FERTILITY DIFFERENTIAL IN RURAL AREAS OF PAURI GARHWAL:

A REGRESSION APPROACH

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Abstract: *Fertility is one of the important demographic indicators in Pauri Garhwal which are responsible for unusual changes in population distributions. A major part of this paper attempts to study fertility differentials in different sub-groups in the population by taking into consideration the various socio-economic variables such as literacy, religion, the proportion of scheduled caste and age at marriage. In order to examine the differentials in fertility for rural areas of study area, a regression model approach is used to measure the extent of the interaction of different type of effects of various socio-economic and demographic variables.*

The relationship between the fertility levels and socio-economic variables shows that female literacy and the number of females attending school were negatively related to fertility in the rural areas of the study area, whereas the other socio-economic variables showed a positive relationship. It has been concluded that rapid industrialisation and various economic development plans are likely to bring about a suitable change in the attribute of the people. This may be achieved by providing better and higher educational facilities and occupational alternatives to the girls.

Keywords: *Literacy, industrialisation, economic development, socio-economic and demographic variables*

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1. INTRODUCTION

Fertility is also one of the three principal components of population dynamics that determines the size and structure of the population of a country. Differentials in fertility behaviour and fertility levels in different areas and among population strata or characteristics have been among the most pervasive findings in demography Rele, (1987) **[1]**. In 2011, Pauri Garhwal had population of 686,527 of which male and female were 326,406 and 360,121 respectively. There was change of -1.51 percent in the population compared to population as per 2001(increase of 3.91 percent) census of India 2011, **[2]**. Clearly, fertility is expected to decline with improvements in social conditions and in the presence of better infant survival. Fertility of uneducated females is generally compared with fertility of educated females. The important factor for declining fertility is education. Several studies conducted in India have confirmed that there exist a strong inverse relationship between education and fertility Mahadevan, 1988, 1987, 1979 **[3, 4, 5]**; Krishnamurthy, 1984 **[6]**.

Education and health are two other areas that require sustained attention. Despite significant advances, in many areas, gaps remain between girls and boys enrolment and participation in education with gender disparities being far more severe in study with greater rural and poor populations Amartya, (2001) **[7]**. Rural children and those with a mother with no education are twice as likely to be out of school. In addition, illiteracy among rural women remains an area of concern. While efforts have been made to broaden the range of health services and quality of care, women living in rural areas still face significant barriers to health care and reproductive health. Fertility rates in rural areas are generally higher than those of urban areas due to rural women's lower access to education, family planning and healthcare services. Rural areas also have some of the highest rates of maternal mortality and obstetric fistula Safilios**,** 1985 **[8]**.

Women living in rural areas play an essential role to effectively mitigate and adapt to climate change and ensure more sustainable rural development. Rural women often depend on access to natural resources for food and fuel, and they are often more aware of the urgency to manage resources in a sustainable manner and to preserve biological diversity. The contribution of women and their role in the family as well as in the economic development and social transformation are pivotal. Women constitute 90 per cent of total marginal workers of the country. Rural women who are engaged in agriculture form 78 per

cent of all women in regular work Roy, (2003) **[9]**. The other issues that impact the empowerment of rural women, including specific groups of women such as girls/young women, indigenous, older women or women with disabilities, need to be further examined. Now-a-days economic development is one of the factors that have changed the entire scenario of social and cultural environment within the country especially for the women. The rural women are engaged in small-scale entrepreneurship programme. Through that they were economically empowered and attaining status in family and community Samantha, (2005) **[10]**.

Although there has been progress in women's participation in decision-making globally, women status and say-so in household decision-making increases with income, the under-representation of women from rural areas in political and public life remains high in most societies. Women can effectively undertake both the production and processing oriented enterprises. Entrepreneurship development among rural women helps to enhance their personal capabilities and increase decision-making status in the family and society as a whole Roy, 2003 **[11]**.

Most of the rural poor, in particular women, is represented in the low-productivity employment segment of the rural economy both in subsistence farming and agricultural wage labour and in non-farm self-employment. Access to decent work remains limited in both agricultural and non-agricultural work. Work is generally more likely to be either unpaid or low-wage, informal, vulnerable, and to lack social protection. For women, many barriers persist to their equal access to decent work, including the lack of education and training and child-care services, as well as constraints due to unequal care and household responsibilities Arunachalam, (2005) **[12]**.

2. PROBLEM FORMULATION

To show the effect of educational and occupational status on fertility. A model on fertility is fitted (multiple regression model is used).

To show the impact of awareness regarding social, health, contraceptives on fertility.

3. METHODOLOGY

For determining the most responsible factor for declining fertility in rural areas, a random sample of 240 respondents are selected from 24 villages (10 respondent from each village) of Pauri Garhwal for investigation by questionnaire and relevant data are collected. The

total sample came to 240. Structured questionnaire with all the necessary details was prepared and the details are then assessed on the selected sampling units. The details collected are age of women at marriage, type of family, education of women, employment of women and spouse, Income of women and spouse. Statistical package such as SPSS is applied to analyse the collected data and compute the objective functions. Multiple regression model is used for number of children and various fertility affecting variables. Various diagrammatic representations are used to show the fertility levels with reference to different factors.

4. PROBLEM SOLUTION

The objective of this paper is to study and compare the fertility level, pattern and differentials in this study area, according to some socio-economic variables and try to determine, as far as possible, the factors that are responsible for the fertility decline. Fertility differentials among sterilized couples have also been analysed.

Table-1 Children of respondent and Education of women

| | | Education of women | | | | | |
		Illiterate	Literate up to 5	5-12	Graduate to Post Graduate	Other Higher Education	Total
Children of Respondent	0	0	1	9	3	0	13 (5.42%)
	1	5	5	15	7	0	32 (13.33%)
	2	6	15	45	9	1	76 (31.67%)
	3	14	7	18	10	0	49 (20.42%)
	4	19	10	17	0	0	46 (19.17%)
	5	5	0	3	0	0	8 (3.33%)
	6	6	3	0	0	0	9 (3.75%)
	7	3	0	1	0	0	4 (1.66%)
	8	1	0	1	0	0	2 (0.83%)
	10	1	0	0	0	0	1 (0.42%)
Total		60 (25.0%)	41 (17.08%)	109 (45.42%)	29 (12.08%)	1 (0.42%)	240 (100%)

Table-2 Children of respondent and Occupation of women

		Occupation of women					
		House wife	Agricultural Labour	Government Service	Private service	Social Service	Total
Children of Respondent	0	9	3	1	0	0	13 (5.42%)
	1	17	12	2	1	0	32 (13.33%)
	2	48	19	2	5	2	76 (31.67%)
	3	25	15	8	1	0	49 (20.42%)
	4	28	17	0	0	1	46 (19.17%)
	5	5	3	0	0	0	8 (3.33%)
	6	4	3	2	0	0	9 (3.75%)
	7	2	2	0	0	0	4 (1.66%)
	8	1	1	0	0	0	2 (0.83%)
	10	0	1	0	0	0	1 (0.42%)
Total		139 (57.9%)	76 (31.7%)	15 (6.2%)	7 (2.9%)	3 (1.2%)	240 (100%)

Table-3 Children of respondent and Monthly income of the family

		Monthly income of the family				
		Below 1000	1000-5000	5000-10000	Above 10000	Total
Children of respondent	0	1	3	5	4	13 (5.42%)
	1	2	7	18	5	32 (13.33%)
	2	7	12	32	25	76 (31.67%)
	3	4	12	12	21	49 (20.42%)
	4	4	14	11	17	46 (19.17%)
	5	1	2	2	3	8 (3.33%)
	6	2	2	1	4	9(3.75%)
	7	0	3	0	1	4 (1.66%)
	8	0	0	2	0	2 (0.83%)
	10	0	0	1	0	1 (0.42%)
Total		21 (8.75%)	55 (22.92%)	84 (35.0%)	80 (33.33%)	240 (100%)

From the above tables, table-1 shows that females are 25% illiterate, 17% are literate up to 5, 45% are up to higher secondary level, 12% are graduates and only less than 1% are in higher education in the study area. Also 50.42% females have less than two children and 49.58% have more than two children.

Table-2 shows that the occupational status of females are 58% housewife, 32% are agricultural labour, 6% are in Government service, 3% are in private service and only 1% are in social service in the study area.

Table-3 shows that the 9% families are in below 1000 income level, 23% are in 1000-5000 income level, 35% are in 5000-10000 income level and 33% are in above 10000 income level in the study area.

4.1 Multiple Regression Model

To show the functional relationship between one dependent variable to another independent variable, multiple regression approach is very useful tool. In this study number of children of respondent is our dependent variable and age of respondent at marriage time, education of women, occupation of women, monthly income of the family, age of mother at first delivery, age of mother at last delivery and think about more children are the independent variables. The data collected from 24 villages of rural areas of Pauri Garhwal by conducting field survey and 240 households were interviewed. The following multiple regression equation is obtained

Number of Children of Respondent = X_1 + X_2 (Age of Respondent at Marriage Time) + X_3 (Education of Women) + X_4 (Occupation of Women) + X_5 (Monthly Income of the Family) + X_6 (Age of Mother at First Delivery) + X_7 (Age of Mother at Last Delivery) + X_7 (Think About More Children)

Table-4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.755[a]	.570	.557	1.07968

a. Predictors: (Constant), Think about more children, Occupation of women, Monthly income of the family, Age of mother at last delivery, Age of respondent at marriage, Education of women, Age of mother at first delivery

b. Dependent Variable: Children of respondent

Table-5 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	359.016	7	51.288	43.997	.000[a]
	Residual	270.446	232	1.166		
	Total	629.462	239			

a. Predictors: (Constant), Think about more children, Occupation of women, Monthly income of the family, Age of mother at last delivery, Age of respondent at marriage, Education of women, Age of mother at first delivery

b. Dependent Variable: Children of respondent

Table-6 Coefficients

Model		Un-standardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant	1.906	.583		3.271	.001
	Age of respondent at marriage	.259	.157	.100	1.652	.100
	Education of women	-.267	.083	-.166	-3.229	.001
	Occupation of women	-.141	.085	-.073	-1.657	.099
	Monthly income of the family	.029	.075	.017	.387	.699
	Age of mother at first delivery	-1.070	.116	-.624	-9.187	.000
	Age of mother at last delivery	.691	.082	.408	8.418	.000
	Think about more children	.989	.210	.236	4.707	.000

a. Dependent Variable: Children of respondent

Table-7 Residuals Statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.3534	5.4582	2.7625	1.22563	240
Residual	-2.44456	5.43493	.00000	1.06376	240
Std. Predicted Value	-1.966	2.199	.000	1.000	240
Std. Residual	-2.264	5.034	.000	.985	240

a. Dependent Variable: Children of respondent

Figure-1 Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Children of respondent
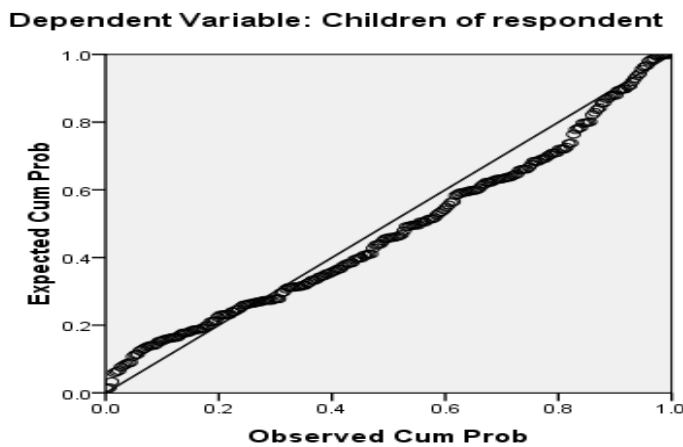
The fitted multiple regression model for the dependent over the various independent variables is given below by the equation:

Number of Children of Respondent = 1.906 + 0.259 (Age of Respondent at Marriage Time) − 0.267 (Education of Women) − 0.141 (Occupation of Women) + 0.029 (Monthly Income of the Family) − 1.070 (Age of Mother at First Delivery) + 0.691 (Age of Mother at Last Delivery) + 0.989 (Think About More Children)

The Standardised regression equation is given below:

$Z_{(Number\ of\ Children\ of\ Respondent)} = 0.100\ Z_{(Age\ of\ Respondent\ at\ Marriage\ Time)} - 0.166\ Z_{(Education\ of\ Women)} - 0.073\ Z_{(Occupation\ of\ Women)} + 0.017\ Z_{(Monthly\ Income\ of\ the\ Family)} - 0.624\ Z_{(Age\ of\ Mother\ at\ First\ Delivery)} + 0.408\ Z_{(Age\ of\ Mother\ at\ Last\ Delivery)} + 0.236\ Z_{(Think\ About\ More\ Children)}$

The multiple regression model is used for out migration on different independent variables. The model summary shows the adjusted R square 0.557 by which 55.7 % variations can be specified. Model shows the positively associated with variables are Age of Respondent at Marriage Time (25.9%), Monthly Income of the Family (2.9%), Age of Mother at Last Delivery (69.1%) and Think About More Children (98.9%) and negatively associated with Education of Women (26.7%), Occupation of Women (14.1%) and Age of Mother at First Delivery (1.07%).

Table-8 Knowledge regarding health, social awareness, Interaction with media communication and Age of Respondent at marriage

		Age of respondent at marriage				
		Below 18 years	18-21 years	22-25 years	26-30 years	Total
Awareness regarding Health	0	16	11	3	0	30 (12.50%)
	1	13	17	3	0	33 (13.75%)
	2	8	13	2	0	23 (9.58%)
	3	9	25	2	0	36 (15.00%)
	4	15	80	22	1	118(49.17%)
Total		61 (25.42%)	146 (60.83%)	32 (13.33%)	1 (0.42%)	240 (100%)
Knowledge regarding social awareness	0	7	6	0	0	13 (5.43%)
	1	12	19	4	0	35 (14.58%)
	2	16	21	7	0	44 (18.33%)
	3	13	35	2	0	50 (20.83%)
	4	13	65	19	1	98 (40.83%)
Total		61 (25.42%)	146 (60.83%)	32 (13.33%)	1 (0.42%)	240 (100%)

		Below 18 years	18-21 years	22-25 years	26-30 years	Total
Interaction with media communication	Low	37	51	7	0	95 (39.59%)
	Middle	21	83	17	1	122 (50.83%)
	High	3	12	8	0	23 (9.58%)
Total		61 (25.42%)	146 (60.83%)	32 (13.33%)	1 (0.42%)	240 (100%)

The above table-8 shows that the 51% females having good knowledge regarding health whereas 49% females having average knowledge. According to the study area 41% of the females having good knowledge regarding social awareness whereas 51% of the females having average knowledge and 51% of the females having average interaction with media, 40% having low and only 9% having high interaction with media.

It has been found that socio-economic status of families of rural areas of the study area has made little contribution to reducing fertility without an organised family planning programme, though it must not be ignored here that an improvement in the socio-economic condition creates a better environment for the acceptance of family planning methods.

**Table-9 Think about more children and Age of respondent at marriage**

		Age of respondent at marriage				
		Below 18 years	18-21 years	22-25 years	26-30 years	Total
Think about more children	Yes	4	33	7	0	44 (18.33%)
	No	57	113	25	1	196 (81.67%)
Total		61 (25.42%)	146 (60.83%)	32 (13.33%)	1 (0.42%)	240 (100%)

According to the study area the above table-9 shows that the 18% females think about more children while 82% of the females did not want any more children.

Table-10 Use of Contraceptives, Children Desired and Age of respondent at marriage

		Age of respondent at marriage				
		Below 18 years	18-21 years	22-25 years	26-30 years	Total
Use of Contraceptives	Female Operation	20	56	13	0	89 (37.08%)
	Condom	1	35	7	1	44 (18.33%)
	Pills	1	3	3	0	7 (2.92%)
	No Contraceptive Use	39	52	9	0	100 (41.67%)
Total		61 (25.42%)	146 (60.83%)	32 (13.33%)	1 (0.42%)	240 (100%)

According to the study area the above table-10 shows that the 37% of the females using (female operation) permanent method of family planning, 42% of the females are not using any type of contraceptive, 18% of the females using condom and only 3% of the females using contraceptive pills.

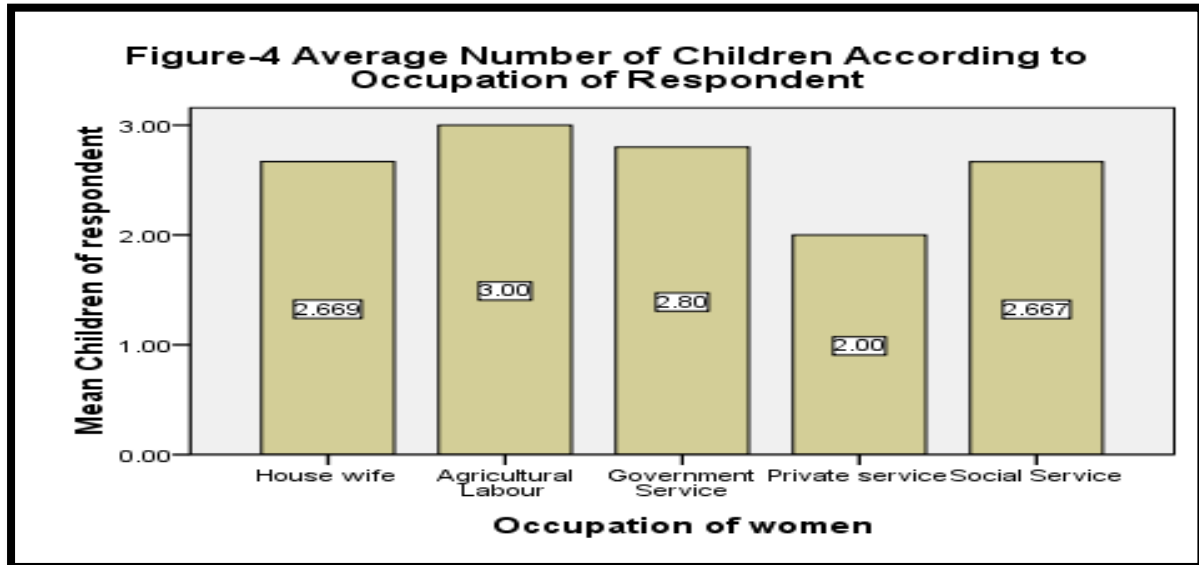Figure-2 Average Number of Children According to Age of Respondent at Marriage
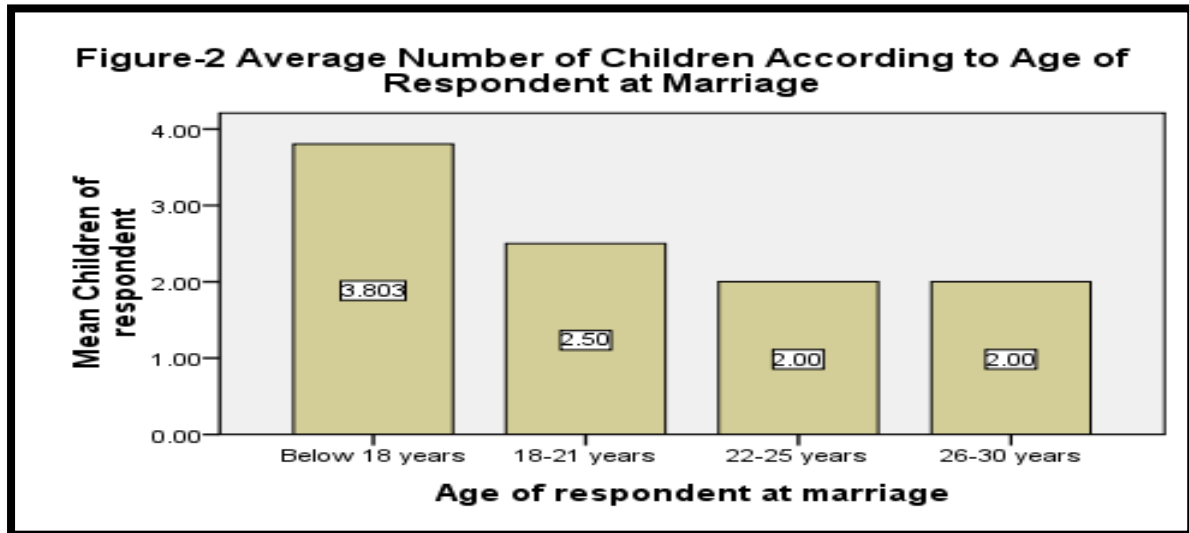
The above figure-2 shows that average number of children according to age of females at marriage. The females whose age at marriage was below 18 years having 3.08 average number of children followed by 18-21 years age group having 2.50, 22-25 years age group having 2.00 and 26-30 years age group having 2.00 average number of children in the study area.

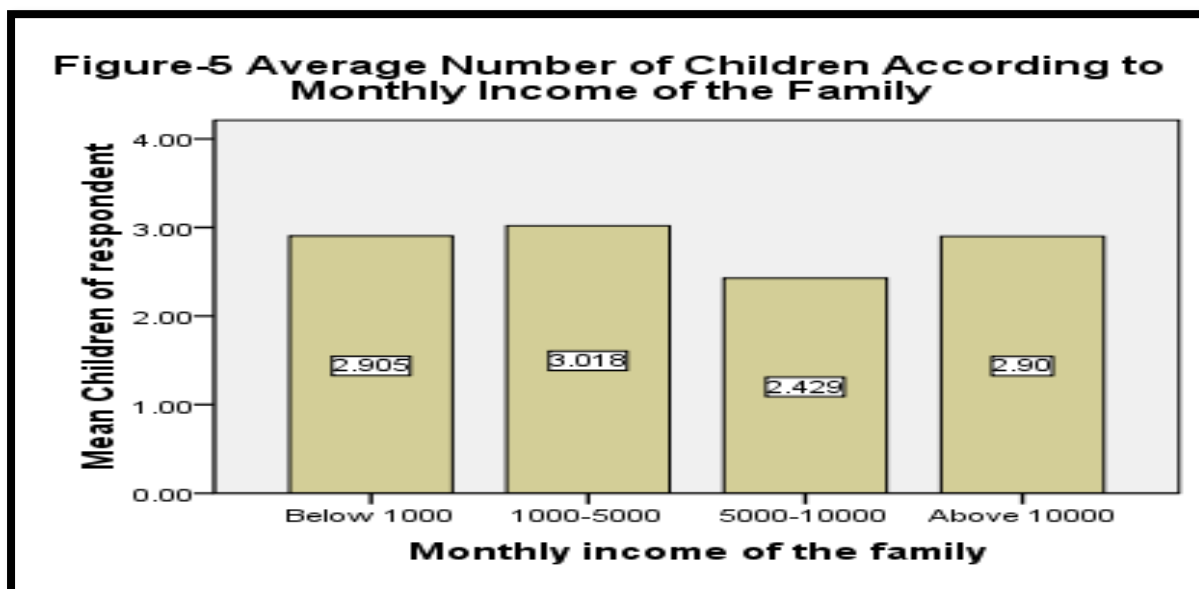Figure-3 Average Number of Children According to Education of Respondent
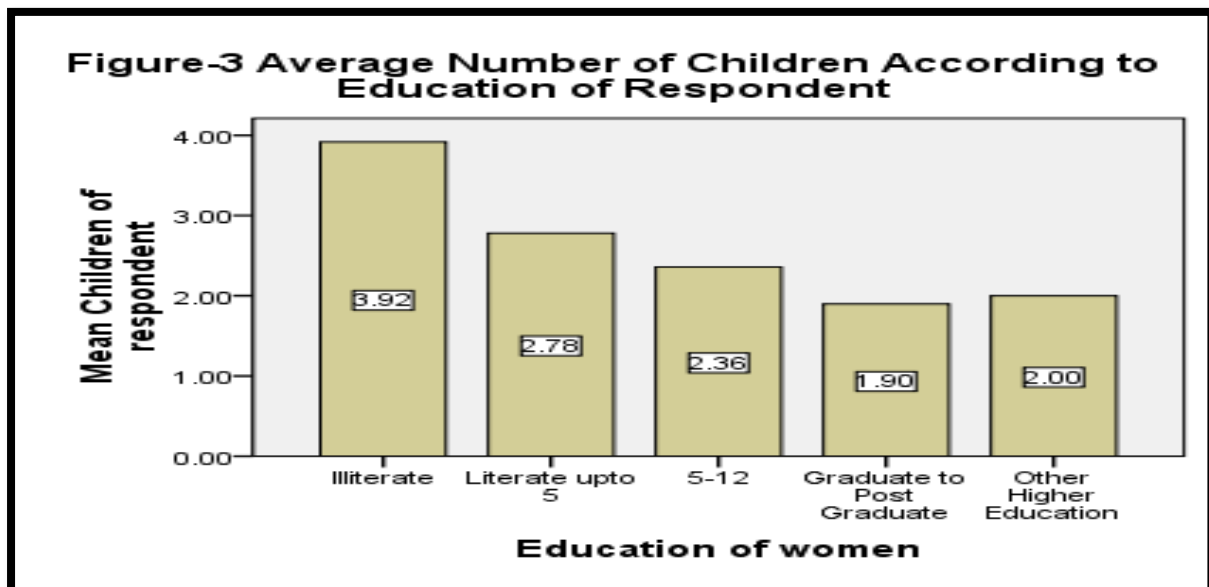
The above figure-3 shows that average number of children according to educational status of women. The illiterate females having 3.92 average number of children followed by females literate up to 5 having 2.78, up to higher secondary level educated female having 2.36, Graduate females having 1.90 and highly educated females having 2.00 average

number of children in the study area. Educational status of females is highly responsible for fertility decline.

The above figure-4 shows that average number of children according to occupational status of females. Average number of children for housewife is 2.67 followed by agricultural labour is 3.00, females is in Government service having 2.80 average number of children, females is in private service having 2.00 average number of children and females in social service having 2.67 average number of children in the study area.

The above figure-5 shows that average number of children according to monthly income of the family. The families whose income level are below 1000 having 2.90 average number of

children followed by families are in income level 1000-5000 having 3.02, income level 5000-10000 having 2.43 and income level above 10000 having 2.90 average number of children in the study area.

5. CONCLUSION AND DISCUSSION

These results suggest that the correlation between poverty and the fertility rate is explained by the other three variables; that is, those poor people tend to have higher fertility than others because they also have higher infant mortality, lower levels of education and less access to family planning services.

The percentage of non-agricultural workers has played a major role in determining the variations in the age of marriage of girls. Female literacy has insignificant impact and urbanisation has a very significant negative effect.

The value of adjusted R^2 (55.7% variation explained) indicated that the impact of fertility affecting variables in predicting fertility index was different in each region. The relationship between women status and fertility is examined. The results of the study show that fertility rate was correlated with all of the socio economic indicators. It was negatively associated with levels of women education, occupation of women, and age of mother at first delivery and positively associated with age of women at marriage, monthly income of the family, age of mother at last delivery and desired number of children.

The analysis implies that in the early stage of development in the short run, the positive relationship may be explained by an improvement in the study variables. It is only after that point at which some economic threshold is reached that we may observe as a result of the decline in demand for children, the generally accepted negative relationship between economic status and fertility.

The results of this analysis suggest that policies focused on improving female education at the primary school level, reducing infant mortality, and improving the availability and quality of family planning services would have mutually reinforcing effects on fertility decline.

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