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Full Length Research Paper

A study of the socio-economic status indicators for heads of farm families in Delta State, Nigeria

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The specific objectives were to collate a universe of socio-economic status indicators; carry out item analysis to validate socio-economic status indicators; select valid socio-economic status indicators for heads of farm families; and discuss the sociological implication of the valid items. Stratified and simple random sampling designs were used in selecting the towns and villages. Twelve percent of heads of farm families in selected Ibo speaking Local Government Areas of the state comprising Aniocha South (41), Ika South (47) Ndokwa West (55) and Oshimili North (31) were selected to give a sample size of 174 heads of farm families. Structured interview schedules were used in data collection. Data were analysed using point-biserial correlation coefficient and t-test. A universe of 106 items were collated from a pre-research survey. Sixty nine (69) items were found as valid indicators of socio-economic status. The number of relatives trained by the individual, axe, yam barn, motor cycle, motor car, bicycles and water cistern toilet had very important social and economic implications among the people. The indexes are recommended to development agencies for evaluating changes in socio-economic status of heads of farm families particularly after an agricultural development intervention programme.

Key words: Indexes, item analysis, valid items, socio-economic status indicators, farm families.

INTRODUCTION

Item analysis is an empirical procedure for selecting valid items which could be used in construction of socio-economic status scale as well as test and non test instrument. It involves selecting valid items from a universe of items based on a pre-determined criterion. Ebel (1972) and Gronlund (1976) stated that item analysis was a procedure used to find out items that might be too easy or difficult for the purpose of test construction. The process helps to identify items which failed to discriminate between the better and poor examinees. Several items analysis procedures have been used in the social and behavioural sciences. Grounlund (1976), Ebel (1972) and Ali et al. (1988) described the discrimination index procedure for selecting objective test items. The procedures are as follows: (1) Arrange the test scores or answer sheets in an order ranging from high to low; (2) Separate two groups of test papers, an upper consisting of approximately 27% of the total group who receive highest scores on the test and a lower group consisting of an equal paper from those who receive lowest scores; (3) Count the number of times each possible response to each item was chosen by the upper group. Do the same separately for the papers of the lower group; (4) Record the response counts opposite the responses they refer to on a copy of the test.; (5) Add the counts from the upper and lower groups to the keyed correct response; (6) Subtract this sum from the maximum possible sum, that is, the sum of the number of papers in upper and lower groups and divide the differences by the maximum possible. Express this as a percentage, that is, multiply the decimal fraction by one hundred (100), the result is an item difficulty; (7) Subtract the lower group count of correct responses from the upper group count of correct responses. Divide this difference by the maximum possible difference that is the number of papers in the upper (or lower) groups. This quotient expressed as a decimal fraction is called index of discrimination.

This could be expressed mathematically as follows (Gronlund, 1976);

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

Where:

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

The above procedure showed that the simple discrimination index procedure did not take into account the performance of an individual on total items in the test. An item analysis procedure such as the point-biserial correlation coefficient takes into cognizance the total test scores and an item response. Karabinus (1975), Henrysson (1976) and Kraemer (1981) remarked that the point-biserial correlation coefficient was used when an association existed between random variables X and Y, where X is a dichotomy and Y is measured on a continuum. The procedure involved simple tabular presentation of each test item to give the following information: (1) Number choosing the correct answer; (2) Number choosing the wrong answer; (3) Frequency distribution of criterion scores for the group choosing either of the options. The resulting Table would show that students with high criterion scores have a much stronger tendency to choose the right answer. They maintained that the relationship could be quantified by the use of the point-biserial correlation coefficient. Other statistical tools which could be used for item analysis included the tetrachoric correlation coefficient, t-test, Pearson r, multiple correlation and contingency Table. Divgi (1979) and Zalinski et al. (1979) explained that the tetrachoric correlation generally denoted by "rt", was used to measure the degree of linear association between two variables X and Y where both were dichotomized and the true underlying distribution were assumed to be normal. If the underlying psychological traits of the dichotomous variables were normally distributed then the tetrachoric correlation coefficient is the product-moment correlation between the traits. It was difficult and time consuming because the formula was based on series of approximation. Akinola and Patel (1987) made use of the t-test in validating socio- economic status indicators. Total score on the scale was calculated by adding 2 or 1 for possession and non-possession, respectively for 75 items. The scores were ranked from the highest to the lowest. The highest and lowest 25% of the farmers were then compared to see if there existed any significant difference in the proportion of farmers possessing the item at 0.01 level of significance. Gullickson and Hopkins (1976) maintained that the Pearson r was an extremely useful means of estimating the discrimination index of linear relationship between two variables for a given population. The Pearson r is a consistent and efficient estimator of p only under the conditions that r was obtained from a random sample of the population. Anderson et al. (1976) found that it was possible to relate one characteristic at the same time to more than two through multiple correlation coefficients. By this definition, the multiple correlation was the product – moment correlation between the predicted independent and best linear composite of the predictor variables. Most researchers especially in developing countries find it difficult to ascertain items that should be used to measure socio-economic status of farmers. Bills et al. (1985) observed that empirical research on the process of social stratification in developing nations has been hampered by the lack of adequate instrumentation and measurement procedures. This was not the case in industrialised nations where such instruments have been developed to a substantial level. This study, therefore, attempt at developing indexes of socio-economic status indicators for heads of farm families in the zone. The objectives of the study were to collate a universe of socio-economic status indicators; carry out item analysis to validate socio-economic status indicators; select valid socio-economic status indicators for heads of farm families; and examine the social and economic importance of some valid socio-economic status indicators.

MATERIALS AND METHODS

Sampling procedure and sample size

Stratified and simple random sampling designs done on multi stage basis were used in selecting the respondents as well as the towns and villages. Delta North agricultural zone is inhabited by the Ibo speaking people. The 9 local government areas in Delta North Agricultural Zone were grouped into 4 on the basis of the old local government map and sub-ethnic groups. The selection was done in three stages. In the first stage, one local government area namely Aniocha South, Ika South, Ndokwa West and Oshimili North were randomly selected from each group. In the second stage, 40% of the towns Aniocha South (6), Ika South (6), Ndokwa west (6) and Oshimili North (4) were randomly selected. The third stage involved random selection of 12% of the heads of farm families and this corresponded to Aniocha South (41), Ika South (47), Ndokwa West (55) and Oshimili North (31). This gave a sample size of 174 respondents.

Data collection

Oral interview and structured interview schedule were used in data collection. The interview schedule contained items which enhance individual's socio-economic status in the agricultural zone. This was done by asking a few farmers in each of the local government areas to mention items that could enhance the socio-economic status of farm families. One hundred and twelve items were collated from the pre-research survey. These items were built into an interview

Table 1. Evaluation of discrimination indexes after item analysis.

Index of discrimination	Item evaluation
0.40 and above	Very good item, accept
0.30 to 0.39	Reasonably good but subject to possible improvement
0.20 to 0.29	Marginal items, usually need and subject to improvement
Below 0.19	Poor items to be rejected or improved by revision

Source: Ebel (1972). Essentials of educational measurement.

schedule.

The respondents were required to indicate possession, non-possession or tick the number of items possessed in the case of quantitative items. The instrument was reliable. The reliability test showed a coefficient of (r = 0.88). Oral interview was used to elicit information related sociological implication of valid items.

Data analyses

A uniform scoring method which assigned a value of 1 for possession and 0 for non-possession was used for the measurement of dichotomous items. For quantitatively measured items, possession scores ranged from 0 to 6 depending on the number of items listed against the particular indicator.

Gronlund (1976) suggested that items with average discriminating power usually fall around 0.58. Ebel (1972) stated various values of discriminating indexes and how to evaluate them (Table 1).

A score was obtained for each individual following the above scoring procedure. The scores for all the respondents were arranged from low to high in order to form the criterion scores and the total for each criterion score were tabulated. The possession scores of the upper and lower 25% were compared by the use of t-test at 0.01 level of significance for quantitative items (Table 2). Significant items were selected as valid. The point -biserial correlation coefficient was used in the item analysis of the dichotomous items. The criterion scores, number of possession, number of non-possession and total for each criterion score were tabulated. Items with rpbis 0.55 and above were selected as valid items (Table 3).

RESULTS AND DISCUSSION

Indexes of valid socio-economic status indicators in the Ibo ethnic group of Delta State Indexes of valid socio-economic status indicators in the Ibo ethnic group of Delta State is given in Table 4. From the universe of socio-economic status indicators, 112 items were collated from the pre-research survey. These items were pre-tested and ambiguous and localised items were removed. The items dropped were elephant tusk, mud house, pit toilet, granaries/silos, outside broom and cooking retort stand. These items were either possessed by very few persons or a particular socio-economic status group. After the pre-test, the universe of the socio-economic status indicators became 106 items. The pre-test was used to show items which did not discriminate or have zero discrimination.

Valid socio-economic status indicators

The results of the item analysis showed that 69 items were valid indicators of socio-economic status in the ethnic group (Table 2). The items were children in primary school, secondary school, tertiary school, number of relatives trained by the sponsor, cement house in the village, cement house outside the village, traditional hats, traditional attires, pair of shoes, George wrappers, single wrappers, room with cemented floor, chieftaincy title, cutlass, spades/shovel, water cistern toilet, wash hand basins, cabinets beds, wall hanger, framed photograph of oneself, axe, farm size, poultry, fish ponds, goats, hired labourers, yam barn, plots of land owned in the village, plots of land owned outside the village, personal borehole, motor cycle, motor car, compact disc player, radio/cassette player, television, ceiling/table fans, executive chairs, stove, GSM handset, personal generator, wheelbarrow, floor carpet, floor rug, wardrobe, rain coat, umbrella, book shelve, dining table, metal buckets, plastic buckets, blender, frying pan, tumblers, kettle, bicycle, electric/coal iron, metal, spoons, suitcases/traveling bags, wash hand basins, glass plates, wrist watch, ability to read in English, ability to read native dialect, membership of social clubs, official in a Christian organization and membership of cooperative societies. These items could be standardized into a socio-economic status scale to measure the socio-economic status of heads of farm families in the Ibo ethnic group of Delta State, Nigeria.

Social and economic implication of some valid items

The valid items were cherished by the people socially, culturally and economically. A few of the items namely cutlasses, axes, yam barn, motor car, bicycle and number of relatives trained by a farmer have far reaching social and economic implication in the study area.

Cutlasses and axes

These two items were valid because they were the major tools used for farm labour. Beside the economic use, the

Table 2. Item analysis procedure for quantitatively measured item using t-test

Item: Number of children in primary school							
Criterion scores	**0**	**1**	**2**	**3**	**4**	**>4**	**Total**
186						1	1
176				1		2	3
171				1		1	2
166		1				2	3
161				1			1
156				1			1
151			1				1
146						3	3
141						1	1
131			1				1
126	1		2				3
121			5		1		6
116			6	2	2		10
111			4	1			5
106		1	2			Upper (3) 25%	
101		1	5	1			7
96			8				8
91		1	3	3	1		8
86			2	2			4
81			1	1	1		3
76			2	1	1		4
71		1		2			3
61		1	1	1	1		4
56	1		2		1		4
51		1	2	1	1		5
46	1	10	8	1	2		22
41	3	3	3	1	1		11
36	1	2	6			Lower (9) 25%	
31	5	10	1	1			17
26	4	13	3				20

Scores of upper 25% group who Possess the item = 5,5,5,5,5,5,5,5,5,4,4,4,3,3,3,3,3,3,3,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,1. Where N = 43, x = 2.98.

Scores of lower 25% group who possess the term = 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,2,2,2,2,2,2,2,2,2,2,3. Where N = 35, x = 1.34.

$$t\text{ - ratio} = \frac{2.98 - 1.34}{0.2280} = 7.19$$

But from Table 2, t = 2.660 at df= 76, p = 0.01. Decision = item is valid in the Ibo ethnic group since the observed t is higher than critical t.

axe and cutlass were used during the Ikenga festival in Delta Ibo area of Delta State. Men come out to brandish cutlass ostensibly to demonstrate their physical prowess during the Ikenga festival which precedes the planting season around February/ March.

Yam barn

The yam barn is a local storage structure for yam. The Ibo ethnic group produces and consumes a lot of yam compared to other ethnic groups in Delta State. The number of yam barn is often used to assess the socio-economic status and performance of a farmer in the preceding farming year. The new yam festival is performed by the people in September every year before the sales and consumption of the new crop. Igbokwe (2005) stated that no member of the Ibo community was allowed to consume and plant yams until the new yam festival and rituals for planting yams were performed.

Table 3. Item analysis procedure for dichotomous item using point-biserial correlation.

Item: Ownership of cement house(s) in the village			
Criterion scores	**Yes (possession)**	**No (non-possession)**	**Total**
186	1		1
176	3		3
171	3		3
166	2	1	3
161	11		11
156	1		1
151	3		3
146	1		1
141	1		1
131	3		3
126	6		6
121	8		8
116	3	2	5
111	1	2	3
106	5	2	7
96	6	2	8
91	5	2	7
86	2	3	5
81	1	2	4
76	1	2	3
71	1	2	3
61		2	2
56	1	4	5
51	1	3	4
46	1	4	5
41		21	21
36		11	11
31		9	9
26		17	17
21		20	2
Total	(62)	(112)	

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

Where:

rpbis = symbol for point- biserial correlation
MP = Mean score for heads of farm families who possessed the item was obtained by multiplying the scores on the yes column by the corresponding criterion score divided by N
MN = Mean criterion score for heads of farm families who did not possess the item was obtained by multiplying the scores on the no column by the corresponding criterion score divided by N.
ST = Standard deviation of the criterion scores
P = Proportion of heads of farm families who possessed the item
(Source: Adapted from Henrysson (1976).

St = 43.42, MP = 117 .69, MN = 50.06, $P = {}^{62}/_{174} = 0.36$, 1 – p = 0.64

$$rpbis = \frac{117.69 - 50.06}{43.42} \sqrt{0.36(0.64)}$$

= 1.56 × 0.48 = 0.75

Decision = the item is valid since the calculated rpbis is above 0.55

Table 4. Indexes of valid socio-economic status indicators in the Ibo ethnic group of Delta State.

	Item	Statistical tool	Discrimination index
1.	Children in primary school	t	7.19
2.	Children in higher school	t	3.53
3.	Children in secondary school	t	2.73
4.	Number of relatives trained by you up to secondary school	t	2.79
5.	Ownership of cement house in the village	rpbis	0.75
6.	Ownership of cement house outside the village	rpbis	0.65
7.	Traditional hats	t	5.54
8.	Traditional attires	t	11.70
9.	Pair of shoes	t	5.23
10.	George wrappers	t	6.63
11.	Single wrappers	t	2.72
12.	Rooms with cemented floor	t	29.56
13.	Chieftaincy title	rpbis	0.56
14.	Cutlasses	t	6.80
15.	Spade/shovel	t	6.80
16.	Water cistern toilet	rpbis	0.64
17.	Wash hand basins	rpbis	0.70
18.	Cabinet beds	t	5.18
19.	Wall hanger	rpbis	0.65
20.	Framed photographs of yourself	t	18.86
21.	Axe	rpbis	0.64
22.	Farm size	t	7.94
23.	Poultry	t	4.48
24.	Fish ponds	t	5.55
25.	Goats	t	5.36
26.	Hired labourers	rpbis	0.69
27.	Yam barn	”	0.55
28.	Plots of land owned in the village	t	6.64
29.	Plots of land owned outside the village	rpbis	0.62
30.	Personal bore- hole	”	0.74
31.	Motor cycle	”	0.60
32.	Motor cars	”	0.73
33.	Turn table/speakers	”	0.70
34.	CD Player	”	0.57
35.	Television	”	0.65
36.	Ceiling / Table fans	”	5.89
37.	Executive chairs	”	0.74
38.	Lantern	t	14.25
39.	Stove	rpbis	0.55
40.	Personal generator	”	0.59
41.	Wheel barrow	”	0.75
42.	Floor carpet	”	0.61
43.	Rug	”	0.64
44.	Wardrobe	”	0.58
45.	Rain coat	”	0.63
46.	Umbrella	t	6,53
47.	Book shelves	rpbis	0.73
48.	Refrigerator	”	0.58
49.	Standing mirror	”	0.71
50.	Dining table	”	0.78
51.	Metal buckets	t	10.67

Table 4. Contd.

	Item	Statistical tool	Discrimination index
52.	Plastic buckets	t	11.92
53.	Electric blender	rpbis	0.68
54.	Frying pan	”	0.72
55.	Tumblers	t	16.08
56.	Kettle	”	6.94
57.	Bicycles	rpbis	0.69
58	Electric/coal Iron	”	0.76
59	Metal spoons	t	21.50
60.	Suitcase/travelling bags	t	3.15
61.	GSM handset	rpbis	0.53
62.	Glass plates	t	8.93
63.	Wrist watch	rpbis	0.69
64.	Can you read English	rpbis	0.55
65.	Can you write English	”	0.55
66.	Can you read your native dialect	”	0.67
67.	Membership of social clubs	”	0.61
68.	Official in a Christian organisation	”	0.59
69.	Membership of co-operative societies	t	9.73

Motor cycle, cars and bicycles

These three items were found valid in the Ibo ethnic group because they were the most popular means of transporting farm produce. Women and girls were often seen in this areas riding motor cycles and bicycles to farm. It was favoured means of transportation in the area because of its land-locked nature.

Number of relatives educated or trained by the farmer

The number of relatives trained by a farmer was a measure of socio-economic status and altruism in the Ibo ethnic group of Delta State. If an individual was wealthy and his relatives were not educated he is not usually accorded a pride of place in the Ibo speaking society of Delta State, In some cases, the individual might be given a chieftaincy title if he is able to train many of his relatives. In essence such an individual is respected for contributing his quota to the preservation of the African extended family system.

Conclusion

The empirical indicants for the measurement and construction of socio-economic status scale for farm families in the Ibo ethnic group of Delta State were established from the study. The 69 valid items play significant role in socio-economic lives of the farm families. Agricultural production like every other business venture is geared towards increase standard of living.

Indexes of socio-economic status provide the basis for evaluating changes in socio-economic of farm families. On the whole, the use of the indexes generated in this study might reduce the arbitrary assignment of socio-economic status to rural farmers in the study areas.

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