ClinicoEconomics and Outcomes Research

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ORIGINAL RESEARCH

# Socioeconomic Inequality in Self-Medication in Iran: Cross-Sectional Analyses at the National and Subnational Levels

This article was published in the following Dove Press journal:
*ClinicoEconomics and Outcomes Research*

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**Background:** Self-medication (SM) is a public health concern globally. This study aimed to measure socioeconomic inequality in SM and identify its main determinants among Iranian households.

**Methods:** A total of 38,859 households from the 2018 Household Income and Expenditure Survey (HIES) were included in the study. Data on SM, household size, age, gender and education status of the head of household, monthly household's expenditures (as a proxy for socioeconomic status), health insurance coverage and living areas and provinces were obtained for the survey. The concentration curve and the normalized concentration index ($C_n$) were used to quantify the magnitude of socioeconomic inequality in SM among Iranian households. The $C_n$ was decomposed to identify the main determinants of socioeconomic inequality in SM in Iran.

**Results:** The results indicated that 18.2% (95% confidence interval [CI]: 17.7% to 18.5%) of households in Iran had SM practice in the past month. The results suggested a higher concentration of SM among the rich households ($C_n$= 0.0466; 95% CI= 0.0321 to 0.0612) in Iran. The concentration of SM among high SES households was also found in urban (0.0311; 95% CI=0.0112 to 0.0510) and rural (= 0.0513; 95% CI=0.0301 to 0.0726) areas. SM was concentrated among the rich households in Tehran, Qom, Esfahan, Ardebil, Golestan, and Sistan and Baluchestan provinces. In contrast, a higher concentration of SM was found among the poor households in Semnan, North Khorasan, Kerman, Bushehr, and South Khorasan provinces. The decomposition revealed SES of household, itself, as the main contributing factor to the concentration of SM among the wealthy households.

**Conclusion:** This study demonstrated that SM is more concentrated among socioeconomically advantaged households in Iran. Thus, effective evidence-based interventions should be implemented to improve awareness about SM and its negative consequences. Further studies are required to investigate the consequences of SM practice among people.

**Keywords:** self-medication, inequality, socioeconomic status, Iran

## Introduction

Self-medication (SM) is a major health concern across different groups of the population globally.[1] As a self-care behavior, SM has remained a common problem globally, and it is more prevalent in developing countries.[2] When individuals faced with a minor or severe illness, they react differently to this situation, and one of the available options is SM.[3] SM is defined as obtaining and using any medication without getting advice from a medical doctor for their diagnosis or treatment.[4] SM can lead to adverse

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submit your manuscript | www.dovepress.com
DovePress
http://doi.org/10.2147/CEOR.S252244

drug reactions, waste of resources, delay in seeking health care as well as adverse health impact due to an increase in the antimicrobial resistance.[5–7]

Several studies investigated the prevalence of SM and its main determinants among different population (eg medical and non-medical student, general population, elderly, pregnant women) worldwide.[7–13] The prevalence of SM varies between and within countries as well as among the different population. The prevalence of SM is reported to be 12.7% −18% in Spain,[14,15] 53% in Mexico,[16] 31% in India,[17] 60% in China,[18] and 60% - 90% in Nigeria.[19] Previous studies highlighted that SM is influenced by various factors such as age, gender, education level, marital status, socioeconomic status, health insurance coverage, living area, and availability of the medication for individuals. A study carried out in China suggested that economic status, educational level, household size as well as medicine accessibility had significant associations with the probability of SM.[13] A systematic review study by Shaghaghi in Iran indicated prior experience, long waiting time to visit a physician, having a minor illness and healthcare costs as the main reasons to SM.[3]

Iran is among the top twenty countries in drug consumption in the world. SM is considered a major public health concern in Iran.[20] The existing studies provided some evidence on the prevalence of SM and its main determinants in Iran.[1,3,20,21] In a study conducted by Shaamekhi et al on the sociodemographic determinants of SM in Tabriz city, the overall prevalence of SM was found to be 71% among those who reported a need to medical care in the last month. The latter study also concluded that the probability of SM is higher among younger age, less-educated individuals and housewives.[22] Although the current studies provided some insight on the issue of SM in Iran, to date, no study measured socioeconomic inequality in SM at the national and subnational levels. To fill this gap in the literature, this study, aimed to measure and decompose socioeconomic inequality in SM in Iran. The findings of the current study can potentially provide useful information for policymakers to design effective strategies to reduce socioeconomic inequalities in the SM in Iran.

# Methods

## Study Setting

Iran is a middle-income country located in the Eastern Mediterranean Region (EMR), with an area of 1,648,000 km$^2$. According to the 2016 census data,[23] the population of Iran was approximately 80 million people living in 31 provinces.

## Data and Variables

We used data from the 2018 Household Income and Expenditure Survey (HIES) conducted by the Iranian Statistical Center[24] The HIES is a large cross-sectional survey, and the unit analysis in this survey is the household. The survey collected information using a face-to-face interview with the head of the household during the year of 2018. The questionnaire used to collect data was designed under the supervisions and recommendations of the United Nations (UN). Three-stage cluster sampling method with strata was used in the HIES. The urban and rural blocks were selected in the second stage. In the final stage, households were selected for the survey. The survey contains information on sociodemographic characteristics of household (eg, household size, the age of head of household, the gender of head of household and education status of head of household), household healthcare utilization (eg, SM), income and expenditure of households in the past month. The 2018 HIES collected information from 38,859 (rural: 18,546 and urban: 20,313) households in Iran.

The outcome variable of interest in the study is a binary variable equal to one if the household used any medication without getting advice from a physician for either diagnosis or treatment (eg, tablet, syrup, etc.) in the last month, and 0 otherwise. Based on the availability of information in the HIES and previous studies,[11,25-27] we used gender of household head, age of head of household, health insurance coverage, education status of the head of household, monthly households expenditures (as a proxy for households' socioeconomic status), living areas (urban/rural) and provincial fixed effects as the determinants of SM in the households. Based on total monthly household expenditures (housing, food, transportation, healthcare, clothing, tobacco, education, furniture, etc.), households were classified into five socioeconomic status (SES) groups from the poorest/first to the richest/fifth quintiles.

## Statistical Analysis

### Measuring Socioeconomic Inequality in Self-Medication

We used the concentration curve and the concentration index[28–30] to illustrate and quantify socioeconomic inequalities in SM among households in Iran and its provinces. The concentration curve plots the cumulative proportion of SM in y-axis against the cumulative proportion of the households ordered by a socioeconomic indicator in

the x-axis. If the concentration curve lies below the perfect equality line, it means that the health variable is concentrated more among the high SES individuals and vice versa. The value of $C$ ranges between −1 and +1, with the value zero indicating no socioeconomic inequality. A negative sign of the $C$ indicates that the health variable is more concentrated among the poor and vice versa. As our outcome variable of interest (SM) is binary, the $C$ does not range between −1 and +1; thus, as per Wagstaff,[31] we normalized the $C$ by dividing it by $\frac{1}{1-}$, where $\mu$ is the mean of the SM.

### Decomposing Socioeconomic Inequality in Self-Medication

We decomposed the $C$ to identify the main factors affecting the observed socioeconomic inequality in SM. As shown by Wagstaff et al, if we have the following regression model that links SM, $y$, to a set of its determinants, $x_k$:

$$y = \alpha + \sum_k \beta_k x_k + \varepsilon \quad (1)$$

The $C$ for SM can be decomposed as:

$$C = \sum_k \left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k + \frac{AC_\varepsilon}{\mu} \quad (2)$$

where $\bar{x}_k$ is the mean of $x_k$, $\mu$ presents the mean of $y$, $C_k$ shows the $C$ for $x_k$, $\left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k$ is the elasticity of SM with respect to the $x_k$. Elasticity indicates the amount of change in SM associated with a one-unit change in the explanatory variable. A positive elasticity for a factor in our study implies as the value of the explanatory variable increases, the probability of SM among households also increases. The share of explanatory factors, $x_k$, to the overall $C$ for SM denotes by $\sum_k \left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k$. The last term, $\frac{AC_\varepsilon}{\mu}$, is the residuals component and indicates the portion of the $C$ for SM, which cannot be determined by the included explanatory variables in the model.

The normalized concentration index, $C_n$, for SM can be decomposed using the following formula:

$$C_n = \frac{C}{1-\mu} = \frac{\sum_k \left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k}{1-\mu} + \frac{\frac{AC_\varepsilon}{\mu}}{1-\mu} \quad (3)$$

A positive (negative) absolute contribution of an explanatory factor to the $C_n$ indicates that the socioeconomic distribution of the respective factor and its association with SM leads to higher (lower) SM among the richer households. The relative contribution of each explanatory factor was computed by dividing the absolute contribution for each explanatory factor by the $C_n$ and then multiplying by 100. As SM is a binary variable, we used the marginal effect of determinants obtained from non-linear logit regression as $\beta_k$ in our decomposition analysis. All the analyses were performed using Stata Version 14. P-values less than 0.05 considered statistically significant.

# Results

## Descriptive Statistics

Table 1 presents the descriptive characteristics of the study population. Of the total 38,859 households included in this study, 33,752 (86.8%) headed by men. The mean age of the head of households was 50.4 years (standard deviation [SD]= 15.1). The majority (76%, n=29,524) of the households' head was literate, and 88.4% of the study population had health insurance coverage. On average, the prevalence of SM among households was 18.2% (95% confidence interval [CI]: 17.7% to 18.5%). The variation of SM among households across the 31 provinces of Iran is shown in Figure 1. As indicated in Figure 1, there is a great variation among the provinces in SM in Iran. While the prevalence of SM in Khuzestan province was 2.4%, the corresponding figure for Kohgiluyeh Buyer Ahmad was 42.8%. The proportion of households with SM varied across different socioeconomic groups of households. The prevalence of SM was 16.1% (95% CI: 15.2% to 16.9%) and 19.1% (95% CI: 18.3% to 20.0%) among the poorest and richest households, respectively.

## Socioeconomic Inequality in Self-Medication

Figure 2 shows the concentration curve for SM among households for the whole of samples, rural and urban areas. As illustrated in Figure 2, the concentration curve lies below the 45-degree line; indicating that the SM more concentrated among the rich. The same result also observed in urban and rural areas.

The results of the $C_n$ for whole of sample, urban and rural areas are reported in Table 2. As indicated in the table, the value of the$C_n$ for the whole of sample is positive, indicating that SM is more concentrated among richer households ($C_n$= 0.0466; 95% CI= 0.0321 to 0.0612) in Iran. Similar results also found in urban ($C_n$= 0.0311; 95% CI=0.0112 to 0.0510) and rural ($C_n$= 0.0513; 95% CI=0.0301 to 0.0726) areas.

**Table 1** Descriptive Characteristics of Households Included in the Analysis, 2018

| Variables | n (%) | Percentage of Households with SM Over the Past Month (95% Confidence Interval) |
|---|---|---|
| Demographic variables | | |
| Sex of household head | | |
| Male | 33,752 (86.9) | 18.2 (17.7 to 18.6) |
| Female | 5107 (13.1) | 18.1 (17.1 to 19.2) |
| Age of household head | | |
| 15–45 | 16,981 (43.7) | 17.5 (16.9 to 18.1) |
| 46–65 | 14,731 (37.9) | 18.2 (17.6 to 18.9) |
| 66 and above | 7147 (18.4) | 19.4 (18.5 to 20.3) |
| Socioeconomic variables | | |
| Household size | | |
| Less than 4 | 19,849 (51.1) | 18.0 (17.5 to 18.5) |
| 4 and above | 19,010 (48.9) | 18.3 (17.7 to 18.8) |
| Education status of the household head | | |
| Illiterate | 9335 (24.0) | 18.9 (18.0 to 19.7) |
| Literate | 29,524 (76.0) | 17.9 (17.5 to 18.4) |
| Economic status of households | | |
| Poorest | 7772 (20.0) | 16.1 (15.2 to 16.9) |
| Poor | 7772 (20.0) | 16.9 (16.1 to 17.8) |
| Middle | 7772 (20.0) | 19.0 (18.2 to 19.9) |
| Rich | 7772 (20.0) | 19.5 (18.6 to 20.4) |
| Richest | 7771 (20.0) | 19.1 (18.3 to 20.0) |
| Insurance coverage | | |
| Yes | 34,370 (88.4) | 18.5 (18.1 to 18.9) |
| No | 4489 (11.6) | 15.2 (14.2 to 16.3) |
| Ecological variables | | |
| Geographical area | | |
| Urban | 20,313 (52.3) | 18.6 (18.1 to 19.2) |
| Rural | 18,546 (47.7) | 17.6 (17.1 to 18.2) |
| Province | | |
| Tehran | 2020 (5.2) | 8.7 (7.6 to 10.1) |
| Markazi | 1433 (3.7) | 8.4 (7.2 to 10.0) |
| Gilan | 1315 (3.4) | 27.4 (25.1 to 29.9) |
| Mazandaran | 1026 (2.6) | 19.4 (17.1 to 21.9) |
| East Azerbaijan | 1279 (3.3) | 39.5 (36.9 to 42.3) |
| West Azerbaijan | 1141 (2.9) | 17.9 (15.8 to 20.0) |
| Kermanshah | 1373 (3.5) | 9.2 (7.7 to 10.8) |
| Khuzestan | 1384 (3.6) | 2.4 (1.7 to 3.4) |
| Fars | 1486 (3.8) | 17.8 (15.9 to 19.8) |
| Kerman | 1089 (2.8) | 6.9 (5.5 to 8.5) |
| Razavi Khorasan | 1608 (4.1) | 15.1 (13.4 to 16.9) |
| Esfahan | 1338 (3.4) | 24.1 (21.9 to 26.5) |
| Sistan and Baluchestan | 1482 (3.8) | 17.3 (15.4 to 19.3) |
| Kurdistan | 821 (2.1) | 14.8 (12.6 to 17.5) |
| Hamadan | 1362 (3.5) | 5.3 (4.2 to 6.6) |
| Chahar Mahall and Bakhtiari | 1165 (3.0) | 21.8 (19.6 to 24.3) |
| Lorestan | 1046 (2.7) | 11.7 (9.9 to 13.8) |
| Ilam | 1007 (2.6) | 26.2 (23.6 to 29.0) |
| Kohgiluyeh Buyer Ahmad | 1126 (2.9) | 42.8 (39.9 to 45.7) |
| Bushehr | 1116 (2.9) | 17.5 (15.3 to 19.8) |
| Zanjan | 1119 (2.9) | 14.3 (12.4 to 16.5) |
| Semnan | 959 (2.5) | 16.5 (14.2 to 18.9) |
| Yazd | 1253 (3.2) | 5.6 (4.4 to 7.0) |
| Hormozgan | 1565 (4.0) | 17.6 (15.8 to 19.6) |
| Ardebil | 960 (2.5) | 34.1 (31.2 to 37.2) |
| Qom | 929 (2.4) | 32.2 (29.2 to 35.3) |
| Qazvin | 987 (2.5) | 24.2 (21.6 to 26.9) |
| Golestan | 1748 (4.5) | 40.6 (38.3 to 42.9) |
| North Khorasan | 1407 (3.6) | 3.9 (3.0 to 5.1) |
| South Khorasan | 1356 (3.5) | 11.6 (9.9 to 13.4) |
| Alborz | 959 (2.5) | 20.5 (18.1 to 23.2) |

The $C_n$ also suggested some variation in socioeconomic inequality in SM across provinces in Iran (Figure 3). While SM was found to be concentrated among richer households in the provinces of Tehran, Qom, Esfahan, Ardebil, Golestan, and Sistan and Baluchestan, a higher concentration of SM was found among poorer households in Semnan, North Khorasan, Kerman, Bushehr, and South Khorasan provinces.

## Determinants of Socioeconomic Inequality in Self-Medication

Table 3 contains the results of the decomposition analysis of socioeconomic inequality in SM among households in Iran. Based on the results of marginal effects of explanatory variables, the probability of SM was higher in households headed with older adults, larger household size, illiterate-headed households and household with health insurance coverage. The probability of SM was

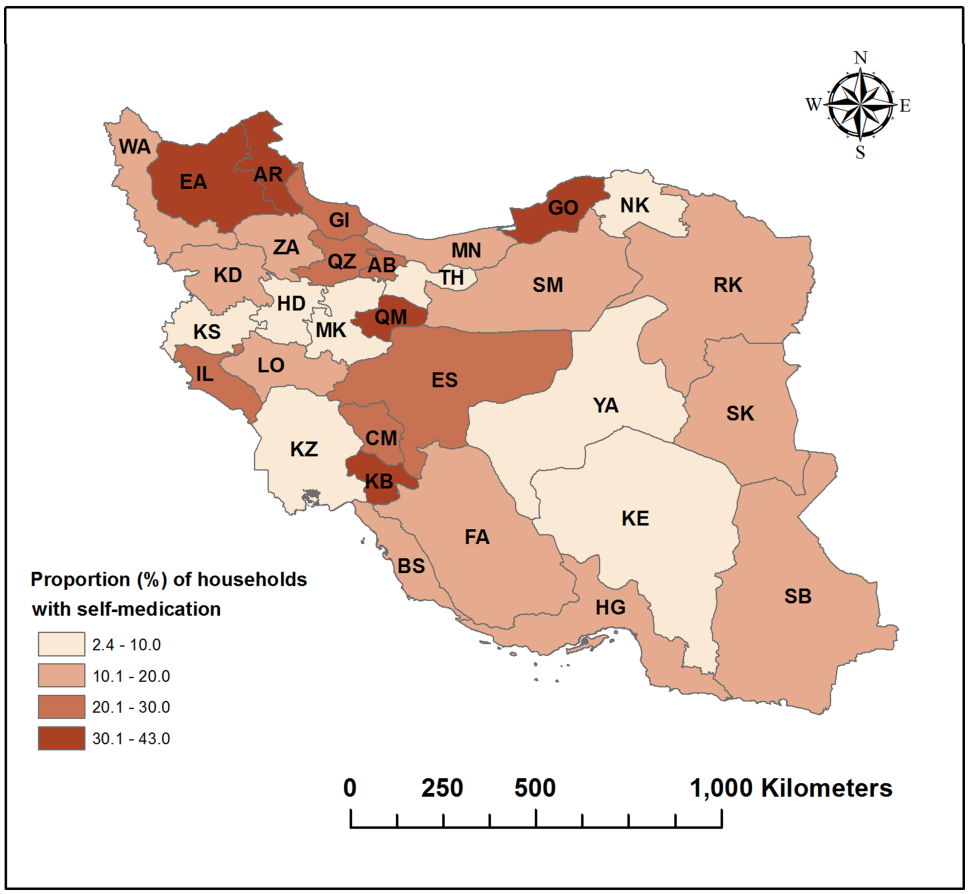


**Figure 1** Proportion of households with self-medication over the last month across provinces in Iran, 2018. **Notes:** TH, Tehran; MK, Markazi; GI, Gilan; MN, Mazandaran; EA, East Azerbaijan; WA, West Azerbaijan; KS, Kermanshah; KZ, Khuzestan; FA, Fars; KE, Kerman; RK, Razavi Khorasan; ES, Esfahan; SB, Sistan and Baluchestan; KD, Kurdistan; HD, Hamadan; CM, Chahar Mahall and Bakhtiari; LO, Lorestan; IL, Ilam; KB, Kohgiluyeh and Buyer-Ahmad; BS, Bushehr; ZA, Zanjan; SM, Semnan; YA, Yazd; HG, Hormozgan; AR, Ardebil; QM, Qom; QZ, Qazvin; GO, Golestan; NK, North Khorasan; SK, South Khorasan; AB, Alborz.

also found to be lower among rural household and in male-headed households as compared to their respective counterparts. The probability of SM among the richest quintile households was 3.4% higher than the poorest households.

The absolute and percentage contribution of determinants to socioeconomic inequality in SM in Iran are reported in the fifth and sixth columns of Table 3. The decomposition analysis showed that SES of households, itself, was the main contributing factor to the concentration of SM among the richer households in Iran. The results also showed that the concentration of households with illiterate and senior heads among low SES households increased the concentration of SM among the poorer households.

As reported in Table 3, 78.6% of socioeconomic inequality in SM was explained by the determinants included in the analysis. The remaining 21.4% of socioeconomic inequality in SM is explained by other variables that are not included in the study.

## Discussion

The use of medicines without physician supervision for diagnosis and/or treatment[32,33] is a common problem and one of the health concerns worldwide. Despite several efforts to reduce SM, the practice of SM is significantly higher among developing countries.[27] Inappropriate use of drugs through SM may cause significant adverse effects such as bacterial resistance, drugs' interactions, serious side effects, intentional and unintentional poisoning, an increase of malignant and lethal diseases, death and drug dependency.[3,33,34] Iran is among the top twenty countries with drug consumption in the world, and the prevalence of the SM in Iran has been increasing.[20,27] In this study, for the first time, we measured the extent of socioeconomic inequalities in SM and its main determinants in Iran. The

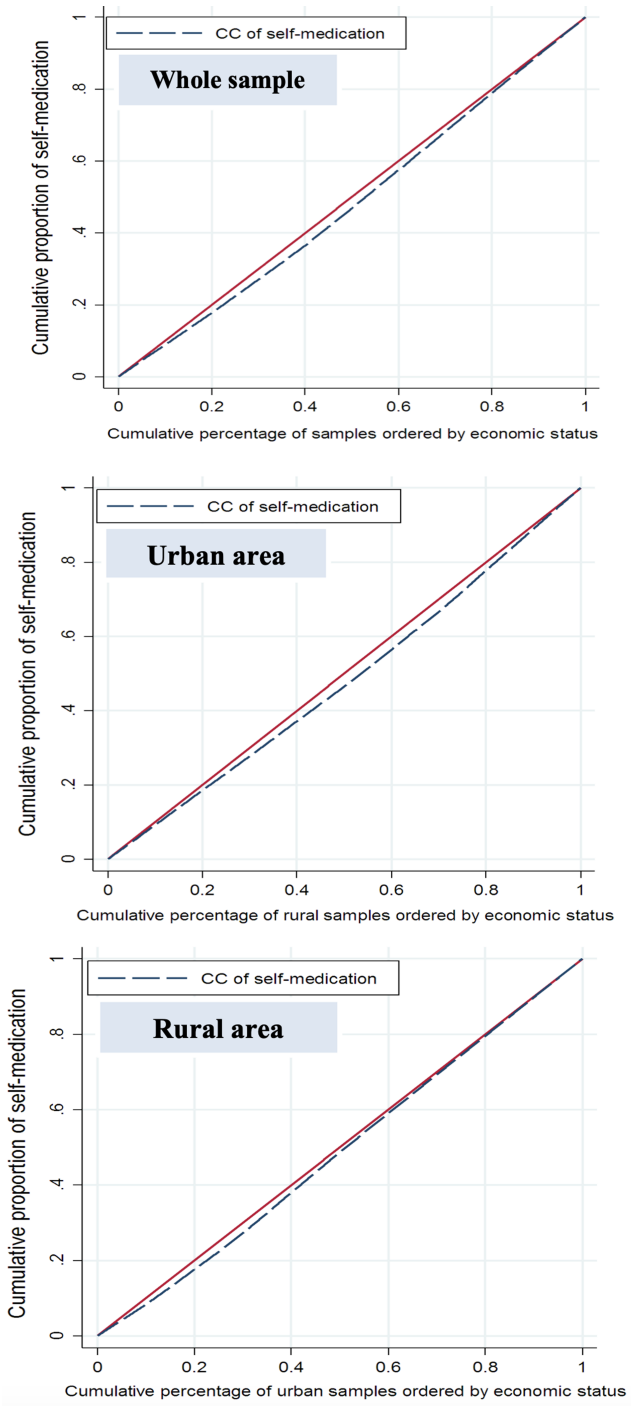


**Figure 2** The Concentration curve for self-medication in Iran for the whole sample, rural and urban areas, 2018.

results of the study contributed to a better understanding of SM at national and subnational levels in Iran.

The prevalence of SM among Iranian household in the last month was found to be 18.2%. The magnitude of SM practice was found to be 23.3% in Egypt,[35] 51% in Slovenia,[32] 25.4% in the United States,[36] 27.5% in Kuwait,[37] 7.3% in Indonesia, and 11.9% in India.[38,39] The reasons for the variation in the practice of SM across different countries and regions could be due to the levels of awareness about the rational use of drugs, accessibility of modern health facilities, cultural preferences and beliefs of the study participants. Our results also showed a significant variation in the prevalence of SM across provinces in Iran. While the prevalence of SM in Khuzestan province was 2.4%, 42.8% of households in Kohgiluyeh Buyer Ahmad had SM in the past month. This variation could also be explained by the sociodemographic composition of communities, differences in beliefs and awareness among the Iranian provinces.

**Table 2** The Normalized Concentration Indices for Self-Medication for the Whole Sample, and Rural and Urban Areas in Iran, 2018

| Sample | n | The $C_n$ | 95% Confidence Interval |
|---|---|---|---|
| Urban | 20,313 | 0.0311 | 0.0112 to 0.0510 |
| Rural | 18,546 | 0.0513 | 0.0301 to 0.0726 |
| Total | 38,859 | 0.0466 | 0.0321 to 0.0612 |

The results revealed that SM was more concentrated among richer households in Iran. The observed socioeconomic inequality in SM can potentially be explained by the accessibility of drugs among high SES households as they may afford to purchase over the counter (OTC) medications and prescription drugs without a prescription. Our results also suggested a higher concentration of SM among richer households in both urban and rural regions in Iran. We found a wide variation in socioeconomic inequality in SM among Iranian provinces. The higher prevalence of SM was found among richer households in the provinces of Tehran, Qom, Esfahan, Ardebil, Golestan, and Sistan and Baluchestan. In contrast, compared to richer households, poor households in Semnan, North Khorasan, Kerman, Bushehr and South Khorasan provinces had a higher prevalence of SM. Differential findings across provinces suggest that effective strategies for reducing SM in Iran should be province-specific. Differences in the prevalence of SM across socioeconomic groups can be explained by several reasons including poor access to doctors, differences in beliefs and health literacy as well as ease of drugs' purchase without having a prescription. A systematic review study indicated that lack of sufficient time to visit a doctor, easy purchase of drugs and high costs of visiting a physician are among the main factors affecting SM behaviors.[3] Our decomposition analysis indicated that SES of households, itself, is the main factor

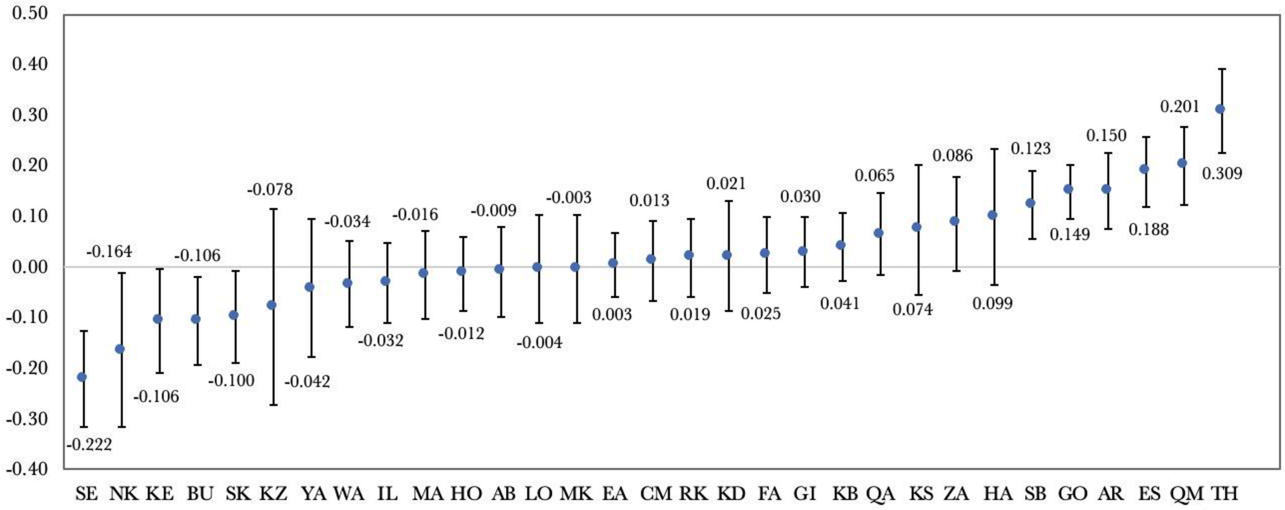


**Figure 3** The normalized concentration index ($C_n$) for self-medication across Iranian provinces, 2018.

contributing to the concentration of SM among richer households. A study by Amaha et al (2019) in Ethiopia reported that high-income individuals were more likely to practice SM compared to their low-income counterparts.[40] A study from China also reported that there is a positive association between self-treating and socioeconomic status.[13]

Our findings showed a higher probability of SM among households headed by older adults. The probability of SM was also found to be higher among households with health insurance coverage, headed by married, illiterate or female adults, living in an urban area, and with larger household size. In contrast to our results, some studies showed a higher prevalence of SM among people with high education.[41] For example, a study by Gillani et al[42] showed a higher tendency to SM among households with high educational attainment in Pakistan. Similar to the findings of our study, a study conducted by Akram et al[25] showed a high prevalence of SM in urban areas in India. The latter study found that 60% of people reported that they indulged in SM practice because medicines were readily available at pharmacies in urban areas. In contrast, a study by Horumpende et al[43] highlighted higher accessibility of medicine in rural areas in Tanzania. Similar to our study, a study by Karimy et al (2019) in Iran also reported a higher probability of SM among households living in rural areas and with health insurance coverage.[44] Several studies have reported a significant positive relationship between old age and the practice of SM in different countries.[32,33,40,45] Klemenc & Kersnik[45] reported that older adults use SM because they usually have more chronic diseases.

Some limitations should be considered when interpreting the findings of the current study. First, this study is a cross-sectional in design; thus, we cannot establish any causality between SM and its determinants. Second, data on SM are self-reported and may introduce some systematic error such as accuracy of the responses due to recall bias. Third, although socioeconomic inequalities in SM measured for different types of medications could have provided a better picture about SM in Iran, we could not examine these inequalities in our study due to unavailability of this information in the HIES.

## Conclusion

Identifying factors related to SM among different social groups is important for implementing the SM preventative programs. This study revealed that SM is more concentrated among socioeconomically advantaged households in Iran. The findings suggested the SES of households as the main contributing factors to the concentration of SM among richer households in Iran. Since we found positive and negative socioeconomic gradients in SM across Iranian provinces, programs designed to address SM in Iran should be province-specific. In other words, while the prevention program should focus on the increase of awareness about the side effects of SM among the richer households in Tehran, Qom, Esfahan, Ardebil, Golestan, and Sistan and Baluchestan. These programs should mainly focus on the poor households in Semnan, North Khorasan, Kerman, Bushehr, and South Khorasan provinces. The use of mass media and local

**Table 3** Decomposition of Socioeconomic Inequality in Self-Medication (SM) Among Iranian Households, 2018

| | Marginal Effect | Elasticity | $C_x$ | Contribution to the $C_n$ | | |
|---|---|---|---|---|---|---|
| | | | | Contribution | % | Summed % |
| Demographic variables | | | | | | |
| Sex of household head | | | | | | |
| Male | −0.0022* | −0.0107 | 0.0543 | −0.0007 | −1.5 | −1.5 |
| Female (ref.) | | | | | | |
| Age of household head | | | | | | |
| 15–45 (ref.) | | | | | | |
| 46–65 | 0.0005* | 0.0011 | 0.0941 | 0.0001 | 0.3 | |
| 66 and above | 0.0197*** | 0.0200 | −0.2362 | −0.0058 | −12.3 | −12.1 |
| Socioeconomic variables | | | | | | |
| Household size | | | | | | |
| Less than 4 | | | | | | |
| 4 and above | 0.0024* | 0.0064 | 0.0656 | 0.0005 | 1.1 | 1.1 |
| Education status of the household head | | | | | | |
| Illiterate | 0.0100** | 0.0132 | −0.3234 | −0.0052 | −11.2 | −11.2 |
| Literate (ref.) | | | | | | |
| Economic status of households | | | | | | |
| Poorest (ref.) | | | | | | |
| Poor | 0.0102** | 0.0112 | −0.4000 | −0.0055 | −11.8 | |
| Middle | 0.0309*** | 0.0341 | 0.0000 | 0.0000 | 0.0 | |
| Rich | 0.0319*** | 0.0351 | 0.4000 | 0.0172 | 36.8 | |
| Richest | 0.0343*** | 0.0377 | 0.6500 | 0.0300 | 64.2 | 89.3 |
| Insurance coverage | | | | | | |
| Yes | 0.0162*** | 0.0790 | 0.0172 | 0.0017 | 3.6 | 3.6 |
| No (ref.) | | | | | | |
| Ecological variables | | | | | | |
| Geographical area | | | | | | |
| Rural | −0.0033* | −0.0086 | −0.1018 | 0.0011 | 2.3 | 2.3 |
| Urban (ref.) | | | | | | |
| Province | | | | | | |
| Tehran (ref.) | | | | | | |
| Markazi | −0.1067*** | −0.0217 | −0.1086 | 0.0029 | 6.2 | |
| Gilan | 0.0749*** | 0.0140 | −0.0659 | −0.0011 | −2.4 | |
| Mazandaran | 0.0138* | 0.0020 | 0.1755 | 0.0004 | 0.9 | |
| East Azerbaijan | 0.1460*** | 0.0265 | 0.0304 | 0.0010 | 2.1 | |
| West Azerbaijan | 0.0084* | 0.0013 | −0.2303 | −0.0004 | −0.8 | |
| Kermanshah | −0.0997*** | −0.0192 | 0.0864 | −0.0020 | −4.3 | |
| Khuzestan | −0.2759*** | −0.0547 | 0.0006 | 0.0000 | −0.1 | |
| Fars | −0.0080* | −0.0017 | 0.1209 | −0.0002 | −0.5 | |
| Kerman | −0.1252*** | −0.0193 | −0.0480 | 0.0011 | 2.4 | |
| Razavi Khorasan | −0.0207** | −0.0047 | −0.0574 | 0.0003 | 0.7 | |
| Esfahan | 0.0506*** | 0.0095 | 0.0807 | 0.0009 | 2.0 | |
| Sistan and Baluchestan | 0.0102* | 0.0021 | −0.4756 | −0.0012 | −2.7 | |
| Kurdistan | −0.0242* | −0.0028 | −0.0235 | 0.0001 | 0.2 | |
| Hamadan | −0.1700*** | −0.0328 | −0.0490 | 0.0020 | 4.2 | |

(*Continued*)

**Table 3** (Continued).

| | Marginal Effect | Elasticity | $C_x$ | Contribution to the $C_n$ | | |
|---|---|---|---|---|---|---|
| | | | | Contribution | % | Summed % |
| Chahar Mahall and Bakhtiari | 0.0342*** | 0.0057 | 0.1025 | 0.0007 | 1.5 | |
| Lorestan | −0.0567*** | −0.0084 | −0.1464 | 0.0015 | 3.2 | |
| Ilam | 0.0687*** | 0.0098 | −0.1049 | −0.0013 | −2.7 | |
| Kohgiluyeh Buyer Ahmad | 0.1652*** | 0.0264 | 0.1265 | 0.0041 | 8.7 | |
| Bushehr | 0.0000* | 0.0000 | 0.1268 | 0.0000 | 0.0 | |
| Zanjan | −0.0325** | −0.0052 | 0.0498 | −0.0003 | −0.7 | |
| Semnan | −0.0034* | −0.0005 | −0.2204 | 0.0001 | 0.3 | |
| Yazd | −0.1669*** | −0.0294 | 0.1247 | −0.0045 | −9.6 | |
| Hormozgan | −0.1013*** | −0.0223 | 0.3398 | −0.0093 | −19.9 | |
| Ardebil | 0.1156*** | 0.0159 | 0.0953 | 0.0019 | 4.0 | |
| Qom | 0.1078*** | 0.0143 | 0.0342 | 0.0006 | 1.3 | |
| Qazvin | 0.0510*** | 0.0070 | 0.1742 | 0.0015 | 3.2 | |
| Golestan | 0.1545*** | 0.0383 | 0.0341 | 0.0016 | 3.4 | |
| North Khorasan | −0.2098*** | −0.0416 | −0.0074 | 0.0004 | 0.8 | |
| South Khorasan | −0.0549*** | −0.0106 | −0.0832 | 0.0011 | 2.3 | |
| Alborz | 0.0244** | 0.0034 | 0.3907 | 0.0016 | 3.4 | 7.2 |
| Sum | | | | 0.037 | | 78.6 |
| Residuals | | | | 0.010 | | 21.4 |
| The $C_n$ | | | | 0.0467 | | 100 |

**Notes:** ***Significant at 1%; **Significant at 5%; *Significant at 10%.

authorities are also required to improve health literacy about the negative side effect of SM among Iranian households.

## Abbreviations

SM, self-medication; SES, socioeconomic status; HIES, Household Income and Expenditure Survey; $C_n$, relative concentration index; CI, confidence interval; ISC, Iranian Statistical Center.

## Data Sharing Statement

The data used in the study were extracted from the Household Income and Expenditure Surveys (HIESs) collected by the Iranian Statistical Center (ISC). The HIES are publicly available at https://www.amar.org.ir/english/Statistics-by-Topic/Household-Expenditure-and-Income#2220530-releases.

## Ethics Approval and Consent to Participate

The study was approved by the Ethics Review Committee (ERC) of the Deputy of Research at Kermanshah University of Medical Sciences (KUMS) (IR.KUMS.REC.1398.1163).

## Consent for Publication

Not applicable.

## Acknowledgments

The authors wish to thank Dr. Yahya Salimi from Kermanshah University of Medical Sciences for his help to conduct this study.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Funding

This study is funded by Kermanshah University of Medical Sciences (code number: 990007). The funder had no role in the design of the study and collection,

analysis, interpretation of data and in writing the manuscript.

## Disclosure

The authors declare no competing interests.

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