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Social mobility, lifestyle and body mass index in adolescents

ABSTRACT

OBJECTIVE: To analyze the association between social mobility, lifestyle and body mass index in adolescents.

METHODS: A cohort study of 1,716 adolescents aged 10 to 17 years of both sexes. The adolescents were participants in a cohort study and were born between 1994 and 1999. The adolescents, from public and private schools, were assessed between 2009 and 2011. Lifestyle was assessed by interview and anthropometry was used to calculatebody mass index. For the economic classification, both at pre-school age and in adolescence, the criteria recommended by the Brazilian Association of Research Companies were used. Upward social mobility was categorized as an increase by at least one class in economic status within a 10-year-period. Poisson regression was used to estimate the association between upward social mobility and the outcomes assessed.

RESULTS: Among all respondents (71.4% follow-up of the cohort), 60.6% had upward social mobility. Among these, 93.6% belonged to socioeconomic class D and 99.9% to economy class E. Higher prevalence of social mobility was observed for students with black skin (71.4%) and mulatto students (61.9%) enrolled in public schools (64.3%) whose mothers had less schooling in the first evaluation (67.2%) and revaluation (68.7%). After adjustment for confounding variables, upward social mobility was associated only with sedentary behavior ($p = 0.02$). The socioeconomic class in childhood was more associated with the outcomes assessed than was upward mobility.

CONCLUSIONS: Upward social mobility was not associated with most of the outcomes evaluated, possibly as it is discreet and because the period considered in the study may not have been sufficient to reflect substantial changes in lifestyle and body mass index in adolescents.

DESCRIPTORS: Adolescent. Body Mass Index. Life Style. Social Mobility. Cohort Studies.

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INTRODUCTION

Changes in an individual's socioeconomic level throughout their life, known as social mobility, is viewed as a factor possibly related to health. Social mobility seems to accompany better or worse health, depending on the direction of the movement.[3,9]

Studies in developed countries have assessed the effect of social mobility on being overweight and on health related habits. Kendzor et al[11] (2012) observed that children who moved to lower social classes or who remained in the same low income class had greater adiposity over time than their counterparts with better socioeconomic trajectories. Social mobility in early years may be related to inherent health related behaviors, with implications for life into adulthood. Karvonen et al[10] (1999) observed that healthy behaviors in Finnish adolescents were more common among those who were moving upwards on the social scale, and less common in those who were descending, compared with those who stayed in their original class. There are few studies evaluating the impact of social mobility on the health of adolescents in developing countries.

Brazil is considered to be one of the most unequal countries in the world, even with the advances made in tackling poverty. However, a new pattern of distribution among socioeconomic classes was noted in the country between 2005 and 2010. This was due to increased income, which led to large scale social mobility. In 2010, around 31 million Brazilians improved their socioeconomic position. Among these, 19 million went from class D/E (the lowest) to class C, and around 12 million moved up to class A/B (the highest).[a]

Past socioeconomic situation may affect conditions in an individual's present life. Barros et al[2] (2006), assessing a cohort from birth to age 19 years, in Pelotas, RS, Southern Brazil observed that those who had a higher socioeconomic level at birth were taller at age 19 irrespective of their current socioeconomic level. Aitsi-Selmi et al[1] (2012), assessing a cohort in Ribeirao Preto, SP, Southeastern Brazil, showed that women who improved their social position, or who stayed in a higher class were, over time, protected from excess adiposity in adult life.

Melchior et al[15] (2007) showed that being socioeconomically disadvantaged in childhood was determinant in alcohol and tobacco dependence and greater cardiovascular risk factors in adulthood in New Zealand, even when the current socioeconomic situation was better than previously.

Faced with the possible effects that social mobility could have on health, the aim of this study was to analyze the association between social mobility, lifestyle and body mass index in adolescents.

METHODS

Study carried out with adolescents belonging to a cohort of children born between 1994 and 1995.[5] The baseline study was carried out in randomly selected health care centers in the city of Cuiabá, MT, Midwestern Brazil, between August 1999 and January 2000. There were 2,405 children aged from zero to five years who were evaluated. On reaching adolescence, the participants of the base study were located by school census (EducaCenso) and the national mortality information system. There were 1,716 adolescents of both sexes who were interviewed (follow up rate of 71.4%). More information on locating the students is described in Gonçalves-Silva et al[6] (2012).

When the children were aged between zero and five, sociodemographic and economic information on the households was obtained by interviewing the parents or guardians. Data on the adolescents were obtained by interviews, using a questionnaire on economic, sociodemographic and lifestyle issues.

The criteria recommended by the *Associação Brasileira de Empresas de Pesquisa* (ABEP – Brazilian Association of Research Companies) were used to assess economic class[b,c] (sum of material assets, purchasing power, education of household head). The households were classified into socioeconomic levels (A: highest to E: lowest). The variable of social mobility was generated based on the difference in the household's economic class in 1999/2000[b] and 2009/2011,[c] analyzing two categories: upwards social mobility and not upwards social mobility. Households who climbed by at least one economic class in the period were deemed to be upwardly mobile. Families which fell (3.3%) were grouped with those who stayed in the same economic class, as they did not substantially alter the results.

Race/skin color was self-reported and classified as follows: white, black, mulatto, Asiatic and

[a] Castro JA, Vaz FM, organizadores. Situação social brasileira: monitoramento das condições de vida 1. Brasília (DF): IPEA; 2011 [cited 2012 Jun 23]. Available from: http://www.ipea.gov.br/portal/index.php?option=com_content&view=article&id=10201
[b] Associação Brasileira de Empresas de Pesquisa. Códigos e guias: CCEB – Critério de Classificação Econômica Brasil. São Paulo: ABEP; 2003 [cited 2012 Mar 10]. Available from: http://www.abep.org/novo/Content.aspx?ContentID=302
[c] Associação Brasileira de Empresas de Pesquisa. Códigos e guias: CCEB – Critério de Classificação Econômica Brasil. São Paulo: ABEP; 2008. [cited 2012 Mar 10]. Available from: http://www.abep.org/novo/Content.aspx?ContentID=302

indigenous.[d] The Asiatic and indigenous adolescents were grouped together due to the low observed frequency. Maternal schooling in childhood, in adolescence and the schooling of the head of the household was evaluated in complete years of study and grouped into three categories: ≤ 8, 9 to 11 and > 11.

Lifestyle behaviors were defined as those that could affect the adolescents' health such as: exposure to household smoking, experimentation with alcohol and tobacco; sedentary behavior; level of physical activity; frequency of consuming meals and of some food items.

Data on exposure to household smoking was obtained by asking directly whether there were any smokers in the home. Questions on experimentation with alcohol and tobacco were taken from the *Pesquisa Nacional de Saúde do Escolar* (PeNSE – National Schoolchildren's Health Survey).[e]

Sedentary behavior was evaluated by hours spent watching television or using a computer and/or videogame. The adolescents responded to the following questions: (1) On a normal weekday, how many hours do you spend watching television? (2) On a normal weekday, how many hours do you spend on a computer and/or videogame? (Sedentary behavior: watching television and/or using a computer and/or videogame ≥ 4 hours/day).[18]

The level of physical activity was classified according to the criteria adopted by the World Health Organization (2008)[f] and categorized into two groups: inactive (< 300 minutes of physical activity/week) and active (≥ 300 minutes/week).

The analysis of the frequency with which meals were consumed considered the three main meals of the day: breakfast, lunch and dinner. A cutoff point of ≥ 5x/week was adopted as desirable. A cutoff point of > 2x/week was considered for the practice of eating a snack instead of dinner.

Food intake was obtained using the qualitative Food Frequency Questionnaire, adapted for adolescents.[17] The frequency with which food items deemed to be markers of the adolescents' diet or deemed to be healthy were consumed was assessed,[e] and categorized into ≤ 1x/week and > 1x/week.

The anthropometric assessment was carried out following the techniques recommended by Gordon et al[7] (1988). Weight was measured on a TANITA electronic scale (model UM-080), with a variation of 0.1 kg and capacity of 150 kg. Height was measured using a portable Sanny anthropometer, with variation of 1 mm and extending to 210 cm. Height was measured twice, with a maximum variation of 0.5 cm allowed between the measurements. The mean of the two measurements was used in the analysis.

Body mass index (BMI) was evaluated according to sex and age and expressed in z-scores,[16] adopting the following classification: underweight (< -2); eutrophic (≥ -2 and ≤ +1); overweight (> +1 and ≤ +2) and obese (> +2). In the analyses, that categories of no excess weight (underweight and eutrophic) and with excess weight (overweight and obese) were used.

In the bivariate analysis, Pearson's Chi-square test was used in comparisons between the proportions. The Bonferroni correction was used to locate statistically significant differences between the comparisons of the multiple proportions in the different groups. Poisson regression analysis was used to control confounding variables in the models constructed for each response variable and the principle explanatory variable was upwards social mobility. Two models were created for each outcome: the first was adjusted for maternal schooling and economic class in childhood; the second was adjusted for economic class in childhood. A limit of 5% was set for rejecting the null hypothesis in all statistic tests ($p \leq 0.05$).

The research project was approved by the Ethics Committee of the *Hospital Universitário Júlio Muller*/UFMT (Protocol no. 651/CEP-HUJM/2009). The parents or guardians of all the students signed consent forms before data collection.

RESULTS

A total of 1,716 adolescents, with a mean age of 12.2 years (standard deviation = 1.5 years) were assessed. Upwards social mobility between childhood and adolescence was observed in 60.6% of the adolescents.

Social mobility proved to be predominantly upwards. Adolescents who belonged to class D (93.6%) and E (99.9%) in childhood had the highest prevalence of upwards mobility.

Upwards mobility occurred in all race/skin color groups and reached the highest percentage in schoolchildren

[d] Instituto Brasileiro de Geografia e Estatística. Tendências demográficas: uma análise dos resultados da amostra do censo demográfico 2000. Rio de Janeiro; 2004. (Estudos e Pesquisas. Informação Demográfica Socioeconômica, 13). [cited 2012 Oct 21]. Available from: http://www.ibge.gov.br/home/estatistica/populacao/censo2000/tendencias_demograficas/tendencias.pdf

[e] Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde do Escolar – PeNSE 2009. Rio de Janeiro; 2009 [cited 2012 Jul 10]. Available from: http://www.ibge.gov.br/home/estatistica/populacao/pense/pense.pdf

[f] World Health Organization, Regional Office for Europe. Inequalities in young people´s health: health behaviour in school-aged children International report from 2005/2006 survey. Copenhagen; 2008. (Health Policy for Children and Adolescents, 5). [cited 2012 Dec 11]. Available from: http://www.euro.who.int/__data/assets/pdf_file/0005/53852/E91416.pdf

Table 1. Upwards social mobility according to sociodemographic characteristics of the adolescents, 2009 to 2011. (N = 1,716)

Variable	Total		Upwards social mobility[a]		p[f]
	n	%	n	%	
Sex					0.71
Male	870	50.7	531	61.0	
Female	846	49.3	509	60.2	
Age (years)					0.16
10	105	6.1	59	56.2	
11	603	35.1	345	57.2	
12	443	25.8	280	63.2	
13	236	13.8	146	61.9	
14 and +	329	19.2	210	63.8	
Race/skincolor[g]					< 0.001[h]
Black	259	5.1	185	71.4	
Mulatto	1,005	58.6	622	61.9	
White	371	21.6	189	50.9	
Asiatic/Indigenous	81	4.7	44	54.3	
Type of school[b]					< 0.001
Public	1,357	79.1	873	64.3	
Private	358	20.9	166	46.4	
Maternal schooling in childhood (years of study)[c]					< 0.001[h]
≤ 8	1,069	62.8	718	67.2	
9 to 11	480	28.2	251	52.3	
> 11	153	9.0	63	41.2	
Maternal schooling in adolescence (years of study)[d]					< 0.001[h]
≤ 8	563	33.9	387	68.7	
9 to 11	841	50.6	506	60.2	
> 11	259	15.6	115	44.4	
Head of household schooling in adolescence (years of study)[e]					< 0.001[h]
≤ 8	659	39.2	432	65.6	
9 to 11	764	45.4	454	59.4	
> 11	258	15.3	137	53.1	

[a] Upward social mobility: increase of at least one economic class between 1999/2000 and 2009/2011, classified according to the criteria of the Brazilian Association of Research Companies – *Associação Brasileira de Empresas de Pesquisa* (ABEP, 2003; 2008).

Data missing for: [b]1 adolescent; [c]14 adolescents; [d]53 adolescents; [e]35 adolescents.

[f] p value in Pearson's Chi-squared test.

[g] Classification according to IBGE, 2004.

[h] Bonferroni correction: skin color – proportion of upwards social mobility greater in those with black skin than in any other category, and in those who were mulattos compared to those with white skin; maternal schooling in childhood and adolescence – proportion of mothers with 8 or fewer years of schooling was higher than in other categories; head of household schooling – higher proportion of heads of household with 8 or fewer years of study than those with more than 11 years of study.

with black (71.4%) and mulattos (61.9%) and was most significant among those in public schools (Table 1). Those whose mothers had lower levels of schooling during their childhood (67.2%) and in adolescence were those who most frequently moved up the social scale (Table 1).

In the bivariate analysis, upwards social mobility proved to be directly associated with household smoking and inversely associated with experimentation with alcohol and with excess weight (Table 2). No significant association was observed between upwards social mobility and experimentation with tobacco, with sedentary behavior or with level of physical activity (Table 2).

Among those adolescents who showed upwards social mobility, eating lunch and eating snack instead of dinner was less common (Table 3). It was more common for adolescents who were upwardly mobile to consume savory snacks, sugar and fruit, and consumption of powdered drinking chocolate was lower in this group (Table 4).

Table 2. Lifestyle and body mass index according to upwards social mobility in the adolescents, 2009 to 2011. (N = 1,716)

Variable	Upwards social mobility[a]						
	Yes		No		p[c]	p[d]	p[e]
	n	%	n	%			
Household Smoking					**0.01**	0.12	0.28
Yes	311	29.9	165	24.4			
Experimentation with tobacco					0.67	0.97	0.86
Yes	41	3.9	24	3.6			
Experimentation with alcohol					**< 0.01**	0.42	0.31
Yes	376	36.2	292	43.2			
Sedentary behavior[b]					0.98	**0.02**	**0.02**
≥ 4 hours/day	473	45.5	307	45.4			
Physical activity					0.11	0.23	0.14
≥ 300 minutes/week	540	51.9	324	47.9			
Classification of body mass index					**0.04**	0.94	0.84
No excess weight	771	74.1	470	69.5			
With excess weight	269	25.9	206	30.5			

[a] Upward social mobility: increase of at least one economic class between 1999/2000 and 2009/2011, classified according to the criteria of the ABEP (2003; 2008).
[b] Hours spent watching television, using a computer or a videogame.
[c] p value in Pearson's Chi-squared test.
[d] p value in Poisson regression adjusted for maternal schooling and economic class in childhood.
[e] p value in Poisson regression adjusted for economic class in childhood.

Upwards social mobility was associated with sedentary behavior in the model adjusted for maternal schooling and economic class in childhood, and in the model adjusted only for economic class in childhood, after adjusting for confounding variables (Table 2). When upwards social mobility was adjusted for maternal schooling and economic class in childhood, this explained household smoking, the level of physical activity, frequency of eating dinner, substituting snacks for dinner and the frequency of consuming powdered drinking chocolate. Maternal schooling in childhood was shown to be positively associated with excess weight in adolescence. When upwards social mobility was adjusted only for economic class in childhood, the same associations were observed, as well as the additional association with consuming savory snacks (inverse association), with intake of milk and with excess weight (direct association).

Table 3. Consumption of meals according to the adolescents' upwards social mobility, 2009 to 2011. (N = 1,716)

Variable	Upwards social mobility[a]						
	Yes		No		p[b]	p[c]	p[d]
	n	%	n	%			
Breakfast					0.59	0.97	0.90
≥ 5x/week	716	68.8	457	67.6			
Lunch					**0.03**	0.99	1.00
≥ 5x/week	977	93.9	651	96.3			
Dinner					**0.03**	0.61	0.51
≥ 5x/eek	775	74.5	472	69.8			
Snack instead of dinner					**< 0.01**	0.91	0.74
> 2 times/week	213	20.5	180	26.6			

[a] Upward social mobility: increase of at least one economic class between 1999/2000 and 2009/2011, classified according to the criteria of the ABEP (2003; 2008).
[b] p value in Pearson's Chi-squared test
[c] p value in Poisson regression adjusted for maternal schooling and economic class in childhood.
[d] p value in Poisson regression adjusted for economic class in childhood.

Table 4. Frequency with which particular food items are consumed according to upwards social mobility in adolescents, 2009 to 2011. (N = 1,716)

Variable	Upwards social mobility[a]						
	Yes		No		p[b]	p[c]	p[d]
	n	%	n	(%)			
Soft drinks					0.11	0.28	0.40
≤ 1x/week	295	28.4	216	32.0			
> 1x/week	745	71.6	460	68.0			
Instant pasta					0.20	0.87	0.64
≤ 1x/week	812	78.1	510	75.4			
> 1x/week	228	21.9	166	24.6			
Cookies					0.59	0.73	0.73
≤ 1x/week	560	53.8	737	55.2			
> 1x/week	480	46.2	303	44.8			
Savory snacks					**0.02**	0.82	0.97
≤ 1x/week	619	59.5	442	65.4			
> 1x/week	421	40.5	234	34.6			
Potato chips					0.25	0.12	0.14
≤ 1x/week	789	75.9	529	78.3			
> 1x/week	251	24.1	147	21.7			
Sugar					**0.009**	0.72	0.81
≤ 1x/week	170	16.3	144	21.3			
> 1x/week	870	83.7	532	78.7			
Candies, toffee, chewing gum					0.58	0.77	0.58
≤ 1x/week	299	28.8	186	38.4			
> 1x/week	741	71.3	490	72.5			
Powdered drinking chocolate					**0.001**	0.51	0.41
≤ 1x/week	382	36.7	197	29.1			
> 1x/week	658	63.3	479	70.9			
Milk					0.45	0.33	0.30
≤ 1x/week	222	21.3	134	19.8			
> 1x/week	818	78.7	542	80.2			
Beans					0.90	0.73	0.72
≤ 1x/week	63	6.1	42	6.2			
> 1x/week	977	93.9	634	93.8			
Fruit					**0.01**	0.87	0.87
≤ 1x/week	15	1.4	22	3.3			
> 1x/week	1,025	98.6	654	96.7			
Vegetables					0.09	0.82	0.80
≤ 1x/week	30	2.9	30	4.4			
> 1x/week	1,010	97.1	646	95.6			

[a] Upward social mobility: increase of at least one economic class between 1999/2000 and 2009/2011, classified according to the criteria of the ABEP (2003; 2008).
[b] p value in Pearson's Chi-squared test.
[c] p value in Poisson regression adjusted for maternal schooling and economic class in childhood.
[d] p value in Poisson regression adjusted for economic class in childhood.

DISCUSSION

Economic class in childhood was shown to be more associated with the outcomes in question than upwards social mobility in the period in question. The large proportion of upwards mobility observed mainly in families from lower socioeconomic classes concords with the significant change in the structure of Brazilian

society, which occurred between 2005 and 2008. The share of the population in the lowest income groups shrank 22.8% in this period, a direct result of the upwards social mobility of 11.7 million individuals to higher income bands.[a]

A higher proportion of adolescents with black skin and mulattos showed upwards social mobility. These results confirm those published by the *Instituto de Pesquisa Econômica Aplicada* (IPEA – Institute of Applied Economic Research),[a] which showed an increase in the black population in medium and, above all, higher income bands (from 25.6% in 1998 to 33.7% in 2008).

Upwards social mobility among the participants in this study was more common among those who were more disadvantaged in the first assessment (1999/2000), belonging to lower economic classes or having mothers with lower levels of schooling. A study of Finnish men showed that schooling can contribute to improved social class. Even among individuals who were from a poor background, but had completed high school, the chance of being upwardly mobile socially was higher than those who only had primary level education.[12]

In Brazil, according to the IPEA[a] (2011), the schooling of the population sector with 11 or more years of study increased their relative share in the higher income band (from 40.0% in 1998 to 55.0% in 2008). This trend concerning maternal schooling was observed in this study, with a 29.0% decrease in mothers with ≤ 8 years of study.

Adolescents attending public school were those who were most upwardly mobile in the period, reinforcing the hypothesis that it was the poorest who most moved upwards. These results confirm the improvement in social conditions for the most disadvantaged classes in Brazil.

Upwards social mobility was shown to be independently associated with sedentary behavior. One of the hypotheses for this result is that the period evaluated may not have been sufficient for significant changes in the adolescents' lifestyle or their BMI to occur. It was not possible to identify the exact moment in which the families moved economic class. However, a persistent pattern of social inequality may contribute to the adoption of unhealthy lifestyles and to the increased prevalence in obesity in some populations.[4]

The decrease in social inequality observed in Brazil in recent years is due, in part, to the Government's creation of social programs of redistributing wealth, such as the *Bolsa Família* and the *Benefício de Prestação Continuada* programs, as well as more availability of credit. This fall merely represents a decrease in extreme poverty, insufficient to provoke great changes in the population's living conditions.

No association was observed between experimentation with tobacco and alcohol and economic class in childhood. Other factors may be more relevant to experimentation with tobacco and alcohol, as these practices are more associated with characteristics of adolescence, such as curiosity, need for group acceptance, psychosocial conflicts and trying to be independent.[19]

In the first assessment of the cohort[5] and in adolescence, being economically disadvantaged in childhood proved to be a significant factor associated with household smoking. According to the World Health Organization,[g] the prevalence of smoking is higher in more economically disadvantaged population groups. Lower levels of schooling and less access to information by those who belong to lower socioeconomic classes are factors that may explain the higher prevalence of smoking.

The adolescents' level of physical activity proved to be inversely associated with economic class in childhood. This result may be associated with the criteria used to measure the level of physical activity, as it took into consideration travelling to school on foot or by bicycle, activities more common in adolescents in lower income groups. Levels of participation in leisure time physical activities may be limited due to factors concerning lack of security, lack of time or even lack of PE classes in schools in developing countries.[18]

The type of physical activity may vary according to socioeconomic level. Male children in lower socioeconomic levels are introduced to the labor market at an earlier age, reducing their leisure time and opportunities to play sports. Male children belonging to higher socioeconomic levels often belong to sports clubs and gymnasiums and take part in more intense physical activities. Female children in lower socioeconomic levels often need to take on housework, whereas those in higher socioeconomic levels do not need to carry out this type of activities.[8]

Sedentary behavior was shown to be associated with upwards social mobility and with economic class in childhood. Even when the upwards move was slight, it was enough for the economically disadvantaged adolescents to have greater access to electronic equipment (TVs, videogames, computers), which may be explained by the greater availability of credit. Sedentary behavior was more common among young people belonging to economically privileged families,[8] probably due to the greater facility with which electronic goods are acquired. However, Malta et al[14] (2010) observed longer amounts of time spent

[g] World Health Organization. Report on the global tobacco epidemic, 2008: the MPOWER package. Geneva; 2008 [cited 2013 Jan 10]. Available from: http://www.who.int/tobacco/mpower/mpower_report_full_2008.pdf

watching television among schoolchildren in public schools, showing that differences may exist in the associations found depending on the type of sedentary behavior in question.

No significant association was found between upwards social mobility and excess weight after adjusting for economic class in childhood. Maternal schooling and economic class in childhood were shown to be directly associated with excess weight in adolescence. Better economic conditions are factors that contribute to excess weight in adolescents in low and middle income countries.[13] The *Pesquisa de Orçamentos Familiares* (POF – Household Budget Survey) (2008/2009) showed a greater prevalence of obesity in Brazilian adolescents in private schools.[h] The greater purchasing power of households in higher economic classes may explain these results because of the greater availability of food and increased possibilities for adopting sedentary behavior.

Economic class in childhood was associated with consumption of meals. The habit of eating dinner was more common among adolescents at lower socioeconomic levels in childhood; in contrast, substituting dinner with a snack was more common among those in higher socioeconomic classes. Results from the POF (2008/2009)[i] show that the traditional Brazilian diet is more commonly consumed among populations on lower incomes. Processed foods used in snacks and ready meals are more commonly consumed in higher economic classes, being more expensive.

A limitation of this study was the criterion used to measure social mobility. The economic classification of the households adopted by the ABEP takes into consideration the acquisition of consumer goods, which may have been acquired due to increased credit and not necessarily due to real increased in purchasing power. Although this criterion was not originally proposed for use in studies evaluating outcomes related to health and social well-being, it has been widely used in epidemiological studies.

The continued follow up of this cohort and the methodological refinement to measure social mobility may contribute to future assessments of the effect reducing social inequalities has on health-related events.

To conclude, this study did not show association between upwards social mobility and most outcomes in question, possibly because it was too slight or because the period evaluated was not sufficient to reflect substantial changes in the adolescents' lifestyles and BMI. However, upwards social mobility may influence health and quality of life, although by itself it cannot ensure a healthy lifestyle. Public policies to encourage healthy eating and physical activity and to discourage sedentary behavior are necessary.

[h] Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares - POF 2008-2009: antropometria e estado nutricional de crianças, adolescentes e adultos no Brasil. Rio de Janeiro; 2010 [cited 2012 Oct 20]. Available from: http://www.ibge.gov.br/home/estatistica/populacao/condicaodevida/pof/2008_2009_encaa/

[i] Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares - POF 2008-2009: análise do consumo alimentar pessoal no Brasil. Rio de Janeiro; 2011 [cited 2012 Sept 18]. Available from: http://www.ibge.gov.br/home/estatistica/populacao/condicaodevida/pof/2008_2009_analise_consumo/pofanalise_2008_2009.pdf

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