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Change and predictors of change in fruit and vegetable consumption among Norwegian women: 1996-2005. The NOWAC study.

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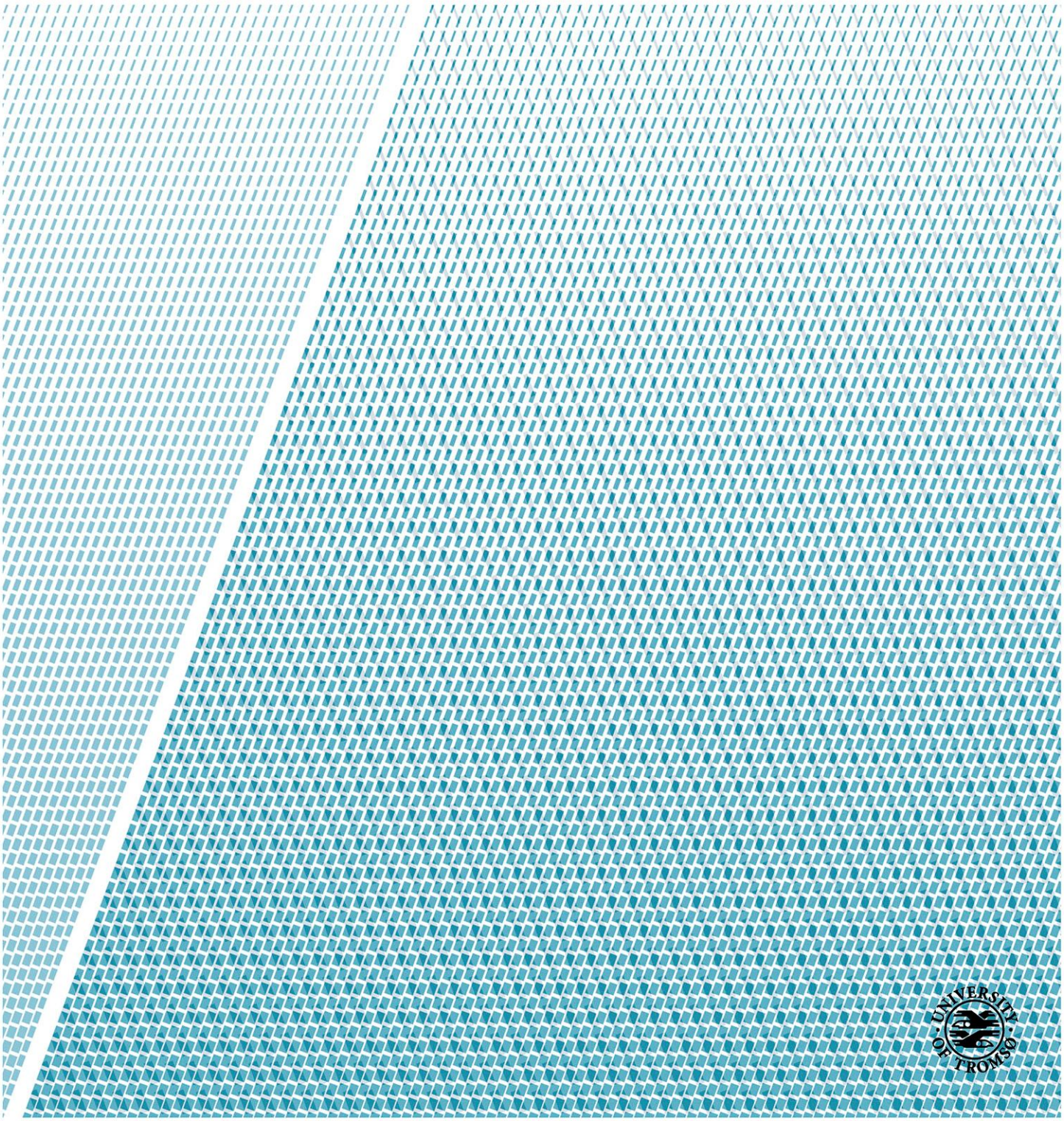

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Abstract

Background

Studies have shown the health benefits of adequate fruit and vegetable consumption with regards to prevention of chronic diseases. To encourage their consumption, health organizations and governments have initiated projects as well as set goals as regards the daily intake recommended per person. Results from the national dietary surveys in Norway show that consumption of fruits and vegetables have been on the increase but the proportion that meets the recommended daily intake is low. The aim of this study was to examine the predictors of fruit and vegetable intake at baseline, the predictors of the change in fruit and vegetable intake from baseline to second measurement as well as to estimate the proportion of women who met the recommended daily intake at baseline and second measurement among participants in the Norwegian Women and Cancer study (NOWAC).

Methods

A prospective study was performed in the NOWAC cohort. Data on dietary, lifestyle, socioeconomic and health-related factors were collected by mailed questionnaires. The change in fruit and vegetable consumption among 49,888 women aged 40 – 70 years was investigated using two measurements taken at intervals of 4–6 years. We used linear regression analyses to describe the change in fruit and vegetable consumption.

Results

At baseline, higher education, income and level of physical activity as well as alcohol intake, dieting and not living with children were all associated with higher intakes of fruit and vegetable while lower BMI and smoking were associated with lower intake of fruit and vegetable. Predictors of increase in fruit intake include more years of education, higher physical activity, dieting, and living with children. These factors, with the exception of dieting, were also associated with an increase in vegetable intake, in addition to high income, high BMI, alcohol consumption and being a former smoker. Older age, alcohol consumption, high

income and smoking were associated with a decrease in fruit intake, whereas older age was associated with a decrease in vegetable intake. BMI was not a significant predictor of the change in fruit intake, while dieting was not a significant predictor of the change in vegetable intake. Region of residence was not a significant predictor of the change in fruit or vegetable intake. The proportion of women that met the recommended daily intake of fruits increased from 27% at baseline to 35% at second measurement while that of vegetable intake increased from 10% to 20%.

Conclusions

Fruit and vegetable consumption as well as the proportion of women who met the recommended daily intake among participants in the NOWAC study showed an increase over the period studied. The intake of fruit and vegetables was influenced by lifestyle, socioeconomic and health related factors. These influencing factors should be considered when designing health promotion programs aimed at increasing fruit and vegetable intake.

Key words

Fruit and vegetable consumption, socioeconomic determinants, lifestyle factors, repeated measurements, Norway, women

Abbreviations

BMI	Body mass index
CI	Confidence Interval
CHD	Coronary heart disease
FFQ	Food frequency questionnaire
KJ	KiloJoule
NOK	Norwegian Kroner
NORKOST	National dietary survey
NOWAC	The Norwegian Women and Cancer Study
24HDR	24 hour dietary recall
P-value	probability value
r	Pearson correlation coefficient
WHO	World Health Organization

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1 Introduction

Fruit and vegetable consumption is an essential component of a healthy diet, and epidemiological evidence suggests a relationship between high fruit and vegetable consumption and the prevention of major chronic diseases such as heart disease, type II diabetes, obesity and certain cancers (1, 2). What counts as fruits and vegetables vary between countries and has also undergone some modification over time with some foods being dropped based on nutrient contents and lack of scientific evidence. Juice is sometimes excluded from the fruit and vegetable recommendation in some countries (Belgium and Spain) but included with limitation in others (Norway) (3). It has however been suggested that since the end goal of increasing fruit and vegetable consumption is to improve human health, it might be logical to exclude certain foods that are technically fruits and vegetables if their consumption is actually counterproductive to the goal (4). Our definition of fruits and vegetables in this thesis will be based on that of Helsedirektoratet, the Norwegian Directorate of Health, which excludes potatoes, legumes, nuts and seeds, spices and herbs (5).

As dietary guidelines are evolving from a primary focus on providing adequate intake of essential nutrients in order to prevent nutritional deficiency to an emphasis on reducing the prevalence of chronic diseases including cardiovascular disease, cancer, type II diabetes, and obesity (6), fruit and vegetable intake may play a more prominent role. To this end, health organizations and governments have set goals as regard the daily intake of fruits and vegetables recommended per person, but studies indicate that intakes remain well below recommended levels (7).

In the light of the association between fruit and vegetable intake and health and disease, evaluating current intakes of fruits and vegetables in a population including determining what proportion of a population meets a set goal intake of fruits and vegetables should be a public health priority (8).

1.1 Health potentials of fruits and vegetables

A wide variety of mechanisms have been postulated for the potential disease-preventive effects of vegetables and fruit (9). Antioxidant activity, modulation of detoxifying enzymes, stimulation of the

immune system, decrease in platelet aggregation, alteration in cholesterol metabolism, modulation of steroid hormone metabolism, blood pressure reduction and even antibacterial and antiviral activity have been hypothesized as mechanisms (10). Although the exact mechanisms through which fruits and vegetables play a role in disease prevention have not been fully defined, the benefits are generally credited to the additive and synergistic effects of the phytochemicals found in them (11). Fruits and vegetables are an excellent source of important nutrients in the diet, including potassium, folate, vitamin A, vitamin C, vitamin E, fiber and many phytochemicals (5). A critical review on vegetable and fruit in the prevention of chronic diseases noted that there was convincing evidence that increased consumption of fruits and vegetables reduces the risk of hypertension, CHD and stroke (2). Furthermore, it reported that there was probable evidence that the risk of cancer in general is inversely associated with the consumption of fruits and vegetables. It concluded that a high daily intake of these foods promotes health (2). A positive link between vegetable and fruit consumption and bone health has also been suggested (12). Also, higher vegetable but not fruit consumption may be associated with slower rate of cognitive decline with older age (13).

However, recent results regarding fruit and vegetable intake and health is less clear cut. While increased consumption of vegetables, fruits and berries was associated with a delayed risk of all-cause mortality and of mortality due to cancer and stroke in a Norwegian paper (14), a systematic literature review concluded that the protective effect of fruits and vegetables on certain cancers is either probable or limited (15). Although there have been suggestions that fruit and vegetable intake may be important in weight management because they promote satiety, decrease energy intake and possibly reduces fat intake (16, 17), a recent systematic review and meta-analysis showed that increased fruit and vegetable intake alone without a compensatory reduction in total energy intake had no discernible effect on weight loss (18). With the suggestion that increased fruit and vegetable consumption can be used as a strategy to decrease the burden of several chronic diseases (2), we wish to examine the change in the intake of fruits and vegetables among

participants in the Norwegian women and cancer study (NOWAC) and also identify the significant predictors of change.

1.2 Recommended daily intake of Fruit and Vegetable and current intake in Norway

The WHO recommends consumption of vegetables and fruit (excluding potatoes and other tubers) of at least 400 g per day (19). The World Cancer Research Fund recommend 400-800 g per day, or 5 or more portions a day, of a variety of vegetables and fruits, all year-round (20). This recommendation excludes pulses (legumes) and starchy vegetables and fruits (tubers, starchy roots and plantains). In 1996, the Norwegian health authorities recommended at least 2 servings of fruit and berries and 3 servings of vegetables (including potatoes) per day, or about 750 g of fruit, vegetables and potatoes per day (21). This has since been reviewed, with the current recommendations for adults being a daily intake of 500 g of vegetables, fruits and berries (including a maximum of 100 g of juice per person for fruits and berries) with potatoes excluded. The optimal ratio is unclear but it is recommended that about half should be vegetables and the other half fruits and berries (including a maximum of 100 g of juice per person) (22).

The Norwegian health authorities conduct national dietary surveys such as *Norkost* periodically and assess the proportion of the population that meet its set goal for intake of fruits and vegetables. In the third national dietary survey (*Norkost* 3) conducted during 2010-2011, the recommended level of vegetable intake was at least 250 g per day per person and that of fruits and berries (including a maximum of 100g of juice) was at least 250 g per day per person. Diet was assessed in 862 men and 925 women aged between 18 and 70 years, the mean intake of vegetables, fruits, berries and juice were 363 g per day for men and 387 g per day for women. 34% of the male participants and 41% of the female participants met the recommended level of intake of fruits and berries. The recommended level of vegetables was achieved by about 15% of men and women (23). On the other hand, a previous cross sectional study based mainly on the first national dietary survey (*Norkost* 1) conducted in 1993-1994 reported that on average, only 8% of women and 10% of men had an absolute intake of at least 750 g/day of potatoes, vegetables, fruits, berries and juice which

was recommended then by the Norwegian Nutrition Council (24). The *Norkost* 2 survey conducted in 1997 among 1,298 men and 1,374 women reported that only 12% had intakes of at least 750 g/day. The average daily intake was 453 g and 448 g respectively among men and women which was significantly lower than the recommended intake (25). The frequency of consumption and intake in grams per day was found to be highest in the oldest age groups of women.

1.3 National promotion activities

Over the past twenty years, a variety of campaigns have been conducted to inform individuals of the benefits of fruit and vegetable consumption, with health policy objectives and international and national dietary guidelines serving as foundation for these campaigns (26). Campaigns now advise people to eat five portions of fruit and vegetables daily, adopting the well-known simple message of '5 A Day', initiated in the United States and extended to several countries (27). The 'fem om dagen' was first launched in 1996 in Norway by the National Nutrition Council and updated in 2011 encourage individuals to eat 5 portions of fruits, berries and vegetables every day. It has however been suggested that since different types of fruit and vegetables have different nutritional attributes. For example, avocado is an excellent source of vitamin E, but is also high in fat, consumers need to be encouraged to eat fruits and vegetables with a range of nutritional characteristics by emphasizing variety, e.g. by stating "eat five different fruits and vegetables a day" (28). Evaluations of the 5-a-day program show that it has increased the consumption of fruit and vegetables (29, 30) but results in Norway are not ambiguous (31).

Other national initiatives to promote fruits and vegetable consumption in Nordic countries include projects such as 'fruits and vegetables against cancer', 'Fruits and vegetables at school' and 'Green canteens' at worksites (9).

1.4 Predictors of fruit and vegetable consumption

Certain variables have been shown to influence the consumption of fruits and vegetables. The influence of these variables on fruit and vegetable intake may differ in cross sectional (baseline) and longitudinal

(change) analyses. Below are some variables that have been examined in other studies and shown to influence fruit and vegetable intake.

Age: While some studies have demonstrated that fruit and vegetable consumption increased with age (32-34), other studies reported that prevalence of low fruit and vegetable consumption tended to increase with age (35, 36).

Education: Studies have reported a positive association between fruit and vegetable consumption and education (37-40).

Income: Income is an important determinant of the consumption of fruits and vegetables. It has been shown that people living in households with higher income had a greater fruit and vegetable consumption (40, 41). It is generally assumed that because low-income families have more restricted budgets for food, their priorities are energy dense foods; therefore, fruit and vegetables may be overlooked (32). But it has been reported that in regions where fruit and vegetable consumption is more common, the lower social classes tend to consume more of these than the higher social classes as the former may have better access to cheaper fruits and vegetables (42). Another study reported that the significant association between income and fruit and vegetable consumption disappeared after the effect of education was taken into account (43).

Living with children: Living with children has been shown to have a positive influence on consumption of fruits and vegetables (44).

Region of residence: Place of living within a country is also an important determinant of fruit and vegetable consumption (26, 40, 45). This within country variation in fruit and vegetable consumption has been linked to structural characteristics such as availability (42).

Smoking status: A consistent pattern of greater intake of fruit and vegetable among non-smokers have been reported (32, 45-49). It has been suggested that this association could be due to the tendency of healthy and unhealthy habits to cluster, in particular, heavy smokers have shown the most unhealthy dietary profiles (50).

BMI: BMI has been shown to be significantly and inversely associated with fruit and vegetable consumption, so that fruit and vegetable consumption increased with decreasing BMI (32, 51).

Physical activity: Individuals who are physically more active have higher frequency of fruit and vegetable consumption than others (24, 32, 39, 52). This may be part of a general health consciousness trend (53).

Alcohol intake: A mixed association was observed. While higher consumption of fruits and vegetables was found among non-drinkers (38), other studies found that never drinkers had lower fruit and vegetable intake compared to regular and occasional drinkers (32, 54).

Dieting: While studies have shown the efficacy of high fruit and vegetable intake on weight management in overweight individuals and obese dieters beyond the effects of change in macronutrient consumption, energy intake and fiber content (55, 56), it has been suggested that further prospective investigations are necessary to elucidate the independent role of fruits and vegetables on weight control (56).

Other variables not included in our study: Meal type play an important role in fruit and vegetable intake with dinner being the most important meal for intake of vegetables while snack meals were the most important for the intake of fruits (57). Consumption of fruits and vegetables was also found to be higher among subjects who paid attention to a healthful diet (24). Consumption of fruits and vegetables have also been shown to vary across neighborhoods suggesting that factors such as socioeconomic status, psychological and social factors are important in shaping these behaviors (58). Social involvement (also referred to as social participation) and community garden participation have been reported to be significantly associated with fruit and vegetable consumption in different populations (45, 59-61). Furthermore, it has been shown that women have higher consumption of fruit and vegetables than men, which may be a result of their higher level of nutritional knowledge, as well as them being more health conscious (61). Household structure is also an important determinant of fruit and vegetable consumption (40). While it was observed that single/never married individuals consumed more fruits and vegetables compared to other marital groups (32), other studies demonstrated that married people consume more fruit

and vegetables (44, 51), while another study found no relationship (35). The manual social class and those in receipt of benefits were negatively associated with fruit and vegetable consumption (45).

1.5 Differences and trends in fruit and vegetable consumption in Europe

Fruit and vegetable intake still varies considerably between countries, in large part reflecting the prevailing economic, cultural and agricultural environments (26). In a study in 2002 to compare the consumption of fruit and vegetable among men and women from the centres participating in the European Prospective Investigation into Cancer and Nutrition (EPIC), the highest consumption of fruit and vegetables was seen in Spain (721 g/day for men in Murcia) and Italy while the lowest consumption was found in Sweden (225 g/day for men in Umea), followed by the Netherlands, Norway, the United Kingdom and Denmark (26). The study observed that women consume similar amounts of fruit and vegetables to men, except in Greece, Italy and Spain, where men have appreciably higher consumption. Within-country variation in intake, which appears to be larger in men than for women, have also been reported (26). These differences range between 36 g/day in Norway and 67 g/day in Finland for women and up to 200 g/day for men in Spain (26).

In 2014, a study was carried out to estimate total fruit and vegetable consumption for forty-five countries across eastern, central and western Europe using the food balance sheet data. Of the forty-five countries, twenty-five had fruit and vegetable consumption equal to or greater than the WHO recommended daily intake of 400 g/day and twenty had less than that amount (62). The average amount of fruit and vegetables consumed ranged from 192 g/day in Latvia to 824 g/day in Greece. Norway was ranked 24th on the hierarchy with a consumption of 417 g/day (62).

In general, fruit and vegetable consumption was highest in southern Europe (600 g/day) followed by northern Europe (434 g/day) and western Europe (387 g/day), and lowest in eastern Europe (310 g/day) (62, 63).

1.6 Aims of the study

This thesis is a prospective study which seeks to describe the change and predictors of change in fruit and vegetable intake between 1996-2005 among participants in the Norwegian women and cancer study (NOWAC) using a repeated measures design. The use of a repeated measures design provide an opportunity to understand the stability and direction of the change in diet of a population using data on the individual level. The knowledge generated can inform public health actions to increase the intake of these healthy food items.

The aims of this master thesis are to examine:

1. The predictors of fruit and vegetable intake at baseline.

2. The predictors of change in fruit and vegetable intake from baseline to second measurement.

3. The proportion of women that met the daily recommendations for fruits and vegetables at baseline and second measurement based on the current dietary guideline of 500 g/day of fruits, berries and vegetables.

2 Material and Methods

The NOWAC study is a national, population-based prospective cohort study which was initiated in 1991 (64). The primary aim of this large cohort study was to investigate the association between oral contraceptive use and breast cancer risk, but it has been expanded to other outcomes and risk factors. The study is based on sampling from the national population register of Norway to ensure representativeness and adequate external validity to estimate relative risks and population attributable fractions (65). The selected women received letters of invitation together with the questionnaire. The cohort includes 172,478 women aged 30–70 years at recruitment. Some of the women have repeated collection of information after 4-6 years (2 or 3 measurements including baseline) (64, 66).

Participants were enrolled in three main waves in a stepwise manner (appendix 1). The first participants were enrolled in 10 mailings in 1991. The second wave of enrollment took place between 1995 and 1997, and the third wave in 2003-2007. In the period 1998-2002 those in the first 24 mailings were invited to answer a second questionnaire. A third questionnaire was sent to parts of the cohort in 2004-2005 and 2011. Written reminders were sent once or twice within each mailing. Details of the NOWAC study, its scientific rationale, design, and baseline characteristics have been published elsewhere (64). The response rates for the first, second and third questionnaires were 57.5%, 81% and 79% respectively.

2.1 Subjects

For this study we included participants who had answered at least two questionnaires (two measurements) on fruit and vegetable consumption. The questionnaires used as the first measurement for this study were those completed by participants during the period 1996 –1998 (first or second questionnaire). The questionnaires used as second measurement for this study were the follow-up questionnaires completed by the same participants during the period 2002–2005 (second or third questionnaire). This was done because all of the first questionnaires did not contain a comprehensive set of fruit and vegetable questions.

Fig.2.1 Selection of the Study Population

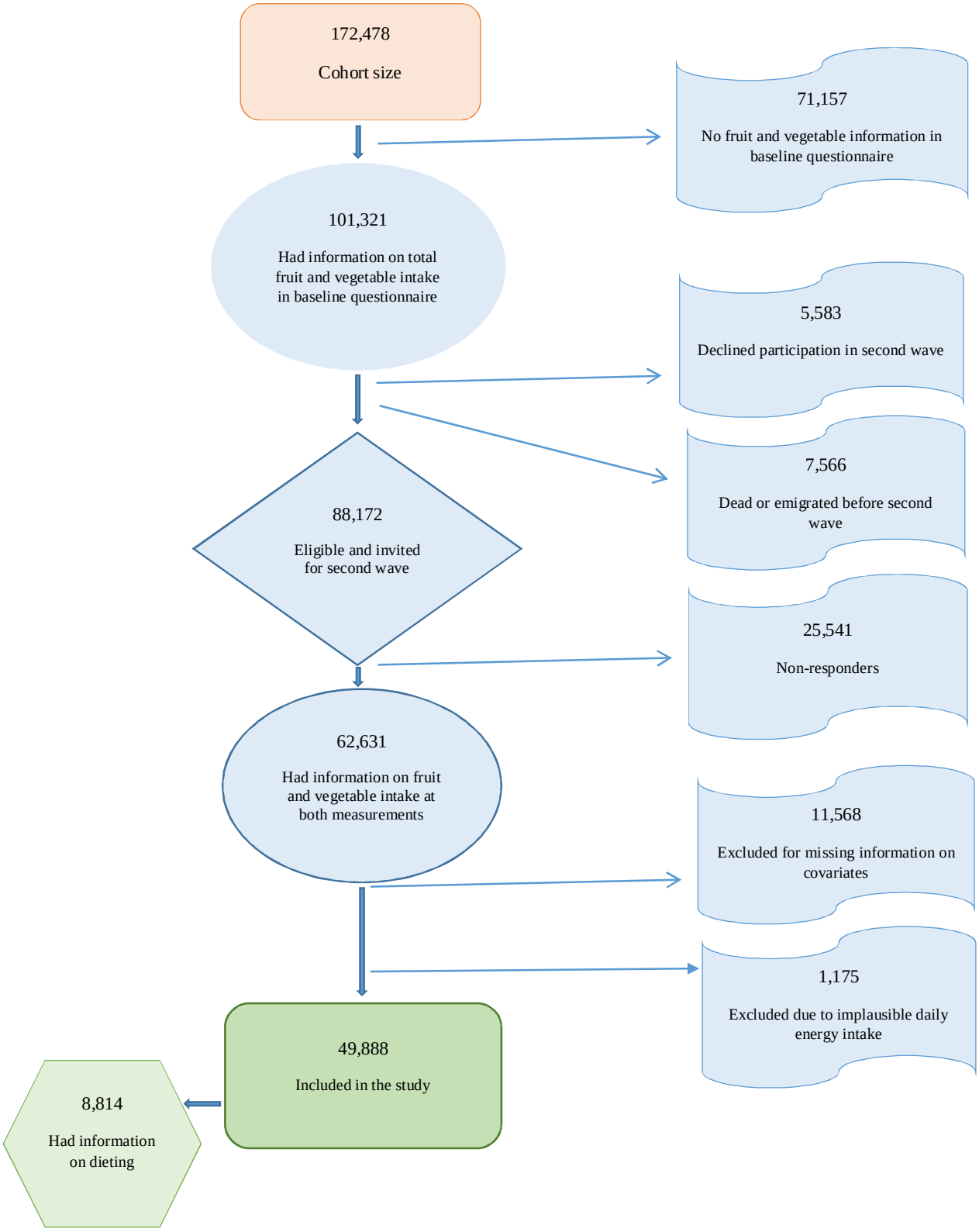

Figure 2.1 shows the selection of the study population. A total of 101,321 participants were available for inclusion in the present study based on the availability of information on fruit and vegetable consumption in their baseline questionnaires. Of this number, 88,172 were invited for the second wave. Others were either dead or emigrated (7,566) or declined to participate (5,583). We excluded 25,541 participants who were non-responders. After further exclusions of 11,568 women for baseline missing information on selected covariates, and 1,175 women due to implausible daily energy intakes (<2,500 KJ, >15,000 KJ) 49,888 women were finally included in the present analyses. We also performed separate analyses in a sub-group of 8,814 women who had information on dieting.

2.2 Measurement of Fruit and Vegetable Intake

Fruits and vegetables are commonly grouped together when discussing nutrition and health but it may be preferable to discuss them separately (57) as we have done. This is because while fruits are most commonly eaten raw, vegetables are consumed either raw or cooked. Besides, intake patterns for fruits and vegetables have been shown to differ in that they are consumed in different meals (57, 67). Also, studies have shown that the proportion that meet the recommended daily intake of fruits and vegetables differ (23). Furthermore, it has been reported that the determinants of fruit and vegetable consumption differ (67).

Intake of fruits and vegetables can be assessed in many ways, such as with use of dietary biomarkers, frequency of consumption or amount consumed (68, 69). Fruit and vegetable intake in our study was assessed using a semi-quantitative food frequency questionnaire (FFQ) which contains detailed questions on dietary habits. It consisted of a long list of specific food items and assessed the frequency with which each item was consumed and often the usual portion size consumed. The portion size was assessed by means of natural units and household measures. The participants were asked to record how often they consumed various kinds of fruits and vegetables per day during the preceding year. Seven responses were possible for fruit intake, ranging from ‘never/seldom’ to ‘two or more times per day’. For each vegetable, seven options were available ranging from ‘never/seldom’ to ‘6-7 times per week’. Three or four portion

sizes specific to each vegetable were specified and participants were asked how much they eat each time. We applied standard portions for other vegetables and onion. Standard portions were used for fruits, and only frequency of consumption was assessed. The final quantity derived from the frequency and portion size was calculated to give the daily intake in grams. The weights and portions used were derived from the Norwegian weights and measures table (70).

The fruits assessed in the NOWAC questionnaires include apples/pears, oranges, bananas, strawberries, other berries and other fruits while the vegetables include carrots, cabbage, tomatoes, onions, swede, cauliflower, mixed salad, mixed vegetables, and other vegetables. Berries were added to the fruit questions in more recent questionnaires while tomatoes and onions were added for vegetables (71).

The NOWAC FFQ has been thoroughly validated by 24-hour dietary recalls (72), a test-retest study (73) along with a study of how to handle missing values in dietary intake calculations (74) and against serum phospholipid fatty acid composition as biomarkers of fatty fish consumption (75). In a validation study comparing diet measures from a FFQ with measures from repeated 24HDR, the median calibration coefficient calculated by regression of the 24HDR data on the FFQ data was 0.57 for foods and 0.38 for nutrients. This shows that the NOWAC FFQ has good ability to rank subjects according to food eaten frequently and macronutrients expressed as percentage of energy intake (72).

2.3 Statistical Analysis

The statistical analyses were performed with IBM SPSS version 21. All p-values below 0.05 were considered statistically significant. Some independent variables had to be transformed before inclusion in the analyses-:

We calculated BMI using self-reported weight in kilograms divided by the square of self-reported height in metres. Physical activity was measured by a 10-scale categorical measure of total physical activity. In order to classify the women as never, current and former smokers, the women were asked “Have you ever smoked”, and next “If yes, are you currently a daily smoker?”. The women were also asked the number of

years of education completed. The variable 'living with children' was generated by combining the existing variables; 'household size' and 'marital status'. Women who were married/living with a partner, and reported no more than two people in the household or women who were single, widowed or divorced and reported one person in the household were categorized as 'not living with children'. Women categorized as 'living with children' were the single, widowed or divorced who reported at least two persons in the household, and the women who answered that they were married or cohabiting and reported more than two persons in the household. The median alcohol intake among drinkers in our study was 4.3 g/day. Alcohol intake was thus categorized into three (non-drinker, median and below intake, and above median intake).

The independent variables examined were income (<150,000; 150,000-300,000; 301,000-450,000; 451,000–600,000, >600,000 Norwegian Kroner (NOK)), education (≤9, 10-12 and ≥13 years), age (40–49, 50–59, >60 years), region of residence (Oslo (capital), North Norway, South Norway, East Norway, West Norway, Mid Norway), smoking status (never, former, current), body mass index (BMI [Kg/m^2]: ≤ 19.99: underweight, 20-24.99: normal weight, 25-29.99: overweight, ≥30: obese), physical activity (1-3: low, 4-7: moderate, 8-10: high), living with children (yes/no), dieting (yes/no), alcohol intake (non-drinker, median and below intake and above median intake).

For baseline data on lifestyle and socioeconomic characteristics, the intake of fruits and vegetables were presented as median intakes with their corresponding percentiles (5th and 95th). Statistical comparison between groups of the independent variables were made using Mann-Whitney U test for variables with two categories and Kruskal-Wallis test for variables with more than two categories. Median consumption of each fruit and vegetable was also computed. Finally, we computed the proportion (%) of women who ate at least 250 g day-1 of fruits and vegetables (taken separately) at each measurement; this is the minimum recommended intake in Norway.

Linear regression analyses with 95% confidence intervals (CI) were performed separately for intake of fruits and vegetables in both age-adjusted and multivariable models where all variables were mutually adjusted to examine the predictors of change. Intake of fruits or vegetables at second measurement was the

dependent variable in the linear regression analyses. All regression analyses were adjusted for fruit or vegetable intake at baseline respectively, and thus providing equal estimates as for *change* in fruit/vegetable intake as the outcomes. For instance;

Let Y= fruit and vegetable intake at second measurement

X_1 = fruit and vegetable intake at first measurement

$X_2,\ldots,X_k$ are predictors

Then

$Y\text{-}X_1$ = change in fruit and vegetable intake

The regression equation using change as dependent variable

$$Y\text{-}X_1 = \beta_0 + \beta_1X_1 + \beta_2X_2 + \ldots + \beta_kX_k$$

$$\Leftrightarrow Y = \beta_0 + (\beta_1 + 1)X_1 + \beta_2X_2 + \ldots + \beta_kX_k \qquad (1)$$

The regression equation using fruit and vegetable intake at second measurement

$$Y = \beta_0' + \beta_1'X_1 + \beta_2'X_2 + \ldots + \beta_kX_k \qquad (2)$$

Comparing (1) and (2) gives that the regression parameters are equal for the two models except for X_1, where $\beta_1' = \beta_1 + 1$

Thus, the estimated regression coefficients for all the predictors will be equal when the models are adjusted for fruit and vegetable intake at first measurement.

Separate multivariable analyses were also performed for women with information on dieting. The dependent variable was tested for normal distribution and was normalized by log-transformation because of skewness of the data distribution. Because of the zero values in the data distribution, a constant (100) was added to all the numbers during the log transformation. Results were presented as estimates (Δ) of the increase/decrease in fruit or vegetable intake per defined unit of change in the independent variable with corresponding 95% CI and P-values (76). These represent the percentage change in intake from first to

second measurement per unit change in the independent variable. The values were back-transformed from log values.

Tests for multicollinearity, outliers, normality, linearity and homoscedasticity in our linear regression analysis showed these assumptions were not violated.

2.4 Ethical Consideration and Consent

The Regional Ethical Committee of North-Norway and the Norwegian Data Inspectorate approved the NOWAC study. The women included in the NOWAC study gave informed consent.

3 Results

The mean age of the women at inclusion was 50 years. The baseline median intake of fruits and vegetables of the women in our study was 163 g/day (P5-P95: 23-472) and 120 g/day (P5-P95: 34-300) respectively, while that of the entire cohort was 167 g/day (P5-P95: 17-486) and 119 g/day (P5-P95: 27-310) respectively. Apples and pears (measured together) were the most frequently eaten fruits among the women while carrot was the most frequently eaten vegetable (appendices 5 and 6). Tests using Pearson correlation showed a significant, fair and positive correlation between fruit and vegetable intake ($r = 0.32$, $p \leq 0.001$)

3.1 Predictors of fruit and vegetable intake at baseline

Table 3.1.1 shows the fruit and vegetable intake by health-related, lifestyle and demographic baseline information from participants. Median intakes of fruits and vegetables showed that higher education, income and level of physical activity as well as alcohol intake, dieting and not living with children were all associated with higher intakes of fruit and vegetable. The underweight group had the lowest intake of fruit, while the overweight (and the normal weight) had the highest intake. Although significant, the difference in vegetable intake between the BMI-groups was less than five grams. Current smokers had the lowest fruit and vegetable intake, larger difference were seen for fruit than for vegetables. The median intake of fruits and vegetables was highest among the age group 50-59. Median intake of fruits was lowest in the age group 40-49 while the median intake of vegetables was lowest among women 60 years and older (Table 3.1.1). Women living in the north of Norway had the lowest median intakes of fruits and vegetables while the women living in the West of Norway and the capital, Oslo had the highest median intakes of fruits and vegetables respectively.

For all variables mentioned above, the differences between the categories were statistically significant. The difference in daily intake between the highest and lowest ranked categories of income, physical activity, and between the never smokers and current smokers was about ½ of a fruit. While the difference in daily intake between the highest and lowest consumers of fruit in the variables age, education, and region of

residence was about ¼ of a fruit, the difference in daily intake between the highest and lowest consumers in the variables living with children, BMI, alcohol intake and dieting was less than ¼ of a fruit.

The difference in daily intake of vegetables between the highest and lowest ranked categories of income and physical activity was well over ¼ of a vegetable whereas that observed in the categories of education, region, and alcohol intake was about ¼ of a vegetable. The difference observed between the highest and lowest consumers in the categories of dieting, BMI, living with children, and age was much less than ¼ of a vegetable.

Table 3.1.1. Median intake (g/day) of fruits and vegetables by health-related factors, lifestyle factors and demographic information of study participants (N = 49,888) at baseline

Variable		n	Fruit intake Median (P5-P95)	Vegetable intake Median (P5-P95)
Age (Years)				
	40-49	22,622	147 (20-434)	118 (34-295)
	50-59	22,714	174 (23-486) [b]	122 (33-311) [b]
	≥60	4,552	163 (17-436)	105 (25-268)
Education (Years)				
	≤9	11,582	141 (16-432)	103 (24-283)
	10-12	17,088	158 (23-467) [b]	116 (32-296) [b]
	≥13	21,218	173 (27-486)	130 (40-312)
Income (,000) NOK				
	<150	3,778	134 (7-431)	100 (19-287)
	151-300	14,731	150 (19-456)	110 (29-292)
	301-450	14,515	158 (23-456) [b]	118 (35-296) [b]
	451-600	10,607	170 (26-477)	126 (40-304)
	>600	6,257	184 (32-491)	142 (45-325)
Living with children				
	No	25,810	168 (20-486) [c]	120 (31-304) [c]
	Yes	24,078	154 (23-442)	118 (35-297)
Region				
	Oslo	4,389	167 (17-486)	131 (33-324)
	East	17,080	167 (23-483)	124 (37-308)
	South	2,282	161 (23-473) [b]	120 (38-303) [b]
	West	10,372	174 (26-486)	125 (36-311)
	Mid	3,745	161 (23-455)	117 (35-293)
	North	12,020	141 (17-423)	114 (25-271)
Smoking status				
	Never	19,333	174 (32-486)	119 (36-291)
	Former	16,514	173 (27-486) [b]	124 (35-312) [b]
	Current	14,041	126 (14-399)	113 (27-299)
BMI category				
	Underweight	3,236	142 (14-463)	116 (29-299)
	Normal weight	27,675	163 (23-472) [b]	119 (34-298) [b]
	Overweight	14,618	167 (23-477)	120 (34-300)
	Obese	4,359	151 (17-472)	120 (28-322)
Physical activity				
	Low	6,212	134 (14-424)	103 (24-279)
	Moderate	36,602	163 (23-462) [b]	119 (35-293) [b]
	High	7,074	181 (23-508)	134 (36-345)
Alcohol intake				
	Non-drinker	9,932	154 (17-474)	106 (24-286)
	Median intake & below	25,581	166 (23-473) [b]	117 (33-300) [b]
	Above median intake	14,375	162 (21-472)	131 (40-311)
Dieting[a]				
	Yes	2,943	208 (33-492) [c]	155 (50-372) [c]
	No	5,871	194 (23-491)	142 (41-337)

[a] N=8,814 [b] $p<0.05$ in Kruskal-Wallis test for significant differences in fruit or vegetable intake between groups

[c] $p<0.05$ in Mann-Witney U test for differences in fruit or vegetable intake between groups

P5-P95: 5^{th}-95^{th} percentile

3.2 Predictors of change in fruit and vegetable intake from baseline to second measurement

Table 3.2.1 Percentage change (Δ) in fruit intake from baseline to second measurement in age-adjusted linear regression analysis by baseline characteristics. The NOWAC study[1].

Lifestyle, socioeconomic and health-related variables		Δ	**95 % CI**		**p-value**	***R^2**
Adjusted for fruit intake at baseline[2]						
Age (Years) (Ref. 40 – 49)						
	50 - 59	-3	-3	-2	<0.001	0.30
	≥60	-8	-9	-7	<0.001	
Adjusted for age and fruit intake at baseline						
Education (Years) (Ref. ≤9)						
	10 - 12	2	1	3	<0.001	
	≥13	4	3	5	<0.001	0.30
Income (NOK) (ref. 301,000 – 450,000)						
	<150,000	-5	-7	-3	<0.001	
	151,000-300,000	-1	-2	0	0.07	
	451,000 – 600,000	1	0	2	0.16	0.30
	>600,000	-3	-4	-1	<0.001	
Living with children (ref. No)						
		2	1	3	<0.001	0.30
Region of residence (Ref. Oslo)						
	East (except Oslo)	1	0	3	0.07	
	South	2	0	5	0.04	
	West	3	1	4	<0.001	0.30
	Mid	-1	-3	1	0.41	
	North	1	-1	2	0.43	
Smoking status (Ref. Never)						
	Former	-3	-3	-2	<0.001	0.31
	Current	-9	-10	-8	<0.001	
BMI (Ref. Normal)						
	Underweight	-2	-3	0	0.05	
	Overweight	-1	-1	1	0.34	0.30
	Obese	-1	-3	1	0.14	
Physical activity (Ref. Moderate)						
	Low	-3	-5	-2	<0.001	0.30
	High	0	-1	1	0.55	
Alcohol intake (ref. Non-drinker)						
	Median intake and below	-2	-3	-1	<0.001	0.30
	Above median intake	-3	-5	-2	<0.001	
Dieting (ref. No)[3]						

Lifestyle, socioeconomic and health-related variables	Δ	**95 % CI**		**p-value**	***R^2**
	-4	-6	-3	<0.001	0.29

[1]n=49,888. Δ Estimates are reported as percentage change in fruit intake per defined unit of change in lifestyle/socioeconomic/dietary variable. The percentage change estimates were derived from regression with log-transformed dependent variable. The results shown are back-transformed from log values.

[2]The dependent variable was fruit intake at second measurement. Intake at second measurement adjusted for baseline intake = change

[3]n=8,814

P, significance value, CI, confidence interval; BMI, body mass index; ref., reference (Δ=0)

NOWAC: The Norwegian women and cancer study

*R^2 Variation in intake of fruit explained by variables.

Table 3.2.1 and Table 3.2.2 show the regression estimates (Δ) indicating the percentage change in fruit intake per defined unit of fruit intake per category of dietary, lifestyle or socioeconomic variable with the corresponding 95% CI and *P* values in age-adjusted and multivariable linear regression analysis respectively. From Table 3.2.1, being in the age group 50-59 or ≥60 years at baseline was associated with a decrease in fruit intake compared to being in the age group 40-49, the larger decrease was for the age group ≥60 years. More years of education was associated with an increase in fruit intake. The highest and lowest income groups were associated with a decrease in fruit intake compared to the income group 301,000-450,000 NOK. Living with children was associated with an increase in fruit intake compared to not living with children. Living in the South or West of Norway was associated with an increase in fruit intake compared to living in the capital Oslo. Being a former or current smoker was associated with a decrease in fruit intake compared to never smokers, but the decrease was larger for current smokers. Engaging in low level of physical activity was associated with a decrease in fruit intake compared to engaging in moderate level of physical activity. Consumption of alcohol and dieting were both associated with a decrease in fruit intake.

Table 3.2.2 Percentage change (Δ) in fruit intake from baseline to second measurement in multivariable linear regression analysis by baseline characteristics. The NOWAC study[1].

Lifestyle, socioeconomic and health-related variables		Δ	95 % CI		p-value
Baseline fruit intake (100 g)[2]					
		230	223	238	<0.001
Age (Years) (Ref. 40-49)					
	50-59	-2	-3	-1	<0.001
	≥60	-7	-8	-5	<0.001
Education (years) (Ref. ≤9 years)					
	10-12	1	0	2	0.03
	≥13	3	2	4	<0.001
Income (NOK) (ref. 301,000–450,000)					
	<150,000	-3	-5	-2	<0.001
	151,000-300,000	0	-1	1	0.68
	451,000–600,000	0	-1	1	0.61
	>600,000	-4	-5	-2	<0.001
Living with children (ref. No)					
		1	0	2	0.01
Region of residence (Ref. Oslo)					
	East (except Oslo)	1	-1	2	0.41
	South	1	-2	3	0.59
	West	1	0	3	0.10
	Mid	-2	-3	0	0.09
	North	0	-1	2	0.81
Smoking status (Ref. Never)					
	Former	-2	-3	-1	<0.001
	Current	-8	-9	-7	<0.001
BMI (Ref. Normal)					
	Underweight	-1	-3	0	0.12
	Overweight	0	-1	0	0.34
	Obese	-1	-3	0	0.19
Physical activity (Ref. Moderate)					
	Low	-3	-4	-1	<0.001
	High	0	-2	1	0.42
Alcohol intake (ref. Non-drinker)					
	Median intake and below	-1	-2	0	0.03
	Above median intake	-3	-4	-1	<0.001
Dieting (ref. No)[3]		-3	-5	0	0.02

[1]n=49,888. Δ Estimates are reported as percentage change in fruit intake per defined unit of change in lifestyle/socioeconomic/dietary variable. The percentage change estimates were derived from regression with log-transformed dependent variable. The results shown are back-transformed from log values.

[2]The dependent variable was fruit intake at second measurement. Intake at second measurement adjusted for baseline intake = change.

P, significance value, CI: confidence interval, BMI: body mass index, NOWAC: The Norwegian women and cancer study; ref., reference (Δ=0)

[3]Separate analysis for dieting n=8,814

R^2 Variation in intake of fruit explained by variables = 0.31

The factors most strongly associated with a decrease in fruit intake were being 60 years old or more (8%) and being a current smoker (9%). The factor most strongly associated with an increase in fruit intake was having 13 or more years of education (4%). All the results presented above are statistically significant. BMI was not a significant predictor of the change in fruit intake. After mutual adjustment (Table 3.2.2), the trend in the results were still similar but weakened and the regions of residence were no longer statistically different from the capital, Oslo. Our model explained 31% of the variation in the change in fruit intake. Baseline fruit intake was the strongest predictor of the increase in fruit intake at second measurement, with each 100 g higher intake of fruits at baseline being directly associated with a 228% higher intake of fruits at second measurement.

Table 3.2.3 Percentage change (Δ) in vegetable intake from baseline to second measurement in age-adjusted linear regression analysis by baseline characteristics. The NOWAC study[1].

Lifestyle, socioeconomic and health-related variables		Δ	95 % CI		p-value	*R^2
Adjusted for vegetable intake at baseline[2]						
Age (years) (Ref. 40 – 49)						
	50 - 59	-4	-5	-4	<0.001	0.34
	≥60	-16	-17	-15	<0.001	
Adjusted for age and vegetable intake at baseline						
Education (years) (Ref. ≤9)						
	10 - 12	5	4	6	<0.001	
	≥13	9	8	10	<0.001	0.35
Income (NOK) (ref. 301,000 – 450,000)						
	<150,000	-7	-8	-5	<0.001	
	151,000-300,000	-2	-3	-1	<0.001	
	451,000 – 600,000	3	2	4	<0.001	0.35
	>600,000	6	5	7	<0.001	
Living with child (ref. No)						
		1	0	1	0.19	0.34
Region of residence (Ref. Oslo)						
	East (except Oslo)	-1	-2	0	0.14	
	South	0	-2	2	0.88	
	West	0	-1	1	0.95	0.35
	Mid	-1	-3	0	0.06	
	North	-9	-10	-8	<0.001	
Smoking status (Ref. Never)						
	Former	1	1	2	<0.001	0.34
	Current	-3	-3	-2	<0.001	
BMI (Ref. Normal)						
	Underweight	0	-1	1	0.71	
	Overweight	0	-1	1	0.37	0.34
	Obese	1	0	3	0.02	
Physical activity (Ref. Moderate)						
	Low	-4	-5	-3	<0.001	0.34
	High	1	1	2	<0.001	
Alcohol intake (ref. Non-drinker)						
	Median intake and below	3	2	4	<0.001	0.34
	Above median intake	6	5	7	<0.001	
Dieting (ref. No)[3]						
		-1	-2	1	0.39	0.30

[1]n=49,888. Δ Estimates are reported as percentage change in vegetable intake per defined unit of change in lifestyle/socioeconomic/dietary variable. The percentage change estimates were derived from regression with log-transformed dependent variable. The results shown are back-transformed from log values.

[2]The dependent variable was vegetable intake at second measurement. Intake at second measurement adjusted for baseline intake = change.

[3]n=8,814.

P, significance value; CI, confidence interval; BMI, body mass index; ref., reference (Δ=0)

NOWAC: The Norwegian women and cancer study

*R^2 Variation in intake of vegetable explained by variables.

Table 3.2.3 and Table 3.2.4 show the regression estimates (Δ) indicating the percentage change in vegetable intake per defined unit of vegetable intake per category of dietary, lifestyle or socioeconomic variable with the corresponding 95% CI and *P* values in age-adjusted and multivariable linear regression analysis respectively. From table 3.2.3, being in the age groups 50-59 and ≥60 years at baseline compared to the reference age group 40-49 was associated with a decrease in vegetable intake, the decrease being larger for the age group ≥60 years. Compared to having 9 or less years of education, having between 10-12 years and 13 or more years of education was associated with an increase in vegetable intake, and the increase was found to be larger with higher levels of education. The income groups below the reference group (301,000-450,000 NOK) had a progressive decrease in vegetable intake while those above the reference group had a progressive increase. Living in the north of Norway was associated with a decrease in vegetable intake compared to living in the capital Oslo. Being a former or current smoker was associated with an increase and decrease in vegetable intake respectively compared to never smokers. Being obese was associated with an increase in vegetable intake compared to having a normal weight. Engaging in low level of physical activity or high level of physical activity was associated with a decrease and increase in vegetable intake respectively compared to engaging in moderate level of physical activity. Alcohol consumption was associated with an increase in vegetable intake.

Table 3.2.4 Percentage change (Δ) in vegetable intake from baseline to second measurement in multivariable linear regression analysis by baseline characteristics. The NOWAC study[1].

Lifestyle, socioeconomic and health-related variables		Δ	95 % CI		p-value
Baseline vegetable intake (100 g)[2]					
		285	277	294	<0.001
Age (years) (Ref. 40-49)					
	50-59	-3	-4	-2	<0.001
	≥60	-10	-12	-9	<0.001
Education (years) (Ref. ≤9 years)					
	10-12	3	2	4	<0.001
	≥13	5	4	6	<0.001
Income (NOK) (ref. 301,000–450,000)					
	<150,000	-4	-5	-2	<0.001
	151,000-300,000	-1	-2	0	<0.001
	451,000–600,000	2	1	2	<0.001
	>600,000	4	3	5	<0.001
Living with children (ref. No)					
		1	0	1	0.05
Region of residence (Ref. Oslo)					
	East (except Oslo)	0	-1	1	0.80
	South	1	-1	3	0.22
	West	1	0	2	0.05
	Mid	0	-2	1	0.89
	North	-6	-7	-5	<0.001
Smoking status (Ref. Never)					
	Former	1	0	2	<0.001
	Current	0	-1	1	0.96
BMI (Ref. Normal)					
	Underweight	0	-2	1	0.46
	Overweight	2	1	2	<0.001
	Obese	4	3	5	<0.001
Physical activity (Ref. Moderate)					
	Low	-4	-4	-3	<0.001
	High	2	1	3	<0.001
Alcohol intake (ref. Non-drinker)					
	Median intake and below	2	1	3	<0.001
	Above median intake	4	3	5	<0.001
Dieting (ref. No)[3]		0	-2	2	0.96

[1]n=49,888. Δ Estimates are reported as percentage change in vegetable intake per defined unit of change in lifestyle/socioeconomic/dietary variable. The percentage change estimates were derived from regression with log-transformed dependent variable. The results shown are back-transformed from log values.

P, significance value; CI, confidence interval; BMI, body mass index; NOWAC, The Norwegian women and cancer study; ref., reference (Δ=0)

[2]The dependent variable was vegetable intake at second measurement. Intake at second measurement adjusted for baseline intake = change.

[3]Separate analysis for dieting n=8,814

R^2 Variation in intake of vegetable explained by variables = 0.36

Some of the factors most strongly associated with a decrease in vegetable intake were being 60 years old or more (16%), living in the north (9%), being in the lowest income category (7%) and low level of physical activity (4%). The factors most strongly associated with an increase in vegetable intake were having 13 or more years of education (9%), being in the highest income category (6%), and alcohol consumption above the median intake (6%). All the results presented above are statistically significant. Living with children and dieting were not significant predictors of the change in vegetable intake. After mutual adjustment (Table 3.2.4), the trend in the results were still similar but weakened while obesity had become stronger. However, being a current smoker was no longer a significant predictor of the change in vegetable intake. Our model explained 36% of the variation in the change in vegetable intake. Baseline vegetable intake was the strongest predictor of the increase in vegetable intake at second measurement with each 100 g higher intake of vegetables at baseline being directly associated with a 278% higher intake in vegetables at second measurement.

3.3 Proportion of women that met the recommended daily intake of fruit and vegetables

At baseline, 27% of the women met the recommended daily intake of fruits while 10% met the recommended daily intake of vegetables. At second measurement, 35% met the recommended daily intake of fruits and 20% met the recommended daily intake of vegetables. When fruit and vegetables were measured together (500 g), 16% and 26% of the women met the recommended daily intake at baseline and second measurement respectively.

4 Discussion

Accurate determination of fruit and vegetable intake is essential for research that seeks to determine current fruit and vegetable intake patterns, what type and amount of fruit and vegetable consumption is optimal for human health and for evaluating interventions developed to increase consumption (4). Also, to promote healthy eating behavior, the appropriate influential factors need to be identified and considered for designing health promotion programs (32).

The predictors of fruit and vegetable intake at baseline (cross sectional) and the predictors of change (longitudinal) may be different hence the need for separate evaluation. A previous study reported that some variables had parallel influences on fruit and vegetable intake of children and adolescents in cross sectional and longitudinal research settings (77). Nonetheless, the discussion on predictors of change (section 4.2) will be more elaborate since it is the focus of the thesis.

4.1 Predictors of fruit and vegetable intake at baseline

Our results are in agreement with those from other cross sectional studies where higher fruit and vegetable intake was observed with higher education (32), income (40, 41) and level of physical activity (24, 32, 39, 52) as well as alcohol intake (32, 54), dieting (55, 56) and not living with children (44). Lower intake of fruit and vegetable was observed with lower BMI as reported in other studies (32, 51). Smokers had lower fruit and vegetable intake compared to other groups which is in agreement with other studies (32, 45-49).

The influence of age on fruit and vegetable intake observed in our study is similar to that from previous studies which reported that people over 50 years pay more attention to their health status and health behaviors including fruit and vegetable intake (78, 79). Another study reported that fruit and vegetable intake increased with age for the age group 18-64 years and suggested that intake among people over this age range may be influenced by reverse causation as the aging process can lead to a decreased appetite among the elderly (32). The influence of place of living on fruit and vegetable intake observed in our study had been previously reported in Norway (26, 40) and elsewhere (45).

4.2 Predictors of Change in Fruit and Vegetable intake from baseline to second measurement

We deliberately included cross sectional studies for comparison in our discussion due to few longitudinal studies available (77).

Age: While our result is concordant with a previous cross-sectional study which reported that prevalence of low fruit and vegetable consumption tended to increase with age (36), results from another longitudinal study (33) and a cross sectional study (80) in subjects of similar age groups have reported that older women had higher consumption of fruits and vegetable. The *Norkost 2* survey conducted in 1997 also showed a progressively higher intake in both the frequency and amount in grams per day of fruits and vegetables consumed from the age group 40-49 years through the age group 70-79 years (25). From our result, we could speculate that younger women will still be employed and are more often constrained by time to prepare regular meals and may thus opt for fruits and vegetables which require little or no preparation. Also, the younger women might be more aware and receptive to campaigns aimed at increasing fruit and vegetable intake.

Alcohol intake: Alcohol intake showed contrasting results with fruit and vegetable intake. While the never drinkers were associated with an increase in fruit intake, consistent with other studies which reported that higher consumption of fruit and vegetable was found among non-drinkers (38, 81), drinkers in our study were associated with an increase in vegetable intake which was congruent with other studies which reported that never drinkers had lower fruit and vegetable intake compared to regular and occasional drinkers (32, 54).

Body mass index (BMI): Previously, a negative association was reported between BMI and fruit and vegetable intake in a cross sectional study (35) and a longitudinal study (51). This is similar to our results for fruit intake but different for vegetable intake that increased with increasing BMI. Fruits are known to have higher sugar content than vegetables, and therefore may be associated with higher risk of overweight

if consumed in excess (82). This may be an explanation for the decreased fruit intake observed with increasing BMI.

Dieting: Although studies (55, 56) have shown the efficacy of high fruit and vegetable intake on weight management in overweight individuals and dieters, we observed that dieting was associated with a decrease in fruit intake. The dieters in our study were probably switching to other dietary products since there is no clinical evidence on the effect of fruits on weight loss without compensatory reduction in energy intake (18). Such products include the high protein diet, provided mainly by animal sources, which severely restricts other foods like fruits and vegetables, and has become very popular (83).

Living with children: As stated earlier, living with children has been reported to have a positive influence on fruit and vegetable consumption (44), which agrees with the increase in fruit and vegetable intake observed in our study. However, that of the latter was only marginally significant. Mothers' fruit and vegetable consumption patterns play an essential role in shaping the food preferences and fruit and vegetable consumption pattern of the children (84). The presence of children in the home may have had an influence on the increase in fruit and vegetable intake of these women. However, women have raised the difficulty in persuading children to eat more vegetables (85).

Income: As mentioned in the literature review, higher income has been associated with higher consumption of fruits and vegetables (32, 37, 40-42). While our findings for vegetable intake are similar to those obtained in the studies listed above, the results for fruit intake were different – higher income was associated with a decrease in fruit intake in our study. The positive association between high income and fruit and vegetable consumption has been attributed to the assumption that low-income families have more restricted budgets for food, therefore their priorities will be energy-dense foods thereby overlooking fruits and vegetables (32). But since we found the opposite, we speculate that with higher income in Norway, trends rather than income will likely determine intake.

Education: The increase in fruit and vegetables intake with more years of education that we observed is consistent with other cross sectional studies that have reported positive associations between fruit and vegetable consumption and education (37-40). Higher levels of education may increase the ability to obtain and understand dietary information needed to develop health-promoting behaviors and beliefs in the field of food habits (86).

Smoking status: The decrease in fruit intake with smoking is congruent with other studies (32, 45-49) as mentioned earlier. It has been suggested that this association could be due to the tendency of healthy and unhealthy habits to cluster, in particular, heavy smokers have shown the most unhealthy dietary profiles (50). Another plausible explanation given is that some physiological properties of tobacco smoking, affecting taste and smell, could modify food preferences (87). Ironically, this is in contrast with smokers' requirements because they usually need more antioxidants to protect cell membranes from oxidative damages caused by smoking, and fruit and vegetables are known as a main source of vitamin C and other antioxidants (32). Meanwhile, the increase in vegetable intake among former smokers in our study is congruent with other cross sectional studies which showed that former smokers consumed more vegetables than never or current smokers (39, 46). It was suggested that quitting smoking might go together with favorable changes in other lifestyle factors, including diet, because of an increase in health consciousness (39).

Physical activity: The increase in fruit and vegetable intake with higher levels of physical activity we observed is similar to that obtained in other studies where sedentary people were found to have lower consumption of fruits and vegetables than others (24, 39, 52). This association may be part of a general health consciousness trend (53).

Region of residence: Previous studies have reported that place of living influences fruit and vegetable consumption (26, 40, 45). Region of residence was not a clear predictor of the change in fruit and vegetable intake in our study as only two of the regions were significantly different from the capital, Oslo. However, within-country variation of 36 g/day of fruit and vegetable intake in Norway has been reported (26). Similar

variations were observed in our study at first and second measurements; 33 g/day & 36 g/day for fruits and 17 g/day & 48 g/day for vegetables respectively. This regional variation in fruit and vegetable consumption has been linked to structural characteristics such as availability (42). But we surmise that cultural factors like traditional foods may have influenced the regional differences observed in our study.

The results of this study highlights the significant predictors of fruit and vegetable intake among Norwegian women. Different factors may influence various populations' consumption of fruits and vegetables and identifying these correlates is an important first step for designing health promotion programs and specific actions to improve fruit and vegetable intake by low consumers (32, 35, 88). We observed that age, living with children and dieting had contrasting effects on fruit and vegetable intake in our cross sectional and longitudinal analysis. Fruit and vegetable intake increased with age, women not living with children had higher intakes of fruits and vegetables compared to women living with children and dieters had higher intakes compared to non-dieters in our cross sectional analysis but the reverse was the case in our longitudinal analysis. We did not find studies that examined the effect of these variables both in a cross sectional and longitudinal analysis to compare this effect with, we thus recommend further studies to elucidate this finding. However, this may be a point to consider when planning and implementing programs aimed at increasing fruit and vegetable intake. Education, smoking, BMI, physical activity, alcohol intake, and income had the same influence on fruit and vegetable intake in our cross sectional and longitudinal analysis.

4.3 Recommended Daily Intake of Fruits and Vegetables at Baseline and Second Measurement

Studies in Norway and elsewhere show that a substantial gap exists between the recommended level and the actual intake of fruits and vegetables among populations (3, 24, 32, 37, 89). A previous cross sectional study based mainly on the nationwide dietary survey (*Norkos*t 1) conducted in 1993-1994 among 3,144

Norwegians showed that only 8% of the 1,627 women who participated in the survey had an absolute intake of at least 750 g/day of fruits, vegetables, berries, juice and potatoes combined recommended then by the Norwegian Nutrition Council (24). In the *Norkost* 2 survey conducted in 1997 among 1,298 men and 1,374 women which was based on the same recommended daily intake as in *Norkost* 1, only 12% of the participants had consumptions of at least this amount (25). In the third national dietary survey (*Norkost* 3) conducted during 2010-2011 among 925 women and 862 men, intake of fruits and vegetables were measured separately. Fruits were measured to include berries and a maximum of 100 g of juice with the recommended daily intake set at 500 g/day of fruits and vegetables. 41% and 13% respectively of the women who participated in the survey met the recommended daily intake of fruits and vegetables (23). While the recommended intake of 500 g/day of fruits and vegetables (excluding potatoes) was used in *Norkost* 3 and in our study, the recommended intake of 750 g/day of fruits and vegetables (including potatoes) was used during *Norkost* 1 & 2 thereby making it difficult to compare. This may explain some of the difference in results between the surveys. Notwithstanding, there appears to be a progressive increase in the proportion of women that met the recommended daily intake of fruits and vegetables over time given the fact that the absolute intake of fruits and vegetables reportedly witnessed an increase between the period 1999-2009 where wholesale consumption of vegetables increased from 61 to 74 kg per person per year and wholesale consumption of fruits increased from 69 to 89 kg per person per year (90). When we added a maximum of 100g of juice per day to the calculation of fruit intake (result not shown), 41% and 46% of the 27,450 women with this information met the recommended daily intake of fruit at baseline and second measurement respectively. With the addition of juice in our calculation for fruit intake, the result was close to that obtained in *Norkost* 3 despite its use of the 24HDR whereas the FFQ was used in our study. Our result (without fruit juice) was similar to that of a previous cross sectional study conducted among European mothers which reported that only 27% of the 9,070 participants met the recommended daily intake for fruits when juice was excluded (3). This shows that inclusion of juice in the calculation of fruit intake has a clear impact on the number of women in the NOWAC study who were classified as meeting the recommended daily intake. Among other reasons, we measured fruits and vegetables separately to ascertain the proportion

of women that met the recommended daily intake of each. When fruits and vegetables were measured together, the proportion of women who met the recommended daily intake was higher than those of women who met the recommended daily intake for vegetables alone and lower than those of women who met the recommended daily intake for fruits. This implies that fruits have a larger impact on the proportion that meet the recommended daily intake for fruits and vegetables combined.

At both baseline and second measurement, the consumption of vegetables was consistently lower than fruit, similar to results obtained in a previous cross sectional study (3). However, the median vegetable consumption of the study population increased from baseline to second measurement by 28% compared to that of fruit which increased by 17%. This may be due to the fruit questions being essentially unchanged, while new questions have been added for vegetable in more recent questionnaires. Strawberries and other berries which were added to more recent questionnaires on fruit intake does not contribute much to the total intake of fruits. Our results are congruent with that from another study in Norway which reported that wholesale consumption of vegetables from 1990 to 2005 increased by 15% from 55 kg to 63 kg while that of fruits increased by 14% from 72 kg to 82 kg. It also noted that while consumer surveys show that consumption of vegetables increased from 1996 to 2004 by 9%, consumption of fruits increased by 5% per person per day during this period (31). But a previous study in our cohort on the dietary change among cancer survivors and cancer-free women reported that fruit consumption increased more than the vegetable consumption despite the increased number of vegetable questions (71). This inconsistency may be due to differences in analysis, adjustments and exclusion criteria. While the study had a healthier sample, we included women with complete information and had more variables in the regression analysis. Also, fruit intake has been previously described as satisfactory across Europe while vegetable intake has been described as marginal (3). The larger increase in vegetable intake we observed may be partly due to campaigns during this period, though not specifically targeted at vegetables, to increase consumption of fruits and vegetables through national campaigns (29, 30).

4.4 Strengths, Weaknesses and Confounding

4.4.1 Strengths

The main strength of this study is its large sample size and the fact that the sample is population-based. Although women in the NOWAC cohort are on average slightly more educated than the general population, the external validity of the NOWAC study instruments has been found acceptable (65). The motivation for this thesis was borne out of the fact that most studies on fruit and vegetable intake in Norway are cross sectional. This is the first Norwegian study to examine the change in fruit and vegetable consumption in a cohort using the repeated measures design. This method gives a more precise estimate of the direction of the consumption of fruits and vegetables in a population and allow the detection of within person change over time than cross sectional designs (91).

4.4.2 Weaknesses

The first weakness of this study is that self-measured variables like BMI, physical activity, diabetes, alcohol intake as well as juice intake could be susceptible to respondent bias in the form of under or over reporting. But as mentioned earlier, the NOWAC diet questions have been validated, as has the question on physical activity (92), and BMI (93), and the results are in the same range as those found in other cohorts. Secondly, the use of the FFQ in assessing fruit and vegetable intake. While the FFQ is somewhat accurate in ranking individuals by intake, it is not very accurate in assessing actual intake (94) as longer FFQ tend to overestimate actual intake (95). Besides the FFQ and other self-reported methods of assessing dietary intake are susceptible to social desirability influences (96, 97) in contrast to objective methods of assessing dietary intake like the use of biomarkers (98). However, a study in this same cohort to compare diet measures from FFQ with measures from 24HDR, Spearman's correlation coefficients between food intake from the FFQ and the 24HDRs was 0.61 for fruits and 0.32 for vegetables which showed that the NOWAC FFQ had good ability to rank subjects according to foods eaten frequently and macronutrients expressed as percentage of energy intake (72). Overall, the relative validity was found to be within the range observed in other European Prospective investigation into Cancer (EPIC) cohorts (99, 100). Thirdly, there were several exclusions made due to non-response. Thus, the analytical sample were younger than the baseline sample

(1.78 years), had slightly higher education (0.47 years), and slightly lower BMI (0.32 kg/m^2). But the median intakes of fruit and vegetable of the samples were very similar. Moreover, there was little we could do to minimize this weakness. Fourthly, the time lag between the period of data collection and this study may be a weakness. However, since this is a prospective study, we believe the findings can still contribute to an understanding of the factors that influence these women's intake of fruits and vegetables. Nonetheless, some of the findings might be influenced by time trends specific to the period covered and we therefore advocate for analysis with recent data which will perhaps give results that will reflect current trends. Fifthly, juice was excluded from the calculation of fruits in our study because we did not have the information for most of the women. Similarly, the third questionnaire sent to parts of the cohort was not used because few women got it. These would have led to further exclusions and a much reduced analytical sample but could have demonstrated whether the trends persisted. On the other hand, this would have required more advanced statistical analyses which are beyond the scope of this thesis.

4.4.3 Confounding

Confounding may be a source of concern. For instance, younger women tend to be more physically active while older women tend to have a healthier diet and generally eat less. In addition, healthy dietary habits tend to be associated with other healthy lifestyle habits (101). But we believe this may have been minimized by adjusting for many possible confounders in the multivariable regression analysis. And as noted earlier, this did not affect the estimate much but we cannot rule out residual confounding.

4.5 Future Studies

From a public health perspective what is required is evidence about the effects of what people eat, in order to frame advice about change (or maintenance) of habits to reduce risks, while ensuring optimal functional levels (100). We suggest that further studies use the repeated measures design to examine if the trend in fruits and vegetables intake continue and possible associations between current intake levels and health outcomes. This will ensure that those charged with guiding public health have the best possible information upon which to make difficult decisions (100).

In retrospect, we would have liked to examine the effect of occupation on the change in fruit and vegetable intake. While a previous cross sectional study had reported that both male and female white-collar workers had higher intakes of fruits and vegetables than blue-collar workers (102), another cross sectional study noted that occupation categories were not related to fruit and vegetable intake (88). We would have also liked to examine the effect of social involvement on fruit and vegetable consumption in our cohort considering the positive associations that have been reported in other populations (59, 60, 103). Other variables like health consciousness, diseases, interest in health, food/diet trends and psychological variables could have been included too. Our R^2 was in the range of 0.3-0.36. The R^2 for the multivariable model was close to the age-adjusted model; none of the predictors added much explanatory power to the age-adjusted model. Including some of these variables may have explained more of the variation in the fruit and vegetable intake.

Future studies could also examine tracking of fruit and vegetable intake in the adult population. Tracking can be defined as the stability of health-related behaviors over time or as stability in rank at the group level (104). Some studies have investigated tracking of dietary patterns or nutrient intake in pre-school children (105, 106). Exploring when, how and why dietary changes occur over time is critical to being able to develop strategies for interventions (106).

5 Conclusion

The current study showed that there was an increase in the intake of fruits and vegetables among women in the NOWAC study. The proportion fulfilling the recommendations was similar to what is found in national dietary surveys. We observed that the increased intake was higher for vegetables than for fruits. Also, the proportion of women who met the recommended daily intake of fruits and vegetables increased from baseline to second measurement, but majority still don't fulfill the recommendations. The use of repeated measures is necessary to continue the monitoring and also to understand the stability and direction of the possible change in diet of a population. It will also give more precise estimates of the associations between fruit and vegetable intake and human health.

The intake of fruit and vegetables was influenced by lifestyle, socioeconomic and health related factors. We observed similar predictors for fruit and vegetables. However, some of these predictors showed contrasting effects on fruit and vegetable intake in our cross sectional and longitudinal analysis.

Since continued attention to increasing fruit and vegetable consumption is a practical and important way to optimize nutrition to reduce disease and maximize good health (107), these influential factors should be considered when planning intervention programs and health campaigns.

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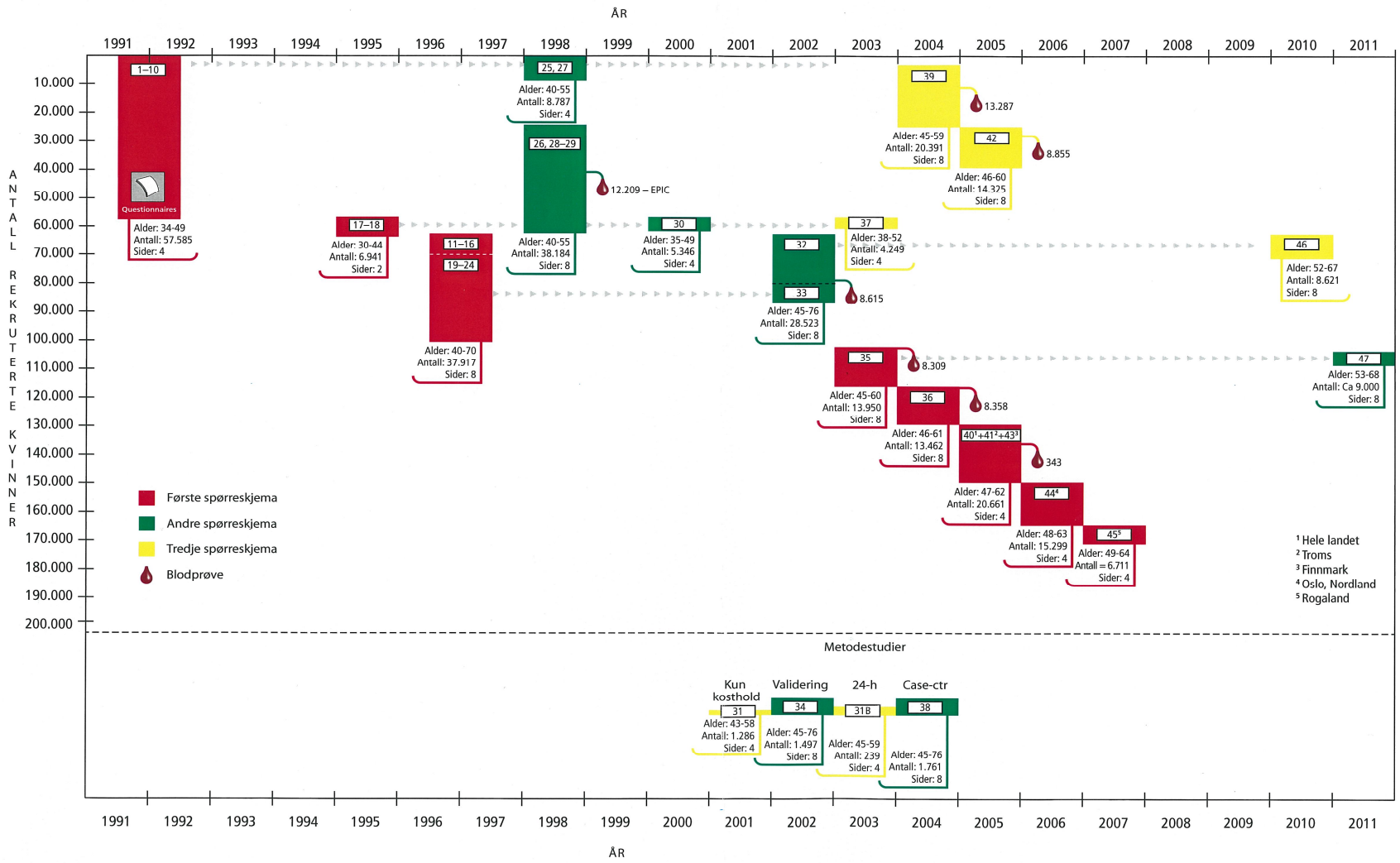
Appendices

Appendix 1 The NOWAC timeline



Appendix 2. Median intake (g/day) of fruits and vegetables at second measurement by health-related factors, lifestyle factors and demographic information of study participants (N = 49,888).

Variable		n	Fruit intake Median (P5-P95)	Vegetable intake Median (P5-P95)
Age (Years)				
	40-49	22,622	183 (23-486)	159 (46-377)
	50-59	22,714	203 (22-500) [b]	152 (36-373) [b]
	≥60	4,552	170 (16-481)	108 (19-288)
Education (Years)				
	≤9	11,582	168 (16-486)	121 (23-332)
	10-12	17,088	184 (23-486) [b]	149 (39-362) [b]
	≥13	21,218	208 (30-506)	169 (50-390)
Income (,000) NOK				
	<150	3,778	158 (7-486)	111 (17-342)
	151-300	14,731	181 (19-486)	135 (31-356)
	301-450	14,515	192 (25-486) [b]	150 (42-365) [b]
	451-600	10,607	208 (29-508)	168 (51-371)
	>600	6,257	208 (23-503)	187 (54-426)
Living with children				
	No	25,810	187 (17-488) [c]	144 (32-364) [c]
	Yes	24,078	192 (25-486)	158 (43-375)
Region				
	Oslo	4,389	197 (16-489)	168 (42-395)
	East	17,080	193 (23-502)	160 (43-380)
	South	2,282	197 (25-488) [b]	159 (47-384) [b]
	West	10,372	208 (26-506)	164 (42-384)
	Mid	3,745	181 (23-486)	155 (44-373)
	North	12,020	172 (19-486)	120 (26-313)
Smoking status				
	Never	19,333	208 (34-499)	151 (40-357)
	Former	16,514	208 (26-502) [b]	158 (41-386) [b]
	Current	14,041	149 (9-472)	143 (31-368)
BMI(kg/m^2)				
	Underweight	3,236	177 (16-486)	152 (35-375)
	Normal weight	27,675	192 (23-486) [b]	151 (39-366) [b]
	Overweight	14,618	189 (23-492)	149 (36-370)
	Obese	4,359	183 (17-486)	153 (31-387)
Physical activity				
	Low	6,212	162 (14-483)	129 (26-343)
	Moderate	36,602	192 (23-486) [b]	152 (40-364) [b]
	High	7,074	208 (23-528)	167 (37-413)
Alcohol intake				
	Non-drinker	9,932	189 (17-495)	129 (26-348)
	Median intake & below	25,581	191 (23-489) [b]	148 (38-367) [b]
	Above median intake	14,375	188 (20-486)	170 (49-386)
Dieting[a]				
	Yes	2,943	169 (7-479) [c]	197 (41-454) [c]
	No	5,871	177 (7-486)	191 (40-455)

[a] N=8,814 [b] p<0.05 in Kruskal-Wallis test for significant differences in fruit and vegetable intake between groups

[c] p<0.05 in Mann-Witney U test for differences in fruit and vegetable intake between groups

P5-P95: 5th-95th percentile

Appendix 3. Median intake (g/day) of fruits at baseline and second measurement

	Baseline measurement Median (P5-P95)	Second measurement Median (P5-P95)
Apple and pears	60 (0-280)	60 (0-280)
Banana	16 (0-110)	16 (0-110)
Orange	20 (0-140)	20 (0-140)
Strawberry	-	2 (0-4)
Other fruits	14 (0-96)	41 (0-96)

P5-P95: 5^{th} – 95^{th} percentile

Appendix 4. Median intake (g/day) of vegetables at baseline and second measurement

	Baseline measurement Median (P5-P95)	Second measurement Median (P5-P95)
Broccoli/cauliflower	18 (0-93)	21 (0-133)
Cabbage	2 (0-20)	2 (0-15)
Carrot	35 (5-113)	35 (3-113)
Mix salad	17 (0-101)	17 (0-101)
Onions	-	10 (0-34)
Other vegetables	3 (0-44)	7 (0-46)
Rutabaga	4 (0-30)	4 (0-30)
Tomato	14 (0-64)	16 (0-64)
Vegetable mix	5 (0-60)	5 (0-60)

P5-P95: 5^{th} – 95^{th} percentile

Appendix 5 Sample of NOWAC questionnaire (Series 28 & 29)

Høst 1998

KVINNER OG KREFT

KONFIDENSIELT

uts. 28 + 29

Hvis du samtykker i å være med, sett kryss for JA i ruten ved siden av. Dersom du ikke ønsker å delta kan du unngå purring ved å sette kryss for NEI og returnere skjemaet i vedlagte svarkonvolutt.

Hvis du vil være med, så ber vi deg fylle ut spørreskjemaet så nøye som mulig, se orienteringen på brosjyren for nærmere opplysninger.

Med vennlig hilsen

Eiliv Lund
Professor dr. med

Jeg samtykker i å delta i spørreskjema-undersøkelsen	JA ☐ NEI ☐

I hvilken kommune har du bodd lengre enn ett år?

Kommune:	Alder	
1. Fødested:	Fra 0 år	til ☐ år
2.	Fra ☐ år	til ☐ år
3.	Fra ☐ år	til ☐ år
4.	Fra ☐ år	til ☐ år
5.	Fra ☐ år	til ☐ år
6.	Fra ☐ år	til ☐ år
7.	Fra ☐ år	til ☐ år

Menstruasjonsforhold

Er menstruasjonen din;

- ☐ Regelmessig (naturlig)
- ☐ Uregelmessig
- ☐ Uteblitt pga. legemiddelbruk, sykdom, trening, annet
- ☐ Sluttet/stoppet

Hvis du ikke har menstruasjon;

- har den stoppet av seg selv? ..... ☐
- operert vekk begge eggstokkene? ..... ☐
- operert vekk livmoren? ..... ☐
- annet, angi ..... ☐

Alder da menstruasjonen opphørte? ..... år

Graviditeter etter 1991

Fyll ut for hvert barn du har født etter 1991 fødselsår og antall måneder du ammet (fylles også ut for dødfødte eller for barn som er døde senere i livet). Dersom du ikke har født barn, fortsetter du ved neste spørsmål.

Barn Nr.:	Fødselsår	Antall måneder med amming

P-Pillebruk etter 1991

Har du noen gang brukt p-piller, minipiller inkludert, etter 1991? ☐ Ja ☐ Nei

Bruker du p-piller nå? ☐ Ja ☐ Nei

Vi vil be deg om å besvare spørsmålene om p-pillebruk etter 1991 mer nøye. For hver periode med sammenhengende bruk av samme p-pille merke håper vi du kan si oss hvor gammel du var da du startet, hvor lenge du brukte det samme p-pillemerket og navnet på p-pillene.
Dersom du har tatt opphold eller skiftet merke, skal du besvare spørsmålene for en ny periode. Dersom du ikke husker navnet på p-pillen, sett usikker. For å hjelpe deg til å huske navnet på p-pille merkene ber vi deg bruke den vedlagte brosjyren som viser bilder av p-pille- merker som har vært solgt i Norge. Vennligst oppgi også nummeret på p-pillen som står i brosjyren.

Årstall	Alder ved start	Brukt samme p-pille sammenhengende år	måneder	Nr.	P-pillene (se brosjyren) Navn

Hormonspiral

Har du noengang brukt hormonspiral (Levonova)? ☐ Ja ☐ Nei

Hvis Ja; hvor lenge har du brukt hormonspiral i alt? ..... år

Hvor gammel var du første gang du du fikk innsatt hormonspiral? ..... år

Bruker du hormonspiral nå? ☐ Ja ☐ Nei

Holdning til bruk av østrogen

Hvilket av følgende alternativer dekker best ditt syn på østrogenbehandling i forbindelse med overgangsalderen (sett ett kryss)

- Positivt - en hjelp som bør tilbys alle kvinner ☐
- Et nødvendig onde- bør bare brukes av de med store plager ☐
- Negativt- bør ikke «klusse med naturen» ☐

Bruk av hormonpreparater med østrogen i overgangsalderen

Har du noen gang brukt østrogentabletter/plaster?

☐ Ja ☐ Nei

Hvis Ja; hvor lenge har du brukt østrogentabletter/plaster i alt? ..... år

Hvis du har brukt østrogenpreparater i *kun 1 år eller mindre;* hvorfor har du brukt midlene så kort tid?

- Har nettopp startet behandlingen ☐
- Er kvitt plagene ☐
- Redd for skadevirkninger ☐
- Fikk plagsomme bivirkninger ☐
- Annet ☐

Hvor gammel var du første gang du brukte østrogentabletter/plaster? ..... år

Hvorfor begynte du å bruke østrogentabletter/plaster?

- Lindre plager i overgangsalderen (hetetokter, uopplagthet, underlivsplager mm) ☐
- Forebygge benskjørhet (osteoporose) ☐
- Forebygge hjerte/kar sykdom ☐
- Annet ☐

Bruker du tabletter/plaster nå? ☐ Ja ☐ Nei

UTFYLLENDE SPØRSMÅL TIL ALLE SOM HAR BRUKT ELLER BRUKER PREPARATER MED ØSTROGEN I FORM AV TABLETTER ELLER PLASTER.

For hver periode med sammenhengende bruk av samme østrogenpreparat håper vi du kan si oss hvor gammel du var da du startet, hvor lenge du brukte det samme østrogenpreparatet, og navnet på dette. Dersom du har tatt opphold eller skiftet merke, skal du besvare spørsmålene for en ny periode. Dersom du ikke husker navnet på østrogenpreparatet sett «usikker». For å hjelpe deg til å huske navnet på østrogenpreparatene ber vi deg bruke den vedlagte brosjyren som viser bilder av østrogenpreparater som har vært solgt i Norge. Vennligst oppgi også nummer på østrogentabletten/plasteret som står i brosjyren.

Periode	Alder ved start	Brukt samme østrogen-tablett/plaster Sammenhengende år	måned	Østrogentablett/ plaster (se brosjyre) Nr.	Navn
Første					
Andre					
Tredje					
Fjerde					
Femte					

Har østrogenpreparatene gitt deg bivirkninger? ☐ Ja ☐ Nei

Hvis Ja; kryss av for hvilke bivirkninger:

- Uregelmessige blødninger ☐
- Brystspenning ☐
- Kvalme/magesmerter ☐
- Hodepine ☐
- Hudreaksjoner ☐
- Vektøkning ☐ ☐ Ant kg
- Annet ..... ☐

Førte de overnevnte bivirkninger til at du forandret østrogenbehandlingen din? ☐ Ja ☐ Nei

Hvis ja;

- Skiftet østrogenpreparat ☐
- Sluttet ☐
- Annet, angi ☐

Østrogenpreparat til lokal bruk i skjeden

Har du noen gang brukt østrogenkrem/stikkpille? ☐ Ja ☐ Nei

Bruker du krem/stikkpille nå? ☐ Ja ☐ Nei

Selvopplevd helse

Oppfatter du din egen helse som; (Sett ett kryss)

☐ meget god ☐ god ☐ dårlig ☐ meget dårlig

Sykdom

Har du eller har du hatt noen av følgende sykdommer?

	Ja	Nei	Hvis Ja: Alder ved start
Høyt blodtrykk	☐	☐	
Hjertesvikt/hjertekrampe	☐	☐	
Årebetennelse	☐	☐	
Blodpropp i legg eller lår	☐	☐	
Hjerteinfarkt	☐	☐	
Slag	☐	☐	
Migrene	☐	☐	
Epilepsi	☐	☐	
Sukkersyke (diabetes)	☐	☐	
Endometriose	☐	☐	
Hypothyreose	☐	☐	
Depresjon (oppsøkt lege)	☐	☐	

For følgende tilstander kryss av for hvilket år tilstanden oppsto eller angi årstall for perioden før 1991.

	før 91	91	92	93	94	95	96	97	98
Muskelsmerter (myalgi)	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fibromyalgi/Fibrositt	☐	☐	☐	☐	☐	☐	☐	☐	☐
Kronisk tretthetssyndrom	☐	☐	☐	☐	☐	☐	☐	☐	☐
Ryggsmerter ukjent årsak	☐	☐	☐	☐	☐	☐	☐	☐	☐
Nakkeslengskade	☐	☐	☐	☐	☐	☐	☐	☐	☐
Osteoporose/(b.skjørhet)	☐	☐	☐	☐	☐	☐	☐	☐	☐
Brudd									
Underarmen (håndledd)	☐	☐	☐	☐	☐	☐	☐	☐	☐
Ryggvirvel (kompresjon)	☐	☐	☐	☐	☐	☐	☐	☐	☐
Andre brudd angi :.....	☐	☐	☐	☐	☐	☐	☐	☐	☐

Sosiale forhold

Er du: (Sett ett kryss) ☐ gift ☐ samboer ☐ annet

Hvor mange personer er det i ditt hushold? .....

Yrke? .....

Hvor høy er bruttoinntekten i husholdet pr. år?

☐ under 150 000 kr ☐ 151 000–300 000 kr
☐ 301 000–450 000 kr ☐ 451 000–600 000 kr
☐ over 600 000 kr

Røykevaner

	Ja	Nei
Har du noen gang røkt?	☐	☐

Hvis Ja, ber vi deg om å fylle ut hvor mange sigaretter du i gjennomsnitt røkte pr. dag i perioden 1991-1998.

	Antall sigaretter hver dag						
Årstall	0	1-4	5-9	10-14	15-19	20-24	25+
1991-94							
1995-98							

	Ja	Nei
Røker du daglig nå?	☐	☐
Bor du sammen med noen som røker?	☐	☐

Hvis Ja, hvor mange sigaretter røker de til sammen pr. dag? .....

Brystkreft i nærmeste familie

Har noen nære slektninger hatt brystkreft;

	Ja	Nei	Vet ikke	Alder ved start
datter	☐	☐	☐	☐
mor	☐	☐	☐	☐
mormor	☐	☐	☐	☐
farmor	☐	☐	☐	☐
søster	☐	☐	☐	☐

Hvor mange helsøsken har du? ☐ **Søstre** ☐ **Brødre**
(oppgi antall)

Hvilket nummer i søskenflokken er du? Nummer ☐

Undersøkelser for kreft

Hvor ofte undersøker du brystene dine selv?
(sett ett kryss)

Aldri ..... ☐
Uregelmessig ..... ☐
Regelmessig (omtrent hver måned) ..... ☐

Går du til regelmessig undersøkelse av brystene dine med mammografi? (sett ett kryss)

Nei ..... ☐
Ja, med to års mellomrom eller mindre ..... ☐
Ja, med to års mellomrom ..... ☐

Fysisk aktivitet

Vi ber deg angi din fysiske aktivitet etter en skala fra svært lite til svært mye. Skalaen nedenfor går fra 1-10. Med fysisk aktivitet mener vi både arbeid i hjemmet og i yrkeslivet, samt trening og annen fysisk aktivitet som turgåing o.l. Sett ring rundt det tallet som best angir ditt nivå av fysisk aktivitet.

Alder	Svært lite									Svært mye
30 år	1	2	3	4	5	6	7	8	9	10
I dag	1	2	3	4	5	6	7	8	9	10

Hvor mange timer pr. dag i gjennomsnitt går eller spaserer du utendørs?

	mindre enn ½ time	½-1 time	1-2 timer	mer enn 2 timer
Vinter				
Vår				
Sommer				
Høst				

	Ja	Nei
Arbeider du utendørs i yrkessammenheng?	☐	☐

Hvis ja:
hvor mange timer pr. uke? .....Sommer .....vinter

Høyde og vekt

Hvor høy er du? ..... cm

Hvor mye veier du i dag? ..... kg

Kosthold

Vi er interessert i å få kjennskap til hvordan kostholdet ditt er **vanligvis.** Kryss av for hvert spørsmål om hvor ofte du **i gjennomsnitt siste året** har brukt den aktuelle matvaren, og hvor mye du pleier å spise/drikke hver gang.

Hvor mange glass melk drikker du vanligvis av hver type? (Sett ett kryss pr. linje)

	aldri/ sjelden	1-4 pr. uke	5-6 pr. uke	1 pr. dag	2-3 pr. dag	4+ pr. dag
Helmelk (søt, sur)	☐	☐	☐	☐	☐	☐
Lettmelk (søt, sur)	☐	☐	☐	☐	☐	☐
Skummet (søt, sur)	☐	☐	☐	☐	☐	☐

Hvor mange kopper kaffe drikker du vanligvis av hver sort? (Sett ett kryss for hver linje)

	aldri/ sjelden	1-6 pr. uke	1 pr. dag	2-3 pr. dag	4-5 pr. dag	6-7 pr. dag	8+ pr. dag
Kokekaffe	☐	☐	☐	☐	☐	☐	☐
Traktekaffe	☐	☐	☐	☐	☐	☐	☐
Pulverkaffe	☐	☐	☐	☐	☐	☐	☐

Hvor mange glass juice, saft og brus drikker du vanligvis? (Sett ett kryss for hver linje)

	aldri/ sjelden	1-3 pr. uke	4-6 pr. uke	1 pr. dag	2-3 pr. dag	4+ pr. dag
Appelsinjuice	☐	☐	☐	☐	☐	☐
Saft/brus med sukker	☐	☐	☐	☐	☐	☐
Saft/brus sukkerfri	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du yoghurt (1 beger)? (Sett ett kryss)

☐ aldri/sjelden ☐ 1 pr. uke ☐ 2-3 pr. uke ☐ 4+ pr. uke

Hvor ofte har du i gjennomsnitt siste året spist kornblanding, havregryn eller müsli? (Sett ett kryss)

☐ aldri/nesten aldri ☐ 1-3 pr. uke ☐ 4-6 pr. uke ☐ 1 pr. dag

Hvor mange skiver brød/rundstykker og knekkebrød/skonrokker spiser du vanligvis?
(1/2 rundstykke = 1 brødskive) (Sett ett kryss for hver linje)

	aldri/ sjelden	1-4 pr. uke	5-7 pr. uke	2-3 pr. dag	4-5 pr. dag	6+ pr. dag
Grovt brød						
Fint brød						
Knekkebrød o.l.						

Nedenfor er det spørsmål om bruk av ulike påleggstyper. Vi spør om hvor mange brødskiver med det aktuelle pålegget du pleier å spise. Dersom du også bruker matvarene i andre sammenhenger enn til brød (f. eks. til vafler, frokostblandinger, grøt), ber vi om at du tar med dette når du besvarer spørsmålene.

På hvor mange brødskiver bruker du? (Sett ett kryss pr. linje)

	0 pr. uke	1-3 pr. uke	4-6 pr. uke	1 pr. dag	2-3 pr. dag	4+ pr. dag
Syltetøy og annet søtt pålegg						
Brun ost, helfet						
Brun ost, halvfet/mager						
Hvit ost, helfet						
Hvit ost, halvfet/mager						
Kjøttpålegg, leverpostei						

Videre kommer spørsmål om fiskepålegg.
På hvor mange brødskiver pr. uke har du i gjennomsnitt siste året spist? (Sett ett kryss pr. linje)

	0 pr. uke	1 pr. uke	2-3 pr. uke	4-6 pr. uke	7-9 pr. uke	10+ pr. uke
Makrell i tomat, røkt makrell						
Kaviar						
Annet fiskepålegg						

Hva slags fett bruker du vanligvis på brødet?
(Sett gjerne flere kryss)

☐ bruker ikke fett på brødet
☐ smør
☐ hard margarin (f. eks. Per, Melange)
☐ myk margarin (f. eks. Soft)
☐ smørblandet margarin (f. eks. Bremykt)
☐ Brelett
☐ lettmargarin (f. eks. Soft light, Letta)

Dersom du bruker fett på brødet, hvor tykt lag pleier du smøre på? (En kuvertpakke med margarin veier 12 gram).
(Sett ett kryss)

☐ skrapet (3 g) ☐ tynt lag (5 g) ☐ godt dekket (8 g)
☐ tykt lag (12 g)

Hvor ofte spiser du frukt? (Sett ett kryss pr. linje)

	aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2-4 pr. uke	5-6 pr. uke	1 pr. dag	2+ pr. dag
Epler/pærer							
Appelsiner o.l.							
Bananer							
Annen frukt (f.eks. druer, fersken)							

Hvor ofte spiser du ulike typer grønnsaker?
(Sett ett kryss pr. linje)

	aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2 pr. uke	3 pr. uke	4-5 pr. uke	6-7 pr. uke
Gulrøtter							
Kål							
Kålrot							
Broccoli/blomkål							
Blandet salat							
Grønnsakblanding (frossen)							
Andre grønnsaker							

For de grønnsakene du spiser, kryss av for hvor mye du spiser hver gang. (Sett ett kryss for hver sort)

- gulrøtter ☐ 1/2 stk. ☐ 1 stk. ☐ 1 1/2 stk. ☐ 2+ stk.
- kål ☐ 1/2 dl ☐ 1 dl ☐ 1 1/2 dl ☐ 2+ dl
- kålrot ☐ 1/2 dl ☐ 1 dl ☐ 1 1/2 dl ☐ 2+ dl
- broccoli/blomkål ☐ 1-2 buketter ☐ 3-4 buketter ☐ 5+ buketter
- blandet salat ☐ 1 dl ☐ 2 dl ☐ 3 dl ☐ 4+ dl
- grønnsakblanding ☐ 1/2 dl ☐ 1 dl ☐ 2 dl ☐ 3+ dl

Hvor mange poteter spiser du vanligvis (kokte, stekte, mos)? (Sett ett kryss)

☐ spiser ikke/spiser sjelden poteter
☐ 1-4 pr. uke ☐ 5-6 pr. uke
☐ 1 pr. dag ☐ 2 pr. dag
☐ 3 pr. dag ☐ 4+ pr dag

Hvor ofte bruker du ris og spaghetti/makaroni ?
(Sett ett kryss pr. linje)

	aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2 pr. uke	3+ pr. uke
Ris					
Spaghetti, makaroni					

Hvor ofte spiser du risengrynsgrøt? (Sett ett kryss)

☐ aldri/sjelden ☐ 1 pr. mnd ☐ 2-3 pr. mnd ☐ 1+ pr. uke

Hva slags fett blir vanligvis brukt til matlaging i din husholdning? (Sett gjerne flere kryss)

☐ smør
☐ hard margarin (f. eks. Per, Melange)
☐ myk margarin (f. eks. Soft)
☐ smørblandet margarin (f. eks. Bremykt)
☐ soyaolje ☐ olivenolje ☐ maisolje

Fisk

Vi vil gjerne vite hvor ofte du pleier å spise fisk, og ber deg fylle ut spørsmålene om fiskeforbruk så godt du kan. Tilgangen på fisk kan variere gjennom året. Vær vennlig å markere i hvilke årstider du spiser de ulike fiskeslagene.

	aldri/ sjelden	like mye hele året	vinter	vår	sommer	høst
Torsk, sei, hyse, lyr						
Steinbit, flyndre, uer						
Laks, ørret						
Makrell						
Sild						

Med tanke på de periodene av året der du spiser fisk, hvor ofte pleier du å spise følgende? (Sett ett kryss pr. linje)

	aldri/ sjelden	1 pr. mnd	2-3 pr. mnd	1 pr. uke	2 pr. uke	3+ pr. uke
Kokt torsk, sei, hyse, lyr						
Stekt torsk, sei, hyse, lyr						
Steinbit, flyndre, uer						
Laks, ørret						
Makrell						
Sild						

Dersom du spiser fisk, hvor mye spiser du vanligvis pr. gang? (1 skive/stykke = 150 gram)
(Sett ett kryss for hver linje)

- kokt fisk (skive) ☐ 1 ☐ 1,5 ☐ 2 ☐ 3+
- stekt fisk (stykke) ☐ 1 ☐ 1,5 ☐ 2 ☐ 3+

Hvor mange ganger pr. år spiser du fiskeinnmat?
(Sett ett kryss pr. linje)

	0	1-3	4-6	7-9	10+
Rogn	☐	☐	☐	☐	☐
Fiskelever	☐	☐	☐	☐	☐

Dersom du spiser fiskelever, hvor mange spiseskjeer pleier du å spise hver gang? (Sett ett kryss)

☐ 1 ☐ 2 ☐ 3-4 ☐ 5-6 ☐ 7+

Hvor ofte bruker du følgende typer fiskemat?
(Sett ett kryss pr. linje)

	aldri/ sjelden	1 pr. mnd	2-3 pr. mnd	1 pr. uke	2+ pr. uke
Fiskekaker/pudding/ boller					
Plukkfisk, fiskegrateng					
Frityrfisk, fiskepinner					
Andre fiskeretter					

Hvor stor mengde pleier du vanligvis å spise av de ulike rettene? (Sett ett kryss for hver linje)

- fiskekaker/pudding/boller (stk.) (2 fiskeboller=1 fiskekake) ☐ 1 ☐ 2 ☐ 3 ☐ 4+
- plukkfisk, fiskegrateng (dl) ☐ 1-2 ☐ 3-4 ☐ 5+
- frityrfisk, fiskepinner (stk.) ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7+

Hvor ofte spiser du skalldyr (f. eks. reker, krabbe)?
(Sett ett kryss)

aldri/ sjelden	1 pr. mnd	2-3 pr mnd	1+ pr. uke
☐	☐	☐	☐

I tillegg til informasjon om fiskeforbruk er det viktig å få kartlagt hvilket tilbehør som blir servert til fisk. Hvor ofte bruker du følgende til fisk? (Sett ett kryss pr. linje)

	aldri/ sjelden	1 pr. mnd	2-3 pr. mnd	1 pr. uke	2+ pr. uke
Smeltet eller fast margarin/fett					
Seterrømme (35%)					
Lettrømme (20%)					
Saus med fett (hvit/brun)					
Saus uten fett (hvit/brun)					

For de ulike typene tilbehør du bruker til fisk, vær vennlig å kryss av for hvor mye du vanligvis pleier spise.

- smeltet/fast fett (ss) ☐ 1/2 ☐ 1 ☐ 2 ☐ 3 ☐ 4+
- seterrømme (ss) ☐ 1/2 ☐ 1 ☐ 2 ☐ 3 ☐ 4+
- lettrømme (ss) ☐ 1/2 ☐ 1 ☐ 2 ☐ 3 ☐ 4+
- saus med fett (dl) ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ 1 ☐ 2+
- saus uten fett (dl) ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ 1 ☐ 2+

Andre matvarer

Hvor ofte spiser du følgende kjøtt- og fjærkreretter?
(Sett ett kryss for hver rett)

	aldri/ sjelden	1 pr. mnd	2-3 pr. mnd	1 pr. uke	2+ pr. uke
Steik (okse, svin, får)					
Koteletter					
Biff					
Kjøttkaker, karbonader					
Pølser					
Gryterett, lapskaus					
Pizza m/kjøtt					
Kylling					
Andre kjøttretter					

Dersom du spiser følgende retter, oppgi mengden du vanligvis spiser: (Sett ett kryss for hver linje)

- steik (skiver) ☐ 1 ☐ 2 ☐ 3 ☐ 4+
- koteletter (stk.) ☐ 1/2 ☐ 1 ☐ 1,5 ☐ 2+
- kjøttkaker, karbonader (stk.) ☐ 1 ☐ 2 ☐ 3 ☐ 4+
- pølser (stk. à 150g) ☐ 1/2 ☐ 1 ☐ 1,5 ☐ 2+
- gryterett, lapskaus (dl) ☐ 1-2 ☐ 3 ☐ 4 ☐ 5+
- pizza m/kjøtt (stykke à 100 g) ☐ 1 ☐ 2 ☐ 3 ☐ 4+

Hvor mange egg spiser du vanligvis i løpet av en uke (stekte, kokte, eggerøre, omelett)? (Sett ett kryss)

☐ 0 ☐ 1 ☐ 2 ☐ 3-4 ☐ 5-6 ☐ 7+

Vi ber deg fylle ut hovedrettene til middag en gang til som en oppsummering. Kryss av i den ruten som passer hvor ofte du i gjennomsnitt i løpet av siste år har spist slik mat til middag

	5+ pr. uke	4 pr. uke	3 pr. uke	2 pr. uke	1 pr. uke	2-3 pr. mnd	1 pr. mnd	nesten aldri
Rent kjøtt	☐	☐	☐	☐	☐	☐	☐	☐
Oppmalt kjøtt	☐	☐	☐	☐	☐	☐	☐	☐
Fet fisk (makrell, laks o.l.)	☐	☐	☐	☐	☐	☐	☐	☐
Mager fisk (torsk o.l.)	☐	☐	☐	☐	☐	☐	☐	☐
Fiskemat	☐	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du iskrem (til dessert, krone-is osv.)?
(Sett ett kryss for hvor ofte du spiser iskrem om sommeren, og ett kryss for resten av året)

	aldri/ sjelden	1-3 pr mnd	1 pr. uke	2-3 pr. uke	4+ pr. uke
– om sommeren	☐	☐	☐	☐	☐
– resten av året	☐	☐	☐	☐	☐

Hvor mye is spiser du vanligvis pr. gang? (Sett ett kryss)

☐ 1 dl ☐ 2 dl ☐ 3 dl ☐ 4+ dl

Hvor ofte spiser du bakervarer som boller, kaker, wienerbrød, vafler, småkaker? (Sett ett kryss)

	aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2-3 pr. uke	4-6 pr. uke	7+ pr. uke
Gjærbakst(boller)						
Kaker						
Pannekaker						
Vafler						
Småkaker						

Hvor ofte spiser du dessert? (Sett ett kryss)

	aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2-3 pr. uke	4-6 pr. uke	7+ pr. uke
Pudding Sjokolade/karamell						
Riskrem, fromasj						
Kompott, fruktgrøt hermetisk frukt						

Hvor ofte spiser du sjokolade? (Sett ett kryss)

☐ aldri/sjelden ☐ 1-3 pr. mnd ☐ 1 pr. uke
☐ 2-3 pr. uke ☐ 4-6 pr. uke ☐ 1+ pr. dag

Dersom du spiser sjokolade, hvor mye pleier du vanligvis å spise hver gang? Tenk deg størrelsen på en Kvikk-Lunsj sjokolade, og oppgi hvor mye du spiser i forhold til den.

☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ 1 ☐ 1,5 ☐ 2+

Hvor ofte spiser du salt snacks? (Sett ett kryss)

	aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2-3 pr. uke	4-6 pr. uke	7+ pr. uke
Potetchips						
Peanøtter						

Tilberedningsmåte

Har du mikrobølgeovn? ☐ Ja ☐ Nei

Hvis Ja; hvor mange ganger pr. uke bruker du mikrobølgeovnen til ganger pr. uke

middagslaging? .....
annet? .....

Hvilken farve foretrekker du på stekeskorpen?

☐ Lys brun ☐ Middels ☐ Mørk brun

Hvor ofte spiser du stekt eller grillet mat?

	aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2-3 pr. uke	4-6 pr. uke	7+ pr. uke
Mørkt kjøtt (biff ol.)						
Lyst kjøtt (kylling ol.)						
Oppmalt kjøtt (kjøttkaker ol.)						
Bacon						
Fisk						

Bruker du stekefettet eller sjyen etter steking?

☐ nei, aldri ☐ av og til
☐ som oftest ☐ ja, alltid

Tran og fiskeoljekapsler

Bruker du tran (flytende)? ☐ Ja ☐ Nei

Hvis ja; hvor ofte tar du tran?
Sett ett kryss for hver linje.

	aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2-6 pr. uke	daglig
- om vinteren	☐	☐	☐	☐	☐
- resten av året	☐	☐	☐	☐	☐

Hvor mye tran pleier du å ta hver gang?

☐ 1 ts ☐ 1/2ss ☐ 1+ss

Bruker du tranpiller/kapsler? ☐ Ja ☐ Nei

Hvis ja; hvor ofte tar du tranpiller/kapsler?
Sett ett kryss for hver linje.

	aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2-6 pr. uke	daglig
- om vinteren	☐	☐	☐	☐	☐
- resten av året	☐	☐	☐	☐	☐

Hvilken type tranpiller/kapsler bruker du vanligvis, og hvor mange pleier du å ta hver gang?

	ja	antall pr. gang
Møllers trankapsler	☐	.....
Møllers omega-3 kapsler	☐	.....
Møllers dobbel	☐	.....
annet, navn	☐	.....

Bruker du fiskeoljekapsler? ☐ Ja ☐ Nei

Hvis ja; hvor ofte tar du fiskeoljekapsler?

aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2-6 pr. uke	daglig
☐	☐	☐	☐	☐

Hvilken type fiskeoljekapsler bruker du vanligvis, og hvor mange pleier du å ta hver gang?

	ja	antall pr. gang
Triomar	☐	.....
Almarin	☐	.....
Nycomed Omega-3	☐	.....
annet, navn	☐	.....

Kosttilskudd

Bruker du annet kosttilskudd (eks. vitaminer, mineraler)? ☐ Ja ☐ Nei

Hvis ja; hvor ofte tar du slike kosttilskudd?

aldri/ sjelden	1-3 pr. mnd	1 pr. uke	2-6 pr. uke	daglig
☐	☐	☐	☐	☐

Navn .....

Alkohol

Er du total avholdskvinne? ☐ Ja ☐ Nei

Hvis Nei, hvor ofte og hvor mye drakk du i gjennomsnitt siste året? (Sett ett kryss for hver linje)

	aldri/ sjelden	1 pr. mnd	2-3 pr. mnd	1 pr. uke	2-4 pr. uke	5-6 pr. uke	1+ pr. dag
Øl (½ L)	☐	☐	☐	☐	☐	☐	☐
Vin (glass)	☐	☐	☐	☐	☐	☐	☐
Brennevin (drinker)	☐	☐	☐	☐	☐	☐	☐

Solvaner

Får du fregner når du soler deg? ☐ Ja ☐ Nei

Hvor mange føflekker har du sammenlagt på begge armer (fra fingertuppene til skuldrene)?

☐ 0 ☐ 1-10 ☐ 11-50 ☐ 51+

Hvor mange uregelmessige føflekker større enn 5 mm har du sammenlagt på begge armene (fra fingrene til armhulene)? Tre eksempler på føflekker større enn 5 mm med uregelmessig form er vist i nedenfor.

☐ 0 ☐ 1 ☐ 2-3 ☐ 4-6 ☐ 7-12 ☐ 13-24 ☐ 25+

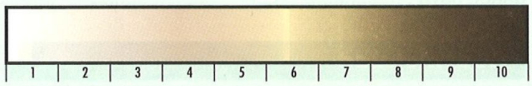
Hvor mange små, regelmessige føflekker har du sammenlagt på begge armene (fra fingrene til armhulene)?

☐ 0 ☐ 1-10 ☐ 11-50 ☐ 51+

Hva er din opprinnelige hårfarge? (sett ett kryss)

☐ mørkbrunt, svart ☐ brun ☐ blond, gul ☐ rød

For å kunne studere effekten av soling på risiko for hudkreft ber vi deg gi opplysninger om hudfarge
Sett ett kryss på den fargen som best passer din hudfarge (uten soling)



Hvor ofte dusjer eller bader du?

	Mer enn 1 g dagl	1 g dagl	4-6 g pr. uke	2-3 g pr. uke	1 g pr. uke	2-3 g pr. mnd.	Sjelden aldri
Med såpe/shampo							
Uten såpe/shampo							

Hvor mange ganger pr. år er du blitt forbrent av solen slik at du har fått svie og blemmer med avflassing etterpå? (ett kryss for hver aldersgruppe)

Årstall	Aldri	Høyst 1 gang pr. år	2-3 g. pr. år	4-5 g. pr. år	6 eller flere ganger
1991-94					
1995-98					

Hvor mange uker soler du deg pr. år i syden?

Årstall	Aldri	1 uke	2-3 uker	4-5 uker	7 uker eller mer
1991-94					
1995-98					

Hvor mange uker pr. år soler du deg i Norge eller utenfor syden?

Årstall	Aldri	1 uke	2-3 uker	4-5 uker	7 uker eller mer
1991-94					
1995-98					

Når bruker du krem med solfaktor (sett evt. flere kryss):

☐ påsken ☐ i Norge eller utenfor syden ☐ solferie i syden

Hvilke solfaktorer bruker du i disse periodene?

	påsken	i Norge eller utenfor syden	solferie i syden
- I dag	.....	.....	.....
- For 10 år siden	.....	.....	.....

Hvilke solkremmerker bruker du? Angi faktor hvis du husker.

	Ja	faktor		Ja	faktor
Piz Buin	☐	....	Cosmica	☐	....
Ambre Solairé	☐	....	Natusan	☐	....
HTH	☐	....	Delial	☐	....
Andre, angi navn.....		....			

Hvor ofte har du solt deg i solarium?

Alder	Aldri	Sjelden	1 gang pr. mnd.	2 ganger pr. mnd.	3-4 ganger pr. mnd	oftere enn1 gang pr. uke
1991-94						
1995-98						

Til slutt vil vi spørre deg om ditt samtykke til å kontakte deg på nytt pr. post.
Vi vil hente adressen fra det sentrale personregister.

☐ Ja ☐ Nei

Takk for at du ville delta i undersøkelsen

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