

## ASSESSING DIETS FOR ENERGY AND NUTRIENTS CONTENT IN NURSERY SCHOOL CHILDREN FROM LODZ, POLAND

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### ABSTRACT

**Background.** Balanced meals eaten by toddlers at nursery school play an important nutritional role in satisfying a child's daily demand for energy and nutrients as well in preventing any dietary deficiencies or excesses from occurring.

**Objective.** To evaluate the energy and nutritional value of children's diets at nursery schools in Lodz, Poland.

**Materials and methods.** Analyses were performed at 30 nursery schools throughout the Lodz city municipality on the basis of 10 day menus and food inventory reports. Results were calculated using the 'Dieta 5.0' computer programme according to the database at the Warsaw Institute for Food and Nutrition. These were related to nutritional standards for children aged 1-3 years.

**Results.** On average, dietary calorific values exceeded those of current nutritional recommendations, where protein was found to be 3 times higher than current standards although falling within the range of reference values. Dietary fat intake was found to be rather low, with a high content of saturated fat coupled with low intakes of polyunsaturated fatty acids. Dietary carbohydrates agreed with recommended limits however these were exceeded by the mean sucrose intake. Significant deficiencies were most noted in vitamin D and iodine intake and additionally vitamin E and iron intakes were also low. However, intakes of sodium, phosphorus, magnesium, zinc, vitamin A, B<sub>2</sub>, B<sub>6</sub> and B<sub>12</sub> were above the recommended values.

**Conclusions.** The diets surveyed in nursery schools need to be better balanced to comply with current standards and dietary guidelines.

**Key words:** *nursery school, nursery school children, energy, nutrients, diet*

### STRESZCZENIE

**Wprowadzenie.** Żywność w żłobku, zapewniając dzieciom większość posiłków w ciągu dnia, odgrywa istotną rolę w dobowym pokryciu zapotrzebowania na energię i składniki odżywcze, a także w zapobieganiu występowania niedoborów czy nadmiarów żywieniowych.

**Cel.** Celem pracy była analiza i ocena wartości energetycznej i odżywczej racji pokarmowych dzieci uczęszczających do łódzkich żłobków, z uwzględnieniem sezonów żywieniowych.

**Material i metody.** Badania zawartości energii i składników odżywczych w racjach pokarmowych dzieci przeprowadzono w 30 żłobkach Miejskiego Zespołu Żłobków w Łodzi, na podstawie analizy dekadowych jadłospisów i raportów magazynowych. Do obliczeń wykorzystano program komputerowy Dieta 5.0 z bazą danych Instytutu Żywności i Żywienia. Uzyskane wyniki odniesiono do aktualnych zalecanych norm żywienia dla dzieci w wieku 1-3 lat.

**Wyniki.** Średnia wartość energetyczna racji pokarmowych była zawyżona w stosunku do zaleceń. Zawartość białka 3-krotnie przekraczała normy, ale mieściła się w zakresie wartości referencyjnych. Stwierdzono zbyt niską podaż tłuszczu z diety, wysoką zawartość kwasów tłuszczowych nasyconych przy zbyt niskiej podaży kwasów wielonienasyconych. Zawartość węglowodanów przyswajalnych była zgodna z zaleceniami, ale średnia podaż sacharozy przekraczała wartości rekomendowane. Najbardziej deficytowa była podaż witaminy D i jodu, badane racje pokarmowe zawierały również za mało witaminy E i żelaza. Zawartość potasu, wapnia, witaminy C, B<sub>1</sub>, PP i kwasu foliowego w badanych racjach pokarmowych była zgodna z normą żywieniową. Podaż sodu, fosforu, magnezu, cynku, witaminy A, B<sub>2</sub>, B<sub>6</sub> i B<sub>12</sub> znacznie przewyższała zalecane wartości.

**Wnioski.** Racje pokarmowe dzieci w badanych żłobkach wymagają lepszego zbilansowania w stosunku do aktualnych norm i zaleceń żywieniowych

**Słowa kluczowe:** *ocena żywienia, żłobki, dzieci, energia, składniki odżywcze, posiłki*

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## INTRODUCTION

During the transition between infancy and childhood, nutrition plays a vital role in development according to the child's ever changing needs. Delivering the required amounts of energy and nutrients from foodstuffs, (according to individual requirements) is essential for growth, development and health. Within a normal weekday, nursery school children spend much of their time there, where they regularly eat main meals, thus forming the core of their dietary requirements for calories and nutrients. In some untoward cases however, this could also cause dietary deficiencies leading to chronic disease arising in later life [11-14, 16, 17]. The presented study is focused on determining the energy and nutrient value of children attending nursery schools in a representative region of Poland, (Lodz), where seasonal variations have also been taken into account.

## MATERIALS AND METHODS

The study was conducted on 30 nursery school samples within the Lodz city district. Children's menus and food inventory were analysed according to 10 day menus from September 2011 to May 2012. In all, 1190 reports and menus were received. Only one school, declared 3 seasons of results due to being closed for autumn decorations. Inventory data enabled the average dietary intakes to be calculated.

Results were calculated using the 'Dieta 5.0' computer programme according to the database at the Warsaw Institute for Food and Nutrition [10]. These analyses included dietary calorific values as well as its composition and nutritional content. Results were then adjusted for children aged below 6 years and then further related to nutritional standards for those aged 1-3 years [8]. Nutritional reference values for nursery school children were taken as being 75% of the EAR (Estimated Average Requirements) for calories and recommended daily intake (RDA) and Adequate Intake (AI) for consumed nutrients and their recommended consumption values expressed in terms of percentage calories obtained from protein, fat and carbohydrates [23, 24]. The study was approved by the Bioethical Commission at the Lodz University of Medicine; decision number RNN/624/12/KB from 17.07.2012. Statistics included calculation of the mean, standard deviation and maximum to minimum ranges. Differences between means were assessed by the *Kruskal-Wallis* non-parametric test of variance, taking a P value of  $\leq 0.5$  as being significant.

## RESULTS

The energy and nutritional mean values of children's dietary consumption according to seasonal variation are shown in Table 1;  $912.3 \pm 158.5$  kcal, where one quarter of the results were greater than 1000 kcal. Mean dietary calorific values consumed for 10 day menus in specific seasons ranged between 832.3 kcal in summer to 965.0 kcal in the autumn; these differences being significant. According to 2012 standards, the daily calorific requirement from the diet in children aged 1-3 years is 1000 kcal/24 hrs [8] of which 750 kcal is obtained during nursery school time. The mean dietary content of protein was found to be 34.1 g which, in most 10 day menus this level amounted to 3-3.5 times the recommended EAR and RDA. Dietary calorific results showed that, on average, protein constituted 15% of the total energy intake ( $E_c$ ), falling within the uppermost range of those values recommended (Table 2). A detailed analysis however demonstrated that 52.6% of dietary calories originating from protein exceeded the 15%  $E_c$  values recommended, whilst 1.8% did so above the 20% mark.

Current dietary intakes required for children aged 1-3 years are predicted to be 1-1.17 g/kg body mass/24 hrs. The mean standard EAR are 12 g/24 hrs, whilst the standard RDA is 14 g/24 hrs, which in an average nursery school diet has a maximum of 10.5 g protein from 4 meals. These amounts are in practice hard to achieve so as to have a nutritionally balanced diet taking into the account other dietary components. When assessing protein intake it is more apt to focus on reference values of consumption, of which protein constitutes 15% of the entire calorific intake of a nursery school diet ( $E_c$ ). Acceptable daily variations may be as large as 5 - 20%, however it is recommended that this should not really exceed the average 15%  $E_c$  level.

The fat content of the diets have been shown, on average, to be 30.9% of the  $E_c$ , ranging from 20.6 - 43.1% (Table 2). According to expert opinion, an infant's dietary intake of saturated fatty acids should be stepwise reduced at the expense of unsaturated fatty acids, which includes polyunsaturated n-3 fatty acids. Results for nursery schools however were found not to be compliant. In an infant's diet, aged 13-36 months, fat should provide 35-40%  $E_c$  and should then be stepwise reduced. However, limiting fat intakes below 25%  $E_c$  may result in dietary intake deficiencies of essential unsaturated fatty acids. It was found that dietary fats were dominated by unsaturated fatty acids and the intakes on the polyunsaturated ones were on average 3.1 g which constituted 3.0% of the  $E_c$  (Table 2).

Mean carbohydrate contents of the studied diets were 130.8 g, (constituting 54% of the  $E_c$ ) of which 121.1 g were digestible and thus accorded with recom-

Table 1. Dietary calorific and nutrient content shown in total or per season

Calories per nutrient	Mean total range (from – to)	Mean for Spring range (from – to)	Mean for Summer range (from – to)	Mean for Autumn range (from – to)	Mean for Winter range (from – to)
Energy (kcal)	912.3 ± 158.5 <sup>1)</sup> 442.8-1507.0 <sup>2)</sup>	919.3 ± 154.7 613.1-1507.0	832.3* ± 123.6 575.3-1213.0	965.0* ± 150.8 621.7-1445.5	934.4 ± 170.6 442.8-1502.3
Protein (g)	34.1 ± 7.1 14.8-60.3	34.2 ± 6.8 20.4-60.3	31.5* ± 6.5 16.8-48.2	36.1* ± 6.7 17.9-58.9	34.6 ± 7.6 14.8-57.9
Fat (g)	31.9 ± 6.8 16.4-58.6	32.5 ± 6.8 17.9-58.6	29.0* ± 5.8 16.8-48.2	33.7* ± 6.5 17.9-53.2	32.4 ± 7.0 16.4-56.3
SFA (g)	15.8 ± 3.3 7.7-29.5	16.2 ± 3.5 9.1-29.5	14.2* ± 2.7 7.7-22.0	16.6* ± 3.2 8.9-26.2	16.2 ± 3.3 8.9-27.3
MUFA (g)	10.8 ± 2.7 5.1-23.3	10.9 ± 2.6 5.3-23.3	10.0* ± 2.5 4.8-19.7	11.5* ± 2.7 5.6-21.1	10.8 ± 2.7 5.1-18.8
PUFA (g)	3.1 ± 1.2 1.0-8.9	3.1 ± 1.3 1.1-8.9	2.7* ± 0.9 1.2-6.8	3.0* ± 0.9 1.2-7.1	3.0 ± 1.4 1.0-8.3
Cholesterol (mg)	164.7 ± 54.3 52.4-501.4	166.7 ± 55.8 63.6-448.5	142.9* ± 45.3 52.4-368.9	179.4* ± 52.5 66.8-371.2	170.3 ± 56.2 60.3-501.4
Carbohydrates (g)	130.8 ± 24.8 62.6-245.5	131.0 ± 23.2 84.4-214.9	119.1* ± 18.2 84.9-186.2	138.5* ± 24.4 93.6-245.5	134.7 ± 28.0 62.6-241.5
Saccharose (g)	30.3 ± 10.2 3.2-81.1	30.0 ± 9.9 5.2-68.0	27.4* ± 8.6 6.6-53.3	32.8* ± 9.7 6.2-79.9	31.2 ± 11.6 3.2-81.1
Dietary fibre (g)	9.6 ± 2.3 3.6-24.4	9.6 ± 2.0 5.0-19.8	9.0* ± 1.9 3.8-14.3	10.2* ± 2.5 5.2-24.4	9.7 ± 2.6 3.6-22.6
Sodium (mg)	657.6 ± 197.6 233.8-1683.8	674.3 ± 184.2 304.5-1349.8	616.5* ± 187.3 285.0-1389.1	678.8* ± 196.6 233.8-1417.3	661.6 ± 215.6 274.4-1683.8
Potassium (mg)	1645.1 ± 334.3 758.3-3431.8	1651.2 ± 313.7 1036.7-2919.7	1524.2* ± 260.0 877.6-2495.0	1752.2* ± 360.8 1084.6-3431.8	1656.3 ± 361.0 758.3-2974.4
Calcium (mg)	496.5 ± 126.6 198.2-1075.9	508.9 ± 132.5 255.0-1075.9	451.4* ± 115.1 237.3-883.9	527.9* ± 122.3 248.2-987.1	498.9 ± 123.8 198.2-877.3
Phosphorus (mg)	642.4 ± 129.4 306.4-1428.1	649.5 ± 127.6 361.1-1092.1	591.2* ± 108.8 326.7-910.7	682.4* ± 126.0 406.0-1428.1	647.9 ± 137.3 306.4-1075.6
Magnesium (mg)	130.7 ± 27.9 61.1-388.2	130.5 ± 26.5 75.7-236.7	125.4* ± 23.5 75.0-212.6	138.3* ± 30.4 83.5-388.2	128.9 ± 29.5 61.1-252.3
Zinc (mg)	4.2 ± 0.9 1.7-9.5	4.2 ± 0.8 2.0-7.3	3.9* ± 0.7 1.9-6.4	4.4* ± 0.9 2.6-9.5	4.2 ± 0.9 1.7-8.3
Iron (mg)	4.3 ± 1.1 1.7-13.0	4.3 ± 1.1 2.5-9.8	3.9* ± 0.8 2.2-7.1	4.5* ± 1.1 2.7-10.6	4.3 ± 1.3 1.7-13.0
Iodine (µg)	20.3 ± 6.9 8.8-72.9	20.4 ± 7.9 9.6-72.9	18.9 ± 6.0 8.8-46.6	22.0 ± 6.9 10.6-64.1	19.7 ± 6.1 9.2-48.0
Vitamin A (µg)	895.8 ± 546.0 200.2-7393.0	922.0 ± 595.3 240.7-5120.4	808.4* ± 433.4 227.3-3540.5	941.9* ± 508.4 251.7-4860.1	912.7 ± 618.8 200.2-7393.0
Vitamin E (mg)	2.6 ± 0.8 0.9-6.4	2.6 ± 0.8 1.1-6.4	2.5 ± 0.7 1.1-6.0	2.8 ± 0.8 1.3-5.9	2.6 ± 0.9 0.9-5.7
Vitamin C (mg)	29.1 ± 11.2 1.6-86.0	26.4 ± 8.9 8.8-55.3	31.4* ± 11.2 8.6-80.9	30.8* ± 11.9 11.4-86.0	27.8 ± 11.9 1.6-77.4
Vitamin B <sub>1</sub> (mg)	0.5 ± 0.1 0.2-1.1	0.5 ± 0.1 0.3-0.9	0.4 ± 0.1 0.3-0.8	0.5 ± 0.1 0.3-1.1	0.5 ± 0.1 0.2-1.0
Vitamin B <sub>2</sub> (mg)	1.0 ± 0.3 0.4-3.4	1.0 ± 0.3 0.6-2.4	0.8 ± 0.2 0.5-1.7	1.0 ± 0.2 0.6-2.4	1.0 ± 0.3 0.4-3.4
Vitamin B <sub>6</sub> (mg)	0.9 ± 0.2 0.3-2.3	0.9 ± 0.2 0.5-1.7	0.8 ± 0.1 0.5-1.6	1.0 ± 0.2 0.6-2.3	0.9 ± 0.2 0.3-1.9
Vitamin PP (mg)	5.4 ± 1.6 1.4-15.2	5.3 ± 1.3 2.9-10.2	5.1* ± 1.5 2.5-12.4	5.8* ± 1.7 2.7-12.1	5.5 ± 1.8 1.4-15.2
Vitamin B <sub>12</sub> (µg)	2.2 ± 2.0 0.8-33.2	2.3 ± 2.3 0.9-21.6	1.9* ± 1.4 0.8-12.8	2.3* ± 1.8 0.9-21.3	2.2 ± 2.4 0.8-33.2
Vitamin D (µg)	0.8 ± 0.4 0.2-5.6	0.8 ± 0.4 0.2-3.5	0.7 ± 0.5 0.2-4.9	0.8 ± 0.3 0.3-3.2	0.8 ± 0.4 0.2-5.6
Folic acid (µg)	106.7 ± 33.4 36.2-444.8	106.0 ± 34.7 54.6-311.5	100.9* ± 24.8 46.3-211.6	115.2* ± 33.9 62.3-365.2	105.0 ± 37.5 36.2-444.8

SFA – Saturated fatty acids, MUFA – Monosaturated fatty acids, PUFA - Polyunsaturated fatty acids

<sup>1)</sup> Mean ± SD <sup>2)</sup> minimum-maximum range

\* – statistically significant at p&lt;0,05

Table 2. The distribution of total energy intake from average diets (% Ec), expressed as totals or per season

Energy derived from nutrients (% Ec)	Total	Spring	Summer	Autumn	Winter
Protein	15.1 <sup>1)</sup> 8.8 – 24.2 <sup>2)</sup>	15.1 10.7-20.9	15.3 9.7-24.2	15.2 10.9-22.8	15.0 8.8-20.9
Fats	30,9 20.6 – 43.1	31,2 22.3-40.5	30.8 20.8-40.1	30.8 20.6-42.7	30.7 20.7-43.1
Carbohydrates	54.0 41.6 – 67.0	53,7 43.4-67.0	58.9 42.2-65.4	54.0 43.4-64.1	54.3 41.6-66.1

<sup>1)</sup> Mean <sup>2)</sup> Minimum to maximum range

mendations (Table 1 and 2), where mean saccharide levels were 30.3 g (13.2% Ec). It is however recommended, that saccharides supply not less than 10% of the Ec, so that nursery school diets should contain less than 18.7g saccharides; this was observed in only 9.1% cases.

Average levels of dietary fibre were found to be  $9.6 \pm 2.3$ . This can be compared with normal dietary requirements of 10-15 g fibre for infants aged 1-3 years as established by the Institute of Food and Nutrition in Poland and which corresponds to those of the American Institute of Medicine that sets such levels of 19 g/24 hrs [24]. The observed dietary levels of vitamins and minerals are shown in Table 1 and indicate that the lowest levels were consumed during the summer but the highest were in autumn.

Apart from vitamins D, E, B<sub>1</sub>, B<sub>6</sub> and iodine, these differences were significant. Mean dietary sodium was  $657.6 \pm 197.9$  mg which did not significantly exceed standard values but keeping in mind that this entirely originated from foodstuffs. Reports from food stores/depots show that added salt constitutes a 1.2 g daily load, combined with a sodium intake of around 1100 mg daily. Potassium stood at  $1600 \pm 334.3$  mg, which reached recommended levels for those attending nursery schools (Figure 1).

Mean dietary calcium content were found to be  $496.5 \pm 126.6$  mg, which adequately fulfilled the AI standards requirements from 2008 [9], however those defined by the EAR and RDA in 2012 showed that the amounts consumed were at 95% of the RDA, which may be considered as being satisfactory. Mean Vitamin D were  $0.8 \pm 0.4$  µg, with maximum levels rising to 5.6 µg; in nursery schools this value approached 5.6 µg. Current recommendations that take into account the pleiotropic action of vitamin D give RDA intakes of 15 µg, where during nursery school this should be set as being 11µg. An iodine deficiency was also found with average intakes of  $20.3 \pm 6.9$  µg that only satisfied 1/3 of that recommended. Iodine deficiency was also seen in nursery school children with average values of  $20.3 \pm 6.9$  µg/ml from only however 1/3 of those participating subjects. In order to increase these dietary components in children, then frequent consumption of foodstuffs like fish (once or twice every 10 days) should be recommended in a diet as they are rich in the aforementioned nutrients.

Mean dietary levels of magnesium and zinc were found to be respectively  $130.7 \pm 27.9$  mg and  $4.2 \pm 0.9$  mg which in turn exceeded the RDA by 218% and 187%. The iron content of diets was high at  $4.3 \pm 1.1$  mg, constituting 82% of the standard nutritional

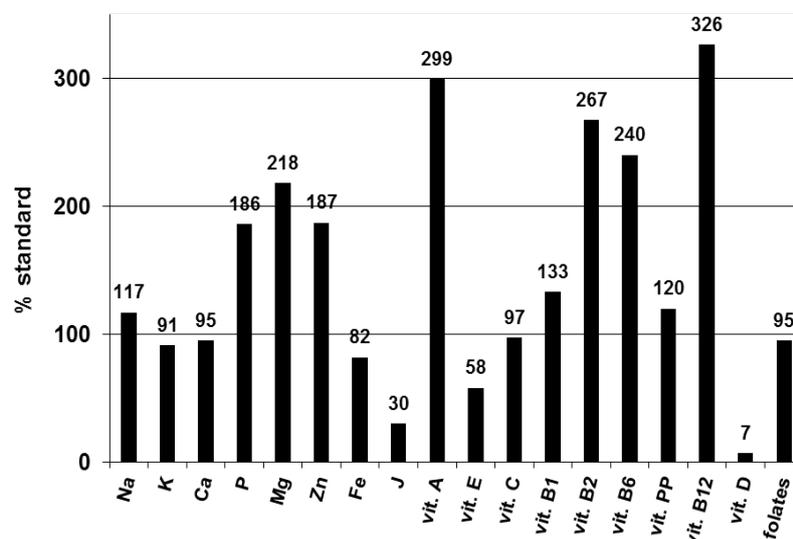


Figure 1. RDA/AI values for vitamins and minerals found in average nursery school diets (as a proportion of the 75% daily standard)

requirement. Amongst the fat soluble vitamins, dietary vitamin E levels were low (2.6 +/- 0.8 mg) forming only 58% of the recommended value. One of the richest sources of this vitamin are oils, however butter is the most frequent fat given in nursery schools whereas vegetable oils are provided in small amounts. Thus an increase in children's dietary oils is indicated especially olive and rapeseed oils. Vitamin C in the diet was on average 29.1 +/- 11.2 mg which was in keeping with recommendations whereas vitamin A levels were 895 +/- 546 µg -expressed as the retinol equivalent. Within the latter, the provitamin A form (*beta*-carotene) was predominant which was due to high amounts of carrots and carrot/fruit juice in the diet. The dietary contents of vitamin B group vitamins, together with folic acid accorded with recommendations and in some cases were higher, (eg. for riboflavin, vitamin B<sub>6</sub> and B<sub>12</sub>).

## DISCUSSION

Over recent years in Poland, much attention has been focused on health and nutrition in children and adolescents. This is related to an ever increasing incidence of overweight in these groups as well as much evidence of bad dietary habits leading to significant increases in various nutritional disorders. These nutritional failings have been observed both in individuals and the education/school system as a whole. Studies are often published in Poland on child and adolescent nutrition (ie. schoolchildren and students), however there are very few devoted to those at nursery school.

A study by *Weker* et al on Warsaw nursery schools found that the mean calorific contents of meals provided were 20% higher than recommended values (964.8 +/- 97.4 kcal), protein was double the standard values at 33.6 g whilst dietary fat intake was insufficient but carbohydrates exceeded recommendations (142.0 +/- 18.5 g) [21]. Another study by *Hamulka* et al. measured the nutritional value of diets consumed by 1-6 year-olds in a Warsaw school for small children and demonstrated a high calorific content and that this was incorrectly distributed amongst the meals eaten, with high amounts of saturated fatty acids and saccharose but low amounts of complex carbohydrates [6, 18]. A nutritional assessment study on nursery school children conducted in Białystok (*Smorzewski-Czuprynski* et al.) clearly showed that the 10 day menus were unbalanced; the calorific contents were too high as was protein (2.5 fold higher than the EAR), fat was within the lower set limits and carbohydrate was deficient [13].

Similar dietary shortcomings have been recorded by other studies [1, 2, 4-6, 11, 15, 22]. Having a varied diet is an important way of achieving a correctly balanced diet in vitamins and minerals, nevertheless this

may not always fulfil other nutritional requirements. This can be especially difficult for vitamin D and iodine and thus it is important that such deficiencies are made up in meals eaten at home. Regarding the latter, a systematic intake of foodstuffs rich in this vitamin is necessary, such as fish, egg yolk or milk/dairy (or milk substitute) products.

Fish are an excellent source of iodine, an element which can also be found in some mineral waters. These can be given to children aged 2-3 years, provided the waters are low or medium mineralised. Dietary deficiencies of the aforementioned nutrients are observed in the majority of studies carried out on various population groups [1, 2, 4-6, 12, 19]. Apart from vitamin E and iron, the remaining dietary vitamins and minerals comply with recommended values and are sometimes even higher. Similar observation has been recorded in those studies on nutrition at nursery schools in Poland. The *Weker* et al. study for instance was conducted on a group of 400 children, representative of Poland, aged 13-36 months [19, 20], where excess intakes of sodium, vitamin C, B group vitamins, magnesium and zinc but low levels of vitamin D were observed. Furthermore, and in similar fashion to the presented study, intakes were very low in the following; iron (4.5 mg), vitamin D (0.9 µg, folates (78.8 µg) and vitamin E (3.1 mg).

Consumption of calcium was 465.5 mg and a little below recommended levels, whereas that for magnesium was on average twice higher than recommended at 136.1 mg. Similar findings were observed in nursery school children from Warsaw [21]. A study by *Sadowska* et al. on nursery schoolchildren from Szczecin showed a twofold excess over recommended dietary levels for copper, vitamin A and vitamins B<sub>2</sub> and B<sub>6</sub>. Intakes of other nutrients were also significantly exceeded such as B group vitamins, vitamin C, phosphorus, magnesium and sodium but were found deficient in the cases of calcium, potassium and iron [12]. Similar dietary shortcomings have been demonstrated in further studies on small children [1, 2, 4, 5-7, 12, 19]. Eating at home should make good any of these nutritional losses during nursery school time, however many studies indicate that this is not so, where unfortunately in many cases sweet snacks are given instead [3, 11].

## CONCLUSIONS

1. Mean calorific values in diets of crèche/nursery schoolchildren exceeded those recommended, with the lowest in summer and highest in autumn.
2. Dietary protein was very much higher compared to recommended standards, but fell within the reference values. Fat content was low and was dominated by saturated fat with low intakes of polyunsaturated

fatty acids. It is thus indicated that the latter needs to increase by eating more foodstuffs containing these compounds such as fish and oils.

3. Intakes of digestible carbohydrates complied with recommendations, however saccharose intake was excessive.
4. The diets showed deficiencies in the following; vitamin D, iodine, vitamin E and iron, whereas significantly excessive intakes were observed for sodium, phosphorus, magnesium, zinc, vitamins A, B<sub>2</sub>, B<sub>6</sub> and B<sub>12</sub> when compared to recommended standards.
5. The diets of nursery school children need to better balance according to recommended standards for nutrition.

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### Conflict of interest

The author declares no conflict of interest.

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