Updating and validation of the socioeconomic status scale for health research in Egypt

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تحديث سلم قياس الوضع الاجتماعي والاقتصادي المستخدم في البحوث الصحية في مصر والتحقق من صحته

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الخلاصـة: تستهدف هذه الدراسة تحديث المعلومات حول سلم قياس نظام "فهمي والشربيني" للوضع الاجتماعي، والاقتصادي الذي يستخدم في البحوث الصحية في مصر والتحقق من صحته. ويضم سلم قياس الوضع الاجتماعي والاقتصادي الجديد سبعة مجالات ويبلغ إجمالي الأحراز (درجات القياس) فيه 84. وقد قيَّم الباحثون الاختلاف بين المراقبين والاختلاف لدى كل مراقب على حِدَة وطُبِّق نموذج للتحوّف الخطي للتعرف على الأهمية النسبية لكل مجال ضمن مجمل الأحراز. واستخدم الباحثون المعامل (كابا) لقياس التوافق بين المستويات الاقتصادية والاجتماعية في سُلَّمَيْ القياس القديم والجديد. واتضح للباحثين وجود ترابط قوي بين معظم المجالات السبعة لسلم القياس. وقد بلغت قيمة كرونباخ ألفا (قياس موثوقية الاتصاف الداخلي) لسلم القياس 0.66. كما ساهم المجال التعليمي في 0.898 من التفاوت في مجمل نتائج القياس وكان هناك توافق متوسط (كابا= 0.76) وترابُط إيجابي قوي يُعْتَد به إحصائياً (r = 0.93) بين المستويات الاقتصادية والاجتماعية وبين الأحراز في كلا المقياسين. واستنتج الباحثون أن سلم قياس الوضع الاجتماعي والاقتصادي الجديد يتمتع بالصحة وبالموثوقية.

ABSTRACT This study aimed to update and re-validate the scoring system of Fahmy and El-Sherbini for measurement of socioeconomic status in health research in Egypt. The new socioeconomic status scale has 7 domains with a total score of 84. Intra-and inter-observer variability and the internal consistency of the scale were assessed. A linear regression model was performed to determine the relative importance of each domain to the total score. Kappa coefficient was used to measure the agreement between the socioeconomic levels of the new and the old scales. There was a strong correlation between most of the 7 domains of the scale. Cronbach α for the scale was 0.66. The education domain contributed to 0.898 of variation in total score. There was a moderate agreement (κ = 0.76) and strong positive significant correlation (r = 0.93) between the socioeconomic levels and scores of both scales. We conclude that the new socioeconomic status scale is valid and reliable.

Mise à jour et validation d'une échelle du statut socioéconomique pour la recherche en santé en Égypte

RÉSUMÉ La présente étude visait à mettre à jour et à revalider le système d'évaluation de Fahmy et El-Sherbini relatif à la mesure du statut socioéconomique dans la recherche en santé en Égypte. La nouvelle échelle du statut socioéconomique compte sept domaines pour un score total de 84. La variabilité inter- et intra-observateurs et la cohérence interne de l'échelle ont été évaluées. Un modèle de régression linéaire a été mis en oeuvre pour déterminer l'importance relative de chaque domaine par rapport au score total. Le coefficient Kappa a été utilisé pour mesurer la concordance entre les niveaux socioéconomiques de la nouvelle échelle et de l'ancienne. Une forte corrélation a été observée entre la plupart des sept domaines de l'échelle. Le coefficient α de Cronbach pour l'échelle était de 0,66. Le domaine portant sur le niveau d'études contribuait pour 0,898 dans la variation du score total. Une concordance modérée (κ = 0,76) et une forte corrélation positive (r = 0,93) ont été observées entre les statuts socioéconomiques et les résultats des deux échelles. Nous en avons conclu que la nouvelle échelle du statut socioéconomique était valable et fiable.

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Introduction

The terms socioeconomic status (SES), socioeconomic position and social class are widely used in health research [1]. Assessment of SES is an important aspect in community-based health research as this is a major determinant of health and nutritional status as well as of mortality and morbidity [2–4]. SES is usually measured by 3 variables: education, occupation and income [4–10]. Occupational categories based on prestige, skills, social influence, and/or power have been the primary basis for SES classification in western European countries [1]. While SES has been seen as an inherited factor, in modern society it may migrate on the basis of factors such as occupation, education, income, type of housing, material possessions, etc. [10].

In Egypt there have been only 2 recorded attempts to develop scales to determine SES. The scale of Fahmy and El-Sherbini, which was originally published in 1983 [5], is the most commonly used in health research, while the second scale of El-Shakhs [6] has been developed for use in educational research. However, social transformations and the fast growing economy of the country may have reduced the validity of these scales for measuring SES over the decades. Furthermore, monetary inflation and the consequent fall in the value of the currency make the economic criteria of the scale less relevant. We suggested the need for an economic revision of this scale in order to account for the devaluation of the Egyptian pound and other changes over time. This study therefore aimed to update and re-validate the scoring system of Fahmy and El-Sherbini for measurement of SES in health research [5].

Methods

Sample

The target population was a convenience sample of 100 households distributed proportionally between both urban and rural areas (40% and 60%, respectively). Ten (10) clusters, each cluster with 10 households, were selected from 6 villages and 4 sectors of Mansoura city in Egypt. The villages were selected to represent small and large villages, as well as those with and without rural health services. The urban sectors were chosen to represent different social strata of the community. The first home in each cluster was randomly chosen. Empty homes were replaced by their neighbours.

In each household we interviewed one adult family member (aged 18+ years) who volunteered to participate in the study. A total of 96 agreed to participate in the study and were interviewed; 6 questionnaires were excluded from analysis (3 due to incomplete data, 2 because the family member interviewed at the first visit was not available at the second visit and 1 due to inability to complete the retest interview as the family was unavailable at their home). Thus 90 questionnaires were analysed (response rate of 90%).

Study tool

The old scoring system of Fahmy and El-Sherbini [5] was updated by the authors, based on a literature review and extensive discussion with a jury of 10 experts (3 psychologists, 3 sociologists and 4 public health specialists). The relative weight of each item and its allocation to different domains were defined by the relevant jury. In case of disagreement between juries, the most frequently cited weight and domain allocation of each item was chosen. The final scale included 7 domains with a total score of 84, with a higher score indicating better SES: Education and cultural, Occupation, Family, Family possessions, Economic, Home sanitation, Health care (Box 1).

The original scale of Fahmy and El-Sherbini included items with no domains and there was more than one model for different health problems [5]. Furthermore, the old scale was not tested for its reliability and validity. It measured the woman's (and man's) education and occupation as 1 item and we judged this to be inappropriate as education does not necessarily correspond to occupation.

The updated scale included all the variables of the previous one. In addition new items and domains were included, e.g. access to health information, more items in the family, family possessions and economic domains, and the health care domain. The variables were grouped into 7 domains and the weight of each item was updated according to the opinion of the jury experts. Both the old and the new scales were developed in English, the official language of scientific writing in the medicine and health fields in Egypt.

Data collection

With the help of the local health facilities of the chosen areas, 2 researchers (A. El-W. and M. El-W.) contacted the target families and agreed a day and time for home visits. At the visit the researchers introduced themselves to the head of the household and obtained verbal approval for his/her participation in the study. To test the reliability of the new scale (final version) it was applied to the 90 households during 3 assessments. To assess inter-observer variability the first 2 assessments were performed consecutively on the same visit by the 2 researchers at an interval of 15 to 20 minutes, with either researcher 1 or researcher 2 applying the first assessment, thus preventing habituation bias. To assess intra-observer reliability the third assessment was applied after 10 days by researcher 1. Personal data of the interviewed family member were collected during the first visit. The tool was completed by the 2 interviewers at the 2 occasions for all subjects to ensure standardization of the wording of the questions and statements.

Box 1 Scoring of scale for measuring family socioeconomic status (SES) for health research in Egypt

Name of head of family:	Address:

Definition of the family: It includes nuclear or joint family. Married couple with unmarried children or without children. Head of the family will be either husband/wife. Dependent father/mother/brother/sister does not become member of the family unless he/she is earning and one kitchen with pooled income is managed by him/her.

This scale includes 7 domains with a total score of 84

Socioeconomic level: to be classified into very low, low, middle and high levels depending on the quartiles of the score calculated.

NB In case of death or retirement of husband or wife, record the education and occupation before death or retirement

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Education and cultural domain
(for both husband & wife)
(score = 30)

Highest level of education	Husband	Wife
Illiterate	0	0
Read & write	2	2
Primary	4	4
Preparatory	6	6
Secondary (general & technical of 3 or 5 years)	8	8
Intermediate (2 years) institutes	10	10
University graduate	12	12
Postgraduate degree	14	14

Access to health information (1 each for the following items): Printed materials, e.g. books, posters, booklets, etc.; Audiovisual message on television &/or radio

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Occupation domain
(for both husband & wife)
(score = 10)

Occupation	Husband	Wife
Non-working/house wife	0	0
Unskilled manual worker	1	1
Skilled manual worker/farmer	2	2
Trades/business	3	3
Semi-professional/clerk	4	4
Professional	5	5

Family possessions domain
(score = 12: 1 each for the presence of items given below)

Refrigerator – Radio – Television – Washing machine – Telephone/mobile phone – Car – Agricultural land – Non-agricultural land for housing – Shop or animal shed – Other house (beside the house in which the family is living) – Animals/poultry – Computer/Internet

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Family domain
(score = 10)

Residence: Urban slum = 0; Rural = 1; Urban = 2

Number of family members (parents, children & all dependents): < 5 members = 2; ≥ 5 members = 1

Number of earning family members: 1 member = 1; 2 members = 2; ≥ 3 members = 3

Education of children (aged ≥ 5 years, whether free or private education): All children going or ever gone to school/university = 3; ≥ 50% going or ever gone to school/university = 2; < 50% going or ever gone to school/university = 1; None go/gone to school/university/not applicable = 0

Home sanitation domain
(score = 12)

Services (1 each for the presence of the following items): Pure water supply – Electricity – Natural gas – Sewerage system – Municipal collection of solid wastes – Flush latrine – Air conditioning

Type of house: Owned, ≥ 4 rooms = 4; Owned, < 4 rooms = 3; Rented, ≥ 4 rooms = 2; Rented, < 4 rooms = 1; No place to reside = 0

Crowing index: (number of family members divided by number of rooms): ≤ 1 person per room = 1 = 1; > 1 person per room = 0

Economic domain
(score = 5)

Income from all sources: In debt = 0; 1 Just meet routine expenses = 1; Meet routine expenses and emergencies = 2; Able to save/invest money = 3

Family receives governmental support: Yes = 1; No = 0

Family pays tax: Yes = 1; No = 0

Health care domain
(score = 5)

Usual source of health care: Private health facilities = 5; Health insurance = 4; Free governmental health service = 3; More than one of the above sources = 2; Traditional healer/self-care = 1

Ethical considerations

The objectives and content of the questionnaire as well as the confidentially of data collected were discussed with an adult member of the household. Participation was on a voluntary basis after giving verbal consent. Households were included if the same adult member was available for retest on a mutually agreed day. At the time of starting this research there was no research ethics committee in our institution.

Data analysis

Data were analysed using *SPSS*, version 16. Descriptive statistical analysis was used for personal data and the total score. The correlation between different domains of the scale as well as their inter-and intra-observer reliability were determined by Pearson correlation coefficient. The internal consistency of the scale was assessed by Cronbach α. Multivariate stepwise linear regression analysis was performed to detect the relative contribution of each domain to the total score. R^2 and added R^2 were calculated. The new scale was categorized into 4 socioeconomic levels according to the 3 quartiles. Agreement between the different levels of SES of the new and the old scales was assessed by kappa coefficient of agreement. A *P*-value ≤ 0.05 was considered statistically significant.

Results

The respondents were 47 women (52.2%), 36 men (40.0%), 4 female youths (4.4%) and 3 male youths (3.3%). Their age ranged from 18 to 65 years with a mean of 35.5 (standard deviation 12.0) years. Their other socioeconomic features are shown in Table 1.

Table 2 shows that the total mean SES scores were nearly equal in the test, retest and second rater rounds (48.2, 48.0 and 47.9 respectively).

Table 3 lists the correlation coefficients between the 7 domains and the total SES score. There was no significant correlation between the family domain and the educational, family possessions, economic and home sanitation domains or the economic and health care domains. The other correlation coefficients were either moderately or highly significant.

Within each domain, both the test-retest and inter-rater correlation coefficients were very strong, ranging from 0.84 to 1.00 (Table 4). The different domains showed a moderate internal consistency (Cronbach α = 0.66) (not shown in the tables).

Table 5 shows the multiple linear regression of the SES scale. The most important predictor was the education and cultural domain (R^2 = 0.898), followed by the occupation domain (R^2 = 0.042). Both the home sanitation and health care domains had the lowest contributions to the SES score (R^2 = 0.005 and 0.002 respectively).

Table 6 shows that there was a moderate coefficient of agreement between

Table 1 Socioeconomic characteristics of the interviewed household members (n = 90)

Variable	No.	%
Age (years)		
< 25	13	14.4
25 –< 50	60	66.6
≥ 50	17	18.9
Sex		
Male	39	43.3
Female	51	56.7
Residence		
Rural	52	57.8
Urban, slum	17	18.9
Urban, non-slum	21	23.3
Education		
Illiterate	21	23.3
Below secondary	17	18.9
Secondary	28	31.1
Above secondary	24	26.7
Occupation		
Housewife	26	28.9
Farmer/ manual worker	15	16.7
Professional/ semiprofessional	29	32.2
Other[a]	20	22.2

[a]Trades, business, students, not working and retired.

Table 2 Descriptive statistics of scores on the proposed socioeconomic status scale (total score range 0–84)

Variable	Test scores	Retest scores	Second rater scores
Min.–max.	19–78	18–78	19–78
Mean (SD)	48.2 (14.8)	48.0 (14.9)	47.9 (14.6)
1st quartile	36.8	36.0	37.0
2nd quartile (median)	46.5	46.0	47.0
3rd quartile	58.3	60.3	58.3

SD = standard deviation.

Table 3 Correlation coefficients between different domains and total socioeconomic status (SES) scale

Domain	Domain						
	Education & cultural	Occupation	Family	Family possessions	Economic	Home sanitation	Health care
Occupation	0.66***	–	–	–	–	–	–
Family	0.20	0.23*	–	–	–	–	–
Family possessions	0.56***	0.38***	0.09	–	–	–	–
Economic	0.50***	0.38***	0.17	0.62***	–	–	–
Home sanitation	0.47***	0.34***	0.15	0.61***	0.49***	–	–
Health care	0.49***	0.27**	0.30**	0.24*	0.18	0.37***	–
Total SES	0.95***	0.75***	0.32**	0.69***	0.62***	0.62***	0.55***

*$P \le 0.05$; **$P \le 0.01$; ***$P \le 0.001$.*

the levels of the new and the old SES scores ($\kappa = 0.76$) and there was a strong positive significant correlation between both scores ($r = 0.93$).

Discussion

A number of classifications and scales for SES have been devised and used in different countries and settings; each has its own strengths and inadequacies and no single scale is suited to every sociocultural setting around the world. However, the general consensus is that occupation, income and education are the key variables that determine the SES of a person [8].

The original scale that we updated in this study [5] measures income in monetary terms (e.g. monthly income *per capita*). This is often difficult to ascertain. There are difficulties in obtaining income because people may be reluctant to talk about their income openly [10]. Instead we asked about the total family income in non-monetary terms. Also an indirect measure of income was included in other domains, covering family possessions and ownership of agricultural land and non-agricultural land for housing, ownership of other houses, etc. All these contribute to the family income. In rural Egypt the whole family—men, women and children—may be working. Likewise, child labour is widely prevalent in urban-based enterprises,

Table 4 Test–retest and inter-rater correlation coefficients of different domains and total socioeconomic status (SES) scale

Domain	Test–retest	Inter-rater
Education & cultural	0.94***	1.00***
Occupation	0.98***	0.96***
Family	0.94***	0.92***
Family possessions	0.95***	0.93***
Economic	0.84***	0.92***
Home sanitation	0.96***	0.89***
Health care	0.92***	0.91***
Total SES	0.93***	0.99***

***$P \le 0.001$.*

especially in the informal sector [11]. Because of these considerations, we used the number of earning members of the family, whatever the type and seasonality of the occupation.

Evidence from the literature indicates that while standard measures of education and income are correlated, these correlations are generally not strong enough to justify using education as a proxy for income (or vice versa). Earnings can vary considerably among people of similar educational level, particularly across different social groups [1]. Both income and education can influence the etiology of many health outcomes, in part through pathways involving material resources. Education can also affect a range of non-economic social

Table 5 Best model obtained by multiple linear regression for prediction of socioeconomic status

Domain	β	Added R^2	t-value
Education & cultural	0.59	0.898	93.9***
Occupation	0.11	0.042	22.5***
Family	0.20	0.027	40.0***
Family possessions	0.10	0.014	25.0***
Economic	0.14	0.012	25.0***
Home sanitation	0.09	0.005	20.5***
Health care	0.06	0.002	12.2***

*Constant = 1.4; model F = 10073.1***; model R^2 = 0.999.*
***$P \le 0.001$.*

Table 6 Agreement between the socioeconomic status (SES) scores of the updated scale and Fahmy and El-Sherbini scale [5] in a sample of 90 people

SES level of proposed scale	SES level of Fahmy & El-Sherbeni scale								Total	
	Very low		Low		Middle		High			
	No.	%	No.	%	No.	%	No.	%	No.	%
Very low	18	–	2	–	0	–	0	–	20	22.2
Low	4	–	19	–	3	–	0	–	26	28.9
Middle	0	–	2	–	16	–	1	–	19	21.1
High	0	–	0	–	4	–	21	–	25	27.8
Total	22	24.4	23	25.6	23	25.6	22	24.4	90	100.0

% agreement = 82.2%; κ coefficient = 0.76; correlation coefficient between the 2 scores, r = 0.93***.
***P ≤ 0.001.

characteristics (e.g. health-related knowledge, literacy, problem-solving skills, prestige, influence over others and one's own life) with important health effects [12–16]. Income is not a proxy for wealth. The total accumulated economic resources or wealth could be at least as important for health. Wealth can buffer the effects of temporarily low income due to unemployment or illness and can reflect power or influence over others [1,17].

In the absence of a gold standard or reference scale, we compared the revised scale with the original scale of Fahmy and El-Sherbini [5], which is most commonly used in health research in Egypt. There was a strong positive correlation between both scales. Furthermore, there was moderate agreement between the socioeconomic levels of the 2 scales. This relatively low agreement can be explained by the different cutoff points in each scale. In the old scale the cutoff points were based on arbitrary points (85%, 75% and 50% of the total score) [5]. However, in the new scale the cutoff points were based on statistical parameters (1st, 2nd and 3rd quartiles). The relative increase in the percentage of people of high social level in the new scale could be a reflection of better opportunities for higher education in Egypt since the time when Fahmy and El-Sherbini's scale was developed.

Multiple linear regression of the SES scale revealed that the most important predictor was the education domain ($R^2 = 0.898$), followed by the occupation domain. Both home sanitation and health care domains had the lowest contribution to SES. This raises the possibility of using a shorter version of the scale as a proxy measure of SES. This short version could be useful for clinical and hospital-based research. However, a short form would need further validation before its application. Busy clinicians considering SES as confounder may ask about 3 or 4 domains, e.g. education, occupation, family and family possessions. For researchers seeking a causal association of SES with specific outcomes, it could be more appropriate to use the full version of the new SES scale.

What is new in the proposed scale? SES scores were classified into very low, low, middle and high levels, depending on the quartiles of the calculated score rather than a fixed point. This could be more practical for application in different settings and populations with varying socioeconomic backgrounds. Education and occupation were dealt with as separate domains. In recent decades the association between education and occupation has diminished. Income was expressed in perceived terms, independent of the actually monetary salary or income. This overcomes the problem of the devaluation of the Egyptian currency. Also family wealth or possessions, as an indicator of family economic status, was included in the scale. Indirect measures of income were also included, e.g. receiving government financial support or paying taxes. The content of the new scale was validated by a jury of experts in this field and its items and domains were tested for reliability by Cronbach alpha as well as inter and intra-rater reliability. Finally, the contribution of each component to the total score was assesses by linear regression model.

The study had some limitations which should be noted. The sample was selected on a convenience basis which means that the results may not be generalizable to other populations. The cross-sectional design of this study made it impossible to assess fluctuations in income over time and their impact on the SES scale. It is difficult to calculate the SES of individuals living alone (single member family), such as retired elderly living alone and dependent on income contributed by their children. The situation is even more complicated in extended families with more than more nuclear families.

This new scale should be tested in different community and clinical settings in Egypt. Also further research is needed to evaluate the predictive validity of the scale in predicting morbidity (both communicable and noncommunicable), mortality and health care utilization, among others. It will be useful to translate the SES scale into Arabic language to be used for self-evaluation of SES. Both the Arabic and the short versions should be adequately tested. Application of this new scale in different Arab cultures is strongly recommended

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