Assessment of dietary intakes and feeding practices in children aged 6–23 months in a town in the Northeast region of Argentina

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ABSTRACT

Introduction. An adequate quantity and quality of complementary feeding is essential during the first 2 years of life. The objective of this study was to assess dietary intakes and feeding practices in children aged 6–23 months in a town in the Northeast region of Argentina.

Population and methods. Descriptive, cross-sectional study (second semester of 2019). Intakes from 24-hour dietary recall interviews conducted among caregivers of children aged 6–23 months were assessed. Data were compared to dietary reference intakes. Feeding practices were assessed as per the World Health Organization's indicators.

Results. A total of 138 children aged 6–23 months were assessed. The mean adequacy ratio of energy and vitamins A, D, and E was below 100% for all ages, whereas the protein adequacy for children aged 7-12 and 13-23 months was 142.8% and 168.1%, respectively. A remarkable number of cases had energy and vitamin A intakes below the estimated average requirement. In relation to feeding practice indicators, 50.8% of infants received a minimum acceptable diet.

Conclusions. There is a high prevalence of an inadequate level of energy and critical nutrient intake during complementary feeding of the children aged 6–23 months included in the study. Nutritional interventions that promote feeding practices to improve micronutrient intake would be highly important for children's current and future health.

Key words: *nutritional needs, micronutrients, infant nutrition, nutritional epidemiology, Argentina.*

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INTRODUCTION

Early childhood is a period of rapid growth and vulnerability. During this stage, young children undergo major physiological changes, and consequently nutritional deficiencies are common due to the high nutrient and energy demands.[1-3] According to more recent data about the quality of complementary feeding and feeding practices worldwide, 2 out of 3 children aged 6–23 months do not receive even the necessary minimum diet to grow up healthy. According to the latest data from the United Nations International Children's Emergency Fund (UNICEF), the burden of micronutrient deficiency remains unresolved, especially in low- and middle-income countries, where nearly 400 million children suffer from vitamin and other essential nutrient deficiencies.[1] In these countries, complementary feeding practices are often untimely, unsafe, and deficient in adequate diversity, frequency, and quantity of foods and nutrients due to multiple factors like poverty, a poor maternal education, and limited access to food.[4,5]

To date, the latest available national data on nutritional intake in this age group are derived from the first National Survey on Nutrition and Health (Encuesta Nacional de Nutrición y Salud, ENNyS) conducted in 2004-2005, where the consumption of energy, fiber, vitamin C, vitamin A, calcium, and iron were highlighted as critical nutrients in the diet of children aged 6–23 months. In addition, the lowest mean nutrient intake levels were observed in the Northeast region

of Argentina (NEA) compared to the rest of the regions.[6] However, there is no updated information available at a national or regional level, which would be of utmost importance when promoting appropriate nutritional interventions.

The objective of this study was to assess nutrient intake and feeding practices in children aged 6–23 months in a town of the NEA.

POPULATION AND METHODS

Study design and sociodemographic characteristics of the study population

This was a descriptive, cross-sectional study conducted during the second semester of 2019. The population consisted of children aged 6–23 months covered by the mother and child plan (MCP), whose objective is to improve health care coverage and reduce maternal and pediatric morbidity and mortality in socio-economically vulnerable sectors in a public health care center located in Taco Pozo. This is a town in the province of Chaco where sociodemographic and geographic conditions are unfavorable. According to the National Statistics and Censuses Institute of Argentina (Instituto Nacional de Estadísticas y Censos, INDEC), 30.8% of households show an indicator of unmet basic needs; 9.4%, overcrowding conditions; and 33% have no access to the water supply network.[7]

The sample size was estimated considering an expected prevalence of timely complementary feeding of 50%, a 95% confidence level, a 5% accuracy level, a 10% non-response rate, and finite population correction, with an estimated sample of 180 participants. A convenience, non-probabilistic sampling was used. Children born at term were selected and those with acute and chronic conditions probably associated with an impaired nutritional status or who required specific feeding were excluded. Participants were asked about their sociodemographic characteristics such as sex, age, maternal status data, and about any guidance received regarding complementary feeding.

Assessment of dietary intake

Intake was assessed via 24-hour dietary recall (24HR) interviews using the multiple pass technique.[8-10] Data were collected by nutrition students during their professional practice rounds, and were trained and supervised by nutritionists. In 20% of the sample, the 24HR was repeated on 2 non-consecutive days to estimate usual intakes adjusting for intra-individual variations. Neither water consumption nor added salt intake were recorded. Portion sizes were estimated using visual aids of food and reference cookware.[11] The composition of some meals was standardized based on basic and regional recipes.[12,13] Subsequently, the net weights of each food were determined, considering the correction factor and the weight modification due to cooking in the case of cereals and legumes.[12] An average breast milk volume of 600 mL/day was estimated for breastfed infants, given that it was not possible to measure it.[14,15] Nutrient intake was mainly estimated based on the Argenfoods chemical composition table, supplementing the values of the nutrients absent in this table with other databases and/or labels of the packaged foods.[16-18]

Assessment of complementary feeding practices

Feeding practices were assessed using the indicators proposed by the World Health Organization (WHO): continuous breastfeeding at 1 year old, introduction of complementary foods, minimum dietary diversity (MDD) (≥ 4 food groups consumed in the previous day), minimum meal frequency (MMF) (minimum daily meals are 2 for breastfed children aged 6–8 months, 3 for children aged 9-23 months, and 4 for non-breastfed children), minimum acceptable diet (MAD) (proportion of children who received a MAD during the previous day and MMF), and consumption of iron-rich or iron-fortified foods.[19]

Statistical analysis

Usual intakes were estimated using the Multiple Source Method® software (version 1.0.1, 2020).[20] Results were compared to dietary reference intakes (DRIs) specific for each age, as established by the Institute of Medicine (IOM).[21,22] DRIs include estimated average requirements (EARs), dietary recommendations (DRs), and adequate intakes (AIs) for various nutrients. EARs were used for vitamin A, B12, and folates as established by the Food and Agriculture Organization of the United Nations (FAO) for children aged 6–12 months because the IOM does not provide an equivalent value.[23] DRs for energy are based on the calories necessary for total energy expenditure and growth.[24] Carbohydrate and fat intake was compared to acceptable

macronutrient distribution ranges (AMDRs) and fiber intake based on AI only for children aged 13–23 months.[21]

Nutrient adequacy was determined as the average percentage covered by DRs or AIs (the latter was used if the DR value for the specific nutrient was not available). In addition, the EAR cut-off point method was used to estimate the proportion of children whose intake does not meet nutrient requirements.[25] The energy distribution of macronutrients by age was also studied.

Stratified analyses for each age group (6 months, 7–12 months, and 13–23 months) were done. The Shapiro-Wilk test was used to corroborate the normality of nutrient distribution. The *t* test was used to determine a significant difference between the intake of each nutrient and the DR/AI value. The differences between age groups were assessed using the ANOVA or the Kruskal-Wallis test, depending on whether or not data had a normal distribution. Proportions were compared using the χ^2 test. Statistical analyses were performed with the STATA® software program, version 15.1.[26] A p value < 0.05 was considered statistically significant.

Ethical considerations

The research protocol was approved by the Research Bioethics Committee of Hospital 4 de junio "Dr. Ramón Carrillo" in the city of Presidencia Roque Sáenz Peña, Chaco (Res. 0038/21). Parents or legal guardians signed an informed consent.

RESULTS

Sociodemographic characteristics

The study included 138 children; of these, 50.7% were males. Most caregivers were the mothers of these children (98.5%), except for 2, whose main caregiver was the grandmother. Mothers' mean age (standard deviation, SD) was 27.8 years (8.5 years). Children's mean age (SD) was 12.9 months (4.4 months). The characteristics of the sample are presented in *Table 1*.

Dietary intake

The usual energy and nutrient intake by age group is described in *Tables 2*, *3*, and *4*. The mean intake of calories, fat, vitamins A, D, and E in the study subjects at 6 months old was significantly lower than the DRs/AIs. In the group of children aged 7-12 months old, the mean intake of iron, vitamins A, C, D, and E was significantly lower than the DRs/AIs. In the group of children aged 13–23 months, the mean intake of most nutrients was significantly lower than the DRs/AIs, except for proteins, vitamin A, vitamin C, thiamin, riboflavin, niacin, vitamin B12, phosphorus, zinc, and magnesium ($p > 0.05$). There were statistically significant differences among the age groups in terms of the proportion of children whose mean intake was below the EAR for iron ($p = 0.000$), folates ($p = 0.018$), and vitamin B12 ($p = 0.004$); such inadequate intakes are higher in the 6-month and 7–12-month old groups.

Percent contributions of macronutrients to total energy by age group are described in *Figure 1*. The mean average energy intake (SD) in children aged 6–23 months was 768.6 kcal/day (328.4 kcal/day); carbohydrates, proteins, and fat accounted for 50.7%, 11.4%, and 37.8% of calories, respectively. It was noted that the older the children, the higher the proportion of energy provided by proteins; however, no significant differences were observed in the proportion of calorie intake from carbohydrates and fat in terms of age. Animal proteins accounted for an average of 75.5% of protein intake in children aged 6–23 months; of this, 21% corresponded to meat/eggs, whereas most proteins (79.0%) corresponded to dairy.

Complementary feeding practices

It was observed that 70.3% of all children were currently continuing with breastfeeding. In 46.0% of children, complementary feeding was introduced at 6 months old, whereas in 28.3% and 25.7%, it was done before and after 6 months old, respectively. The median meal frequency was 4 meals a day on the day prior to the interview. *Table 5* shows the level of compliance with complementary feeding practices.

DISCUSSION

The number of children with inadequate energy intakes in this study was higher than the values observed in the ENNyS, the national reference study, in which 31.7% of children aged 6-23 months had energy intakes below their needs, a value that increased to 42.4% in the NEA.[6] As for proteins, the trend towards consumption above requirements has also been observed in other countries.[27,28] In our study, all age groups

TABLE 1. *Sociodemographic characteristics of study participants in Taco Pozo, Chaco, 2019 (n = 138)*

Parameters	% (n)
Age groups (months)	
6	7.3 (10)
7–12	38.4 (53)
13–23	54.3 (75)
Maternal marital status	
Single	46.4 (64)
Married	11.6 (16)
Cohabitating	40.6 (56)
Separated / divorced	1.4 (2)
Maximum level of maternal education	
None	12.4 (17)
Primary education	42.3 (58)
Secondary education	35.8 (49)
Tertiary / university education	9.5 (13)
Maternal occupation	
Unemployed	63.2 (86)
Student	14.0 (19)
Employee	12.5 (17)
Self-employed	10.3 (14)
Received guidance about complementary feeding	
From a family member	10.2 (14)
From a health care provider	24.8 (34)
On their own	5.8 (8)
Did not receive any information	59.1 (81)

TABLE 2. *Usual nutrient intake in children aged 6 months and comparison with dietary reference intakes (n = 10)*

	DRIs		Mean (95% CI)	Median (IQR)	% DR/AI	% < EAR
	DR/AI	EAR				
Energy (kcal)	682	[a]	516.7 (373.2–660.2)	519.3 (426.7–617.3)	75.8	70.0
Carbohydrates (g)	60[b]	-	62.6 (42.3–82.9)	59.4 (42.8–76.0)	104.3	-
Proteins (g)	9.1[b]	-	7.8 (5.9–9.8)	7.4 (5.6–9.7)	86.1	-
Fat (g)	31[b]	-	25.1 (18.6–31.5)	27.2 (27.3–29.2)	80.9	-
Fiber (g)	-	-	2.6 (1.2–3.9)	2.3 (1.6–3.5)	-	-
Vitamin A (μg RAE)	400[b]	180[c]	96.9 (47.0–146.8)	79.5 (41.3–154.1)	6.4	80.0
Vitamin C (mg)	40[b]	-	32.9 (19.8–45.9)	33.5 (26.7–49.4)	82.1	-
Vitamin D (μg)	10	-	1.3 (0.0–2.6)	0.6 (0.0–1.8)	5.2	-
Vitamin E (mg)	4[b]	-	1.1 (0.7–1.5)	1.1 (0.8–1.5)	27.6	-
Thiamin (mg)	0.2[b]	-	0.2 (0.2–0.3)	0.2 (0.1–0.3)	116.0	-
Riboflavin (mg)	0.3[b]	-	0.4 (0.3–0.5)	0.4 (0.3–0.4)	128.3	-
Niacin (mg NE)	2[b]	-	5.1 (3.5–6.7)	4.6 (3.7–6.3)	255.1	-
Folates (μg)	65	65[c]	54.9 (24.6–85.3)	43.7 (23.5–104.8)	84.5	70.0
Vitamin B_{12} (μg)	0.4	0.32[c]	0.5 (0.4–0.7)	0.4 (0.3–0.8)	128.9	40.0
Sodium (mg)	120[b]	-	150.9 (89.3–212.5)	117.7 (107.9–175.7)	125.7	-
Potassium (mg)	400[b]	-	557.3 (353.0–761.6)	481.7 (406.7–661.1)	139.3	-
Phosphorus (mg)	100[b]	-	183.7 (143.3–224.1)	170.8 (151.9–226.4)	183.7	-
Calcium (mg)	200[b]	-	237.8 (193.0–282.5)	219.9 (202.1–252.7)	118.9	-
Iron (mg)	0.27[b]	-	1.2 (0.6–1.8)	0.9 (0.7–1.5)	428.1	-
Zinc (mg)	2[b]	-	1.7 (0.9–2.6)	1.6 (0.8–2.3)	86.5	-
Magnesium (mg)	30[b]	-	31.5 (18.0–45.1)	29.9 (22.1–42.4)	105.1	-

DRIs: dietary reference intakes; DR: dietary recommendation; AI: adequate intake; EAR: estimated average requirement; CI: confidence interval for the mean; IQR: interquartile range; % DR/AI: percentage of average adequacy of mean intake to DR/AI; % < EAR: percentage of cases whose mean intake is below the EAR; RAE: retinol activity equivalent; NE: niacin equivalent.

[a] Estimated energy requirement (EER) by age and sex.

[b] Values corresponding to AI.

[c] EAR value established by FAO 2001.

exceeded the current recommendation, which establishes an intake of 50% of high biological value protein for children aged 6–12 months and 20-40% for children older than 1 year.[29]

When complementary feeding is initiated, the intake of some micronutrients may be insufficient, increasing the risk for deficiencies.[3] Vitamin A and D deficiencies are global health problems, and data similar to that observed in this study have been reported for infants in Latin America, Europe, and Africa.[30-33] Vitamin E deficiency is rare in adults, but frequent in children, probably because they have limited reserves and grow rapidly.[34] In relation to iron, the data obtained differ from the results of the ENNyS, where only 18.9% of children aged 6–23 months in Argentina had intakes below the EAR.[6] Meeting the iron requirements of young children is critical for an optimal functioning, including cognition and immunity.[35] In our study, just over 50% of the children consumed iron-rich or iron-fortified foods, so it is necessary to conduct more in-depth investigations to establish the factors associated with low intakes and bioavailability. It is worth taking into account that this study did not analyze the contributions from supplements administered routinely that would ensure the coverage of daily needs, thus avoiding outliers in nutrient distribution because only 8.2% of interviewed participants consumed such supplements.

TABLE 3. *Usual nutrient intake in children aged 7–12 months and comparison with dietary reference intakes (n = 53)*

	DRIs		Mean (95% CI)	Median (IQR)	% DR/AI	% < EAR
	DR/AI	EAR				
Energy (kcal)	756	[a]	708.4 (626.3–790.6)	613.1 (468.8–973.1)	93.7	52.8
Carbohydrates (g)	95[b]	-	90.0 (78.5–101.5)	81.1 (53.7–125.2)	94.8	-
Carbohydrates (% kcal)	AMDRs: 45–65[c]		50.6 (48.4–52.7)	49.9 (45.4–53.9)	-	35.7[e]
Proteins (g)	11	1 g/kg	15.7 (13.1–18.3)	12.5 (8.8–20.9)	142.8	30.2
Fat (g)	30[b]	-	30.4 (27.2–33.7)	29.3 (25.5–39.8)	101.4	-
Fat (% kcal)	AMDRs: 30–40[c]		39.0 (36.3–41.7)	39.7 (34.6–44.4)	-	14.3[e]
Fiber (g)	-	-	3.0 (2.5–3.5)	3.1 (1.8–4.1)	-	-
Vitamin A (μg RAE)	500[b]	400[d]	211.3 (153.2–269.3)	173.5 (52.4–286.1)	22.6	50.9
Vitamin C (mg)		-	30.2 (26.6–33.7)	30.6 (27.4–37.5)	60.3	-
Vitamin D (μg)	10	-	2.3 (1.5–3.2)	1.5 (0.2–3.0)	23.4	-
Vitamin E (mg)	5[b]	-	1.9 (1.6–2.2)	2.0 (1.5–2.6)	38.2	-
Thiamin (mg)	0.3[b]	-	0.4 (0.3–0.5)	0.4 (0.2–0.5)	133.0	-
Riboflavin (mg)	0.4[b]	-	0.8 (0.6–1.0)	0.6 (0.3–1.0)	201.4	-
Niacin (mg NE)	4[b]	-	7.5 (6.6–8.4)	7.0 (5.0–9.1)	187.3	-
Folates (μg)	80[b]		86.4 (70.4–102.4)	81.9 (48.1–126.7)	108.0	32.1
Vitamin B_{12} (μg)	0.5[b]	0.32[d]	1.4 (0.9–1.8)	1.0 (0.2–1.7)	277.7	3.8
Sodium (mg)	370[b]	-	404.9 (172.4–637.4)	211.8 (107.8–345.9)	109.4	-
Potassium (mg)	700[b]	-	834.3 (702.5–966.1)	731.7 (494.6–1069.4)	119.2	-
Phosphorus (mg)	275[b]	-	368.4 (288.0–448.8)	314.9 (174.9–517.1)	134.0	-
Calcium (mg)	260[b]	-	401.2 (317.6–484.8)	361.6 (219.8–491.9)	154.3	-
Iron (mg)	11	6.9	2.5 (1.6–3.3)	2.0 (1.2–2.6)	19.3	96.2
Zinc (mg)	3	2.5	2.8 (2.3–3.4)	2.6 (1.4–4.1)	94.8	43.4
Magnesium (mg)	75[b]	-	57.5 (45.7–69.4)	49.2 (28.9–95.7)	76.7	-

DRIs: dietary reference intakes; DR: dietary recommendation; AI: adequate intake; EAR: estimated average requirement; CI: confidence interval for the mean; IQR: interquartile range; % DR/AI: percentage of average adequacy of mean intake to DR/AI; % < EAR: percentage of cases whose mean intake is below the EAR; RAE: retinol activity equivalent; NE: niacin equivalent; AMDRs: acceptable macronutrient distribution ranges.

[a] Estimated energy requirement (EER) by age and sex.

[b] Values corresponding to AI.

[c] Estimated for children aged 12 months.

[d] EAR value established by FAO 2001.

[e] % < AMDR: determined as intake below the lower limit of AMDR.

TABLE 4. *Usual nutrient intake in children aged 13–23 months and comparison with dietary reference intakes (n = 75)*

	DRIs		Mean (95% CI)	Median (IQR)	% DR/AI	% < EAR
	DR/AI	EAR				
Energy (kcal)	1092	[a]	844.7 (766.6–922.8)	819.8 (611.1–1091.9)	77.4	50.7
Carbohydrates (g)	130	100	109.3 (98.3–120.4)	111.9 (69.7–134.7)	84.1	44.0
Carbohydrates (% kcal)	AMDRs: 45–65		52.0 (49.6–54.5)	49.4 (45.9–57.0)	-	22.7[c]
Proteins (g)[b]	13	0.87 g/kg	21.8 (19.0–24.7)	19.6 (12.8–29.5)	168.1	14.7
Fat (g)	-	-	33.7 (30.3–37.2)	33.2 (25.4–39.8)	-	-
Fat (% kcal)	AMDRs: 30–40		36.4 (33.9–38.9)	37.9 (30.1–44.6)	-	24.0[c]
Fiber (g)	19[b]	-	4.1 (3.6–4.6)	4.1 (2.8–5.4)	21.6	-
Vitamin A (µg RAE)	300[b]	210	340.8 (263.5–418.1)	246.3 (99.5–426.4)	35.4	48.0
Vitamin C (mg)	15	13	36.4 (31.2–41.5)	32.9 (27.4–43.9)	242.4	9.3
Vitamin D (µg)	15	10	4.0 (2.8–5.2)	2.2 (0.7–5.0)	25.2	90.7
Vitamin E (mg)	6	5	2.2 (1.8–2.6)	1.9 (0.9–2.9)	36.6	92.0
Thiamin (mg)	0.5	0.4	0.5 (0.4–0.5)	0.4 (0.3–0.6)	97.2	33.3
Riboflavin (mg)	0.5	0.4	1.0 (0.8–1.2)	0.7 (0.5–1.2)	200.1	16.0
Niacin (mg NE)	6	5	10.3 (9.2–11.3)	9.4 (7.0–12.8)	171.0	14.7
Folates (µg)	150	120	119.3 (102.1–136.6)	116.4 (62.7–159.1)	79.5	53.3
Vitamin B_{12} (µg)	0.9	0.7	2.2 (1.7–2.6)	1.5 (0.9–2.8)	240.4	17.3
Sodium (mg)	1000[b]	-	460.2 (300.0–620.3)	307.2 (192.9–535.2)	46.0	-
Potassium (mg)	3000[b]	-	1132.4 (970.7–1294.1)	1051.6 (609.7–1529.9)	37.7	-
Phosphorus (mg)	460	380	509.5 (424.1–594.8)	420.8 (238.7–738.9)	110.8	45.3
Calcium (mg)	700	500	501.5 (415.2–587.8)	386.2 (243.6–597.2)	71.6	66.7
Iron (mg)	7	3	3.2 (2.4–3.9)	2.6 (1.7–3.9)	45.2	60.0
Zinc (mg)	3	2.5	4.0 (3.3–4.7)	3.6 (1.7–5.6)	133.8	37.3
Magnesium (mg)	80[b]	65	86.6 (72.5–100.8)	74.4 (39.5–128.5)	108.3	40.0

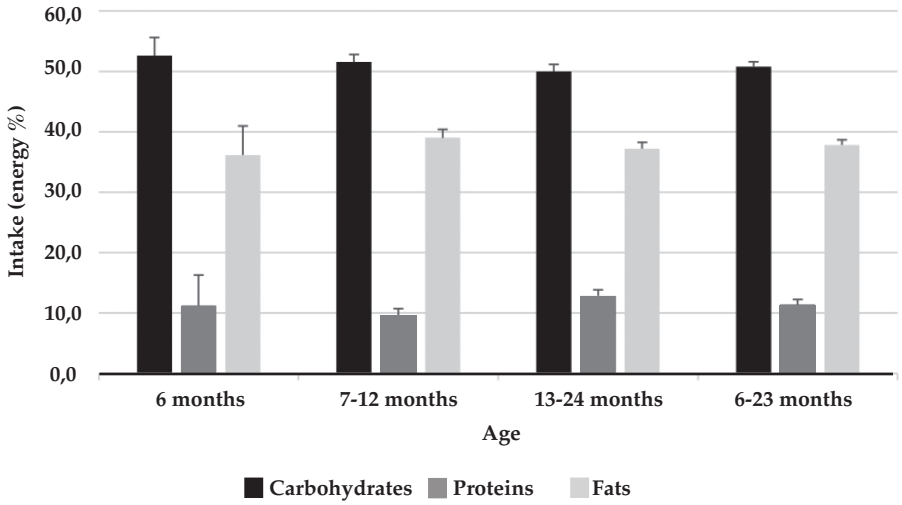
DRIs: dietary reference intakes; DR: dietary recommendation; AI: adequate intake; EAR: estimated average requirement; CI: confidence interval for the mean; IQR: interquartile range; % DR/AI: percentage of average adequacy of mean intake to DR/AI; % < EAR: percentage of cases whose mean intake is below the EAR; RAE: retinol activity equivalent; NE: niacin equivalent; AMDRs: acceptable macronutrient distribution ranges.

[a] Estimated energy requirement (EER) by age.

[b] Values corresponding to AI.

[c] % < AMDR: determined as intake below the lower limit of AMDR.

FIGURE 1. *Energy intake from macronutrients by age group in the population of Taco Pozo, Chaco, 2019 (mean ± standard error)*



More than half of the children were shown to meet a MDD, an indicator of micronutrient density, and although most of the children received a MMF, the prevalence is lower than that observed in other studies.[33,36] Meal frequency is an indirect indicator of calorie intake from complementary foods, which may explain the low energy adequacy.[19] The MAD was slightly lower than that observed in another study conducted at a national level, but higher than the findings in other countries.[33,36-38] This last indicator provides a useful way of assessing both the quantity and quality of young children's diets, as it considers multiple dimensions of feeding.[19]

Some of the relevant aspects of this study are the use of an interview technique that aims to minimize recall biases and that intakes were collected twice in a sub-sample to account for daily intake variation.[9,10]

The limitations of the study include its cross-sectional nature, which did not allow seasonal variation in consumption to be taken into account, and the non-probabilistic sampling without stratifying by age group for the calculation of the sample size. Although the optimal method for this type of study is random sampling to ensure representativeness and avoid a selection bias, its design was chosen because of the difficulty of contacting participants in any other way, given that the sample was restricted to a population with low economic resources attending the public health system; therefore, results should be assessed in this context. In addition, the planned sample size was not reached due to the health emergency situation caused by the coronavirus disease 2019 (COVID-19). Although caregivers can be reliable reporters of children's food intake, with the 24HR method there may be errors in respondents' recall lapses, as well as incorrect estimation of portion sizes consumed.[39] However, to reduce the error of omission, visual models and household cookware were used to assist in the estimation of portions.

The study is expected to be extended in the future to include the possible relationship between nutritional intakes, feeding practices, and sociodemographic characteristics, in order to identify risk factors and propose timely interventions.

CONCLUSION

This study demonstrated that the intake of energy and several nutrients is below the recommendations, including vitamins A, D, and E, iron, and calcium; however, it showed an over-adequacy for protein intake among children older than 6 months. In addition, a remarkable proportion of cases does not comply with the indicators for complementary feeding practices. This indicates that interventions are required to improve feeding in infants and toddlers in this town in the NEA. ■

REFERENCES

1. United Nations Children's Fund. Nutrition, for Every Child: UNICEF Nutrition Strategy 2020-2030. New York: UNICEF; 2020.
2. Victora CG, Christian P, Vidaletti LP, Gatica-Domínguez G, et al. Revisiting maternal and child undernutrition in low-income and middle-income countries: variable progress towards an unfinished agenda. *Lancet*. 2021; 397(10282):1388-99.
3. World Health Organization. Infant and young child feeding. Model Chapter for textbooks for medical students and allied health professionals. Geneva: WHO; 2009.

TABLE 5. *Compliance with complementary feeding practices according to the World Health Organization's indicators (n = 138)*

Indicator	n	% (95% CI)
Continued breastfeeding at 1 year old[a]	38	77.5 (63.4–88.2)
Introduction of complementary foods[b]	25	89.3 (71.8–97.7)
MDD	85	61.6 (52.9–69.7)
MMF	96	69.6 (61.2–77.1)
MAD	65	50.8 (41.8–59.7)
Consumption of iron-rich or iron-fortified foods	78	56.5 (47.8–64.9)

CI: confidence interval for the ratio; MDD: minimum dietary diversity; MMF: minimum meal frequency; MAD: minimum acceptable diet.

[a] For children aged 12–15 months.

[b] For children aged 6–8 months.

4. Daelmans B, Ferguson E, Lutter CK, Singh N, et al. Designing appropriate complementary feeding recommendations: tools for programmatic action. *Matern Child Nutr*. 2013; 9(Suppl 2):116-30.
5. Zezza A, Tasciotti L. Urban agriculture, poverty, and food security: Empirical evidence from a sample of developing countries. *Food Policy*. 2010; 35(4):265-73.
6. Argentina. Ministerio de Salud. Encuesta Nacional de Nutrición y Salud: Documento de resultados. Buenos Aires: Ministerio de Salud; 2007.
7. Instituto Nacional de Estadísticas y Censos. Censo Nacional de Población, Hogares y Viviendas 2010. Base de datos REDATAM. Argentina, 2010. [Accessed on: July 16th, 2021]. Available at: https://redatam.indec.gob.ar/argbin/RpWebEngine.exe/PortalAction?&MODE=MAIN&BASE=CPV2010A&MAIN=WebServerMain.inl&_ga=2.59343589.950624587.1626440426-1419892933.1626440426
8. Organización Panamericana de la Salud; Fondo de las Naciones Unidas para la Infancia. ProPAN: Proceso para la Promoción de la Alimentación del Niño: Manual de Trabajo de Campo. Washington, DC: OPS; 2013.
9. Gibson RS, Charrondiere UR, Bell W. Measurement errors in dietary assessment using self-reported 24-hour recalls in low-income countries and strategies for their prevention. *Adv Nutr*. 2017; 8(6):980-91.
10. Steinfeldt L, Anand J, Murayi T. Food reporting patterns in the USDA Automated Multiple-Pass Method. *Procedia Food Sci.* 2013; 2:145-56.
11. López LB, Poy MS, Barreto L. Atlas fotográfico de alimentos: una propuesta para contextos educativos. Castelar: Laura Beatriz López; 2019.
12. Suárez MM, López LB. Alimentación saludable: guía práctica para su realización. Buenos Aires: Hipocrático; 2012.
13. Argentina. Ministerio de Salud. Implementación ENNyS 2004 2005. Anexo 14: Manual del encuestador. Buenos Aires: Ministerio de Salud; 2004.
14. European Food Safety Authority. Panel on Dietetic Products, Nutrition and Allergies (NDA). Scientific Opinion on the appropriate age for introduction of complementary feeding of infants. *EFSA Journal*. 2009; 7(12):1423.
15. Butte NF, Fox MK, Briefel RR, Siega-Riz AM, et al. Nutrient intakes of US infants, toddlers, and preschoolers meet or exceed Dietary Reference Intakes. *J Am Diet Assoc*. 2010; 110(Supll 12):S27-37.
16. Universidad Nacional de Lujan. ARGENFOODS. Tabla de composición de alimentos. Argentina, 2010. [Accessed on: May 23rd, 2020]. Available at: http://www.argenfoods.unlu.edu.ar/Tablas/Tabla.htm
17. U.S. Department of Agriculture, Agricultural Research Service. Food Data Central. 2019. [Accessed on: May 23rd, 2020]. Available at: https://fdc.nal.usda.gov/ndb
18. Argentina. Ministerio de Salud. Dirección Nacional de Salud Materno Infantil. Software SARA. Sistema de Análisis y Registro de Alimentos. Versión 1.2.12. 2014.
19. World Health Organization. Indicators for assessing Infant and young child feeding practices part 2: measurement. Geneva: WHO; 2010.
20. Department of Epidemiology of the German Institute of Human Nutrition Postdam-Rehbrucke (DIfE). The Multiple Source Method (MSM). 2020. [Accessed on: September 2nd, 2020]. Available at: https://msm.dife.de/
21. Institute of Medicine. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. Washington, DC: National Academies Press; 2005.
22. Institute of Medicine. Dietary Reference Intakes for Calcium and Vitamin D. Washington, DC: National Academies Press; 2011.
23. Food and Agricultural Organization/World Health Organization. Human Vitamin and Mineral Requirements. Report of a joint FAO/WHO expert consultation. Bangkok: Food and Nutrition Division; 2001.
24. Butte NF. Energy Requirements of Infants, Children and Adolescents. In Berthold K, ed. Pediatric nutrition in practice. 2nd ed. Basel: Karger; 2015.p.34-40.
25. Institute of Medicine. Dietary Reference Intakes: Applications in Dietary Assessment. Washington, DC: Institute of Medicine; 2000.
26. StataCorp. Stata Statistical Software. College Station, TX: StataCorp LLC; 2018.
27. Osendarp S, Broersen B, van Liere M, De-Regil L, et al. Complementary Feeding Diets Made of Local Foods Can Be Optimized, but Additional Interventions Will Be Needed to Meet Iron and Zinc Requirements in 6- to 23-Month-Old Children in Low- and Middle-Income Countries. *Food Nutr Bull*. 2016; 37(4):544-70.
28. Damianidi L, Gruszfeld D, Verduci E, Vecchi F, et al. Protein intakes and their nutritional sources during the first 2 years of life: secondary data evaluation from the European Childhood Obesity Project. *Eur J Clin Nutr*. 2016; 70(11):1291-7.
29. González Hernández N, López Robles GA, Prado López LM. Importancia de la nutrición: primeros 1,000 días de vida. *Acta Pediatr Hondu*. 2016; 7(1):597-607.
30. Jiménez-Aguilar A, González Castell D, Flores-Aldana M, Mundo-Rosas V, et al. Dietary intake and adequacy in Mexican preschool children: National Health and Nutrition Survey 2012. *Nutr Hosp*. 2018; 35(5):1186-94.
31. Brito A, Cori H, Olivares M, Mujica M, et al. Less than adequate vitamin D status and Intake in Latin America and the Caribbean: A problem of unknown magnitude. *Food Nutr Bull*. 2013; 34(1):52-64.
32. Zaragoza-Jordana M, Closa-Monasterolo R, Luque V, Ferré N, et al. Micronutrient intake adequacy in children from birth to 8 years. Data from the Childhood Obesity Project. *Clin Nutr*. 2018; 37(2):630-7.
33. Feyisa B, Tefera G, Endris B, Asayehu T, Gebreyesus S. Feeding practice, energy, and nutrient intake adequacy among children aged 6–23 months in Southern Ethiopia: a community based cross-sectional study. *Food Sci Nutr*. 2020; 8(12):6680-90.
34. Traber M. Vitamin E inadequacy in humans: causes and consequences. *Adv Nutr*. 2014; 5(5):503-14.
35. Ahluwalia N, Herrick K, Rossen L, Rhodes D, et al. Usual nutrient intakes of US infants and toddlers generally meet or exceed Dietary Reference Intakes: findings from NHANES 2009–2012. *Am J Clin Nutr*. 2016; 104(4):1167-74.
36. Zapata M, Fortino J, Palmucci C, Padrós S, et al. Diferencias en las prácticas de lactancia materna y alimentación complementaria, según los indicadores básicos propuestos por la OMS, en niños con diferentes condiciones sociodemográficas de Rosario, Argentina. *Diaeta.* 2015; 33(150):12-20.
37. Dafursa K, Gebremedhin S. Dietary Diversity among Children Aged 6–23 Months in Aleta Wondo District, Southern Ethiopia. *J Nutr Metab*. 2019; 2019:2869424.
38. Mekonnen T, Workie S, Yimer T, Mersha W. Meal frequency and dietary diversity feeding practices among children 6–23 months of age in Wolaita Sodo town, Southern Ethiopia. *J Health Popul Nutr*. 2017; 36(1):18.
39. Rangan A, Allman-Farinelli M, Donohoe E, Gill T. Misreporting of energy intake in the 2007 A ustralian Children's Survey: differences in the reporting of food types between plausible, under- and over-reporters of energy intake. *J Hum Nutr Diet*. 2014; 27(5):450-8.