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The Factor Structure and Generalizability of the Iranian Socioeconomic Status (SES) Questionnaire Administered in a Nationally Divergent Population

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Abstract

Background: Measuring socioeconomic status (SES) as an independent variable is challenging, especially in epidemiological and social studies. This issue is more critical in large-scale studies on the national level. The present study aimed to extensively evaluate the validity and reliability of the Iranian SES questionnaire.

Methods: This psychometric, cross-sectional study was conducted on 3000 households, selected via random cluster sampling from various areas in East Azerbaijan province and Tehran, Iran. Moreover, 250 students from Tabriz University of Medical Sciences were selected as interviewers to collect data from 40 districts in Iran. The construct validity and internal consistency of the SES questionnaire were assessed using exploratory and confirmatory factor analyses and the Cronbach's alpha. Data analysis was performed in SPSS and AMOS.

Results: The complete Iranian version of the SES questionnaire consists of 5 factors. The Cronbach's alpha was calculated to be 0.79, 0.94, 0.66, 0.69, and 0.48 for the occupation, self-evaluation of economic capacity, house and furniture, wealth, and health expenditure, respectively. In addition, the confirmatory factor analysis results indicated the data's compatibility with the 5-factor model (comparative fit index = 0.96; goodness of fit index = 0.95; incremental fit index = 0.96; root mean square error of approximation = 0.05).

Conclusion: According to the results, the confirmed validity and reliability of the tool indicated that the Iranian version of the SES questionnaire could be utilized with the same structure on an extensive level and could be applicable for measuring the SES in a broader range of populations.

Keywords: Socioeconomic Status, Generalizability, Validity, Reliability, Factor Structure, Psychometric

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↑What is "already known" in this topic:
Generally, SES assessment is very challenging, and various studies use different indicators to measure it. The only available questionnaire for SES assessment in Iran was validated on a small urban sample size of the capital city; therefore, it is not generalizable to the entire country.

→What this article adds:
The confirmed validity and reliability of the tool showed that the Iranian SES questionnaire can be used in various Iranian societies. This tool can also be used in population-based studies such as cohort studies, as used in the Persian Traffic Cohort Project.

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Introduction

Socioeconomic status (SES) is defined as the status of individuals or families based on the expected standards of cultural features, adequate income, financial assets, and participation in social group activities (1). The variables associated with SES may be confounding or have dependent and independent effects, and they have been measured in several studies. However, their measurement may be challenging because of the impact of social and cultural structures and policies on these variables. As communities become distant from political, economic, and social fluctuations, measuring SES variables becomes easier (2). (SES) is a key factor determining health status in any society. SES has a multidimensional structure requires a standardized measurement format for each society. Indeed, SES is defined as an individual's or a family's position in a society with factors such as occupation, education, income, wealth, and neighborhood (3-5). The ineffective measurement of SES as a study variable could affect the final results and outcomes and the implications for further practice (6). Nevertheless, numerous studies in many countries have attempted to develop valid tools for assessing SES. For instance, the SES scale is updated annually in India with the 3 subscales of occupation, education, and income status (7). Moreover, the questionnaire constructed by Fahmi and Sherbini in Egypt was reevaluated by El-Gilany et al (8) in 2012, and the researchers concluded that the revised questionnaire required many additional domains.

In Iran, the only available questionnaire for the assessment of SES was developed before 2014, validated on a small sample size, and limited to the urban areas of Tehran (2). The specific conditions of Tehran as a metropolis required the development of an SES assessment tool applicable to populations not restricted to the capital. As such, the Iranian version of the SES questionnaire was developed and validated in the studies performed in the urban areas of Tabriz and Tehran. The questionnaire was published in 3 versions, and its psychometric properties were investigated and published elsewhere (9, 10).

The Iranian version of the SES questionnaire has also been applied in several studies and confirmed to be practical for health studies (11-14). The instrument contains questions in 3 domains—economic, education, and income status—with 22 items encompassing 5 factors, including the main factor, self-evaluation of the economic capacity, house and furniture, wealth, and health expenditure.

The present study aimed to extensively evaluate the applicability and psychometric properties of the Iranian version of the SES questionnaire in a nationally divergent population in Iran. Considering that we used this tool in several other studies to assess the socioeconomic level, in this study the researchers investigated whether the factor structure of the Iranian version of the SES questionnaire could be confirmed when administered to a broader range of urban and rural Iranian households in Tabriz and Tehran, as well as a smaller sample size selected from 40 other districts in Iran.

Methods

The present study was the third phase of a former project aiming to develop an SES measurement tool for use in the Iranian population, focusing on health studies (Table 1). The first and second phases of the project were performed in 2015, and 3 versions of the study were prepared, including the complete version, the Short version (SES-Iran-SV), and the Ultra-short version (SES-Iran-UV). In the third phase, the authors investigated the factor structure of the Iranian version of the SES questionnaire in a larger sample population with higher diversity in the residents of various cities in Iran.

Study Design and Population

This psychometric study was conducted on a household level through interviews with trained interviewers. In total, 3,00 households were selected via random cluster sampling from various areas of East Azerbaijan province and Tehran, Iran. Considering the feasibility and logistics, 250 students were also chosen from Tabriz University of Medical Sciences as the representatives of the households as interviewers to collect data from 40 districts in Iran. To improve the

Table 1. Development and assessment process of Iranian socioeconomic status assessment questionnaire

Phase	Year	Description
1	2015	Development and assessment of validity and reliability at Tabriz metropolitan: 700 households
2	2015	Assessment of validity (diagnostic validity) and reliability of shortened questionnaires:1000 households
3	Present article	Assessment of generalizability by collecting data at level of: 1-Cities of East Azerbaijan province 2- Tehran 3- 40 other areas in Iran, including a smaller sample from rural areas
4	Not conducted	Assessment in a larger rural population
5	Not conducted	Full assessment in a nationally representative population

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homogenous distribution of the samples with various SES levels, the students were classified into 3 categories of high-, medium-, and low-income status in terms of their residence (urban/rural) and based on consensus. One household was selected from each of the low-income and high-income areas, and another was selected from the other urban or rural areas.

The inclusion criteria were as follows: (a) living with family members in the same residence; (b) similar goals and characteristics of all the household members; (c) shared family expenses; and (d) consent to participate in the study. The exclusion criteria were as follows: (a) separation of children from the family as separate households; (b) lack of shared expenses and goals; (c) lack of consent to participate in the study; and (d) presence of disorders causing the disability to complete the questionnaire.

Construct Validity

The factor loadings were measured using exploratory factor analysis based on extracting the principal components and direct Oblimin rotation. Moreover, confirmatory factor analysis was used to determine the factors' numbers. Concerning the sample size, 10 participants were required to respond to each item for the exploratory and confirmatory factor analyses (15, 16). As such, the sample size was larger than the minimum recommended level (n = 3240).

Several indicators were involved in assessing the model, each of which was focused on a particular aspect of fit. Therefore, the indicators of the goodness of fit index (GFI), relative chi-square, comparative fit index (CFI), incremental fit index (IFI), and root mean square error of approximation (RMSEA) were applied. Model fitting was confirmed by the researchers with the relative chi-square of <5, RMSEA of < 0.08, and GFI, CFI, and IFI of >0.90 (17, 18). To assess the internal consistency of the finalized instrument after the factor analysis, the Cronbach's alpha was calculated for the entire scale and the subscales. Data analysis was performed using SPSS Version 21 and AMOS software package Version 13.

Table 2. The baseline characteristics of participants

Variable		Frequency	Percent
Gender	Male	2905	89.7
	Female	294	9.1
	Unspecified	41	1.2
Education (years)	<7	985	30.4
	7-12	1711	52.8
	12<	508	15.7
	Unspecified	36	1.1
Income level	Low income	765	23.6
	Medium income	1491	46.0
	High income	861	26.6
	Unspecified	123	3.8
Place of residence	Urban	2302	71.0
	Rural	870	26.9
	Unspecified	68	2.1

Results

Participants Characteristics

Of all participants, 2905 (89.7%) were men, and the mean age (SD) of the participants was 47.34 (23.57) years. The baseline characteristics of the participants are shown in Table 2.

Exploratory Factor Analysis

In total, 5 factors were extracted (Table 3). The loadings of all the factors were considered appropriate and similar to those obtained in the previous study. The results of Bartlett's test were deemed significant ($P < 0.001$), and the value of the Kaiser-Meyer-Olkin test was determined to be 0.912. Therefore, the study's sample size was considered fit for the factor analysis, and the 5-factor model was also compatible with the data. The extracted factors included occupation (5 items), self-evaluation of the economic capacity (6 items), wealth (5 items), house and furniture (4

Table 3. Extracted factors using principal component extraction and direct Oblimin rotation

Items	Factor				
	Occupation	self-evaluation of economic capacity	Wealth	House and furniture	Health expenditure
Ses1	-0.688	-0.235	0.124	-0.357	-0.087
Ses2	-0.481	-0.214	0.257	0.368	0.260
Ses3	0.546	-0.342	0.321	0.157	0.241
Ses20	0.925	0.424	0.276	0.195	0.172
Ses21	0.872	0.182	0.385	0.218	-0.287
Ses4	0.287	-0.895	-0.202	0.178	0.426
Ses5	0.352	-0.892	0.300	0.186	0.272
Ses6	0.369	-0.859	0.247	0.266	-0.212
Ses7	-0.147	-0.855	0.408	0.374	-0.084
Ses8	0.249	-0.874	-0.299	0.216	-0.090
Ses9	0.334	-0.872	0.188	0.173	0.054
Ses11	0.258	-0.421	0.692	0.298	0.254
Ses12	0.154	-0.210	0.315	0.301	0.098
Ses13	0.263	-0.187	0.645	0.240	0.269
Ses14	0.188	0.416	0.833	0.322	0.277
Ses15	0.307	0.254	0.816	0.279	0.158
Ses10	-0.087	0.098	0.355	-0.718	0.297
Ses16	0.133	0.258	0.308	-0.615	0.257
Ses17	0.452	0.286	0.283	-0.708	0.136
Ses18	0.420	0.241	0.187	-0.655	0.154
Ses22	0.358	-0.232	0.288	-0.433	0.808
Ses23	0.222	-0.276	0.331	0.166	0.825

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items), and health expenditure (2 items). The results show that the model could explain 64% of the variable variance.

Confirmatory Factor Analysis

Figure 1 shows the confirmatory factor analysis of the 5-factor model, in which the factors were extracted using the exploratory factor analysis. The factors were observed to have moderate correlations, and the errors of some items were also correlated. The standard coefficients of the confirmatory factor analysis indicated that all the coefficients were significant ($P < 0.05$) (Table 4). Furthermore, the confirmatory factor analysis results demonstrated the data's compatibility with the 5-factor model (CFI = 0.96, GFI = 0.95, IFI = 0.96, RMSEA = 0.05). In other words, the model was consistent with the theoretical expectations.

Internal Consistency

Table 5 shows the status of the instrument's internal consistency. The questionnaire consisted of 5 factors, and the Cronbach's alpha was estimated at 0.79, 0.94, 0.66, 0.69, and 0.48 for the main factor, self-evaluation of the economic capacity, house and furniture, wealth, and health expenditure, respectively. Although the obtained Cronbach's alpha was relatively low for the health expenditure factor, the factor remained in the model considering the high total Cronbach's alpha value and some questionnaire items' high Cronbach's value.

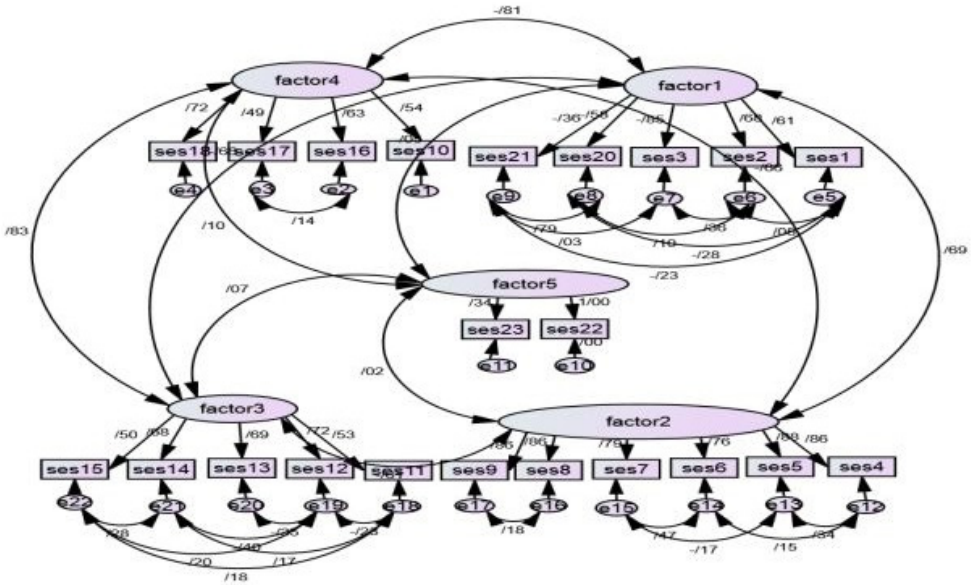

Figure 1. Arrows drawn from the error (e) toward items show the effect of errors on the items and those which drown from factors toward items show that the factors are reason of items. Factor1 is named main factor that includes education (2 items), occupation (2 items), and income (1 item). Factor2 assesses economic expenditure from respondent's view that includes items 4, 5, 6, 7, 8, and 9. Factor3 is about household's asset that includes the items 11, 12, 13, 14, and 15. Factor4 assesses the house and furniture that includes 4 items, and Factor5 assesses the health expenditure of household that includes 2 items.

Table 4. Confirmatory factor analysis coefficients

Item		Factor	Estimate	S.E.*	Standard Estimate	C.R.**	*P*-value
ses10	<---	factor4	1.000		0.542		
ses16	<---	factor4	0.898	0.035	0.632	25.925	<0.001
ses17	<---	factor4	0.454	0.021	0.493	21.839	<0.001
ses18	<---	factor4	0.998	0.036	0.716	27.887	<0.001
ses1	<---	factor1	1.000		0.611		
ses2	<---	factor1	1.374	0.050	0.685	27.615	<0.001
ses3	<---	factor1	-1.356	0.043	-0.847	-31.656	<0.001
ses20	<---	factor1	-1.361	0.043	-0.578	-31.628	<0.001
ses21	<---	factor1	-0.399	0.021	-0.362	-19.017	<0.001
ses22	<---	factor5	1.000		1.000		
ses23	<---	factor5	0.527	0.216	0.342	2.444	0.015
ses4	<---	factor2	1.000		0.856		
ses5	<---	factor2	1.058	0.013	0.881	80.968	<0.001
ses6	<---	factor2	1.007	0.018	0.764	55.194	<0.001
ses7	<---	factor2	1.070	0.020	0.795	53.975	<0.001
ses8	<---	factor2	1.098	0.018	0.859	60.207	<0.001
ses9	<---	factor2	1.064	0.018	0.857	60.009	<0.001
ses11	<---	factor3	1.000		0.532		
ses12	<---	factor3	1.811	0.084	0.718	21.639	<0.001
ses13	<---	factor3	1.073	0.046	0.693	23.455	<0.001
ses14	<---	factor3	1.093	0.041	0.682	26.751	<0.001
ses15	<---	factor3	0.474	0.022	0.497	22.006	<0.001

* Standard Error; ** Composite Reliability

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Table 5. Situation of the internal consistency for the whole scale and its sub-scales

Sub-scales	Number of items	Cronbach's alpha	Mean of inter-item correlation	Internal consistency
Occupation	5	0.79	0.46	Suitable
Self-evaluation of the economic capacity	6	0.94	0.72	Suitable
House and furniture	4	0.66	0.36	Suitable
Wealth	5	0.69	0.36	Suitable
Health expenditure	2	0.48	0.35	Medium
Whole scale	22	0.88	0.3	Suitable

Discussion

The present study aimed to assess the factor structure and generalizability of the Iranian version of the SES questionnaire, which was administered to a broader range of urban/rural Iranian households. Although many tools have been proposed and validated in small populations and on local levels, it is incredibly beneficial to repeatedly apply, validate, and reevaluate the psychometric properties of a specific instrument in larger sample populations. According to the current research findings, the Iranian version of the SES questionnaire maintained its validity in a larger population with broader geographical coverage. Therefore, this instrument is applicable in extensive studies with nationally divergent levels. However, it is notable that a new national project with a large population should be initiated using the tools with confirmed applicability in various studies (19). In the present study, the exploratory factor analysis resulted in the extraction of 5 factors, confirmed by the confirmatory factor analysis and discussed in the following sections. Occupation status is considered an important predictor of SES, with high stability as the main factor, which has been employed in numerous studies in this regard (20); therefore, it is used in many studies. In a study in this regard, Galobardes et al confirmed the applicability of this approach (21). Notably, the determined occupational prestige in the present study differed from the foreign studies in this regard. We determined occupational prestige based on Kazemipur's (22) and Kalaki (23) findings. Moreover, we applied expert comments to update the previous conclusions and eliminate their possible limitations; this is considered a major strength of the questionnaire. Also, this study (23) classified all the individuals with military occupations in a single category, while we considered their grade of service for more accurate classification. In addition, we considered and ranked the occupations that had not been assessed in the previous studies in data collection. As such, occupational prestige was defined using objective methods and based on the review of the previous studies in this regard. In the present study, education level and income status were loaded in the factor. These items have been used together in several studies (7, 24-27) to accurately measure the SES, while some studies have used these items independently (28, 29). Therefore, there is the possibility of some errors in measuring the main variable. Considering the changes in educational classifications of the Iranian educational system in recent decades, additional items should be developed to measure the educational level so that this variable is minimally affected by the changes in the educational system. For this reason, we used the number of years of successful education that has been used in many studies, such as the study conducted by Duncan (25) and Braveman (6). Self-evaluation of the Economic Capacity can also be mentioned as one of the important factors in this questionnaire. Household expenses have been considered in some studies for measuring the SES. One of the strengths of this factor is its ability to measure household expenses at all times. Furthermore, it has been evaluated in 2 studies (30, 31) and has proven to have high internal consistency (0.96). This is also consistent with the findings of our previous study.

For the Wealth, House, and Furniture factor given that the evidence attests to the importance of wealth in measuring the SES in health studies, this factor cannot be an indicator of the income status. For instance, Wardle et al (32) claimed that obtaining data on the items related to the main factor is challenging because of the possibility of completion bias. In contrast, such bias is not observed in the extracted items regarding factors such as house. In addition, these items have high internal and external validity and have been loaded in the wealth factor. There is disagreement regarding the use of health expenditure as a determinant of the SES since high health expenditure is associated with favorable health, as well as the ability of individuals to spend part of their income on their health. In addition, the expenditure for preventative measures indicates the capability to pay intervention costs, although it reveals no precise data on the current health status of individuals (33). However, this factor has been considered in numerous high-income countries, given its importance (34-36). In the current research, we used this factor since health expenditure cannot be converted into properties, and it has not been taken into account in the other studies conducted in Iran. Therefore, it is suggested that the sixth item be ignored while using the short version of the Iranian SES questionnaire. A representative sample is required to determine some norms, while a non-full representative sample could improve external validity, which is one of the strengths of the present study (10).

In the current research, various aspects of validity and reliability were assessed extensively, and all the validity and reliability indices were confirmed. As a tool constructed and used in a step-by-step manner, the Iranian version of the SES questionnaire was considered practical in the early phases of the project; as such, it has been used in several studies in this regard. Furthermore, reasonable correlations were observed between the Iranian version of the SES questionnaire and other variables (11, 12, 14, 34). However, there may be differences in the use of this instrument in rural populations despite its similar function in these populations. One of the influential factors in such differences is the sense of belonging in rural populations, which is defined as the wealth factor in urban populations. Despite the

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differences in these patterns in the past decades, the differences in the distribution of urban and rural populations may not significantly impact the validity of the tool. The Iranian version of the SES questionnaire does not assess the changes in literacy level based on the country's educational model. Moreover, it does not change impressive in terms of economic measurements. Details in household wealth (eg, type of refrigerator or TV brand) have been presented in some of the previous studies in this regard; however, due to the wide variety of household appliances and their reduced price gap, such data may lead to inefficient assessments. In this study, the critical strategy in the utilization of the SES measurement tool was to use the monetary value of home appliances.

One of the limitations of the present study was the lack of responsibility; to decrease the effect of this factor, data collection was performed simultaneously with the health complex project. However, because of time constraints and expense limitations, we could not assess the questionnaire's efficacy in rural areas, although its use is recommended in all research. Despite the strengths of the questionnaire, it is advised that its applicability be evaluated in rural populations as well. While the Iranian version of the SES questionnaire has real value in community-based studies, it also has controlling confounding effects on clinical research (37).

Another limitation of the present study was the inability to determine the occupational prestige of some jobs. The prestige level of various occupations was verified based on the structural values of the community. Further investigations are required to reevaluate this variable so that individuals can be classified more specifically based on their former occupations.

Conclusion

The confirmed validity and reliability of the tool indicated that the Iranian version of the SES questionnaire could be utilized with the same structure on an extensive level. In this study, the authors investigated whether the factor structure of the Iranian version of the SES questionnaire can be verified when implemented on a broader range of urban/rural Iranian households in the 2 cities of Tabriz and Tehran, as well as in a smaller sample size in >40 other regions in Iran. This questionnaire can be an applicable instrument for measuring SES in a wider range of populations.

Acknowledgment

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Ethical Approval

Informed consent was obtained from all participants in this study. This work was extracted from a student thesis grant approved by the Department of Statistics & Epidemiology, Tabriz University of Medical Sciences, with code B/254, which has gone through the entire process related to compliance with ethical considerations.

Authors' Contributions

All the authors have contributed to the study design, data collection, data analysis, and manuscript editing.

Abreviations

SES: Socioeconomic Status
CFI: confirmatory factor analysis
SES-Iran-SV: Socioeconomic Status Short Version
SES-Iran-UV: Ultra-short Version

Conflict of Interests

The authors declare that they have no competing interests.

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