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Modeling Socioeconomic Factors Affecting Age at Marriage among females in Kogi State, Nigeria

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Abstract
This paper is aimed at determining the effect of socioeconomic factors such as cultural background, level of education and religion in relation to age at marriage among women in Kogi State Nigeria. The survey area is made up of diverse ethnic groups with three major languages. The study reveals that education is an important factor which increases the age at marriage in the State. The study equally proved that religion and cultural background does not affect age at marriage among women in Kogi State, Nigeria. A Saturated one-way and two-way model was fitted to reveal the behavioral pattern of the distribution.
Key words: Socioeconomic, Modeling, Marriage, Saturated, Analysis.

1.0 Introduction.

In modern research concerning women and marriage, it is a common practice to include social determinants like race, religion, region of residence, educational attainment etc. In the last two decades,research focus has shifted from the social and familial determinants to the impact of educational and career attainment to the age at first marriage(See Wong,2002,Brien et all,1994,Upchurch et al ,2002).It is no longer legitimate to study fertility in terms of female age distribution alone. In Nigeria, the bulk of reproduction takes place within marriage (legitimate births account for about 95% of all births), and though among the younger women marriage may not frequently follow conception rather than precede it, even if pre-nuptial conceptions are excluded the proportion of martially conceived births only falls to 87%. Moreover, given the small family system prevalent in this country, the normal size of family may be achieved without much difficulty even by women who marry relatively late. The amount and timing of marriage is therefore important in the study of fertility and greater attention has recently been devoted to the study of nuptial. (Maitra,2004). This paper focuses on modeling major factors affecting age at marriage among females in Kogi State, Nigeria.

2.0 Materials and Methods

2.1 Data and Descriptive Statistics.

The data for this study was obtained through primary source. Questionnaires were sent to three senatorial districts in the response area, 600 responses were obtained. Age was classified into three groups and coded as follows for the purpose of analysis:0 represents age group 1 – 29 years, 1 represents 30 – 39 years and 2 represents 40 years and above. Similarly education was classified into three groups: 0 for no education, 1 for secondary education and 2 for higher degree.Religion classified into three, 0 for traditional, 1 for Islam and 2 for Christian. Also zone classified into three. 0 represent East (Igala zone) , 1 represent central (Ebira zone), 2 represent west (Okun zone).

We analyzed data containing more than two categorical variables by using log-linear procedure. Table 3.1a,(appendix 1) shows the cross tabulation of age of male at marriage and the associated social factors and that of female respectively.

3.0 Results and Discussion

In this study, we discovered that majority (524 out of 600respondents)of the women got married between ages group 0 – 29 .This accounts for about 87.33%. On rare occasion do we have those that got married above 40 years of age. Only 2 women (0.33%) married at the age of 40 and above and they are educated. The test was significant at $p<0.05$. This confirmed that Age at which women married is affected by the level of their education. Religion and senatorial zone does not play a significant role in determining the age at marriage for females as the test was not significant as $p>0.05$ (Tables 2 and 3).

3.1 Results of the Saturated Models

In this section, we want to see where any of the three factors; Education, Religion and zone is a function of the age at marriage (female). In doing this , we employ the chi-square test for goodness of fit. The two-way and multi-way contingency tables use a chi-square statistics to test hypothesis of independence, there are some critical differences in the use of chi-square tests. The use of a chi-square test for independence in two-way contingency table is used in testing the hypothesis that observed values differ significantly from the value of the expected due to chances. In the use of a chi-square test, rejection of the null hypothesis indicates that the two variables in the model are not independent of each other or that they are somehow related to each other.

Multiway contingency tables use a chi-square for goodness of fit in which a restricted model is compared with a saturated model to determine whether there is a significant difference between the two models, that is whether the restricted model is Parsimonious or not. The saturated model contains all of the variables being analyzed and all the possible relationships between these variables whereas, restricted model contains a subset of the possible relationship between the variables in the saturated model. In the use of a chi-square test, a failure to reject the null hypothesis indicates that there is no difference between the restricted and saturated model. We select the more parsimonious (restricted) model because it can and will still explain the data equally well as the saturated model. We achieve this through the use of backward selection procedure (Hierarchical log-linear modeling) of the log linear models.

The procedure begins with the saturated model with the designs.

Design = constant +Age + Edu +Rel + zone + Age x Edu
+ Age x Rel + Age x Zone + Edu x Rel + Edu x Zone +Rel x zone +Age x Edu xRel
+Age x Rel x Zone +Age x Edu x Zone +Edu x Rel x Zone + Age x Edu x Rel x Zone which is denoted by

$$\ln (M_{ijkl}) = \mu + \alpha_i^{A} + \alpha_j^{E} + \alpha_k^{R} + \alpha_l^{Z} + \alpha_{cj}^{AE} + \alpha_{ik}^{AR} + \alpha_{il}^{AZ} + \alpha_{jk}^{ER} + \alpha_{jl}^{EZ} + \alpha_{kl}^{RZ} + \alpha_{ijk}^{AER} + \alpha_{ijl}^{AEZ} + \alpha_{ikl}^{ARZ} + \alpha_{ijkl}^{AERZ} \quad \text{-------------------------------(2)}$$

Where μ is the logarithm of the overall mean.

The likelihood ratio and the Pearson chi-square for the model is also zero. This indicates that the model perfectly fits the data.Also in the test of significant for the K-way effects, it was discovered that elimination of the 4th and third order with probabilities 1.000 and 0.8886 are not significant. This shows that the particular effects had no contributions to the saturated model at 5% level of significance. But the 2-way and 1-way effects had a significant contribution. The best model has generating class and can be represented as:

$\ln (M_{ijkl})$ = Constant + Age +Edu +Rel + Zone + Age x Edu + Edu x Rel + Edu x Zone +Rel xZone + Edu x Rel x Zone.

Under the effect of Age x Edu x Rel x Zone, parameter 1 corresponding to Age 0, Edu 0, Rel 0 and Zone 0 is – 0.2645 with the standard value t-value – 0.68443. We obtain the standard value by dividing the estimate by the standard error.

After the operation of the backward selection procedure, the most parsimonious restricted models were given as the final model. Hence we have the model:

$$\ln(m_{ijklt}) = \mu + \gamma_i^{A} + \gamma_j^{E} + \gamma_k^{R} + \gamma_k^{R} + \gamma_l^{Z} + \gamma_t^{S} + \gamma_{ij}^{AE} + \gamma_{ik}^{AR} + \gamma_{il}^{AZ} + \gamma_{it}^{AS} + \gamma_{jk}^{ER} + \gamma_{jl}^{EZ} + \gamma_{jt}^{ES} + \gamma_{kl}^{RZ} + \gamma_{kt}^{RS} + \gamma_{lt}^{ZS} + \gamma_{ijk}^{AER} + \gamma_{ijl}^{AEZ} + \gamma_{ijk}^{AES} + \gamma_{ijt}^{ARZ} + \gamma_{ikl}^{ARS} + \gamma_{ilt}^{AZS} + \gamma_{jkl}^{ERZ} + \gamma_{jkt}^{ERS} + \gamma_{jkt}^{EZS} + \gamma_{klt}^{RZS} + \gamma_{ijkl}^{AERZ} + \gamma_{ijkt}^{AERS} + \gamma_{jklt}^{ERZS} + \gamma_{ijklt}^{AERSZ} \text{------------(3)}$$

Where μ is the logarithms of the overall mean and S is the gender effect.

The likelihood ratio and the Pearson chi-square for this model is zero, this indicates that the model fits the data well.

In the test of significance for the k-way effects it was discovered that elimination of the 5th and the 4th order with probabilities .9997 and 1.000 are not significant

(Table8). This shows that the particular effect has no contribution to the saturated model at 5% level of significance, but the 3-way, 2-way and 1-way effects are significant.

We also present the estimates of the parameters. For instance, under the effect Age x Edu x Rel x Zone x Gender, parameter 1 corresponding to Age = 0, Edu = 0, Rel = 0, Zone = 0 and Gender = 0 is .1253 with standard value Z =.2612. Dividing the estimate by the standard error gives us the standard value.

After the backward elimination procedure, we discovered that the final model or the most parsimonious restricted model contains all the 2-ways and 1-way effect in addition to Edu x Rel x Zone only in 3-way interactions. Hence, the final model has a generating class.

Edu x Rel x Zone, Gender x Age, Age x Edu, Gender x Rel,
Age x Rel, Edu x Rel, Age x Zone, Edu x Zone, Rel x Zone

These are necessarily conditional independence models. Now, the best fitting model has the generating class.

$\ln(m_{ijklt})$ = constant + Age + Edu + Rel + Zone + Age x Rel + Edu x Rel + Age x Zone + Edu x Zone + Rel x Zone + Gender x Age + Age x Edu + Gender x Rel + Edu x Rel x Zone.

4.0 **Conclusion**

The results from the analysis show that there is a statistical relationship between age at marriage and level of education attainment. Religion and cultural background (senatorial zone) played a less significant role in determining age at marriage for women in Kogi State, Nigeria. The result of the cross tabulation between age and zone indicate that there was no age differences at marriage among the three zones. That is to say that the probability of getting married at any particular age is equally likely among the three zones in Kogi State, Nigeria.

Crosstab

Count

		WEDUC			Total
		0	1	2	
WAGE	0	122	290	112	524
	1	15	30	29	74
	2		1	1	2
Total		137	321	142	600

Crosstab

Count

		WRELI			Total
		0	1	2	
WAGE	0	19	249	256	524
	1	2	33	39	74
	2		1	1	2
Total		21	283	296	600

Pearson Chi-Square	12.660[a]	4	.013
Likelihood Ratio	11.976	4	.018
Linear-by-Linear Association	7.041	1	.008
N of Valid Cases	600		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .46.

Crosstab

Count

		ZONE			Total
		0	1	2	
WAGE	0	178	139	207	524
	1	20	30	24	74
	2	1	1		2
Total		199	170	231	600

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.555[a]	4	.109
Likelihood Ratio	7.886	4	.096
Linear-by-Linear Association	.091	1	.763
N of Valid Cases	600		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is .57.

Table 2: Cross tabulation of age and religion

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.544[a]	4	.969
Likelihood Ratio	.623	4	.960
Linear-by-Linear Association	.461	1	.497
N of Valid Cases	600		

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is .07.

Crosstab

Count

ZONE			WEDUC 0	WEDUC 1	WEDUC 2	Total
0	WAGE	0	37	99	42	178
		1	2	7	11	20
		2		1		1
	Total		39	107	53	199
1	WAGE	0	32	75	32	139
		1	8	13	9	30
		2			1	1
	Total		40	88	42	170
2	WAGE	0	53	116	38	207
		1	5	10	9	24
	Total		58	126	47	231

Chi-Square Tests

WRELI	WEDUC		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
0	0	Pearson Chi-Square	1.938[b]	2	.379		
		Likelihood Ratio	2.201	2	.333		
		Linear-by-Linear Association	1.471	1	.225		
		N of Valid Cases	14				
	1	Pearson Chi-Square	.[c]				
		N of Valid Cases	4				
	2	Pearson Chi-Square	3.000[d]	1	.083		
		Continuity Correction[a]	.188	1	.665		
		Likelihood Ratio	3.819	1	.051		
		Fisher's Exact Test				.333	.333
		Linear-by-Linear Association	2.000	1	.157		
		N of Valid Cases	3				
1	0	Pearson Chi-Square	6.752[e]	2	.034		
		Likelihood Ratio	7.801	2	.020		
		Linear-by-Linear Association	.343	1	.558		
		N of Valid Cases	61				
	1	Pearson Chi-Square	5.887[f]	2	.053		
		Likelihood Ratio	5.588	2	.061		
		Linear-by-Linear Association	.048	1	.826		
		N of Valid Cases	157				
	2	Pearson Chi-Square	2.233[g]	4	.693		
		Likelihood Ratio	2.716	4	.606		
		Linear-by-Linear Association	.027	1	.870		
		N of Valid Cases	65				
2	0	Pearson Chi-Square	1.104[h]	2	.576		
		Likelihood Ratio	1.090	2	.580		
		Linear-by-Linear Association	.064	1	.800		
		N of Valid Cases	62				
	1	Pearson Chi-Square	3.104[i]	4	.540		
		Likelihood Ratio	3.033	4	.552		
		Linear-by-Linear Association	.070	1	.791		
		N of Valid Cases	160				
	2	Pearson Chi-Square	.993[j]	2	.609		
		Likelihood Ratio	1.136	2	.567		
		Linear-by-Linear Association	.049	1	.825		
		N of Valid Cases	74				

a. Computed only for a 2x2 table
b. 5 cells (83.3%) have expected count less than 5. The minimum expected count is .21.
c. No statistics are computed because WAGE and ZONE are constants.
d. 4 cells (100.0%) have expected count less than 5. The minimum expected count is .33.
e. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 1.87.
f. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 4.39.
g. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .17.
h. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 1.81.
i. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .23.
j. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 2.16.

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Table6. To test that K-way and higher order effects are zero

K	DF	.R chisq	Prob	Pearson	Prob chi-sq
4	16	2.052	1.00	1.304	1.000
3	48	38.485	.8351	36.455	.8886
2	72	125.398	.0001	136.121	.0000
1	80	1415.277	.0000	2046.000	.0000

Table7: Tests of Partial Associations.

Effect Name	DF	Partial Chisq	Prob
AGE*EDUC*RELI	8	4.674	.7918
AGE*EDUC*ZONE	8	4.019	.8554
AGE*RELI*ZONE	8	12.248	.1405
EDUC*RELI*ZONE	8	15.980	.0427
AGE*EDUC	4	11.387	.0225
AGE*RELI	4	.985	.9121
EDUC*RELI	4	21.748	.0002
AGE*ZONE	4	8.205	.0844
EDUC*ZONE	4	5.379	.2505
RELI*ZONE	4	43.378	.0000
AGE	2	843.837	.0000
EDUC	2	102.814	.0000
RELI	2	333.905	.0000
ZONE	2	9.323	.0095

Table8: To test that K-way and higher order effects are zero.

K	DF	L.R. Chisq	Prob	Pearson Chisq	Prob
1	9	1486.048	.0000	2295.860	.0000
2	32	849.329	.0000	978.532	.0000
3	56	79.383	.0216	126.528	.0000
4	48	23.473	.9989	21.175	.9997
5	16	1.899	1.0000	1.385	1.0000

Table 9: Test of Partial Associations

Effect Name	DF	Partial Chisq	Prob
GENDER*AGE*EDUC*RELI	8	467	.9999
GENDER*AGE*EDUC*ZONES	8	.016	.9333
GENDER*AGE*RELI*ZONES	8	.101	.9279
GENDER*EDUC*RELI*ZONES	8	.782	.8762
AGE*EDUC*RELI*ZONES	16	.362	.9981
GENDER*AGE*EDUC	4	.147	.0575
GENDER*AGE*RELI	4	.581	.8122
GENDER*EDUC*RELI	4	.106	.7163
AGE*EDUC*RELI	8	.211	.1420

GENDER*AGE*ZONES	4	1.495	.8275
GENDER*EDUC*ZONES	4	1.304	.8606
AGE*EDUC*ZONES	8	3.407	.9063
GENDER*RELI*ZONES	4	5.186	.2688
AGE*RELI*ZONES	8	15.349	.0527
EDUC*RELI*ZONES	8	16.701	.0334
GENDER*AGE	2	494.216	.0000
GENDER*EDUC	2	.581	.7479
AGE*EDUC	4	74.582	.0000
GENDER*RELI	2	15.408	.0005
AGE*RELI	4	17.253	.0017
EDUC*RELI	4	66.438	.0000
GENDER*ZONES	2	4.660	.0973
AGE*ZONES	4	16.217	.0027
EDUC*ZONES	4	14.688	.0054
RELI*ZONES	4	87.014	.0000
GENDER	1	.000	.9912
AGE	2	674.043	.0000
EDUC	2	165.838	.0000
RELI	2	627.521	.0000
ZONES	2	18.646	.0001

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