

**MATERNAL DIETARY PREFERENCES BY SOCIOECONOMIC FACTORS  
AND DIFFERENCES IN HEALTH RISK PERCEPTION  
STRAVOVACÍ PREFERENCE MATEK PODLE SOCIOEKONOMICKÝCH FAKTORŮ  
A ROZDÍLY V PERCEPCI ZDRAVOTNÍCH RIZIK**

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#### ABSTRACT

**Background:** The diet of mothers during pregnancy significantly influences the health status of the developing fetus, subsequently influencing the child's dietary habits, which are adopted within the family and carried into adulthood.

**Aim:** The study aimed to determine the eating habits of mothers of newborns and the socioeconomic factors that influence their healthy or unhealthy eating.

**Material and methods:** The questionnaires of a sample of mothers from the HAIE project in the period of 2019 – 2020 were analysed. Data collection took place in České Budějovice and Karviná during the mothers' hospitalization in maternity hospitals, and a comprehensive questionnaire was employed as the data collection tool. The study examined the dietary habits of mothers and their perception of health risks associated with diet and lifestyle. The consumption of individual foods and meals stated by the mothers was divided according to the basic nutritional guidelines into risky/non-risky intake, and according to the frequency of risky consumption of each mother, a group of mothers with the riskiest diet was created (10 or more types of risky food consumption). Differences in food preferences according to age, education, marital status, and BMI were analysed.

**Results:** The sample consisted of 498 non-smoking mothers, the majority of whom self-reported good or very good subjective health. Approximately 62.2 % of respondents subjectively evaluated their dietary habits as corresponding to a healthy diet. Risky food consumption, categorized by groups and nutritional guidelines, was applied to 16.5 % of the mothers. The results of the fully adjusted logistic regression model confirmed healthier eating habits among mothers aged 31 – 35 years OR = 0.41 (95% CI: 0.17 – 0.97) and older. A healthier diet was linked to the perception of the significance of physical exercise. The association between healthy diet and education, marital status, and the opinion regarding the impact of obesity on health was not confirmed.

**Conclusion:** Knowledge of sociodemographic contexts and risk perception of healthy eating provides a good basis for health intervention in early childhood.

**Key words:** Stravovací návyky. Těhotné ženy. Determinanty zdravé stravy. Vnímání rizik. Výživová doporučení.

#### ABSTRAKT

**Východiska:** Stravování matek v těhotenství významným způsobem ovlivňuje zdravotní stav vyvíjejícího se plodu,

názně ovlivňuje stravovací návyky dítěte, které si v rodině osvojuje a přenáší do dospělosti.

**Cíle:** Studie byla zaměřena na zjištění stravovacích návyků matek novorozenců a socioekonomických faktorů, které ovlivňují jejich zdravé nebo nezdravé stravování.

**Materiál a metody:** Analyzovány byly dotazníky souboru matek z projektu HAIE z období let 2019 – 2020. Sběr dat probíhal v Českých Budějovicích a Karviné v průběhu pobytu matek v porodnicích a nástrojem byl obsáhlý dotazník. Byly zjišťovány stravovací návyky matek a vnímání zdravotních rizik ve vztahu ke stravování a životnímu stylu. Matkami uvedená konzumace jednotlivých potravin byla rozdělena podle základních výživových doporučení na rizikový/nerizikový příjem a podle četnosti rizikových konzumací každé matky byla vytvořena skupina matek s nejrizikovějším stravováním (10 a více druhů rizikové konzumace potravin). Dále byly analyzovány rozdíly stravovacích preferencí podle věku, vzdělání, rodinného stavu a BMI.

**Výsledky:** Soubor tvořilo 498 matek-nekuřeček, většina matek deklarovala dobré nebo velmi dobré subjektivní zdraví. Subjektivně hodnotilo své výživové zvyklosti jako odpovídající zdravé výživě 62,2 %. Riziková konzumace potravin podle skupin a výživových doporučení se týkala 16,5 % matek. Výsledky plně adjustovaného logistického regresního modelu potvrdily zdravější stravovací návyky u matek ve věku 31 – 35 let OR = 0,41 (95% IS: 0,17 – 0,97) a starších. Zdravější stravování bylo spojeno s vnímáním důležitosti pohybu. Nebyl prokázán vztah zdravého stravování se vzděláním, rodinným stavem a názorem na vliv obezity na zdraví.

**Závěr:** Znalost sociodemografických souvislostí a risk percepce zdravého stravování poskytuje dobrý základ pro zdravotní intervenci v raném dětství.

**Klíčová slova:** Dietary habits. Pregnant women. Healthy diet determinants. Risk perception. Nutritional recommendations.

#### INTRODUCTION

Dietary habits are mainly formed in the family of orientation and usually have a strong influence in shaping the future lifestyle of one's own family. Some studies [1] brought evidence that there are potential associations among parent's own eating behaviours, feeding practices, and children's eating behaviours. Parents are highly influential in shaping

their children's dietary habits. Children whose mothers emphasized health goals consumed more healthy food and less unhealthy food [2]. Quantitative and qualitative nutritional needs change over the life course and depend on many factors – for example, age, gender, physical activity, health status, climate, pregnancy, or lactation [3, 4]. The study on nutritional behaviour in pregnancy [5] found that nutritional behaviours were correlated with education level. Another study [6] reported that maternal factors such as age, social class, education, and smoking influence diet quality.

Healthy eating determinants and their association with socio-economic status and perceived health risks are an important public health topic. The present study is focused on the determination of the dietary habits of newborns' mothers and their relationship to socioeconomic factors that influence their dietary preferences.

## MATERIAL AND METHODS

The questionnaires of a group of mothers involved in the "Healthy Aging in Industrial Environment" (HAIE) project (CZ.02.1.01/0.0/0.0/16\_019/0 000798) during 2019 – 2020 were examined [7]. Data collection took place in České Budějovice and Karviná. The sample consisted of 498 non-smoking mothers who filled out a comprehensive questionnaire (88 questions) with the assistance of an interviewer using the CAPI (Computer Assisted Personal Interviewing) method during their stay in maternity hospitals. The process of data collection was done through the utilization of Qualtrics.XM online software.

The investigation on how individuals perceive health risks associated with their diet and lifestyle was conducted. In the questionnaire, women were asked to rate, on a 5-point Likert scale (ranging from 1 – "not at all" to 5 – "strongly"), to express their opinions on how certain factors influence human health. These factors included eating habits, lack of exercise, genetic factors, obesity, level of medical care, use of dietary supplements, level of awareness, lifestyle and financial insufficiency. For the evaluation, the answers were grouped into two categories of low impact (answer 1 – 3) and strong impact (answer 4 – 5). The consumption of food choices stated by the mothers was divided according to the basic nutritional recommendations into risky/non-risky intake, and according to the frequency of risky consumption of each mother, a group of mothers

with the most risky diet (10 or more types of risky food consumption) was created. Differences in food preferences according to age, education, marital status and BMI were analyzed. Statistical analysis included descriptive statistics,  $\chi^2$ -test and logistic regression at 5% significance level. Stata v.15 software was used. [8].

## RESULTS

In the cohort of 498 mothers, the age ranged from 18 to 48 years, with a mean age of 30.7 years (SD 4.9). Most of mothers were married (56.6 %) or lived with a partner (12.3 %). Households consisting of three people (50.8 %) and households with four members (37.2 %) were the most represented. In the households being monitored, there were mostly one or two dependent children (52.8 % and 37.8 %, respectively). The average housing density was 1.2 rooms per person.

Among the surveyed mothers, 16.7 % had basic and secondary education without a high school diploma, 34.3 % completed high school with a diploma, and 49.0 % of respondents achieved higher post-secondary or university education. Most mothers evaluated the economic situation of their family as either average (83.9 %) or above average (14.5 %). A good financial situation, that mothers' households do not lack money for essential expenses such as food or clothing, was declared by most women in both study areas, only 7.2 % of mothers had problems with these expenses.

Mothers most often ranked obesity (88.0 %), eating habits (86.3 %) and lack of exercise (85.3 %) as factors that strongly influence human health. The factors with the least influence on health, as per the respondents, were the use of dietary supplements (88.2 %) and the level of awareness (81.9 %).

Respondents subjectively evaluated their health status on a 5-point scale (1 – very good, 5 – very bad). The health status was most often rated as good (53.4 %) or very good (40.6 %). A small proportion of mothers (6 %) assessed their health status as satisfactory. Mothers were asked about their height, pre-pregnancy weight and waist circumference as part of health questions. The average height of the women was 167.4 cm (SD 6.4), and their average weight was 69 kg (SD 14.3). Most women (62.9 %) had values of BMI within the normal range, which is up to 25 kg/m<sup>2</sup>. Some women were overweight (24.3 %) or obese (12.9 %).

Over 62.2 % of the women perceived their dietary habits as corresponding to the principles of healthy nutrition guidelines. Some women recognized that they do not follow them (26.1 %) and several mothers (12.7 %) admitted that they do not know or do not deal with this issue.

The questionnaire survey revealed that nearly all the women interviewed (98.8 %) consumed at least one hot meal daily. Most respondents (89 %) stated that if they got information about the health risks that would come from a meal or foodstuff or from their lifestyle, they usually try to change their habits.

Among the cooking techniques, mothers showed a preference for cooking (79.9 %) and baking (63.9 %). Steaming (40 %) and grilling (37.8 %) were also popular methods of food preparation.

In the survey, 71.7 % of mothers were interested in the information provided on food packaging. They were most often interested in food composition (87.1 %), use-by date (75.1 %), nutritional information (42 %) and information about the manufacturer or importer (34.2 %). Six women responded that they were interested in different details on the packaging, including the price, country of origin, calorie content, the percentage of meat in the ham, and whether it is organic (BIO) food.

Part of the questionnaire was a table listing sixteen types of food or dishes. The respondents were asked to indicate the average frequency of their consumption for each of these items. These were basic

foods from the food pyramid and other popular prepared dishes. To describe the frequency of consumption, respondents had the following options to select from: never, less than once a week, 1 – 3 times a week, 4 – 6 times a week, and once or more times a day.

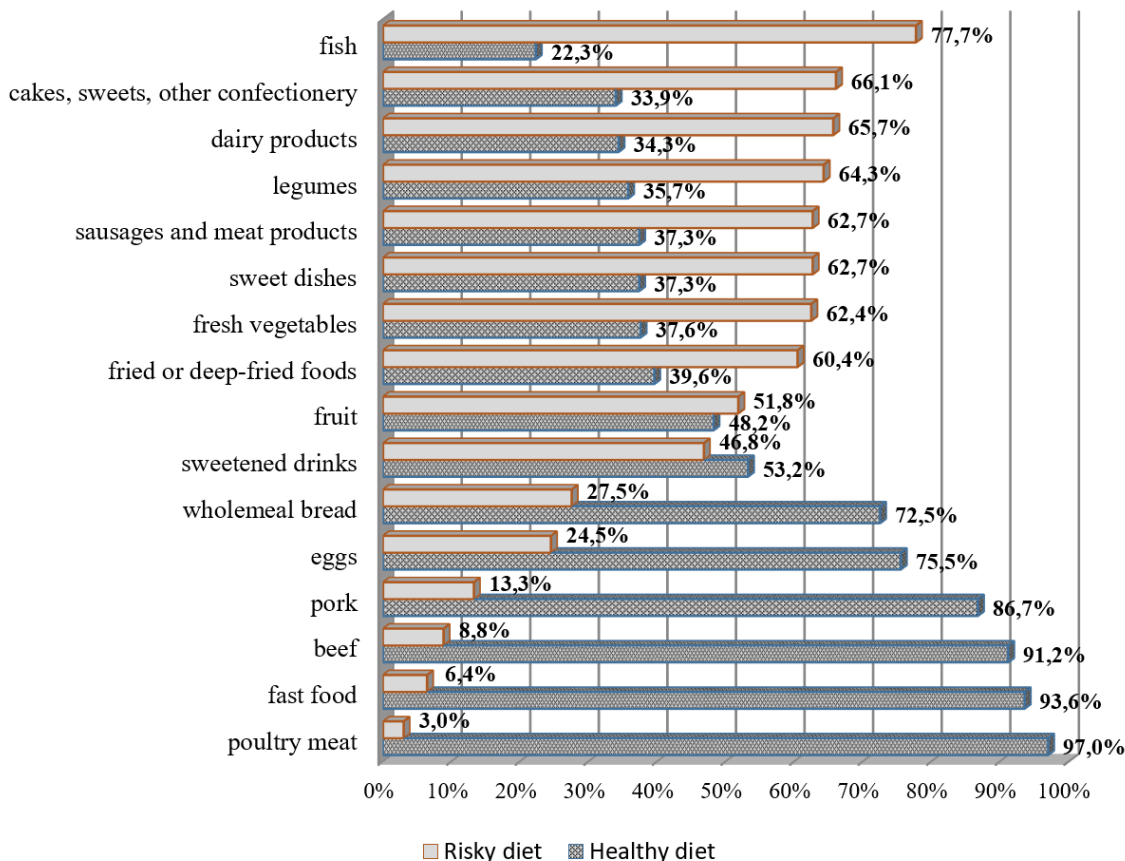
The foods and dishes listed in Table 1 were categorized into two groups: one for risky intake and the other for non-risky intake, based on basic nutritional guidelines. The categories are shown in the table using coloured boxes – light grey represents healthy (recommended) intake of a certain type of food or dish, indicating non-risky consumption, while a shaded or penalized box indicates an unhealthy amount, signifying risky consumption.

Based on the Table 1, the frequency of risky or non-risky consumption of individual types of food or dishes among the interviewed mothers was assessed. The results (Fig. 1) indicate that 48.2 % of mothers have a healthy/recommended intake for fruit, 37.6 % of women for fresh vegetables and only 22.3 % of women for fish. Most women consumed all types of meat in the recommended amount. A healthy intake of eggs was observed in 75.5 % of women. A regular consumption of whole grain bread had 72.5 % of the mothers. More than half of mothers (65.7 %) had insufficient consumption of dairy products and legumes (64.3 %), unhealthy intake of sweets and confectionery (66.1 %), excessive consumption of sweet foods

**Table 1** Average food consumption by specific group and nutritional guidelines

Factor	Never*	Less than once a week*	1-3 times a week*	4-6 times a week*	Once or more times a day*
fruit	1	1	1	1	0
fresh vegetables	1	1	1	1	0
fish	1	1	0	0	0
beef	1	0	0	1	1
dairy products	1	1	1	1	0
pork	1	0	0	1	1
eggs	1	1	0	0	1
poultry meat	1	0	0	0	1
sweet dishes	0	0	1	1	1
legumes (peas, beans...)	1	1	0	0	0
wholemeal bread	1	1	1	0	0
fried or deep-fried foods	0	0	1	1	1
cakes, sweets, other confectionery	0	0	1	1	1
sweetened drinks (lemonades, juices)	0	0	1	1	1
sausages and meat products	0	0	1	1	1
fast food	0	0	1	1	1

**Legend:** \* "1" represents the risk consumption, "0" represents the recommended consumption



**Figure 1** Risky diet by the food groups according to the dietary recommendations

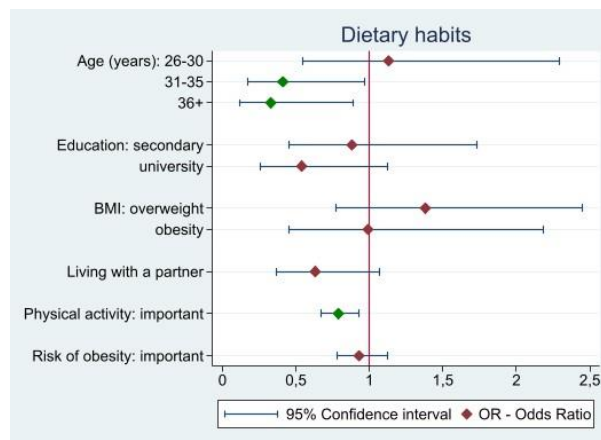
(62.7 %), sausages and meat products (62.7 %) and fried or deep-fried foods (60.4 %). Approximately 46.8 % of women consumed sugar-sweetened drinks in excessive amounts. Only 6.4 % of mothers regularly consumed unhealthy fast food.

In the further analysis, each mother was individually evaluated for how many types of food and dishes were consumed at risk, and subsequently, a group with the riskiest diet (16.5 % of women with consumption of 10 or more types of risky food consumption) and a group with non-risky diet was created.

Differences between these two groups were examined based on factors such as age, education, marital status, family economic situation, varying perceptions of the impact of dietary habits, physical inactivity, and obesity on health. Significantly more often, women over 31 years of age ate healthy ( $p < 0.001$ ), mothers with higher education ( $p = 0.001$ ), women living with a partner ( $p = 0.001$ ) and women who considered dietary habits ( $p < 0.001$ ), lack of exercise ( $p < 0.001$ ) and obesity ( $p = 0.023$ ) as a factor strongly affecting health.

There was no statistically significant difference ( $p = 0.185$ ) found in dietary habits based on the family economic situation.

The results of the fully adjusted logistic regression model (Fig. 2) confirmed that mothers aged 31–35 years had healthier dietary habits, with the odds ratio (OR) of 0.41 (95% CI: 0.17 – 0.97),



**Figure 2** The results of a fully adjusted regression model of dietary habits

as did those aged over 36 years, with the OR = 0.33 (95% CI: 0.12 – 0.89), when compared to the youngest age group. Women who regarded exercise as a significant factor impacting health were notably less likely to have risky eating habits, with the OR = 0.79 (95% CI: 0.67 – 0.93). The healthier dietary patterns of women with higher education and mothers living with a partner did not maintain statistical significance after adjustment. Following adjustment, the association between one's opinion on the impact of obesity on health and dietary habits was also not confirmed.

## DISCUSSION

A questionnaire survey revealed that the main predictor of healthy eating habits is the age of mothers over 31 and their opinion on the importance of exercise as a factor influencing health. The impact of other socioeconomic factors, such as marital status, education, and economic situation, on dietary habits was not confirmed. Dietary habits showed no correlation with the perception of obesity impact on health.

Most of the mothers reported a healthy diet. The healthy nutrition of most of the interviewed women was likely influenced by the fact that they were in the prenatal and postpartum period, during which women typically prioritize their health and nutrition. This fact was confirmed by a review study from 2017 [9], that examined alterations in women's dietary patterns before and during pregnancy. The findings confirmed that women tend to be more attentive to their food choices during pregnancy and are highly motivated to enhance their dietary habits. The study also shows that during pregnancy, women typically reduce their consumption of fast food or abstain from it altogether. The presented questionnaire survey reached the same results, where most mothers stated that they do not consume fast food at all or consume it less than once a week. Moreover, the above-mentioned study revealed that women increased their intake of fruits and vegetables during pregnancy, but they still did not consistently reach the recommended intake. Likewise, in the questionnaire survey presented here, not all mothers met the recommended intake of fruits and vegetables. In spite of that, an inadequate maternal diet can adversely affect mother and child, the decreased consumption of fruit and vegetables in pregnant women was also reported in the study of Jardí C et al. [6].

The two promising approaches to increase the acceptance of vegetables in children were described in the study of Maier-Nöth [10]: (a) offering infants a variety of vegetables at the beginning of weaning increases acceptance of new foods, including vegetables, and (b) offering 7-month-old infants an initially disliked vegetable at 8 subsequent meals markedly increases acceptance for that vegetable. Explanation of the principle how the eating preferences of children are developed was described in the study of Forestel C [11]: starting before birth and continuing throughout development, there are repeated and varied opportunities for children to learn to enjoy the flavours of healthful foods. Because flavours are transmitted from the maternal diet to amniotic fluid and breast milk, mothers who consume a variety of healthful foods throughout pregnancy and lactation provide their infants with an opportunity to learn to like these flavours.

From the perspective of thermal food processing, the foremost recommendations for preparing food in the healthiest and the gentlest manner involve boiling or steaming. Most of the interviewed mothers chose cooking, which is the correct food preparation technique. Their other preferred methods of preparation included baking, stewing, and grilling. Baking and grilling are no longer among the recommended technological procedures, because of biological changes in the diet that can occur during baking, frying, or grilling. Food may lose its nutritional value during such modifications, and substances harmful to health may form in food, such as polycyclic aromatic hydrocarbons [12].

Women with higher levels of education were found to have a higher propensity for consuming healthy diets, possibly attributed to their increased awareness and knowledge concerning the impact of lifestyle on human health. The association between higher education and the adoption of a healthier diet was confirmed in a 2020 research study including 12 European countries. The findings indicated that individuals with higher educational attainment tended to have a reduced fat intake, while those with lower levels of education generally exhibited diminished intake of micronutrients (vitamins, minerals, and trace elements) and an elevated consumption of macronutrients (carbohydrates, fats, and proteins), signifying an overall lower dietary quality [13]. A better adherence to healthy diet was reported by pregnant women that were older, of higher social

class, and higher education level also in the ECLIPSES Study [6].

In the questionnaire survey, the statistically significant relationship was observed between healthy eating habits and the age of the surveyed women. Specifically, women aged 31 years and older exhibited a greater tendency to adopt healthier dietary practices. This relationship was also confirmed in a Brazilian study from 2016, which found that older pregnant women generally had lower consumption of processed foods and showed a greater inclination towards healthier eating. Older pregnant women, in particular, had a higher intake of whole-grain bread, fruits, vegetables, white meat, and other nutritious foods [14].

The results of the questionnaire survey indicate that women living with a partner tended to have healthier dietary habits compared to those living without a partner. Similar findings were reported in a 2015 Australian study, which revealed that individuals living alone were more inclined to unhealthy eating habits. They mainly have an insufficient intake of basic foods, especially fruit, vegetables, and fish. The reason of poorer dietary habits in individuals living alone may be reduced motivation and enjoyment in meal preparation, potentially resulting in the preparation of simpler dishes or reliance on ready-made meals. Single individuals may find less motivation to adhere to the tenets of a healthy diet, which could result in a loss of control over the quantity of food portions they consume. Another contributing factor to unhealthy diet habits could be lack of finances, as individuals living alone may face greater challenges in affording housing, utilities, and other essential necessities. As a result, they may not have sufficient financial resources to purchase fresh and nutritious foods, including fruits, vegetables, and fish [15]. The study [16] found that caregiver education and living in a single-parent household were consistently associated with poorer eating habits. In all models in that study, general family functioning and parental psychological distress were associated with poorer eating habits.

Women who recognized the importance of dietary habits as a key factor in human health were also more inclined to maintain a healthy diet. Therefore, the perception of risk factors associated with diet is very important. In addition, it was confirmed that children whose mothers emphasized health goals consumed more healthy food and less unhealthy food [2]. The potential associations among parent's

own eating behaviours, feeding practices, and children's eating behaviours were indicated in the study of Gray H et al. [1].

## CONCLUSION

Knowledge of sociodemographic contexts and risk perception of healthy eating provides a good basis for health intervention in early childhood. The presented results indicate a health intervention for the younger age group of women and the need to emphasize the influence of obesity and lack of exercise on health in health education.

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