

## Factor and Multiple Regression Analysis for Human Fertility in Kanyakumari District

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**ABSTRACT** This paper focuses on the cause and effect relations on human fertility. Here fertility is used as the number of children ever born for a woman. This variable is easily measurable. The entire set of variables related to fertility are classified into Natural variables, knowledge variables and Economic variables by Factor analysis and the effect of each group on fertility is discussed separately and collectively. Higher employment, higher income and nuclear family system could bring the reduction of the fertility rate in the Kanyakumari District Women.

### INTRODUCTION

Studies pertaining to fertility of women is important to policy makers in view of their participation in labour and all the more the participation in the women self help groups for the economic development of the household (Salikumar, 1992; Joseph Raj, 1996; Chiranjeevulu, 2003; Sampoomam, 2003; Ramachandran, 2005). Biswas (1972) has examined the linear model with single equation, Fertility rate increases upto 20-24 for women and slowly declines and also currently majority of the married women feel that they don't want more than one child (NFHS-3). Kannan et al. (1998) have analysed birth interval in human fertility. In view of the importance acquired by the women force in the development of the country this study is taken in Kanyakumari district. The sample size is 270.

### MATERIAL AND METHODS

**Sampling:** Kanyakumari District Consists of nine Panchayat Unions Viz: Agasteeswaram, Thovalai, Rajakkamangalam, Kurunthencode, Thuckalay, Melpuram, Killiyoor, Munchirai and Thiruvattar. In each the best maternity nursing home were selected purposively and from each the patients, who had under gone all the delivery in that hospital was taken as the sample. In this

way the nine hospital were selected. The total sample came to 270. A structured questionnaire with all the necessary details were prepared and the details are then assessed on the selected sampling units. The details collected are age of women, age of women at marriage, religion, type of family, education of women and spouse, employment of women and spouse, Income of women and spouse. Statistical package for social science (SPSS) was used for all the analysis. Simple correlation was used to find the association between the variables. Linear regression was estimated wherever significant association was observed, (Table 2). Factor Analysis was used for segregation of the variables. For the variables under each factor linear multiple regression equations were fitted. (Table 3, Table 4)

Factor analysis was used to group the variables. Varimax-rotation was used for the segregation of the variables. Accordingly three groups were obtained (Table 5, Table 6, Table 7 and Table 8)

- (1) Group one consisting of age of women ( $X_1$ ), Age of the women at marriage ( $X_2$ ), religion ( $X_3$ ) and type of family ( $X_4$ ) and this is designated as Natural Factor
- (2) Group two consisting of education of women ( $X_5$ ) and Education of spouse ( $X_6$ ) designated as knowledge factor and

- (3) Group three consisting of Employment of women ( $X_7$ ), Employment of spouse ( $X_8$ ), Income of women ( $X_9$ ), Income of spouse ( $X_{10}$ ) designated as Economic factor. The variables contained in each factor is analysed separately with the dependent variable fertility (Y).

**Measurement of Variables**

- $X_1$  -This is conceived as the age of the women at the time of the survey.
- $X_2$  - Age at the time of the marriage of the women.
- $X_3$  -This variable is measured as 3 if the respondent is Hindu, 2 if the respondent is a Christian and 1 for Muslim.
- $X_4$  -There are two systems
  - (i) They live as Joint family with their parents and other elders; in this case it is given value one
  - (ii) They live separately as a single family, now the variable is given Zero as value.
- $X_5$  -It is taken as the minimum number of years needed to complete the programme, for example an Arts Degree is given value 15 since it needs only 15 years to get an Arts Degree, Similarly for others.
- $X_6$  -As in the case of spouse.
- $X_7$  -Employment of Women
- $X_8$  -Employment of spouse.
- $X_9$  -Total amount in a month which she draws form all the sources.
- $X_{10}$  -Total amount in a month which he draws form all the sources
- Y -Fertility of women.

**RESULT AND DISCUSSION**

In the case of the independent variable “Type of Family” the mean and standard deviation and the t-values are presented in table 1 for the two categories.

**Table 1: Statistical details for type of family**

	Mean	S.D	t – Value
Nuclear family (177)	2.1	0.67	7.77
Joint Family (93)	2.8	0.78	

**Table 2: Association of fertility with factor affecting its correlation and linear regression analysis**

Variables	Value of Correlation	Regression equation
Age of Women	-0.10	Live birth = -3.175-0.043 age of women
Age at marriage	-0.16*	Live birth = -4.62-0.018 age at marriage
Religion	0.08	Live birth = +1.53-0.063 religion
Type of family	0.38*	Live birth = +0.125+0.057 type of family
Education of women	-0.32*	Live birth = 3.423-0.014 Education of women
Education of spouse	-0.21*	Live birth = +3.102-0.022 Education of spouse
Employment of women	-0.23*	Live birth = 1.216 – 0.15 Employment of women
Employment of spouse	-0.17*	Live birth = 1.012 – 0.17 Employment of spouse
Income of women	-0.30*	Live birth = -3.432-0.32 Income of women
Income of spouse	-0.19*	Live birth = -1.452-0.21 Income of spouse

Among all the variables included in the study the only variable which has positive association with fertility is “Type of family”. The other variables which affect the fertility are: Age at marriage, Education of women, Education of spouse, Employment of women, Employment of spouse, Income of women, Income of spouse (Coale, 1995; Ghosh, 1975; Zachariah, 1981; Jolly, 1991; Johnson, 1993; Dabral and Malik, 2005)

The results of the factor Analysis are presented below.

**Table 3: Unrotated factors**

Age of women	0.70	0.14	0.20	0.11	0.21
Age at marriage	0.78	-0.13	-0.09	-0.06	-0.01
Religion	0.36	0.46	-0.04	0.29	0.01
Type of family	0.81	-0.01	-0.11	-0.05	-0.02
Education of women	0.38	0.11	0.55	-0.02	0.02
Education of spouse	0.28	0.16	0.59	0.02	-0.02
Employment of women	0.33	0.44	0.20	0.02	0.26
Employment of spouse	0.11	0.72	0.03	0.06	0.01
Income of women	-0.01	0.42	-0.01	0.38	0.26
Income of spouse	0.28	0.36	0.26	-0.10	0.25

**Table 4: Rotated factors (Varimax rotation)**

Age of women	0.22	0.55*	0.34	0.01	0.39
Age at marriage	0.08	0.79*	0.09	-0.10	0.13
Religion	0.36	0.59*	0.07	0.22	0.21
Type of family	0.16	0.81*	0.14	0.02	0.02
Education of women	0.06	0.15	0.65*	0.02	0.20
Education of spouse	0.07	0.10	0.63*	0.10	0.15
Employment of women	0.16	0.15	0.22	0.31	0.46*
Employment of spouse	0.20	-0.02	0.07	0.26	0.66*
Income of women	0.15	0.11	0.07	0.27	0.54*
Income of spouse	0.15	0.11	0.07	0.27	0.47*

Based on the above, the variables are segregated into natural factors (Age of women, Age at Marriage, Religion, Type of family) knowledge factor (Education of women, Education of spouse and Economic factor (Employment of women and spouse, Income of women and spouse). The linear multiple regression equation are fitted for each set of variables in the factors and also for the entire set of variables.

The mathematical forms of the equations obtained are  
 For Natural Factor  
 $Y = 0.943 - 0.012 X_1 - 0.006 X_2 + 0.044 X_3 + 0.032 X_4$  ,  
 For Knowledge Factor  
 $Y = 0.612 - 0.003 X_5 - 0.002 X_6$   
 For Economic Factor  
 $Y = 0.384 - 0.08 X_7 - 0.06 X_8 - 0.11 X_9 - 0.09 X_{10}$

The statistical details pertaining to the above three models, are presenting in the Table 5, Table 6, Table 7.

From table 5, it is seen that R-square is 0.47 which is significant at one percent level of probability indicating the fact that 47 percentage of the variations in the fertility is being explained by the four variables in the natural factor. The

**Table 5: Statistical details pertaining to the natural factor**

S. No.	Variable name	Sym- bol	b- values	Stan- dard error	t- value	Level of signi- ficance
1	Age of women	X1	-0.012	0.014	-0.857	NS
2	Age at marriage	X2	-0.006	0.0028	-2.41	0.05
3	Religion	X3	+0.044	0.032	1.37	NS
4	Type of family	X4	+0.032	0.011	2.90	0.01
5	Regression constant	b0	0.943	-	-	-

R square = 0.47\*\* Sample size = 270  
 NS - Not Significant  
 \* - Significant at 5% level of probability  
 \*\* - Significant at 1% level of probability

**Table 6: Statistical details pertaining to the knowledge factor**

S. No.	Variable name	Sym- bol	b- values	Stan- dard error	t- value	Level of signi- ficance
1	Education of women	X5	-0.003	0.0013	-2.31	0.05
2	Education of Spouse	X6	-0.002	0.0009	-2.22	0.05
3	Regression constant	b0	+0.612	-	-	-

R-square 0.40\*\* N= 270

**Table 7: Statistical details pertaining to the economic factor**

S. No.	Variable name	Sym- bol	b- values	Stan- dard error	t- value	Level of signi- ficance
1	Employment of women	X7	-0.08	0.040	-2	0.05
2	Employment of spouse	X8	-0.06	0.030	-2	0.05
3	Income of women	X9	-0.11	0.023	-4	0.01
4	Income of spouse	X10	-0.09	0.03	3	0.01
5	Regression constant	b0	-0.384	-	-	-

R square = 0.62\*\* N=270

**Table 8: Statistical details pertaining to all the variables**

Variable	Symbol	Multiple regression b-value
Age of women	X1	-0.012
Age at marriage	X2	-0.006
Religion	X3	0.044
Type of family	X4	0.032
Education of women	X5	-0.003
Education of spouse	X6	-0.002
Employment of women	X7	-0.08
Employment of spouse	X8	-0.06
Income of women	X9	-0.11
Income of spouse	X10	-0.09

R - square = 0.71\*\*

significance of the regression co-efficient indicates that the current age of women has nothing to do with fertility however; her age at the time of marriage has negative effect on the fertility. This implies that late marriage reduces the fertility. That is timely marriage will bring issues in time. The non significant co-efficient for religion indicates, that the religion has nothing to do with the fertility of women. The highly significant coefficient for the variable type: of the family reveals the following: this variable is a binary with 1 for joint family and 0 for nuclear family. Thus the implication is that the joint family system helps in fertility. The reason might be that in the joint family their contact cannot be regular and hence the productive germs might be with good vigour, another reason might be that it prevents abortion. Since, once they live with the elders they might resist termination of pregnancy.

In the case of Table 6, both variables are negative and significant at five percent level of probability indicating that the knowledge induces reduction in fertility. Again Table 7 reveals that

employment and income of women as well as spouse, together helps in reducing the fertility of women. Comparing R-square and the level of significance of the co-efficients together reveal that the economic factor stands first, the knowledge factor comes as the second and the natural factor is the last in reducing the fertility of women. This is again entrosed by the results of joint multiple regression Analysis.

### CONCLUSION

Higher employment, higher income of both husband and wife and nuclear family system could bring the reduction in the fertility level of the women in Kanyakumari district.

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