Socioeconomic determinants of inequality and self–reported morbidity among adolescents in a developing country

Leticia Avila-Burgos, DSc, Gustavo Ramirez-Valverde, DSc, Miguel A. Martinez-Damian, PhD, Aurelio Cruz-Valdez, DSc, Maria J. Santiago-Cruz, PhD, Carlo E. Medina-Solis, MSc.

ABSTRACT

Objective: Studies about health inequalities among adolescents have been conducted principally in developed countries. Although adolescents represent 15% of the Mexican population, no studies are available in this specific age group on health inequalities. In this study, we assess differences in the perception of morbidity severity among adolescent students, as well as their association with selected socioeconomic characteristics.

Methods: We carried out a cross-sectional study (base-line of a longitudinal study of adolescent's health) in 1999. Participants were Mexican adolescents (n=12769) aged 12-19 years, attending to public schools selected through of multistage sampling method. We measured the health status through a self-reported morbidity in 2 weeks time. We included several socioeconomic indicators and for statistical analysis we used the multinomial logistic regression model.

Results: The prevalence of self-reported health problems was 32%. Women had 23% increased odds for reporting health problems. Age was positively associated to frequency and severity of health problems; also, there was a positive association with the mother's occupation, one-parent homes, and not owning an automobile.

Conclusions: Morbidity reporting rates are higher than expected in this population. Moderate reporting levels are found among social groups, especially when health problems were perceived as moderately severe, suggesting the importance of socioeconomic factors as determinants. Further studies should conducted using different kinds of health indicators in this age group.

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S tudies about health inequalities among adolescents have been conducted in developed countries such as the United Kingdom,[1,2] Finland,[3] Sweden,[4] and the United States of America.[5] These studies have used different types of health indices to measure health and have found that adolescents have a relative similarity in health levels with respect to other social groups. West[2] reported a factor that the exposure to a different environment than that of parents, such as the school. Studies[6,7] carried out in Mexico on health inequalities show that poor health conditions are found among groups with the greatest economic and social disadvantages. Nevertheless, similar to West[2] reports, it is not possible to identify whether these differences are present among all age groups and specifically among adolescents. This is due to the wide age intervals that do not specifically refer to adole-

scents. Such intervals refer to ages ≥ 5 years or ages 12-44. It is important to mention that inequality in household income distribution is one characteristic of Mexico.[8] The income of the population located at decile 10 is 4.4 times greater than that of the population located in the first 4 deciles. In 1999, 21% of the economically active population,[9] reported an income lower than the minimum wage, which at the time was equivalent to 2.42 sterling pounds per day.[10] In 2000, 9.5% of the population over 15 years of age was illiterate,[11] and only 50% of adolescents aged 16-18 years attended secondary school. Adolescents (aged 12-19 years) represent 15% of the Mexican population. Despite their size as a population group, their health-illness patterns have been barely studied. Health inequalities among adolescents, as well as the way they perceive and value health, are issues that should be addressed, since they are central to understanding their demand and utilization of health services. This knowledge would facilitate framing better health policies for this population sector, which is characterized by its low utilization of health services.[12] In this context, the objective of this study is to know whether there are health inequalities among a group of Mexican adolescents, considering the disease's severity, a characteristic often overlooked, and its relationship with socioeconomic indicators. To measure health status, we used subjective indicators such as self-reported morbidity in the previous 2 weeks and the individual's perception on disease severity of their health problem. Socio-economic indicators used are parents' occupation, education, household characteristics, income, and the deprivation index by type of locality.

Methods. The Joint Ethical Committee of the National Institute of Public Health (INSP) approved this study and we obtained a written informed consent from all participants/mothers/tutors. This project is part of a larger longitudinal study entitled "Life-styles of adolescents and young adults in Morelos State". The baseline measurement was carried out in 1999, and 2 additional measurements will be conducted in 2002 and 2004. This project presents the cross-sectional analysis of the 1999 study. The sample was selected among adolescents aged 12-24, attended to public secondary and high schools of Morelos State, Mexico. There were 3 sampling stages: the first included all municipalities (n=33); one of every 6 secondary and high schools was then systematically selected from the total in the state (n=348); finally, 40% of the school population was selected. This is a self-weighted study with equal inclusion probabilities, thus there is no need for sample weights.[13] Thirteen thousand and two hundred ninety-three adolescents participate

in this study but during the study period 1.4% had incomplete participation and some of them were absent during the day of the examination; thus, they were excluded in the study. Another 4% of the students were excluded from the study due to aged ≤ 12 or >19 years. We used 2 questionnaires, one applied to adolescents at schools, to collect confidential information on addictions, sexual behavior, and domestic violence. The second questionnaire, answered by the adolescent and their family, was used to collect information on socioeconomic characteristics, nutrition, acute morbidity self- report, and health services utilization. The dependent variable was the self-reported morbidity. The question asked for its measurement was: "Have you had any health problem in the past 2 weeks?" This question measured the acute morbidity in this group. Those who answered "yes" to this question were asked to evaluate the severity of their health problem, considering the categories of severe, moderate, and minor. In parents' occupation the category "self-employed in business" was kept as an independent category, since it included activities that assume a great diversity of investment amounts as well as work qualifications. Fortnightly family income was adjusted per capita. **Appendix 1*** shows the indicator of housing characteristics. The existences of some home appliances were considered, and added to create another index in which the highest values represent the greatest ownership of goods. The model incorporates automobile ownership as a separate variable as it represents more accurately a certain level of wealth.[14] Home structure was grouped similarly to the classifications used by Sweeting and West:[1] 0=single-parent homes, 1=reconstructed homes (when a step-parent is reported), and 2=intact homes (when both parents are reported).

In this study, the index calculated by Consejo Nacional de Población (National Population Council)[15] was used; it classifies municipalities in 5 categories of deprivation, from highest to lowest. Univariate analysis was carried out for all variables according to measure scale. Chi-squared, Spearman correlation, median differences, odds ratio, and test for trends were used to assess associations. Additionally, assuming an ordinal behavior of the dependent variable, an ordered logistic regression model was used. It was later changed for the multinomial logistic regression model, since the assumption of similar coefficients among categories was not met, an important assumption for the ordinal logistic regression model. The multinomial model is the same as the logistic regression model, except for the fact that it includes >2 categories.[16,17] This model calculates different coefficients for each

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*The full text including **Appendix 1** is available in PDF format on SMJ website (www.smj.org.sa)

category;[17] therefore, coefficients were calculated when morbidity was perceived as moderate and minor severity. The reference category was that of no health problems. Colinearity problems were observed between education and age, education was discarded, since it explained less than age did. Interactions were tested; the only significant interaction was between age and gender. The final model was controlled with variables that in bivariate analyses showed *p* values of <0.10. The coefficients are expressed as odds ratios, with 95% confidence intervals. The statistical analysis was carried out using SPSS 10.

Results. Descriptive analyses are shown in **Tables 1 and 2**. The age group with higher percentage (55.1%) was 12-13 years old. The illiteracy proportion for both parents was 9.6%, and 60% of parents had attended elementary or secondary school. The unemployment rate among parents was 8.7%. Women with less work qualification prevailed in single-parent homes and housewives in intact homes (*p*<0.05). Single-parent homes was observed and intact and reconstructed homes had adequate housing conditions (*p*<0.05). Only intact homes reported owning an automobile. This adolescent population reported 32.4% prevalence of health problems. The frequency of report of serious health problems was low (0.09%); this is why this category was collapsed together with the report of moderate health problems. Approximately, 12% had moderate health problems and 20.4% had minor health problems. The variable was categorized as 0=moderate/severity, 1=minor severity, 2=no health problems. Females had 8% greater odds of reporting health problems (95% CI 1.03-1.15) than males. Females were found to perceive their problems as more severe most frequently (*p*<0.01). Age was found to be partially associated to disease severity (trend *p*<0.01). In the multivariate model (**Table 3**) a direct association between female gender and moderately severe health problems was found (OR=1.23, 95% CI 1.10-1.37). Regarding age, adolescents aged 12-13 years had 17% lower odds (OR=0.83, 95% CI 0.71-0.96) for reporting moderately severe health problems than adolescents aged 16-19 years. When health problems were perceived as minor, age was marginally significant (*p*<0.10). An interaction between age and gender was also greater when health problems were perceived as more severe. The probability of perceiving health problems with more severity increased of 4% (OR=1.04, 95% CI 1.00-1.03) per year of age increase for male; for females this increase was 5% (OR=1.05, 95% CI 1.01-1.11). When the problem was perceived as minor, interaction was greater for females. Therefore, as females' age increases by one year, the odds increased 5% (OR=1.05, 95% CI 1.00-1.05).

Among men, this interaction was not significant when the problem was perceived as minor. Parents' education was not significantly associated with the reported severity of health problems. The mother's occupation was associated in only 2 categories: housewives and free-lance workers compared to non-manual workers. It is however interesting to note that the direction of the association was surprisingly contradictory depending upon the per-ception of the problem; whether it was considered as severe or minor (**Table 3**). There was also an important association found between perceived moderate health problems and home structure, although these differences were statistically significant for single-parent homes for reporting moderate health problems when compared with adolescents with intact homes. Housing characteristics, the per capita family income, as well as home appliances and type of area were not significantly associated with self-reported severity of health problems. Nevertheless, adolescents whose homes lacked an automobile reported severe health problems more often than those from automobile-owning households (**Table 4**).

Discussion. The prevalence (32%) of health problems reported by public school students was higher than found at the national level in 10-20 years (5-8%).[18] Studies carried out using similar indicators in other countries have reported frequen-cies of 12-14%,[4] although the population studied included young adults. The high frequency found in our study could be due to the way in which interviews were carried out; the questionnaire was given to adolescents to be answered at home with their parents; the presence of other people, as well as a calm atmosphere may have exerted some influence, resulting in a more frequent reporting of health problems. The results of this study were consistent with those from other studies[3,19-21] that have found a higher frequency of reported health problems and greater severity among female adolescents. These differences could be due to psychological factors such as stress, or a greater tendency of females to consider health as less favorable.[20] Moreover, females' greater gender rela-ted exposure to risks such as less education and less access to formal employment have been pointed out.[19] In our study, this mechanism did not seem important, since female adolescents had a greater average access to secondary schools, as well as greater education than men. As age increased, so did the probability of reporting health problems with greater severity. This is similar to findings in other studies.[14,19,21] This tendency persisted in both gender, although gradients were higher among females. Single-parent homes have higher material depri-vation,[1] significant associations between type of home and differences in health conditions would be

Table 1 - Characteristics of students aged 1-19 years, attending public schools in Morelos state, Mexico, 1999.

Variables	Males (N=5573)		Females (N=7191)		Total N=12764
	n	(%)	n	(%)	
Age (years)*					
12-13	3218	(57.7)	3811	(53)	**7029**
14-15	1536	(27.6)	2045	(28.4)	**3581**
16-17	499	(9)	905	(12.6)	**1404**
18-19	320	(5.7)	430	(6)	**750**
Adolescents' education*					
Secondary	4780	(85.8)	5902	(82.1)	**10682**
High school	715	(12.8)	1202	(16.7)	**1917**
Bachelor's degree	78	(1.4)	87	(1.2)	**165**
Home structure*					
Single-parent	288	(5.2)	571	(7.9)	**859**
Reconstructed	58	(1)	128	(1.8)	**186**
Intact	5227	(93.8)	6492	(90.3)	**11719**
Father's education*					
Illiterate	661	(11.9)	641	(8.9)	**1302**
Elementary and secondary	3141	(56.4)	4316	(60)	**7457**
High school and more	1771	(31.8)	2234	(31.1)	**4005**
Father's occupation*					
Unemployed	501	(9.7)	605	(8.9)	**1106**
Farmer	779	(15.1)	1021	(15.1)	**1800**
Manual worker	1285	(25)	1698	(25.1)	**2983**
Own business	763	(14.8)	908	(13.4)	**1671**
Employee	1820	(35.4)	2535	(37.5)	**4355**
Missing	425		424		**849**
Mother's education					
Illiterate	636	(11.4)	501	(7)	**1137**
Elementary and secondary	3254	(58.4)	4594	(63.9)	**7848**
High school and more	1683	(30.2)	2096	(29.1)	**3779**
Mother's occupation*					
Housewife	1791	(32.1)	2576	(34.1)	**4367**
Manual worker	1032	(18.5)	1239	(17.6)	**2271**
Own business	732	(13.1)	924	(13.2)	**1656**
Employee	2018	(36.2)	2452	(35.1)	**4470**
Type of municipality*					
High deprivation	2388	(42.8)	2841	(39.5)	**5229**
Moderate deprivation	1278	(22.9)	1918	(26.7)	**3196**
Low deprivation	1907	(34.2)	2432	(33.8)	**4339**

* χ^2, $p<0.05$

Table 2 - Home structure and type of work, housing conditions, and automobile ownership, among public school students in Morelos state, Mexico, 1999.

Variables	Single-parent		Reconstructed		Intact		χ^2 p value
	n	(%)	n	(%)	n	(%)	
Mother's occupation							0.00
Housewife	392	(45.6)	107	(57.5)	3868	(33)	
Manual workers	116	(13.5)	23	(12.4)	2132	(18.2)	
Own business	98	(11.4)	20	(10.8)	1532	(13.1)	
Non-manual workers	243	(29.5)	36	(19.4)	4181	(35.7)	
Father's occupation							0.00
Unemployed	25	(4.8)	4	(2.5)	1077	(9.6)	
Farmer	63	(12)	23	(14.4)	1714	(15.3)	
Manual worker	148	(28.2)	56	(35.0)	2779	(24.7)	
Own business	68	(13)	28	(17.5)	1575	(14)	
Non-manual worker	220	(42)	49	(30.6)	4086	(36.4)	
Housing conditions							0.00
Inadequate	187	(21.8)	42	(23.6)	3908	(33.3)	
Deficient	290	(33.8)	91	(48.9)	4576	(39)	
Adequate	382	(44.5)	53	(28.5)	3235	(27.6)	
Has automobile					1657	(14.1)	

Table 3 - Self-reported morbidity and demographic and socioeconomic characteristics in public school students aged 12-19 years in Morelos state, Mexico, 1999.

Variables	Self-reported severity	
	Moderate severity OR* CI 95%	Minor severity OR* CI 95%
Gender		
Females	1.23 (1.10-1.37)*	1.04 (0.96-1.15)
Males	1	1
Age category		
12-13	0.83 (0.72-0.96)*	0.89 (0.79-1.01)†
14-15	0.90 (0.76-0.06)	0.89 (0.77-1.02)†
16-19	1	1
Interaction		
Male to age*	1.04 (1.01-1.04)*	1.02 (0.99-1.05)†
Female to age*	1.05 (1.02-1.12)*	1.05 (1.01-1.05)*
Mother's education		
Illiterate	0.80 (0.58-1.1)	0.89 (0.68-1.17)
Elementary	0.88 (0.67-1.15)	0.99 (0.78-1.12)
Secondary	0.90 (0.68-1.18)	1.06 (0.84-1.35)
High school or technical	1.01 (0.77-1.32)	1.16 (0.92-1 .47)
Bachelor or more	1	1
Father's education		
Illiterate	1.14 (0.85-1.53)	0.99 (0.77-1.27)
Elementary	1.11 (0.86-1.44)	1.05 (0.84-1.31)
Secondary	1.01 (0.77-1.32)	1.01 (0.81-1.26)
High school or technical	1.10 (0.84-1.44)	1.10 (0.83-1.29)
Bachelor or more	1	1
Mother's occupation		
Housewife	1.15 (1.00-1.31)*	0.80 (0.72-0.897)*
Manual worker	0.95 (0.81-1.12)	0.97 (0.86-1.12)
Free-lance	1.06 (0.89-1.27)	0.84 (0.73-1.29)*
Non-manual worker	1	1
Father's occupation		
Farmer	0.97 (0.82-1.15)	0.96 (0.83-1.11)
Manual worker	1.05 (0.86-1.44)	1.05 (0.86-1.44)
Own business	1.01 (0.85-1.21)	1.01 (0.85-1.21)
Non-manual worker	1	1
Home structure		
One parent	1.36 (1.10-1.65)*	0.87 (0.72-1.05)
Reconstructed	1.11 (0.73-1.68)	0.87 (0.59-1.28)
Intact	1	1

Model adjustment (deviance) 0.425, Significance *$p<0.05$, †$p<0.10$. *Adjusted model by age category, gender, mother's occupation, home structure, and automobile. OR - odds ratio, CI - confidence interval

Table 4 - Self-reported morbidity and home characteristics in adolescents aged 12-19 years, attending public schools in Morelos State, Mexico, 1999.

Variables	Self-reported severity	
	Moderate severity OR* CI 95%	Minor severity OR* CI 95%
Per capita family income	1.00 (0.97-1.01)	1.01 (0.99-1.03)
Household conditions		
Inadequate	0.89 (0.77-1.01)	1.02 (0.99-1.03)
Deficient	0.94 (0.82-1.07)	0.97 (0.87-1.04)
Adequate	1	1
Home appliance		
Scarce	0.93 (0.81-1.07)	1.02 (0.90-1.03)
Deficient	0.95 (0.84-1.08)	0.97 (0.87-1.04)
Adequate	1	1
Car ownership		
No	1.25 (1.04-1.5)*	0.90 (0.90-1.14)
Yes	1	1
Type of locality		
High deprivation	0.98 (0.86-1.12)	0.97 (0.87-1.09)
Medium deprivation	0.99 (0.86-1.15)	0.97 (0.85-1.09)
Low deprivation	1	1

Model adjustment (deviance) 0.425, Significance *$p<0.05$, †$p<0.10$. *Adjusted model by age category, gender, mother's occupation, home structure, and automobile. OR - odds ratio, CI - confidence interval

attributable to structural home characteristics rather than to the type of home. In our study, no clear association was found between type of home and socioeconomic indicators. Nevertheless, there were significant associations between type of home and health problems perceived as severe, these findings are consistent with those reported by Sweeting and West.[1] There are different opinions in relation to which social indicators are better associated to health conditions. In general, it has been stated that for adolescents, the most sensitive indicators are those related with their specific activities.[2] Nevertheless, in this study, a significant association was found between the mother's occupation and perceived severity of health problems, although this association depended on the perceived severity of health problems. This finding could be understood in part, if we consider that different people have different perceptions of severity, as well as different health expectations. Groups that are socially disadvantaged may have low health expectations or less clarity in their concept of health.[22] As methodological note, even though a house ownership indicator was not available in this study, automobile ownership as an economic indicator[14] proved to be more useful in comparison to family income, deprivation, housing conditions or quantity of assets, since it allowed for the identification of health inequalities; this association has been documented in other studies[21] that also used subjective indicators. Since the study population consisted of adolescent students, it is important to stress the family environment as a determining factor of health status; in spite of this, only modest gradients were found with greater perceived severity of self-reported health problems. West[2] has recognized the possibility of differences among social groups for this age group in severe cases of illness, or in extreme cases of economic disadvantages. In spite of the importance of adolescents as a population sector in Mexico, their health-disease patterns and social determination of inequalities have been little explored and this group is characterized by low utilization rates of health services;[18] it has been reported that could be due to their low morbidity and mortality rates.[20] Nevertheless, our findings show that there are modest differences in self-reporting by social groups for this young population sector, and this could increase if their health needs are not addressed. Even though the use of subjective indicators for health measurements has been questioned due to their dependence on cultural, educational, and ethnic factors,[23] and even on access to health services,[24] it has been demonstrated that they are good predictors of future mortality.[25,26] Moreover, they have been recognized as useful indicators among adolescent groups,[3] and because they can be easily applied to large population groups. An additional advantage of subjective indicators is that they allow the collection of a great diversity of socioeconomic data simultaneously, which facilitates the analysis of relationships to determine health inequalities across social groups.[27] In Mexico, the use of this type of indicators is recent and scarce; more studies are required to measure responses and to relate them with objective measures of confirmed results that also include disease severity.

In conclusion, results in this study showed the existence of modest gradients when health problems were perceived as moderate. Age and female gender, as well as single-parent homes, and lack of an automobile were positively associated with more frequent self-reporting of moderate health problems. Mothers' occupation was also significantly associated, even though the direction of the association changed depending on the perceived severity of the health problem. Further research on health inequalities analysis among social groups from a socioeconomic perspective will favor understanding on the causes of health differences. Combining this with the analysis of determinants of service utilization will allow a more effective policy design, which may help to improve health services access by dis-advantaged population sectors, or groups with low utilization rates of health services.

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