Nausea and vomiting in pregnancy: effects on maternal diet, health, and birth outcomes.

An investigation using the Norwegian Mother and Child Cohort Study

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Summary

Background: Nausea and vomiting in pregnancy (NVP), sometimes referred to as morning sickness, is a common condition which accompanies gestation, particularly during the first trimester. Prevalence for this condition is estimated to be 50-90% of all pregnancies. There is currently no clear understanding of the aetiology of NVP, although pregnancy hormones are often suspected as being involved. Limited research has been conducted on consequences for mother and offspring suffering NVP. The aim of this study was to evaluate the diet, gestational health, pregnancy, and birth outcomes for women with NVP or nausea alone (NP), as compared to symptom-free (SF) women.

Data material: >51,000 pregnancies from the Norwegian Mother and Child Cohort Study (MoBa), merged with the Medical birth registry of Norway (MBRN).

Results: The results showed the NVP group of women were significantly younger, shorter and heavier than the SF group. The NVP group had the highest proportions with an education ≤12 years, with an income <300,000 NOK, and being non-smokers 3 months prior to and during pregnancy. They also had the highest total mean energy intake, with the highest absolute intake of all macronutrients, except for monounsaturated fat and fibre. Significantly more women in the NVP group increased their intake of meat, vegetables, water, and sugar-containing or artificially sweetened soft drinks as a result of the pregnancy. By contrast, significantly more SF women introduced probiotic containing dairy foods and chocolate. The NVP women had the highest proportion experiencing dietary change, by either representing the highest proportion eating more or less than before the pregnancy. Women with NVP and NP had higher odds for gestational complications such as pelvic girdle pain (PGP), high blood pressure and proteinuria, yet reduced odds for pregnancy complications such as preterm birth, and low birth weight infants. The NP and NVP women had higher odds for having female infants.When we analysed the association between NP/NVP and PGP further, we found that the NP/NVP women with PGP during pregnancy had a higher prevalence of PGP also 4-6 months post-partum compared to the SF group. This association suggests a common pathway between NP/NVP and PGP.

Conclusions: We found women with NVP to be characterised by high intakes of carbohydrates and added sugar, primarily from sugar-containing soft drinks. These women also had a higher degree of dietary change compared to SF women. Women with NP and NVP were found more likely to develop pregnancy complications, yet displayed mostly favourable delivery and birth outcomes. An association found between NP/NVP and PGP during pregnancy and post-partum is shown here for the first time.

List of papers

I Arthur Chortatos, Margaretha Haugen, Per Ole Iversen, Åse Vikanes, Per Magnus, Marit B Veierød

Nausea and vomiting in pregnancy: associations with maternal gestational diet and lifestyle factors in the Norwegian Mother and Child Cohort Study

BJOG, 120 (2013) 1642 -1653

II Arthur Chortatos, Margaretha Haugen, Per Ole Iversen, Marit B Veierød

Dietary changes during first trimester pregnancy for women with nausea and vomiting in the Norwegian Mother and Child Cohort Study

The Norwegian Journal of Epidemiology, 24 (2014) 147-53

III Arthur Chortatos, Margaretha Haugen, Per Ole Iversen, Åse Vikanes, Malin Eberhard-Gran, Elisabeth Krefting Bjelland, Per Magnus, Marit B Veierød

Pregnancy complications and birth outcomes among women experiencing nausea only or nausea and vomiting during pregnancy in the Norwegian Mother and Child Cohort Study

BMC Pregnancy Childbirth, 15 (2015) 167-77

IV Arthur Chortatos, Per Ole Iversen, Margaretha Haugen, Malin Eberhard-Gran, Elisabeth Krefting Bjelland, Marit B Veierød

Nausea and vomiting in pregnancy – association with pelvic girdle pain during pregnancy and 4-6 months post-partum

Submitted

Abbreviations

5-HT_3 receptors - 5-hydroxytryptamine, or serotonin, receptor of unique structure

17-OHP - 17-hydroxyprogesterone, a hormone produced by the corpus luteum

ADH - Anti diuretic hormone

AFLP - Acute fatty liver of pregnancy

ANOVA - Analysis of variance

aOR - Adjusted odds ratio

B.C.E. - Before the Common/Current Era

BMI - Body mass index (kg/m^2)

CI - Confidence interval

CL - Corpus luteum

cOR - Crude odds ratio

E% - Energy percent, the proportion of the total energy intake from different macronutrients

ED - Eating disorders

ESR2 - A gene coding for an estrogen receptor

GIT - Gastro-intestinal tract

GWG - Gestational weight gain

hCG - Human chorionic gonadotropin

HELLP - Haemolytic anaemia, elevated liver enzymes and low Platelet count

HG - Hyperemesis gravidarum

HTR3C - A subunit of a serotonin receptor

IBS - Irritable bowel syndrome

MBRN - Medical Birth Registry of Norway

mmHG - Millimetres of mercury

MoBa - The Norwegian Mother and Child Cohort Study

NP - Nausea alone in pregnancy

NVP - Nausea and vomiting in pregnancy

PGP - Pelvic girdle pain

PMS - Premenstrual syndrome

Q1-4 - Questionnaire number

SF - Symptom-free for nausea only or nausea and vomiting in pregnancy

SGA - Small for gestational age, birth weight below the 10th percentile for the gestational age

sPGP - Severe PGP

U.S. - United States of America

1 Introduction

"You should have her sit on earth smeared with dregs of sweet beer...(if she) ejects, she will give birth ..... If she does not eject though, she will never give birth."

Kahun Gynaecological Papyrus, dated 1800 years B.C.E. [1]

Symptoms of nausea and vomiting – whether occurring separately or together – have been recorded as elements of pregnancy for thousands of years, even mentioned amongst the earliest medical records currently in existence, the Kahun Gynaecological Papyrus [2]. Although nausea alone (NP) or nausea and vomiting in pregnancy (NVP) seldom progress to a condition that is life-threatening for the gestating woman, the symptoms present an extreme form of discomfort (in the best case), and often a reduction in the quality of life. In the worst case, long term NP/NVP can potentially lead to challenges in nutrient intake in the most vulnerable period of gestational development [3]. Furthermore, termination of otherwise wanted pregnancies among women suffering from severe and prolonged NVP has previously been reported [4]. The complex conflict involving maternal suffering and unpleasantness during a period of creating and fostering new life represents a challenge which science, perhaps owing to the mostly non-fatal consequences, has addressed lightly. For the affected women and their partners or families, it is altogether another story. It has been with these affected individuals in mind that the present investigation and resultant thesis has been undertaken.

It appears that NP and NVP symptoms are uniquely related to the pregnant state of human beings alone. After much dialogue with animal investigators in the U.S. regarding primate pregnancy and NVP-like symptoms, one researcher discovered that the phenomena of a gestating female having symptoms of NP or NVP seems to be exclusive only to human beings [5]. A deeper examination of NP/NVP symptoms in veterinary textbooks, zoo yearbooks, and consultations with actual veterinarians in fields regarding appetites of primates, swine, sheep, cats, dogs, rats, rabbits, horses, and goats during pregnancy by others revealed only references to a sharp drop in food consumption during weeks 3 to 5 of gestation for domestic dogs (*Canis familiaris*) and captive rhesus macaques (*Macaca mulatta*) [6].

1.1 Designation, prevalence, and timing of nausea and vomiting symptoms

"Morning sickness" is the common term for gestational nausea and vomiting, particularly in the U.S. [7-10], although the notion that symptoms appear primarily at one main time of the day has been discredited [11-13]. This misnomer also illustrates one of the fundamental

challenges when reporting upon the NVP condition, namely, terminology. When a study reports upon nausea and vomiting, there invariably comes a grey zone of uncertainty as to how many in the study were exclusively experiencing nausea, vomiting, or both conditions together. The same holds true for labels such as 'pregnancy sickness' [14], which may refer to either or both conditions simultaneously. By contrast, there is some research published which clearly delineates symptoms experienced. Throughout the work presented here the symptoms have been carefully allocated so that NP refers exclusively to nausea alone, while NVP is used to describe nausea and vomiting together during pregnancy. Women labelled symptom-free (SF) distinctly refer to women free from symptoms of either nausea or vomiting.

Although manifesting uniquely from person to person, the initiation and duration of NP and NVP display a pattern which the majority of women affected usually tend to follow. A detailed study performed among 160 women found that 74% experienced NP, while 50% of those with NP (37% of the total sample) experienced NVP [13]. Although cases with NP and NVP had begun to appear from approximately week 3 or 4 of gestation, 90% reported initiation of symptoms by week 8 [13]. The percentage of women with either condition peaked at week 11 of gestation. Furthermore, 90% of the women with nausea reported a cessation of symptoms by approximately week 22 [13]. A larger prospective study found similar results, whereby NVP peaked at approximately 9 weeks of gestation. Of these, 60% resolved by the end of the first trimester, and 91% resolved by week 16 of gestation [15]. Since symptoms for the majority of the women in the study tended to disappear at approximately the same time, regardless of whether symptoms had begun early or late, researchers began to question whether the mechanisms responsible for the aetiology of the condition might be somehow different from mechanisms which bring about the cessation of symptoms [15].

The time frames discussed are particularly interesting when we consider the simultaneously occurring phases of embryogenesis and foetal development taking place; beginning at approximately week 5 of gestation the various organ systems of the developing embryo are considered vulnerable and the developing central nervous system and heart become critically sensitive [16]. The peak of organogenesis and embryonic susceptibility to teratogens occurs during weeks 6 to 12, with the embryo's central nervous system continuing to be sensitive through to week 18 [6]. The similarity in time periods for both events creates the basis for NVP being considered as an evolutionary response designed to protect the developing embryo from potential toxins in the maternal diet [17].

1.2 Alternative origins of nausea and vomiting in pregnancy

Even though other causes of pregnancy-related nausea, retching and/or vomiting are rarely encountered, a failure to distinguish them from actual NVP may easily occur, resulting in a misclassified diagnosis and subsequent incorrect treatment. Gastrointestinal disorders have previously been credited with causing nausea and vomiting, either as a result of an inflammatory process (such as appendicitis, cholecystitis or pancreatitis), from obstructions, or peptic ulcers [8]. The incidence of gastro-oesophageal reflux disease in pregnancy is estimated to be between 40% and 85% [18]. Neurological conditions could also account for NVP in the form of motion sickness, extreme migraines, depression, anxiety, or metabolic conditions such as acidosis, hyperthyroidism, parathyroid or adrenal disorders. Other causes of pregnancy-related nausea and vomiting may include preeclampsia, the HELLP syndrome (Haemolytic anaemia, Elevated Liver enzymes and Low Platelet count), and acute fatty liver of pregnancy, although these conditions typically occur in the latter stages of pregnancy [19].

1.2.1 Hyperemesis gravidarum

Although evidence reveals that the majority of women's symptoms ease by the end of the first trimester, a small proportion may continue to experience symptoms throughout most of the pregnancy. Hyperemesis gravidarum (HG) is defined as a condition of intractable vomiting during pregnancy, leading to fluid, electrolyte and acid–base imbalance, nutrition deficiency and weight loss severe enough to require hospital admission [20]. Estimates of the incidence of HG vary from 0.3 to 1.5% of all live births [20]. As with NVP, HG typically occurs in the early part of the first trimester, with a resolution by approximately gestational week 20. In almost 10% of HG patients, symptoms will persist throughout the entire pregnancy [20].

1.3 Theories regarding aetiology of nausea and vomiting in pregnancy

1.3.1 Older theories

Throughout the years that NVP has been investigated a plethora of aetiologies for its presence have been hypothesised. These hypotheses, much like hairstyles and clothing, have undergone various trends, so much so that it was at one point termed the 'disease of theories' [21]. As the bulk of research performed on the topic has concentrated mainly upon emesis associated with episodes of nausea and very few observing nausea alone, the term 'NVP' shall be used in the introduction and discussion section to incorporate both NP and NVP, unless otherwise specified.

During the late 19th century, in a medical environment excited by Sigmund Freud's recent psychological publications, NVP was thought to be caused by some imbalance in the mind of the mother to be [21]. Hypotheses regarded NVP as a mental illness, a result of repressed sexuality, or a subconscious act against the foetus, the latter considered especially robust since women tended to stop vomiting in the later stages of gestation after their subconscious had accepted the notion that the infant's delivery was imminent [21].

Surprisingly, many of these ideas continued and developed into the early part of the 20th century, whereby the mind, or psyche, was still considered to be the source of NVP symptoms. The jargon of this time described NVP's aetiology as stemming from a neurosis closely allied with hysteria as the primary cause, with hysteria being considered a manifestation of the woman's unconscious loathing of her husband and expected child [22]. This loathing was central in the diagnosis made for perhaps NVP's most famous victim, the 19th century English author Charlotte Brontë, who died from starvation and dehydration after suffering from very severe NVP early in her first pregnancy [23]. In the psychoanalysis written about her, it was stated that Brontë was 'fearful, conflicted, and reluctant to accept her future marriage and childbearing', concluding that 'pernicious vomiting . . . always has psychogenic features' [24]. Acceptance of the mind's power to contribute to (if not cause) NVP was still prevalent on the late 20th century. A study performed in the 1970's found that 50% of obstetricians questioned believed that NVP was a psychologically based malady [25].

It was not until the late 1970s/early 1980s that a new interest in NVP began to emerge, and with this new interest came new hypotheses regarding aetiology. The notion that the NVP symptoms were caused by a slow adaptation from the gestating woman to hormonal fluctuations associated with pregnancy, or else altered hormonal levels, are among the most popular of the latter theories [20, 26, 27]. Another novel hypothesis introduced in the 1980's involved abnormal gastro-electric activity in the gestating woman's gastrointestinal tract - either slower (bradygastrias) or faster (tachygastrias) neural activity, supposedly resulting in symptoms of NVP [28]. These hypotheses dominate much of the present consensus regarding NVP, in addition to the hormonal-related theories.

1.3.2 Hormone-related theories

During early pregnancy, estradiol increases and slowly continues to rise throughout the remainder of pregnancy [29]. Also increasing early in the first trimester is progesterone [30, 31]. Their association with NP and NVP have been proposed by studies reporting that women with an inability to tolerate oral contraceptives have a remarkably high risk for NVP [32-36] .

Progesterone and estradiols/estrogen have been demonstrated to inhibit the activity of smooth muscles [37], which can lead to delayed gastric emptying, and consequently result in gastric reflux and increased occurrences of gastric emptying [3, 37]. However, these results have not been conclusive, as other studies report no evidence of either progesterone or estrogen's role in NVP [38, 39].

Human chorionic gonadotropin (hCG) is now probably recognised as the leading cause of NVP. It is mainly accepted as the prime aetiological hormone because of the near-identical timing hCG has with the onset of NVP symptoms [9]. Although secretion of hCG by the placental trophoblasts has been proposed as the most likely endocrine contributor to NVP, data to support this are far from conclusive [29, 40, 41].

One review examining hCG and NVP found an association in 13 of 17 studies reviewed, with the authors speculating that the failure of other studies to show an association was possibly owing to varying biologic activity of different forms of hCG [38].

1.3.3 Helicobacter pylori

There has been interest generated into the association between the bacteria Helicobacter pylori (*H. pylori*) and NVP ever since a systematic review addressing HG and *H. pylori* infection was performed in 2007 and an association was suggested to exist [42]. However, the review mentioned that limitations in individual studies may have a bearing on the differing results [42]. Others have also discussed contraindications possibly resulting from different testing procedures used to determine the presence of *H. pylori* [43]. Confusing matters further is the knowledge that *H. pylori* infection symptoms include nausea, vomiting, and heartburn, symptoms also reported to occur in 50 to 90% of all pregnancies [44].

1.3.4 Genetics

Previous research has reported that NVP tends to have a higher frequency in monozygotic twins, in women whose siblings and mothers were affected by NVP, and is correlated with other genetically determined conditions, such as taste sensation, anosmia (loss of smell), and glycoprotein receptor defects [15, 20, 38, 45, 46]. These results have strengthened the hypothesis that NVP is a heritable condition with a genetic aetiology [47].

Further examples supporting this hypothesis are studies showing significantly lower incidences of NVP in samples of American Southern black teenagers when compared with American Southern white teenagers [48], and the incidence of NVP to be slightly lower in samples of South African blacks as compared to South African whites [49].

1.4 Other risk factors

The literature regarding NP and NVP has produced a list of maternal characteristics and lifestyle factors reported to increase the risk of experiencing symptoms, although it must be highlighted that for almost every association reported there are studies showing no association. A young maternal age has been associated with NVP [27, 35, 36, 50-53], however not conclusively [12, 34, 54-56]. Likewise, women having previously given birth and those with a previous plurality >1 have also been reported to have an increased risk of NVP [51, 53, 57-62], although a number of studies have placed primiparous women at risk [27, 36, 50, 60].

An increased risk of NVP was also reported for women who experienced NVP in previous pregnancies [34, 59, 63, 64], having had a mother who had also experienced NVP [34], and women having prior miscarriages [51]. Furthermore, NVP has also been associated with a maternal education of <12 years [50], and maternal cigarette smoking [36, 50, 52]. Reports associating smoking with NVP have frequently been contested, with some suggesting maternal smoking as having a protective mechanism effect against NVP [13, 27, 34, 35, 51].

1.5 Gestational diet

The theme of diet and nutrition is not only relevant to the health and wellbeing of the gestating woman, but also to the effects her diet has upon progress and growth of the developing foetus. It is widely believed that foetal nutrition plays a key role in the well-being of the new-born and further impacts on health during childhood and adulthood, with possible effects into the next generation [65-67].

1.5.1 Cravings and aversions

The diet of a gestating woman will experience some form of modification, either via an intentional selection or rejection of foods in an attempt to improve their well-being, or else via unintentional cravings or aversions [68]. However, women experiencing symptoms of NVP have been reported as being especially vulnerable to experience food cravings and aversions [69].

Cravings and aversions have been reported in the medical literature for hundreds of years [70, 71], with gestating women experiencing cravings for foods such as sweets (especially chocolate), fruits and fruit juices, ice cream, milk and other dairy products [72, 73]. Alternately, the types of foods often avoided by gestating women include drinks containing caffeine, strong tasting and smelling foods, and fatty or greasy foods [69]. Food cravings are reported to be especially prominent during the first and third trimesters of pregnancy [73, 74],

although it seems the most significant modifications occur during the first trimester [75]. However, no evidence presently exists to suggest that food cravings and aversions during pregnancy are associated with each other [76].

1.5.2 Proteins

Previous research has explored associations between macronutrient intake and NVP symptoms. Proteins have received much attention owing to the findings of Jednak et al. [77] reporting that nausea and gastric dysrhythmias were significantly reduced by feeding patients high-protein meals, but not by feeding them high-fat or high-carbohydrate meals. Women experiencing NVP reported in another study that high protein food such as dairy products, tuna, and roast beef were items most helpful in relieving nausea and vomiting [78]. Less severe symptoms of NVP as well as less days of nausea experienced have also been correlated with a higher protein intake [68, 79]. Furthermore, it may not simply be proteins in general reducing nausea symptoms but select amino acids. One study exposed non-pregnant females to experimental nausea conditions using a rotation device after consuming a protein drink – one group took a protein drink which included the amino acid tryptophan whilst the other consumed a protein drink without tryptophan; the tryptophan depleted subjects experienced increased symptoms of nausea, as well as an increase in hunger throughout the nausea [80].

1.5.3 Fats

When investigating the macronutrient intake in women experiencing severe NVP and HG, one study reported that the pre-pregnancy intake levels of saturated fat seemed to influence the risk of symptoms [81]. In particular, it was found that higher levels of saturated fat tended to increase the risk of symptoms, perhaps owing to the report that saturated fat creates an increase in the circulating levels of estrogen [82, 83].

1.5.4 Carbohydrates

Perhaps of all the macronutrients investigated in relation to pregnancy, carbohydrates are the most fascinating. Carbohydrates have previously been suggested to provide relief to feelings of depression – owing to their opiate-like sedative effect [84]. In this context it has been proposed that pregnant women suffering discomfort from NP or NVP may be turning to carbohydrates as a form of self-medication [72]. Carbohydrate-rich foods are thought to elevate production and release of brain serotonin which, in turn, elevates mood [85, 86]. This hypothesis is supported by observations that carbohydrate cravings are reduced by drugs which enhance serotonin release or synthesis [87]. It has also been proposed that mood changes during pregnancy may be more predictive of food cravings and aversions than

pregnancy sickness itself [17]. One study has also reported that a diet high in carbohydrates was effective in eliminating or reducing symptoms of NVP [88].

1.6 Gestation and delivery outcomes

Literature addressing the effects NVP have upon pregnancy outcomes has tended to focus mostly upon birth outcomes, however, there have also been epidemiological studies reporting upon gestational outcomes. As with risk factors presented earlier, there exist a number of contradicting reports for certain maladies. A number of studies have reported an increased risk of gestational complications such as gestational diabetes, hypertension, and preeclampsia for the women experiencing NVP [89, 90], although other studies found no association with these conditions [33, 50, 54].

Length of gestation has also been investigated to determine the effects of nausea and vomiting upon pregnancy, with some studies reporting NVP women being more likely to have a longer gestation compared to women without symptoms [26, 50, 62, 91], but again, others have reported a shorter gestation [89, 92] or no association at all [93, 94].

Because of its obvious importance as an outcome variable, birth weight is often used in epidemiological and clinical investigations as an indicator of the successful outcome of pregnancy [95]. Some studies have reported a higher proportion of low birth weight infants (< 2500 g) delivered by SF women [62, 79, 96], yet others have found no association between NVP and low birth weight infants [39, 50, 57, 91, 93]. Other studies observed a lower birth weight in infants born to NVP women [56, 97, 98].

Many previous studies regarding NVP and birth outcomes have reported an association between infant gender and NVP, specifically, that women experiencing NVP symptoms tend to give birth to female infants [26, 89, 92, 94, 99, 100]. Although this finding seems to be ubiquitous, other studies observed no such association [53, 56, 57], with some studies reporting that NVP was associated with male infants [68, 101].

1.6.1 Pelvic girdle pain

Pelvic girdle pain (PGP) is defined as pain experienced between the posterior iliac crest and the gluteal fold, particularly in the vicinity of the sacroiliac joints and generally arises in relation to pregnancy [102]. In addition to pregnancy, PGP usually arises as a result of trauma or reactive arthritis, and the diagnosis is usually reached after exclusion of lumbar causes [102]. The onset of symptoms occurs from approximately week 6 of the pregnancy, and reaches pain peak intensity between the 24th and 36th week of pregnancy [103, 104].

The prevalence figures vary widely for this condition, possibly owing to the wide variety of names the symptoms have been given, for example lower pregnancy back pain [105] or lumbo-pelvic back pain [104]. The prevalence has been estimated at 20% [102], while others report a prevalence of 48-56% [106, 107]. Much like NVP, back pain in the gestating woman is so common it is often looked upon as a part of normal pregnancy [7, 106]. Known risk factors for PGP are smoking during pregnancy, high BMI, young maternal age, previous pregnancies, and early menarche [108-113].

The causes of PGP are not well understood, and presently mechanical or hormonal factors are suspected [106, 114, 115] as PGP has been linked previously to ovarian hormone levels which have been suggested to influence ligament laxity of the pelvic joints and lead to pain [102, 116]. In addition to estrogen and progesterone, the early pregnancy hormone relaxin has also been suggested as being involved with the development of PGP [117, 118].

1.6.2 Questions raised

The content of this introduction highlights many instances where lack of consensus regarding maternal risk factors, gestational conditions, pregnancy and birth outcomes regarding NVP exist. A large prospective study focussing upon the particulars of women with NVP would therefore be expected to provide some degree of accord within the topic, providing a further understanding of this condition.

2 Aims of the thesis

The overall aim was to evaluate the diet, gestational health, pregnancy, and birth outcomes for NP and NVP women.

The specific aims were;

Paper I: To assess dietary intake, as well as demographic profile and lifestyle factors, in pregnant women divided into three groups: those experiencing NP, those experiencing NVP, and those SF.

Paper II: To examine responses given to specific questions addressing how SF and NVP women had altered their food habits in the first trimester of pregnancy, as well as investigating which food items the women had altered their eating habits the most for in order to better understand the dietary changes taking place in women with first trimester NVP.

Paper III: To compare pregnancy complications and birth outcomes in full term pregnancies for the women that experience NP or NVP, compared with SF women.

Paper IV: To examine NP and NVP in relation to PGP during pregnancy and 4-6 months post-partum.

3 Material and methods

3.1 The Norwegian Mother and Child Cohort Study

The present thesis used data from The Norwegian Mother and Child Cohort Study (MoBa) [119]. The main objective of MoBa is to test aetiological hypotheses regarding genetic and environmental exposures in relation to risk of disease, and data has been collected on many exposures and health outcomes. Recruitment to MoBa took place between 1999 and 2008, and the study targeted all women who gave birth in Norway with the only criteria for exclusion being the inability to comprehend Norwegian language [120]. Of the women invited, 40.6% consented to participate, and by 2008 data on more than 95,000 mothers and over 114,000 children were included. The women were asked to provide biological samples as well as to answer three questionnaires during pregnancy. Follow-up questionnaires were also delivered post-partum at regular intervals.

3.2 MoBa questionnaires

The questionnaires distributed to the conceiving women have been the main data source in this thesis. The first questionnaire (Q1) was completed by the women between gestational weeks 13 and 17; questionnaire 2 (Q2) between gestational week 18 and 22; questionnaire 3 (Q3) in approximately gestational week 30, and questionnaire 4 (Q4) when the resultant infant was aged 6 months. In total, there are currently 9 questionnaires in the MoBa cohort, as well as two directed towards the father [121, 122]. Questionnaires 1 to 4 were used in this thesis. As they are an integral part of the thesis, Q1, Q2, Q3, and the relevant page regarding PGP used from Q4 are given in appendices 1, 2, 3, and 4 respectively.

Q1 was a general questionnaire covering details regarding maternal health and the medical history of the women, lifestyle, demographics, previous pregnancies, as well as early reports of nausea and vomiting.

Q2 primarily contained a semi-quantitative and validated food frequency questionnaire designed to capture the dietary habits of participants during the first 4 to 5 months of pregnancy. There were two versions of Q2 used in MoBa, and the second version (version 2) contained detailed questions regarding nausea and vomiting in addition to the food frequency questionnaire which was used in this thesis, thus only women answering version 2 of Q2 were included in this thesis.

Q3 included data regarding pregnancy-related symptoms of various conditions retrospectively covering weeks 1 to 30 of gestation. Of particular interest to this thesis were

reports of NP, NVP, and PGP. Questionnaires 4 through to 9 were all answered at various time points post-partum and included data regarding the mother and child's health, development, and other lifestyle factors. MoBa regularly releases new versions of the quality assured datasets containing updated follow-up information; the data used in this thesis was obtained from version 4 (papers I-III) and version 8 (paper IV). Owing to a later ruling by the Regional Committee for Medical Research Ethics of Southern Norway, MoBa was given permission to include data from passive participants (i.e. participants who gave consent to participate but never returned follow-up questionnaires), thereby making the total number of participants included in paper IV slightly higher.

3.2.1 Assessment of nausea and vomiting in MoBa

At the core of this thesis is the occurrence of NP or NVP for the women during gestation. In latter section of Q2, women were asked whether they had experienced nausea alone during the pregnancy. This question was then followed up with questions regarding whether the nausea had affected their appetite, which week of gestation the symptoms had begun, and which gestational week nausea had ended. There was also an opportunity for the women to indicate if nausea was still being experienced at the time of answering Q2. Immediately after these questions followed similar questions regarding the occurrence of vomiting. The results of these questions enabled categorisation of the groups NP and NVP.

Women who experienced NVP for a prolonged period of time and required hospitalisation were considered as having proceeded into HG. Data in Q3 was used to identify women hospitalised with NVP anytime during the first 25 weeks of gestation. These women were subsequently excluded, as outlined in **Figure 1**.

3.2.2 The food frequency questionnaire

The food frequency questionnaire (FFQ) in Q2 (week 22) asked questions about the intake of over 200 food items and was designed to illustrate dietary habits, consumption frequencies, and intake levels of foods and dietary supplements since the woman had become pregnant. It was designed for use in MoBa, and was subsequently validated [123]. The validation study found that the MoBa FFQ produced a realistic and relatively precise estimate of the habitual intake of energy, nutrients and food groups among the pregnant Norwegian women featured in the MoBa cohort. Predefined portion sizes were applied to bread and drinks. Food frequencies were converted into daily energy and nutrient intakes by FoodCalc, a program designed to calculate intake of nutrients from the amounts of different foods specified [124], and the Norwegian food composition table [125].

3.2.2.1 Open-ended food question in Q2

Also contained in Q2, immediately after questions regarding nausea and vomiting, was a question asking 'Have you started to eat or drink certain food items during this pregnancy? Yes/No'. An open-ended follow up question (Appendix 2, question 38) asked 'If yes, name the two most important food items you have started to eat/drink', followed by two empty spaces where the women were requested to write the food items. The open answers from question 38 required extensive coding and categorisation, a task undertaken by the present author. Foods were grouped into the following main categories: Milk and milk products; Breads and cereals; Biscuits, buns and cakes; Fat; Meats; Fish; Egg; Vegetables; Fruit; Chocolate; Sweets (non-chocolate); Coffee; Tea; Juice; Carbonated drinks; Water; Alcohol; Spreads; Unspecified; Pica; General food types. In addition to the exhaustive categorisation of the foods reported in question 38, food items were also tagged into broader categories relating to pregnant women and their food choices in an effort to map the various trends in consumption. These broader categories are: Foods that help reduce nausea; Foods helping digestion (dried fruits etc.); Foods containing probiotics; Foods rich in proteins; Foods rich in fat; Foods rich in sugar; Foods using artificial sweeteners; and Foods rich in sour/salt taste. The categories and complete list of foods are/were presented in Supplementary table 1 of Paper I.

3.3 Medical Birth Registry of Norway (MBRN)

Using the unique personal identification number assigned to all individuals living in Norway, the MoBa data were linked with data in the Medical Birth Registry of Norway (MBRN) [126]. The MBRN is the national registry documenting all live births taking place in Norway since its establishment in 1967. The registry also contains a wealth of data regarding the mother's medical history before and during pregnancy.

3.4 Definition of variables and categorisations

3.4.1 MoBa

NP: Was defined as women reporting symptoms of nausea alone (i.e. no vomiting recorded at any time) based upon answers reported in Q2 (question 32 in Appendix 2). In addition, the women were asked to note the gestational week of initiation and, if relevant, cessation.
NVP: Was defined as women reporting symptoms of nausea together with vomiting based upon answers reported in Q2 (that is, indicating 'yes' for both question 32 and question 35).

In addition, the women were asked to note the gestational week of initiation and, if relevant, cessation.

PGP/sPGP: PGP was defined as symptoms of mild or severe pain on one or both of the pelvic/sacroiliac joints in the back, in addition to mild or severe pain over the pubic bone, during the current pregnancy [110]. When severe pain had been reported for all 3 locations, this was designated as severe PGP (sPGP). The questions appeared in Q3 (question 29, Appendix 2).

The data regarding PGP at 4 to 6 months post-partum comes from Q4, where women were asked about pain intensities in the same areas at 4 to 6 months post-partum (question 59, Appendix 4).

qNP, qNVP, qPGP: In paper IV a simpler assessment for NP, NVP and PGP was used in addition to those described above. Contained in Q1 and Q3 are listed a series of conditions, amongst them NP, NVP and PGP (question 38 in Appendix 1, and question 52 in Appendix 3). These conditions are categorised into 4 week blocks, beginning from gestational week 0 (in Q1), through to week 29 and over (where the same question is repeated in Q3). Women were asked to place a tick in any box which corresponded to a condition in order to indicate which weeks of gestation they had been experiencing symptoms. We used this question to distinguish where the three conditions began to appear, and their use is clearly distinguished from answers to the more rigorous assessments used for NP, NVP, PGP, and sPGP by use of the 'q' prefix.

Body mass index (BMI): Calculated as weight at start of pregnancy divided by height squared (kg/m^2). BMI was categorised according to the definition formulated by the World Health Organisation: <18.5 kg/m^2 (underweight), 18.5–24.9 kg/m^2 (normal), 25–29.9 kg/m^2 (overweight), and ≥30 kg/m^2 (obese) [127].

Food items eaten more/less of: These were determined using a series of questions appearing at the end of the FFQ in Q2 (question 31, Appendix 2). Seventeen food types were featured with respective areas requiring a tick to communicate the women's relationship to those items as either 'did not eat or drink this before pregnancy', 'as before', 'more', 'less', and 'stopped completely'. The 'less' and 'stopped completely' answers were combined and analysed as 'reduced intake' in paper II.

Specific foods begun to be consumed since pregnancy: These foods are based upon responses to the open-ended question enquiring about foods women began to eat since becoming pregnant (question 38 in Appendix 2), as described in Section 3.2.2.1.

Energy intake and energy percent (E%): As outlined in Section 3.2.2, the data in the FFQ were converted into daily energy, macro- and micro-nutrient intake values. The E% values for the various macronutrients were obtained by multiplying the absolute intake (in grams) by the respective food energy per mass values (37 kJ/g for fat, 17 kJ/g for carbohydrates and proteins), then multiplying the result by 100.

Previous experiences of NVP and PGP: These data were obtained from Q1 (question 33, Appendix 1), where women were asked if they had experienced any symptoms of either condition in previous pregnancies. In the case of PGP, women reporting PGP requiring either medical leave or bed rest were coded as experiencing earlier episodes of PGP.

Gestational weight gain (GWG): Was determined by subtracting the maternal weight at the start of pregnancy (obtained from Q1) from the maternal weight at end of pregnancy (from Q4).

High blood pressure pre-pregnancy: Question 39 in Q1 (appendix 1) listed a number of conditions and asked women if they had experiences of them prior to pregnancy. Women indicating high blood pressure before pregnancy were thereby classified.

High blood pressure - no prior history: This variable was determined from question 55 in Q3 (appendix 3), where a number of conditions were listed and women were asked whether they had experienced any of them during pregnancy by ticking a box allocated to 4 week blocks of pregnancy (e.g. gestational week 13-16, 17-20 etc.). Any women indicating 4 or more weeks of high blood pressure were classified as having high blood pressure during pregnancy. Furthermore, women reported as having experienced high blood pressure pre-pregnancy were excluded from those reporting high blood pressure during pregnancy in order to highlight those with no prior history.

Diabetes pre-pregnancy: This value was obtained from question 39 in Q1 (appendix 1**)** by combining responses from women reporting either diabetes before pregnancy treated with insulin treatment or diabetes before pregnancy without insulin treatment.

Previous preeclampsia: Was determined from question 33 in Q1 where women responded ‘yes’ or ‘no’ to previous preeclampsia.

Age at menarche: From the questions regarding maternal history in Q1.

Incidences of irritability before menses: Data for this variable were obtained from questions 3 and 4 in Q1, with five categories collapsed into a binary ‘yes’ or ‘no’.

3.4.2 MBRN

Diabetes – no prior history: Data regarding maternal history in the MBRN provided information regarding maternal incidences of diabetes prior to and during pregnancy (5 categories combined into 'yes' or 'no'). Women reporting diabetes pre-pregnancy were excluded from these results in order to highlight women with gestational diabetes and no prior history.

Preeclampsia: Preeclampsia is defined by the Norwegian Federation of Obstetricians and Gynaecologists as an increase in blood pressure ≥140 mmHg systolic or 90 mmHg diastolic from gestational week 20, together with proteinuria, defined as excreting ≥0.3 g of protein in a 24 hour period using a dip-stick assay, both measured at least twice [128]. We combined the 11 various degrees of eclampsia, preeclampsia, or indications of the HELLP syndrome in MBRN into a binary variable 'yes' or 'no'.

Small for gestational age (SGA): Sex-specific foetal growth according to gestational age was calculated for the SGA variable, defined as infants born with a birth weight lower than the 10^{th} percentile of the cohort for each gestational weight. This variable was calculated with data from both the MoBa questionnaires and the MBRN [129].

Caesarean delivery type: This variable was registered in the MBRN as either 'planned', 'emergency', or 'unspecified'.

Apgar score at 5 minutes post-delivery: The MBRN scores 0 to 10 were categorised as 0-6 or 7-10.

Birth defects: Birth defects were defined as any birth defect or malformation registered in the MBRN using the International Classification of Diseases chapter 17 definition [130, 131], and were classified into a binary variable 'yes' or 'no'.

Infant mortality: The eight categories from MBRN were categorised as 'born alive (lived >1 y)' or 'born alive then died ≤1 y post-delivery'.

Infant anthropometry and gender: Data regarding infant's sex, weight (grams), and length (centimetres) at birth were all obtained from the MBRN.

Delivery mode: Data regarding the delivery mode were from the MBRN. The categories 'normal cephalic', 'breech', 'transverse', 'cephalic abnormal, and 'other' were transformed into the binary variable 'normal cephalic' and 'presentations other than normal cephalic'.

Gestation length: This is based upon ultrasound estimates recorded in the MBRN. Where ultrasound estimates were not available, the gestational length was calculated from the last menstrual cycle.

Low birth weight (LBW): This was defined as <2500 grams.

Years from menarche to pregnancy: The number of years from menarche to pregnancy was calculated by subtracting age at menarche (from Q1) from maternal age at time of birth (from MBRN).

3.4.3 Confounders

Confounders are variables that are 1) associated with the outcome (either as a cause or a proxy for a cause, but not as an effect of the outcome), 2) associated with the exposure, and 3) not an effect of the exposure [132]. Confounders, if not adjusted for in the analyses, have the ability to result in biased effect estimates.

Literature searches were performed in order to ascertain if an outcome could potentially be affected by another variable relative to the exposure. In this way potential confounders were studied and included in the various models. Data regarding maternal age, parity, and infant gender were obtained from the MBRN. Data regarding smoking during pregnancy, maternal education, and incidences of irritability prior to menses were obtained from MoBa questionnaires. Figure 3 shows an example of the results obtained when considering exposure variables and outcomes for paper III.

Variables versus outcomes	Hyper tension	PGP	Emergency C-delivery	Birth weight	Head circ.	Low BW	Preterm births	Sex of child
Age	+	+	+	+	+	+	+	+
BMI	+	+	+	+	+	+	+	+
Smoking during	+	+	+	+	+	+	+	+
Gestational length	\	\	\	+	+	+	\	\
Parity	+	+	+	+	+	+	+	+
Education	+	+	+	+	+	+	+	+
Sex of child	+	+	+	+	+	+	+	\

+ = confounder (included in the model), \ = collider or mediator (not included in the model), BW = birth weight

Figure 3: Example of results of a literature search used to determine potential confounders of the association between NVP/NP, maternal variables, and gestational and birth outcomes in paper III.

3.5 Study samples

3.5.1 Papers I and III

In these papers the aim was to capture the lifestyle and dietary profile of the women separated into groups representing NP and NVP symptoms, compared to SF, as well as a number of outcomes from gestation and birth. We excluded women not answering the relevant questionnaires/questions. In addition, we excluded women who had multiple births, women with non-living births, and those whose NVP condition progressed to HG. For women with a multiple participation in MoBa, all but their first participation was excluded.

Figure 1 provides a flow chart with more details regarding exclusions. The final study sample in these two papers included 51,675 women.

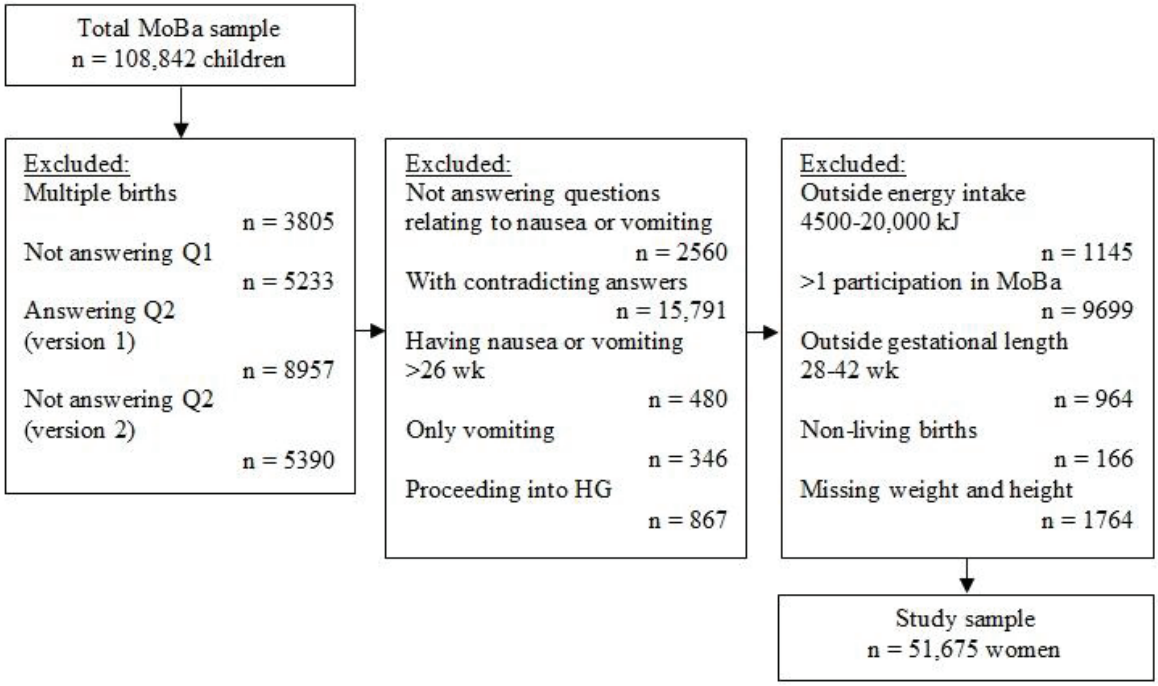

Figure 1: Flow chart illustrating the selection of study sample as used in papers I and III.

3.5.2 Paper II

In paper II we took a more detailed investigation into dietary choices of women, this time choosing to divide the sample into only two groups: SF and NVP. Thus, in addition to the exclusions made in papers I and III, we excluded the NP group, as well as those not answering the specific question under investigation. Figure 2 provides a flow chart detailing exclusions made. The final study sample included 30,072 women.

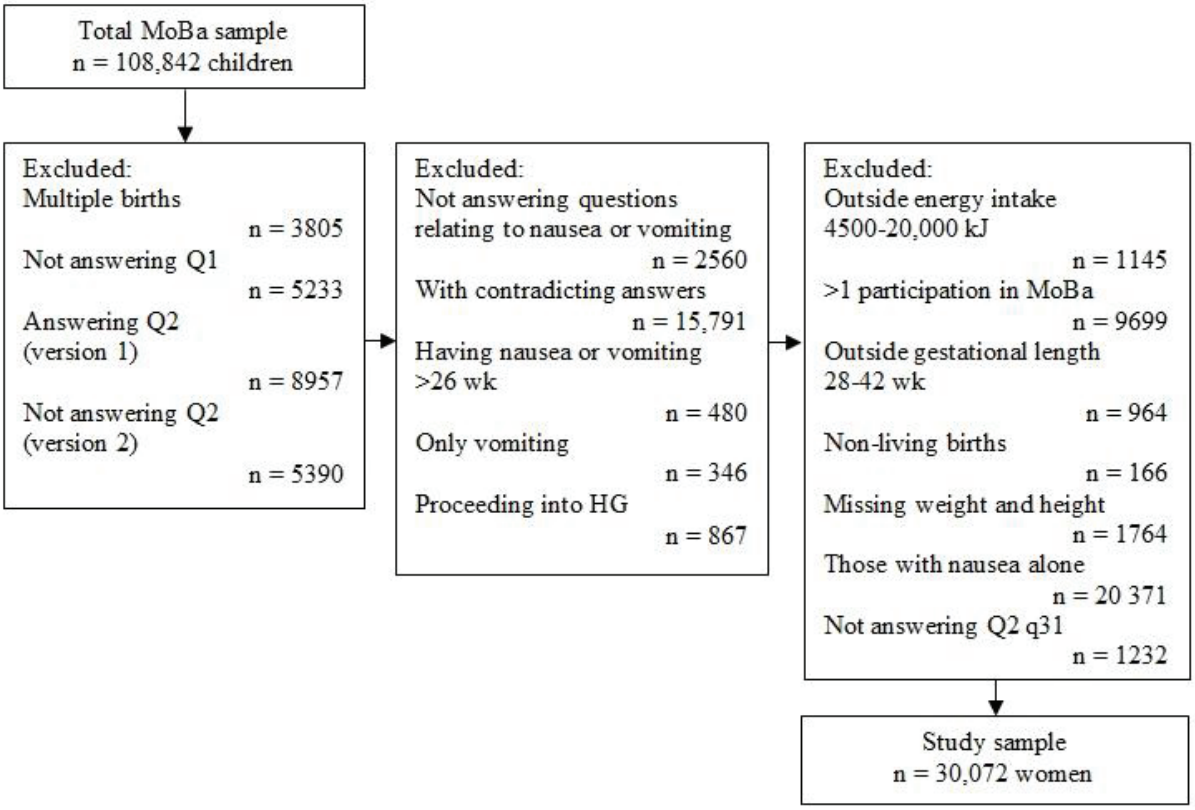

Figure 2: Flow chart illustrating the selection of study sample in paper II.

3.5.3 Paper IV

The updated version of the MoBa data (n=114,275 children) used for this paper (see Section 3.2) providing more women to be included in the analysis. The criteria for exclusion were the same as in papers I and III, however, as diet was not included in the analyses, previous exclusions regarding energy intake were ignored. The final study sample included 52,678 women. A subgroup analyses was also performed among women having PGP or sPGP during pregnancy who then proceeded to experience PGP or sPGP 4-6 months post-partum (n = 7502).

3.6 Approvals and ethics

Written informed consent was obtained from both mothers and fathers participating in MoBa, with the mother consenting on behalf of her child. Participants were informed that they were free to withdraw from the study at any time. The MoBa study was approved by the Regional Committee for Medical Research Ethics of Southern Norway and by the Norwegian Data Protection Authority (S-97045, S-95113) and the papers in this thesis have been approved by the MoBa steering committee.

3.7 Statistical analyses

All analyses were performed using SPSS (versions 18-22, SPSS, Inc., Chicago, IL). Below is an outline of analyses performed in each paper.

Paper I: One-way analysis of variance (ANOVA) was used to compare the SF, NP, and NVP groups as regards continuous variables, and a further pair-wise comparison was performed in instances where the P value from the comparison of the three groups was significant using Bonferroni's correction, indicating in the results which of the pairwise comparisons were significant. Chi-square test was used for categorical variables. Multiple linear regression was performed analysing group (SF, NP, NVP) and GWG. In this analysis we adjusted for gestational length (continuous), smoking during pregnancy (yes/no), and energy intake (continuous). As there was a significant interaction between group and BMI, we tested the difference between groups in analyses stratified by BMI: <18.5 kg/m^2 (underweight); 18.5–24.9 kg/m^2 (normal); 25–29.9 kg/m^2 (overweight); and >30 kg/m^2 (obese). A significance level of 0.05 was used.

Paper II: As only two groups were featured in this paper (SF and NVP), an independent samples t-test was used to compare the two groups in regards to continuous variables. Chi-square test was used for categorical variables. Logistic regression was used to analyse binary outcomes of food consumption behaviour ('more', 'less' etc.) in relation to group (SF, NVP). We adjusted for energy intake (continuous). The results were presented as crude odds ratios (cOR) and adjusted odds ratios (aOR) with 95 % confidence intervals (95 % CIs). We combined data for foods reported as consumed 'less' and 'stopped completely' to create a category showing overall reduced intake in the logistic regression analyses. A significance level of 0.05 was used.

Paper III: Chi-square test was used for categorical variables. Logistic regression was used to analyse the following outcomes against group (SF, NP, NVP): PGP, sPGP, high blood pressure – no previous history, proteinuria, preeclampsia, gestational diabetes – no prior history, emergency caesarean delivery, birth type, preterm births (<37 weeks), Apgar scores after 5 minutes, low birth weight (<2500 g), SGA, birth defects, and gender of infant. Associations between continuous outcomes (birth weight, body length, and head circumference) and group (SF, NP, NVP) were studied by multiple linear regression. Logistic regression models (except low birth weight and gender of infant) included maternal age (continuous), BMI (continuous), smoking during pregnancy, parity, education, and gender of infant. Gender of infant analysis included the same covariates minus gender of infant. Logistic

regression of low birth weight and linear regression analysis of birth weight, body length, and head circumference additionally included adjustments for gestational length (continuous) and energy intake (continuous). Results were presented as cOR and aOR with 95 % CIs, or mean differences. Linear regression was used to analyse continuous variables against group. Statistical interaction effects were studied and presented in supplementary tables for paper III. A significance level of 0.05 was used.

Paper IV: The sample was divided into three groups: SF, NP, and NVP, and we further categorised the women according to whether they were with or without all forms of PGP (i.e. PGP or sPGP during pregnancy, and/or PGP or sPGP at 4-6 months post-partum). The variables 'nausea duration' and 'vomiting duration' were dichotomised according to their median value. Descriptive results are presented as means (standard deviations; SDs) or frequencies (%). All forms of PGP were explored using logistic regression analysis. We adjusted for maternal age, BMI, smoking during pregnancy, parity, education, age at menarche, and incidences of irritability before menses, and presented cOR and aOR with 95% CI's. Chi-square tests were used for categorical variables. Statistical interactions were also studied and presented. A subgroup analysis was performed among women having PGP or sPGP during pregnancy who then proceeded to experience PGP or sPGP 4-6 months post-partum (n = 7502). A significance level of 0.05 was used except where statistical interaction effects were studied, where 0.01 was used to allow for multiple testing.

4 Summary of results

Paper I: Nausea and vomiting in pregnancy: associations with maternal gestational diet and lifestyle factors in the Norwegian Mother and Child Cohort Study

We found that 28% reported no symptoms of nausea or vomiting in pregnancy (SF group), 39% had experienced nausea alone (NP group), and 33% reported both nausea and vomiting (NVP group). Overall, the women with NVP tended to be younger and heavier at the onset of pregnancy, with the lowest GWG and the highest energy intake during pregnancy.

When an adjusted multiple linear regression analysis was performed between GWG and group, a significant interaction was found between BMI and group ($P < 0.001$). All BMI strata examined had a significant effect of group on GWG ($P < 0.001$), except among underweight women ($P = 0.65$).

The NVP group had a significantly longer duration of nausea than the NP group, mean (SD) 9.6 (3.9) weeks versus 7.4 (3.2) weeks, respectively ($P < 0.001$), and more women in the NP group were affected by a shorter period of nausea (≤8 weeks) than the NVP group. Furthermore, 65% of the NVP group experienced vomiting for ≤8 weeks. In total, 93% of the NP women experienced nausea between gestational weeks 3 to 14, while 95% of the NVP women experienced nausea between gestational weeks 3 to 17.

The overall intake of carbohydrates and added sugar in the NVP women was significantly higher compared with the other groups ($P < 0.001$). Of the 13,179 (25%) who reported a change of eating habits due to the pregnancy, the SF group reported more frequent intake of probiotic-containing milk products and chocolate, whereas all other food items examined were either not significantly different between the groups or else more frequent in the NP or NVP groups.

Paper II: Dietary changes during first trimester pregnancy for women with nausea and vomiting in the Norwegian Mother and Child Cohort Study

Amongst 30,072 women answering questions regarding alterations in diet, we found that 54% reported NVP. The NVP women were more affected by fluctuations in their food consumption than SF women. They reported the lowest proportion eating as they did before pregnancy, as well as the highest proportion eating ‘more’ and ‘reduced eating’. In the SF group more women reported eating more chocolate (SF 17.7% vs NVP 16.3%), equating to a reduced odds for NVP eating chocolate (aOR 0.88, 95% CI 0.83-0.94).

Paper III: Pregnancy complications and birth outcomes among women experiencing nausea only or nausea and vomiting during pregnancy in the Norwegian Mother and Child Cohort Study

The 51,675 women in paper I were studied through gestation onwards to delivery of child, with outcomes regarding gestation health and pregnancy explored. We found women with NVP had significantly increased odds for experiencing high blood pressure (aOR 1.40, 95% CI 1.17–1.67) and preeclampsia (aOR 1.13, 95% CI 1.01–1.27) during gestation.

Furthermore, women with NVP and NP had significantly increased odds for PGP (aOR 2.26, 95% CI 2.09–2.43, and aOR 1.90, 95% CI 1.76–2.05, respectively) and proteinuria (aOR 1.50, 95% CI 1.38–1.63, and 1.20, 95% CI 1.10–1.31, respectively). In contrast, the NVP and NP women had significantly reduced odds for unfavourable birth outcomes such as LBW (aOR 0.72, 95% CI 0.60–0.88, and aOR 0.73, 95% CI 0.60–0.88, respectively) and SGA (aOR 0.78, 95% CI 0.73–0.84, and aOR 0.87, 95% CI 0.81–0.93, respectively).

Article IV: Nausea and vomiting in pregnancy – association with pelvic girdle pain during pregnancy and 4-6 months post-partum

Of the 52,678 women studied, 3,626 (6.9%) had both NVP and PGP together, and these represented the heaviest in the sample, as well as being the youngest at menarche, and having highest proportion with education ≤12 years. The primiparous women in this group had the shortest timespan from menarche to pregnancy.

NP and NVP women had higher odds of PGP during pregnancy and 4-6 months post-partum (aOR=2.10, 95% CI 1.68–2.61, and aOR=2.71, 95% CI 2.18–3.38, respectively), compared to symptom-free women. NP and NVP symptoms tended to appear early in the first trimester, while PGP symptoms appeared later in pregnancy. Women with longer durations of nausea and/or vomiting had a higher proportion of PGP compared to those with a shorter duration.

5 Discussion

5.1 Discussion of results

The aims presented in Section 2 were mainly concerned with maternal demographics, diet, gestational conditions and pregnancy outcomes for women with NP and NVP. As outlined in the results section, NVP women were found to be younger and heavier compared to NP and SF women. NVP women also represented the highest proportion having experienced NVP in previous pregnancies. Regarding diet, NVP women had the highest energy intake compared to NP and SF women, and their diet was characterised by a higher carbohydrate and added sugar E%, based primarily upon sugar-containing soft drinks. NVP women also reported to be most affected by changes in food consumption, having the lowest proportion reporting to eat as before pregnancy, as well as the highest proportion reporting eating 'more' and 'reduced eating' when compared to SF women.

In regards to gestational and pregnancy outcomes, the NVP women had the lowest GWG compared to NP and SF women, and the NVP and NP women had higher proportions with term births and lower odds for having an emergency caesarean delivery. Additionally, the NP and NVP women had higher odds for giving birth to a female infant, and higher odds for PGP and sPGP both during pregnancy and 4-6 months post-partum.
These and other findings will be discussed below.

5.1.1 Demographics, maternal history, and lifestyle

The majority of the maternal demographics was analysed in paper I, with some additional elements of maternal history analysed in paper IV. The women in the NVP group tended to be younger when compared to the other groups, which supports the numerous studies naming younger women as being most likely to experience NVP [26, 35, 36, 50, 51], however, whether a mean difference of 1 year between the SF and NVP women has any relevance in NVP risk is questionable. Perhaps a more appropriate variable to consider would be a measure of the reproductive age of women in the various groups, such as years from menarche to this pregnancy, as reported in paper IV. In that paper we observed that primiparous NVP women, whether they had PGP or not, had a lower mean number of years between menarche and pregnancy compared to the NP and SF women. Unfortunately this measure of reproductive age is rarely used in NVP research, and the only study found using such a variable (n=1000) reported no association between SF and NVP women for either maternal age or reproductive age [133].

The NVP group also had the highest proportion of overweight and obese women, supporting claims that NVP symptoms are related to a heavier maternal weight [50, 89, 134-136]. Somewhat surprisingly is the NVP group also having the highest proportion in the <18.5 kg/m^2 (underweight) category. Yet population-based studies have previously observed a low pre-pregnancy BMI as being associated with a higher risk of HG [136].

The SF group had the highest proportion of women who were primiparous, with those multiparous having a higher risk of experiencing NP. These results support other research observing multiparity as a risk factor for NVP [36, 57, 59], including a cohort study involving >7000 women which found multiparous women to be statistically more likely to experience nausea than primiparous women [53].

A maternal education ≤12 years was significantly more common in the NVP group, which is consistent with the results of one study [50]. However, a recent retrospective study involving 560 women reported higher maternal education as significantly associated with NVP symptoms [137], as did a case-control study involving >20,000 women [51], yet others have found that education level was not significantly different between SF and NP/NVP women [53, 68].

There were significantly more women experiencing either NP or NVP who were married compared to SF women. It is somewhat tempting to speculate upon how marriage may have a role in NVP compared to merely co-habitating or being single. The theories discussed in Section 1.3.1 regarding a neurosis or hysteria specifically manifested via the woman's unconscious loathing for her husband come to mind [22]. One 1988 study observed that stress related to poor communication with the women's husbands influenced the severity of NVP [138], yet it is extremely difficult to discern such a noticeable difference between marriage and co-habitation, especially within a 21st century Scandinavian domestic setting where co-habitation has been reported to be an institutionalised alternative to a formal marriage [139].

There were significantly more non-smokers amongst the NP and NVP women compared with the SF women, both before pregnancy as well as during, a finding which supports numerous other studies [13, 27, 34, 35, 51, 140]. This result has been attributed to the proposed hormonal contribution towards NVP symptoms, as smoking has been shown to decrease circulating levels of estrogen [141, 142]. Another study reports that smoking while pregnant significantly decreases the levels of hCG and estradiol, both thought to be associated with the onset of NVP, with a steady decline of these hormones reported as cigarette consumption increases [143].

In paper IV the mean age at menarche for women was included and presented in the analysis. The NVP women, particularly those with PGP, were found to have a marginally lower mean age at menarche. Additionally, those primiparous amongst these NVP/PGP women also had the lowest number of years from menarche to the present pregnancy (as this analysis included only primiparous women, this equated to their first pregnancy). These two findings combined present an encouraging indication suggesting some form of hormonal disturbance might be occurring in these women. Researchers have reported that an early age at menarche was associated with both elevated levels of estradiol and with more frequent menstrual cycle hormonal variability, owing to the earlier establishment of regular ovulation [144]. They further hypothesised that it was the regular exposure to estradiol spikes during the follicular phase of the menstrual cycle (rather than higher overall basal levels) which contributed to these individual's elevated risk for some diseases. Additionally, girls with earlier ages at menarche also tended to have higher reproductive hormone concentrations in adulthood [144, 145], as well as a higher prevalence of PGP [146]. It must be stressed that although paper IV observed women with both NVP and PGP having the lowest age at menarche, all groups of women reported a somewhat similar age at menarche. Additionally in paper IV, the NP and NVP women with PGP where found to have the highest frequencies reporting incidences of irritability prior to menses compared to all other groups of women. An irritability experienced prior to the onset of menses is one of the main properties defining the premenstrual syndrome (PMS) [147], and it has been reported that PMS symptoms display a correlation with progesterone and estrogen levels [148, 149]. These findings taken together tentatively implicate the women's hormones in the NP, NVP, and PGP conditions. This theme is discussed in further detail in Section 7.1.

That the women with both NVP and PGP had the highest frequency reporting previous experiences of these conditions in prior pregnancies are findings which have been observed elsewhere [34, 38, 105, 113]. Although there are no readily available explanations in current literature, this repetitiveness from previous pregnancies gives rise to suspicions regarding the potential for a genetic component to NP, NVP, or PGP. One research group recently presented several lines of evidence supporting a genetic predisposition to NVP, referring to the high rates of NVP in a twin study, as well as mentioning the higher frequency of NVP women with certain genetically-determined conditions such as defects in taste sensation and glycoprotein hormone receptor defects, as examples implicating genes [150]. This theme is discussed in further detail in Section 7.3.

5.1.2 Diet

Dietary issues were primarily analysed in papers I and II. The results were obtained from the FFQ, from one open question asking about new foods begun to be consumed due to pregnancy, and from one question asking women's relationship to select food items via a series behaviours regarding eating listed as 'did not eat or drink this before pregnancy', 'as before', 'more', 'less', and 'stopped completely'. Although the gestational diet has increasingly become recognised as having important consequences for the resultant offspring's childhood and adulthood [66, 67], there is a scarcity of studies available regarding maternal diet and NVP, hence there are limitations as to what is available for comparison with the results obtained in papers I and II.

In paper I we found that when compared to the SF and NP groups, the NVP group tended to have the highest energy intake, as well as the highest energy percent (E%) for carbohydrates and added sugar. As the NVP women had the highest energy intake overall, instances where the other groups had the highest macronutrient E% tend to be of more interest for investigation. In particular, these are: protein, fat, and saturated fat (where SF had the highest E%), monounsaturated fat (where SF and NP shared the highest E%), and fibre (where NP had the highest E%).

That the SF group had the highest protein E% supports the findings of another study observing the diets of women with NVP [68], as well as researchers who have observed that high protein meals significantly reduce slow wave gastric dysrhythmias and nausea [77]. The findings regarding protein presented here tend to add support to the hypothesis that a low protein E% intake, acting on gastric dysrhythmias, is a contributing factor to NVP. However, one study exploring mediators for gastric dysrhythmias reported progesterone alone or co-administered together with estradiol also produced dysrhythmias in non-pregnant women [151], therefore the question remains as to whether the protein-related dysrhythmias themselves are producing the resultant nausea, or else the early pregnancy hormones acting as mediators to dysrhythmias, or perhaps some compound effect of the two combined.

It is impossible using the results of the FFQ to determine if the high protein E% in the NVP group is related to findings mentioned earlier regarding tryptophan and induced nausea, whereby tryptophan depleted subjects experienced increased nausea symptoms [80]. Tryptophan's relationship has been linked via its association with serotonin, as it acts as a precursor to serotonin production [152].

Serotonin's possible role in NP and NVP is presently uncertain, although evidence is growing [153]. Whilst it has been reported that high serotonin levels are responsible for

nausea [52], inducing nausea by stimulating the 5-HT_3 receptors on the vagal nerves which in turn affect the medullary vomiting system, this mechanism does not explain how tryptophan depletion might be involved with nausea symptoms, since a reduction in tryptophan correlates to a reduction in serotonin [154]. In any case, the effects of a meal on gastric motility and the incidence of nausea is an extremely complex event. Given the multitude of factors that are potentially involved, such as the acidity, osmolality, and viscosity of a meal's effect upon gastric emptying times, all plausibly having some effect on the stomach's response to food, a distortion of the results relating to tryptophan depletion may be present. Furthermore, there may well be another mechanism behind the low tryptophan finding completely unrelated to serotonin.

In response to new foods consumed during pregnancy in paper I, we observed that the NP and NVP women both had the highest proportion beginning to drink water in addition to having the highest proportions consuming foods rich in sour/salty taste. Furthermore, in regards to the FFQ, the SF women had the highest proportion consuming salty snacks most frequently. Taken together, these dietary results may be indicative of the SF group possibly maintaining a more suited plasma osmolality during the onset of pregnancy compared to the NP and NVP women. The consequence of an abnormal plasma osmolality during early pregnancy therefore has the potential to contribute to NVP. This theme is explored in further detail in Section 7.2.

In paper I the SF women were reported to be eating fresh meat significantly more frequently compared to the other groups, which is likely the source of the high protein E% reported. We also found the SF group had consumed the highest E% of saturated fat, which supports another study observing the diet of women with NVP [68]. However, this finding does not support a study claiming saturated fat as a risk factor for HG [81], yet the possibility remains that HG and NVP may have different underlying mechanisms. In other studies reporting upon dietary intakes of women with NVP and HG, no significant association between NVP symptoms and saturated fat has been observed [68, 155]. It is appropriate to consider that women experiencing NVP symptoms often report food aversions to fatty foods [76], making the findings here easier to accept. This explanation may also be relevant in the findings related to monounsaturated fat. In paper I the SF group is reported to consume chocolate and fresh meat more frequently, as well as reporting chocolate and probiotic-containing dairy foods as foods begun to be eaten during pregnancy.

When these results are contrasted with results in paper II, where significantly more SF women are reported to be eating 'more' chocolate (the only exception in the analyses

otherwise dominated by NVP women eating 'more'), speculative inferences can be made suggesting the results regarding fat are likely owing to the chocolate consumption of SF women.

As outlined in the discussion of paper II, the higher intake of chocolate and dairy-based probiotic foods seen in the SF women was hypothesised as conferring some protection from NVP symptoms. The two food groups may be acting together to symbiotically modify the inflammatory response to pregnancy, or via other pathways. A recent systematic review demonstrated several beneficial effects of probiotic consumption in pregnancy, indicating their potential use as a safe therapeutic tool to improve maternal outcomes, however further research prioritising NP and NVP symptoms are required [156].

The NVP group had the highest E% intake of carbohydrates when compared to the SF and NP groups. Coad et al. [3] postulated that women suffering NVP were most likely to be increasing their carbohydrate intake to alleviate symptoms, which would correspond to an intake distribution such as that found here. Their research found that just over 30% of women reported their symptoms were alleviated by continually snacking, usually on carbohydrate-rich meals. This comes as no surprise, as it is carbohydrate meals which are either advised by midwives to minimise NVP symptoms [157] or reported in interviews by affected women as they explain how carbohydrate-rich meals were eaten for relief, in particular sugar-rich beverages [158]. It has been reported that high carbohydrate meals exasperate gastric dysrhythmias, leading to nauseous effects [77]. Findings regarding carbohydrates here also support those findings of Latva-Pukkila et al. [68], where significantly higher E% intakes of carbohydrates were reported by NVP women. As reported in paper I, the NVP women consumed significantly higher amounts of sugar-containing soft drinks, and in paper II the NVP women had the highest odds for eating more biscuits in the analysis.

Based upon the results presented already regarding protein's ability to reduce symptoms of nausea and the suggestion that carbohydrate rich meals exasperated gastric dysrhythmias [77], it is plausible that this high carbohydrate E% intake reported here for the NVP group may be actually exasperating their NVP symptoms. However, as this is a cross-sectional study it is impossible to determine this based upon the data available.

5.2 Gestational conditions

5.2.1 Gestational weight gain

In paper I it was reported that the NVP women had a significantly lower GWG compared to the SF and NP groups. This finding may simply be a result of the nutrients which these

women were unable to retain as a result of vomiting, especially in consideration of their significantly higher energy intake. It is an easier finding to accept when the results of paper II are examined, where the NVP group reported experiencing the highest degree of modulation to their pre-pregnancy diet when compared to the SF group. Furthermore, the results of the multiple regression analyses performed in paper I where analyses were stratified by BMI revealed GWG to be much lower in all groups (SF, NP, and NVP) among women classified as obese. This finding is supported by a study observing a lower GWG for overweight and obese women compared to women defined as normal or underweight, although incidences of NVP were not commented upon [159].

5.2.2 High blood pressure, proteinuria, and preeclampsia

Figure 4 illustrates that NVP women had higher odds for experiencing preeclampsia during gestation than SF women. Since the pathophysiology and diagnosis of preeclampsia includes both high blood pressure and proteinuria [160], it is not surprising that the NP and NVP women had increased odds for both high blood pressure and proteinuria. The MoBa data allowed the mean systolic and diastolic blood pressures to be recorded for those women answering that question (142/87 mmHg for NP women, and 142/88 mmHg for NVP women), and as these values were very close to those used to define hypertension (≥140/90 mmHg), a survey of the literature regarding high blood pressure and hypertension was performed. In studies observing women experiencing HG, similar results regarding hypertension and preeclampsia were reported [161, 162]. Similar results regarding hypertension and NVP [89], and preeclampsia and vomiting [90] have also been previously observed. Factors already named such as maternal BMI, diet, or the effects of stress associated with NVP may all have contributed to these associations.

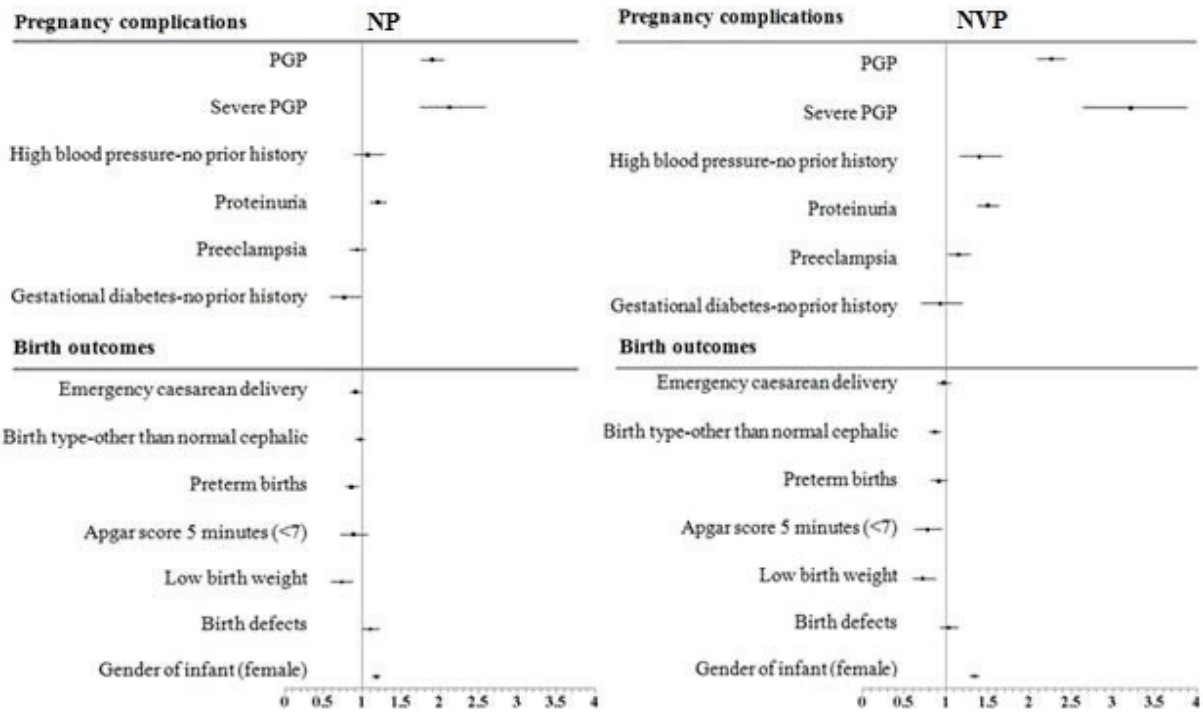

Figure 4. Odds ratios (with 95% confidence intervals) for pregnancy complications and birth outcomes comparing the nausea alone group (NP, left hand side) and the nausea and vomiting group (NVP, right hand side) to the symptom-free (SF) group (reference).

5.2.3 Gestational diabetes

In paper III women with NP had reduced odds for experiencing gestational diabetes. Reduced odds were somewhat apparent for the NVP group also, although not significantly so. This diverges with two studies reporting upon women experiencing NVP, where a higher association of gestational diabetes was reported for women with NVP compared to SF women [89, 163]. As indicated in paper III, this anomaly may be owing to the validity of the diagnosis of gestational diabetes used from the MBRN [164].

5.2.4 Pelvic girdle pain

In paper III the NP and NVP women were observed to have significantly increased odds for experiencing PGP and sPGP during gestation. At the time of publication, there was no comparable literature available to reference this finding with. Therefore, in paper IV this association was investigated further. We repeated the analyses regarding NP/NVP and PGP/sPGP owing to a larger study sample and found increased odds for NP and NVP women to experience PGP or sPGP during gestation, reproducing our previous findings. We also found NP/NVP with increased odds for experiencing PGP/sPGP at 4-6 months post-partum when compared to SF women. Furthermore, we found that NP and NVP appeared earlier in

pregnancy than PGP, and that women with a longer duration of nausea and/or vomiting had a higher proportion of PGP compared to those women with a shorter duration.

As mentioned in Section 1.6.1, the aetiology of both NVP and PGP is unknown, and while both conditions continue to have a number of suggested aetiologies, the most openly accepted are those associated with pregnancy related hormones [9, 106, 114, 115, 117, 118]. Women with a younger age at menarche have also been reported as having an increased prevalence of PGP [146]. As it was observed that the NVP women with PGP shared a tendency for having the lowest number of years from menarche to first pregnancy, and the NP and NVP women with PGP reported the highest proportions experiencing episodes of irritability prior to the onset of menstruation, a closer investigation into hormonal influences seems reasonable.

5.2.4.1 Hormones with regard to NVP and PGP

Even though no biomarkers were available for analysis in the production of this thesis, the results reported here regarding NVP and PGP were encouraging enough to speculate further upon the role reproductive hormones may have in the aetiology of both these conditions.

Women with both NVP and PGP had the highest proportions reporting PMS, and although there is no clear understanding of PMS aetiology, it is generally believed to be caused by sex steroids originating from the corpus luteum (CL) [165]. Aside from the association of increases in progesterone, the most important finding noted regarding PMS development is the necessity of CL formation and ovulation to occur [165]. This clearly illustrates how the CL may have an integral role in either instigating or else contributing to the onset of NP, NVP, and/or PGP. Hormones produced by the CL during the luteal phase of the menstrual cycle which also feature in early pregnancy are therefore worth investigating when discussing NVP and PGP aetiology. The main luteal hormones are 17-hydroxyprogesterone (17-OHP), progesterone, estrogens (particularly estradiol), and relaxin [166, 167], although the list of other factors released by the CL (such as oxytocin) is also noteworthy [168-170]. Moreover, it is worth noting the connection hCG has with these luteal hormones. HCG is released by the syncytiotrophoblast of the developing foetus as early as one week after conception, having an essential role in stimulating the CL to secrete hormones for approximately 6 weeks while the foetal-placental unit is developed, with it thereafter overtaking the CL with hormone secretion [171]. Therefore, hCG's presence during early pregnancy can neither be overlooked nor underestimated.

Studies regarding the role luteal hormones may have in causing NVP symptoms found low progesterone and high estradiol levels in emetic women during early pregnancy [172, 173], while another study reported progesterone alone or in combination with estradiol created conditions leading to NVP [174], although other studies have been unable to reproduce these findings [39, 175]. Likewise, a number of discrepant results have emerged for hCG, the hormone popularly accepted as causing NVP [29, 173, 175, 176]. Surprisingly, there is a conspicuous absence of studies to have examined the role of either 17-OHP or relaxin in the aetiology of NVP. Soules et al.'s investigation of 17-OHP in regards to NVP is the only clinical study identified addressing this hormone [29]. Perhaps since no correlation between 17-OHP and NVP was identified, interest in 17-OHP waned, although one 35 year old study involving 40 women can hardly be considered as conclusive. The plasma concentration of 17-OHP rises steeply following conception, peaking around week 5 thereafter decreasing steadily until around week 13 [177] in a similar pattern to hCG and relaxin [168, 178], making it a hormone of interest for future research. Relaxin has never been investigated clinically in relation to NP, NVP, or HG symptoms.

In regards to PGP however, relaxin is the main luteal hormone to have received attention since abnormal levels have been hypothesised to increase the risk of PGP, although these findings are not conclusive [115, 179]. Additionally, relaxin has been identified as being responsible for allowing increased joint laxity during pregnancy [180]. Progesterone has also been investigated for a potential role in PGP, with one study reporting a significantly higher level of progesterone and relaxin in early pregnancy to have increased the risk for PGP [116]. In animal studies performed regarding estrogen, progesterone and relaxin's effect upon pelvic ligaments and cervical softening, it was suggested that the presence of these hormones activate receptors in the pubic symphysis region, causing a loosening of this area during pregnancy [117, 181]. Elsewhere, activity of relaxin has been reported to be dependent upon, as well as potentiated by, other reproductive hormones, especially estrogen [182].

Research into women experiencing PGP post-partum reported that pain was exasperated by menstruation and/or ovulation, further implicating luteal hormones [183]. In addition, hormonal influences on collagen synthesis have been suggested to be involved in 'reduced forced closure', a condition commonly associated with post-partum PGP [116, 184]. Reproductive hormones thus appear to be strongly associated with NVP and PGP symptoms. Further details and future recommendations regarding this theme follow in Section 7.1.

5.3 Pregnancy and birth outcomes

5.3.1 Pregnancy outcomes

In paper III the SF women had the highest proportion having either an early (35-36 weeks gestation) or very early (28-34 weeks gestation) birth compared to the NP or NVP groups. This finding supports the results of previous studies [26, 50, 62, 91]. Somewhat surprisingly, a recent MoBa study examining HG found that significantly more women suffering HG had a gestational length <37 weeks [185]. Discounting any reporting errors inherent in the data, this finding provides a good argument that the mechanisms and outcomes for NVP and HG are to a certain extent different, although the relationship between NVP and HG is still unclear [20].

The NP group had significantly reduced odds for having an emergency caesarean delivery, and non-significant reduced odds were also found in the NVP group, as shown in figure 4. Another large cohort reporting upon outcomes for NVP women found no significant association between NVP and caesarean delivery [89], while a study on women with HG reported contrasting results [162]. Reasons for such a variety of results are lacking, and the scarceness of literature available regarding NVP and delivery modes reflects the need for further research in this area.

5.3.2 Birth outcomes

The infants born to the NP and NVP women were heavier, longer, and with a larger head circumference than the children born to women in the SF group (paper III). These findings, combined with those reporting NP and NVP groups having a significantly higher number of women giving birth after week 37, culminate in the NP and NVP women also having significantly reduced odds for having SGA infants, as it is gestational length together with birth weight which is used to determine the SGA value (see Section 3.4). Infants from NVP women having higher anthropomorphic measurements and longer gestational lengths support other studies [26, 62, 75, 96]. It has been suggested that the longer gestation time may be connected with the favourable hormonal milieu NVP women tend to have, producing a higher placenta weight and birth weight [26], although attempts to explain the contradicting findings are limited given the data available. If the maternal diets as well as the birth outcomes for women with NVP are considered together, the variation in outcome results may be easier to explain. One cohort study from Finland (n=187) contained both these variables [68], however comparing their results with those presented in papers I and III did not reveal any clear insights or easy explanations. The NVP women in that study are reported as consuming less overall energy, with significantly more carbohydrate and fibre E%, and less protein E%

compared to SF women. Furthermore, they reported NVP women having a significantly shorter gestation, as well as lighter, shorter infants with a smaller head circumference (although lacking statistical significance), compared to the SF women. In contrast to those results, the NP and NVP women featured in papers I and III consumed more energy and produced heavier and longer infants with a larger head circumference when compared to the SF group. It should be mentioned that both the SF and NVP groups in the Finnish study consumed considerably less energy overall compared to the sample featured in paper I, perhaps as a result of a dietary intervention some women had received beforehand in that study. It may be simply that an increased energy intake is responsible for these contrasting results regarding birth outcomes. It has been suggested that the favourable birth outcomes associated with NVP actually are a result of NVP women increasing their nutrient intake during gestation, resulting in a higher consumption of certain nutrients [3].

Therefore, it may be appropriate to consider the role the overall energy intake a maternal diet might have in contributing to infant anthropometry. One study has reported a lower birth weight for lower energy intake levels [186]. However, as their results were not significant, they conceded that maternal diet among the reasonably well nourished women of industrialised countries had, at most, a small impact on birth weights.

Another approach is to consider food types consumed by the different groups. One study (n=693) reported that pregnant women consuming a diet rich in fruit, vegetables, dairy foods, yoghurt, and water were less likely to deliver a SGA infant [187]. Interestingly, the NP and NVP groups in paper I featured as the highest consumers for most of these foods, both from the FFQ and from the list of foods begun to be consumed due to pregnancy. By contrast, the Finnish study had SF women consuming more fruit and vegetables than the NVP group, although the difference in consumption were not significant [68]. That the maternal dietary composition, independent of energy intake and weight gain during pregnancy, can have an effect upon the placental and birth weight of infants has been reported elsewhere also [188].

5.3.3 Sex of infant

Amongst the NP and NVP women there were higher odds of having an infant of female gender compared to the SF group (paper III), which corresponds with the numerous studies reporting a similar result [26, 58, 99, 100, 134]. The result was more pronounced in the NVP group than the NP group (52.1% female vs 49.0% female for NVP and NP, respectively, and 45% for SF). As reported in paper III, the average Norwegian male:female sex ratio for the same years as when the cohort conducted its questioning was 51% male: 49% female [189]. It

has been postulated that results such as these may be related to a hormonal element, particularly as reports of higher levels in both plasma and amniotic fluid of hCG have been related to carrying a female foetus during gestation [190, 191]. Another group has suggested that elevated levels of serum estradiol may be connected to the altered sex ratio [192]. It should be noted, however, that the higher odds for a female infant for NP and NVP women is not ubiquitous, as other studies have previously reported an association between NVP and male infants [68, 101].

5.4 Consideration of methodology

5.4.1 Strengths and weaknesses

The main strength of this thesis is the large population-based cohort the data has been sourced from. In addition, the MoBa data has been linked with the MBRN, providing a thorough and comprehensive amount of data related to each individual woman enrolled in the study. Another strength is that the FFQ used extensively in paper I has been validated. The strict definitions used for NP and NVP, as well as our exclusion for inconsistent answers regarding these outcomes also add strength to the selection of our sample. Also, since we have proceeded to investigate the same sample throughout the papers contained in this thesis, the combined output of results regarding maternal history, demographics, lifestyle, and diet, in addition to gestational, pregnancy and birth outcomes, makes this collected study a source of abundant information regarding the NP and NVP conditions in the 21st century. As has been pointed out in the papers themselves, a cohort of this size generates a number of significant associations, however the merit of these significant associations in the clinical setting are not always relevant. Weaknesses of this thesis are primarily that the data are obtained from self-reported questionnaires, with the possibility for measurement errors in recalling symptoms. Errors in recalling the consumption frequency patterns and foods detailed in the FFQ are also possible, especially when one considers the voluminous questions presented in Q2.

Furthermore, the questions NP and NVP are defined upon are featured on the very last pages of the exhaustive FFQ, by which time respondents may have been tired or less accurate with the quality of their answers. The questioning regarding NP and NVP also did not allow for an assessment of the severity or frequency of the symptoms. That biomarker and anthropometric data for the participating women were absent from this thesis may also be considered a weakness. Methodological considerations which may have had an effect on the interpretation of the findings in this thesis are discussed below.

5.4.2 Internal validity

Internal validity refers to features of studies that allow readers to judge whether the results of the study represent an unbiased estimate of the effect of an exposure. The internal validity characterises the degree to which a study is free from bias or systematic error [193]. The internal validity depends upon the methods used to select the study subjects, collect the relevant information, and conduct analyses [193]. Internal validity also depends upon the subject matter knowledge, such as the identification and measurement of confounders [193, 194].

Selection bias, information bias and confounding are important features relevant to the MoBa study.

5.4.2.1 Selection bias

Selection bias is a systematic error in a study that stems from the procedures used to select subjects and from factors that influence study participation, and appears when the association between exposure and disease differs for those who participate and those who do not participate in a study [132].

In order to minimise the presence of selection bias in studies, the baseline characteristics between the created groups for comparison should be relatively consistent. To evaluate the potential for selection bias in the MoBa cohort, one research group studied the differences in prevalence estimates and association measures for the women enrolled in MoBa and compared these with the entire population of women giving birth in Norway during the same time period [195]. Although they reported significantly different prevalence estimates for some exposure-outcome variables, overall the study found no statistically relative differences in association measures between MoBa participants and the total population based upon eight well-known exposure-outcome associations (including prenatal smoking and low birth weight, parity and preeclampsia, and marital status and preterm birth) [195].

Owing to our thorough definitions of NP and NVP used, as well as the problem of missing data for key variables in our studies from the MoBa data set, a sizeable proportion of the original MoBa sample was excluded from the samples used in papers I-IV. To assess the potential effect of these exclusions, we performed sensitivity analyses in papers I, III, and IV (Table S1 in paper I, Table 1 in paper III, Table S1 in paper IV) comparing the excluded sample with our study sample in order to determine if the results were affected by the excluded women. Our analyses indicated that our results were essentially unaffected by the exclusions performed. Other research groups working with MoBa have faced similar concerns

and have approached the issue by conducting multiple imputation using chained equations [196, 197]. They reported that the results of these imputations yielded similar results as for those of their included subjects.

Another source of selection bias relevant to this thesis is related to those women failing to return one or more of the follow-up questionnaires related to study questions involving Q3 and Q4. These two questionnaires were mostly featured in papers III and IV, which is why the sensitivity analyses were undertaken predominantly in these two papers.

5.4.2.2 Information bias

Information bias refers to flaws occurring when measuring exposure, covariate, or outcome variables that result in different quality of information between comparison groups [193]. Measurement errors are inevitable in observational studies.

The fact that most of the data in MoBa is self-reported is a concern for creating the potential for information bias [123]. Regardless of the validation existing for the FFQ used in Q2, FFQs and other tools used to measure diets have been reported to contain both random and systematic errors [198]. How questions are worded and presented in the questionnaires, and how they are ultimately understood and answered has previously been highlighted in another large birth cohort as a potential cause for misclassification [199]. However, as the MoBa questionnaires were regularly paced throughout gestation, the potential for errors concerning poor memory have likely been minimised.

One exclusion criteria employed throughout this thesis was for women who were answering inconsistently between Q1 and Q2 regarding their NP and NVP symptoms. The decision to remove those with inconsistent answers was taken in order to increase confidence in the resultant three groups (SF, NP, NVP).

5.4.2.3 Confounding

Confounding was defined and previously discussed in Section 3.4.3. Since there were no investigations included into whether any of the women in the SF group had used medications or other therapies to avoid symptoms of NP or NVP, there may exist a degree of unmeasured or residual confounding in the results of the thesis. The results obtained may therefore be influenced by some degree owing to this type of confounding, however, as the sample proportion of SF women closely resemble proportions reported in other studies [8, 62], any unmeasured or residual confounding featured here would most likely be negligible. Furthermore, confounders that are misclassified or else categorised incorrectly may also be sources of residual confounding, which is confounding still remaining after unsuccessfully

attempting to adjust for confounding [194]. In this thesis, the impact of the adjustments made in the multivariate analyses resulted in minimal changes in the estimated associations when comparing the crude and adjusted estimates.

5.4.3 External validity

External validity deals with the extent to which the findings can be generalised from the sample in the study to a target population, in this case the Norwegian population of pregnant women [200]. In this thesis, we used data from the MoBa study in which nearly all pregnant women between 1999 and 2008 were invited to participate. However, the external validity is somewhat threatened by the low participation rate.

When the external validity of the MoBa cohort was evaluated using 23 exposure and outcome variables including maternal age, parity, preeclampsia and hypertension, significantly different prevalence estimates between the cohort sample and the total Norwegian population were reported [195]. A strong underrepresentation was highlighted for women <25 years, those living alone, women with para ≥2, women with previous still births, and smokers [195].

In conclusion however, they reported that although the differences noted have implications for prevalence studies, the finding of similar associations between study participants and the total population indicated selection procedures in MoBa may not represent a validity problem in studies of exposure-outcome associations [195]. This finding indicates little reason for concern regarding selection bias threatening the relative generalisability to the Norwegian population. The only exception is for the immigrant population residing in Norway, as the only exclusion criteria for MoBa participation was command of the Norwegian language.

6 Conclusion

The following conclusions can be drawn from the work contained in this thesis:

Demographics, maternal history, and lifestyle

- NVP women were younger, heavier, and had the largest proportion with an education <12 years, compared to NP and SF women.
- SF women had the largest proportions primiparous, co-habitating, and smoking before and during pregnancy compared to NP and NVP women.
- NP and NVP women, particularly the latter, had higher proportions reporting having experienced NVP in previous pregnancies.

Diet

- NVP women had the highest energy intake compared to NP and SF women, characterised by a higher carbohydrate and added sugar E% primarily from sugar-containing soft drinks.
- According to the FFQ results, the SF women consumed the highest protein E%, fat E%, and saturated fat E%. From the specific foods begun in pregnancy reported, the SF women had the highest consumption of probiotic-containing foods and chocolate.
- NVP women were most affected by changes in food consumption, having the lowest proportion reporting to eat as before pregnancy, as well as the highest proportion reporting eating ‘more’ and ‘reduced eating’ when compared to SF women.

Gestational conditions

- NVP women had the lowest GWG compared to NP and SF women, with obese women having the lowest overall GWG.
- NP and NVP women had higher odds for having PGP, sPGP, high blood pressure before and during pregnancy, proteinuria, and preeclampsia compared to SF women.
- NP women had reduced odds for having gestational diabetes compared to SF women.

Pregnancy and birth outcomes

- NP and NVP women had a higher proportion of term births, and lower odds for having an emergency caesarean delivery, a birth type other than normal cephalic, a preterm birth, a low Apgar score after 5 min, a low birth weight, and SGA infants compared to SF women.
- NP and NVP women had higher odds for giving birth to a female infant.

- NP and NVP women had higher odds for experiencing PGP or sPGP during pregnancy and for having PGP 4-6 months post-partum, with NVP women also having significantly higher odds for having sPGP 4-6 months post-partum.

7 Future research directions

NP and NVP, as stated earlier, have been present in gestation for millennia. As epidemiological and medical researchers, it is completely appropriate to wonder how this is caused, and how it might be prevented.

However, prior to discussing future research directions for this field, the question of 'why' needs to be briefly aired, as the question of why NP or NVP exists has been ignored throughout this thesis. NVP by definition is a dis-ease of the gestating woman, and researchers tend to approach it as a disease, as a product of some out-of-control biological system in the body which can be rectified with the aid of some corrective medical-based procedure.

Yet the idea that NP or NVP might have some function to fulfil cannot be overlooked. Most of the literature regarding this issue is found in the field of evolutionary anthropology, and I would consider this thesis somewhat incomplete if I did not suggest for readers to refer to some of the more intriguing papers discussing NVP's hypothesised evolutionary function [6, 17, 201].

When approaching NVP as a disease then, future directions clearly need to be directed to the thorough and comprehensive task of determining NVP's aetiology. If, as some have suggested, it has a multi-factorial aetiology [14], then a model needs to be developed to understand the many elements likely involved in NVP's manifestation.

Below are some of the areas potentially associated with NVP which require further research.

7.1 Hormones

It seems impossible to examine literature regarding NVP, and PGP to an extent, and not be presented with some hypothesis or association regarding the role of reproductive hormones.

The present status quo for NVP or PGP has no conclusive aetiology for either condition based upon abnormal levels of any single luteal hormone. The results of the speculations presented in this thesis encourage the premise that a combination or certain ratio of some or all of the luteal hormones discussed is contributing to NVP symptoms. Hormonal ratios have been previously discussed in PMS literature, as well as limited NVP and PGP literature [175, 184, 202-205].

Alternately, the issue of the functionality or availability of hormone receptors at key sites may be creating the symptoms rather than the actual hormone levels themselves, as discussed in some articles [38, 117].

Future research should therefore be performed upon ascertaining not only levels of luteal hormones in very early pregnancy, but also the functionality of the receptors for these hormones at key sites. The development of more sophisticated technology and techniques in assessing these factors must also be employed in order to update the hormonal aetiological theory for NVP which is, for the most part, based upon superseded techniques.

7.2 Hyponatremia

In paper I certain patterns in the food intake of the women provided the basis for speculating upon the osmotic state of plasma in the women during the course of early gestation.

During the first trimester of pregnancy, there are a number of changes in the body's biochemical environment taking place, such as plasma volume expanding and total body water increasing, creating lower sodium concentrations and a reduced plasma osmolality [206]. Since it takes several weeks for the body's osmoreceptors to reset to the lower values, it has been suggested that these changes may cause symptoms of hyponatremia to develop [206]. A decrease in plasma osmolality, stimulation of thirst, and persistent anti diuretic hormone (ADH) release are features of normal pregnancy, as is renal sodium and water retention [207]. Incidentally, ADH release has also been shown to stimulate the emetic centres in humans [208]. It has been previously reported that serum sodium and serum osmolality levels decreased significantly by the 6th week of gestation, a time which generally coincides with NVP onset [209]. Furthermore, a complete placentation is not required for these initial hemodynamic changes to occur in pregnancy, indicating that maternal factors are possibly related to changes in ovarian factors [209]. Adding weight to this idea, many studies have reported nausea and vomiting in non-pregnant people to be symptoms of mild to severe hyponatremia [210-212].

The body's homeostasis is mainly achieved via the hormones ADH and aldosterone [212]. ADH release retains water in dehydration states, and aldosterone increases the reabsorption of sodium ions and water. As healthy women increase in plasma volume during pregnancy, the increased plasma volume - which is also proportional to the size of the foetus - creates a hemodilution and subsequent state of hyponatremia, with the increased plasma volume resulting in an environment of decreased plasma osmolality [213].

Relaxin is also implicated in hyponatremia during pregnancy, via its role in the resetting of osmoreceptors and the release of ADH [214]. Circulating relaxin has also been shown to stimulate thirst, even in a hyponatremic state [182, 215]. A combination of hyponatremia and excessive thirst is prolonged by progesterone acting as a competitive binder

to aldosterone receptors [216], a competition hypothesised to continue until aldosterone levels overcome the progesterone levels. The lingering high aldosterone concentration acts to induce salt appetite in adults, with research using estradiol and progesterone reporting these hormones are also adequate in increasing salt appetite [217, 218], and as mentioned in Section 1.3.2, estradiol and progesterone are both at elevated levels in the first trimester of pregnancy.

Pre-conceiving conditions where a woman's osmoreceptors were already in the process of becoming attuned to adjustments regarding sodium and water following conception might possibly cause these women to be less susceptible to the hyponatremic effects caused by early pregnancy.

Supporting this idea, researchers have reported a protective effect against developing HG from a marginally higher water consumption when surveying the pre-conception diet of women with and without HG [219]. Women without HG symptoms were observed to be consuming approximately 200-450 g more water per day than women developing HG.

Results in paper I regarding NP and NVP women having the highest proportion beginning to drink water in addition to having the highest proportions consuming foods rich in sour/salty taste could be indicative that these women may have been consuming relatively lower amounts of water pre-conception compared with the SF women. Since the delay in resetting osmoreceptors is suggested as being the cause for extended hyponatremia in the early pregnant state, with nausea and/or vomiting resulting, it seems plausible that an increased water intake pre-conception may prime the osmoreceptors for the changes forthcoming with pregnancy.

Further support for this idea is present in research reporting that an increased water intake can cause reductions in plasma osmolality and create a mild hyponatremia [220, 221], which may act to induce the osmoreceptors to reset to a lower plasma osmolality, a model which would hypothetically prepare the body for the larger homeostatic changes to come with pregnancy and possibly avoid the nausea and NVP symptoms.

It therefore it seems prudent to direct future research into the mechanisms involving osmoreceptor adjustment in women prior to and during early pregnancy in relation to NVP.

7.3 Genes and other factors of interest

The apparent heritability of NVP and, to a certain extent, PGP, has always piqued interest in the idea that some genetic component is responsible for these conditions. This notion seems plausible when we consider recent findings discussing serotonin, migraines, and

irritable bowel syndrome (IBS). Researchers have announced an association between these maladies and the serotonin receptor 2A gene, reporting that IBS and migraine headache groups had at least one gene that differed from the genes of the healthy participants [222]. There is also a study reporting upon a genetic variation in the subunit of a serotonin receptor (HTR3C) having an association with NVP [52], and serotonin receptors are located both in areas known to be involved in the emetic reflex (chemoreceptor trigger zone and vomiting centre) and on vagal terminals that innervate the gastrointestinal mucosa [223]. Furthering the case for hormone receptors made in Section 7.1, it may be that a similar genetic variation exists in receptors for estrogen, progesterone, or relaxin. Indeed, estrogen receptors have already been implicated with NVP, albeit in an indirect way. Research into the genetic variability in eating disorders (ED) have reported an association with the ESR2 locus which codes for specific estrogen receptors [224]. This finding is of interest to NVP research as it has been reported previously that women with ED showed over twice the odds for developing NVP compared to the women without any ED in the first trimester of pregnancy [225]. Furthermore, serotonin receptors have also been implicated with ED [226].

The metabolites produced from the metabolism of progesterone have also been previously implicated with the effects of PMS, with the authors reporting the possibility that women may be susceptible to maladies associated with exposure to high levels of progesterone metabolites during episodes (such as pregnancy) of high progesterone secretion or its withdrawal [205, 227]. Hence attention to these suspect hormone's metabolites is also worthy of future study.

At the very cutting edge of future fields for research related to NVP would have to be the possible role microchimerism may have. Microchimerism is a bi-directional exchange of foetal and maternal cells which takes place during pregnancy [228]. Foetal cells migrate throughout the maternal body, increasing in quantity throughout the gestational period with the potential to create conflict between foetal and maternal systems over resource allocations [228]. Foetal cells also have the ability to bypass the brain-blood barrier and find residence in the maternal brain, although microchimerism in the brain is not clearly associated with either maternal health or disease [228]. Furthermore, the foetal cells may be found in maternal blood and tissues for decades following birth, with cells not thought to be limited to just the bi-directional exchange of mother and foetus, since cells from older siblings and even maternal grandmother cells might also find their way to be transferred to the foetus [228]. Although evidence is currently lacking, it is not inconceivable to suggest that some degree of resultant maternal immune response throughout these conflicts may manifest as NP or NVP.

These findings presented in this section should encourage NVP research to focus upon the field of genetic mutations in the receptors for luteal hormones. Furthermore, the phenomenon of microchimerism requires further study to ascertain if it has any impact upon the mechanisms responsible for NVP.

8 References

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Appendix 1

den norske **Mor & barn undersøkelsen**

Questionnaire 1

This questionnaire will be processed by a computer. It is therefore important that you follow these instructions:

- Please use a blue or black ballpoint pen.
- Put a cross in the box that is most relevant like this:
- Should you put a cross in the wrong box correct it by
- In the large green boxes write a number or a capital l

  It is important that you only write in the white area of

Please do not use this questionnaire. Contact us at morbarn@fhi.no or phone + 47 53 20 40 40 if you need a questionnaire.

Number: 0 1 2 3 4 5 6 7 8 9 Letter: A B C D

- When filling in a single figure in boxes containing two or more squares, please use the square to the right. Example: 5
- A number of questions in this questionnaire concern the week of pregnancy. For example, fill in week 5 for something that occurred 5 weeks after your last period.
- Specific information concerning, for example, medication or profession should be written in the boxes or on the lines provided. Please write clearly in CAPITAL LETTERS.
- Remember to provide the date when you completed the questionnaire.

Please return the completed questionnaire in the stamped addressed envelope provided.

Date on which the questionnaire was completed ☐☐ Day ☐☐ Month ☐☐☐☐ Year (write the year with 4 numbers, e.g. 2000)

Menstruation

1. How old were you when you had your first menstrual period?

☐☐ Years

2.How many days are there usually between the first day in your menstrual period and the first day in your next menstrual period?

☐☐ Days

3. Are you usually depressed or irritable before your period?

☐ No ☐ Yes, noticeably
☐ Yes, but just slightly ☐ Yes, very much

4. If yes, does this feeling disappear after you get your period?

☐ No
☐ Yes

5. Were your periods regular the year before you became pregnant?

☐ No
☐ Yes

6. During the last year before you became pregnant, did you lose your period for more than three months?

☐ No
☐ Yes, due to an earlier pregnancy
☐ Yes, for other reasons

7. Date of first day of last menstrual period.

☐☐ Day ☐☐ Month ☐☐☐☐ Year

8. Did your last menstrual period come at the expected time?

☐ No
☐ Yes

9. Are you certain about the date of first day of last menstrual period?

☐ Certain
☐ Uncertain

10. Describe the duration, amount of bleeding and menstrual pains of your last period ?

	As usual	More than usual	Less than usual
Duration	☐	☐	☐
Amount of bleeding	☐	☐	☐
Menstrual pains	☐	☐	☐

Questionnaire 1C - MB - 40.000 - 0303

Contraception and pregnancy

11. Have you/your partner at any time during the last year used the following methods to avoid becoming pregnant? (Fill in all that apply.)

- ☐ Condom
- ☐ Diaphragm
- ☐ IUD
- ☐ Hormone IUD
- ☐ Hormone injection
- ☐ Mini pill
- ☐ Pill
- ☐ Spermicides (foam, suppositories, cream)
- ☐ Safe period
- ☐ Withdrawal
- ☐ No such methods
- ☐ Other_____

12. If you have used the pill/mini-pill, how long altogether have you used them?

	Pill	Mini-pill
Less than one year	☐	☐
1-3 years	☐	☐
4-6 years	☐	☐
7-9 years	☐	☐
10 years or more	☐	☐

13. If you have used the pill/mini-pill, how old were you when you first used it?

☐☐ Years old

14. Were you taking the pill/mini-pill during the last 4 months before this pregnancy?

- ☐ No
- ☐ Yes

15. If yes, how long before your last menstrual period did you stop taking the pill/mini-pill?

☐☐ Weeks

16. Was this pregnancy planned?

- ☐ No
- ☐ Yes

17. If yes, how many months did you have regular intercourse without contraception before you became pregnant?

- ☐ Less than I month
- ☐ 1-2 months
- ☐ 3 months or more

☐☐ Number of months if more than 3

18. Did you become pregnant even though you or your partner used contraceptives?

- ☐ No (proceed to question 21)
- ☐ Yes

19. If yes, which type? (Fill in all that apply.)

- ☐ Condom
- ☐ Diaphragm
- ☐ IUD
- ☐ Hormone IUD
- ☐ Hormone injection
- ☐ Mini pill
- ☐ Pill
- ☐ Spermicides (foam, suppositories, cream)
- ☐ Safe period
- ☐ Withdrawal
- ☐ Other_____

20. If you became pregnant while using an IUD, has it now been removed?

- ☐ No
- ☐ Yes

21. How long have you and the baby's father had a sexual relationship?

☐☐ months or ☐☐ years

22. How often did you have sexual intercourse during the four weeks before you became pregnant and during the last four weeks?

	Before	Now
Every day	☐	☐
5-6 times a week	☐	☐
3-4 times a week	☐	☐
1-2 times a week	☐	☐
1-2 times every two weeks	☐	☐
Less than 1-2 times every 2 weeks	☐	☐
Never	☐	☐

23. Have you ever been treated for infertility?

- ☐ No
- ☐ Yes

24. If yes, was it in connection with this pregnancy or an earlier pregnancy and what type of treatment did you have? (Fill in all that apply.)

	Earlier Pregnancy	This Pregnancy
Fallopian tube surgery	☐	☐
Other surgery	☐	☐
Medication for endometriosis	☐	☐
Hormone treatment	☐	☐
Insemination (injection of sperm)	☐	☐
IVF (test tube) method	☐	☐
Other	☐	☐

25. Have you been given information about having an amniocentesis performed?

- ☐ No
- ☐ Yes

26. What was your blood pressure at your first antenatal visit? (Check your medical card.)

☐☐☐/☐☐☐ E.g. 150/95

27. What did you weigh at the time you became pregnant and what do you weigh now (in kilograms)?

When I became pregnant : ☐☐ kg Now: ☐☐ kg

28. How tall are you?

☐☐ cm

29. How tall is the baby's father?

☐☐ cm

30. How much does the baby's father weigh (in kilograms)?

☐☐ kg

Previous pregnancies

31. Have you been pregnant before? (Include all pregnancies that ended in abortion, miscarriage or stillbirth as well)

☐ No (proceed to question 36)
☐ Yes

32. If yes, fill in for all earlier pregnancies. Include all pregnancies that ended in abortion, miscarriage or stillbirth as well as ectopic pregnancies. State the year the pregnancy began, how many kilos you gained during the pregnancy and the number of months you breast-fed each baby. State whether or not you smoked during earlier pregnancies.

Pregnancy Number	Year pregnancy started	Live infant born	Spontaneous abortion/ stillbirth	Termination of pregnancy	Ectopic pregnancy	Week of pregnancy for abortion/ still birth	Number of months breast feeding	Weight gain during pregnancy (in kg)	Smoked during pregnancy
1		☐	☐	☐	☐				☐
2		☐	☐	☐	☐				☐
3		☐	☐	☐	☐				☐
4		☐	☐	☐	☐				☐
5		☐	☐	☐	☐				☐
6		☐	☐	☐	☐				☐
7		☐	☐	☐	☐				☐
8		☐	☐	☐	☐				☐
9		☐	☐	☐	☐				☐
10		☐	☐	☐	☐				☐

33. Have you had any of the following problems during previous pregnancies? (Fill in all that apply.)

	No	Yes
1. Pelvic girdle pain requiring medical leave	☐	☐
2. Pelvic girdle pain requiring bed rest	☐	☐
3. Serious nausea and vomiting	☐	☐
4. Pre-eclampsia during pregnancy	☐	☐
5. Pregnancy diabetes	☐	☐
6. Sugar in urine	☐	☐
7. Problems with incontinence	☐	☐

34. If you had pelvic girdle pain in a previous pregnancy that led to bed rest or medical leave, when did the pain start?

☐☐ months after start of pregnancy

35. When did the pain stop?

☐☐ months after pregnancy
☐ still have pain

Illnesses and health problems during this pregnancy

36. Have you had bleeding from the vagina once or more during this pregnancy?

☐ No
☐ Yes

37. If yes, describe the first and last bleeding. Give the date the bleeding started, how many days the bleeding lasted and how much you bled.

	Date when bleeding started	No. of days variation	(Enter a cross in a box indicating the amount of blood (trace blood means a few drops) Amount		
First bleeding	☐☐ ☐☐ ☐☐☐☐	☐☐	☐ Trace of blood	☐ More than just a trace	☐ Clots
Last bleeding	☐☐ ☐☐ ☐☐☐☐	☐☐	☐ Trace of blood	☐ More than just a trace	☐ Clots
	Day Month Year				

If more than two episodes of bleeding write in the number of times ☐☐

38. Have you experienced any of the following illnesses or problems during this pregnancy? If you have used medication in connection with these problems give the name of the medicine, the weeks you took the medicines and how many days you took them. (Include all types of medication, both prescription and over the counter medicines in addition to alternative and herbal remedies. Do not include vitamins and dietary supplements as these are discussed elsewhere.)

Illness/health problem during this pregnancy					Use of medication during this pregnancy					
	Week of pregnancy					Week of pregnancy				Number of days taken
Illness/health problem	0-4	5-8	9-12	13+	Name of medicine taken	0-4	5-8	9-12	13+	
1 Pelvic girdle pain	☐	☐	☐	☐		☐	☐	☐	☐	
2 Abdominal pain	☐	☐	☐	☐		☐	☐	☐	☐	
3 Back pain	☐	☐	☐	☐		☐	☐	☐	☐	
4 Neck and shoulder pain	☐	☐	☐	☐		☐	☐	☐	☐	
5 Nausea	☐	☐	☐	☐		☐	☐	☐	☐	
6 Nausea with vomiting	☐	☐	☐	☐		☐	☐	☐	☐	
7 Vaginal thrush	☐	☐	☐	☐		☐	☐	☐	☐	
8 Vaginal catarrh/unusual discharge	☐	☐	☐	☐		☐	☐	☐	☐	
9 Pregnancy itch	☐	☐	☐	☐		☐	☐	☐	☐	
10 Constipation	☐	☐	☐	☐		☐	☐	☐	☐	
11 Diarrhoea/gastric flu	☐	☐	☐	☐		☐	☐	☐	☐	
12 Unusual tiredness/sleepiness	☐	☐	☐	☐		☐	☐	☐	☐	
13 Sleeping problems	☐	☐	☐	☐		☐	☐	☐	☐	
14 Heartburn/reflux	☐	☐	☐	☐		☐	☐	☐	☐	
15 Oedema	☐	☐	☐	☐		☐	☐	☐	☐	
16 Fever with rash	☐	☐	☐	☐		☐	☐	☐	☐	
17 Fever over 38.5 C	☐	☐	☐	☐		☐	☐	☐	☐	
18 Common cold	☐	☐	☐	☐		☐	☐	☐	☐	
19 Throat infection	☐	☐	☐	☐		☐	☐	☐	☐	
20 Sinusitis/ear infection	☐	☐	☐	☐		☐	☐	☐	☐	
21 Influenza	☐	☐	☐	☐		☐	☐	☐	☐	
22 Pneumonia/bronchitis	☐	☐	☐	☐		☐	☐	☐	☐	
23 Sugar in urine	☐	☐	☐	☐		☐	☐	☐	☐	
24 Protein in urine	☐	☐	☐	☐		☐	☐	☐	☐	

Previous and current illnesses and health problems

39. Do you have or have you had any of the following illnesses or health problems? If you have taken medication (tablets, mixtures, suppositories, inhalers, creams, etc.) in conjunction with the illness or health problem give the name(s) of the medication(s) and when you took them.

Illness/health problem during this pregnancy			Use of medication						
Illness/health problem	Before Pregnancy	During Pregnancy	Name of medicines	Last 6 months before pregnancy	Pregnancy week 0-4	5-8	9-12	13+	Number of days used
Asthma/Allergy/Skin disorders									
1 Asthma	☐	☐		☐	☐	☐	☐	☐	
2 Hay fever, pollen allergy	☐	☐		☐	☐	☐	☐	☐	
3 Animal hair allergy	☐	☐		☐	☐	☐	☐	☐	
4 Other allergy	☐	☐		☐	☐	☐	☐	☐	
5 Atopic dermatitis (childhood eczema)	☐	☐		☐	☐	☐	☐	☐	
6 Urticaria (hives)	☐	☐		☐	☐	☐	☐	☐	
7 Psoriasis	☐	☐		☐	☐	☐	☐	☐	
8 Other eczema	☐	☐		☐	☐	☐	☐	☐	
9 Cold sores (herpes)	☐	☐		☐	☐	☐	☐	☐	
10 Acne/pimples (serious)	☐	☐		☐	☐	☐	☐	☐	
Diabetes									
11 Diabetes treated with insulin	☐	☐		☐	☐	☐	☐	☐	
12 Diabetes not treated with insulin	☐	☐		☐	☐	☐	☐	☐	
Heart/Blood/Metabolism/Blood vessels									
13 Congenital heart defect	☐	☐		☐	☐	☐	☐	☐	
14 Other heart disease	☐	☐		☐	☐	☐	☐	☐	
15 High cholesterol	☐	☐		☐	☐	☐	☐	☐	
16 High blood pressure	☐	☐		☐	☐	☐	☐	☐	
17 Hypothyroidism or hyperthyroidism	☐	☐		☐	☐	☐	☐	☐	
18 Anaemia/low haemoglobin	☐	☐		☐	☐	☐	☐	☐	
19 B-12/folic acid insufficiency	☐	☐		☐	☐	☐	☐	☐	
Gastrointestinal									
20 Hepatitis/jaundice	☐	☐		☐	☐	☐	☐	☐	
21 Gall stones	☐	☐		☐	☐	☐	☐	☐	
22 Duodenal/stomach ulcer	☐	☐		☐	☐	☐	☐	☐	
23 Crohn's disease/ulcerative colitis	☐	☐		☐	☐	☐	☐	☐	
24 Celiac sprue (gluten sensitivity)	☐	☐		☐	☐	☐	☐	☐	
25 Other gastro-intestinal problems	☐	☐		☐	☐	☐	☐	☐	
Muscle/Skeleton/Connective tissue									
26 Arthritis (rheumatoid arthritis)/ Bechterev's reflex	☐	☐		☐	☐	☐	☐	☐	

Illness/health problem during this pregnancy			Use of medication					
Illness/health problem	Before Pregnancy	During Pregnancy	Name of medicines	Last 6 months before pregnancy	Pregnancy week 0-4	5-8	9-12	13+	Number of days used
27 Lupus (SLE)	☐	☐		☐	☐	☐	☐	☐	
28 Sciatica	☐	☐		☐	☐	☐	☐	☐	
29 Fibromyalgia	☐	☐		☐	☐	☐	☐	☐	
Genital and urinary tract									
30 Ovary/fallopian tube infection	☐	☐		☐	☐	☐	☐	☐	
31 Endometriosis	☐	☐		☐	☐	☐	☐	☐	
32 Uterus prolaps	☐	☐		☐	☐	☐	☐	☐	
33 Ovarian cyst	☐	☐		☐	☐	☐	☐	☐	
34 Myoma	☐	☐		☐	☐	☐	☐	☐	
35 Cervical cell changes	☐	☐		☐	☐	☐	☐	☐	
36 Herpes	☐	☐		☐	☐	☐	☐	☐	
37 Venereal warts/condyloma	☐	☐		☐	☐	☐	☐	☐	
38 Gonorrhea	☐	☐		☐	☐	☐	☐	☐	
39 Chlamydia	☐	☐		☐	☐	☐	☐	☐	
40 Kidney stones	☐	☐		☐	☐	☐	☐	☐	
41 Kidney infection/pyelonephritis	☐	☐		☐	☐	☐	☐	☐	
42 Urinary tract infections/cystitis	☐	☐		☐	☐	☐	☐	☐	
43 Incontinence	☐	☐		☐	☐	☐	☐	☐	
Other illnesses/health problems									
44 Anorexia/bulimia/other eating disorders	☐	☐		☐	☐	☐	☐	☐	
45 Migraine	☐	☐		☐	☐	☐	☐	☐	
46 Other headache	☐	☐		☐	☐	☐	☐	☐	
47 Epilepsy	☐	☐		☐	☐	☐	☐	☐	
48 Multiple sclerosis	☐	☐		☐	☐	☐	☐	☐	
49 Cerebral palsy	☐	☐		☐	☐	☐	☐	☐	
50 Cancer	☐	☐		☐	☐	☐	☐	☐	
51 Depression	☐	☐		☐	☐	☐	☐	☐	
52 Anxiety	☐	☐		☐	☐	☐	☐	☐	
53 Other long illiness or health problems	☐	☐		☐	☐	☐	☐	☐	

Which . . . . . .

40. Do you have a congenital malformation/birth defect?

☐ No
☐ Yes

41. If yes, which? _____

42. Do your gums bleed when you brush your teeth at present?

☐ No, rarely or never
☐ Yes, sometimes
☐ Yes, often
☐ Yes, almost always

43. If you had diabetes before you became pregnant, what was your last long-term blood sugar level (HbA1c) before you became pregnant?

☐ Less than 7.5
☐ 7.5 - 12
☐ More than 12
☐ Don't Know

Other medicines

44. Have you used other medication not previously mentioned? If yes, which and when did you take them?

Name of medication (e.g. Valium, Rohypnol, Paracetamol)	Use of medication during pregnancy weeks: Last 6 months before pregnancy	0-4	5-8	9-12	13+	Number of days used
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	

Vitamins, minerals and dietary supplements

45. Do you take vitamins, minerals or other dietary supplements?

☐ No (proceed to question 49)
☐ Yes

46. If yes, fill in the table below for the vitamins and minerals found in the contents list on the vitamin package/bottle. (For instance, if you have taken cod liver oil for the last six months before becoming pregnant, enter a cross for each period under "When" (i.e. 7 crosses) and enter a cross in "Daily" under "How often").

	When did you take the supplements? Last 6 months before pregnancy: 26-9 weeks	8-5 weeks	4-0 weeks	During pregnancy: 0-4 weeks	5-8 weeks	9-12 weeks	13+ weeks	In this period how often did you take this? Daily	4-6 times a week	1-3 times a week
1 Folate/folic acid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2 Vitamin B1 (Thiamine)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3 Vitamin B2 (Riboflavin)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4 Vitamin B6 (Pyridoxine)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5 Vitamin B12	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6 Niacin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7 Pantothenic acid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8 Biotin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9 Vitamin C	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10 Vitamin A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11 Vitamin D	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12 Vitamin E	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13 Iron	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14 Calcium	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15 Iodine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16 Zinc	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17 Selenium	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18 Copper	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19 Chromium	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20 Magnesium	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21 Cod liver oil	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22 Omega-3 fatty acid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

47. Give the complete name(s) of all vitamins and dietary supplements you take. Include alternative/herbal remedies and diet products. (Write clearly in CAPITAL LETTERS.)

E.g. VITAPLEX WITH IRON

1

2

3

4

5

6

48. If you use multivitamins (with or without minerals) do these contain folic acid?

☐ Yes
☐ No
☐ Don't Know

Civil status and education

49. What is your civil status?

☐ Married
☐ Cohabitant
☐ Single
☐ Divorced/separated
☐ Widow
☐ Other

50. What education do you and the baby's father have? (Enter a cross indicating the highest level of education you both have completed and current studies if you are still studying.)

	You		Baby's Father	
	Completed	On-going	Completed	On-going
1 9-year secondary school	☐	☐	☐	☐
2 1-2 year high school	☐	☐	☐	☐
3 Technical high school	☐	☐	☐	☐
4 3-year high school general studies, junior college	☐	☐	☐	☐
5 Regional technical college, 4-year university degree (Bachelor's degree, nurse, teacher, engineer)	☐	☐	☐	☐
6 University, technical college, more than 4 years (Master's degree, medical doctor, PhD)	☐	☐	☐	☐
7 Other education	☐	☐	☐	☐

Work and leisure

51. What was your and the baby's father's work situation when you became pregnant? (Fill in one or several boxes for each.)

	You	Baby's Father
1 Student	☐	☐
2 At home	☐	☐
3 Intern/apprentice	☐	☐
4 Military service	☐	☐
5 Unemployed/laid off	☐	☐
6 Rehabilitation/disabled	☐	☐
7 Employed in public sector	☐	☐
8 Employed in private sector	☐	☐
9 Self-employed	☐	☐
10 Family member without steady income in family company (e.g. Farming, business)	☐	☐
11 Other	☐	☐

52. Did you have an extra job (with or without salary) when you became pregnant? (For example, accountant, hair dresser, singer in a dance band, club leader)

☐ No
☐ Yes, describe_____

53. Have you been absent from your usual work more than two weeks altogether during this pregnancy?

☐ No
☐ Yes

54 Are you absent from your work at the present time?

☐ No
☐ Yes

55. If yes, what is the reason for your absence? (Fill in one or several boxes.)

☐ Medical leave
☐ Leave of absence
☐ Sick child
☐ Other _____

56. The usual number of paid working hours a week before you became pregnant and at present.

Before the pregnancy: ☐☐,☐ Hours

During the pregnancy : ☐☐,☐ Hours

(Questions about current work situation to be answered by anyone in paid employment, even if they are temporarily absent due to illness, being on leave or for similar reasons.)

57. Describe the type of work carried out at your and the baby's father's place of work as accurately as possible. (Write for example, hospital department for children with cancer, body shop at a garage for diesel vehicles, farming with grain and swine, work in the home.)

58. Occupation/title at this workplace? (Write for example, staff nurse, mechanic, foreman, lecturer, student, cleaning assistant, housewife/at home.)

	You	Baby's Father

59. Indicate the appropriate answer for each of the following questions concerning your present work situation. (Fill in only one box in each line.)

	Yes every day more than half of the working day	Yes every day less than half of the working day	Yes, periodically but not daily	Seldom or never
Do you sometimes have so much to do that your work situation becomes taxing?	☐	☐	☐	☐
Do you have to turn or bend many times in the course of an hour?	☐	☐	☐	☐
Do you work with your hands up at shoulder level or higher?	☐	☐	☐	☐
Do you work standing or walking?	☐	☐	☐	☐
Can you choose to work a little faster some days and a little slower on other days?	☐	☐	☐	☐
Are you subjected to a lot of uncomfortable background noise?	☐	☐	☐	☐
Are you subjected to a lot of background noise that makes you have to raise your voice when talking to others, even at a distance of one metre?	☐	☐	☐	☐

60. How do the following statements describe your work situation? (Fill in only one box in each line.)

	Agree	Agree mostly	Disagree mostly	Disagree completely
I have physically heavy work.	☐	☐	☐	☐
My work is very stressful	☐	☐	☐	☐
I learn a lot at work	☐	☐	☐	☐
My work is very monotonous	☐	☐	☐	☐
My work demands a lot of me.	☐	☐	☐	☐
I am able to decide how my work is to be carried out.	☐	☐	☐	☐
There is a good team spirit at my place of work.	☐	☐	☐	☐
I enjoy my work	☐	☐	☐	☐

61. When are your working hours? (Fill in one or several boxes.)

☐ Permanent day work
☐ Permanent afternoon or evening work
☐ Permanent night work
☐ Shift work or shift rotations
☐ No set times (extra help, extra shifts, temporary employment, etc.)
☐ Other

62. During your pregnancy do you lift anything that weighs more than 10 kg (10 kilos is the equivalent of a full bucket of water.)

	At Home	At Work
Seldom or never	☐	☐
Yes, less than 20 times a week	☐	☐
Yes, more than 20 times a week	☐	☐
Yes, 10-20 times a day	☐	☐
Yes, more than 20 times a day	☐	☐

63. How often have you worked with radio transmitters or radar after becoming pregnant?

- ☐ Seldom/Never
- ☐ A few times a week
- ☐ Daily
- ☐ On average more than an hour daily

64. How often do you talk on a cell phone?

- ☐ Seldom/Never
- ☐ A few times a week
- ☐ Daily
- ☐ On average more than an hour daily

65. Do your cell phone calls last more than 15 minutes?

- ☐ Never
- ☐ Seldom
- ☐ Often

66. How often have you worked with a computer monitor, laser printer or copying machine (at a distance of less than two metres) after you became pregnant?

	Computer monitor	Laser printer	Copying machine
Seldom/Never	☐	☐	☐
A few times per week	☐	☐	☐
Daily	☐	☐	☐
On average more than an hour daily	☐	☐	☐

67. How often have you worked with X-ray equipment (at a distance of less than two metres) after you became pregnant?
(This does not include treatment as a patient)

- ☐ Seldom/Never
- ☐ A few times a week
- ☐ Daily
- ☐ On average more than an hour daily

68. Have you been in contact with any of the following substances either at work or in your leisure time during the last six months? (Fill in each line.)

		No	Yes	If Yes, number of days the last 6 months (daily = 180 days)	Fill in if you have used a hood for gases or breathing protection	Fill in if you have used protective gloves
1	Lead vapours, lead dust, lead particles or lead alloys	☐	☐		☐	☐
2	Chrome, arsenic, cadmium or combinations of these	☐	☐		☐	☐
3	Gasoline or exhaust (does not apply to filling gasoline in your own car)	☐	☐		☐	☐
4	Mercury vapours, mercury or work with amalgam fillings (does not apply to your own dental treatment)	☐	☐		☐	☐
5	Disinfectants, vermin poisons	☐	☐		☐	☐
6	Weed killers, insecticides, fungicides	☐	☐		☐	☐
7	Oil-based paint	☐	☐		☐	☐
8	Water-based or latex paint	☐	☐		☐	☐
9	Paint thinner, paint-lacquer-glue remover or other solvents (e.g. lynol, turpentine, toluene, carbon tetrachloride)	☐	☐		☐	☐
10	Industrial dyes or ink	☐	☐		☐	☐
11	Motor oil, lubrication oil or other types of oil	☐	☐		☐	☐
12	Photographic chemicals (fixatives or developers)	☐	☐		☐	☐
13	Substances used in welding	☐	☐		☐	☐
14	Substances used in soldering	☐	☐		☐	☐
15	Formalin/formaldehyde	☐	☐		☐	☐
16	Chemotherapeutic substances/chemotherapy treatment (does not apply to your own medical treatment)	☐	☐		☐	☐
17	Laughing gas or other anaesthetic gases (does not apply to your own treatment as a patient)	☐	☐		☐	☐
18	Other substances and conditions, describe_____	☐	☐		☐	☐

69. How often have you been to a discotheque since you became pregnant?

- ☐ 1-2 times a week
- ☐ Less often
- ☐ Never

70. Are you in contact with animals either at work or in your leisure time?

- ☐ No
- ☐ Yes

71. If yes, what sort of animals and how often are you in contact with them on a weekly basis?

	Daily	3-6 times a week	1-2 times a week	Less than 1 time a week
1 Dog	☐	☐	☐	☐
2 Cat	☐	☐	☐	☐
3 Guinea pig	☐	☐	☐	☐
4 Hamster	☐	☐	☐	☐
5 Rabbit	☐	☐	☐	☐
6 Canary or other bird	☐	☐	☐	☐
7 Aquarium fish	☐	☐	☐	☐
8 Cow	☐	☐	☐	☐
9 Pig	☐	☐	☐	☐
10 Sheep, goat	☐	☐	☐	☐
11 Horse	☐	☐	☐	☐
12 Poultry	☐	☐	☐	☐
13 Other	☐	☐	☐	☐

Housing and household

72. With whom do you live? (Fill in one or several boxes.)

- ☐ Spouse/partner
- ☐ Parents
- ☐ Parents-in-law
- ☐ Children
- ☐ No one
- ☐ Other describe_____

73. How many people including you live in your home?

Number of people over 18 years . . . . . ☐☐

Number of people between 12 - 18 years . . . . . ☐☐

Number of people between 6 - 11 years . . . . . ☐☐

Number of people under 6 years . . . . . ☐☐

74. How many children are at nursery school/day care?

☐ children

75. Do you or the baby's father have a mother tongue other than Norwegian?

- ☐ No
- ☐ Yes

76. If yes, which language?

	You	Baby's Father
Sámi	☐	☐
Urdu	☐	☐
English	☐	☐
Other	☐	☐

If other, which?_____

77. Do your parents or the baby's father's parents have a mother tongue other than Norwegian?

- ☐ No
- ☐ Yes

78. If yes, which language?

	Your Mother	Your Father	Mother of the child's father	Father of the child's father
Sámi	☐	☐	☐	☐
Urdu	☐	☐	☐	☐
English	☐	☐	☐	☐
Other	☐	☐	☐	☐

If other, which? _____

79. What is your and the baby's father's yearly gross income? (Include child support, unemployment benefits and other allowances.)

Your gross income	Child's father's gross income
☐ No income	☐ No income
☐ Under 150.000 NOK	☐ Under 150.000 NOK
☐ 150-199.999 NOK	☐ 150-199.999 NOK
☐ 200-299.999 NOK	☐ 200-299.999 NOK
☐ 300-399.999 NOK	☐ 300-399.999 NOK
☐ 400-499.999 NOK	☐ 400-499.999 NOK
☐ over 500.000 NOK	☐ over 500.000 NOK
	☐ Don't know

80. Is it possible for your household to manage financially without your income?

- ☐ No
- ☐ Yes, but with difficulty
- ☐ Yes, without difficulty

81. What type of house do you live in?

- ☐ Detached house
- ☐ Farm
- ☐ Semi detached
- ☐ Four-flat house
- ☐ Maisonette
- ☐ Terraced flat
- ☐ Basement flat
- ☐ Apartment building
- ☐ Townhouse/tenement
- ☐ Which floor? ☐☐
- ☐ Other_____

82. Has there been damp damage, visible signs of fungus/mildew or a smell of mildew in your home in the past 3 months? (Fill in one or several boxes.)

- ☐ No
- ☐ Yes, damp damage
- ☐ Yes, signs of fungus and mould
- ☐ Yes, a smell of mildew

83. Where does your drinking water come from?

- ☐ Public or private water company
- ☐ Water from a local source (e.g. own well)

84. How many times have you moved in the last 3 years?

☐☐ times

85. Has anyone in your home had influenza, a prolonged cough, childhood disease or an illness with fever and a rash after you became pregnant?

- ☐ No
- ☐ Yes

86. If yes, which illness? (fill in one or several boxes)

- ☐ German measles
- ☐ Chicken pox
- ☐ Measles
- ☐ Roseola infantum
- ☐ Other fever with rash
- ☐ Influenza
- ☐ Prolonged cough
- ☐ Tuberculosis
- ☐ Hand, foot and mouth disease
- ☐ Other

Living habits

87. Did your mother smoke when she was pregnant with you?
- ☐ No
- ☐ Yes
- ☐ Don't Know

88. Are you exposed to passive smoking at home?
- ☐ No
- ☐ Yes

89. If yes, how many hours a day are you exposed to passive smoking?

☐☐ hours per day

90. Are you exposed to passive smoking at work?
- ☐ No
- ☐ Yes

91. If yes, how many hours a day are you exposed to passive smoking?

☐☐ hours per day

92. Did the baby's father smoke before you became pregnant?
- ☐ No
- ☐ Yes

93. Does he smoke now?
- ☐ No
- ☐ Yes

94. Have you ever smoked?
- ☐ No (proceed to question 104)
- ☐ Yes

95. Do you smoke now (after you became pregnant)?
- ☐ No
- ☐ Sometimes ☐☐ cigarettes per week
- ☐ Daily ☐☐ cigarettes per day

96. Did you smoke during the last 3 months before you became pregnant this time?
- ☐ No
- ☐ Sometimes ☐☐ cigarettes per week
- ☐ Daily ☐☐ cigarettes per day

97. How old were you when you started to smoke on a daily basis?

☐☐ Years

98. Have you stopped smoking completely?
- ☐ No
- ☐ Yes

99. If yes, how old were you when you stopped smoking?

☐☐ Years

100. If you stopped smoking after you became pregnant, in which week of pregnancy did you stop?

☐☐ week of pregnancy

101. How long after you get up in the morning until you light your first cigarette?
- ☐ 5 minutes
- ☐ 6-29 minutes
- ☐ 30-60 minutes
- ☐ More than one hour

102. Do you smoke when you are ill?
- ☐ No
- ☐ Yes

103. Do you smoke more often during the first few hours after you wake up than you do during the rest of the day?
- ☐ No
- ☐ Yes

104. If you have used other kinds of nicotine indicate which and when you used them.

	Before pregnancy	During pregnancy
Chewing tobacco/snuff	☐	☐
Nicotine chewing gum	☐	☐
Nicotine adhesive patch	☐	☐
Nicotine inhaler	☐	☐

105. What was your fluid consumption (number of cups/glasses) per day before and during pregnancy? (1 mug = 2 cups, 1 small plastic bottle (0.5 litre) = 4 cups, 1 large plastic bottle (1.5 litres) = 12 cups)

	Number of cups/glasses: Before pregnancy	Number of cups/glasses: Now	Decaffeinated (Enter a cross)
1 Filter coffee	☐☐	☐☐	☐
2 Instant coffee	☐☐	☐☐	☐
3 Boiled coffee	☐☐	☐☐	☐
4 Tea	☐☐	☐☐	☐
5 Herbal tea	☐☐	☐☐	☐
6 Coca Cola/Pepsi etc.	☐☐	☐☐	☐
7 Other fizzy drinks	☐☐	☐☐	☐
8 Diet Coca Cola/Pepsi	☐☐	☐☐	☐
9 Other diet fizzy drinks	☐☐	☐☐	☐
10 Tap water	☐☐	☐☐	☐
11 Bottled water	☐☐	☐☐	☐

	Before pregnancy	Now	Ecological (Enter a cross)
12 Juice/squash	☐☐	☐☐	☐
13 Diet juice/squash	☐☐	☐☐	☐
14 Milk (skim, low fat, whole)	☐☐	☐☐	☐
15 Yogurt, all types	☐☐	☐☐	☐
16 Yogurt/active Lactobacillus	☐☐	☐☐	☐
17 Other type of cultured milk - Kefir	☐☐	☐☐	☐
18 Other	☐☐	☐☐	☐

106. Have you used any of the following substances?

	Never	Previously	Last month before pregnancy	During pregnancy
1 Hash	☐	☐	☐	☐
2 Amphetamine	☐	☐	☐	☐
3 Ecstasy	☐	☐	☐	☐
4 Cocaine	☐	☐	☐	☐
5 Heroin	☐	☐	☐	☐

107. Have you ever consumed alcohol?

☐ No (proceed to question 117)
☐ Yes

Alcohol units are used to compare the different types of alcoholic beverages. 1 alcohol unit (= 1.5 cl. pure alcohol) is equivalent to:

1 bottle/can energy drink or cider
1 glass (1/3 litre) of beer
1 wine glass red or white wine
1 sherry glass sherry or fortified wine
1 snaps glass spirits or liqueur

108. How often did you consume alcohol in the 3 months before you became pregnant and how often do you consume alcohol during the pregnancy?

	Last 3 months before pregnancy	During pregnancy
1 Approximately 6-7 times a week	☐	☐
2 Approximately 4-5 times a week	☐	☐
3 Approximately 2-3 times a week	☐	☐
4 Approximately once a week	☐	☐
5 Approximately 1-3 times a month	☐	☐
6 Less than once a month	☐	☐
7 Never	☐	☐

109. What type of alcohol do you usually drink? (Fill in one or several boxes.)

1 Light beer ☐
2 Beer ☐
3 Red wine ☐
4 White wine ☐
5 Low alcohol sodas ☐
6 Fortified wines (sherry, port, Madeira) ☐
7 Spirits (vodka, gin, snaps, cognac, whisky, liqueur) ☐

110. Did you drink 5 units or more at least once during the last 3 months before pregnancy or during pregnancy?

	Last 3 months before pregnancy	During pregnancy
1 Several times per week	☐	☐
2 Once a week	☐	☐
3 1-3 times a month	☐	☐
4 Less than once a month	☐	☐
5 Never	☐	☐

111. How many units of alcohol do you usually drink when you consume alcohol?

	Last 3 months before pregnancy	During pregnancy
10 or more	☐	☐
7-9	☐	☐
5-6	☐	☐
3-4	☐	☐
1-2	☐	☐
Less than 1	☐	☐

112. How many units of alcohol do you have to drink before you feel any effect?

☐☐ units

113. Have other people irritated you or hurt your feelings by criticising how much you drink?

☐ No
☐ Yes

114. Have you ever felt that you ought to drink less alcohol?

☐ No
☐ Yes

115. Have you ever drunk alcohol in the morning to calm your nerves or to get rid of a hangover?

☐ No
☐ Yes

116. Have you ever experienced any of the following problems during the last year in relation to your alcohol consumption?

	Never	Once	Several times
Argued with or had negative feelings for a family member	☐	☐	☐
Suddenly found yourself somewhere without knowing how you got there	☐	☐	☐
Been absent from work or school	☐	☐	☐
Fainted or passed out suddenly	☐	☐	☐
Had a sad period	☐	☐	☐

Weight and weight control

117. Do you think you were overweight just before this pregnancy?

☐ Yes, a lot
☐ Yes, a little
☐ No

118. Are you worried about putting on more weight than necessary during this pregnancy?

☐ Yes, very worried
☐ Somewhat worried
☐ No, not especially worried

119. Has anyone said that you were too thin while you felt that you were overweight during the last 2 years?

☐ Yes, often
☐ Yes, occasionally
☐ No

120. Have you ever felt that you lost control while eating and were not able to stop before you have eaten far too much?

	Last 6 months before this pregnancy	Now
No	☐	☐
Infrequently	☐	☐
Yes, at least once a week	☐	☐

121. Have you ever used any of the following methods to control your weight?

	Last 6 months before this pregnancy		Now	
	At least once a week	Seldom/ Never	At least once a week	Seldom/ Never
Vomiting	☐	☐	☐	☐
Laxatives	☐	☐	☐	☐
Fasting	☐	☐	☐	☐
Hard physical exercise	☐	☐	☐	☐

122. Is it important for your self-image that you maintain a certain weight?

☐ Yes, very important
☐ Yes, quite important
☐ No, not especially important

Physical activity

123. How often do you exercise? (Fill in each line for both before and during this pregnancy.)

	Last 3 months before this pregnancy					During this pregnancy				
	Never	1-3 times a month	1 time a week	2 times a week	3 or more times a week	Never	1-3 times a month	1 time a week	2 times a week	3 or more times a week
1 Walking	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2 Brisk walking	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3 Running/jogging/orienteering	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4 Bicycling	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5 Training studio/weight training	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6 Special gymnastics/aerobics for pregnant women	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7 Aerobics/gymnastics/dance without running and jumping	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8 Aerobics/gymnastics/dance with running and jumping	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9 Dancing (swing/rock/folk)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10 Skiing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11 Ball sports	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12 Swimming	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13 Riding	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14 Other	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

124. How often do you do exercises for the following muscle groups? (Fill in each line for both before and during this pregnancy.)

	Last 3 months before pregnancy					During pregnancy				
	Never	1-3 times a month	1 time a week	2 times a week	3 or more times a week	Never	1-3 times a month	1 time a week	2 times a week	3 or more times a week
Abdominal muscles	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Back muscles	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pelvic floor muscles (muscles around the vagina, urethra, anus)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

125. How often are you so physically active in your leisure and/or at work that you get out of breath or sweat?

	Last 3 months before this pregnancy		During this pregnancy	
	Leisure	At work	Leisure	At work
Never	☐	☐	☐	☐
Less than once a week	☐	☐	☐	☐
Once a week	☐	☐	☐	☐
2 times a week	☐	☐	☐	☐
3-4 times a week	☐	☐	☐	☐
5 times a week or more	☐	☐	☐	☐

A little more about yourself and how you are keeping now

126. Do you agree or disagree with the following statements? (Fill in only one box in each line.)

	Disagree completely	Disagree	Disagree somewhat	Don't agree or disagree	Agree somewhat	Agree	Agree completely
My life is largely what I wanted it to be	☐	☐	☐	☐	☐	☐	☐
My life is very good	☐	☐	☐	☐	☐	☐	☐
I am satisfied with my life	☐	☐	☐	☐	☐	☐	☐
To date, I have achieved what is important for me in my life	☐	☐	☐	☐	☐	☐	☐
If I could start all over, there is very little I would do differently	☐	☐	☐	☐	☐	☐	☐

127. How do these statements describe your relationship? (Only answer if you have a partner.) (Fill in only one box in each line.)

	Agree Completely	Agree	Agree somewhat	Disagree somewhat	Disagree	Disagree completely
My husband/partner and I have a close relationship	☐	☐	☐	☐	☐	☐
My partner and I have problems in our relationship	☐	☐	☐	☐	☐	☐
I am very happy in my relationship	☐	☐	☐	☐	☐	☐
My partner is usually understanding	☐	☐	☐	☐	☐	☐
I often think about ending our relationship	☐	☐	☐	☐	☐	☐
I am satisfied with my relationship with my partner	☐	☐	☐	☐	☐	☐
We often disagree about important decisions	☐	☐	☐	☐	☐	☐
I have been lucky in my choice of a partner	☐	☐	☐	☐	☐	☐
We agree about how children should be raised	☐	☐	☐	☐	☐	☐
I think my partner is satisfied with our relationship	☐	☐	☐	☐	☐	☐

128. Do you have anyone other than your husband/partner you can ask for advice in a difficult situation?

- ☐ No
- ☐ Yes 1-2 people
- ☐ Yes more than 2 people

129. How often do you meet or talk on the telephone with your family (other than those you live with) or close friends?

- ☐ Once a month or less
- ☐ 2-8 times a month
- ☐ More than twice a week

130. Do you often feel lonely?

- ☐ Almost never
- ☐ Seldom
- ☐ Sometimes
- ☐ Usually
- ☐ Almost always

131. Have you been bothered by any of the following during the last two weeks? (Enter a cross for each line.)

	Not bothered	A little bothered	Quite bothered	Very bothered
Feeling fearful	☐	☐	☐	☐
Nervousness or shakeiness inside	☐	☐	☐	☐
Feeling hopeless about the future	☐	☐	☐	☐
Feeling blue	☐	☐	☐	☐
Worrying too much about things	☐	☐	☐	☐

132. Have you ever in your adult life been slapped, hit, kicked or bothered in any way physically? (fill in one or several boxes)

	During this pregnancy	Last 6 months before pregnancy	Earlier
No	☐	☐	☐
Yes	☐	☐	☐
Don't remember	☐	☐	☐

133. Have you ever been pressured or forced to have sexual intercourse? (Fill in one or several boxes.)

	During this pregnancy	Last 6 months before pregnancy	Earlier
No, never	☐	☐	☐
Yes, pressured	☐	☐	☐
Yes, forced with violence	☐	☐	☐
Yes, raped	☐	☐	☐

134. How do you feel about yourself? (Enter a cross for each line.)

	Agree completely	Agree	Disagree	Disagree completely
I have a positive attitude toward myself	☐	☐	☐	☐
I feel completely useless at times	☐	☐	☐	☐
I feel that I do not have much to be proud about	☐	☐	☐	☐
I feel that I am a valuable person, as good as anyone else	☐	☐	☐	☐

135. Have you ever experienced the following for a continuous period of 2 weeks or more? (Fill in each line.)

	No	Yes
Felt depressed, sad	☐	☐
Had problems with appetite or eaten too much	☐	☐
Been bothered by feeling weaker or a lack of energy	☐	☐
Really blamed yourself and felt worthless	☐	☐
Had problems with concentration or had problems making decisions	☐	☐
Had at least 3 of the problems named above simultaneously	☐	☐

136. If you have had 3 or more of these problems at the same time, how many weeks did the longest period last?

☐☐ weeks

137. Was there a particular reason for this?

- ☐ No, no particular reason
- ☐ Yes (e.g. death, divorce, miscarriage, accident)

We would be grateful if you would write anything else you would like to tell us about this pregnancy or previous births/pregnancies that are not addressed in this questionnaire on the next page.

Comments

Have you remembered to fill in the date on which you completed the questionnaire on page 1?

Thank you very much for your help!

Please return the completed questionnaire in the stamped addressed envelope provided.

Avd. for medisinsk fødselsregister
Kalfarveien 31
5018 Bergen

Bording

Appendix 2

den norske Mor & barn undersøkelsen

Questionnaire 2

Your Diet

Please fill in today's date:

☐☐ ☐☐ ☐☐☐☐

day month year

Instructions

In this questionnaire we ask you what you have eaten since you became pregnant until now. We therefore ask you to remember what you have eaten in the last three to four months.

We know that many of you have experienced nausea and perhaps still are nauseous part of the day in a way that has affected your diet. We would still like to have information about your actual diet during this period.

We greatly appreciate your cooperation in this study, and wish you good luck for the remaining part of your pregnancy.

This questionnaire will be processed by a computer. It is therefore important that you follow the instructions below:

- Please use a blue or black ballpoint pen
- Mark the most relevant box for the most app
- You should only mark **one** box for each line
- If you have marked the wrong box fill it in co

Please do not use this questionnaire. Contact us at morbarn@fhi.no or phone + 47 53 20 40 40 if you need a questionnaire.

Example

	Slices of bread with this food item												
	per day						or per week			or per month			
Cheese	6+	5	4	3	2	1	5-6	3-4	1-2	3	2	1	0
Hard cheese (fat 27%)	☐	☐	☐	☒	☐	■	☐	☐	☐	☐	☐	☐	☐

- The (plus) sign "+" means " more than". Example: 6+ means 6 and more than 6
- Please fill in the mean intake of the food items eaten since you became pregnant.
  Example: If you ate grilled chicken twice a week for 2 weeks in a row during the first month, but have not had grilled chicken since, you ate grilled chicken 4 times. Mean intake of grilled chicken will then be once a month, and you mark the question like this;

	Number of times eaten								
	per week					or per month			
Dinners with poultry	5+	4	3	2	1	3	2	1	0
Fried chicken	☐	☐	☐	☐	☐	☐	☐	☒	☐

- Some places we ask you to write comments, please write clearly and only in the questions when you are asked to do so.

When completed, please return the form in the stamped addressed envelope provided.

Your diet

1. How would you describe your diet since you became pregnant?

My diet	Mark only one box
1. I eat both meat and fish	☐
2. I avoid meat, but eat fish	☐
3. I avoid fish, but eat meat	☐
4. I'm a vegetarian and include dairy products and eggs in my diet (ovo-lacto-vegetarian)	☐
5. I'm a vegetarian and include dairy products but not eggs in my diet (lacto-vegetarian)	☐
6. I'm a vegetarian and avoid all dairy products and eggs (vegan)	☐

Have you consumed organic food products since you became pregnant? (Mark only one box per line).
2.

Organic food group	Seldom/never	Sometimes	Often	Mostly
1. Milk, dairy products, cheese	☐	☐	☐	☐
2. Bread and cereals	☐	☐	☐	☐
3. Eggs	☐	☐	☐	☐
4. Vegetables	☐	☐	☐	☐
5. Fruit	☐	☐	☐	☐
6. Meat	☐	☐	☐	☐

Your meal pattern

3. How often have you had the following meals per week since you became pregnant?
A snack is a smaller meal consisting of for example a fruit, biscuit, bun, cake, yoghurt or sweets/candy. A snack consisting only of a drink should not be included as you will be asked about beverages later. (Mark only one box per line).

	Number of meals per week							
	7	6	5	4	3	2	1	0
1. Breakfast	☐	☐	☐	☐	☐	☐	☐	☐
2. Snack, morning	☐	☐	☐	☐	☐	☐	☐	☐
3. Lunch	☐	☐	☐	☐	☐	☐	☐	☐
4. Snack, afternoon	☐	☐	☐	☐	☐	☐	☐	☐
5. Dinner	☐	☐	☐	☐	☐	☐	☐	☐
6. Snack, evening	☐	☐	☐	☐	☐	☐	☐	☐
7. Supper	☐	☐	☐	☐	☐	☐	☐	☐
8. Night meal	☐	☐	☐	☐	☐	☐	☐	☐

Bread/ crispbread/ crackers

4. How many slices of bread/ crispbread/ crackers have you eaten on average per day/week since you became pregnant? When answering this question we ask you to include bread eaten during the day,i. Half a roll = 1 slice of bread, 1 baguette = 4 slices of bread, 1 ciabatta = 3 slices of bread. (Mark only one box per line)

	Number of slices per day										or per week			
Type of bread	13+	9-12	8	7	6	5	4	3	2	1	5-6	3-4	1-2	0
1. White bread (white loaf, baguettes, ciabatta)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Wholemeal bread (Kneipp, Graham etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Dark bread (Danish ryebread etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Fibrebread, fibre crispbread, ryecrisp	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Crispbread, rusk etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Crackers (Cream cracker etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

5. Do you use butter/ margarine on your bread/crispbread/crackers?

☐ **Yes** ☐ **No** (go to question 8)

6. If you use butter /margarine, on how many slices on average and what kind do you use? (Mark only one box per line)

	Number of slices per day										or per week			
Type of butter/ margarine	13+	9-12	8	7	6	5	4	3	2	1	5-6	3-4	1-2	0
1. Butter/ (Bremyk)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Hard margarine (Per, Melange)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. "Butter-like" light margarine (Brelett)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Soft margarine (Soft, Vita, Olivero etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Light margarine (Soft light, Vita lett etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

7. How much butter/ margarine do you use on your slices of bread?

Plenty ☐ **Medium** ☐ **Minimum** ☐

Spreads on bread, crispbread, crackers

8. How many slices of bread with the following spreads have you eaten on average since you became pregnant? (Mark only one box per line).

	Number of slices with this food item per day						or per week			or per month			
Cheese	6+	5	4	3	2	1	5-6	3-4	1-2	3	2	1	0
1. Whey cheese goat milk, (brown cheese)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Whey cheese goat, low fat (brown)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Hard white cheese, cream cheese	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Hard white cheese, cream cheese, low fat	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Blue cheese (Camembert, Norzola etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Other kinds of cheese	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fish													
7. Roe spread	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8. Mackerel/sardines in tomato sauce	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9. Sardines in oil	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10. Smoked salmon/trout/mackerel	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11. Herring, pickled	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12. Shrimp, (prawn)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13. Crab	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14. Tuna	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15. Svolværpostei (spread of fish liver/roe)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16. Other kinds of fish	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Meat													
17. Low fat cold cuts (ham, roast beef etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18. Bologna, cold cuts of lamb, veal etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19. Salami, Swedish sausage etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20. Cold cuts of turkey, chicken	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Liver paste	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22. Other kinds of meat	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Number of slices with this food item

Other spreads	per day 6+	5	4	3	2	1	or per week 5-6	3-4	1-2	or per month 3	2	1	0
23. Spread with mayonnaise (Italian etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24 Spread made with yoghurt and mayo.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25. Mayonnaise	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Jam	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
27. Honey	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
28. Peanut butter	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
29. Other nut spreads (Nugatti etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
30. Other sweet spreads (Choclate etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
31. Vegetarian spreads (Tartex etc)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
32. Fruit (banana, apple etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
33. Vegetables (tomato, cucumber etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Eggs

9. How many eggs have you eaten on average since you became pregnant? Include eggs eaten with all meals; however, do not include eggs in pastries. (Mark one box per line)

Eggs	per day 2+	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
Eggs, - fried, boiled, scrambled, omelette	☐	☐	☐	☐	☐	☐	☐	☐

Number of seagull eggs eaten last year: 0 ☐ 1-5 ☐ 6-10 ☐ more than 10 ☐

Breakfast cereals, porridge

10. How often have you eaten breakfast cereals or porridge on average since you became pregnant? Please include breakfast cereals eaten with other meals. (Mark one box per line)

How often

Breakfast cereals	per day 2+	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
1. Unsweetened muesli, All-Bran Flakes	☐	☐	☐	☐	☐	☐	☐	☐
2. Sweetened muesli, muesli with fruits/ nuts	☐	☐	☐	☐	☐	☐	☐	☐
3. Porridge, oatmeal etc.	☐	☐	☐	☐	☐	☐	☐	☐
4. Corn Flakes, Frosties etc.	☐	☐	☐	☐	☐	☐	☐	☐
5. Sugar with your cereals	☐	☐	☐	☐	☐	☐	☐	☐
6. Jam with your cereals	☐	☐	☐	☐	☐	☐	☐	☐

Beverage

11. How many cups/glasses have you drunk on average of the following since you became pregnant? Please include also milk/yoghurt consumed with breakfast cereal. 1 mug = 1 glass = 2 cups = 2.5 dl, ½ litre plastic bottle = 2 glasses. (Mark one box per line)

How many glasses

Milk and yogurt		per day 8+	6-7	4-5	2-3	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
1. Full-fat milk and fermented milk	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Low-fat milk	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Extra low-fat milk	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Skimmed milk,and fermented	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Cultura, all types (probiotic)	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Biola milk/yoghurt (probiotic)	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7. Yoghurt, natural/ fruit	(1 serving)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8. Low-fat yoghurt	(1 serving)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Milk and yoghurt		How many glasses/servings per day 8+	6-7	4-5	2-3	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
9. Go'morgen yogurt	(1 serving)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10. Chocolate milk, Litago	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11. Soya milk	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12. Rice and oat milk	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Juice/ soft drink/ water/ alcohol		How many glasses per day 8+	6-7	4-5	2-3	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
13. Orange juice	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14. Other fruit juices, nectar	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15. Tomato- and vegetable juices	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16. Cordial, with sugar	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17. Cordial, with sweetener	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18. Coca Cola/Pepsi with sugar	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19. Other soft drinks with sugar	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20. Diet Coke/Diet Pepsi	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Other light/diet soft drinks	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22. Caffeine drinks (Battery etc.).	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
23. Tap water	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Uncarbonated bottled water	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25. Carbonated bottled water	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Non/low -alcoholic beers	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
27. Pilsner	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
28. Wine	(1 glass)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
29. Spirits, liqueur	(1 drink)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Coffee/tea		How many cups/mugs per day 8+	6-7	4-5	2-3	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
30. Filter coffee	(1 cup)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
31.Coffee instant	(1 cup)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
32. Coffee boiled/cafetiere	(1 cup)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
33. Cafe latte, cappuccino	(1 cup)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
34. Espresso	(1 cup)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
35. Decaffeinated coffee	(1 cup)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
36.Fig/ barley coffee	(1 cup)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
37. Tea (black tea, fruit tea etc.)	(1 mug)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
38. Green tea	(1 mug)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
39. Rosehip tea, herb tea	(1 mug)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

12. In how many cups of coffee or tea do you use milk/ cream/ sugar?

Milk/ cream/ sugar in coffee and tea	per day 8+	6-7	4-5	2-3	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
1. Milk/ cream in coffee/ tea	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Sugar/ honey in coffee/ tea	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Artificial sweetener in coffee/ tea	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Hot meals

First, we ask you to answer a couple of general questions concerning your hot meals. We will then ask more detailed questions about your intake of hot meals since you became pregnant. When you answer these questions please include all hot food you would eat during the day.

13. How often have you on average eaten the following types of hot food since you became pregnant? (Mark one box only)

	How often									
	per week						or per month			
General questions	6+	5	4	3	2	1	3	2	1	0
1. Meat and meat products	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Meat and meat products, grilled	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Offal	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Chicken, turkey	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Fish, fish products, boiled/ baked	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Fish, fish products, fried	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7. Vegetarian dishes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

More detailed questions

14. How often have you on average had the following types of hot food since you became pregnant?

	How often									
	per week						or per month			
Hot meal with meat products	6+	5	4	3	2	1	3	2	1	0
1. Meat /pork sausage	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Hot dogs and/or frankfurters	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Chicken and/or turkey sausage	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Meat balls, meat loaf	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Hamburger, meat patty	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Minced meat in sauce e.g. casserole	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hot meal with beef/ veal										
7. Beef or veal roast	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8. Beef (fillet, tenderloin, sirloin, entrecote)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9. T-bone steak, veal cutlet	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10. Casserole, stew, soup	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hot meal with Pork										
11. Pork chop, cutlet, roast pork	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12. Pork tenderloin, fillet	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13. Smoked pork chops, pork loin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14. Pork, ribs, spareribs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15. Bacon	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16. Pork in stew	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hot meal with Lamb										
17. Lamb roast, lamb chop	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18. Lamb stews (Fårikål etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hot meal with Venison										
19. Reindeer roast	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20. Roast of elk, roe deer, fallow deer	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21. Reindeer patty/reindeer stew	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22. Patty/ stew of elk, roe / fallow deer	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Offal										
23. Liver, kidney from ox, pig	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Liver kidney from lamb	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25. Liver, kidney from venison	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26. Black pudding,"hashed lungs"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hot meal with	per week						or per month			
Poultry	6+	5	4	3	2	1	3	2	1	0

27. Chicken fillet, turkey fillet	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
28. Fried chicken	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
29. Pan fried/ boiled chicken, turkey	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
30. Chicken schnitzel, nuggets	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
31. Game (grouse, pheasant etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
32. Other poultry (duck, goose, ostrich)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Seafood										
33. Cod, saithe, haddock, pollack (boiled/fried/smoked)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
34. Mackerel, herring	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
35. Salmon, trout	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
36. Halibut, plaice, flounder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
37. Tuna fish	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
38. Perch, pike, pikecake	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
39. Other fish	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
40. Fish cake, fish pudding, fish balls	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
41. Fish fingers, breaded fish	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
42. Fish casserole, soup, fish au gratin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
43. Shrimps	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
44. Mussels	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
45. Crab	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
46. Roe	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
47. Fish liver	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pasta dishes										
48. Pasta with meat (Bolognaise, Lasagne etc)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
49. Pasta with fish/ mussels/ shrimp	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
50. Pasta with vegetables	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
51. Pasta with only tomato sauce/ ketchup	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
52. Cheese (Parmesan) with your pasta	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other hot meals										
53. Pizza	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
54. Taco, burritos etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
55. Pancakes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
56. Rice pudding etc. (not breakfast)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
57. Soup, home made and packet	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vegetable dishes as main course										
58. Only with vegetables	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
59. With beans and/or lentils	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
60. With soya products (sausage, burger)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

With your hot meal

15. How often have you on average eaten the following food items since you became pregnant?

	How often						
	per day	or per week			or per month		
Potato/ rice/ spaghetti	1	5-6	3-4	1-2	2-3	1	0
1. Potatoes (boiled, baked, mashed)	☐	☐	☐	☐	☐	☐	☐
2. French fries, fried potatoes	☐	☐	☐	☐	☐	☐	☐
3. Creamed potatoes, gratinated potatoes	☐	☐	☐	☐	☐	☐	☐
4. Spaghetti, macaroni, noodles	☐	☐	☐	☐	☐	☐	☐
5. Rice	☐	☐	☐	☐	☐	☐	☐
6. Millet, couscous etc.	☐	☐	☐	☐	☐	☐	☐

Gravy/ trimmings	How often: per day 1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
7. Melted butter	☐	☐	☐	☐	☐	☐	☐
8. Melted margarine	☐	☐	☐	☐	☐	☐	☐
9. Brown gravy/white sauce	☐	☐	☐	☐	☐	☐	☐
10. Béarnaise sauce etc.	☐	☐	☐	☐	☐	☐	☐
11. Mayonnaise, remoulade	☐	☐	☐	☐	☐	☐	☐
12. Sour cream	☐	☐	☐	☐	☐	☐	☐
13. Low-fat sour cream	☐	☐	☐	☐	☐	☐	☐
14. Ketchup	☐	☐	☐	☐	☐	☐	☐
15. Mustard	☐	☐	☐	☐	☐	☐	☐

Cooking fat

16. How often have you used the following types of fat in your cooking since you became pregnant? Mark only one box for each line.

Cooking fat	How often: per day 2+	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
1. Butter	☐	☐	☐	☐	☐	☐	☐	☐
2. Butter soft (Bremyk, Smørgod)	☐	☐	☐	☐	☐	☐	☐	☐
3. Margarine hard (Melange, Per)	☐	☐	☐	☐	☐	☐	☐	☐
4. Soft soya margarine (pack/pot)	☐	☐	☐	☐	☐	☐	☐	☐
5. Margarine with olive oil (Olivero)	☐	☐	☐	☐	☐	☐	☐	☐
6. Other types of margarine	☐	☐	☐	☐	☐	☐	☐	☐
7. Soya oil	☐	☐	☐	☐	☐	☐	☐	☐
8. Cooking oil	☐	☐	☐	☐	☐	☐	☐	☐
9. Olive oil	☐	☐	☐	☐	☐	☐	☐	☐
10. Corn oil	☐	☐	☐	☐	☐	☐	☐	☐
11. Other types of oil	☐	☐	☐	☐	☐	☐	☐	☐

Vegetables

First we ask you a couple of general questions. We will then ask more detailed questions about your intake of vegetables since you became pregnant. (Mark only one box for each line.)

17. How often have you on average eaten vegetables since you became pregnant?

General questions	How often: per day 2+	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
1. Raw vegetables (salads etc.)	☐	☐	☐	☐	☐	☐	☐	☐
2. Vegetables in casseroles, soups, wok etc.	☐	☐	☐	☐	☐	☐	☐	☐
3. Boiled vegetables with main dish	☐	☐	☐	☐	☐	☐	☐	☐

18. More detailed question about vegetables

How often have you on average eaten the following vegetable since you became pregnant? (Mark one box per line)

Vegetable	How often: per day 2+	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
1. Frozen vegetable mix	☐	☐	☐	☐	☐	☐	☐	☐
2. Cucumber	☐	☐	☐	☐	☐	☐	☐	☐
3. Aubergine	☐	☐	☐	☐	☐	☐	☐	☐
4. Avocado	☐	☐	☐	☐	☐	☐	☐	☐

Vegetable	How often: per day 2+	per day 1	or per week 5-6	per week 3-4	per week 1-2	or per month 2-3	per month 1	per month 0
5. Cauliflower, raw	☐	☐	☐	☐	☐	☐	☐	☐
6. Cauliflower, boiled/ in casseroles	☐	☐	☐	☐	☐	☐	☐	☐
7. Broccoli, raw	☐	☐	☐	☐	☐	☐	☐	☐
8. Broccoli, boiled/ in casseroles	☐	☐	☐	☐	☐	☐	☐	☐
9. Green beans, haricots verts	☐	☐	☐	☐	☐	☐	☐	☐
10. Peas	☐	☐	☐	☐	☐	☐	☐	☐
11. Carrots, raw	☐	☐	☐	☐	☐	☐	☐	☐
12. Carrots, boiled/ in casseroles	☐	☐	☐	☐	☐	☐	☐	☐
13. Cabbage, raw	☐	☐	☐	☐	☐	☐	☐	☐
14. Cabbage, boiled/ in casseroles	☐	☐	☐	☐	☐	☐	☐	☐
15. Garlic	☐	☐	☐	☐	☐	☐	☐	☐
16. Swede, raw	☐	☐	☐	☐	☐	☐	☐	☐
17. Swede, boiled/ in casseroles	☐	☐	☐	☐	☐	☐	☐	☐
18. Onion, leek, spring onion, raw	☐	☐	☐	☐	☐	☐	☐	☐
19. Onion, leek, boiled/ in casseroles	☐	☐	☐	☐	☐	☐	☐	☐
20. Sweetcorn	☐	☐	☐	☐	☐	☐	☐	☐
21. Pepper, raw	☐	☐	☐	☐	☐	☐	☐	☐
22. Pepper in casseroles	☐	☐	☐	☐	☐	☐	☐	☐
23. Brussels sprouts, boiled/ in casseroles	☐	☐	☐	☐	☐	☐	☐	☐
24. Lettuce, Chinese cabbage	☐	☐	☐	☐	☐	☐	☐	☐
25. Lettuce, Chinese cabbage	☐	☐	☐	☐	☐	☐	☐	☐
26. Celery, celeriac	☐	☐	☐	☐	☐	☐	☐	☐
27. Button mushroom, raw	☐	☐	☐	☐	☐	☐	☐	☐
28. Button mushroom, fried/ in casseroles	☐	☐	☐	☐	☐	☐	☐	☐
29. Wild mushroom	☐	☐	☐	☐	☐	☐	☐	☐
30. Spinach	☐	☐	☐	☐	☐	☐	☐	☐
31. Courgette (zucchini)	☐	☐	☐	☐	☐	☐	☐	☐
32. Tomato	☐	☐	☐	☐	☐	☐	☐	☐
33. Other vegetables	☐	☐	☐	☐	☐	☐	☐	☐

19. How often have you used dressing and other trimmings with salad since you became pregnant? (Mark one box per line)

Dressing/ trimmings	How often: per day 2+	per day 1	or per week 5-6	per week 3-4	per week 1-2	or per month 2-3	per month 1	per month 0
1. Dressing (Thousand-island etc.)	☐	☐	☐	☐	☐	☐	☐	☐
2. Light dressing, yoghurt dressing	☐	☐	☐	☐	☐	☐	☐	☐
3. Olives, black/green	☐	☐	☐	☐	☐	☐	☐	☐
4. Feta cheese	☐	☐	☐	☐	☐	☐	☐	☐
Home-made dressing								
5. With oil	☐	☐	☐	☐	☐	☐	☐	☐
6. Without oil	☐	☐	☐	☐	☐	☐	☐	☐
7. With sour cream/ yoghurt	☐	☐	☐	☐	☐	☐	☐	☐

20. How would you characterize the usual ratio between vegetables and meat in your casseroles.

	Have not eaten	More vegetables than meat	Same amount meat and veg.	More meat than vegetables
1. Casseroles with meat/ fish	☐	☐	☐	☐
2. Casseroles with offal	☐	☐	☐	☐
3. Casseroles with minced meat	☐	☐	☐	☐

Fruit

21. How many fresh fruits have you eaten on average since you became pregnant?

	per day					or per week			or per month		
	8+	6-7	4-5	2-3	1	5-6	3-4	1-2	2-3	1	0
Fresh fruit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

22. How often have you on average eaten the following fresh fruits since you became pregnant?
(Mark one box per line)

		How often									
		per day				or per week			or per month		
Fresh fruit		4+	3	2	1	5-6	3-4	1-2	2-3	1	0
1.Orange, mandarin	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Banana	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Grapes	(8-10 pieces)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Apple	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Peach, nectarine	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Grapefruit	(½ piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7. Strawberries	(1 cup)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8. Other berries (blueberries etc.)	(1 cup)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9. Mango	(½ piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10. Melon	(1 slice)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11. Papaya	(½ piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12. Plum	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13. Pear	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14. Other fruits		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

23. How often have you on average eaten the following dried fruits since you became pregnant?
(Mark one box per line)

	How often									
	per day				or per week			or per month		
Dried fruit /nuts	4+	3	2	1	5-6	3-4	1-2	2-3	1	0
1. Apricots	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Raisins	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Prune, fig, date	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Peanuts	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Almonds, hazelnuts, cashew nuts etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Desserts, ice cream, cakes, candy

24. How often have you on average eaten the following sweets since you became pregnant? (Mark one box per line)

	How often							
	per day		or per week			or per month		
Dessert/ice cream	2+	1	5-6	3-4	1-2	2-3	1	0
1. Pudding (chocolate,creme caramel etc.)	☐	☐	☐	☐	☐	☐	☐	☐
2. Tinned fruit, stewed fruit thickened with potato flour	☐	☐	☐	☐	☐	☐	☐	☐
3. Fruit salad made of fresh fruit	☐	☐	☐	☐	☐	☐	☐	☐
4. Ice cream	☐	☐	☐	☐	☐	☐	☐	☐
5. Ice cream made of yogurt or low fat	☐	☐	☐	☐	☐	☐	☐	☐
6. Ice lollies, sorbet	☐	☐	☐	☐	☐	☐	☐	☐
7. Vanilla sauce/custard	☐	☐	☐	☐	☐	☐	☐	☐
8. Cream, whipped cream	☐	☐	☐	☐	☐	☐	☐	☐

25. How often have you on average eaten cakes and buns since you became pregnant?

Cakes, buns		How often: per day 4+	3	2	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
1. Sweet bun, Norwegian Christmas cake etc	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Danish pastry	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Doughnut, cake	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Waffle	(1 plate)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Chocolate cake, sponge cake etc.	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Cookie	(1 piece)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

26. How often have you on average eaten sweets and snacks since you became pregnant? (Mark only one box per line)

Sweets and snacks	How often: per day 4+	3	2	1	or per week 5-6	3-4	1-2	or per month 2-3	1	0
1. Plain chocolate	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Chocolate with nuts etc	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Caramel,liquorice	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Sweets, jelly sweets	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Pastilles with sugar	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Sugar-free pastilles	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7. Marzipan	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8. Potato chips	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9. Popcorn	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10. Salty snacks	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Other food items

27. It is difficult to ask about all the food you have eaten since you became pregnant. Please write down the names of any food items that you have eaten and that you have not yet been asked about.

Other food items eaten		How often: per day 6+	5	4	3	2	1	or per week 5-6	3-4	1-2	or per month 2-3	1
Name:		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Name:		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Name:		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Name:		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Genetically modified food

28. Many countries, including USA, England and France, allow the sale of genetically modified food. Most European countries, however, require labeling of such food items. We wish to know if you have eaten any genetically modified food items, either abroad or in Norway, since you became pregnant?

☐ **Yes** ☐ **No** ☐ **Do not know**

29. If yes, please write down the name of the genetically modified food item(s) you have eaten.

Genetically modified food items		How often: per day 6+	5	4	3	2	1	or per week 5-6	3-4	1-2	or per month 2-3	1
Name		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Name		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Name		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Name		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Hot meals from kiosks, gas/petrol stations and fast food restaurants

30. On average, how often have you eaten hot meals bought at kiosks, gas stations or fast food Restaurants since you became pregnant?

Food bought from	per day 4+	per day 2-3	per day 1	or per week 5-6	or per week 3-4	or per week 1-2	or per month 2-3	or per month 1	or per month 0
1. Kiosks	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Gas/petrol stations	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Fast food restaurants (McDonald's etc)	☐	☐	☐	☐	☐	☐	☐	☐	☐

Dietary changes during this pregnancy

31. Please mark if you have eaten more, less or the same amount of the following food items compared to before becoming pregnant

Food item	Did not eat or drink this before pregnancy	As before	More	Less	Stopped completely
1. Milk, dairy products, cheese	☐	☐	☐	☐	☐
2. Bread and cereals	☐	☐	☐	☐	☐
3. Biscuits	☐	☐	☐	☐	☐
4. Fat	☐	☐	☐	☐	☐
5. Meat	☐	☐	☐	☐	☐
6. Fish	☐	☐	☐	☐	☐
7. Eggs	☐	☐	☐	☐	☐
8. Vegetables	☐	☐	☐	☐	☐
9. Fruit	☐	☐	☐	☐	☐
10. Chocolate	☐	☐	☐	☐	☐
11. Other sweets/candy	☐	☐	☐	☐	☐
12. Coffee	☐	☐	☐	☐	☐
13. Tea	☐	☐	☐	☐	☐
14. Juice	☐	☐	☐	☐	☐
15. Soft drinks with sugar	☐	☐	☐	☐	☐
16. Soft drinks sugar free	☐	☐	☐	☐	☐
17. Alcohol	☐	☐	☐	☐	☐

32. Have you experienced nausea during this pregnancy? ☐ **Yes** ☐ **No**

33. If yes; have you eaten more or less than before you became pregnant? ☐
More ☐ **Less**

34. In which week(s) were you most bothered with nausea?

From pregnancy week	To pregnancy week	Still nauseous
		☐

35. Have you vomited during this pregnancy? ☐ **Yes** ☐ **No**

36. In which week(s) did you vomit?

From pregnancy week	To pregnancy week	Still vomiting
		☐

37. Have you started to eat or drink certain food items during this pregnancy? ☐ **Yes** ☐ **No**

38. If yes, name the two most important food items you have started to eat/drink.

Write the name of the food item

Dietary Supplements

39. Do you use, or have you used supplements during this pregnancy? ☐**Yes** ☐**No**

40. If yes, we ask you to name and quantify the supplements you have used/are using
(ts = 3.5 ml (teaspoon), bs = 5 ml (2 x teaspoon), ss = 10 ml (3 x teaspoon)

Liquid supplements	Times per week 7	6	5	4	3	2	1	<1	0	Amount 1 ts	1bs	1ss
1. Cod liver oil	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Omega-3 cod liver oil	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Sanasol	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Biovit	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Liquid iron mixture (Floradix etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other liquid supplements												
6. Name: 7.Manufacturer:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8. Name: 9.Manufacturer:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Capsules/tablets	Times per week 7	6	5	4	3	2	1	<1	0	Number(s) per time 1	2	3	4+
10. Cod liver oil capsules	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11. Fish oil capsules	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12. Vitaplex, B vitamins	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13. Kostpluss/nyco plus multi	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14. Nyco plus folic acid 0.4 mg	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15.Spektro (Solaray)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
16. Hemofer	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17. Duroferon duretter, Ferro Retard	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other supplements													
18. Name: 19. Manufacturer:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20. Name: 21. Manufacturer:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22. Name: 23. Manufacturer::	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24. Name: 25. Manufacturer:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Please remember to fill out the date on page 2!

Thank you for your time and help!

Appendix 3

den norske Mor & barn undersøkelsen

Questionnaire 3C

This questionnaire applies mainly to the period after week 12 of your pregnancy. We will ask you some questions which you may recognise from the first questionnaire. We do this because we want to continue following your and your child's progress. It would be useful for you to consult your pregnancy health card before you start answering the questions so that you can use the information contained in it when completing this questionnaire. If you feel uncomfortable with a question or it is difficult to answer, you can skip this question and go on to the next one.

This questionnaire will be processed by a computer. It is therefore important that you follow these instructions:

- Use a blue or black ballpoint pen.
- Put a cross in the box that is most relevant like this: ☒
- If you put a cross in the wrong box, correct it by fillin
- Write a number or capital letter in the large green bo
  It is important that you only write in the white are

Please do not use this questionnaire. Contact us at morbarn@fhi.no or phone + 47 53 20 40 40 if you need a questionnaire.

Number: 1 2 3 4 5 6 7 8 9 0

- When entering a single-digit number in boxes containing two or more squares, use the square on the right.
  For example: 5 is written like this: | | 5 |
- A number of questions in this questionnaire concern the week of pregnancy. *For example: If you want to indicate something that happened 14 weeks after your last period, enter a cross in the box for week 13-16.*
- Specific information concerning, for example, medication or profession should be written in the boxes or on the lines provided. Please write clearly in CAPITAL LETTERS.
- Remember to enter the date when you completed the questionnaire.

Please return the completed questionnaire in the stamped addressed envelope provided.

Date when the questionnaire was completed ☐☐ Day ☐☐ Month ☐☐☐☐ Year (write the year in full, e.g. 2001)

Antenatal care and health

1. Where have you been to antenatal check- ups? (Fill in one or more boxes.) Specify how many times.

- ☐ Public health centre ☐☐ times
- ☐ Doctor's surgery ☐☐ times
- ☐ Hospital (outpatients) clinic ☐☐ times

2. Who has examined you each time? (Fill in one or more boxes.) Specify how many times.

- ☐ Midwife ☐☐ times
- ☐ General practitioner ☐☐ times
- ☐ Gynaecologist ☐☐ times
- ☐ Public health nurse ☐☐ times

3. Is your doctor male or female? How many times have you gone to him/her?

General practitioner	☐ female	☐☐	times
	☐ male	☐☐	times
Gynaecologist	☐ female	☐☐	times
	☐ male	☐☐	times

4. If you visit or have visited a gynaecologist or hospital clinic for your antenatal check-ups, what is or was the reason?

- ☐ Referred due to complications during this pregnancy
- ☐ Referred due to previous illness or complications in previous pregnancies
- ☐ On your own initiative without a referral
- ☐ Referred for another reason

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5. Do you agree with the following statements concerning your antenatal check-ups?

	Agree completely	Agree	Agree somewhat	Disagree somewhat	Disagree	Disagree completely
I have been given sufficient advice and information	☐	☐	☐	☐	☐	☐
I have been well taken care of	☐	☐	☐	☐	☐	☐
There was not enough time during the consultations	☐	☐	☐	☐	☐	☐
I felt secure during these check-ups	☐	☐	☐	☐	☐	☐
I have been able to discuss everything I needed to during the check-ups	☐	☐	☐	☐	☐	☐
On the whole, I am satisfied with the way I have been followed up by the health service	☐	☐	☐	☐	☐	☐

6. Have you contacted a midwife or doctor in addition to your normal check-ups?

	No	Yes
Midwife	☐	☐
Doctor	☐	☐

7.If yes, was it difficult to get an appointment?

	Midwife	Doctor
Not difficult	☐	☐
Somewhat difficult	☐	☐
Very difficult	☐	☐

8. Have you had a gynaecological examination during your pregnancy (internal examination)? If so, how many times?

☐ No
☐ Yes ☐☐ Times

9. How many ultrasound examinations have you had during your pregnancy?

External ultrasound examination ☐☐ Times

Internal ultrasound examination ☐☐ Times

10. How many children are you expecting? ☐

11. Have you been offered an amniocentesis or placenta biopsy?

☐ No (go to question 16)
☐ Yes

12. If yes, were any tests performed and what were the results?

	Was the test performed? Yes	Was the test performed? No	Were the results normal? Yes	Were the results normal? No
Amniocentesis	☐	☐	☐	☐
Placenta biopsy	☐	☐	☐	☐

If the tests were abnormal, describe the findings:

_____

13. If an amniocentesis or placenta biopsy was performed, what was the reason?

☐ Due to my age (normally 38 or older at the time of delivery)
☐ Previous child with a chromosome disorder
☐ Previous child with neural tube defect (spina bifida)
☐ Epilepsy (medication for epilepsy)
☐ Ultrasound findings
☐ Other

14. Were there complications during the first 2 weeks following the amniocentesis?

☐ No
☐ Yes

15. If yes, what kind of complications?

☐ Vaginal bleeding
☐ Leakage of amniotic fluid
☐ Abdominal pain (similar to or stronger than menstrual pains)
☐ Other _____

16. Have you had an X-ray during pregnancy?

☐ No
☐ Yes

17. If yes, what part of your body was X-rayed? How many X-rays were taken and in which week of pregnancy? (Fill in one or more boxes.)

	Week of pregnancy 0-12	13-16	17-20	21-24	25-28	29+	No. of times
Teeth	☐	☐	☐	☐	☐	☐	☐☐
Lungs	☐	☐	☐	☐	☐	☐	☐☐
Arms or legs	☐	☐	☐	☐	☐	☐	☐☐
Pelvis/abdomen/back	☐	☐	☐	☐	☐	☐	☐☐
Other	☐	☐	☐	☐	☐	☐	☐☐

18. Have you received treatment to prevent a premature birth during this pregnancy? (Fill in one or more boxes.)

☐ No
☐ Yes, relax or bed-rest
☐ Yes, medication
Which medicines? _____

19. Have you been vaccinated during this pregnancy?

☐ No
☐ Yes
Which vaccine? _____

20. Has the midwife or doctor told you that you have or have had high blood pressure during this pregnancy?

☐ No
☐ Yes

21. If yes, what was the highest reading during this pregnancy? (High blood pressure is over 140/90) (Refer to your health card.)

☐☐☐ / ☐☐☐ *E.g.* 150 / 95

☐ Don't know

22. Have you had high blood pressure without being pregnant?

☐ No
☐ Yes
☐ Don't know

23. If yes, what was the highest reading before this pregnancy?

☐☐☐ / ☐☐☐ *E.g.* 150 / 95

☐ Don't know

24. What was your blood percentage/haemoglobin (Hb) value during this pregnancy? (Refer to your health card and note the most recent, in addition to the highest and lowest values.)

	Haemoglobin (Hb)	Week of preg
Value at last antenatal check-up during pregnancy	☐☐,☐	☐☐
Highest value during pregnancy	☐☐,☐	☐☐
Lowest value during pregnancy	☐☐,☐	☐☐

☐ Don't know

25. How much did you weigh at your last antenatal check-up and when was it? (Refer to your health card.)

Weight ☐☐☐,☐ kg

Date of antenatal check -up ☐☐ Day ☐☐ Month ☐☐☐☐ Year

26. Have you been admitted to the hospital since you became pregnant?

☐ No

☐ Yes, which hospital(s) _____

27. If yes, why and when were you hospitalised? (Fill in one or more boxes.)

	In which week of pregnancy were you admitted? 0–4	5–8	9–12	13–16	17–20	21–24	25–28	29+
☐ Prolonged nausea and vomiting	☐	☐	☐	☐	☐	☐	☐	☐
☐ Bleeding	☐	☐	☐	☐	☐	☐	☐	☐
☐ Leakage of amniotic fluid	☐	☐	☐	☐	☐	☐	☐	☐
☐ Threatening preterm labour	☐	☐	☐	☐	☐	☐	☐	☐
☐ High blood pressure	☐	☐	☐	☐	☐	☐	☐	☐
☐ (Pre-)Eclampsia	☐	☐	☐	☐	☐	☐	☐	☐
☐ Other _____	☐	☐	☐	☐	☐	☐	☐	☐

28. Do you have or have you ever had any of the following?

Before this pregnancy:	No	Yes	If yes, how often have you had problems? 1–4 times a month	1–6 times a week	Once a day	More than once a day	How much at a time? Drops	Large amounts
Incontinence when coughing, sneezing or laughing	☐	☐	☐	☐	☐	☐	☐	☐
Incontinence during physical activity (running / jumping)	☐	☐	☐	☐	☐	☐	☐	☐
Incontinence with a strong need to urinate	☐	☐	☐	☐	☐	☐	☐	☐
Problems retaining faeces	☐	☐	☐	☐	☐	☐	☐	☐
Problems with flatulence	☐	☐	☐	☐	☐	☐	☐	☐
In this pregnancy:								
Incontinence when coughing, sneezing or laughing.								
Incontinence during physical activity (running / jumping)	☐	☐	☐	☐	☐	☐	☐	☐
Incontinence with a strong need to urinate.	☐	☐	☐	☐	☐	☐	☐	☐
Problems retaining faeces	☐	☐	☐	☐	☐	☐	☐	☐
Problems with flatulence	☐	☐	☐	☐	☐	☐	☐	☐

29. Do you have or have you had pain in any of the following parts of your body? Where and when? (Fill in one or more boxes.)

	No	During this pregnancy Mild Pain	During this pregnancy Severe Pain	During earlier pregnancies Mild Pain	During earlier pregnancies Severe Pain	Between pregnancies Mild Pain	Between pregnancies Severe Pain	Prior to first pregnancy Mild Pain	Prior to first pregnancy Severe Pain
Small of the back	☐	☐	☐	☐	☐	☐	☐	☐	☐
One of the pelvic/sacroiliac joints at the back	☐	☐	☐	☐	☐	☐	☐	☐	☐
Both pelvic/sacroiliac joints at the back	☐	☐	☐	☐	☐	☐	☐	☐	☐
Over the coccygeal bone	☐	☐	☐	☐	☐	☐	☐	☐	☐
In the buttocks	☐	☐	☐	☐	☐	☐	☐	☐	☐
Over the pubic bone	☐	☐	☐	☐	☐	☐	☐	☐	☐
Groin	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other back pains	☐	☐	☐	☐	☐	☐	☐	☐	☐

30. Do you wake up at night due to pelvic pain?

- ☐ Yes, frequently
- ☐ Yes, sometimes
- ☐ No, never

31. Do you have to use a stick or crutches in order to walk due to pelvic pain?

- ☐ No, never
- ☐ Yes, but not every day, the pain varies from day to day
- ☐ Yes, I have to use a stick or crutches every day

32. Have you received an anaesthetic in connection with surgery or dental treatment during this pregnancy?

- ☐ No
- ☐ Yes

33. If yes, what type of anaesthetic have you had? (Fill in one or more boxes.)

- ☐ General (full) anaesthetic
- ☐ Spinal anaesthetic (epidural)
- ☐ Local anaesthetic
- ☐ Don't know

34. Have you been to the dentist during this pregnancy?

- ☐ No
- ☐ Yes

35. If yes, did the dentist perform any of the following treatments? (Fill in one or more boxes.)

	Yes	No
Put in new amalgam fillings (silver fillings)	☐	☐
Removed or replaced amalgam fillings	☐	☐
Put in new white fillings	☐	☐

36. How many teeth do you have and how many have fillings? (Look in the mirror and count.)

Total number of teeth ☐☐

Number of teeth with amalgam fillings ☐☐

Number of teeth with other types of fillings ☐☐

37. At present, do your gums bleed when you brush your teeth?

- ☐ No, seldom or never
- ☐ Yes, sometimes
- ☐ Yes, frequently
- ☐ Yes, nearly always

38. Have you had a tattoo or body piercing, including extra holes in the ears? (Do not include pierced ears if you have one hole in each ear.)

- ☐ No
- ☐ Yes

39. If yes, where and when was it done? (Fill in one or more boxes.)

	Tattoo	Body piercing
Before this pregnancy:		
In Norway	☐	☐
Abroad	☐	☐
During this pregnancy:		
In Norway	☐	☐
Abroad	☐	☐

40. Have you ever had a blood transfusion? If yes, give the number of transfusions.

- ☐ No
- ☐ Yes, during this pregnancy ☐☐ Times
- ☐ Yes, before this pregnancy ☐☐ Times

41. If yes, in which country and which year? (Give the last 2 transfusions.) **YEAR**

Country: _____ ☐☐☐☐

Country: _____ ☐☐☐☐

42. Have you ever had breast surgery?

- ☐ No
- ☐ Yes

43. If yes, was it:

- ☐ Breast enlargement
- ☐ Breast reduction
- ☐ Cancer/biopsy
- ☐ Other, describe: _____

44. Have you ever had cervical dysplasia?

- ☐ No
- ☐ Yes

☐☐☐☐ Year the dysplasia was detected the first time

45. Have you had an operation on your cervix?

- ☐ No
- ☐ Yes

☐☐☐☐ Year of operation

46. Have you ever had a gamma globulin injection? (used to prevent infection of hepatitis A, primarily when travelling abroad.)

- ☐ No
- ☐ Yes

If yes, which year? ☐☐☐☐

How have you been recently?

Some questions about the time that has elapsed since the 13th week of pregnancy.

47. Have you had one or more episodes of vaginal bleeding after the 13th week of pregnancy?

☐ No
☐ Yes

48. If yes, how much did you bleed, in which week(s) of pregnancy and how many days did the bleeding last? (If you have had more than 2 episodes of bleeding, describe the last 2 only.)

	The amount of blood (spotting means a few drops)			In which week of pregnancy did the bleeding occur? 13–16	17–20	21–24	25–28	29+	No. of days bleeding lasted
1.	☐ Spotting	☐ More than spotting	☐ Large amounts	☐	☐	☐	☐	☐	
2.	☐ Spotting	☐ More than spotting	☐ Large amounts	☐	☐	☐	☐	☐	

☐ Number of episodes of bleeding if more than 2

49. Do you know why you bled?

☐ No
☐ Yes

50. If yes, what was the reason? (Fill in one or more boxes.)

☐ The placenta is too low/is in a difficult position/placenta previa
☐ Premature separation of the placenta/abruptio/ablatio placenta
☐ Threatening miscarriage/premature birth
☐ Cervical ulcer, bleeding of the mucous membrane in the vagina
☐ Following intercourse
☐ Other reason

51. Have you been bothered by uterine contractions?

☐ No
☐ Yes, a little
☐ Yes, a lot

52. Do you have or have you had any of the following illnesses or problems after the 13th week of pregnancy? If you have used tablets, mixtures, suppositories, inhalers, creams, etc. in connection with the illness or problem, give the name(s) of the medication(s), when and how long you took them. (Fill in one or more boxes.) (This applies to all types of medicines including alternative and herbal remedies, both regular and occasional use. Do not include vitamins and nutritional supplements as these are asked about elsewhere.)

		In which week of pregnancy did you have problems? 13-16	17-20	21-24	25-28	29+	The name of the medication taken	In which week of pregnancy did you take medication 13-16	17-20	21-24	25-28	29+	No. of days taken
1	Pelvic girdle pain . . .	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
2	Back pains	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
3	Other pains in muscles/joints	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
4	Nausea	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
5	Long-term nausea and vomiting	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
6	Vaginal thrush	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
7	Vaginal catarrh, unusual discharge . . .	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
8	Pregnancy itch	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
9	Constipation	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
10	Diarrhoea/gastric flu. . . .	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	

Continued...

	In which week of pregnancy did you have problems? 13-16	17-20	21-24	25-28	29+	The name of the medication taken	In which week of pregnancy did you take medication 13-16	17-20	21-24	25-28	29+	No. of days taken
11 Unusual fatigue /drowsiness	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
12 Heartburn	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
13 Swelling of the body (oedema)	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
14 Common cold	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
15 Throat infection	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
16 Sinusitis/ear infection	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
17 Influenza	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
18 Pneumonia /bronchitis	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
19 Other cough	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
20 Sugar in urine	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
21 Protein in urine	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
22 Bladder infection/ cystitis	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
23 Incontinence	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
24 High blood pressure	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
25 Leg cramps	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
26 Asthma	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
27 Hay fever/other allergy	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
28 Headache/migraine	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
29 Depression	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
30 Other psychological problems	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	
31 Other	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	

53. If you have had a fever once or more since the 13th week of pregnancy, indicate in which week of pregnancy, name of any medication taken to reduce the fever and the highest temperature measured. (If more than 3 times, indicate the last 3.)

	Which week of pregnancy did you have a fever? 13–16	17–20	21–24	25–28	29+	Name any medication taken to lower the fever	Highest recorded temperature *(e.g. 38.9° C)*	Temperature not taken
1st time	☐	☐	☐	☐	☐		, °C	☐
2nd time	☐	☐	☐	☐	☐		, °C	☐
3rd time	☐	☐	☐	☐	☐		, °C	☐

☐ Fever more than 3 times

54. Have you taken other medication after the 13th week of pregnancy not previously mentioned, for example, sleeping tablets or sedatives? Give the name, when and how many days altogether the medication was taken **for.** (This applies to all types of medicines including alternative and herbal remedies, both regular and occasional use. Do not include vitamins and nutritional supplements as these are discussed elsewhere.)

Name of medication (e.g. Valium, Rohypnol, Paracetamol)	Use of medication in week of pregnancy 13–16	17–20	21–24	25–28	29+	No. of days taken
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	
_____	☐	☐	☐	☐	☐	

55. During this pregnancy have you been involved in an accident or been injured *(e.g. traffic accident, fall, hit in the stomach)?*

☐ No
☐ Yes

56. If yes, in which week of pregnancy?

Vitamins, minerals and dietary supplements

57. Have you taken vitamins, minerals or other nutritional supplements after the 13th week of pregnancy?

☐ No (go to question 61)
☐ Yes

If you take supplements, please find the package/bottle.

58. Fill in the table below for the vitamins and minerals found on the vitamin package/bottle. Fill in when and approximately how often you have taken them.

	Week of pregnancy supplement taken? 13–16	17–20	21–24	25–28	29+	How often did you take this supplement? Daily	4-6 times a week	1-3 times a week
1 Folate/folic acid	☐	☐	☐	☐	☐	☐	☐	☐
2 Vitamin B1 (Thiamine)	☐	☐	☐	☐	☐	☐	☐	☐
3 Vitamin B2 (Riboflavin)	☐	☐	☐	☐	☐	☐	☐	☐
4 Vitamin B6 (Pyridoxine)	☐	☐	☐	☐	☐	☐	☐	☐
5 Vitamin B12	☐	☐	☐	☐	☐	☐	☐	☐
6 Niacin	☐	☐	☐	☐	☐	☐	☐	☐
7 Pantothenic acid	☐	☐	☐	☐	☐	☐	☐	☐
8 Biotin	☐	☐	☐	☐	☐	☐	☐	☐
9 Vitamin C	☐	☐	☐	☐	☐	☐	☐	☐
10 Vitamin A	☐	☐	☐	☐	☐	☐	☐	☐
11 Vitamin D	☐	☐	☐	☐	☐	☐	☐	☐
12 Vitamin E	☐	☐	☐	☐	☐	☐	☐	☐
13 Iron	☐	☐	☐	☐	☐	☐	☐	☐
14 Calcium	☐	☐	☐	☐	☐	☐	☐	☐
15 Iodine	☐	☐	☐	☐	☐	☐	☐	☐
16 Zinc	☐	☐	☐	☐	☐	☐	☐	☐
17 Selenium	☐	☐	☐	☐	☐	☐	☐	☐
18 Copper	☐	☐	☐	☐	☐	☐	☐	☐
19 Chromium	☐	☐	☐	☐	☐	☐	☐	☐
20 Magnesium	☐	☐	☐	☐	☐	☐	☐	☐
21 Cod liver oil	☐	☐	☐	☐	☐	☐	☐	☐
22 Omega-3 fatty acid	☐	☐	☐	☐	☐	☐	☐	☐

59. Give the complete name(s) of all the vitamins and nutritional supplements you take. Include also herbal remedies and diet products. (Write clearly using CAPITAL LETTERS since this will be read by a computer.)

1 e.g. V I T A P L E X M E D J E R N

2

3

4

5

6

60. If you take multivitamins (with or without minerals), do these contain folate/folic acid?

- ☐ No
- ☐ Yes
- ☐ Don't know

WORK

61. Have you been in paid employment during this pregnancy?

- ☐ No *(go to question 76)*
- ☐ Yes

62. Do you have the same job conditions now after the 13th week of pregnancy that you described in the first questionnaire?

- ☐ No
- ☐ Yes *(go to question 66)*

63. If no, in which week of your pregnancy did your work situation change?

Week of pregnancy ☐☐

64. How has your work situation changed?

- ☐ I have stopped working
- ☐ I have gone over to a part-time position
- ☐ Other

65. If you have stopped working, why did you stop?

- ☐ I handed in my notice
- ☐ The work was temporary (seasonal, short-term contract)
- ☐ I was fired
- ☐ Other

66. Have your working arrangements been changed during this pregnancy making your job more suitable for you now that you are pregnant?

- ☐ No
- ☐ Yes

67. If no, why have your working conditions not been changed to make them more suitable for you?

- ☐ Not necessary
- ☐ Impossible or nearly impossible
- ☐ I have asked for changes but no changes have been made
- ☐ It is difficult to ask
- ☐ None of the above (explain why)

68. What are your working hours? (Fill in one or more boxes.)

- ☐ Permanent day work
- ☐ Permanent afternoon or evening work
- ☐ Permanent night work
- ☐ Shift work or shift rotas
- ☐ No set times (extra work, extra shifts, temporary employment, etc.)
- ☐ Other

69. Answer each of the following questions for your present work. (Fill in each item.)

	Yes daily, more than half of working hours	Yes daily, less than half of working hours	Yes periodically, but not daily	Seldom or never
Do you ever have so much to do that your work situation becomes stressful and annoying?	☐	☐	☐	☐
Do you have to bend or turn many times a day?	☐	☐	☐	☐
Do you work with your hands at shoulder level or higher?	☐	☐	☐	☐
Do you work standing or walking about?	☐	☐	☐	☐
In some jobs it is possible to decide yourself how much and how quickly you work. You can, for example, work a little faster one day and take it a little easier the next. Do you have this opportunity?	☐	☐	☐	☐
Is there so much noise at your workplace that it is uncomfortable?	☐	☐	☐	☐
Is there so much noise that you have to raise your voice to speak with others even at a distance of one metre?	☐	☐	☐	☐

70. How often have you worked with a radio transmitter or radar after the 13th week of pregnancy?

- ☐ Seldom/never
- ☐ A few times a week
- ☐ Daily
- ☐ On average, more than 1 hour a day

71. How often have you worked with X-ray equipment (at a distance of less than 2 metres) after the 13th week of pregnancy? *(Do not include treatment as a patient.)*

- ☐ Seldom/never
- ☐ A few times a week
- ☐ Daily
- ☐ On average, more than 1 hour a day

72. Have you been absent from your normal job for more than two weeks after the 13th week of pregnancy?

- ☐ No
- ☐ Yes, part time
- ☐ Yes

73. Are you absent from regular work at the present time?

- ☐ No
- ☐ Yes, part time
- ☐ Yes

74. If yes, why are you currently absent from work?

(Fill in for only one item.)

- ☐ Sick leave (with sick compensation pay)
- ☐ Absent due to sick child
- ☐ Made redundant with compensation
- ☐ Absent with maternity allowance due to the working environment
- ☐ Started maternity leave (with allowance)
- ☐ Service leave
- ☐ Other (describe)

_____

_____

_____

75. Complete the table below if you were on sick leave (full or part time) after the 13th week of pregnancy. Fill in the reason (e.g. pelvic girdle pain, pneumonia), which weeks you were on sick leave, the number of days and the percentage of time each period of sick leave represents. (*Give one reason for sick leave per line.***)**

Reason for sick leave	Sick leave during week of pregnancy: 13-16	17-20	21-24	25-28	29+	Number of days	% sick leave
Example: Pelvic girdle pain	☐	☐	☐	☐	☐	14	50
	☐	☐	☐	☐	☐		
	☐	☐	☐	☐	☐		
	☐	☐	☐	☐	☐		
	☐	☐	☐	☐	☐		

76. Do you currently lift anything over 10 kilos while you are pregnant? *(10 kilos is equivalent to a full bucket of water)*

	Home	Work
Seldom or never	☐	☐
Yes, less than 20 times a week	☐	☐
Yes, more than 20 times a week	☐	☐
Yes, 10-20 times a day	☐	☐
Yes, more than 20 times a day	☐	☐

77. Have others helped you with housework or childcare more than they usually do to relieve you during this pregnancy?

- ☐ Yes, considerably
- ☐ Yes, to a fair extent
- ☐ No, no one has offered
- ☐ No, it has not been necessary

78. If you are on maternity leave for this pregnancy, when did it start?

Date: ☐☐ ☐☐ ☐☐☐☐

day month year

Habits

79. How often do you talk on a mobile phone?

- ☐ Seldom/never
- ☐ A few times a week
- ☐ Daily
- ☐ On average, more than 1 hour a day

80. Do you talk on your mobile phone for longer than 15 minutes at a time?

- ☐ Never
- ☐ Seldom
- ☐ Frequently

81. How frequently have you worked with a computer monitor, laser printer or photocopy machine (at a distance of less than 2 metres) after the 13th week of pregnancy?

	Computer monitor	Laser printer	Photocopy machine
Seldom/never	☐	☐	☐
A few times a week	☐	☐	☐
Daily	☐	☐	☐
On average, more than 1 hour a day	☐	☐	☐

82. Do you live close to high-voltage power lines?

- ☐ No
- ☐ Yes, closer than 50 metres
- ☐ Yes, between 50 - 100 metres
- ☐ Yes, more than 100 metres

83. How often have you been to a discotheque since you answered the previous questionnaire?

- ☐ Never
- ☐ At least 1-2 times a week
- ☐ Less often

84. How often do you exercise at present? *(Fill in for each item.)*

	Never	1-3 times a month	Once a week	Twice a week	3 times or more a week
1. Walking	☐	☐	☐	☐	☐
2. Brisk walking	☐	☐	☐	☐	☐
3. Running/jogging/orienteering	☐	☐	☐	☐	☐
4. Cycling	☐	☐	☐	☐	☐
5. Training studio/weight training	☐	☐	☐	☐	☐
6. Special gymnastics/aerobics for pregnant women	☐	☐	☐	☐	☐
7. Aerobics/gymnastics/dance without running and jumping	☐	☐	☐	☐	☐
8. Aerobics/gymnastics/dance with running and jumping	☐	☐	☐	☐	☐
9. Dancing (swing/rock/folk)	☐	☐	☐	☐	☐
10. Skiing	☐	☐	☐	☐	☐
11. Ball sports	☐	☐	☐	☐	☐
12. Swimming	☐	☐	☐	☐	☐
13. Riding	☐	☐	☐	☐	☐
14. Other	☐	☐	☐	☐	☐

85. How often do you do exercises at home or at a gym for the following groups of muscles? *(Fill in for each item.)*

	Never	1-3 times a month	Once a week	Twice a week	3 times a week or more
Abdominal muscles	☐	☐	☐	☐	☐
Back muscles	☐	☐	☐	☐	☐
Pelvic floor muscles *(Muscles around the vagina, urethra, anus)*	☐	☐	☐	☐	☐

86. How often at the moment are you so physically active in your spare time and/or at work that you get out of breath or sweat? *(Fill in for both spare time and work.)*

	Spare time	At work
Never	☐	☐
Less than once a week	☐	☐
Once a week	☐	☐
Twice a week	☐	☐
3-4 times a week	☐	☐
5 or more times a week	☐	☐

87. How often on average have you had sexual intercourse during the last month?

- ☐ Daily
- ☐ 5-6 times a week
- ☐ 3-4 times a week
- ☐ 1-2 times a week
- ☐ Less frequently
- ☐ Never

88. Have you been abroad during the last year?

- ☐ No
- ☐ Yes

89. If yes, which countries did you visit and when?

Country	Month	Year
_____		
_____		
_____		

90. Have you come into contact with animals either at work or in your free time?

- ☐ No
- ☐ Yes

91. If yes, which animals have you come into contact with and how often?

	Daily	3–6 times a week	1-2 times a week	Less often
Dog	☐	☐	☐	☐
Cat	☐	☐	☐	☐
Guinea pig/hamster/rabbit/rat, etc.	☐	☐	☐	☐
Canary or other caged birds	☐	☐	☐	☐
Hens and other poultry	☐	☐	☐	☐
Cow/sheep/goat	☐	☐	☐	☐
Horse	☐	☐	☐	☐
Pig	☐	☐	☐	☐
Other	☐	☐	☐	☐

92. How many hours a day do you usually sleep now when you are pregnant?

☐ Over 10 hours
☐ 8–9 hours
☐ 6-7 hours
☐ 4-5 hours
☐ Less than 4 hours

93. Do you currently sleep on a waterbed or use an electric blanket?

	Yes	No
Waterbed	☐	☐
Electric blanket	☐	☐

94. Can you rest during the day (both at home and at work)?

☐ No
☐ Yes

95. Have you been in a sauna while you have been pregnant?

☐ No
☐ 1–5 times
☐ 6-10 times
☐ More than 10 times

96. Have you been in a solarium while you have been pregnant?

☐ No
☐ 1-5 times
☐ 6-10 times
☐ More than 10 times

97. Are you exposed to passive smoking either at home or at work? If yes, how many hours a day?

	No	Yes	No. of hrs
Home	☐	☐	☐☐
Work	☐	☐	☐☐

98. Do you smoke at present? If yes, how many cigarettes?

☐ No
☐ Sometimes ☐☐ Cigarettes per week
☐ Daily ☐☐ Cigarettes per day

99. Does the baby's father smoke at present? If yes, how many cigarettes?

☐ No
☐ Sometimes ☐☐ Cigarettes per week
☐ Daily ☐☐ Cigarettes per day

100. If one or both of you have stopped smoking during the pregnancy, in which week of pregnancy did you stop?

☐ You ☐☐ Week of pregnancy
☐ Baby's father ☐☐ Week of pregnancy

101. If you or the baby's father have smoked during the pregnancy, were there periods during which you or the baby's father did not smoke? *(Fill in the weeks during pregnancy when you did not smoke.)*

	Weeks of pregnancy without smoking							
	0–4	5–8	9–12	13–16	17–20	21–24	25–28	29+
You	☐	☐	☐	☐	☐	☐	☐	☐
Baby's father	☐	☐	☐	☐	☐	☐	☐	☐

102. Have you used other forms of nicotine after the 13th week of pregnancy?

	No	Yes
Nicotine chewing gum	☐	☐
Nicotine patches	☐	☐
Nicotine inhaler	☐	☐
Chewing tobacco/snuff	☐	☐

103. Have you used any of the following substances after the 13th week of pregnancy?

	No	Yes
Hash	☐	☐
Amphetamine	☐	☐
Ecstasy	☐	☐
Cocaine	☐	☐
Heroin	☐	☐

104. Have you ever used any of the following substances? (Fill in for each item.)

	No	Previously	Last 6 months before pregnancy	During this pregnancy
Anabolic steroids	☐	☐	☐	☐
Testosterone products	☐	☐	☐	☐
Growth hormones *(e.g. genotropin/somatropin)*	☐	☐	☐	☐

Food and drink

105. How often do you eat the following foods? *(Fill in for each item.)*

		Before the pregnancy				During the pregnancy		
		Never	A few times a year	1–3 times a Month	Once a week or more	Never	1–3 times a month	Once a week or more
1	Crab	☐	☐	☐	☐	☐	☐	☐
2	Shrimps	☐	☐	☐	☐	☐	☐	☐
3	Shellfish (e.g. mussels, oysters)	☐	☐	☐	☐	☐	☐	☐
4	Fish liver	☐	☐	☐	☐	☐	☐	☐
5	Tuna fish or halibut	☐	☐	☐	☐	☐	☐	☐
6	Flounder/other flat fish	☐	☐	☐	☐	☐	☐	☐
7	Pike or perch	☐	☐	☐	☐	☐	☐	☐
8	Other fresh water fish	☐	☐	☐	☐	☐	☐	☐
9	Reindeer meat	☐	☐	☐	☐	☐	☐	☐
10	Mutton	☐	☐	☐	☐	☐	☐	☐
11	Liver or kidney from game	☐	☐	☐	☐	☐	☐	☐
12	Wild mushrooms	☐	☐	☐	☐	☐	☐	☐

106. How often do you eat the following types of food? *(Fill in for each item.)*

	Never	A few times a year	1-3 times a month	Once a week or more
Food from restaurant/street vendors/canteen or the like	☐	☐	☐	☐
Meat (not including tinned) bought in other countries	☐	☐	☐	☐
Meat (including poultry) that is raw or undercooked (pink near the bone)	☐	☐	☐	☐
Raw minced meat/meat mixtures (even to taste)	☐	☐	☐	☐
Smoked or cured salmon or trout (uncooked)	☐	☐	☐	☐
Soft cheeses (e.g. cream cheese, camembert, blue cheese, etc.)	☐	☐	☐	☐
Unwashed raw vegetables, unwashed fruit	☐	☐	☐	☐

107. Do you avoid eating the following foods during this pregnancy?

	No	Yes
Fish	☐	☐
Eggs	☐	☐
Nuts	☐	☐
Oranges, lemons	☐	☐
Strawberries	☐	☐

Other, specify _____

108. What type of drinking water do you have where you live?

- ☐ Own water source (e.g. well)
- ☐ Water company (public or private)
- ☐ Other source

Name of water company _____

☐ Don't know the name of the water company

109. Is your water treated (chlorinated or UV-radiated)?

- ☐ No
- ☐ Yes, UV radiation
- ☐ Yes, chlorinated
- ☐ Don't know

110. What was your fluid consumption (number of cups/glasses) per day after the 13th week of pregnancy? *(1 mug = 2 cups, 1 small plastic bottle (0.5 litre) = 4 cups, 1 large plastic bottle (1.5 litres) = 12 cups)*

	Number of cups / glasses	Decaffeinated (fill in)
1. Filter coffee	☐☐	☐
2. Instant coffee	☐☐	☐
3. Boiled coffee	☐☐	☐
4. Other coffee	☐☐	☐
5. Tea	☐☐	☐
6. Coca Cola/Pepsi, etc.	☐☐	☐
7. Other fizzy drinks	☐☐	☐
8. Diet Coca Cola, diet Pepsi	☐☐	☐
9. Other diet fizzy drinks	☐☐	☐
10. Tap water	☐☐	
11. Bottled water	☐☐	

	Number of cups/glass	Organic (fill in)
12. Juice/squash		☐
13. Diet juice/squash		☐
14. Milk (skimmed, low fat, whole)		☐
15. Yogurt, all types		☐
16. Yogurt with active Lactobacillus all types		☐
17. Other type of cultured milk (kefir)		☐
18. Other		☐

111. How often did you consume alcohol before and how often do you consume it now?

	Last 3 months before last period	In this pregnancy week of pregnancy 0–12	13–24	25+
Roughly 6-7 times a week	☐	☐	☐	☐
Roughly 4–5 times a week	☐	☐	☐	☐
Roughly 2-3 times a week	☐	☐	☐	☐
Roughly 1 time a week	☐	☐	☐	☐
Roughly 1–3 times a month	☐	☐	☐	☐
Less then once a month	☐	☐	☐	☐
Never	☐	☐	☐	☐

Alcohol units
Alcohol units are used to compare the different types of alcoholic beverages. 1 alcohol unit = 1.5 cl. pure alcohol.

1 glass of beer	= 1 alcohol unit
1 wine glass of red or white wine	= 1 alcohol unit
1 sherry glass of sherry or other fortified wine	= 1 alcohol unit
1 spirit glass of spirits or liqueur	= 1 alcohol unit
1 bottle/can breezer or cider	= 1 alcohol unit

112. In the period just before you became pregnant and during this pregnancy, how many times have you consumed 5 units or more of alcohol? *(See the explanation for units.)*

	Last 3 mths before last period	In this pregnancy week of pregnancy 0–12	13–24	25+
Several times a week	☐	☐	☐	☐
Once a week	☐	☐	☐	☐
1-3 times a month	☐	☐	☐	☐
Less than once a month	☐	☐	☐	☐
Never	☐	☐	☐	☐

113. How many units do you usually drink when you consume alcohol? *(See the above explanation.)*

	Last 3 mths before last period	In this pregnancy week of pregnancy 0–12	13–24	25+
10 or more	☐	☐	☐	☐
7–9	☐	☐	☐	☐
5–6	☐	☐	☐	☐
3–4	☐	☐	☐	☐
1–2	☐	☐	☐	☐
Less than 1	☐	☐	☐	☐

114. If you have changed your drinking habits before this pregnancy, when did the change occur? *(Fill in one or more boxes.)*

	Reduced intake	Increased intake
Last 3 months before last period	☐	☐
During pregnancy weeks 0-6	☐	☐
During pregnancy weeks 7-12	☐	☐
During pregnancy weeks 13-24	☐	☐
After pregnancy week 25	☐	☐

115. If you have modified your consumption of alcohol, how important were the following factors? *(Fill in one or more boxes.)*

	Not relevant	Not very important	Quite important	Important	Very important
Nausea, discomfort	☐	☐	☐	☐	☐
Altered taste	☐	☐	☐	☐	☐
For the baby's sake	☐	☐	☐	☐	☐
Depression/problems	☐	☐	☐	☐	☐
Other reasons	☐	☐	☐	☐	☐

You and your life now

116. What is your current civil status?
- ☐ Married
- ☐ Cohabiting
- ☐ Single
- ☐ Divorced/separated
- ☐ Widowed
- ☐ Other

117. Do you have anyone other than your husband/partner you can ask for advice in a difficult situation?
- ☐ No.
- ☐ Yes, 1 or 2 people
- ☐ Yes, more than 2 people

118. How frequently do you meet or talk on the telephone with your family (other than your husband/partner and children) or close friends?
- ☐ Once a month or less
- ☐ 2-8 times a month
- ☐ More than twice a week

119. Do you often feel lonely?
- ☐ Almost never
- ☐ Seldom
- ☐ Sometimes
- ☐ Usually
- ☐ Almost always

120. If you have given birth before, in general, how was the experience of giving birth?
- ☐ Very good
- ☐ Good
- ☐ Alright
- ☐ Bad
- ☐ Very bad

121. Do you agree or disagree with the following statements relating to the forthcoming birth of your baby?
(Fill in for each statement.)

	Agree completely	Agree	Agree somewhat	Disagree somewhat	Disagree	Disagree completely
I want to give birth as naturally as possible without painkillers or intervention	☐	☐	☐	☐	☐	☐
I am really dreading giving birth	☐	☐	☐	☐	☐	☐
I want to have enough medication so that the birth will be painless	☐	☐	☐	☐	☐	☐
I want to have an epidural regardless	☐	☐	☐	☐	☐	☐
I want to have an epidural if the midwife agrees	☐	☐	☐	☐	☐	☐
If I could choose I would have a caesarean	☐	☐	☐	☐	☐	☐
I think the woman herself should decide whether or not to have a caesarean	☐	☐	☐	☐	☐	☐
I worry all the time that the baby will not be healthy or normal	☐	☐	☐	☐	☐	☐
I am really looking forward to the baby coming	☐	☐	☐	☐	☐	☐

122. How do these statements describe your relationship? (Only answer if you have a partner.)
(Fill in for each statement.)

	Agree completely	Agree	Agree somewhat	Disagree somewhat	Disagree	Completely disagree
My husband/partner and I have a close relationship	☐	☐	☐	☐	☐	☐
My partner and I have problems in our relationship	☐	☐	☐	☐	☐	☐
I am very happy in my relationship	☐	☐	☐	☐	☐	☐
My partner is usually understanding	☐	☐	☐	☐	☐	☐
I often think about ending our relationship	☐	☐	☐	☐	☐	☐
I am satisfied with my relationship with my partner	☐	☐	☐	☐	☐	☐
We often disagree about important decisions	☐	☐	☐	☐	☐	☐
I have been lucky in my choice of a partner	☐	☐	☐	☐	☐	☐
We agree on how children should be raised	☐	☐	☐	☐	☐	☐
I think my partner is satisfied with our relationship	☐	☐	☐	☐	☐	☐

123. Have you been bothered during the last 2 weeks by any of the following? *(Enter a cross in a box for each item.)*

	Not bothered	Slightly bothered	Fairly much bothered	Very much bothered
1. Feeling fearful	☐	☐	☐	☐
2. Nervousness or shakiness inside	☐	☐	☐	☐
3. Feeling hopeless about the future	☐	☐	☐	☐
4. Feeling blue	☐	☐	☐	☐
5. Worrying too much about things	☐	☐	☐	☐
6. Feeling everything is an effort	☐	☐	☐	☐
7. Feeling tense or keyed up	☐	☐	☐	☐
8. Suddenly scared for no reason	☐	☐	☐	☐

124. How often do you experience the following in your everyday life? *(Fill in for each statement.)*

	Seldom/ never	Fairly seldom	Sometimes	Often	Very often
Feel pleased about something	☐	☐	☐	☐	☐
Feel happy	☐	☐	☐	☐	☐
Feel joyful, as though everything is going your way	☐	☐	☐	☐	☐
Feel that you will scream at someone or hit something	☐	☐	☐	☐	☐
Feel angry, irritated or annoyed	☐	☐	☐	☐	☐
Feel mad at someone	☐	☐	☐	☐	☐

125. How well do these statements describe you? *(Fill in for each statement.)*

	Incorrect	Partly correct	Almost correct	Completely correct
I always manage to solve difficult problems if I try hard enough	☐	☐	☐	☐
If anyone opposes me, I find a way to get what I want	☐	☐	☐	☐
I am sure that I can cope with unexpected events	☐	☐	☐	☐
I am calm when I encounter difficulties because I trust my ability to cope	☐	☐	☐	☐
When I am in a difficult situation, I usually find a solution	☐	☐	☐	☐

126. Do you agree or disagree with the following statements? *(Fill in for each statement.)*

	Disagree completely	Disagree	Disagree somewhat	Don't agree or disagree	Agree somewhat	Agree	Agree completely
My life is largely what I wanted it to be	☐	☐	☐	☐	☐	☐	☐
My life is very good	☐	☐	☐	☐	☐	☐	☐
I am satisfied with my life	☐	☐	☐	☐	☐	☐	☐
I have achieved so far what is important for me in my life	☐	☐	☐	☐	☐	☐	☐
If I could start all over, there is very little I would do differently	☐	☐	☐	☐	☐	☐	☐

127. How do you feel about yourself? *(Fill in for each statement.)*

	Agree completely	Agree	Disagree	Disagree completely
I have a positive attitude toward myself	☐	☐	☐	☐
I feel completely useless at times	☐	☐	☐	☐
I feel that I do not have much to be proud about	☐	☐	☐	☐
I feel that I am a valuable person, as good as anyone else	☐	☐	☐	☐

128. Have you experienced any of the following during the last 12 months? If yes, how painful or difficult was it for you? *(Fill in for each statement.)*

	No	Yes	IF YES: Not too bad	IF YES: Painful/ difficult	IF YES: Very painful/ difficult
Have you had problems at work or where you study?	☐	☐	☐	☐	☐
Have you had financial problems?	☐	☐	☐	☐	☐
Have you been divorced, separated or ended your relationship with your partner?	☐	☐	☐	☐	☐
Have you had problems or conflicts with your family, friends or neighbours?	☐	☐	☐	☐	☐
Have you been seriously ill or injured?	☐	☐	☐	☐	☐
Has anyone close to you been seriously ill or injured?	☐	☐	☐	☐	☐
Have you been involved in a serious accident, fire or robbery?	☐	☐	☐	☐	☐
Have you lost someone close to you?	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

129. Have you ever experienced any of the following? *(Fill in for each statement.)*

	No, never	Yes, as a child *(under 18)*	Yes, as an adult *(over 18)*	Who was responsible for this? A stranger	Family or relative	Another known person	Has this occurred during the last year? No	Yes
Someone has over a long period of time systematically tried to subdue, degrade or humiliate you	☐	☐	☐	☐	☐	☐	☐	☐
Someone has threatened to hurt you or someone close to you	☐	☐	☐	☐	☐	☐	☐	☐
You have been subjected to physical abuse	☐	☐	☐	☐	☐	☐	☐	☐
You have been forced to have sexual intercourse	☐	☐	☐	☐	☐	☐	☐	☐

Miscellaneous

130. Has anyone living with you had any of the following illnesses during this pregnancy? *(Enter a cross and specify the period)*

	In which week of pregnancy? 0–9	10–19	20–29	30+
☐ Influenza	☐	☐	☐	☐
☐ Childhood diseases (fever and rash)	☐	☐	☐	☐
☐ Prolonged cough	☐	☐	☐	☐
☐ Other infectious disease	☐	☐	☐	☐

131. Have there been any instances of cot death in your family or your partner's family?

- ☐ No
- ☐ Don't know
- ☐ Yes, in my family (see question 132)
- ☐ Yes, in the baby's father's family (see question 133)

132. The child that died of cot death in my family was:

- ☐ My sister
- ☐ My brother
- ☐ My sister's child ☐ Boy ☐ Girl
- ☐ My brother's child ☐ Boy ☐ Girl
- ☐ My mother's sibling ☐ Boy ☐ Girl ☐ Sex unknown
- ☐ My father's sibling ☐ Boy ☐ Girl ☐ Sex unknown
- ☐ Other

133. The child that died of cot death in the baby's father's family was:

- ☐ Baby's father's sister
- ☐ Baby's father's brother
- ☐ Baby's father's sister's child ☐ Boy ☐ Girl
- ☐ Baby's father's brother's child ☐ Boy ☐ Girl
- ☐ Baby's paternal grandmother's sibling ☐ Boy ☐ Girl ☐ Sex unknown
- ☐ Baby's paternal grandfather's sibling ☐ Boy ☐ Girl ☐ Sex unknown
- ☐ Other

134. Have you ever lost a child?

- ☐ No *(if no, you are finished with the questionnaire)*
- ☐ Yes

135. If yes, what was the cause of death and when did the death occur?

- ☐ Stillbirth (Birth after the 16th week of pregnancy.)
- ☐ Cot death
- ☐ Accident
- ☐ Illness/birth defect
  Which illness/birth defect: _____
- ☐ Other

	Year	Child's age	
		Years	Months
Child 1			
Child 2			

136. Did you receive counselling from healthcare staff or other persons after the death? How many sessions did you have with healthcare staff, and/or parent support group, family and friends? How many weeks did you receive support?

	Healthcare staff	Parent support group, family, friends
Number of meetings (approximately):		
Number of sessions via telephone (approximately):		
Weeks of support (approximately):		

137. Do you feel that the follow -up you received after your child's death was adequate?

- ☐ No follow-up was provided
- ☐ Very good
- ☐ Good enough
- ☐ Should have been better
- ☐ Bad

138. Has the death made you more anxious during this pregnancy?

- ☐ No, not at all
- ☐ No, not very much
- ☐ Yes, to a fair extent
- ☐ Yes, very much

139. Do you feel that the health care staff at the antenatal clinics took into consideration this painful experience in their contact with you?

- ☐ Yes, very much
- ☐ Yes, to a fair extent
- ☐ No, not at all

Have you remembered to fill in the date on which you completed the questionnaire on page 1?

Thank you very much for your help!

Please return the completed questionnaire in the stamped addressed envelope provided.

Appendix 4

Questionnaire 4 - When your child is around 6 months old

58. Have you experienced any pain in your back or pelvis since you completed the previous questionnaire?

- ☐ No
- ☐ Yes

59. If yes, enter a cross to indicate where you have experienced pain, when and how much.

Where was the pain?	Last part of pregnancy: Some pain	Last part of pregnancy: Major pain	0-3 months after the birth: Some pain	0-3 months after the birth: Major pain	4-6 months after the birth: Some pain	4-6 months after the birth: Major pain
Small of the back	☐	☐	☐	☐	☐	☐
One of the pelvic/sacroiliac joints at the back	☐	☐	☐	☐	☐	☐
Both pelvic/sacroiliac joints at the back	☐	☐	☐	☐	☐	☐
Over the coccygeal bone	☐	☐	☐	☐	☐	☐
In the buttocks	☐	☐	☐	☐	☐	☐
Over the pubic bone	☐	☐	☐	☐	☐	☐
Groin	☐	☐	☐	☐	☐	☐
Other back pains	☐	☐	☐	☐	☐	☐

60. Currently, do you wake up at night because of pelvic pain?

- ☐ No, never
- ☐ Yes, but only sometimes
- ☐ Yes, often

61. Do you have such problems walking at the moment due to pelvic pain that you have to use a stick or crutches?

- ☐ No, never
- ☐ Yes, but not every day
- ☐ Yes, every day

62. Have you *ever* received treatment for pelvic pain?

- ☐ No
- ☐ Yes

63. If yes, enter a cross to indicate the type of treatment and when it was.

	Before this pregnancy	During this pregnancy	After this birth
Physiotherapy	☐	☐	☐
Chiropractic	☐	☐	☐
Medication	☐	☐	☐
Other, specify: _____	☐	☐	☐

64, How long was it before you resumed sexual intercourse after the birth?

☐☐ weeks

☐ Have not had sexual intercourse

65. Do you have any of the following problems at the moment; if so, how often and to what extent? *(Enter a cross in a box for each item.)*

Problem	How often do you have these problems? Never	1-4 times a month	1-6 times a week	Once a day	More than Once a day	How much at a time? Drops	Large amounts
Incontinence when coughing, sneezing or laughing	☐	☐	☐	☐	☐	☐	☐
Incontinence during physical activity (running/jumping)	☐	☐	☐	☐	☐	☐	☐
Incontinence with a strong need to urinate	☐	☐	☐	☐	☐	☐	☐
Problems retaining faeces	☐	☐	☐	☐	☐	☐	☐
Problems with flatulence	☐	☐	☐	☐	☐	☐	☐

66. How many times did you go for an ultrasound scan during your pregnancy?

☐☐ times

67. Was everything OK with the ultrasound scan(s)?

- ☐ Yes
- ☐ No

68. If no, what was the problem?

- ☐ The baby was not growing enough.
- ☐ Suspected malformation,describe: _____
- ☐ Other, specify: _____