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Statistical Analysis of Socio-economic Determinants of Fertility A Case Study of Kingdom of Saudi Arabia

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Abstract

This research deals with the socio- economic factors that may affect fertility levels in Kingdom of Saudi Arabia.

Socio- economic factors were described applying multiple regression analysis to study the potential relationship between selected socio- economic determinants of fertility in Saudi Arabia using SPSS. This study indicate that there is no socio-economic factor that has a strong negative correlation coefficient with fertility variables education, health and housing, also it shows that the differences in fertility explain better education variables and the variables of housing in the variables of health.

1. INTRODUCTION:

The highest levels of fertility for Saudi population consider the key element in Saudi population growth which affect socio-economic and the quality human development. Pattern of chilled bearing is a key factor affecting high levels of fertility in Saudi societies. Education, economic and health are the most important indirect factors that strongly affect the intermediate variables that affect fertility levels. Saudi society is classified within community's high population growth. The average annual population growth (1992-2004) reached to (2.5%) according to the results of Saudi Arabia Population and Housing census 1425H (2004).

The woman formerly married at an early age which leads to start early child bearing and gives more children and there was no set of reproduction and this is the main causes of the currently high rate of fertility among women at that period of time. Where extended family were common, which includes the father, mother and sons

and grandchildren in one house, this means that series of reproductively. With the rapid development in various fields in the Saudi society has changed significantly in the process of reproductive pattern. Some multiple factors and variables contributed significantly and influenced fertility according to the results of some studies and research implemented in this area. This study presents some of the indirect variables that affect the reproductive process in recent period of time using the data derived from the last Population & Housing Census 1425H (2004) carried out in Kingdom of Saudi Arabia. Then some policy implications can be suggested to deal with and reduce fertility levels in Saudi societies.

The main objective of this study is to explore the effect of socio-economic variables on fertility in Saudi Arabia. In addition to levels education variables such as the number of illiterate female and female population able to read and write and females with elementary and intermediate level of educations and the number of educated female with secondary and higher education. Health status variables displayed in some selected indicators such as, numbers of doctors, nurses, and number of hospitals beds, housing conditions levels such as the number of houses and the number of popular residential apartments and study try to investigate the relationship between health, economic and housing variables from one side and fertility rate of the other side in the Kingdom of Saudi Arabia.

Study of the real factors affecting the fertility of women in Saudi Arabia areas, which proposed changes :(educational – health levels - how they had positive impact on fertility and give some parameters that have not proven through statistical analysis.

Fertility is a measure of the actual level of childbearing in the community, expresses a number of live births, which gives birth to a calculated from vital registration statistics. It is important to differ between two types fertility, normal and physiological fertility. Fertility measured in the number of regular live births a woman gave during her reproductive life. Fertility physiological means the ability to reproduce or pregnancy reversing infertility. The study depends on normal fertility. For females reproductive age (15 – 49 years old). There are more than 30 years during which women can bear children. Begin childbearing age in men aged 13 and extends until the end of life. Women can give birth theoretically every ten months for up to 34 years if that can give birth up to around 41 births. The women can give birth every

fifteen months she gives birth around to 27 births. With this levels of fertility it's consider like biological weapons.

The main data sources of fertility are vital registration, sample surveys, and censuses. Various measures of fertility can reflect the circumstances and inappropriate under other circumstances. Many studies have been undertaken to examine the relationship between various social-economic variables and fertility (Birdcall and Jamison, 1983; Gulati, 1988; Abulbanakat, ET. Al.1997).

Carl P. Schmertmann (2003) proposed and examined new family models for age-specific fertility schedules, in which three age groups determine the schedule's shape. The new system is based on constrained quadratic spines. .

Parfait M. E., and Shannon C. (2004), previous studies in developed countries have found a micro-level association between teenage fertility and girls' educational attainment but researchers still debate the policy implications of these associations.

Riikka, S., Veijo, N. and Harri, S. (2005), examined fertility decline in North-Central Namibia in the period 1960-2000. A Scandinavian-type parish-register system, established in the beginning of 20th Century and still in use, provided register-based data for fertility analysis

Nasser M.S., Mahkhdoom A.S., Zoran R., (1998), founded the ideal number of children desired by Kuwaiti women was 5.3 children. Fifty percent of the women were practicing contraception, mainly to space births. Forty-one percent said they wanted more children, but only 45% of them were using a method.

David F. and Sebastian T. (2005) used a new cross-county dataset to estimate the strength of the links between different dimensions of social and economic development, including indicators of health, fertility and education as well as material wellbeing.

Cameron, D. C. and James Z.L. (2005) examined such behavior in detail.

Teresa, C. M. , Fatima, J.and M.akany, R. (1995) According to data from Demographic and Health Surveys for nine Latin American countries, women with no education have large families of 6-7 children, whereas better educated women have family sizes of 2-3 children, analogous to those of women in the developed world. Despite these wide differentials in actual fertility, desired family size is surprisingly homogeneous throughout the educational spectrum.

The last statistical report issued by the Department of Statistics, Saudi Arabia declared that total fertility rate of Saudi women decreased remarkably from 7.3 births per woman during the period from (1970 – 1975) to 4.1 births per woman during the period from (2000 - 2005,) considering that the international level average 4.5 births per woman. The life expectancy at birth among Saudi population increased from 53.9 to 71.6 years during the period from (2000 – 2005), noting that the global average of 67 years.

Statistics indicate that the Saudi population size in 2005 reached to (16.8 million people) in addition to (6.2 million foreign inhabitants), bringing the total population Saudis and non-Saudis 23.1 million. Reside in the Kingdom of 4.3 million foreign male.

Relying on a comprehensive demographic survey data, the Department of Statistics in conducting in 1999, the results showed that the proportion of relatively low usage of family planning methods in the Kingdom; not exceed 20%, but the prevalence slightly rises more than that in urban areas also the educated women by her husband has relatively large number of children; with respect to families of a high standard of living, more inclined to use family planning methods especially among families living in urban comparing with rural areas, in addition the prevalence of family planning methods increases in Central, Western and Eastern regions, while declining in the southern and northern regions.

Applying logistic regression technique to predict the probability of using of family planning methods as a function of socioeconomic factors called "control or independent variables" , indicating that the practice of family planning is affected by the level of education of husband, wife education, the number of living children and in addition to age at marriage, urban/rural residence, and the standard of living of the families as a determinants of use family planning methods specified number practice in the countryside and almost confined to a few variables in education, especially education husband, in addition to the number of children living, shows that there is no preference for male model in the countryside influence moral standard of living or age at marriage as example, also the results show that no significant differences in morale

for the participation of women in the labor force in both rural and urban areas, and generally the results proved that family planning practices mostly to spacing between births, without any limitation of desired number of children.

1.2 organization of the study:

This article can be organized as follows. Section 1 is introductory one. Section 2 contains assumptions of the research. research population and source of data collection. Section 3 contains statistical and analytical procedure, definition of variables, and correlation matrix. In section 4 estimated fertility models, partial correlation coefficient. The last section includes results and recommendations.

2. THEORETICAL ASSUMPTIONS:

- The number of illiterate female and female can read and write, number of female received certificate elementary and intermediate level of education and the number of female with secondary and higher levels of education what could be considered significantly relevant on the number births?
- Is there healthy moral relationship between the number of doctors, nurses, the number of beds and the number of hospitals respectively affect the number of births?.
- Is housing characteristics has moral cause affecting number of births?

2.1 Natural and Sources of Data:

The scope of this study covers areas of Saudi Arabia and the administrative areas covering 13 regions.

- Statistical Yearbook - Department of Statistics, Saudi Arabia - Release 41 - 2005.
- Population & Housing Census 1425H (2004) of Kingdome of Saudi Arabia, represent the main source of data for this research.

3. STATISTICAL AND ANALYTICAL PROCEDURE:

Descriptive Statistics of the variables - a form of dispersion to ascertain the relationship between variables written to calculate correlation coefficients, correlation matrix between all variables, multiple regression, estimating the liner regression through the stepwise method.

3.1 Definition of variables used in the study:

First: the dependent variable.

Number of live births "TFR".

Second: The independent variables.

A: variables education.

1 - Number of illiterate females "IF".

2 - Number of females read and write "FRW".

3 - Number of female educated women with primary and intermediate certificate "PM".

4 - Number of educated females produces the certificate of secondary and above "FE".

5 - Number of married women "NFM".

B: health variables.

1 - Number of doctors "DOC".

2 - Number of nurses "WHC".

3 - Number of hospital beds "HB".

4 - Number of hospitals "H".

5 - The number of normal births "ND".

6 - The number of births unnatural "UPND".

C: variables development.

1 - Number of people's homes "TRH".

2 - Number of apartments "AH".

Correlations

	IF	FRW	PM	FE	DOCTOR	WHC	HB	H	ND	UPND	TRH	AH	NFM	No.birth
IF	1	**	**	**	**	**	**	**	*	**	**	**	**	**
FRW	.937**	1	**	**	**	**	**	**		**	**	**	**	**
PM	.917**	.993**	1	**	**	**	**	**		**	**	**	**	**
FE	.898**	.987**	.996**	1	**	**	**	**		**	**	**	**	**
DOCTOR	.934**	.975**	.983**	.969**	1	**	**	**	*	**	**	**	**	**
WHC	.947**	.975**	.973**	.953**	.992**	1	**	**	*	**	**	**	**	**
HB	.965**	.986**	.975**	.963**	.982**	.988**	1	**	*	**	**	**	**	**
H	.874**	.940**	.952**	.936**	.962**	.940**	.937**	1		**	**	**	**	**
ND	.632*	.515	.496	.422	.583*	.645*	.581*	.497	1	*	**			
UPND	.945**	.968**	.962**	.943**	.974**	.978**	.978**	.954**	.583*	1	**	**	**	**
TRH	.901**	.804**	.747**	.711**	.764**	.823**	.842**	.686**	.755**	.798**	1	*	**	**
AH	.882**	.978**	.992**	.996**	.966**	.944**	.952**	.943**	.400	.942**	.669*	1	**	**
NFM	.918**	.987**	.988**	.983**	.965**	.951**	.964**	.961**	.466	.958**	.750**	.982**	1	**
No.birth	.934**	.998**	.993**	.991**	.970**	.966**	.982**	.938**	.477	.963**	.784**	.984**	.990**	1

**.Correlation is significant at the 0.01 level (2-tailed).

*.Correlation is significant at the 0.05 level (2-tailed).

Table 3.2: show Correlation Coefficients between TFR and independent variables

Independent variable	Correlation cofficient(r) with dependent variable
	TFR
IF	0.934
FRW	0.998
PM	0.993
FE	0.991

DOC	0.970
WHC	0.966
HB	0.982
H	0.938
UPND	0.963
TRH	0.784
AH	0.984
NFM	0.990

The general form of multiple-regression model can be described as follows:

$$y_t = b_0 + b_1 x_{1t} + b_2 x_{2t} + \ldots\ldots + b_k x_{kt} + U_t \ , t = 1, \ldots, n$$

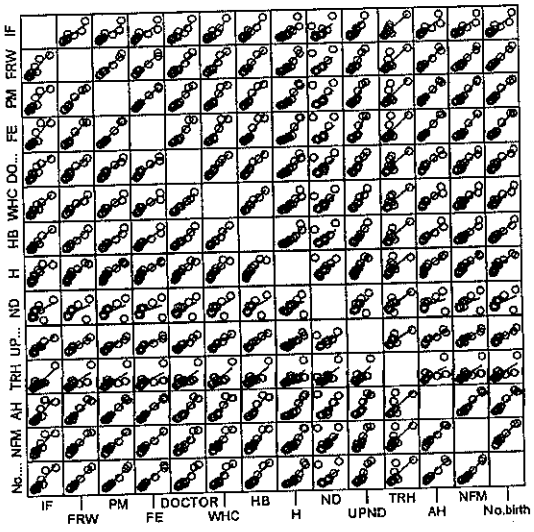
Where

Y_t = The dependent variable,

E_{xit}= the t^{ithe} observation on the dependent variable, (regressor), i=1, K where K is the number of independent variables,

.u_t=the t^{th} value of disturbance term, and b_i= the coefficient of the i^{th} independent variable.

Scatter digram,



4. Fertility Model

The model suggested in the study describes fertility as a function of socio-economic variables.

$$TFR = C_0 + C_1(\text{IF}) + C_2(\text{FRW}) + C_3(\text{PM}) + C_4(\text{FE}) + C_5(\text{DOC}) + C_6(\text{WHC}) + C_7(\text{HB}) + C_8(\text{H}) + C_9(\text{UPND}) + C_{10}(\text{TRH}) + C_{11}(\text{AH}) + C_{12}(\text{NFM}).$$

4.1. Estimated Fertility Models

To examine the variation in fertility and to shows if it is be explained by other socio-economic, the multiple regression analysis (step-wise method)has been attempted by taking total fertility rate (TFR)as dependent variable and education variables(IF,FRW,PM,NFM),health variables (DOC,WHC,HB,H,ND) and social development variables (TRH,AH).

Three sets of results have been estimated for TFR each with one education variables(IF,FRW,PM,NFM),health variables (DOC,WHC,HB,H,ND) and social development variables (TRH,AH).

1. The regression of TFR on the variable of illiterate females "IF". Alone emerges the following equation:

TFR= -28.162+0.361*IF

T-ratio (8.675)

R^2= 0.934

Regression shows that the variable of illiterate females "IF". Explains 93.4%of the variation in TFR.It has significant and positive impact on TFR. The addition of other socio-economic variables step by step improves R^2, but most of the variables added are not found significant at 5% level of confidence.

2. The regression of TFR on the variable Number of females read and writes "FRW"... alone by equation:

TFR= 1464.204+ 0.466*FRW

T-ratio (52.318)

R^2= 0.996

Regression shows that the variable of females read and writes "FRW" explains 99.6%of the variation in TFR. It has significant and positive impact on TFR. The addition of other socio-economic variables step by step improves R^2, but most of the variables added are not found significant at 5% level of confidence.

3. The regression of TFR on the variable female educated women with primary and intermediate certificate "PM" by.

TFR= -247.116+ -247.116*PM

T-ratio (28.241)

R^2= 0.986

"PM" explains 98.6%of the variation in TFR.

4. The regression of TFR on the variable of educated females produces the certificate of secondary and above "FE" by equation.

TFR= 4940.999 + 0.353*FE

T-ratio (24.497)

R^2= 0 .982

"FE" explains 98.2%of the variation in TFR.

5. The regression of TFR on the variable of doctors "DOC" by.

TFR=-9448.902 + 37.787*DOC

T-ratio (13.160)

R^2= 0.940

"DOC" explains 9٤%of the variation in TFR.

6. The regression of TFR on the variable of nurses "WHC".

TFR= -5463.411 + 15.618*WHC

T-ratio (12.323)

R^2= 0.932

"WHC" explains 93.2%of the variation in TFR.

7. The regression of TFR on the variable of hospital beds "HB".

TFR= -6473.896 + 23.387*HB

T :(17.207)

R^2= 0.964

"HB" explains 96.4%of the variation in TFR.

8. The regression of TFR on the **variable** of hospitals "H".

TFR= -27639.678 + 4886.214*H

T-ratio (8.982)

R^2= 0.880

"H" explains 88%of the variation in TFR.

9. The regression of TFR on the variable of normal births "ND".

TFR= 14160.759 + 2.428*ND

T-ratio (1.801)

R^2= 0.228

"ND" explains 22.8%of the variation in TFR.

10. The regression of TFR on the variable of births unnatural "UPND".

TFR= -20442.636 + 16.221*UPND

T-ratio (11.868)

R^2= 0.928

"UPND" explains 92.8%of the variation in TFR.

11. The regression of TFR on the variable of people's homes "TRH".

TFR= 14357.297 + 14357.297*TRH

T-ratio (4.191)

R^2= 0.615

"TRH" explains 61.5%of the variation in TFR.

12. The regression of TFR on the variable of apartments "AH".

TFR= 4613.143 + 0.214*AH

T-ratio (18.328)

R^2= 0.968

"AH" explains 96.8%of the variation in TFR.

13. The regression of TFR on the variable of married women "NFM".

TFR= -5391.065 + 0.190*NFM

T-ratio (23.605)

R^2= 0.981

"NFM" explains 98.1%of the variation in TFR.

Multiple regressions

1. Study education variables (IF, FRW, PM, FE)

By this equation

$$TFR=\beta_0+\beta_1 IF +\beta_2 FRW + \beta_3 PM + \beta_4 FE + \varepsilon_{ij}$$

by step wise method

TFR=1464.204+ 0.466 FRW

FRW is related to TFR. It is significantly and positively affects the fertility.

R^2 adj. =0.996= %99.6

P-value=0<0.05

"FRW" explains 99.6%of the variation in TFR.

2. Study health variables (DOC,WHC,HB,H,ND)

By equation

$$TFR=\beta_0+\beta_1 \text{ doctor} +\beta_2 \text{ WHC} + \beta_3 \text{ ND} + \beta_4 \text{ UPND} +\beta_5 \text{ HB} + \varepsilon_{ij}$$

TFR=-1860.142+25.325 HB- 0.713 ND

P-value=0<0.05

R^2 adj.=0.973= %97.3

"HB" and "ND" explains 97.3% of the variation in TFR.

3. Study social development variables (TRH,AH).

$$TFR=\beta_0+\beta_1 \text{ TRH} +\beta_2 \text{ AH} +\varepsilon_{ij}$$

TFR= 2075.557 +0.181 AH+ 0.11 TRH

p-value=0<0.05

R^2 adj.=0.996= %99.6

"AH" and "TRH" explains 99.6% of the variation in TFR.

4.2.partial correlation coefficient

1. partial correlation coefficient to education variables:

correlation coefficient for TFR and IF with fixed FE.

$r_{No.birth*IF.FE} = .743$

$H_0 : \rho_{No.birth*IF.FE} = 0$

$H_1 : \rho_{No.birth*IF.FE} \neq 0$

$\alpha = 0.05$p-value=0.006<

It is increasing correlation between TFR and IF with fixed FE.

correlation coefficient for TFR and FRW with fixed IF.

$r_{No.birth*FRW.IF} = .984$

$H_0 : \rho_{No.birth*FRW.IF} = 0$

$H_1 : \rho_{No.birth*FRW.IF} \neq 0$

$\alpha = 0.05$p-value=0<

It is increasing correlation between TFR and IF with fixed FE.

correlation coefficient for TFR and FRW with fixed PM.

$r_{No.birth*FRW.PM} = .852$

It is increasing correlation between TFR and FRW with fixed PM.

correlation coefficient for TFR and FRW with fixed FE.

$r_{No.birth*FRW.FE} = .92$

It is increasing correlation between TFR and FRW with fixed FE

correlation coefficient for TFR and PM with fixed IF.

$r_{No.birth*PM.IF} = .959$

It is increasing correlation between TFR and PM with fixed IF.

correlation coefficient for TFR and FE with fixed IF.

$r_{No.birth*FE.IF} = .968$

It is increasing correlation between TFR and FE with fixed IF.

correlation coefficient for TFR and WHC with fixed H.

$r_{No.birth*WHC.H} = .709$

It is increasing correlation between TFR and WHC with fixed H.

correlation coefficient for TFR and WHC with fixed ND.

$r_{No.birth*WHC.ND} = .98$

It is increasing correlation between TFR and WHC with fixed ND.

correlation coefficient for TFR and HB with fixed DOC.

$r_{No.birth*HB.DOCTOR} = .644$

It is increasing correlation between TFR and HB with fixed DOC.

correlation coefficient for TFR and HB with fixed WHC.

$r_{No.birth*HB.WHC} = .697$

It is increasing correlation between TFR and HB with fixed WHC.

correlation coefficient for TFR and HB with fixed H.

$r_{No.birth*HB.H} = .851$

It is increasing correlation between TFR and HB with fixed H.

correlation coefficient for TFR and HB with fixed ND.:

$r_{No.birth*HB.ND} = .985$

It is increasing correlation between TFR and HB with fixed ND.

correlation coefficient for TFR and HB with fixed UPND.:

$r_{No.birth*HB.UPND} = .712$

It is increasing correlation between TFR and HB with fixed UPND.

correlation coefficient for TFR and H with fixed ND.:

$r_{No.birth*H.ND} = .919$

It is increasing correlation between TFR and H with fixed ND.

correlation coefficient for TFR and ND with fixed WHC.

$r_{No.birth*ND.WHC} = -.733$

It is decreasing correlation between TFR and ND with fixed WHC.

correlation coefficient for TFR and ND with fixed HB.

$r_{No.birth*ND.HB} = -.603$

It is decreasing correlation between TFR and ND with fixed HB.

correlation coefficient for TFR and UPND with fixed H.

$r_{No.birth*UPND.H} = .657$

It is increasing correlation between TFR and UPND with fixed H.

correlation coefficient for TFR and UPND with fixed ND.

$r_{No.birth*UPND.ND} = .959$

It is increasing correlation between TFR and UPND with fixed ND.

correlation coefficient for TFR and TRH with fixed AH.

$r_{No.birth*TRH.AH} = .953$

It is increasing correlation between TFR and TRH with fixed AH.

correlation coefficient for TFR and AH with fixed TRH.

$r_{No.birth*AH.TRH} = .996$

It is increasing correlation between TFR and AH with fixed TRH.

correlation coefficient for TFR and NFM with fixed TRH.

$r_{No.birth*NFM.TRH} = .98$

It is increasing correlation between TFR and NFM with fixed TRH.

correlation coefficient for TFR and NFM with fixed AH.

$r_{No.birth*NFM.AH} = .71$

It is increasing correlation between TFR and NFM with fixed AH.

5. RESULTS AND RECOMMENDATIONS:

The study showed that all the variables of education (the number of illiterate female - female population able to read and write - the number of women with a certificate of primary and intermediate level of education - the number of educated female receiving the certificate of secondary and above)>

Housing (People's homes - apartments) variables moral impact on the number of live births and also have an significant impact on the fertility rate moral virtue forward relationship between the number of births and fertility rate.

The health variables were not all moral impact on the fertility rate in the number of births of others-natural moral The remaining variables, we found it significant.

Recommendations:

1 – establish integrated database related to demographic and socio-economic variables and made it available to researchers.

2- encourage studies and researches that based on and investigate the censuses data of Kingdome of Saudi Arabia.

3 - Health awareness among married and comers to marry regarding the reproductive health issues especially family planning.

Finally, not only just above factors represented in this study affecting the number of births, but there are other factors not run in this study.

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التحليل الإحصائي للمحددات الاقتصادية والاجتماعية المؤثرة على الخصوبة دراسة حالة للمملكة العربية السعودية

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الملخص:

١- هذا البحث يهتم بدراسة العوامل الاقتصادية والاجتماعية التي تؤثر في الخصوبة في دراسة خاصة على المملكة العربيّة السعوديّة.

٢- تم توصيف العوامل الاقتصادية و الاجتماعية كلا على حدة ثم استخدمنا تحليل الانحدار المتعدد لدراسة العلاقة بين المحددات الاجتماعية و الاقتصادية للخصوبة في المملكة العربيّة السعوديّة باستخدام برنامج الـ SPSS.

٣- هذه الدراسات كشفت أنه لايوجد عامل اجتماعي اقتصادي له معامل ارتباط قوي سالب، مع الخصوبة لمتغيرات التعليم والصحة والسكن.

٤- وجد أن الاختلافات في الخصوبة توضح بشكل أفضل بمتغيرات التعليم ومتغيرات السكن عنه في متغيرات الصحة المختارة بالدراسة.