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ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Parent's social status and children's nutrition influence on the university entrance of young adults in the last two decades in Brazil

Estado social dos pais e nutrição infantil influenciam no ingresso de jovens adultos à universidade nas duas últimas décadas

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ABSTRACT: ***Introduction:*** The analysis of social indicators and health status of parents and children is a preferred way to estimate the potential for social mobility in different societies or different periods in the same society. ***Objective:*** To analyze the evolution of educational and nutritional status of the Brazilian families by an intergenerational approach. ***Methods:*** A representative sample of the Brazilian population, consisting of parents (35 to 65 years old) and young adults (20 to 24 years old) obtained from three national surveys NHNS (1989), HBS (2003 and 2009). We performed a descriptive analysis and, for the sons, we calculated the probability of starting college using the multilevel logistic regression with random intercept model. ***Results:*** The advance of the nutritional status of young people was statistically higher than to their parents ($p < 0.005$). Social conditions experienced in childhood and family status had great influence on their later school success. ***Conclusion:*** These data indicate improvements in social status controlled by the nutritional status, initiated in the period of 1989 – 2003. Although inequality persists in the country, the family's influence declined in the period 2003 – 2009.

Keywords: Nutritional status. Educational status. Social inequity. Young adult. Social mobility. Brazil.

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RESUMO: ***Introdução*:** A análise da evolução dos indicadores sociais e de saúde de pais e filhos é uma das formas preferidas para estimar o potencial de mobilidade social nas diferentes sociedades ou entre diferentes períodos de uma mesma sociedade. ***Objetivos*:** Analisar a e evolução do estado nutricional e educacional das famílias brasileiras em uma abordagem intergeracional. ***Métodos:*** Foram utilizadas amostras representativas da população brasileiras, contendo pais (35 a 65 anos de idade) e filhos jovens adultos (20 a 24 anos de idade) obtidos a partir de três pesquisas nacionais PNSN (1989), POFs (2003 e 2009). Realizamos análises descritivas e, para os filhos, calculamos a probabilidade de iniciar o ensino superior por meio de regressão logística com intercepto randômico. ***Resultados*:** O avanço do estado nutricional dos jovens foi estatisticamente superior ao de seus pais ($p < 0,005$). As condições sociais experimentadas na infância e o estado social da família foram de grande influência no posterior sucesso escolar do filho. ***Conclusão***: Os dados aqui apresentados indicam avanços no estado social modulado pelo estado nutricional, iniciado no período 1989 – 2003. Apesar de ainda haver persistência da desigualdade a influência familiar diminuiu no período 2003 – 2009.

Palavras-chave: Estado nutricional. Escolaridade. Iniquidade social. Jovem adulto. Mobilidade social. Brasil.

INTRODUCTION

A comparison between social and health conditions experienced in childhood with those achieved in adulthood can provide a basis to estimate late outcomes and changing trends in a given society. The pooled analyses of the progress of social and health indicators — which is a proxy of human capital — is the preferred way to estimate the potential for social mobility in different societies or in different periods in the same society.

The concept of human capital focuses mainly on how much health and education can be aggregated across social strata in a population. Considering the progress of adequacy of height within groups, for example, is a good method to access the improvements in human capital. The theoretical foundation for the use of height as an indicator is that the adequacy in height is related to how much society and families invest in the child on social issues such as education and health[1,2]. This theory is justified by the association of height adjustment with favorable socioeconomic conditions, such as greater parental education and this relation could be influenced by several factors such as appropriate neonatal monitoring, good nutrition in early childhood, drug availability and positive changes in lifestyle[3].

In Brazil, epidemiological transition, with nutritional transition, brought mixed changes in health and nutrition indicators. The infant mortality rate decreased by 73.6% from 1980 to 2005, acute diarrheal disease ceased to be the second leading cause of death and their toll became only 4% in 2005[4].

In contrast, non-communicable diseases (NCDs) have become responsible for 72% of deaths in the country in 2007. Although mortality rate attributable to NCDs has decreased by 20% from 1996 to 2007, social inequality remained constant: the poorest regions of the country had the lowest decreases, and additionally they had the highest mortality rates caused by diabetes[5].

Secular changes in health and nutrition are often analyzed considering the effects of age-period-cohort. The age effect indicates changes associated with different age groups in terms of typical features of each group, such as biological, social and psychological development, as well as how each group is exposed to the environment[6]. Period effect is defined as the changes that affect all age groups simultaneously as a function of time, more specifically between time intervals[7]. Finally, the cohort effect is by definition the variation in the individual risk to have a certain disease or the risk of death according to their year of birth, which may coincide with the population exposure to risk factors over time[8].

So far, the studies conducted on social mobility in Brazil only portray the changes that happened in the Brazilian society. It is important to add to this scenario the social and temporal relationships between individuals and their group. This approach allows the analysis of an intergenerational advancement of educational and nutritional status of Brazilian families. In this context, we analyzed, in the present study, the evolution of Brazilian families with young people, regarding the relationship between education and nutritional indicators, adjusted by time and age, based on three national surveys.

METHODS

SAMPLE

A representative sample of the Brazilian population, consisting of parents (35 to 65 years old) and young adults (20 to 24 years old) of both sexes was obtained from three national surveys: from PNSN 1989 (acronym in Portuguese to the National Healthand Nutrition Survey); POF 2002/2003 (acronym in Portuguese to the Household Budget Survey) and POF 2008/2009. All surveys have probabilistic samples with national coverage, selected in multiple stages, and were conducted by the Brazilian Institute of Geography and Statistics (IBGE). Detailed description of these surveys, including sampling strategies, methods and information collected, can be found elsewhere[9-11].

Families ties were recreated from two variables: the household identifier number and individual's relationship with reference to the head of family, in this article named "parent". We grouped the eldest children (named child) within the above-cited range of age. Child and parent composed our analytical group. The study variables were: height (m), education (years of study), *per capita* income, age (years), sex and place of residence (urban and rural) of the individual.

We standardized the height for all individuals below 19 years expressing it in z-score (Z), according to the current age values established by the World Health Organization. The height of individuals

aging 19 or more was standardized using values of 19 years in references[12]. Then, the educational status and nutritional status of the group of parents and sons was classified in the following levels:

a) Educational status: Elementary (E1: 0 to 8 years), Medium (E2: 9 to 11 years) College (E3: 12 or above years).
b) Nutritional status: Below-1Z (N-); from -1Z to +1 Z (Nm); Above +1Z (N +).

Household income was, firstly, updated to current values in January 2009, including currency conversion to Brazilian Real using the National Consumer Price Index[a].

The second step was to calculate the average income in order to allow this characteristic to become a second level variable in the multilevel model, presented in the next section (data analysis), without detriment on the analysis considering that was a population data.

DATA ANALYSIS

We have compared the trajectory of parent-child over decades, calculating mean values or Odds for main characteristics. We focused on nutritional and social status.

For child, we estimated the probability of starting college in logistic regression with a random intercept model. The outcome "University" was classified as "1" if the young had at least started college and "0" when they hadn't.

To model social influence, we have chosen parental education to characterize the second level. First we set parental educational status, defined as above, to organize contextual randomization. Besides that, we calculated the mean *per capita* household income for each educational parental strata and set it as contextual determinant too. Thus, the probability of reaching university was influenced, in a fixed way, by the child's height, age, survey year, geographic area, and, in a random way, by parental educational status and *per capita* household income.

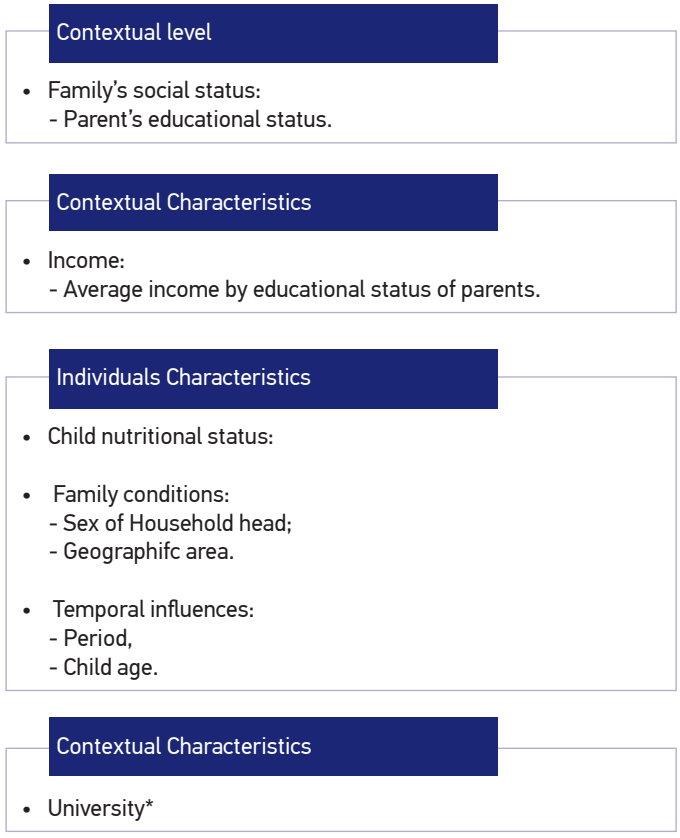
The first level of the model included individual characteristics of the offspring. So, age and nutritional status of the offspring, place of residence and period were added to the model as individual variables. The conceptual model is presented in Figure 1.

All analyses were performed using Stata SE11.2, considering the effects of complex sample in the descriptive analysis.

RESULTS

Changes between the periods 1989, 2003 and 2009 in the characteristics of Brazilian families with young adults are presented in Table1. Over the past 20 years, male members prevailed as head of family in households; however, there was an increase of approximately 50% of women in this position from 1989 to 2009.

[a]Available at www.bcb.gov.br



*To be college or graduate student .

Figure 1. Conceptual model.

It can be highlighted from these descriptive analyses that the advance of child's nutritional status was statistically higher than that of their parents: child average height difference in paired parent-offspring sample increased by 0.33 Z from 1989 to 2003 and by 0.11Z in the period 2003 – 2009 ($p < 0.05$ in both cases).

Concerning the educational status, the distance between parents and offspring at the higher education remained unchanged (Table 1). Unequal progress was observed for parents and offspring in years of schooling gain. In the first period (1989 to 2003), offspring increased by 0.23 on average each year against 0.07 for the parents. In the second period (2003 to 2009), the average gain in years of school was almost the same for the offspring: 0.22 each year. In contrast, for the parents, the increase in schooling jumped to 0.33 each year. Comparison by gender of the child revealed no difference in average years of study (data not shown).

Turning now to the raw description of the influence of parent's educational status on the offspring's achievement of higher education, data showed that the prevalence ratio of (parentsE3)/(parentsE1) for the probability of the child being at university was 4.7 in 1989, rose to 12.2 in 2003 and dropped to 5.7 in 2009.

Table 1. Distribution of socioeconomic, demographic and anthropometric features of sons and parents in Brazilian families, Brazil, 1989, 2003, 2009.

	1989	2003	2009
	n = 1,968	n = 6,312	n = 6,597
Household area			
Urban (%)	57.40	78.48	71.24
Sex of the household head			
Female (%)	23.80	34.72	35.67
Schooling of the household head			
Elementary (%)	87.06	78.25	65.19
Medium (%)	8.18	14.87	23.17
College (%)	4.76	6.89	11.64
Schooling of children			
Elementary (%)	80.74	54.13	44.34
Medium (%)	14.92	39.37	44.40
College (%)	4.34	6.50	11.26
Family income (R$*)	2,319.05	2,523.60	3,132.18
Age (years)			
Household head - Mean (SE)	51.41 (0.27)	50.44 (0.15)	50.26 (0.14)
Children - Mean (SE)	21.92 (0.05)	21.82 (0.03)	21.91 (0.03)
Height ($Z_{who2007}$)			
Household head - Mean (SE)	-1.29 (0.03)	-1.00 (0.02)	-0.95 (0.02)
Children - Mean (SE)	-0.74 (0.03)	-0.41(0.02)	-0.30 (0.02)

Brazilian Currency. SE: standard error.

When contextual level was taken into account, we considered child living conditions, including differences within and between the educational levels of parents. The probability of young adults reaching higher education changed substantially over the period analyzed. The average risk difference to begin the university from 2003 to 2009 was 0.52 (Table 2).

It is noteworthy that the social conditions experienced in childhood, in this case represented by the nutritional status of the child, were of great influence on their later school success. Not only the medium group (Nm) had better outcomes than those who had experienced the lower conditions (N-), but also those who have reached higher nutritional status (N+) got even odds 1.6 times greater than Nm.

Families in urban areas which had a male head of family had odds of 2.2 ($p < 0.05$) to have children with higher education. It is observed that the variance of the second level was strongly reduced when the adjustment for family income was made, and still practically sold out the coefficient of intraclass correlation. This shows that the model could explain individual influences, when discounting the environmental influences (Table 2).

The comparison of the crude situation of young with the predicted model showed that, in the second case, where no influence of family status was computed, socially deprived young would have had a greater chance, between 1989 and 2003, to achieve higher education;

Table 2. Odds Ratio between college students and family's characteristics, Brazil, 1989, 2003, 2009.

	Model 1 ('null')		Model 2		Model 3 ('full')	
	OR	SE	OR	SE	OR	SE
Fixed effects						
Intercept	0.35					
First level: Child						
Period						
2003*			1.27	0.15	1.27	0.15
2009**			2.14	0.24	2.14	0.24
Age**			1.16	0.02	1.16	0.02
Area (urban)**			1.57	0.05	1.57	0.11
Gender (male)**			1.41	0.04	1.41	0.08
Nutritional status						
Nm**			1.84	0.12	1.84	0.12
N+**			2.69	0.26	2.69	0.26
Second level: Parent's education						
Average income† **					3.73	0.36
Random effects						
Parents level variance (SE)	2.36 (0.97)		2.16 (0.88)		0.36 (0.24)	
ICC (SE)§	0.30 (0.17)		0.26 (0.16)		0.05 (<0.01)	
Deviance	9753.30		9377.69		9365.32	

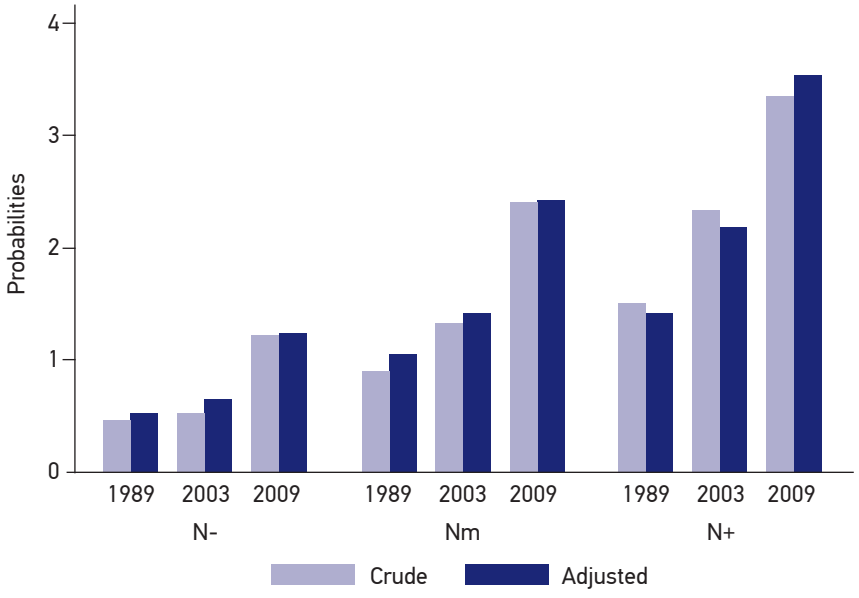
Model 1 ('null') represents the unconditional model; Model 2 represents individual covariates; Model 3 ('full') represents subject and parents school level covariates; **Significant at $p < 0.001$ level; *Significant at $p < 0.05$ level; † Represent average income from the neighbourhood; § Intraclass correlation coefficient: fraction of the total variance that is due to the school level.

the most privileged young would advance a little less in the same year (Graph 1). It was possible to observe that, in 2009, the distance between observed and expected values were smaller, which suggests lesser social determination of the family in the last six years.

DISCUSSION

Based on three national surveys, the analysis showed the intergenerational evolution of social and nutrition indicators over twenty years in Brazil. Data provided by the National Institute of Applied Economic Research[b] have already shown an increase in the schooling level (years of study) of the Brazilian population; however, these data did not prove that the evolution of this index was associated with the reduction of inequalities, especially intergenerational inequalities.

[b]Available at: www.ipeadata.gov.br



Graph 1. Crude and adjusted probabilities to reach college education by son's nutritional status, Brazil, 1989, 2003, 2009.

Schooling is considered as a structural determinant in the group of social determinants of health (SDH), sufficient to generating unequal socioeconomic positions. The SDH are also causes of inequities in health and, therefore, the public policies should be concentrated on acting over them in order to reduce inequities[13].

The improvement in schooling observed suggests the construction of social capital between the periods analyzed, and probably the greatest possibility of social mobility. Despite this progress, it is known that in 1996, for example, Brazil was still among the worst ratings in Latin America regarding the degree of intergenerational persistence (equal to 0.70) in the education category[14].

In Brazil, university studies are still delayed. Given that the ideal age to start higher education would be soon after the end of the second degree (between 17 and 19 years), this study found that the higher the age in the studied age group, the greater the chances of young adults starting college.

Inequalities in the access to higher education for families living in rural areas or with female heads of family still persist, considering that families in opposite conditions, namely living in urban areas with a male household head, had about two times more chances of starting a university course.

The causal relationship between health and social position has been studied. Cohort studies in Guatemala, India, South Africa, Philippines and Brazil allowed to associate child and maternal malnutrition, expressed by inadequacies in anthropometric indexes, with

losses in the son's human capital in adulthood, particularly short stature, inadequate school achievement, low income or purchase of goods, high BMI, high concentration of blood glucose and possibly type 2 diabetes, high blood pressure and low weight at birth of offspring[3].

There are two moments of acceleration in height gain during the linear growth period: early childhood and adolescence. Boys reach 49% and girls 52% of final height at 2 years old, and 52% and 67% respectively at 5 years old; in adolescence, individuals will reach about 20% of the height to achieve[15]. So, a person with a low height at the end of their youth is possibly one of those who persistently had bad living conditions for much of his childhood.

Child nutrition in Brazil has already been evaluated in another study in a more direct way: based on national studies, between 1996 and 2007, Monteiro et al.[16] used indicators height-for-age and weight-for-height. They found a reduction of malnutrition of about 50% in this period as a consequence of a raising in maternal education level (responsible for the largest share of this reduction – 25.7%), followed by improved purchasing power, health care and sanitation. When these data were analyzed for the northeast region, which had twice the frequency of malnutrition higher than other regions, data showed that the mother's education was responsible for a 10% decline in the prevalence of malnutrition between 1986 and 1996[16].

These data indicate that social and nutritional status improvements, which initiated in the period 1974-2003 for the population of Brazilian youngers and adults, persisted in the following years and reached the child population, the most vulnerable to unfavorable conditions.

Despite the maintenance of this scenario, there was a possibility of reducing inequality; this is seen by the distance between the families of worse and better social status: it decreases again from 2003 to 2009.

Political programs implemented in 2003-2009, such as the "Bolsa Família" (Family Allowance), which operates in income redistribution, and "PROUNI" (acronym in Portuguese for Program University for All), which aims to expand the access to university degrees, may have influenced the overall increase in the range of higher education. However, variations in economic and political factors that occurred about two decades before the study also contributed to our findings, since it is a capital built from childhood of these young people. Thus, part of the persistent inequality and of immobility interfamily nowadays are understandable, due to the absence, until recently, of policies and programs to encourage income redistribution.

If we take age-period-cohort effects analyzed, we can see the adding contribution to the recent scenario as well. Young groups increased probability to start university. When partitioned, period effect in 2003-2009 was two times higher than prior period, even when we consider 6 versus 14 years, especially due to the public policies aimed at university access. These better results than those found in cohorts come from an expansion in secondary school degree. It all contributes with virtuous sum of effect we have detected.

A limitation of this study is that its findings are based on the premise of correct representation of cohorts in each survey. Nevertheless, the improvement in the paired parent-offspring condition, found either through more traditional methods of study or through this new model, indicates an accumulation of human capital related to education and health that enables and facilitates social advancement from generation to generation in

a family. In general, improvements in nutritional status can be obtained with less economic and social inputs in a shorter time. Accumulation of human capital related to schooling demand broader investments and broader time scale.

The effects of changes in political, economic and social contexts which happened during the last twenty years on social and health indicators of young adults are not yet completely understood. However, it was possible to observe a favorable scenario in Brazil, with a relative advance in child nutrition and enrollments in higher education. It is important to further examine these questions in the light of some aspects identified in this study, particularly the determinants of differentiation observed in the development of young Brazilians.

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