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Impact of Higher Education and Income Inequality on Family Size of Staff of Tertiary Institutions in Imo State, Nigeria

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ABSTRACT

The family is one of the key tools for promoting socialization, harmony, cultural heritage and procreation in a given society. Maintaining standard and manageable family size with regards to current economic conditions within the society is important. Many scholars have studied several factors that influence the choice of family size in various societies, however impact of higher education and income inequality on family size of staff of tertiary institutions have been grossly understudied in Imo State. The target populations in this study were teaching and non-teaching staff. Structured questionnaire was administered to a sample size of 384 respondents which returned 300 valid responses. The Ordinal Logistic Regression modeling approach was applied to determine the effect of some important factors on family size of staff in the institutions using R statistical programming language. The results revealed that alternative income source, staff-category (teaching or non-teaching) and their institution were the significant factors at 5% level of significance. Therefore, we recommend that individuals should consider smaller family sizes in Imo State, Nigeria in order to achieve financial stability and cope with dwindling economy in the place.

Keywords: Ordinal logistic model, Income source, Staff-category, Financial stability, Economy.

INTRODUCTION

The family, till date remains the core unit of the society challenged with heavy cultural, social and moral responsibilities (Haralambos *et al.*, 2008). From the global point of view, the size of a family is an important index of population, socio-economic issues and reproductive health (Arthur, 2005; Sam *et al.*, 2005; Ajao *et al.*, 2010; Hyeladi *et al.*, 2014). Notably, fertility rate varies in different countries of the world and demographic evidence shows that developed/industrialized nations maintain low figures as against developing countries with characteristically high fertility figures. In under-developed communities, alarming family size has been recorded, whereas global fertility rate decreased from 5 children per woman-lifetime in 1950-1955 to 2.7 children in 2000-2005 (Cohen, 2003). From this analysis, fertility statistics in under-developed communities contradicts current reports by Gallagher (2020) that there are falling fertility rates in many countries which will culminate in shrinking populations by the end of the century. In current evaluations (Gallagher, 2020), if fertility rate falls below approximately 2.1 per woman, then the size of the population begins to fall. In black nations, Nigeria stands out as country with prolific family size with fertility rate of 5.7 births per woman few years ago (Cohen, 2003). According to United Nations-World Population Prospects, currently (year 2022), Nigeria has fertility rate of 5.14 per woman. This contradicts the implementation of the national policy on population in 1988 that restricts fecundity to four children per woman (James and Isiugo-Abanihe, 2010). Many Nigerians still believe that large family size is an asset of labour, social symbol and useful for, physical and security purposes (Owumi *et al*., 2016; Alaba *et al*., 2017). Moreover, the mean 5.7 fertility rate predominant in Nigeria is greater than the average fertility rate of 5.2 in sub-Saharan Africa and 2.7 fertility rate across the world (Population Reference Bureau, 2005). However, some families in Nigeria are beginning to consider smaller family sizes due to prolonged hardship in the country while majority of the citizens allow family size to chance and consequently, Nigeria has become the most populous black nation in the world (James and Isiugo-Abanihe, 2010).

For emphasis, the family is the building unit of the society with inevitable variation in size and form. Apart from socio-economic conditions and the level of education of a couple, income inequality is one of the major factors which affect family size (Scott and Gordon, 2006). Available and accessible resources are part of the most critical factors which determine the wellbeing of families (Jennings and Barber, 2013). New family members or children in homes with limited resources will struggle with the challenges of poverty and distorted future. Incidentally, when family members are poor; the society is poor and this incontrovertibly, culminates in depreciated livelihood (Sahleyesus, 2005). In other words, the welfare, health and success of family members get incredibly compromised when family size does not balance with available resources. Unfortunately, the community and country at large become equally affected. Therefore, to prevent the chain reaction problem that may arise from family sizes not proportional to available resources, couples are advised to consider their capacity in terms of asset and resources, in maintaining a particular family size. Earlier researchers have considered the effects of educational status, income levels, parental influence, religion, knowledge of family planning, age at marriage, duration of marriage, ethnic origin, women's employment status and wealth index on family size with different degrees of significance (Murphy and Knudsen, 2002; Kamal and Pervaiz, 2011; Okolo and Okolo, 2013; Ojo and Adesina, 2014; Yidana *et al*., 2015; Dibaba and Mitike, 2016; Egenti *et al*., 2016; Eboh *et al*., 2017). From the information in literature on family size, staff of high institutions in Imo State, Nigeria have grossly been understudied. This is one major gap which the present study hopes to tackle. Therefore, this study was designed to determine the impact of level of education, gender, category of employment and income inequality on the family sizes of staff working in selected high institutions in Imo State, Nigeria. The study will reveal the effects of factors which influence family size and estimate the significance of the factors using the Ordinal Logistic Regression modeling approach. The study is unchallengeable, with regards to the current economic conditions in Nigeria and the seeming income inequality among staff of high institutions with respect to their family sizes. It is expected that the findings of this research will foster steps taken by both government and policy makers towards maintaining standard and manageable family size.

MATERIALS AND METHODS

Data structure

The study sampled the teaching and non-teaching staff of the following higher institutions in Imo State, Nigeria: Imo State Polytechnic, Umuagwo (IMO POLY), Federal University of Technology Owerri (FUTO), Federal Polytechnic, Nekede (NEKEDE), Imo State University, Owerri (IMSU), Alvan Ikoku Federal College of Education, Owerri (ALVAN) and Federal College of Land Resources and Technology, Owerri (FECOLART). Sampled individuals comprised basically married staff in the institutions. Briefly, the categorical questionnaire style that allows for answers not to be unnecessarily blown out of proportion was used for constructing the questionnaire. The study had six categorical independent variables: highest education qualification, institution of employment, gender of respondent, alternative source of income, category of staff and monthly income with one categorical outcome variable: family size (at 3 levels).

Study design

A sample of the two staff categories were selected using simple random sampling. The sample size was determined using the Cochran (1977) method presented in equation (1).

$$n_o = \frac{z^2 pq}{e^2} \qquad (1)$$

where

n_0 = sample size,

z = confidence level critical value,

p = estimated proportion of the attribute in the population,

q = estimated proportion not in the population $(1 - p)$,

e = chosen precision level.

For this study, we assume the maximum variability which is equal to $50\% \ (p = 0.5)$ and taking 95% confidence level with $\pm 5\%$ precision which arrived at 384 respondents as the sample size.

Ordinal Logistic Regression

The linear regression that uses the ordinary least squares method to minimize sum of the squared deviations is often used for predicting continuous Y variables while logistic regression is used for categorical Y variable classification. It is inappropriate to use linear regression to model a categorical Y variable since the resulting model will give predicted Y's outside the assigned arbitrary coding. Also, other numerous assumptions such as normality of the errors may also get violated. Since the response variable - family size is ordered and categorized in three levels (2-5, 6-9 and ≥10) then, the appropriate logit model is the ordinal logistic regression model. Meanwhile, the Ordinal Logistic Regression is a type of regression used to predict an ordinal dependent variable given one or more independent variables. As with other types of regression, ordinal logistic regression is majorly used to determine the relationship between one or more independent variables and a dependent variable arranged in a categorical/nominal dataset with ordered responses. Let Y be an ordinal response variable (family size) with $J = 3$ categories. Then $P(Y \le j)$ is the cumulative probability of Y less than or equal to a specific category

$$j = 1, ..., j-1$$

. The odds of being less than or equal a particular category can be expressed as in equation (2)

$$\frac{P(Y \le j)}{P(Y > j)} \qquad (2)$$

for , but since

$$P(Y > j) = 0$$

, equation (2) becomes undefined; the log odds is also known as the logit is expressed as equation (3)

$$\log\left(\frac{P(Y \le j)}{P(Y > j)}\right) = \text{logit}(P(Y \le j)) \qquad (3)$$

The ordinal logistic model is given in equation (4) as

$$\text{logit } [P(Y \le j)] = á_j - \sum_{i=1}^{m} â_i X_i \; ; \; j = 1, \ldots, j-1 \qquad (4)$$

where
j is the number of levels of the dependent variable
m is the number of the predictor variables.
Computationally, equation (4) is expressed as in equation (5)

$$P(Y \le j) = \frac{1}{1 + \exp\left(-(á_j - \sum_{i=1}^{m} â_i X_i)\right)} \qquad (5)$$

The statistical analyses were carried out with Statistical Package for the Social Sciences version 22.0 and R statistical programming language. The statistical analysis was based 78% response rate (i.e. 300 valid copies of the questionnaire out of 384 administered).

Hypotheses tested

Parallel regression test: In testing for parallel lines, the null hypothesis considered is as follows: H_0

There is no difference in the coefficients between models (proportional odds assumption is satisfied).

Model fitting testing by education qualification and monthly salary: The null hypothesis tested is as follows:

The coefficients of the model are not statistically significant (the variables added did not improve the model when compared to the intercept only model).

The Pearson and deviance Chi-square statistic mode fitting: The null hypothesis tested is as follows:

The model fit the data well.

RESULTS

Primary data presentation

The large primary data obtained in this study are described in Table 1 in simplified/ pooled nature. There were differences in the educational qualification, monthly salary, other income sources and family size of workers in the institutions. a=0.05

Table 1: Educational and econometric pooled primary data of individuals sampled in this study during year 2020/2021

		N	Marginal percentage
	2 – 5	192	64.0%
Number of family size including (parents and	6 – 9	94	31.3%
children)	≥10	14	4.7%
	Teaching staff	199	66.3%
Staff category	Non-teaching staff	101	33.7%
	Male	167	55.7%
Gender	Female	133	44.3%
	HND/B.A/B.SC/B.ENG/B.TECH	60	20.0%
	Master's degree	155	51.7%
	Ph.D.	52	17.3%
Highest educational qualification	ND/NCE/DIPLOMA	33	11.0%
	₦101,000 - ₦200,000	100	33.3%
	₦201,000 - ₦300,000	25	8.3%
	₦301,000 - ₦400,000	8	2.7%
	₦400,000 and above	3	1.0%
Monthly salary income	₦1,000 - ₦100,000	164	54.7%
	Yes	196	65.3%
Other sources of income	No	104	34.7%
Total		**300**	

Parallel regression assumption

Table 2 shows the results of test of parallel lines. It is required that the proportional odds assumption must be satisfied. The analysis of results showed a p-value of 0.825 which is greater than

Table 2: Results of test of parallel lines

Model	-2 Log Likelihood	Chi-Square	df	p-value
Null Hypothesis	158.562			
General	152.674	5.888	10	0.825

Table 3: Three-way classification of family size by alternative income source and monthly salary

		Family size		
Alternative income source	**Monthly salary**	**=10**	**2 – 5**	**6 – 9**
No	#1,000 - #100,000	0 (0%)	48 (62.34%)	16 (66.67%)
	#101,000 - #200,000	2 (66.67%)	25 (32.47%)	5 (20.83%)
	#201,000 - #300,000	1 (33.33%)	3 (3.9%)	2 (8.33%)
	#301,000 - #400,000	0 (0%)	1 (1.3%)	1 (4.17%)
	#400,000 and above	0 (0%)	0 (0%)	0 (0%)
	Sub-total	3 (21%)	77 (40%)	24 (26%)
Yes	#1,000 - #100,000	5 (45.45%)	59 (51.3%)	36 (51.43%)
	#101,000 - #200,000	5 (45.45%)	36 (31.3%)	27 (38.57%)
	#201,000 - #300,000	0 (0%)	14 (12.17%)	5 (7.14%)
	#301,000 - #400,000	1 (9.09%)	4 (3.48%)	1 (1.43%)
	#400,000 and above	0 (0%)	2 (1.74%)	1 (1.43%)
	Sub-total	11 (79%)	115 (60%)	70 (74%)
	Grand total	**14**	**192**	**94**

Table 2:

Ordinal Logistic Regression model

Having satisfied the assumption of proportional odds, the Ordinal Logistic Regression model was proceeded. The results of the characteristics of the data collected and investigated by three way cross tabulations are presented Tables 3 and 4. From Table 3, the percentage of staff with no other alternative income source that have ≥10, 2-5 and 6-9 family size is 21%, 40% and 26%, respectively. Consequent upon this, cross tabulation which included the highest level of education of an individual was computed and shown in Table 4.

Table 4: Three-way classification of family size by education qualification and monthly salary

		Family size		
Educational qualification	**Monthly salary**	**=10**	**2 – 5**	**6 - 9**
HND/B.A/B.SC/B.ENG/B.TECH	#1,000 - #100,000	2 (100%)	35 (94.59%)	20 (95.24%)
	#101,000 - #200,000	0 (0%)	2 (5.41%)	1 (4.76%)
	#201,000 - #300,000	0 (0%)	0 (0%)	0 (0%)
	#301,000 - #400,000	0 (0%)	0 (0%)	0 (0%)
	#400,000 and above	0 (0%)	0 (0%)	0 (0%)
	Sub-total	2 (14%)	37 (19%)	21 (22%)
Master's Degree	#1,000 - #100,000	2 (22.22%)	50 (51.02%)	22 (45.83%)
	#101,000 - #200,000	6 (66.67%)	46 (46.94%)	24 (50%)
	#201,000 - #300,000	1 (11.11%)	2 (2.04%)	2 (4.17%)
	#301,000 - #400,000	0 (0%)	0 (0%)	0 (0%)
	#400,000 and above	0 (0%)	0 (0%)	0 (0%)
	Sub-total	9 (64%)	98 (51%)	48 (51%)
ND/NCE/DIPLOMA	#1,000 - #100,000	1 (100%)	22 (100%)	10 (100%)
	#101,000 - #200,000	0 (0%)	0 (0%)	0 (0%)
	#201,000 - #300,000	0 (0%)	0 (0%)	0 (0%)
	#301,000 - #400,000	0 (0%)	0 (0%)	0 (0%)
	#400,000 and above	0 (0%)	0 (0%)	0 (0%)
	Sub-total	1 (7%)	22 (11%)	10 (11%)
Ph.D.	#1,000 - #100,000	0 (0%)	0 (0%)	0 (0%)
	#101,000 - #200,000	1 (50%)	13 (37.14%)	7 (46.67%)
	#201,000 - #300,000	0 (0%)	15 (42.86%)	5 (33.33%)
	#301,000 - #400,000	1 (50%)	5 (14.29%)	2 (13.33%)
	#400,000 and above	0 (0%)	2 (5.71%)	1 (6.67%)
	Sub-total	2 (14%)	35 (18%)	15 (16%)
	Grand total	14	192	94

Model fitting information

Table 5 presents the information on model fitting.

Table 5: Model fitting information

Model	-2 Log Likelihood	Chi-Squar	Df	p-value
Intercept Only	176.520			
Final	158.562	17.959	10	.036

Link function: Logit.

Table 7: Pearson and deviance Chi-square statistic

	Chi-square	Df	Sig.
Pearson	91.017	74	.087
Deviance	74.293	74	.469

Model goodness of fit

Table 6 shows the Pseudo R-square. Nagelkerke approximation of the linear regression R-square statistic was used as an approximation of the percentage variation in the dependent variable explained by the independent variable.

Table 6: Pseudo R-square

Cox and Snell	.058
Nagelkerke	.073
McFadden	.038

The Pearson and deviance Chi-square statistic

The results of the Pearson and deviance Chi-square statistic are summarized in Table 7. From the results, it is concluded that the model fit the data well since the p-values (0.087 and 0.469) for Pearson and deviance statistic respectively, are not less than .

Parameter estimates

The estimates for the two intercepts, which are sometimes called cut points are given in Table 8. The intercepts indicate where the latent variable is cut to make the independent variable groups that were observed in the data. In general, these are not used in the interpretation of the results. The cut points are closely related to thresholds, which are reported by other statistical packages. Statistically, we are interested in the levels of the independent variables that are significant at 5% alpha level. Other levels of the categorical variables are redundant in the model and the missing level in each of the categorical variables has been set as the reference level for that particular categorical independent variable. Therefore, the estimated model can then be written just as expressed in equation (4) as:

$$\operatorname{logit}\left(\hat{P}\left(\hat{Y} \le 1\right)\right) = -1.29 - 1.05 \times FECOLART - 0.53 \times FUTO - 1.02 \times IMO\,POLY - 0.90 \times IMSU \\ - 0.99 \times NEKEDE - 1.17 \times NON(TEACHING) \quad (6)$$

$$\operatorname{logit}\left(\hat{P}\left(\hat{Y} \le 2\right)\right) = 2.71 - 1.05 \times FECOLART - 0.53 \times FUTO - 1.02 \times IMO\,POLY - 0.90 \times IMSU \\ - 0.99 \times NEKEDE - 1.17 \times NON(TEACHING) \quad (7)$$

The p-values as shown in Table 8 were computed by comparing the t-value against the standard normal distribution, like a z test. The coefficients from the model can be somewhat difficult to interpret because they are scaled in terms of logs. Therefore, to interpret the coefficients of this logistic regression model, we converted the coefficients into odds ratios (OR). To get the OR and confidence intervals, we exponentiated the estimates and also profiled the confidence intervals.

Furthermore, the OR and corresponding 95% confidence interval are shown in Table 9. The confidence intervals for the OR of the parameter estimates were obtained by profiling the likelihood function. The profiled CIs (confidence intervals) are not symmetric (although they are usually close to symmetric). Generally, if the 95% CI does not cross 0, the parameter estimate is statistically significant. The estimates in the output are given in units of ordered logits, or ordered log odds.

Table 8: Parameter estimates Call: polr (formula = Family_Size ~ Institution + Staff_Category + Gender + Educational_Qualification + Monthly_Salary + Staff_Income2, data = ml, Hess = TRUE)

Coefficients:	Value	Std. Error	t value	p-value
Institution FECOLART	1.0459	0.4428	2.3619	0.02
Institution FUTO	0.5330	0.4666	1.1424	0.25
Institution IMO POLY	1.0245	0.4663	2.1969	0.03
Institution IMSU	0.9015	0.4522	1.9937	0.04
Institution NEKEDE	0.9891	0.4485	2.2056	0.03
Staff_Category Non-Academic Staff	1.1677	0.4082	2.8603	0.00
Gender Male	0.3725	0.2627	1.4177	0.16
Educational_Qualification Masters	0.2627	0.4199	0.6255	0.53
Educational_Qualification ND/NCE/DIPLOMA	-0.4104	0.4628	-0.8867	0.38
Educational_Qualification PH.D	0.2014	0.6457	0.3119	0.76
Monthly_Salary#101,000 - #200,000	0.1682	0.3786	0.4443	0.66
Monthly_Salary#201,000 - #300,000	0.2022	0.6637	0.3046	0.76
Monthly_Salary#301,000 - #400,000	-0.2137	1.0431	0.2049	0.84
Monthly_Salary#400,000 and above	0.6197	1.3641	0.4543	0.65
Alternative Income Yes	0.9120	0.2699	1.8198	0.03
Intercepts:	Value	Std. Error	t value	p-value
10 and above|2 - 5	-1.2952	0.5786	-2.2385	0.03
2 - 5|6 - 9	2.7060	0.5782	4.6802	0.00

Residual Deviance: 452.9903 AIC: 486.9903

Table 9: Odds ratio and 95% confidence interval

	OR	2.5 %	97.5 %
Institution FECOLART	2.8460731	1.20578661	6.870821
Institution FUTO	1.7041145	0.68499346	4.284591
Institution IMO POLY	2.7856138	1.12512154	7.029207
Institution IMSU	2.4633455	1.02305972	6.048271
Institution NEKEDE	2.6888167	1.12543588	6.556106
Staff_CategoryNon-Academic Staff	3.2145192	1.45972535	7.277362
GenderMale	1.4513266	0.86960885	2.439989
Educational_Qualification Masters Degree	1.3004081	0.57509352	2.996279
Educational_Qualification ND/NCE/DIPLOMA	0.6633966	0.26500599	1.634728
Educational_QualificationPH.D	1.2230983	0.34369736	4.346303
Monthly_Salary#101,000 - #200,000	1.1831779	0.56425473	2.496734
Monthly_Salary#201,000 - #300,000	1.2240405	0.33133287	4.501266
Monthly_Salary#301,000 - #400,000	0.8075934	0.09940684	5.917075
Monthly_Salary#400,000 and above	1.8583204	0.10633852	26.936667
Alternative IncomeYes	2.4892961	1.00711762	2.791820

Performance measure of the model

The confusion matrix for the predicted and the actual levels of family size of the staff is given in Table 10. The confusion matrix is used to ascertain the prediction accuracy of the ordinal logistic model. In the confusion matrix, the interest is in higher numbers appearing on the major diagonals than the off diagonals. The prediction accuracy was computed by dividing the sum of the numbers on the major diagonal by the total sample size.

Accuracy

$$= \frac{\text{Number of correct prediction}}{\text{Total number of respondents}} = \frac{187+16+0}{300} = \frac{203}{300} = 0.6766$$

The model gave a prediction accuracy level of 0.6766, which strongly indicates that 67.66% of the respondents were classified correctly.

Table 10: The confusion matrix

		Number of family size including (parents & children)			Total
		2 – 5	6 – 9	≥10	
Predicted response category	2 – 5	187	5	0	192
	6 – 9	78	16	0	94
	≥10	12	2	0	14
Total		**192**	**94**	**14**	**300**

Predicted response

DISCUSSION

The analysis of results revealed variations in the educational and econometric data of staff of tertiary institutions in Imo State, Nigeria and this is in line with observations in different parts of the world (Volchik *et al*., 2018). Dynamics in countries' economies, propensity for survival, individual differences in vision, values, priorities and achievements have caused variations in educational qualifications, monthly salaries, income sources and family size (Gunay *et al*., 2013; Volchik *et al*., 2018). Therefore, it is not surprising that educational status, monthly salaries, income sources and family sizes of workers in tertiary institutions in Imo State differed considerably, taking into accounts job category and gender. The result of test for proportionality odds assumption was shown at 5% level of significance. The analysis of results revealed that p-value of 0.825 was not less than 0.05, therefore, there is not enough evidence to reject the null hypothesis. The test was not significant which implies that there is no difference in the coefficients between models (therefore, proportional odds assumption is satisfied). Bases for proportional odds assumption have been described by earlier workers (Dolgun and Saracbasi, 2014). The findings of the study showed that the percentage of staff with no other alternative income source that have ≥10, 2-5 and 6-9 family size is relatively smaller when compared to 79%, 60% and 74% respectively for their counterparts who have alternative income source. This is a strong indication that alternative source of income could be a contributing factor to family size of teaching and non-teaching staff of higher institutions in Imo State, Nigeria. Judging from staff with alternative income source and those that do not have alternative income source, there are indications that staff who earn more tend to have less or no persons in their household, given that the percentage values are very small. The observation that family size can be influenced by any social, economic, cultural, religious and ethnic factor is supported in literature (Murphy and Knudsen, 2002; Kamal and Pervaiz, 2011; Okolo and Okolo, 2013; Ojo and Adesina, 2014; Dibaba and Mitike, 2016; Egenti *et al*., 2016; Eboh *et al*., 2017). It is expected that earning higher salary in the higher institution is a strong indication that one has acquired more degrees or more years of experience. It was further revealed that education level did not clearly show evidences that it is a significant factor for the variations in family size rather, it showed that it is a significant factor for monthly salary because most of the staff that have records for family size are those with other degrees other than ND, NCE and DIPLOMA. Again, those with ND, NCE and DIPLOMA earned lower with 33 (11.0%) of them having 2-5 family size. This is a notable observation. The findings of this study on model fitting revealed statistical significance of the independent variables. Thus, the null hypothesis was rejected and it was concluded that the coefficients of the model are statistically significant. In other words, the variables added, improved the model when compared to the intercept only model, since the p-value (0.036) of the final row was less than $05.0=\alpha$. In the study, it was revealed that 7.3% of the unexplained variations in family size of staff of higher institutions in Imo State were explained by the independent variables. Therefore, it was possible to understand patterns and trend with the addition that more work is required to consolidate the contribution of the background factors that first inform higher education and income inequality before they can have effect on family size. Generally, the analyses of results on Pseudo R-square, Pearson and deviance and Chi-square statistic revealed good fits. Notably, the residual deviance as well as the AIC of the model was found useful for model comparison. Similarly, it was possible to understand the results of the parameter estimates. Corroborating the interpretations of the logit results in Orumie *et al*. (2021), for institution types, odds ratio of 2.85 for staff from FECOLART means that when staff of FECOLART is compared to staff of ALVAN (reference level), we expect a 2.85 increase in the expected number of family size given that all other variables in the model are held constant. Comparing staff from IMO POLY, NEKEDE and IMSU with staff from ALVAN increases the odds for the expected family size by 2.79, 2.69 and 2.46, respectively. These are interesting observations. The odds are higher for staff of FECOLART followed by Imo State Polytechnic, Owerri, then Federal Polytechnic, Nekede and finally, Imo State University, Owerri. In general, when non-teaching staff of these institutions were compared with the teaching staff (reference level), the relative risk for the expected family size increases by 3.21 units. This simply means that non-teaching staff of the higher institutions have family sizes that are 3 times higher than the teaching staff. This is another notable observation in the study. Having an alternative source of income increases the odd for higher expected family size when compared to those without alternative income source by 2.5 units. The findings on income status in this study are in agreement with the results of Ojo and Adesina (2014) and Yidana *et al*. (2015). However, the results of the present study did not identify education levels as a significant variable that affects family size. This contradicts the results of Dibaba and Mitike (2016) and Alaba *et al*. (2017) which listed education level as a contributing factor to family size.

CONCLUSION

The focus of the study was to examine the factors influencing family size among the staff of selected higher institutions in Imo State, Nigeria. Thus, some very important factors such as higher institution of employment, gender, alternative source of income, highest level of education, monthly salary and staff-category were assessed using the approach of Ordinal Logistic Regression Analysis. The factors impacting on family size were established using the assumptions and model of the ordinal logistic regression, as well as testing for the model fitting. The proportionality odds assumption tested and satisfied, along with all other assumptions of ordinal logistic regression indicated that there was no difference in the coefficients between models. The model fitting information satisfies that the coefficients of the model are statistically significant. The Pearson and deviance Chi-square statistic showed that the data were well fitted; and then, the Pseudo R-square statistic shows the percentage variation in the dependent variable that can be explained by the independent variables. Among the six predicting factors considered, the research has identified three factors as significant variables at 5% level of significance that affect the family size of both teaching and non-teaching staff of higher institutions in Imo State, Nigeria. Staff- category, the institution where the staff works and other sources of income (outside monthly salary) were the significant factors at 5% level of significance that affected the family sizes of staff of higher institutions in Imo state, Nigeria. The study further reveals that staff's gender and monthly salary income have no significant effect on the family size of staff of high institutions in the area, since their p-values for the levels of the factors compared to the reference level are all greater than 0.05 at 5% level of significance.

REFERENCES

Alaba, O.O., Olubusoye, O.E. and Olaomi, J.O. (2017). Spatial patterns and determinants of fertility levels among women of childbearing age in Nigeria. *South African Family Practice,* 1 (1):1-5.

Ajao, K.O., Ojofeitimi, E.O., Adebayo, A.A., Fatusi, A.O. and Afolabi, O.T. (2010). Influence of family size, household food security status, and child care practices on the nutritional status of under-five children in Ile-Ife, Nigeria. *African Journal of Reproductive Health*, 14 (4): 123-132.

Arthur, J.L. (2005). Family size and its socio-economic implications in the Sunyani Municipality of the Brong Ahafo Region of Ghana, West Africa. Center for Development Studies, Ghana. Unpublished.

Cochran, W.G. (1977). Sampling techniques, (3rd ed.), New York: John Wiley & Sons.

Cohen, J. (2003). Human Population: the Next half Century. *Science*, 302: 1172-1175.

Dibaba, B. and Mitike, G. (2016). Factors influencing desired family size among residents of Assela town. *Journal of Women's Health Care,* 5 (6): 1-8.

Dolgun, A. and Saracbasi, O. (2014). Assessing proportionality assumption in the adjacent category logistic regression model. *Statistics and its Interface*, 7 (2): 275 - 295.

Eboh Alfred, Akpata Grace Oremeyi, and Owoseni J. S., (2017). Socio-economic impact of family size preference on married couples in Kogi State University Community, Anyigba, Kogi State, Nigeria. *American Journal of Sociological Research*, Vol. 7 No. 4, pp. 99-108. doi: 10.5923/j.sociology.20170704.01.

Egenti, N.B., Chineke, H.N., Merenu, I.A., Egwuatu, C.C. and Adogu, P.O.U. (2016). Family size preference: socio-cultural and economic determinants among the obstetric population in Orlu South East Nigeria. *British Journal of Education, Society and Behavioural Science,* 15 (3): 1-7.

Gallagher, J. (2020). Fertility rate: Jaw-dropping global crash in children being born. BBC News. Available at: bbc.com/news/health-53409521.

Gunay, G., Boylu, A.A. and Bener, O. (2013). An examination of factors affecting economic status and finance satisfaction of families: a comparison of metropolitan and rural areas. *Social Indicators Research* 119 (1): 211-245.

Haralambos, M., Holborn, M. and Heald, R. (2008). *Sociology: Themes and Perspectives* (7th Ed.). London: HarperCollins Publishers Limited.

Hyeladi, A. Alfred, J and Gyang, L.D. (2014). Assessment of family sizes and poverty levels in Mangu LGA, Plateau State. *International Journal of Humanities and Social Science,* 4 (3): 310-315.

James, G. and Isiugo-Abanihe, U. (2010). Adolescents' reproductive motivations and family size preferences in North-Western Nigeria. *Asian Journal of Medical Science*, 2 (5): 218-22.

Jennings, E.A. and Barber, J.S. (2013). The influence of neighbors' family size preference on women's progression to higher parity births. *Studies in Family Planning,* 44 (1): 67-84.

Kamal, A. and Pervaiz, M.K. (2011). Factors affecting the family size in Pakistan: Clog-log regression model analysis. *Journal of Statistics,* 18:29-53.

Murphy, M. and Knudsen, L.B. (2002). The Intergenerational transmission of fertility in contemporary Denmark: the effects of a number of siblings (full and half), birth order, and whether male or female. *European Journal of Population*, 17:75-96.

Ojo, S.S. and Adesina, A.S. (2014). Women empowerment and fertility management in Nigeria: a study of Lafia area of Nasarawa State. *Mediterranean Journal of Social Sciences*, 5 (26): 1-14. MCSER Publishing, Rome-Italy.

Okolo, N. C. and Okolo, C. A. (2013). Factors influencing the choice of family size amongst female health professionals in Uduth Sokoto. *International Journal of Social Sciences and Humanities Reviews*, 4(1): 159-166.

Orumie, U.C, Bartholomew, D.C, Obite, C.P and Kiwu, L.C. (2021) Likelihood of insurance coverage on damages due to level of insecurity in Nigeria: logistic modeling approach, *Financial Risk and Management Reviews*, 2021 Vol. 7, No. 1, pp. 50-59.

Owumi, B.E., Eboh, A., Owoyemi, J.O. and Akpata, G. O. (2016). Perceived causes of childhood illnesses and herbal medicine utilization among mothers of child-patients in Lokoja, Kogi State, North-Central, Nigeria. *Research on Humanities and Social Sciences*, 6 (23):14-28.

Population Reference Bureau, (2005). Women of our World. Washington DC.

Sahleyesus, D. (2005). Attitudes toward family size preferences among Urban Ethiopians. PSC *Discussion Papers Series*, 19 (10): 1-31.

Scott, J. and Gordon, M. (2006). Oxford Dictionary of Sociology. New York: Oxford University Press.

Sam, D.L., Peltzer, K. and Mayer, B. (2005). The changing values of children and preferences regarding family size in south Africa. *Applied Psychology: an International Review*, 54 (3): 355-377.

United Nations-World Population Prospects (2022).Availableat: https://www.macrotrends.net/countries/NGA/nigeria/birth-rate.

Volchik, V., Oganesyan, A. and Olejarz, T. (2018).Higher education as a factor of socio-economic performance and development. *Journal of International studies*, 11(4): 326-340.

Yidana, A. Ziblim, S. Azongo, T.B. and Abass, Y. (2015). Socio-Cultural Determinants of contraceptives use among adolescents in Northern Ghana. *Public Health Research* 2015, 5(4): 83-89.