
# Development of a diet quality and variety index for Norwegian children at 12 months of age

- *The relationship between diet quality and variety and age of introduction to solid foods*

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# Abstract

## Introduction

Sufficient dietary intake in early childhood is essential for an adequate supply of important nutrients for development and growth, and for establishing healthy dietary habits at an early stage of life. Recommendations regarding the appropriate age of introduction to solid foods have changed over the past 20 years, and both internationally and nationally, has this been a topic of much debate. The third nationally representative Spedkost survey was conducted in 2018/2019, providing updated information about the dietary habits of infants aged 6 and 12 months. Dietary intake in early childhood consists of a wide range of different foods and nutrients. Dietary indices offer the possibility to evaluate dietary quality by comparing guidelines and nutrient recommendations. Due to limited knowledge about diet quality and variety in Norwegian children, this master thesis aimed to develop a diet quality and variety index for Norwegian children at 12 months of age, and to explore possible differences in the diet quality and variety indexscore according to age of introduction to solid foods and selected parental and child characteristics.

## Methods

A sample of 3000 mother and infant pairs was invited to the Spedkost survey at 6 and 12 months of age. The study had a longitudinal design where the same infants were invited to participate in the study when they were 6 months and 12 months of age. Dietary data were collected through a semi-quantitative food frequency questionnaire at 6 and 12 months of age, and a diet quality and variety indexwas developed for children aged 12 months. The diet quality and variety indexwas mainly based on the Norwegian dietary guidelines for adults and infants. The difference in indexscore at 12 months of age between groups introduced to solid foods at 4.5 months of age or earlier and at 5.0 months of age or later was assessed. Differences in indexscores between different groups according to parental and child characteristics were also evaluated.

## Results

The mean diet quality and variety indexscore in the total sample was 7.6 (SD 0.8) out of 10.0 possible points. There was no difference in the diet quality and variety indexscore between the group of children introduced to solid foods at 4.5 months of age or earlier, and the group introduced to solid foods at 5.0 months of age or later (p=0.838). Multivariate analysis

showed that the diet quality and variety index score was significantly associated with birth weight, infant eating-related problems, parental education, maternal family situation, maternal work situation, and parity in the total sample.

## Conclusion

To our knowledge, a diet quality and variety index score made for children at 12 months of age has not previously been done in Norway. Such diet indices are a novel way of presenting a holistic view of the dietary intake and the dietary variety among children at this age. The mean diet quality and variety index was overall high, and no difference in the score was seen according to age of introduction to solid foods. Results indicated that the score was significantly associated with some parental and child background characteristics. Due to possible challenges in the diet with increasing age and that early food habits create a foundation for healthy food habits later in life, the average diet quality and variety index score could have the potential to be improved to prevent a falling diet quality and variety with increasing age. Further research on diet quality and variety in children is required to assess how the diet is affected by factors such as age of introduction to solid foods and parental and child characteristics.

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# Abbreviations

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| **WHO** | World Health Organization |
| **ESPGHAN** | European Society for Pediatric Gastroenterology, Hepatology and Nutrition |
| **FFQ** | Food Frequency Questionnaire |
| **USDA** | The United States Department of Agriculture |
| **YHEI** | Youth Healthy Eating Index |
| **RC-DQI** | Revised Children's Diet Quality Index |
| **EFSA** | European Food Safety Authority |

# 1 Introduction

Sufficient dietary intake in infancy and early childhood is essential for an adequate supply of essential nutrients for development and growth, and for establishing healthy food habits in the first years of life (1, 2). Infancy is a period of rapid growth and high nutritional requirements, in addition to substantial changes in the diet with new foods and feeding experiences (2). Taste preferences and food habits develop early in life (3). Thus introduction of solid foods to infants is essential for establishing healthy and diverse eating habits (4), which could contribute to the prevention of non-communicable diseases later in life (5). There is suggested that the first thousand days in a child's life represent a window of opportunity for establishing healthy dietary habits with a potential impact on dietary habits later in childhood and adulthood (6).

## 1.1 Development of the diet the first year of life

### 1.1.1 Breastfeeding

Breastmilk is a central component in the infant´s diet in the first year of life and the natural form of infant feeding from birth (7). An Infant is defined as being 0 to 12 months of age in this paper. Breastmilk is well established to have positive health effects, both short and long term for the infant and the mother (8, 9). Breastmilk is a complex bioactive fluid containing most of the essential nutrients (except vitamin D) the infant needs during the early period of life (10). Breastmilk is beneficial for the development of the brain and the immune system for the infant and contains several enzymes that aid in digestion and maturation of the infant's gastrointestinal tract system (10, 11). There is convincing evidence that breastfeeding has a protective effect on gastrointestinal tract infections in infancy, and that being breastfed reduces the risk of obesity and diabetes in childhood and later years (8, 12, 13). Studies show that breastfeeding may also have a protective effect on irritable bowel disease and coeliac disease later in life (12). Moreover, breastfeeding may have beneficial effects on the infant's IQ and developmental scores in later childhood (12, 13). A recent large cohort study found breastfeeding in infancy to be associated with higher IQ scores, educational level, and income at 30 years of age when adjusted for confounding factors such as parental education and monthly family income (14). Furthermore, research suggest that breastfeeding may have some

favorable maternal health effects, such as a reduced risk of type 2 diabetes, breast, and ovarian cancer in the mother, as well as aid in maintaining a healthy body weight post-pregnancy (9, 15).

### 1.1.2 Infant Formula

Infant formula is the only adequate substitute for breastmilk and is created to imitate the content of breastmilk (16). Infant formula is often based on either cow's milk or soy milk and supplemented with different nutrients and other compounds to best mimic the nutritional values in breastmilk and to attain health benefits for the infant (16, 17). There are also specialized formulas adjusted to fit dietary requirements for infants with special needs, such as amino acid-based formulas or rice-based formulas (16). However, unlike breastmilk, infant formula is lacking bioactive components that can aid in digestion and gut maturation for the infant (17).

### 1.1.3 Solid foods

Solid foods are defined as any other foods besides breastmilk, formula, liquids (juice, soft drinks, cow's milk, ect.), and liquids and syrups containing vitamins and minerals in this paper. At 6 months of age, exclusive breastfeeding is not sufficient to meet the infant`s increased requirements for energy and nutrients, and introduction to solid foods is necessary (11, 18, 19). Iron is an essential nutrient for humans, but especially important for infants because of their rapid growth of organs and expanding blood volume (20). Infants are often self-sufficient with iron from birth and up to 6 months of age because of the iron storage they gain from their mother's blood during pregnancy if the iron status in the mother is adequate (20, 21). Also, iron-enriched infant formula is a source of iron for infants using formula (16). At 6 months of age, the amount of iron in the breastmilk is insufficient to cover the infant`s need for iron if exclusively breastfed, even though the bioavailability of iron in breastmilk is high (20, 22, 23). Therefore, the introduction of solid foods after the age of 6 months is vital to prevent iron deficiency in infants, which can lead to poor neurodevelopment, growth retardation and impaired immune responses (19, 20).

In addition to the increased need for energy and nutrients, it is essential to start introducing solid foods to the infant to ensure the acceptance of new foods and flavors during an early stage of life (10). The sensory experiences associated with solid foods, such as flavors and textures, as well as the social context of complementary feeding, all contribute to cognitive, social, and emotional development for the infant (10). Recent studies have pointed towards the lack of dietary diversity in children's diets, with particular concerns about a low intake of

fruit and vegetables, and a high intake of processed foods, which has been linked to a higher risk of developing non-communicable diseases later in life (24). Picky eating and food neophobia in infants and children is a widely studied topic and of interest seen in the light of dietary quality and diversity in infants and children (24). Picky eating is defined as inadequate intakes or rejection of familiar or novel foods (4). Food neophobia is generally defined as the reluctance to eat or to try new foods and usually develop at 2 to 5 years of age (4). Food neophobia has, in a recent study, been associated with a lower intake of vegetables and a generally lower dietary diversity in Australian children aged 2 to 5 years (24). However, there are lacking studies on dietary diversity and adequacy in Norwegian infants and children (25).

## 1.2 Recommendations

### 1.2.1 Norwegian dietary guidelines for infants 0-12 months of age

The Norwegian dietary guidelines for infant feeding state that breastmilk is the best option for infant feeding the first months of life, and it is recommended to exclusively breastfeed for the first 4 months of life or longer (11). The guidelines further state that exclusive breastfeeding the first 6 months of life is safe if the infant grows adequately, and the mother is content with breastfeeding (18). The World Health Organization (WHO) defines exclusive breastfeeding as the infant receiving no other foods or drinks (besides drops or syrups containing vitamins and minerals) but breastmilk (26). If exclusive breastfeeding is insufficient to cover the infant's nutritional requirements, not possible, safe, or wanted, the only feeding option for infants the first 4 months of life is infant formula (18). Breastfeeding, in addition to infant formula, is recommended if possible because of the beneficial compounds in the breastmilk (18). Furthermore, the dietary guidelines recommend partial breastfeeding throughout the first year and longer, if possible, and wanted for the mother (18). WHO defines partial breastfeeding as the infant receiving other foods or breastmilk substitutes in addition to breastmilk (27).

The Norwegian dietary guidelines state that solid foods should not be introduced to the infant before 4 months of age (18). The most favorable time for the introduction to solid foods has been a topic of debate internationally and reflects the considerable variation in recommendations between countries (19). WHO defines complementary feeding as; "The process starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk" (28). If the infant shows signs of needing more energy than exclusive breastfeeding can provide, or shows an interest in new foods, the guidelines recommend to start carefully with solid foods between 4 and 6 months of age (18). If the infant is formula fed, it is also

recommended to start carefully introducing solid foods to the infant at 4 months of age due to lack of variation in flavor notes in the infant formula (18). Breastmilk or infant formula should still be the primary source of energy to cover the infant's nutritional requirements while introducing solid foods (18). The guidelines further state that solid foods should be introduced at 6 months of age at the latest (18).

The introduction to solid foods for the infant should include only small tastings of foods at the beginning (18). The quantity of foods should be increased carefully over days and weeks according to the infant's needs and signals with a varied selection of foods in a liquid or finely mashed consistency (18). Foods may be given as more lumpy textures as the infant gets older (18). The Norwegian dietary guidelines recommend choosing nutrient-rich foods, such as whole-grain products, iron-enriched porridge, fruits and vegetables, plant oils, lean meats, fish, and legumes for the infant (18). Furthermore, foods high in salt should be avoided when introducing solid foods to the infant because the infant´s kidneys are not fully developed (18). It is advised not to include cow's milk as a beverage or in porridge before 12 months of age because of the low content of iron in cow`s milk, making less room for other iron-rich foods (18). The infant can consume small amounts of cow's milk in cooking or as yogurt at the age of 10 months, but the serving sizes should be small (2-3 spoons of yogurt) (18). Foods high in fat and sugar may make less room for nutritious foods and should be limited (18). The Norwegian dietary guidelines recommend vitamin D supplements in the form of cod liver oil or vitamin D drops from 4 weeks of age to reach the daily requirement of 10 micrograms of vitamin D per day (18).

### 1.2.2 Dietary recommendations for children at 12 months of age

At 12 months of age, children can mostly eat the same foods as the rest of the family (29). Children are defined as being at 12 months of age or older in this paper. Similar to infants, children around 12 months of age have high requirements of micronutrients per kilogram of body weight, together with a small gastric capacity for foods (30). Therefore, meals offered to children should be small, but nutrient-dense, to ensure an adequate intake of macro- and micronutrients (30, 31). The Norwegian dietary guidelines for children at 12 months of age recommend introducing the child to a variety of different foods and food groups, as well as offer meals regularly throughout the day (29). The dietary guidelines for children aged 12 months are generally similar to the dietary guidelines for the adult population, which recommend having a varied selection of foods and a balanced diet with mostly plant-based foods, which are limited in foods high in fat, sugar, and salt (32). Children at 12 months of

age have about one-third of the energy intake that adults have (12). Simultaneously, the serving sizes in the dietary guidelines should also be smaller to fit children at 12 months of age.

*Fruits, berries, and vegetables*

The recommended amount of fruits and vegetables for children is five servings per day, similar to the adult recommendation, which is equivalent to 500 gram per day for adults (33). The Norwegian dietary guidelines do not include recommended amounts of fruit and vegetables for children at 12 months of age (32). However, the British nutrition foundation has determined that appropriate daily serving sizes for fruits and vegetables for children aged 12 months are about half of the adult recommended serving sizes (34).

*Fish*

Fish is recommended to consume about two to three times per week for the whole population, which is equivalent to 300-450 grams per week for adults (33). The Norwegian dietary guidelines do not include recommended amounts of fish in grams for children at 12 months of age. The American heart association has determined that serving sizes for fish for children at 12 months of age are 1 to 1½ ounces (28-42 grams) (35), which can compare to about half of an adult serving size. The United States Department of Agriculture (USDA) has determined that a serving size of fish is about ½ to 1 ounce (14-28 grams) for children at 12 months of age (36).

*Whole grains*

As for the adult Norwegian dietary guidelines, the dietary guidelines for children also recommend to include whole grains in the every-day diet (33, 37). The whole grain products should contain as big of a proportion of whole grains and fiber as possible, and four servings of whole grains per day are recommended for both children and adults (33, 37). Norwegian nutritional guidelines have not quantified recommended amounts of whole grains for children aged 12 months (11, 37). However, food authorities in the USA have stated that children aged 12-24 months should have six servings of whole grains per day, where one portion is about 1 ounce (28 grams) (38).

*Lean dairy products*

From 12 months of age, children can consume lean dairy products as a beverage in addition to cow's milk in foods, which can be consumed from 10 months of age (11). The Norwegian dietary guidelines state that 5 to 6 deciliters of cow`s milk per day, including yogurt and in

porridge, is an appropriate amount of dairy products to cover children's needs for vital nutrients such as calcium and iodine (37). The daily amount of cow`s milk should, however, not exceed 5 to 6 deciliters per day (37).

*Red and processed meat*

The Norwegian dietary guidelines do not include recommended amounts of red and processed meats for children at 12 months of age (32, 37), contrary to the dietary guidelines for adults, which have set an upper limit of 500 grams per week (33). However, the guidelines state that it is favorable to substitute meat and meat products for fish and vegetarian options a couple of days a week (37).

*Dietary fats*

The Norwegian dietary guidelines for both children and adults recommend to include moderate amounts of healthy fats with a low saturated fat content, such as oils and plant-based margarines in the diet (11, 33). Furthermore, it may be necessary to add small amounts of healthy dietary fats to the child's meals to provide suffient energy for the child (11).

Sugary foods and beverages

It is recommended to limit sugary foods and beverages in the diet for adults and children at 12 months of age, and water is the recommended choice for an every-day beverage (11, 33). Sugary foods and beverages are often energy-dense without providing a lot of other essential nutrients to the diet (37). As for infants under 12 months of age, children from 12 months of age also have lower intakes of foods and energy than adults have, and sugary foods and beverages tend to make less room for other nutritious foods children need (37). Sugary foods and beverages can also contribute to higher energy intake in the diet, which can lead to excess weight gain (37).

*Iron*

The Norwegian dietary guidelines for children state that products rich in iron, such as iron-fortified cereals, whole grain products, lean meats, and other iron-rich foods should be included in the diet (37). The recommendations are in line with recommendations from other Scandinavian countries, such as Sweden (29) and Denmark (39).

## 1.3 Sources of information about diet of Norwegian infants and children

### 1.3.1 The Spedkost surveys

In the last two decades, three extensive national dietary surveys among infants at 6 months of age, and children at 12 months of age have been conducted in Norway (40-45). The purpose of the Spedkost surveys has been to map the total diet for Norwegian infants and children and to assess the adherence to the dietary recommendations (46). The surveys aimed to increase knowledge about the dietary intake of infants and children in Norway (46). The surveys have also been conducted to create a better foundation when developing nutritional guidelines for this group (46). The first Spedkost survey was conducted in 1998 (40, 41), the second in 2006-07 (43, 44), and the latest Spedkost survey was conducted in 2018, where the report for the survey is not yet published (42, 45). All Spedkost surveys invited a nation-wide sample of 3000 mother and infant pairs, which was randomly selected to participate (40-45). The dietary data from all three Spedkost surveys were collected using a semi-quantitative food frequency questionnaire (FFQ) completed by the parents (40-45). The questionnaires used in the three surveys were similar in size and items included, with small changes to the included food items to represent new products available on the food market (43, 44). The questionnaires used in the surveys included questions about breastfeeding, age of introduction to solid foods, dietary intakes, and parental and child characteristics (40-45).

## 1.4 Diets in Norway during the first year of life – comparisons with other countries

### 1.4.1 Breastfeeding 2.0

Results from the Spedkost survey from 2006 showed that exclusive breastfeeding rates were overall high in Norwegian infants (43). The study observed that 82% of infants were exclusively breastfed the first 4 weeks of life, and 46% still exclusively breastfed at 4 months of age (43). However, at 6 months of age, only 6 % of Norwegian infants were exclusively breastfed (43). These exclusive breastfeeding rates are comparable with other Nordic countries where most infants are exclusively breastfed the first months of life (47). The proportion of initiation of exclusive breastfeeding the first week of life in Sweden was 83 % in 2012 and 86 % in Iceland in 2006 (47). At 4 months of age, the rates of exclusive breastfeeding were reported at 51% in Sweden (2012) and 63% in Iceland (2006) (47). In other European countries, exclusive breastfeeding rates have been reported lower than in Norway and the other Nordic countries. The proportion of exclusive breastfeeding in Italy in the first weeks of life was at 77 % in 2004, and at 4 months of age, the proportion of infants

who were exclusively breastfed was 31 % (48). In the United Kingdom, 69 % of the infants were exclusively breastfed at birth (49). The proportion who were exclusively breastfed decreased to 12 % at 4 months of age (2010) (49).

Results from the Spedkost survey conducted in 2006 showed that proportions of infants receiving any breastmilk (exclusive and partial breastfeeding) in Norway were overall high (43). Most infants were breastfed the first 4 weeks of life, and 80 % of the infants were still breastfed at 6 months of age (43). At 12 months of age, 46 % of Norwegian infants were still partially breastfed, according to the Spedkost survey from 2006 (44). In other Nordic countries, partial breastfeeding rates have been reported lower compared to Norway (47). At 6 months of age, 74 % of infants in Iceland were partially breastfed (2006), 58 % in Finland (2010), and 63 % in Sweden (2012) (47). In Finland, 34 % of the infants still received breastmilk at 12 months of age (12). In Iceland, the percentage was 27 %, while in Sweden, the proportion was 16 % (12). Partial breastfeeding rates have also been reported higher in Norway compared to other European countries, where the proportion of infants being partially breastfed at 6 months of age was 47 % in Italy in 2004 (48), and 30 % in the United Kingdom in 2010 (49).

### 1.4.2 Use of infant formula

Results from the Spedkost study from 2006 reported that 22% of Norwegian infants had been introduced to infant formula before the age of 3 months (43). At 6 months of age, 36 % of Norwegian infants used infant formula daily or weekly, and at 12 months of age, 43 % of the children had been introduced to infant formula (43, 44). The use of infant formula in the first year of life in Norway seems to be lower compared to other Nordic countries. According to a national birth cohort from Denmark from 1996-2003, 40 % of the infants used infant formula at 6 months of age (50). In Finland, 51 % used infant formula as their main milk at 6 months of age, according to a national birth cohort from 2009 (51). However, in Iceland, a survey conducted in 2011 showed the use of infant formula at 6 months of age to be at 20 % (52), which were lower compared to the proportion of infant formula use in Norwegian infants at 6 months of age.

### 1.4.3 Introduction to solid foods

The majority of infants in Norway are introduced to solid foods before the age of 6 months (43, 53). According to the Norwegian dietary survey Spedkost from 2006, 23 % of the infants were introduced to solid foods at 4 months of age, while only 4 % of the infants were introduced at 6 months of age or later (43). However, Norwegian infants have been observed

introduced to solid foods later compared to other European countries. In Italy, the proportion of infants introduced to solid foods at 4 months of age was 34 % (2004) (48), and in the UK, 51 % of the infants were introduced to solid foods at 4 months of age (2005) (54).

## 1.5 Dietary patterns

Dietary patterns describe an overall diet, such as foods, nutrients, and quantity of the foods consumed as a whole (55). USDA defines dietary patterns as "the quantities, proportions, variety, or combination of different foods and drinks in diets, and the frequency in which they are habitually consumed" (56). The use of dietary patterns as a method is an alternative approach to measure diet quality in humans instead of assessing individual nutrients or foods (55).

As foods are consumed in combinations, and not as single foods or nutrients, dietary patterns are a more holistic way of exploring the relationship between diet and health (57, 58). Furthermore, using dietary patterns in the research of nutrition and health can avoid challenges with assessing relationships between dietary intake and outcomes, for example, that higher intakes of certain foods can be associated with lower intakes of other foods. This confounding factor can result in a misleading picture of the role of certain foods or nutrients concerning health and disease (59).

Dietary patterns can be defined as theoretically or empirically methods, or by using a combination of these two methods (57, 59, 60). In theoretically driven dietary patterns, nutrients and foods are grouped by researches into diet quality indices or scores according to present nutritional knowledge, such as dietary guidelines and recommendations (57, 59). Empirically driven methods reduce nutrients and foods into a smaller number of variables through data-driven and statistical methods such as principal component analysis or cluster analysis, and the methods create dietary patterns based on the existing data. (57, 59, 60). The theoretically-driven approach and the data-driven approach explore different angles of dietary intakes and are both useful for different needs in research on dietary patterns (60).

### 1.5.1 Dietary indices

An advantage of theoretically-driven methods is the objective character of the method by using general dietary guidelines to develop the indices or scores (59). Such indices are also generally easy to understand for the overall population (59). However, as the indices or scores are based on dietary guidelines to determine an index or a score, the limitation of the index or

the score could be if the dietary guidelines are not fully developed or adequate (28). Also, the components included in a dietary index or score depends upon the knowledge of the developer and can make the index or the score more subjective than desired (28).

Dietary indices, or scores, give an overall rating of an individual's nutritional intake compared to the dietary guidelines for a specific population (58). Dietary indices are usually divided into three categories, nutrient-based indices, food group based indices, or a combination of these two (58, 61), and many of the well-known dietary indices are in the third category (62-64). Combined indices often measure the variation in the diet, where the index score depend on the number of different foods or food groups consumed (62). The indices often also include a measure of the adequacy of the nutrient- or food intake in reference to recommendations, a measure of foods to consume in moderations, and a measure of the overall balance of macronutrients (61).

### 1.5.2 Dietary indices among infants and children

The use of dietary patterns in research in pediatric populations is increasing (58). However, current information about dietary indices in infants and children is limited (58). Several diet quality indices for children and adolescents have emerged, such as the new Youth Healthy Eating Index (YHEI) (65), and the Revised Children's Diet Quality Index (RC-DQI) (66). The two dietary indices were created for children 9 to 14 years of age and 2 to 5 years of age, respectively. Both indices were created in the USA and were made to fit populations in developed countries (65, 66). The RC-DQI was based on the national dietary intake recommendations and consisted of 13 nutrient and food-based components. The maximum total score was 90 points, and a higher score reflected a higher diet quality (66). The YHEI also consisted of 13 nutrient and food based-components and was a revised version of the adult dietary index, the Healthy Eating Index (65). The basis for the index was the USDA Food Guide Pyramid recommendations, and the maximum score was 100 points, where a higher score reflected a higher diet quality (65). These two diet quality indices aimed to explore the relationship between diet quality in childhood, and sociodemographic factors and child outcomes.

Creating a diet quality and variety index for infants and children can be challenging. For instance, nutritional requirements and appropriate feeding practices often vary by age (67). Also, in many countries, dietary recommendations for infants and children are lacking in scientific evidence, which makes it challenging to have specific dietary recommendations for

this group. For that reason, it can be challenging to include the right components in a diet quality index for infants and children (68).

Weight status is the most commonly measured health-related outcome in studies with diet quality indices for infants and children (58). The relationship between weight and diet quality in infants and children is generally inconsistent. However, studies have observed associations between a lower diet quality and variety index score and a higher weight or BMI in children (65, 66, 68-70). Infant and child characteristics such as picky eating, female gender, and shorter duration of breastfeeding are also suggested to be associated with lower diet quality and variety index scores (69, 71, 72). Some studies have observed associations between higher diet quality scores among infants and children and maternal factors, such as a higher level of maternal education, higher maternal age, lower maternal BMI before pregnancy, and no smoking during pregnancy (69, 72-74).

There are few studies on the relationship between diet quality index scores and the age of introduction to solid foods (71, 72). Later introduction (at 6 months of age) compared to earlier introduction to solid foods (before 4 months of age) has been positively associated with diet quality index scores in a study among Dutch children (72). Contrarily, a study among Australian children found no association between the age of introduction to solid foods and diet quality and variety index score (71).

As mentioned, a few diet quality indices that include children at 12 months of age have been developed in the last two decades (67-69, 72, 75, 76). However, many of the indices are created for use in developing countries, where the structure and components included may differ from components in indices for populations in developed countries. Furthermore, none of these are developed specifically for children at 12 months of age, where they investigate associations between age of introduction to solid foods and diet quality and variety index scores. Besides, none of these indices target Norwegian dietary guidelines and practices. Due to the lack of research on the relationship between age of introduction to solid foods and diet quality in a Norwegian setting, this master thesis will aim to develop a diet quality and variety index among Norwegian children at 12 months of age. Further, the relationship between age of introduction to solid foods and diet quality and variety index score will be explored, using data from the Spedkost 3 survey conducted in 2018.

# 2 Aims

The primary aim of this master thesis is to develop a diet quality and variety index among Norwegian children at 12 months of age. Further, the relationship between age of introduction to solid foods and diet quality and variety index score will be explored, using data from the Spedkost 3 survey conducted in 2018.

## 2.1 Research questions

1. What is the overall diet quality and variety index score among children at 12 months of age participating in the Spedkost 3 survey?

2. Does the diet quality and variety index score at 12 months of age differ between children introduced to solid foods at 4.5 months of age or earlier and at 5.0 months of age or later?

3. Does the diet quality and variety index score differ according to selected parental and child characteristics?

# 3 Methods

## 3.1 Sample

A nationwide sample of 3000 mothers and infants from the Norwegian national registry was drawn by the IT company Evry after approval from the Norwegian Tax Administration. Eligible participants were mothers born in Scandinavia, and the mother and the infant had to be residents of Norway. The sample of mothers and infants included infants born from March 1st, 2018, and until the sample size reached 3000 pairs of mothers and infants. The last inclusion date was March 29th, 2018. Infants of mothers born outside of Scandinavia were excluded from the survey because more targeted surveys were regarded as necessary to describe the diet in these groups. Only one infant per mother was included in the drawn sample. There was assumed that infants born in the period the sample was drawn had comparable diets to infants born at other times of the year. Invitees in the Spedkost 6 months survey were invited to participate in the Spedkost 12 months survey if they had not declined to participate in the survey.

The Spedkost surveys were approved by the Norwegian Center for Research Data (Appendix 1). The parents gave consent to participate in the surveys.

## 3.2 Design

The study had a longitudinal design as the same infants were invited to participate in the Spedkost 6 months survey and the Spedkost 12 months survey. The Spedkost 6 months data were collected from September to November 2018. The Spedkost 12 months data were collected from March to April 2019. The invitation letter included a link to the web-based questionnaire and was sent by regular mail to the mothers when the infants were around 6 months of age and 12 months of age. The parents or other caregivers were asked to complete the questionnaire as close to the infants 6 months and 12 months birthday. Approximately one week after receiving the invitations, all non-responders were contacted by telephone by a project assistant to clarify questions about the study. Invited participants who had declined to participate in the survey did not receive a call. Three weeks after receiving the invitation, non-responders received a written reminder including a paper-based version of the questionnaire.

The parents completed the questionnaire with details about the infant's length and weight at 6 months of age and 12 months of age, as well as the infant's length and weight at birth. If the participants returned the questionnaire without details about the infant's weight and length at both 6 months of age and 12 months of age, they received a reminder with a link to a web-based questionnaire where they could fill out the missing information.

All the participants who returned a completed questionnaire from the Spedkost 6 months survey received a gift card of 500 NOK. The participants also received a gift card of 500 NOK if they returned the completed questionnaire from the Spedkost 12 months survey.

## 3.3 Data collection and handling

### 3.3.1 Dietary data

The questionnaires used in the Spedkost 6 months survey and the Spedkost 12 months survey had both a web-based version and a paper-based version. The questionnaires from the two surveys asked about the infant's diet at 6 months of age and at 12 months of age, and from birth up to 6 months and 12 months of age. In both surveys, the caregivers should try to give details about their child`s regular diet having the past 14 days in mind.

Results from the web-based questionnaire were opened in Excel and transferred into SPSS. The paper-based version of the questionnaire was scanned in Teleform (version 8.0) and opened directly in SPSS Statistics (Version 25.0).

*Spedkost 6 months survey questionnaire*

The questionnaire in the Spedkost 6 months survey was based on the questionnaire used in the Spedkost 6 months survey from 2006. The questionnaire was similar to the questionnaire from 2006, to facilitate comparisons of results between studies. However, small changes were made to the questionnaire to reflect newly available products on the food market. The questionnaire consisted of 31 to 122 items dependent on previous markings in the questionnaire (for example, participants who had marked that the infant had been introduced to solid foods got further questions about different types of solid foods). The completion time of the questionnaire was about 10-20 minutes. The questionnaire also included a written consent. The questionnaire included background questions about the infant and the parents, and questions about the infant's diet (including breastfeeding).

The questions about breastfeeding included were if the infant received breastmilk, how often the infant received breastmilk, the age of the infant at the cessation of breastfeeding (if not

breastfed), and reasons for why the mother did not breastfeed. The questionnaire included questions about solid foods, which were defined as any other foods besides water, milk, juice, other beverages, and dietary supplements. The questionnaire included questions about the age of introduction to infant formula, other milk, solid foods, water, soft drinks, juice, etc. For every food, the parents reported the frequency of the food consumed. The frequencies ranged from "never/less than every week" up to "5 or more times per day". Quantities, in addition to frequencies, were reported for infant formula, different types of beverages (milk, water, and juice), porridge, and supplements. Portion sizes for formula, beverages, and porridge were presented in a booklet and contained four to six pictures of different portion sizes. Questions about quantities of breastmilk consumed and other foods were not included in the questionnaire. Hence, the data from the questionnaire could not estimate the total energy and nutrient intake for breastfed infants at 6 months of age.

*Spedkost 12 months survey questionnaire*

In the Spedkost 12 months survey, the questionnaire consisted of about 200 food-related items, with a completion time for about 40 minutes (Appendix2). The questionnaire included questions about the child, such as gender, and weight and length at birth. The questionnaire included questions about diet and breastfeeding, age of introduction to solid foods and meal patterns. Parental background questions, such as maternal age, parity, parental education, maternal work situation before, and after the birth of the child, maternal family situation, and maternal tobacco habits were also included in the questionnaire (Appendix2).

The questions about breastfeeding included if the child still received breastmilk and the frequency of breastfeeding if the infants was still breastfed. The questionnaire did not include questions about quantities of breastmilk consumed. For most of the foods in the questionnaire, frequencies and quantities of the foods consumed were asked for. The frequencies of foods consumed ranged from "never/less than each month" up to "5 or more times per day". Pictures of foods in different portions sizes or household measures such as teaspoons and deciliters were used to estimate the serving size of different foods consumed. In the web-based version of the questionnaire, the pictures appeared when a food item was reported used. For the paper-based questionnaire, parents received a picture booklet along with the questionnaire (Appendix3). Nutrient and food intakes for the non-breastfed infants were computed in the dietary calculation program KBS. The KBS database (version 7.3) is based on the Norwegian Food Composition Table (77) and is supplemented with additional food items from reliable sources.

### 3.3.2 Control of completed questionnaires

*Control of completed web-based questionnaires*

The identification number first in the questionnaire was controlled to see if it matched the number filled in at the end of the questionnaire. If the numbers were not identical, the child`s gender and the mother`s age was collected from the national register from the identification numbers first in the questionnaire. If the identification of the child and the mother was still not possible, the mother received a call to confirm that the questionnaire belonged to her. The child`s gender and the mother`s age was matched with information from the national register for both the web-based and the paper-based version. If the information did not match the national register, the mother received a call to confirm the correct age and gender of the child.

*Correction of completed paper-based questionnaires*

Unanswered food-related questions were corrected to "never or rarely" whenever that was an alternative. If only the quantity of the foods consumed was marked, but not frequency, the frequency of the foods consumed was corrected to "never or rarely". If only the frequency of the foods consumed was marked, but not quantity, it was corrected to the lowest quantity. More than one mark for quantity or frequency was corrected to the lowest alternative if the marks were in neighboring categories. If there was an open alternative between the two marks, the marks were corrected to the open mark. If there were more than two alternatives between the two marks, the middle or the lowest of the middle categories was marked. More than one mark for age at cessation of breastfeeding was corrected to the highest alternative when the marks were next to each other and to the unmarked alternative in the middle if it was one alternative in-between the marks. If there were two open alternatives between the marks, the question was counted as unanswered. More than one mark for parental education was corrected to the highest alternative. More than one mark for the age of introduction to a type of food was corrected to the lowest alternative when the marks were next to each other and to the unmarked alternative in the middle if there was one alternative in-between the marks. If there were two open alternatives between the marks, the mark was corrected to unanswered.

## 3.4 Diet quality and variety index score

In this master thesis, the aim was to develop a diet quality and variety index for Norwegian children at 12 months of age (Table 1). The diet quality and variety index was based on the Norwegian dietary guidelines (32), and the Norwegian guidelines for infant nutrition (18).

The Nordic dietary recommendations for children at 1 to 2 years of age were used for the estimation of adequate serving sizes for children at 12 months of age (11, 12, 18). Feeding guidelines from WHO (78), the Women, Infants, and Children program from the United States Department of Agriculture (WIC) (79), The American Heart Association (35), The European Food Safety Authority (EFSA) (80), British Nutrition Foundation (34), USDA (36) and other diet quality indices (65, 72) were also utilized to determine appropriate serving sizes for children at 12 months of age. The following ten components were included in the index score: "breastfeeding", "fruit", "vegetables", "fish", "sugary foods and beverages", "red and processed meat", "dietary fats", "vitamin D", "whole grains", and "lean dairy products" (Table 1).

A higher score of the diet quality and variety index represented an overall higher dietary quality and variety in the group, as having higher index scores reflected the use of multiple food groups in the diet and adherence to the national dietary guidelines (Table 1). The diet quality and variety index score for all children in the study came from data from the questionnaire from the Spedkost 12 months survey (Appendix 2). All reported foods consumed were listed as total intakes in grams per day in individual food variables in SPSS. The daily intakes of all foods and data on breastfeeding were added into one of the ten food components in the diet quality and variety index dependent on where they belonged to (ex. the daily intake of apple was added into the "fruit" component). The components were coded in SPSS Statistics (Version 25.0) to give the infants the correct score based on the adherence to the recommendations in the diet quality and variety index. The component scores for each individual were summed into a total score that ranged from 0.0 to 10.0 points. The diet quality and variety index score could not exceed 10.0 points. For all ten components, scores ranged from 0.0 to 1.0 point, dependent on the adherence to the cut-offs for serving sizes for the components (Table 1).

The single component "breastfeeding" had a maximum score of 1.0 points, and this score was reached if the child was breastfed for 12 months or longer. Breastfeeding duration under six months gave a score of 0.0 points, and for each month of breastfeeding after six months, the score increased with 0.17 points (Table 1).

For "fruit" and "vegetables" the maximum score of 1.0 point was given for an intake of fruit and vegetables at or above 125 grams per day. A maximum of 50 grams of processed fruit (for example, store-bought smoothies) could be included in the 125 grams per day to reach a score of 1.0 point for the component "fruit" (for example, 75 gr/125 gr of fruit = 0.6 points)

(Table 1). The same concept of scoring was done for the components "fish" and "whole grains" (Table 1).

For "red and processed meat" and "sugary foods and beverages", a lower intake gave a higher score. The maximum score was 1.0 point if the intake of red and processed meat was at or below 35 grams per day. For an intake over 35 grams per day the score decreased. The score decreased with 0.15 points for every 7 grams approximately consumed over 35 grams until an upper limit of 70 grams, which gave a score of 0.0 points. A maximum score of 1.0 point was given if the intake of sugary foods and beverages was at or below 14 grams per day. An intakes over 14 grams per day gave lower scores, where the score decreased with 0.2 points for every 3.5 grams, approximately, increase of sugary foods or beverages consumed over 14 grams until an upper limit of 28 grams. An intake at 28 grams or more of sugary foods and beverages per day gave a score of 0.0 points (Table 1).

The single component "dietary fats" reached a higher score if the kinds of margarines and oils with a lower saturated fat content was marked as used in the questionnaire (Table 1). This component consisted originally of the two components "fats in cooking" and "fats as spreads". For "fats in cooking", the participants could mark one or more types of butter, oils, and types of margarines in the questionnaire. The score for the component "fats in cooking" was made by adding the scores, based on the saturated fat content, of the butters, oils and kinds of margarines. The mean score of the different kinds of fat chosen was calculated (for example, if sunflower oil and butter was marked, the score was made by adding 1.0 points for the oil and 0.0 for the butter, and dividing the total by 2 = 0.5 points) (Table 1). For the component "fats as spreads", only one butter or margarine could be marked in the questionnaire, and the score was given based on the saturated fat content of the marked butter or margarine (For example butter gave a score of 0.0 points) (Table 1). The two scores from the components "fats in cooking" and "fats as spreads" were merged into one component "dietary fats", and the average score of these two components resulted in the score for the single component "dietary fats" (Table 1).

For "vitamin D", the maximum score was 1.0 point if the intake were at or above 10 µg per day. The score decreased with and intake under 10 µg per day, based on the percentage of 10 µg consumed (ex. an intake of 4 µg per day = 4/10 µg = 0.4 points) (Table 1). The children received a score of 1.0 point until the intakes of vitamin D exceeded the upper cut-off limit of 35 µg per day, which then gave a score of 0.0 points.

For "lean dairy products", an intake within a recommended range of 500 to 600 grams of lean dairy products per day gave a maximum score of 1.0 point, while an intake below 500 grams per day gave a lower score based on the quantity consumed under 500 grams (Table 1). An intake above 600 grams gave a lower score based on the quantity consumed over 600 grams (ex. if an infant had an intake of lean dairy products of 300 grams per day, the score was 300/500 grams = 0,6 points) (Table 1).

In mixed dishes including more than one food group (for example. lasagna where there are both red meat and vegetables in the dish), the different food groups from the dish where included in different components. For example, the meat intake from the lasagna was included in the meat component, while the vegetables were included in the vegetable component, etc. For fish products (ex. fish cakes) only the amount of fish in the products was included in the fish component, not the other ingredients from the fish product. For red and processed meat, all ingredients in the meat products were included in the component. Appendix 4 presents the different foods included in the components.

**Table 1.** Diet quality and variety index for children at 12 months of age. Components included and the scoring of the components.

| Components | Scoring criteria | Score |
|---|---|---|
| **Breastfeeding (months)** | ≥ 12 months | 1.0 |
| | 11 months | 0.85 |
| | 10 months | 0.68 |
| | 9 months | 0.51 |
| | 8 months | 0.34 |
| | 7 months | 0.17 |
| | ≤ 6 months | 0.0 |
| **Fruits (gr/day)** | ≥ 125 grams per day, ≤ 50 grams from industrialized fruit and/or fruit juice. | 1.0 |
| | Amount of fruit consumed/125 grams | 1.0-0.0 |
| | 0 grams per day | 0.0 |
| **Vegetables (gr/day)** | ≥ 125 grams per day | 1.0 |
| | Amount of vegetables consumed/125 grams | 1.0-0 |
| | 0 grams per day | 0.0 |
| **Fish (gr/day)** | ≥ 21 grams per day | 1.0 |
| | Amount of fish consumed/21 grams | 1.0-0.0 |
| | 0 grams per day | 0.0 |

| | | |
|---|---|---|
| **Sugary foods and beverages (gr/day)** | ≤ 14 grams per day | 1.0 |
| | 14.1-17.6 grams per day | 0.80 |
| | 17.7-21.0 grams per day | 0.60 |
| | 21.1-24.6 grams per day | 0.40 |
| | 24.7-27.9 grams per day | 0.20 |
| | ≥ 28.0 grams per day | 0.0 |
| **Red and processed meat (gr/day)** | ≤ 35 grams per day | 1.0 |
| | 35.1-41.9 grams per day | 0.85 |
| | 42-48.9 grams per day | 0.70 |
| | 49-55.9 grams per day | 0.55 |
| | 56-62.9 grams per day | 0.40 |
| | 63-69.9 grams per day | 0.25 |
| | ≥ 70 grams per day | 0.0 |
| **Dietary fats** | | |
| = | | |
| Fats in cooking | Marked "do not use" "Soft flora/Vita", "liquid margarine", "rapeseed oil", "olive oil" or "other oils" | 1.0 |
| | Marked of "Bremykt", "Mélange", "margarine from store brands", "Olivero" or "other margarine" | 0.50 |
| | Marked "butter" | 0.0 |
| | A score is given for each butter, oils or margarine marked, and further a mean score for all fats marked. | 1.0-0.0 |
| + | | |
| Fats as spreads | Marked «do not use», «Brelett», «Soft flora, vita», «light margarine», «margarin from store brands» | 1.0 |
| | Marked «Bremykt», «Melange», «Olivero», «other margarine» | 0.50 |
| | Marked «butter» | 0.0 |
| **/2 =** | | 1-0 |
| **Vitamin D-intake (ug/day)** | ≥ 10 ug per day | 1.0 |
| | Amount of vitamin D consumed/10 ug | 1.0-0.0 |
| | 0 ug per day, or > 35 ug per day | 0.0 |
| **Whole grains (gr/day)** | ≥ 30 grams per day | 1.0 |
| | The amount of whole grains consumed/30 grams | 1.0-0.0 |
| | 0 grams per day | 0.0 |
| **Lean dairy products (gr/day)** | 500-600 grams per day | 1.0 |
| | Ratio between 500-600 grams and amount consumed | 1.0-0.0 |

| | |
|---|---|
| For intakes below 500 grams per day, the amount of lean dairy products consumed divided by 500 grams determines the score. For intakes above 600 grams per day, 600 gram divided by the amount of lean dairy products consumed determines the score. | |
| 0 grams per day | 0.0 |

## 3.5 Data management and analysis

### 3.5.1 Variables and measures

The primary outcome measure, diet quality and variety index score, was a numeric variable. The variable age of introduction to solid foods (initially 16 response categories ranging from 1 week of age to 6 months of age) was divided into the two following categories $\leq 4.5$ months of age and $\geq 5.0$ months of age. The data on age of introduction to solid foods were collected from the Spedkost 6 months questionnaire. The missing data on age of introduction to solid foods were collected from the Spedkost 12 months questionnaire.

Birth weight (reported as a continuous variable) was categorized into the three categories under 2500 grams, 2500 to 4500 grams, and over 4500 grams. The variable perception of child eating-related problems was defined as having marked the question "Does the child have any problems with eating?" with yes. The different eating-related problems in the questionnaire were a small appetite, liking of a small selection of foods, troubles with weaning on the family`s diet, allergies/intolerances to foods, and other reasons. The variable was categorized into the two categories, yes and no. Maternal age (reported as a continuous variable) was recoded into the three categories $\leq 24$ years, 25 to 34 years, and $\geq 35$ years. Maternal age was the age of the mother when the child was 12 months of age. Parental level of education had eight response categories and was categorized into lower education (no college or university education) and higher education (college or university education). Maternal family situation (originally four response categories) was recoded into the two categories married/cohabitant and not married/not cohabitant. Parity (originally four response categories) was recoded into the three categories one child, two children, and three or more children. Maternal work situation after the child`s birth had ten response categories and was recoded into the two categories paid work and not paid work. Paid work included working full time or part-time, parental leave, sick leave, or being a student. Not paid work included the categories disabled to work, work assessment allowance, homemaker, unemployed, and others. The variable maternal tobacco habits was combined from the two variables maternal smoking habits (originally four response categories), and maternal snuff habits (originally

three response categories). The two variables were recoded into the two categories use of tobacco and no use of tobacco (included smoking or use of snuff daily or occasionally).

### 3.5.2 Statistical analyses

In the present master thesis, a total of 1829 child and mother pairs were included in the analyses (children and mothers who participated in both the Spedkost 6 months survey, and the Spedkost 12 months survey). A total of seven children were excluded from the analyses, six due to extremely high reported energy intakes, and one due to a very low reported energy intake. All analyses were performed in SPSS (version 25.0).

Details about the study population are presented as frequencies within groups of parental and child characteristics (Table 2). The total diet quality and variety index score was computed for each child, as well as scores for the single components (Table 3). The difference in total diet quality and variety index score and differences in single component scores between the groups of age of introduction to solid foods ($\leq$ 4.5 months of age and $\geq$ 5.0 months of age) were assessed with independent samples t-test (Table 5 and 6). The differences between the diet quality and variety index score and child and parent characteristics were assessed by linear regression analysis (Table 7). The multivariate regression analysis was adjusted for gender, perception of infant related eating problems, parental education, maternal work situation after the child`s birth, birth weight, and parity. The differences in single component scores according to selected parental and child characteristics were tested with univariate linear regression analysis (Table 8). The included parental and child characteristics in table 8 were those which were significantly different in the multivariate regression analysis on total diet quality and variety index score in table 7. All p-values were two-sided. The level of significance was set to $p < 0.05$ in the majority of the analyses. The level of significance was set to $< 0.01$ in the analysis for scores for the single components and parent and child characteristics due to multiple testing (Table 8).

## 3.6 Student responsibilities

Apart from writing the thesis, the main task for the student was to develop the diet quality and variety index for infants at 12 months of age. The student performed the handling of the data, the statistical analyses, as well as quality checking of the 6 month and the 12 month data.

# 4 Results

## 4.1 Parent and infant characteristics

Of the 3000 invited mothers and children in the survey, the participation rate was 73 % in the Spedkost 6 months survey, and 66 % in the Spedkost 12 months survey. A total of 1829 children were included in the present analyses. Parental and child characteristics when the children were 12 months of age are presented in table 2. There was a higher proportion of male children in the sample (55%) compared to national statistics (52%) (Table 2). Most children had a birth weight categorized as normal birth weight (2500-4500 g). The mean birth weight of the children in the sample was comparable to the national average for all children born in 2018 (Table 2). One-fourth of the parents reported child eating-related problems, which included reduced appetite, allergy or intolerances to specific foods, liking of a small selection of foods, troubles weaning on family foods, and others. The majority of the children were born after 37 completed weeks of gestation (88%), and the proportion was comparable to national statistics (Table 2). Mean maternal age when the child was 12 months of age was 31.7 years, which was comparable to national statistics. There were fewer young mothers (≤ 24 years) in this sample compared to national statistics. Most mothers had a high level of education (74%), were married or cohabitant (97%), had paid work after the birth of the child (91 %), and did not use tobacco daily or occasionally (86%) (Table 2). About half of the fathers in the sample had a higher level of education (Table 2).There was a higher proportion of parents with a high level of education in this sample compared to national statistics. The proportion of married or cohabitant mothers and mothers not using tobacco were higher compared to the national statistics. Forty-five percent of the mothers were primiparous, which was comparable to the national statistics (Table 2).

**Table 2.** Parental and child characteristics reported when the child was at 12 months of age.

| | **Spedkost 2019[1] (n=1829)** | **National statistics (2018)** |
|---|---|---|
| | n (%) | % |
| **Child** | | |
| Gender | | |
| Female | 830 (45) | 48 |
| Male | 999 (55) | 52 |
| Birth weight (mean, g (SD)) | *3544 g (*SD 557*)* | *3490 g* |
| < 2500 g | 76 (4) | 5 |

| | | |
|---|---|---|
| 2500-4500 g | 1681 (93) | 92 |
| > 4500 g | 59 (3) | 3 |
| Weight at 12 months (mean, g (SD)) | *10015 (*SD 1188*)* | |
| < 9230 g | 423 (24) | |
| 9230-10700 g | 841 (50) | |
| > 10700 g | 432 (26) | |
| Gestational age | | |
| < 38 weeks | 218 (12) | 11 |
| ≥ 38 weeks | 1606 (88) | 89 |
| Foods avoided in fear of allergy/intolerances | | |
| No | 1712 (94) | |
| Yes | 117 (4) | |
| Perception of eating-related problems[2] | | |
| No | 1376 (75) | |
| Yes | 453 (25) | |
| **Parent** | | |
| Maternal age (mean, years (SD))[3] | *31.7 (*SD 4.6*)* | *32.1* |
| ≤ 24 years | 80 (4) | 11 |
| 25–34 years | 1262 (69) | 69 |
| ≥ 35 years | 487 (27) | 20 |
| Maternal education[4] | | |
| Lower education | 475 (26) | 57 |
| Higher education | 1354 (74) | 43 |
| Paternal education[4] | | |
| Lower education | 870 (48) | 66 |
| Higher education | 958 (52) | 34 |
| Maternal work situation | | |
| Paid work[5] | 1670 (91) | |
| Not paid work[6] | 159 (9) | |
| Maternal family status | | |
| Married/cohabitant | 1770 (97) | 88 |
| Not married/cohabitant | 58 (3) | 12 |
| Parity | | |
| 1 child | 830 (45) | 43 |
| 2 children | 722 (40) | 38 |
| ≥ 3 children | 277 (15) | 19 |
| Maternal tobacco habits [7] | | |
| No use of tobacco | 1578 (86) | 83 |
| Use of tobacco | 250 (14) | 17 |

Missing values ranged from 0-28. [1]The reported data were collected from the questionnaire in the Spedkost 12 months survey. [2]Perception of eating-related problems included reduced appetite, liking of a small selection of foods, troubles weaning on family foods, food allergy/intolerances, and others. [3]Maternal age was the mother's age when the child was 12 months of age. National statistics for maternal age is for maternal age at the birth of the child plus one year to reflect maternal age at 12 months of age. [4]The category high parental education included education from college or university. [4]National statistics for parental education were for all adults from 20 years of age up to 49 years of age. [5]Maternal work situation after the birth of the child. [5]Paid work included having part-time work, full-time work, maternity leave, sick leave, and being a student [6]Not paid work included being unemployed, disabled to work, homemaker, work-assessment allowance, and the category "others". [7]Maternal tobacco habits included those who smoked or used snuff daily or occasionally when the child was at 12 months of age. [7]National statistics for tobacco habits included all women who smoked or used snuff daily or occasionally from 16 to 54 years of age. National statistics were obtained from Statistics Norway (81-89) and the Medical Birth Registry of Norway (90).

## 4.2 Diet quality and variety index score

The average diet quality and variety index score for the children was 7.6 points (SD 0.8) out of a total of 10.0 points (Table 3). The highest achieved diet quality and variety index score was 9.8 points, while the lowest achieved score was 4.1 points (Table 3). The highest mean score for the single components was observed for "red and processed meat" (0.99 points), while the lowest observed mean component score was observed for "lean dairy products" (0.4 points) (Table 3). Several of the children reached the maximum achieved score of 1.0 points for the single components. Some of the children also got the minimum score of the single components of 0.0 points, except for the single component "red and processed meat," where the minimum achieved score was 0.5 points among the children (Table 3).

**Table 3.** Minimum, maximum and mean (SD) scores for the total diet quality and variety index and for the single component scores.

| | **Scores n=1829** | | |
|---|---|---|---|
| | Min. | Mean (SD) | Max. |
| **Total diet quality and variety index score** | 4.10 | 7.62 (0.84) | 9.84 |
| Components | | | |
| Red and processed meat | 0.53 | 0.99 (0.04) | 1.0 |
| Whole grains | 0.0 | 0.98 (0.11) | 1.0 |
| Vitamin D | 0.0 | 0.89 (0.22) | 1.0 |
| Sugary foods and beverages | 0.0 | 0.92 (0.21) | 1.0 |
| Fruit | 0.0 | 0.83 (0.22) | 1.0 |
| Dietary fats | 0.0 | 0.73 (0.23) | 1.0 |
| Vegetables | 0.0 | 0.65 (0.29) | 1.0 |
| Breastfeeding | 0.0 | 0.65 (0.42) | 1.0 |
| Fish | 0.0 | 0.56 (0.32) | 1.0 |
| Lean dairy products | 0.0 | 0.41 (0.35) | 1.0 |

## 4.3 Age of introduction to solid foods and diet quality and variety index score

Table 4 presents the number of children, with percentages, introduced to solid foods at different ages. The median age of introduction to solid foods in the sample was at 4.0 months of age, where 43 % reported introduction to solid foods at this age. Few children were introduced to solid foods before 4.0 months of age (6 %). More children were introduced to solid foods at 4.5 months of age or earlier (67 %), compared to at 5.0 months of age or later (33 %).

**Table 4.** The number of children (with percentages) introduced to solid foods at different ages.

| Age of introduction to solid foods[1] | n=1829 |
|---|---|
| | n (%) |
| ≤ 1 month | 4 (0.2) |
| 1.5 months | 1 (0.1) |
| 2 months | 0 (0) |
| 2.5 months | 3 (0.2) |
| 3 months | 19 (1) |
| 3.5 months | 76 (4.2) |
| 4 months | 792 (43.3) |
| 4.5 months | 337 (18.4) |
| 5 months | 281 (15.4) |
| 5.5 months | 197 (11) |
| ≥ 6 months | 119 (6.5) |

[1]The data on age of introduction to solid foods are collected from the Spedkost 6 months survey. Missing data on age of introduction to solid foods in the 6 months survey, are collected from the 12 months survey.

Table 5 presents the diet quality and variety index score among children introduced to solid foods at 4.5 months of age or earlier versus at 5.0 months of age or later. The children introduced to solid foods at 4.5 months or earlier had a mean score of 7.63 points. The children introduced to solid foods at 5.0 months or later had a mean score of 7.62 points. The difference in score between the two groups was generally small and not statistically significant (-0.01 (-0.09, 0.07), p = 0.838). The maximum achieved score in the group introduced to solid foods at 4.5 months of age or earlier was 9.8 points, while the minimum score was 4.1 points. The maximum achieved score in the group introduced to solid foods at 5.0 months or later was 9.7 points, while the minimum score was 4.6 points. (Table 5).

**Table 5**. Diet quality and variety index score according to age of introduction to solid foods.

| Age of introduction to solid foods (n=1829) | Diet quality and variety index score | | | | | p-value[1] |
|---|---|---|---|---|---|---|
| | n (%) | Mean (SD) | Median ($25^{th}$, $75^{th}$) | Min. | Max. | |
| ≤ 4.5 months | 1232 (67.4) | 7.63 (0.84) | 7.68 (7.07, 8.23) | 4.07 | 9.84 | |
| ≥ 5.0 months | 597 (32.6) | 7.62 (0.84) | 7.68 (7.05, 8.24) | 4.57 | 9.73 | |
| | | | | | | 0.838 |

[1]Results are from independent samples t-test. Level of significance: $p < 0.05$.

### 4.3.1 Age of introduction to solid foods and scores for the single components in the diet quality and variety index

Table 6 presents the single component scores in the two groups according to age of introduction to solid foods. The differences in single component scores between the two groups were generally small. The children introduced to solid foods at 4.5 months of age or

earlier had significantly higher scores for the single components "whole grains" (0.99 vs. 0.96 points), "vitamin D" (0.90 vs 0.88 points), "fish" (0.58 vs. 0.53 points), and "lean dairy products" (0.46 vs. 0.32 points), compared to the group of children introduced at 5.0 months of age or later (Table 6). The children introduced to solid foods at 5.0 months of age or later had significantly higher scores for the single components "breastfeeding" (0.81 vs. 0.57 points) and "sugary foods and beverages" (0.94 vs. 0.91 points) compared to the children introduced at 4.5 months of age or later (Table 6).

**Table 6.** Scores for the different components in the diet quality and variety index between the two groups of age of introduction to solid foods.

| | **Age of introduction to solid foods (n=1829) Mean score (SD)** | | |
|---|---|---|---|
| | ≤ 4.5 months (n=1232) | ≥ 5.0 months (n=597) | **p-value** |
| **Components** | | | |
| Red and processed meat | 0.99 (0.04) | 1.00 (0.03) | 0.153 |
| Whole grains | 0.99 (0.08) | 0.96 (0.15) | < **0.001** |
| Vitamin D | 0.90 (0.21) | 0.88 (0.25) | **0.033** |
| Sugary foods and beverages | 0.91 (0.22) | 0.94 (0.19) | **0.021** |
| Fruit | 0.84 (0.22) | 0.82 (0.23) | 0.112 |
| Dietary fats | 0.73 (0.23) | 0.72 (0.24) | 0.121 |
| Vegetables | 0.66 (0.29) | 0.64 (0.30) | 0.311 |
| Breastfeeding | 0.57 (0.44) | 0.81 (0.34) | < **0.001** |
| Fish | 0.58 (0.32) | 0.53 (0.31) | **0.003** |
| Lean dairy products | 0.46 (0.34) | 0.32 (0.34) | < **0.001** |

The results are from independent samples t-test. Bold figures: $p < 0.05$.

## 4.4 Diet quality and variety index score according to parental and child characteristics

Table 7 presents associations assessed by univariate and multivariate regression analysis. The differences in scores between the groups of parental and child characteristics were generally small. Variables showing significant associations in the univariate analyses remained

significant in the multivariate analyses (adjusted for gender, parental education, perception of eating-related problems, maternal work situation, parity, and birth weight) (Table 7). Multivariate analysis showed that the diet quality and variety index score was significantly associated with birth weight, where the children with a low birth weight (< 2500 g) had a significantly lower score compared to children with a normal birth weight (2500-4500 g) (-0.22 (-0.41, -0.03), p = 0.023) (Table 7). In multivariate analysis, a significantly lower score was observed among children where parents reported the perception of eating-related problems (-0.33 (-0.41, -0.24), p < 0.001) (Table 7). In multivariate analysis, a significantly lower score was observed among children with mothers and fathers with a lower level of education (-0.10 (-0.20, -0.01), p = 0.036) (-0.11 (-0.19, -0.03), p = 0.010), and among children with mothers not having paid work (-0.20 (-0.36, 0.08), p = 0.002) (Table 7). In multivariate analysis, parity was significantly associated with lower scores, were an increasing number of children were significantly associated with lower scores (-0.1 (-0.18, -0.02), p = 0.016) (-0.24 (-0.35, -0.13), p < 0.001) (Table 7). In univariate analysis, a lower score was observed for children with mothers who were unmarried or lived alone. However, the association was borderline significant (-0.22 (-0.44, 0.00, p = 0.051) (Table 7).

**Table 7.** Differences in diet quality and variety index scores according to parental and child characteristics (n=1829).

| | | **Univariate model** | | **Multivariate model[1]** | |
|---|---|---|---|---|---|
| | ***n*** | **β (95% CI)** | ***p-value*** | **β (95% CI)** | ***p-value*** |
| **Child** | | | | | |
| Gender | | | | | |
| Female | 830 | -0.06 (-0.14, -0.02) | 0.136 | -0.04 (-0.12, 0.03) | 0.260 |
| Male | 999 | Ref. | | | |
| Gestational age | | | | - | |
| < 38 weeks | 218 | -0.02 (-0.14, 0.10) | 0.78 | | |
| ≥ 38 weeks | 1606 | Ref. | | | |
| Birth weight | | | **0.03[3]** | | |
| < 2500 g | 76 | -0.25 (-0.44, -0.06) | **0.012** | -0.22 (-0.41, -0.03) | **0.023** |
| 2500-4500 g | 1681 | Ref. | | | |
| > 4500 g | 59 | -0.10 (-0.32, 0.11) | 0.35 | -0.04 (-0.25, 0.18) | 0.747 |
| Weight at 12 months | | | 0.145[3] | - | |
| < 9230 g | 423 | -0.10 (-0.20, 0,00) | | | |
| 9230-10700 g | 841 | Ref. | | | |
| > 10700 g | 432 | 0.03 (-0.13, 0.07) | | | |
| Foods avoided in fear of allergy/intolerances | | | | - | |

| | | | | | |
|---|---|---|---|---|---|
| No | 1712 | Ref. | | | |
| Yes | 117 | -0.12 (-0.27, 0.04) | 0.147 | | |
| Perception of eating related problems | | | | | |
| No | 1376 | Ref. | | | |
| Yes | 453 | -0.33 (-0.41, 0.24) | < **0.001** | -0.33 (-0.41, -0.24) | < **0.001** |
| **Parent** | | | | | |
| Maternal age | | | 0.31[3] | - | |
| ≤ 24 years | 80 | -0.14 (-0.33, 0.05) | | | |
| 25-34 years | 1262 | Ref. | | | |
| ≥ 35 years | 487 | 0.02 (-0.07, 0.11) | | | |
| Maternal education | | | | | |
| Lower education | 475 | -0.20 (-0.28, -0.11) | < **0.001** | -0.10 (-0.20, -0.01) | **0.036** |
| Higher education | 1354 | Ref. | | | |
| Paternal education | | | | | |
| Lower education | 870 | -0.16 (-0.24, -0.08) | < **0.001** | -0.11 (-0.19, -0.03) | **0.010** |
| Higher education | 958 | Ref. | | | |
| Maternal work situation | | | | | |
| Not paid work | 159 | -0.29 (-0.43, -0.16) | < **0.001** | -0.20 (-0.36, -0.08) | **0.002** |
| Paid work | 1670 | Ref. | | | |
| Maternal family situation | | | | - | |
| Not married/not cohabitant | 58 | -0.22 (-0.44, 0.00) | 0.051 | | |
| Married/cohabitant | 1770 | Ref. | | | |
| Parity | | | < **0.001**[3] | | |
| 1 child | 830 | Ref. | | | |
| 2 children | 722 | -0.09 (-0.17, -0.01) | **0.039** | -0.1 (-0.18, -0.02) | **0.016** |
| ≥ 3 children | 277 | -0.24 (-0.36, -0.13) | < **0.001** | -0.24 (-0.35, -0.13) | < **0.001** |
| Maternal tobacco habits | | | | - | |
| No use of tobacco | 1578 | Ref. | | | |
| Use of tobacco | 250 | -0.07 (-0.18, 0,04) | 0.190 | | |

The number of missing values were 0-28. [1]Variables included in the multivariate model are gender, birth weight, perception of infant eating-related problems, maternal education, paternal education, maternal work situation, and parity. [3]Overall p-value. Bold figures: $p < 0.05$.

### 4.4.1 Associations between parent and child characteristics and scores for single components of the diet quality and variety index

Lower scores for the single component "whole grains" were observed for the children with a birth weight under 2500 grams compared to having a normal birth weight (2500-4500 grams) (Table 8). Significantly lower scores were observed for the single components "whole grains," "fruit," "vegetables," and "fish" for children with the perception of eating-related problems (Table 8). However, significantly higher scores were observed for the single component "sugary foods and beverages" for children with the perception of eating-related problems (Table 8). There were observed significantly lower scores for the single components

“breastfeeding” and “sugary foods and beverages” for children of mothers and fathers with a lower educational level. However, significantly higher scores were observed for the single component “lean dairy products” for children of mothers and fathers with a lower educational level. Significantly lower scores for the single components “vitamin D,” and “vegetables” were observed for children with one or more sibling compared to children who were first born, while there were significantly higher scores observed for the single component “breastfeeding” for the children with two or more siblings compared to the children who were first born (Table 8). There were no significant differences in single component scores according to maternal work situation (data not shown).

**Table 8.** Scores for single components of the index according to birth weight, perception of eating-related problems, parental education, and parity (n=1829).

| | Mean single component scores (SD) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Birth weight | | | Perception of eating-related problems | | Maternal education | | Paternal education | | Parity | | |
| **Components** | < 2500 g | 2500-4500 g (ref.) | < 4500 g | Yes | No (ref.) | High education (ref.) | Lower education | High education (ref.) | Lower education | 1 child (ref.) | 2 children | ≥ 3 children |
| Red and processed meat | 0.99 (0.05) | 0.99 (0.04) | 1.00 (0.02) | 0.99 (0.05) | 1.00 (0.04) | 1.00 (0.04) | 0.99 (0.05) | 0.99 (0.04) | 0.99 (0.04) | 0.99 (0.05) | 1.00 (0.04) | 1.00 (0.03) |
| Whole grains | **0.95 (0.18)** | 0.98 (0.10) | 0.99 (0.08) | **0.95 (0.16)** | 0.99 (0.08) | 0.98 (0.11) | 0.98 (0.10) | 0.98 (0.11) | 0.98 (0.10) | 0.98 (0.11) | 0.98 (0.10) | 0.98 (0.10) |
| Vitamin D | 0.90 (0.23) | 0.89 (0.22) | 0.88 (0.21) | 0.91 (0.23) | 0.89 (0.22) | 0.89 (0.22) | 0.89 (0.23) | 0.90 (0.21) | 0.89 (0.23) | 0.92 (0.21) | **0.88 (0.23)** | **0.85 (0.25)** |
| Sugary foods and beverages | 0.95 (0.17) | 0.92 (0.21) | 0.88 (0.25) | **0.94 (0.18)** | 0.91 (0.22) | 0.94 (0.19) | **0.87 (0.27)** | 0.94 (0.19) | **0.90 (0.24)** | 0.93 (0.20) | 0.92 (0.21) | 0.90 (0.24) |
| Fruit | 0.78 (0.25) | 0.83 (0.22) | 0.83 (0.21) | **0.78 (0.24)** | 0.85 (0.21) | 0.83 (0.22) | 0.83 (0.22) | 0.84 (0.22) | 0.83 (0.22) | 0.84 (0.22) | 0.83 (0.22) | 0.81 (0.23) |
| Dietary fats | 0.74 (0.23) | 0.73 (0.23) | 0.79 (0.21) | 0.74 (0.23) | 0.72 (0.23) | 0.74 (0.23) | 0.70 (0.25) | 0.74 (0.23) | 0.72 (0.24) | 0.74 (0.23) | 0.71 (0.23) | 0.71 (0.25) |
| Vegetables | 0.62 (0.29) | 0.66 (0.29) | 0.61 (0.29) | **0.58 (0.30)** | 0.68 (0.29) | 0.66 (0.29) | 0.64 (0.30) | 0.66 (0.29) | 0.64 (0.29) | 0.70 (0.28) | **0.64 (0.30)** | **0.57 (0.30)** |
| Breastfeeding | 0.53 (0.45) | 0.66 (0.42) | 0.66 (0.45) | 0.64 (0.44) | 0.65 (0.42) | 0.69 (0.40) | **0.53 (0.45)** | 0.71 (0.40) | **0.58 (0.44)** | 0.62 (0.43) | 0.65 (0.42) | **0.72 (0.40)** |
| Fish | 0.49 (0.31) | 0.57 (0.32) | 0.57 (0.30) | **0.45 (0.32)** | 0.60 (0.31) | 0.56 (0.32) | 0.57 (0.33) | 0.56 (0.31) | 0.56 (0.32) | 0.57 (0.33) | 0.57 (0.31) | 0.52 (0.30) |
| Lean dairy products | 0.43 (0.36) | 0.42 (0.35) | 0.36 (0.33) | 0.39 (0.36) | 0.42 (0.35) | 0.38 (0.34) | **0.50 (0.36)** | 0.36 (0.34) | **0.47 (0.35)** | 0.41 (0.34) | 0.42 (0.35) | 0.40 (0.35) |

Bold figures: statistically significant difference in single component scores compared to the reference group. Level of significance is set to < 0.01 due to multiple testing.

# 5 Discussion

The present master thesis aimed to develop a diet quality and variety index for Norwegian children at 12 months of age and aimed to assess the relationship between diet quality and variety index score and age of introduction to solid foods. There was no significant difference between diet quality and variety index score and age of introduction to solid foods in this thesis. However, the diet quality and variety index score was associated with several parental and child characteristics, such as the perception of eating-related problems, birth weight, parental education, maternal work situation, and parity.

A diet quality and variety index has not previously been explicitly developed for Norwegian children at 12 months of age. Hence, this index may increase the knowledge about diet quality and variety in Norwegian children, as well as strengthen the existing literature on diet quality and variety in children according to parental and child characteristics.

## 5.1 Dietary assessment

In this master thesis, dietary data from children at 12 months of age were collected through a semi-quantitative food frequency questionnaire (FFQ). The collection of dietary data in small children may be less challenging compared to dietary data collection in older children and adults, due to a few conditions in the child's diet. First, as the parents often decide what the child eats, the parents may have more control over the dietary intake for the child. Also, small children usually eat a smaller selection of foods compared to adults and older children. Hence, it may be easier to remember and report the dietary intake correctly with fewer foods.

However, several factors in a small children`s diets can make dietary assessment challenging (91, 92). Infancy and early childhood consist of rapid changes in the diet as well as the parents often sharing the responsibility for the child`s diet with other adults (for example, nursery staff) (91, 93). Thus, the child`s dietary information is usually based on reported intakes from multiple respondents around the child (92). The accuracy of the reported dietary intake for the child may be dependent on cognitive factors in the respondents (parents/caregivers), and the knowledge of the dietary intake for the children can be limited to the number of meals the respondent has spent together with the child (92). There may also be challenges capturing the quantities of the foods consumed due to small tastings or spilling of

foods (91). In breastfed children, assessing nutrient intakes can be challenging and inaccurate because of the variation in the nutritional composition of the breastmilk, as well as challenges with measuring the quantity of breastmilk consumed (94). Breastfeeding duration can also be challenging to report correctly, as shown by the inconsistent validity of reported breastfeeding duration in a few studies (95, 96).

### 5.1.2 Dietary assessment methods

The choice of method for dietary assessment depends upon the purpose of the study, the population of interest, the size of the population, the period of the study, and the resources available (94). FFQs, dietary records, and 24-hour recalls are all widely used in the assessment of dietary intake among infants and small children (94, 97). All three methods require extensive work from the researches with collecting, handling, and analyzing the dietary data derived from the methods (94). There are both strengths and limitations to all of the three methods when collecting dietary data for children. A review conducted in 2010 found that all three methods had a degree of under- or over-reporting of energy intake in children and adolescents when compared to a golden standard of measuring energy intake, the double-labeled water method (98).

An option for dietary data collection for the children in this study could be dietary records. Dietary records have been used in several national dietary surveys among children at 12 months of age in European countries (99-102). In dietary records, respondents log (and sometimes weigh) all foods consumed in a specific number of consecutive days (103, 104). This open-ended method can give detailed information about the children`s diet if reported at the same time the foods are consumed (104). One strength of the method is the momentarily reporting of consumption of foods, which may minimize recall bias from the respondent not being able to remember or report correctly what the child consumes (104). In a cohort where they used weighed dietary records on preschool children, the dietary records provided valid details about the children's diet in terms of energy intake, when compared with the double-labeled water method (105). Dietary records are also applicable to a diverse group of people because of the open-ended format with no cultural specific dietary questions. However, dietary records often require a high level of motivation and literacy from the participant, which may lead to a high participant burden. Hence, there is a high probability for selection bias to occur (94, 103). The open-ended questions in this method also impose a high workload for the researcher when handling the collected data. Using weighed dietary records in children

can also be challenging because the data collection period can be more sensitive to the rapid changes in a child`s diet (91).

The 24-hour recall method is another option for dietary data collection in children, and have been used in a few national dietary surveys in European countries among children at 12 months of age (106, 107). The 24-hour recall method includes in-depth interviews about the participant's dietary intake for the previous 24 hours (103, 104). Because of the open-ended questions asked in the interview, detailed information about diet can be collected (103). As for dietary records, the 24-hour recall method is also applicable to diverse groups with a wide range of eating habits and diets (103, 104). One strength of this method is the relatively low participant burden, which decreases the probability of selection bias (97, 108). However, in 24-hour recalls, recall bias can be a challenge as the dietary data is collected retrospectively, and the respondent may have a challenge remembering previous food intakes (97, 103). The respondent may also not report the dietary data accurately, which can be related to the respondent`s knowledge or situation of the interview (97). In a validation study, the 24-hour recall method overestimated energy and nutrient intakes in infants compared to a chemical duplicate portion technic (109). Furthermore, a single day of a 24-hour recall may not be representative of the whole diet, and multiple days of 24-hour recalls are often necessary (97). Similar to dietary records, the rapidly changing diet for a child can also be problematic as the 24-hour recall method only askes for specific days or short periods, and the data collected may not be representative for the whole diet over time (103).

The present master thesis included a semi-quantitative FFQ to collect dietary data for children at 12 months of age. FFQs are considered the most suitable dietary assessment method for large samples and have been widely used in epidemiological studies (91, 103). Semi-quantitative FFQs are often more cost-effective and time saving for the researcher compared to 24-hour recalls and dietary records (103). In FFQs, the participants are asked to report their own or other`s usual dietary intake in frequency, and often quantities, for a specific period. The FFQ aims to collect data about the usual food consumption (94, 104). A strength for choosing a semi-quantitative FFQ in this study may be that the method allows for a lower participant burden compared to dietary records (103). Also, FFQs are more cost-effective and time-saving for the researcher compared to both dietary records, and 24-hour recalls for large sample sizes (103). Besides, a semi-quantitative FFQ can cover a variety of food and drinks, including specific types of foods or brands (94, 97). In addition, an important argument for choosing a semi-quantitative FFQ in this study was the comparability to the previous

Spedkost surveys, which also used a semi-quantitative FFQ as the dietary data collection method (40, 41, 43, 44). The FFQ used in the Spedkost 1998 study was validated in 2002 using a 7-day weighed food record as a reference method (91). The findings indicated that the FFQ overestimated energy- and nutrient intakes by 25 %, with a moderate capability to rank food and nutrition intakes for infants at 12 months of age in the (91). The ability to collect dietary data accurately was at the same level as other validation studies have observed with FFQs for children (110-112). This validation study is useful when assessing the validity of the FFQ in this study. However, the FFQ in this study has gone through multiple changes since 1998, and the current use of a web-based questionnaire may make the questionnaire less comparable to the questionnaire from 1998.

One limitation with the semi-quantitative FFQ method is that the reported intakes in FFQs may be sensitive to recall bias. The caregivers may not accurately report what the child usually eats, not know how to answer the questions correctly, and over- and under-report the food intakes (94, 103). In contrast to dietary records and 24-hour recalls, there can be challenging capturing all variation in the diet with FFQs, where there is a set list of questions. Simultaneously, essential details about the diet can be left out (97). Another limitation with the semi-quantitative FFQ is the population-specific characteristic of the method. Hence, FFQs are not always suitable to describe the diet in cultural or other subgroups in a study population in contrast to dietary records and 24-hour recalls (103, 104). The population specific characteristics of the method was showed by those children of mothers born outside of Scandinavia were not invited to participate in the study because the FFQ was not suitable to cover all food intakes in these groups.

## 5.2 Sample

Out of the 3000 randomly selected mother and child pairs for this study, the participation rate in the Spedkost study was 73 % at 6 months of age and 66 % at 12 months of age. The participation rates in the Spedkost studies have been observed marginally higher compared to participation rates in other European national dietary surveys among infants and children (101, 102, 113). In general, participation rates in epidemiological studies have decreased in the past 30 years (114, 115). The declining participation rates are also noticeable in the Spedkost studies conducted in the last 20 years, where the first Spedkost study in 1998/1999 had the highest participation rate of all Spedkost studies at 79 % at 6 months of age (40). The participation rate for the Spedkost study from 1998/1999 at 12 months of age was similar to

the current Spedkost study (66 %) (40, 41). However, the participation rate in the Spedkost study from 2006 was 66 % at 6 months of age and 57 % at 12 months of age, which was the lowest participation rate of the three Spedkost studies (43, 44).

There can be several reasons for the continuous high participation rates in the Spedkost studies. One reason can be the young study population. Participation rates have been reported to be decreasing with increasing age in other Norwegian national dietary surveys to 50 % among children in the 4th and 8th grade, and to 37 % among adults (116, 117). However, comparisons should be made with caution due to the school-based requirement process in the study with children in the 4th and 8th grade, which have shown to increase participation rates compared to other requirement methods (118). However, other studies have shown increasing participation rates with increasing age of the study population in an adult population (119, 120).

Another possible reason for the high participation rates in the Spedkost studies can be that the respondents in the study may still be on parental leave, especially in the Spedkost 6 months study. Thus, the mothers or other caregivers in the study may have more time completing questionnaires and participating in a study, compared to if they were working. As women being mostly the primary caregiver for the children in this study, this could have led to a relatively high participation rate as female gender has been associated with higher participation rates in epidemiological studies (114). All of the participants received a gift card for each questionnaire completed. The participants receiving rewards in studies, such as money, gifts, or treatments, have shown to increase participation rates (121). A pilot study conducted prior to the Spedkost study from 2018/2019 also found that receiving gift cards lead to higher participation rates compared to joining a lottery of a monetary price (122). The use of gift cards in this study may reflect the increase of participation rates in the current Spedkost study compared to the Spedkost study from 2006, where the participants who completed the questionnaires were randomly selected to receive a monetary price instead of receiving a gift card (43).

It is a desirable goal to keep the participation rates high in epidemiological studies, as studies with low participation rates are particularly vulnerable to selection bias (115). Selection bias occurs when the study population deviates from the target population, for instance, a higher proportion of high educational level in the study sample compared to the target population (123). Furthermore, selection bias may contribute to a lower validity in epidemiological

studies (115). The validity in a study refers to how well the findings from the study represent the actual situation among the target population outside of the study and can be divided into internal validity and external validity (124). Studies with high internal validity are more likely to represent actual results for the study population (125). Studies with high external validity are more likely to have a study population that is representative of the outside target population (115). Even if the participation rates in this study are relatively high, selection bias may still be a limitation that needs to be considered when interpreting the findings of this study.

The characteristics of the study sample in this master thesis were generally similar to the overall target population. However, the proportions of parents with a high level of education, mothers who were married or cohabitant, and mothers over 24 years were higher compared to the national statistics. Higher education and being married have been associated with higher participation rates in studies (126, 127). The fact that there were fewer young mothers in this sample compared to the general population could also be a reason for the higher educational level in this population as young mothers would be less likely to have finished their education. These three deviating characteristics from the target sample could lead to an overall higher diet quality and variety score in this sample compared to the outside target population, as previous research has linked higher education, and married and older mothers to higher diet quality index scores in infants and children (69, 73, 74, 128, 129). Also, an exclusion criterion for the study was if the mothers were born outside of Scandinavia. This exclusion criterion led to ethnic minorities not being included in the study. Therefore the ethnicity of the study sample deviates from the general Norwegian population, and the results are not necessarily representative of the whole Norwegian population of children at 12 months of age.

A lower external validity could be the consequence of several parental and child characteristics in this sample deviating from the overall Norwegian population and, therefore, a generalization of the results should be done carefully.

## 5.3 Design

The study design in this master was longitudinal, as the mothers completed a questionnaire both when the infants were 6 months and 12 months old. The longitudinal design is a strength of the study as the design employs two separate measures to follow the children over a set

period. Longitudinal designs and can be useful to evaluate relationships between exposure factors and outcomes (130). Also, the longitudinal design is a strength of the study because it may be easier for the mothers to remember the correct age of introduction to solid foods at 6 months of age compared to at 12 months of age.

This study also used a cross-sectional design when assessing the relationship between diet quality and variety index score and parental and child characteristics, where both the score and the parent and infant characteristics were collected when the child was at 12 months of age. One strength with using a cross-sectional design is that they are often cost- and time effective for the researcher, and many different variables can be studied at the same time (130). Cross-sectional designs are also well suited to assess the prevalence of diseases in a population (131). However, as cross-sectional designs only measure exposure and outcome variables at one point, the design cannot be used to derive causal relationships (131). Therefore, the findings on diet quality and variety index score and parental and child characteristics in this study should be interpreted with caution.

### 5.3.1 The diet quality and variety index

The diet quality and variety index used to evaluate the children`s diet quality and variety in this thesis was based on the Norwegian dietary guidelines (32). The use of national dietary guidelines may be a strength of the diet quality and variety index because the Norwegian dietary guidelines are based on carefully considered scientific evidence on a diet for achieving good health and development (32). Furthermore, the cut-offs for serving sizes that determined the score of the single components in the diet quality and variety index were based on both Norwegian adult and infant dietary guidelines (11, 18). Besides, the cut-offs for the serving sizes were based on dietary guidelines from great health authorities such as the WHO, national dietary guidelines from the Nordic and European countries, and national dietary guidelines from the USA (12, 34-36, 78-80). However, when creating the cut-offs for serving sizes in the index, which determined the score, avoiding subjectivity was a challenge. Due to no existing recommended serving sizes for children aged 12 months in the Norwegian dietary guidelines, the cut-offs in the index were determined based on an overall assessment from the recommendations on serving sizes available from other resources in a subjective manner of the author of the master thesis. Therefore, the recommended serving sizes in the index may not be entirely correct for children at 12 months of age, which could weaken the quality of the findings in the study.

A second strength of the diet quality and variety index could be the high number of components included in the index. With careful consideration of the included components in the diet quality and variety index, the index covered most of the food groups that were asked for in the semi-quantitative FFQ in the study. Therefore, it is likely to be relevant for the diet for children at 12 months of age. However, there may be errors connected to the different components. For the component "sugary foods and beverages", both sugary foods and beverages were included in the same component due to an overall low intake of sugary foods and beverages among the children. Sugary drinks have a higher weight than sugary foods but often contain less sugar in grams. Hence, it could lead to different scores for this component, dependent on whether the children ate sugary foods or drank sweetened beverages the most.

A third strength of the diet quality and variety index is the use of a comprehensive FFQ, which covered many different foods. The comprehensiveness of the FFQ could minimize the bias of certain foods or food groups not being included because they were missing in the FFQ. Certain foods not being included in the FFQ could lead to a wrong estimate of the intake of foods and nutrients for the children. However, as mentioned, there are methodological limitations to using FFQ as a dietary data collection method and could be a weakness for the diet quality and variety index as well.

A limitation with the diet quality and variety index score is that it was not adjusted for energy intake to control for over- or under consumption. This FFQ has shown to overestimate energy intakes in infants and children, which could lead to falsely high intakes of the foods recommended in the index, following higher mean scores for the children in the sample. The cut-offs for serving sizes in the index were made to fit an energy intake equivalent to about one-third of an adult energy intake. If the child had a lower or a higher energy intake than estimated for the diet quality and variety index, the child could achieve a falsely high or low score due to over- or under consumption. The consequence of not adjusting for over- or under consumption could be a higher mean score for the whole sample. However, it should not affect the differences in diet quality and variety index scores between the different groups.

## 5.4 Statistical considerations

In this master thesis, multiple statistical analyses were conducted, which could increase the probability of finding statistically significant results caused by random errors (type 1 error) (132). Further, multiple statistical analyses could contribute to finding statistically significant

results even if there were no real differences (132). Because of multiple testing in this study, the significance level was lowered to < 0.01 in the analysis with s high number of statistical tests (Table 8). However, one strength was the large sample size in the study, which could increase the probability of detecting true differences in the study population (133).

## 5.5 Discussion of results

### 5.5.1 Diet quality and variety index score

The average diet quality and variety index score of 7.6 points out of 10.0 points in this sample indicates that the children had relatively high adherence to the recommended intakes of foods in the index. Furthermore, the relatively high score may indicate that diet quality and variety in children at 12 months of age in Norway is overall good but could be improved. The mean diet quality and variety index score from this study is comparable to index scores in similar studies in Asian and European countries. One study using diet quality index scores in Asian children at 12 months of age found that the mean dietary score was 44 out of 62 points (69). In a study on German children aged 12 months, the mean diet quality score was above 80 points out of 100 points (75). Many studies on dietary indices in children at 12 months of age have also found that the children only achieved about half of the total dietary score (68, 72, 76, 120, 128). These findings could indicate that the quality of the diet in Norwegian children is overall high compared to children in other countries. However, when comparing scores from different indices, the included components and the scoring of the index should also be considered. The diet quality and variety indices used in the different studies are not entirely similar to the scoring of components and the choice of different components in the index used in this study. Different design and structure of these indices may contribute to variable results in diet quality and variety among the 12-month old children in the studies.

The findings should be considered with the limitation that the study sample had a relatively high socioeconomic status, where the majority of the children had parents with a high level of education, and mothers who were married or cohabitant, with a higher proportion compared to the national statistics. A higher socioeconomic status has been observed with higher diet quality and health in children in previous studies (69, 73, 74, 134). The higher prevalence of high socioeconomic status among the children in this study could be a reason for the relatively high score among the children. One should, therefore, consider a possible lower average score among the target population compared to the study population.

As the mean diet quality and variety index score in this study reached about three-fourths of the maximum score, a possible decrease in diet quality and variety with increasing age in this sample should be considered. Several studies on diet quality indices in children have observed decreasing diet quality and higher consumption of unhealthy foods from the age of 12 months up to 5 years of age (68, 71, 75, 120, 135). Furthermore, even if diet quality and variety in Norwegian children at 12 months of age is relatively high, the dietary quality may decrease with increasing age of the children. Therefore, maybe the diet quality and variety index score in this study should be higher to prevent the decrease in diet quality and variety to such a low level in later years, which could be of concern in terms of future health in these children.

In regards to the single component scores, the highest scores were observed for the following components "red and processed meat" and "whole grains". The serving size for a maximum score for the component "red and processed meat" was under 35 grams of red and processed meat per day. One reason for the high scores of this component could be that the children were not able to eat more than the upper limit in the index, even if this was the only source of meat in the diet. This could contribute to the children getting a high score even though the variety of meat was not adequate. According to the two previous Spedkost studies from 1998 and 2006, the intake of saturated fat among Norwegian children aged 12 months has been reported higher than recommended (12 E %) (41, 44), and red and processed meat is a source of saturated fat in the diet (32). However, the findings from the most recent Spedkost study have demonstrated a decrease in the intake of saturated fat in the diet to 10 percentages of energy (unpublished data) (45). The decrease in saturated fat intake may reflect the overall high score for the single component "red and processed meat" in the study. The single component "whole grains" also had one of the highest mean component scores among the children in this study. One reason for the high score for the component "whole grains" could be the frequent consumption of porridge and whole-grain bread among Norwegian children at 12 months of age (44). In contrast, a similar study on diet index scores in Asian children at 12 months of age observed low scores for whole grains (69), which could be explained by a food culture where whole-grain bread and porridge is not included in the every-day diet.

The component "lean dairy products" had the lowest mean score of the single components in this sample. One critic of the scoring of this component is that the recommended range for the intake of lean dairy products in the diet quality and variety index was set to 500 to 600 grams per day. The Norwegian dietary guideline on infant nutrition states that an intake of 500 to 600 grams of lean dairy products is adequate for a child at 12 months of age, but should not

exceed 600 grams a day. Furthermore, there is no minimum recommended intake of lean dairy products for children at 12 months of age (11). Therefore, children who did not consume 500 grams of lean dairy products per day got a lower score even if it would be adequate not to consume this full amount if other foods covered the nutritional needs.

The single component "fish" was also reported low in this sample. The low score for this component was expected based on a report on the development of the Norwegian diet from 2019, where the intake of fish was lower than desired for both adults and children (136).

### 5.5.2 Diet quality and variety index score according to age of introduction to solid foods

The majority of the children were introduced to solid foods at 4.5 months of age or earlier in this study (67 %). There was a higher proportion of infants introduced to solid foods at 4.5 months of age or earlier compared to the previous Spedkost studies from 1998 (64 %) and 2006 (50 %) (40, 43). The recommendations of the Norwegian dietary guideline on infant nutrition have changed in the later years, from the recommendation to introduce solid foods between the age of 4 to 6 months (2001), to the current recommendation that it is safe to exclusively breastfeed until the infant is at 6 months of age (18, 40, 43). The recommendation still states that solid foods can be introduced between 4 and 6 months if the infant is ready for solid foods (18). The change in the proportions of age of introduction to solid foods the last years may be due to the different wording in the dietary guidelines. Also, maybe the mothers are more aware of the infant's signals for wanting to try new foods. However, there is lacking research to support this claim, and there could be other reasons for the earlier introduction to solid foods in this study compared to previous studies.

In this master thesis, the main aim was to explore the relationship between age of introduction to solid foods and diet quality and variety index score at 12 months of age. The main finding demonstrated no significant difference in diet quality and variety index score between the children introduced to solid foods at 4.5 months or earlier, and children introduced to solid foods at 5.0 months of age or later. The difference in the score between these groups was also generally small. The difference in score remained small and not significant after testing with other groups of age of introduction to solid foods ($\leq$ 4.0 months of age and $\geq$ 4.5 months of age, or $\leq$ 5.0 months of age and $\geq$ 5.5 months of age). The non-finding is supported by a recent similar study in Australian children where no significant difference between diet quality scores and age of introduction to solid foods was reported (71). However, other studies have found a relationship between age of introduction to solid foods and diet quality

and variety in children. A study on Dutch children showed that introduction to solid foods before the age of 6 months was associated with a lower diet quality and variety index score at 12 months of age compared to introduction to solid foods at 6 months of age or later (72). Contrarily, one study found that children introduced to solid foods before 6 months of age ate a wider amount of family foods later in childhood, which could reflect a higher variety in the diet, compared to children introduced to solid foods after 6 months of age diet (137).

The difference in score was tested between two ages, both within the recommended age of introduction to solid foods according to the Norwegian dietary guidelines (18). Maybe the difference in the score would have been more substantial if tested between one age group within the recommended age of introduction to solid foods (between 4 to 6 months of age), and one age group before and after the recommended age of introduction to solid foods (before 4 months of age and after 6 months of age). However, this was not performed in the present study due to a small sample size in the group introduced to solid foods before 4 months of age, and after 6 months of age.

One reason for not finding any difference in the diet quality and variety index score between the two groups of age of introduction to solid foods could be the homogenous characteristics of the sample. Most of the children had mothers with a high level of education and mothers who were married or cohabitant, and the homogeneity of the sample could contribute to the non-findings in this study. The two groups of age of introduction to solid foods had similar background characteristics such as parental education, maternal family situation, gender, and birth weight (data not shown). However, the group who were introduced to solid foods at 4.5 months of age or earlier had a slightly higher proportion of mothers over 35 years, maternal tobacco users, and mothers who had paid work (data not shown). The differences in maternal characteristics between the two groups of age of introduction to solid foods could lead to a small amount of skewness between the two groups, ex higher maternal age has been associated with higher diet quality and variety in children (73, 74, 128, 129). The skewness between the groups of age of introduction to solid foods could contribute to the non-findings in the study.

As mentioned, a few studies have assessed the relationship between age of introduction to solid foods and diet quality and variety in children at 12 months of age (71, 72, 137). However, the topic is not widely studied. There are some studies that have assessed the relationship between age of introduction to solid foods and other infant and child health

outcomes. According to two reviews and one clinical trial, there were no significant differences among infants introduced to solid foods before 6 months of age compared to 6 months of age or later in terms of healthy growth and development (19, 138, 139). However, studies point towards infants who were introduced to solid foods early (before 4 months of age) being heavier compared to infants introduced at 6 months of age or later (12, 53, 140-142). These findings could be of importance as there is some evidence suggesting that rapid weight gain in infancy and early childhood may influence the risk of excessive weight and obesity later in childhood (143, 144).

For the prevention of allergic diseases, both short term and later in life, studies comparing introduction to solid foods at 6 months of age versus 4 months of age have shown inconclusive results. Currently, there are no recommendations on age of introduction to solid foods for preventing allergic diseases in infants and small children (145, 146). In the early 2000s, the recommendations pointed towards delaying the introduction of allergenic foods to prevent later food allergies (147). A review from 2006 found associations between introduction of solid foods before 6 months of age and an increased risk of developing food allergies (148). More recent studies have, however, shown opposite results where early introduction (between 4 and 6 months of age) of possible allergens could prevent food allergies (149, 150). A recent study conducted in England found that introducing possible allergens to infants with the risk of developing food allergies between the age of 3 and 6 months could reduce the risk of developing food allergies (151). Concerning coeliac disease, ESPGHAN has stated that the risk of developing coeliac disease will not be influenced by which time gluten is introduced between the periods 4 to 12 months of age (152).

Regarding essential nutrients in the infant's diet, such as iron, studies have indicated that introducing solid foods at 6 months of age compared to 4 to 6 months of age could lead to lower hemoglobin and ferritin values in infants at 6 months of age (139, 153, 154). However, there is still no evidence that these lower values caused any harm to neurodevelopment or had significant associations with iron deficiency anemia or iron depletion in infants (139, 153).

### 5.5.3 Age of introduction to solid foods and single component scores

The children who were introduced to solid foods at 4.5 months of age or earlier had significantly higher scores for the single components "fish", "whole grains", "vitamin D" and "lean dairy products" compared to the children introduced at 5.0 months or later. Based on these findings, it may indicate that the children introduced to solid foods earlier had a higher and more adequate intake of healthy foods. A study conducted in 2016 on British children

found that introduction to solid foods before 6 months of age was associated with less feeding difficulties at 3 years of age (155). This finding could compare to the findings of a higher intake of healthy foods among the children introduced to solid foods later with later in this study. One reason for the higher score of certain components among the group introduced to solid foods at 4.5 months or earlier, could be that the children have had more time introducing a wider variety of different foods compared to the children introduced later. Contrary, another study conducted in 2011 found that late feeding practices (after 6 months of age) were associated with reduced odds of picky eating and associated with a greater variety of foods eaten at 3 years of age (156). Although interesting and contradictory findings, caution should be made when comparing these results because of differences in the study population such as age, gender, and nationality.

The children who were introduced to solid foods at 5.0 months of age or later had a higher score for the component "breastfeeding" compared to the children introduced at 4.5 months of age or earlier. One reason for the higher score in the group introduced at 5.0 months of age or later could be that breastfeeding remained a more central component in this group of children compared to the group that had been introduced to solid foods earlier. Also, the Norwegian dietary guidelines recommend introducing solid foods at 4 months of age, if the infant is formula fed (18). Therefore, the majority of the non-breastfed children who received infant formula, most likely ended up in the group introduced to solid foods at 4.5 months or earlier. That could be a reason for the lower scores of breastfeeding in the introduction group at 4.5 months of age or earlier.

There were no differences between the two groups of age of introduction to solid foods, and scores for the single components "fruit" and "vegetables." This finding is comparable to a study conducted in 2014, which showed no association between vegetable intake in 4 to 6-months old infants introduced to solid foods before the age of 5.5 months compared to introduction after 5.5 months of age after a short period of introducing different vegetables (157). However, one study found that introducing solid foods to the child before 6 months of age compared to after 6 months of age was associated with a higher intake of vegetables at 9 months of age (158). Contrarily, another study found that early introduction to solid foods (before 5 months of age) was associated with a decreased intake of vegetables compared to introduction after 5 months of age in Japanese infants (159). Furthermore, the findings are inconclusive, with no clear associations between age of introduction to solid foods and fruit and vegetable intake.

### 5.5.4 Diet quality and variety index score according to parental and child characteristics

The differences in diet quality and variety index scores according to parental and child characteristics were also investigated in this study. A lower diet quality and variety index score was observed for children with the perception of eating-related problems. The lower score in the group of children with reported eating-related problems was expected because of children with eating problems may also eat less of the recommended amounts of foods in the diet quality and variety index. This finding is supported by findings from previous studies about diet quality and variety index scores children aged 12 months (71, 72, 155). This was also shown by that the children with the perception of eating-related problems had a higher score for "sugary foods and beverages", which reflected lower intakes. The single component scores "whole grains," "fruit," "vegetables," and "fish" were significantly lower in the group of children with the perception eating-related problems compared to children with no reported eating-related problems. Eating related problems for the child in this study may be comparable to picky eating. Picky eating in children has been linked to a lower intake of vegetables, whole grains, and fish compared to non-picky eaters in a recent review (160), while the intake of fruit has shown variable results (160).

High maternal and paternal education was associated with higher diet quality and variety index scores in the children in this study, which is supported by previous studies (69, 73, 74), in addition to higher parental education being a well-known determinant for better health in children (161-164). The scores for the single components "sugary foods and beverages," "dietary fats," and "breastfeeding." were also higher in the high maternal and paternal education group. In a large study in the UK, high maternal education was associated with a lower intake of sugar in small children, which can compare to the findings in this study (165). However, the intake of sugary foods and beverages has generally been reported low in Norwegian children in recent years, and the sugar intake has decreased dramatically from the first Spedkost study from 1998 (40, 41, 43, 44). This finding is comparable to a large study among American children aged 2 to 19 years, which also showed a significant decrease in the intake of sugar-sweetened beverages from 2001 to 2010 in children (166). Although the difference in score between the groups of maternal education level was significant, the score in both groups was still generally high (0.94 and 0.87), and the difference may not be as important as for other food groups. Some studies have also pointed towards that a high level of maternal education has been associated with longer breastfeeding duration in western populations (167, 168), which is in line with the findings in this study. Contrary, a review

conducted in China in 2017 found that mothers with a high level of education had lower odds of breastfeeding (169). However, caution should be made when comparing factors associated with breastfeeding duration in different populations due to potential differences in maternity leave benefits and other cultural and economic, economic differences between the study populations.

Children of mothers with paid work had a significantly higher diet quality and variety index scores compared to the children of mothers without paid work. One reason could be that mothers who had paid work had a different socioeconomic profile compared to mothers without paid work, for instance a higher income, which was not included as a variable in this study. A previous German study found no difference in diet quality in small children according to maternal work situation (170). However, the study had a different definition of the variable paid work, and the study also focused on older children compared to in this study. Therefore, the findings are not directly comparable to the present study. A difference in social class could also be connected to the mother`s work situation, where a higher social class has been associated with a higher diet quality indexscore in Australian children at 3 years of age (73).

There was also a significant difference in diet quality and variety indexscore among the different groups of birth weight. This finding is in contrast to findings in previous studies where no differences in diet quality and variety indexscores have been observed between groups with different birth weights (73, 128). However, one reason for this finding could be that some of the children in the lowest birth weight category were born premature, and, therefore, had not developed eating skills at the same level as children with normal birth weight. Therefore, the children with a low birth weight may eat less of the recommended foods in the diet quality and variety index.

The mother having two or more children was negatively associated with the diet quality and variety indexscore. This finding is in line with findings from a similar study (72), but not in line with two other studies in the same age group (69, 71). These two studies, however, included other ethnic groups and operated with a dietary risk score and not a dietary quality and variety score (69, 71), which could be a reason for the contradictory findings. One reason for the lower diet quality and variety indexscore in the children with one or more siblings could be that children with siblings are earlier exposed to unhealthy foods and affected by the dietary intake of their older siblings. However, the score for the single component "sugary

foods and beverages" did not differ between the groups according to the number of siblings. Furthermore, the score for the single component "vegetables" and "vitamin D" was significantly lower in the children with one or more siblings. One reason could be that the focus on healthy foods for the children becomes limited to the increasing number of children in the household.

There were no significant differences between diet quality and variety index score and the parental and child characteristics gender, weight at 12 months of age, gestational age, maternal age, maternal family situation, and maternal tobacco habits. These findings are in line with previous findings from similar studies (69, 71-73, 75, 128). However, higher maternal age has been associated with higher diet quality and variety index scores in four studies with similar age groups (73, 74, 128, 129). The mothers being married or cohabitant have also been associated with higher scores for children at 3 years of age (73) as well as male gender being associated with higher diet quality and variety index score in a Dutch study from 2015 (72). Also, the mother not smoking or using tobacco has been associated with higher scores in children (72, 73, 128).

Furthermore, the findings of the relationship between diet quality and variety index scores and parental and child characteristics should be interpreted with caution. These findings were derived from a cross-sectional design as the data for the diet quality and variety index score were collected at the same time as the parental and child characteristics were collected. Thus, a causal relationship cannot be determined. However, the results could indicate that certain parental and child factors could be of importance for the future diet quality and variety for children.

Lastly, the differences in diet quality and variety index scores between the different groups in this study were generally small, even though they showed significant associations. Therefore, one should consider if these differences are enough to present a clinical significance for these children regarding their future health and development.

# 6 Conclusion

This master thesis aimed to develop a diet quality and variety index for children aged 12 months and to explore differences in diet quality and variety index score between the children introduced to solid foods at 4.5 months of age or earlier and at 5.0 months of age or later. The main result indicated no difference in scores between the two groups. The mean diet quality and variety index score in the total sample was 7.6 points out of a total of 10.0 points, which indicates that Norwegian 12-month old children have a relatively high dietary quality and variety at this age. This study also showed that the diet quality and variety index score was higher for children with a birth weight between 2500 and 4500 grams, the children who were first born, and the children with no perception of eating-related problems. Among the children of parents with a high educational level, of married or cohabitant mothers, and of mothers who had paid work, higher diet quality and variety index scores were observed.

*Future perspectives*

The diet quality and variety index for children at 12 months of age offers a more holistic way of presenting the children's diets and could build a foundation for further research on how the diet in childhood affects other health parameters later in life.

Previous studies have observed decreasing diet quality and diet quality scores with increasing age from infancy into later childhood. To prevent the reduction in diet quality with increasing age, more focus should be given to developing more effective dietary interventions at an early stage of life. In the present study, foods with a lower score in the sample were fish, fruit, vegetables, and lean dairy products, and intakes of several of those food items are a challenge among all age groups in Norway. To improve the diet quality and variety among Norwegian children, interventions targeted at the intakes of the challenging foods may also be necessary. However, unfortunately, dietary interventions have not always resulted in substantial dietary changes in previous intervention studies. Hence, innovative strategies to improve dietary intake should be developed and tested. Kindergartens and schools may play an essential role in delivering dietary interventions and providing a health conscious environment for the children. Therefore, interventions targeted at these arenas could be helpful in making successful dietary changes in children.

In the Spedkost 12 survey, the majority of the mothers agreed to participate in future dietary surveys for their child. Because of the possibility, in the future, to contact the mothers who

participated in the Spedkost 12 months survey, a similar study on the same children at an older age could be interesting to conduct, with adjustments on the diet quality and variety index to meet increasing food intakes. Such study could provide useful data about the changes in diet quality and variety index scores with increasing age, as demonstrated in other studies. Other factors, such as ethnicity or residency, were not included in the questionnaire, and therefore, not as background factors in this thesis. However, there would also be interesting in future research to assess how the factors ethnicity and place of residency in Norway affect diet quality and variety index scores.

Age of introduction to solid foods showed no association with diet quality and variety index scores at 12 months of age in the children, which could indicate that the timing of introduction to solid foods within the recommended range is not associated with the quality and variation of the children's diet. However, more research is needed to clarify a possible role of the age of introduction to solid foods and later diet quality.

Socioeconomic differences in the child's diet were present already at 12 months of age, similar to findings in previous studies. Children of parents with lower education showed lower diet quality and variety index scores. Perhaps future dietary interventions in small children should be targeted to the groups with a lower socioeconomic status to prevent socioeconomic differences from evolving already in early childhood.

To conclude, the diet quality and variety index score is a new way of presenting the diet in Norwegian children at 12 months of age. The score was overall high, but with possible falling diet quality and variety with increasing age, the score can be improved. Further research on diet quality and variety in children could be useful to assess how the diet is affected by factors such as age of introduction to solid foods and parental and child characteristics.

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# Appendices

## Appendix 1

Approval from Norwegian Centre for Research Data (NSD)

Anne Lene Kristiansen
Postboks 1110 Blindern
0317 OSLO

Vår dato: 23.02.2018 Vår ref: 58855 / 3 / BGH Deres dato: Deres ref:

# Tilrådning fra NSD Personvernombudet for forskning § 7-27

Personvernombudet for forskning viser til meldeskjema mottatt 31.01.2018 for prosjektet:

| | |
|---|---|
| *58855* | *Spedkost 3 - hovedundersøkelse* |
| *Behandlingsansvarlig* | *Universitetet i Oslo, ved institusjonens øverste leder* |
| *Daglig ansvarlig* | *Anne Lene Kristiansen* |

## Vurdering

Etter gjennomgang av opplysningene i meldeskjemaet og øvrig dokumentasjon finner vi at prosjektet er unntatt konsesjonsplikt og at personopplysningene som blir samlet inn i dette prosjektet er regulert av § 7-27 i personopplysningsforskriften. På den neste siden er vår vurdering av prosjektopplegget slik det er meldt til oss. Du kan nå gå i gang med å behandle personopplysninger.

## Vilkår for vår anbefaling

Vår anbefaling forutsetter at du gjennomfører prosjektet i tråd med:

- opplysningene gitt i meldeskjemaet og øvrig dokumentasjon
- vår prosjektvurdering, se side 2
- eventuell korrespondanse med oss

## Meld fra hvis du gjør vesentlige endringer i prosjektet

Dersom prosjektet endrer seg, kan det være nødvendig å sende inn endringsmelding. På våre nettsider finner du svar på hvilke endringer du må melde, samt endringsskjema.

## Opplysninger om prosjektet blir lagt ut på våre nettsider og i Meldingsarkivet

Vi har lagt ut opplysninger om prosjektet på nettsidene våre. Alle våre institusjoner har også tilgang til egne prosjekter i Meldingsarkivet.

## Vi tar kontakt om status for behandling av personopplysninger ved prosjektslutt

Ved prosjektslutt 31.12.2020 vil vi ta kontakt for å avklare status for behandlingen av personopplysninger.

Se våre nettsider eller ta kontakt dersom du har spørsmål. Vi ønsker lykke til med prosjektet!

*Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.*

Vennlig hilsen

Marianne Høgetveit Myhren

Belinda Gloppen Helle

Kontaktperson: Belinda Gloppen Helle tlf: 55 58 28 74 / belinda.helle@nsd.no
Vedlegg: Prosjektvurdering

# Personvernombudet for forskning

## Prosjektvurdering - Kommentar

Prosjektnr: 58855

NASJONAL SAMARBEIDSSTUDIE
Vi forstår det slik at prosjektet er en nasjonal samarbeidsstudie hvor Universitetet i Oslo er behandlingsansvarlig institusjon. Personvernombudet forutsetter at ansvaret for behandlingen er avklart mellom institusjonene, og anbefaler at dere inngår en avtale som omfatter ansvarsfordeling, hvem som initierer prosjektet, bruk av data, eventuelt eierskap.

FORMÅL
Formålet med kostholdsundersøkelsen er å øke kunnskapen om kostholdet til spedbarn, følge utviklingen i kostholdet over tid, få et bedre grunnlag for å gi råd om kosthold samt å forebygge kostholdsrelaterte helseproblemer i denne aldersgruppen. Prosjektets pilotstudie har tidligere vært meldt og vurdert av personvernombudet (vår ref: 53936).

UTVALG OG REKRUTTERING
Prosjektet vil trekke et utvalg på 3000 6 måneder gamle barn født i en treukersperiode i mars 2018 og deres foresatte. Mødrene til barna må være født i Norge, Sverige eller Danmark og det må finnes et registrert telefonnummer til mor.

I følge opplysninger i meldeskjemaet trekkes utvalget tilfeldig fra Folkeregisteret via Evry etter godkjennelse fra Skatteetaten. Personvernombudet legger til grunn at taushetsplikten ikke er til hinder for førstegangskontakt og rekruttering, samt at frivilligheten understrekes ved rekruttering.

METODE OG DATAINNSAMLING
Hele utvalget vil få tilsendt en forespørsel om å delta i posten, adressert til barnets mor.

Datamaterialet skal samles inn ved at deltakerne besvarer et elektronisk spørreskjema eller et papirbasert spørreskjema. Deltakerne vil få tilsendt ett spørreskjema når barnet er 6 måneder og ett spørreskjema når barnet er 12 måneder.

I spørreskjemaet er det inkludert spørsmål om foresatte ønsker å delta eller ikke. Dersom prosjektet ikke mottar svar vil det gjennomføres en purrerunde. Purring vil skje tilsvarende for spørreundersøkelsen ved 6 mnd og ved 12 mnd. Det skal ikke gjennomføres purring på den gruppen som aktivt har svart at de ikke ønsker å delta

Det behandles sensitive personopplysninger om helseforhold.

SAMTYKKE/HJEMMELSGRUNNLAG
Dere har opplyst i meldeskjema at utvalget vil motta skriftlig informasjon om prosjektet, og samtykke skriftlig til å delta. Vår vurdering er at informasjonsskrivet til utvalget er godt utformet. Dette gjelder både

informasjonsskrivene som sendes ut ved 6 mnd, 12 mnd og informasjonsskrivene hvor det purres på deltakerne.

Vi minner imidlertid om at NSD har byttet navn til NSD - Norsk senter for forskningsdata AS.

ANDRE TILLATELSER OG VURDERINGER
Det vil behandles noen personopplysninger i forbindelse med rekrutteringen, dvs. noen bakgrunnsvariabler om utvalget for å kunne trekke et representativt utvalg. Personvernombudet finner at behandlingen kan hjemles i personopplysningsloven § 8 d (allmenn interesse). Vi legger til grunn at øvrige nødvendige tillatelser innhentes, for eksempel tillatelse fra Skattedirektoratet.

Det behandles enkelte opplysninger om tredjeperson (forelderen som ikke svarer på spørreskjemaet). Det skal kun registreres opplysninger om forelderens utdannelse. Opplysningene er av mindre omfang og ikke sensitive, og skal anonymiseres i publikasjon. Så fremt personvernulempen for tredjeperson reduseres på denne måten, kan prosjektleder unntas fra informasjonsplikten overfor tredjeperson, fordi det anses uforholdsmessig vanskelig å informere.

Personvernombudet legger rutinemessig til grunn at taushetsplikten ikke er til hinder for behandling av personopplysninger i prosjektet. Vi legger også til grunn at frivilligheten understrekes i forbindelse med rekruttering og purring.

PREMIERING
Alle deltakerne som fullfører undersøkelsen vil motta et gavekort på 500 kr. Personvernombudet vurderer at premieringen ikke går på bekostningen av frivilligheten til å delta i prosjektet.

INFORMASJONSSIKKERHET
Personvernombudet forutsetter at dere behandler alle data i tråd med Universitetet i Oslo sine retningslinjer for datahåndtering og informasjonssikkerhet.

PROSJEKTSLUTT OG VIDERE LAGRING AV DATAMATERIALET
Prosjektslutt er oppgitt til 31.12.2020. Det fremgår av meldeskjema og informasjonsskriv at datamaterialet skal lagres med personopplysninger frem til 31.12.2040 for videre forskning og mulige oppfølgingsstudier. I følge informasjonsskrivet skal deltakerne kontaktes med ny informasjon og det skal innhentes nytt samtykke dersom datamaterialet skal brukes i nye studier.

OPPFØLGINGSSTUDIER OG VIDERE FORSKNING
Personvernombudet minner om at dersom datamaterialet som er samlet inn i Spedkost 3 skal brukes til nye forskningsformål vil dette kreve søknad til personvernombudet.

ANONYMISERING AV DATAMATERIALET
Innen 31.12.2040 skal datamaterialet anonymiseres, med mindre det er innhentet samtykke fra informantene til videre lagring. Vanligvis innebærer anonymisering å:
- slette direkte personopplysninger (som navn/koblingsnøkkel)
- slette/omskrive indirekte personopplysninger (identifiserende sammenstilling av bakgrunnsopplysninger som

f.eks. bosted/arbeidssted, alder og kjønn)
- slette koblinger mellom IP-/epostadresser og besvarelser

## Appendix 2

The Spedkost 12 months questionnaire

40407

# SPEDKOST

## Undersøkelse av kostholdet blant spedbarn

Kryss av for "Ja" i ruten under dersom du samtykker i å delta i undersøkelsen. Dersom du ikke ønsker å delta og vil reservere deg mot å bli oppringt samt å bli purret på, krysser du av for "Nei" og returnerer skjemaet.

☐ Ja

☐ Nei

---

**Ved utfylling er det viktig at du går frem slik**:

* Sett kryss i boksene. Slik: ☒ Ikke slik: ☒
* Ved rettelser kan du markere tydelig at det er feil, slik: ■
* I de åpne feltene skriver du inn tydelig tekst
* Der det spørres etter tall, skriver du disse slik: 1 2 3 4 5 6 7 8 9
* Skjemaet må ikke brettes
* Det utfylte skjemaet vil bli lest av en maskin. **Bruk blå eller sort kulepenn**.

---

Fyll inn opplysninger om barnets vekt og lengde - ved fødsel og ved 12 måneders alder (fra helsekortet).

**Dersom barnet ikke har vært på 12-månederskontrollen ennå, kan du la feltene for vekt og lengde ved 12 måneders alder stå åpne.**

### Fylles ut fra helsekortet

**Dato for måling av vekt/lengde (12 mnd):** dag mnd år

**Barnets vekt (12 mnd):** gram **Barnets lengde (12 mnd):** cm

**Fødselsvekt:** gram **Lengde ved fødsel:** cm

## BAKGRUNNSSPØRSMÅL

**1. Dato for utfylling av skjemaet**

*Skriv inn datoen for dag, måned og år i rutene.*

☐☐ dag ☐☐ mnd ☐☐☐☐ år

**2. Hva er barnets kjønn?**

*Sett **kun** ett kryss.*

☐ Jente

☐ Gutt

**3. Hvem fyller ut skjemaet?**

*Her kan du sette flere kryss.*

☐ Barnets mor

☐ Barnets far

☐ Barnets medmor

## SPØRSMÅL OM MORSMELK

**4. Får barnet morsmelk nå?**

*Sett **kun** ett kryss.*

☐ Ja ⇨ *Gå til spørsmål 5 og deretter til spørsmål 8*

☐ Nei, men barnet har fått morsmelk tidligere ⇨ *Gå til spørsmål 6*

☐ Nei, barnet har aldri fått morsmelk ⇨ *Gå til spørsmål 7*

**5. Hvor mange ganger i døgnet får barnet vanligvis morsmelk nå?**

*Regn også med de gangene barnet bare får morsmelk til trøst eller kos, dag- og nattetid.*
*Sett **kun** ett kryss.*

☐ 1 gang

☐ 2-3 ganger

☐ 4-5 ganger

☐ 6-7 ganger

☐ 8-9 ganger

☐ 10 ganger eller flere

**6. Hvor gammelt var barnet da det sluttet å få morsmelk?**

*Sett **kun** ett kryss.*

| Uker | | | | | | | Måneder | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**7. Hva var viktigste og nest viktigste grunn til at mor ikke ammet barnet eller har sluttet å amme det?**

*Sett **kun** ett kryss for viktigste grunn og **kun** ett kryss for nest viktigste grunn.*

| | Viktigste grunn | Nest viktigste grunn |
|---|---|---|
| Barnet ville ikke | ☐ | ☐ |
| Barnet biter/har fått tenner | ☐ | ☐ |
| Sugeproblemer | ☐ | ☐ |
| Barnet sykt/for tidlig født | ☐ | ☐ |
| Kolikk/urolig barn | ☐ | ☐ |
| For lite melk | ☐ | ☐ |
| Mor begynte å arbeide/å studere | ☐ | ☐ |
| Mor syk/medisinbruk | ☐ | ☐ |
| Bekymring/stress/sliten | ☐ | ☐ |
| Brystbetennelse | ☐ | ☐ |
| Tilstoppede melkeganger | ☐ | ☐ |
| Såre brystknopper | ☐ | ☐ |
| Brystoperert | ☐ | ☐ |
| Ble rådet til å slutte | ☐ | ☐ |
| Ingen spesielle problemer, men ønsket ikke å amme (lenger) | ☐ | ☐ |
| Andre grunner | ☐ | ☐ |

Dersom mor ble rådet til å slutte å amme, hvem var det som rådet henne til det?
(f.eks. helsepersonell, familie, venner)

## SPØRSMÅL OM MORSMELKERSTATNING/MELK

**8. Hvor gammelt var barnet da det begynte med morsmelkerstatning/kumelk i tillegg til eller istedenfor morsmelk?**

*Sett **kun** ett kryss for hver matvare.*

| | | Barnets alder (måneder) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ikke fått | 0-3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Morsmelkerstatning som drikke | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Morsmelkerstatning til grøt o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kumelk som drikke | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kumelk til grøt o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kumelk i annen matlaging | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## 9. Hvor ofte og hvor mye morsmelkerstatning pleier barnet å drikke nå?

*For hver melketype settes **kun** ett kryss for **hvor ofte**, enten ganger pr. uke eller ganger pr. døgn. I tillegg settes **kun** ett kryss for **hvor mye** pr. gang. For mengdeangivelse se på bilde 1 i bildeboken. 100 ml = 1 dl.*

| | **Hvor ofte?** | | | | | | | | **Hvor mye?** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Ganger pr. uke** | | ***eller*** | **Ganger pr. døgn** | | | | | **Mengde (ml) pr. gang** | | | |
| | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 | 3 | 4 | 5 el. flere | 60 A | 120 B | 180 C | 240 D |
| NAN Pro 1 eller NAN Organic 1 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| NAN Pro 2, NAN Organic 2, NAN Pro 3 eller NAN Pro 4 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| NAN H.A. 1 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| HiPP Combiotic 1 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| HiPP Combiotic 2 eller 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Semper Allomin 1 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Semper Allomin 2 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Holle morsmelkerstatning 1 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Holle tilskuddsblanding 2 eller 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Annen morsmelkerstatning/ tilskuddsblanding | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

oppgi type:

## 10. Hvor ofte og hvor mye melk pleier barnet å drikke nå?

*For hver melketype settes **kun** ett kryss for **hvor ofte**, enten ganger pr. uke eller ganger pr. døgn. I tillegg settes **kun** ett kryss for **hvor mye** pr. gang. For mengdeangivelse se på bilde 2 i bildeboken. 100 ml = 1 dl. Morsmelk regnes ikke med her.*

| | Hvor ofte? | | | | | | | | Hvor mye? | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ganger pr. uke | | *eller* | Ganger pr. døgn | | | | | Mengde (ml) pr. gang | | | |
| | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 | 3 | 4 | 5 el. flere | 30 A | 60 B | 120 C | 180 D |
| Helmelk (søt og sur) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lettmelk (1.0 % og 1.2 % fett) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lettmelk (0.5 % fett, tidligere ekstra lett melk) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Skummetmelk (søt og sur) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Biola, Cultura o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Sjokolademelk, O'boy, jordbærmelk o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Drikkeyoghurt (Danonino, Actimel o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Annen melk | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

oppgi type: ☐

## SPØRSMÅL OM FAST FØDE

## 11. Hvor gammelt var barnet da det første gang fikk fast føde?

*Med fast føde menes alle andre matvarer enn melk/vann/saft/juice/annen drikke og kosttilskudd.*
*Fast føde inkluderer velling selv om denne er tyntflytende.*
*Sett **kun** ett kryss.*

| Uker | | | | | | | Måneder | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**12. Hvor gammelt var barnet da det fikk følgende matvarer for første gang?**
*Sett **kun** ett kryss for hver matvare.*

| | Barnets alder (måneder) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ikke fått | 0-3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Mais-/ris-/hirsegrøt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Havre-/hvete-/bygg-/ kavringgrøt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Frukt-/bærmos | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Poteter | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Grønnsaker | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kjøtt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Fisk | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Brød | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Yoghurt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Nøtter/nøtteprodukter (peanøttsmør o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## SPØRSMÅL OM YOGHURT

**13. Hvor ofte og hvor mye yoghurt pleier barnet å spise nå?**
*For hver yoghurttype settes **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** barnet vanligvis spiser pr. gang.*

| | Hvor ofte? | | | | | | Hvor mye? | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ganger pr. uke | | *eller* | Ganger pr. dag | | | Mengde pr. gang | | | | |
| | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 | 3 el. flere | | ¼ | ½ | ¾ | 1 |
| Barnefruktyoghurt (Sprett, Safari, Danonino o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | beger/ pose | ☐ | ☐ | ☐ | ☐ |
| Barnefruktyoghurt med topping (Q-meieriene o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | beger | ☐ | ☐ | ☐ | ☐ |
| Fruktyoghurt (Tine, Q-meieriene o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | beger/ pose | ☐ | ☐ | ☐ | ☐ |
| Go'morgen yoghurt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | beger | ☐ | ☐ | ☐ | ☐ |
| Fruktyoghurt uten fett og sukker (Yoplait Double 0% o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | beger | ☐ | ☐ | ☐ | ☐ |
| Yoghurt naturell, Biola yoghurt, gresk yoghurt naturell | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ss | 2 ☐ | 4 ☐ | 6 ☐ | 8 ☐ |
| Skyr Mini (klemmepose) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | pose | ¼ ☐ | ½ ☐ | ¾ ☐ | 1 ☐ |

## SPØRSMÅL OM GRØT, KORNBLANDING, GRYN O.L.

**14. Hvor ofte og hvor mye grøt, kornblanding, gryn o.l. pleier barnet å spise nå?**

*For hver grøttype, kornblanding, gryn o.l. settes **kun** ett kryss for **hvor ofte**, enten ganger pr. uke eller ganger pr. dag. I tillegg settes **kun** ett kryss for **hvor mye** barnet vanligvis spiser pr. gang. For mengdeangivelse se på bilde 3 og 4 i bildeboken.*

| | Hvor ofte? | | | | | | | Hvor mye? | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ganger pr. uke | | *eller* | Ganger pr. dag | | | | Mengde (dl) pr. gang | | | | | | |
| **Hjemmelaget grøt av:** | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 | 3 | 4 el. flere | | ½ A | 1 B | 1½ C | 2 D | 2½ E | 3 F |
| Havregryn | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Grovt/sammalt mel | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Fint/hvitt mel/kavring/ semule/ris/mais | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Hirse | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| **Industrifremstilt grøt/velling fra pulver:** | | | | | | | | | A | B | C | D | E | F |
| Nestlé grøt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Semper grøt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| HiPP grøt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Holle grøt (tilberedt med vann/melk) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Velling (fra pulver eller drikkeklar) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| **Industrifremstilt grøt på klemmepose:** | | | | | | | | | ¼ | ½ | 1 | 2 | | |
| Nestlé, HiPP, Lillego, Lev Vel, Organix | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | pose | ☐ | ☐ | ☐ | ☐ | | |
| Semper | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | pose | ☐ | ☐ | ☐ | ☐ | | |
| **Kornblanding, gryn o.l. med melk:** | | | | | | | | | A | B | C | D | | |
| Havregryn, puffet havre, puffet hvete, 4'korn o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 4 | ☐ | ☐ | ☐ | ☐ | | |
| Fruktmüsli (Axa, Eldorado, Rema 1000 o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 4 | ☐ | ☐ | ☐ | ☐ | | |
| Weetabix, Cheerios, Havre fras, All Bran o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 4 | ☐ | ☐ | ☐ | ☐ | | |
| Solfrokost, Crunchy müsli o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 4 | ☐ | ☐ | ☐ | ☐ | | |
| Cornflakes, puffet ris, Rice Krispies o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 4 | ☐ | ☐ | ☐ | ☐ | | |
| Honni-Korn, Frosties, Coco pops o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 4 | ☐ | ☐ | ☐ | ☐ | | |
| Müsli for barn (Holle o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 4 | ☐ | ☐ | ☐ | ☐ | | |

**15. Hvor ofte og hvor mye av de ulike matvarene nevnt nedenfor tilsettes på grøt, gryn, kornblanding o.l.?**

*For hver matvare settes **kun** ett kryss for **hvor ofte**, enten ganger pr. uke eller ganger pr. dag. I tillegg settes **kun** ett kryss for **hvor mye** barnet vanligvis spiser pr. gang.*

| | Hvor ofte? | | | | | | | Hvor mye? | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ganger pr. uke | | *eller* | Ganger pr. dag | | | | Mengde pr. gang | | | |
| **Tilsatt på grøt, gryn, kornblanding o.l.:** | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 | 3 | 4 el. flere | 1 ts | 2 ts | 3 ts | 4 ts |
| Syltetøy | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lett syltetøy | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Sukker | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Honning | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Frukt-/bærmos | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**16. Dersom barnet får grøt/velling nå, hva slags væske tilsettes vanligvis grøten/vellingen ved tilberedning/koking?**

*Hvis det vanligvis brukes mer enn én type væske, settes flere kryss.*

- ☐ Bruker ikke grøt/velling
- ☐ Vann
- ☐ Morsmelk
- ☐ Morsmelkerstatning
- ☐ Helmelk
- ☐ Lettmelk (1.0 % og 1.2 % fett)
- ☐ Lettmelk (0.5 % fett, tidligere ekstra lett melk)
- ☐ Skummetmelk
- ☐ Annet

**17. Dersom barnet har fått industrifremstilt grøt daglig i en periode fra 6 til 12 måneders alder, hvor ofte og hvor mye spiste barnet da det spiste mest?**

*Sett **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** pr. gang. Se mengdeangivelse på bilde 3 i bildeboken.*

| | Hvor ofte? | | | | | Hvor mye? | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ganger pr. dag | | | | | Mengde (dl) pr. gang | | | | | | |
| | Ikke spist daglig | 1 | 2 | 3 | 4 el. flere | | ½ A | 1 B | 1½ C | 2 D | 2½ E | 3 F |
| Industrifremstilt grøt tilberedt med melk | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Industrifremstilt grøt tilberedt med vann | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

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## SPØRSMÅL OM BRØD OG PÅLEGG

**18. Hvilken type brød og hvor mye brød pleier barnet å spise nå?**
*For hver brødtype settes **kun** ett kryss for antall skiver pr. dag (½ rundstykke = 1 skive = 1 polarbrød).*

| | Antall skiver pr. dag | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aldri/ sjelden | ½ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 el. flere |
|  Fint brød (0-25% grovt) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Halvgrovt brød (25-50% grovt) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Grovt brød (50-75% grovt) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
|  Ekstra grovt brød (75-100% grovt) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Knekkebrød, kavring o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Sum skiver pr. dag =** ☐☐ **x 7 =** ☐☐☐ **= Sum pr. uke.** Summen brukes i spørsmål 22.

**19. Skjæres skorpene på brødskivene til barnet vanligvis bort?**
*Sett **kun** ett kryss.*

- ☐ Bruker ikke brødskiver
- ☐ Ja
- ☐ Nei

**20. Hva smører du vanligvis på brød, knekkebrød o.l. til barnet?**
*Sett **kun** ett kryss.*

- ☐ Bruker ikke smør/margarin på brødet ⇨ *Gå til spørsmål 22*
- ☐ Smør (meierismør o.l.)
- ☐ Bremykt
- ☐ Brelett
- ☐ Melange
- ☐ Soft Flora, Vita
- ☐ Olivero
- ☐ Lett margarin (Soft Flora Lett, Vita lett o.l.)
- ☐ Margarin fra Rema 1000, First Price, Coop o.l.
- ☐ Annen margarin

**21. Hvor mye smører du vanligvis på brød, knekkebrød o.l. til barnet?**
*Se mengdeangivelse på bilde 5 i bildeboken.*
*Sett **kun** ett kryss.*

- ☐ Skrapet lag (Bilde A)
- ☐ Middels lag (Bilde B)
- ☐ Godt dekket lag (Bilde C)
- ☐ Tykt lag (Bilde D)

**22. Hvilke påleggstyper pleier barnet å spise nå? (fortsetter også på neste side)**
*For hver påleggstype settes **kun** ett kryss for antall brødskiver, knekkebrød o.l. pålegget brukes til i løpet av en uke. Ta utgangspunkt i sum brødskiver pr. uke fra spørsmål 18.*

| | | **På antall skiver pr. uke** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Aldri/sjeldnere enn hver uke | ½ -1 | 2-3 | 4-5 | 6-7 | 8-14 | 15-21 | 22-28 | 29 el. flere |
| Brunost/prim | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Barnebrunost/barneprim | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lett/mager brunost/prim | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Hvitost | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lett/mager hvitost | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Smøreost | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lett/mager smøreost | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Leverpostei | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Mager leverpostei | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kyllingpostei | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Servelat | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kokt skinke, lettservelat o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kylling/kalkunpålegg | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Salami, fårepølse o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Svolværpostei, Lofotpostei | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Makrell i tomat o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kaviar | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Egg (kokt, stekt, eggerøre) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**22. Hvilke påleggstyper pleier barnet å spise nå?**

*For hver påleggstype settes **kun** ett kryss for antall brødskiver i løpet av en uke.*
*Ta utgangspunkt i sum brødskiver pr. uke fra spørsmål 18.*

| | Aldri/sjeldnere enn hver uke | På antall skiver pr. uke: ½ -1 | 2-3 | 4-5 | 6-7 | 8-14 | 15-21 | 22-28 | 29 el. flere |
|---|---|---|---|---|---|---|---|---|---|
| Syltetøy, marmelade | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lett syltetøy/syltetøy med mindre sukker | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Honning | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Hapå | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Sjokolade-, nøttepålegg o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Sjokoladepålegg med mindre sukker | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Annet søtt pålegg (Banos, Sunda o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Peanøttsmør o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Salat med majones (rekesalat o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Frukt som pålegg (banan o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Grønnsaker som pålegg | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Annet pålegg | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

oppgi type: ☐

## SPØRSMÅL OM MIDDAGSMAT (UTENOM INDUSTRIFREMSTILT BARNEMAT)

**23. Hvor ofte og hvor mye middagsmat pleier barnet å spise nå? (fortsetter også på neste side)** *For hver type middagsmat settes **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** pr. gang. Industrifremstilt barnemat på glass/pose regnes ikke med her. Spørsmål om grønnsaker og tilbehør som poteter, ris og pasta kommer senere i skjemaet.*

| | Hvor ofte? Aldri/sjeldnere enn hver måned | Ganger pr. mnd: 1 | 2 | 3 | *eller* Ganger pr. uke: 1 | 2 | 3 el. flere | Hvor mye? Mengde pr. gang | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Kjøtt og kjøttretter:** | | | | | | | | | | | | |
| Grill-, wiener-, kjøttpølser o.l. av storfe- og svinekjøtt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 7 | A ☐ | B ☐ | C ☐ | D ☐ |
| Grill-, wiener-, kjøttpølser o.l. av kylling/kalkun | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 7 | A ☐ | B ☐ | C ☐ | D ☐ |
| Magre grill-, wiener-, kjøttpølser o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 7 | A ☐ | B ☐ | C ☐ | D ☐ |
| Kjøttkaker, medisterkaker, kjøttpudding, kjøttboller av storfe/svin o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 8 | A ☐ | B ☐ | C ☐ | D ☐ |
| Kjøttkaker, karbonader, kjøttboller av kylling/kalkun | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 8 | A ☐ | B ☐ | C ☐ | D ☐ |
| Hamburgere, karbonader av storfe/svin o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ½ ☐ | 1 ☐ | 1½ ☐ | 2 ☐ |

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## 23. Hvor ofte og hvor mye middagsmat pleier barnet å spise nå?

*For hver type middagsmat settes **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** pr. gang. Industrifremstilt barnemat på glass/pose regnes ikke med her. Spørsmål om grønnsaker og tilbehør som poteter, ris og pasta kommer senere i skjemaet.*

| | **Hvor ofte?** | | | | | | **Hvor mye?** |
|---|---|---|---|---|---|---|---|
| | | **Ganger pr. mnd** | | ***eller*** | **Ganger pr. uke** | | **Mengde pr. gang** |
| **Kjøtt og kjøttretter:** | Aldri/sjeldnere enn hver måned | 1 | 2 | 3 | 1 | 2 | 3 el. flere | |
| Kjøttsaus/kjøttretter av kjøttdeig | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 6 A ☐ B ☐ C ☐ D ☐ |
| Kjøttsaus/kjøttretter av karbonadedeig/svinekjøttdeig | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 6 A ☐ B ☐ C ☐ D ☐ |
| Kjøttsaus/kjøttretter av kylling/kalkunkjøttdeig | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 6 A ☐ B ☐ C ☐ D ☐ |
| Kjøtt av okse, lam, svin o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 6 A ☐ B ☐ C ☐ D ☐ |
| Kylling, høne, kalkun | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 6 A ☐ B ☐ C ☐ D ☐ |
| Gryte med helt kjøtt fra okse, lam, svin o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 6 A ☐ B ☐ C ☐ D ☐ |
| Gryte med kylling/kalkun | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 6 A ☐ B ☐ C ☐ D ☐ |
| Taco (fylte lefser) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | liten lefse ¼ ☐ ½ ☐ ¾ ☐ 1 ☐ |
| **Fisk og fiskemat:** | | | | | | | | |
| Fiskeboller, fiskepudding o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk./ skive ½ ☐ 1 ☐ 2 ☐ 3 ☐ |
| Fiskegrateng | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 11 A ☐ B ☐ C ☐ D ☐ |
| Fiskekaker | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. ½ ☐ 1 ☐ 2 ☐ 3 ☐ |
| Fiskepinner, panert fisk o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. 1 ☐ 2 ☐ 3 ☐ 4 ☐ |
| Fiskegryte/suppe | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 10 A ☐ B ☐ C ☐ D ☐ |
| Torsk, sei, annen hvit fisk | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 9 A ☐ B ☐ C ☐ D ☐ |
| Ørret, laks, makrell, sild | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 9 A ☐ B ☐ C ☐ D ☐ |
| **Annen middagsmat:** | | | | | | | | |
| Tomatsuppe, annen suppe | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 10 A ☐ B ☐ C ☐ D ☐ |
| Pannekaker | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. ½ ☐ 1 ☐ 2 ☐ 3 ☐ |
| Risgrøt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 12 A ☐ B ☐ C ☐ D ☐ |
| Pizza (1 bit = 1/8 Pizza Grandiosa) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bit ½ ☐ 1 ☐ 1½ ☐ 2 ☐ |
| Omelett | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | av antall egg ½ ☐ 1 ☐ 1½ ☐ 2 ☐ |
| Vegetarrett (linsegryte, bønnegryte o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 6 A ☐ B ☐ C ☐ D ☐ |

Annen middagsmat, oppgi type:

**24. Hvor ofte og hvor mye poteter, ris, pasta, grønnsaker og saus pleier barnet å spise nå?**

*For hver matvaretype settes **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** pr. gang. Her regnes både det som spises til middag og eventuelt til andre måltider i løpet av dagen. Industrifremstilt barnemat på glass/pose regnes ikke med her.*

| | **Hvor ofte?** | | | | | **Hvor mye?** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Ganger pr. uke** | ***eller*** | **Ganger pr. dag** | | **Mengde pr. gang** | | | | |
| **Poteter, ris, pasta:** | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 el. flere | | | | | |
| Poteter, kokt/most | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 11 | A ☐ | B ☐ | C ☐ | D ☐ |
| Pommes frites, stekte poteter | ☐ | ☐ | ☐ | ☐ | ☐ | stav/båt | 1 ☐ | 2 ☐ | 4 ☐ | 6 ☐ |
| Ris | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 12 | A ☐ | B ☐ | C ☐ | D ☐ |
| Pasta/nudler | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 12 | A ☐ | B ☐ | C ☐ | D ☐ |
| Fullkornspasta | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 12 | A ☐ | B ☐ | C ☐ | D ☐ |
| Hamburger-, pølsebrød, lomper | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ½ ☐ | 1 ☐ | 1½ ☐ | 2 ☐ |
| **Saus og annet:** | | | | | | | | | | |
| Brun saus, hvit saus | ☐ | ☐ | ☐ | ☐ | ☐ | ss | 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ |
| Smeltet margarin, smør | ☐ | ☐ | ☐ | ☐ | ☐ | ss | 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ |
| Ketchup | ☐ | ☐ | ☐ | ☐ | ☐ | ss | ½ ☐ | 1 ☐ | 1½ ☐ | 2 ☐ |
| **Grønnsaker (rå, kokte, moset):** | | | | | | | | | | |
| Gulrot | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 13 | A ☐ | B ☐ | C ☐ | D ☐ |
| Kålrot | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 13 | A ☐ | B ☐ | C ☐ | D ☐ |
| Blomkål, brokkoli | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 13 | A ☐ | B ☐ | C ☐ | D ☐ |
| Frossen grønnsaksblanding | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 14 | A ☐ | B ☐ | C ☐ | D ☐ |
| Råkost | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 15 | A ☐ | B ☐ | C ☐ | D ☐ |
| Spinat | ☐ | ☐ | ☐ | ☐ | ☐ | ss | 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ |
| Agurk | ☐ | ☐ | ☐ | ☐ | ☐ | skiver | 2 ☐ | 4 ☐ | 6 ☐ | 8 ☐ |
| Tomat (¼ tomat = 1 cherrytomat) | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ¼ ☐ | ½ ☐ | ¾ ☐ | 1 ☐ |
| Erter | ☐ | ☐ | ☐ | ☐ | ☐ | ss | 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ |
| Bønner, linser o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ss | 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ |
| Mais | ☐ | ☐ | ☐ | ☐ | ☐ | ss | 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ |
| Paprika | ☐ | ☐ | ☐ | ☐ | ☐ | ringer | ½ ☐ | 1 ☐ | 2 ☐ | 3 ☐ |
| Avokado (1 bit = 1/8 avokado) | ☐ | ☐ | ☐ | ☐ | ☐ | bit | 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ |
| Andre grønnsaker | ☐ | ☐ | ☐ | ☐ | ☐ | | | | | |

oppgi type:

**25. Hvilken type fett bruker du vanligvis til matlaging (sauser, steking o.l.)?**
*Her kan du sette flere kryss.*

- ☐ Bruker ikke
- ☐ Smør (meierismør o.l.)
- ☐ Bremykt
- ☐ Melange
- ☐ Soft Flora, Vita
- ☐ Olivero
- ☐ Flytende margarin på flaske (Vita, Melange, Bremykt o.l.)
- ☐ Margarin fra Rema 1000, First Price, Coop o.l.
- ☐ Annen margarin
- ☐ Rapsolje
- ☐ Olivenolje
- ☐ Andre oljer (solsikke, soya, mais o.l.)

## SPØRSMÅL OM INDUSTRIFREMSTILT BARNEMAT PÅ GLASS/POSE

**26. Dersom barnet får industrifremstilt barnemat på glass/pose, hvor ofte og hvor mye pleier det å spise?**
*For hver type industrifremstilt barnemat på glass/pose settes **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** pr. gang. For mengdeangivelser se på bilde 16 og 17 i bildeboken. 1 klemmepose = mengde B.*

| | **Hvor ofte?** | | | | | | **Hvor mye?** | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Ganger pr. uke** | | | ***eller*** | **Ganger pr. dag** | | **Mengde (glass) pr. gang** | | | |
| | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 | 3 el. flere | ¼ A | ½ B | ¾ C | 1 D |
| Potet/grønnsaker (uten kjøtt og fisk) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Pasta/ris og grønnsaker (uten kjøtt) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Pasta/ris, grønnsaker og kylling/kalkun | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Pasta/ris, grønnsaker og kjøtt av okse, lam, svin o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Grønnsaker og kjøtt av okse, lam, svin o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Grønnsaker og fisk | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| **Industrifremstilt frukt-/bær-/grønnsaksmos:** | | | | | | | ¼ A | ½ B | ¾ C | 1 D |
| Smoothie/frukt-/bærmos, kun frukt/bær | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Smoothie/frukt-/bærmos med korn | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Smoothie/frukt-/bærmos med yoghurt, med/uten korn | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Frukt- og grønnsaksmos | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Dersom barnet får andre typer barnemat på glass/pose, oppgi type:

## SPØRSMÅL OM IS, KAKER, KJEKS, GODTERIER O.L.

**27. Hvor ofte og hvor mye is, kaker, kjeks, godterier o.l. pleier barnet å spise nå?**
*For hver matvaretype settes **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** pr. gang.*

| | Hvor ofte? | | | | | | | Hvor mye? | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ganger pr. mnd | | *eller* | | | | Ganger pr. uke | Mengde pr. gang | | | | |
| | Aldri/sjeldnere enn hver måned | 1-3 | 1 | 2 | 3 | 4 | 5 el. flere | | A | B | C | D |
| Is - fløteis (1 pinne = mengde C) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 18 | ☐ | ☐ | ☐ | ☐ |
| Is - saftis | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | pinne | ☐ ½ | ☐ 1 | | |
| Puddinger, gelé, fromasj | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 18 | ☐ A | ☐ B | ☐ C | ☐ D |
| Boller, skolebrød o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ ¼ | ☐ ½ | ☐ 1 | ☐ 2 |
| Kaker (sjokoladekake, formkake, muffins o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ ¼ | ☐ ½ | ☐ 1 | ☐ 2 |
| Vafler | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | plate | ☐ ¼ | ☐ ½ | ☐ 1 | ☐ 1½ |
| Barnekjeks (HiPP, Holle o.l) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |
| Andre barnekjeks (Tom & Jerry, Eventyrkjeks, Bokstavkjeks o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |
| Søte kjeks (Mariekjeks, fylte kjeks o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ ½ | ☐ 1 | ☐ 2 | ☐ 3 |
| Smørbrødkjeks (Kornmo, Kaptein, Ritz o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ ½ | ☐ 1 | ☐ 2 | ☐ 3 |
| Riskaker | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ ¼ | ☐ ½ | ☐ 1 | ☐ 2 |
| Müslibar (Bixit, Mellombar, Go'morgen o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ ¼ | ☐ ½ | ☐ ¾ | ☐ 1 |
| Sjokolade | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bit | ☐ 2 | ☐ 4 | ☐ 6 | ☐ 8 |
| Smågodt, seigmenn, drops o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ 2 | ☐ 4 | ☐ 6 | ☐ 8 |
| Snacks (potetgull, popcorn, ostepop o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | dl | ☐ ½ | ☐ 1 | ☐ 1½ | ☐ 2 |
| Barnemaissnacks (Skumpinner, Maismums o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ☐ 2 | ☐ 4 | ☐ 6 | ☐ 8 |

Dersom barnet får andre typer is, kaker, kjeks, godterier o.l., oppgi type:

## SPØRSMÅL OM FRUKT OG BÆR

**28. Hvor ofte og hvor mye frukt og bær pleier barnet å spise nå?**

*For hver type frukt/bær settes **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** pr. gang. Frukt og bær som pålegg til brødskiver og fra industrifremstilt barnemat på glass/pose regnes ikke med her.*

| | Hvor ofte? | | | | | | | Hvor mye? | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ganger pr. uke | | | *eller* | Ganger pr. dag | | | Mengde pr. gang | | | | |
| | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 | 3 el. flere | | A | B | C | D |
| Hjemmelaget frukt- og grønnsaksmos | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 17 | ☐ | ☐ | ☐ | ☐ |
| Hjemmelaget smoothie/ frukt-/bærmos | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | bilde 17 | ☐ | ☐ | ☐ | ☐ |
| Bær (friske, frosne) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ss | 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ |
| Appelsin, klementin o.l. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | båter | 2 ☐ | 4 ☐ | 6 ☐ | 8 ☐ |
| Banan | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ¼ ☐ | ½ ☐ | ¾ ☐ | 1 ☐ |
| Eple, pære | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ¼ ☐ | ½ ☐ | ¾ ☐ | 1 ☐ |
| Druer | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | 3 ☐ | 6 ☐ | 9 ☐ | 12 ☐ |
| Annen frukt (kiwi, melonskive o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ¼ ☐ | ½ ☐ | ¾ ☐ | 1 ☐ |
| Hermetisk frukt | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ss | 1 ☐ | 2 ☐ | 3 ☐ | 4 ☐ |
| Rosiner (1 eske = 42 g) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | eske | ¼ ☐ | ½ ☐ | ¾ ☐ | 1 ☐ |
| Annen tørket frukt (aprikos, svisker o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stk. | ½ ☐ | 1 ☐ | 1½ ☐ | 2 ☐ |
| Fruktstang, fruktsnøre o.l. (Nestlé, Ella's, Kiddylicious o.l.) (1 pose snører = 1/2 stang) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | stang | ¼ ☐ | ½ ☐ | ¾ ☐ | 1 ☐ |

## SPØRSMÅL OM VANN, SAFT, JUICE O.L.

**29. Hvor ofte og hvor mye vann, saft, juice o.l. pleier barnet å drikke nå?**

*For hver type drikke settes **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** barnet vanligvis drikker pr. gang. For mengdeangivelse se på bilde 2 i bildeboken. 100 ml = 1 dl.*

| | Hvor ofte? | | | | | | | | Hvor mye? | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ganger pr. uke | | | *eller* | Ganger pr. dag | | | | Mengde pr. gang (ml) | | | |
| | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 | 3 | 4 | 5 el. flere | A 30 | B 60 | C 120 | D 180 |
| Vann | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Barnedrikk (Nestlé, HiPP, Sprett o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Saft, sukret (husholdningssaft, Kuli, Capri-Sonne o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Saft, kunstig søtet (Fun light o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Brus, sukret | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Brus, kunstig søtet | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Juice, kjøpt smoothie | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Nektar (eplenektar o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## SPØRSMÅL OM ØKOLOGISKE PRODUKTER

**30. Pleier barnet å få økologiske produkter nå?**
*Sett **kun** ett kryss for hver matvare.*

| | Ja, vanligvis | Ja, av og til | Nei, sjelden/aldri |
|---|---|---|---|
| Kornprodukter/grøt | ☐ | ☐ | ☐ |
| Frukt | ☐ | ☐ | ☐ |
| Grønnsaker | ☐ | ☐ | ☐ |
| Kjøtt/kylling/kalkun/fisk | ☐ | ☐ | ☐ |
| Melk | ☐ | ☐ | ☐ |
| Andre økologiske produkter | ☐ | ☐ | ☐ |

## SPØRSMÅL OM MÅLTIDER

**31. Hvor ofte pleier barnet å spise følgende måltider i løpet av <u>én uke</u>?**
*For hver måltidstype settes **kun** ett kryss.*

| | Ganger pr. uke | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Aldri/sjeldnere enn hver uke | 1 | 2 | 3 | 4 | 5 | 6 | Hver dag |
| Frokost | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Formiddagsmat/lunsj | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Ettermiddagsmat (måltid etter lunsj og før middag) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Middag | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Kveldsmat | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Andre måltider/mellommåltider | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

oppgi hva slags type måltid(-er):

**32. Hvis barnet er i barnehage, hos dagmamma o.l., hvor ofte pleier det å spise følgende måltider på disse stedene i løpet av <u>én uke</u>?**
*For hver måltidstype settes **kun** ett kryss.*

| | Ganger pr. uke | | | | | |
|---|---|---|---|---|---|---|
| | Aldri/sjeldnere enn hver uke | 1 | 2 | 3 | 4 | 5 |
| Frokost | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Formiddagsmat/lunsj | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Ettermiddagsmat (måltid etter lunsj og før middag) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Middag | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Andre måltider/mellommåltider | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## ANDRE SPØRSMÅL OM KOSTHOLDET

**33. Er det noen matvarer det kunne være aktuelt å gi barnet, men som du unngår å gi fordi du er redd barnet kan reagere med allergi/intoleranse?**
*Sett **kun** ett kryss.*

- ☐ Ja
- ☐ Nei ⇨ *Gå til spørsmål 35*

**34. Hvilke matvarer/ingredienser i matvarer unngår du å gi barnet?**
*Her kan du sette flere kryss.*

- ☐ Glutenholdige mel/korn (hvete, rug og bygg)
- ☐ Vanlig kumelk
- ☐ Morsmelkerstatning
- ☐ Appelsin/appelsinjuice/annen sitrusfrukt
- ☐ Fisk/skalldyr
- ☐ Nøtter/nøtteprodukter (peanøttsmør o.l.)
- ☐ Belgfrukter (erter, bønner o.l.)
- ☐ Egg
- ☐ Soya
- ☐ Matvarer med tilsetningsstoffer
- ☐ Annet

**35. Har barnet problemer med spising/mat?**
*Her kan du sette flere kryss.*

- ☐ Nei, har ikke noen problemer
- ☐ Ja, dårlig matlyst/småspist
- ☐ Ja, liker få matvarer
- ☐ Ja, vanskelig med tilvenning til familiens kosthold
- ☐ Ja, allergi/intoleranse mot enkelte matvarer
- ☐ Ja, andre problemer

oppgi hvilke:

## SPØRSMÅL OM KOSTTILSKUDD

**36. Får barnet vitamin D-tilskudd (som vitamin D-dråper/tran) eller annet kosttilskudd nå?**
*Sett **kun** ett kryss.*

☐ Ja

☐ Nei, men barnet har fått vitamin D-tilskudd/kosttilskudd tidligere ⇨ *Gå til spørsmål 38*

☐ Nei, barnet har aldri fått vitamin D-tilskudd/kosttilskudd ⇨ *Gå til spørsmål 38*

**37. Hvor ofte og hvor mye vitamin D-tilskudd eller annet kosttilskudd pleier barnet å få nå?**
*For hver type kosttilskudd settes **kun** ett kryss for **hvor ofte** og **kun** ett kryss for **hvor mye** pr. gang.*
*Det er satt opp to mengder for en teskje: 3 ml (liten teskje) og 5 ml (stor teskje).*

| | Hvor ofte? | | | | | Hvor mye? | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ganger pr. uke | | | *eller* Ganger pr. dag | | Mengde pr. gang | | | | | |
| | Aldri/sjeldnere enn hver uke | 1-3 | 4-6 | 1 | 2 el. flere | 1 stk | 2 stk | 3 stk | | | |
| Multivitamin-tabletter for barn (Nycoplus Multi Barn o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | | | |
| Kalsium/kalktabletter | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| Vitamin C | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | | | |
| Tyggetablett med omega 3 (Nycoplus geleputer o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | | | |
| | | | | | | 3 dråper | 5 dråper | | | | |
| Vitamin D-dråper | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | | | |
| | | | | | | 1 ts 3 ml | 1 ts 5 ml | 1 bs 7 ml | 1 ss 10 ml | | |
| Tran | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |
| Flytende multivitaminer (Sana-sol, Biovit og Nycoplus Multi Vitaminmikstur o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | |
| | | | | | | 1 ts 3 ml | 1 ts 5 ml | 1 bs 7 ml | 1 ss 10 ml | 1 tablett | 2 tabletter |
| Jern | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | | | | | | 1/2 dråpe | 1 dråpe | 2 dråper | | | |
| Joddråper | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | | | |
| | | | | | | knivsodd: 1/4 | 1/2 | 3/4 | 1 | 1 tablett | 2 tabletter |
| Tang-/taremel (pulver, tabletter o.l.) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | | | | | | 1 ts 3 ml | 1 ts 5 ml | 1 bs 7 ml | 1 ss 10 ml | 1 tablett | 2 tabletter |
| Annet kosttilskudd | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

oppgi type:

## BAKGRUNNSSPØRSMÅL OM BARNET

**38. Når ble barnet født i forhold til ultralydstermin?**
*Sett **kun** ett kryss.*

- ☐ I 38. svangerskapsuke eller senere
- ☐ Før 38. svangerskapsuke

**39. Hvem har tilsyn med / passer barnet vanligvis på dagtid (hverdager)?**
*Her kan du sette flere kryss.*

- ☐ Mor
- ☐ Far
- ☐ Medmor
- ☐ Dagmamma
- ☐ Barnehage
- ☐ Besteforeldre eller annen omsorgsperson

## BAKGRUNNSSPØRSMÅL OM BARNETS MOR OG FAR

**40. Hva er mors alder?**
*Skriv inn mors alder.*

☐☐ År

**41. Hvor mange barn har mor født?**
*Sett **kun** ett kryss.*

- ☐ 1 barn
- ☐ 2 barn
- ☐ 3 barn
- ☐ 4 barn eller flere

## 42. Hvilken utdannelse har barnets mor og far/medmor?

*Sett **kun** ett kryss for høyeste fullførte utdannelse hos mor og **kun** ett kryss for høyeste fullførte utdannelse hos far/medmor.*

| | Barnets mor | Barnets far/ medmor |
|---|---|---|
| 9/10-årig grunnskole eller kortere | ☐ | ☐ |
| 9/10-årig grunnskole *og* folkehøgskole eller annen ett-årig utdanning | ☐ | ☐ |
| Videregående opplæring (videregående skole/gymnas/fagbrev/svennebrev) | ☐ | ☐ |
| Fagskole | ☐ | ☐ |
| Høgskole- eller universitetsutdanning på 4 år eller mindre | ☐ | ☐ |
| Høgskole- eller universitetsutdanning på mer enn 4 år | ☐ | ☐ |
| Annet | ☐ | ☐ |
| Vet ikke | ☐ | ☐ |

## 43. Hvordan var mors arbeidssituasjon før barnet ble født og hvordan er arbeidssituasjonen hennes nå?

*Sykemeldinger i forbindelse med svangerskapet skal ikke regnes med. Dersom flere alternativer passer, kryss av for det alternativet som passer best.*
*Sett **kun** ett kryss for arbeidssituasjon før fødsel og **kun** ett kryss for arbeidssituasjon nå.*

| | Før | Nå |
|---|---|---|
| Inntektsgivende arbeid heltid | ☐ | ☐ |
| Inntektsgivende arbeid deltid | ☐ | ☐ |
| Sykemeldt | ☐ | ☐ |
| Permisjon | ☐ | ☐ |
| Ufør | ☐ | ☐ |
| Under arbeidsavklaring | ☐ | ☐ |
| Hjemmearbeidende | ☐ | ☐ |
| Student/skoleelev | ☐ | ☐ |
| Arbeidsledig | ☐ | ☐ |
| Annet | ☐ | ☐ |

**44. Har mor et vegetarisk kosthold?**
*Sett **kun** ett kryss.*

- ☐ Nei
- ☐ Ja, mor er vegetarianer og inkluderer melkeprodukter og egg i kosten (ovolakto-vegetarianer)
- ☐ Ja, mor er vegetarianer og inkluderer melkeprodukter, men ikke egg i kosten (lakto-vegetarianer)
- ☐ Ja, mor er vegetarianer og utelater alle melkeprodukter og egg fra kosten (veganer)

**45. Har barnet et vegetarisk kosthold?**
*Sett **kun** ett kryss.*

- ☐ Nei
- ☐ Ja, barnet er vegetarianer og inkluderer melkeprodukter og egg i kosten (ovolakto-vegetarianer)
- ☐ Ja, barnet er vegetarianer og inkluderer melkeprodukter, men ikke egg i kosten (lakto-vegetarianer)
- ☐ Ja, barnet er vegetarianer og utelater alle melkeprodukter og egg fra kosten (veganer)

**46. Hvordan er mors familiesituasjon?**
*Sett **kun** ett kryss.*

- ☐ Samboer
- ☐ Gift
- ☐ Bor alene med barnet/barna
- ☐ Annet

**47. Røyker mor nå?**
*Sett **kun** ett kryss.*

- ☐ Nei
- ☐ Ja, av og til (ikke hver dag)
- ☐ Ja, 1-9 sigaretter pr. dag
- ☐ Ja, 10 sigaretter eller flere pr. dag

**48. Bruker mor snus nå?**
*Sett **kun** ett kryss.*

- ☐ Nei
- ☐ Ja, av og til
- ☐ Ja, daglig

**49. Har barnets foreldre eller søsken astma/allergi, eller har de hatt slike plager tidligere?**

*Her kan du sette flere kryss.*

- ☐ Nei
- ☐ Mor har/har hatt astma/allergi
- ☐ Far har/har hatt astma/allergi
- ☐ Barnets søsken har/har hatt astma/allergi

**50. På et senere tidspunkt kan det bli aktuelt å knytte andre undersøkelser til Spedkost-studien. Kan vi kontakte deg igjen med forespørsel om å være med i denne typen undersøkelser?**

- ☐ Ja
- ☐ Nei

**Tusen takk for at du tok deg tid til å besvare spørsmålene!**

**Spørreskjemaet postlegges i vedlagte svarkonvolutt - bildeboken skal du ikke returnere.**

## Appendix 3

Booklet of pictures of portion sizes for foods from the Spedkost 12 months questionnaire

Bildehefte

# Matmengder til barn

Spedkost 3

Bildene i dette heftet
er tenkt som en hjelp til å oppgi
hvor mye barnet vanligvis drikker eller
spiser pr. gang.

Bildene består av 4–6 alternativer
merket A, B, C, D, (E, F).

Velg det alternativet som stemmer
best med den mengden barnet
vanligvis spiser, og kryss av
i spørreskjemaet.

Omrisset av tallerkenen på bildene
er gjengitt i full størrelse
på denne siden.

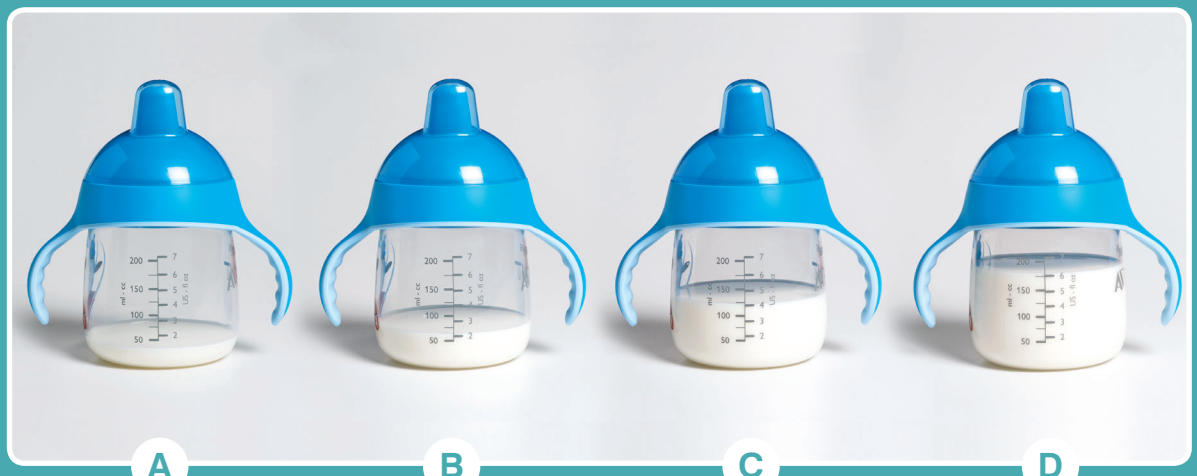
UiO : Universitetet i Oslo

folkehelseinstituttet

## 1. Drikke (melk, vann, saft, juice o.l.) på flaske

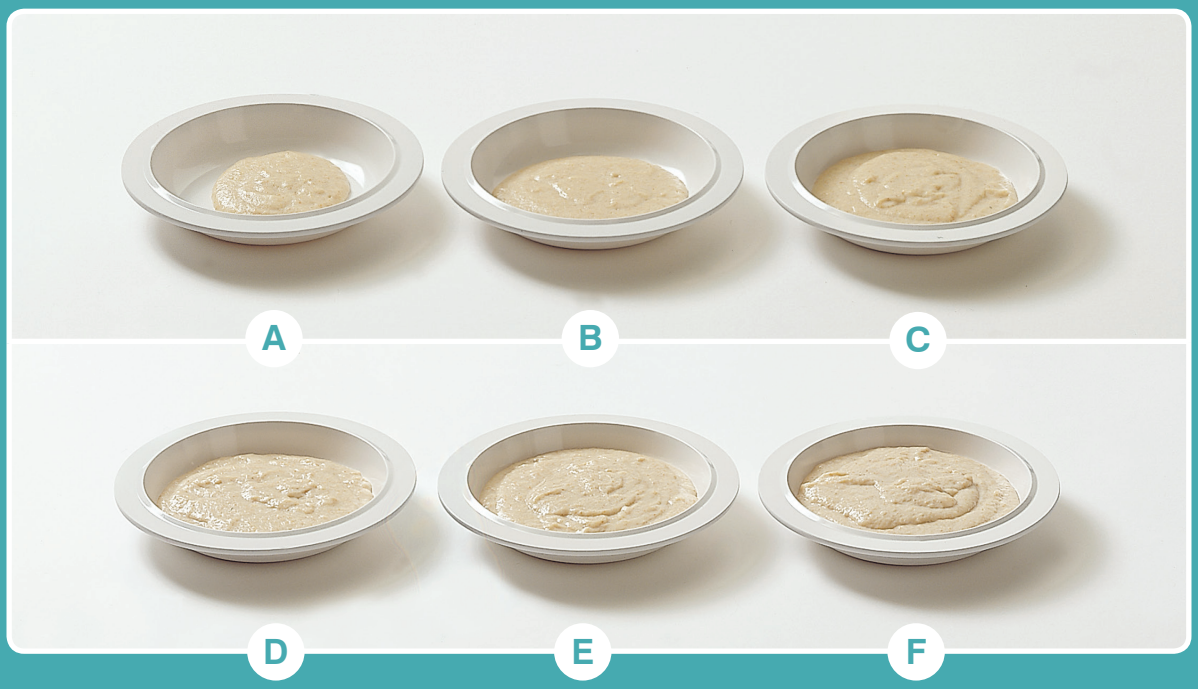
| A | B | C | D |
|---|---|---|---|
| 60 ml | 120 ml | 180 ml | 240 ml |

## 2. Drikke (melk, vann, saft, juice o.l.) i tutekopp

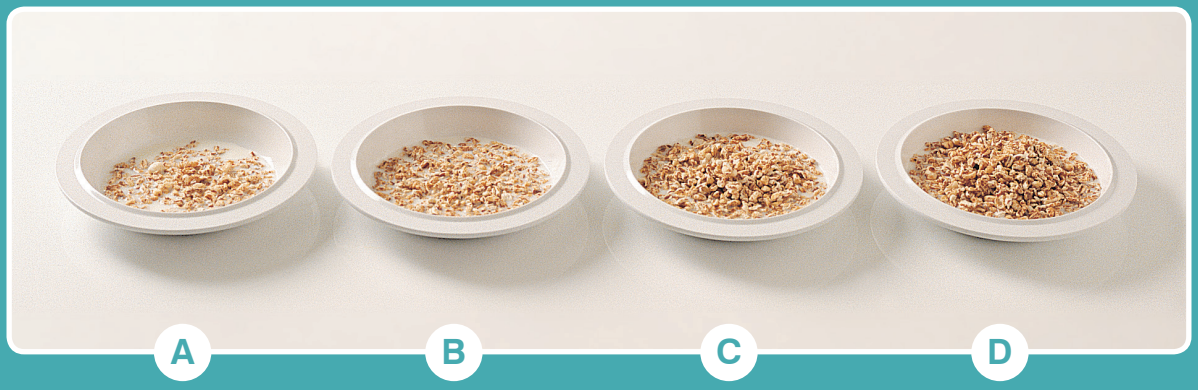


| A | B | C | D |
|---|---|---|---|
| 30 ml | 60 ml | 120 ml | 180 ml |

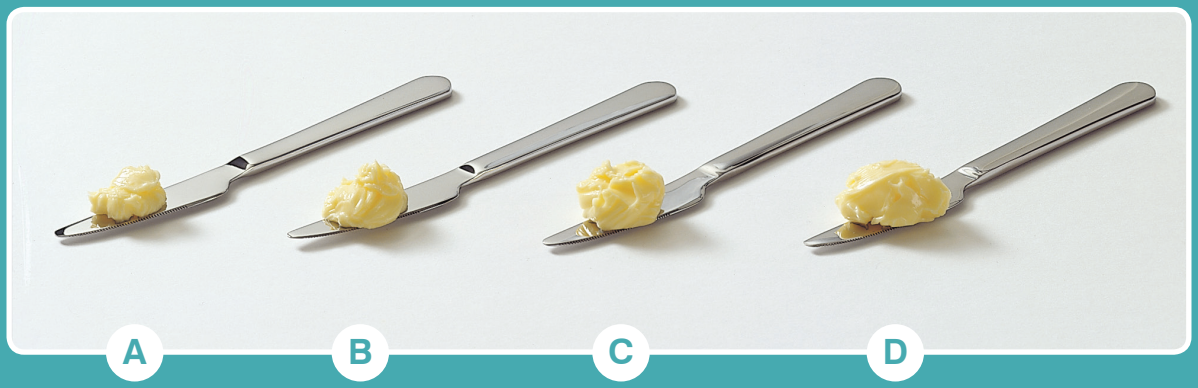
3. Grøt



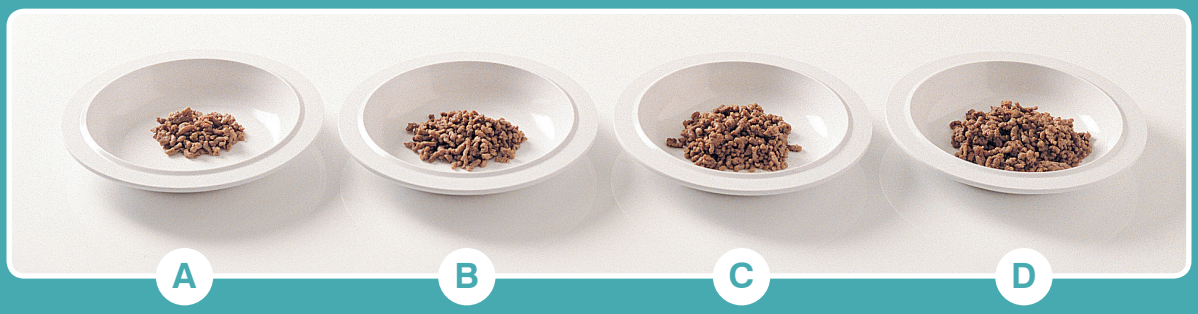

4. Kornblanding, gryn o.l. med melk




5. Margarin/smør på brød

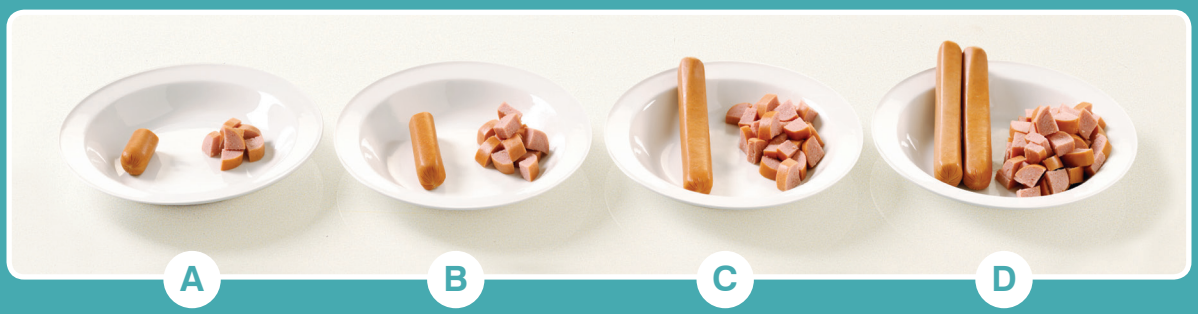


## 6. Kjøtt



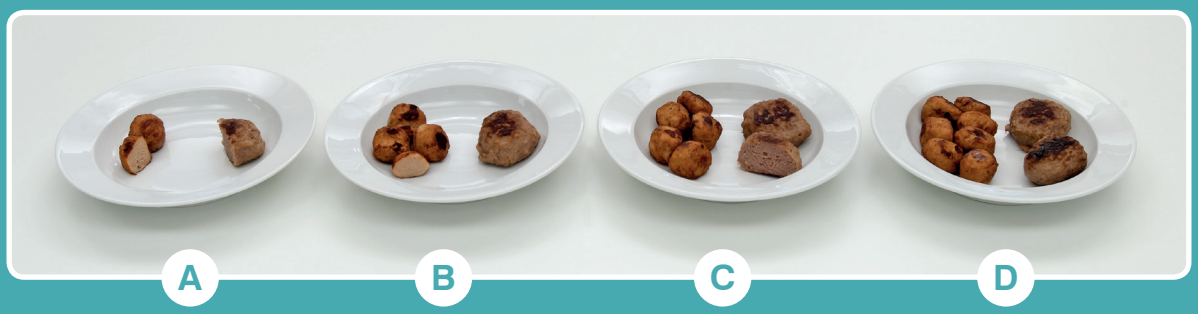

## 7. Pølse

Samme mengde matvare er vist i to forskjellige former.
Velg én av formene når du bestemmer porsjonsstørrelse.

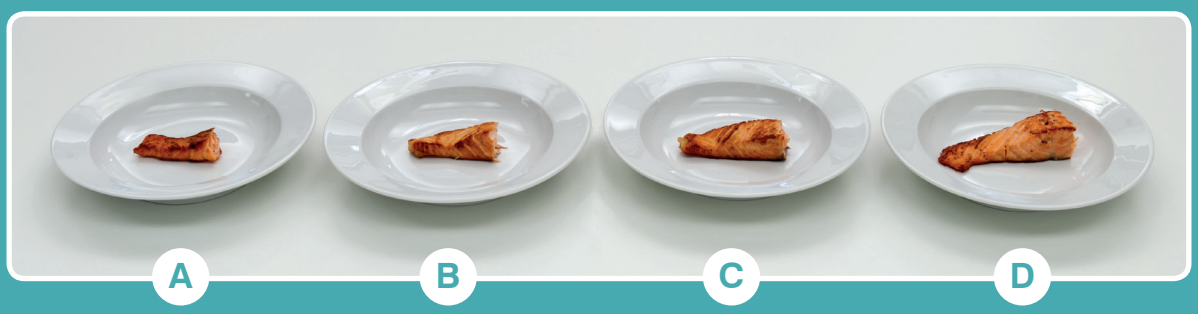



## 8. Kjøttkaker/boller

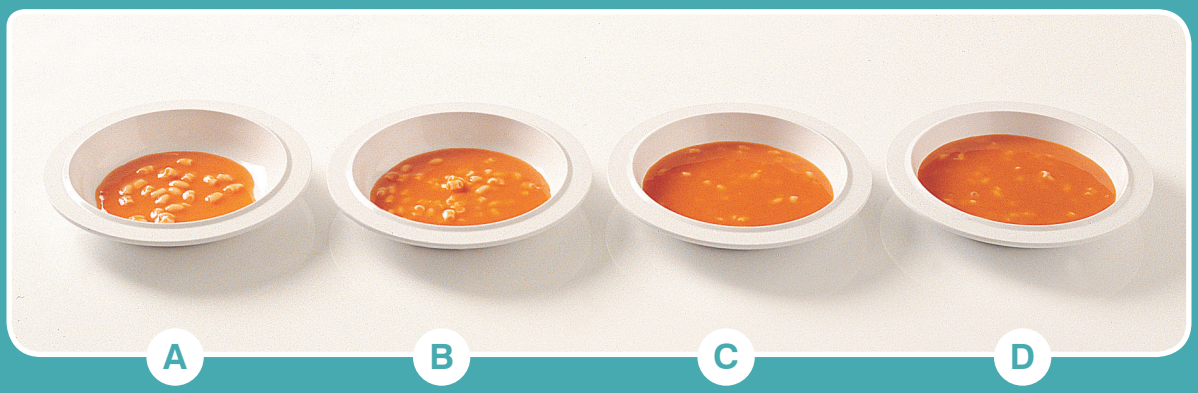
Samme mengde matvare er vist i to forskjellige former.
Velg én av formene når du bestemmer porsjonsstørrelse.



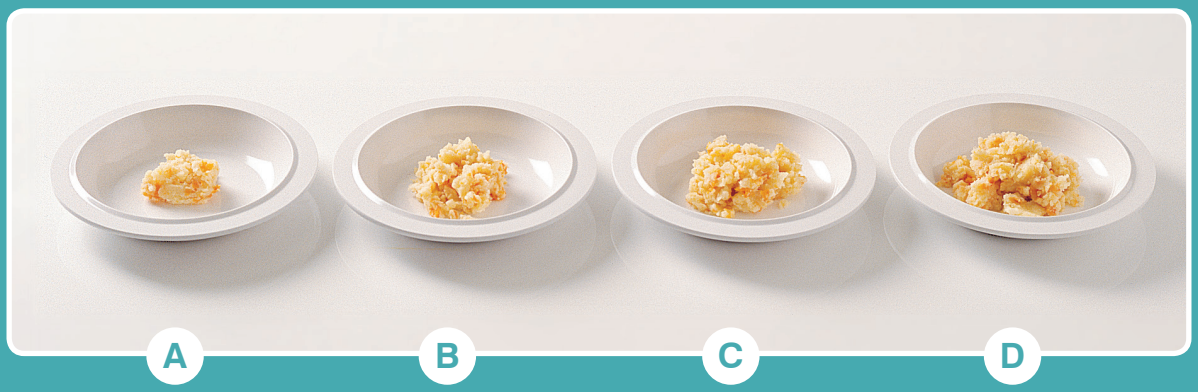

## 9. Fisk



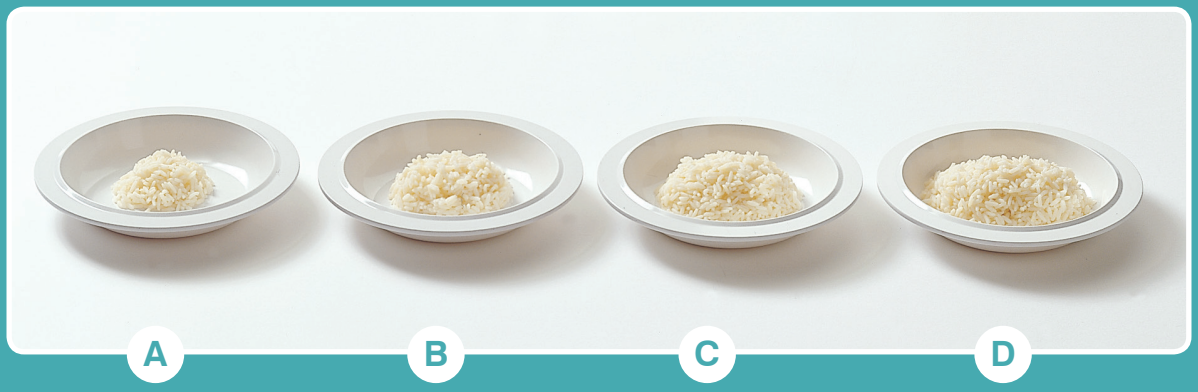
## 10. Suppe



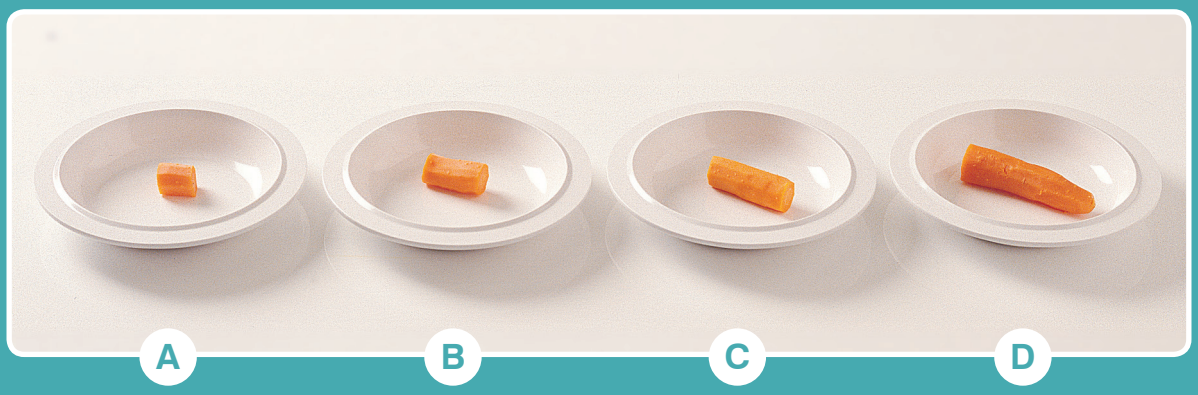

## 11. Potet-/grønnsaksmos



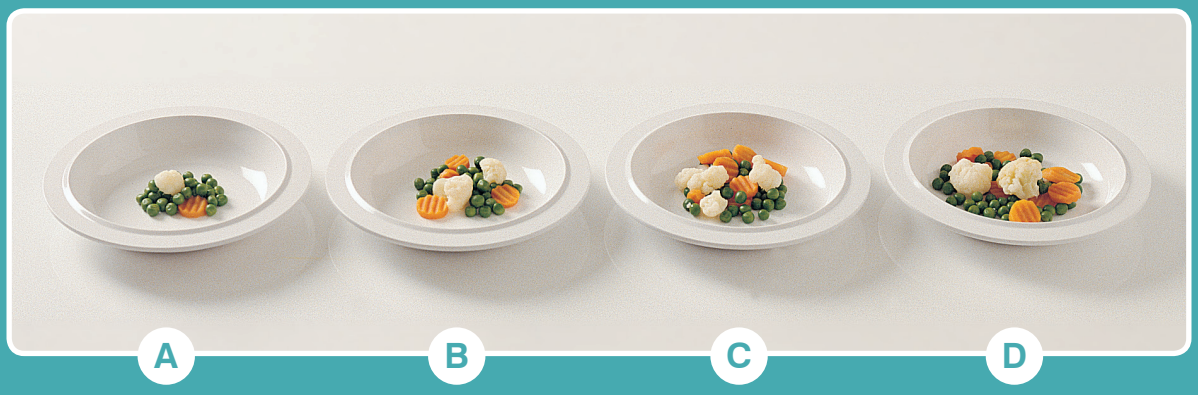

## 12. Ris, spagetti o.l.



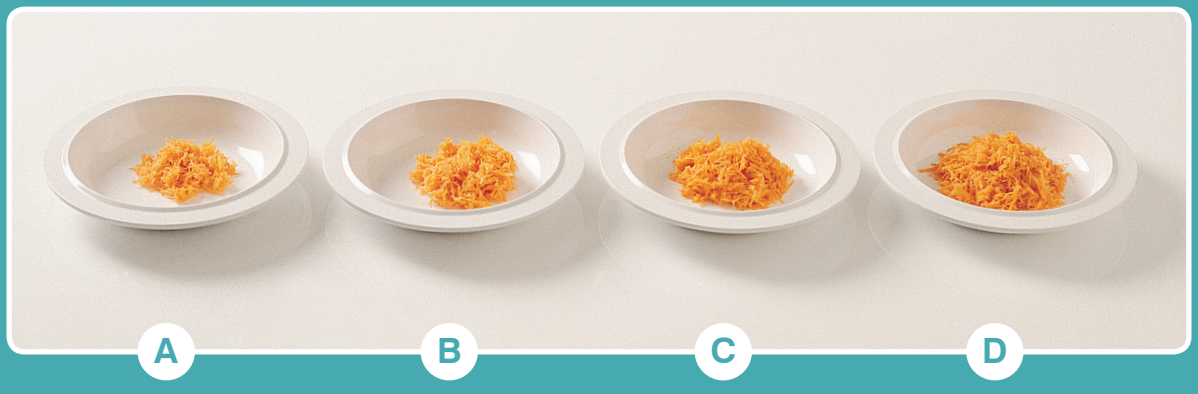
## 13. Grønnsaker



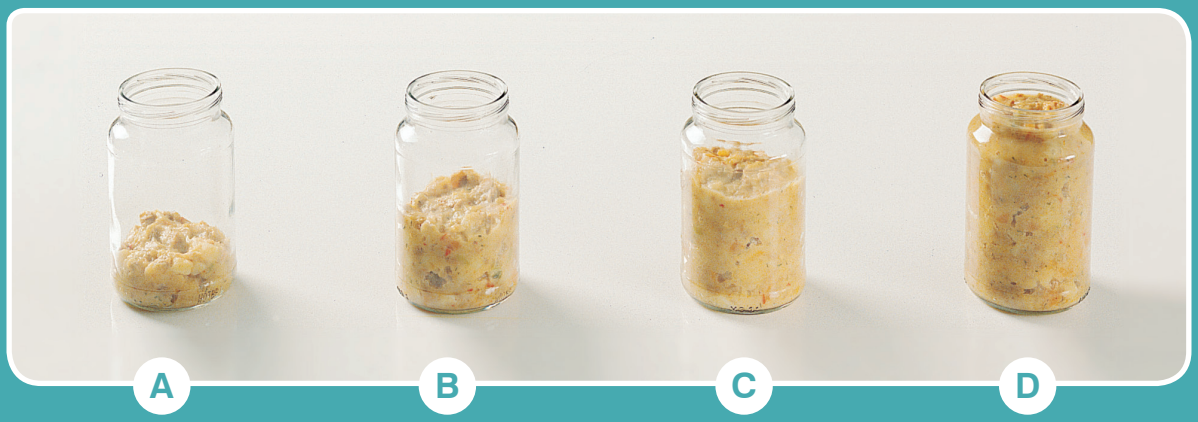

## 14. Grønnsaksblanding



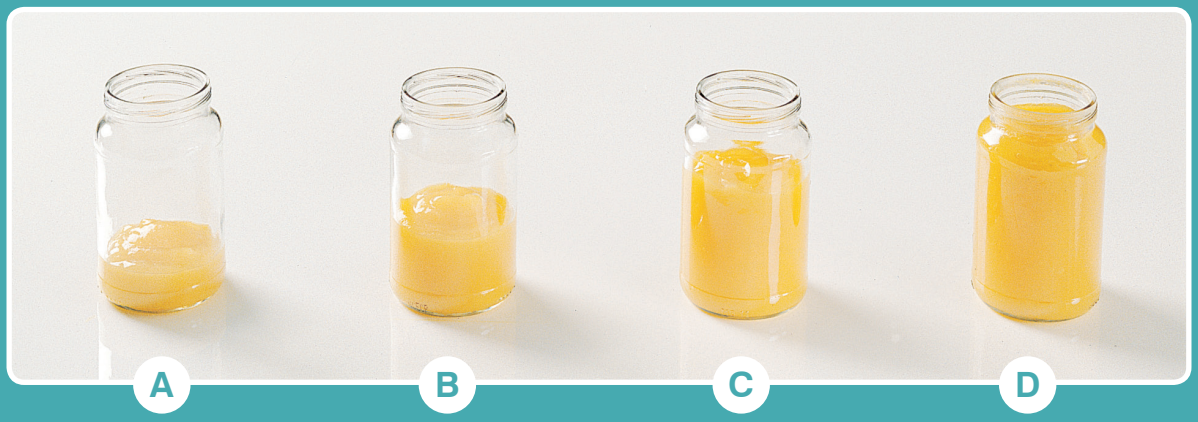

## 15. Råkost



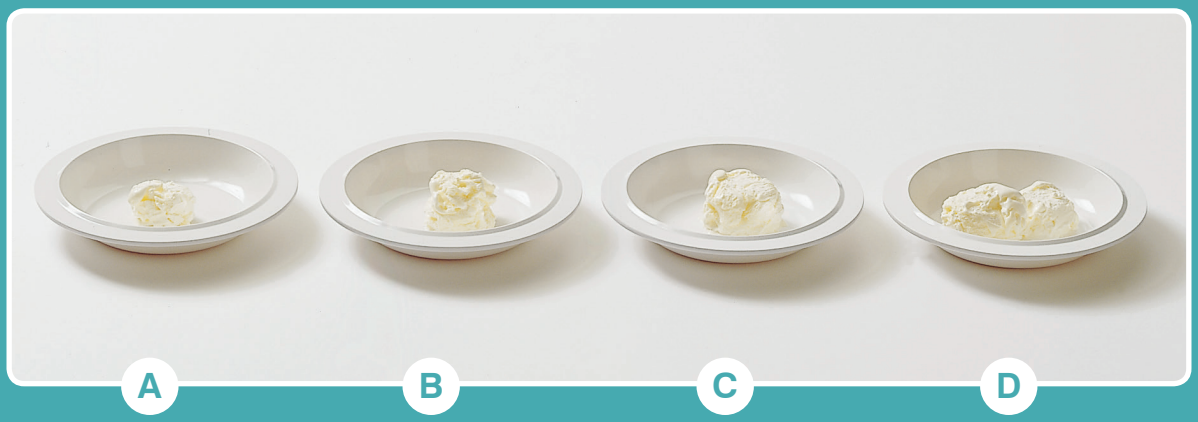
16. Middagsmat (stort glass 195 g)




17. Frukt-/bærmos (stort glass 195 g)




18. Is o.l.



## Appendix 4

Items included in the diet quality and variety index

| Components | Items included[1] |
|---|---|
| **Breastfeeding** | "How old was the child when he or she stopped receiving breastmilk?" |
| **Fruit** | Fruit from: "industrialized fruit- and berry and vegetable mash with or without cereals/yoghurt", "homemade smoothie/fruit-/berry mash", "berries (fresh, frozen)", "orange, clementine", "apple, pear", "bananas", "grapes", "other fruit", "raisins", "other dried fruit", "canned fruit". |
| **Vegetables** | Vegetables from industrialized baby foods: "potato/vegetables", "pasta/rice, vegetables", "pasta/rice, vegetables and meat", "vegetables and meat", "vegetables and fish", "pasta/rice, vegetables and chicken/turkey", "carrot", "rutabaga", "cauliflower, broccoli", "frozen vegetable mix", "raw vegetables with sugar and lemon", "spinach", "cucumber", "tomato", "paprika", "avocado", "other vegetables". Vegetables from: "fish stew/fish soup", "tacos", "tomato soup, other soup», "pizza", "vegetarian dishes" "vegetables on bread". |
| **Fish** | "fish balls", "fish pudding", "fish gratin", "fish cakes", "fried and crusted fish", "fish stew/fish soup" "cod, pollock, other white fish", "trout, salmon, mackerel, herring, "mackerel in tomato sauce". Fish from industrialized baby foods: "vegetables and fish". |
| **Sugary foods and beverages** | "ice cream", "popsicles", "pudding, jelly, fromage", "Sweet buns with and without cream filling", "cakes", "waffles", "other children's cookies", "sweet cookies", "muslibar", "chocolate", "candy", "soft drinks", "soda with sugar", "nectar", "honey", "HaPå", "chocolate and nut spreads", "chocolate spreads with less sugar", "other sugary spreads". |
| **Red and processed meat** | "hot dogs/sausages from beef and pork", "lean hot dog/sausages from beef and pork", "meat balls, pork patties, meat loaf, meatballs from beef/pork etc.", "hamburger from beef/pork etc.", "meat sauce/dishes made out of ground beef", "meat sauce/dishes made out of lean ground beef/ground pork" "meat from beef, lamb, pork, etc.", "stew with meat from beef, lamb, pork, etc.", "tacos", "pizza", "baloney", "ham, lean baloney". Meat from industrialized baby foods: "pasta/rice, vegetables and meat from beef, lamb, pork etc." "vegetables and meat from beef, lamb, pork etc.". |
| **Fats in cooking** | "do not use", "butter", "Bremykt", "Melange", "Soft flora/Vita", "Olivero", "liquid margarine", "margarine from store brands", "other margarine", "rapeseed oil", "olive oil", "other oil". |
| **Fats as spreads** | "do not use", "butter», "Bremykt", "Brelett", "Melange", "Soft Flora/Vita", "Olivero", "light margarine", "margarine from store brands", "other margarine" |
| **Vitamin D** | "multi vitamin tablets for children", "chewing tablets with omega 3", "cod liver oil", "liquid multivitamin", "other supplements" |
| **Whole grains** | Porridge: "home-made porridge", "industrialized porridge from powder", "industrialized porridge in pouch". Cereals with milk. Bread and crackers: "white bread", "semi-whole-grain bread", "whole-grain bread", "crackers". "whole-grain pasta», "muslibar". |

| | |
|---|---|
| **Lean dairy products** | Formula: "NAN Pro 1 or NAN Organic 1", "NAN Pro 2, NAN Organic 2, NAN Pro 3, or NAN Pro 4", "NAN H.A. 1», "HIPP Combiotic 1", "HIPP Combiotic 2 or 3", "Semper Allomin 1", "Semper Allomin 2", "Holle formula 1", "Holle follow-up formula 2 or 3", "other formula/follow-up formula".<br>Cow's milk: "low-fat milk 1,0 % fat and 1,2 % fat", "low-fat milk 0,5 % fat", "skimmed milk (sweet and sour)".<br>Yoghurt: "children's fruit yoghurt", "children's fruit yoghurt with toppings", "fruit yoghurt", "yoghurt with muesli", "sugar and fat free fruit yoghurt", "neutral yoghurt", "yoghurt with probiotics", " neutral Greek yoghurt, "Skyr mini (in pouch)", "cultured yoghurt drink".<br>Milk with cereals. |

The items included in the diet quality and variety index are from the questionnaire from the Spedkost 12 months survey.