

NUTRITION-RELATED PRACTICES IN KINDERGARTENS IN THE CONTEXT OF CHANGES TO LEGAL REGULATIONS ON FOODSTUFFS USED IN CANTEEN MENUS FOR CHILDREN

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ABSTRACT

Background. In order to improve the quality of nutrition in care and educational institutions, in year 2015 a restrictive law regulation was introduced. The following year this regulation was withdrawn, and a new legal policy has been introduced. However, data on the impact of these legislations on nutrition in kindergartens are lacking.

Objective. The aim of the study was to evaluate the compliance with mandatory nutrition recommendations in preschools.

Material and methods. The study included 706 institutions. Data were collected during the periods when two consecutive Regulation of the Minister of Health were in force (I - 01.09.2015 - 31.08.2016 and II - 01.09.2016 to 30.05.2017). Data were obtained by face-to-face interviews with staff with a validated questionnaire. Parameters characterizing the quality of nutrition were analyzed with focus on compliance with legal regulations. 706 decade's menus and 7060 daily inventory reports were analyzed to verify information on vegetables and fruit supply, frequency of frying and type of fat used, sweetening and salting practices. Statistical significances were determined in *Statistica 13.1* with *t-Student* and *Chi²* tests ($p < 0.05$).

Results. The preschools have implemented regulations concerning the supply of fresh fruit and vegetables (~93%), the amount of fried dish per week (~75%), and the use of suitable frying fat (~95%). About half of institutions managed to serve vegetables and/or fruits in every meal. Compliance with the regulations on sweetening and salting was unsatisfactory: about 1/4 of institutions used banned sugar, and 46% regular salt.

Conclusions. Legislations influenced nutrition practices in preschools, but additional support is needed to bring all institutions into compliance with the current policies. The current law regulations are general, and allow a great flexibility in planning menus, which might have an adverse effect on menu quality. Therefore, nutrition education and more detailed mandatory nutrition standards for kindergartens are crucial.

Key words: preschool, legislation, food, nutrition, children

STRESZCZENIE

Wprowadzenie. W celu poprawy jakości żywienia w placówkach opiekuńczo-wychowawczych i edukacyjnych, w 2015 r. wprowadzono restrykcyjne rozporządzenie w tym zakresie. W kolejnym roku uchylono obowiązujące rozporządzenie poprzez wprowadzenie kolejnego. Brakuje jednak danych o wpływie tych regulacji na żywienie w przedszkolach.

Cel. Celem pracy była ocena zgodności parametrów jakości żywienia z obligatoryjnymi zaleceniami w przedszkolach.

Material i metody. Badaniem objęto 706 przedszkoli. Dane zbierano w okresie obowiązywania dwóch kolejnych rozporządzeń Ministra Zdrowia (I - 01.09.2015 - 31.08.2016 i II - 01.09.2016 do 30.05.2017). Dane uzyskano na podstawie bezpośredniego wywiadu z personelem przedszkoli za pomocą walidowanego kwestionariusza. Dla weryfikacji informacji przeanalizowano 706 dekadowych jadłospisów i 7060 dziennych raportów magazynowych pod kątem zawartości warzyw i owoców, częstotliwości serwowania potraw smażonych i rodzaju tłuszczu, słodzenia i solenia. Analizę statystyczną wykonano w *Statistica 13.1* z wykorzystaniem testu *t-Studenta* oraz *Chi²* ($p < 0,05$).

Wyniki. Przedszkola wprowadziły przepisy dotyczące podaży świeżych owoców i warzyw (~ 93%), liczby smażonych potraw na tydzień (~ 75%), a także stosowania odpowiedniego tłuszczu do smażenia (~ 95%). Około połowa przedszkoli serwowała warzywa i / lub owoce w każdym posiłku. Przestrzeganie regulacji dotyczącymi słodzenia i solenia było niezadowalające: około 1/4 instytucji stosowało niedozwolony cukier, a 46% sól kuchenną.

Wnioski. Wprowadzenie regulacji prawnych wpłynęło na praktyki żywieniowe w placówkach przedszkolnych, ale konieczne jest dodatkowe wsparcie, aby wszystkie ośrodki przestrzegały obowiązujących zasad. Obecne przepisy są bardzo ogólne i pozwalają na dużą elastyczność w planowaniu żywienia dzieci, co może powodować pogorszenie jakości żywienia w przedszkolach. Dlatego kluczowe znaczenie ma edukacja żywieniowa i obowiązkowe, bardziej szczegółowe zalecenia żywieniowe dla przedszkoli.

Słowa kluczowe: przedszkola, prawo, żywność, żywienie, dzieci

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INTRODUCTION

In Poland, in the school year 2015/2016 there were 21.1 thousand day care centers (DCCs) for children aged 3-5, including 11.3 thousand kindergartens. Pre-school education covered 1140.6 thousand children, which represents 84.2% of children in the age group of 3-5 years in Poland [2]. In kindergarten, child spends up to 10 hours a day and receives at least 3 meals, including two main meals, which covers up to 75% of the daily energy and nutrient intake [3]. Proper nutrition in preschool setting is therefore crucial for adequate child diet: prevention of nutrients deficiencies and oversupply, as well as shaping correct eating habits [3, 5, 11, 16]. The role of feeding in DCCs is also becoming increasingly important due to the increasingly widespread problem of children overweight and obesity [28], also in Poland [14, 17].

Due to the above, in year 2015 a restrictive legislation of the Minister of Health was introduced, which among others regulated the supply of vegetables and fruit, salt and sugar, fried foods and the type of fat used for frying. Especially restrictive was the legal regulation on sweetening of beverages: no sugar, but only honey for selected beverages was allowed (except e.g. very popular compote) [24]. The regulation was widely commented and met with a great criticism in media. Consequently, it was repealed, and a new regulation was introduced from the 1st of September 2016. In the current regulation, restrictions on sugar and salt supply, as well as required amounts of fresh vegetables have been significantly reduced [23]. There are no data available on the effect of introducing these legislations, changes in institutions, compliance with recommendations, and effects on nutrition in kindergartens.

The purpose of the study was to evaluate nutrition-related practices and the compliance with mandatory nutrition recommendations in preschool settings in Poland.

MATERIAL AND METHODS

The study included 706 kindergartens localized throughout Poland which took part in the education and research program “*Healthy eating, healthy growing*” (HEHG)¹ [9]. The analysis included the data collected during the period when two consecutive Regulation of the Minister of Health were in force: I - between 01.09.2015 and 31.08. 2016 [24], and II - between 01.09.2016 to 30.05.2017 [23]. Data were obtained by face-to-face interviews with

DCCs directors and/or staff responsible for nutrition. All interviews were conducted by specially trained interviewers using a validated author’s questionnaire consisted of closed-ended questions (e.g. presence of vegetables and/or fruits in every meal, presence of fresh vegetables and/or fruits in daily menu, frequency of frying, sweetening practices), and open-ended questions (e.g. others sweeteners used in DCC). In addition, 10-day menu and inventory reports were analyzed to verify selected information. In total, 706 decade’s menus and 7060 daily inventory reports were examined. The parameters characterizing the quality of nutrition were analyzed. Particularly we focused on the parameters regulated by the mentioned above legal regulations: serving of vegetables and/or fruits in every meal (including fresh), sugar and salt supply, the frequency of frying, and the type of fat used. The basic characteristics of the participating institutions were also collected (e.g. number of children, the daily food allowance², and the type of kitchen). All data has been processed statistically using *Statistica 13.1*. The collected data were analyzed by the type of institution (public vs. non-public DCCs), and separately for the two legislative periods (public in I vs. II; non-public in I vs. II period). For statistical analysis *Chi-squared* quality assays and quantitative *t-Student* tests with significance levels of $p < 0.05$ were performed.

RESULTS

The general characteristic of DCCs participating in the study is presented in Table 1. In the analyzed institutions, meals were distributed to nearly 80,000 children. The average number of children in public preschool was 123, while in non-public 74, respectively. Children on special diets accounted for less than 3 %, and most often a non-dairy diet, then gluten free diet were listed. Among the “others” special diets reported by the preschools managers were: diabetic, vegetarian, low-calorie diet, eliminating selected products and related to religion (e.g. pork meat free). The daily food allowance was significantly higher in non-public DCCs; with no statistical difference in the rate between the first and the second study period. However, for public DCCs downward trend in the second period was observed ($p=0.07$). In both analyzed periods, the organization of nutrition differentiated public institutions from non-public. Public kindergartens more often managed own kitchen, and in private institutions catering system was more popular. In contrast, no difference in the organization of nutrition between institutions during the two study periods was observed.

¹ education and research program granted by *Danone Ecosystem* [<http://www.zdrowojemy.info>]

² the amount of money allocated per day to feed a child in a DCC

Table 1. The general characteristic of DCCs including the information on nutrition organization (n = 706)

Factor	I period (n = 349)		II period (n = 357)	
	Public n=266	Non-public n= 83	Public n = 255	Non-public n = 102
Number of children (total)	32 638	5 420	31 575	8 277
Children on special diets:	663 (2.0%)	264 (4.9%)	865 (2.7%)	242 (2.9%)
gluten-free	82	47	110	55
non-dairy	502	188	695	173
others	150	59	167	53
Budget in PLN/child/day menu* mean ± SD	5.8 ± 1.26 ^a	8.4 ± 2.14 ^b	5.7 ± 1.28 ^a	8.1 ± 1.97 ^b
min - max	3.4 - 9.5	4.0 - 15.0	3.0 - 11.0	4.5 - 16.0
Type of kitchen in the DCCs**:				
DCC's kitchen***	249 ^a (93.6%)	47 ^b (56.6%)	238 ^a (93.3%)	55 ^b (53.9%)
internal catering****	8 (3.0%)	4 (4.8%)	4 (1.6%)	8 (7.8%)
catering	8 ^a (3.0%)	27 ^b (32.5%)	13 ^a (5.1%)	36 ^b (35.3%)
mixed	1 (0.4%)	5 (6.0%)	0 (0%)	3 (2.9%)

* *t-Student* test; ** *Chi-square* test: ^{a,b} public vs. non-public; *** kitchen managed and run by DCC; **** kitchen placed in DCC but managed and run by catering company or kitchen co-run in a collaborating institution

Table 2. The aspects of nutrition related-practices and quality of the diet in DCCs (n = 706)

Factor	I period (n = 349)		II period (n = 357)	
	Public n = 266	Non-public n = 83	Public n = 255	Non-public n = 102
Occurrence daily:				
Vegetables and/or fruits in every meal	140 (52.6%)	37 (44.5%)	141 ^c (55.3%)	36 ^d (35.3%)
Fresh vegetables and/or fruits	249 (93.6%)	76 (91.6%)	238 (93.3%)	98 (96.0%)
Frequency of frying and the type of fat used*:				
Frying ≤ 2 x / week	206 (77.4%)	61 (73.5%)	194 (76.1%)	77 (75.5%)
Frying > 2 x / week	60 (22.6%)	22 (26.5%)	61 (23.9%)	25 (24.5%)
Olive oil for frying	17 (6.4%)	10 (12.0%)	15 ^c (5.9%)	13 ^d (12.7%)
Canola oil for frying	258 ^a (97.0%)	74 ^b (89.2%)	245 (96.1%)	95 (93.1%)
Other type of vegetable fats	12 (4.5%)	6 (7.2%)	19 (7.5%)	9 (8.8%)
Butter, lard, coconut oil	24 ^A (9.0%)	8 ^C (9.6%)	50 ^{cB} (19.6%)	33 ^{dD} (23.4%)
No data	2 (0.8%)	7 (8.4%)	1 (0.4%)	3 (2.9%)
Sweetening tea, cocoa, coffee substitute, fruit/herbal tea*:				
Sugar	59 ^A (22.2%)	23 ^C (27.7%)	76 ^{cB} (29.8%)	47 ^{dD} (46.1%)
Honey	178 ^a (66.9%)	38 ^{bC} (45.8%)	153 ^c (60.0%)	28 ^{dD} (27.4%)
Others	3 (1.1%)	4 (4.8%)	2 (0.8%)	2 (2.0%)
Sweetening compote*:				
Sugar	69 ^A (25.9%)	23 ^C (27.7%)	131 ^B (51.7%)	63 ^D (61.8%)
Honey	68 (25.6%)	20 ^C (24.1%)	72 ^c (28.2%)	8 ^{dD} (7.8%)
Others	19 (7.1%)	2 (2.4%)	5 (2.0%)	0 (0%)
Sweetening juices, milk shakes*:				
Sugar	45 ^A (16.9%)	11 ^C (13.3%)	65 ^{cB} (25.5%)	37 ^{dD} (36.3%)
Honey	69 (25.9%)	16 (19.3%)	61 ^c (23.9%)	12 ^d (11.8%)
Others	8 (3.0%)	2 (2.4%)	4 (1.6%)	0 (0%)
Type of salt / salting practices*:				
Regular salt	124 ^A (46.6%)	38 ^C (45.8%)	152 ^{cB} (59.6%)	76 ^{dD} (74.5%)
Low sodium salt	160 ^{aA} (60.2%)	33 ^{bC} (39.8%)	127 ^{cB} (49.8%)	20 ^{dD} (19.6%)
Salting during preparation	259 ^{aA} (97.4%)	61 ^{bC} (73.5%)	230 ^B (90.0%)	90 ^D (88.2%)
Salting after preparation	14 ^{aA} (5.3%)	12 ^b (14.5%)	59 ^B (23.1%)	15 (14.7%)

* - possible multiply answers statistically significant *Chi-squared* test:

^{a,b} - public vs. non-public (I period), ^{c,d} public vs. non-public (II period)

^{A,B} - public in I vs. II period, ^{C,D} - non-public in I vs. II period

The examined aspects of nutrition related-practices are presented in Table 2. Vegetables and/or fruits occurred at every meal in more than half of the public kindergartens (both in 1 and 2 analysis); whereas in case of the private institutions these numbers were lower. The percentage of private vs. public DCCs serving fruit and/or vegetables in every meal was significantly different during the second analysis. However, there was no such difference in the first analysis, and no differences between the two analyzed periods. Fresh vegetables and/or fruits were served every day in more than 90% of DCCs, no significant differences were found depending on the type of facility or study period. Practise of serving fried food more than 2 times per week was observed in about one quarter of preschools. There were also no significant differences in frying frequency between public and private DCCs, and in both analyzed periods. The type of fat used was significantly differentiated by the type of facility, but in all DCCs canola oil was the most frequently used for this purpose. For sweetening tea, cocoa, coffee substitute, fruit/herbal tea, honey was the most often used, but during the second analysis the percentage of DCCs using sugar increased (especially in non-public DCCs). Similar tendency was observed in case of sweeteners for compote: the percentage of DCCs adding sugar increased significantly in second analysis. For sweetening juices, milk shakes in the first period honey was the most popular, whereas in the second period sugar was the most frequent choice. There were also differences in the type of salt used: in the first analysis, low sodium salt was more commonly used in public institutions but its share decreased in the second period. Additionally, there was an increase in the frequency of “regular” salt usage in both public and private institutions in the second analysis. The salt was added usually during preparation, but in the second period the frequency of salting after the preparation increased significantly in public preschools.

DISCUSSION

By September 2015 there was no mandatory legislation on nutrition in pre-school facilities. When setting up the menu, DCCs used the various recommendations available, such as nutrition guidelines, SANEPID recommendations, children’s food pyramids or other publications [3, 10, 22]. However, studies on nutrition in these institutions conducted by many authors pointed existing abnormalities, e.g. insufficient supply of vegetables, fruit, as well as often too high share of sugar and sweets in the diets [8, 12, 19, 20, 21]. The introduction of legal regulations was aimed at improving the quality of nutrition situation in kindergartens. Unfortunately, due to the lack of relevant information and education campaign, the regulation met

with great social criticism and was repealed after a year. The current law regulations are very general, and allow great flexibility in planning menus. Unfortunately, there are no data available to illustrate the effect of the above regulations, no information on the nature and extent of the changes introduced in DCCs. The question is also raised, whether these institutions that made “good” changes required by the first regulation, would retain them, despite the absence of such a need at present. In present paper we try to answer these questions.

The study covered 706 kindergartens from all over Poland; pre-school units located in schools and part day care facilities were excluded because they usually do not provide a full board. This represented about 6% of all kindergartens in Poland in 2015-2016 [2]. Most of analyzed DCCs were public facilities, characterized by higher number of children, lower financial rate for nutrition and managing the kitchen. “Own” kitchen gives the ability to fully influence the planning and preparing menus, which can result in faster and more complete adaptation to legal requirements. However, the limitation may be the lower budget, which may limit the assortment of purchased food products, especially those more expensive. It also seems that large institutions may be less flexible with respect to individual children’s diets: in public kindergartens there were 2.3% of children on special diets, while in non-public 3.4%, respectively. The catering system was used more often in private DCCs. In this case, the facility has a limited influence on the planning and preparation of meals for children, as well as less control over their quality.

The aspect regulated by both legislations was the addition of vegetables and/or fruits to every meal. Approximately half of public institutions failed to implement this recommendation; in the case of private DCCs this percentage was even higher (especially in the second analysis). It seems that the problem with required supply of vegetables and fruits is not due to financial constraints. Previous studies on children nutrition specially indicated a low intake of vegetables [8, 19, 25]. The first legislation also required fresh vegetables in the menus at least 3 times a week in lunch meal. Over 90% of facilities served fresh vegetables and fruits every day, which is even more than was required. This number did not decrease in the second analysis, when the legal legislation was repealed. However, it is still a challenge to provide vegetables or fruits in every meal served, which is an important element in shaping correct eating habits in children. It could be concluded that, despite the existence of mandatory regulations, education is still needed to increase the amount of vegetables and/or fruits in the pre-school diet.

The method of culinary process influences the quality and nutritional value of meals. Frying causes an increase in the amount of fat in the final product, thus increasing its energy value. When frying in inappropriate

fat, compounds with harmful effects on health can be formed [7]. The current review suggested that more frequent consumption of fried foods (i.e., four or more times per week) was associated with a higher risk of developing diabetes type 2, heart failure, obesity and hypertension [6]. Both regulations [23, 24] restricted the number of fried dishes to 2 servings per weeks, as well as allowed to use only canola oil and olive oil for this preparation. In the present study, nearly a quarter of the facilities served fried foods more than twice a week. There also have been no changes in this frequency over time or depending on type of institution. On the other hand, some changes have been observed with regard to fat used for frying. The most commonly used was canola oil, which is in line with the requirements. The other of permitted fats, olive oil was actually used more often by private institutions. The reason for this might be higher oil prices compared to canola oil. It is alarming to see a significant increase in the number of facilities using prohibited fats for frying. This may be due to a lack of knowledge in this regard: frequently listed butter may be suitable for children nutrition but not for frying. Conversely, coconut oil or lard should not be used in pre-school children diets [3, 10].

In the prevention of excessive weight in children, it is very important to limit the intake of sugar and sweets [4, 6, 27]. Studies show that young children's main sources of added sugar are sweetened beverages and desserts; the majority of daily beverages are consumed during children's meals [18]. Thus, policy change is the one approach for improving healthy beverage practices in child care settings. The first legislation completely forbade sweetening fruit juices or often served compotes (compote according to traditional recipe is prepared with added sugar). Instead, only honey was allowed to other drinks e.g. tea, cocoa or coffee substitute [24]. In this respect, many facilities did not follow the recommendations. Approximately, one quarter of the DCCs sweetened the compote with sugar or honey, a slightly lower percentage of facilities inappropriately sweetened fruit juices and milk shakes. In case of sweetening tea, cocoa or coffee substitute, also approximately one quarter of DCCs used banned sugar. In the second legislation [23], the requirements for sweetening were considerably reduced, allowing the addition of 10 g of sugar to 250 ml of any beverage prepared for children. It can be observed that facilities have benefited from this opportunity, and increased the frequency of sweetening beverages, especially by using sugar. With regard to the general recommendations for reducing sugar supply, specially so called "free" sugars coming from beverages, [10, 22, 27] this is not beneficial and needs improvement.

The excessive salt intake is a widespread problem, resulting in an increased risk of developing hypertension in adulthood [15]. High content of sodium was also

reported in preschool menus in Lublin [13]. Strategies to reduce sodium intake include replacement of regular salt with low sodium salt, as well as lack of salt at the table. The legislation from 2015 [24] used both options: allowed to use only low sodium salt (so called dietetics or potassium salt) during cooking, but not after preparation of meals. Most DCCs limited salting after preparation of meals, but nearly half of the kindergartens used the regular salt. Interestingly, despite the higher price of "diet" salts, a greater number of public establishments have introduced such salt to the menu. The legislation from 2016 has not regulated the type of salt, its quantity or way of addition [23]. In response, the facilities increased the usage of regular salt and reduced the low-sodium salt. There was also a significant increase in the frequency of salting meals after preparation. The increased of salt supply is unfavourable, and contrary to the principles of proper nutrition [10, 22, 26], so education in this regard seems to be crucial.

This study is not without limitations. The selection of DCCs was not representative, but the strength of the study is a large number and nationwide range. The great advantage of the study is the way of collecting data: with a validated questionnaire, in a face-to-face interview conducted by trained interviewers. Unique on such a scale is the verification of data based on 10-day menus and inventory reports, which significantly increases the reliability of the results. Finally, this is the first study to examine the effects of nutrition legislation policies in DCCs in Poland.

Our findings suggest that policies may be effective in changing nutrition in kindergartens, but policies alone may be insufficient to obtain a clear and permanent improvement. Similar observations were made by *Benjamin Neelon et al.* [1].

CONCLUSIONS

Policy might affect nutrition-related practices in child care centers, but additional support is needed to bring all preschools into compliance with the regulations. Lack of mandatory regulations might have an adverse effect on nutrition quality. Therefore, nutrition education and more detailed mandatory nutrition standards for kindergartens are crucial. It is worth stressing that proper nutrition of children must be treated as an investment in their healthy development, and there is a urgent need for a systematic solution to improve nutrition in pre-schools.

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Conflict of interest

The authors declare no conflict of interest.

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