Research Article

Psychometric Properties of the Short and Ultra-short Versions of Socioeconomic Status Assessment Tool for Health Studies in Iran (SES-Iran)

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Introduction

Socioeconomic status (SES) is defined as “someone’s or group’s position within a hierarchical social structure and is combined of variables, including job, education, income, wealth, and place of residence” [1]. It is related to a lot of exposures and outcomes such as chronic diseases, child malnutrition and infections [2]. Also, it has confounding effect on inter variables associations. Hence, it has been recently considered by health researchers to determine its role in many other diseases and control its confounding effect in studies in Iran. In most of studies, only a particular aspect of socioeconomic status has been taken in self-administered tools [3, 4]. Therefore, it is essential to provide a standard tool to measure SES correctly.

While efforts are made to measure this variable in high-income countries in epidemiological studies [5], scholars put efforts into designing and assessing a tool to perfectly measure SES in low

Abstract

Purpose: Socioeconomic Status assessment tool (SES-Iran) as an accurate and standard measure with no complexity is applied to measure socioeconomic status of household, at a large-scale (Iran). Having a large number of variables and subsequent limitations imposed on data collection in most studies, the tool has a restricted use. So it is needed to be shortened in a way that could measure socioeconomic status using a minimum number of variables. The aim of this study was to curtail the full version of instrument by 50% (short version) and 25% (ultra-short version) of its original size (22 items) and evaluate the reliability and validity of both versions.

Methods: The experts’ comments were used to make short and ultra-short versions. The two versions were evaluated by use of indicators related to reliability (internal consistency and test-retest) and diagnostic validity, diagnosis of marginal areas from central areas using ROC curve analysis, among 1600 households. Also, intraclass correlation coefficient (ICC), Pearson correlation coefficient and Bland-Altman plot were used in order to assess agreement between full and shortened versions.

Results: The short and ultra-short versions were included 10 items and 6 items, respectively. Cronbach’s Alpha was 0.83 and 0.65 for short version and ultra-short version respectively. The Pearson correlation coefficient and the coefficient of agreement were desirable and acceptable for both versions (p<001). Because of high agreement between shortened versions and full version, the two shortened versions measured the socioeconomic status as good as the full version. Meanwhile, the results were confirmed by means of Bland-Altman plot.

Conclusion: Both short version and ultra-short version had suitable validity and reliability. As a result, both questionnaires can be used by researchers.
and middle income countries, and take into account the various aspects of socioeconomic status in these countries. For example, socioeconomic status assessment tool in Egypt covers education, culture, employment, family, family ownership, the economy, health care and home health care compliance [6]. Moreover, a study conducted by Vijaya et al. in India [7], revealed that socioeconomic status is composed of employment status, education and household income.

However, a tool to measure the socioeconomic status correctly has been firstly designed and evaluated in Tehran, Iran, in 2007. It is well-set with cultural and social conditions of people living there and cannot be used on a large scale [8]. For this reason, in 2014, we conducted a study in Tabriz, Iran to provide a standard tool measuring socioeconomic status of household nationwide, as an accurate measure with no complexity, which is entitled “development and psychometric evaluation of a socioeconomic status questionnaire for urban households (SESIran)” [9]. According to the results of the study, the created questionnaire includes 5 factors (main factor, self-evaluation of the economic capacity, house and furniture, wealth and health expenditure) and it is composed of 22 items.

Short versions of the questionnaire are useful on particular occasions that time is important, besides it is necessary to apply short versions through epidemiological studies especially in clinical settings. Having a large number of variables and subsequent limitations imposed on data collection in most studies, the tool has a restricted use. So it is needed to be shortened in a way that could measure socioeconomic status using a minimum number of variables. Thus, use of shortened versions is advantageous to these studies providing that their psychometric properties are preserved. The aim of this study was to curtail the full version of instrument by 50% (short version) and 25% (ultra-short version) of its original size (22 items) and evaluate the reliability and validity of both versions.

Methods
This study is a cross-sectional and methodological one, conducted in order to design and evaluate Iranian shortened versions of the socioeconomic status assessment tool (SESIran). Initially, experts’ comments were used to make short and ultra-short versions, then their reliability and validity were assessed.

Study tool
The socioeconomic status assessment tool (SESIran) was used in the present research and evaluated in the previous study [9]. It includes 22 items under 5 factors: Main factor, self-evaluation of the economic capacity, house and furniture, wealth and health expenditure. In order to score the socioeconomic status, the mean of normalized scores was used and classified as very low, low, average and high, using mean of total score with regard to statistical parameter (quartile).

Constructing short and ultra-short versions
The full version was distributed among 10 experts in the fields of social sciences, economics, psychology, public health, epidemiology and methodology to make summary versions. They received a request for comments and scores concerning features of a summarized tool and nature of the subject relating to any item in shortened versions. Then, a meeting was held by research members to review the comments and total scores for each item. Therefore, the selection of items was made by use of the comments and scores given to each item.

Validity and reliability of short and ultra-short versions
Agreement between full version and two shortened versions was evaluated. Also, the short and ultra-short versions were evaluated using indicators related to reliability (internal consistency and test-retest) and validity (diagnostic validity).

Intraclass Correlation Coefficient (ICC) and Pearson correlation coefficient were used in order for assessment of agreement between full and shortened versions. Moreover, with regard to the restriction of them [10, 11], Bland-Altman method was used to assess the agreement. In this way, the average of total score was superseeded by the full version as horizontal axis, since the full version acts as standard tool and it seems that such replacement makes results more accurate [12]. Therefore, the vertical axis and the horizontal axis of Bland-Altman plot indicate difference between full version and short version scores and the full version scores, respectively (Figure 1).

In addition, Cronbach’s alpha and intraclass correlation coefficient (ICC) were used to determine the internal consistency reliability and test-retest reliability, respectively.

Using ROC (Receiver operating characteristic) curve of full version and shortened versions, diagnostic validity of them was assessed by comparison of known groups. It was expected that all versions would be able to separate marginal areas from central areas.

The closer to one the area under curve is, the higher the predictive power is [13]. Thus, values greater than 0.7 were considered as desirable for area under curve in ROC curve analysis. Additionally, the closer to one the Pearson correlation coefficient, ICC and Cronbach’s alpha are, the higher the reliability and validity are [14]. Therefore, values greater than 0.6 were considered as desirable for ICC, Pearson correlation coefficient and Cronbach’s alpha. Significant level for tests was considered at 0.05 and analysis was done using software packages of Stata 13 and SPSS 16.

Sample size and sampling method
Sampling unit in this study was household which was selected via compound methods including: Stratify and cluster sampling methods; the city of Tabriz was stratified into marginal areas and central areas and 50 clusters were randomly selected in both central and marginal areas. Each cluster included 16 households. Therefore, the sample size with 1600 households in Tabriz, was used for internal consistency reliability, ROC analysis and agreement. Inclusion criteria were living family members in the same residence, having same goals and features of all household members, share of family expense, consent of people to participate in the study, and lack of any feature or disorder leading to an inability to respond to the questions. To assess the test-retest reliability, with regard to the inclusion criteria, 30 households were selected using simple random sampling method.
Ethical consideration

The study procedure was explained to the participants, especially illiterate people. Then, informed consent was obtained from them and data were collected afterwards.

Results

Short and ultra-short versions

The short version was comprised of 10 items as below: Three items were about occupation, income per month and years of successful education, four items were about financial security for clothing, financial security for food and fruit, financial security for education costs, and financial security for health expenditure. Also, one item was about private housing, one item was about private car and therefore one item was about the share of health expenditure to total expenditures. The above mentioned items were selected from main factor, self-evaluation of the economic capacity, house and furniture, wealth and health expenditure, respectively. Also, the ultra-short version included 6 items (4 items were excluded from self-evaluation of the economic capacity).

Psychometric properties of the short and ultra-short versions

After analyzing incomplete data set by means of multiple imputation, 28 participants were included in analysis for test-retest reliability and 1600 participants were included in analysis for internal consistency reliability, diagnostic validity and agreement assessment by means of Bland-Altman plot, Pearson correlation coefficient and intraclass correlation coefficient (ICC). Results are presented in the following sections.

Reliability

Intraclass correlation coefficient (ICC) and Cronbach’s Alpha for test-retest and internal consistency reliability, respectively, are shown in Table 1. Cronbach’s alpha is higher than 0.6 and is desirable for both versions. ICC is similarly higher than 0.6 and significant for both versions. Therefore, reliability of the shortened versions is confirmed.

Validity

The areas under curve to detect the margin area (low socioeconomic status) were 0.81, 0.78, 0.76 for the full version, short and ultra-short versions, respectively (Figure 1). Table 2 shows comparison of the area under curve for three versions. However, their difference is statistically significant (p < .001), the area under curve is high for all three versions. In other words, the power to detect the marginal areas (low socioeconomic status) from central areas (high socioeconomic status) becomes desirable using all three versions.

Agreement

Table 3 shows the coefficients of agreement (intraclass correlation and Pearson correlation coefficients) between the full version (22 items) and two shortened versions (short and ultra-short versions). The Pearson correlation coefficient and the intraclass correlation coefficient of agreement are desirable and acceptable for both versions (p<0.001). Pearson correlation coefficient shows a strong positive relationship between the short version and the full version. Additionally, it shows a strong positive relationship between ultra-short version and full version. Figure 2 illustrates that the strong positive relationship is not due to outlier and there are no
systematic differences (bias) between the full version and short versions.

Table 1. Reliability (internal consistency and test-retest) of short and ultra-short versions.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Cronbach's Alpha</th>
<th>Mean of inter-item correlation</th>
<th>Intraclass correlation coefficient</th>
<th>95% confidence interval</th>
<th>p-value</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short version</td>
<td>.83</td>
<td>.10</td>
<td>.78</td>
<td>.52 .90</td>
<td>&lt;.001</td>
<td>desirable</td>
</tr>
<tr>
<td>Ultra-short version</td>
<td>.65</td>
<td>.18</td>
<td>.79</td>
<td>.55 .91</td>
<td>&lt;.001</td>
<td>desirable</td>
</tr>
</tbody>
</table>

Bland-Altman plot (modified) is presented in Figures 3 and 4 for two shortened versions separately. In the first graph, most of the points with lower score fall within the range of ±2SD of the mean differences and by increasing the socioeconomic status score (using full version) the points deviate from mean slightly. Though, the distance between 2 standard deviations from the mean differences is slightly wider in graph 2, the situation is still going to exist. Thus, in both graphs, most of the points lie in the distance of ±2SD of mean differences and represent the high agreement between two shortened versions and full version.

Discussion

The results showed that both short versions had acceptable reliability and validity. Also, indices related to the assessment of agreement demonstrated that there is suitable agreement between the full version and the short versions and the Bland-Altman plot showed that the strongest disagreement exists on high socioeconomic status scores (using full version) which probably is due to heterogeneity from the aspect of different factors among high socioeconomic people. Various factors affect socioeconomic status in different societies, in addition, despite the fact that no standard and total agreement exists on measuring SES applying three variables (occupation, education, income), the instrument is frequently utilized in developing countries [6, 15]. If the data on all three variables are simultaneously existent in the shortened versions, the socioeconomic status could be measured relatively more accurate than being presented separately [16] nevertheless, they have been individually employed in numerous studies in Iran [4, 17]. That may not measure the socioeconomic status properly. All three variables confirmed in researcher-made tools and the shortened questionnaire in Tehran, exist in shortened versions [3, 8].

Innovation has been directly brought into the educational system, but success rate of innovative methods used in classes and teaching-learning process is low in many circumstances.
in Iran [18], also the classification of school courses has been changed in the past years. Therefore, of two items related to education, the number of successful educational years mentioned in the shortened versions is similar to that of the tool used in developed countries [19-21]. With regard to the fact that education is measured by the number of educational years in more high-income countries, it can also be applied in low-income countries [5]. On the other hand, according to the latest national statistics in 2012-2013, the number of associate and bachelor students are more than the number of higher education ones [22]. In consequence, in terms of difficulty, possibility of graduating from bachelor programs are more feasible than that of higher education programs. So academic courses were considered as a category based on the division of number of educational years in the questionnaires to meet above-mentioned conditions.

Vickie states that composite SES measures can be divided into two basic categories: Those that measure material and social deprivation and those that measure social standing or prestige [20]. In the full version, occupation is measured using the occupational prestige by two items, one of which was deleted in shortened versions owing to self-evaluation of occupational prestige and probable raise of bias. Thus, the authors used encoded occupations to increase accuracy in the present study.

Although income is an important factor to determine the socioeconomic status of the household, it can’t be measured correctly because of several reasons such as response bias, informal work and monthly fluctuations in low and moderate income countries [2]. Accordingly, socioeconomic status is measured incorrectly. To improve this weakness, some countries such as the UK used tax administration as a proxy for income. However, a two-way relationship between income and health is more important in low income countries as Iran, the absence of a social security system has a negative impact on income [5]. Therefore, wealth index was used too. Wealth index is a suitable predictor for socioeconomic status in long-term especially in developing countries [2, 23]. Hence, the factor which was used in the shortened versions includes personal car (1 item) and personal house (1 item).

El-Gilany et al. suggested that by removing the home and health care domains, because they had the lowest contribution to SES, a shortened version can be produced [6]. Cultural and social differences between Egypt and Iran can justify the inconsistency between their results and ours.

Using of information about economic expenditure is another important property of the shortened versions. One of the differences between these questionnaires and other Iranian tools (self-made) is the use of health expenditure, which isn’t converted to wealth. Also, the self-evaluation of economic capacity factor has high validity and reliability, prevents recall bias and is measured easier than income [24-26], so both exist in the short version. The ultra-short version does not contain the self-evaluation of economic capacity factor that may be supposed to be its defect in measuring the socioeconomic status.

**Conclusion**

The indicators related to the assessment of agreement between full version and the short versions were acceptable and using of the short versions (Instead of the full version) is desirable on condition that a limitation of data collection exists in epidemiological studies. Also, reliability and validity of the short versions were approved. As a result, both questionnaires can be used by researchers.

**Limitations and Suggestions**

One of the limitations in this study was the failure to apply all three versions to rural communities, due to high costs and lack of time. Therefore, it is suggested to evaluate the versions in rural societies, in Iran. However this study was designed in the form of cross-sectional study, because of fluctuation in income and inflation rate, we suggest that all three versions would be assessed in the coming years. Another limitation was lack of accountability to the questionnaires. In order to reduce its effect on results, they were distributed along with questionnaires relating to a study conducted by province health department.

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References


