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Original Article

Socioeconomic Inequalities in Nonuse of Seatbelts in Cars and Helmets on Motorcycles among People Living in Kurdistan Province, Iran

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Abstract

Background: The aim of this study was to determine the socioeconomic inequalities in nonuse of seatbelts in cars and helmets on motorcycles in Kurdistan Province, west of Iran, 2009.

Methods: The data used in this study was collected from the data gathered in non-communicable disease surveillance system (NCDSS) in 2009 in Kurdistan. A total of 1000 people were included in this study. The outcome variable of this study was the nonuse of seatbelts and helmets. The socio-economic status (SES) was calculated based on participants' residential area and assets using Principal Component Analysis (PCA) method. The concentration index, concentration curve, and comparison of Odds Ratio (OR) in different SES groups were used to measure the socioeconomic inequalities using logistic regression. In order to determine the contribution of determinants of inequality, decomposition analysis was used.

Results: The prevalence of nonuse of seatbelts in cars and helmets on motorcycles were 47.5%, 95%CI [44%, 55%], respectively. The Concentration index was -0.097, CI [-0.148, -0.046]. The OR of nonuse of seatbelts in cars and helmets on motorcycles in the richest group compared with the poorest group was 0.39, 95%CI [0.23, 0.68]. The results of the decomposition analysis showed that 34% of inequalities were due to SES, 47% were due to residential area, and 12% were due to unknown factors.

Conclusion: There is a reverse association between SES and nonuse of seatbelts in cars and helmets on motorcycles. This issue must be considered while planning to reduce traffic accidents injuries.

Keywords: Inequality, Traffic accidents, Socio-economic status (SES), Concentration Index, Iran

Introduction

From all deaths occurred in 2008 globally, 67% were due to non-communicable diseases (NCDs) (1, 2). The burden of NCDs is rapidly increasing in low- and middle -income countries. Traffic accident is one of the most important causes of NCDs. 80% of traffic accidents occur in low-and middle -income countries (3, 4). Currently, about 1.3 million people worldwide, mainly youth aged between 15 and 29 years, die due to traffic accidents every year (5). The five traffic accidents risk

factors include speed, drunk driving, child protection, the use of helmets, and the use of seat belts. Usually appropriate legislations are used to control these risk factors. Now, only 28 countries around the world, which cover seven percent of the world population, have appropriate legislation to control the risk factors of traffic accidents (6). More than half of the world's deaths due to traffic accidents which occur among pedestrians and motorcyclists (6, 7). Traffic accidents are a major cause of disease burden in Iran. Although from 2004 to 2011 the death rate from traffic accidents reduced from 38 to 31 per hundred thousand, deaths from traffic accidents has remained as a major cause of mortality in Iran. Nonuse of helmets is one of the leading causes of death from traffic accidents (8). According to a study, the incidence of damages and accidents of motorcyclists in Tehran, the capital of Iran, was 95 per 1000 people; nonuse of helmets was a cause of severe injuries in this group of people (9).

In the recent decade much attention has been paid to the subject of health inequality and justice. During this time, researchers have tried to demonstrate the status of health equity using different measures and through different methods (10, 11). Justice and reduction of inequality has become one of the major national goals in Iran and ensuring justice in health has been one of the main objectives of health programs in recent years (12).

Like other NCDs, it is essential to determine the inequalities in the risk factors of traffic accidents risk factors (13). Few studies have been conducted worldwide to determine inequalities in traffic accidents, for instance based on a study in China, which is a developing country, there are inequalities in the incidence of traffic accidents and they happen more among poor people (14).

To our knowledge, no study if any has been conducted in Iran to assess inequalities in the risk factors of traffic accidents. Identifying and assessing inequalities in the risk factors of traffic accidents' mortality and complications can help to make policies and design interventions to control the accidents mortality and morbidity. As mentioned, nonuse of seatbelts in care and helmets on motorcycles are two of the traffic accident risk factors (6).

The aim of this study was to determine the socioeconomic status (SES) of inequalities and the proportion of the determinants in nonuse of seat belts in cars and helmets on motorcycles in Kurdistan a province in western of Iran in 2009.

Materials and Methods

Data and setting of the study

Data used in this study was collected from Non-Communicable Disease Surveillance Survey (NCDSS) in Kurdistan, 2009. Additionally, the researchers used an additional questionnaire to measure the socioeconomic status of the participants. The population of the study included people with Iranian nationality, aged 15 to 64 years who were living in Kurdistan province.

The sampling framework in this study included households living in Kurdistan province. Non-Iranian families and those who did not consent to participate were not enrolled in the study. In addition, a maximum of two persons were selected from each family. In this study we used stratified sampling method (the strata included cities and villages) and for each stratum we used stratified probability cluster sampling. The sampling framework for this study was determined to be based on postal codes. To determine the clusters in this study, the desired clusters were selected in each category based on 10-digit postal codes. The family members of eligible households were classified into five age groups of 15 to 24 , 25 to 34 , 35 to 44 , 45 to 54, and 55 to 64 years and inquiries were made in each age group; in every age group, four patients (2 females and 2 males) and in clusters 20 people were questioned and examined. After selecting the clusters, people were selected for the study through visiting households. This procedure continued until the time the last samples were included. When the sex and age groups in every cluster were completed, the search was continued for the remaining samples. The sample size for this study was 1000 which was based on WHO STEPS protocol; it provided the Precision

necessary to compute NCDs risk factors, including risk factors examined in this study. From all, 997 persons were studied. The individual's data was used as the unit of analysis. The NCDSS method is described in more details elsewhere (15, 16).

Variables

The variables required for this study, which were obtained using interviews and the completion of questionnaires, included demographic variables such as age, gender, and residential area and assets. The variables needed to determine the SES of people included some questions about residential area and assets.

The outcome variable of this study was the nonuse of seatbelts and helmets; the outcome was attributed to any person who sometimes or never used seatbelts when in the front seat of a car (as driver or passenger) or who sometimes or never used helmets when riding a motorcycle (as driver or accompany). The main questionnaire for this study was obtained from the WHO STEPS protocol which had been previously piloted in Iran and since then it has become valid for Iran (15).

Measuring socioeconomic inequalities

In this study the concentration index, concentration curve, and the comparison of OR in different SES groups were used to measure the socioeconomic inequalities. Concentration Index is an index for measuring socioeconomic inequality which is calculated based on covariance method. To draw concentration curve, the cumulative percentage of nonuse of seat belts in cars and helmets on motorcycles was plotted on y-axis, and the cumulative percentage and the SES of the poorest to the richest group was plotted on the x-axis. The concentration index values are between -1 to 1; to interpret the index, when the curve lies above the line of equality, the concentration index value will be between 0 and -1 and represents the distribution of the outcome variable among the poor people. When the curve lies below the line of equality, the concentration index value will be between 0 and 1 and represents the distribution of the outcome variable amongst the rich people (17, 18).

In this study, in addition to the concentration index, OR was determined using logistic regression to determine socioeconomic inequalities in the different SES groups. The poorest SES group was selected as the baseline group and the other groups were compared with this baseline group. In this study, both the crude and adjusted ORs were calculated.

In logistic model, the outcome variable was adjusted for some variables and determinants including SES, education, urban or rural residency, and age. The variables which were correlated with the outcome variables after adjusting were selected for the decomposition analysis.

Decomposition analysis shows the contribution of each determinant in the inequalities. In decomposition analysis we seek to answer what are the factors generating inequality? And how much does each factor contribute in the inequality? In fact, the goal of decomposition analysis is to quantify the contribution of each factor or determinants affecting the socioeconomic inequality.

Measuring SES

In this study, the SES was determined based on some assets and residential area. Accordingly, PCA was performed on assets and residential area. The SES was determined for all the subjects using the PCA of assets and residential area. PCA provides an asset score for each person which ranks people from the poorest to the richest person. In view of the asset score, people were divided into five SES groups, including the poorest, poor, average, rich, and the richest (19). Then the prevalence of nonuse of seatbelts in cares and helmets on motorcycles in these groups were compared with each other.

Data gathering process and using software for analysis

To complete the data for this study eight teams were assigned which were consisted of People who were educated in the field of health care with a degree of higher than BS. The teams were trained to control the quality of data and to reduce the biases in data collection. There was a supervisor in each team to monitor and supervise the in-

terviewers and to communicate with team members to solve the problems. According to the study protocol, when people were not present at the place of interview, the interviewers referred up to three times to pursue and complete the questionnaires. If a person refused to participate in the study or was not available for follow-ups, the researchers did not replace him/her with somebody else. After collecting data for this study, they were entered into STATA software version 10. Missing data were detected during data cleansing. If the missing data were not available or it was not possible to complete them, they were not included in the analysis. In this study STATA software version 10 was used for data analysis. The significance level of 0.05 was considered for the results. Considering the method of data sampling, the collected data were analyzed based on survey analysis available in STATA software version 10.

Ethical consideration

Since 2005, NCDSS at the country level have been approved by the Ministry of Health and Medical Education. As a part of NCDSS, this program is run every year in the country and its data is collected at the national level. Based on instructions on conducting the study, verbal consent of participants is required in the study. To collect SES data required for the study, a questionnaire was added to the NCDSS by the researchers which was approved and supported by health deputy of Kurdistan University of Medical Sciences. During the data collection process, if a participant was reluctant to provide socioeconomic data, researcher did not insist on getting the data. The data collected in this study was anonymous and lack the identity and name of the participants and no one was able to discover the identity of individuals using electronic data.

Results

Demographic status and the flowchart of participants' SES distribution

In this study, 997 patients through 50 clusters of 20 people were recruited in the study. The participants' response rate was 99.7% the willingness of participants to answer all questions was lower (96.3%). The mean age of the participants was 39.77 years with a standard deviation of 14.24. The flowchart of participants in the study is shown in Fig. 1.

Table 1 shows the distribution of people in the five SES groups in the study in 2009.

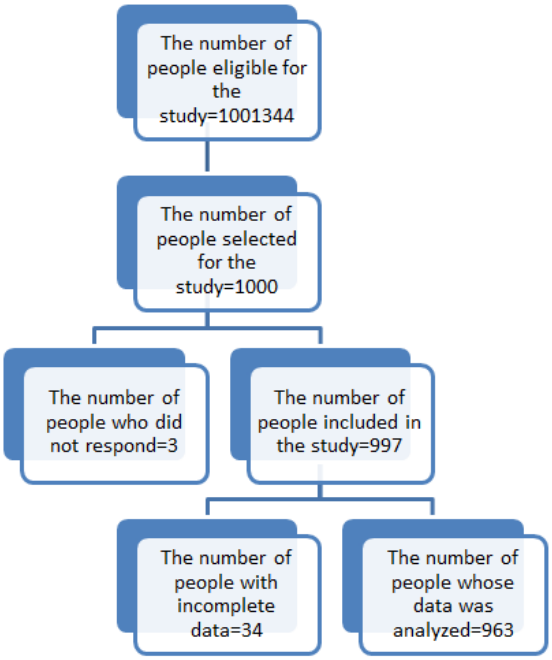

Fig. 1: Flowchart of people participating in the study

Table 1: Distribution of individuals in different SES calculated by PCA method

SES group	Frequency	Percentage (%)
The poorest group	224	23.26
poor group	186	19.31
average group	183	19
rich group	186	19.31
The richest group	184	19.11
total	963	100

The prevalence and inequality measures of nonuse of seatbelts in cars and helmets on motorcycles

The prevalence of nonuse of seatbelts in cars and helmets on motorcycles was 47.5%, 95%CI [44%, 55%]. The OR of nonuse of seat belts in cars and

helmets on motorcycles in Kurdistan in the richest to the poorest group was 0.39, 95%CI [0.23, 0.68]. The results are presented in Table 2.

The calculated concentration index was -0.097, 95%CI [-0.148, -0.046]. Figure 2 shows the concentration curve of nonuse of seatbelts in cars and helmets on motorcycles. The concentration curve shows higher concentration of the risk factors amongst the poor and low SES groups.

Table 3 shows the crude and adjusted OR values of association between independent variables or determinants with the outcome or dependent variable which was the nonuse of seatbelts in cars and helmets on motorcycles.

The variables considered for adjusted logistic regression included some important determinants which had an impact on inequality**.** Usually, in decomposition analysis those variables are entered into models which are significant in multivariate analysis.

In the final model, OR values allowed decomposition analysis for three variables including residential area, SES, and age.

The results of decomposition analysis are shown in Table 4. The results of decomposition analysis showed that 34%, 47%, and 12% of inequalities were due to the SES, residential area, and unknown factors, respectively.

Table 2: Frequency and OR of nonuse of seatbelts in cars and helmets on motorcycles among different SES groups in Kurdistan, 2009

	1st group (the poorest)	2nd group (poor)	3rd group (average)	4th group (rich)	5th group (the richest)
Number (nonuse/Total)	116/224	112/186	83/183	80/186	55/184
OR(logistic regression)	OR=1	OR=1.13	OR=0.69	OR=0.68	OR=0.39
CI of OR		(0.78, 1.64)	(0.46, 1.03)	(0.42, 1.12)	(0.23, 0.68)

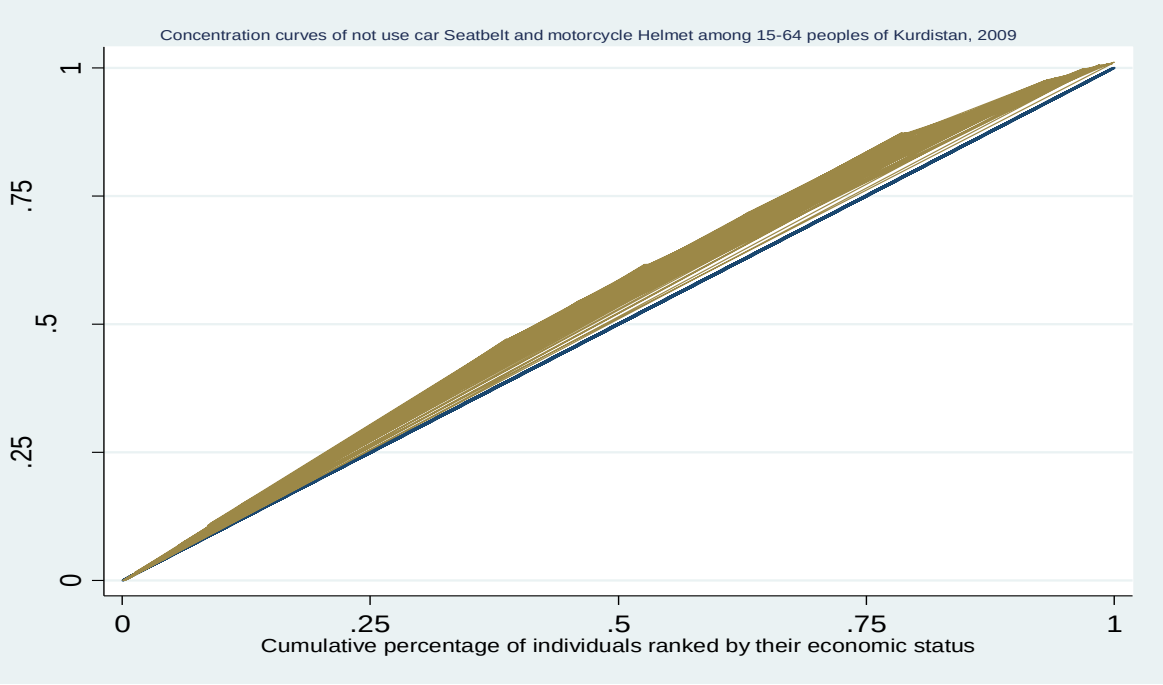

Fig. 2: The concentration curve of nonuse of seatbelts in cars and helmets on motorcycles in Kurdistan, 2009

Table 3: The Crude and adjusted OR for nonuse of seatbelts in cars and helmets on motorcycles in Kurdistan, 2009, calculated by logistic regression

No.	Determinant (compared with base)	Crude OR [a] (CI)	Adjusted OR [a] (CI)
1	Gender (female)	1.17 (0.86, 1.59)	1.26 (0.80, 1.99)
2	Residential area (rural)	2.18 (1.59, 2.97)	2.01 (1.18, 3.43)
3	SES (rich and the richest compared with others)	0 .57 (0.42, 0.78)	0.76 (0.54, 1.06)
4	Educational status (academic compared with less educated)	0.78 (0.40, 1.50)	0.78 (0.40, 1.55)
5	Age (18-50 years old group compared with others)	0.89 (0.79, 0.99)	0.81 (0.59, 1.14)

[a] Calculated by logistic regression

Table 4: Contribution percentage of determinants and decomposition analysis for nonuse of seatbelts in cars and helmets on motorcycles in Kurdistan, 2009[a]

Variable or determinant	Coefficient	Mean	Elasticity	Concentration index	Contribution to C	Contribution to C (%)	%
Residential area (rural)	0.1659	0.5568	0.1944	-0.2355	-0.0458	0.4713	47
SES (rich and the richest compared with others)	-0.0645	0.3998	-0.0543	0.6009	-0.0326	0.3359	34
Age (18-50 years old group compared with others)	-0.0423	0.7685	-0.0684	0.0095	-0.0007	0.0067	1
Unknown factors							12
Total							100
		-0.09715093		Concentration index			
		0.47509081		Mean of risk factor			

[a] The Total concentration index (C) can be rewritten as a linear combination of the concentration indices of determinants plus an error term which is calculated in the above study.

Decomposition analysis

$$C = \sum_k \left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k + \frac{GC_\varepsilon}{\mu}$$

Bk, which are presented in the second column of the above table are the coefficients obtained from the regressions of the study outcome on each *k* determinant, $\bar{x}_k$ which is presented in the first column of the above table is the mean or proportion of each *k* determinant, μ which is presented in the third column of the above table is the mean or proportion of the study outcome, and *Ck* which is presented in the fifth column of the above table is the concentration index for the *kth* determinant, replacing the health outcome (*hi*) with the determinant (x*ki*).

$GC\varepsilon$ is the generalized concentration index for the error term.(18)

Discussion

The prevalence of nonuse of seatbelts and helmets was 47.5%, 95%CI [44%, 55%]. The concentration index was -0.097, 95%CI [-0.148, -0.046]. The OR of nonuse of seat belts in cars and helmets on motorcycles in Kurdistan in the richest to the poorest group was 0.39, 95%CI [0.23, 0.68]. The results of decomposition analysis showed that 34%, 47%, and 12% of inequalities were due to the SES, residential area, and unknown factors, respectively. The results of this study showed an inverse association between SES and nonuse of seat belts and helmets.

The results of our study with is consistent with the other studies which showed an association between SES and traffic accidents caused by neglecting laws like nonuse of seat belts and helmets

(20-23). A study showed that generally there was an inverse association between countries' per capita income and mortality rates caused by traffic accidents risk factors and nonuse of seatbelts. Nonuse of seatbelts is more common among lower SES groups. However, it is also related to the culture and geography of the residential area (24).
The traffic accident risk factors and the relationship between traffic accidents and SES have also been studied in Iran. Like other developing countries, nonuse of seatbelts and helmets in Iran is an important source of morbidity and mortality due to traffic accidents (25). In Sehat et al.'s study in Tehran, the results showed an inverse association between SES with the incidence of physical traumas and injuries and traffic accidents. Lower SES and a lower education were associated with trauma caused by accident (26).
Of course, the SES is not the only determinant and geography, culture, and residential area are also important. A study on the use of seatbelts among children showed that the residential area, gender, and SES of children affected the use of seat belts. The children living in residential areas with better SES were more apt to use seatbelts (27).
There are some studies that are not consistent with our study. A study showed that nonuse of seatbelts is not only associated with the SES but also it is linked to the culture. Despite the good economic status, people living in the Arab countries on the coast of Persian Gulf are less likely to use seatbelts. These countries which often have a high income, compared to other high-income countries, are less likely to use seatbelts. This indicates that, in addition to SES, other factors such as culture or geography are involved in the use of seatbelts (28, 29). Thus, as it has been reported in other studies, the distribution pattern of traffic accidents risk factors such as nonuse of seatbelts and helmets, is associated with development status, age group, and some of the cultural, social, and political status of the countries and people (30).
It seems that development and education are important factors which make our results similar to the results of other studies. Culture and geography are among the factors which make our study different from other studies.

Limitation and biases of this study

This study had some limitations. The sample size was small and therefore the results in subgroups had low precision. Additionally, like other studies which use assets to assess the SES, we were not able to consider the SES over time (SES lifetime). Another limitation was that some of the measures were based on self-reports and they were prone to recall error. It is likely that respondents report what is socially acceptable rather than what is real. Because of high response rate and low exclusion criteria, the study can be well generalized to Kurdistan province, however, due to cultural differences with other regions of the country, it cannot be freely generalized to the whole this country.

Conclusion

As a conclusion, this study showed that nonuse of seatbelts and helmets are associated with SES. Therefore, without considering such an association it is not possible to design appropriate interventions for using seatbelts and helmets.
Therefore, to reduce inequalities in the use of seatbelts and helmets, which can lead to serious complications in traffic accidents, poor groups in the community need more attention for using cars and motorcycles. So while planning to reduce traffic accidents injuries, the inequality should be considered.
Based on the results the socioeconomic inequalities in the use of seatbelts and helmets can be decreased through reducing poverty, improving education, paying more attention to the poorer groups in society in health politics, increasing the access of disadvantaged groups, and designing special programs for reducing inequality.
Special attention must be paid to policy making and health goals to reduce socioeconomic inequality in traffic accidents.
Policy makers must try to provide a healthy life for people living in cities.

Recommendations

An increasing attention is being paid to inequality in Iran in terms of public health (31, 32) but there are few studies about socioeconomic inequities in terms of traffic accidents. We recommend conducting studies which measure socioeconomic factors in this field and also studies about inequalities in the five traffic accident risk factors including speed, drunk driving, child protection, use of helmets, and use of seatbelts.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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