Women's Education and Their Fertility

Rural Upper Egypt by: Youssef Mostafa Mahgoub*

Introduction:

It has been widely known nationaly and imternationaly that education is the only factor among socio-economic variables that proved to have the stongest negative association with fertility. As for example, Ridker (1976) stated that: "parents with more education have smaller families and parents whose children have more education also have smaller families. These relationships hold in both cross sectional and time series studies at both national and family levels and whether or not other important variables such as income and place of residence are controlled. Some studies have found that the relationship is positive for families with only a few years of primary education suggesting the possibility that it is necessary to achieve a certain threshold before the negative impact takes hold". In this study, four data sets of Demographic Health Surveys for 'rural upper Egypt' are investigated using both weighted least squares and maximum likelihood estimates. Different models for global odds ratios are tested. We are concentrating here on 'rural upper Egypt' for two reasons. First; rural upper Egypt had proved consistently to have the highest fertility levels among different geographic regions of Egypt. For instance, total fertilitry rate reached 5.2 births / woman according to DHS(1995). Second; it has been noticed from earlier studies that rural upper Egypt has the lowest association between fertility and education among all geographic ares of Egypt (Mahgoub (1989;1990,1991) and Mahgoub & Hussein (1992)).

Section 1: Global Odds Ratio Definition:

Global odds ratios and their interpretations are introduced below.

$$\Psi_{ij} = \frac{\left\{ \sum\limits_{a \leq i} \sum\limits_{b \leq j} \prod_{ab} \right\}^* \left\{ \sum\limits_{a \geq i} \sum\limits_{b \geq j} \prod_{ab} \right\}}{\left\{ \sum\limits_{a \geq i} \sum\limits_{b \leq j} \prod_{ab} \right\}^* \left\{ \sum\limits_{a \leq i} \sum\limits_{b \geq j} \prod_{ab} \right\}}$$

for i=1,21,..., r-1 (rows), j=1,2,..., c-1 (columns), where Πij denotes the population proportion in the cell (i,j) and

$$\sum_{i=1}^{r} \sum_{j=1}^{c} \Pi_{ij} = 1$$

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Each global odds ratio can be expressed as a ratio of odds of cumulation events as:

$$\Psi_{ij} = \frac{odds(c_1 \subseteq i / c_2 \subseteq j)}{odds(c_1 \subseteq i / c_2 \supset j)} = \frac{odds(c_2 \subseteq j / c_1 \subseteq i)}{odds(c_2 \subseteq j / c_1 \supset i)}$$

Odds for an event E are defined as:

$$\frac{p(E)}{1 - p(E)}$$

The following is an example for global odds ratio interpretation. The global odds ratio at Secondary / Higher 4-5/6+ cutpoint (Table (1)) means the odds on having at most five living children given that the level of education is "Higher" is 2.64 times the odds on having at least six living children given that the level of education is "Higher". It also means :for those women whose level of education is "Higher" the odds on having at most five children is 2.64 times the odds on having at least six children. This means that women with "Higher" education are much less probable to have six or more children.

Table (1): Education and No. of Living Children (DHS, 1988)
Rural Upper Egypt

Level of Education	Tiltin		Numb	er of Liv	ing Chi	ldren
. organilitie	0-1		2-3	Bayna	4-5	6+
Higher	6	(200 F	2300	i unibro	oda ass	richy (altri
enitri areas tacarei	Let's se	3.24		3.80	selt mil	2.64
Secondary	32		22	Same of the	12	fig has l ail
Trickly in	ADM D	2.66		3.68		10.41
Primary	132		143	ADDIVI D	133	95
-		1.16	1998	1.24		1.44
No Education	398		401		374	338

^{*:} Global Odds Ratios

Section 2: Results:

Models of the form $\ln \Psi ij = X\beta$, where X is a design matrix. The null hypothesis is that each global odds ratio equals to one, which is equivalent to no association at the corresponding cutpoint.

Table A-1 shows the results for "First Row Effect" for global odds ratios in Table 1. All global odds ratios in this row are not significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of

2.97 (p-value =0.3955) meanining that the model is accepted. These results mean that women with education level 'Higher' are not different than women with other educational levels with respect to number of living children.

Table A-2 presents the results for "Second Row Effect" for global odds ratios in Table 1. The first two global odds ratios in this row are highly significant, and the third global odds ratio is also significant. The test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 21.15 (p-value = 0.0001) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 1.10 (p-value=0.2954), meanining that the linear trend is accepted which means that global odds ratios in this row increase linearly across number of living children..

Table A-1: First Row Effect, DHS 1988, Rural Upper Egypt

Source	n E-lighterint	DF	Chi-s	square	prob.
Intercept		3	2.9	7 HT E-A	0.3955
Residual	.dorq.	omano di	* 12 - 13 <u>1</u> 1	Marca	
	Analysis of	Weighted	Least squ	iares	
Effect	Parameter	Estimate	Std Error	Chi-squa	re Prob.
	1	3.24	1.97	2.17	0.0998
	2	3.80	2.98	1.63	0.2015
	3	2.64	2.77	.91	0.3410

Table A-3 presents the results for "Third Row Effect" for global odds ratios in Table 1. Obviously, all global ods ratios in this row are highly significant. Also, the test statistic for godness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 130.08 (p-value = 0.0000) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 2.22 (p-value=0.1362), meanining that the linear trend is accepted which means again that global odds ratios here are increasing linearly.

Table A-2: Second Row Effect, DHS 1988, Rural Upper Egypt

Source	provide the same and development of the same and	DF	Chi-sq	uare	prob.
Intercept Residual		3 0	21.10	ew adi ataw anit adi tim	0.0001
Effect	Analysis o Parameter 1 2 3	f Weighted Estimate 2.66 3.68 10.41	Least squar Std Error 0.617 1.067 7.48	es Chi-square 18.83 11.83 1.94	Prob. 0.0000 0.0006 0.1639
Contrast Test for L	A inear Trend	nalysis of DF 1	Contrasts Chi-square 1.10	a doute no To iorlinia	Prob. 0.2954

Table A-3: Third Row Effect, Rural Upper Egypt 1988

Source		DF	Chi-squar	e prob	•
Intercept		3	130.08	0.00	00
Residual		0	straters of		
	Analysis o	f Weighted	Least squa	res	
Effect	Parameter	Estimate	Std Error	Chi-squa	re Prob.
	1	1.16	0.1253	85.28	0.0000
ection 2. D	2	1.24	0.1233	102.78	0.0000
	3	1.44	0.1829	61.78	0.0000
		Analysis	of Contras	ts	
Contrast		DF	Chi-squar	е	Prob.
Test for Li	near Trend	1	2.22		0.1362

Section 3: Log Linear Models:

Log linear models are similar to multiple regression analysis for categorical data. In log linear models the dependent variable is the number of cases in a cell of the table while the independent variables are all variables that are used for classification. Models for the natural logarithms of the observed counts are as follows:

 $\ln \pi i i = \mu + \lambda i + \lambda j + \lambda i j$

Where πij is the observed count in the cell (i,j), λi is the row effect, and λj is the column effect, and λij is the interaction effect for rows and columns. Maximum Likelihood (ML) procedure is used to fit and test for different loglinear models of the form shown above. Table (A-4) shows that the chi-square test statistic has a value of 33.67 with 9 degrees of freedom which means that the association between level of education and number of living children is highly significant (Appendix 1).

Table (2): Education and No. of Living Children (DHS, 1995)
Rural Upper Egypt

Level of Education	F3 (Number of Living Child					
Same	0-1	2-3	4-	5	6+		
Hihger	15	10	4	27/7	1		
.00		2.95	4.68	9.07			
Secondary	247	209		78	16		
(3)	0.04	2.80	5.36	11	.99		
Primary	28	262		276	276		
	14047515	1.45	.64	1.	65		
No Education	720	773	se.I be	804	833		

Table B-1 presents the results for "First Row Effect" for global odds ratios in Table 2. Obviously, the first two global odds ratios in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 8.92 (p-value = 0.0403) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 0.45 (p-value=0.5010), meanining that the linear trend is accepted.

Table B-2 presents the results for "Second Row Effect" for global odds ratios in Table 2. Obviously, all global odds ratios in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 140.82 (p-value = 0.0000) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 9.70 (p-value=0.0018), meanining that the linear trend is rejected.

Table B-3 presents the results for "Third Row Effect" for global odds ratios in Table 2. Obviously, all global odds ratios in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 328.80 (p-value = 0.0000) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 2.16 (p-value=0.1416), meanining that the linear trend is rejected.

Table (B-4) shows that the chi-square test statistic has a value of 283.29 with 9 degrees of freedom which means that the association between level of education and number of living children is highly significant (Appendix 2).

Table B-1: First Row Effect, Rural Upper Egypt 1995

Source		DF	Chi-square	pı	ob.
Intercept		3 3	8.29	0.04	103
Residual		0	162 (3)		
	Analysis o	of Weighted	Least squares	3	
Effect	Parameter	stimate	Std Error C	hi-square	Prob.
	abbd indoly	2.95	1.0822	7.44	0.0064
	na 2 or sid	4.68	2.2969	4.15	0.0416
	teric3 ₃ temp	9.07	9.2303	0.97	0.3258
	rwith? deg	rodustribution	maga-fill-street		
18/1/2006		Analysis of	Contrasts		
Contrast		DF	Chi-square		Prob.
Test for Line	ar Trend	1	0.45		0.5010

Table B-2: Second Row Effect, Rural Upper Egypt 1995

Source	nerbiil) sa	DF	Chi-square	9	prob.
Intercept		3	140.82		0.0000
Residual		0	2.78		
	2.0	57	18		Secondary
	Analysis	of Weighted	Least squar		
Effect	Parameter	Estimate	Std Error	Chi-squa	are Prob.
	1	2.80	0.2557	120.10	0.0000
1. 005	2002	5.36	0.6148	76.10	0.0000
	3	11.99	2.9815	16.17	0.0001
		Analysis of	Contrasts		
Contrast		DF	Chi-squar	е	Prob.
	inear Trend	LO WOZI JENIS I	9.70	I ZINGSOTO	0.0018

TAble B-3: Third Row Effect, Rural Upper Egypt 1995

the test statistic for goodness of fit for equal global odds ratios for this row,

Source	cow auc in Indole laup	DF	Chi-square	pro	b.
Intercept	vitin 3 degre that the ma	e distrib <mark>a</mark> tion v 00) megnining	328.80	0.0	000
Residual		d is suggested	for Head tren	ore, testing	
	Analysis	of Weighted	Least square	es	
Effect	Parameter	Estimate	Std Error	Chi-square	Prob.
	1	1.45	0.0996	211.50	0.0000
appo radora ;	2 200114	1.64	0.1014	259.97	0.0000
		1.65	0.1253	172.38	0.0000
		Analysis of	Contrasts		
Contrast	distribute	DF	Chi-square	woi sin in	Prob.
Test for Line	ear Trend	$U(t) = 1 \mathbf{u}(s) + 1 \mathbf{u}(s)$	2.16	HEVE THE !!	0.1416

test for linear trend with one degree of freedom is 0.45 (p-value= 3646).

Table (3): Education and No. of Living Children (DHS, 1997)
Rural Upper Egypt

Level of Education	Number of Living Children						
Transition of the second	0-1	2-3	4-5	6+			
Higher.	6	5	1	1			
COTTO metalescone		2.78 *	543	3.69			
Secondary	81	57	20	. 6			
23	respect	3.82	6.29	8.60			
Primary	53	84	87	74			
about the first to		1.58	1.79	1.76			
No Education	197	234	260	250			

^{*:} Global Odds Ratios

Table C-1 presents the results for "First Row Effect" for global odds ratios in Table 3. Only the first global odds ratio in this row is significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 3.62 (p-value = 0.3095 meanining that the model is accepted. Table C-2 presents the results for "Second Row Effect" for global odds ratios in Table 3. All global odds ratios in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 41.76(p-value = 0.0000) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 2.10 (p-value=.1473), meaning that the linear trend is accepted.

Table C-3 presents the results for "Third Row Effect" for global odds ratios in Table 3. Obviously, all global odds ratios in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 96.61 (p-value = 0.0000) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 0.45 (p-value=.5046), meaning that the linear trend is accepted.

No Education

Table C-1: First Row Effect, DHS 1997, Rural Upper Egypt

Source	Propher ref	DF SH	Chi-squar	e oloo i	prob.
Intercept	Jorq	Chi-senare	3.62	0	.3059
Residual	0.000	0			ka
Effec	Analysis o	f Weighted	Least squar	res	-squarels
Effect	Parameter	Estimate	Std Error	Chi-squa	re Prob
	1	2.78	1.5543	3.19	0.0741
	2	5.43	4.1840	1.68	0.1944
	3 1.00	3.69	3.8483	0.92	0.3376

Table C-2: Second Row Effect, DHS 1997, Rural Upper Egypt

Source	ource		Chi-s	Chi-square	
Intercept		3	41.	67	0.0000
Residual		iest ste ö stic luse is that the associ	chi-square i which mean	s that the freedom	(1-4) show decrees of
	Analysi	s of Weighted	Least squ	ares	
Effect	Parameter	r Estimate	St Error	Chi-squa	are Prob.
	$\mathcal{P}^{H}(\mathbf{q})$ is	3.82	0.6355	36.21	0.0000
	2	6.29	1.3435	21.89	0.0000
graphial space () and a weight	3	8.60	3.3628	6.54	0.0106
		Analysis of	Contrasts	1-0	
Contrast		DF	Chi-squa	re	Prob.
Test for Line	ear Trend	1	2.10		0.1473

Table C-3: Third Row Effect, DHS 1997, Rural Upper Egypt

Source PROF.0	DF	Chi-squar	e pr	ob.
Intercept	3	96.61	0.	0000
Residual	Coan Oquates	. bordgie d		
Analysis	of Weighted	Least squar	es	
Effect Parameter	Estimate	Std Error	Chi-square	Prob.
arrea lean	1.58	0.2030	60.43	0.0000
2	1.79	0.2047	76.52	0.0000
in 1 - 3 - 3	1.76	0.2509	49.19	0.0000
4				
of Upper Reyat	Analysis of	Contrasts		
Contrast	DF	Chi-square		Prob.
Test for Linear Trend		0.45		0.5046

Table (C-4) shows that the chi-square test statistic has a value of 110.53 with 9 degrees of freedom which means that the association between level of education and number of living children is highly significant (Appendix 3).

Table (4): Education and No. of Living Children (DHS, 1998)
Rural Upper Egypt

Level of Education		Number	of Living Childre	en
	0-1	2-3	4-5	6+
Higher	10	8	5	1
	, 1	1.90	2.52	6.09
Secondary	120	105	30	6
	2	2.70	6.21	12.90
Primary	73	91	89	73
		.56	2.20	2.24
No Education	249	242	281	260

^{*:} Global Odds Ratios

Table D-1: First Row Effect, DHS 1998, Rural Upper Egypt

D.3: Third Row Effect, DHS 1998, Rural Upper Egypt

Source	0.0000	DF 10.0	Chi-square	p p	rob.
Intercept	Fable (5): Educ	3	6.94	0.	0738
Residual		(squato Error Chi-squ			
i jarei o	Analysis	of Weighted	Least square		
Effect	Parameter	Estimate	Std Error	Chi-squar	e Prob
	1001	1.90	0.7949	5.73	0.0167
	2	2.52	1.1943	4.45	0.0349
	. 3	6.09	6.2335	0.95	0.3285

Table D-2: Second Row Effect, DHS 1998, Rural Upper Egypt

Source	DF	Chi-square prob.
ntercept ship fadolg		63.82 0.0000
esidual Vidani on W	U	able 4. The first two global odds at Also the test statisticalor goods
and the second second of the second	s of Weighted	Least squares
ffect Parameter	Estimate	Std Error Chi-square Prob.
The dusquare	2.70	0.3642 54.90 0.0000
2	6.21	0.0911 32.39 0.0000
anites sistes and cla	12.90	5.0042 6.65 0.0099
	Analysis of	Contrasts do la life visuoi valore del
Contrast	DF	Chi-square Prob.
Test for Linear Trend	enuos a rib s ae	4.32 0.0398

is rejected. Therefore, testing for linear frend is suggested. The clus-quare test for linear trend with one degree of freedom is 4.64 (pevalue-0.0313).

meanining that the linear trend is rejected.

Table D-3: Third Row Effect, DHS 1998, Rural Upper Egypt

Source	idvad re	DF 1	Chi-squa	re wo A	prob.
Intercept		3	115.51		0.0000
Residual	armo a	0			
	Analysis	s of Weighted	Least squa	res	
Effect	Paramete		Std Error		are Prob.
	1	1.56	0.1761	78.92	0.0000
	2	2.20	0.2331	88.94	0.0000
	3	2.24	0.3124	5.22	0.0000
		Analysis of	Contrasts		
Contrast		DF	Chi-squar	e	Prob.
Test for L	inear Trend	1	4.64		0.0312

Table D-1 presents the results for "First Row Effect" for global odds ratios in Table 4. Only the first two global odds ratio in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 6.94 (p-value = 0.0738) meanining that the model is accepted.

Table D-2 presents the results for "Second Row Effect" for global odds ratios in Table 4. The first two global odds ratios in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 63.82 (p-value = 0.0000) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 4.32 (p-value=0.0398), meanining that the linear trend is rejected.

Table D-3 presents the results for "Third Row Effect" for global odds ratios in Table 4. Obviously, all global odds ratios in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 15.15 (p-value = 0.0000) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 4.64 (p-value=0.0312), meanining that the linear trend is rejected.

Table (D-4) shows that the chi-square test statistic has a value of 99.99 with 9 degrees of freedom which means that the association between level of education and number of living children is highly significant (Appendix 4).

Table (5): Education and No. of Living Children (DHS, 2000)
Rural Upper Egypt

Level of Education	1 67 - 668	Numb	er of Liv	ing Ch	ildren
ered with one discuss	0-1	2-3		4-5	6+
Sec.&Higher	184	187	3	73	6
	. 2.96		5.40		25.23
Prim. & some Sec.	136	138		82	36
to California de Mariana de	4.28		4.28		7.27
Primary incomplete	91	159		159	143
	2.39		2.39		2.55
No Education	445	561		681	657

Table E-1: First Row Effect, DHS 2000, Rural Upper Egypt

Source	res et freeden Officefamali	DF Total	Chi-square	Me slavi	prob.
Intercept	0.66 0.000	001 3041.0		i teler	0.0000
Residual	5.65 0.00	0.1660 26			\$
	Analysis of	f Weighted	Least squar	ec	
Effect	Parameter	Estimate	Std Error		e Prob
	1 creas	2.69	0.2833	90.38	0.0000
	2	5.40	0.6947	60.33	0.0000
SAN COLOR	3	25.23	10.4186	5.86	0.0155

f & set of 450) of women whose educations

six or mire living children

in Table 5. All globel odds ratio in this row are highly a gniffeant. Also test statistic den geodeness of fit for equal global odds ratios for this row

Table E-2: Second Row Effect, DHS 2000, Rural Upper Egypt

Source		DF	Chi-squa	re	prob.
Intercept		an arangga atta 3 222 on	182.2	26	0.0000-
Residual		gia Ofaid ai	ng cividren		
	Analysis o	f Weighted	Least squa	ares	
Effect	Parameter	Estimate	St Error	Chi-squa	are Prob.
	1	2.70	0.2311	136.42	0.0000
the state of the	2	4.28	0.3832	124.49	0.0000
	3	7.27	1.1899	73.33	0.0000
	Aı	alysis of	Contrasts		teds
Contrast		DF	Chi-squa	re	Prob.
Test for Li	near Trend	1	15.28		0.0001

Table E-3: Third Row Effect, DHS 2000, Rural Upper Egypt

Source		DF	Chi-squa	re	prob.
Intercept	tena selich	3	260.6	8	0.0000
Residual		da codust	Weiter, Di		l alda f
	Analysis o	f Weighted	Least squa	res	
Effect	Parameter	Estimate	Std Error	Chi-squa	re Prob.
	(0.01)1	1.78	0.1408	160.66	0.0000
	2	2.39	0.1663	205.65	0.0000
	3	2.55	0.2325	119.80	0.0000
	An	alysis of	Contrasts	To Say	
Contrast		DF	Chi-squar	re	Prob.
	near Trend	dis for sea o	10.23		0.0014

Table E-1 presents the results for "First Row Effect" for global odds ratios in Table 5. All global odds ratio in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of

. 109.50 (p-value = 6.0000) meanining that the model is rejected. Therefore,

testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 4.70 (p-value=0.0301), meanining that the linear trend is rejected.

Table E-2 presents the results for "Second Row Effect" for global odds ratios in Table 5. All global odds ratios in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 182.26 (p-value = 0.0000) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 15.28 (p-value=0.0001), meanining that the linear trend is rejected.

Table E-3 presents the results for "Third Row Effect" for global odds ratios in Table 4. Obviously, all global odds ratios in this row are highly significant. Also, the test statistic for goodness of fit for equal global odds ratios for this row, which follows a chi-square distribution with 3 degrees of freedom, has a value of 260.68 (p-value = 0.0000) meanining that the model is rejected. Therefore, testing for linear trend is suggested. The chi-square test for linear trend with one degree of freedom is 10.23 (p-value=0.0014), meanining that the linear trend is rejected

Table (E-4) shows that the chi-square test statistic has a value of 348.14 with 9 degrees of freedom which means that the association between level of education and number of living children is highly significant (Appendix 5).

Section 3: Conclusion:

- 1- Both Weighted least squqres and maximum likelihood approaches showed that there is a strong association between education and fertility measured by number of living children in "Rural Upper Egypt". Moreover, this relationship is increasing through time. Global odds ratios for DHS 2000 (Table (5)). are the largest and more significant among their counterparts in the previous four data sets.
- 2- Overall, all global odds ratios for all data sets are highly significant except the third global odds ratio in the first row because the cell (1,3) always has a low number of frequencies. This low number of frequencies shows that women with "Higher" education are less likely to have six or more living children.
- 3- Table (5) which represents DHS 2000 shows that 28% (657 out of 2344) of uneducated women have six or more living children. while only 1% (6 out of 450) of women whose educational level is "Sec.& Higher" have six or more living children.

the linear trend is rejected

counterprets or disc previous faur

sus or more hying children.

4- From table (5) we can conclude that:

a- If the target would be to reduce number of living children to at most five, women shoud have some education ("Primary Incomplete") since global odds ratio at this location is greatly higher than the previous ones in this row (7.27).

b- If the target would be to reduce number of living children to at most three, women should reach at least some secondary since global odds ratio at this location is almost two-fold the preceeding one in this row (5.40). 5- From the above results we conclude that women's education in "Rural Upper Egypt" is necessary to control women's fertility as measured by number of living children.

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freedom, has a value of 260.68 (p-value = 0.0000) succeeding that the model is rejected. Therefore, lesting for linear trend is suggested. The cirl-

square lest for linear trend with one degree of freedom is 10.23 (p-

Table (15-4) shows that the chi-square test statistic has a value of 348.

1- Join Weighted East squares and reaxing a likelihood approaches

this relationship is increasing through time. Clubal onds ratios for Difference

2. Overall, all global odds rands for ell data blanes highly significant stars except the chart global odes man to the first yew because the self (1,3) and

shows that wrome with "Higher education and Realizable to large about its

The medical received received for the first service of the residence of the received received r 2344) of uneducated women have six or more given clouds to while only 1% (6 pm of 450) of women whose adocational level is "Social Higher" have References:
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Appendix 1: Chi - square	Tal D.F.	ole (A-4): Lo Significanc	glinear result e Min E.F.	s (DHS 198 . Cells wit	8) h E.F.<5	
33.67	9	0.0001	2.287	4 of 16 (2	5%)	
FACTOR	Code	OBS count	EXP count	Residual	Std Resi	ovine s
EDLEVEL	ng oldbi	6	2.99	3.013	1.74	page and a second
NOLCH	1 2	3	2.99	0.008	0.005	
NOLCH	3	Stantof I almost	2.73	-1.734	-1.049	
NOLCH NOLCH	4	romania i ion Carladana	2.79	-1.2873	- 0.851	
EDLEVEL	2		2.2)	1.2075		bomusy
NOLCH	1	32	18.19	13.809	3.238	HSVIII.
	1 101 2 13 d	22	18.22	3.777	0.885	
NOLCH	3	12	16.65	-4.65	-1.140	TIAM-
NOLCH		1.55	13.93	-12.93	-3.460	Uniters
NOLCH	4	1,00.0	13.93	-12.93	-3.400	
EDLEVE	3	122	136.57	-4.57	-0.39	
NOLCH	and I was	10 304 132	135.81			entra esta de la seconda d
NOLCH	2 (3	143		6.19	0.53	
NOLCH	VII3 OV	aU on 133 A.	125.03	7.97	0.71	
NOLCH	4	95	104.59	-9.59	-0.94	
EDLEVE	4	1				70
NOLCH	11 -4 1 (20)	398	410.25	-12.252	-0.605	ACHSI-
NOLCH	2	401	410.97	- 9.970	- 0.492	
NOLCH	3	374	375.58	-1.580	-0.082	
NOLCH	d c 40is	19V 20338	314.19	23.81	1.343	

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Ordered Cutsgories Using Plackett's Coefficient of Association for Bivariate

Appeudix 2 Chi - square		ole (B-4): Lo . Significa	oglinear resu unce Min E	lts (DHS 19 .F. Cells wi	95) th E.F.<5
283.29	9	0.000	7.11	No	ne
Factor	Code	OBS count	EXP count	Residual	Std Resi
EDLEVEL	1				EDLEVEL
NOLCH	1	0015	7.64	7.36	2.66
NOLCH	2	10	7.92	2.08	0.74
NOLCH	3	4	7.34	-3.34	-1.23
NOLCH	0 < 4	bo 1	7.11	-6.11	-2.29
EDLEVEL	2	4 72 6			EDLEVEL
NOLCH	1	247	140.05	106.95	9.04
NOLCH	2	209	145.14	63.86	5.31
NOLCH	3	78	134.49	-56.49	-4.87
NOLCH	4	16	130.32	-114.32	-10.01
EDLEVEL	3				
NOLCH	1	282	265.32	-37.32	-2.29
NOLCH	2	262	274.97	-12.97	- 0.78
NOLCH	3	276	254.80	21.20	1.33
NOLCH	4	276	246.90	29.10	1.85
EDLEVEL	4			à.	EDLEVEL
NOLCH	c. 1	720	796.99	-76.99	-2.73
NOLCH	2	773	825.97	-52.97	-1.84
NOLCH	3	804	765.37	38.63	1.40
NOLCH	4	833	741.66	91.34	3.35

Appendix 3: Chi - square	D.		oglinear result ance Min I	s (DHS 1997) E.F. Cells w) rith E.F.<5
110.53 .	1	9 0.00	0000 3.0)39 4of 16	(25%)
Factor	Code	OBS count	EXP count	Residual	Std Resi
EDLEVEL	1 0	de 085 gar			
NOLCH	1	6	3.09	2.91	1.65
NOLCH	2	5	3.49	1.51	0.81
NOLCH	3	1	3.38	-2.38	-1.29
NOLCH	4	1	3.04	-2.04	- 1.17
EDLEVEL	2				
NOLCH	199.991	81	39.03	41.97	6.72
NOLCII	2	57	44.01	12.99	1.96
NOLCH	3 -	20	42.62	-22.62	-3.47
NOLCH	4	6	38.34	-32.34	-5.22
EDLEVEL	3 .		13.43		
NOLCH	29.50	53	70.92	-17.92	-2.13
NOLCH	2	84	79.97	4.03	0.45
NOLCH	033	87	77.45	9.55	1.09
NOLCH	4	74	69.66	-4.34	0.52
EDLEVEL	4		5 104.50	e de	
NOLCH	166 D.	197	223.95	-26.95	-1.80
NOLCH	2	234	252.53	-18.53	- 1.17
NOLCH	3	260	244.55	15.45	0.99
NOLCH	4	250	219.97	30.03	2.03

pendix 4 hi - square	Table (D.F.	D-4): Loglin Significa	near results (Dance Min)HS 1998) E.F. Cell	s with E.F
99.9919	9	0.00	000 4.19	00 1 of	16 (6.3%)
ACTOR	Code	OBS count	EXP count	Residual	Std Resi
DLEVEL	1 00 10		787	2.40	1.32
NOLCH	1	10	6.60	3.40	0.58
NOLCH	2	8	6.51	1 49	Y 1/ V T
NOLCH	3	5	5.92	-0.92	- 0.38
NOLCH	4	1,50	4.97	-3.97	-1.78
DLEVEL	211.80			10.00	5.60
NOLCH	1	120	71.80	48.20	5.69
NOLCH	2	105	70.85	34.15	4.06
NOLCH	3	30	64.34	-34.34	-4.28
NOLCH	4	ine och alsi	54.01	-48.01	-6.53
DLEVEL	3	eighlise re il			に入口 報告を記して
NOLCH	1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	73	89.68	-16.68	-1.76
NOLCH	2	91	88.49	2.51	0.27
NOLCH	3	89	80.36	8.64	0.96
NOLCH	4	73	67.46	5.54	0.67
EDLEVEL	4				HAI
NOLCH		249	283.91	-34.91	-2.07
NOLCH	2	242	280.14	-38.14	-2.28
NOLCH	3	281	254.39	26.61	1.67
NOLCH	4	260	213.56	46.94	3.18

Consider the three-way classification:

- X < . M.

Appendix 5: Chi - square	Table (E-4): Loglinear results (DHS 2000) D.F. Significance Min E.F. Cells with E.F.<5				
	v aligot	9 0.0	0.00000 189.66		6 None
Factor	Code	OBS count	EXP count	Residual	Std Resi
EDLEVEL	1 1 miles	QBS WALL TY	100 to 22 25	00.05	7.97
NOLCH	1	184	103.05	80.95	
NOLCH	2	187	125.80	61.20	5.46
NOLCH	3	73	119.78	-46.78	-4.27
NOLCH	4	6	101.36	-95.36	- 9.47
EDLEVEL	2		3.04		4.00
NOLCH	1	136	89.77	46923	4.88
NOLCH	2	138	109.59	28.41	2.71
NOLCH	3	82	104.34	-22.34	-2.19
NOLCH	4	36	88.30	-52.30	-5.57
EDLEVEL	3		NO OL		FREE WAS
NOLCH	1	91	126.41	-35.41	-3.15
NOLCH	2	159	154.32	4.68	0.38
NOLCH	3	159	146.93	12.07	1.00
NOLCH	4	143	124.34	18.66	1.67
EDLEVEL	4				
NOLCH	1	445	536.77	-91.77	-3.96
NOLCH	20	561	655.29	-94.29	- 3.68
NOLCH	3	681	623.94	57.06	2.28
NOLCH	4	657	528.00	129.00	5.61
MOVE CHAIR					