Standardisation of a Socio-economic Status Scale for Heads of Rural Arable Farm Families in the North Agricultural Zone of Delta State, Nigeria

B. O. Ovwigho
Department of Agricultural Economics and Extension, Delta State University Asaba Campus, Asaba, Delta State, Nigeria

Abstract
The main objective of the study was to standardise a socio-economic status scale to measure the socio-economic status of heads of rural arable farm families in the Delta North agricultural zone of Delta State, Nigeria. Stratified and multi-stage simple random sampling techniques were used to select the towns and respondents. The sample size was 174 heads of rural arable farm families. Data were collected by the use of structured interview schedule. The variables were measured by the use of Sigma scoring method and analysed by the use of Pearson r and t-test. Sixty-nine (69) valid items were standardized into a socio-economic status scale. There was a significant positive correlation between socio-economic status and adoption (r=0.76, P<0.01). The scale had concurrent validity (t=78.82, P<0.01) and was reliable (r=0.89, P<0.01). The scale is, therefore, recommended for use by rural social workers to ascertain the changes occurring as a result of development intervention programmes.

Keywords: Socio-economic Status Indicators; Construction of a Scale; Standardisation of a Scale; Construct Validity; Concurrent Validity; Social Stratification

Introduction
The family or an adult individual occupies a social and economic position in relation to other members of the society. This position could be high or low depending on the possession and non-possession of those socio-economic status indicators adjudged important by members of the society.

According to Akinola and Patel (1987), Tubbs (1988), Onwueme and Ugbor (1994), Akinbile (2007), and Marriage and Family Encyclopedia (2010), socio-economic status was the position an individual occupies in a society with respect to the amount of cultural possession, effective income, material possession, prestige and social participation. It implied the two dimensions of social and economic inequality.

The terms socio-economic status and social stratification are often used interchangeably. However, it should be understood that social stratification is an empirical process which leads to assignment of socio-economic statuses to members of a society. Otite and Ogionwo (1979), and Ekong (2003) stated that social stratification was an unequal distribution of members of human societies into available social positions. They maintained that the criteria for social stratification included authority, power (democratic and military), ownership of property in relation to the means of production and control over land, income (amount, type and sources), consumption pattern and styles of life, occupation or skill, education and wisdom, morality, place in high society, kinship connections and ancestry (inherited position), associational ties and connections, ethnicity, states, religion and race. Goode (1974) noted that it was the family that was ranked in the class structure and not the individual. Marks et.al (2000) stated that socioeconomic background was defined as the socioeconomic position of an individual's family of origin rather than their present occupational or family circumstances.

Socio-economic status scales are important tools for the stratification of human societies. They are also useful means of evaluating changes in socio-economic status resulting from development intervention programmes. Anderson et. al (1975) maintained that socio-economic status measures served as important variables in a wide variety of research and evaluation settings. They were used as descriptive variables in reporting relevant background or input characteristics of subjects. They found that socio-economic status was positively related to School achievement, ability test performance, language acquisition, educational aspiration, achievement motivation and leadership qualities. Ramesh and Gangaboraiah (2013) stated that socio economic status (SES) was an important determinant of health, nutritional status, mortality and morbidity of an individual. SES also influences the accessibility, affordability, acceptability and actual utilization of available health facilities.

Many rural development intervention programmes have been implemented in Nigeria without the in-built monitoring and evaluation instrument. This situation has resulted in failure of many of the development intervention programmes. Many researchers shy away from constructing evaluation devices particularly socio-economic status scales because of the apparent difficulties and lack of technical know-how. According to Akinola and Patel (1987) very few studies have been carried out in the area of socio-economic status scaling in Nigeria. This situation has persisted over the years. The two major studies in the area of socio-economic status scale construction in Nigeria were the socioeconomic status scale constructed by Akinola and Patel (1987), and Akinbile (2007).

The present study was aimed at standardisation of the socio-economic status indexes constructed by Ovwigho (2009) for rural farm families in the north agricultural zone of Delta State, Nigeria. The specific objectives, therefore, were to:
• standardise validated socio-economic status indicators into a scale;
• determine the construct and concurrent validity of the scale; and
• ascertain the reliability of the scale.

Materials and Methods
Brief Description of the Study Area
Delta State was created from the then Bendel State on 27th August 1991. It's capital is Asaba Delta State shares common boundaries with Edo and Ondo States to the north west, Imo and Anambra to the north east, Rivers and Bayelsa States to the south east. In the south west and south it has approximately 122 kilometres of coastline bounded by the Bight of Benin on the Atlantic ocean. The State is made up of three Agricultural Zones namely Delta North, Delta Central and Delta South. The Local Government Areas in Delta North Zone are Oshimili South, Oshimili North, Aniocha South, Aniocha North, Ika South, Ika North East, Ndokwa West, Ndokwa East and Ukuani. The central Agricultural Zone is made up of Ughelli South, Ughelli North, Ethiope West, Ethiope East, Sapele, Okpe, Uvwie and Udu Local Government Areas. The Local Government Areas in the South Agricultural Zone are Isoko South, Isoko North, Bomadi, Burutu, Warri North, Warri South, Warri South West and Patani. The Major ethnic groups are Urhobo, Igbo, Ezon, Isoko and Itsekiri (www.nigeriagalleria.com/Nigeria/States_Nigeria/Delta_State.htm)

Sampling Techniques and Sample Size
Stratified and multi-stage simple random sampling techniques were used to select towns and respondents from the nine (9) Local Government Areas in the Delta north agricultural zone.

The Local Government Areas were stratified into urban and rural areas based on the degree of rurality. A rural area was classified as a town where over 50% of the inhabitants were farmers, lacks a clinic/ hospital, lacks an industry, and with a population size of less than 20,000 persons These procedures agreed with the major elements of the definition of rural area offered by Olawoye (1983), and Ovwigho and Ifie (2009.) The multi-stage sampling procedure was done in three (3) stages. First four Local Government Areas namely Aniocha south, Ika south, Ndokwa west and Oshimili north were randomly selected. Second, 40% of the rural towns and villages corresponding to Aniocha south (6), Ika south (6), Ndokwa west (6), and Oshimili north (4) were randomly selected. Third, 12% of the heads of farm families corresponding to Aniocha south (41), Ika south (47), Ndokwa west (55), and Oshimili north (31) were randomly selected. This gave a sample size of 174 heads of farm families.

Data Collection
Sixty- nine (69) valid socio-economic status indicators constructed by Ovwigho (2009) were standardised into the socio-economic status scale. Data on adoption were collected by the use of interview schedule. Data were collected in 2012. The respondents were tested on five technologies which were disseminated by the Delta Agricultural Development Programme (DADP) in 2010. These technologies were application of chemical fertilisers, improved cassava varieties, cowpea interplanted with other crops, yam minisett and vegetable production. The respondents were asked whether they were aware of the technology, whether they have applied the technology on their farms, to state duration of use, and intention to continue the use. The responses were scored using Sigma scoring method (Tables 1 -4)). The scores for the 5 technologies were added for each respondent to make up the adoption score.

Measurement of adoption scores
Table 1: Awareness of Chemical Fertilizer Application

Response Categories	Frequency	Percentage	Proportion	Z	(z+2) x 2	Z rounded
Yes	151	86.78	$100-\dfrac{86-78}{2}$ $= 100-43.39$ $= 56.61$ $= 0.566$	0.166	4.332	4
No	23	13.22	$\dfrac{13.22}{2}$ $=6.61$ $= 0.070$	-1.476	1.048	1

Table 2: Application of Chemical Fertilizer

Response Categories	Frequency	Percentage	Proportion	Z	(z+2) x 2	Z rounded
Yes	72	41.38	100 -41.82	0.810	5.62	6
No	102	58.62	58.62 / 2 = 29.31 = 0.293	-0.545	2.91	3

Standardisation of Valid Socio-economic Indexes and Data Analysis

The valid socio-economic indexes derived from the study conducted by Ovwigho (2009) were standardised using Sigma scoring method. The Sigma scoring method assigns scores in reverse proportion to ranks or position in a population. In other words, a "yes" response or I would yield a higher score than "no" response or 2 in a distribution. A zero score in Sigma scoring has an arbitrary origin. Akinbile (2007) also made use of the Sigma scoring method in standardisation of a socio-economic status scale. The construct validity and reliability test were analysed by the use of Pearson r. Data on concurrent validity were analysed by the use of t-test.

Table 3: Duration of Chemical Fertilizer Application

Response Categories	F	Cf	Cfm	Cpm	Z	Standard value (z+2) x 2	Z rounded
0	102	102	51	0.293	0.545	2.91	3
>5 Months	5	107	104.5	0.601	0.256	4.512	5
6-10 Months	9	116	111.5	0.641	0.361	4.722	5
11-15 Months	6	122	119	0.684	0.479	4.958	5
16-20 Months	11	133	127.5	0.733	0.622	5.244	5
21-25 Months	4	137	135	0.776	0.759	5.518	6
26-30 Months	27	164	150.5	0.865	1.103	6.206	6
>3	10	174	169	0.971	1.896	7.792	8

Table 4: Intention to Continue Application of chemical fertilizer

Response Categories	Frequency	Percentage	Proportion	Z	(z+2) x 2	Z rounded
Yes	67	38.51	100 – 38.51 / 2 100-19.26 = 80.74 = 0.807	0.867	5.734	6
No	107	64.49	64.49 / 2 = 32.25 = 0.323	-0.459	3.082	3

Results and Discussion
Standardisation of Socio-economic Status Indicators

The 69 valid socio-economic status indica-tors were converted to standard scores by the use of Sigma scoring method. The Sigma scoring methods for quantitative and dichotomous responses were presented in Tables 5 and 6 respectively. This scoring

procedure was done for the 69 valid items to generate the standard scores. The standard scores were built into the socio-economic status scale as shown in Table 7). The was applied to measure the socioeconomic status of the heads of the rural farm families by scoring the items possessed using the standard scores.

Table 5: Children in higher institutions

Response Categories	F	Cf	Cfm	Cpm	Z	(z+2) x 2	Z rounded
0	78	78	39	0.224	-0.759	2.48	3
1	57	135	106.5	0.612	0.285	4.57	5
2	28	163	149	0.856	1.063	6.13	6
3	8	171	167	0.960	1.751	7.50	8
>3	3	174	172.5	0.991	2.366	8.73	9

F   = Frequency of Response
CF   =Cumulative Frequency
CFM   = Cumulative Frequency to Mid-Point
CPM   = Cumulative Proportion to Mid - Point
Z   = Sigma score (Got by checking the corresponding CPM from the Table of Z - normal deviates)

Construct Validity of the Scale

A Pearson r value (r=0.76, p< 0.01) was found between the socio-economic status and adoption scores. This meant that the scale had construct validity. Adoption has been hypothesised as a psychological construct related to socio-economic status. Ogunfiditimi (1981), Rogers (1983), Gartrell and Gartrell (1985), and Akinola and Patel (1987) also found a positive relationship between socio-economic status and adoption of recommended technologies. Ebel (1972), Kerlinger (1973), Gronlund (1976), Dane (1990) stated that construct validity was concerned with the psychological qualities which a test should measure.

Table 6: Ownership of cement house in the village

Response Categories	Frequency	Percentage	Proportion	Z	(z+2) x 2	Z rounded
Yes	79	45.40	$100-\dfrac{45.40}{2}$ = 100-22.70 = 77.30 = 0.773	0.749	5.50	6
No	95	54.60	$\dfrac{54.60}{2}$ = 27.3 = 0.273	-0.607	2.79	3

Concurrent Validity of the Scale

The difference between upper 25% and lower 25% of the socio-economic status scores was compared by the use of t-test. A t-value (t=78.82, p< 0.01) showed that there was a statistically significant difference between the low and high socio-economic status scores. This meant that the scale had concurrent validity, Concurrent validity could be found by using the known group techniques of comparing the upper and lower socio-economic status categories (Akinola and Patel 1987; Adekunle 2000).

Table 7: Socio-economic status scale for heads of farm families in the north agricultural zone of Delta State, Nigeria

S/NO.	Valid indicators	Response Categories	Standard Scores
1.	Children in primary school	0	0
		1	1
		2	2
		3	3
		4	4
		>4	5
2.	Children in higher school	0	3
		1	5

		2	6
		3	8
		>3	9
3.	Children in secondary school	0	1
		1	2
		2	3
		3	3
		4	4
		>4	5
4.	Number of relatives trained by you to secondary school	0	2
		1	3
		2	4
		3	5
		>3	6
5.	Ownership of cement house in the village	Yes	6
		No	3
6.	Ownership of cement house outside the village	Yes	7
		No	3
7.	Traditional hats	1	2
		2	4
		>2	5
8.	Traditional attires	0	0
		1	2
		2	3
		>2	5
9.	Pair of shoes	0	1
		1	3
		2	5
		>2	7
10.	George wrappers	0	2
		1	3
		2	5
		>2	6
11.	Single wrapper	0	1
		1	3
		2	4
		>2	5
12	Rooms with cemented floor	0	1
		1	2
		2	3
		3	4
		>3	5
13.	Chieftaincy title	Yes	7
		No	2
14.	Cutlasses	1-3	2
		4-6	4
		7-9	5
		>9	7
15.	Spade/Shovel	0	1
		1	3
		2	4
		3	5
		>3	6
16.	Water cistern toilet	Yes	5
		No	2
17.	Wash hand basins	Yes	5
		No	2
18.	Cabinet beds	0	1
		1	2

		2	3
		>2	5
19.	Wall hanger	Yes	5
		No	3
20.	Framed photograph of yourself	0	2
		1	3
		2	4
		3	5
		>3	6
21.	Axe	Yes	5
		No	2
22.	Farm size	<1 ha	2
		1 ha	3
		1-2 ha	5
		3-4 ha	6
		>4 ha	7
23.	Poultry birds	0	2
		1-10	3
		11-20	4
		21-30	6
		31-40	7
		41-50	8
		>50	8
24.	Local fish ponds	0	1
		1	3
		2	4
		3	5
		>3	6
25.	Goats	0	3
		1	4
		2-4	5
		>4	6
26.	Hired labourers	Yes	7
		No	3
27.	Yam barn	Yes	6
		No	3
28.	Plots of land owned in the village	0	3
		1	4
		2	5
		>2	6
29.	Plots of land owned outside the village	Yes	7
		No	2
30.	Personal bore-hole	Yes	7
		No	3
31.	Motor cycle	Yes	6
		No	3
32.	Motor car	Yes	7
		No	3
33.	Turn table/speakers	Yes	6
		No	3
34.	CD/DVD player	Yes	5
		No	3
35.	Television	Yes	6
		No	2
36.	Ceiling/table fans	0	3
		1	4
		2	5
		>2	7
37.	Executive chairs	Yes	6
		No	3

38.	Lantern	0	0
		1	2
		2	3
		>2	4
39.	Store	Yes	5
		No	2
40.	Personal generator	Yes	7
		No	3
41	Wheel barrow	Yes	5
		No	3
42.	Floor carpet	Yes	7
		No	3
43.	Rug	Yes	6
		No	3
44.	Wardrobe	Yes	5
		No	2
45.	Rain coat	Yes	5
		No	2
46.	Umbrella	0	1
		1	2
		2	4
		>2	6
47.	Book shelves	Yes	6
		No	3
48.	Refrigerator	Yes	7
		No	3
49.	Standing mirror	Yes	5
		No	2
50.	Dinning table	Yes	6
		No	3
51.	Metal buckets	0	1
		1	3
		2	4
		>2	6
52.	Plastic buckets	1	1
		2	3
		3	4
		>4	5
		Yes	7
53.	Electric blender	No	3
		Yes	6
54.	Frying pan	No	3
55.	Tumblers	1-5	2
		6-10	3
		11-15	4
		>15	6
56.	Kettle	0	3
		1	4
		2	5
		>2	6
57.	Bicycles	Yes	5
		No	2
58.	Electric/coal iron	Yes	5
		No	2
59.	Metal spoons	1-3	2
		4-6	4
		>6	5
60.	Suitcases/travelling bags	1	1
		2	3
		>2	4

61.	GSM handset	Yes	7
		No	3
62.	Glass plates	1-3	2
		4-6	3
		7-9	4
		10-12	5
		13-15	6
		>15	7
63.	Wrist watch	Yes	6
		No	3
64.	Can you read in English	Yes	6
		No	3
65.	Can you write in English	Yes	6
		No	3
66.	Can you read your native dialect	Yes	7
		No	3
67.	Membership of social clubs	Yes	5
		No	2
68.	Official in a Christian organization	Yes	6
		No	3
69.	Membership of cooperative societies	Yes	5
		No	2

Reliability Test of the Scale

A test-retest reliability conducted after one month using the same respondents confirmed that the scale was reliable ($r=0.89$, $p< 0.01$). Asika (2001) defined reliability as the consistency between independent measurements of the same phenomenon. He noted that test-retest reliability was used to take two separate measurements on the same population at different times.

Conclusion

A socio-economic status scale consisting of 69 valid items was constructed to measure the socio-economic status of heads of rural arable farm families in the study area. The scale has construct validity, concurrent validity and was reliable. The scale revealed a significant positive relationship between socio-economic status of heads of rural arable farm families and adoption of innovation. The scale is, therefore, recommended for use by rural social workers to ascertain the changes occurring as a result of development intervention programmes.

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