Main determinants of socioeconomic disparities in children and adolescents' malnutrition: evidence from Latin America

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Extended Abstract

Background and introduction
Nutrition during childhood and adolescence is fundamental to guarantee an adequate state of health, including cognitive and social development. Currently, malnutrition (understood as increasing prevalence of overweight and obesity along with the persistence of undernutrition) constitutes a public health problem for minors in Colombia, as in many other low and middle-income countries. The purpose of this paper is to contribute to the understanding of the inequalities in malnutrition in children and adolescents in Colombia. Specifically, the study attempts to estimate the socioeconomic disparities in malnutrition both in urban and rural regions, and to evaluate the factors (at the individual, household and contextual levels) that explain these disparities.

Chronic childhood malnutrition in Colombia has shown slight improvement in the last decade (passing from 15% in 1995 to 12% in 2005). However, as with various other Latin American countries, markers of inequality still persist by income level and region. The most recent Demographic and Health Survey (DHS), completed in 2005, showed that boys and girls younger than five years of age belonging to the lowest income quintile were six times more likely to suffer chronic malnutrition than those in the highest income quintile. Close to a third (27%) of children between 10 and 17 years old of the lowest wealth quintile are found to be in a state of chronic malnutrition, which represents a risk three times higher than that for children of the same age in the wealthiest quintile.

In addition to income related inequalities, regional inequalities are also marked. Ruel (2000) uses data from Colombia's Health and Demographic Survey of 1995 to show the difference in undernutrition between socioeconomic groups is twice as large in urban areas than in rural areas. This suggests the existence of living conditions in urban areas that exacerbate the nutritional situation of children from low-income households. On the other hand, the National Survey for Nutritional Status (known by its Spanish acronym ENSIN) showed that as the level of urbanization increased from 10,000 inhabitants to more than 100,000 inhabitants, the prevalence of overweight children increased from 8.5% to 14.6%.

While these inequalities have been documented for Colombia (Flórez et al., 2007; PROFAMILIA, 2005), few studies have analyzed the determinants of childhood malnutrition in a multivariate manner. What's more, these studies have concentrated on the group of 0 to 5 years old and have not analyzed the determinants of malnutrition for older children, particularly adolescents. In Colombia, malnutrition affects the population between 10 and 17 years old with the greatest severity. In 2005, 12% of children of less than 10 years of age were found to be chronically malnourished; however, the percentage for minors between 10 and 17 years old climbed to 16%.

Theoretical framework

This study takes as its starting point the conceptual framework of Mosley and Chen (2003) for the study of childhood survival in developing countries. This framework understands malnutrition as the result of an accumulative process of multiple factors and considers *proximate determinants* as well as household socioeconomic determinants. Proximate determinants are factors such as the nutritional state of the mother, parity, the use of prenatal care as well as characteristics of the child such as gender, birth weight and birth order (Gaviria & Palau, 2006; Smith et al., 2004). Household socioeconomic determinants are factors such as income level, physical condition of the dwelling, and parent's educational attainment.

In addition to these individual and household determinants, we identify a second group of environmental or contextual factors in this study. We understand these as the environmental characteristics that can have a direct effect on nutrition, independent of individual or household characteristics. For example, without access to potable water and sanitation or availability of health services, access to food or nutrients will not necessarily translate into better nutritional conditions (Uzma & Muhammad, 2004).

Data and Methods

This analysis uses the database from the National Demographic and Health Survey (known by its Spanish acronym ENDS), completed in 2005, and Colombia's 2005 census. ENDS is a random, multistage, clustered sample of children and adolescents younger than 18 and it is representative at the national and state levels.

We use two dependent variables to measure malnutrition: chronic undernutrition and being overweight/obese. To be considered chronically undernourished, the normalized value (or z-score) of the child's height must be two standard deviations or more below the mean of their age group, according to nutrition tables from the World Health Organization. Body Mass Index (BMI) is used to determine overweight and obesity.

With the goal of classifying households by socioeconomic status, we use the wealth index developed by the World Bank with the data from the health and demographic surveys. This index takes into account the possession of assets such as radio, television, refrigerator, car, motorcycle, among others, as well as physical characteristics of the household such as the source of drinking water, quality of the flooring and the use of toilets.

We identify three categories of independent variables of interest to this study. The first has to do with childcare practices related to food, hygiene and health. The second has to do with access to services such as water and sanitation as well as access to health and childcare for female heads of household. The third has to do with contextual characteristics at the level of census units (that which is closest to neighborhood) and municipalities.

These variables are first analyzed using bivariate descriptive techniques. With the goal of showing inequalities in malnutrition by socioeconomic level, the prevalences of chronic undernutrition and overweight/obesity are calculated by level of wealth quintiles for both urban and rural areas.

However, the understanding of the determinants of the inequalities in malnutrition requires

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multivariate analysis. For this, logit models are used for chronic undernutrition and being overweight/obesity (dichotomous variables). To explain the inequalities by socioeconomic level, we included several dummy variables in the model for each of the quintiles of wealth, leaving the highest group for comparison. Different groups of variables are aggregated in a sequential manner: demographic characteristics of the child and the mother, household characteristics, risk behavior and childcare behavior.

Finally, the access to service variables are added as well as the contextual variables described above. With the goal of determining the contribution of each one of these groups in explaining the inequalities in malnutrition, we will compare the reduction in the coefficients of the dummy variables in each of the models. We will determine the contribution of three groups of interest: childcare practices, access to services, and environmental/contextual factors independent of the demographic characteristics of the household. For the last group (contextual factors) we will use census-segment[1] level data.

 Preliminary results
A double burden of malnutrition is found across all age groups for both urban and rural areas. In urban areas, 12% of children younger than 5 years old are stunted (that is, they are chronically undernourished). While close to 10% of urban children 5 to 9 years old are stunted, 16.8% are overweight or obese. Similarly, 11% of urban adolescents are stunted and at the same time 15% are overweight or obese. A double burden of malnutrition is also found for rural areas, although with a substantially higher prevalence of stunting and lower rates of overweight and obesity (see Table 1).

Table 1 also shows the prevalence of undernutirtion and overweight/obesity by wealth quintile. Both in urban and rural areas a social gradient for malnutrition is found, although operating different depending on the nutritional outcome. While children and adolescents living in the poorest households are substantially more likely to be chronically undernourished, the opposite is true for overweight/obesity: children and adolescents from the richest households are more likely to be overweight or obese than their poorest counterparts.

Our preliminary results for the multivariate analysis show that about 50% of the socioeconomic disparities in undernutrition for children younger than 5 years old are due to mother's education and care practices. An additional 12% is due to access to services, particularly access to toilet sanitation.

For children between 5 and 9 years old, 50% of the disparities in undernutrition are explained by mother's education and care practices and 38% are explained by access to services. Actually, once we control for access to basic utilities (water, sanitation, garbage collection and toilet sanitation) and health services the difference in the prevalence of undernutrition between the poorest and the richest wealth quintiles is reduced by a third and is no longer significant at the 0.05 level.

In contrast, for adolescents, access to basic public utilities does not reduce the

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[1] Equivalent to "census-track" in the United States.

socioeconomic gradient observed, even after controlling for household characteristics and mother's education.

We will estimate an additional model for each of the three age groups, adding contextual characteristics that we are getting from the 2005 census at the segment level. We expect that contextual variables such as child labor conditions, school attendance rates and community participation will help to further explain this gradient.

Table 1: Nutritional status by wealth quintile, age group and residence (urban and rural).

	Urban (N=9,503)							Rural (N=4,266)					
	Wealth quintile							Wealth quintile					
	Poorest 1st	2nd	3rd	4th	Richest 5th	All chidlren	p-value	Poorest 1st	2nd	3rd	Richest 4th & 5th	All chidlren	p-value
Children under 5 yrs old													
Undernutrition Stunting	19.9	17.4	13.8	9.8	4.5	12.4	***	26.2	15.5	10.1	9.0	22.45	***
Overnutrition Overweight or obesity	16.2	22.2	24.5	23.7	27.8	23.9	**	21.5	23.2	22.6	24.8	22.05	
Children 5-9 yrs old													
Undernutrition Stunting	20.3	16.0	9.4	6.8	6.3	9.8	***	23.0	13.7	11.1	5.2	19.2	***
Overnutrition Overweight or obesity	5.8	11.3	15.0	19.8	22.6	16.8	***	7.4	10.3	10.4	16.1	8.6	**
Adolescents 10-17 yrs old													
Undernutrition Stunting	22.2	18.7	11.7	9.4	5.3	11.4	***	28.3	16.8	15.1	10.4	23.6	***
Overnutrition Overweight or obesity	6.9	10.8	14.2	16.5	20.2	15.3	***	8.9	11.1	10.2	19.9	9.9	**

***p<0.00; **p< 0.01; *p< 0.05; + p<0.1