





# The Impact of Socioeconomic Inequality on Mental Health among Adolescents in Qazvin, Iran: Blinder-Oaxaca Decomposition Method

Elahe Jafari<sup>1</sup>, Mohammadreza Pirmoradi<sup>2</sup>, Elham Mohebbi<sup>3</sup>, Manar Ahmed Kamal<sup>4</sup>, Zahra Hosseinkhani<sup>1,5\*</sup> , Majid Meshkini<sup>1\*</sup> 

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## Abstract

**Background:** Mental health is integral to public health in adolescents. Although previous studies have shown that low socioeconomic status (SES) is associated with mental disorders (MD), it is unclear which mental health domains are most important. Thus, our study aimed to investigate the associations between 5 domains of mental disorder and SES inequality in adolescents.

**Methods:** We conducted a cross-sectional study among adolescents (N = 1724). Associations between SES inequality with mental disorders, such as emotional symptoms, conduct problems, hyperactivity, peer relationship problems, and prosocial behavior, were examined. We used the concentration index (CI) to determine inequality. The gap between the low and high socioeconomic groups was decomposed into its determinants using the Blinder-Oaxaca decomposition method.

**Results:** Mental health's overall CI was  $-0.085$  ( $P < 0.001$ ). The emotional problem was primarily caused by SES inequality ( $-0.094$  [ $P = 0.004$ ]). Decomposition of the gap between the 2 economic groups showed that physical activity, school performance, exercise, parents' smoking status, and gender were the most important determinants of inequality.

**Conclusion:** SES inequality plays a vital role in adolescents' mental health. It seems that the emotional problem domain of mental health might be more amenable to interventions than other domains.

**Keywords:** Health Status Disparities, Socioeconomic Factors, Mental Health, Adolescent, Iran

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## Introduction

Mental health is an integral part of public health in adolescents (1, 2). Worldwide, 13.4% of children and adolescents experience mental health disorders (3). Half of mental health disorders initiate by the age of 14 (4). Etiological factors—such as low socioeconomic status (SES), low parental education, and parental occupation status—have been identified to negatively affect mental health in the adolescent population (5-7). Mental health issues of the future

generation of adolescents are associated with the socioeconomic deprivation of their parents (8).

Socioeconomic status has been identified as a risk factor for mental disorders—such as depression, stress, and anxiety in adolescents (9). A few studies described the existence of inequality in health and mortality in children and adolescents (10, 11). The PERSIAN cohort study results show that socioeconomic disparities in poor mental health were

**Corresponding author:** Dr Zahra Hosseinkhani, [z.hosseinkhani@iums.ac.ir](mailto:z.hosseinkhani@iums.ac.ir)  
Dr Majid Meshkini, [meshkini.m@iums.ac.ir](mailto:meshkini.m@iums.ac.ir)

1. Department of Epidemiology, School of Public Health, Iran University of Medical Sciences, Tehran, Iran
2. Department of Clinical Psychology, School of Behavioral Sciences and Mental Health, Iran University of Medical Sciences, Tehran, Iran
3. Department of Oncology, Lombardi Comprehensive Cancer Center, Georgetown University, Washington, DC, USA
4. Faculty of Medicine, Benha University, Benha, Egypt
5. Metabolic Diseases Research Center, Research Institute for Prevention of Non-Communicable Diseases, Qazvin University of Medical Sciences, Qazvin, Iran

### ↑What is “already known” in this topic:

Mental health problems are a serious concern during adolescence. The relationship between socioeconomic status (SES) and mental health problems has been reported. The disadvantageous effects of low SES on mental health problems have been proven in several studies.

### →What this article adds:

This article illustrates how adolescent mental health issues are impacted by SES inequality. The effective factors that reduce SES inequality are also demonstrated.

mainly explained by gender, age, and physical activity (12). Consistent with these findings, several studies in Iran represent a correlation between low SES and higher incidence rates of non-communicable diseases (13, 14). Also, psychiatric problems and violent behaviors are more common among the group with lower SES (15). In addition, the association between low SES and mental disorders has been explored in adolescents and children in developing countries (16-18).

Effective mental disorder (MD) control programs require investigating the prevalence and predictors of MD among different groups to optimize prevention strategies. There is little research on the effects of MD in adolescents from various SES levels. Here, we determine the prevalence of MD in adolescents between socioeconomic groups and use the Oaxaca-Blinder decomposition to identify factors associated with observed differences in MD and emotional problems prevalence between SES groups.

## Methods

### Study Design

We performed a cross-sectional study according to the Strengthening the reporting of observational studies in epidemiology Statement Checklist for cross-sectional studies in Qazvin, Iran. A stratified multistage cluster sampling method was used in this study. We classified the first and second periods of high schools based on the list of the type of schools, that is private, public, and special schools. A total of 30 students were randomly selected from each of the 53 schools in Qazvin. Parents and students signed the consent form before the study. The questionnaires were completed by students without mentioning their names (19).

### Data Collection

A self-administered 25-item Strengths and Difficulties questionnaire (SDQ-25) was used to detect potential mental disorders such as conduct disorder, emotional problems, peer problems, and hyperactivity. A score of 0 to 17 is classified as having high mental health, and a score of 18 to 40 is classified as having low mental health. Detailed analysis of the questionnaire is explained elsewhere. The validity and reliability of this questionnaire have been evaluated in Iranian adolescents and adults. The Cronbach alpha of this questionnaire in the Persian version is 0.82 (20).

### Statistical Analysis

Principle Component Analysis (PCA) was used to estimate SES among participants. The assets that were questioned about were as follows: personal computers/laptops, refrigerators/freezers, LCD TVs, PlayStations/Xboxes, parents owning a car (other than a taxi, agricultural machines, or bus), the number of owned vehicles, going to the movies or eating out in the previous month, additional education in private institutions, parents owning a house, private rooms for each member of the family, and experience traveling domestically and internationally. All variables were binary (yes or no); we used tetrachoric correlation before PCA analysis (21).

To estimate the impact of socioeconomic inequality on

mental health, we used a concentration index (CI) approach; the CI is defined based on a concentration curve (CC) (21). After that, the significant variable was entered into the logistic regression model and utilized to conduct a functional analysis of the variables that had been kept. Those variables with the statistical significance were entered into the Blinder-Oaxaca decomposition model. This strategy, which compared the 2 groups using 2 components, breaks down the disparity between low and high SES. The explained part reflects differences in the magnitudes of the determinants of mental health between populations; for example, it describes differences in gender or academic performance between the 2 SES. The unexplained component is attributable to group differences in the effects of these determinants (22, 23). Before decomposing, we identified MD's determinants using a linear regression model. The forward strategy, recommended by Hosmer-Lemeshow (24), was used to build the model. All analyses were performed in STATA software Version 11/SE.

## Results

### Baseline and Demographic Characteristics

We enrolled 1724 participants in the analysis. The mean age was 15 years ( $\pm 1.7$ ) (range, 12-19 years). The frequency (%) of those with mental disorders was 428 (24.83). The demographic characteristics of the participants are presented in Table 1. As shown, the participants were mostly in the first grade of school (52.38%). The majority of them (50.12) were girls. It should be noted that economic tertiles were created by splitting participants' economic scores from PCA into 3 groups. A total of 135 participants did not answer the questions on asset variables. Thus, the financial score and economic tertiles were unknown to them.

Figure 1 illustrates the concentration index of MD disorders. Adolescents in Qazvin who belonged to lower socioeconomic status suffered more mental disorders than those with higher socioeconomic status (CI,  $-0.085$ ;  $P < 0.001$ ). Emotional issues also considerably differed by socioeconomic class (CI,  $-0.094$ ) and peer problems (CI,  $-0.020$ ).

We entered all variables with a significance level below 0.2 in the multivariable linear regression. The variables with a significance level below 0.1 in this step, including gender, school performance, physical activity, and parents' smoking, remained in the final model, as presented in Tables 2 and 3.

Table 1. Demographic Characteristics of Participants, Qazvin, Iran, 2018

Variable	Mean/ Number	SD/Proportion
Gender (girls)	864	50.12
Grade school (first)	903	52.38
Physical activity	247.16	7.76
School performance	18.02	0.08
Secondhand of parents smoking (yes)	265	15.59
Mental health (Low)	428	24.83
Socioeconomic status		
Poor	569	35.90
Mid-	502	31.67
Rich	514	32.43

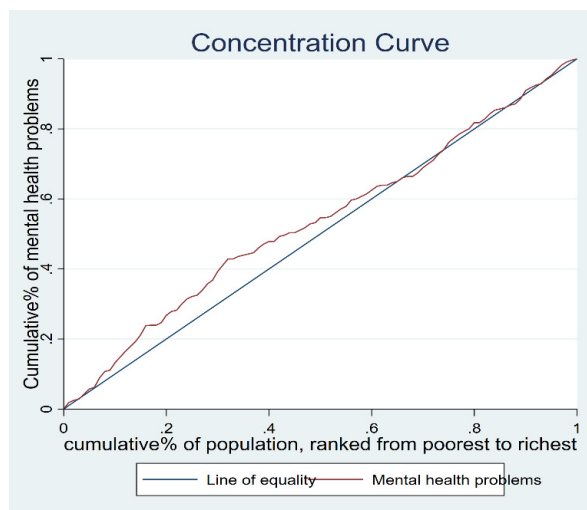


Figure 1. Concentration curve of mental disorders in adolescents, Qazvin, Iran, 2018 (Concentration Index:  $-0.085$  ( $P < 0.001$ )).

### Mental Disorders

Table 2 shows that in low SES areas, girls were more likely than boys to have mental illnesses. (odds ratio [OR], 2.02; 95% CI, 1.43-2.85). Mental disorders were more prevalent among those with less than 150 minutes of exercise per week than others (OR, 1.46, 95% CI, 1.02-2.07). Parents' smoking status (OR, 1.75; 95% CI, 1.17-2.24). Mental disorders were prevalent among students with poor academic achievement (OR, 1.75; 95% CI, 1.25-2.44).

### Socioeconomic Inequality and Mental Disorders

The prevalence of mental disorders was higher among those in the low SE group (29.91%,  $P < 0.001$ ) than those in the high SE group (21.99%;  $P < 0.001$ ). About 54.36% of the total difference in mental disorders prevalence was related to factors in our decomposition model. School performance had the most significant contribution and was associated with 27.18% of the observed difference in mental disorders between high and low SES groups ( $P = 0.001$ ). Other sources of this inequality were gender (8.09%), parents' smoking status (9.10%), and physical activity (10.11%). The negative sign of gender, school achieve-

ment, parents' smoking status, and physical activity suggests that if the levels of each variable were the same for low and high SES groups, mental problems would be more common among low SE groups (Table 4).

Around 45.64% of the variation in the prevalence of mental disorders among teenagers could not be explained by the decomposition model. For the unexplained part of the model, the difference in coefficients of gender was statistically significant ( $P = 0.007$ ), meaning that gender has a more significant association with mental disorders prevalence among the low SE group than in high SES group. However, the coefficient of the variables for physical activity, secondhand smoking, and school performance was not statistically significant (Table 3).

### Emotional Problems

As shown in Table 3, in the low SES group, girls (OR, 3.42; 95% CI, 2.39-4.89) were likely to have emotional problems. Parents' smoking status (OR, 1.41; 95% CI, 1.01-2.11) and physical activity (OR, 1.44; 95% CI, 1.01-2.05) were associated with emotional problems. Those who had poor school performance (OR, 1.47, 95% CI, 1.04-2.05) suffered more from emotional problems.

### Socioeconomic Inequality and Emotional Problems

The prevalence of emotional problems was higher among the low SE group (30.79%;  $P < 0.001$ ) than in the high SES group (21.79%;  $P < 0.001$ ). School performance was the essential variable related to 22.23% of the difference between low and high SE groups for emotional problems—a difference reaching statistical significance ( $P = 0.004$ ). Gender (17.80%), parents' smoking status (7.78%), and physical activity (2.67%) were other impressive variables. The unexplained part of the model was responsible for 48.88% of the observed difference. Variables in the unexplained part of the model were not statistically significant (Table 5).

### Discussion

We investigated the impact of socioeconomic factors on MD in adolescents. In particular, SES among adolescents could explain substantial variations in MD and emotional problems. Our main finding was that mental illnesses and

Table 2. Adjusted associations between mental health disorders, emotional problems, and their determinants based on the logistic model among adolescents by socioeconomic status, Qazvin, Iran, 2018

Variable	Low Socioeconomic Level		High Socioeconomic Level	
	OR	95% CI	OR	95% CI
Gender				
Boys	Ref.		Ref.	
Girls	2.02	1.43, 2.85	1.05	0.699, 2.03
Physical activity (in the week)				
More than 150 min	Ref.		Ref.	
Less than 150 min	1.46	1.02, 2.07	1.42	0.993, 2.051
School performance <sup>a</sup>				
High	Ref.		Ref.	
Low	1.75	1.25, 2.44	1.58	1.11, 2.26
Parents' smoking status				
Yes	Ref.		Ref.	
No	1.75	1.17, 2.24	1.19	0.699, 2.03

Abbreviations: OR, odds ratio; CI, concentration index; <sup>a</sup> grade score of point average.

**Table 3.** Adjusted Associations Between Emotional Problems and Their Determinants Based on the Logistic Model Among Adolescents by Socioeconomic Status, Qazvin, Iran, 2018

Variable	Low Socioeconomic Level		High Socioeconomic Level	
	OR	95% CI	OR	95% CI
Gender				
Boys	Ref.		Ref.	
Girls	3.42	2.39, 4.89	2.57	1.77, 3.72
Physical activity (in the week)				
More than 150 min	Ref.		Ref.	
Less than 150 min	1.44	1.01, 2.05	1.24	0.86, 1.79
School performance <sup>a</sup>				
High	Ref.		Ref.	
Low	1.47	1.04, 2.05	1.20	0.84, 1.72
Parents' smoking status				
Yes	Ref.		Ref.	
No	1.41	1.01, 2.11	1.53	0.904, 2.61

**Table 4.** Decomposition of the Gap Between the Low and High Economic Groups in Mental Disorder and Description of the Contribution of Each Variable in Creating this Gap in the Explained and Unexplained Components, Qazvin, Iran, 2018

Results of Blinder-Oaxaca of MHD	Prediction	95% CI		P-Value
prevalence of MD in high SES group	21.99%	0.1833	0.2566	< .001
prevalence of MD in low SES group	29.91%	0.2613	0.3369	< .001
Differences (total gap)	-0.0791	-0.1318	-0.0265	0.003
1) Due to Endowment (explained):	Prediction	95% CI		P-value
Gender	-0.0064	-0.01300	0.0001	0.050
Parents' smoking status	-0.0072	-0.0146	0.0001	0.050
Physical activity	-0.0080	-0.0151	0.0001	0.048
School performance	-0.0215	-0.0357	-0.0073	0.003
Due to endowments (explained)	-0.0430	-0.0610	-0.0243	<.001
2) Due to Coefficients (unexplained)	Prediction	95% CI		P-value
Gender	-0.0725	-0.1256	0.0195	0.007
Parents' smoking status	-0.0089	-0.0314	0.0140	0.442
Physical activity	-0.0415	-0.1020	0.0190	0.179
School performance	0.0030	-0.0500	0.0553	0.918
Due to coefficients (unexplained)	-0.0364	-0.0903	0.0173	0.184

Abbreviations: MD, mental disorders; CI, concentration index.

<sup>a</sup> High economic group: group with an economic score equal to or more than the median<sup>b</sup> Low economic group: group with an economic score lower than the median.<sup>c</sup> It was calculated via dividing prediction into the total gap (-0.0791) for each variable**Table 5.** Decomposition of the Gap Between the Low and High Economic Groups in Emotional Problems and Description of the Contribution of Each Variable in Creating this Gap in the Explained and Unexplained Components, Qazvin, Iran, 2018

Results of Blinder-Oaxaca	Prediction	95% CI		P-value
prevalence of EP in high SES group	21.79%	18.13	25.44	< .001
prevalence of EP in low SES group	30.79%	26.98	34.60	< .001
Differences (total gap)	-0.0900	-0.1428	-0.0372	0.001
1) Due to Endowment (explained):	Prediction	95% CI		P-value
Gender	-0.0160	-0.0297	-0.0023	0.022
Parents' smoking status	-0.0070	-0.0139	0.0002	0.030
School performance	-0.0202	-0.0339	-0.0065	0.004
Physical activity	-0.0024	-0.0092	-0.0044	0.043
Due to endowments (explained)	-0.0460	-0.0665	-0.0244	<.001
2) Due to Coefficients (unexplained)	Prediction	95% CI		P-value
Gender	-0.0402	-0.0927	0.0122	0.133
Parents' smoking status	-0.0042	-0.0262	0.0177	0.706
School performance	-0.0136	-0.0647	0.0374	0.601
Physical activity	0.0370	-0.0965	0.0233	0.231
Due to coefficients (unexplained)	-0.0450	-0.0970	0.0080	0.096

Abbreviations: MD, mental disorders; CI, concentration index.

<sup>a</sup> High economic group is a group with an economic score equal to or more than the median.<sup>b</sup> Low economic group: group with an economic score lower than the median.<sup>c</sup> It was calculated via dividing prediction into the total gap (-0.0900) for each variable

their domains were more prevalent among adolescents with lower SES. Decomposition of the observed gaps in the prevalence of MD showed that school performance was the most critical contributor to the discrepancy. About half of the total gap in the majority of MD between high and low socioeconomic groups was attributable to differences in school performance, parents' smoking status, physical activity, and gender.

School performance was the most significant contributor

to economic inequality in MD and emotional problems; in particular, it was responsible for more than 22% of the disparity. Higher school performance as a proxy of SES suggested that the higher SES could prevent MD and emotional problems. In other studies, this factor has also been reported to be the most critical contributor to economic inequality in MD and emotional problems (25, 26).

Low school performance was an independent risk factor for mental health and emotional problems because of a lack

of educational family support (27). In contrast to low SES, those who live in high SES families could access more financial support (28). We recommended school performance interventions at the community level to reduce socioeconomic inequalities in MD and emotional problems.

Gender was the second most important contributor to inequality in emotional problems and the third in mental disorders. Parents with a better economic status might discriminate less against children by gender (29). Also, logistic regression results showed that being a girl could be a risk factor for MD and emotional problems. In addition, in unexplained components of Blinder-Oaxaca decomposition in MD, the most critical variable was gender. Negative values for these variables showed the gap in their effects on MD favored the high economic group. Hence, taking into account the girls from low SES homes and raising their awareness about gender equality, maintaining their health, and restoring their mental health during menstruation circumstances may prevent MD and emotional issues. Parents who smoked were concentrated in the low economic status group (30). Thus, parents' feasible tobacco cessation program in schools could be a preventive strategy to increase SES levels and decrease MD. In addition, physical activity was another inequality factor. Evidence indicates adolescents' intensity of physical activity in low SES groups (31). A school-based program to improve physical activity in adolescents of low socioeconomic status would be essential.

It is also essential to know that the P value was significant in the peer-pressure problem, but the inequality was very low. Therefore, it was not sufficient for decomposition analysis. The study provides information about how peer pressure and socioeconomic status have played a role in cybercrime (32). Also, adolescents with lower socioeconomic status experience weaker social connections than their peers (33). Recognizing peer pressure is also important for comprehending wellbeing disparities because it can be just as strong or even stronger than a family's financial situation (34).

This study has 2 limitations. First, the generalizability of our results may be slightly low due to focusing on adolescents in the city of Qazvin. Nonetheless, according to data from the Statistical Center of Iran, the socioeconomic features of the people in Qazvin were roughly comparable to those of the urban population in Iran. Thus, our results can be generalizable to the Iranian urban adolescent population.

Second, the diagnostic tools were the summary form of the SDQ, which did not include all MDs. The data weren't gathered to provide the intended answer. Prior to gathering data, it is preferable to take into account additional factors, such as consulting a psychologist, the standard of mental health services offered in schools and society, et cetera. The large sample size of our study, the use of principal component analysis for dual-state questions, which has been underutilized or not reported in most publications, and lastly the use of the Blinder-Oaxaca Analysis were all strengths of our study. Also, health services can use the results of this study to reduce the gap between groups in society. Since most adolescents in Iran go to school, school students are a good representative of the adolescent population of Qazvin, and these results can be generalized to adolescents.

## Conclusion

Overall, adolescents from lower socioeconomic backgrounds may experience higher mental health issues. Poor levels of physical activity, poor academic achievement, parents who smoke, and female gender may all play significant factors in maintaining and developing MD in people of low socioeconomic position. Appropriate interventions to reduce the burden of mental health problems in the community are essential to improve the quality of life of the next generation.

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## Authors' Contribution

The authors thank the participants for their involvement in this study.

## Ethical Considerations

This study was reviewed by the board members of the ethical committee at Iran University of Medical Sciences and approved (Ethical Code: IR.IUMS.REC.1399.1024).

## Conflict of Interests

The authors declare that they have no competing interests.

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