

FAMILY INFLUENCES ON BREAKFAST FREQUENCY AND QUALITY AMONG PRIMARY SCHOOL PUPILS IN WARSAW AND ITS SURROUNDING AREAS

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ABSTRACT

Background. Regular consumption of a well balanced breakfast is a pre-requisite for normal growth and child development, along with the acquisition of proper eating habits. The family environment is crucial place where children learn such patterns of behaviour that form the basis for their development.

Objectives. To determine how family factors affect the regular eating of breakfast and types of foodstuffs consumed in primary school pupils, including food purchases made from vending machines and school tuck shops.

Materials and methods. Subjects were 836 pupils (435 girls and 401 boys, aged 6 - 13) from Warsaw and the surrounding areas. Appropriate socio-demographic data and relevant eating habits were obtained from direct interviewing of the subjects by means of a custom designed questionnaire. Statistical analyses were performed by the *Kohonen* type cluster analysis model and *Chi-square* test (Chi^2); ($p \leq 0.05$).

Results. Three clusters of pupils were identified by their differing socio-demographics and eating habits (eg. rates of breakfast consumption, buying from vending machines or school tuck shops). The first and third clusters were mainly pupils from two-parent families with parents proportionally spending similar times at work, where respective breakfast (87% and 91%) and second breakfast (77% and 72%) consumption rates were also similar together with food shopping rates during school time (respectively 69% and 63%). Pupils with single-parents, multi-generation families or if both parents were professionally active, predominated in the second cluster. These ate breakfast (73%) and second breakfast (67%) more rarely, but more frequently shopped for food at school (84%). A small number of pupils had a packed second breakfast from home, rarely ate sandwiches, fruit and/or vegetables and dairy products but ate more sweets, sweet rolls and savoury snacks. However, a large number of subjects bought sandwiches, fresh fruit and/or vegetables and fast-food at school.

Conclusions. Family factors were found to affect eating habits in children and adolescents regarding how often breakfast was eaten and the type of foodstuffs consumed. High consumptions of unhealthy food items for second breakfast were also observed. Single-parent pupils, those in multi-generation families or if both parents are employed rarely brought second breakfasts from home but frequently bought food from vending machines and school tuck shops. The results of the presented findings are significant towards planning an appropriate educational campaigns and health programmes targeted at children, adolescents and their families.

Key words: children, adolescents, breakfast, second breakfast, determinants of consumption and consumption rates, family structure, types of foodstuffs

STRESZCZENIE

Wprowadzenie. Regularne spożycie zbilansowanych śniadań warunkuje wzrost i rozwój dzieci oraz kształtuje prawidłowe nawyki żywieniowe. Środowisko rodzinne jest pierwszym i najważniejszym miejscem, z którego dziecko czerpie wzorce i podstawy do ich wykształcenia.

Cel pracy. Ocena rodzinnych uwarunkowań częstości spożywania śniadań oraz asortymentu spożywanej żywności przez uczniów szkół podstawowych oraz dokonywania przez nich zakupów w automacie i/lub sklepie szkolnym.

Materiał i metody. Badaniami objęto 836 uczniów (435 dziewcząt i 401 chłopców), w wieku 6 – 13 lat, z Warszawy i okolic. Dane dotyczące sytuacji socjo-demograficznej uczniów oraz wybranych składowych sposobu żywienia zebrano metodą bezpośredniego wywiadu ankietowego. Do statystycznego opracowania uzyskanych wyników wykorzystano analizę skupień metodą modelu sieci *Kohonena* oraz test Chi^2 ($p \leq 0,05$).

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Wyniki. Wyodrębniono trzy skupienia uczniów różniące się między sobą cechami socjo-demograficznymi oraz częstością spożywania śniadań i dokonywania zakupów w sklepiku szkolnym i/lub automacie ($p \leq 0,05$). W skupieniu 1 i 3 dominowali uczniowie z pełnych rodzin o podobnym odsetku aktywności zawodowej rodziców; uczniowie z podobną częstością spożywania śniadań (I – 87% i 91%; II – 77% i 72%) oraz dokonywania zakupów w szkole (69% i 63%). W skupieniu 2 przeważali uczniowie z rodzin niepełnych lub wielopokoleniowych oraz z obojgiem rodziców aktywnych zawodowo. Charakteryzowali się oni niższą częstotliwością spożywania śniadań (I - 73%; II - 67%) oraz wyższą dokonywania zakupów w szkole (84%). Mniejszy odsetek uczniów zabierał z domu II śniadania, rzadziej spożywali kanapki, owoce i/lub warzywa oraz przetwory mleczne, a częściej słodczyce, słodkie bułki oraz słone przekąski. Większy odsetek uczniów kupował w szkole kanapki, świeże owoce i/lub warzywa oraz dania typu *fast-food*.

Wnioski. Struktura rodziny wpływała na zachowania żywieniowe dzieci i młodzieży dotyczące częstości spożywania śniadań oraz asortymentu spożywanej żywności. Dzieci z rodzin niepełnych lub wielopokoleniowych oraz z wyższym odsetkiem obojga pracujących rodziców rzadziej spożywały I i II śniadania, rzadziej zabierały II śniadania z domu oraz częściej dokonywały zakupów w sklepiku szkolnym i/lub automacie. Ponadto na II śniadania częściej spożywały produkty niewskazane. Uzyskane wyniki wskazują na potrzebę planowania i wdrażania odpowiednich kampanii edukacyjnych i programów zdrowotnych skierowanych do dzieci i młodzieży oraz ich rodzin.

Słowa kluczowe: *dzieci, młodzież, I śniadanie, II śniadanie, uwarunkowania spożywania, struktura rodziny, asortyment produktów spożywczych*

INTRODUCTION

Regularly eating a well-balanced breakfast is an important factor for ensuring healthy nutrition, especially in children of school age. In turn, healthy eating not only depends on delivering the nutrients sufficient for normal growth and psychophysical development, or in preventing modern day diseases, but it also serves to foster healthy eating habits [1]. The family environment is the first and most crucial place where a child acquires the examples and principles of own eating habits. It is only in older years that, in this respect, school-life becomes an additional environment for the child, with its diversely rich array of new influences, often coming from their peers. Nevertheless, such influences are still secondary to the home environment [18]. Because children and adolescents eat fewer breakfast meals when attending school, it is therefore crucial to determine what the family circumstances are that lead children to acquire healthy eating habits [5]. Indeed, there are many references in the literature on the relationship between breakfast consumption rates with low socio-economic status of the parents as well as their education levels [1, 5, 7, 14, 18-20, 23].

Less attention is however focused on the contributing factors such as family structure or the maternal employment in which many changes in the statistics have arisen over the last few years [6, 12]. Thus, the study aim was to determine how family factors affect the regular eating of breakfast and types of foodstuffs consumed by primary school pupils, including food purchased in vending machines and school tuck shops.

MATERIALS AND METHODS

The study was conducted during the 2013/14 school term (December – June) on primary school children from Warsaw and its surrounding areas. There were 836 subjects, consisting of 435 girls and 401 boys, both aged 6 – 13 years.

A direct questionnaire method was used to survey rates of consuming breakfast (ie. incidence) and of food shopping from vending machines or school tuck shops along with what types of foodstuffs were purchased. Permission for the study had been previously granted by the school authorities and parents or guardians. The data was gathered from direct interviewing of the subjects by means of a custom designed questionnaire. This included closed socio-demographic questions about the child and their family (ie. gender, age, family structure, parents employment), school attendance, frequency of eating breakfast and second breakfast, food purchases made at school vending machines and/or tuck shops and the types of foodstuffs eaten most commonly for breakfast and during school time. The following frequency categories for eating breakfast were adopted; daily, 2 -3 times weekly, ≤ 1 times weekly or never. Those for making the aforementioned purchases were; daily, 2 - 3 times weekly, once weekly, < 1 times weekly or never. Questions about foodstuffs or dishes eaten most often were either a single (breakfast) or a triple choice (second breakfast and food purchases at school). It was also assumed that the foodstuffs bought at school were consumed there.

Statistical analyses were performed by the STATISTICA ver. 10 programme. The self-organising *Kohonen* network model was used to separate out three pupil clusters according to the socio-demographics, rates of breakfast consumption and of making food purchases

at school. A random sampling method was used with sample size parameters of 100% for the training set and 0% for test and validation sets; epoch numbers were set at 200. The input variables were socio-demographics (ie. gender, age, family structure, parents employment), and features of dietary habits ie. rates of breakfast consumption, of making food purchases at school from vending machines and/or school tuck shops and what the origins of second breakfasts were. The significance of differences between clusters were determined by Chi^2 at a significance level of $p < 0.05$.

RESULTS

The subjects' overall profiles clustered according to their socio-demographics are shown in Table 1, whereas Table 2 presents consumption rate data on eating breakfast, type of foodstuffs and vending machine or school tuck shops purchases. Results showed that pupils regularly ate breakfast (87% daily) but ate second breakfast somewhat less (73% daily); the latter being mainly brought from home in 88% cases. A significant effect of gender and family structure was also seen on how frequently breakfasts were eaten. Boys daily ate breakfast more often than girls (88% vs 84%; $p \leq 0.01$) as did children living with both parents compared to single parent families (89% vs 74%; $p \leq 0.001$). For second breakfast, its daily consumption was inversely correlated with age ($p \leq 0.01$) and family structure and it

was also more often eaten in two-parent families compared to single-parent ones (75% vs 65%; $p \leq 0.01$). The frequency of no making food purchases from vending machines and tuck shops decreased with age (45% for 6 – 7 year olds vs 24% for 12 – 13 year olds; $p \leq 0.01$), and furthermore children more often did this if breakfast was missed ($p \leq 0.01$).

The study analysis separated out 3 clusters that were significantly differentiated ($p \leq 0.05$) according to socio-demographics such as gender, age, family structure, school attendance (Table 1) and rates of consuming breakfasts and second breakfasts together with purchases made at tuck shops and/or vending machines (Table 2). The overall population profiles according to the clusters are described as follows;

- *Cluster 1* – Medium-large numbers of pupils eating breakfast, highest numbers eating second breakfasts and low numbers making tuck shop/vending machine purchases. Girls from two-parent families with one or two parents professionally active.
- *Cluster 2* – Lowest numbers pupils daily eating breakfast or second breakfast (most rarely brought from home) and highest numbers making tuck shop/vending machine purchases. Children from single-parent or multi-generation families and mostly with both professionally active parents (even in single parents families).
- *Cluster 3* – Highest numbers of pupils daily eating breakfast and second breakfast but low numbers

Table 1. Study subjects' socio-demographic profiles separated into clusters according to their numbers found

Demographic features	Total (n = 836)	Cluster			p ¹
		1 (n = 343)	2 (n = 147)	3 (n = 346)	
Total (%)	100	41	18	41	-
Gender:					
– girls	52	100	63	0	<0.001***
– boys	48	0	37	100	
Age (years):					
– 6 – 7	20	23	8	21	0.001***
– 8 – 9	22	22	20	25	
– 10 – 11	37	37	48	32	
– 12 – 13	21	18	24	22	
Living with:					
– both parents	81	99	0	97	<0.001***
– single parents	13	0	71	1	
– parents and/or grand- parents	6	1	29	2	
Parental employment obligations:					
– both working parents	78	76	84	77	NS
– mother working	11	12	6	12	
– father working	11	12	9	11	
– neither working	0	0	1	0	
Average time spent at school (hours):					
– 3 – 4	6	5	11	4	0.043*
– 5 – 6	51	50	54	50	
– 7 – 8	37	39	31	39	
– > 8	6	6	4	7	

¹ Chi^2 test results; levels of significance * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$ and NS – statistically insignificant ($p > 0.05$).

Table 2. Nutritional profiles of study subjects, clustered according to their percentage rates of breakfast consumption, type of foodstuffs and vending machine or school tuck shops purchases

Selected eating habits	Total (n = 836)	Cluster			p ¹
		1 (n = 343)	2 (n = 147)	3 (n = 346)	
How often was breakfast eaten:					
– daily	87	87	73	91	<0.001***
– 2 – 3 times weekly	8	10	12	4	
– ≤ 1 times weekly	2	3	4	1	
– never	3	1	10	3	
How often was 2 nd breakfast eaten:					
– daily	73	77	67	72	0.003**
– 2 – 3 times weekly	17	17	18	17	
– ≤ 1 times weekly	4	3	4	6	
– never	6	3	12	5	
Places providing 2 nd breakfast:					
– home	88	92	77	90	<0.001***
– buying at school	4	3	8	3	
– buying at grocers	2	3	3	1	
– not eaten	6	3	12	5	
Frequencies of school purchases:					
– daily	4	4	7	4	0.002**
– 2 – 3 times weekly	18	17	25	17	
– once weekly	17	19	20	14	
– < 1 once weekly	29	27	32	28	
– never	32	34	16	36	

¹ *Chi*² test results; levels of significance **p* ≤ 0.05, ***p* ≤ 0.01, ****p* ≤ 0.001 and NS – statistically insignificant (*p* > 0.05).

making tuck shop/vending machine purchases. Boys from two-parent families with one or both parents professionally active.

When analysing family structures, children that lived in single-parent families with only their fathers, (a relatively low number; 2%), exhibited a greater tendency for making dietary errors compared to those living with just their mothers (11% of all subjects; data not shown). Such errors consisted of large intakes of ready-to-eat cereal for breakfast, eating fewer second breakfasts and a higher consumption of the more unhealthy foodstuffs, (eg. sweet rolls, sweets, savoury snacks), at the expense of those recommended as being healthy (ie. sandwiches, fruit/vegetables and dairy products).

These pupils also more frequently bought food from school tuck shops and/or vending machines.

The type of most commonly consumed foodstuffs was also investigated, taking the respective clustering into account. There were no significant differences between clusters in the foodstuffs and dishes eaten for breakfast (Figure 1), however age was found to affect the types of food eaten. With increasing age, the numbers of pupils eating sandwiches without fruit or vegetables decreased (35% for 6 – 7 year olds to 17% for 12 – 13 year olds) at the expense of increases in eating sandwiches accompanied by fruit or vegetables (respectively, 19 % to 34%; *p* ≤ 0.001). Foodstuffs most frequently eaten for second breakfast are shown in Figure 2.

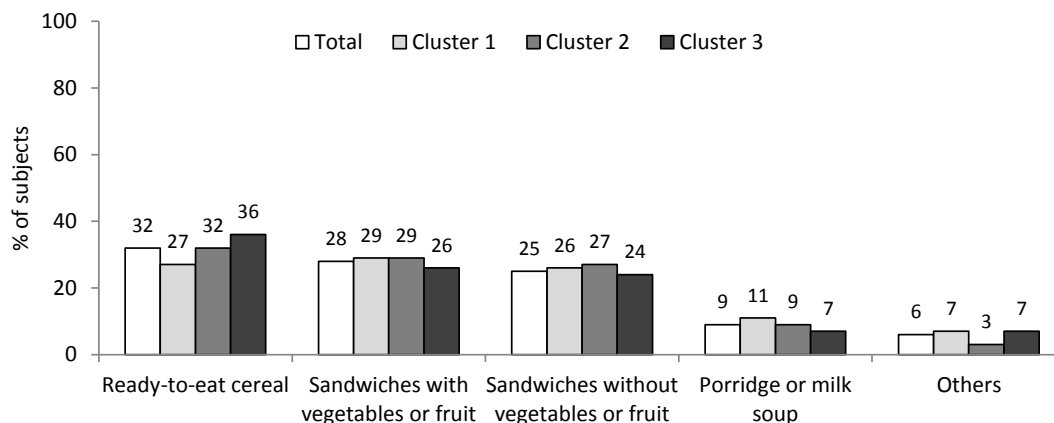


Figure 1. Breakfast dishes most frequently eaten by subjects according to cluster classification.

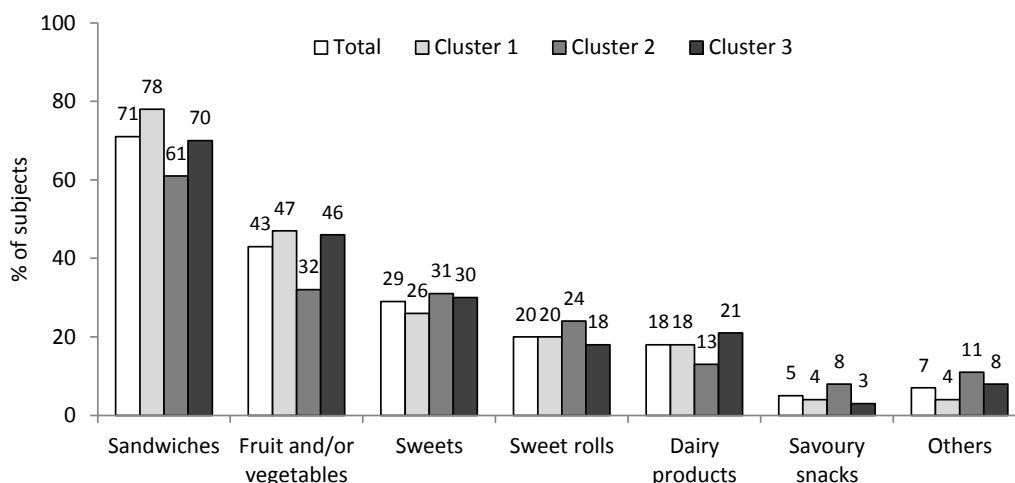


Figure 2. Second breakfast dishes most frequently eaten by subjects according to cluster classification.

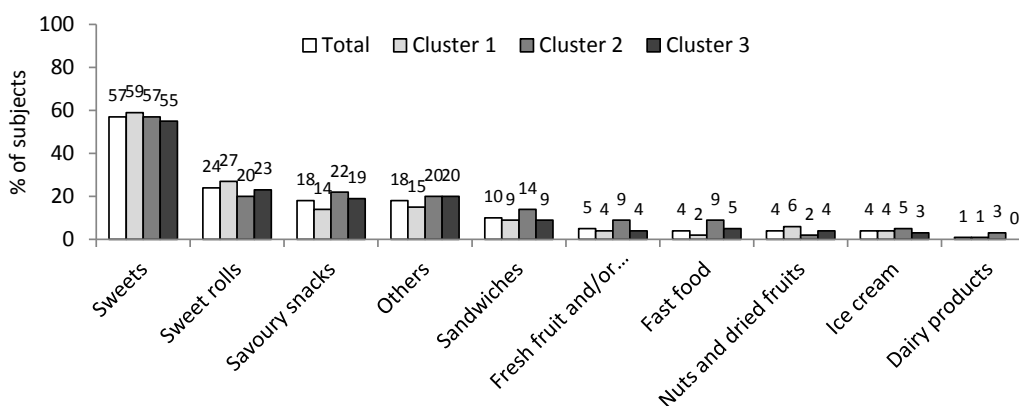


Figure 3. Food products most frequently bought at school by subjects according to cluster classification.

Pupils belonging to cluster 2 more often ate unhealthy foodstuffs (sweets, sweet rolls, savoury snacks) instead of the healthy ones (eg. fruit, vegetables, dairy products) compared to those from clusters 1 and 3. They also tended to buy food for second breakfast at school or grocery stores before lessons. In addition, girls more often ate fruit and/or vegetables than boys; 47% vs 39% respectively. Eating sandwiches and dairy products was found to decrease with age; respectively 86% vs 53% and 26% vs 14%. There were however, no such clear differences between the clusters for any of the foodstuff purchases made from vending machines and/or tuck shops (Figure 3). The only observations of note were greater numbers of pupils buying sandwiches, fresh fruit and/or vegetables, fast-food, milk and dairy products that may have arisen through the greater pupil numbers in cluster 2 who bought their second breakfasts at school.

DISCUSSION

Amongst the factors affecting the family food environment that shape the child's eating habits, one can discern three scenarios; a personal environment (linked

to parents), an impersonal environment (exposure to dietary stimuli within the family environment) and the environment of the parent-child interaction (ie. those stimuli and behaviours chosen by parents to which offspring are exposed to). At the same time, single family members, and later the family, are themselves subject to certain factors that govern their choices and consumption of food. These may be internal such as demographic, economic and socio-professional or external like geographic, and politico-economic [15]. It can therefore be expected that such factors will bear a significant influence on eating habits in the family and so on the child, thus they will determine the healthy (or lack thereof) eating habits of children and adolescents.

The presented study has demonstrated significant effects of family structure on adopted eating habits. Children from single-parent families tend to more often skip eating breakfast and second breakfast; they more often purchase food at school and eat unhealthy foods instead of the healthy foods as recommended. These findings are consistent with studies from abroad undertaken on large population groups of children and adolescents [7, 12, 13]. A systematic review undertaken by *Pearson et al.* [13], together with an HBSC data analysis from the UK [12] have provided evidence on the adverse link

between single-parent families and how often breakfast and second breakfast was eaten by children and adolescents. The HELENA study, conducted on $n=3528$ adolescents from 10 European cities, however showed that this behaviour was only significant for boys [7]. A study by *Stewart and Menning* [17] found that the risk of skipping breakfast in adolescents is increased by 36% in a single-mother upbringing compared to households with two parents (whether biological or adoptive); this increasing to 42% if there is a mother and stepfather. Likewise, *Dufur et al.* [4] showed that children brought up by single mothers more rarely ate breakfast than those brought up by single fathers, which disagrees with the presented study findings.

In Polish society, it is mainly women that are responsible for preparing meals [22], which may exacerbate the dietary errors made when children are brought up by single fathers. The presented study has shown that consuming unhealthy foodstuffs at the expense of healthy recommended foods is consistent with the *Stewart and Menning* [17] study in which the children of single-parents ate fewer vegetables. A USA study comparing domestic expenditure in households on food, found that mothers in single-parent families bought significantly more wheat products but less vegetables than did two parent families. In similar fashion, fathers in single parent families more rarely bought fruit, meat, legumes, sweets and snacks, but spent more on providing food and meals outside the house [24].

The current study demonstrated insignificant differences between clusters regarding parental employment. Those parents bringing up children who skipped breakfast and ate unhealthy food more frequently both worked professionally. This is consistent with the literature where it has been shown that when both parents are employed or if the mother is working then there is a significant risk of children skipping breakfast and lowered consumption of those foods recommended as being healthy [2, 3, 9, 11, 13]. Reasons for this may be the limited amount of time available to working parents for preparing meals [18]. This is particularly significant for one-parent families, where such parents are doubly stressed to ensure both a suitably high socio-economic status for the children as well as in maintaining their upbringing.

This also applies to type of foodstuffs. Studies by *Ziol-Guest et al.* [24] reported differences in money spent on food between households in which both parents were working compared to those where the mother was unemployed; more money being spent on food outside the home, but less on vegetables, fruit, milk and legumes. The presented study also found that children from single parent families or those with both parents working, more frequently purchased food items for second breakfast during going to school along with

buying sweets, savoury snacks and sweet rolls. Thus, it is crucial to increase of availability of variety type of healthy foodstuffs in tuck shops and vending machines, where up till now there have been many shortcomings regarding recommended breakfast foods [8]. According to *Bauer et al.* [2], mothers in full-time employment demonstrated more unhealthy eating habits than those working part time or not at all.

Recent studies ever more frequently point towards the importance of eating regular breakfasts for ensuring an adequate body mass [21] and for preventing disease, including cardiovascular disease and type II diabetes [1, 16] as well as on cognitive performance [10], which in the latter case is reflected by achievements at school [19]. For these reasons, it is thus necessary to ensure that the habits of children eating regular breakfasts are maintained.

CONCLUSIONS

Family factors were found to affect eating habits in children and adolescents regarding how often breakfast was eaten and the type of foodstuffs consumed. High consumptions of unhealthy food items for second breakfast were also observed. Single-parent pupils, those in multi-generation families or if both parents are employed rarely brought second breakfasts from home but frequently bought food from vending machines and school shops.

The results of the presented findings are significant towards planning an appropriate educational campaigns and health programmes targeted at children, adolescents and their families. Furthermore, these results pointed that a range of healthy foodstuffs should now be available in school shops and vending machines, where up till now there have been many shortcomings regarding recommended breakfast foods.

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Conflict of interest

The authors declare no conflict of interest.

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