Serving size, energetic adequacy and waste control at a day care center

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Abstract

Objective: Describe the serving size standardization process of meals offered to children in a nursery school, for adequacy of energetic offer and waste control. **Methods**: During 11 days in a nursery school in Aracaju, state of Sergipe, Brazil, attending 45 children between eight months and two years old, were evaluated the rest and food scrap from lunch, snack and dinner. After the first seven days, the serving sizes standardization was implemented. In order to do it, training was conducted with the employees, based on pictures and descriptions of homemade measures preparation. The serving size was determined by considering energy recommendation for children. Utensils used in the nursery school were used for standardization of homemade measures. After this stage, data of the rest and the food scrap was collected again for four days. **Results**: The average percentages of rest-intake, on first stage, were 21% on snack, 33% on lunch and 36% on dinner. After standardization of serving sizes, these percentages dropped to 14% on snack, 16% on lunch and 15% on dinner. The adequacy of daily energy was evaluated for three days and ranged from 63 to 106%. The results clearly show the importance of standardization of serving portion sizes to control waste and adequacy of energetic offer in food producing establishments.

Key words: Institutional feeding, child day care center, food wastefulness, food production.

Introduction

Infant nutrition is something peculiar, since starting at that age, eating habits will be built during other phases of life. The feeding of children under two years of age has some peculiarities, because it is at this age group that complementary foods are introduced.

From six months of age, some of the energy supplied to the child must come from foods complementary to breast milk. This should be made gradually, with changes in consistency until the child's feeding equals that of the family.[1] According to the World Health Organization,[2] the frequency with which complementary foods should be offered to small children varies with the energetic density of the diet foods.

Some decades ago, child development occurred almost exclusively at home. However, from the 1970s in Brazil, the expansion of the economy, the process of urbanization and increased industrialization favored the incorporation of new workers in the market. This paved the way for greater inclusion of women in the labor market[3] and, added to other economic, social and demographic change, have contributed to the emergence and growth of day care centers. Today, day care centers have a role to educate and nurture the children of mothers who usually work outside the home.[4]

The day care center plays several important roles related to the development of the child, whether it is physical, psychological or social. The importance of the day care center also relates to the quality of the food offered, as inadequate feeding practices or nutritional deficiencies can cause great damage to the child's health. Besides the nutritional aspect, extremely important for a child's growth, nutrition presents emotional, cultural and social problems that can not be neglected. The centers fall on the issue of food and nutrition education, especially with regards to the acceptance, by the child, of a variety of foods, which may influence future eating behaviors and practices. Food and nutritional education in this context should be directed primarily to those responsible for feeding on the site (cooks, maids), who will distribute and prepare meals.

The supply of nutritionally adequate meals in kindergartens and preschools is critical. However, besides the nutritional point of view, which values the variety, balance and moderation, food involves other aspects, such as pleasure, taste, dimensions of gender and ethnicity, production methods that are environmentally sustainable and free of chemical contaminants, physical and biological, are equally important.[5,6] The menu planning should be done, therefore, to address all these issues in the best way possible.

However, the menu planning is one of the steps for the provision of proper meals. It is also necessary to adjust the production and distribution of meals. In a survey on consumption conducted in 16 nurseries in the city of São Paulo by direct weighing, an energy deficit was identified, although the menus weredeveloped by nutritionists.[7] This underscores the importance of monitoring

the production and distribution of preparations served during meals. Another highlight is the importance of following up on the consumption of meal leftovers. There are several factors that influence food intake, such as the child's relationship with the environment and the people involved with the provision of the meal and the conditions at the time of the meal. Thus, to meet the nutritional recommendations and to facilitate and expedite the distribution of meals, meal portioning can be done by standardizing household measures.

According to Vargas[8], "[...] household measures are instruments to measure the amounts of certain foods that will be used to prepare and serve meals, as measured by tools that exist in any residence, such as glasses, cups, spoons, ladles, etc. Due to their ease of use and access, these culinary tools are widely used both in residential kitchens and in Food and Nutrition Units (FNU), to calculate the quantities of food that will be prepared for the meals."

The deployment of standardized household measures depends on the awareness regarding the importance of standardization and training of workers for the quantities offered. Therefore, it is necessary to work on the food and nutritional education of the workers responsible for portioning meals, based on a dialogical relationship between the learning actors.[9]

Standardization, besides aiding in the preparation of meals and facilitating the adjustment of energy supply, also acts as a factor for reducing food waste, since the standardized amounts avoid excess food in the dish and excess food prepared, consequently minimizing waste. On the issue of solid waste management, which is relevant even on a legal scale,[10] the non-generation, such as control of food production and leftovers, takes precedence over all other actions. Furthermore, standardization can lead to reduced waste, with consequent cost reduction and generation of environmental impacts, and is aligned with the consolidation of the human right to adequate food and promotion of food and nutritional security.

Given the scarcity of studies related to portioning and evaluation of waste in daycare centers, this study aimed to describe the process of standardizing the portioning of meals offered in a day care center, with the evaluation of leftovers for adequacy of food supply and waste control.

Methods

Research site

The day care center where the study was developed belongs to a nonprofit parastatal institution. It is located in the neighborhood of Siqueira Campos, west of the city of Aracaju, and 25 people there provide services, among which teachers, housekeepérs, cooks, kitchen assistants and trainees. It offers 45 openings for children aged 8 to 24 months and is open Monday through Friday from 7:10AM through 5:30PM. Openings are for children of parents employed in the commercial sector,

and in order for them to enjoy the daycare center, a monthly fee is required. One of the factors leading to the high demand of daycare services is the offer of this service at very affordable prices. At the time of the study, all openings were occupied.

During the period in which they remain in the day care center, children have the following meals: morning snack at 9am, lunch at 11am, afternoon snack at 2pm and dinner at 4pm. The morning snack is sent home by their parents, while the day care center supplies the other three meals. The production sector where the entire preparation of meals is done has two workers (cook and kitchen assistant). The meals are served and offered to the children by the teachers and assistants responsible for each class.

Energetic value recommendation

The energetic recommendation used in order to adjust the size of portions offered by the institution was based on the *Recommended Dietary Alowance*,[11, 12] as directed by the Ministry of Health[1]

Children are divided into two groups: children aged eight months to one year and five months (group 1) and children aged one year and six months to two years (group 2). The energetic recommendation was calculated for each group, using the average weights of children in groups 1 and 2. The weight data was provided by the daycare, since the anthropometric measurement of children is performed twice a semester.

Portion standardization of and homemade measurement

The size of the portions to be offered to children based on the energetic recommendation is estimated. Although the day care center involved in this work is not tied to the National School Nutrition Programme (PNAE), the program's recommendation was used, with adaptations, to supply at least 70% of the children's daily needs, when in full time.[13] However, while children remain full time in the daycare center, they have only three meals, among them, two main meals (lunch and dinner). Therefore, it was chosen to employ 60% of the recommended daily energy intake to estimate the portions. Thus, the distribution of the total energy value was 25% to 30% for lunch, 10% to 15% for the snack and 20% to 25% for dinner. The remaining 40% of energy needs are offered daily at breakfast and supper (held at home) and morning snack (held at the day care center, with food sent by the parents). The day care center chose not to elaborate the morning snack, since there was not enough time, given the work schedule of the two workers involved in the production of meals. Since children are aged between eight and 24 months, from Monday to Friday, in general, they receive milk meals at home and complementary feeding at the day care center.

For the standardization of household measures, the energetic value of the menu of three nonconsecutive days was calculated. To this end, the preparation of meals was monitored, weighing each ingredient and using the Brazilian Table of Food Composition (NEPA-UNICAMP).[14] The portion size was defined based on the energetic value of the preparation, considering the age group it was intended to. The home measurements were then established from the portion size and consistency of preparations. Utensils commonly used in the day care center were used for portioning meals and, for weighing, a Plenna brand electronic scale with a capacity of 2 kg and 1 g division was used.

Illustrative tables of the portions and home measurements proposed for each meal were developed. Then, the cook and assistant involved in the production and distribution of meals were trained for a week, presenting the proposal of portion standardization.

Waste assessment: leftovers

The assessment of leftovers was held for the three meals offered by the day care center (lunch, afternoon snack and dinner) in two steps. In the first one, the preparations produced, preparations distributed, leftovers and scraps were wheighed for seven days. After this step, the intervention was carried out using the portioning illustrative table. In the second step, preparations produced, preparations distributed, leftovers and scraps were wheighed for four days after the intervention measure.

To obtain the weight of the distributed preparation, the container was wheighed after each preparation was ready, and discounting the weight of the container and the remains. The values obtained for each preparation were summed to obtain the weight of the distributed meal. The weight of the leftovers was obtained by scraping the children's dishes after consumption of each meal, checking the sum of the contents rejected by them. The formulas used, according to Vaz,[15] are described in Chart 1.

Chart 1. Formulas used to calculate the scraps and leftovers-ingestion percentages. Aracaju, SE.

Wheight of the provided meal (g) = total produced (g) – scraps after serving meals (g)
Scraps percentage = scraps after serving the meal (g) x 100 / Wheight of the provided meal (g)
Leftovers-ingestion percentages = scraps wheight (g) x 100 / wheight ofr the provided meal (g)

The leftover-ingestion is described as the ratio between the leftovers in the plates and the amount of food and food preparations provided, expressed as a percentage. Rates below 10% are acceptable as a leftover-ingestion percentage. When the result is above 10% in healthy communities and 20% in sick communities, it is assumed that the menus are inadequate for being poorly designed or poorly executed.[16]

To assess how many children could be fed with the leftovers and scraps accumulated during the period of data collection, the per capita consumption per meal was calculated (weight of distributed meals divided by the number of meals).

Results and discussion

Leftovers assessment

The weight of food scraps and leftovers from lunch, snack and dinner offered to the children are presented in Tables 1, 2 and 3. Leftovers and scraps were quantified for 11 days to analyze food waste in the day care center in two steps, (1) prior to the of meal portioning standardization and (2) after portioning standardization. The unit's workers were trained on portioning standardization, this step being called intervention measure.

The menu in steps 1 and 2 were not equal, since it was not possible to interfere in its planning. However, there is a wide variety of preparations on the general menu and many of the preparations were repeated in step 2.

Table 1. Scraps and leftover values, at lunch, before and after intervention**.** Aracaju, SE.

Step	Day	Quantity produced (g)	Leftovers (g)	Quantity distributed (g)	Scraps (g)	Leftovers-ingestion (%)	Leftovers (%)
	1	12735	6700	6035	1980	32.8	111.0
	2	13205	5830	7375	1760	23.9	79.1
1*	3	13130	6135	6995	2440	34.9	87.7
	4	11585	2570	9015	3740	41.5	28.5
	5	11860	2290	9570	3235	33.8	23.9
	6	11230	4200	7030	2165	30.8	59.7
	7	9940	3025	6915	2395	34.6	43.7
Mean		11955	4392.9	7562.1	2530	33.2	61.9
	1	9615	4440	5175	930	18.0	85.8
	2	8865	3845	5020	540	10.8	76.6
2**	3	8065	2360	5705	1060	18.6	41.4
	4	8910	3560	5350	800	15.0	66.5
Mean		8863.8	3551.2	5312.5	832.5	15.6	67.6

*Step 1: wheighing of lunch preparations, scraps and leftovers before applying the intervention measurement (portioning standardization).

**Step 2: wheighing of lunch preparations, scraps and leftovers after applying the intervention measurement (portioning standardization).

Table 2. Scraps and leftover values, for the snack, before and after intervention. Aracaju, SE.

Step	Day	Quantity produced (g)	Leftovers (g)	Quantity distributed (g)	Scraps (g)	Leftovers-ingestion (%)	Leftovers (%)
	1	1960	0	1960	295	15.1	0.0
	2	7150	400	6750	1350	20.0	5.9
1*	3	6635	1360	5275	1185	22.5	25.8
	4	5395	85	5310	1565	29.5	1.6
	5	5530	0	5530	830	15.0	0.0
	6	4690	730	3960	1100	27.8	18.4
	7	3780	750	3030	445	14.7	24.8
Mean		5020	475	4545	967.1	20.7	10.9
	1	4870	1225	3645	415	11.4	33.6
	2	2230	45	2185	300	13.7	2.1
2**	3	4670	265	4405	885	20.1	6.0
	4	3300	550	2750	295	10.7	20.0
Mean		3767.5	521.3	3246.3	473.8	13.9	15.4

*Step 1: wheighing of snack preparations, scraps and leftovers before applying the intervention measurement (portioning standardization).

**Step 2: wheighing of snack preparations, scraps and leftovers after applying the intervention measurement (portioning standardization).

Table 3. Scraps and leftover values, at dinner, before and after intervention**..** Aracaju, SE.

Step	Day	Quantity produced (g)	Leftovers (g)	Quantity distributed (g)	Scraps (g)	Leftovers-ingestion (%)	Leftovers (%)
	1	3195	1235	1960	660	33.7	63.0
	2	4930	1750	3180	2030	63.8	55.0
1*	3	7005	1490	5515	1555	28.2	27.0
	4	5550	1585	3965	1850	46.7	40.0
	5	3665	310	3355	860	25.6	9.2
	6	5415	1705	3710	375	10.1	46.0
	7	3980	1205	2775	1190	42.9	43.4
Mean		4820	1325.7	3494.3	1217	35.9	40.5
	1	3295	1150	2145	280	13.1	53.6
	2	6745	3870	2875	360	12.5	134.6
2**	3	6055	2150	3905	1110	28.4	55.1
	4	4370	400	3970	225	5.7	10.1
Mean		5116.3	1892.5	3223.8	493.8	15.0	63.4

*Step 1: wheighing of dinner preparations, scraps and leftovers before applying the intervention measurement (portioning standardization).

**Step 2: wheighing of dinner preparations, scraps and leftovers after applying the intervention measurement (portioning standardization).

It can be observed, in step 1, a high leftovers-ingestion percentage in big meals - the highest leftovers-ingestion percentage, and leftovers reached 64% and 111%, respectively. Literature data offer no leftovers-ingestion parameters for children, but for adults, leftovers-ingestion percentages are considered acceptable when below 10%.[16]

It can be noted that, on some days, the leftover percentage exceeds 100%, because the calculation of the leftover percentage is given by the ratio of the leftover weight and the weight of the meals that were distributed. Since the leftovers appeared larger than the amount distributed in a few days, the percentage exceeded 100%. This shows that, possibly, there was a great imbalance between the demand for meals and the amount of food produced.

Soares et al.[17], studying leftovers of eight food and nutrition units in a steel company for five months, found up to 1,213 kg of food wasted each month, which is equal to 3% of monthly expenditures on food. The authors emphasized not only the financial loss resulting from the waste but also the environmental impact of the generation of excessive waste.

By analyzing Tables 1, 2 and 3, it can be observed that the meal in which the waste was greatest was lunch, which showed high percentages of leftovers. On average, more than half of what was produced was discarded. Moreover, the snack was the meal that presented less waste.

In step 2, after application of training on portioning using standardized measures, it was found that the average percentage of leftover-ingestion in large meals decreased by half when compared to step 1. Possibly, the quantities previously offered to the children were not adequate, a fact that could be causing the high leftover-ingestion rates found. However, the average leftover percentage increased in meals in step 2, which is justified because the portion size defined for the preparations was reduced, but at first the total amount produced was not altered; therefore, the amount of leftovers increased. When observed, this fact was passed on to the nutritionist responsible for the unit, so that adjustments could be made at the time of planning, from shopping to the production of meals. It was observed that the nutritionist had difficulties performing the systematic monitoring of the production and distribution of meals in the day care center, since he was also responsible for the production of meals in other larger units of the same institution for care of workers and students. It is interesting to highlight the importance of daily monitoring the volume of leftovers as important information to plan and produce sufficient amounts of each preparation in order to avoid excess production and unnecessary waste.

During the first step, the values of leftovers and scraps accumulated totaled 43,335 g and 33,005 g, respectively. This total could feed, during those seven days, 323 children; 183 children with the accumulated leftovers and 140 children with the accumulated scraps, considering the proposed portioning.In a study by Augustini et al.[18] on a food and nutrition unit (FNU) at a metalworking company, low percentages of leftovers for lunch and dinner were found (between 5 and 13%), unlike the results of this study. Regarding the ingestion-leftover rate, the percentages found by

Augustini et al.,[18] generally less than 10%, were lower than the percentages of ingestion-leftover observed in the day care center in the study. According to Hirschbruch,[19] in a FNU the waste may involve leftovers and food scraps and ready preparations and can be influenced by a number of factors: inadequate planning of the number of meals to be produced, food preferences, lack of trained staff in production and portioning.During the development of this work, some factors were identified that may be related to the high percentage of leftovers found, namely: lack of datasheets, which caused difficulty in establishing per capita quantities adjusted to the children; the fear on the part of the cooks that the quantity produced would not meet the demand, as the daily number of children present every day was not informed in advance.As mentioned previously, at the time of the study the availability of the nutritionist's time in the day care center was quite limited, which generated implications for the technical monitoring of production. However, this situation has changed with the hiring of new nutritionists by the institution. Moreover, there is the fact that the employees worked previously with production of restaurant meals for adults. This may be one of the factors that influenced the large amount of food prepared and the amount of food portioned onto the plates of children in step 1. With respect to the high levels of scraps in step 1 other factors were observed that could be negatively influencing the intake of meals, such as the fact that the foods were not kneaded enough. During the study, it was observed that when some preparations were offered a little crumpled, children discarded the food from the dish with their hands and did not ingest it. The Ministry of Health[1] directs that in order to offer complementary feeding, one should start with a pasty consistency (porridge/purees) and gradually increase consistency until the food is the same eaten by the family. Vitolo[20] also emphasizes that fruit must be crushed and savory purees should have well cooked and mashed foods for the first year of life. Therefore, it is necessary to adjust the consistency of the food to the child's age for better adherence to complementary feeding. Another factor identified, specific for dinner, is the fact that some children leave the day care before the dinner is served. That is why, in some days, dishes that were not opened were weighed as "scraps". The lack of standardization in portioning also falls as a factor in the high rates of scraps in step 1, since it was observed that the quantities portioned in the dishes were too large, considering the childrens' age.The small gap between lunch and dinner can also have favored the high percentage of leftovers for dinner. The intervals between meals and snacks are positively correlated with the size of meals - that is, the longer the interval, the higher the amount of food ingested at the time of the meal.[20] The satiety power of food consumed biologically determines the next feeding time. A fickle appetite, usually more related to preschool children, can also be a factor responsible for the high rates of ingestion-leftover in step 1. It is common for children between one and six years to present food inappetence, which is associated with decreased growth rate and also to behavioral factors, when the child stops eating for attention, among other reasons.[20]Regarding the use of ingestion-leftover percentages to indirectly assess the acceptability of meals, some considerations are relevant when it comes to a population of small children. The Ministry of Education recommends, for applying the acceptability test, the

methodologies of "Ingestion-leftover" or "Hedonic Scale", observing the technical, scientific and sensory parameters recognized.[13] Due to the age of the study population, the ingestion-leftover, then, would be the most appropriate methodology to assess the acceptability of food. In contrast, the manual for applying acceptability tests in the National School Nutrition Programme (PNAE), prepared by UNIFESP and UNB, [21] does not recommend the acceptability test for the population of day care centers: "[...] with respect to day care centers, it is known that, from the age of six months, the introduction of new foods in the dietary pattern of the child is expected, and that this introduction should be done slowly and gradually, because the child tends to reject the first offers. Moreover, in this case, eight to ten exposures to a new food are recommended so that it is accepted by the infant without necessarily having a constant concern for conciliation with the acceptability of the child. With this guidance, the acceptance test is invalidated for day care center customers, because rejection in this case can not make correlations of acceptance or preference."Thus, the leftover values were not used to assess acceptability, but to help standardize the portioning of meals.

Standardization of portioning

The size of portions and home measurementes was standardized for each of the groups: children aged eight months to one year and five months (group 1) and children aged one year and six months to two years (group 2). The recommended average energy for group 1 was 902 kcal, and for group 2 was 1214 kcal. To meet the childrens' caloric needs, 60% of the daily calorie recommendation were used, given that the day care center provides three meals. Thus, for group 1, 60% corresponded to 541 kcal and, for group 2, this value corresponds to 728 kcal. Table 4 presents the standardization of portions, home measurements and respective energy content for their preparations for lunch, afternoon snack and dinner. The standardization of home measurements was based on three days that presented different preparations often used in the day care center. The adequacy of the daily caloric value to the proposition of offering 60% of the recommended average energy was 106%, 95% and 71% in the three days, respectively, for group 1. For group 2, the energy adequacy was 91%, 92% and 63% in the three days, respectively.

Table 4. Portion standardization and home measurements of lunch, snack and dinner preparations. Aracaju, SE.

	Group 1 - 8 months to 1 year and 5 months			Group 2 - 1 year and 6 months to 2 years		
Preparation	Home measurement	Quantity (g)	Energy (kcal)	Home measurement	Quantity (g)	Energy (kcal)
Beans	1 LA[a] shallow	75	57.0	1 LA full	100	81.8
Rice	1 PS[b] full	50	40.2	2 PS shallow	60	48.2
Potatoes and carrots	1 PS shallow	20	10.0	1 PS shallow	20	10.0
Fresh salad	2 PS shallow	13.5	4.5	2 PS shallow	13.5	4.5
Pasta	1 PS full	25	33.3	1 PS full	25	33.3
Sautee pumpkin	*2* cubes	50	23.1	2 cubes	50	23.1
Mashed potatoes	1 PS shallow	25	67.6	1 PS full	45	121.7
Chicken stew	1 TBS[c] full	35	25.6	1 TBS full	30	32.9
Roast meat	2 TBS shallow	30	62.0	2 TBS shallow	30	62.0

	Group 1 - 8 months to 1 year and 5 months			Group 2 - 1 year and 6 months to 2 years		
Mashed bananas with infant formula	1 UN[d] medium 2 TBS shallow	70 14	61.0 58.0	1 UN big 2 TBS shallow	81 14	70.5 58.0
Porridge	1 ½ LA	180	159.6	2 LA	200	177.5
Cake	1 PIE[e] medium	30	113.7	1 PIE medium	30	113.7
Juice	Graded cup	100	76.4	½ Colored cup	130	99.3
Corn couscous with Milk	1 PIE small 1 LA shallow	50 25	124.1 125.0	1 PIE medium 1 LA shallow	60 25	149.3 125.0
Eggs	1 PS full	20	39.0	1 PS full	20	39.0
Manioc	2 PIE small	65	56.2	2 PIE medium	100	86.3
Soup	1 ½ LA	160	70.7	2 LA	200	88.4

[a]LA= Ladle; [b]PS= Polyethylene spoon; [c]TBS= Table spoon; [d]UN= Unit; [e]PIE= Piece

The third day's menu included some preparations of low caloric density, such as *sautée* pumpkin for lunch and vegetable soup for dinner. That is why, possibly, the adequacy of the caloric value was so low that day in both classes. It is important to emphasize the fact that the soup has a naturally low caloric value and was offered for dinner, which is a main meal and should contribute with a higher percentage to meet the daily caloric needs. Some difficulties were found when accomplishing the standardization of home measurements in order to adequate the energy offer. When calculating the calorific value of the preparations, it was found that some had low energy density. This hindered the establishment of the portion, because the caloric value of some preparations was low, it would soon be necessary to increase the portion size to meet the goal of offering 60% of the recommendation. However, one factor that must be observed to standardize portion sizes for children in this age group is the small gastric volume of the child, which does not support large amounts. A review of the menu, looking to minimize the presence of preparations of low energy density (below 0.7 Kcal / g^1), is an important measure to adjust the supply of energy in the day care center. Despite the reduction, the food scraps of the children are still considerable, which thus further reduces the amount of energy consumed daily. Therefore, attention to the variety of the menu, texture and energy density of preparations assumes a key role in providing meals in the day care center. During the food preparation monitoring period, it was found that small amounts of oil were used in the preparations. In some cases, the low energy density of some preparations is related to this fact. This is not to say that one should increase the supply of oil indiscriminately, but it is known that besides their energetic importance, oils are sources of important nutrients such as essential fatty acids, and they have an important role in the absorption of vitamins A, D, E and K. Therefore, they should be used in food preparation.Another difficulty has been the short time between the afternoon snack and dinner (2 hours), a factor that limited the standardization of larger sizes for portions. Larger portions at lunch could result in lower dinner acceptance.It is observed, in Table 4, that in some preparations portion size was equally standardized for both groups. We chose to use the same measure for cakes, infant formula and milk for easy portioning done by the workers. In the case of salads and pasta, the measures already employed in the day care center remained, as they were considered adequate in terms of quantity and energy. With respect to the portion of meat, it was decided to raise the quantity from a shallow tablespoon to a full tablespoon full in group 1, to better tailor the caloric value of the meal. In addition, these foods are important sources of protein and micronutrients, and it is believed that the only opportunity for the child to eat foods like meat and egg, Monday through Friday, is at the day care center, since it's where they have their two main meals of the day (lunch and dinner). On weekdays, the meals that children receive at home, in general, are milk-based.According to Vitolo,[20] when introducing complementary foods, it is important that there is already the inclusion of meat, to ensure good bioavailability of iron. The delay in the introduction of foods with good bioavailability of iron can deplete the child's iron storage and put them in risk of anemia. Juice had the standard amount of 100 ml for group 1 and 130 ml for group 2, as a complement to the afternoon snack. There was low frequency in

the supply of fruit during meals, so the supply of fresh juice was maintained, as an opportunity to provide a portion of the fruit group. Although it is a low energy density preparation, the presence of vitamins and minerals, which are important for the child's healthy growth, should be taken into consideration in this food group. According to Longo-Silva et al., [7] who conducted a study in 16 day care centers, the problems found related to insufficient caloric intake may be related to failures in the process of production, portioning and distribution of meals, being influenced not only by portion sizes, but also by the number of daily meals and the variety and energy density of the foods served. The authors admit the difficulty of ensuring adequate daily energy intake and although the menus are designed by nutritionists, child feeding was insufficient, which reinforces the need for further education actions, especially aiming the workers who portion meals and feed the children.To present the standardization of portions, three illustrative charts (for lunch, snack and dinner) that present quantities in home measurements and respective photo of the adequate portion for each preparation (figure 1). A similar proposal was made by Goulart et al.,[22] with the creation of an illustrative guide of standardized home measurements for lunch and dinner meals in the hospital, in order to assist in portioning. The authors concluded that the use of the guide was an effective measure to improve the quality of food portioning and standardization of diets, while emphasizing the importance of conducting training with employees who participate in the process.

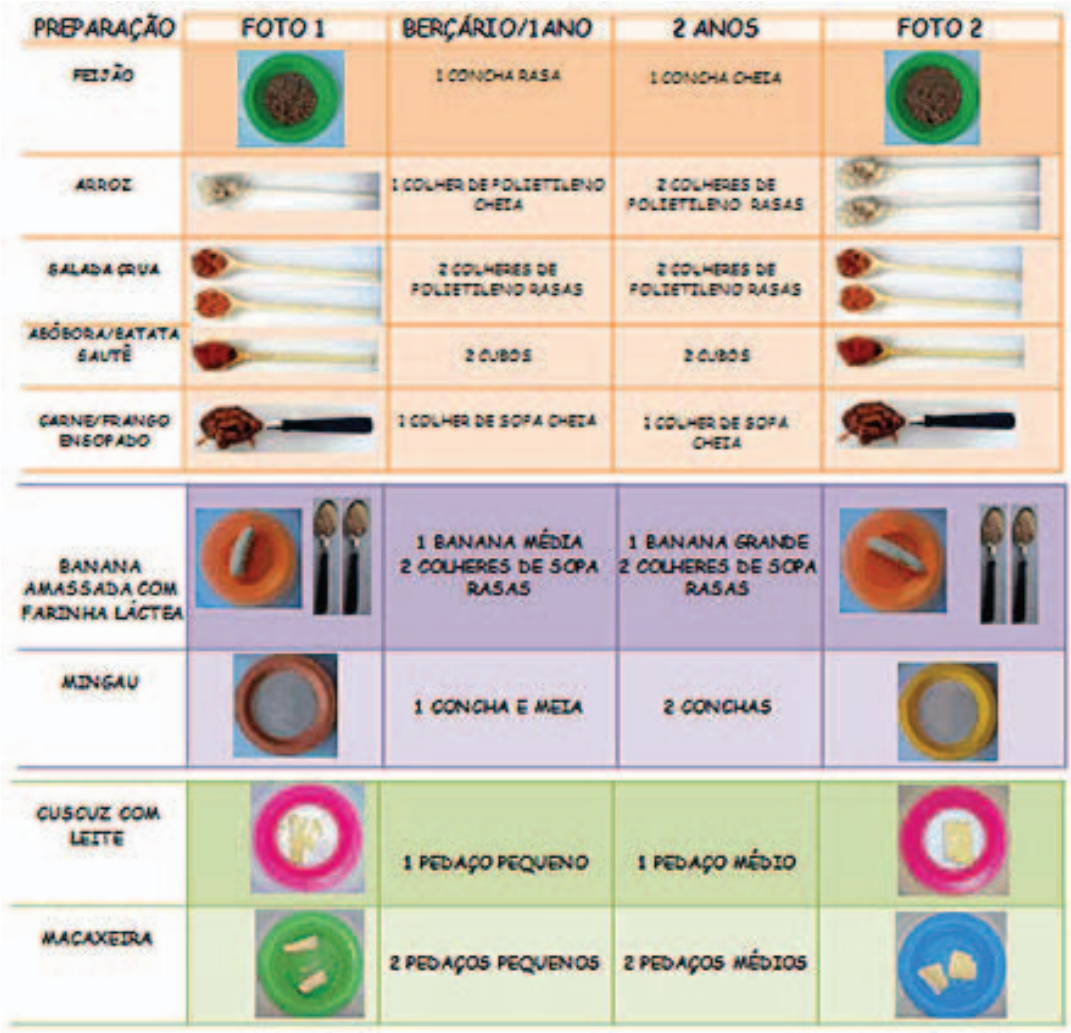

Figure 1. Partial image of the food portion charts served for lunch (orange color), snack (purple color) and dinner (green color)

In the present study, training on the use of the charts was conducted during a week with the workers, discussing how to use them, what is the purpose and importance of this instrument in cooks' daily lives. The proposal was to establish a dialogical relationship with the workers, so that learning was not based on imposition, but on motivated action.According to Freire,[9] real communication happens through dialogue where educator and learner are active and on the same level. Thus, we sought to "leverage previous knowledge acquired over the life of the subject in order to enhance learning, transforming the learner from education object to subject" according to the andragogical model.[23] To prepare the tables of this study, portion sizes were considered established based on the energy supply desired and on the literature guidelines for children aged seven months to three years. To facilitate understanding of the cooks, home measurements were described based on utensils used routinely in the center and on the discussion about the size of the portions between one author of this study and the cooks. The quantity of each portion was weighed and the choice of suitable home measurement was discussed with the cooks. According to the responses and discussions, cooking measurements were being defined in order to facilitate the work of the cooks, adjusting the size of the portions previously proposed, but seeking to meet the energy needs of children and avoid wasting food.After discussing the charts with the cooks, adjustments were made based on observations made by the workers, for example: the home measurement of bananas, proposed by the researchers, was identified by the cook as of difficult interpretation, because it claimed that it was difficult to differentiate a medium banana from a large banana. It was suggested by the cook that the home measurement not be described in size, but in unitary value, for example: ½ banana, 1 banana and 1 ½ banana. The role of the workers in this environment is crucial to the results, as it acts as the key point so that standardization is achieved. The involvement of the cooks in the selection of home measurements and discussion of the illustrative charts for portioning was essential to achieve results. The food and nutrition education is also key for this to occur, since they discuss the importance and usefulness of standardized portion sizes in an environment producing meals. Thus, the workers could understand the practical importance of the subject, recognizing the situation experienced in their workplace and being able to act for its transformation, both in relation to each child, and in relation to waste for the day care center as an institution.The menu planning is a fundamental step for the provision of healthy eating. However, it is necessary that the menu is executed as planned and that the portioning takes place properly. Only then one can ensure that the food offered in the day care center will fulfill its essential role in the development of children.

Conclusion

High levels leftovers-ingestion were observed before portioning standardization. After the introduction of this measure, the average leftover-ingestion percentages decreased by almost half. The data from step 1 demonstrate the dimension of the waste, since the scraps and leftovers accumulated could feed 30 children per day.The adequacy of energy supply was partially achieved from the standardization of portioning, but it was noted that there are other determinant factors so that the energy recommendations are met, e.g., planning the menu so as not to concentrate low energy density preparations in a single day. It was also observed that the peculiarities of the age treated in the study should be taken into consideration for the provision of adequate food, for example, the consistency of the preparations and the time interval between meals. The training experience of the workers was very enriching and crucial to the proposal.During the study, it was observed that the percentage of scraps increased in step 2 due to the reduced portion size. Some adjustments are suggested, such as the readjustment of the purchase order and implementation of data sheets to minimize food waste.Although this work involved only one day care center, some observations can be leveraged in other situations, being it necessary to adapt to each situation. Although it has been observed that the portioning alone does not solve the issues of adequate energy supply and waste control, its standardization is a tool that deserves attention, given its significant impact on these issues.Despite the limitations of this study, it was observed that the standardization of portioning is essential to ensure adequate supply of food to meet the needs of children and that such standardization can contribute to reducing food waste, which affects the volume of waste generated and the unit cost.

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