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Mother-Related Determinants of Children At-Home Fruit and Vegetable Dietary Patterns in a Polish National Sample

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Abstract: Fruit and vegetable intake is indicated among the features of sustainable diets, while children's intake is strongly associated with the intake of their parents, as well as the availability of food products and their accessibility at home. The aim of the study was to analyze the mother-related determinants of children at-home fruit and vegetable dietary patterns in a Polish national sample of children aged 3–10 years. The random quota sampling (with quotas for age, education, and place of residence) was conducted to recruit the national representative sample of Polish mothers of children aged 3–10 years (n = 1200) who were interviewed using a Computer-Assisted Telephone Interviewing (CATI) method. They were asked about their children's at-home fruit and vegetable dietary patterns, which were later compared in sub-groups that were stratified for age, educational background, marital status, place of residence, occupational status, and total net income in households. The indicated features, but not marital status, were indicated as determinants of children at-home fruit and vegetable dietary patterns. Children of younger mothers more often than others consumed fruits, whereas those of older mothers consumed vegetables. Children of mothers who had a lower level of education more commonly than others consumed fruits alone as a dish, and they had a higher preference for them, while those of mothers who had a higher level of education had a higher consumption of vegetables than others, although they had a medium preference for them. Children of mothers from villages had a lower consumption of vegetables and fruits than others, although they had a higher preference for fruits. Children of mothers with no professional job had a lower consumption of vegetables than others and more often consumed them processed, although they had a higher preference for fruits and vegetables. Children of mothers with low income had a lower consumption of vegetables than others and more often consumed fruits in a dish with other products, although they had a higher preference for fruits and vegetables. To summarize, an indication of a high preference for fruits and vegetables by mothers is not accompanied by the higher consumption and recommended dietary patterns for fruit and vegetable intake by their children. In particular, the sub-samples of mothers who had a low level of education, were from villages, did not have a professional job, and had low income may either overestimate the fruit and vegetable preference of their children or do not offer them sufficient amount of fruits and vegetables, although they indicate a higher preference. In order to encourage more sustainable diet following, in terms of the fruit and vegetable intake, it is essential to introduce actions toward the properly planned nutritional education for the indicated target groups.

Keywords: children; mothers; fruit intake; vegetable intake; consumption behaviors; dietary patterns; choice; preferences; determinants; social factors

1. Introduction

According to the directions and solutions for policy, research, and action that were elaborated for the sustainable diets and biodiversity by Food and Agriculture Organization of the United Nations (FAO), the necessary element for sustainable nutrition is increasing fruit and vegetable intake [1]. This is not only due to the lowest environmental impact of fruit and vegetable production, as indicated for the environmental pyramid of food production [2]—even though some negative effects are also mentioned [3], but above all because sustainable diets contribute to a healthy life [1].

To date, there has been no global dietary recommendation for children and adolescents; however, the World Health Organization (WHO) indicates primary issues for individuals and populations, including the increasing the intake of fruits and vegetables [4]. Moreover, for the intake of fruits and vegetables, the joint report of the FAO and WHO [5] indicated increasing food intake as an extremely important aim for the global population, which is very challenging because the interventions and programs assessed by the FAO/WHO have contributed to a daily increase of intake of only 0.14–0.9 servings of fruit and vegetable for children and up to 1.2 in adults to date. Furthermore, the intake of fruits and vegetables is commonly inadequate. According to the Eurostat data for 2014 [6], only one in seven European Union inhabitants met the recommendation of five servings of fruits and vegetables per day. Similar data were indicated by the Centers for Disease Control and Prevention (CDC) of the United States of America for 2015 [7], in which only one in 10 inhabitants of the United States met the abovementioned recommendations.

Thus, the current situation of inadequate fruit and vegetable intake is alarming because, according to estimations of Lim et al. [8], inadequate consumption contributed in 2010 alone to a worldwide burden of 6.7 million deaths. Moreover, the diseases that are linked with inadequate fruit and vegetable intake (coronary heart disease, stroke, and certain types of cancer) [9], are currently more often observed both for adults and in the pediatric population, while dietary habits and related excessive body mass are among the most important risk factors [10–12]. Therefore, it must be emphasized that childhood is a period in which dietary prevention is particularly important. Moreover, the WHO [9] emphasizes that childhood dietary patterns of fruit and vegetable intake are later transferred to adulthood [13,14]; therefore, it is particularly vital to create beneficial patterns from the very early beginning because they will be decisive for the future.

However, as indicated by WHO [9] in this period of life, there are important factors that determine the fruit and vegetable intake, which are not observed for adults and may reduce their intake. These include the food consumption patterns of parents, as well as the availability of fruits and vegetables and accessibility at home [15–17]. Furthermore, although children learn their eating behaviors from peers and others in kindergarten and school, the parents are the ones who are the most important influencing individuals because their dietary patterns are confirmed to be strongly associated with the dietary patterns of their progeny [18]. This was confirmed in our own previous analysis for the fruit and vegetable intake in Polish and Romanian national samples [19,20]. Taking this into account, the aim of the presented study was to analyze the mother-related determinants of children at-home fruit and vegetable dietary patterns in a Polish national sample of children aged 3–10 years.

2. Materials and Methods

2.1. Ethical Statement

The study was conducted in accordance with guidelines laid down in the Declaration of Helsinki. All the procedures involving human subjects were approved by the Ethics Committee of the Faculty of Human Nutrition and Consumer Sciences of the Warsaw University of Life Sciences. All the participating women were recruited as a national sample of Polish mothers of children aged 3–10 and provided their informed consent to participate.

2.2. Studied Sample

The study was conducted in a national representative sample of Polish mothers of children aged 3–10 years who were recruited using the quota sampling procedure (with quotas for age, education, and place of residence, i.e., region of Poland and size of the city), similar to previously published studies [19,20]. The recruitment procedure was conducted by a professional agency that assesses the public opinion and perception. The recruited sample was verified for the following inclusion and exclusion criteria:

Inclusion criteria:

- women,
- aged 25–45 years,
- inhabitant of Poland,
- mother of at least one child aged 3–10 years.

Exclusion criteria:

- lack of informed consent to participate (which was to be registered as an audio material during a telephone interview),
- missing data in the questionnaire (except for the question about total net income in household being the only question allowed not to be answered).

2.3. Study Design

Since the dietary patterns of children aged 3–10 years were assessed, children were not asked about their own patterns, but the proxy reporting by mothers was applied, because it is commonly performed for children. At the beginning of the interview, mothers were asked about the number of children they had who were aged 3–10 years; if they indicated more than one, they were asked to arbitrarily select one of them and later answer always about this one specific child.

Mothers were asked direct closed-ended and open-ended questions about their child's at-home fruit and vegetable dietary patterns, while the open-ended ones were later interpreted by the interviewer and attributed to a specific category, if needed. The included questions were associated with the following:

- general frequency of fruit consumption (open-ended question about number of servings a day);
- general frequency of vegetable consumption (open-ended question about number of servings a day);
- number of servings of fruits consumed during previous day (assessed using 24-h dietary recall of fruit and vegetable intake);
- number of servings of vegetables consumed during previous day (assessed using 24-h dietary recall of fruit and vegetable intake);
- treatment applied for fruits that are consumed (open-ended question, with the answer attributed to one of the following categories: consumed unprocessed only; consumed processed (including juices, salads, cooked, etc.) only; consumed both unprocessed and processed);
- treatment applied for vegetables that are consumed (open-ended question, with the answer attributed to one of the following categories: consumed unprocessed only; consumed processed (including juices, salads, cooked, etc.) only; consumed both unprocessed and processed);
- characteristics of typical dishes, including fruit, that are consumed (open-ended question, with the answer attributed to one of the following categories: fruit consumed alone; fruit consumed with other products; fruit consumed both alone and with other products). This question was asked only for fruits and not for vegetables because, in Poland, vegetables are generally not consumed alone, but mainly with other products;

- general preference for fruits assessed by mothers (closed-ended question, with the following answers to choose one: definitely yes; rather yes; neither yes, nor not; rather not; definitely not).
- general preference for vegetables assessed by mothers (closed-ended question, with the following answers to choose one: definitely yes; rather yes; neither yes, nor not; rather not; definitely not).

For mothers of children who were school-age students, there were additional questions associated with the at-school fruit and vegetable dietary patterns of their children (Supplementary Material: Tables S1–S12). Similarly, as questions associated with at-home dietary patterns, there were direct closed-ended and open-ended questions, while the open-ended ones were later interpreted by the interviewer and attributed to a specific category, if needed. The included questions were associated with the following:

- being given fruits from home to school (closed-ended question, with the following answers to choose one: yes; rather yes; rather no; no);
- being given vegetables from home to school (closed-ended question, with the following answers to choose one: yes; rather yes; rather no; no);
- consuming at school fruits given from home (closed-ended question, with the following answers to choose one: yes; rather yes; rather no; no; not given fruits);
- consuming at school vegetables given from home (closed-ended question, with the following answers to choose one: yes; rather yes; rather no; no; not given vegetables);
- treatment applied for fruits given from home to school (open-ended question, with the answer attributed to one of the following categories: consumed unprocessed only; consumed processed (including juices, salads, cooked, etc.) only; consumed both unprocessed and processed; not given fruits);
- treatment applied for vegetables given from home to school (open-ended question, with the answer attributed to one of the following categories: consumed unprocessed only; consumed processed (including juices, salads, cooked, etc.) only; consumed both unprocessed and processed; not given vegetables).

While analyzed the information about children fruit and vegetable dietary patterns, they were compared between sub-groups stratified by characteristics of mothers. The analyzed characteristics of mothers included:

- age—respondents were divided into four sub-groups: aged 25–30 (n = 274); aged 30–35 (n = 448); aged 35–40 (n = 333), and aged 40–45 (n = 145);
- educational background—respondents were divided into four sub-groups: primary education (n = 56); vocational qualification (n = 187); secondary education (n = 470); and higher education (n = 487);
- marital status—respondents were divided into two sub-groups: married/in a married-like relationship (n = 1072); single/separated/divorced/widowed (n = 128);
- place of residence—respondents were divided into three sub-groups: village (n = 501); city of up to 100,000 inhabitants (n = 375); city of above 100,000 inhabitants (n = 324);
- occupational status—respondents were divided into two sub-groups: any full-time or part-time job (n = 790); no job declared (n = 410);
- total net income in household—respondents were divided into three sub-groups: lower than 2000 PLN (~450 €) (n = 307); 2000–4000 PLN (~450–900 €) (n = 494); higher than 4000 PLN (~900 €) (n = 302), while 97 respondents were excluded from this analysis because they refused to answer the question about total net income in their household.

2.4. Statistical Analysis

In order to verify the normality of distribution, the Shapiro–Wilk test was applied and afterwards, due to nonparametric distribution, the comparison of typical values was conducted

using Mann–Whitney U test and Kruskal–Wallis ANOVA. The comparison of shares of sub-groups was conducted using the chi^2 test.

For all the conducted analysis, $p \leq 0.05$ was interpreted as statistically significant. The statistical analyses were conducted using Statistica 8.0 (StatSoft Inc., Tulsa, OK, USA) and Statgraphics Plus for Windows 5.1 (Statgraphics Technologies Inc., The Plains, VA, USA).

3. Results

3.1. Influence of the Age of Mothers on At-Home Fruit and Vegetable Dietary Patterns of Their Children

The analysis of association between the age of mothers and at-home fruit consumption behaviors of their children in a national sample of Polish respondents is presented in Table 1. For a majority of assessed variables, there were no statistically significant differences; however, regarding the number of servings of fruits that were consumed during previous day, there was a significant difference depending on the age of the mother ($p = 0.0198$). For younger mothers (25−35 years), the declared number of servings was higher (up to 10 servings a day) compared to older (35−45 years) ones (up to seven servings a day). While analyzing the association between the age of mothers and at-school fruit consumption behaviors of their children in a sub-sample of school children of the national sample of Polish respondents (Supplementary Material: Table S1), there were no statistically significant differences.

Table 1. The analysis of association between the age of mothers and at-home fruit consumption behaviors of their children in a national sample of Polish respondents.

		25–30 Years (n = 274)	30–35 Years (n = 448)	35–40 Years (n = 333)	40–45 Years (n = 145)	*p*
General number of servings per day**	Mean ± SD Median (min–max)	2.32 ± 1.29 2* (0.15–5)	2.33 ± 1.29 2* (0.05–5)	2.12 ± 1.24 2* (0.05–5)	2.17 ± 1.26 2* (0.05–5.0)	0.0992
Number of servings during previous day**	Mean ± SD Median (min–max)	2.33 ± 1.29 2* (0–7)	2.34 ± 1.35 2* (0–10)	2.08 ± 1.24 2* (0–7)	2.28 ± 1.18 2* (0–5)	0.0198
Treatment applied for fruits***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	44 (16.1%) 8 (2.9%) 222 (81.0%)	74 (16.5%) 23 (5.1%) 351 (78.3%)	73 (21.9%) 18 (5.4%) 242 (72.7%)	22 (15.2%) 7 (4.8%) 116 (80.0%)	0.1956
Characteristics of dish including fruit***	Fruit consumed alone Fruit consumed with other products Fruit consumed both alone and with other products	42 (15.3%) 21 (7.7%) 211 (77.0%)	67 (15%) 22 (4.9%) 359 (80.1%)	68 (20.4%) 19 (5.7%) 246 (73.9%)	22 (15.2%) 6 (4.1%) 117 (80.7%)	0.2212
General preference for fruits assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	110 (40.1%) 118 (43.1%) 29 (10.6%) 13 (4.7%) 4 (1.5%)	166 (37.1%) 218 (48.7%) 46 (10.3%) 14 (3.1%) 4 (0.9%)	135 (40.5%) 149 (44.7%) 34 (10.2%) 10 (3.0%) 5 (1.5%)	62 (42.8%) 66 (45.5%) 8 (5.5%) 6 (4.1%) 3 (2.1%)	0.7330

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Kruskal–Wallis ANOVA; *** compared in sub-groups using the chi^2 test.

The analysis of association between the age of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents is presented in Table 2. For the number of servings of vegetables that were consumed during the previous day ($p = 0.0297$) and are generally consumed ($p = 0.0100$), as well as treatment applied for vegetables ($p = 0.0145$), significant differences dependent on the age of mothers were stated. While a majority of children consumed processed vegetables, the oldest group of mothers (40−45 years) had the lowest share of children consuming only processed vegetables. Moreover, for the indicated group of mothers, a median of two servings a day was observed for both the general consumption and vegetables consumed during the previous day compared with other sub-groups that had lower consumption (commonly attributed to one serving a day). While analyzing the association between the age of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children of the

national sample of Polish respondents (Supplementary Material: Table S2), there were no statistically significant differences.

Table 2. The analysis of association between the age of mothers and at-home vegetable consumption behaviors of their children in a national sample of Polish respondents.

		25–30 Years (n = 274)	30–35 Years (n = 448)	35–40 Years (n = 333)	40–45 Years (n = 145)	*p*
General number of servings per day **	Mean ± SD Median (min–max)	1.86 ± 1.25 2* (0.05–5)	1.96 ± 1.22 2* (0.05–5)	1.66 ± 1.09 1* (0.05–5)	1.84 ± 1.15 2* (0.05–5.0)	0.0100
Number of servings during previous day**	Mean ± SD Median (min–max)	1.74 ± 1.12 1* (0–5)	1.91 ± 1.30 2* (0–13)	1.64 ± 1.04 1* (0–5)	1.84 ± 1.10 2* (0–5)	0.0297
Treatment applied for vegetables***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	1 (0.4%) 83 (30.3%) 190 (69.3%)	6 (1.3%) 107 (23.9%) 335 (74.8%)	7 (2.1%) 104 (31.2%) 222 (66.7%)	5 (3.4%) 30 (20.7%) 110 (75.9%)	0.0145
General preference for vegetables assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	40 (14.6%) 73 (26.6%) 101 (36.9%) 45 (16.4%) 15 (5.5%)	49 (10.9%) 139 (31%) 167 (37.3%) 74 (16.5%) 19 (4.2%)	32 (9.6%) 108 (32.4%) 124 (37.2%) 47 (14.1%) 22 (6.6%)	25 (17.2%) 46 (31.7%) 54 (37.2%) 14 (9.7%) 6 (4.1%)	0.2396

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Kruskal–Wallis ANOVA; *** compared in sub-groups using chi^2 test.

3.2. Influence of the Educational Background of Mothers on At-Home Fruit and Vegetable Dietary Patterns of Their Children

The analysis of association between the educational background of mothers and the at-home fruit consumption behaviors of their children in a national sample of Polish respondents is presented in Table 3. For the majority of the assessed variables, there were no statistically significant differences, but there were for the characteristics of dishes including fruit ($p = 0.0077$) and general preference for fruits assessed by mothers ($p < 0.0001$). The mothers with a lower level of education more often than others indicated that their children consumed fruits alone (34% of primary education ones versus 15–16% for other sub-groups). Moreover, they indicated a very high fruit preference for their children (45% of primary education and 51% of vocational qualification ones for the highest level of preference), while those with a higher level of education declared fruit preference, but it was not very high (42% of secondary education and 56% of higher education for the lower level of preference). While analyzing the association between the educational background of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of the school children within the national sample of Polish respondents (Supplementary Material: Table S3), there were no statistically significant differences.

Table 3. The analysis of association between the educational background of mothers and at-home fruit consumption behaviors of their children in a national sample of Polish respondents.

		Primary Education (n = 56)	Vocational Qualification (n = 187)	Secondary Education (n = 470)	Higher Education (n = 487)	*p*
General number of servings per day **	Mean ± SD Median (min–max)	2.01 ± 1.11 2* (0.15–5)	2.18 ± 1.28 2* (0.05–5)	2.19 ± 1.30 2* (0.05–5)	2.36 ± 1.26 2* (0.15–5)	0.0538
Number of servings during previous day**	Mean ± SD Median (min–max)	2.16 ± 1.19 2* (0–5)	2.19 ± 1.33 2*(0–10)	2.19 ± 1.31 2* (0–7)	2.36 ± 1.26 2* (0–7)	0.0625
Treatment applied for fruits***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	11 (19.6%) 3 (5.4%) 42 (75%)	39 (20.9%) 7 (3.7%) 141 (75.4%)	86 (18.3%) 20 (4.3%) 364 (77.4%)	77 (15.8%) 26 (5.3%) 384 (78.9%)	0.7379
Characteristics of dish including fruit***	Fruit consumed alone Fruit consumed with other products Fruit consumed both alone and with other products	19 (33.9%) 5 (8.9%) 32 (57.1%)	30 (16.0%) 13 (7.0%) 144 (77.0%)	72 (15.3%) 29 (6.2%) 369 (78.5%)	78 (16%) 21 (4.3%) 388 (79.7%)	0.0077

Table 3. *Cont.*

		Primary Education (n = 56)	Vocational Qualification (n = 187)	Secondary Education (n = 470)	Higher Education (n = 487)	*p*
General preference for fruits assessed by mother***	Definitely yes	25 (44.6%)	96 (51.3%)	201 (42.8%)	151 (31%)	<0.0001
	Rather yes	22 (39.3%)	62 (33.2%)	196 (41.7%)	271 (55.6%)	
	Neither yes, nor not	8 (14.3%)	20 (10.7%)	42 (8.9%)	47 (9.7%)	
	Rather not	0 (0.0%)	6 (3.2%)	23 (4.9%)	14 (2.9%)	
	Definitely not	1 (1.8%)	3 (1.6%)	8 (1.7%)	4 (0.8%)	

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Kruskal–Wallis ANOVA; *** compared in sub-groups using chi^2 test.

The analysis of association between the educational background of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents is presented in Table 4. For a number of servings of vegetables that were consumed during the previous day ($p < 0.0001$) and are generally consumed ($p < 0.0001$), as well as general preference for vegetables assessed by mothers ($p = 0.0177$), significant differences dependent on the educational background of mothers were stated. For a group of mothers with a higher level of education, the higher vegetable consumption was observed for both the general consumption and vegetables consumed during the previous day (median of two servings a day for higher education) compared with other sub-groups (median of one serving a day for primary education and vocational qualification). Furthermore, women with a lower level of education declared either a high vegetable preference of their children or low preference, but not of a medium level (25% for medium level of preference for primary education mothers compared with 39% for higher education ones). While analyzing the association between the educational background of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children of the national sample of Polish respondents (Supplementary Material: Table S4), there were no statistically significant differences.

Table 4. The analysis of association between the educational background of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents.

		Primary Education (n = 56)	Vocational Qualification (n = 187)	Secondary Education (n = 470)	Higher Education (n = 487)	*p*
General number of servings per day **	Mean ± SD	1.65 ± 1.27	1.66 ± 1.31	1.77 ± 1.20	2.00 ± 1.10	<0.0001
	Median (min–max)	1* (0.05–5)	1* (0.05–5)	2* (0.05–5)	2* (0.05–5)	
Number of servings during previous day**	Mean ± SD	1.57 ± 1.14	1.54 ± 1.05	1.70 ± 1.13	1.99 ± 1.22	<0.0001
	Median (min–max)	1* (0–5)	1* (0–5)	1.5* (0–5)	2* (0–13)	
Treatment applied for vegetables***	Consumed unprocessed only	1 (1.8%)	3 (1.6%)	7 (1.5%)	8 (1.6%)	0.8264
	Consumed processed only	17 (30.4%)	58 (31.0%)	127 (27.0%)	122 (25.1%)	
	Consumed both unprocessed and processed	38 (67.9%)	126 (67.4%)	336 (71.5%)	357 (73.3%)	
General preference for vegetables assessed by mother***	Definitely yes	7 (12.5%)	35 (18.7%)	64 (13.6%)	40 (8.2%)	0.0177
	Rather yes	18 (32.1%)	56 (29.9%)	129 (27.4%)	163 (33.5%)	
	Neither yes, nor not	14 (25.0%)	65 (34.8%)	177 (37.7%)	190 (39.0%)	
	Rather not	12 (21.4%)	24 (12.8%)	74 (15.7%)	70 (14.4%)	
	Definitely not	5 (8.9%)	7 (3.7%)	26 (5.5%)	24 (4.9%)	

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Kruskal–Wallis ANOVA; *** compared in sub-groups using chi^2 test.

3.3. Influence of the Marital Status of Mothers on At-Home Fruit and Vegetable Dietary Patterns of Their Children

The analysis of association between the marital status of mothers and the at-home fruit consumption behaviors of their children in a national sample of Polish respondents is presented in Table 5. For the assessed variables, there were no statistically significant differences. However, while analyzing the association between the marital status of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents (Supplementary Material: Table S5), there was a significant difference. The difference was associated with the frequency of consumption of only unprocessed fruits, which was more common for children

of mothers who were single/separated/divorced/widowed than of those who were married/living in a married-like relationship.

Table 5. The analysis of association between the marital status of mothers and the at-home fruit consumption behaviors of their children in a national sample of Polish respondents.

		Married/in a Married-Like Relationship (n = 1072)	Single/Separated/ Divorced/Widowed (n = 128)	*p*
General number of servings per day **	Mean ± SD Median (min–max)	2.23 ± 1.26 2* (0.05–5)	2.42 ± 1.36 3* (0.05–5)	0.1174
Number of servings during previous day**	Mean ± SD Median (min–max)	2.26 ± 1.29 2* (0–10)	2.29 ± 1.27 2* (0–6)	0.6380
Treatment applied for fruits***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	30 (23.4%) 5 (3.9%) 93 (72.7%)	183 (17.1%) 51 (4.8%) 838 (78.2%)	0.1982
Characteristics of dish including fruit***	Fruit consumed alone Fruit consumed with other products Fruit consumed both alone and with other products	26 (20.3%) 9 (7%) 93 (72.7%)	173 (16.1%) 59 (5.5%) 840 (78.4%)	0.3411
General preference for fruits assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	48 (37.5%) 60 (46.9%) 12 (9.4%) 7 (5.5%) 1 (0.8%)	425 (39.6%) 491 (45.8%) 105 (9.8%) 36 (3.4%) 15 (1.4%)	0.7483

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Mann–Whitney U test; *** compared in sub-groups using chi^2 test.

The analysis of association between the marital status of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents is presented in Table 6. For the assessed variables, there were no statistically significant differences. However, while analyzing the association between the marital status of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents (Supplementary Material: Table S6), there were significant differences. The differences were associated with that, compared with the children of those who were married/living in a married-like relationship, the children of mothers who were single/separated/divorced/widowed were more often given vegetables to school, consumed them, and more often consumed unprocessed vegetables.

Table 6. The analysis of association between the marital status of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents.

		Married/in a Married-Like Relationship (n = 1072)	Single/Separated/ Divorced/Widowed (n = 128)	*p*
General number of servings per day **	Mean ± SD Median (min–max)	1.83 ± 1.17 2* (0.05–5)	1.96 ± 1.33 2* (0.05–5)	0.5343
Number of servings during previous day**	Mean ± SD Median (min–max)	1.78 ± 1.17 2* (0–13)	1.87 ± 1.20 2* (0–5)	0.5901
Treatment applied for vegetables***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	4 (3.1%) 34 (26.6%) 90 (70.3%)	15 (1.4%) 290 (27.1%) 767 (71.5%)	0.3354
General preference for vegetables assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	23 (18.0%) 38 (29.7%) 40 (31.3%) 21 (16.4%) 6 (4.6%)	123 (11.5%) 328 (30.6%) 406 (37.9%) 159 (14.8%) 56 (5.2%)	0.2312

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Mann–Whitney U test; *** compared in sub-groups using chi^2 test.

3.4. Influence of the Place of Recidence of Mothers on At-Home Fruit and Vegetable Dietary Patterns of Their Children

The analysis of association between the place of residence of mothers and the at-home fruit consumption behaviors of their children in a national sample of Polish respondents is presented in Table 7. For a majority of assessed variables, there were no statistically significant differences, but only for a general preference for fruits assessed by mothers ($p = 0.0025$) and general frequency of consumption ($p = 0.0206$). The mothers from villages more often than others indicated a very high fruit preference for their children (44% for the highest level of preference), while those from large cities indicated a preference for fruits, but it was not very high (54% for the lower level of preference). A corresponding difference was observed for the general frequency of fruit consumption. While analyzing the association between the place of residence of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents (Supplementary Material: Table S7), the corresponding association was stated because mothers from villages more often than others indicated that their children either did not receive or did not consume fruits that were given to school.

Table 7. Analysis of association between the place of residence of mothers and the at-home fruit consumption behaviors of their children in a national sample of Polish respondents.

		Village (n = 501)	**City of up to 100,000 Inhabitants (n = 375)**	**City of above 100,000 Inhabitants (n = 324)**	***p***
General number of servings per day **	Mean ± SD Median (min–max)	2.14 ± 1.27 2* (0.05–5)	2.33 ± 1.34 2* (0.05–5)	2.33 ± 1.20 2* (0.05–5)	0.0206
Number of servings during previous day**	Mean ± SD Median (min–max)	2.20 ± 1.28 2* (0–7)	2.28 ± 1.38 2* (0–10)	2.32 ± 1.19 2* (0–6)	0.3056
Treatment applied for fruits***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	88 (17.6%) 23 (4.6%) 390 (77.8%)	69 (18.4%) 16 (4.3%) 290 (77.3%)	56 (17.3%) 17 (5.2%) 251 (77.5%)	0.9720
Characteristics of dish including fruit***	Fruit consumed alone Fruit consumed with other products Fruit consumed both alone and with other products	86 (17.2%) 29 (5.8%) 386 (77%)	63 (16.8%) 25 (6.7%) 287 (76.5%)	50 (15.4%) 14 (4.3%) 260 (80.2%)	0.6545
General preference for fruits assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	222 (44.3%) 198 (39.5%) 58 (11.6%) 16 (3.2%) 7 (1.4%)	151 (40.3%) 177 (47.2%) 28 (7.5%) 13 (3.5%) 6 (1.6%)	100 (30.9%) 176 (54.3%) 31 (9.6%) 14 (4.3%) 3 (0.9%)	0.0025

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Kruskal–Wallis ANOVA; *** compared in sub-groups using chi^2 test.

The analysis of association between the place of residence of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents is presented in Table 8. For the number of servings of vegetables that were consumed during the previous day ($p = 0.0016$) and are generally consumed ($p = 0.0001$), a significant difference dependent on the place of residence of mothers was observed. For mothers from villages, a median of one serving a day was observed for both the general consumption and vegetables consumed during the previous day, while for mothers from cities, a higher median of intake of two servings a day was declared. Furthermore, while analyzing the association between the place of residence of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children of the national sample of Polish respondents (Supplementary Material: Table S8), there were significant differences. The differences were associated with that, compared with the children of those who were living in the cities, children of mothers from villages were less often given vegetables to bring to school and consumed them less often.

Table 8. The analysis of association between the place of residence of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents.

		Village (n = 501)	City of up to 100,000 Inhabitants (n = 375)	City of above 100,000 Inhabitants (n = 324)	*p*
General number of servings per day **	Mean ± SD Median (min–max)	1.69 ± 1.18 1* (0.05–5)	1.94 ± 1.22 2* (0.05–5)	1.97 ± 1.14 2* (0.05–5)	0.0001
Number of servings during previous day**	Mean ± SD Median (min–max)	1.65 ± 1.06 1* (0–5)	1.84 ± 1.25 2* (0–13)	1.94 ± 1.21 2* (0–10)	0.0016
Treatment applied for vegetables***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	10 (2.0%) 146 (29.1%) 345 (68.9%)	8 (2.1%) 93 (24.8%) 274 (73.1%)	1 (0.3%) 85 (26.2%) 238 (73.5%)	0.1379
General preference for vegetables assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	62 (12.4%) 155 (30.9%) 181 (36.1%) 73 (14.6%) 30 (6.0%)	50 (13.3%) 113 (30.1%) 147 (39.2%) 47 (12.5%) 18 (4.8%)	34 (10.5%) 98 (30.2%) 118 (36.4%) 60 (18.5%) 14 (4.3%)	0.5040

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Kruskal–Wallis ANOVA; *** compared in sub-groups using chi^2 test.

3.5. Influence of the Occupational Status of Mothers on At-Home Fruit and Vegetable Dietary Patterns of Their Children

The analysis of association between the occupational status of mothers and the at-home fruit consumption behaviors of their children in a national sample of Polish respondents is presented in Table 9. For the majority of assessed variables, there were no statistically significant differences, but there was one for a general preference for fruits as assessed by mothers ($p = 0.0008$). The mothers with no job indicated more often than others a very high fruit preference for their children (48% for the highest level of preference), while those with a full-time or part-time job declared a preference for fruit, but it was not very high (50% for the lower level of preference). While analyzing the association between the occupational status of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents (Supplementary Material: Table S9), no statistically significant differences were observed.

Table 9. The analysis of association between the occupational status of mothers and the at-home fruit consumption behaviors of their children in a national sample of Polish respondents.

		Full-Time/Part-Time Job (n = 790)	No Job Declared (n = 410)	*p*
General number of servings per day **	Mean ± SD Median (min–max)	2.30 ± 1.28 2* (0.05–5)	2.16 ± 1.26 2* (0.05–5)	0.0693
Number of servings during previous day**	Mean ± SD Median (min–max)	2.30 ± 1.30 2* (0–10)	2.19 ± 1.26 2* (0–7)	0.1943
Treatment applied for fruits***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	137 (17.3%) 37 (4.7%) 616 (78%)	76 (18.5%) 19 (4.6%) 315 (76.9%)	0.8763
Characteristics of dish including fruit***	Fruit consumed alone Fruit consumed with other products Fruit consumed both alone and with other products	127 (16.1%) 40 (5.1%) 623 (78.8%)	72 (17.6%) 28 (6.8%) 310 (75.6%)	0.3310
General preference for fruits assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	278 (35.2%) 394 (49.9%) 78 (9.9%) 28 (3.5%) 12 (1.5%)	195 (47.6%) 157 (38.3%) 39 (9.5%) 15 (3.7%) 4 (1.0%)	0.0008

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Mann–Whitney U test; *** compared in sub-groups using chi^2 test.

The analysis of association between the occupational status of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents is presented in

Table 10. Regarding the number of servings of vegetables that were consumed during the previous day ($p < 0.0001$) and are generally consumed ($p = 0.0001$), as well as the treatment applied for vegetables ($p = 0.0002$) and a general preference for vegetables assessed by mothers ($p = 0.0181$), a significant difference dependent on the occupational status of mothers was observed. For mothers with no job declared, a median of one serving a day was observed for both the general consumption and vegetables consumed during the previous day, while for mothers with a full-time or part-time job, the higher median of intake of two servings a day was stated. This corresponded with a more common consumption of only processed vegetables for the children of mothers with no job compared with those declaring a job (34% versus 23%). Moreover, mothers with no job declared more often than others declared a very high vegetable preference for their children (15% versus 11% for the highest level of preference), while those with a full-time of part-time job declared a preference for vegetables, but it was not very high (34% versus 25% for the lower level of preference). While analyzing the association between the occupational status of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents (Supplementary Material: Table S10), a corresponding association was stated because mothers with no job indicated more often than others that their children consumed only processed vegetables at school.

Table 10. The analysis of association between the occupational status of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents.

		Full-Time/Part-Time Job (n = 790)	No Job Declared (n = 410)	*p*
General number of servings per day **	Mean ± SD Median (min–max)	1.92 ± 1.16 2* (0.05–5)	1.70 ± 1.24 1* (0.05–5)	0.0001
Number of servings during previous day**	Mean ± SD Median (min–max)	1.88 ± 1.13 2* (0–10)	1.61 ± 1.23 1* (0–13)	<0.0001
Treatment applied for vegetables***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	15 (1.9%) 184 (23.3%) 591 (74.8%)	4 (1.0%) 140 (34.1%) 266 (64.9%)	0.0002
General preference for vegetables assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	85 (10.8%) 264 (33.4%) 291 (36.8%) 112 (14.2%) 38 (4.8%)	61 (14.9%) 102 (24.9%) 155 (37.7%) 68 (16.6%) 24 (5.9%)	0.0181

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Mann–Whitney U test; *** compared in sub-groups using chi^2 test.

3.6. Influence of the Total Net Inclome in Household of Mothers on At-Home Fruit and Vegetable Dietary Patterns of Their Children

The analysis of association between the total net income in household of mothers and the at-home fruit consumption behaviors of their children in a national sample of Polish respondents is presented in Table 11. For the majority of the assessed variables, there were no statistically significant differences, but they were stated for the characteristics of dishes including fruit ($p = 0.0145$) and a general preference for fruits as assessed by mothers ($p < 0.0001$). The mothers with the lowest total net income more often than others indicated that their children did not consume fruits alone, but rather with other products (9% versus 3% for the highest income), but they indicated the very high fruit preference of their children (52% for the highest level of preference), while mothers with the highest income indicated a preference for fruits, but it was not very high (54% for the lower level of preference). Furthermore, while analyzing the association between the total net income in the households of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents (Supplementary Material: Table S11) for this group, there was a significantly higher frequency of consuming at-school unprocessed fruits only compared with others.

Table 11. The analysis of association between the total net income in household of mothers and the at-home fruit consumption behaviors of their children in a national sample of Polish respondents.

		Lower than 2000 PLN (~450 €) (n = 307)	2000–4000 PLN (~450-900 €) (n = 494)	Higher than 4000 PLN (~900 €) (n = 302)	*p*
General number of servings per day **	Mean ± SD Median (min–max)	2.17 ± 1.25 2* (0.05–5)	2.24 ± 1.31 2* (0.05–5)	2.30 ± 1.23 2* (0.05–5)	0.3609
Number of servings during previous day**	Mean ± SD Median (min–max)	2.19 ± 1.23 2* (0–6)	2.24 ± 1.34 2* (0–7)	2.89 ± 1.26 2* (0–6)	0.5692
Treatment applied for fruits***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	58 (18.9%) 14 (4.6%) 235 (76.5%)	90 (18.2%) 27 (5.5%) 377 (76.3%)	46 (15.2%) 12 (4%) 244 (80.8%)	0.5868
Characteristics of dish including fruit***	Fruit consumed alone Fruit consumed with other products Fruit consumed both alone and with other products	50 (16.3%) 29 (9.4%) 228 (74.3%)	86 (17.4%) 30 (6.1%) 378 (76.5%)	52 (17.2%) 8 (2.6%) 242 (80.1%)	0.0145
General preference for fruits assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	160 (52.0%) 103 (33.6%) 30 (9.8%) 10 (3.3%) 4 (1.3%)	179 (36.2%) 233 (47.2%) 55 (11.2%) 20 (4.0%) 7 (1.4%)	97 (32.2%) 162 (53.6%) 27 (8.9%) 13 (4.3%) 3 (1.0%)	<0.0001

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Kruskal–Wallis ANOVA; *** compared in sub-groups using chi^2 test.

The analysis of association between the total net income in the households of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents is presented in Table 12. Regarding the number of servings of vegetables that were consumed during the previous day ($p < 0.0001$) and are consumed in general ($p < 0.0001$), as well as regarding a general preference for vegetables assessed by mothers ($p = 0.0272$), a significant difference dependent on the total net income in the household of mothers was stated. For the group of mothers with the lowest income, a lower vegetable consumption was observed both for the general consumption and vegetables consumed during the previous day (median of one serving a day) compared with the other sub-groups (median of two servings a day). Furthermore, they declared more often a very high vegetable preference of their children than others (19% versus 10–11%), while those with higher income more often indicated a preference for vegetables, but it was not very high (32% versus 26%). While analyzing the association between the total net income in the households of mothers and at-school vegetable consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents (Supplementary Material: Table S12) for this group, there was a significantly lower frequency of being given vegetables to bring to school, particularly processed ones, and consuming them at school compared with others.

Table 12. The analysis of association between the total net income in the household of mothers and the at-home vegetable consumption behaviors of their children in a national sample of Polish respondents.

		Village (n = 501)	City of up to 100,000 Inhabitants (n = 375)	City of above 100,000 Inhabitants (n = 324)	*p*
General number of servings per day **	Mean ± SD Median (min–max)	1.62 ± 1.23 1* (0.05–5)	1.89 ± 1.21 2* (0.05–5)	1.99 ± 1.08 2* (0.05–5)	<0.0001
Number of servings during previous day**	Mean ± SD Median (min–max)	1.56 ± 1.11 1* (0–5)	1.78 ± 1.15 2* (0–10)	2.02 ± 1.25 2* (0–13)	<0.0001
Treatment applied for vegetables***	Consumed unprocessed only Consumed processed only Consumed both unprocessed and processed	5 (1.6%) 90 (29.3%) 212 (69.1%)	10 (2.1%) 138 (27.9%) 346 (70.0%)	4 (1.3%) 71 (23.5%) 227 (75.2%)	0.4579
General preference for vegetables assessed by mother***	Definitely yes Rather yes Neither yes, nor not Rather not Definitely not	57 (18.6%) 79 (25.7%) 115 (37.5%) 43 (14%) 13 (4.2%)	50 (10.1%) 152 (30.8%) 180 (36.4%) 84 (17%) 28 (5.7%)	33 (10.9%) 98 (32.5%) 114 (37.7%) 40 (13.3%) 17 (5.6%)	0.0272

* nonparametric distribution (verified using Shapiro–Wilk test; $p \leq 0.05$); ** compared in sub-groups using Kruskal–Wallis ANOVA; *** compared in sub-groups using chi^2 test.

4. Discussion

The crucial observation from the national Polish study conducted for a representative sample of mothers of children aged 3–10 is associated with the role of assessed factors such as the mother-related determinants of children at-home fruit and vegetable dietary patterns. Among the assessed factors, age, educational background, place of residence, occupational status, and total net income in household influenced the fruit and vegetable consumption, their general dietary patterns, and their preferences as assessed by mothers.

In the conducted study, only the marital status of mothers did not determine the at-home dietary patterns associated with fruit and vegetable intake. It may be associated with the common observation that single mothers [21], even with the limited financial resources [22], are trying to provide their children with an adequate diet, and that their own diet is characterized by a lower quality than those of their children. Moreover, even if they are not able to provide the adequate meal, they provide the possibility of obtaining it, as in the other Polish study that presented a lower frequency of having school lunch prepared at home for the children of single mothers, than for others, but at the same time providing their children resources to buy it at school [23]. However, a lack of nutritional knowledge may be a problem, as it is an important determinant [24], which was also evident from the example of pregnant single mothers who tend to have a lower nutritional value of their diet but also smoke cigarettes compared with the reference group of other pregnant women [25]. Also, the recent study by Boccia et al. [26] indicated that for consumers, their perception and awareness may be crucial while making purchase decisions.

The children of younger mothers more often consumed fruits, while for the children of older mothers, vegetables may have been associated with the natural age-related profile of food choices [27]. Fruit and vegetable preferences may change after adolescence, which is a point at which lower self-efficacy, peer modelling, and family dinner frequency are observed [28]. The situation that is observed in Poland is in agreement with the other studies indicating that vegetable consumption is most likely for the children of the oldest mothers [29], while a younger age of mother is a risk factor for the child having an improperly balanced diet [30].

The observed associations allow indicating that the specific target groups of children may be characterized by particularly unfavorable nutritional behaviors that are associated with the lowest fruit and vegetable intake, consuming these items only in the processed form, and not as a part of a properly balanced meal. Indicating such target groups in a specific population is essential to introduce any actions in order to conduct the properly planned nutritional education [31], which should be developed for specific population groups [32].

Based on the conducted study, the following target groups are in Poland: children of mothers with a low level of education, from villages, with no professional job, and with a low income, which may be summarized as children from families that have a lower socioeconomic status. It is well-known that socioeconomic status is a significant determinant of health [33] and of the eating behaviors of children in the family [34]. Moreover, fruit and vegetable intake is particularly reduced in families with lower socioeconomic status because the financial resources are spent on other products [35], including those that are not necessary, such as alcoholic beverages [36]. Such a situation is typical and observed independently from any individual country, which was stated in a study of Nordic countries, as socioeconomic inequalities in fruit and vegetable consumption were observed in all countries with no cross-country differences and no changes over time [37].

However, in our own conducted study, for those specific groups of children of mothers with a low level of education, from villages, with no job, and with low income, an additional aspect was declared by mothers, i.e., their children having an especially high preference for fruits and/or vegetables. Such a situation was unexpected, as mothers indicated an especially high preference for their children; however, at the same time, they indicated worse dietary patterns for the fruit and vegetable intake of their children compared with other sub-groups. Such a situation may result from multiple reasons; among the main ones, there may be indicated: mothers overestimating the fruit

and vegetable preference of their children and mothers not offering children a sufficient amount of fruits and vegetables because of low financial resources, despite indicating a high preference for such products.

The overestimation by mothers of the fruit and vegetable preference of their children may be associated with the common overestimation of the fruit and vegetable intake of children by their parents, which is associated with the general overestimation of the quality of the diet of children by their parents [38]. It is especially common in the case of children with a higher body mass [39], probably because parents want to present themselves in a better way, and they perceive fruit and vegetable consumption as a promoted dietary habit [40]. Moreover, especially women overestimate their children's intake of fruits and vegetables [41], which may have contributed to the observed overestimation of preference. Furthermore, the observed situation may have been associated with so-called pseudo-maintenance (the false belief that the intake is adequate), which for fruit and vegetable consumption was so far indicated as associated with certain socioeconomic factors such as educational background or food and nutrition security [42]. Moreover, it must be emphasized that maternal educational background was indicated in another Polish study as an important determinant of overweight adolescents [43]. Therefore, it may be concluded that mothers from a lower socioeconomic status families overestimate the fruit and vegetable preference of their children because of a lack of knowledge, a lack of interest in their real preference, and a need for family to be perceived in a better way.

The other explanation for the presented situation may be associated with the real (not overestimated) high preference for fruits and vegetables by children, which may result from the needs that are not met because of low financial resources and relatively high prices of fruits and vegetables, which are important determinants [44]. As was previously indicated, the fruit and vegetable intake in families of lower socioeconomic status is reduced [35]. Moreover, reduced intake may cause the feeling of deprivation and so-called hedonic hunger, which is defined as a need to consume driven by pleasure and creating psychological effects [45], which is known to be associated with prolonged food deprivation [46]. In general, food preference depends, among others, on the symbolic value that the food product has for a consumer; if the product is perceived as valuable or rare, the consumer may even perceive a more favorable taste as they consume it [47]. For adults, one well-known case is that of upscale wines, which may be perceived as tasting better only because of their price and not the real feeling of taste [48]. A similar association may be assumed for children from lower socioeconomic status families, which may perceive rarely consumed products as tastier compared to perception of other children. However, it must be emphasized that in such cases, the poverty and high prices of food products, which are commonly indicated as factors limiting the fruit and vegetable intake increase [49], are the real barriers that require a general intervention to ensure that such products are provided to families with low financial resources, e.g., by offering healthy products at lower prices [50].

Considering the role of fruits and vegetables, particularly for children who should create beneficial patterns that will be transferred to adulthood, actions planned to increase the intake of these products are necessary, not only to obtain a sustainable diet following, but also due to the health-related consequences for society. It should be also indicated that in another Polish study, the fruit and vegetable dietary patterns were associated with generally positive attitudes toward health [51], and thus may be treated as an indicator of broader problems. Furthermore, financial support for the fruit and vegetable consumption of children from lower socioeconomic status families is needed, as the financial barrier may reduce the effectiveness of education. However, the mother-related determinants of fruit and vegetable consumption should be still analyzed and considered for nutritional education as a factor that may affect the intake.

5. Conclusions

The age, educational background, place of residence, occupational status, and total net income of the households of mothers were determinants of their children's at-home fruit and vegetable dietary

patterns. The indication by mothers of their children having a high preference for fruits and vegetables is not accompanied by higher consumption or recommended dietary patterns of fruit and vegetable intake. In particular, the sub-samples of mothers with a low level of education, from villages, with no professional job, and with low income may either overestimate the fruit and vegetable preference of their children, or do not offer them sufficient amount of fruits and vegetables, although they may observe a high preference. In order to obtain a more sustainable diet following, in terms of fruit and vegetable intake, it is essential to introduce any actions in order to conduct the properly planned nutritional education for the indicated target groups.

Supplementary Materials: The following are available online at http://www.mdpi.com/2071-1050/11/12/3398/s1, Table S1. The analysis of association between the age of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S2. The analysis of association between the age of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S3. The analysis of association between the educational background of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S4. The analysis of association between the educational background of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S5. The analysis of association between the marital status of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S6. The analysis of association between the marital status of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S7. The analysis of association between the place of residence of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S8. The analysis of association between the place of residence of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S9. The analysis of association between the occupational status of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S10. The analysis of association between the occupational status of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S11. The analysis of association between the total net income in household of mothers and the at-school fruit consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents; Table S12. The analysis of association between the total net income in the households of mothers and the at-school vegetable consumption behaviors of their children in a sub-sample of school children within the national sample of Polish respondents.

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