European Journal of Public Health, Vol. 21, No. 5, 649–655

doi:10.1093/eurpub/ckq071 Advance Access published on 6 June 2010

Contextual and family factors associated with negative assessment of children's health

Sandhi Maria Barreto[1], Luana Giatti[1], Angel Martinez Hernaez[2]

1 Department of Social and Preventive Medicine, Faculty of Medicine, Federal University of Minas Gerais, Brazil
2 Department of Social Anthropology and Philosophy, Universitat Rovira i Virgili, Spain

Correspondence: Prof. Sandhi Maria Barreto, Faculdade de Medicina, Universidade Federal de Minas Gerais, Av. Prof. Alfredo Balena, 190 – Sala 814, Belo Horizonte/MG – Brasil, CEP 30190-100, tel/fax: +55 31 34099014, e-mail: sbarreto@medicina.ufmg.br

Received 19 August 2009, accepted 7 May 2010

Background: The health and well-being of children are intimately linked to their families' physical, emotional and social circumstances. Evaluation of children's health has most often been based on parental responses. This work investigates whether proxy health, family context and household factors are associated with child's poor health reported by parental figures. **Methods:** Data of 32 688 children of three age-strata (0–5; 6–11; 12–17 years) were obtained from a representative survey in Brazil in 2003. The analyses used generalized estimation equations to examine the association between having a bad health evaluation and the following factors grouped as: children/adolescents characteristics, history of child's health care use, proxy characteristics and family and household factors. **Results:** Over 60% of the questionnaires were answered by the child's mother, with no significant difference among age groups. The proportion of children who had their health rated as bad decreased with age and was greater among males in all age groups (9.7%; 7.5%; 6.7% vs. 6.8%; 6.6%; 6.3%). The final model shows that household income per capita is inversely related to child's bad health in all age groups. Additionally, parent/proxy bad self-rated health is strongly and directly associated with child's bad health and is not explained by measures of the child's health or by the proxy's lack of education or a family's low income. The number of medical visits by the child in past year is also inversely associated with bad health. **Conclusion:** Results reinforce the importance of the household context to child's health and the association between parental figures and child health.

Keywords: adolescent health, child health, family context, household context, socio-economic factors, social determinants of health

Introduction

The health and well-being of children are intimately linked to their families' physical, emotional and social circumstances.[1] Health problems in childhood vary with age, gender, access to health care as well as according to parental and contextual factors surrounding the child.[2–4] For instance, there is vast literature on the influence of parental socio-economic (SE) conditions on child's health, though the impact of these conditions seems to reduce in the adolescence.[5,6]

Evaluation of children's health has most often been based on parental responses.[7] A study in UK showed that parental attitudes and beliefs about the vulnerability of their children to illness were associated with the child's number of visits to the general practitioner and of school days missed.[8] Reports of quantitative and qualitative studies also show that parents are more effective than professionals in the early diagnosis of a wide range of child health problems.[9]

Despite the validity of parent-proxy reports regarding the overall health condition of their children throughout childhood,[10] some disagreements were observed between parents' and children's self-reports among children with chronic health conditions.[11,12] Similarly, only fair concordance was found between parents and doctors when rating the functional ability of children with juvenile idiopathic arthritis. Parent rating was influenced by the level of the child's pain, whereas physician rating was associated with the severity of joint inflammation.[13] In comparison with children's self-rated pain, there was moderate agreement with their parents and poor agreement with their physicians,[14] suggesting that parents were better than physicians in rating their children's health.

The main objective of this work is to investigate whether SE factors, healthcare use and family context is associated with bad evaluation of children/adolescents' health by parental figures using data of a nationwide representative survey in Brazil. We also examine whether parents/proxies' self-rated health is related to the way they assess their child's health.

Methods

This study is based on data from the National Health Survey (PNAD) carried out in 2003 by the Brazilian Institute for Geography and Statistics (IBGE), using complex probabilistic samples, obtained in three stages, as described elsewhere.[15] PNAD investigated demographic, education, labour and household characteristics as well as selected health aspects of residents. Information was obtained by means of interviews carried out in the household. Refusal rates were 1.1% of the eligible households contacted in 2003. We studied children and adolescents aged 0–17 years living in any of the eight metropolitan regions of Brazil (Fortaleza, Recife, Salvador, Belo Horizonte, Rio de Janeiro, São Paulo, Curitiba and

Porto Alegre). In order to make the information comparable, we only included in the analysis children whose overall health condition has been evaluated by an adult proxy who lived in the same household, which comprise 89% of the participants. Thus, we excluded data obtained from a proxy who did not live in the same household of the child ($n = 1034$). Similarly, all children who provided his own health assessment ($n = 3291$) were excluded from the analysis. Due to very small numbers and because ethnical origin may influence health, we did not include in the analysis data from 81 children and adolescents classified as Indigenous and 107 as Asian.

Variables

The response variable of the study was the overall evaluation of child's health obtained from a single question ('how do you evaluate the health of.....') with five possible answers, grouped into two categories: good (very good, good) and poor (fair, bad, very bad). For 63% of the children included, the questionnaire was answered by the child's mother: 61.6% among children aged 0–5 years, 64.5% among children aged 6–11 years and 62.5% among children aged 12–17 years.

The independent variables were grouped into three blocks of co-variables in this analysis. The first set of co-variables included the factors related to the children/adolescents: (i) socio-demographic characteristics: sex, age (0–5, 6–11 and 12–17 years), race/colour (white, black and brown)—defined in these terms by the survey—and registration at school for children aged ≥6 years (yes or no); (ii) health care use: number of medical visits in past 12 months (none, 1, 2, 3 or 4 and more) and hospitalization in past 12 months (yes or no).

The second set of variables was the proxy characteristics: self-rated health, that was obtained using the same question and grouped into two categories: good (very good, good) and poor (fair, bad, very bad); proxy is the mother of the child/adolescent (yes or no); schooling (0–3, 4–7, 8–10, ≥11 years) and working situation (working, unemployed, economically inactive).

The last set of co-variables assembled family and household characteristics as follows: child/adolescent living with his/her mother (yes or no); household headed by male or female; household income per capita grouped in quintiles.

Analysis

Each age group (0–5, 6–11, 12–17) was analysed separately as a stratum because these age groups represent distinct stages of children development and degree of dependency on parental figures. Furthermore, types of health problems also vary among these age groups. A descriptive analysis of the distribution of the children with overall health evaluation as bad was carried out according to children/adolescents' socio-demographic and health characteristics, proxy characteristics and household characteristics. Normed weights were used to correct differences in the selection probabilities of each individual.[16] Univariate analyses were carried out in order to estimate the association between the children/adolescents' household and proxy characteristics with bad health evaluation. Variables associated at the level of $P < 0.20$ were included in the multivariate analysis of each set of variables separately. Age was used as a category variable (<1 and 1–5) in the analysis of children under 6 years due to great difference in needs during the first year of life and as continuous variable in the analysis of the two other age groups, First, we examined the association between bad health evaluation and children/adolescents socio-demographic characteristics. Next, we examined the association of the same response variable with children/adolescents health care use, proxy characteristics and finally with family and household characteristics. The final analysis included all variables that remained statistically associated with the response variable at the level of $P < 0.05$ in the intermediate analysis described earlier. The final analysis was carried out without any hierarchical criterion.

These analyses were carried out using multiple logistic regressions to obtain odds ratios (ORs) and 95% confidence intervals (CIs). We used generalized estimation equations which considers the correlation among individuals within the same household and models the average population response as a function of co-variables.[17] We have used Pan's[18] modification to the Akaike's information criterion, available in Stata, to select the best working correlation structure and as a goodness-of-fit statistics for model selection based on the quasi-likelihood function under the independence model. The best models were the ones with the smallest QIC and QIC_u values.

The multicollinearity among household and proxy co-variables was assessed using variance inflation factor and the condition number. Multicollinearity was not found among the variables. All the analysis was made using Stata statistical software, version 11.0 for windows.

Results

Table 1 presents the prevalence of children classified as having a bad health based on proxy reports according to child socio-demographic factors and health care use, and to proxy, family and household characteristics in the three age groups analysed. The proportion of children with bad health is greater among males in all age groups, but especially so among the youngest one. White children had the smallest prevalence of reported poor health and black children the highest. Among those at school ages (6–11 and 12–17 years), the prevalence of bad health is twice as great for those not registered at school. Prevalence of children with poor health increases directly according to the number of medical visits and is much higher among those who have been hospitalized in past 12 months.

Prevalence of children in bad health also varied according to proxy characteristics, being more elevated among proxies who rated their own health as bad/very bad and being inversely associated to proxy schooling. For the youngest and oldest children, bad health evaluation was more frequent if the proxy was unemployed. Regarding family and household characteristics, prevalence rates were higher among children living with their mother (0–5 and 6- to 11-year-old children) and in female-headed households and decreased with increasing household income per capita.

Table 2 show the results of the uni- and multivariate analyses of factors associated with poor health evaluation among 0- to 5-year-old children. In the univariate analysis, females were negatively associated with poor health evaluations. Being black or brown, age 1–5 years, increasing number of medical visits and hospitalizations were statistically and positively related to child's poor health with a clear upward trend. With regard to proxy's characteristics, schooling, unemployment and poor self-rated health were also positively associated with child's bad health evaluation. Female-headed household and lower household income per capita were associated with higher prevalence of child's bad health, with a clear inverse trend for income per capita. In the multivariate analysis, all but race/skin colour of the child, proxy's unemployment and living in a household headed by women remained statistically associated with child's poor health evaluation among 0–5 years old.

Table 3 shows the results of the uni- and multivariate analyses of factors associated with poor health evaluation among 6- to 10-year-old children. In the univariate analysis,

Table 1 Prevalence of children with poor health based on parental figures report according to child socio-demographic factors and health care use, proxy, family and household characteristics in three age groups

Child age group	0–5 years		6–11 years		12–17 years	
	N	Percentage of bad health	*N*	Percentage of bad health	*N*	Percentage of bad health
Socio-demographic characteristics of the child						
Sex						
Male	5666	9.2[a]	5970	7.5	5379	6.7
Female	5385	6.8	5550	6.6	4551	6.4
Race/colour						
White	5923	6.5[a]	5685	5.8[a]	5083	5.1[a]
Black	819	10.5	965	9.1	861	8.7
Brown	4309	9.9	4870	8.5	3986	8.3
Registered at school						
Yes	–	–	11 084	6.9[a]	9215	6.1[a]
No	–	–	436	12.2	713	12.9
Missing					2	
Health care use by the child						
Number of medical visits in past 12 months						
None	2047	4.8[a]	4206	3.8[a]	4906	4.10[a]
1	1445	5.2	2002	4.4	1722	5.5
2	1675	6.2	1957	5.9	1313	6.6
3	1425	7.4	1228	9.7	730	10.8
4 or more	4458	11.2	2127	15.1	1259	14.9
Hospitalization in past 12 months						
No	10 265	6.9[a]	11213	6.6[a]	9728	6.2[a]
Yes	785	23.1	307	24.4	201	22.4
Missing	1				1	
Characteristics of proxy						
Proxy self-rated health						
Good	8823	4.8[a]	8610	3.3[a]	7161	2.9[a]
Poor	2228	21.7	2910	20.0	2769	17.0
Relationship with child						
Mother	6776	8.3	7352	7.4	6220	6.9
Other	4275	7.6	4168	6.5	3710	6.0
Schooling (years)						
≥12	3418	4.5[a]	3199	3.7[a]	2966	3.3[a]
5–11	5821	9.0	5868	8.2	4800	7.3
0–4	1715	12.1	2325	9.3	2052	10.0
Missing	97		128		112	
Working status						
Working	5063	6.9[a]	5945	6.9	5265	5.9[a]
Unemployed	1466	11.1	1318	8.8	1032	8.5
Do not work	4522	8.3	4257	6.8	3633	6.9
Characteristics of the family and household						
Child lives with his/her mother						
Yes	10 506	7.9[a]	10 454	6.9[a]	8840	6.4
No	498	10.7	910	9.7	859	7.3
Missing	47		156		231	
Head of household						
Man	8444	7.4[a]	8571	6.6[a]	7105	5.8[a]
Woman	2657	10.1	2949	8.6	2825	8.6
Household income per capita (quintile)						
5	2017	3.4[a]	2142	2.8[a]	2366	3.2[a]
4	2067	5.7	2111	6.1	2067	5.0
3	2136	8.0	2257	7.1	1820	7.3
2	2243	9.9	2288	9.1	1741	9.2
1 (poorest)	2392	14.1	2474	11.1	1685	11.2
Missing	196		248		251	

Source: Brazil, 2003
[a] $\chi^2 \leq 0.05$

we found the same associations and directions shown previously for the younger age group, except for child's age, which was inversely related to poor health evaluation. In the multivariate analysis, increasing number of medical visits and hospitalizations in previous 12 months, schooling, working status and self-rated health of proxy, household income per capita remained statistically associated with poor health evaluation of children aged 6–10 years.

Table 4 presents the factors associated with poor health evaluation among adolescents (12–17 years old). Adolescent's age, black or brown skin colour, registration at school, number of medical visits and hospitalizations in past year were statistically and positively associated with poor health evaluation. With regard to proxy characteristics, schooling, unemployment and poor self-rated health were also related to a bad health evaluation. Prevalence of adolescents with poor health was also inversely related to household income per capita, with a clear trend. Female-headed household was also associated with poor health evaluation. In the multivariate analysis all variables but proxy unemployment and head of household

Table 2 Socio-demographic and healthcare use factors, proxy, family and household characteristics statistically associated with poor health evaluation of children aged 0–5 years

	Univariate analysis OR (95% CI)	Intermediate analysis OR (95% CI)	Final analysis OR (95% CI)
Socio-demographic characteristics of the child			
Sex			
Male	1.00	1.00	1.00
Female	0.77 (0.65–0.91)	0.77 (0.65–0.90)	0.76 (0.65–0.90)
Age, years			
<1	1.00		
1–5	1.50 (1.14–1.96)	1.49 (1.14–1.95)	1.99 (1.52–2.61)
Race/colour			
White	1.00	1.00	–
Black	1.48 (1.05–2.10)	1.46 (1.03–2.07)	–
Brown	1.44 (1.18–1.77)	1.43 (1.17–1.76)	–
Health care use by the child			
Number of medical visits in past 12 months			
None	1.00	1.00	1.00
1	1.60 (0.95–2.70)	1.54 (0.92–2.57)	1.49 (0.99–2.25)
2	1.81 (1.07–3.05)	1.67 (1.00–2.79)	1.88 (1.24–2.83)
3	2.27 (1.36–3.80)	2.02 (1.21–3.39)	2.29 (1.52–3.45)
4 or more	3.67 (2.32–5.78)	3.07 (1.96–4.81)	3.78 (2.65–5.39)
Hospitalization in past 12 months			
No	1.00	1.00	1.00
Yes	3.51 (2.72–4.53)	2.71 (2.00–3.69)	3.19 (2.42–4.19)
Characteristics of proxy			
Proxy self-rated health			
Good	1.00	1.00	1.00
Poor	5.10 (4.21–6.17)	4.79 (3.94–5.83)	4.53 (3.72–5.52)
Relationship with child			
Mother	1.00	–	–
Other	0.92 (0.76–1.13)	–	–
Schooling (years)			
≥12	1.00	1.00	
5–11	1.98 (1.59–2.47)	1.62 (1.29–2.04)	–
0–4	2.58 (1.96–3.40)	1.75 (1.31–2.33)	–
Working status			
Working	1.00	1.00	–
Unemployed	1.56 (1.18–2.05)	1.45 (1.09–1.93)	–
Do not work	1.20 (0.99–1.45)	0.96 (0.79–1.17)	–
Characteristics of family and household			
Child lives with his/her mother			
Yes	1.00	1.00	–
No	1.38 (0.91–2.09)	1.20 (0.82–1.76)	–
Head of household			
Man	1.00	1.00	–
Woman	1.49 (1.23–1.81)	1.29 (1.05–1.57)	–
Household income per capita (quintile)			
5	1.00	1.00	1.00
4	1.62 (1.13–2.33)	1.61 (1.13–2.31)	1.51 (1.05–2.18)
3	2.38 (1.70–3.34)	2.33 (1.66–3.27)	2.10 (1.48–2.99)
2	3.04 (2.18–5.95)	2.97 (2.12–4.15)	3.08 (2.18–4.34)
1 (poorest)	4.30 (3.11–5.95)	4.04 (2.91–5.61)	4.11 (2.95–5.74)

Source: Brazil 2003 ($n = 10\,850$)

remained statistically associated with child's poor health evaluation among 11–17 years old.

We have tested for a possible interaction between household income and proxy's self-rated health in each age group, but none was statistically significant (age groups 0–5: $P = 0.764$; age-group 6–11: $P = 0.390$; age group 12–17: $P = 0.123$).

Discussion

Our results are consistent with the evidence that parent's socio-demographic factors, such as schooling, and household income per capita are associated with child's poor health. Additionally, parental figures who rate their own health as bad/very bad are also more likely to evaluate the health of their children as poor.

These results also show the importance of understanding the influence of the household context in child's health. Household can be understood as both, the locality where family cultural perspectives or explanatory models on illness and health are build up[19] and the principal locus of health production through behaviours, preventive practices, material scarcity or its opposite.[20] Indeed, household can be understood as a mediator between macro-level social determinants of health and individual health status and health perception.

In this study, lower household income is related to bad health evaluation for the three age groups analysed. This result is congruent with a great corpus in scientific literature about the effect of SE status on health and, indeed, on health perception. Additionally, the results show attenuation in this effect during adolescence when compared with other age groups. Such attenuation can be attributable to the wider social and psychological autonomy in this age group which is perceived by parents as healthy status.

Table 3 Socio-demographic, health care use, proxy, family and household characteristics statistically associated with poor health evaluation by parental figures of children aged 6–11 years

	Univariate analysis OR (95% CI)	Intermediate analysis OR (95% CI)	Final analysis OR (95% CI)
Socio-demographic characteristics of the child			
Sex			
Male	1.00	1.00	
Female	0.87 (0.74–1.03)	0.88 (0.75–1.04)	
Age (years)	0.94 (0.90–0.99)	0.95 (090–1.00)	
Race/colour			
White	1.00	1.00	
Black	1.63 (1.22–2.15)	1.62 (1.22–2.16)	
Brown	1.52 (1.26–1.83)	1.51 (1.25–1.81)	
Registered at school			
Yes	1.00	1.00	
No	1.86 (1.30–2.69)	1.67 (1.14–2.43)	
Health care use by the child			
Number of medical visits in past 12 months			
None	1.00	1.00	1.00
1	1.15 (0.84–1.56)	1.12 (0.83–1.53)	1.23 (0.90–1.69)
2	1.58 (1.18–2.09)	1.51 (1.14–2.02)	1.70 (1.26–2.30)
3	2.69 (2.00–3.62)	2.55 (1.89–3.44)	3.16 (2.28–4.38)
4 or more	4.47 (3.55–5.64)	4.02 (3.17–5.11)	5.06 (3.90–6.57)
Hospitalization in past 12 months			
No	1.00	1.00	1.00
Yes	4.84 (3.51–6.68)	3.08 (2.19–4.32)	3.25 (2.24–4.71)
Characteristics of proxy			
Proxy self-rated health			
Good	1.00	1.00	1.00
Poor	7.11 (5.89–8.59)	6.97 (5.73–8.48)	6.36 (5.20–7.78)
Relationship with child			
Mother	1.00		
Other	0.88 (0.73–1.01)	0.75 (0.61–0.91)	
Schooling (years)			
≥12	1.00	1.00	1.00
5–11	2.25 (1.77– 2.87)	1.74 (1.35–2.24)	1.53 (1.15–2.03)
0–4	2.59 (1.95–3.45)	1.64 (1.21–2.22)	1.46 (1.05–2.04)
Working status			
Working	1.00	1.00	1.00
Unemployed	1.29 (0.99–1.71)	1.16 (0.86–1.55)	0.92 (0.67–1.26)
Do not work	0.98 (0.80–1.20)	0.73 (0.59–0.90)	0.68 (0.54–0.84)
Characteristics of the family and household			
Child lives with his/her mother			
Yes	1.00	1.00	–
No	1.46 (1.11–1.91)	1.37 (1.04–1.82)	–
Head of household			
Man	1.00	1.00	–
Woman	1.34 (1.10–1.63)	1.24 (1.00–1.53)	–
Household income per capita (quintile)			
5	1.00	1.00	1.00
4	2.31 (1.59–3.36)	2.36 (1.62–3.46)	1.95 (1.30–2.92)
3	2.70 (1.88–3.88)	2.71 (1.88–3.90)	2.13 (1.43–3.18)
2	3.55 (2.48–5.07)	3.58 (2.49–5.14)	2.81 (1.88–4.21)
1 (poorest)	4.41 (3.11–6.26)	4.38 (3.07–6.26)	3.57 (2.38–5.33)

Source: Brazil 2003 ($n = 11\,272$)

However, Emerson *et al.*[5] found little evidence that adolescence represents a period of relative equalization of health inequalities in a cross-sectional survey using multistage stratified random sample of households in Britain. Laflamme *et al.*[6] reached a similar conclusion in their study on risk of traffic injuries in childhood in Sweden. A study in Britain found that the association between youth' health reported by parents as fairly good/poor and SE status varies with the SE measure used, and that equalization seems to occur among young people at the top and middle levels of the social spectrum but not in the most disadvantaged groups.[21] In conclusion, the role of adolescence in the attenuation of social inequalities in health is not clear and the distribution by social class of risk behaviours in this age and their long-lasting consequences ought to be studied more in depth.[22]

Health-related variables such as number of child's medical visits in past 12 months and proxy's self-rate health (bad) do not show a similar gradient along the life cycle. The first has a strong association with child bad health evaluation, especially when the number of medical visits is four or more. The association with proxy's self-rated health is consistent and strong in all age groups, being more robust in the intermediate (6–11 years) and older age groups (12–17 years) than in the younger group. Also, the relationship between the proxy's report of the child's health and proxy's self-rated health is consistent across the five income groups, there being no statistically significant interaction between the two predictors of the child's health. The correlation between the proxy's five-point ratings of the child's health and their own health is modest; the rank correlations being 0.465, 0.451 and 0.0433 for the <5, 6–11 and 12–17 age groups, respectively.

Table 4 Socio-demographic and health care use factors, proxy, family and household characteristics statistically associated with poor health evaluation of teenagers aged 12–17 years

	Univariate analysis OR (95%CI)	Intermediate analysis OR (95%CI)	Final analysis OR (95%CI)
Socio-demographic characteristics of the child			
Sex			
Male	1.00	–	–
Female	0.94 (0.79–1.13)	–	–
Age (years)	1.06 (1.01–1.12)	1.04 (0.98–1.09)	1.07 (1.01–1.13)
Race/colour			
White	1.00	1.00	1.00
Black	1.76 (1.28–2.41)	1.72 (1.25–2.37)	1.45 (1.02–2.06)
Brown	1.57 (1.28–1.91)	1.54 (1.26–1.88)	1.21 (0.97–1.52)
Registered at school			
Yes	1.00	1.00	1.00
No	2.21 (1.68–2.92)	2.04 (1.53–2.71)	1.44 (1.01– 2.04)
Health care use by the child			
Number of medical visits in past 12 months			
None	1.00	1.00	1.00
1	1.31 (0.96–1.78)	1.29 (0.95–1.75)	1.54 (1.14–2.08)
2	1.69 (1.22–2.36)	1.67 (1.20–2.32)	1.98 (1.43–2.74)
3	2.93 (2.09–4.11)	2.83 (2.01–3.98)	3.67 (2.53–5.32)
4 or more	4.47 (3.46–5.76)	4.01 (3.08–5.21)	4.64 (3.47–6.20)
Hospitalization in past 12 months			
No	1.00	1.00	1.00
Yes	4.28 (2.89–6.34)	2.23 (1.46–3.40)	2.56 (1.44–4.55)
Characteristics of proxy			
Proxy self-rated health			
Good	1.00	1.00	1.00
Poor	6.85 (5.57–8.42)	6.27 (5.06–7.77)	5.93 (4.76–7.40)
Relationship with child			
Mother	1.00	1.00	–
Other	0.86 (0.70–1.04)	0.87 (0.71–1.07)	–
Schooling (years)			
≥12	1.00	1.00	1.00
5–11	2.340 (1.82–3.15)	1.66 (1.24–2.21)	1.49 (1.07–2.07)
0–4	3.48 (2.58–4.70)	1.99 (1.45–2.74)	1.58 (1.08–2.30)
Working status			
Working	1.00	1.00	–
Unemployed	1.57 (1.15–2.16)	1.55 (1.12–2.16)	–
Do not work	1.20 (0.98–1.48)	0.90 (0.73–1.12)	–
Characteristics of the family and household			
Child lives with his/her mother			
Yes	1.00	–	–
No	1.22 (0.90–1.64)	–	–
Head of household			
Man	1.00	1.00	–
Woman	1.53 (1.25–1.88)	1.45 (1.17–1.79)	–
Household income per capita (quintile)			
5	1.00	1.00	1.00
4	1.60 (1.12–2.30)	1.58 (1.10–2.26)	1.17 (0.79–1.73)
3	2.46 (1.74–3.48)	2.46 (1.69–3.40)	1.57 (1.08–2.29)
2	3.10 (2.18–4.40)	3.01 (2.12–4.28)	1.93 (1.29–2.89)
1 (poorest)	3.88 (2.76–5.45)	3.64 (2.58–5.14)	2.40 (1.64–3.53)

Source: Brazil 2003 ($n = 9676$)

The inverse association between health care use and child's poor health is coherent with what one would expect from a medical point of view: the worse the health, the greater the need to use medical services. Especially, if one considers that children and adolescents generally sees a doctor or goes to the hospital because of a health problem. Among infants, vaccination, which is not a health problem, is the most frequent motive of visiting a health service. However, it does not always count as a medical visit and the effect of age (<1 year vs. 1–5 years) has been taken into consideration among the youngest age group.

The opinion given by parental figures about their child's health is subjective and his/her judgement is influenced by the way they perceive and process information. Memory, emotion, information processing and motivation to respond accurately seem to influence parents and proxy views on his/her child's health.[23] The strong association between proxies' self-rated health and how they perceive their children's health suggests that these judgements are not independent from each other. This finding has also been identified previously. Children with chronic pain very often have parents with chronic pain, and parents with chronic pain often have children with chronic pain.[24] Walters *et al.*[25] reported a significant association between perceived poor global health by mothers and reporting poor child health on all domains of functioning, social role, physical and emotional health. Subjective as well as objective factors could play a role in such associations, but comparatively little is explained by the extent of illness in the child or SE circumstances of the family. For instance, poverty, diet and smoking are objective health factors shared by parental figures and children living in the same household. Similarly, social functioning, mood and family relationships can also influence health collectively. Child's health is also likely to influence parent's health.

Understanding the factors that affect self- and external reports of health is essential not only to assess externally rated data but also to use this information more critically.

Among children at school age, the negative association between children's registration at school and bad health evaluation by proxy is in conformity with other studies. In this work, school registration means being a regular school pupil. It does not refer to episodic absences due to a health problem, for instance. In Brazil, 97.2% of the children aged 7–14 years and 82.4% of those aged 15–17 years were at school in 2003.[26] In almost all countries, being not registered at school is associated with health risk behaviours such as use of illicit drugs and smoking.[27]

Unfortunately, in the present study, we do not have information on the nature of the health problems presented by the children with poor health. Distinct problems are likely to influence differently how proxies perceive a child's health. For instance, a study in Sweden found that parents tend to under-report conditions and under-rate subjective complaints from their children, especially when estimating their emotional state and symptoms of malaise.[7]

The cross-sectional nature of this study does limit the interpretation of results. However, health evaluation is a continuous and dynamic process, reflecting previous experiences and exposures as well as current ones. Understand the current factors that influence how parental figures perceive their child's health is important because they are likely to impact their subsequent actions and attitudes regarding child's health and well being.

Funding

This study was supported by the Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG). S.M.B. received a research grant from CNPq (Brazilian Ministry of Science and Technology) and L.G. from CAPES (Brazilian Ministry of Education). A.M.H. had a visiting professorship grant from CNPq (Brazil) at the Federal University of Minas Gerais during the preparation of this article.

Conflicts of interest: None declared.

Key points

- What is already known: the health and well-being of children are intimately linked to their families' physical, emotional and social circumstances.
- What the paper adds: Parent/proxy schooling and household income per capita influence how parental figures evaluate their child's health. Parents/proxies who rate their own health as bad/very bad are also more likely to evaluate their own children as also having a bad health. This is not explained by illness in the child or the SE circumstances of the family. Results reinforce the importance of the household context to child's health and the interplay between parental figures and child health.

References

1 Schor EL. American Academy of Pediatrics task force on the family. Family pediatrics: report of the task force on the family. *Pediatrics* 2003;111(6 Pt 2): 1541–71.

2 Jozefiak T, Larsson B, Wichstrøm L, et al. Quality of life as reported by school children and their parents: a cross-sectional survey. *Health Qual Life Outcomes* 2008;19:6–34.

3 Torsheim T, Ravens-Sieberer U, Hetland J, et al. Cross-national variation of gender differences in adolescent subjective health in Europe and North America. *Soc Sci Med* 2006;62:815–27.

4 Williams DR, Sternthal M, Wright RJ. Social determinants: taking the social context of asthma seriously. *Pediatrics* 2009;123(Suppl. 3): S174–84.

5 Emerson E, Graham H, Hatton C. Household income and health status in children and adolescents in Britain. *Eur J Public Health* 2006;16:354–60.

6 Laflamme L, Engström K, Huisman M. Is there equalisation in socioeconomic differences in the risk of traffic injuries in childhood? A study of three cohorts of Swedish school children. *Int J Adolesc Med Health* 2004;16:253–63.

7 Sundblad GM, Saartok T, Engström LM. Child-parent agreement on reports of disease, injury and pain. *BMC Public Health* 2006;6:276.

8 Spurrier NJ, Sawyer MG, Staugas R, et al. Association between parental perception of children's vulnerability to illness and management of children's asthma. *Pediatr Pulmonol* 2000;29:88–93.

9 Roberts H. Listen to the parents. *Br Med J* 1996;313:954–55.

10 Varni JW, Limbers CA, Burwinkle TM. Parent proxy-report of their children's health-related quality of life: an analysis of 13,878 parents' reliability and validity across age subgroups using the PedsQL™ 4.0 Generic Core Scales. *Health Qual Life Outcomes* 2007;5:2.

11 Yeh CH, Chang CW, Chang PC. Evaluating quality of life in children with cancer using children's self-reports and parent-proxy reports. *Nurs Res* 2005;54:354–62.

12 Cremeens J, Eiser C, Blades M. Factors influencing agreement between child self-report and parent proxy-reports on the Pediatric Quality of Life Inventory 4.0 (PedsQL) generic core scales. *Health Qual Life Outcomes* 2006;4:58.

13 Palmisani E, Solari N, Pistorio A, et al. Agreement between physicians and parents in rating functional ability of children with juvenile idiopathic arthritis. *Pediatr Rheumatol Online J* 2007;5:23.

14 Garcia-Munitis P, Bandeira M, Pistorio A, et al. Level of agreement between children, parents, and physicians in rating pain intensity in juvenile idiopathic arthritis. *Arthritis Rheum* 2006;55:177–83.

15 Giatti L, Barreto SM. Health, work and ageing in Brazil. *Rep Pub Health* 2003;19:759–71.

16 Brogan DJ. Pitfalls of using standard statistical software packages for sample survey data. Available at: http://www.rti.org/sudaan/pdf_files/brogan.pdf (23 December 2007, date last accessed).

17 Liang KY, Zeger LS. Regression analysis for correlated data. *Annu Rev Pub Health* 1993;14:43–68.

18 Pan W. Akaike's information criterion in generalized estimating equations. *Biometrics* 2001;57:120–5.

19 Powdthavee N. Ill-health as a household norm: evidence from other people's health problems. *Soc Sci Med* 2009;68:251–9.

20 Berman P, Kendall C, Bhattacharyya K. The household production of health: integrating social science perspectives on micro-level health determinants. *Soc Sci Med* 1994;38:205–15.

21 Spencer NJ. Social equalization in youth: evidence from a cross-sectional British survey. *Eur J Public Health* 2006;16:368–75.

22 Vuille JC, Schenkel M. Social equalization in the health of youth. The role of the school. *Eur J Public Health* 2001;11:287–93.

23 Lynn Snow A, Cook KF, Lin PS, et al. Proxies and other external raters: methodological considerations. *Health Serv Res* 2005;40(5 Pt 2):1676–93.

24 Evans S, Tsao JC, Lu Q, et al. Parent-child pain relationships from a psychosocial perspective: a review of the literature. *J Pain Manag* 2008;1:237–46.

25 Walters E, Doyle J, Wolfe R, et al. Influence of parental gender and self-reported health and illness on parent-reported child health. *Pediatrics* 2000;6:1422–28.

26 IBGE. Instituto Brasileiro de Geografia e Estatistica. Available at: http://www.ibge.gov.br/series_estatisticas/subtema.php?idsubtema=124 (15 March 2009, date last accessed).

27 West P, Sweeting H. Evidence on equalisation in health in youth from the West of Scotland. *Soc Sci Med* 2004;59:13–27.