Construction of socio–economic status indexes for heads of rural farm families in the central Agricultural Zone of Delta State, Nigeria

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Abstract. The specific objectives of the study were to collate, and validate socio-economic status indicators for heads of farm families in the agricultural zone. Stratified and multi-stage simple random sampling techniques were used in selecting the towns and respondents. Five percent (5%) of the respondents which corresponded to 147 heads of farm families were selected to constitute the sample. Data were collected by the use of interview schedule. The uniform scoring method was used to measure the variables. Data were analysed by the use of t-test and Point-Biserial correlation coefficient. A universe of 110 socio economic status indicators were collated. Sixty seven (67) socio-economic status indicators were valid. The valid socio-economic status indicators could be constructed into a scale to measure the socio-economic status of the heads of farm families in the agricultural zone. The knowledge of the socio-economic status of farm families is necessary in predicting the adoption behaviour and socio-economic well-being of the farmer.

Key words: construction, indexes, validation, item analysis, socio-economic status

Introduction

This research work was necessitated by the fact that many researchers make use of single factor indices, particularly occupational prestige, in assessing socio-economic status of families. For instance, Straus (1969) assigned high socio-economic status to white collar workers and high? income farmers. He assigned low socio-economic status to manual workers and low income farmers. According to the Family Encyclopaedia (2010) the very earliest measures of socio-economic status in North America relied on community reputation. A families social standing, as judged by others, was used to differentiate between upper, middle and lower classes. Later, prestige studies were conducted to judge the social standing of different occupations. Recently, scholars of inequality in North America have moved away from single scales of socio-economic status to an amalgam of measures. Researchers now asked a set of questions related to socio-economic status such as level of education, earnings, home ownership, occupation of wives and husbands and net value of family home.

Similarly, Marks (1998) stated that socio-economic status indices were derived from the codes assigned to occupations. He maintained that before the mid 1980s, occupations in the census were generally assigned occupation codes from the Australian Bureau of Statistics (ABS) Classification and Classified List of Occupations (CCLO). He noted that that socio-economic status could be derived from single measures or calculated from several variables related to occupational status. Most often single-based measures were derived from responses to questions on occupations of the respondents. In contrast, multiple measures could be derived from a range of variables including father's and mother's occupation, educational attainment, income, possessions (such as video recorder, television, cars and size of home), number of books in the home and home ownership. He found that multiple measures have stronger correlations with school achievement than single measures. This implied that multiple measures capture aspects of socio-economic background which were not captured by single measures

From the foregoing, it could be surmised that the use of multiple measures was the best approach to measuring socio-economic status. However, most researchers find it difficult to generate multiple indexes that could be used to measure socio-economic status. The multiple measures approach involves collation and item analysis of socio-economic status indicators for the purpose of determining valid items which could be used to measure socio-economic status. The valid items are regarded as good measures of socio-economic status.

According to Instructional Assessment Resource (IAR 2007), item analysis involved many statistics that could provide useful information for improving the quality and accuracy of multiple or true-false items (questions). The item analysis procedures include item difficulty, item discrimination, reliability coefficient and distractor evaluation. Item difficulty, also known as p-value, was calculated by dividing the number of students who got an item correct by the total number of students who answered it. Ali et al. (1988) expressed item difficulty as a the percentage of the upper $1/3$ of candidates who got the item correct divided by the total number in both the upper $1/3$ and lower $1/3$ groups of candidates. IAR (2007) rated items with p-values

above 0.90 as very easy and below 0.20 as difficult. The IAR, advised that very easy and difficult items should be revised before including them in the total test items.

Item discrimination or discriminating power of a test indicates how a test discriminates between poorer and better examinees. A good test item should be answered correctly more often by students who perform better in the overall test. IAR (2007) stated that item discrimination was the relationship between how well students did on the item and their total examination scores. The value ranges between -1.00 to 1.00. The higher the value the more discriminating is the item. A highly discriminating item indicated that students with high scores in the examination got the item correct whereas students who had low scores got the item wrong. Items with discrimination values near or less than zero should be removed from the examination because it showed that students who did poorly in the examination did better on the item than students who performed well in the examination. They mentioned that item discrimination was also referred to as the Point-Biserial correlation (PBS).

The formula for item discrimination could be expressed as IAR (2007):

$$r = \frac{(\bar{x}c - \bar{x}t)}{SD\ Total} \cdot \sqrt{\frac{p}{q}}$$

where:

r = discrimination index
$\bar{x}\,c$ = the mean total score for persons who got the item correct
$\bar{x}\,t$ = mean total score for all candidates
p = difficulty value for the item
q = $(1 - p)$
$SD\ Total$ = Standard Deviation of total examination score

Ovwigho (2009) made use of the Point – Biserial correlation and the t-test in calculating the indexes of dichotomous and quantitative socio-economic status indicators respectively. The modified Point- Biserial correlation formula was as follows:

$$rpbis = \frac{MP - MN}{ST} \bullet \sqrt{P(1-P)}$$

where:

$rpbis$ = Symbol for Point – Biserial correlation
MP = Mean criterion score for heads of farm families who possessed the item.
MN = Mean criterion score for heads of farm families who did not possess the item.
ST = Standard deviation of the criterion scores
P = Proportion of heads of farm families who possessed the item.

The modified t-test formula was as follows (Joe 1992):

$$t = \frac{\bar{x}1 - \bar{x}2}{\sigma\bar{x}1 - \bar{x}2}$$
$$\sigma\,\bar{x}_1 - \bar{x}_2 = \sqrt{\frac{SS1 + SS2}{N1 + N2 - 2}} \bullet \frac{N1 + N2}{N1 \bullet N2}$$

where:

$\sigma\,\bar{x}_1 - \bar{x}_2$ = estimated standard error of the difference between the means
$\bar{x}_1$ = mean score for upper 25 % group of the farm families
$\bar{x}_2$ = mean score for lower 25% group of the farm families
SS1 = sum of suares for sample 1 (upper group)
SS2 = sum of squares for sample 2 (lower group)
$$SS = \sum X^2 - \frac{(\sum X)2}{N}$$
N1 = sample size for upper group
N2 = sample size for lower group

Gronlund (1976) expressed item discrimination with the following formula

$$DI = \frac{RU - RL}{\frac{1}{2}T}$$

where:

DI = Discrimination Index
RU = Number of persons in the upper group who got the item right
T = Total number of persons in both upper and lower groups.

This study is concerned with calculating the indexes of socio-economic status indicators with a view to selecting the valid indicators. The specific objectives were to:

8.   collate a universe of socio-economic status indicators, and
9.   validate socio-economic status indicators

Methodology

Sampling techniques and sample size

Stratified and multi-stage simple random sampling techniques were used in selecting the towns and respondents. Delta central agricultural zone is made up of 10 Local Government Areas. The indigenes speak Urhobo and Isoko languages (Delta Agricultural Development Programme, DADP 2005). The ten (10) Local Government Areas were previously grouped into five before they were split into two each in 1991. The ten Local Government Areas were grouped into 5 on the basis of the old Local Government map. One Local Government Area was randomly selected from each group. Twenty percent (20%) of the rural towns corresponding to Ughelli South (6), Ethiope East (4), Okpe (3), Udu (5), and Isoko North (4) were randomly selected. Five percent (5%) of the heads of the rural households which corresponded to Ughelli South (33), Ethiope East (31), Okpe (27), Udu (15) and Isoko North (41) were randomly selected. Thus the sample size was 147 heads of rural households.

Measurement of variables

The variables were socio-economic status indicators. A pre-research survey was carried out to determine items which enhance socio-economic status of individuals in the agricultural zone. One contact farmer and an opinion leader were selected from each of the 10 local government area to constitute the sample for the pre-research survey resulting in 20 heads of farm families. The pre-research respondents were identified by asking any adult member of the community to show us the contact farmer and opinion leader. However, the main research was with the unregistered and registered farmers with the DADP in the community. Items from the pre-research survey were built into an interview schedule. A uniform scoring method which assigned a value of one (1) for possession and zero (0) for non-possession was used to measure dichotomous items. A dichotomous item was one which required a yes or no answer. A quantitative item was one in which an individual could have up to 6 or more options for an item. This meant that for quantitative items, possession scores ranged from zero (0) to six (6) or more depending on the number of items listed against the indicator. Based on the responses, a score was obtained for each individual. The scores were arranged in a descending or ascending order to form the criterion scores. The heads of farm families were asked to explain qualitatively why some of the valid indicators had social value in the community.

Method of data analysis

Data were analysed by the use of Point-Biserial correlation and t-test for dichotomous and quantitative items respectively. The correlation between possession and non-possession scores for each item was found (Table 1). Items with rpbis 0.55 and above were selected as valid for dichotomous items. The upper 25% and lower 25% of the scores for quantitative items were compared by the use of t-test at 0.01 level of significance. Significant items were selected as valid (Table 2). Ovwigho (2009) and Akinola and Patel (1987) made use of the t-test in validating quantitative measures of socio-economic status.

Results

Universe of socio-economic status indicators

One hundred and twenty one items were collated from the pre-research survey. The 121 items were pre-tested by finding out ambiguous and localized items. The localized items were items possessed only by very low and high socio-economic status heads of farm families. These items had perfect negative value (-1) or perfect positive value (+ 1) discrimination indexes. Old fashioned items and those found in only poor communities were regarded as ambiguous. Eleven ambiguous and localized items were removed from the initial universe of indicators. These items were: Pick up vans, Pit toilet, Cooking retort stand, Lap top, Desk top, Security guards, Satellite dish, Torch light, Outside brooms, Mud house, and Grinding mortar. This brought the universe of socio-economic status indicators to 110 items.

Validation of socio-economic status indicators

The universe of socio-economic status indicators were subjected to item analysis by use of Point-Biserial correlation and t- test. The analytical procedures for dichotomous and quantitative items are presented in Tables 1 and 2 respectively.

Table 1. Item analysis of ownership of traditional beads (dichotomous item)

Criterion Scores	Yes	No	Total
190	1	-	1
185	3	-	3
170	3	-	3
165	2	-	2
160	3	-	3
155	1	-	1
145	-	1	1
140	2	-	2
135	1	-	1
130	2	1	3
125	3	1	4
120	3	-	3
115	6	9	15
110	8	8	16
105	3	5	8
100	1	4	5
95	3	1	4
90	-	3	3
85	-	4	4
80	-	1	1
75	-	2	2
70	1	3	4
65	-	3	3
60	-	1	1
55	-	1	1
45	-	4	4
40	-	15	15
35	-	16	16
30	-	2	2
25	1	7	8
20	-	8	8
Total	**47**	**100**	**147**

$$rpbis = \frac{MP - MN}{St} \sqrt{P(1-P)}$$

where:

MP = 127.55, MN = 64.56
St = 45.56, P = 0.32

$$rpbis = \frac{127.55 - 64.56}{45.56} \sqrt{0.32(1-0.32)}$$

= 1.38 x 0.47

= 0.65

Decision =   Item is a strong indicator of socio-economic since it is above 0.55.

Table 2. Item analysis of number of children (quantitative item)

Criterion Scores	Possession Scores					
	0	1	2	3	4 & above	Total
190	-	-	-	1	-	1
185	-	-	1	1	1	3
170	-	-	-	2	1	3
165	-	-	-	2	-	2
160	-	-	1	-	2	3
155	-	-	-	1	-	1
145	-	-	-	-	1	1
140	-	-	-	-	2	2
135	-	-	-	-	1	1
130	-	-	2	-	1	3
125	-	-	-	1	3	4
120	-	-	1	1	1	3
115	-	-	2	4	9	15
110	-	-	1	5	9	16
105	-	-	-	3	5	8
100	-	-	1	3	1	5
95	-	-	2	2	-	4
90	-	1	1	1	-	3
85	-	1	1	2	-	4
80	-	1	-	-	-	1
75	-	2	-	-	-	2
70	-	1	1	2	-	4
65	-	-	2	1	-	3
60	1	-	-	-	-	1
55	-	-	1	-	-	1
45	-	-	-	1	3	4
40	-	-	2	9	4	15
35	2	-	-	14	-	16
30	-	-	1	-	1	2
25	3	-	1	2	2	8
20	4	3	1	-	-	8

$\overline{X}$ upper = 4, 4, 4, 4, 4, 4, 4, 4, 4, 4
        4, 4, 4, 4, 4, 4, 4, 4, 4, 4,
        4, 4, 3, 3, 3, 3, 3, 3, 3, 3
        3, 3, 2, 2, 2, 2, 2,

$\overline{X}$ = $\dfrac{128}{37}$ = 3.46

$\overline{X}$ lower = 4, 4, 4, 4, 4, 4, 3, 3, 3, 3
      3, 3, 3, 3, 3, 3, 3, 3, 3, 3
      3, 3, 2, 2, 2, 1, 1, 1

$\overline{X}$ = $\dfrac{81}{28}$ = 2.89

$\sigma\ \overline{X}_1 - \overline{X}_2 = \sqrt{\dfrac{462 - \frac{(128)2}{37} + 255 - \frac{(81)2}{28}}{37+28-2} \bullet \dfrac{37+28}{37 \bullet 28}}$

     = $\sqrt{0.63 \times 0.06}$

     = 0.19

$$t = \frac{3.64 - 2.89}{0.19}$$

$$= 2.938$$

$$t = 2.93, P < 0.05$$

Decision: The item was valid.

Valid socio-economic status indicators

The valid socio-economic status indicators were selected by inspection of the indexes after the item analysis. Dichotomous items which had indexes of 0.55 and above were selected as valid. Quantitative items above the Table values were selected as valid. .Sixty seven (67) items were found to be valid measures of socio-economic status of farm families in the study. The valid items are presented in Table 3

Discussion

Advantages of the methods of data analysis

The Point-Biserial correlation is advantageous over other item analysis techniques because it takes into cognizance the scores of every individual or test taker in the item analysis. The technique has been found quite suitable for analysis of dichotomous items requiring yes or no answers. The t-test is most suitable for quantitatively measured items. However, the application of the t-test for item analysis of quantitative items does not take into cognizance the responses of all individuals. An upper 25% and lower 25% of high and low scores were compared by the use of t-test. The present study is an improvement over the work of Akinola and Patel(1987) because it showed clearly the quantity of each items that were used in the data analysis. They also made use of t-test in analysing both dichotomous and quantitative items. This meant that about 50% of the respondents were left out for the analysis of dichotomous items. In item analysis efforts should be made toward including all respondents' scores in the data analysis. It is also wrong for researchers to assign socio-economic status to individuals in a society merely on the basis of occupation without empirical validation of the indicators of social status in that society. These methods of data analysis are, therefore, recommended to other researchers in the field of social stratification and mobility in human societies.

Characteristics of valid items

Table 3, showed the 67 items which were found valid out of the universe of 110 socio-economic status indicators in the study area. A valid item is one that discriminates between high and low socio-economic status respondents. A valid item should not be too strong or weak measure of socio-economic status. The valid items in this study could be classified into cultural, material, income and social participation items .Some cultural possession items were number of wives, number of children, number of relatives trained by you, traditional beads, traditional attires, walking sticks, traditional hats, George wrappers, single wrappers and Chieftaincy title. The people have high regards for children and wives. They regard children as wealth and gifts from God. People without children were often regarded as irresponsible and castigated as infertile members of the society who have not been able to perpetuate themselves in the society. In primordial times, children were also used as source of rural farm family labour. Ovwigho (2008) observed that a man without children could go to a beer parlour and drink to forget himself but a married man with children cannot indulge in such behaviour.

The permissive nature of the extended family system practiced in many parts of Africa allows an individual to have as many children as possible. In the course of the study the researcher came across a man with 91 children. Having large number of children is now alien to the European culture where population control has been practiced. Ovwigho and Ifie (2009) noted that population control in most countries of Africa could best be described as a matter of theory and not practice. For instance, in Nigeria population control has not been made a policy trust for reducing crime, hunger and deprivation. Today, traumatic economic experience and austerity have resulted in the younger generation practicing monogamy and giving birth to fewer children. A person with more than one wife was regarded as a highly placed person in the traditional communities within the study area. Sometimes, you find a person with two wives boasting and asking another person with one wife a question like, 'how many wives do you have that you are talking here'?

Table 3. Valid socio–economic status indicators

S/NO	Item	Statistical Tool	Discrimination Index
1	Number of wives	t	5.107
2	Number of children	"	2.938
3	Children in primary school	"	4.681
4	Children in secondary school	"	2.978
5	Number of relatives trained by you up to secondary level	"	4.630
6	Traditional beads	rpbis	0.650
7	Necklace	"	0.630
8	Ownership of cement house in the village	"	0.750
9	Ownership of cement house outside the village	"	0.610
10	Earth plates	t	4.200
11	Walking sticks	"	5.105
12	Traditional hats	"	3.529
13	Traditional attires	"	15.750
14	Pair of shoes	"	3.581
15	George wrapper	"	11.200
16	Single wrapper	"	5.484
17	Rooms with cemented floor	"	28.100
18	Personal well	rpbis	0.670
19	Chieftaincy title	"	0.550
20	Cutlasses	t	10.625
21	Spade/shovel	"	8.125
22	Hand hoes	"	5.938
23	Wash hand basins	rpbis	0.550
24	Cabinet beds	t	7.684
25	Framed photographs of yourself	"	11.429
26	Farm size	"	15.550
27	Poultry birds	"	6.612
28	Fish ponds	"	6.900
29	Hired labourers	rpbis	0.580
30	Plots of land owned in the village	t	9.785
31	Personal bore-hole	rpbis	0.550
32	Motor cycle	"	0.580
33	DVD/CD Player	"	0.550
34	GSM Handsets	"	0.640
35	Radio/Cassette players	"	0.550
36	Television	"	0.600
37	Ceiling/Table fans	t	3.667
38	Executive chairs	rpbis	0.550
39	Stove	"	0.730
40	Gas cooker	"	0.550
41	Wheel barrow	"	0.810
42	Floor carpet	"	0.590
43	Wall clock	"	0.560
44	Rain coats	"	0.580
45	Umbrella	t	5.548
46	Book shelves	rpbis	0.590
47	Standing mirror	"	0.630
48	Dining table	"	0.550
49	Metal buckets	t	8.933
50	Plastic buckets	"	6.529
51	Blender	rpbis	0.570
52	Frying pan	"	0.680
53	Tumbles	t	14.290
54	Kettle	"	3.931
55	Bicycles	"	9.930
56	Metal spoons	"	14.526
57	Suitcases/Travelling bags	"	3.750
58	Hurricane lantern	"	14.909
59	Glass plates	"	21.563
60	Ownership of wrist watch	rpbis	0.700
61	Ability to read in English	"	0.730
62	Ability to write in English	"	0.730
63	Ability to read native dialect	"	0.690
64	Membership of social clubs	"	0.590
65	Membership of village executive leaders	"	0.590
66	Official in a Christian organization	"	0.560
67	Membership of cooperative societies	t	8.462

Cultural possession items such as walking sticks, traditional hats, George and single wrappers constitute part of the traditional attires. The numbers of traditional attires owned by the individual were regarded as measures of his social status. A genuine Chief is one with good amount of wealth, high spiritual altruism and one that is respected by the people. Nowadays some people pay money to obtain it in the study area. Chieftaincy titles are supposed to be conferred only on worthy members of the society who have contributed their time energy, money and resources to the advancement of their immediate communities.

The material possession items include bicycle, motor cycles, personal well, wash hand basins, beds, personal bore-hole, television, DVD/CD players, GSM handsets, radio/cassette players, stove, gas cooker, number of rooms with cemented floors, and ownership of cement house in the village. Bicycles and motor cycles were the valid and popular means of transportation in the study area. Motor cars were not valid because only an insignificant number of the respondents in high status categories have them.

The income generation items include farm size, fish ponds, poultry birds, hired labourers, plots of land owned in the village, house(s) outside the village and wheel barrows. Plots of land owned by the individual represent potential wealth or stored capital for the individual and inheritance for the children. A person with plenty of undeveloped land is regarded as a wealthy person in the study area. Ownership of cement house(s) outside the village gives the owner additional income in the form of house rent. A house owned by the individual in the village seldom gives additional income to the Landlords hence it was classified as a material possession item. The rural people usually keep poultry under the free range system for consumption and sale during festivals. The fish ponds were constructed on seasonally flooded plains and were harvested during dry season.

The social participation items were membership of cooperative societies, membership of village executive council of leaders, membership of social clubs, and ability to read and write in English, and read native dialect. People who possess these social participation items were often the educated members of the community with better social and economic status than the average member of the community.

Conclusion

Many researchers in Nigeria avoid constructing indexes of socio-economic indicators because of the lack of the technical know-how and time. This study came up with 67 socio-economic status indicators which could be used to measure socio-economic changes among farm families in the study area. The items were the statistically valid indicators of socio-economic status in the study area. There are many rural development intervention programmes in the study area which could be evaluated by changes in socio-economic status. The 67 valid measures of socio-economic status could be used to construct a socio-economic status scale for measuring changes in socio-economic status of farm families in the study area.

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