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Prevalence and determinants of the dual burden of malnutrition at the household level in Puna and Quebrada of Humahuaca, Jujuy, Argentina

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Abstract

Objective: **The objective of the present study was to identify households in which overweight and underweight coexisted (dual burden of malnutrition) and explore the factors that could be contributing to the dual burden of malnutrition at the household level in this population.**

Study design: **Cross-sectional nutritional survey.**

Methods: **After applying the exclusion criteria, 136 households were included. Mothers were classified as normal weight or overweight/obese based on body mass index (BMI) cut-off points and children and adolescents were classified as stunted or not based on height-for-age z-score. Households with an obese mother and a stunted children or adolescent were categorized as dual burden households.**

Results: **The prevalence of dual burden household was 12%. Compared with other households, dual burden households tended to have more people living in the house, and the educational level of the head of household was lower. Individuals living in dual burden households showed overall lower energy intakes and were more likely to have inadequate intakes of calcium and iron.**

Conclusions: **The nutrition transition in this community might be one of the leading causes of the observed dual burden of malnutrition. The results presented here indicate the need to consider whether programs that focus on only one type of nutritional problem come might actually exacerbate the other.**

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Key words: *Dual burden of malnutrition. Household. Stunted. Overweight. Argentina.*

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PREVALENCIA Y DETERMINANTES DE LA DOBLE CARGA DE MALNUTRICIÓN EN HOGARES EN LA PUNA Y QUEBRADA DE HUMAHUACA, JUJUY, ARGENTINA

Resumen

El objetivo del presente estudio fue identificar los hogares en los que coexisten el sobrepeso y bajo peso (doble carga de malnutrición) y explorar los factores que podrían contribuir a la doble carga de malnutrición en los hogares de esta población. Después de aplicar los criterios de exclusión, se incluyeron 136 hogares. Las madres fueron clasificadas como de peso normal o con sobrepeso/obesidad basado en puntos de corte del índice de masa corporal (IMC), los niños y adolescentes fueron clasificados según z–score de la talla para la edad, si tenían o no retraso en el crecimiento (Stunted). Los hogares con una madre obesa y niños o adolescentes con retraso en el crecimiento fueron clasificados como hogares de doble carga. La prevalencia de hogares con doble carga fue del 12 %. En comparación con los otros hogares, en los hogares con doble carga de malnutrición habitan un mayor número de personas en la casa, y el nivel de educación del jefe de familia fue menor. Las personas que viven en hogares de doble carga mostraron ingestas de energía global más bajas y eran más propensos a tener una ingesta insuficiente de calcio y hierro.

Una de las principales causas de la doble carga de malnutrición observada en esta comunidad podría ser la transición nutricional. Los resultados presentados aquí indican la necesidad de considerar a los programas que se centran en un solo tipo de problema nutricional y que en realidad podrían exacerbar el otro.

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Palabras clave: *Doble carga de malnutrición. Hogar. Retraso en el crecimiento. Sobrepeso. Argentina.*

Introduction

The dual burden of malnutrition has been defined as the coexistence of undernutrition and overweight at the individual, household or population level.[1] The phenomenon of coexistence of child undernutrition and a maternal overweight in the same household has been described in several developing countries settings, including South Africa, China, India, Russia, Brazil, Haiti, Benin and Peru.[2-5] The possibility of underweight and overweight coexisting is not usually considered in the design and implementation of nutrition interventions.

The examples of dual burden occurring in close proximity are from countries experiencing rapid changes in diet and physical activity. These changes have been characterized as the nutrition transition.[6] This nutrition transition is associated in developing countries with an increased consumption of more milled grains, higher fat foods, animal products, sugar and ready-made foods, or foods prepared away from home.[7] The change in diets can be further compounded by simultaneous changes in physical activity, such as the shift from manual labour to mechanized jobs, an increase in no active entertainment such as television viewing and computer use. The transition is not uniform; it occurs first among urban high income households, but also has emerged as a matter of concern in adults and child from poor communities.[8, 9]

The dual burden is likely to become even more prevalent as obesity rates climb with increasing wealth and urbanization in middle and lower incomes nations.[10]

Prior Studies[11,12] have shown that Quebrada and Puna region would be in early stage of nutrition transition as symptoms of undernutrition and overnutrition coexist at the population level and dietary patterns are changing towards the westernization of the diet, which tends to be associated with poor diet quality (in terms of macro and micro nutrients content of the diet).

The aim of present study was to identify households in the Quebrada and Puna Regions in which overweight and underweight coexist and also explore the factors that could be contributing to the double burden of malnutrition at the household level in this population.

Methods

Population and sample

The target population consisted of all inhabitants living in the Puna and Quebrada regions (82922 individuals according to the last national census, 2000).[13]

The present study is a population-based, cross-sectional nutritional survey carried out in a representative sample (N = 356) of households from the Andean regions of Puna and Quebrada of Humahuaca, in the province of Jujuy, Argentina. The field work was carried out from May to December of 2005.

Exclusions

Only houses in which at least one mother and one children or adolescent (< 18 years old) were present at the moment of the interview were included (N = 120 houses excluded). We further excluded houses in which there were more than 10 people living (N = 23 households excluded). Pregnant and lactating women (N = 13 households excluded); and children under the age of 2 years old (N = 14 households excluded) were excluded from the household definition because of difficulty in accurately determination appropriate weight classification. Also were excluded households in which there was not complete data for both members of the pair (N = 50 households excluded). Therefore, a total of 136 households were included in the present study. These were composed by 136 mothers and 267 children/adolescents.

Classification of the households into four types

Adult individuals in the household were categorized as underweight, normal weight, and overweight/obese according to their body mass index (BMI). The criteria for defining underweight and overweight/obesity in adults is a body mass index (BMI) of < 18.5 and ≥ 25 kg/m^2 respectively as suggested by the WHO[14].

Stunted children and adolescents were identified as those with a height-for-age *Z*-score < -2 standard deviations (SD) of the WHO Growth standards.[15] In children and adolescents, thinness was defined as a body mass index (BMI; kg/m^2) for age percentile of the WHO reference standards [16] .

A household classification based on the nutritional status of mother and children was defined to identify households with the double burden of malnutrition:

- The normal mother/normal child household (NM/NC) was categorized as any household with a normal weight mother and all children in the household classified as with normal height-for-age [4]. This categorised was compared against to three other household.
- The overweight mother/normal child household (OM/NC), which had an overweight mother but no stunting child.
- The normal mother/stunted child (NM/SC), which had a normal weight mother but at least a stunting child.
- The overweight mother/stunted child household (OM/SC), which had an overweight mother and at least a stunting child (dual burden household).

Socio-demographic characteristics

The socio-demographic variables included in this study were region; household status; occupational level of the head of the household codified as low, medium or high according to the methodology described by the National Institute of Statistics and Censuses [13]; educational level of the head of household classified as low (none or primary school incomplete), medium (primary school complete or secondary school incomplete) or high (secondary school complete or university degree); and level of poverty according to estimated US$ per person per day (extreme poverty-less than US$1 per person per day; poverty-less than US$2 per person per day; above poverty threshold-more than US$ 2 per person per day). Gross US$ per person per day was estimated by dividing the total monthly income of the household by the number of family members and by 30.

Household status was assessed according to seven variables about the sanitation and hygienic conditions of the household (type of floor, number of rooms; electricity; toilets, waste pipes; separate kitchen; and drinkable water). A household status score (HSS) was constructed in order to facilitate the analysis. Each category of these seven variables received a score to construct the composite HSS (0, 0.5 and 1 for variables with three categories; 0 and 1 for variables with two categories; total score range 0-7).[11, 12]

Also, maternal age and number of individuals in the household were considered in the present study.

Dietary questionnaire

Dietary data collection methods comprised a 24h recall and a semi-quantitative food frequency questionnaire (FFQ).

In order to accurately perform the 24h recall, we asked the individual responsible for cooking about the ingredients, amounts and cooking technique of meals consumed the previous day. In order to estimate usual portion and serving sizes, representative samples of local foods were weighed and volume of household bowls and cups normally used in the community were measured at the beginning of the study. To convert food consumption into nutrient (energy and macronutrient) intakes, Argentinean and Latin-American food composition tables were used.[17,18] For foods not included in these tables, Spanish food composition tables were used.[19,20] Food patterns were assessed by means of semi-quantitative FFQ. This included forty-six foods grouped in thirteen foods groups. The serving size of each food item was determined according to the observed amount consumed usually in this population as described above.

Physical activity for both child-mother pairs was recorded using a 24 hour activity recall list.

Statistical analysis

The data were analyzed using STATA version 10.0 (StataCorp, College Station, TX) and SPSS version 15.0 (SPSS Inc.). Significant differences in percentages between groups were calculated by means of the X^2 test. The level of significance between group means was assessed by one-way ANOVA. Differences were regarded as statistically significant when the p-value was < 0.05.

Results

The prevalence of the dual burden household (i.e. OM/SC) in the Andean population was 11.8%; on the other hand, 34.6%, 43.4%, and 10.3% of the households were classified as NM/NC, OM/NC and NM/SC respectively.

The socio-demographic characteristics according to the household nutritional status classification are presented in table I. The heads of dual burden households were more likely to have a low educational level; in addition the number of individuals living in dual burden households was significantly higher compared to other types of households ($p < 0.05$). Although there were no statistically significant differences among the different categories of households, a high percentage of households with overweight mothers and/or stunted children had a low occupational level (head of household) and the household income represented extreme poverty (less than US$ 1 per person).

No differences were observed among households regarding household status score (HSS).

Results of the anthropometric measurements for the mother, child and adolescent are shown in table II. The mean age for all the mothers (n = 136) was 37.1 ± 9.2 years, and the mean height was 151 ± 5.1 cm (data not shown). Overweight and obese mothers were more likely to be older and, as expected, had an average higher BMI.

The mean age of all children (n = 159) and adolescents (n = 108) was 5.5 ± 2.4 and 12.9 ± 2.2 years old respectively (data not shown). As expected, households with stunted children and adolescents showed on average significantly lower HA-z. No differences in the children and adolescents BMI or BMI centile among household categories were observed.

The mean energy and macronutrients intakes for the different categories of the household are shown in table III. The households with one stunted child and/or overweight mothers showed overall lower energy intakes and were less likely to meet the energy requirements. The energy intake from protein, carbohydrates and lipid were 12.5, 63.0 and 23.9% respectively for all groups of households (data not shown). There were no statistically significant differences among the types of households in the macronutrient composition of the diet.

Table I
Socio-demographic characteristics of household according to their nutritional situation

	NM/NC (n = 47)	*OM/NC (n = 59)*	*NM/SC (n = 14)*	*OM/SC (n = 16)*	*p-value*
%	34.5	43.4	10.3	11.8	
*Region*º					
Quebrada	40,4	59.3	35.7	37.5	n.s.
Puna	59.6	40.7	64.3	62.5	
*Occupational level of household head*º					
High	6.4	10.5	0.00	0.00	
Medium	25.5	33.3	23.1	14.3	n.s.
Low	68.1	56.1	76.9	85.7	
*Educational level of household head*º					
High	27.7	22.0	14.3	0.00	
Medium	57.4	47.5	78.6	81.2	0.04
Low	14.9	30.5	7.1	18.7	
*Household incomes*º					
Extreme poverty	78.3	77.6	85.7	93.8	
Poverty	13.0	13.8	14.3	6.3	n.s.
Above poverty threshold	8.7	8.6	0.0	0.0	
Household score (0-7)†*	4.9 ± 1.3	5.1 ± 1.3	4.9 ± 1.1	5.3 ± 1.3	n.s.
*Number of individuals per household**	5.6 ± 1.9	5.8 ± 1.9	5.5 ± 1.9	7.2 ± 2.1	0.04

ºValues shows are percentages (%). The level of significance of the observed differences between groups was calculated by means of the X^2 test.
*Values shown are mean ± standard deviation (SD). The level of significance between group means was assessed by one-way ANOVA.
†The points given to each category to construct the household status score (HSS) were described previously[9]. The total score range was 0-7.
Classification of households: NM: Normal weight mother; OM: Overweight/obese mother; NC: Normal height child; SC: Stunted child (low height for age).

Table II
Anthropometric characteristics of the of household according to their nutritional situation

	NM/NC Mean ± SD	*OM/NC Mean ± SD*	*NM/SC Mean ± SD*	*OM/SC Mean ± SD*	*p-value*
Mother (n = 136)					
Age (years)	35.2 ± 9.0	39.3 ± 9.3	32.2 ± 8.2	38.4 ± 7.9	0.02
Height (cm)	152.1 ± 5.7	151.7 ± 4.9	152.4 ± 5.4	151.6 ± 5.1	n.s.
BMI (kg/m^2)	21.8 ± 2.2	30.5 ± 7.4	22.4 ± 1.4	29.8 ± 3.8	< 0.0001
Child (n = 159)					
Age (year)	5.7 ± 2.7	5.2 ± 2.4	5.7 ± 2.2	5.2 ± 1.7	n.s.
Height (cm)	110.7 ± 15.9	107.0 ± 15.1	111.6 ± 16.9	109.1 ± 12.8	n.s.
HA, z-score	-0.0 ± 1.2	-0.0 ± 1.1	-1.8 ± 1.1	-1.0 ± 1.3	< 0.0001
BMI (kg/m^2)	16.3 ± 1.9	16.2 ± 2.6	15.6 ± 2.0	16.1 ± 2.1	n.s.
BMI centile	55.8 ± 29.0	56.6 ± 32.5	50.5 ± 26.6	59.4 ± 26.6	n.s.
Adolescents (n = 108)					
Age (year)	12.4 ± 2.2	13.0 ± 2.1	13.2 ± 2.5	13.0 ± 2.2	n.s.
Height (cm)	148.1 ± 11.6	149.1 ± 10.6	148.1 ± 13,6	148.3 ± 9.9	n.s.
HA, z-score	-0.7 ± 0.9	-0.3 ± 1.0	-1.2 ± 1.5	-1.6 ± 1.0	< 0.0001
BMI (kg/m^2)	19.0 ± 3.4	19.5 ± 4.8	19.8 ± 3.6	18.3 ± 3.5	n.s.
BMI centile	53.2 ± 28.8	51.6 ± 26.1	56.5 ± 28.4	40.6 ± 28.4	n.s.

Classification of households: NM: normal weight mother; OM: mother with overweight; NC: normal weight child; SC: child with underweight and stunting. BMI: Body Mass Index. PAL: physical activity level. HA z-core: Height-

The table IV shows the risk of inadequate intake of micronutrients in the different categories of households. The households with normal weight mother and stunting children (NM/SC) and dual burden households were more likely to have inadequate intakes of the micronutrients.

Table III
Energy and macronutrients intake of the sample by categories of household

Variables	*NM/NC Mean ± SD*	*OM/NC Mean ± SD*	*NM/SC Mean ± SD*	*OM/SC Mean ± SD*	*p-value*
Energy (kcal/d)	1521.9 ± 523.8	1388.6 ± 509.2	1268.3 ± 469.8	1372.9 ± 451.1	0.02
Requirement of energy (%)	89.2 ± 39.8	72.9 ± 30.1	73.3 ± 29.4	72.5 ± 28.4	< 0.0001
Energy from protein (%)	12.6 ± 3.0	12.4 ± 3.1	11.8 ± 3.2	13.2 ± 3.3	n.s
Energy from vegetable proteins (%)	6.7 ± 1.6	6.6 ± 1.7	6.8 ± 1.9	6.4 ± 2.0	n.s.
Energy from animal proteins (%)	5.8 ± 3.8	5.8 ± 3.8	4.8 ± 3.8	6.6 ± 3.9	n.s
Energy from lipids (%)	23.8 ± 7.5	25.2 ± 8.4	21.5 ± 6.7	22.7 ± 10.1	n.s.
Energy from carbohydrates (%)	63.2 ± 8.8	61.8 ± 9.1	66.0 ± 7.4	63.7 ± 10.6	n.s.

*Values shown are Means ± SD
Classification of households: NM: Normal weight mother; OM: Mother with overweight; NC: Normal weight child; SC: Stunting child.

The dietary patterns for all groups of households are shown in table V. Households with normal weight mothers and normal weight children tended to consume more meat, potatoes and tubers, fruits and vegetables and dairy products. Dual burden households tended to show higher consumption of vegetable oils and lower of animal fats.

Discussion

Almost 12% of the Andean households in this sample were classified as dual burden households, indicating that the mother was overweight or obese and at least one of her son was stunted. Dual burden households tended to be larger in terms of number of people living in the households, and the educational level of the head of household was lower than other household types.

Some methodological limitations of the present study should be highlighted: the study design, cross-sectional study, only permitted us to make inferences regarding some possible association between the exposure variables (i.e. socio-demographic and dietary factors) and the outcome of interests (type of household), however it is not possible to establish the direction of the causation; second, despite having an original representative sample of household in the area, after applying the exclusion criteria only 136 households (composed of 136 mothers and 267 children/adolescents) could be used in the present study. This is because all household types could be included in the original sample, independently of their composition (i.e. there were households composed of a single member). Finally, only one 24h recall was administered and cross-border food composition tables were used to estimate nutrient intake.

The coexistence of dual expressions of under- and overnutrition are now apparently global; in 2001 the estimated number of people worldwide suffering from overweight equalled those with underweight.[21] The prevalence of double burden households around the world ranges from 1.0 to 23.0% when the definition of child malnutrition used is stunting.[3] This situation is more prevalent when there are both high overweight and high stunting levels in the population[4]. In low- and middle- income countries this prevalence is generally below 10%. It occurs most frequently in Latin America, followed by Africa and then Asia (less than 5%). The prevalence of households with stunted child and overweight mother exceeds 10% in Bolivia, Guatemala, Peru and Egypt.[4]

The children and adolescents in the double burden households showed as expected a low HA-z. These low values of height in children and adolescents (9% of children and 16.2% of adolescents showed Z-score values of height-for-age, <-2 SD, indicative of stunting) reflect that growth retardation, chronic malnutrition and deprivation at the household level are important nutritional problems. On the other hand 22% of children and 13.1% of adolescents showed either overweight or obesity (BMI percentile ≥ 85). In a previous study we have described a very high prevalence of overweight and obesity among women in this population (52% of women had a BMI > 25 kg/m^2).[11] Several factors have been hypothesized to influence the development of the double burden of malnutrition at the household level. Garrett and Ruel [4] suggest that per capita GNP is a significant predictor of the risk of an underweight child having an overweight mother. Our results showed an association between level of income and presence of dual burden in households, although it is not statistically significant, and a significant association between educational level and presence of double burden households. It may be possible that the education of head of households represent better the socioeconomic status in this population. It has been sug-

Table IV
Risk of inadequate intakes of macronutrientes in the sample by household category

Variables	*NM/NC*		*OM/NC*		*NM/SC*		*OM/SC*		*p-value*
	High risk of inadequate intakes (%)[2]	*Moderate risk of inadequate intakes (%)*[3]	*High risk of inadequate intakes (%)*[2]	*Moderate risk of inadequate intakes (%)*[3]	*High risk of inadequate intakes (%)*[2]	*Moderate risk of inadequate intakes (%)*[3]	*High risk of inadequate intakes (%)*[2]	*Moderate risk of inadequate intakes (%)*[3]	
Ca (mg)	22.6	45.3	22.5	68.7	11.1	73.3	32.8	69.8	< 0.0001
Fe (mg)	25.0	39.8	15.1	40.0	26.7	46.7	31.9	45.28	n.s.
Mg (mg)	23.4	3.1	35.0	3.1	20.0	15.6	43.4	0.00	< 0.0001
Zn (mg)	43.8	11.7	48.8	17.5	51.1	26.7	45.3	18.9	n.s.
Vitamin C (mg)	9.4	3.1	14.4	3.1	15.7	6.7	17.0	1.9	n.s.
Vitamin A (eR)	14.1	2.3	10.0	9.4	11.1	8.9	13.2	3.8	n.s.
Vitamin B1 Thiamine (mg)	31.2	3.1	43.1	6.3	31.1	15.6	45.3	9.4	0.01
Vitamin B2 riboflavin (mg)	35.2	8.6	35.6	15.0	42.5	28.9	30.2	18.9	0.01
Vitamin B6 (mg)	20.3	0.0	26.9	2.5	31.1	8.9	24.5	0.0	< 0.0001
Vitamin B12 (mcg)	21.9	21.1	20.0	25.0	25.6	33.3	17.0	28.3	n.s.
Pantothenic	39.8	2.3	42.5	10.6	51.1	17.8	37.7	13.2	< 0.0001

The level of statistical significance between the differences percentages of the groups was performed with Chi square test (p- value < 0.05).
The percentages of coverage of vitamin and mineral requirements were calculated as the average intake divided by the RNI and this multiplied by 100. 2 A high risk of inadequate intake was set to an intake <1/3 RNI. 3 The moderate risk of inadequate intake was defined as an intake < 2/3 RNI.

Table V
Food frequency intake of different categories of household (n = 136)

Food	*Type of food*	*Servings sizes (g)*	*Median consumption**				*p value*
			NM/NC	*OM/NC*	*NM/SC*	*OM/SC*	
Cereals and grains	Bread, Tortilla and bollo, biscuits	50	4,2 ± 2,2	4,1 ± 2,7	3,8 ± 2,2	4,2 ± 1,7	n.s
Potatoes and tubers	Pasta, polenta,rice, mote, quinoa Creole potatoes, common potatoes, batata	60 150	2,4 ± 2,3	1,7 ± 0,9	1,5 ± 1,0	2,1 ± 1,0	0.00
Pulses	Lentils, chickpeas, beans, peas	60	0,5 ± 1,1	0,4 ± 0,4	0,4 ± 0,5	0,3 ± 0,3	n.s.
Meat and meat products	Chicken, beef, pork, lamb, llama, entrails, processed cold meat	50	1,4 ± 0,7	1,2 ± 0,6	1,1 ± 0,8	1,2 ± 0,4	0.01
Eggs	Hens' eggs	60	0,4 ± 0,4	0,3 ± 0,3	0,4 ± 0,3	0,3 ± 0,4	n.s.
Fish	Canned and fresh fish	60	0,0 ± 0,0	0,0 ± 0,0	0,0 ± 0,0	0,0 ± 0,0	n.s.
Milk and dairy products	Cows' milk, goats' milk, yogurt cheese	200 50	1,2 ± 1,1	1,2 ± 1,2	0,9 ± 0,8	0,8 ± 0,9	0.02
Fruits and vegetables	Fresh fruits, fresh and cooked vegetables	150	2,2 ± 0,9	2,0 ± 1,1	1,7 ± 0,8	1,8 ± 0,6	0.00
Added oil	Mixed vegetable oil	10	1,0 ± 0,6	0,8 ± 0,5	0,8 ± 0,6	1,2 ± 1,2	0.00
Animal fat used for cooking	Animal fat, butter	10	0,7 ± 0,7	0,5 ± 0,7	0,7 ± 0,8	0,3 ± 0,4	0.00
Sugary drinks	Soft drinks, powered instant juices	150	0,9 ± 0,9	0,9 ± 1,0	0,6 ± 0,9	0,6 ± 0,5	n.s.
Herbal teas	Tea, mate, herbs	200	1,9 ± 0,6	1,6 ± 0,8	1,5 ± 0,9	1,9 ± 0,4	0.00
Added sugar and sweets	Table sugar, jam, honey, dulce de leche	10	1,9 ± 1,0	1,8 ± 1,0	1,6 ± 0,7	1,7 ± 0,9	n.s.
Sweet and milk desserts¥	Api, anchi, arroz con leche	100	0,9 ± 0,5	0,4 ± 0,5	0,3 ± 0,4	0,3 ± 0,4	n.s.

*Values shown are Means ± SD.
¥Typical sweet and milk dessert were prepared with maize flour and/or milk and/or fruit juice plus sugar and other ingredients.
Classification of households: NM: Normal weight mother; OM: Mother with overweight; NC: Normal weight child; SC: Stunting child.

gested that the dual burden household is a product of the nutritional transition whereby rising national income in middle- and lower-income countries produces changes in dietary and activity patterns that increase the risk of overweigh and obesity while many of the risk factors for under-nutrition remain. Other authors suggested that poverty in low-income countries is less likely to be associated with obesity, as it is mainly the wealthy individuals in these countries that have access to refined foods and live sedentary lifestyles.[22,23] However, in Brazil the prevalence of adult overweight is rapidly increasing among low income families in which child underweight is still relevant problem.

Others studies have reported that in countries with high prevalence of low birth weight there is a greater risk of stunting and, in turn, later availability of food may lead to an increase in body weight but not height proportionately. The hypothesis of "fetal origins of disease", which is supported by a number of observational epidemiologic studies, postulates that early (intrauterine or early postnatal) undernutrition causes an irreversible differentiation of metabolic systems, which may, in turn, increase the risks of certain chronic diseases in adulthood.[24,25] Countries with stunting > 50% may have many children at risk for obesity and subsequent chronic diseases.[26]

Caballero[24] has scrutinized the phenomenon of people with high and low body weights living in the same household. The globalization of food markets has resulted in the introduction of mass-produced, low-cost foods to the domestic food supply of many developing countries. The introduction of low-cost foods products from industrialized countries greatly increased the proportion of fat calories in the average diet in countries undergoing the nutrition transition. Although many of these low-cost commercial foods are energy-dense, they may be nutrient-poor. Cheap, energy-dense, nutrient-poor foods may adversely affect the growth of the child but may provide sufficient calories for the adult to gain excess weight. Factors other than diet and lifestyle also link early undernutrition with overweight in adulthood.[24] In our population we could observe that households, in which members had an adequate nutritional status, were more likely to report a higher consumption of nutrient-dense foods (i.e. dairy, meat, fruit and vegetable, tubers) in comparison with dual burden households.

Finally, the quality and adequacy of food offered in feeding programs may not be adequate. Andean food should be enhanced for their nutritional quality, and sometimes because of the low social status are marginalized and devalued, such as quinoa, amaranth, native potatoes or llama meat. Not only should increase the supply of these foods in feeding programs as opposed to other non-native foods and lower nutritional quality, but also should be promoted production and marketing as a source of wealth for this community.

In conclusions, identifying the dual burden household is important because it represents a clustering of opposite types of malnutrition among individuals sharing the same household environment. The results presented here indicate the need to consider whether programs that focus on only one type of nutritional problem might actually exacerbate the other. Therefore, it is increasingly important for public health programs to focus on healthy diet and life style patterns that will lead to optimal health outcomes at both ends of the spectrum.

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