... 2
- Rather more than usual ..... 3
- Much more than usual ..... 4

## Appendix 2a

Questionnaire 1, the 3<sup>rd</sup> Tromsø Study 1986–87

English version



# THE TROMSØ HEALTH SURVEY

(Applies only to the person to whom the letter is addressed.)

The health survey is coming now to your district.

You find the time and place for attendance below.

You will find an orientation on the survey in the enclosed brochure.

*We would like you to fill in the form on the back and take it with you to the survey.*

We ask those possibly not attending to report their absence in the attached absence report.

Yours sincerely

MUNICIPAL HEALTH AUTHORITY OF TROMSØ  
 COUNTY DOCTOR OF TROMSØ UNIVERSITY OF TROMSØ  
 NATIONAL HEALTH SCREENING SERVICE

Birth date

Personal number

Municipality

Circuit number

Meeting place

Gender

First letter of last name

Day and date

Time

HEIGHT WEIGHT ANM 70

M P Ø KODE 75

AVVIK ARM MAN APP.NR. TSM 82

**MEASUREMENT 1**

**MEASUREMENT 2**

**MEASUREMENT 3**

MAR	S
<input type="text"/> 85	<input type="text"/> 88
HR	D
<input type="text"/> 103	<input type="text"/> 106

MAR	S
<input type="text"/> 91	<input type="text"/> 94
HR	D
<input type="text"/> 109	<input type="text"/> 112

MAR	S
<input type="text"/> 97	<input type="text"/> 100
HR	D
<input type="text"/> 115	<input type="text"/> 118

## A FAMILY

Have one or more of your parents or siblings had a heart attack (heart wound) or angina pectoris (heart cramp)? ..... 12

Yes	No	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## B OWN ILLNESSES

Do you have, or have you had:

- A heart attack? ..... 13
- Angina pectoris (heart cramp)? ..... 14
- A cerebral stroke? ..... 15
- Diabetes? ..... 16

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Are you being treated for:

- High blood pressure? ..... 17

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

Do you use:

- Nitroglycerine? ..... 18

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

## C SYMPTOMS

Do you get pain or discomfort in the chest when:

- Walking up hills or stairs, or walking fast on level ground? ..... 19
- Walking at normal pace at level ground? ..... 20

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

If you get pain or discomfort in the chest when walking, do you usually:

- Stop? ..... 21
- Slow down? ..... 21
- Carry on at the same pace? ..... 21

<input type="checkbox"/>	1
<input type="checkbox"/>	2
<input type="checkbox"/>	3

If you stop or slow down, does the pain disappear:

- After less than 10 minutes? ..... 22
- After more than 10 minutes? ..... 22

<input type="checkbox"/>	1
<input type="checkbox"/>	2

Do you usually have:

- Cough in the morning? ..... 23
- Phlegm chest in the morning? ..... 24

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

## D EXERCISE

Exercise and physical exertion in leisure time. If your activity varies much, for example between summer and winter, then give an average. The question refers only to the last year:

Tick the most appropriate box.

- Reading, watching TV, or other sedentary activity? ..... 25

<input type="checkbox"/>	1
--------------------------	---

- Walking, cycling or other forms of exercise at least 4 hours a week? ..... 2

<input type="checkbox"/>	2
--------------------------	---

- Participation in recreational sports, heavy gardening, etc.? ..... 3

<input type="checkbox"/>	3
--------------------------	---

- Participation in hard training or sports competitions, regularly several times a week? ... 4

<input type="checkbox"/>	4
--------------------------	---

## E SALT/ FAT

How often do you use salted meat or salted fish for dinner?

Tick the most appropriate box.

- Never or less than once a month ..... 26
- Once a week or less ..... 26
- Twice a week or less ..... 26
- More than twice a week ..... 26

<input type="checkbox"/>	1
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4

How often do you add extra salt to your dinner?

Tick the most appropriate box.

- Rarely or never ..... 27
- Sometimes or often ..... 27
- Always or nearly always ..... 27

<input type="checkbox"/>	1
<input type="checkbox"/>	2
<input type="checkbox"/>	3

What type of margarine or butter do you usually use on your bread?

Tick the most appropriate box.

- Do not use margarine or butter on bread ..... 28
- Butter ..... 28
- Hard Margarine ..... 28
- Soft (soya) margarine spread ..... 28
- Butter/ margarine mixtures ..... 28

<input type="checkbox"/>	1
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4
<input type="checkbox"/>	5

What type of cooking fat do you normally use in your household?

Tick the most appropriate box.

- Butter or hard margarine ..... 29
- Soft (soya) margarine or oil ..... 29
- Butter/ margarine mixtures ..... 29

<input type="checkbox"/>	1
<input type="checkbox"/>	2
<input type="checkbox"/>	3

## F SMOKING

Do you smoke daily at present? ..... 30

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

If the answer is "YES", then:

Do you smoke cigarettes daily? ..... 31  
(hand-rolled or factory made)

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

If you do not smoke cigarettes at present, then:

Have you previously smoked cigarettes daily? ... 32

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

If you answered "Yes", how long is it since you stopped:

- Less than 3 months? ..... 33
- 3 months to 1 year? ..... 33
- 1-5 years? ..... 33
- More than 5 years? ..... 33

<input type="checkbox"/>	1
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4

To be answered by those who smoke or who have smoked previously:

How many years altogether have you smoked daily? ..... 34

Year
<input type="text"/>

How many cigarettes do you smoke or did you smoke daily? ..... 36

Give number of cigarettes per day ..... 36  
(hand-rolled + factory made)

Cigarettes
<input type="text"/>

Do you smoke anything else other than cigarettes daily?

- Cigars or cigarillos/cheroots? ..... 40
- A pipe? ..... 41

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

If you smoke a pipe, how many packs of tobacco (50 grams) do you smoke per week?

Give the average number of packs per week ..... 42

Tobacco packets
<input type="text"/>

## G COFFEE

How many cups of coffee do you usually drink daily?

Tick the most appropriate box.

- Do not drink coffee, or less than one cup ..... 45
- 1-4 cups ..... 45
- 5-8 cups ..... 45
- 9 or more cups ..... 45

<input type="checkbox"/>	1
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4

What type of coffee do you usually drink daily?

- Coarsely ground coffee for brewing (boiled) ..... 46
- Finely ground filter coffee ..... 47
- Instant coffee ..... 48
- Caffeine free coffee ..... 49
- Do not drink coffee ..... 50

<input type="checkbox"/>	1
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4

## H EMPLOYMENT

Have you within the last 12 months received unemployment benefit? ..... 51

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Are you at present on sick leave, or receiving rehabilitation benefit? ..... 52

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

Do you receive a complete or partial disability pension? 53

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

Do you usually work shifts or at night? ..... 54

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

During the last year, have you had:

Tick the most appropriate box.

- Mostly sedentary work? ..... 55  
(e.g. office work, watchmaker, light manual work)
- Work that requires a lot of walking? ..... 55  
(e.g. shop assistant, light industrial work, teaching)
- Work that requires a lot of walking and lifting? ... 55  
(e.g. postman, heavy industrial work, construction)
- Heavy manual labour? ..... 55  
(e.g. forestry, heavy farm-work, heavy construction)

<input type="checkbox"/>	1
<input type="checkbox"/>	2
<input type="checkbox"/>	3
<input type="checkbox"/>	4

Is house-keeping your main occupation? ... 56

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

## I FOLLOW-UP EXAMINATION

Has any one in your household (other than yourself) been called in to a doctor for further medical examination after the previous cardiovascular disease survey? ..... 57

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

If this survey suggests that you need a further medical examination, which general practitioner do you wish to be referred to?

Write the doctor's name here?

Don't write here

..... 58

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

No particular doctor ..... 58

## Appendix 2b

Questionnaire 2, the 3<sup>rd</sup> Tromsø Study 1986–87

English version



# ADDITIONAL QUESTIONS TO THE TROMSØ HEALTH SURVEY 1986-87.

Cardiovascular heart and circulatory diseases, on which the surveys of the 1974 and 1979-80 focused, are a very varied category of diseases whose causes are still partly unknown. In Tromsø we are therefore trying to obtain a more complete description of factors which may be important for the course of these diseases, such as diet, psychological pressure, "stress", social conditions and the occurrence of disease in relatives. Such a description is also important in the search of factors that contribute to cancer, a group of diseases which also we try to combat in the coming years.

When you were called in, you received a questionnaire which you handed in at the survey. The present questionnaire asks for further information about your health and includes questions on various diseases and physical and psychological complaints. We have included questions on pregnancy, birth and menstruation.

In addition, we are interested in obtaining information on the public use of medical health services in order to find out how to improve the health service.

We hope that you will take the trouble to fill in yet another questionnaire and return it to "Tromsø Board of Health" in the enclosed envelope. All information will be treated with strict confidentiality. If you have any comments regarding the survey, you may write them down in the space provided on the last page of the questionnaire.

Yours sincerely

Tromsø Board of Health      Department of medicine  
University of Tromsø

GENERAL STATE OF HEALTH	
How is your health? Tick the box where "Yes" is appropriate.	Yes
Very bad ..... 12	<input type="checkbox"/> 1
Bad ..... 13	<input type="checkbox"/> 2
Neither good nor bad, "middling" ..... 14	<input type="checkbox"/> 3
Good ..... 15	<input type="checkbox"/> 4
Excellent ..... 16	<input type="checkbox"/> 5
ILLNESSES	
Do you have, or have you had: Tick "Yes" or "No" for each question.	Yes    No
The skin disease psoriasis ..... 13	<input type="checkbox"/> <input type="checkbox"/>
Asthma ..... 14	<input type="checkbox"/> <input type="checkbox"/>
Allergic eczema ..... 15	<input type="checkbox"/> <input type="checkbox"/>
Hay fever ..... 16	<input type="checkbox"/> <input type="checkbox"/>
Chronic bronchitis ..... 17	<input type="checkbox"/> <input type="checkbox"/>
Gastric ulcer ..... 18	<input type="checkbox"/> <input type="checkbox"/>
Duodenal ulcer ..... 19	<input type="checkbox"/> <input type="checkbox"/>
Your appendix removed ..... 20	<input type="checkbox"/> <input type="checkbox"/>
An operation for a stomach ulcer ..... 21	<input type="checkbox"/> <input type="checkbox"/>
Chronic rheumatoid arthritis ..... 22	<input type="checkbox"/> <input type="checkbox"/>
Cancer ..... 23	<input type="checkbox"/> <input type="checkbox"/>
Epilepsy ..... 24	<input type="checkbox"/> <input type="checkbox"/>
Migraine ..... 25	<input type="checkbox"/> <input type="checkbox"/>
INFECTIONS	
How many times in the last 6 months have you had infections like a cold, influenza (flu) diarrhoea/vomiting, or similar illnesses? ..... 26	Number <input type="text"/>
Have you had one of these infections in the past 14 days? ..... 27	Yes    No <input type="checkbox"/> <input type="checkbox"/>

ILLNESSES IN PARENTS OR SIBLINGS	
Tick for the relatives who have or have ever had any of the following illnesses:	mother    father    brother    Sister
Cerebral stroke or brain haemorrhage ... 28	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Diabetes ..... 32	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Rheumatoid arthritis ..... 36	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Cancer ..... 40	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Psoriasis ..... 44	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Gastric or duodenal ulcer ..... 48	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Asthma ..... 52	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Tick if none of the relatives have or have had any of those illnesses ..... 56	Yes    No <input type="checkbox"/> <input type="checkbox"/>
MEDICINES	
Have you during the last year used tablets/sprays or had injections for asthma or allergies? ..... 60	Yes    No <input type="checkbox"/> <input type="checkbox"/>
Have you used any of the following medicines in the past 14 days?	Yes    No
Painkillers ..... 61	<input type="checkbox"/> <input type="checkbox"/>
Antipyretic drugs (to reduce fever) ..... 62	<input type="checkbox"/> <input type="checkbox"/>
Eczema ointment ..... 63	<input type="checkbox"/> <input type="checkbox"/>
Blood pressure medicines ..... 64	<input type="checkbox"/> <input type="checkbox"/>
Heart medicines ..... 65	<input type="checkbox"/> <input type="checkbox"/>
Sleeping pills ..... 66	<input type="checkbox"/> <input type="checkbox"/>
Nerve tablets ..... 67	<input type="checkbox"/> <input type="checkbox"/>
Migraine drugs ..... 68	<input type="checkbox"/> <input type="checkbox"/>
Epilepsy drugs ..... 69	<input type="checkbox"/> <input type="checkbox"/>
Other medicines ..... 70	<input type="checkbox"/> <input type="checkbox"/>

## CONTACT DUE TO OWN HEALTH OR ILLNESS

How many visits have you made during the past year due to your own health or illness?		Number of visits	
To a GP (general practitioner) .....	71	<input type="checkbox"/>	
To a specialist (not hospital) .....	72	<input type="checkbox"/>	
Emergency GP .....	85	<input type="checkbox"/>	
Medical officer at work .....	87	<input type="checkbox"/>	
Physiotherapist .....	89	<input type="checkbox"/>	
Chiropractor .....	81	<input type="checkbox"/>	
Alternative practitioner (homoeopath, foot zone therapist, etc.) ..	83	<input type="checkbox"/>	
Hospital outpatient department .....	85	<input type="checkbox"/>	
Number of hospital admissions in the past year ..	87	<input type="checkbox"/>	

## DIET

How many slices of bread do you usually eat daily?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Less than 2 slices .....	88	<input type="checkbox"/>	2
2 - 4 slices .....		<input type="checkbox"/>	3
5 - 6 slices .....		<input type="checkbox"/>	4
7 - 12 slices .....		<input type="checkbox"/>	5
13 or more slices .....			

What type of milk do you usually drink?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Do not drink milk .....	89	<input type="checkbox"/>	2
Full cream milk (ordinary or curdled) .....		<input type="checkbox"/>	3
Semi-skimmed milk .....		<input type="checkbox"/>	4
Skimmed milk (ordinary or curdled) .....			

How many glasses/cups of milk do you usually drink daily?		Yes	
Less than 1 glass/cup .....	90	<input type="checkbox"/>	1
1 - 2 glasses/cups .....		<input type="checkbox"/>	2
3 - 4 glasses/cups .....		<input type="checkbox"/>	3
5 or more glasses/cups .....		<input type="checkbox"/>	4

## FISH

How often do you eat cod/pollock or other lean fish for dinner or in a sandwich?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Less than once a week .....	91	<input type="checkbox"/>	2
Once a week .....		<input type="checkbox"/>	3
Twice a week .....		<input type="checkbox"/>	4
3 or more times a week .....			

How often do you eat fatty fish such as herring, halibut, red fish, mackerel, salmon or trout for dinner or in a sandwich?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Less than once a week .....	92	<input type="checkbox"/>	2
Once a week .....		<input type="checkbox"/>	3
Twice a week .....		<input type="checkbox"/>	4
3 or more times a week .....			

Do you take cod liver oil regularly?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
No .....	93	<input type="checkbox"/>	2
During polar night .....		<input type="checkbox"/>	3
All year .....			

## BREAKFAST

Do you usually eat breakfast daily? .....	94	Yes	No
		<input type="checkbox"/>	<input type="checkbox"/>

## DINNER

How often do you eat meat for dinner?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Less than once a week .....	95	<input type="checkbox"/>	2
Once or twice a week .....		<input type="checkbox"/>	3
3 - 4 times a week .....		<input type="checkbox"/>	4
5 or more times a week .....			

How often do you use fat like butter, margarine, mayonnaise, etc. with your dinner?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Less than once a week .....	96	<input type="checkbox"/>	2
Once or twice a week .....		<input type="checkbox"/>	3
3 - 4 times a week .....		<input type="checkbox"/>	4
5 or more times a week .....			

Do you usually eat vegetables with your dinner? .....	97	Yes	No
		<input type="checkbox"/>	<input type="checkbox"/>

## FRUIT

How often do you usually eat fruit?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Less than once a week .....	98	<input type="checkbox"/>	2
About once a week .....		<input type="checkbox"/>	3
2 - 3 times a week .....		<input type="checkbox"/>	4
4 - 5 times a week .....		<input type="checkbox"/>	5
More or less .....			

## ALCOHOL

Are you a teetotaler?		Yes	No
		<input type="checkbox"/>	<input type="checkbox"/>

If not,		Yes	
- How often do you usually drink beer?		<input type="checkbox"/>	1
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	2
Never or just a few times a year .....	100	<input type="checkbox"/>	3
1 - 2 times a month .....		<input type="checkbox"/>	4
About once a week .....		<input type="checkbox"/>	5
2 - 3 times a week .....			
More or less daily .....			

How often do you usually drink wine?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Never or just a few times a year .....	101	<input type="checkbox"/>	2
1 - 2 times a month .....		<input type="checkbox"/>	3
About once a week .....		<input type="checkbox"/>	4
2 - 3 times a week .....		<input type="checkbox"/>	5
More or less daily .....			

- How often do you usually drink spirits?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Never or just a few times a year .....	102	<input type="checkbox"/>	2
1 - 2 times a month .....		<input type="checkbox"/>	3
About once a week .....		<input type="checkbox"/>	4
2 - 3 times a week .....		<input type="checkbox"/>	5
More or less daily .....			

Approximately how often have you during the last year consumed alcohol corresponding to at least 5 small bottles of beer, a bottle of wine, or 1/4 bottle of spirits?		Yes	
Tick the box where "Yes" is appropriate.		<input type="checkbox"/>	1
Not at all the past year .....	103	<input type="checkbox"/>	2
A few times .....		<input type="checkbox"/>	3
Once or twice a month .....		<input type="checkbox"/>	4
3 or more times a week .....			

**PHYSICAL ACTIVITY**

How often do you take part in physical activity lasting at least 20 minutes, which makes you perspire or become breathless?

- Tick the box where "Yes" is appropriate.
Rarely or never ..... 104
Weekly .....
Several times a week .....
Daily .....

Yes
[ ] 1
[ ] 2
[ ] 3
[ ] 4

If you usually take part in this type of activity at least weekly, how much time do you spend exercising?

- Tick the box where "Yes" is appropriate.
Less than 30 minutes a week ..... 105
Between 30 minutes and 1 hour a week .....
Between 1 and 2 hours a week .....
More than 2 hours a week .....

Yes
[ ] 1
[ ] 2
[ ] 3
[ ] 4

**CHANGE IN DIETARY HABITS AND OTHER HABITS**

Have you changed any of the following habits during the last 5 years: (Tick once for each question)

- Dietary fat ..... 106
Soya margarine or oil ..... 107
Skimmed or low fat milk ..... 108
Coffee intake ..... 109
Alcohol intake ..... 110
Physical activity ..... 111

Now use
As more before Less
[ ] [ ] [ ]
[ ] [ ] [ ]
[ ] [ ] [ ]
[ ] [ ] [ ]
[ ] [ ] [ ]
[ ] [ ] [ ]

**MARRIAGE / PARTNER**

- Are you married or partner ..... 112
How old were you when you first married or Moved in with a partner? ..... 113

Yes No
[ ] [ ]
[ ] years

**HOUSEHOLD**

- How many people live in your household? ..... 115
Is anyone in your household 10 years or younger? ..... 117
Does anyone in your household need special care/assistance - other than the children? .... 118

Number
[ ]
Yes No
[ ] [ ]
Yes No
[ ] [ ]

**SCHOOLING**

- How many years education have you had? (including primary and secondary schools) 119

[ ] years

**EMPLOYMENT**

- Have you had paid work the entire past year? Tick the box where "Yes" is appropriate.
Full-time work ..... 121
Part-time work .....
Unpaid work .....
How much house work do you normally do yourself? Tick the box where "Yes" is appropriate.
All or almost all ..... 122
At least half .....
More than quarter .....
Less than quarter .....

Yes
[ ] 1
[ ] 2
[ ] 3
[ ] 4
[ ] 1
[ ] 2
[ ] 3
[ ] 4

**BACK AND JOINTS CONDITIONS**

- During this last year have you suffered from back pain that has lasted longer than 4 weeks? 123
If yes, does the pain improve when you move around? ..... 124

Yes No
[ ] [ ]
[ ] [ ]

- Have you suffered from morning stiffness in your back lasting more than 30 minutes? ..... 125

[ ] [ ]

During the past 3 years have you suffered from pain in any of the following joints lasting more than 30 minutes?

- Knees ..... 126
Elbows ..... 127
Innermost finger joints ..... 128
Other joints ..... 129

Yes No
[ ] [ ]
[ ] [ ]
[ ] [ ]
[ ] [ ]

- If yes, have you suffered from stiff joints in the morning lasting more than 30 minutes? ..... 130

[ ] [ ]

**NECK, HEAD AND SHOULDER COMPLAINTS**

How often do you suffer from headache? Tick the box where "Yes" is appropriate.

- Rarely or never ..... 131
Once or more a month .....
Once or more a week .....
Daily .....

Yes
[ ] 1
[ ] 2
[ ] 3
[ ] 4

How often do you suffer pain in the neck or shoulder? Tick the box where "Yes" is appropriate.

- Rarely or never ..... 132
Once or more a month .....
Once or more a week .....
Daily .....

Yes
[ ] 1
[ ] 2
[ ] 3
[ ] 4

Do the pains in your head, neck or shoulder reduce your ability to work? Tick the box where "Yes" is appropriate.

- Little or no effect ..... 133
To some degree .....
To a large degree .....
Cannot do ordinary work .....

Yes
[ ] 1
[ ] 2
[ ] 3
[ ] 4

- Have your back, shoulder, and/or neck ever been x-rayed? ..... 134

Yes No
[ ] [ ]

**SLEEPLESSNESS/ LOSS OF CONSCIOUSNESS**

- Have you ever suffered from sleeplessness? 135
If yes, what time of the year does it affect you most? Tick the box where "Yes" is appropriate.

Yes No
[ ] [ ]
Yes
[ ] 1
[ ] 2
[ ] 3
[ ] 4

- No particular time ..... 136
Especially during the polar night .....
Especially during the midnight sun season .....
Especially in spring and autumn .....

- Have you at any time during the last 12 months suffered from tiredness that has affected your work performance? ..... 137

Yes No
[ ] [ ]

- Have you suffered from sudden loss of consciousness in the past year? ..... 138

Yes No
[ ] [ ]

- Have you noticed sudden changes in your pulse rate of heartbeat in the past year? .... 139

Yes No
[ ] [ ]

**REACTION TO PROBLEMS**

If you have major personal problems, do you expect to get help and support from your spouse or family? ..... 140

Yes  No

In the last year, have you for a long time felt a need to seek help with personal problems, without doing so? ..... 141

Yes  No

During the past 2 weeks have you felt unable to cope with your problems? Tick the box where "Yes" is appropriate.

Seldom or never ..... 142  1

Sometimes .....  2

Often .....  3

Nearly always .....  4

During the past 2 weeks have you felt unhappy or depressed? Tick the box where "Yes" is appropriate.

Seldom or never ..... 143  1

Sometimes .....  2

Often .....  3

Nearly always .....  4

Do you ever feel lonely? Tick the box where "Yes" is appropriate.

Very often ..... 144  1

Sometimes .....  2

Rarely or never .....  3

**THE REMAINING SECTION OF THE QUESTIONNAIRE APPLIES TO WOMEN ONLY**

**MENSTRUATION**

How old were you when you started menstruating? ..... 145  years

When did your last period start? ..... 147

day month year / /

How many days usually pass from the first day of one period to the first day of your next period (the time lapsed between the start of two periods) ..... 153  days

Do/ did you menstruate regularly? ..... 155

Yes  No

Do you usually take painkillers during menstruation? ..... 156

Yes  No

Do the complaints disappear when you get your period? ..... 160

Yes  No

For these complaints, do you use?

- diuretics? ..... 161 Yes  No

- other medications? ..... 162 Yes  No

**PREGNANCY**

How many children have given birth to? .... 163

number

How old were you when you got pregnant for the first time? ..... 164  years

**CONTRACEPTION**

Do you use or have you ever used oral contraceptive pills or an intrauterine device? ..... 166

Yes  No

If yes, for how many years altogether have you used:

The pill? ..... 167  years

An intrauterine device? ..... 169  years

How old were you when you started using:

The pill? ..... 171  years

An intrauterine device? ..... 173  years

If you have stopped taking the pill, did 6 months or more pass without menstruating without you being pregnant? 175

Yes  No

Did you have to stop taking the pill due to high blood pressure? ..... 176

Yes  No

**CERVICAL SMEAR TEST**

How many times have you had a cervical smear test in the last 3 years? ..... 177

Number of tests

How many years is it since you had your last cervical smear test? ..... 178  years

**PRE-MENSTRUAL TENSION**

Do you have any of the following complaints before your period:

- Are you depressed or irritable? Tick the box where "Yes" is appropriate.

Hardly at all ..... 157  1

Noticeably .....  2

Very much so .....  3

- Are your breasts painful? Tick the box where "Yes" is appropriate.

Hardly at all ..... 158  1

Noticeably .....  2

Very much so .....  3

- Do you have swollen hands/feet, put on weight, or feel bloated? Tick the box where "Yes" is appropriate.

Hardly at all ..... 159  1

Noticeably .....  2

Very much so .....  3

Your comments: ..... 179

## Appendix 3a

Questionnaire 1, the 4<sup>rd</sup> Tromsø Study 1994–95

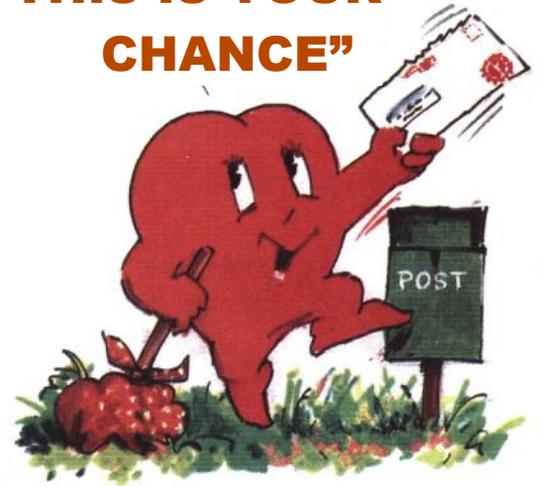
English version



# HEALTH SURVEY

Invitation

**“THIS IS YOUR  
CHANCE”**



Date of birth

Social security No.

Municipality

Electoral ward No.

## Welcome to the Tromsø Health Survey!

The Health Survey is coming to Tromsø. This leaflet will tell you when and where. You will also find information about the survey in the enclosed brochure.

*We would like you to fill in the form overleaf and take it with you to the examination.*

The more people take part in the survey, the more valuable its results will be. We hope, therefore, that

you will be able to come. Attend even if you feel healthy, if you are currently receiving medical treatment, or if you have had your cholesterol and blood pressure measured recently.

Yours sincerely,  
**Municipal Health Authorities**  
**Faculty of Medicine - University of Tromsø**  
**National Health Screening Service**

*“THIS IS A REAL  
OPPORTUNITY- TAKE IT!”*



**YOUR OWN HEALTH**

What is your current state of health? *Tick one box only.*

- Poor ..... 12  1
- Not so good .....  2
- Good .....  3
- Very good .....  4

Do you have, or have you had:

	Yes	No	Age first time
A heart attack..... 13			years
Angina pectoris (heart cramp) ..... 16			years
A cerebral stroke/ brain haemorrhage 19			years
Asthma ..... 22			years
Diabetes ..... 25			years

Do you use blood pressure lowering drugs?

- Currently..... 28  1
- Previously, but not now.....  2
- Never used.....  3

Have you during the last year suffered from pains and/or stiffness in muscles and joints that have lasted continuously for at least 3 months? 29

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Have you in the last two weeks felt:

	No	A little	A lot	Very much
Nervous or worried? 30	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Anxious?..... 31	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Confident and calm? 32	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irritable? ..... 33	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Happy and optimistic? 34	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Down/depressed? .... 35	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lonely? ..... 36	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4

**SMOKING**

Did any of the adults at home smoke while you were growing up? ..... 37

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Do you currently, or did you previously, live together with daily smokers after your 20<sup>th</sup> birthday? 38

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

If "YES", for how many years in all? ..... 39

Years
<input type="text"/>

How many hours a day do you normally spend in smoke-filled rooms? ..... 41

Hours
<input type="text"/>

*Put 0 if you do not spend time in smoke-filled rooms.*

Do you yourself smoke: ..... 43

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Cigarettes daily? ..... 43

Cigars/ cigarillos daily? ..... 44

A pipe daily? ..... 45

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

If you previously smoked daily, how long is it since you quit?..... 46

Years
<input type="text"/>

If you currently smoke, or have smoked previously:

How many cigarettes do you or did you usually smoke per day? ..... 48

cigarettes
<input type="text"/>

How old were you when you began daily smoking?..... 52

Age
<input type="text"/>
years

How many years in all have you smoked daily? ..... 54

Years
<input type="text"/>

**EXERCISE**

How has your physical activity in leisure time been during this last year? *Think of your weekly average for the year.*

*Time spent going to work counts as leisure time.*

	Hours per week			
	None	Less than 1	1-2	3 or more
Light activity ( <i>not sweating/out of breath</i> ) ..... 56	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hard activity ( <i>sweating/out of breath</i> ) ..... 57	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4

**COFFEE**

How many cups of coffee do you drink daily?

*Put 0 if you do not drink coffee daily.*

Coarsely ground coffee for brewing.... 58	<input type="text"/>	Cups
Other coffee ..... 60	<input type="text"/>	Cups

**ALCOHOL**

Are you a teetotaler? ..... 62

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

How many times a month do you normally drink alcohol? *Do not count low-alcohol beer.*

*Put 0 if less than once a month. .... 63*

Times
<input type="text"/>

How many glasses of beer, wine or spirits do you normally drink in a fortnight? 65

	Beer	Wine	Spirits
<i>Do not count low-alcohol beer.</i>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<i>Put 0 if less than once a month.</i>	Glasses	Glasses	Glasses

**FAT**

What type of margarine or butter do you usually use on bread? *Tick one box only.*

- Don't use butter/margarine ..... 71  1
- Butter .....  2
- Hard margarine .....  3
- Soft margarine .....  4
- Butter/margarine mixtures.....  5
- Light margarine .....  6

**EDUCATION/WORK**

What is the highest level of education you have completed?

- 7-10 years primary/secondary school, modern secondary school..... 72  1
- Technical school, middle school, vocational school, 1-2 years senior high school .....  2
- High school diploma (3-4 years).....  3
- College/university, less than 4 years ...  4
- College/university, 4 or more years .....  5

What is your current work situation?

- Paid work ..... 73
- Full-time housework..... 74
- Education, military service..... 75
- Unemployed, on leave without payment..... 76

How many hours of paid work do you have per week? ..... 77

No. of hours
<input type="text"/>

Do you receive any of the following benefits?

- Sickness benefit (sick leave) ..... 79
- Rehabilitation benefit..... 80
- Disability pension..... 81
- Old-age pension..... 82
- Social welfare benefit..... 83
- Unemployment benefit ..... 84

**ILLNESS IN THE FAMILY**

Have one or more of your parents or siblings had a heart attack or had angina (heart cramp)? ..... 85

Yes	No	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Appendix 3b

Questionnaire 2 (<70 years), the 4<sup>th</sup> Tromsø Study 1994–95

English version



# The Tromsø Health Survey

The main aim of the Tromsø Study is to improve our knowledge about cardiovascular diseases in order to aid prevention. The survey is also intended to improve our knowledge of cancer and other general conditions, such as allergies, muscle pains and mental conditions. We would therefore like you to answer some questions about factors that may be relevant for your risk of getting these and other illnesses.

This form is a part of the Health Survey, which has been approved by the Norwegian Data Inspectorate and the Regional Board of Research Ethics. The answers will only be used for research purposes and will be treated in strict confidence. The information you give us may later be stored along with information from other public health registers in accordance with the rules laid down by the Data Inspectorate and the Regional Board of Research Ethics.

If you are in doubt about what to answer, tick the box that you feel fits best.

The completed form should be sent to us in the enclosed pre-paid envelope.

Thank you in advance for helping us.

*Yours sincerely,*

Faculty of Medicine  
University of Tromsø

National Health  
Screening Service

If you do not wish to answer the questionnaire, tick the box below and return the form. Then you will not receive reminders.

I do not wish to answer the questionnaire .....17

Day Month Year

Date for filling in this form:.....18 ...../...../.....

## CHILDHOOD/YOUTH

In which Norwegian municipality did you live at the age of 1 year?

.....24-28  
If you did not live in Norway, give country of residence instead of municipality.

How was your family's financial situation during your childhood?

- Very good .....29   
 Good .....   
 Difficult .....   
 Very difficult .....

How many of the first three years of your life

- did you live in a town/city? .....30 \_\_\_\_\_ years  
 - did your family have a cat or dog in the home? .....31 \_\_\_\_\_ years

How many of the first 15 years of your life

- did you live in a town/city? .....32 \_\_\_\_\_ years  
 - did your family have a cat or dog in the home? .....34 \_\_\_\_\_ years

## HOME

Who do you live with?

Tick once for each item and give the number. Yes No Number

- Spouse/partner .....36   \_\_\_\_\_  
 Other people over 18 years .....37   \_\_\_\_\_  
 People under 18 years .....40   \_\_\_\_\_

How many of the children attend day care/kindergarten? ....43 \_\_\_\_\_

What type of house do you live in?

- Villa/detached house .....45  1  
 Farm .....  2  
 Flat/apartment .....  3  
 Terraced /semi-detached house .....  4  
 Other .....  5

How big is your house? .....46 \_\_\_\_\_ m<sup>2</sup>

Approximately what year was your house built? .....49 \_\_\_\_\_

Has your house been insulated after 1970?.....53  Yes  No

Do you live on the lower ground floor/basement? .....54    
 If "Yes", is the floor laid on concrete? .....55

What is the main source of heat in your home?

- Electric heating .....56   
 Wood-burning stove .....   
 Central heating system using:  
 Paraffin .....   
 Electricity .....  Yes No

Do you have fitted carpets in the living room? .....60

Is there a cat in your home? .....61

Is there a dog in your home? .....62

## WORK

If you have paid or unpaid work, how would you describe your work?

- Mostly sedentary work? .....63  1  
 (e.g. office work, mounting)  
 Work that requires a lot of walking? .....  2  
 (e.g. shop assistant, light industrial work, teaching)  
 Work that requires a lot of walking and lifting? .....  3  
 (e.g. postman, nursing, construction)  
 Heavy manual work? .....  4  
 (e.g. forestry, heavy farm-work, heavy construction)

Can you decide yourself how your work should be organised?

- No, not at all .....64  1  
 To a small extent .....  2  
 Yes, to a large extent .....  3  
 Yes, I decide myself .....  4

Are you on call, do you work shifts or nights?.....65  Yes  No

Do you do any of the following jobs (full- or part-time)?

- Tick one box only for each item. Yes No  
 Driver .....66    
 Farmer .....    
 Fisherman .....

## YOUR OWN ILLNESSES

Have you ever had:

Tick one box only for each item. Give your age at the time.

If you have had the condition several times, how old were you **last** time?

	Yes	No	Age
Hip fracture .....	69 <input type="checkbox"/>	<input type="checkbox"/>	_____
Wrist/forearm fracture .....	72 <input type="checkbox"/>	<input type="checkbox"/>	_____
Whiplash .....	75 <input type="checkbox"/>	<input type="checkbox"/>	_____
Injury requiring hospital admission .....	78 <input type="checkbox"/>	<input type="checkbox"/>	_____
Gastric ulcer .....	81 <input type="checkbox"/>	<input type="checkbox"/>	_____
Duodenal ulcer .....	84 <input type="checkbox"/>	<input type="checkbox"/>	_____
Gastric/duodenal ulcer surgery .....	87 <input type="checkbox"/>	<input type="checkbox"/>	_____
Neck surgery .....	90 <input type="checkbox"/>	<input type="checkbox"/>	_____

Have you ever had, or do you still have:

Tick one box only for each item.

	Yes	No
Cancer .....	93 <input type="checkbox"/>	<input type="checkbox"/>
Epilepsy .....	<input type="checkbox"/>	<input type="checkbox"/>
Migraine .....	<input type="checkbox"/>	<input type="checkbox"/>
Chronic bronchitis .....	<input type="checkbox"/>	<input type="checkbox"/>
Psoriasis .....	<input type="checkbox"/>	<input type="checkbox"/>
Osteoporosis .....	98 <input type="checkbox"/>	<input type="checkbox"/>
Fibromyalgia/fibrositis/chronic pain syndrome .....	<input type="checkbox"/>	<input type="checkbox"/>
Psychological problems for which you have sought help .....	<input type="checkbox"/>	<input type="checkbox"/>
Thyroid disease .....	<input type="checkbox"/>	<input type="checkbox"/>
Liver disease .....	<input type="checkbox"/>	<input type="checkbox"/>
Kidney disease .....	103 <input type="checkbox"/>	<input type="checkbox"/>
Appendectomy .....	<input type="checkbox"/>	<input type="checkbox"/>
Allergy and hypersensitivity:		
Atopic eczema (e.g. childhood eczema) .....	<input type="checkbox"/>	<input type="checkbox"/>
Hand eczema .....	<input type="checkbox"/>	<input type="checkbox"/>
Hay fever .....	<input type="checkbox"/>	<input type="checkbox"/>
Food allergy .....	108 <input type="checkbox"/>	<input type="checkbox"/>
Other hypersensitivity (not allergy) .....	<input type="checkbox"/>	<input type="checkbox"/>

How many times have you had a cold, influenza (flu), vomiting/diarrhoea, or similar in the last six months? \_\_\_\_\_ times

Have you had this in the last 14 days? .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

## ILLNESS IN THE FAMILY

Tick for the relatives who have or have ever had any of the following diseases:

Tick "None" if none of your relatives have had the disease.

	Mother	Father	Brother	Sister	Child	None
Cerebral stroke or brain haemorrhage .....	113 <input type="checkbox"/>	<input type="checkbox"/>				
Heart attack before age 60 .....	119 <input type="checkbox"/>	<input type="checkbox"/>				
Cancer .....	125 <input type="checkbox"/>	<input type="checkbox"/>				
Asthma .....	131 <input type="checkbox"/>	<input type="checkbox"/>				
Gastric/duodenal ulcer .....	137 <input type="checkbox"/>	<input type="checkbox"/>				
Osteoporosis .....	143 <input type="checkbox"/>	<input type="checkbox"/>				
Psychological problems .....	149 <input type="checkbox"/>	<input type="checkbox"/>				
Allergy .....	155 <input type="checkbox"/>	<input type="checkbox"/>				
Diabetes .....	161 <input type="checkbox"/>	<input type="checkbox"/>				
– age when they got diabetes .....	167 _____	_____	_____	_____	_____	_____

## SYMPTOMS

Do you cough about daily for some periods of the year? .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

If "Yes":

Is your cough productive? .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Have you had this kind of cough for as long as 3 months in each of the last two years? .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Have you had episodes of wheezing in your chest? .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

If "Yes", has this occurred:

Tick one box only for each item.

At night .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

In connection with respiratory infections .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

In connection with physical exertion .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

In connection with very cold weather .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Have you noticed sudden changes in your pulse or heart rhythm in the last year? .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

How often do you suffer from sleeplessness?

Never, or just a few times a year .....

1	<input type="checkbox"/>
---	--------------------------

1-2 times a month .....

2	<input type="checkbox"/>
---	--------------------------

Approximately once a week .....

3	<input type="checkbox"/>
---	--------------------------

More than once a week .....

4	<input type="checkbox"/>
---	--------------------------

If you suffer from sleeplessness, what time of the year does it affect you most?

No particular time of year .....

1	<input type="checkbox"/>
---	--------------------------

Especially during the polar night .....

2	<input type="checkbox"/>
---	--------------------------

Especially during the midnight sun season .....

3	<input type="checkbox"/>
---	--------------------------

Especially in spring and autumn .....

4	<input type="checkbox"/>
---	--------------------------

Have you in the last year suffered from sleeplessness to the extent that it has affected your ability to work? .....

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

How often do you suffer from headaches?

Rarely or never .....

1	<input type="checkbox"/>
---	--------------------------

Once or more a month .....

2	<input type="checkbox"/>
---	--------------------------

Once or more a week .....

3	<input type="checkbox"/>
---	--------------------------

Daily .....

4	<input type="checkbox"/>
---	--------------------------

Does the thought of getting a serious illness ever worry you?

Not at all .....

1	<input type="checkbox"/>
---	--------------------------

Only a little .....

2	<input type="checkbox"/>
---	--------------------------

Some .....

3	<input type="checkbox"/>
---	--------------------------

Very much .....

4	<input type="checkbox"/>
---	--------------------------

## USE OF HEALTH SERVICES

How many visits have you made during the past year due to your own health or illness:

Tick 0 if you have **not** had such contact

Number of times the past year

To a general practitioner (GP)/Emergency GP .....

191	_____
-----	-------

To a psychologist or psychiatrist .....

_____	_____
-------	-------

To an other medical specialist (not at a hospital) .....

_____	_____
-------	-------

To a hospital out-patient clinic .....

197	_____
-----	-------

Admitted to a hospital .....

_____	_____
-------	-------

To a medical officer at work .....

_____	_____
-------	-------

To a physiotherapist .....

203	_____
-----	-------

To a chiropractor .....

_____	_____
-------	-------

To an acupuncturist .....

_____	_____
-------	-------

To a dentist .....

209	_____
-----	-------

To an alternative practitioner (homoeopath, foot zone therapist, etc.) .....

_____	_____
-------	-------

To a healer, faith healer, clairvoyant .....

_____	_____
-------	-------

## MEDICATION AND DIETARY SUPPLEMENTS

Have you for any length of time in the past year used any of the following medicines or dietary supplements daily or almost daily? Indicate how many months you have used them.

Put **0** for items you have **not** used.

Medicines

Painkillers .....215 \_\_\_\_\_ months

Sleeping pills ..... \_\_\_\_\_ months

Tranquillizers ..... \_\_\_\_\_ months

Antidepressants .....221 \_\_\_\_\_ months

Allergy drugs ..... \_\_\_\_\_ months

Asthma drugs ..... \_\_\_\_\_ months

Dietary supplements

Iron tablets .....227 \_\_\_\_\_ months

Calcium tablets or bonemeal ..... \_\_\_\_\_ months

Vitamin D supplements ..... \_\_\_\_\_ months

Other vitamin supplements .....233 \_\_\_\_\_ months

Cod liver oil or fish oil capsules ..... \_\_\_\_\_ months

Have you in the last 14 days used the following medicines or dietary supplements?

Tick **one** box only for **each** item.

	Yes	No
Medicines		
Painkillers .....237	<input type="checkbox"/>	<input type="checkbox"/>
Antipyretic drugs (to reduce fever) .....	<input type="checkbox"/>	<input type="checkbox"/>
Migraine drugs .....	<input type="checkbox"/>	<input type="checkbox"/>
Eczema cream/ointment .....	<input type="checkbox"/>	<input type="checkbox"/>
Heart medicines (not blood pressure) .....	<input type="checkbox"/>	<input type="checkbox"/>
Cholesterol lowering drugs .....	<input type="checkbox"/>	<input type="checkbox"/>
Sleeping pills .....	<input type="checkbox"/>	<input type="checkbox"/>
Tranquillizers .....	<input type="checkbox"/>	<input type="checkbox"/>
Antidepressants .....	<input type="checkbox"/>	<input type="checkbox"/>
Other drugs for nervous conditions .....	<input type="checkbox"/>	<input type="checkbox"/>
Antacids .....247	<input type="checkbox"/>	<input type="checkbox"/>
Gastric ulcer drugs .....	<input type="checkbox"/>	<input type="checkbox"/>
Insulin .....	<input type="checkbox"/>	<input type="checkbox"/>
Diabetes tablets .....	<input type="checkbox"/>	<input type="checkbox"/>
Drugs for hypothyroidism (Thyroxine) .....	<input type="checkbox"/>	<input type="checkbox"/>
Cortisone tablets .....252	<input type="checkbox"/>	<input type="checkbox"/>
Other medicine(s) .....	<input type="checkbox"/>	<input type="checkbox"/>
Dietary supplements		
Iron tablets .....	<input type="checkbox"/>	<input type="checkbox"/>
Calcium tablets or bonemeal .....	<input type="checkbox"/>	<input type="checkbox"/>
Vitamin D supplements .....	<input type="checkbox"/>	<input type="checkbox"/>
Other vitamin supplements .....257	<input type="checkbox"/>	<input type="checkbox"/>
Cod liver oil or fish oil capsules .....	<input type="checkbox"/>	<input type="checkbox"/>

## FRIENDS

How many good friends do you have whom you can talk confidentially with and who give you help when you need it? <sup>259</sup> \_\_\_\_\_ good friends  
Do not count people you live with, but do include other relatives!

How many of these good friends do you have contact with at least once a month? .....261 \_\_\_\_\_

Do you feel you have enough good friends? .....263  Yes  No

How often do you normally take part in organised gatherings, e.g. sewing circles, sports clubs, political meetings, religious or other associations?

Never, or just a few times a year .....264  1

1-2 times a month .....  2

Approximately once a week .....  3

More than once a week .....  4

## FOOD HABITS

If you use butter or margarine on your bread, how many slices does a small catering portion normally cover? By this, we mean the portion packs served on planes, in cafés, etc. (10-12g)

A catering portion is enough for about .....265 \_\_\_\_\_ slices

What kind of fat is normally used in **cooking** (not on the bread) in your home?

Butter .....266

Hard margarine .....

Soft margarine .....

Butter/margarine blend .....

Oils .....270

What kind of bread (bought or home-made) do you usually eat?

Tick one or two boxes!

	White bread	Light textured	Ordinary brown	Coarse brown	Crisp bread
The bread I eat is most similar to: <input type="checkbox"/>	<input type="checkbox"/>				
	271				275

How much (in **number** of glasses, cups, potatoes or slices) do you usually eat or drink **daily** of the following foodstuffs?

Tick one box for **each** foodstuff.

	0	Less than 1	1-2	3-4	5-6	More than 6
Full milk (ordinary or curdled) (glasses) <sup>276</sup>	<input type="checkbox"/>					
Semi-skimmed milk (ordinary or curdled) (glasses)	<input type="checkbox"/>					
Skimmed milk (ordinary or curdled) (glasses)	<input type="checkbox"/>					
Tea (cups) .....	<input type="checkbox"/>					
Orange juice (glasses) .....	<input type="checkbox"/>					
Potatoes .....281	<input type="checkbox"/>					
Slices of bread in total (incl. crisp-bread) .....	<input type="checkbox"/>					
Slices of bread with						
- fish						
(e.g. mackerel in tomato sauce) .....	<input type="checkbox"/>					
- lean meat (e.g. ham) .....	<input type="checkbox"/>					
- fat meat (e.g. salami) .....	<input type="checkbox"/>					
- cheese (e.g. Gouda/ Norvegia) .....286	<input type="checkbox"/>					
- brown cheese .....	<input type="checkbox"/>					
- smoked cod caviare .....	<input type="checkbox"/>					
- jam and other sweet spreads .....	<input type="checkbox"/>					
	1	2	3	4	5	6

How many **times per week** do you normally eat the following foodstuffs?

Tick a box for **all** foodstuffs listed.

	Never	Less than 1	1	2-3	4-5	almost daily
Yoghurt .....290	<input type="checkbox"/>					
Boiled or fried egg .....	<input type="checkbox"/>					
Breakfast cereal/ oat meal, etc. ....	<input type="checkbox"/>					
Dinner with						
- unprocessed meat.....	<input type="checkbox"/>					
- sausage/meatloaf/ meatballs .....	<input type="checkbox"/>					
- fatty fish (e.g. salmon/redfish) <sup>295</sup>	<input type="checkbox"/>					
- lean fish (e.g. cod) .....	<input type="checkbox"/>					
- fishballs/fishpudding/fishcakes ...	<input type="checkbox"/>					
- vegetables .....	<input type="checkbox"/>					
Mayonnaise, remoulade .....	<input type="checkbox"/>					
Carrots .....300	<input type="checkbox"/>					
Cauliflower/cabbage/ broccoli .....	<input type="checkbox"/>					
Apples/pears .....	<input type="checkbox"/>					
Oranges, mandarins .....	<input type="checkbox"/>					
Sweetened soft drinks .....	<input type="checkbox"/>					
Sugar-free ("Light") soft drinks .....	<input type="checkbox"/>					
Chocolate .....	<input type="checkbox"/>					
Waffles, cakes, etc. ....307	<input type="checkbox"/>					
	1	2	3	4	5	6

## ALCOHOL

How often do you usually drink

	beer?	wine?	spirits?
Never, or just a few times a year	..... <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 1
1-2 times a month	..... <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 2
About once a week	..... <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 3
2-3 times a week	..... <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 4
More or less daily	..... <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 5

308 310

Approximately how often during the last year have you consumed alcohol corresponding to at least 5 small bottles of beer, a bottle of wine, or 1/4 bottle of spirits?

Not at all the last year .....  1  
 A few times .....  2  
 1-2 times a month .....  3  
 1-2 times a week .....  4  
 3 or more times a week .....  5

For approximately how many years has your alcohol consumption been as you described above? ..... 312 \_\_\_\_\_ years

## WEIGHT REDUCTION

About how many times have you deliberately tried to lose weight? Write 0 if you never have.

- before age 20 ..... 314 \_\_\_\_\_ times  
 - later ..... 316 \_\_\_\_\_ times

If you have lost weight deliberately, about how many kilos have you ever lost at the most?

- before age 20 ..... 318 \_\_\_\_\_ kg  
 - later ..... 320 \_\_\_\_\_ kg

What weight would you be satisfied with (your "ideal weight")? ..... 322 \_\_\_\_\_ kg

## URINARY INCONTINENCE

How often do you suffer from urinary incontinence?

Never ..... 325  1  
 Not more than once a month .....  2  
 Two or more times a month .....  3  
 Once a week or more .....  4

Your comments:

## TO BE ANSWERED BY WOMEN ONLY

### MENSTRUATION

How old were you when you started menstruating? ..... 326 \_\_\_\_\_ years

If you no longer menstruate, how old were you when you stopped menstruating? ..... 328 \_\_\_\_\_ years

Apart from pregnancy and after giving birth, have you ever stopped having menstruation for 6 months or more? ..... 330  Yes  No

If "Yes", how many times? ..... 331 \_\_\_\_\_ times

If you still menstruate or are pregnant: \_\_\_\_\_ day/month/year

What date did your last menstruation period begin? 333 \_\_\_\_/\_\_\_\_/\_\_\_\_

Do you usually use painkillers to relieve period pains? ..... 339  Yes  No

### PREGNANCY

How many children have you given birth to? ..... 340 \_\_\_\_\_ children

Are you pregnant at the moment? ..... 342  Yes  No  Don't know

Have you during pregnancy had high blood pressure and/or proteinuria? ..... 343  Yes  No

If "Yes", during which pregnancy? Pregnancy  
First Later

High blood pressure ..... 344    
 Proteinuria ..... 346

If you have given birth, fill in for each child the year of birth and approximately how many months you breastfed the child.

Child	Year of birth:	Number of months breastfed:
1	348 _____	_____
2	_____	_____
3	356 _____	_____
4	_____	_____
5	364 _____	_____
6	_____	_____

### CONTRACEPTION AND ESTROGEN

Do you use, or have you ever used:

	Now	Before	Never
Oral contraceptive pills (incl. minipill) ... 372	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hormonal intrauterine device	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Estrogen (tablets or patches) ..... 374	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Estrogen (cream or suppositories) ..... 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you use oral contraceptive pills, hormonal intrauterine device, or estrogen, what brand do you currently use?

376 \_\_\_\_\_

If you use or have ever used oral contraceptive pills:

Age when you started to take the pill? ..... 380 \_\_\_\_\_ years

How many years in total have you taken the pill? ..... 382 \_\_\_\_\_ years

If you have given birth, how many years did you take the pill before your first delivery? ..... 384 \_\_\_\_\_ years

If you have stopped taking the pill:  
 Age when you stopped? ..... 386 \_\_\_\_\_ years

**Thank you for the help! Remember to mail the form today!**  
 The Tromsø Health Survey

## Appendix 3c

Questionnaire 2 ( $\geq 70$  years), the 4<sup>th</sup> Tromsø Study 1994–95

English version



# Tromsø Health Survey

## for the over 70s

The main aim of the Tromsø Study is to improve our knowledge about cardiovascular diseases in order to aid prevention. The survey is also intended to improve our knowledge of cancer and other general conditions, such as allergies, muscle pains and mental conditions. Finally, the survey should give knowledge about the older part of the population. We would therefore like you to answer the questions below.

This form is a part of the Health Survey, which has been approved by the Norwegian Data Inspectorate and the Regional Board of Research Ethics. The answers will only be used for research purposes and will be treated in strict confidence. The information you give us may later be stored along with information from other public health registers in accordance with the rules laid down by the Data Inspectorate and the Regional Board of Research Ethics.

If you are in doubt about what to answer, tick the box that you feel fits best.

The completed form should be sent to us in the enclosed pre-paid envelope.

Thank you in advance for helping us.

*Yours sincerely,*

Faculty of Medicine  
University of Tromsø

National Health  
Screening Service

If you do not wish to answer the questionnaire, tick the box below and return the form. Then you will not receive reminders.

I do not wish to answer the questionnaire .....17

Day Month Year

Date for filling in this form: .....18 ...../...../.....

### CHILDHOOD/YOUTH

In which Norwegian municipality did you live at the age of 1 year?

.....24 -28

*If you did not live in Norway, give country instead of municipality*

How was your family's financial situation during your childhood?

- Very good .....29  1  
 Good .....  2  
 Difficult .....  3  
 Very difficult .....  4

How old were your parents when they died?

Mother .....30 \_\_\_\_\_ Years  
 Father .....32 \_\_\_\_\_ Years

### HOME

Who do you live with?

*Tick once for each item and give the number.* Yes No Number

Spouse/partner .....34   \_\_\_\_\_  
 Other people over 18 years .....35   \_\_\_\_\_  
 People under 18 years .....38   \_\_\_\_\_

What type of house do you live in?

- Villa/ detached house .....41  1  
 Farm .....  2  
 Flat/apartment .....  3  
 Terraced /semi-detached house .....  4  
 Other .....  5

How long have you lived in your present home? .....42 \_\_\_\_\_ years

Is your home adapted to your needs? .....44  Yes  No

*If "No", do you have problems with:*

- Living space .....45    
 Variable temperature,  
 too cold/too warm .....46    
 Stairs .....47    
 Toilet .....48    
 Bath/shower .....49    
 Maintenance .....50    
 Other (please specify) .....51

Would you like to move into a retirement home? ...52

### PREVIOUS WORK AND FINANCIAL SITUATION

How will you describe the type of work you had for the last 5-10 years before you retired?

- Mostly sedentary work? .....53  1  
*(e.g. office work, mounting)*  
 Work that requires a lot of walking? .....  2  
*(e.g. shop assistant, housewife, teaching)*  
 Work that requires a lot of walking and lifting? .....  3  
*(e.g. postman, nurse, construction)*  
 Heavy manual work .....  4  
*(e.g. forestry, heavy farm-work, heavy construction)*

Did you do any of the following jobs (full-time or part-time)?

*Tick one box only for each item.* Yes No

Driver .....54    
 Farmer .....55    
 Fisherman .....56

How old were you when you retired? .....57 \_\_\_\_\_ Years

What kind of pension do you have?

Basic state pension .....59   
 An additional pension .....60

How is your current financial situation?

- Very good .....61  1  
 Good .....  2  
 Difficult .....  3  
 Very difficult .....  4

## HEALTH AND ILLNESS

Has your state of health changed in the last year?

- Yes, it has got worse .....62  1  
 No, unchanged .....  2  
 Yes, it has got better .....  3

How do you feel your health is now compared to others of your age?

- Much worse .....63  1  
 A little worse .....  2  
 About the same .....  3  
 A little better .....  4  
 Much better .....  5

## YOUR OWN ILLNESSES

Have you ever had:

*Tick one box only for each item. Give your age at the time. If you have had the condition several times, how old were you last time?*

- |   | Yes                      | No                       | Age   |
|---|--------------------------|--------------------------|-------|
| Hip fracture .....64                        | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Wrist /forearm fracture .....67             | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Whiplash .....70                            | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Injury requiring hospital admission .....73 | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Gastric ulcer .....76                       | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Duodenal ulcer .....79                      | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Gastric/duodenal ulcer surgery .....82      | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| Neck surgery .....85                        | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Have you ever had, or do you have:

*Tick one box only for each item.*

- |   | Yes                      | No                       |
|---|--------------------------|--------------------------|
| Cancer .....88  | <input type="checkbox"/> | <input type="checkbox"/> |
| Epilepsy .....  | <input type="checkbox"/> | <input type="checkbox"/> |
| Migraine .....  | <input type="checkbox"/> | <input type="checkbox"/> |
| Parkinson's disease .....                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| Chronic bronchitis .....                                    | <input type="checkbox"/> | <input type="checkbox"/> |
| Psoriasis .....93   | <input type="checkbox"/> | <input type="checkbox"/> |
| Osteoporosis .....  | <input type="checkbox"/> | <input type="checkbox"/> |
| Fibromyalgia/fibrositis/chronic pain syndrome .....         | <input type="checkbox"/> | <input type="checkbox"/> |
| Psychological problems for which you have sought help ..... | <input type="checkbox"/> | <input type="checkbox"/> |
| Thyroid disease .....                                       | <input type="checkbox"/> | <input type="checkbox"/> |
| Liver disease .....98                                       | <input type="checkbox"/> | <input type="checkbox"/> |
| Recurrent urinary incontinence .....                        | <input type="checkbox"/> | <input type="checkbox"/> |
| Glaucoma .....  | <input type="checkbox"/> | <input type="checkbox"/> |
| Cataract .....  | <input type="checkbox"/> | <input type="checkbox"/> |
| Arthrosis (osteoarthritis) .....                            | <input type="checkbox"/> | <input type="checkbox"/> |
| Rheumatoid arthritis .....103                               | <input type="checkbox"/> | <input type="checkbox"/> |
| Kidney stones .....   | <input type="checkbox"/> | <input type="checkbox"/> |
| Appendectomy .....  | <input type="checkbox"/> | <input type="checkbox"/> |
| Allergy and hypersensitivity                                |                          |                          |
| Atopic eczema (e.g. childhood eczema) .....                 | <input type="checkbox"/> | <input type="checkbox"/> |
| Hand eczema .....   | <input type="checkbox"/> | <input type="checkbox"/> |
| Hay fever .....108  | <input type="checkbox"/> | <input type="checkbox"/> |
| Food allergy .....  | <input type="checkbox"/> | <input type="checkbox"/> |
| Other hypersensitivity (not allergy) .....                  | <input type="checkbox"/> | <input type="checkbox"/> |

How many times have you had a common cold, influenza (flu), diarrhoea/vomiting or similar in the last 6 months? 111 \_\_\_\_\_ times

- |   | Yes                      | No                       |
|---|--------------------------|--------------------------|
| Have you had this in the last 14 days? .....113 | <input type="checkbox"/> | <input type="checkbox"/> |

## ILLNESS IN THE FAMILY

Tick for the relatives who have or have ever had any of the following diseases:

*Tick "None" if none of your relatives have had the disease.*

	Mother	Father	Brother	Sister	Child	None
Cerebral stroke or brain haemorrhage 114	<input type="checkbox"/>					
Heart attack before age 60 .....120	<input type="checkbox"/>					
Cancer .....126	<input type="checkbox"/>					
Hypertension .....132	<input type="checkbox"/>					
Asthma .....138	<input type="checkbox"/>					
Osteoporosis .....144	<input type="checkbox"/>					
Arthrosis (osteoarthritis) .....150	<input type="checkbox"/>					
Psychological problems .....156	<input type="checkbox"/>					
Dementia .....162	<input type="checkbox"/>					
Diabetes .....168	<input type="checkbox"/>					
- age when they got diabetes .....174	_____	_____	_____	_____	_____	_____

## SYMPTOMS

Do you cough about daily for some periods of the year? .....184

If "Yes":  
Is your cough productive? .....185

Have you had this kind of cough for as long as 3 months in each of the last two years? .....186

Have you had episodes with wheezing in your chest? .....187

If "Yes", has this occurred:

*Tick one box only for each item.*

At night .....188

In connection with respiratory infections .....

In connection with physical exertion .....

In connection with very cold weather .....191

Have you noticed sudden changes in your pulse or heart rhythm in the last year? .....192

Have you lost weight in the last year? .....193

If "Yes":  
How many kilograms? .....194 \_\_\_\_\_ kg

How often do you suffer from sleeplessness?

Never, or just a few times a year .....196  1

1-2 times a month .....  2

Approximately once a week .....  3

More than once a week .....  4

If you suffer from sleeplessness, what time of the year does it affect you most?

No particular time of year .....197  1

Especially during the polar night .....  2

Especially during the midnight sun season .....  3

Especially in spring and autumn .....  4

	Yes	No
Do you usually take a nap during the day? ....198	<input type="checkbox"/>	<input type="checkbox"/>
Do you feel that you usually get enough sleep?	<input type="checkbox"/>	<input type="checkbox"/>

Do you suffer from:	No	A little	A lot
Dizziness .....200	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poor memory .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of energy .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Constipation .....203	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Does the thought of getting a serious illness ever worry you?

Not at all ..... 204

Only a little .....

Some .....

Very much .....

Are you pleased with the health care and home assistance services in the municipality?

Yes No Don't know

Assigned family GP ..... 255

Home nursing care .....

Home assistance services .....

Do you feel confident that you will receive health care and home assistance services if you need it?

Confident ..... 258  1

Not confident .....  2

Very unsure .....  3

Don't know .....  4

### BODILY FUNCTIONS

Can you manage the following everyday activities on your own without help from others?

	Yes	With some help	No
Walking indoors on one level ..... 205	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking up/down stairs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking outdoors .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking approx. 500 metres .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Going to the toilet .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Washing yourself ..... 210	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Taking a bath/shower .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dressing and undressing .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Getting in and out of bed .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eating .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooking ..... 215	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Doing light housework (e.g. washing up) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Doing heavier housework (e.g. cleaning floor) ..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Go shopping .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Take the bus .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Yes	With difficulty	No
Can you hear normal speech (if necessary with hearing aid)? ..... 220	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can you read (if necessary with glasses)? ..... 221	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Are you dependent on any of the following aids? ?

	Yes	No
Walking stick ..... 222	<input type="checkbox"/>	<input type="checkbox"/>
Crutches .....	<input type="checkbox"/>	<input type="checkbox"/>
Walking frame/zimmer frame .....	<input type="checkbox"/>	<input type="checkbox"/>
Wheelchair .....	<input type="checkbox"/>	<input type="checkbox"/>
Hearing aid .....	<input type="checkbox"/>	<input type="checkbox"/>
Safety alarm device ..... 227	<input type="checkbox"/>	<input type="checkbox"/>

### USE OF HEALTH SERVICES

How many visits have you made during the past year due to your own health or illness:

Put 0 if you have not had such contact

	Number of times the past year
To a general practitioner (GP)/emergency GP ..... 228	_____
To a psychologist or psychiatrist .....	_____
To an other medical specialist (not at a hospital) .....	_____
To a hospital out-patient clinic ..... 234	_____
Admitted to a hospital .....	_____
To a physiotherapist .....	_____
To a chiropractor ..... 240	_____
To a acupuncturist .....	_____
To a dentist .....	_____
To a chiropodist ..... 246	_____
To an alternative practitioner (homoeopath, foot zone therapist, etc.) .....	_____
To a healer, faith healer, clairvoyant .....	_____

	Yes	No
Do you have home aid?		
Private ..... 252	<input type="checkbox"/>	<input type="checkbox"/>
Municipal .....	<input type="checkbox"/>	<input type="checkbox"/>

Do you receive home nursing care? .....

### MEDICATION AND DIETARY SUPPLEMENTS

Have you for any length of time in the last year used any of the following medicines or dietary supplements daily or almost daily? Indicate how many months you have used them.

Put 0 for items you have not used.

Medicines:

Painkillers ..... 259 \_\_\_\_\_ months

Sleeping pills ..... \_\_\_\_\_ months

Tranquillizers ..... \_\_\_\_\_ months

Antidepressants ..... 265 \_\_\_\_\_ months

Allergy drugs ..... \_\_\_\_\_ months

Asthma drugs ..... \_\_\_\_\_ months

Heart medicines (not blood pressure) ..... 271 \_\_\_\_\_ months

Insulin ..... \_\_\_\_\_ months

Diabetes tablets ..... \_\_\_\_\_ months

Drugs for hypothyroidism (Thyroxine) ..... 277 \_\_\_\_\_ months

Cortisone tablets ..... \_\_\_\_\_ months

Remedies for constipation ..... \_\_\_\_\_ months

Dietary supplements:

Iron tablets ..... 283 \_\_\_\_\_ months

Vitamin D supplements ..... \_\_\_\_\_ months

Other vitamin supplements ..... \_\_\_\_\_ months

Calcium tablets or bone meal ..... 289 \_\_\_\_\_ months

Cod liver oil or fish oil capsules ..... \_\_\_\_\_ months

### FAMILY AND FRIENDS

Do you have close relatives who can give you help and support when you need it? ..... 293

If "Yes", who can give you help?

Spouse/partner ..... 294

Children .....

Others .....

How many good friends do you have whom you can talk confidentially with and who give you help when you need it? ..... 297 \_\_\_\_\_ good friends

Do not count people you live with, but do include other relatives!

Do you feel you have enough good friends? ..... 299

Do you feel that you belong to a community (group of people) who can depend on each other and who feel committed to each other (e.g. a political party, religious group, relatives, neighbours, work place, or organisation)?

Strong sense of belonging ..... 300  1

Some sense of belonging .....  2

Not sure .....  3

Little or no sense of belonging .....  4

How often do you normally take part in organised gatherings, e.g. sewing circles, sports clubs, political meetings, religious or other associations?

- Never, or just a few times a year .....301  1  
 1-2 times a month .....  2  
 Approximately once a week .....  3  
 More than once a week .....  4

### FOOD HABITS

Number

How many meals a day do you normally eat (dinner and bread meals)? .....302 \_\_\_\_\_

How many times a week do you eat warm dinner? .....304 \_\_\_\_\_

What kind of bread (bought or home-made) do you usually eat?

- Tick one or two boxes.
- |                                    |                          |                          |                          |                          |                          |
|------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                    | White Bread              | Light textured           | Ordinary brown           | Coarse brown             | Crisp bread              |
| The bread type is most similar to: | <input type="checkbox"/> |
|                                    | 306                      |                          |                          |                          | 310                      |

What kind of fat is normally used in cooking (not on the bread) in your home?

- Butter .....311   
 Hard margarine .....   
 Soft margarine .....   
 Butter/margarine blend .....   
 Oils .....315

How much (in number of glasses, cups, potatoes or slices) do you usually eat/drink daily the following foodstuffs?

- Tick one box for each foodstuff.
- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
|   | None                     | Less than 1              | 1-2                      | 3 or more                |
| Milk of all types (glasses) .....316        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Orange juice (glasses) .....                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Potatoes .....                              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Slices of bread in total (incl. crispbread) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Slices of bread with                        |                          |                          |                          |                          |
| - fish (e.g. mackerel in tomato sauce)      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - cheese (e.g. Gouda/Norvegia) .....        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - smoked cod caviare .....322               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   | 1                        | 2                        | 3                        | 4                        |

How many times per week do you normally eat the following foodstuffs?

- Tick for all foodstuffs listed.
- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
|   | Never                    | Less than 1              | 1                        | 2 or more                |
| Yoghurt .....323                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Boiled or fried egg .....                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Breakfast cereal/oatmeal, etc. ....       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Dinner with                               |                          |                          |                          |                          |
| - unprocessed meat .....                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - fatty fish (e.g. salmon/red-fish) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - lean fish (e.g. cod) .....328           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| - vegetables (fresh or cooked) .....      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Carrots (fresh or cooked) .....           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cauliflower/cabbage/broccoli .....        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Apples/pears .....                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Oranges, mandarins, etc. ....333          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   | 1                        | 2                        | 3                        | 4                        |

### WELL BEING

How content do you generally feel with growing old?

- Good .....334  1  
 Quite good .....  2  
 Up and down .....  3  
 Bad .....  4

What is your view of the future?

- Bright .....335  1  
 Not too bad .....  2  
 Quite worried .....  3  
 Dark .....  4

### TO BE ANSWERED BY WOMEN ONLY

#### MENSTRUATION

How old were you when you started menstruating? .....336 \_\_\_\_\_ years

How old were you when you stopped menstruating? .....338 \_\_\_\_\_ years

#### PREGNANCY

How many children have you given birth to? .....340 \_\_\_\_\_ Children

If you have given birth, fill in for each child the year of birth and approximately how many months you breastfed the child. If you have given birth to more than 6 children, note their birth year and number of months you breastfed at the space provided below for comments.

Child	Year of birth:	Number of months breastfed:
1	342 _____	_____
2	346 _____	_____
3	_____	_____
4	_____	_____
5	358 _____	_____
6	_____	_____

Have you during pregnancy had high blood pressure and/or proteinuria? .....366  Yes  No

If "Yes", during which pregnancy?

- |                              |                          |                          |                          |
|------------------------------|--------------------------|--------------------------|--------------------------|
|                              |                          | First                    | Later                    |
| High blood pressure .....367 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Proteinuria .....369         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

#### ESTROGEN

Do you use, or have you ever used estrogen:

- |                                 |                          |                          |                          |                          |
|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                 |                          | Now                      | Previously               | Never                    |
| Tablets or patches .....371     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cream or suppositories .....372 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

If you use estrogen, what brand do you currently use?

.....373

Your comments:

## Appendix 4a

Questionnaire 1 (<70 years), the 5<sup>th</sup> Tromsø Study 2001–02

English version



# Health survey

## Personal Invitation

Don't write here

5.3 (Municipality)

(County)

(Country)

↓

9.3 (Business)

9.4 (Occupation)

14.7 (Mark)

## 1. YOUR OWN HEALTH

### 1.1 What is your current state of health? (Tick one only)

Poor  1      Not so good  2      Good  3      Very good  4

### 1.2 Do you have, or have you had?:

	Yes	No	Age first time
Asthma.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Hay fever .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Chronic bronchitis/emphysema .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Diabetes .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Osteoporosis .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Fibromyalgia/chronic pain syndrome .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Psychological problems for which you have sought help .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
A heart attack .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Angina pectoris (heart cramp) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Cerebral stroke/brain haemorrhage .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>

1.3 Have you noticed attacks of sudden changes in your pulse or heart rhythm in the last year? ..... Yes  No

1.4 Do you get pain or discomfort in the chest when: Walking up hills, stairs or walking fast on level ground? Yes  No

### 1.5 If you get such pain, do you usually:

Stop?  1      Slow down?  2      Carry on at the same pace?  3

1.6 If you stop, does the pain disappear within 10 minutes? ..... Yes  No

1.7 Can such pain occur even if you are at rest?..... Yes  No

## 2. MUSCULAR AND SKELETAL COMPLAINTS

### 2.1 Have you suffered from pain and/or stiffness in muscles and joints during the last 4 weeks?

(Give duration only if you have had problems)

	No complaint			Duration	
	Some complaint	Severe complaint	Up to 2 weeks	2 weeks or more	
Neck/shoulders .....	<input type="checkbox"/>				
Arms, hands .....	<input type="checkbox"/>				
Upper part of your back...	<input type="checkbox"/>				
Lumbar region .....	<input type="checkbox"/>				
Hips, legs, feet .....	<input type="checkbox"/>				
Other places .....	<input type="checkbox"/>				

1      2      3      1      2

### 2.2 Have you ever had:

	Yes	No	Age last time
Fracture in the wrist/forearm .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Hip fracture?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>

## 3. OTHER COMPLAINTS

### 3.1 Below is a list of various problems. Have you experienced any of this during the last week (including today)?

(Tick once for each complaint)

	No complaint	Little complaint	Pretty much	Very much
Sudden fear without reason .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt afraid or anxious .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Faintness or dizziness .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt tense or upset .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tend to blame yourself .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sleeping problems .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Depressed, sad .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling of being useless, worthless .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling that everything is a struggle .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling of hopelessness with regard to the future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1      2      3      4

## 4. USE OF HEALTH SERVICES

### 4.1 How many times in the last 12 months have you been to/used: (Tick once for each line)

	None	1-3 times	4 or more
General practitioner (GP) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Medical officer at work .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Psychologist or psychiatrist (private or out-patient clinic) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other specialist (private or out-patient clinic) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency GP (private or public) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hospital admission .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Home nursing care .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physiotherapist .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chiropractor .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dentist .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative practitioner .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 5. CHILDHOOD/YOUTH AND AFFILIATION

5.1 How long altogether have you lived in the county?   year (Put 0 if less than half a year)

5.2 How long altogether have you lived in the municipality?   year (Put 0 if less than half a year)

### 5.3 Where did you live most of the time before the age of 16? (Tick one option and specify)

Same municipality ....  1

Another municipality in the county .....  2      Which one: \_\_\_\_\_

Another county in Norway  3      Which one: \_\_\_\_\_

Outside Norway .....  4      Country:: \_\_\_\_\_

### 5.4 Have you moved within the last five years?

No  1      Yes, one time  2      Yes, more than once  3

## 6. BODY WEIGHT

6.1 Estimate your body weight when you were 25 years old:     kg

## 7. FOOD AND BEVERAGES

### 7.1 How often do you usually eat these foods? (Tick once per line)

	Rarely /never	1-3 times /month	1-3 times /week	4-6 times /week	1-2 times /day	3 times or more /day
Fruit, berries .....	<input type="checkbox"/>					
Cheese (all types).....	<input type="checkbox"/>					
Potatoes .....	<input type="checkbox"/>					
Boiled vegetables .....	<input type="checkbox"/>					
Fresh vegetables/salad	<input type="checkbox"/>					
Fatty fish (e.g. salmon, trout, mackerel, herring)	<input type="checkbox"/>					
	1	2	3	4	5	6

### 7.2 What type of fat do you usually use? (Tick once per line)

	Don't use	Butter	Hard margarine	Soft/light margarine	Oils	Other
On bread .....	<input type="checkbox"/>					
For cooking .....	<input type="checkbox"/>					
	1	2	3	4	5	6

### 7.3 Do you use the following dietary supplements:

	Yes, daily	Sometimes	No
Cod liver oil, fish oil capsules .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vitamins and/or mineral supplements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 7.4 How much of the following do you usually drink? (Tick once per line)

	Rarely /never	1-6 glasses /week	1 glass /day	2-3 glasses /day	4 glasses or more /day
Full milk, full-fat curdled milk, yoghurt .....	<input type="checkbox"/>				
Semi-skimmed milk, semi-skimmed curdled milk, low-fat yoghurt .....	<input type="checkbox"/>				
Skimmed milk, skimmed curdled milk .....	<input type="checkbox"/>				
Extra semi-skimmed milk .....	<input type="checkbox"/>				
Juice .....	<input type="checkbox"/>				
Water .....	<input type="checkbox"/>				
Mineral water (e.g. Farris, Ramløsa etc)	<input type="checkbox"/>				
Cola-containing soft drink .....	<input type="checkbox"/>				
Other soda/soft drink .....	<input type="checkbox"/>				
	1	2	3	4	5

### 7.5 Do you usually drink soft drink: with sugar 1 without sugar 2

### 7.6 How many cups of coffee and tea do you drink daily? Number of cups (Put 0 for the types you don't drink daily)

Filtered coffee .....	<input type="text"/>
Boiled coffee/coarsely ground coffee for brewing .....	<input type="text"/>
Other type of coffee .....	<input type="text"/>
Tea .....	<input type="text"/>

### 7.7 Approximately how often have you during the last year consumed alcohol? (Do not count low-alcohol and alcohol-free beer)

Never consumed alcohol	Have not consumed alcohol last year	A few times last year	About 1 time a month
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
2-3 times per month	About 1 time a week	2-3 times a week	4-7 times a week
<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8

To those who have consumed the last year:

### 7.8 When you drink alcohol, how many glasses or drinks do you normally drink? number

### 7.9 Approximately how many times during the last year have you consumed alcohol equivalent to 5 glasses or drinks within 24 hours? Number of times

### 7.10 When you drink, do you normally drink: (Tick one or more)

Beer	Wine	Spirits
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 8. SMOKING

### 8.1 How many hours a day do you normally spend in smoke-filled rooms? Number of total hours

### 8.2 Did any of the adults smoke at home while you were growing up? Yes No

### 8.3 Do you currently, or did you previously live together with a daily smoker after your 20<sup>th</sup> birthday? Yes, now Yes, previously Never

### 8.4 Do you/did you smoke daily? If NEVER: Go to question 9 : (EDUCATION AND WORK)

### 8.5 If you smoke daily now, do you smoke: Yes No

Cigarettes?.....

Cigars/cigarillos?.....

A pipe?.....

### 8.6 If you previously smoked daily, how long is it since you quit? Number of years

### 8.7 If you currently smoke, or have smoked previously:

How many cigarettes do you or did you normally smoke per day? Number of cigarettes

How old were you when you began daily smoking? Age in years

How many years in all have you smoked daily? Number of years

## 9. EDUCATION AND WORK

### 9.1 How many years of education have you completed? Number of years (Include all the years you have attended school or studied)

### 9.2 Do you currently have paid work?

Yes, full-time  1 Yes, part-time  2 No  3 T

### 9.3 Describe the activity at the workplace where you had paid work for the longest period in the last 12 months. (e.g. Accountancy firm, school, paediatric department, carpentry workshop, garage, bank, grocery store, etc.)

Business: \_\_\_\_\_

If retired, enter the former business and occupation. Also applies to 9.4

### 9.4 Which occupation/title have or had you at this workplace? (e.g. Secretary, teacher, industrial worker, nurse, carpenter, manager, salesman, driver, etc.)

Occupation: \_\_\_\_\_

### 9.5 In your main occupation, do you work as self-employed, as an employee or family member without regular salary?

Self-employed  Employee  Family member

### 9.6 Do you believe that you are in danger of losing your current work or income within the next two years? Yes No

### 9.7 Do you receive any of the following benefits? Yes No

Sickness benefit (are on sick leave) .....

Old age pension, early retirement (AFP) or survivor pension .....

Rehabilitation/reintegration benefit .....

Disability pension (full or partial) .....

Unemployment benefits during unemployment .....

Social welfare benefits .....

Transition benefit for single parents .....

## 10. EXERCISE AND PHYSICAL ACTIVITY

### 10.1 How has your physical activity in leisure time been during this last year?

Think of a weekly average for the year.

Time spent going to work is count as leisure time. Answer both questions.

	Hours per week			
	None	Less than 1	1-2	3 or more
Light activity (not sweating/out of breath).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hard physical activity (sweating/out of breath).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4

### 10.2 Describe exercise and physical exertion in your leisure time. If your activity varies much e.g. between summer and winter, then give an average. The question refers only to the last year. (Tick the most appropriate box)

Reading, watching TV or other sedentary activity? .....  1

Walking, cycling or other forms of exercise at least 4 hours a week? .....  2  
(Include walking or cycling to work, Sunday walk/stroll, etc.)

Participation in recreational sports, heavy gardening, etc.? .....  3  
(Note: duration of activity at least 4 hours a week)

Participation in hard training or sports competitions, regularly several times a week? .....  4

## 11. FAMILY AND FRIENDS

### 11.1 Do you live with: Spouse/partner?.....

Yes  No

### 11.2 How many good friends do you have?

Count the ones you can talk confidentially with and who can give you help when you need it. Do not count people you live with, but do include other relatives.

Number of friends

### 11.3 How much interest do people show for what you do? (Tick only once)

Great interest  1    Some interest  2    Little interest  3    No interest  4    Uncertain  5

### 11.4 How many associations, sport clubs, groups, religious communities or similar do you take part in? (Write 0 if none)

Number

### 11.5 Do you feel that you can influence what happening in your local community where you live? (Tick only once)

Yes, a lot  1    Yes, some  2    Yes, a little  3    No  4    Never tried  5

## 12. ILLNESS IN THE FAMILY

### 12.1 Have one or more of your parents or siblings had a heart attack (heart wound) or angina pectoris (heart cramp)?

Yes  No  Don't know

### 12.2 Tick for the relatives who have or have had any of the illnesses: (Tick for each line)

	Mother	Father	Brother	Sister	Child	None of these
Cerebral stroke or brain haemorrhage .....	<input type="checkbox"/>					
Heart attack before age of 60 years	<input type="checkbox"/>					
Asthma.....	<input type="checkbox"/>					
Cancer .....	<input type="checkbox"/>					
Diabetes .....	<input type="checkbox"/>					

### 12.3 If any relatives have diabetes, at what age did they get diabetes (if for e.g. many siblings, consider the one who got it earliest in life):

Don't know, not applicable	Mother's age	Father's age	Brother's age	Sister's age	Child's age
<input type="checkbox"/>	<input type="text"/>				

## 13. USE OF MEDICINES

With medicines, we mean drugs purchased at pharmacies. Supplements and vitamins are not considered here.

### 13.1 Do you use:

	Now	Previously, but not now	Never used
Blood pressure lowering drugs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cholesterol-lowering drugs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 13.2 How often have you during the last 4 weeks used the following medicines?

(Tick once for each line)

	Not used in the last 4 weeks	Less than every week	Every week but not daily	Daily
Painkillers non-prescription ....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Painkillers on prescription .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sleeping pills .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tranquillizers .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antidepressants .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other prescription medicines ...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4

### 13.3 For those medicines you have checked in points 13.1 and 13.2, and that you've used during the last 4 weeks:

State the name and the reason that you are taking/have taken these (disease or symptom):

(Tick for each duration you have used the medicine)

Name of the medicine: (one name per line)	Reason for use of the medicine	How long have you used the medicine	
		Up to 1 year	1 year or more
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

If there is not enough space here, you may continue on a separate sheet that you attach

## 14. THE REST OF THE FORM IS TO BE ANSWERED BY WOMEN ONLY

### 14.1 How old were you when you started menstruating?

Age in years

### 14.2 If you no longer menstruating, how old were you when you stopped menstruating?

Age in years

### 14.3 Are you pregnant at the moment?

Yes  No  Uncertain  Above fertile age

### 14.4 How many children have you given birth to?

Number of children

### 14.5 Do you use, or have you ever used? (Tick once for each line)

	Now	Before, but not now	Never
Oral contraceptive pills/mini pill/contraceptive injection .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hormonal intrauterine device (IUD) (not ordinary IUD) ..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Estrogen (tablets or patches) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Estrogen (cream or suppositories)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 14.6 If you use/have used prescription estrogen:

How long have you used it? Number of years

### 14.7 If you use contraceptive pills, mini pill, contraceptive injection, hormonal IUD or estrogen, what brand do you use?

## Appendix 4b

Questionnaire 1 ( $\geq 70$  years), the 5<sup>th</sup> Tromsø Study 2001–02

English version



# Health survey

## Personal invitation

Do not write here:

E13 (Municipality)

(County)

(Country)

E15 (Mark)

## E1. YOUR OWN HEALTH

What is your current state of health? (Tick only once)

Poor  1      Not so good  2      Good  3      Very good  4

Do you have, or have you had?:

	T		Age first time	
	Yes	No		
Asthma.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Chronic bronchitis/emphysema.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Diabetes .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Osteoporosis .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Fibromyalgia/chronic pain syndrome .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Psychological problems for which you have sought help .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
A heart attack .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Angina pectoris (heart cramp) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Cerebral stroke/brain haemorrhage .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

Do you get pain or discomfort in the chest when: Yes No

Walking up hills, stairs, or walking fast on level ground?

If you get such pain, do you usually:

Stop?  1      Slow down?  2      Carry on at the same pace?  3

If you stop, does the pain disappear within 10 minutes? .....

Yes  No

Can such pain occur even if you are at rest?....

Yes  No

## E2. ILLNESS IN THE FAMILY

Have one or more of your parents or siblings had: T

A heart attack (heart wounds) or angina pectoris (heart cramp) .....

Yes  No  Don't know

Tick for the relatives who have or have had any of the illnesses: (Tick for each line)

	Mother	Father	Brother	Sister	Child	None of these
Cerebral stroke or brain haemorrhage ...	<input type="checkbox"/>					
Heart attack before age of 60 years	<input type="checkbox"/>					
Asthma .....	<input type="checkbox"/>					
Cancer .....	<input type="checkbox"/>					
Diabetes .....	<input type="checkbox"/>					

If any relatives have diabetes, at what age did they get diabetes (if for e.g. many siblings, consider the one who got it earliest in life)

Don't know, not applicable       Mother's age        Father's age        Brother's age        Sister's age        Child's age

## E3. COMPLAINTS

Below is a list of various problems.

Have you experienced any of this during the last week (including today)?

(Tick once for each line)

	No complaint	Little complaint	Pretty much	Very much
Sudden fear without reason .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt afraid or anxious .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Faintness or dizziness .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Felt tense or upset .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tend to blame yourself .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sleeping problems.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Depressed, sad .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling of being useless, worthless ..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling that everything is a struggle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling of hopelessness with regard to the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4

## E4. TEETH, MUSCLE AND SKELETON

How many teeth have you lost/extracted? Number of teeth (disregard milk-teeth and wisdom teeth)

Have you been bothered by pain and/or stiffness in muscles and joints during the last 4 weeks?

	No complaint	Little complaint	Severe complaint
Neck / shoulders .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arms, hands.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upper part of the back .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lumbar regions .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hips, legs, feet .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other places.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Have you ever had:

	Yes	No	Age last time
Fracture in wrist/forearm? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>
Hip fracture?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/>

Have you fallen down during the last year? (Tick once only)

No  1      Yes, 1-2 times  2      Yes, more than 2 times  3

## E5. EXERCISE AND PHYSICAL ACTIVITY

How has your physical activity been during this last year?

Think of a weekly average for the year. Answer both questions.

	Hours per week			
	None	Less than 1	1-2	3 or more
Light activity (not sweating/out of breath).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hard physical activity (sweating/out of breath).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4

## E6. BODY WEIGHT

Estimate your body weight when you were 25 years old:     kg.

## E7. EDUCATION

How many years of education have you completed? *Number of years*

(include all the years you have attended school or studied)

## E8. FOOD AND BEVERAGES

How often do you usually eat these foods?  
(Tick once for each line)

	Rarely /never	1-3 times /month	1-3 times /week	4-6 times /week	1-2 times /day	3 times or more /day
Fruit, berries .....	<input type="checkbox"/>					
Cheese (all types) ...	<input type="checkbox"/>					
Potatoes .....	<input type="checkbox"/>					
Boiled vegetables ..	<input type="checkbox"/>					
Fresh vegetables/salad	<input type="checkbox"/>					
Fat fish (e.g. salmon, trout, mackerel, herring)	<input type="checkbox"/>					
	1	2	3	4	5	6

Do you use dietary supplements: *Yes, daily* *Sometimes* *No*

Cod liver oil, fish oil capsules .....

Vitamins and/or mineral supplements ...

How much of the following do you usually drink?  
(Tick once for each line)

	Rarely /never	1-6 glasses /week	1 glass /day	2-3 glasses /day	4 glasses or more /day
Full milk, full-fat curdled milk, yoghurt .....	<input type="checkbox"/>				
Semi-skimmed milk, semi-skimmed curdled milk, low-fat yoghurt .....	<input type="checkbox"/>				
Skimmed milk, skimmed curdled milk .....	<input type="checkbox"/>				
Extra semi-skimmed milk ....	<input type="checkbox"/>				
Juice .....	<input type="checkbox"/>				
Water .....	<input type="checkbox"/>				
Soft drink, mineral water .....	<input type="checkbox"/>				
	1	2	3	4	5

How many cups of coffee and tea do you drink daily?

(Put 0 for the types you do not drink daily) *Number of cups*

Filtered coffee .....	<input type="text"/>	<input type="text"/>	T
Boiled coffee/coarsely ground coffee for brewing .....	<input type="text"/>	<input type="text"/>	
Other type of coffee .....	<input type="text"/>	<input type="text"/>	
Tea .....	<input type="text"/>	<input type="text"/>	

Approximately, how often have you during the last year consumed alcohol? (Do not count low-alcohol and alcohol-free beer)

Never consumed alcohol	Have not consumed alcohol last year	A few times last year	About 1 time a month
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
2-3 times per month	About 1 time a week	2-3 times a week	4-7 times a week
<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8

To those who have consumed the last year:

When you drink alcohol, how many glasses or drinks do you normally drink? *Number*

Approximately how many times during the last year have you consumed alcohol equivalent to 5 glasses or drinks within 24 hours? *Number of times*

## E9. SMOKING

How many hours a day do you normally spend in smoke-filled rooms? *Number of total hours*

Did any of the adults smoke at home while you were growing up? *Yes* *No*

Do you currently, or did you previously live together with a daily smoker after your 20<sup>th</sup> birthday? *Yes* *No*

Do you/did you smoke daily? *Yes, now* *Yes, previously* *Never*

If you have NEVER smoked daily; Go to question E11 (BODILY FUNCTIONS AND SAFETY)

If you smoke daily now, do you smoke: *Yes* *No*

Cigarettes?.....

Cigars/cigarillos? .....

A pipe?.....

If you previously smoked daily, how long is it since you quit? *Number of years*

If you currently smoke, or have smoked previously:

How many cigarettes do you or did you normally smoke per day? *Number of cigarettes*

How old were you when you began daily smoking? *Age in years*

How many years in all have you smoked daily? *Number of years*

## E10. BODILY FUNCTIONS AND SAFETY

Would you feel safe by walking alone in the evening in the area where you live?

*Yes* *A little unsafe* *Very unsafe*

When it comes to mobility, sight and hearing, can you: (Tick once for each line)

	Without problems	With some problems	With great problems	No
Take a 5 minute walk in fairly high pace? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Read ordinary text in newspaper, if necessary with glasses? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hear what is said in a normal conversation? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4

Do you because of chronic health problems have difficulties with: (Tick once for each line) *No* *Some* *Great* *difficulties* *difficulties* *difficulties*

Move around in your home? .....

Get out of your home by yourself? .....

Participate in organization or other leisure time activities? .....

Use public transport? .....

Perform necessary daily shopping? .....

## E11. USE OF HEALTH SERVICES

### How many times in the last 12 months

have you been to/used:

(Tick once for each line)

	None	1-3 times	4 or more
A general practitioner (GP) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specialist (private or out-patient clinic) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency GP (private or public).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hospital admission .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Home nursing care .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physiotherapist .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chiropractor .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Municipal home care .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dentist .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternative practitioner .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Are you confident that you will receive health care and home assistance if you need it?

YES	NO	Don't know
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3

## E12. FAMILY AND FRIENDS

Do you live: At home?  1 In an institution/shared apartment?  2

Do you live with:

	YES	NO
Spouse/ partner?.....	<input type="checkbox"/>	<input type="checkbox"/>
Other people? .....	<input type="checkbox"/>	<input type="checkbox"/>

How many good friends do you have?

Count the ones you can talk confidentially with and who can give you help when you need it. Do not count people you live with, but do include your children and other relatives.....

Number of friends

<input type="text"/>	<input type="text"/>
----------------------	----------------------

How much interest do people show for what you do?

(Tick only once)

Great interest	Some interest	Little interest	No interest	Uncertain
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

How many associations, sport clubs, groups, religious communities, or similar do you take part in? (write 0 if none)

Number

<input type="text"/>	<input type="text"/>
----------------------	----------------------

## E13. CHILDHOOD/YOUTH AND AFFILIATION

How long altogether have you lived in the county?  years

How long altogether have you lived in the municipality?  years

Where did you live most of the time before the age of 16? (Tick one option and specify)

Same municipality.....	<input type="checkbox"/> 1
Another municipality in the county.....	<input type="checkbox"/> 2 Which one: _____
Another county in Norway.....	<input type="checkbox"/> 3 Which one: _____
Outside Norway .....	<input type="checkbox"/> 4 Country: _____

Have you moved during the last five years?

No	Yes, once	Yes, more than once
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3

## E14. USE OF MEDICINES

With medicines, we mean drugs purchased at pharmacies. Supplements and vitamins are not considered here

Do you use?

(Tick once for each line)

	Now	previously, but not now	Never used
Blood pressure lowering drugs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cholesterol-lowering drugs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drugs for osteoporosis .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insulin.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tablets for diabetes .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How often have you during the last 4 weeks used the following medicines?

(Tick once for each line)

	Not used in the last 4 weeks	Less than every week	Every week, but not daily	Daily
Painkillers non-prescription.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Painkillers on prescription .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sleeping pills.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tranquillizers .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antidepressants .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other prescription medicines ....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

State the name of the medicines you are using now and the reason you are taking the medicines (disease or symptom):

(Tick for each duration you have used the medicine)

Name of the medicine: (one name per line):	Reason for use of the medicine:	How long have you used the medicine	
		Up to 1 year	One year or more
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

If there is not enough space here, you may continue on a separate sheet that you attach.

## E15. THE REST OF THE FORM IS TO BE ANSWERED BY WOMEN ONLY

How old were you when you started menstruating? Age in years

How old were you when you stopped menstruating? Age in years

How many children have you given birth to? Number of children

Do you use, or have you ever used estrogen? Total number of years

	Never	Previously	Now	
Tablets or patches .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Cream or suppositories .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

If you use estrogen, which brand you use now?

Have you ever used contraceptives pills? .....  Yes  No

## Appendix 4c

Questionnaire 2, the 5<sup>th</sup> Tromsø Study 2001–02

English version



Label

## Additional questions to the health survey in Troms and Finnmark 2001-2002

The main aim of the Tromsø Study is to improve our knowledge about cardiovascular diseases in order to aid prevention. The study is also intended to improve our knowledge of cancer and other general conditions, such as allergies, muscle pains and mental conditions. We would therefore like you to answer some questions about factors that may be relevant for your risk of getting these and other illnesses. This form is part of the Health Survey, which has been approved by the Norwegian Data Inspectorate and the Regional Board of Research Ethics. The answers will only be used for research purposes and will be treated strictly confidential.

The information you give us may later be linked with information from other public health registers in accordance with the rules laid down by the Data Inspectorate and the Regional Board of Research Ethics.

If you are unsure about what to answer, tick the box that you feel fits best.

The completed form should be sent to us in the enclosed prepaid envelope. Thank you in advance for helping us.

Yours sincerely

Department of Community Medicine  
University of Tromsø

National Health  
Screening Service

If you do not wish to answer the questionnaire, tick the box below and return the form. Then you will not receive reminders.

I do not wish to answer the questionnaire

Date of completion:

Day                      Month                      Year

<input type="text"/>					
----------------------	----------------------	----------------------	----------------------	----------------------	----------------------

T

### T1. NEIGHBORHOOD AND HOME

**1.1 In which municipality did you live at the age of 1 year?**  
*(If you have not lived in Norway, state country of residence instead of the municipality)*

**1.2 What type of house do you live in? (Tick only once)**

- Detached house/villa.....  1  
Farm .....  2  
Flat/apartment .....  3  
Terraced/semi-detached house .....  4  
Institution/care home .....  5  
Other .....  6

**1.3 How big is your house?**  m<sup>2</sup> (gross)

**1.4 Are you bothered by: (Tick once for each line)**

- |   | No complaint             | Little complaint         | Severe complaint         |
|---|--------------------------|--------------------------|--------------------------|
| Moisture, drought or coldness in your home        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other forms of bad indoor climate                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Traffic noise (cars or aircraft)                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other noise (industrial, construction, etc.)      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Neighbour noise                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Drinking water quality                            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Air pollution from traffic                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Air pollution from wood/oil heating, factory etc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**1.5 What home language did your grandparents have?**  
*(Tick for one or more alternatives)*

- |                       | Norwegian                | Sami                     | Kven/<br>Finnish         | Other<br>language        |
|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Mother's mother ...   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Mother's father ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Father's mother ...   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Father's father ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### T1. NEIGHBORHOOD AND HOME (cont.)

**1.6 What do you consider yourself as?**  
*(Tick for one or more alternatives)*

- Norwegian  Sami  Kven/  
Finnish  Other

**1.7 Do you feel that you have enough good friends?**

Yes  No

**1.8 How often do you normally take part in organised gatherings, e.g. sewing circles, sports clubs, political meetings or other associations?**  
*(Tick only once)*

- Never, or just a few times a year .....  1  
1-3 times a month .....  2  
Approximately once a week .....  3  
More than once a week .....  4

### T2. PAID AND UNPAID WORK

**2.1 If you have paid or unpaid work, how would you describe your work? (Tick only once)**

- Mostly sedentary work?  
*(e.g. office work, mounting)* .....  1  
Work that requires a lot of walking?  
*(e.g. shop assistant, light industrial work, teaching)*  2  
Work that requires a lot of walking and lifting?  
*(e.g. Postman, nursing, construction)* .....  3  
Heavy manual labour?  
*(e.g. forestry, heavy farm-work, heavy construction)* .....  4

**2.2 Can you decide yourself how your work (paid or unpaid) should be organised? (Tick only once)**

- No, not at all .....  1  
To a small extent .....  2  
Yes, to a large extent .....  3  
Yes, I decide myself .....  4

**2.3 Are you on call, do you work shifts or nights?**

Yes  No

### T3. TOBACCO

#### 3.1 Do you smoke?

Yes, daily  1      Yes, sometimes  2      No, never  3

If "Yes, sometimes"

#### What do you smoke?

Cigarettes     Pipe     Cigar/cigarillos

#### 3.2 Have you used or do you use snuff daily?

Yes, now       Yes, previously       Never

If YES:

How many years altogether have you used snuff?   years

### T4. ALCOHOL

#### 4.1 Are you a teetotaler?.....

Yes  No

#### 4.2 How many times a month do you normally drink alcohol?..... Number of times

*(Do not count low-alcohol beer. Put 0 if less than once a month)*

#### 4.3 How many glasses of beer, wine or spirits do you normally drink in a fortnight?

*(Do not count low-alcohol beer. Put 0 if you do not drink alcohol)*

Beer        Wine        Spirits

#### 4.4 For approximately how many years has your alcohol consumption been at the same level you described above? years

#### 4.5 Have you, in one or more periods in the last 5 years consumed so much alcohol that it has inhibited your work or social life?

Yes, at work  1      Yes, socially  2      Yes, both at work and social life  3      No, never  4

### T5. FOOD AND DIETARY SUPPLEMENTS

#### 5.1 Do you usually eat breakfast every day?...

Yes  No

#### 5.2 How many times a week do you eat a warm dinner?..... times

#### 5.3 How important is it for you to have a healthy diet?

Very  1      Somewhat  2      Little  3      Not  4

#### 5.4 Do you use the following dietary supplements?

Yes, daily      sometimes      No

Iron tablets .....

Calcium tablets or bonemeal .....

Vitamin D supplements .....

Cod liver oil .....

### T6. BODY WEIGHT

#### 6.1 Do you currently try to change your body weight?

No  1      Yes, I try to gain weight  2      Yes, I try to lose weight  3

#### 6.2 What weight would you be satisfied with (your "ideal weight")?..... kg

### T7. ILLNESSES AND INJURIES

#### 7.1 Have you ever had:

Tick once for each question. Also give the age at the time. If you have had the condition several times, how old were you the last time

	Yes	No	Age last time
Severe injury requiring hospital admission .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> years
Ankle fracture .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> years
Peptic ulcer .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> years
Peptic ulcer surgery .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> years
Neck surgery .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> years
Prostate surgery .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> years

#### 7.2 Do you have, or have you ever had: (Tick once for each question)

	Yes	No
Cancer .....	<input type="checkbox"/>	<input type="checkbox"/>
Psoriasis.....	<input type="checkbox"/>	<input type="checkbox"/>
Thyroid disease .....	<input type="checkbox"/>	<input type="checkbox"/>
Glaucoma .....	<input type="checkbox"/>	<input type="checkbox"/>
Cataract .....	<input type="checkbox"/>	<input type="checkbox"/>
Osteoarthritis (arthrosis).....	<input type="checkbox"/>	<input type="checkbox"/>
Bent fingers .....	<input type="checkbox"/>	<input type="checkbox"/>
Skin contractions in your palms .....	<input type="checkbox"/>	<input type="checkbox"/>
Kidney stone .....	<input type="checkbox"/>	<input type="checkbox"/>
Appendectomy.....	<input type="checkbox"/>	<input type="checkbox"/>
Hernia surgery .....	<input type="checkbox"/>	<input type="checkbox"/>
Surgery/treatment for urine incontinence ....	<input type="checkbox"/>	<input type="checkbox"/>
Epilepsy.....	<input type="checkbox"/>	<input type="checkbox"/>
Poliomyelitis (polio) .....	<input type="checkbox"/>	<input type="checkbox"/>
Parkinson's disease.....	<input type="checkbox"/>	<input type="checkbox"/>
Migraine.....	<input type="checkbox"/>	<input type="checkbox"/>
Leg ulcer .....	<input type="checkbox"/>	<input type="checkbox"/>

#### Allergy and hypersensitivity:

	Yes	No
Atopic eczema (e.g. childhood eczema)	<input type="checkbox"/>	<input type="checkbox"/>
Hand eczema.....	<input type="checkbox"/>	<input type="checkbox"/>
Food allergy .....	<input type="checkbox"/>	<input type="checkbox"/>
Other hypersensitivity (not allergy).....	<input type="checkbox"/>	<input type="checkbox"/>

#### 7.3 Have you had common cold, influenza, gastroenteritis, etc. during the last 14 days?

Yes  No

#### 7.4 Have you during the last 3 weeks had common cold, influenza, bronchitis, pneumonia, sinusitis, or other respiratory infection?.....

Yes  No

#### 7.5 Have you ever had bronchitis or pneumonia?.....

Yes  No

#### 7.6 Have you during the last 2 years had bronchitis or pneumonia?(Tick only once)

No  1      1-2 times  2      More than 2 times  3

## T8. SYMPTOMS

**8.1 Have you in the last two weeks felt:**  
(Tick once for each question)

	No	A Little	A lot	Very much
Nervous or worried .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bothered by anxiety.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Confident and calm .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irritable.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Happy and optimistic .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Down/depressed .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lonely.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4

**8.2 Do you cough about daily for periods of the year?** Yes  No

If YES:

**Is your cough productive?** .....  Yes  No

**Have you had this kind of cough for as long as 3 months in each of the last two years?**.....  Yes  No

**8.3 Have you had episodes with wheezing in the chest?**  Yes  No

If YES:

**Has this occurred:** (Tick once for each question) Yes  No

At night .....

In connection with respiratory infections .....

In connection with physical exertion .....

In connection with very cold weather .....

**8.4 Do you get pain in the calf while walking** ..... Yes  No

If YES:

**How long can you go before you notice the pain?**.....    meter

**8.5 Do you get short-winded in the following situations?**  
(Tick once for each question)

While walking fast on level ground or slight up hills ..... Yes  No

While walking calmly on level ground .....

While washing or dressing yourself .....

While resting .....

**8.6 Do you have to stop because of short-windedness while walking in your own pace on level ground?...** Yes  No

**8.7 Have you during the last year suffered from pain and/or stiffness in muscles and joints that have lasted continuously for at least 3 months?**..... Yes  No

If YES:

**Has the complaint reduced your leisure time activity?** ..... Yes  No

**For how long has the complaint endured in total?**

approx.  years and  months

**Has the complaint reduced your ability to work during the last year?** (Also applies to domestic workers and pensioners) (Tick once)

No/insignificantly  1 To some extent  2 Significantly reduced  3 Do not know  4

**Have you been on sick leave due to these complaints during the last year?**..... Yes  No  Do not work

## T8. SYMPTOMS (continue)

**8.8 How often do you suffer from sleeplessness?**  
(Tick only once)

Never, or just a few times a year .....  1

1-3 times a month .....  2

Approximately once a week .....  3

More than once a week .....  4

**8.9 If you suffer from sleeplessness monthly or more frequently, what time of the year does it affect you most?**

No particular time of the year .....  1

Especially during the polar night .....  2

Especially during the midnight sun season .....  3

Especially in spring and autumn .....  4

**8.10 Have you in the last year suffered from sleeplessness to the extent that it has affected your ability to work ?** ..... Yes  No

**8.11 Do you usually sleep during the day?**.....  Yes  No

**8.12 How often do you suffer from urinary incontinence?**

Never .....  1

Not more than once a month .....  2

Two or more times a month .....  3

Once a week or more .....  4

**8.13 Are you able to walk down 10 steps without holding on to something (e.g. a handrail) ...** Yes  No

**8.14 Do you use glasses?**.....  Yes  No

**8.15 Do you use a hearing aid?**.....  Yes  No

**8.16 How is your memory?**  
(Tick once for each question)

Do you forget what you just have heard or read?..... Yes  No

Do you forget where you have placed things?.....  Yes  No

Is it more difficult to remember now than earlier?..  Yes  No

Do you more often write memos now than earlier?  Yes  No

If "YES" on one of these questions;  
**Is this a problem in your daily life?**..... Yes  No

## T9. MEDICINES

**9.1 Do you use, or have you used any of the following medicines:**

	Now	Previously, but not now	Age when used 1 <sup>st</sup> time	Never used
Drugs for osteoporosis.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> years	<input type="checkbox"/>
Tablets for diabetes .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> years	<input type="checkbox"/>
Drugs for hypothyroidism (thyroxine) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/> <input type="text"/> years	<input type="checkbox"/>

**9.2 Do you use any medicines which you take as injections?** ..... Yes  No

If YES:

**Give the name of the medicines (for injection):** T

(one name per line)

---



---

**T10. ILLNESS IN THE FAMILY**

**10.1 Tick for the relatives who have or have ever had any of the diseases: (Tick for each line)**

	Mother	Father	Brother	Sister	Child	None of these
Heart attack (heart wound)	<input type="checkbox"/>					
Angina pectoris (heart cramp)	<input type="checkbox"/>					
High blood pressure .....	<input type="checkbox"/>					
Aneurysm.....	<input type="checkbox"/>					
Gastric/duodenal ulcer ....	<input type="checkbox"/>					
Hip fracture .....	<input type="checkbox"/>					
Psychological problems ..	<input type="checkbox"/>					
Allergy .....	<input type="checkbox"/>					
Osteoarthritis (arthrosis) ..	<input type="checkbox"/>					
Dementia .....	<input type="checkbox"/>					

**10.2 How many siblings and children do you have?**

Number	Brothers	Sisters	Children
	<input type="text"/>	<input type="text"/>	<input type="text"/>

**10.3 Do you usually do extra caring work because of illness etc. in your close family?**

Yes, daily/almost daily	Yes, sometimes	No
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3

**10.4 Do you/your family receive home aid or home nursing care?.....**

Yes  No

**10.5 Is your mother alive? .....**

Yes  No  Age at death  years

**10.6 Is your father alive? .....**

Yes  No  Age at death  years

**T11. MOBILE TELEPHONE**

**11.1 Do you have (own, rent, etc.) a mobile telephone?**

Yes, always  1 Yes, sometimes  2 No  3

If Yes: **What do you use your mobile telephone for, and how often do you use it? (Tick once for each line)**

	Number of times per day				
	30 or more	10-29	2-9	1 or less	Never
Conversations..	<input type="checkbox"/>				
Text messaging	<input type="checkbox"/>				

12345

**T12. THE REST IS TO BE ANSWERED BY WOMEN ONLY**

**12.1 If you have given birth, fill in each child's birth year and how many months you breastfed after delivery. (If you did not breastfeed, write 0)**

Child:	Birth year:	Number of months breastfed:
1 <sup>st</sup> child	<input type="text"/>	<input type="text"/>
2 <sup>nd</sup> child	<input type="text"/>	<input type="text"/>
3 <sup>rd</sup> child	<input type="text"/>	<input type="text"/>
4 <sup>th</sup> child	<input type="text"/>	<input type="text"/>
5 <sup>th</sup> child	<input type="text"/>	<input type="text"/>
6 <sup>th</sup> child	<input type="text"/>	<input type="text"/>

(If more children, use additional sheet)

**T12. THE REST IS TO BE ANSWERED BY WOMEN ONLY**

**12.2 If you still have menstruate or are pregnant: What date did your last menstruation start?**

Day   Month   Year

**12.3 If you no longer menstruate; why did your periods stop? (Tick once)**

It stopped by itself .....  1  
 Uterus surgery .....  2  
 Surgically removed both ovaries .....  3  
 Other reason (e.g. radiation, chemotherapy) ...  4

**12.4 Do you use or have you used prescribed estrogen (tablets or patches)?.....**

Yes  No

If YES: **How old were you when you started taking estrogen ? .....**

years

If you stopped using estrogen, **How old were you when you stopped taking estrogen?.....**

years

**12.5 Do you use or have you used oral contraceptive pills?.....**

Yes  No

If YES: **How old were you when you started taking the pill?.....**

years

**How many years in total have you taken the pills?....** Number of years

If you have given birth: **How many years did you take the pill before your first delivery?....** Number of years

If you stopped taking the pill: **How old were you when you stopped?....**

years

**12.6 Apart from pregnancy and after giving birth, have you ever stopped having menstruation for 6 months or more?**

Yes  No

If YES: **How many times?.....**

times

**12.7 How is your current menstruation status?**

I have not had menstruation in the last year  1  
 I have regular menstruation .....  2  
 I have irregular menstruation .....  3

**12.8 When you were 25-29 years old, how many days usually passed between the start of two periods?**

Minimum   days Maximum   days Do not know

**The periods were of approximately equal length every time?.....**

Yes  No

**How many days did a typical menstrual bleeding period last?...**

days

**Thank you for the help! Remember to mail the form today!**

## Appendix 5a

Questionnaire 1, the 6<sup>th</sup> Tromsø Study 2007–08

English version





# Tromsø-undersøkelsen

The form will be read electronically. Please use a blue or black pen  
You can not use comas, use upper-case letters.

2007 - 2008 Confidential



## HEALTH AND DISEASES

1 How do you in general consider your own health to be?

- Very good
- Good
- Neither good nor bad
- Bad
- Very bad

2 How is your health compared to others in your age?

- Much better
- A little better
- About the same
- A little worse
- Much worse

3 Do you have, or have you had?

Yes No Age first time

Heart attack .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Angina pectoris .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Stroke/brain hemorrhage.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Atrial fibrillation .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
High blood pressure .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Osteoporosis .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Asthma .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Chronic bronchitis/Emphysema/COPD....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Diabetes mellitus .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Psychological problems <i>(for which you have sought help)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Low metabolism.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Kidney disease, <i>not including urinary tract infection (UTI)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Migraine .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

4 Do you have persistent or constantly recurring pain that has lasted for 3 months or more?

- Yes
- No

5 How often have you suffered from sleeplessness during the last 12 months?

- Never, or just a few times
- 1-3 times a month
- Approximately once a week
- More than once a week

6 Below you find a list of different situations. Have you experienced some of them in the last week (including today)? (Tick once for each complaint)

	No complaint	Little complaint	Pretty much	Very much
Sudden fear without reason	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
You felt afraid or worried .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Faintness or dizziness .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
You felt tense or upset .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easily blamed yourself .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sleeping problems .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Depressed, sad .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
You felt useless, worthless .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling that life is a struggle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feeling of hopelessness with regard to the future .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## USE OF HEALTH SERVICES

7 Have you during the past year visited: If YES; how many times?

	Yes	No	No. of times
General practitioner (GP) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Psychiatrist/psychologist .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Medical specialist outside hospital <i>(other than general practitioner/psychiatrist)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Physiotherapist .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Chiropractor .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Alternative medical practitioner <i>(homeopath, acupuncturist, foot zone therapist, herbal medical practitioner, laying on hands practitioner, healer, clairvoyant, etc.)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Dentist/dental service .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

8 Have you during the last 12 months been to a hospital?

	Yes	No	No. of times
Admitted to a hospital .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Had consultation in a hospital without admission;			
At psychiatric out-patient clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
At another out-patient clinic .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

9 Have you undergone any surgery during the last 3 years?

- Yes
- No

## USE OF MEDICINE

10 Do you take, or have you taken some of the following medications? (Tick once for each line)

	Never used	Now	Earlier	Age first time
Drugs for high blood pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Lipid lowering drugs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Drugs for heart disease .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Diuretics .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Medications for osteoporosis .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Insulin .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Tablets for diabetes .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Drugs for metabolism				
Thyroxine/levaxin .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

11 How often have you during the last 4 weeks used the following medications?(Tick once for each line)

	Not used the last 4 weeks	Less than every week	Every week, but not daily	Daily
Painkillers on prescription .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Painkillers non-prescription .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sleeping pills .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tranquillizers .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antidepressants .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12 State the names of all medications -both those on prescription and non-prescription drugs- you have used regularly during the last 4 weeks. Do not include vitamins, minerals, herbs, natural remedies, other nutritional supplements, etc.

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If the space is not enough for all medications, use an additional paper of your own.

When attending the survey centre you will be asked whether you have used antibiotics or painkillers the last 24 hours. If you have, you will be asked to provide the name of the drug, strength, dose and time of use.

## FAMILY AND FRIENDS

13 Who do you live with? (Tick for each question and give the number)

	Yes	No	Number
Spouse/cohabitant .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Other persons older than 18 years..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Persons younger than 18 years .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

14 Tick for relatives who have or have had

	Parents	Children	Siblings
Myocardial infarction .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Myocardial infarction before 60 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angina pectoris .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stroke/brain haemorrhage .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Osteoporosis .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stomach/duodenal ulcer .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Asthma .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diabetes mellitus .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dementia .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Psychological problems .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drugs/substance abuse .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15 Do you have enough friends who can give you help when you need it?

Yes  No

16 Do you have enough friends whom you can talk confidentially with?

Yes  No

17 How often do you normally take part in organised gatherings, e.g. sports clubs, political meetings, religious or other associations?

- Never, or just a few times a year  
 1-2 times a month  
 Approximately once a week  
 More than once a week

## WORK, SOCIAL SECURITY AND INCOME

18 What is the highest level of education you have completed? (Tick one)

- Primary, 1-2 years secondary school  
 Vocational school  
 High secondary school (A-level)  
 College/university less than 4 years  
 College/university 4 years or more

19 What is your main occupation/activity? (Tick one)

- Full time work  Housekeeping  
 Part time work  Retired/benefit recipient  
 Unemployed  Student/military service

20 Do you receive any of the following benefits?

- Old-age, early retirement or survivor pension
- Sickness benefit (are in a sick leave)
- Rehabilitation benefit
- Full disability pension
- Partial disability pension
- Unemployment benefits
- Transition benefit for single parents
- Social welfare benefits



21 What was the households total taxable income last year? Include income from work, social benefits and similar

- Less than 125 000 NOK
- 125 000-200 000 NOK
- 201 000-300 000 NOK
- 301 000-400 000 NOK
- 401 000-550 000 NOK
- 551 000-700 000 NOK
- 701 000 -850 000 NOK
- More than 850 000 NOK

22 Do you work outdoors at least 25% of the time, or in cold buildings (e.g. storehouse/industry buildings)?

- Yes
- No

## PHYSICAL ACTIVITY

23 If you have paid or unpaid work, which statement describes your work best?

- Mostly sedentary work  
*(e.g. office work, mounting)*
- Work that requires a lot of walking  
*(e.g. shop assistant, light industrial work, teaching)*
- Work that requires a lot of walking and lifting  
*(e.g. postman, nursing, construction)*
- Heavy manual labour

24 Describe your exercise and physical exertion in leisure time. If you activity varies much, for example between summer and winter, then give an average. The question refers only to the last year. (Tick the one that fits best)

- Reading, watching TV, or other sedentary activity.
- Walking, cycling, or other forms of exercise at least 4 hours a week *(here including walking or cycling to place of work, Sunday-walking, etc.)*
- Participation in recreational sports, heavy gardening, etc. *(note:duration of activity at least 4 hours a week)*
- Participation in hard training or sports competitions, regularly several times a week.

25 How often do you exercise?(With exercise we mean for example walking, skiing, swimming or training/sports)

- Never
- Less than once a week
- Once a week
- 2-3 times a week
- Approximately every day



26 How hard do you exercise on average?

- Easy- do not become short-winded or sweaty
- You become short-winded and sweaty
- Hard- you become exhausted



27 For how long time do you exercise every time on average?

- Less than 15 minutes
- 15-29 minutes
- 30-60 minutes
- More than 1 hour

## ALCOHOL AND TOBACCO

28 How often do you drink alcohol?

- Never
- Monthly or more infrequently
- 2-4 times a month
- 2-3 times a week
- 4 or more times a week

29 How many units of alcohol (a beer, a glass of wine or a drink) do you usually drink when you drink alcohol?

- 1-2
- 3-4
- 5-6
- 7-9
- 10 or more

30 How often do you drink 6 units of alcohol or more in one occasion?

- Never
- Less frequently than monthly
- Monthly
- Weekly
- Daily or almost daily

31 Do you smoke sometimes, but not daily?

- Yes
- No

32 Do you/did you smoke daily?

- Yes, now
- Yes, previously
- Never

33 If you previously smoked daily, how long is it since you stopped?

Number of years

34 If you currently smoke, or have smoked before: How many cigarettes do you or did you usually smoke per day?

Number of cigarettes

35 How old were you when you began smoking daily?

Number of years

36 How many years in all have you smoked daily?

Number of years

37 Do you use or have you used snuff or chewing tobacco?

- No, never
- Yes, previously
- Yes, sometimes
- Yes, daily



## DIET

38 Do you usually eat breakfast every day?

Yes  No

39 How many units of fruits or vegetables do you eat on average per day? (units means for example a fruit, a cup of juice, potatoes, vegetables)

Number of units   +

40 How many times per week do you eat hot dinner?

Number

41 How often do you usually eat these products?

(Tick once for each line)

	0-1 times/ mth	2-3 times/ mth	1-3 times/ week	4-6 times/ week	1-2 times/ day
Potatoes .....	<input type="checkbox"/>				
Pasta/rice .....	<input type="checkbox"/>				
Meat (not processed) .....	<input type="checkbox"/>				
Processed meat (sausages/meatloaf/meatballs) .....	<input type="checkbox"/>				
Fruits, vegetables, berries .....	<input type="checkbox"/>				
Lean fish .....	<input type="checkbox"/>				
Fat fish (e.g. salmon, trout, mackerel, herring, halibut, redfish) .....	<input type="checkbox"/>				

42 How much do you normally drink the following?

(Tick once for each line)

	Rarely/ never	1-6 glasses /week	1 glass /day	2-3 glasses /day	4 or more glasses /day
Milk, curdled milk, yoghurt .....	<input type="checkbox"/>				
Juice .....	<input type="checkbox"/>				
Soft drinks with sugar .....	<input type="checkbox"/>				

43 How many cups of coffee and tea do you drink daily? (Put 0 for the types you do not drink daily)

	Number of cups
Filtered coffee .....	<input type="text"/> <input type="text"/>
Boiled coffee (coarsely ground coffee for brewing) .....	<input type="text"/> <input type="text"/>
Other types of coffee .....	<input type="text"/> <input type="text"/>
Tea .....	<input type="text"/> <input type="text"/>

44 How often do you usually eat cod liver and roe? (i.e. "mølje")

Rarely/never  1-3 times/year  4-6 times/year  
 7-12 times/year  More than 12 times/year

45 Do you use the following supplements?

	Daily	Sometimes	No
+ Cod liver oil or fish oil capsules .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Omega 3 capsules (fish oil, seal oil) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vitamins and/or mineral supplements .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## QUESTIONS FOR WOMEN

46 Are you currently pregnant?

Yes  No  Uncertain

47 How many children have you given birth to?

Number   +

48 If you have given birth, fill in for each child: birth year, birth weight and months of breastfeeding (Fill in the best you can)

Child	Birth year	Birth weight in grams	Months of breastfeeding
1	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
2	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
3	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
4	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
5	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
6	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>

49 During pregnancy, have you had high blood pressure?

Yes  No

50 If yes, which pregnancy?

The first  Second or later

51 During pregnancy, have you had proteinuria?

Yes  No

52 If yes, which pregnancy?

The first  Second or later

53 Were any of your children delivered prematurely (a month or more before the due date) because of preeclampsia?

Yes  No

54 If yes, which child?

1st child 2nd child 3rd child 4th child 5th child 6th child

55 How old were you when you started menstruating?

Age   +

56 Do you currently use any prescribed drug influencing the menstruation?

Oral contraceptives, hormonal IUD or similar .....

Yes  No

Hormone treatment for menopausal problems .....

Yes  No

When attending the survey centre you will get a questionnaire about menstruation and possible use of hormones. Write down on a paper the names of all the hormones you have used and bring the paper with you. You will also be asked whether your menstruation have ceased and possibly when and why.

## Appendix 5b

Questionnaire 2, the 6<sup>th</sup> Tromsø Study 2007–08

English version



# 1. DESCRIPTION OF YOUR HEALTH STATUS

Mark the statement that best fits your state of health today by ticking once in one of the boxes under each of the five groups below:

1.6 To allow you to show us how good or bad your state of health is we have made a scale (almost like a thermometer) where the best state of health you can imagine is marked 100 and the worst 0. We ask you to show your state of health by drawing a line from the box below to the point on the scale that best fits your state of health.

## 1.01 Mobility

- I have no problems in walking about
- I have little problems in walking about
- I am confined to bed

## 1.02 Self-care

- I have no problems with self-care
- I have some problems washing or dressing myself
- I am unable to wash or dress myself

## 1.03 Usual activities (e.g. work, study, housework, family or leisure activities)

- I have no problems with performing my usual activities
- I have some problems with performing my usual activities
- I am unable to perform my usual activities

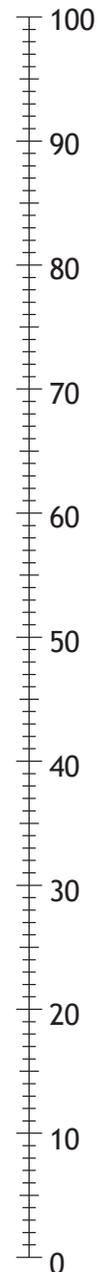
## 1.04 Pain and discomfort

- I have no pain or discomfort
- I have moderate pain or discomfort
- I have extreme pain or discomfort

## 1.05 Anxiety and depression

- I am not anxious or depressed
- I am moderately anxious or depressed
- I am extremely anxious or depressed

Best imaginable health state



Best imaginable health state

Your own health state today

## 2. CHILDHOOD/YOUTH AND AFFILIATION

2.01 **Where did you live at the age of 1 year?**

- In Tromsø (with present municipal borders)
- In Troms, but not Tromsø
- In Finnmark
- In Nordland
- Another place in Norway
- Abroad

2.02 **How was your family's financial situation during your childhood?**

- Very good
- Good
- Difficult
- Very difficult

2.03 **What is the importance of religion in your life?**

- Very important
- Somewhat important
- Not important

2.07 **What was/is the highest completed education for your parents and your spouse/cohabitant?**  
(Tick once for each column)

	Mother	Father	Spouse/ cohabitant
Primary 7-10 years, 1-2 years secondary school .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vocational school .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High secondary school (A level) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
College or university (less than 4 years) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
College or university (4 years or more) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.04 **What do you consider yourself as? (Tick for one or more alternatives)**

- Norwegian
- Sami ethnicity
- Kven/Finnish
- Another ethnicity

2.05 **How many siblings and children do you have/have you had?**

Number of siblings .....

Number of children .....

2.06 **Is your mother alive?**

- Yes       No

If NO: her age when she died .....

**Is your father alive?**

- Yes       No

If NO: his age when he died .....

### 3. WELL BEING AND LIVING CONDITIONS

**3.01** Below are three statements about satisfaction with life as a whole. Then there are two statements about views on your own health. Show how you agree or disagree with each of the statements by ticking in the box for the number you think fits best for you. (tick once for each statement)

	Completely disagree	1	2	3	4	5	6	7	Completely agree
In most ways my life is close to my ideal .....	<input type="checkbox"/>								
My life conditions are excellent .....	<input type="checkbox"/>								
I am satisfied with my life .....	<input type="checkbox"/>								
I have a positive view of my future health .....	<input type="checkbox"/>								
By living healthy, I can prevent serious diseases	<input type="checkbox"/>								

**3.02** Below are four statements concerning your current job conditions, or if you are not working now, the last job you had. (Tick once for each statement)

	Completely disagree	1	2	3	4	5	6	7	Completely agree
My work is tiring, physically or mentally .....	<input type="checkbox"/>								
I have sufficient influence on when and how my work should be done .....	<input type="checkbox"/>								
I am being bullied or harassed at work .....	<input type="checkbox"/>								
I am being treated fairly at work .....	<input type="checkbox"/>								

**3.03** I consider my occupation to have the following social status in the society (if you are not currently employed, think about your latest occupation)

- Very high status
- Fairly high status
- Middle status
- Fairly low status
- Very low status

**3.04** Have you over a long period experienced any of the following? (Tick one or more for each line)

	No	Yes, as a child	Yes, as adult	Yes, last year
Been tormented, or threatened with violence .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Been beaten, kicked at or victim of other types of violence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Someone in your close family have used alcohol or drugs in such a way that it has caused you worry .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have experienced anything of the above, how much are you affected by that now?

- Not affected       Affected to some extent       Affected to a large extent

## 4. ILLNESS AND WORRIES

4.01 **Have you during the last month experienced any illness or injury?**

Yes       No

If YES: have you during the same period?  
(Tick once for each line)

	Yes	No
Been to a general practitioner .....	<input type="checkbox"/>	<input type="checkbox"/>
Been to a medical specialist .....	<input type="checkbox"/>	<input type="checkbox"/>
Been to emergency department .....	<input type="checkbox"/>	<input type="checkbox"/>
Been admitted to a hospital .....	<input type="checkbox"/>	<input type="checkbox"/>
Been to an alternative practitioner (chiropractor, homeopath or similar) .....	<input type="checkbox"/>	<input type="checkbox"/>

4.02 **Have you noticed sudden changes in your pulse or heart rhythm in the last year?**

Yes       No

4.03 **Do you become breathless in the following situations? (tick once for each question)**

	Yes	No
When you walk rapidly on level ground or up a moderate slope .....	<input type="checkbox"/>	<input type="checkbox"/>
When you walk calmly on level ground .....	<input type="checkbox"/>	<input type="checkbox"/>
While you are washing or dressing .....	<input type="checkbox"/>	<input type="checkbox"/>
At rest .....	<input type="checkbox"/>	<input type="checkbox"/>

4.04 **Do you cough about daily for some periods of the year?**

Yes       No

If YES: Is the cough usually productive?

Yes       No

Have you had this kind of cough for as long as 3 months in each of the last two years?

Yes       No

4.05 **How often do you suffer from sleeplessness? (tick once)**

Never, or just a few times a year  
 1-3 times a month  
 Approximately once a week  
 More than once a week

If you suffer from sleeplessness monthly or more often, what time of the year does it affect you most? (Put one or more ticks)

No special time  
 Polar night time  
 Midnight sun time  
 Spring and autumn

4.06 **Have you had difficulty sleeping during the past couple of weeks?**

Not at all  
 No more than usual  
 Rather more than usual  
 Much more than usual

4.07 **Have you during the last two weeks felt unhappy and depressed?**

Not at all  
 No more than usual  
 Rather more than usual  
 Much more than usual

4.08 **Have you during the last two weeks felt unable to cope with your difficulties?**

Not at all  
 No more than usual  
 Rather more than usual  
 Much more than usual

4.09 **Below, please answer a few questions about your memory: (tick once for each question)**

	Yes	No
Do you think that your memory has declined? .....	<input type="checkbox"/>	<input type="checkbox"/>
Do you often forget where you have placed your things? .....	<input type="checkbox"/>	<input type="checkbox"/>
Do you have difficulties finding common words in a conversation? .....	<input type="checkbox"/>	<input type="checkbox"/>
Have you problems performing daily tasks you used to master? .....	<input type="checkbox"/>	<input type="checkbox"/>
Have you been examined for memory problems? .....	<input type="checkbox"/>	<input type="checkbox"/>

If YES to at least one of the first four questions above: Is this a problem in your daily life?

Yes       No

4.10 Have you during the last last year suffered from pain and/or stiffness in muscles or joints in your neck/shoulders lasting for at least 3 consecutive months?  
(tick once for each line)

	No	A little	A lot
Neck, shoulder.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arms, hands.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upper part of the back....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The lumbar region.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hips, leg, feet.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other places.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.11 Have you suffered from pain and/or stiffness in muscles or joints during the last 4 weeks

	No	A little	A lot
Neck, shoulder .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arms, hands .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upper part of the back .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The lumbar region .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hips, leg, feet .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other places .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.12 Have you ever had:

	Yes	No	Age last time
Fracture in the wrist/underarm? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Hip fracture? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

4.13 Have you been diagnosed with arthrosis by a doctor?

Yes  No

4.14 Do you have or have you ever had some of the following:

	Never	Little	Much
Nickel allergy .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pollen allergy .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other allergies .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.15 Have you ever experienced infertility for more than 1 year?

Yes  No

If Yes: was it due to:

	Yes	No	Do not know
A condition concerning you?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A condition concerning your partner?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.16 To which degree have you had the following complaints during the last 12 months?

	Never	Little	Much
Nausea .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heartburn/regurgitation....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Diarrhoea.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Constipation.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alternating diarrhoea and constipation.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bloated stomach.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abdominal pain.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.17 If you have had abdominal pain or discomfort during the last year:

	Yes	No
Was it located in your upper stomach?.....	<input type="checkbox"/>	<input type="checkbox"/>
Were you bothered as often as once a week or more during the last 3 months?...	<input type="checkbox"/>	<input type="checkbox"/>
Became better after bowel movement?...	<input type="checkbox"/>	<input type="checkbox"/>
Are the symptoms related to more frequent or rare bowel movements than normally? .....	<input type="checkbox"/>	<input type="checkbox"/>
Are the symptoms related to more loose or hard stool than normally?.....	<input type="checkbox"/>	<input type="checkbox"/>
Do the symptoms appear after a meal? ...	<input type="checkbox"/>	<input type="checkbox"/>

4.18 Have you ever had:

	Yes	No	Age last time
Stomach ulcer .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Duodenal ulcer .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
Ulcer surgery .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

4.19 For women: Have you ever had a miscarriage?

Yes  No  Do not know  
If Yes: number of times .....

4.20 For men: Have your partner ever had a miscarriage?

Yes  No  Do not know  
If Yes: number of times .....

4.21 Is your diet gluten-free?

Yes  No  Do not know

4.22 Have you been diagnosed with Dermatitis Herpetiformis (DH)?

Yes  No  Do not know

4.23 Have you been diagnosed with coeliac disease, based on a biopsy from your intestine taken in an endoscopy examination?  
 Yes     No     Do not know

4.24 Do you have your natural teeth?  
 Yes     No

4.25 How many amalgam tooth fillings do you have/have you had?  
 0     1-5     6-10     10+

4.26 Have you been suffering from headache the last year?  
 Yes     No  
**If No: go to section 5, food habits**

4.27 What kind of headache are you suffering from?  
 Migraine     Other headache

4.28 How many days per month do you suffer from headache?  
 Less than one day  
 1-6 days  
 7-14 days  
 More than 14 days

4.29 Is the headache usually:  
 (tick one for each line)

	Yes	No
Pounding/pulsatory pain .....	<input type="checkbox"/>	<input type="checkbox"/>
Pressing/tightening pain .....	<input type="checkbox"/>	<input type="checkbox"/>
Unilateral pain ( <i>right or left</i> ) .....	<input type="checkbox"/>	<input type="checkbox"/>

4.30 What is the intensity of your headache?  
 Mild (*do not hinder normal activity*)  
 Moderate (*decrease normal activity*)  
 Strong (*block normal activity*)

4.31 What is the duration of the headache usually?  
 Less than 4 hours  
 4 hours - 1 day  
 1-3 days  
 More than 3 days

4.32 If you suffer from headache, when during the year does it affect you most? (tick one or more)  
 No special time  
 Polar night time  
 Midnight sun time  
 Spring and/or Autumn

4.33 Before or during the headache, do you have a transient:

	Yes	No
Visual disturbances? ( <i>flickering, blurred vision, flashes of light</i> ).....	<input type="checkbox"/>	<input type="checkbox"/>
Unilateral numbness in your face or hand? .....	<input type="checkbox"/>	<input type="checkbox"/>
Deterioration by moderate physical Activity? .....	<input type="checkbox"/>	<input type="checkbox"/>
Nausea and/or vomiting? .....	<input type="checkbox"/>	<input type="checkbox"/>

4.34 Describe how many days you have been away from work or school during the last month due to headache?  
 Number of days .....

## 5. FOOD HABITS

5.01 How often do you usually eat the following? (tick once for each line)

	0-1 times per month	2-3 times per month	1-3 times per week	More than 3 times per week
Fresh water fish ( <i>not farmed</i> ) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salt water fish ( <i>not farmed</i> ) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Farmed fish ( <i>salmon, trout, char</i> ) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tuna fish ( <i>fresh or canned</i> ) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fish bread spread .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mussels, shells .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The brown content in crabs .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Whale or seal meat .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pluck (liver/kidney/heart) from reindeer or elk/moose..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pluck (liver/kidney/heart) from ptarmigan/grouse .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5.02 How many time during the year do/did you usually eat the following? (number of times)

	In adulthood	In childhood
Mølje (cod or pollack meat, liver, and roe)( <i>Number of times per year</i> ) ...	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
Gulls egg ( <i>Number of eggs per year</i> ) .....	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
Reindeer meat ( <i>Number of times per year</i> ) .....	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
Local mushroom and wild berries ( <i>blueberries/lingonberries/cloudberries</i> ) ( <i>Number of times per year</i> ) .....	<input style="width: 60px;" type="text"/>	<input style="width: 60px;" type="text"/>

5.03 How many times per month do you eat  
canned (tinned) foods (from metal boxes)?

Number .....

5.04 Do you take vitamins and/or mineral  
supplements?

Yes, daily     Sometimes     Never

5.05 How often do you eat?

	Never	1-3 times per month	1-3 times per week	4-6 times per week	1-2 times per day	3 times per day or more
Dark chocolate .....	<input type="checkbox"/>					
Light chocolate/milk chocolate ...	<input type="checkbox"/>					
Chocolate cake .....	<input type="checkbox"/>					
Other sweets .....	<input type="checkbox"/>					

5.06 If you eat chocolate, how much do you usually eat each time?

Compared with the size of a Kvikk-Lunsj sjokolade (*a chocolate brand in the market*) and describe how much do you eat in relation to it.

$\frac{1}{4}$       $\frac{1}{2}$      1     1  $\frac{1}{2}$      2     More than 2

5.07 How often do you drink  
cocoa/hot chocolate?

	Never	1-3 times per month	1-3 times per week	4-6 times per week	1-2 times per day	3 times per day or more
	<input type="checkbox"/>					

## 6. ALCOHOL

**6.01 How often have you in the last year:**

	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
Not been able to stop drinking alcohol when you have started? .....	<input type="checkbox"/>				
Failed to do what was normally expected of you because of drinking? .....	<input type="checkbox"/>				
Needed a drink in the morning to get yourself going after a heavy drinking session? .....	<input type="checkbox"/>				
Had feeling of guilt or remorse after drinking? .....	<input type="checkbox"/>				
Not been unable to remember what happened the night before because of your drinking?.....	<input type="checkbox"/>				

	Never	Yes, but not in the last year	Yes, during the last year
<b>6.02 Have you or someone else been injured because of your Drinking?</b> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?</b> .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 7. WEIGHT

<p><b>7.01 Have you involuntary lost weight during the last 6 months?</b></p> <p><input type="checkbox"/> Yes      <input type="checkbox"/> No</p> <p>If Yes: how many kilograms? ..... <input style="width: 50px;" type="text"/></p>	<p><b>7.03 Are you satisfied with your present body weight?</b></p> <p><input type="checkbox"/> Yes      <input type="checkbox"/> No</p>
<p><b>7.02 Estimate your body weight when you were 25 years old:</b></p> <p>Number of kilograms ..... <input style="width: 50px;" type="text"/></p>	<p><b>7.04 What weight would you be satisfied with (your "ideal" weight)?</b></p> <p>Number of kilograms ..... <input style="width: 50px;" type="text"/></p>

## 8. SOLVENTS

<p><b>8.01 How many hours per week, do you do the following leisure- or professional activities:</b></p> <p>Automobile repair/paint, ceramic work, painting/solvents, hair dressing, glazier, electrician. (Put 0 if you do not engage in such leisure or professional activities)</p> <p>Number of hours per week on average: <input style="width: 50px;" type="text"/></p>	<p><b>8.02 Do you use hair color preparations</b></p> <p><input type="checkbox"/> Yes      <input type="checkbox"/> No</p> <p>If Yes: How many times per year?.. <input style="width: 50px;" type="text"/></p>
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## 9. USE OF HEALTH SERVICES

9.01 **Have you ever experienced that disease has been inadequately examined or treated, and that this had serious consequences?**

- Yes, this has happened to me  
 Yes, this has happened to a close relative  
*(child, parents, spouse)*  
 No

If Yes, where do you think the reason of the problem is? (tick once or more):

- With a general practitioner  
 With an emergency medical doctor  
 With a private practising specialist  
 With a hospital doctor  
 With another health personnel  
 With an alternative practitioner  
 with more than one person due to the failure of procedures and collaboration

9.02 **Have you ever felt persuaded to accept an examination or treatment that you do not want?**

- Yes       No

If Yes, do you think this has had unfortunate health-related consequences?

- Yes       No

9.03 **Have you ever complained about a treatment you have got?**

- Have never a reason for complaining  
 Have considered complaining, but did not do that  
 Have complained verbally  
 Have complained in writing

9.04 **How long have you had your current general practitioner/other physician?**

- Less than 6 months  
 6 to 12 months  
 12 to 24 months  
 More than 2 years

9.05 **At the last visit to the general practitioner, did the doctor(s) speak to you in a way so you understand them?** Answers to a scale from 0 to 10, where 0 = they were difficult to understand and 10 = they were always easy to understand

- 0 1 2 3 4 5 6 7 8 9 10

9.06 **How would you characterize the treatment or counselling, you got the last time you were with a doctor?** Answer on a scale from 0 to 10, where 0 = very bad treatment, and 10 = very good treatment

- 0 1 2 3 4 5 6 7 8 9 10

9.07 **Do you have during the last 12 months experienced that it has been difficult to be referred to special investigations (like X-ray or similar) or to specialized health service (private practising specialist or at hospital)?**

- Not applicable  
 No problem  
 Some problems  
 Great problems

9.08 **Have you during the last 12 months experienced that it is difficult to be referred to physiotherapist, chiropractor or similar?**

- Not applicable  
 No problem  
 Some problems  
 Great problems

9.09 **All in all, have you experienced that it is difficult or simply to be referred to specialized health services?**

- Not applicable  
 Very difficult  
 Somehow difficult  
 Reasonably easy  
 Very easy

## 10. USE OF ANTIBIOTICS

**10.01 Have you used antibiotics during the last 12 months?** (all penicillin-like medicine in the form of tablets, syrups or injections)

Yes       No       Do not remember

If YES: What did you get the treatment for?

Have you taken many antibiotic treatments, tick for each treatment.

	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6
• Urinary tract infection ( <i>bladder infection, cystitis</i> ) .....	<input type="checkbox"/>					
• Respiratory tract infection ( <i>ear, sinus, throat or lung infection, bronchitis</i> ).....	<input type="checkbox"/>					
• Other .....	<input type="checkbox"/>					
Treatment duration: number of days .....						

How did you acquire the antibiotics for treatment?

Have you acquired many treatments, tick for each one.

With prescription from a doctor/dentist .....	<input type="checkbox"/>					
Without contacting a doctor/without prescription:						
• Purchase from a pharmacy abroad .....	<input type="checkbox"/>					
• Purchase over the internet .....	<input type="checkbox"/>					
• Remnants from earlier treatment at home .....	<input type="checkbox"/>					
• From family/friends .....	<input type="checkbox"/>					
• Other ways .....	<input type="checkbox"/>					

**10.02 Do you have antibiotics at home?**

Yes       No

If YES: is this after an agreement with your doctor for treatment of chronic or frequently recurring disease?

Yes       No

If No: how did you acquire this antibiotic? (Multiple ticks are possible)

- Purchased from a pharmacy abroad ...
- Purchased over the internet .....
- Remnants from earlier treatment .....
- From family/friends .....
- Other ways .....

**10.03 Would you consider using antibiotics without consulting your doctor?**

Yes       No

If YES: which conditions would you treat in such situation? (multiple ticks are possible)

- Common cold .....
- Cough .....
- Bronchitis .....
- Sore throat .....
- Sinusitis .....
- Fever .....
- Influenza .....
- Ear infection .....
- Diarrhoea .....
- Urinary tract infection .....
- Other infections .....

## 11. YOUR CIRCADIAN RHYTHM

We will ask you some questions about your sleeping habits

II.01 Have you worked in a shift work schedule during the last 3 months?

Yes  No

II.02 Number of days per week which you cannot freely choose when you sleep (e.g. work days)?

0 1 2 3 4 5 6 7

Then I go to bed at .....

I get ready to fall asleep at .....

Number of minutes I need to fall asleep .....

I wake up at .....

With help of:  Alarm clock  External stimulus (*noise, family members etc.*)  By myself

Number of minutes I need to get up .....

II.03 Number of days per week which you can freely choose when you sleep (e.g. free days or holidays)

0 1 2 3 4 5 6 7

Then I go to bed at .....

I get ready to fall asleep at .....

Number of minutes I need to fall asleep .....

I wake up at .....

With help of:  Alarm clock  External stimulus (*noise, family members etc.*)  By myself

Number of minutes I need to get up .....

## 12. SKIN AND DERMATOLOGY

12.01 How often do you usually take a shower or a bath? (tick once)

- 2 or more times daily
- 1 time daily
- 4-6 times per week
- 2-3 times per week
- Once a week
- Less than once a week

12.02 How often do you during a day usually wash your hands with soap? (tick once)

- 0 times
- 1-5 times
- 6-10 times
- 11-20 times
- More than 20 times

12.03 Have you ever taken any antibiotics (penicillin and similar medicines) because of a skin disease, for example infected eczema, acne, non-healing leg ulcers, recurrent abscess?

- Yes       No

If Yes: How many times in average per year did you take antibiotics during the period you were most affected (tick once)

- 1-2       3-4       More than 4 times

12.04 Have you or have you ever had the following skin disorders? (tick once for each line)

- |   | Yes                      | No                       |
|---|--------------------------|--------------------------|
| Psoriasis .....   | <input type="checkbox"/> | <input type="checkbox"/> |
| Atopic eczema (children's eczema).....                  | <input type="checkbox"/> | <input type="checkbox"/> |
| Recurrent hand eczema .....                             | <input type="checkbox"/> | <input type="checkbox"/> |
| Recurrent pimples/spots for several months .....        | <input type="checkbox"/> | <input type="checkbox"/> |
| Leg or foot ulcer that did not heal for 3-4 weeks ..... | <input type="checkbox"/> | <input type="checkbox"/> |

If Yes for the question on leg and/or foot ulcer, do you have the ulcer today?

- Yes       No

12.05 Have you often or always any of the following complaints? (tick once for each line)

- |  | Yes                      | No                       |
|--|--------------------------|--------------------------|
| Swelling in the ankles or legs, particularly in the evenings ..... | <input type="checkbox"/> | <input type="checkbox"/> |
| Varicose veins .....   | <input type="checkbox"/> | <input type="checkbox"/> |
| Eczema (red, itchy rash) on your legs .....                        | <input type="checkbox"/> | <input type="checkbox"/> |
| Leg pain when you walk, but is relieved when you stand still ..... | <input type="checkbox"/> | <input type="checkbox"/> |

12.06 Have you ever had the following diagnoses by a physician? (tick once for each line)

- |                     | Yes                      | No                       |
|---------------------|--------------------------|--------------------------|
| Psoriasis .....     | <input type="checkbox"/> | <input type="checkbox"/> |
| Atopic eczema ..... | <input type="checkbox"/> | <input type="checkbox"/> |
| Rosacea .....       | <input type="checkbox"/> | <input type="checkbox"/> |

12.07 Have you recurring large acne/abscesses that are tender/painful and often form scars in the following places? (tick once for each line)

- |                                | Yes                      | No                       |
|--------------------------------|--------------------------|--------------------------|
| Armpits .....                  | <input type="checkbox"/> | <input type="checkbox"/> |
| Under the breasts .....        | <input type="checkbox"/> | <input type="checkbox"/> |
| Stomach groove/the navel ..... | <input type="checkbox"/> | <input type="checkbox"/> |
| Around the genitalia .....     | <input type="checkbox"/> | <input type="checkbox"/> |
| Around the anus .....          | <input type="checkbox"/> | <input type="checkbox"/> |
| The groin .....                | <input type="checkbox"/> | <input type="checkbox"/> |

If Yes: Have you ever visited a physician because of abscesses?

- Yes       No

If Yes, did you get any of the following treatments? (tick once for each line)

- |   | Yes                      | No                       |
|---|--------------------------|--------------------------|
| Antibiotic ointment .....                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| Antibiotic tablets .....                                    | <input type="checkbox"/> | <input type="checkbox"/> |
| Surgical drainage .....                                     | <input type="checkbox"/> | <input type="checkbox"/> |
| A larger surgical intervention including skin removal ..... | <input type="checkbox"/> | <input type="checkbox"/> |
| Surgical laser treatment .....                              | <input type="checkbox"/> | <input type="checkbox"/> |