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A Revised Scoring Scheme for the Classification of Socio-economic Status in Nigeria

DOI:<http://dx.doi.org/10.4314/njp.v48i1.5>

Accepted: 30th November 2020

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Abstract: *Background:* Researchers in medicine and related fields in Nigeria have usually made recourse to the instrument developed by Olusanya *et al* and Oyedeji in the past three-and-a-half decades for determination of socioeconomic status (SES). Beside the question of their age, however, these instruments were purposive and might no longer be suitable because of the changes in the parameters on which they were based.

Objective: To develop a robust but generic scheme that takes into consideration the changes in the nation's socioeconomic space in the succeeding three and a half decades.

Methods: A detailed and comprehensive review of the extant schemes was undertaken with a view to identifying their inherent weaknesses. The latter were then factored into the design of a new scheme taking into consideration the emergent restructuring of

career positions in the civil/public service as well as the place of private and informal sectors of the economy. The new scheme was validated at the University of Benin and Irrua Specialist Teaching Hospitals.

Results: The new scheme had a remarkably high Inter-rater reliability ($r = 0.947, p < 0.001$), rater-rater reliability ($r = 0.984, p < 0.001$) and % agreement (with modified Oyedeji's tool as standard) of 67% (K coefficient = 0.47, $r = 0.71, p < 0.001$)

Conclusion/Recommendation: The new scheme could be a viable tool for the assessment of SES of families and individuals, which not only takes into consideration current realities of the nation's economy, but also is readily adaptable to meet foreseeable changes.

Keywords: New Scheme, Nigeria, Socioeconomic Status, Stratification.

Introduction

Socioeconomic standing refers to valued personal and societal resources attached to occupied positions in the society.^{1,2} It is measured as socioeconomic status (SES), an individual's or family's position in the socioeconomic stratification of a given community or economy.^{1,2}

Researchers in Medicine, Social Sciences and Humanities, often make recourse to the SES of subjects or their families because of its association with patterns of diseases and as a modifier of disease risk, onset, progression and outcome.³⁻⁸ SES is also a major determinant of healthcare access, health seeking behaviour, nutritional status and general wellbeing of individuals and families.^{9,10} Within these contexts, it is seen as a modifier of attitude and behaviour,⁹ and it is often taken as an independent factor in the analyses of many variables of interest in medical practice and research endeavours.¹¹⁻¹³

SES in most economies is linked to the family's income, and to parents' educational levels, occupation and social

status.^{2,14} In several studies these attributes are used singly or in combination to assign family SES in Medicine,¹² and several other disciplines,¹⁵⁻¹⁷ and in some cases, composite scoring systems have been developed to guide the stratification of families into socioeconomic classes.^{4,5,7} There are however inter-disciplinary variations in the instrument used¹⁶ because of the need to take into account inherent peculiarities in the disciplines,^{4,5,7,12,16} even as different schemes have also been developed for rural and urban residents.¹⁶ Thus, there is no single scale suited to every socio cultural setting,^{12,17} although there is a consensus that occupation, education and income are the key determinants of SES.¹⁸

Overall, there have been two broad approaches to the determination of SES in Nigeria. In the first approach,^{8,12,13,15-17} the determinants of SES are used singly or in combination, based on correlation¹⁹ and computer modelling,² while in the second approach, composite scoring systems fashioned from the determinants of SES are used.^{4,5,7} Irrespective of the approach adopted, the

designs were meant to be purposive to the individual study, and the resultant method unintended for subsequent use by other researchers as standards. Aside from this, some of the schemes incorporating computer modelling are quite complex and cumbersome.^{2,16} In addition, these extant schemes fail to meet some of the important requirements that an appropriate instrument for SE classification should be dynamic and responsive to changes in the inputs to its design in a given economy.¹¹ These include changes in personal and family incomes, and in consumer price index.²⁰ However, we note that consumer price index as a basis for calculating aggregate family income may not be suitable in Nigeria because of frequent wide variations and fluctuations in the indices used in its computation over very short intervals.²⁰ Its inclusion would necessitate frequent revisions which will be impracticable. Also, it would be difficult to integrate the parameter of “aggregate family income” in the design of family socioeconomic structure in Nigeria because the salaries and allowances of some key sectors are not made public. In addition, most families in Nigeria are reluctant in disclosing their sources of income. This may make it difficult to ascertain the actual income available to many families should it be a key parameter.

Perhaps for reason of professional preference, most health researchers in Nigeria in the past three-and-a-half decades, have used either the scheme proposed by Oyediji⁴ or that proposed by Olusanya *et al.*⁵ despite the availability of other methods for the assessment of SES.^{12,13,15} The two schemes are based on the parameters of education and occupation of the family head or his surrogate, and the mother or her surrogate, but the economic status of a surrogate may not necessarily impact positively on the child’s welfare. Whereas Oyediji⁴ included the highest educational attainment and occupation of both parents in the development of his scheme, Olusanya *et al.*⁵ included only the father’s occupation and mother’s highest educational attainment, making their schemes less comprehensive. Beside these limitations, some of the indices, classifications and designations that formed the bases of the development of the two extant schemes have changed over time about some occupational groups. For instance, there has been professional upward migration of nurses and laboratory scientists.²¹ Salaries have been adjusted several times, and super salary structures have been introduced while the emoluments of some groups in public service are not made public.²² Furthermore, most of the previous efforts focused essentially on the public sector workers, who are in a minority in the Nigerian economy, to the virtual exclusion of private sector employees.^{2,4,5} Finally, although in 2010, Ogunlesi *et al.*⁷ attempted a modification of Oyediji’s classification⁴ by incorporating the average income of the father and mother, these limitations were not addressed. The need for an updated / revised scheme has therefore remained unaddressed. In response to this, we have developed a method, which should be easy to apply, and is reflective of and adaptable to the subsisting socioeconomic realities in the

country.

Methodology

This was done in four stages. First, we reviewed the schemes of Oyediji⁴ and Olusanya *et al.*,⁵ and the modification of the former,⁶ and reviewed literature on the methods used in non-medical disciplines^{8,14,15,17,21} with a view to defining the differences, ease of application and suitability to the emergent economy in Nigeria. Regarding the latter, we were particularly interested in the applicability of the extant schemes to the career/occupational structures and salary grading, and educational levels in public and private sectors in the modern Nigerian economy. In addition, we also appraised the mode and ease of interpretation of recommendations in the schemes.

Second, we then sought to harmonise the two schemes^{4,5} and re-classify the scores taking on board the developments in career structure, education and salary grading in the public and private sectors. This was done to make the revised scoring system composite, responsive and up to date within the context of modern-day realities in Nigeria.

Third, the draft revised and harmonised instrument was subjected to peer review by researchers and potential end users in the Departments of Child Health and Community Health, University of Benin Teaching Hospital, Benin City and the Department of Paediatrics, Irrua Specialist Teaching Hospital, Irrua. The reviewers were requested to give particular attention to the classifications of occupation and highest educational attainment, and the instrument was revised to incorporate the observations and recommendations made.

For interpretation, we propose that the aggregate score be divided by four (two, where only one parent or caregiver is available) and the derived value approximated to the nearest whole number as in Oyediji’s scheme.⁴ The resultant score range of 1-6 was classified into SES classes as follows: Upper class (scores 1 and 2), Middle class (scores 3 and 4) and Lower class (scores 5 and 6). Each class is further classifiable into high and low, to meet the requirement of potential researchers in need of more subdivisions.

Finally, we validated the new instrument through determination of the inter-rater reliability, validity and ratter-ratter reliability: To determine the inter-ratter reliability, two resident doctors on posting to the Paediatric Neurology Clinic (PNC) of UBTH were designated as ratters I and II to simultaneously assess the SES of 100 consecutive families attending the clinic, using the revised instrument. To determine the validity, a senior resident in the PNC, UBTH, concurrently assessed the SES of another set of 100 consecutive families using the modified Oyediji’s method⁶ and the new instrument. Oyediji’s instrument as modified⁶ was adopted for this purpose being that it was more comprehensive than that

of Olusanya *et al*,⁵ and, to evaluate the ratter-re-ratter reliability, four senior residents in the Department of Child Health, UBTH, each consecutively assessed 25 families utilizing other care services of the Hospital on two occasions at least one week apart using the new tool.

All resident doctors that participated in the validation exercise were adequately familiarized with the instrument through training by the authors before the exercise, while the families that declined participation were excluded. The scores generated from the validation exercise were analysed for inter-rater/rater-re-rater agreement/disagreement and correlation of ratings obtained by the two instrument using SPSS version 22. P<0.05 was accepted as significant.

Results

The limitations inherent in the popular extant methods, which also informed the need for our revision, areas listed in Table 1, while the categories and assigned scores of educational attainment and occupational levels in the revised versus Oyedeji's⁴ schemes are displayed in Tables 2 and 3.

Table 1: Limitations of extant instruments

| Serial # | Limitation |
|----------|---|
| 1 | Long standing and old, being between thirteen years ⁷ and over three and half decades ^{4,5} old |
| 2 | The salary ceilings that informed the classifications have been jettisoned through salary reviews and government policies. For example, the scheme of service of some professional groups, such as laboratory scientists, has been revised with the emergence of new ranks, ¹⁹ and new salary structures have been introduced. ²⁰ |
| 3 | Unemployment has become pervasive over the last decade or so, ²² sometimes involving both parents, unlike when the extant schemes/modifications were formulated |
| 4 | The service schemes in the private sector, and that of judicial and legislative officers were only minimally or not at all accommodated in extant schemes. Besides, new positions have also emerged in the private sector. |
| 5 | Most were designed for use within the context of the individual studies ^{4,5,7} and not meant to serve as standard. In addition, the indicators of SES were used in isolation as variables in some. ^{8,12,13,15} |

Table 2: Categories and assigned scores of highest educational attainment in the revised versus Oyedeji's⁴ schemes

| Revised scheme Category | Assigned score | Oyedeji's ⁴ scheme Category | Assigned score |
|---|----------------|--|----------------|
| Postgraduate education (Diploma, Certificate, Master and Doctorate) | 1 | NA | NA |
| University degree or Higher National Diploma | 2 | University graduates or equivalents | 1 |
| National Certificate of Education/National Diploma/Advanced Level GCE&NABTEB/Final City and Guilds | 3 | School certificate holders (GCE or SSCE) who also had teaching or other professional training i.e. NCE | 2 |
| School Certificate/NECO/Teachers Grade II/Intermediate C&G/NABTEB | 4 | School Certificate or Grade II Teachers, certificate holders or equivalent | 3 |
| Junior Secondary School Certificate/ Modern III/ Primary School leaving Certificate (including those who attempted) | 5 | Junior secondary school certificate, modern three and primary six | 4 |
| Unable to read or write | 6 | Those who could not just read or write or are illiterates | 5 |

NA =not applicable; NABTEB = National Business and Technical Education Board; NECO = National Examination Council; C&G = City and Guilds

A comparison of the characteristics of Oyedeji's, (as modified⁶) Olusanya *et al*'s⁵ and the revised schemes is as shown in Table IV. The differences are in the number of levels, range of attainable scores (aggregate and final), and number of categories under educational attainment and occupation. Unlike the extant schemes, the revised scheme has made provision for postgraduate education, higher professionals and the occupational super class with the salary structure of Consolidated Salary for Political Office Holders (CONTOPSAL)²² (Tables 2 and 3).

Table 3: Categories of occupation and assigned scores in the revised versus Oyedeji's⁴ schemes.

| Category | Revised scheme [@] Description | Assigned score | Oyedeji's ⁴ scheme Description | Assigned score |
|----------|--|----------------|--|----------------|
| 1a | Senior political/judicial/legislative office holders (federal and state); Top echelon of military and para-military; Heads of ministries, department, and agencies (on CONTOPSAL scale) | 1 | NA | NA |
| 1b | Top level entrepreneurs and professionals, top management staff of public and private companies, top level politicians, top rank and first-class monarchs, and accomplished internet bloggers, media magnates and proprietors | 1 | NA | NA |
| 2a | Top civil and public servants in directorate grade, senior military and paramilitary officers, senior academicians, senior politicians, and other political office holders. | 2 | Senior public servants, | 1 |
| 2b | Other professionals and managers, large scale traders and businessmen, established contractors, very senior clergy, second class monarchs, editors and top executives of media houses, and accomplished film producers and artists | 2 | Professionals, managers, large scale traders, businessmen and contractors | 1 |
| 3a | Senior civil and public servants in non-directorate grade, junior academicians, junior military and paramilitary officers, senior schoolteachers, and junior judicial officers and other politicians | 3 | Intermediate grade public servants, senior schoolteachers, nurses, and technicians | 2 |
| 3b | Technologists, skilled professionals, self-employed artisans, other monarchs, agricultural entrepreneurs, medium scale traders and contractors, senior clergymen, and senior media practitioners and seasoned artists | 3 | NA | NA |
| 4a | Intermediate civil and public servants, executive officers, senior clerical officers, junior schoolteachers, local government legislators | 4 | Junior schoolteachers, clerks, auxiliary nurses | 3 |
| 4b | Technicians and employee artisans, non-subsistent agriculturalists, petty contractors, other non-employee clergymen, other media practitioners and artists | 4 | Drivers and mechanics | 3 |
| 5a | Clerical officers, assistants, and attendants | 5 | Messengers and similar grades | 4 |
| 5b | Petty traders, subsistent farmer, and employee clergymen | 5 | Petty traders, labourers | 4 |
| 6a | Unemployed | 6 | Unemployed | 5 |
| 6b | Full time housewives, students, and artisan apprenticeships | 6 | Full-time housewives, students and subsistence farmers | 5 |

NA = not applicable; CONTOPSAL²⁰ = Consolidated Salary for Political Office Holders (political appointees, judicial officers, federal legislators, senior members of the military and para-military, federal permanent secretaries, heads of ministries, department and agencies)[@]The classification of monarchs is based on the size of the population of subjects, antecedent history and recognition granted by the State; Top level entrepreneurs are persons fully established as employers of labour and so publicly acknowledged; Top professionals, top management staff of Public and Private Companies, and top level Politicians are persons in public or private sector whose earnings are far in excess of what are obtainable in Public Service; Top civil servants are persons in the directorate cadre; Senior civil servants in non-directorate grade are persons on GLs 12 to 14 or their equivalents; Senior media practitioners include proprietors, editorial staff and managers; Seasoned artist are long serving and accomplished artists in notable print/electronic and other media including musicians of repute; and Artisans are individuals with or without basic education who become skilled through apprenticeship in various vocations. Accomplished internet bloggers: persons in ICT business with known trademark publicly acknowledged.

| Attribute | Oyedeji's scheme, modified ⁶ | Olusanya <i>et al</i> 's ⁵ scheme | Revised scheme |
|---|--|---|--|
| Range of final scores | 1-5 | 1-3 | 1-6 |
| Minimum/maximum aggregate score | 4/20 | 2/6 | 4/24 |
| No. of categories of educational attainment | 5 | 3 | 6 |
| No. of categories of occupation | 5 | 3 | 12 |
| Classification (scores) of SES | Upper (1-2), middle (3) and lower (4-5) | Upper (1), middle (2) and lower (3) | Upper (1-2), middle (3-4) and lower (5-6) |
| Remarks | Scores include the educational attainment and occupation of both parents or caregivers | Scores include only the educational attainment of mothers and occupation of fathers | Scores include the educational attainment and occupation of both parents or caregivers |

The revised scheme also includes political, legislative and judicial office holders that were excluded under the old schemes, while nurses and laboratory technologists (as laboratory scientists), which were previously grouped as intermediate public servants, have migrated up the ladder to become senior civil/public servants. The correlation between SES ratings of the 100 families by two resident doctors is illustrated in Figure 1a, and that between the rating and re-rating of SES of 100 other families by a senior registrar is shown in Figure 1b. Both correlations were strong with a correlation coefficient, $r = 0.947$ and $p < 0.001$ for inter-rater reliability (Figure 1a) and $r = 0.984$, $p < 0.001$ for rater, re-rater reliability (Figure 1b).

Fig 1a: Scatter plot of scores of rater 1 versus those of rater 2

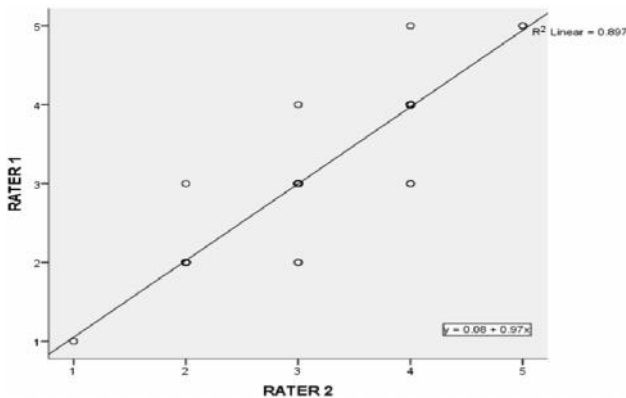
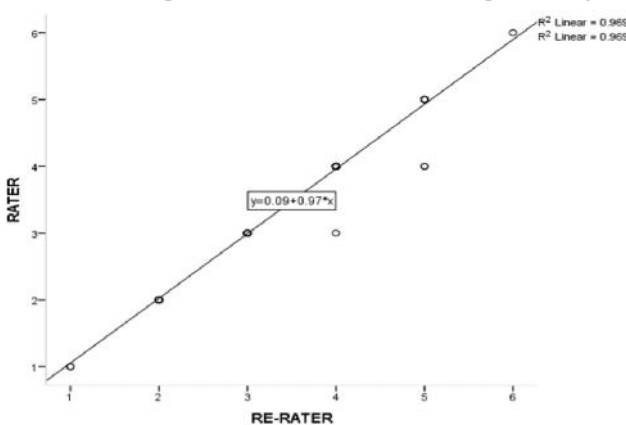


Fig 1b: Scatter plot of scores at initial and subsequent rating



The agreement between the SES scores of another 100 families obtained concurrently by the senior resident using the revised and modified Oyedeji's tools is shown in Table V, while the correlation between the SES scores obtained using the two tools is illustrated in Figure 2. There was concordance between the tools with respect to the classification of the SES of 67 (67.0%) families (upper class 24, middle class 33 and lower class 10) and discordance with 33 (33.0%) families. The discordance was significantly higher in relation to classification of the upper class using modified Oyedeji versus revised schemes ($p < 0.001$) and classification of the middle class using the revised versus modified Oyedeji schemes ($p < 0.001$) (Table V). The kappa coefficient, k , for the agreement between the two tools was 0.47, $r = 0.71$, and $p < 0.001$: Figure 2)

| SES determined using modified Oyedeji scheme | SES determined using the revised scheme | | | **@No. (%) correctly assessed relative to modified Oyedeji's scheme |
|--|---|----------------------|---------------------|---|
| | Upper class No. (%) | Middle class No. (%) | Lower Class No. (%) | |
| Upper class | 24 (100.0) | 30 (46.1) | 0 | 54 (54.0) 24/54 (44.4) |
| Middle class | 0 | 33 (50.8%) | 1 | 34 (34.0) 33/34 (97.1) |
| Lower class | 0 | 2 (3.1) | 10 | 12 (12.0) 10/12 (83.3) |
| *Total | 24 (24.0) | 65 (65.0) | 11 (100.0) | 67/100 (67.0) |
| **@No. (%) correctly assessed relative to the revised scheme | 24/24 (100.0) | 33/65 (50.8%) | 10/11 (90.9) | 67/100 (67.0) |

Percentage agreement of 67%, k coefficient = 0.47, correlation coefficient of the two scores, $r = 0.715$.

*Percentages add across with respect to the results for modified Oyedeji scheme and downwards with respect to the revised scheme.

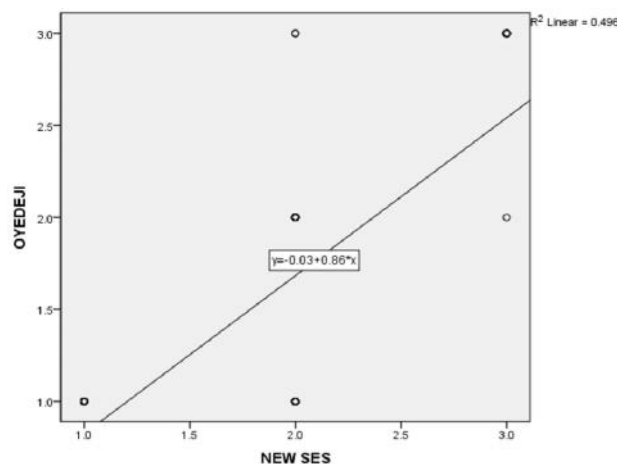
** Number correctly assigned/no. assessed.

NA = not applicable

@ Chi 2 square = 27.77, degrees of freedom = 2, $p < 0.001$; @@

Chi 2 square = 22.41, degrees of freedom = 2, $p < 0.001$

Fig 2: Correlation between socio-economic stratification using method of Oyedeji (modified) and the new scheme. (kappa coefficient, $k = 0.47$, $r = 0.71$, and $p < 0.001$)



Discussion

This revision was necessitated by changes in the public sector of the Nigerian economy as well as the need to be more robust in evolving a classification scheme inclusive of all sectors of the economy. It was also important to make allowance for the full range of educational attainments and socio-economic disposition of families and individuals in the country. In the process, we now have six levels for both “highest educational attainment” and occupation as against the three recommended by Olusanya *et al*⁵ and five by Oyedeji.⁴ This has enabled us to include the occupational super scale to which some political appointees, judicial/legislative officers and federal permanent secretaries belong.²² It has also enabled us to include persons with postgraduate qualifications and those in elite professional groups. Postgraduate education is an enhancer of earning and point of entry in certain professional cadres in public service. In some professions, for instance Medicine, it confers skills and competences, which can serve as determinants of income and public acknowledgement.

In addition, we have expanded the scope of the five occupational classes. The new additions have not made the revised scheme unwieldy, but rather have made it possible for us to harmonise the extant schemes. The additions could also have made the scheme adaptable to ongoing changes in the nation’s economy. Furthermore, the new scheme is not sector specific nor purposive to any particular study unlike the older schemes.^{4,5}

In the new scheme, we have moved away from the pitfalls inherent in other/older classifications. For instance, Ijezie *et al*¹² utilised salary earnings operational at the time of their study, and the figures were not only arbitrary at the time but are also now unrealistic in view of current earnings. In particular, the dichotomization of SES into upper and lower classes in Oyedeji’s⁴ scheme was a major disadvantage relative to other schemes,⁵⁻⁷ bearing in mind the contributions of the middle class to production, distribution and consumption of a nation’s wealth as well as their developmental roles.²³ Most elites in many societies belong to this class.⁶ The restriction of occupational consideration to fathers and of educational attainment to mothers, coupled with the contraction of the respective categories to 3 in Olusanya *et al*’s scheme⁵ were also disadvantageous. This is because it ignored the important contributions of mothers to the family income and the importance of the father as the head of the family in decision making.¹⁸ The mothers’ occupation is also a major determinant of children’s welfare and health outcomes.²⁴ Parents with primary education were also curiously combined with those without it in Olusanya *et al*’s⁵ scheme. Other limitations in extant schemes⁴⁻⁶ included the lack of provision for such occupations as judicial officers, legislators, military and paramilitary officers and the clergy, and lack of provision for postgraduate qualifications. Making allowance for these parameters is a key strength of the new scheme, as is the robust provision for mothers and accommodation of practically all sectors of the economy.

The inter-rater and rater, re-rater reliabilities of the new tool were very high, indicating very strong consistencies between users and spatial relationship by same user of the instrument. Ease of use and reliability of the scores obtained by different users and same user over time are quite satisfactory. These are also indications of the versatility of the new tool.

In the absence of a standardized tool for assessing family SES, we compared the new instrument with the modified Oyedeji instrument despite the inherent limitations of the latter.⁶ However, the percentage agreement, the correlation coefficient and kappa coefficient were fair. The poor alignment might relate to the subsisting limitations in the extant tool.^{4,6} as highlighted earlier (*vide supra*). It is also possible that the migration of many families down the ladder from upper to middle SES due to the steady decline of the nation’s economy particularly with the last decade or so is a factor.

This study has at least 2 limitations. The incorporation of aggregate family income in developing a new scheme might have made the instrument more robust, but this could not be done because of the potential uncertainties regarding actual family income in some instances. Also, our inability to include every facet of occupation applicable in public and private sectors may pose some challenges, albeit minor, at the point of application of the instrument in some instances. However, these limitations should not detract from the robustness and applicability of the new instrument.

Conclusion

We have developed an up-to-date, robust, and reliable revised instrument for the assessment of SES, with ample provisions which obviates the shortcomings of extant instrument. The latter should make the new instrument adaptable and applicable for quite some time, as the indices used are less likely to be susceptible to the vicissitudes of the economy. We recommend the new scheme to researchers and practitioners in relevant fields of the Nigerian economy for assessment of family SES.

Acknowledgements

The pioneering roles of Oyedeji and Olusanya and co-workers in this all-important subject in Nigeria are deeply acknowledged. We also thank our numerous colleagues in the Departments of Child Health and Community Health of the University of Benin Teaching

Hospital and Department of Paediatrics, Irrua Specialist Teaching Hospital for their invaluable contributions to enhancing the quality of the work. Dr Nwaneri made invaluable contributions in the data analyses. The roles of residents in the Department of Child Health, UBTH Benin in the validation processes are deeply appreciated.

Authors Contributions'

Both authors (MOI and GOA) were involved in the conception and design, acquisition of information, data analyses and drafting and revision of the article plus approval of the final version meant for publication.

Conflict of interest: None

Funding: None

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