Nutrire (2021) 46: 17
https://doi.org/10.1186/s41110-021-00146-4

RESEARCH

Socioeconomic factors related to food consumption and the condition of food and nutrition insecurity in preschoolers

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Received: 26 April 2021 / Accepted: 22 October 2021 / Published online: 24 November 2021

Abstract

Objectives Assess the nutritional status of children attending Municipal Centers for Early Childhood Education (CMEIs, in Portuguese) in Lavras-MG, using anthropometric data, food consumption, and food and nutrition insecurity, identifying the main factors that may be associated with the investigated outcomes.

Methodology This is a cross-sectional study, conducted with 581 children aged 0 to 5 years and 11 months, in which anthropometric conditions, food consumption, and food and nutrition insecurity were investigated. Logistic regression models were used to study the association among several variables and the outcomes (food consumption and food insecurity). Variables were selected through lasso and the model effects were interpreted in terms of odds ratio.

Results According to the anthropometric profile, it was observed that 23.6% of the children were of low stature, 8.3% of high weight, 22.7% were overweight, and 8.8% were obese, according to the H/A, W/H, and BMI/A indicators, respectively. The mean value of the School Feeding Index (ALES) was found to be 6.2 (SD = 4.5). It can be observed that 32.0% of children consume low quality food, 15.8% medium quality, and 52.2% good quality. Food insecurity index was 43.2%; 185 children (35.3%) have mild insecurity; 26 children (5.0%) have moderate insecurity and 15 children (2.9%) have severe insecurity. Through the logistic models, we found that food insecurity and inadequate food consumption are mainly associated with the economic situation of the family.

Conclusion A relevant portion of the children in this study suffer from food insecurity and inadequate food consumption, and these are related to the family's socioeconomic level, demonstrating the need for educational and preventive interventions.

Keywords Health promotion · Child nutrition · Nutritional vigilance · Eating behavior

Introduction

Childhood is considered a period of development of human potentialities, in which children are exposed to several determinants of morbidity and mortality that are due, mostly, to external conditions such as environmental, basic sanitation, socioeconomic, housing, access to food, hygiene, and the availability of health services [1]. In this phase, rapid developmental changes occur in the several systems of the body (brain and nervous) due to their plasticity [2, 3].

During childhood, many children remain for long periods in schools or daycare centers, which have a relevant impact on these processes and, consequently, on the lives of these individuals. Daycare centers have become a significant institutional necessity for the population, depriving them of their intrinsic welfare character, as a consequence

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of the socioeconomic transformations that society has been undergoing [4]. Thus, in addition to the educational aspect, schools have been concerned with the health aspect, becoming an important scenario for the integral development of children [5]. In this sense, it is emphasized that early childhood education has a direct and favorable impact on children's quality of life, as well as in their subsequent years, through the provided services, which include adequate food and nutrition [6].

Healthy eating is one of the great responsibilities of day care centers. The guidelines of the National School Feeding Program (PNAE) guarantee children enrolled in day care centers access to healthy, balanced, nutritious, and tasty food that awakens the desire to try new foods, providing all the necessary and recommended nutrients, reducing the probability nutritional deficiencies, in addition to collaborating to maintain the individual's adequate nutritional status [7–9], thus aiming at the integral development, promotion, and protection of the child's health [10].

Schools could contribute to data feedback from national and international health organizations that advocate the monitoring of growth and development as a routine activity in child health care, in order to prevent nutritional problems. Recently, a resolution was passed by the World Health Assembly on a comprehensive maternal and child nutrition plan to be fulfilled by 2025, including a 40% reduction in the number of children under 5 years of age with stunted growth and an increase in the rate of exclusive breastfeeding in the first 6 months by at least 50% [11, 12].

The monitoring of the nutritional status of children who attend institutionalized spaces, as well as the frequent provision of information that characterizes the first years of life of this public, is considered decisive for an adequate growth and development, and may reduce the risks of morbidity and mortality and subsidize the formulation of strategies for the prevention and control of nutritional disorders that affect childhood, and can extend to adulthood [13, 14].

It is necessary to look beyond the health care of children only in clinical settings, focusing on the different socio-cultural and economic contexts of insertion of these subjects, especially those who are exposed to unfavorable socioeconomic conditions. For this, it is necessary, above all, to quickly identify all factors that may favor or threaten such expectation [15, 16]. In the socioeconomic sphere, the household factors related to the economic profile stand out, especially with regard to the possibility of access to healthy food and other factors that can be determinant in the health-disease process in the child population, highlighting family income, education, and access to health services as important indicators of food and nutritional insecurity [17].

Investing in the evaluation and monitoring of preschool health will subsidize the planning of health actions and services for child care and well-being, with a view to long-term benefits [18]. Thus, the objectives of this study were to assess the nutritional status, food consumption, and the situation of food and nutritional insecurity of children assisted in Municipal Centers for Early Childhood Education (CMEIs, in Portuguese) in Lavras-MG, in addition to identifying the main factors that may be associated with the investigated food and nutrition insecurity outcomes.

Methodology

This is an analytical, observational cross-sectional study developed in a probabilistic sampling by conglomerates of children from 6 months to 5 years old, from 15 CMEIs in the urban area of the municipality of Lavras, located in southern Minas Gerais.

This study was submitted to and approved by the Ethics Committee in Research with Human Beings at the Federal University of Lavras-UFLA, nº 80,841,917.0.0000.5148. Prior to data collection, authorization was requested from the Municipal Education and Health Secretariats. For authorization from the parents, the project was presented during meetings already held by the CEMEIs, where school topics were discussed. The children's guardians, after being informed about the objective of the study and its voluntary nature, were invited to sign a free and informed consent form.

Sampling

For the sample calculation, a 95% confidence level was considered, a prevalence of 50%, for unknown outcomes, and a sampling error of 5%. The final result was multiplied by a correction factor and design effect of two with 20% added for eventual losses, resulting in 704 children.

A multistage sampling was carried out. In the first step, it was considered the tertile of socioeconomic level. The socioeconomic conditions of the neighborhood, through a list obtained from the municipality's Department of Education, permitted classifying the childcare centers' socioeconomic level. So, the 15 municipal day care centers were grouped into three clusters: low, medium, and high social vulnerability. In the second step, a random selection was stratified by children's age on each cluster. This way, the sample was representative of the proportion of children assisted by each CMEI, according to age group and social vulnerability.

The exclusion criteria adopted were the presence of clinical signs of neurological impairment, not obtaining free and informed consent, or refusal to perform the exams, once they would be impedive in the study participation. At the end, a sample of 581 preschool children, aged between 6 months and 5 years of age, was obtained (Fig. 1).

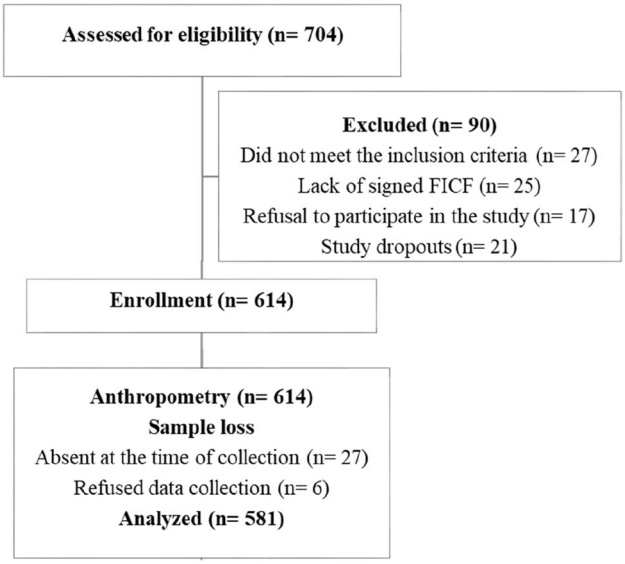

Fig. 1 Flowchart of the sampling and study design, according to TREND, 2004

Data collection

During data collection performed at the CMEIs by a previously trained nutritionist, anthropometric data was measured and socioeconomic data and questionnaires on nutritional conditions were collected. All the selected children received a semi-structured questionnaire to be answered by their parents, containing questions about socioeconomic status (monthly family income, number of people living in the household, parents' educational level, home and car ownership) [19], variables related to pregnancy and childbirth, adapted from the National Survey on Demography and Health of Children and Women [20], and variables related to dietary practices [21]. All variables collected in this study are shown in Table 1.

Information on eating habits was obtained from a food frequency questionnaire (FFQ) containing 19 items [22]. To assess food quality, an indicator was developed according to the frequency of consumption, proposed by Molina [23]. An indicator called School Feeding Index (ALES) was developed, based on the frequency of consumption of 19 food items. Each specific frequency of consumption was given a score (positive or negative), based on the guidelines for healthy eating recommended by the Ministry of Health, present in the Food Guide for the Brazilian Population [24]. The values of the individual frequencies were added and distributed in tertiles, constituting three categories of food quality: ≤ 3 low quality, between $3 \geq$ and < 6, intermediate quality and values ≥ 6 good quality.

The household food security situation was obtained through the Brazilian Food Insecurity Scale (EBIA, in Portuguese), proposed, and validated for Brazil [25]. Families were classified according to their food security situation into four categories: food security, mild food insecurity, moderate food insecurity, and severe food insecurity.

Anthropometric measures were obtained according to the techniques established by the World Health Organization (WHO) and the anthropometric references used in this study were weight/age (W/A), height/age (H/A), weight/height (W/H), and body mass index/age (BMI/A), measured in *Z*-score values, using the WHO Anthro software (2010) and classified according to the World Health Organization Growth Curves [26].

Data analysis

Logistic regression models were fitted to study the association between the investigated variables and the outcomes: food consumption (0 low or intermediate quality and 1 good quality) and EBIA (0 mild, moderate, or severe insecurity and 1 security). The variables that were part of the final models for EBIA were as follows: color/race; economic situation; parental education; and car. As for food consumption, the following were part of the final model: age; daily meals; and use of vitamins. As a first step, we pre-selected the variables from the questionnaire, taking into account the practical and clinical importance of each. As a result, 18 variables were selected for possible associations with EBIA and 36 for food consumption. Descriptive statistics for these variables are shown in Table 1.

The selection of the variables for the logistic models was made through the lasso procedure, proposed by Hastie, Tibshirani, and Friedman [27], through the glmnet package [28] of R program version 3.5.1 [29]. Once the most important variables were selected, the effects in logistic models were estimated using maximum likelihood. The models obtained for both outcomes are summarized in Table 2. The interpretation of the significant effects was carried out in terms of odds ratio, presented with respective confidence intervals. The significance level was set at 5%.

The adequacy of the models was evaluated by a diagnostic analysis that involved the study of normal plots with simulation envelopes [30] and the comparison between residual deviances and residual degrees of freedom.

Results

A total of 581 children were examined, 307 of whom were male (52.8%) and 75.9% of those evaluated between two and 5 years of age. A significant portion of the children belonged to families with a monthly family income between 1 and 3 minimum wages (90.3%). Regarding the education level of the parents, a higher rate of illiteracy

Table 1 Relative frequency of sociodemographic variables and child health, Lavras-MG, 2019

Children			Birth conditions			Child food and health		
Variable	*N*	(%)	Variable	*N*	(%)	Variable	*N*	(%)
Gender □			Prenatal care ■			Current exclusive breastfeeding □■		
Male	307	52.8	Yes	556	95.7	Yes	76	13.1
Female	274	47.2	No	13	2.2	No	476	81.9
			N/A	12	2.1	N/A	29	5.0
Age □■			**Planned pregnancy ■**			**Exclusive breastfeeding up to 6 months □■**		
Children under 6 months	2	0.4	Yes	269	46.3	Yes	331	57.0
Children from 6 to 11 months	24	4.1	No	297	51.1	No	211	36.3
Children from 12 to 23 months	114	19.6	N/A	15	2.6	N/A	39	6.7
Children from 24 to 35 months	164	28.2						
Children from 36 to 47 months	190	32.7	**Prenatal complications ■**			**Weaning □ ■**		
Children from 48 to 59 months	49	8.4	Yes	125	21.5	Still breastfed	21	3.6
Children from 60 to 71 months	37	6.4	No	436	75.0	Under 2 months	40	6.9
Children over 72 months	1	0.2	N/A	20	3.5	Between 2 and 6 months	98	16.9
						Over 6 months	147	25.3
						Between 1 and 2 years	108	18.6
						Over 2 years	43	7.4
						N/A	124	21.3
Color/race □			**High risk pregnancy ■**			**Use of artificial baby milk (brand name NAN) ■**		
White	201	34.6	Yes	103	17.7	Yes	233	40.1
Brown	210	36.2	No	460	79.2	No	330	56.8
Black	77	13.2	N/A	18	3.1	N/A	18	3.1
Yellow	1	0.2						
N/A	92	15.8						
Monthly family income □■			**Gestational age ■**			**Age of introduction to infant formulas ■**		
Up to 1 minimum wage	276	47.5	Preterm	104	17.9	Before 6 months	173	74.2
From 2 to 3 minimum wages	249	42.8	Term	399	68.7	After 6 months	60	25.8
From 4 to 5 minimum wages	31	5.3	Postterm	16	2.7			
From 5 to 9 minimum wages	12	2.2	N/A	62	10.7			
N/A	13	2.2						
Number of family members □■			**Place of delivery ■**			**Type/classification of the formulas ■**		
Up to 2 people	19	3.3	Hospital	567	97.6	Cow milk	13	5.6
3 people	167	28.7	Home	2	0.4	Infant formula	199	85.4
4 people	196	33.7	Other or N/A	12	2.0	Dietotherapy formulas	6	2.6
5 people	91	15.7				Soy based or semi-elementary	4	1.7
6 people	54	9.3				Others	11	4.7
Over 6 people	44	7.6						
N/A	10	1.7						
Degree of education/schooling			**Type of delivery ■**			**Home visits by the Family Health Team ■**		
Father □■/mother □■			Normal	232	39.9	Yes	111	19.1
Incomplete elementary	46/35	7.9/6.0	C-section	327	56.3	No	456	78.5
Incomplete junior high	74/49	13.4/8.4	Use of forceps	4	0.7	N/A	14	2.4
Incomplete high school	135/137	23.2/23.6	N/A	18	3.1			

Table 1 (continued)

Children			Birth conditions			Child food and health		
Variable	*N*	(%)	Variable	*N*	(%)	Variable	*N*	(%)
Complete high school and incomplete higher education	217/288	37.4/49.6	**Use of ICU/neonatal ICU ■**			**Food introduction □■**		
Complete higher education	44/67	7.6/11.5	Yes	53	9.1	Before 6 months	182	31.3
N/A	61/5	10.5/0.9	No	513	88.3	After 6 months	320	55.1
			N/A	15	2.6	N/A	79	13.6
Home occupancy regime □■			**Apgar test ■**			**Number of meals for the child during the day □■**		
House not in mortgage	151	26.0	0–3 (Reanimation)	2	0.4	1–3	64	11.1
House in mortgage	133	22.9	4–6 (Moderate asphyxia)	3	0.5	4–6	371	63.8
Provided by parents/relatives	86	14.8	7–10 (Normal vitality)	342	58.9	7–10	57	9.8
Provided in exchange for work	2	0.4	N/A	234	40.2	N/A	89	15.3
Rented	173	29.8						
Provided	34	5.7						
N/A	2	0.4						
Profession of head of the family □■			**Height at birth ■**			**Home visits by the Family Health Team ■**		
Grade I	5	0.9	Small for Gestational Age	24	4.1	Yes	111	19.1
Grade II	34	5.8	Adequate for Gestational Age	497	85.5	No	456	78.5
Grade III	84	14.4	Big for Gestational Age	20	3.5	N/A	14	2.4
Grade IV	209	36.0	N/A	40	6.9	**Follow-up with pediatrician ■**		
Grade V	182	31.5				Yes	440	75.7
N/A	67	11.4				No	120	20.6
						N/A	21	3.7
Car ownership □■			**Weight at birth □■**			**Severe illness or recurrent infection ■**		
None	262	45.1	Extremly underweight	1	0.2	Yes	54	9.3
Owns 1 car	271	46.6	Very underweight	6	1.0	No	505	86.9
Owns 2 or more cars	40	6.9	Underweight	48	8.3	N/A	22	3.8
N/A	8	1.4	Normal	467	80.4			
			Macrosomic	20	3.4			
			N/A	39	6.7			
Use of piped water (public network) □■			**Head circumference at birth ■**			**Time spent with the child ■**		
Yes	560	96.4	Head circumference below expected for age	38	6.5	Father/mother	422	72.6
No	6	1.0	Expected head circumference for age	370	63.7	Grandparents	96	16.5
N/A	15	2.6	Head circumference above expected for age	21	3.6	Minor siblings	16	2.8
			N/A	152	26.2	Others or N/A	47	8.1
Drinking water □■						**Up to date vaccination ■**		
Filtered	481	82.8				Yes	568	97.8
Boiled	8	1.4				No	5	0.9
Chlorinated	48	8.2				N/A	8	1.3
Mineral	26	4.5						
Untreated	14	2.4						
N/A	4	0.7						

□ variables used in the EBIA model ($n=18$); ■ variables used in the model for Food Consumption ($n=36$). *Source:* Research Data

Table 2 Estimates and Wald tests for the parameters of the logistic models, estimates of odds ratios (OR), and respective 95% confidence intervals, Lavras-MG, 2019

Variable	Estimate	Standard error	*p*-value	OR	$CI_{95\%}$ (OC)
EBIA (food security)					
Color/race (2)	−0.9074	0.4520	0.04469*	0.40359	(0.164; 0.973)
Color/race (3)	−0.5373	0.3547	0.12976	0.58431	(0.288; 1.166)
Economic situation (2)	1.6802	0.3533	< 0.0001***	5.36680	(2.720; 10.922)
Economic situation (3)	2.9181	0.8287	< 0.0001***	18.50621	(4.373; 130.169)
Paternal education (2)	−1.5922	0.7798	0.04118*	0.20348	(0.041; 0.911)
Paternal education (3)	−1.6691	0.7424	0.02457*	0.18841	(0.040; 0.786)
Paternal education (4)	−0.8877	0.7430	0.23218	0.41158	(0.088; 1.718)
Paternal education (5)	−1.4526	0.8953	0.10472	0.23397	(0.038; 1.326)
Car (2)	0.2508	0.3461	0.46854	1.28511	(0.646; 2.522)
Car (3)	1.1830	0.7423	0.11099	2.26412	(0.839; 16.647)
Food consumption (good quality)					
Age (2)	1.2131	1.5752	0.4412	3.36402	(0.108; 107.724)
Age (3)	−0.9652	1.2970	0.4568	0.38090	(0.016; 4.061)
Age (4)	−1.3687	1.2763	0.2835	0.25443	(0.011; 2.560)
Age (5)	−1.6887	1.4765	0.2527	0.18476	(0.006; 2.784)
Age (6)	−1.3653	1.6096	0.3963	0.25529	(0.007; 5.514)
Daily meals	0.4250	0.2366	0.0725	1.52955	(0.975; 2.498)
Use of vitamins (1)	1.2999	0.9084	0.1524	3.66901	(0.665; 26.215)

Color/Race (1): White†; Color/Race (2): Black; Color/Race (3): Brown; Economic situation (1): up to 1 minimum wage†; Economic situation (2): 2 to 3 minimum wages; Economic situation (3): more than 3 minimum wages. Paternal education (1): Incomplete elementary school†; Paternal education (2): incomplete high school; Paternal education (3): incomplete high school; Paternal education (4): incomplete high school and incomplete higher education; Paternal education (5): Complete higher education. Car (1): None†; Car (2): Own a car; Car (3): Own two or more cars. Age (1): from 0 to 11 months†; Age (2): from 12 to 23 months; Age (3): from 24 to 35 months; Age (4): from 36 to 47 months; Age (5): from 48 to 59 months; Age (6): over 60 months. Use of vitamins (1): He used vitamins for the first 2 years of his life; Use of vitamins (2): He did not use vitamins for the first two years of life†

***(0.001)

*(0.05)

†Reference variable

Source: research data

was observed among men than among women. Regarding the residence, a majority of families live in a rented or owned house. On the other hand, 46.6% of these children's families own at least one car.

It was observed that 51.1% of the studied population were born of an unplanned pregnancy. However, prenatal care was performed by 95.7% of the women and most children had normal parameters at birth.

The general data on children's food and health indicate that 57.0% had exclusive breastfeeding up to 6 months and 55.1% had food introduction after 6 months of age, with an average of 5 ± 2 meals/day. The use of baby artificial milk occurred with 40.1% of children and 74.2% of these children ($n = 233$) received this food before completing 6 months of age, with a predominance of infant formulas (85.4%).

The children's anthropometric profiles highlight the occurrence of 22.7% overweight, 8.8% obesity, 8.3% high weight, and 23.6% short stature, according to the BMI/A, W/H, and H/A indicators, respectively.

The average value of the ALES Index was found to be 6.2 (SD = 4.5), and minimum and maximum values equal to − 10 and 17, respectively. Most children, 275 (52.2%) were observed to have consumed good quality food, however, an significant number, 168 (32.0%), of low quality.

As for the data from the EBIA, most families were observed to be in a situation of food security (FS) with a percentage of 56.8%. However, a considerable percentage presented food insecurity at mild, moderate, and severe levels 35.3%, 5.0%, and 2.9%, respectively (Table 1).

Results of logistic models are shown in Table 2. The effects were considered statistically significant for *p*-values below 5%.

In this sample, among the variables associated with the condition of food and nutrition security, the chances of the black child being in the safety margin were observed in 0.403 times, in relation to white children. The economic situation can increase up to 5.366 and 18.506 times for those who receive 2 or 3, or more than 3 minimum wages,

respectively, in relation to families that receive up to 1 minimum wage. The chances of a child, whose paternal education is complete elementary school or high school, to have food security are 0.203 and 0.188, respectively, compared to those whose parents have incomplete elementary school. Regarding food consumption in this sample, no variable was statistically associated with the chances of having good quality food.

It can be noted that the models obtained for both food security and food consumption were well adjusted, as all points were within the range defined by the simulation envelopes. For the food consumption model, the residual deviance and residual degrees of freedom were 71.378 and 63, respectively; for the EBIA model, the residual deviance and residual degrees of freedom were 252.29 and 226, respectively. The proximity between these values for each model also indicates a good fit. In Fig. 2, the *y* axis presents the deviation components and the *x* axis the percentile of the normal, with a mean of 0 and variance of 1, showing that the models were well adjusted, as all points are within the range defined by the simulated envelope.

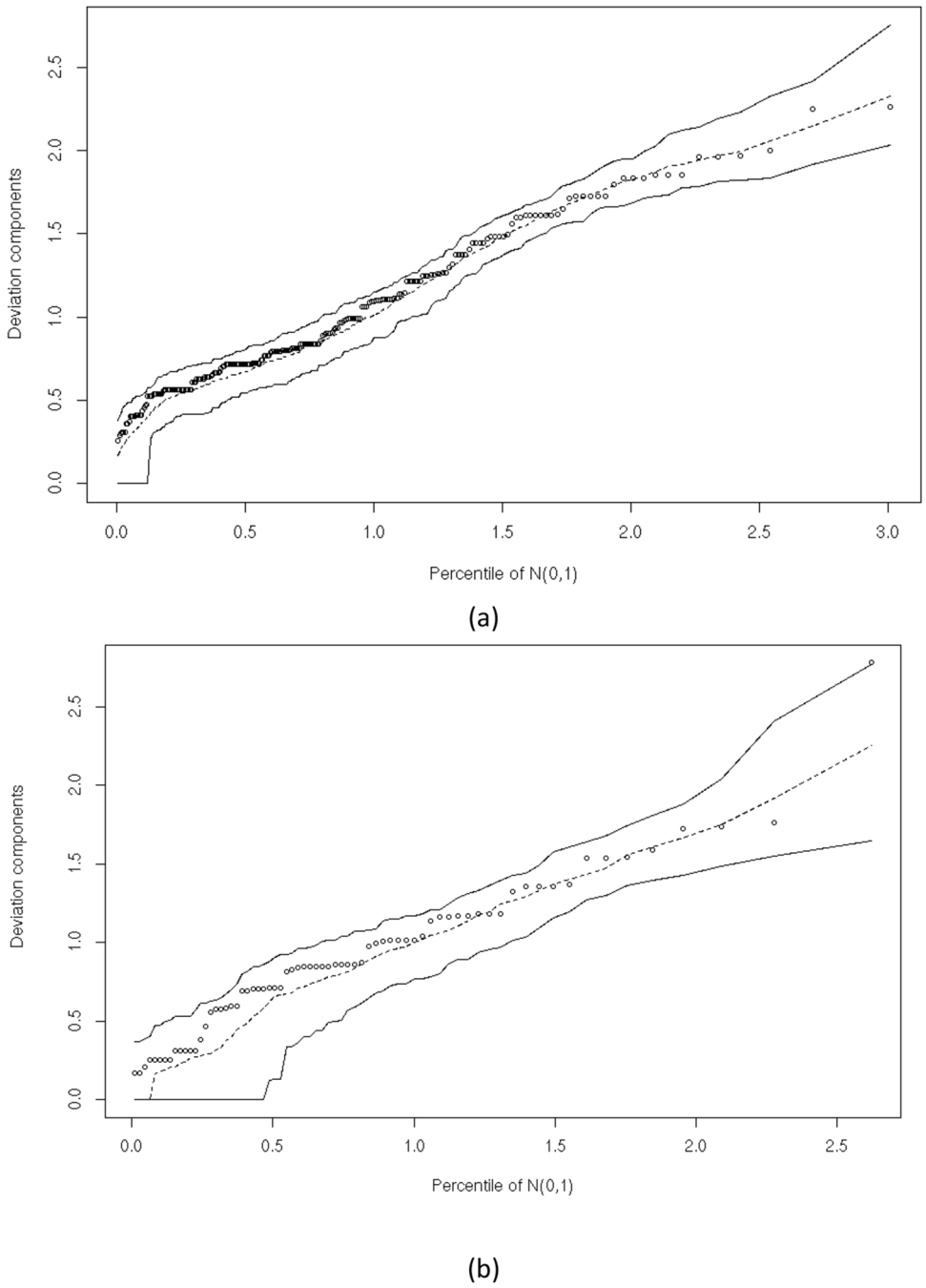

Fig. 2 Normal plots with simulation envelopes for diagnostics from the fitted models for EBIA (a) and food consumption (b)

Discussion

The assessment of nutritional status, especially among children and, especially, those at a young age, has become a fundamental aspect for the establishment of risk situations with a view to planning actions for health promotion and disease prevention [31, 32].

Considering the nutritional status of the evaluated children, the stature deficit was observed to be 23.6%. This indicator (H/A) may represent a possible condition of malnutrition or chronic malnutrition, reflected by the observed socioeconomic conditions [33]. The literature shows that the prevalence of chronic malnutrition can affect most of the child population in countries that have worse socioeconomic conditions [34, 35].

On the other hand, the prevalence of excess weight in the child population, in line with the nutritional transition, in our country and in other locations, in this study pronounced indices of excess weight is also demonstrated, mainly by the BMI/A of children, when compared to national data. Percentages of 22.7% overweight and 8.8% obesity were observed. This increase in weight has been highlighted in more disadvantaged socioeconomic classes, with poor diet as the central determinant of excess weight (95%), with only 5% corresponding to endogenous causes [36]. Such findings may be related to the fact that, often, cheaper foods can be highly caloric and have a low nutritional value [37].

Infant food consumption has been considered a decisive factor in the child's overall health, being the main source of energy density and micronutrient intake. Exclusive breastfeeding up to the first 6 months of life is documented as sufficient to supply these needs, offering the necessary nutrients for the child's growth and development. After 6 months, the introduction of complementary food should be properly oriented, in order to minimize the nutritional problems that may arise [38].

The global goal for the year 2025 is to reach at least 50% in the prevalence of exclusive breastfeeding up to the first 6 months of life [39]. The data in this study show that 57.0% of children had exclusive breastfeeding up to 6 months and that the food introduction of 55.1% of the sample occurred after 6 months, thus exceeding global expectations, but this can still be further increased through the dissemination of information and monitoring by health services, since the prevalence of exclusive breastfeeding in other countries can reach up to 77.6%, demonstrating that guaranteed access to breastfeeding assistance programs is able to further reduce the rates of early weaning in the population [40, 41].

Economic and social conditions, such as financial condition, parental education, and working conditions, are considered variables strongly associated with the consumption profile of families [42]. The quality of infant feeding comes from a series of behaviors and decisions, which can be taken throughout life, due to its various determinants, including the purchasing power and purchasing power of different food groups [43]. However, in this study, socioeconomic variables were not found associated with child food consumption, unlike the food and nutritional security condition, with the economic condition as its main predictor being emphasized.

The population of this study was constituted, in its majority (47.5%) by people with low socioeconomic status, when observing the family salary income of up to 1 minimum wage, where decisions about food choices, determinants of health conditions, are conditioned to the purchasing power of the families in which the child is inserted, on which the availability, quantity, and quality of the consumed food depend. The level of parental education, such as low paternal education, associated with the outcome of this study, is reported in the literature as a variable that directly influences the higher prevalence of consumption of processed and ultra-processed foods, since this condition is linked to the lack of access to information on health, price, and practicality can lead to the early introduction of processed foods [44, 45].

The food insecurity evaluation has the complementary character of assessing and monitoring social and nutritional vulnerability, objectively assessing the experience of hunger, or the concern of regularly having food, of Brazilian families [46]. The food and nutritional insecurity index found in this study is worrying, present in 43.2% of the sample, and of this percentage, 5.0% and 2.9% point to moderate and severe food insecurity, respectively, raising concern about the presence of hunger among the sample. The National Household Sample Survey, carried out in 2013, identified that 22.6% of families in Brazilian households live with some degree of food insecurity, with severe insecurity present in 4.8% of the population aged 0 to 4 years [47].

In this study, the economic situation of the family nucleus was associated with the risk of the child having food insecurity, clearly demonstrating that the deprivations and instability of access to food, from a qualitative and quantitative point of view, resulting from a social vulnerability, can result in serious consequences to the well-being and health of individuals [48, 49].

Financial scarcity can reduce the amount of food consumed by family members and the reduction in the number of daily meals, becoming an important predictor of food and nutritional insecurity. Thus, the family's decision is to consume cheaper food, so that the quantity is not compromised, inferring that the socioeconomic conditions of the families largely determine the food consumed by the child [50, 51].

In this context, daycare centers and schools can collaborate to improve the indicators of food insecurity (FI), since this can strongly stimulate the appearance of more nutritional disorders, impaired growth, and learning. The concept of food security emerged at the end of the First World War (1914–1918), and currently, in Brazil, it is defined as the right of all to permanent and regular access to quality food in sufficient quantity, without compromising access to other essential needs, based on health-promoting dietary practices that respect cultural diversity and that are environmentally, economically, and socially sustainable [52, 53]. The child group is considered to be the most vulnerable to food insecurity, since the nutritional consequences are immediate and serious, and there is a consonance between a poor diet and various undesirable outcomes in the different stages of life [54].

The drop in food insecurity, observed in Brazil in the period 2004–2013, was indicative of the advance of public policies on food and nutrition and the implementation of programs to fight hunger. Even with government and civil society actions acting in cooperation with the institutionalization of food and nutrition security policies and the reestablishment of the National Council for Food and Nutrition Security (CONSEA, in Portuguese), social inequalities still persist that culminate in this outcome, making access difficult feeding the most vulnerable Brazilian classes. Public policies that definitely included school spaces as scenarios for vigilance and implementation of nutritional programs could greatly contribute to this decline [55, 56].

The assessment of socioeconomic aspects has become essential for the establishment of risk situations with a view to planning health promotion and disease prevention actions. The results of this study point to the need for public actions aimed at food and nutrition, especially access to food, ensuring healthy and adequate food. Through the tests performed, the authors emphasize the extreme importance of identifying socioeconomic factors that predict food and nutritional insecurity, and also inadequate food consumption, in order to support public policies aimed at early childhood.

Abbreviations CMEIs: Municipal Centers for Early Childhood Education (in Portuguese); FFQ: Food frequency questionnaire; ALES: School Feeding Index; EBIA: Brazilian Food Insecurity Scale (in Portuguese); WHO: World Health Organization; W/A: Weight/age; H/A: Height/age; W/H: Weight/height; BMI/A: Body mass index/age; FI: Food insecurity; CONSEA: National Council for Food and Nutritional Security

Acknowledgements Municipal Education and Health Secretariats of Lavras-MG; Coordinators, to Coordination for the Improvement of Higher Education Personnel (CAPES); Minas Gerais State Research Support Foundation (FAPEMIG).

Author contribution LFPL: designed research, conducted research, analyzed data or performed statistical analysis, wrote paper. PRS: analyzed data or performed statistical analysis. IRCO: analyzed data or performed statistical analysis. FLAF: designed research, provided essential materials. PFD: provided essential materials. MMCG: designed research, provided essential materials. SMPD: designed research, conducted research, analyzed data or performed statistical analysis, wrote paper. All authors have read and approved the final manuscript.

Funding Coordination for the Improvement of Higher Education Personnel (CAPES).

Data availability (data transparency) Not applicable.

Code availability (software application or custom code) Not applicable.

Declarations

Ethics approval (include appropriate approvals or waivers) Ethics Committee in Research with Human Beings at the Federal University of Lavras-UFLA, nº 80841917.0.0000.5148.

Consent to participate (include appropriate consent statements) All participants consented to participate in the research and signed the Free and Informed Consent Form.

Consent for publication (consent statement regarding publishing an individual's data or image) All participants consented to provide their data and make it publishable, confidentially, in accordance with the Free and Informed Consent Form.

Conflict of interest The authors declare no competing interests.

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