



Revista da Escola de Enfermagem da USP

ISSN: 0080-6234

reeusp@usp.br

Universidade de São Paulo

Brasil

Santos Felisbino-Mendes, Mariana; Dias Campos, Mirelle; Félix Lana, Francisco Carlos
Avaliação do estado nutricional de crianças menores de 10 anos no município de Ferros, Minas

Gerais

Revista da Escola de Enfermagem da USP, vol. 44, núm. 2, junio, 2010, pp. 257-265

Universidade de São Paulo

São Paulo, Brasil

Available in: <http://www.redalyc.org/articulo.oa?id=361033304003>

- How to cite
- Complete issue
- More information about this article
- Journal's homepage in redalyc.org

redalyc.org

Scientific Information System

Network of Scientific Journals from Latin America, the Caribbean, Spain and Portugal

Non-profit academic project, developed under the open access initiative

Nutritional assessment in children under 10 in Ferros, Minas Gerais

AVALIAÇÃO DO ESTADO NUTRICIONAL DE CRIANÇAS MENORES DE 10 ANOS NO MUNICÍPIO DE FERROS, MINAS GERAIS

EVALUACIÓN DEL STATUS NUTRICIONAL DE NIÑOS CON MENOS DE 10 AÑOS EN LA CIUDAD DE FERROS, ESTADO DE MINAS GERAIS

Mariana Santos Felisbino-Mendes¹, Mirelle Dias Campos², Francisco Carlos Félix Lana³

ABSTRACT

Brazil is going through problems with obesity as well as malnutrition and starvation – the nutritional transition. This is a cross sectional study with a sample of 1322 children under 10 years of age, residents in Ferros, Minas Gerais, Brazil, enrolled in SISVAN. Results showed that: 20.7% of children had nutritional disorder (10.1% nutritional risk, 3.8% malnourished and 6.7% overweight risk). Malnutrition risk factors were also identified: low birth-weight, RP=3.57, IC 95% (1.96-6.52); stunting, RP=19.36, IC 95% (11.53-32.52); no breast-feeding, RP=2.23, IC 95% (1.19-4.18); family income below R\$ 95, RP=2.39, IC 95% (1.10-5.16). Prevalence for overweight was higher than for malnutrition. While the rural population presented higher prevalence for nutritional risk and malnutrition, in the urban area there was higher prevalence of risk for overweight. These results show the need for specific nutritional interventions according to the specific issues identified.

KEY WORDS

Child nutrition disorders.
Malnutrition.
Obesity.
Nutritional transition.
Nutritional assessment

RESUMO

A sociedade brasileira vivencia, além da desnutrição e fome, problemas relacionados à obesidade – a transição nutricional. Este trabalho é um estudo transversal com amostra de 1322 crianças menores de 10 anos, residentes no município de Ferros, Minas Gerais, e cadastradas no SISVAN. Observou-se que 20,7% das crianças apresentaram alguma alteração nutricional (10,1% risco nutricional, 3,8% desnutrição e 6,7% sobrepeso). Fatores de risco para o desenvolvimento de desnutrição foram pesquisados: baixo peso ao nascer, RP=3,57, IC 95% (1,96-6,52); baixa estatura RP=19,36, IC 95% (11,53-32,52); aleitamento materno ausente RP=2,23, IC 95% (1,19-4,18); renda familiar de até R\$ 95, RP = 2,39, IC 95% (1,10-5,16). Destaca-se maior prevalência de sobrepeso em relação à desnutrição. Enquanto a população rural apresentou maior prevalência de desnutrição e risco nutricional, a urbana destacou-se pelo sobrepeso. Esses resultados são importantes para mostrar que intervenções nutricionais são necessárias e devem considerar os problemas específicos apontados.

DESCRIPTORES

Transtornos da nutrição infantil.
Desnutrição.
Obesidade.
Transição nutricional.
Avaliação nutricional.

RESUMEN

La sociedad brasileña experimenta, más allá de la desnutrición y el hambre, problemas relacionados con la obesidad -la transición nutricional-. Este trabajo es un estudio transversal, fue realizado sobre una muestra de 1322 niños con menos de 10 años residentes en Ferros, Minas Gerais, registrados en el SISVAN. Se observó que el 20,7% de los niños presentaba alguna alteración nutricional (10,1% riesgo nutricional, 3,8% desnutrición y 6,7% sobrepeso). Fueron investigados factores de riesgo para el desarrollo de la desnutrición: bajo peso al nacer, RP = 3,57, IC 95% (1,96-6,52); baja estatura, RP = 19,36, IC 95% (11,53-32,52); ausencia de amamantamiento, RP = 2,39, IC 95% (1,10-5,16). Es destacable la prevalencia del sobrepeso respecto de la desnutrición. Mientras la población rural presentó mayor prevalencia de desnutrición y riesgo nutricional, la urbana se destacó por el sobrepeso. Estos resultados son importantes para demostrar que las acciones nutricionales son necesarias y deben enfocarse en los problemas específicos detectados.

DESCRIPTORES

Transtornos de la nutrición del niño.
Desnutrición.
Obesidad.
Transición nutricional.
Evaluación nutricional.

¹ Nurse. Student of the Master's Program in Health and Nursing, School of Nursing at Federal University of Minas Gerais. Belo Horizonte, MG, Brazil. marianafelisbino@yahoo.com.br ² Nurse with the Family Health Program in the municipality of Ferros, Minas Gerais. Ferros, MG, Brazil. mya_diasufmg@yahoo.com.br ³ PhD, Professor at School of Nursing at Federal University of Minas Gerais. Belo Horizonte, MG, Brazil. xicolana@enf.ufmg.br

INTRODUCTION

Despite a worldwide reduction in child malnutrition, it is currently the most important public health problem in developing countries. It is a complex disease, originated from many causes and rooted in poverty⁽¹⁾.

Malnutrition occurs when the body does not receive the nutrients required for its physiologic metabolism, which occurs when food intake is not adequate in either quantity or quality. Most cases, however, have a secondary cause: the intake of food that is poor in basic nutrients, i.e., they result from insufficient food intake or hunger⁽²⁻³⁾.

Malnutrition is directly or indirectly responsible for high rates of morbidity and mortality, mainly in younger children (first years of life) experiencing an accelerated growth rate⁽⁴⁾. Some epidemiologic data reflect the magnitude of malnutrition according to this context: 12 million deaths of children younger than five years old reported every year in developing countries, mainly due to avoidable causes, around 60% are related to malnutrition⁽⁴⁾.

Improvements in life conditions and healthcare quality throughout the years have caused a decrease in national child malnutrition rates. Prevalence, measured by weight/age deficit in children younger than five years old for the national surveys carried out in 1974-1975, 1989 and 1996, were 18.4%, 7.1% and 5.7%, respectively⁽⁵⁾.

In 2002, the prevalence of chronic malnutrition in this age bracket was 7% and 2% for severe malnutrition⁽⁶⁾. In 2005, a world prevalence of child malnutrition was estimated in 29%; the African continent holds the highest rate, 33.8%, followed by Asia with 29.9% and Latin America with 9.3%⁽⁷⁾.

Despite the significant reduction of child malnutrition prevalence, millions of Brazilian children currently suffer from the consequences of this morbidity, especially those in rural areas and in the poorest regions of the country. Malnutrition repercussions are systemic, affecting the body as a whole, and, in children, may hinder appropriate growth and development⁽⁴⁾.

Hence, when addressing malnutrition, its multiple etiologies must be considered. In addition to specific cures for malnourished children, interventions in the family and with community leaders are necessary within a multidisciplinary work, in an attempt to promote health⁽⁴⁾.

In addition to malnutrition and hunger, Brazilian society currently experiences obesity-related problems. Such a scenario represents a transitional nutritional phase; in other words, changes in food intake patterns of individuals due to dietary changes caused by socio-economic changes and the influence of the media⁽⁸⁾.

The nutritional transition, in general, is characterized by the passage from malnutrition to obesity. Obesity has shown an important prevalence in several population subgroups in almost all Latin American countries⁽⁹⁻¹⁰⁾.

Obesity is a result of a diet rich in fats and sugar, namely *Eastern diet* parallel to a progressive decrease in physical activities⁽⁸⁾. Child obesity is directly related to obesity at adult age. In addition, atherosclerosis and high blood pressure are pathologic processes related to obesity and initiated during childhood, as well as dyslipidemia, diabetes, orthopedic problems, sleep apnea, biliary lithiasis and food intake disorders⁽⁴⁾. Obese children can develop low self-esteem, affecting school development and social relations, as well as long-term psychological consequences⁽⁴⁾.

Hence, as malnutrition, obesity is also an important public health problem justifying a preventive approach that should be initiated in childhood.

OBJECTIVES

In addition to malnutrition and hunger, Brazilian society currently experiences obesity-related problems. Such a scenario represents a transitional nutritional phase...

The National Program of Nutritional and Food Surveillance – SISVAN in Brazilian acronyms – of the Department of Health in the municipality of Ferros, Minas Gerais, Brazil, the Municipal Health Department organized a process of data collection targeting the population of children under 10 years old. The research allows for the identification of this population's nutritional profile, resulting on grounds to support interventions and, at the same time, the implementation and provision of this information system to basic healthcare.

Therefore, the objective of this study was to analyze the nutritional profile of children younger 10 years old living in the municipality of Ferros/MG, based on the data collected for SISVAN, so as to identify social groups that are more vulnerable to malnutrition and being overweight.

METHOD

This is a cross-sectional study whose sample consists of children registered in SISVAN, ages from 0 and 9 years and 11 months, of both genders, living in urban or rural areas of the municipality of Ferros, Minas Gerais.

The municipality of Ferros is located in the region of Itabira/MG, 174 Km away from the capital Belo Horizonte. It is divided into six districts in addition to the urban area. It has four Family Health Teams (FHT I, II, III, IV). The FHT IV covers the Urban Area, and the other three, cover the Rural Area. Public Basic healthcare services in the municipality include the Mayor Moacyr Dias Lage Health Center, located in the municipal seat, and other rural service stations in the other districts. Around 64% of the population lives in the Rural Area⁽¹¹⁾.

The Basic Care Information System (SIAB in Brazilian acronyms) was used to learn about the universe of children between 0 and 9 years and 11 months old registered in SISVAN. Data prior to registration showed a universe of 1,766 children.

On 08/16/2006, the SISVAN registry began a strong effort to reactivate the program in the municipality. For this study, children with registration files logged before 02/30/2007 were considered, corresponding to 1,322 children. Registration was a result of a partnership among academic nursing professionals who underwent the Supervised Internship in Basic Health Services – Nursing School, Rural Internship Mode of the Federal University of Minas Gerais, with the Municipal Health Department of Ferros and multi-professional teams of the FHT municipalities.

The following information were obtained from the SISVAN registration files: anthropometric data (height and weight), birth and the child's data (weight at birth, gestational age, breastfeeding) demographic and socio-economic data (age, gender, residence, district, family Support Program benefit provision) to evaluate the presence or not of risk factors for malnutrition. Other data were collected with the same purpose from the Basic Care Information System of the municipality and the children's medical records in the healthcare services in order to complement the data analysis (educational level of mothers, FHT team, number of people living in the house, vaccine records).

The anthropometric method was used to obtain the weight and height of the children wearing light clothes. Excess clothes such as jackets and shoes were taken off. The weight was measured with a scale. Weighing children younger than two years was performed with a previously-calibrated mechanical pediatric scale, according to their availability in the service and. An appropriately calibrated platform mechanical scale was used for children between 2 and 9 years and 11 months old. The weight was measured until the closest to 0.1 Kg. Children younger than two years were measured by a horizontal anthropometer for their height, and children older than two years were measured with vertical anthropometer, in cm⁽¹²⁾. Anthropometric measures were carried out by trained FHT team professionals. Children holding the Ministry of Health's *child card* (provided by the maternity at birth, and used to follow their growth and development) had their weight and height registered in the growth curve. Whenever they showed altered registry, a child development appointment was booked with a team nurse. Those without a child card had their values compared to a NCHS (National Center of Health Statistics) table and the same procedure was carried out whenever alterations were identified.

Based on measures of weight and height, the child's nutritional status was evaluated according to NCHS tables, internationally adopted by the WHO and alleged by SISVAN/MS, considering the child's gender and age (in months). According to the corresponding percentage in the anthropometric data, the child was then diagnosed as eutrophic,

under nutritional risk, malnourished, or under the risk of being overweight.

Nutritional rates used to evaluate children's nutritional status were: weight according to age, height according to age and weight according to height⁽¹²⁾. In the case of abnormal indexes, immediate procedures were adopted as guidelines for mothers or legal guardians regarding food intake; appointments with the nursing team for the next month or in fifteen days to follow-up the child's growth and development.

Also, it is important to state that in this evaluation, the index of weight according to age was used as the main value in the malnutrition diagnosis; however, other ratios were also considered as parameters. When altered, they determined irregularities of the child's nutritional status.

In the evaluation of weight according to age, weight equal to or higher than 97 percent determines the risk of overweight in a child; weight equal to or higher than 10 and less than 97 percent characterizes the child as eutrophic; those with less than 10 and equal to or higher than 3 percent suggest nutritional risk situation; and less than 3 percent represent malnutrition⁽¹³⁾.

In the evaluation of height according to age, 3 percent is the limit for considering a child as low height, since 3% of the reference population demonstrated lower height to what is considered normal⁽¹³⁾. It indicates the accumulative effect of adverse situations on child development, a more sensible indicator to evaluate quality of life in a population⁽¹³⁾.

The weight according to the height index is the most sensible index to diagnose overweight. It expresses the harmony between body mass and height. When the percentage is higher or equal to 97, it indicates risk of being overweight, and when it is lower than 3, severe malnutrition. The prevalence of low weight according to height in our environment is low, around 5%. An isolated interpretation cannot occur, because weight can be adjusted to a deficient height.

The data obtained were registered in the SISVAN records by technicians at the epidemiology sector of the municipality and, afterwards, extracted from the information system by the nursing professionals with the purpose of building a data base to analyze it with the aid of a statistical program. The EPI-INFO 6.0 software was used to determine nutritional alteration frequencies and associated factors. Tests such as the X2 and the bivariate analysis were used to verify associations between possible risk factors. The prevalence ratio was calculated with a confidence interval of 95% and p-value < 0.05.

These regard the use of secondary data extracted from SISVAN and SIAB of the municipality. They were used to establish the nutritional profile and to support care strategies to children with nutritional hazards, without any damage to children, their parents or legal guardians. The work followed ethical rules according to Resolution 196/96 of the Research Ethics National Council. Secrecy and anonymity on the accessed information were ensured. This research

was proposed and approved by the Municipal Health Department of Ferros, Minas Gerais, Brazil.

RESULTS

Data from the SISVAN related to 1,322 children were collected, corresponding to 74.9% of the population in this age bracket for this study, registered in SIAB in August 2006.

Data collection coverage reached values above 80% in some Family Health Teams, except for FHT I, which delayed registration due to operational problems in the registry process.

Description of the population under study

Of the 1,322 children registered, 661 (50.0%) were male and 661 (50.0%) were female. The age bracket of 5 years and 1 month to 9 years and 11 months was the most prevalent, represented by 51.0% of the studied population. Regarding the place of residence, 78.1% lived in the rural area, while 21.9% were from the urban area.

The illiteracy rate among mothers was 10.6% and most of them had only had four years of education (65.4%). The average number of dwellers per residence was five, and 32.3% of the families had more people living in the same residence. It is important to point out that 73.6% of the studied population received the Family Support Program, a fact that illustrates their low income. Low weight prevalence at birth was 9.1%.

Another aspect evaluated in these children was the presence of clinical intercurrents in the past six months. For those children under 6 months, they were inquired if they had been ill prior to the registry date. The municipality reported an excellent result (98%) on vaccine coverage.

Maternal breastfeeding information is prioritized by SISVAN/MS. Regarding the progressive breastfeeding in the first six months of age, 11.0% of children demonstrated that they were not even breastfed. Among those that were breastfed, the average breastfeeding time was seven months.

It is well-known that exclusive breastfeeding is best for children in the first six months of life. Only 32 out of 75 children within that age (42.7%) experienced it. Breastfeeding can occur up to two years of age as a complement to child food intake. After the first six months of life, new types of food are introduced until the child becomes used to the same diet as the rest of the family. From all 176 children in this age bracket, only 63 (35.8%) had complementary breastfeeding, characterizing a very low rate.

Weaning is recommended after two years of age in case the child is still under maternal breastfeeding. A concerning factor was that 36.4% of children under maternal breastfeeding were older than two years old. In other words, even at that age, they are still being fed only by maternal milk and water, tea and juice. Also, 33.1% of these children (older than 2 years) received maternal milk as a complement.

Table 1 - Characterization of the population under study - Ferros, Minas Gerais - March - 2007

Variables	N	%
Gender		
Female	661	50.0
Male	661	50.0
Age		
Younger than 1 year	123	9.3
From 1 to 5 years	525	39.7
From 5.1 to 9.11 years	674	51.0
Residence		
Rural Area	1032	78.1
Urban Area	290	21.9
FHT Teams		
FHT I	193	14.6
FHT II	339	25.6
FHT III	466	35.2
FHT IV	324	24.5
Mother's Education		
Illiterate	140	10.6
1-4 years	725	54.8
Above 4 years	418	31.6
Not able to inform	39	3.0
Number of people in the house		
1-5	818	61.9
Above 5	427	32.3
Not able to inform	77	5.8
Family Support Program		
Yes	973	73.6
No	349	26.4
Birth Weight		
Normal	1108	83.8
Low	120	9.1
Not able to inform	94	7.1
Illness in the past 6 months		
Diarrhea	51	3.9
Anemia	08	0.6
Acute Respiratory Infections	304	23.0
Parasites	25	1.9
Others	49	3.7
More than one	184	13.9
None	540	40.8
Not able to inform	161	12.2
Vaccine Coverage		
Complete	1306	98.8
Incomplete	16	1.2

Nutritional Alterations

An analysis of the studied population according to the Height/Age index demonstrated a prevalence of 6.7% of Low Height (Table 2). The second index analyzed was Weight/Height, revealing 7.1% of Overweight Risk in the studied population, a very close value to the Weight/Age

index (6.7%). Regarding the Weight/Height index, a good indicator of acute malnutrition, 5.3% demonstrated nutritional alterations, composing 34% of malnourished children.

Table 2 - Distribution of the nutritional status of children under 10 years according to the Index - Ferros, Minas Gerais - March, 2007

Nutritional Status	N	%
Height/Age Index		
Suitable	1140	86.2
Low height	88	6.7
Above 97 percent	92	7.0
Missing	02	0.2
Total	1322	100
Weight/Height Index		
Eutrophic	1156	87.4
Acute Malnutrition	70	5.3
Overweight risk	94	7.1
Missing	02	0.2
Total	1322	100
Weight/Age Index		
Eutrophic	1049	79.3
Nutritional Risk	134	10.1
Malnutrition	50	3.8
Overweight Risk	89	6.7
Total	1322	100

Finally, the Weight/Age index, used to classify the final infantile nutritional status, demonstrated that 20.7% of children showed some type of nutritional alteration, 10.1% nutritional risk, 3.8% malnutrition and 6.7% overweight risk.

Possible risk factors

Table 3 shows the significant risk factors researched (p-value < 0.05), as the rural area contains the higher number of children in risk of malnutrition and malnourished, and the urban area has a higher prevalence of obese children (9.7%). The FHT III team demonstrated a higher prevalence for nutritional risk and malnutrition, 12.7% and 5.6%, respectively, and Team IV, in the urban area, a higher prevalence of child obesity (9.3%). Children born with low weight demonstrated higher prevalence of malnutrition (11.7%), as well as those with low height (33.0%).

Among the malnourished children in this study (n=50; 3.8%), 34.0% can be characterized as having acute malnutrition, and the rest as having chronic malnutrition. Moreover, 58% of these children have low height – in other words, a longitudinal growth beneath the normality rate for that age, reflecting the high prevalence of chronic malnutrition in this population.

Table 3 - Possible risk factors to nutritional status alterations Ferros, Minas Gerais - March, 2007

Possible Risk Factors/ Nutritional Status	E		NR		M		OWR		p-Value
	N	%	N	%	N	%	N	%	
Residence									0.000
Rural Area	809	78.4	120	11.6	42	4.1	61	5.9	
Urban Area	240	82.8	14	4.8	08	2.8	28	9.7	
Number of people in the house									0.028
Less or equal to 5	665	81.3	66	8.1	26	3.2	61	7.5	
More than 5	327	76.6	57	13.3	20	4.7	23	5.4	
FHT Team									0.000
Team I	162	83.9	17	8.8	04	2.1	10	5.2	
Team II	259	76.4	40	11.8	11	3.2	29	8.6	
Team III	361	77.5	59	12.7	26	5.6	20	4.3	
Team IV	267	82.4	18	5.6	09	2.8	30	9.3	
Family Support Program									0.024
Yes	775	79.7	101	10.4	42	4.3	55	5.7	
No	274	78.5	33	9.5	08	2.3	34	9.7	
Weight at birth									0.000
Low Weight (< 2.500 grams)	90	75.0	13	10.8	14	11.7	03	2.5	
Normal Weight (≥ 2.500 grams)	890	80.3	106	9.6	32	2.9	80	7.2	
N/A	69	73.4	15	16.0	04	4.3	06	6.4	
Currently Breastfeeding									0.049
Yes	121	73.8	17	10.4	12	7.3	14	8.5	
No	928	80.1	117	10.2	38	3.3	75	6.5	
Height/Age Index									0.000
Normal	966	84.7	94	8.2	21	1.8	59	5.2	
Low height	22	25.0	37	42.0	29	33.0	00	0.0	
Higher or equal to 97 percent	61	64.9	03	3.2	00	0.0	30	31.9	
Weight/Height Index									0.000
Eutrophic	972	84.2	108	9.4	32	2.8	42	3.6	
Acute Malnutrition	30	42.9	23	32.9	17	24.2	00	0.0	
Overweight Risk	47	48.9	01	1.1	01	1.1	47	48.9	
Missing	00	0.0	02	100	00	0.0	00	0.0	

E= Eutrophic; NR= Nutritional Risk; M= Malnutrition; OWR= Overweight risk.

Finally, risk factors for the development of malnutrition were found: low weight at birth, PR=3.57, CI 95% (1.96-6.52); low height PR= 19.36, CI 95% (11.53-32.52); living in the district of Cubas PR= 2.26, CI 95% (1.24-4.11); belonging to FHT team III, PR= 1.99, CI 95% (1.16-3.43); absent maternal breastfeeding PR=2.23, CI 95% (1.19-4.18); and family income of up to 95 reais, PR = 2.39, CI 95% (1.10-5.16). Therefore, it is suggested that children who presented these factors in their lives had higher chances (PR) of developing malnutrition than those without those factors (p -value<0.05). The other factors demonstrated here were not statistically relevant.

Table 4 - Prevalence Ratio for Risk Factors - Ferros, Minas Gerais - March, 2007

Risk Factors	Malnutrition	p-Value*
	RP (IC95%)	
Low Weight at birth	3.57 (1.96-6.52)	0.000
Low height	19.36 (11.53-32.52)	0.000
Living in Cubas	2.26 (1.24-4.11)	0.006
Belonging to FHT III	1.99 (1.16-3.43)	0.017
Absent maternal breastfeeding	2.23 (1.19-4.18)	0.020
Receiving up to R\$95.00 (Family Support Program)	2.39 (1.10-5.16)	0.036
More than 5 people living in the house	1.47 (0.83-2.61)	0.238
Mother's Education < 4 years	0.93 (0.51-1.71)	0.945

*p-value: Yates corrected and Fisher Exact 2-tailed

DISCUSSION

Results demonstrated that the sample is homogeneous regarding gender. As for the age, individuals were grouped according to the following age brackets: less than 1 year; from 1 to 5 years; and from 5 and 1 month to 9 and 11 months. This division was based on the importance of this factor in the life of the child in each age bracket (growth, development milestones, socialization, breastfeeding, among others), in addition to being used in most studies involving children's nutritional status.

The educational profile of mothers was also investigated, because it is seen as a potential factor that leads to malnutrition. Various studies point out that the mother's lack of information contributes directly or indirectly to her nutritional status, morbidity and mortality^(3,13-16,19). The educational level of mothers in the municipality was observed to be poor. No significant associations with this factor were found; however, during the child development appointments and registry, a high amount of misinformation was observed, especially in those mothers with children under nutritional alterations. It is known that such misinformation is related to the educational level.

Vaccine coverage was verified in order to evaluate the Municipal Health Department efforts to achieve the targets established by the Integrated and Negotiated Pro-

gramming. Also, good vaccine coverage is considered to significantly contribute to improve children's quality of life and health.

Regarding maternal breastfeeding, the results found show the need for improving the maternal breastfeeding profile of the municipality. A suitable attendance of the prenatal phase and the fifth day appointment can improve this scenario, since the data show great misinformation. Nurses, during the child's growth and developmental attendance appointments, and in operational groups can in-sidiously act by informing and contributing for the improvement of maternal breastfeeding profile.

The malnutrition rate found in Ferros was lower to the national rate of 5.8%, also close to the values for the south-eastern region. The nutritional risk demonstrated an important prevalence and, in many studies, it is considered as light malnutrition. Also, when alterations are grouped, the prevalence of nutritional disorders was high. The prevalence of overweight risk is demonstrated as being higher than malnutrition.

A similar study in the rural area of Guatemala found a much higher prevalence (7.6%) of malnutrition⁽¹⁴⁾ and some strongly associated socio-economic factors to this result, akin to this study. In Porto Alegre, high prevalence for malnutrition and nutritional risk was found in a district of the municipality (38.1% and 61.9%, respectively)⁽¹⁷⁾.

A higher prevalence for general overweight risk, malnutrition, and the differences between these alterations was found in the rural and urban population. The rural population demonstrated a higher prevalence of malnutrition and nutritional risk, while the urban population demonstrated a higher risk prevalence to overweight. This is an important finding, since it can be confirmed by the nutritional transition that has possibly reached the urban area already, but not the rural area in the municipality. It also shows the coexistence of two opposite and severe nutritional problems, relevant to public health. Other studies⁽¹⁰⁾ found similar results in Pelotas, Rio Grande do Sul.

A study using IBGE (Brazilian Institute of Geography and Statistics) data showed that the lower the income, the higher the prevalence of malnutrition over obesity. And the higher the income, the higher the prevalence of obesity over malnutrition⁽⁸⁾, as well as other studies⁽¹⁰⁾, supporting the results found. Most residents of the rural area of the municipality have low income and worse life conditions compared to those who live in the urban area. Table 4 demonstrates some regions that were strongly associated to malnutrition, because families with unfavorable characteristics are part of them, as those pointed out above in a different proportion from other regions. Areas pertaining to FHT III, and most specifically from the district of Cubas, are the areas that concentrate most of these families, enhancing their risk of developing a nutritional disorder. Also, in these regions, people live exclusively in the rural area.

An increased prevalence of obesity risk was found in a study with schoolchildren in the municipality of Franca, São Paulo, supporting the findings in this study⁽¹⁸⁾.

Other indexes such as height/age and weight/height were used in addition to the diagnosed nutritional alterations according to the weight/age index (malnutrition, nutritional risk and overweight risk). The first is an important parameter since it detects low height, the indicator for a multifaceted privation with prevalence currently considered as a suitable indicator to express the quality of a population's conditions of life, and of chronic malnutrition^(1,3).

The normal share of genetically small children varies between 2 and 3%⁽¹⁶⁾. It is a low value when compared to the Brazilian rate (10.4%), similar to the Center-South region (5.6%) and very low when compared to the Northeast region (17.9%)⁽⁸⁾. In a study in Pelotas, 25.9%, 14.4% and 3.5% were found respectively for the height/age, weight/age and weight/height indexes⁽¹⁴⁾.

In the specific case of height deficit, the most probable cause is an association between a deficient diet and the occurrences of previous infections, reflecting the past life of the child, especially the dietary conditions and morbidity⁽¹³⁾.

Eighty-eight children (6.7%) showed lower height than expected for their age, and among them, 29 also demonstrated alterations in the weight/age indexes. Of the total malnourished children, 58% had chronic malnutrition. Therefore, in addition to having their growth and development compromised, in some way, on a long term basis, these children are currently nutritionally compromised, characterizing a high chronic malnutrition rate.

The weight/height index holds a complementary feature. It is highly sensitive to overweight and able to detect acute malnutrition. When analyzing the weight/age index compared to the weight/height index, approximately one third of the malnourished population (34%, n=17) have acute malnutrition. These findings support the value of chronic malnutrition found in this study. Hence, among malnourished children, the chronic malnutrition and acute malnutrition proportions indicated by complementary indexes agree; around 58% and 34%, respectively. From this total of 50 malnourished individuals, only 04 (8%) were not detected by the complementary indexes used in the study to classify chronic and acute scenarios. The value for overweight was very close to the one tracked by the

weight/age index, also demonstrating accordance among data⁽¹²⁾.

In São Paulo, a study performed in five cities also found a prevalence of obesity higher than low height and malnutrition⁽¹⁸⁾. The phenomenon described as nutritional transition shows the coexistence of the same community presenting malnutrition and overweight/obesity⁽¹⁹⁾. Many studies point out those children who are affected by chronic malnutrition can potentially become obese in adult life^(3,19).

Also, specific and non-specific risk factors strongly associated to malnutrition can be observed. Some of these factors are highly related to socio-economic conditions supporting the idea that poverty is the fundamental cause of insufficient food intake. A good example is the low weight at birth, a variable that is almost always associated to poor life conditions, deficient food intake and maternal poor nutrition⁽²⁰⁾.

Another important factor in this scenario was the relatively increased risk for those that receive Family Support Program aid. Considering this data, it is possible to infer that the benefit would be directly related to those who really need it; in other words, it is being well applied.

CONCLUSION

The possibility of determining the real growth of the children in this study is limited due to the cross-sectional study design. A longitudinal study could allow for the visibility of changes in growth on a long-term basis, better indicated for growth patterns.

These results point out the importance and need of the nutritional surveillance program guiding health services to an active investigation of this population's nutritional status, not restricted to service users. It is necessary to acknowledge the fundamental role of the mothers of children with nutritional alterations and of health professionals. These subjects, in a partnership, can develop strategies and find solutions for the suitable control of the nutritional status of the municipality's children.

Also, it clearly illustrates the nutritional transition that has already reached the urban area of the studied municipality. The findings of this study are important to signal the fact that nutritional interventions must deal with the problems pointed out, especially in municipalities with similar characteristics to the one observed in this study.

REFERENCE

1. Monte CMG. Desnutrição: um desafio secular à nutrição infantil. *J Pediatr*. 2000;76 Supl 3:S285-97.
2. Leão E, Corrêa EJ, Mota JAC, Viana MB. *Pediatria ambulatorial*. 4ª ed. Belo Horizonte: COOPMED; 2005.
3. Martins IS, Marinho SP, Oliveira DC, Araújo EAC. Pobreza, desnutrição e obesidade: inter-relação de estados nutricionais de indivíduos de uma mesma família. *Ciênc Saúde Coletiva*. 2007; 12(6):1553-65.

4. Alves CRL, Viana MRA. Saúde da família: cuidando de crianças e adolescentes. Belo Horizonte: COOPMED; 2003.
5. Taddei JAAC, Rodrigues EM, Leite MG, Colugnati FAB, Sigulem DM. Estudos populacionais em nutrição e saúde. In: Anais da 49ª Reunião Anual da SBPC; 1997; Belo Horizonte, BR. Belo Horizonte: SBPC; 1997. p.173-6.
6. Fundo das Nações Unidas para a Infância (UNICEF). Panorama: Brasil - Estatísticas 2004 [texto na Internet]. [citado 2007 dez. 20]. Disponível em: http://www.unicef.org/spanish/infobycountry/brazil_statistics.html
7. Mackey M, Montgomery JMA. Plant biotechnology can enhance food security and nutrition in the developing world part 1. *Nutr Today*. 2004;39(1):52-8.
8. Monteiro CA. Velhos e novos males da saúde no Brasil: a evolução do país e de suas doenças. 2ª ed. São Paulo: Hucitec/Nupens/USP; 2000.
9. Kac G, Velásquez-Meléndez G. A transição nutricional e a epidemiologia da obesidade na América Latina. *Cad Saúde Pública*. 2003;19 Supl. 1:S4-5.
10. Barros AJD, Victora CG, Santos IS, Matijasevich A, Araújo CL, Barris FC. Infant malnutrition and obesity in three population-based birth cohort studies in Southern Brazil: trends and differences. *Cad Saúde Pública*. 2008;24 Supl. 3:S417-26.
11. Ferros. Secretaria Municipal de Saúde. Sistema de Informação da Atenção Básica (SIAB). Ferros (MG); 2005.
12. Fagundes AA, Barros DC, Duar HA, Sardinha LMV, Pereira MM, Leão MM. Vigilância alimentar e nutricional – SISVAN: orientações básicas para coleta, processamento, análise de dados e informações em serviços de saúde. Brasília: Ministério da Saúde; 2004.
13. Brasil. Ministério da Saúde. Secretaria de Políticas de Saúde. Departamento de Atenção Básica. Saúde da Criança: acompanhamento do crescimento e desenvolvimento infantil. Brasília; 2002.
14. Post CLA, Victora CG, Barros AJD. Entendendo a baixa prevalência de déficit de peso para estatura em crianças brasileiras de baixo nível socioeconômico: correlação entre índices antropométricos. *Cad Saúde Pública*. 2000;16(1):73-82.
15. Sereebutra P, Solomons N, Aliyu MH, Jolly PE. Sociodemographic and environmental predictors of childhood stunting in rural Guatemala. *Nutr Res*. 2006;26(1):65-70.
16. Monteiro CA, Benício MHD, Konno SC, Silva ACF, Lima ALL, Conde WL. Causas do declínio da desnutrição infantil no Brasil, 1996-2007. *Rev Saúde Pública*. 2009;43(1):35-43.
17. Cuervo MRM, Aerts DRGC, Halpern R. Nutritional status surveillance of children in a health district in southern Brazil. *J Pediatr*. 2005;81(4):325-31.
18. Cano MAT, Pereira CHC, Silva CCC, Pimenta JN, Maranhã PS. Estudo do estado nutricional de crianças na idade escolar na cidade de Franca-SP: uma introdução ao problema. *Rev Eletrônica Enferm* [periódico na Internet]. 2005 [citado 2007 dez. 15];7(2):[cerca de 6 p.]. Disponível em: http://www.fen.ufg.br/revista/revista7_2/pdf/ORIGINAL_05.pdf
19. Saldiva SRDM, Escuder MML, Venâncio SI, Benício MHD. Prevalence of obesity in preschool children from five towns in São Paulo state, Brazil. *Cad Saúde Pública*. 2004;20(6):1627-32.
20. Minagawa AT, Biagoline REM, Fujimore E, Oliveira IMV, Moreira APCA, Ortega LDS. Baixo peso ao nascer e condições maternas no pré-natal. *Rev Esc Enferm USP*. 2006;40(4):548-54.