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Original article

Fertility profile of the Bhil tribe of Barmer district, Rajasthan

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ABSTRACT

Present study investigates fertility profile of the Bhil tribe of Rajasthan. For present investigation Barmer district of Rajasthan was selected keeping in to consideration the strength of Bhil population in the district as well as its ecological setting in the famous Thar Desert. A total of 971 households were covered from the 18 villages of three tehsils of the selected Barmer district of Rajasthan.
The analysis of the results showed that all the fertility indicators among the Bhils were exceptionally high as compared to the existing trends among the contemporary populations of the state as well Indian national population. The exploratory analysis indicates that there are several determinants of high fertility level among the Bhil tribe of the Rajasthan viz. current age of mother, child death, mother's age at marriage etc. Education, income, son preference were not investigated in the present study but they are also important contributing factors to the fertility trends.

Key words: Fertility, Bhil, Thar Desert

INTRODUCTION

Fertility refers to the process of biological replacement of living creatures and maintenance of its existence. There are three terms which are used as alternatives viz. fertility, natality and birth. Human fertility is responsible for perpetuation of human being on the planet. This is a positive force, through which a population expands, counteracting the force of attrition caused by mortality. If this replacement of human number is not adequate – that is (Birth – Death = less than zero or Death – Birth = greater than zero) the number of deaths in a particular society continues to be more than that of births, that society become

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extinct after a certain period. On the other hand, excessive replacement of Human numbers can also create several social and political problems. Therefore, the study of human fertility occupies a central position in the study of human population.

Although, there is wide gap between the potential level of fertility (fecundity) and actual performance of the potentiality (fertility), here we discuss about later one. Further, fertility is an event that occurs over time, therefore, knowledge of the current fertility levels; differentials and trends (at a specified time/period), as well as cumulative fertility/ family size estimates for a population are of vital importance. Fertility in spite of being biological phenomena is significantly influenced by a number of demographic, economic, socio-cultural, environmental factors. Besides the attitude and perception of people with respect to various aspects like gender preference, family size, adoption of family planning methods etc. also play a significant role (Bhasin 2000, Bhasin and Nag, 2002 and Gautam 2006).

The objective of present investigation was to assess the current levels of fertility as well as to find out the differentials and trends for the Bhil tribe. Further an attempt has been made to study the fertility related variables, viz. number of children ever born, number of children surviving, to explore the possibility of any relationship between these two and a set of independent determinants namely age of mothers, age at marriage of mother and father, marriage distance, family type and child death etc.

MATEIAL AND METHODS

For present investigation Barmer district of Rajasthan was selected keeping in mind the strength of Bhil population in the district as well as its ecological setting in the famous Thar Desert. A total of 971 households were covered from the selected district - Barmer. Firstly, list of the village of the district was obtained. After obtaining village list, a total of 18 villages were selected on the basis of PPS. In the second phase households were selected randomly, in order to constitute a total sample size of 971 households, which was estimated following Lwanga and S. Lemeshow (1991) and tested at 5% level of significance, with a power of 80%. Data was collected using semi-structured and pre-tasted schedule which was culturally validated before executing actual data collection.

Tehsil wise details of villages and households are displayed in Table 1.

Table 1. Village wise distribution of household covered.

Tehsil	Village	Household Surveyed	
		Number	%
Barmer	Mahawar	63	6.5
	Barmer Aagor	73	7.5
	Kabas	75	7.7
	Gahu	51	5.3
Chohtan	Dhok	43	4.4
	Kelnaur	56	5.8
	Sihania	40	4.1
	Arti	77	7.9
	Sedwa	44	4.5
Ramsar	Bhilon ka par	65	6.7
	Jhadua	45	4.6
	Ramsar Aagor	50	5.1
	Sarup ki dhani	59	6.1
	Chadar	63	6.5
	Chadi	58	6.0
	Ranigaon	39	4.0
	Garal	27	2.8
	Mithra	43	4.4
	Total	971	100.0

The information was collected through a semi-structured schedule by interview, observation, participation, semi-participation, case study and group discussion methods. After collecting information, the schedule is edited and coded. The data is entered in MS-Excel worksheet. IBM SPSS version 25 was used for the tabulation and analysis of the data. Frequency distribution, cross tabulation, central tendencies, one-way-ANOVA, t-test, box-plot diagram, scattered plot diagram and regression analysis etc. were performed using the SPSS.

The pilot survey was carried out between April and July 2002 for a period of two weeks. The purpose of survey was to demarcate geographic area of the population proposed to be studied, its structure, distribution and the feasibility of study. Keeping in view the climatic condition and stress due to desert, it was decided to complete the fieldwork and data collection in two phases. It was executed in the year 2002 and 2003. The first phase was of 3 months from August to October 2002. The second phase was of again 3 months from September to November 2003.

Prior ethical clearance to conduct the research was obtained from the Institutional Review Committee, Department of Anthropology, University of Delhi (India).

RESULTS

To understand the dynamics of fertility among the Bhil tribe of Rajasthan, different measures of fertility estimation were computed as presented below:

Crude Birth Rate (CBR)

Crude birth rate is the most commonly used measure of fertility. It indicates the general magnitude of the fertility level of a population/region at a specific time. It is also used to estimate current growth. However, it is a crude measure, since the estimation considers the entire population, rather than those exposed to the risk of childbearing. In the present study, the crude birth rate of Bhil of Rajasthan is estimated as 34.05, which is higher than state and national average (Table 2).

General Fertility Rate (GFR)

General fertility rate is a refined measure of fertility, as it takes into consideration, the population at risk of childbearing i.e. female at reproductive ages of 15-49 years. However, it is also affected by the distribution of females by age in the reproductive span. In the present study general fertility rate for the Bhil of Rajasthan has been estimated as 192.9 (Table 2).

Age Specific Fertility Rate (ASFR)

Age specific fertility rate gives a detailed panorama of fertility in a population at a specified time/period. It is estimated for conventional five-year age groups, from 15-19 years to 45-49 years, which minimizes the effects of misreporting of ages by mothers, and distortion produced by variations in the age composition. The age of mother is an important factor affecting the fertility level and the rate of child bearing is not uniform throughout all the ages. In fact, fertility is usually concentrated between ages 20-29 years.

Table 2: Birth rates, fertility rates, reproduction rates and child women ratio among the Bhil of Rajasthan.

Region/ Population/ State Country	Crude Birth Rate $\frac{C^{0-1} x}{1000}$ P	General Fertility Rate $\frac{C^{0-1} x}{1000}$ W^{15-49}	Total Fertility Rate $\frac{\sum ASFR x5}{1000}$	Gross Reproduction Rate TFR x 0.49	Child women Ratio $\frac{C^{0-5} x}{1000}$ W^{15-49}	Total 0-1 yrs.	Total Population	Number of Women (15-49 yrs)
Present study								
Bhil	33.06	192.9	8.7	3.9	1205.7	181	5380	938
NFHS-3								
India	23.1		2.68	1.3				
Rajasthan	25.7		3.21	1.6				

Table 3: Distribution of Crude Birth Rates, General Fertility Rates, Total Fertility Rates, Gross Reproduction Rates and Child-Women Ratio Among Some Tribal and Non-Tribal Population Groups of India.

Region/ State/ Country	Population Group	CBR	GFR	TFR	GRR	Child women Ratio	Source
Region and Population Specific Comparative Fertility Measures							
Sikkim							
	Buddhist	21.8	92.6	3.1	1.5	553.4	Bhasin and Bhasin (2000)
	Hindus	28.3	108.6	3.2	1.6	516.1	,,
	Bhutias	22.2	93.2	3.1	1.5	-	Bhasin and Bhasin (1995)
	Tamangs	24.3	92.3	3.1	1.5	-	,,
	Lepchas	20.8	92.1	3.0	1.5	-	,,
	Buddhist	21.8	92.5	3.0	1.5	-	,,
	Sherpas	19.6	90.9	3.0	1.5	-	,,
	Hindus	29.2	108.5	3.1	1.5	-	,,
West Bengal							
Kalimpong	Sherpa	-	-	6.6	3.2	-	Gupta et.al. (1989)
Kalimpong	Lepcha	-	-	5.4	2.6	-	,,
Rango	Sherpa	-	-	6.1	3.0	-	,,
Echhay	Sherpa	-	-	5.0	2.5	-	,,
Munsong	Sherpa	-	-	6.5	3.2	-	,,
Lava	Sherpa	-	-	**7.1**	3.5	-	,,

Labbah ***(Darjeeling)***	Sherpa	-	-	5.9	2.9	-	,,
Mungpoo (Darjeeling)	Sherpa	-	-	4.4	2.2	-	,,
	Total	20.7					SRS (2002)
Manipur							
	Mao	12.0	65.3	4.9	2.4	-	Maheo (1999)
Jammu and Kashmir							
Ladakh[HA]		22.4	88.9	2.7	1.3	563.9	Bhasin and Nag (2002)
	Bodhs	24.4	95.7	2.7	1.7	510.1	,,
	Baltis	23.5	98.5	3.1	1.5	689.3	,,
	Brokpas	27.1	119.0	3.0	1.5	296.2	,,
	Arghuns	14.2	49.8	1.6	0.3	360.1	,,
	Total	19.7	-	-	-	-	SRS (2002)
Himachal Pradesh							
	Total	30.8	126.3	3.9	1.9	-	Bhasin and Bhasin (2000)
	Hindu	-	-	2.1	1.0	-	,,

Region/ State/ Country	**Population Group**	**CBR**	**GFR**	**TFR**	**GRR**	**Child women Ratio**	**Source**
State/Country Specific Comparative Fertility Measures							
INDIA			-			-	1998-99 NFHS-3 (2007)
Delhi		18.1	-	2.13	1.0	-	,,
Haryana		22.1	-	2.69	1.3	-	,,

Himachal Pradesh	18.3	-	1.94	1.0	-	,,
Jammu & Kashmir	20.9	-	2.38	1.2	-	,,
Punjab	18.6	-	1.99	1.0	-	,,
Rajasthan	25.7	-	3.21	1.6	-	,,
Uttaranchal	21.8		2.55	1.2		
Chhattisgarh	22.7		2.62	1.3		
Madhya Pradesh	24.9	-	3.12	1.5	-	,,
Uttar Pradesh	29.1	-	3.82	1.9	-	,,
Bihar	32.4	-	4.00	2.0	-	,,
Jharkhand	26.8		3.31	1.6		
Orissa	22.1	-	2.37	1.2	-	,,
West Bengal	21.2	-	2.27	1.1	-	,,
Arunachal Pradesh	24.1	-	3.03	1.5	-	,,
Assam	22.1	-	2.42	1.2	-	,,
Manipur	25.0	-	2.83	1.4	-	,,
Meghalaya	28.7	-	3.80	1.9	-	,,
Mizoram	24.8	-	2.86	1.4	-	,,
Nagaland	28.5	-	3.74	1.8	-	,,
Sikkim	18.2	-	2.02	1.0	-	,,
Tripura	21.9		2.22	1.1		
Goa	16.7	-	1.79	0.9	-	,,
Gujarat	21.7	-	2.42	1.2	-	,,
Maharashtra	18.8	-	2.11	1.0	-	,,
Andhra Pradesh	17.1	-	1.79	0.9	-	,,

Karnataka		19.6	-	2.07	1.0	-	,,
Kerala		16.4	-	1.93	0.9	-	,,
Tamil Nadu		16.4	-	1.80	0.9	-	,,
Indian State	**Minimum**	16.4	0.0	1.8	0.9	-	,,
	Maximum	32.4	0.0	4.0	2.0	-	,,
Rajasthan							
	Bhil	33.06	192.90	8.70	3.90	1205.7	*Present Study*

HA= High Altitude, PVTG= Particularly Vulnerable Tribal Group, SC= Scheduled Caste, ST=Scheduled Tribe, SRS=Sample Registration Survey (2000), NA= Not Available

Table 4: Age Specific Fertility Rates Among Bhil, Rajasthan state and India.

Age Group	Bhil (Present Study)	Rajasthan*	India*
15-19	217	98	90
20-24	492	245	209
25-29	366	171	139
30-34	280	85	62
35-39	282	26	25
40-44	87	12	7
45-49	13	4	3

*Source: National Family Health Survey-III (NFHS-3), 2007

In the present study, age specific fertility rates were estimated for Bhil, as evident from table 4, it reaches in its peak at ages 20-24, with 492 births per 1000 women for total population. It starts declining with growing age of mothers as also apparent from the figure 1.

For better understanding of phenomenon and measure the present findings are compared with NFHS-3 (2007) according to which among Bhil the age specific fertility rate all throughout was found to be higher than the state and national averages.

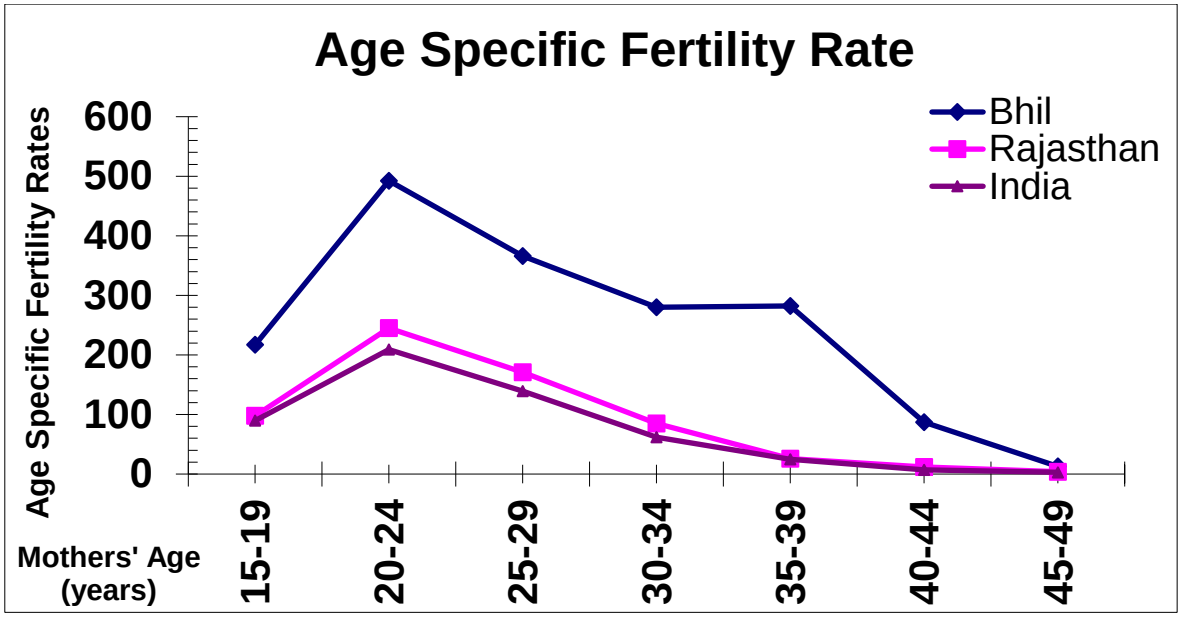

Figure 1: Line Graph Showing Comparative Age Specific Fertility Rates Among Bhil, state of Rajasthan and India

Total Fertility Rate (TFR)

Total fertility rate summarizes the pattern of fertility exhibited by ASFRs and represents a single index of total fertility. It is an estimate of the expected number of children that would be born (ignoring mortality), to a hypothetical cohort of 1000 women in their lifetime, if they all pass through their reproductive years exposed to the schedule of ASFR on which the index is based. In other words, TFR expressed per women refers to the number of children a hypothetical average woman would have if, during her lifetime her child-bearing behaviour remain same as that of cross-section of women at the time of observation. In this way, the TFR is a type of standardized rate, as it is not influenced by differences in the age composition.

As evident from table 2, the TFR for India during 2005-06 was estimated as 2.68, while for Rajasthan it was recorded 3.21. In the present study, total fertility rate for Bhil was estimated as 8.7, which is exceptionally higher than state and national average.

Gross Reproduction Rate (GRR)

Gross Reproduction Rate is also considered as replacement Index as it indicates how effectively mothers are replacing themselves with daughters (ignoring mortality), who would bear the next generation. It points towards the average number of female children expected to be born per woman during her entire reproductive span, if there is no mortality, and the fertility schedules represented by the age specific fertility rates continue to remain the same. In the present study, the Bhil as a total has registered a gross reproduction rate of 3.9 (Table 2). The findings suggest that among Bhil, a woman would bear on an average about four daughters until the end of the childbearing age (if there were no mortality). The estimation of GRR for Indian States (as displayed in Table 3) shows that it varies from 0.9 to 2. The lowest (0.9) was recorded for Goa, Andhra Pradesh, Kerala and Tamilnadu; whereas highest (2.0) was recorded for Bihar.

Table 5: Estimation of Fertility and mean age at child bearing from age specific average parities among Bhil of district Barmer, Rajasthan

Age Interval	No. of Women	No. of Births	Mean parities
15-19	89	82	0.92
20-24	227	475	2.09
25-29	230	822	3.57
30-34	160	726	4.53
35-39	11	645	5.76
40-44	74	437	5.9
45-49	48	284	5.92
Total	938	3471	3.7

Estimation total Fertility = $[P_{(3)}^2/P_{(2)}] = 6.09$

Child Woman Ratio

Child woman ratio is also referred as 'general fertility ratio'. This is very useful indicator of fertility. This is computed by dividing the number of children of under 5 years old in the population by the number of women 15-49 years old. The childbearing ages in the denominator are approximated by the ages 20 to 49 or 15 to 44 or 15 to 50. This depends on the lowest and highest age of women at which they are exposed to the risk of child bearing. It must be noted that the children under 5 may have borne up to 5 years prior to the census date (or date of investigation) when women were up to 5 years younger. Although some mothers are left out, they have contributed so few of the children under 5 that the inclusion of younger or older ages would include mostly women who are not exposed to risk.

In the present study Child-woman ratio were computed from the number of children under 5 years of age and number of women at the age of 15-49 years. As evident from Table 2 the child-woman ratio among Bhil is 1205.7, which again exceptionally higher as compared to all other population studied earlier. Among the tribes of Rajasthan the Bhil and Garasia have child women ratio above 1000.

Mean Age of Child Bearing

Table 5 showing the age specific mean parities among Bhil women shows that mean parities increases along with the increase in age. It is highest among older women. The estimated fertility rate calculated from $(P_3)^2/P_2$ has been found to be 6.09. Like other indicators of fertility, it is also higher among Bhil. For Jaunsari tribe of Uttarakhand it was found to be 3.81 (Kshatriya et al., 1997), whereas, for Kinnaura of Himachal Pradesh it was recorded as 4.76 (Gautam et al. 2010).

Marital Fertility Rates

Marital fertility rates are more refined measures of fertility as only married women are taken into consideration during estimating these measures. In many societies, only married women are actually exposed to childbearing. The married women of reproductive age (15-49) are really, almost completely, ethically, and legally exposed to child bearing.

General Marital Fertility Rate (GMFR)

General marital fertility rate is a refined measure of fertility, as it takes into consideration, the population who are at risk of childbearing i.e. married women at reproductive ages of 15-49 years. However, it is also affected by the distribution of females by age in the reproductive span. As evident from Table 6, in the present study general marital fertility rate for the Bhil has been estimated 376.

Table 6 Marital Fertility and Gross Reproduction Rates among Bhil of Rajasthan

Population	General Marital Fertility Rate	Total Marital Fertility Rate	Marital Gross Reproduction Rate
Bhil	376	9.5	4.3

Age Specific Marital Fertility Rate (ASMFR)

When age specific fertility is computed only for the married women of reproductive age group (15-49 or 15-49+), this is known as age specific marital fertility rate (ASMFR). In the present study, age specific marital fertility rate was computed for Bhil which indicate that the fertility is at peak during the age of 20-24, after that it declines gradually. To understand the proportion of fertility contributed by unmarried women the index of marriage (C_m) was computed, which is a ratio of age specific fertility rate (ASFR) and age specific marital fertility rate (ASMFR).

Index of marriage (C_m) = ASFR/ASMFR

If the value of index of marriage is 1, it means unmarried women are not participating in fertility; but if it is less, then it indicates that the unmarried women are also participating in the fertility. In the present except for age group 15-19 the index of marriage is approximately 1. It means among Bhil, very few women remain unmarried after 20 years of age. For age group 15-19, the index value is 0.613.

Table 7: Age Specific Marital Fertility Rates Among Bhil, Rajasthan state and India.

Age Group	Bhil (Present Study)	Index of Marriage, C_m
15-19	354	0.613
20-24	508	0.970
25-29	366	1.000
30-34	284	0.987
35-39	287	0.983
40-44	87	1.000
45-49	13	1.000

Table 8: Distribution of Marital Fertility Rates and Reproduction Rates Among Some Tribals and Non-Tribal Population Groups of India.

Region/ State/ Country	**Population Group**	**GMFR**	**TMFR**	**MGRR**	**Source**
Sikkim					
	Buddhist	148.5	-	-	Bhasin and Bhasin (2000)
	Hindus	178.7	-	-	,,
	Bhutias	154.9	-	-	Bhasin and Bhasin (1995)
	Tamangs	157.8	-	-	,,
	Lepchas	141.3	-	-	,,
	Buddhist	148.5	-	-	,,
	Hindus	178.6	-	-	,,

Jammu and Kashmir

Ladakh[HA]					Bhasin and Nag (2002)
	Bodhs	144.3	5.2	2.5	,,
	Baltis	137.2	3.4	1.6	,,
	Brokpas	153.8	6.0	2.9	,,
	Arghuns	75.5	2.9	1.4	,,
Himachal Pradesh					
	Gaddis	145.1	-	-	Bhasin and Bhasin (1993)
	Brahman	122.2	-	-	**„**
	Rajput	115.0	-	-	**„**
	SC	236.8	-	-	**„**
Kinnaur	Kinnaura	60.95	2.55	1.25	Gautam (2006)
Middle altitude	Kinnaura	54.98	2.13	1.04	**„**
High Altitude	Kinnaura	131.29	2.92	1.43	**„**

Uttaranchal (or erstwhile UP)

	Johar Bhotia	90.9	4.1	2.0	Chachra and Bhasin (1998)
	Marchha Bhotia	194.4	5.6	2.7	,,
	Dharchula Bhotia	135.5	2.8	1.3	,,
	Raji	226.0	7.5	3.6	Samal, et.al. (2000)
	Raji	227.6	7.3	3.5	Patra (2001)

Rajasthan	Sahariya	206.5	6.4	3.1	Bhasin and Nag (2007)
	Mina	108.4	3.3	1.6	,,
	Bhil	181.8	5.9	2.9	,,
	Kathodi	126.4	4.3	2.1	,,
	Damor	153.8	4.8	2.4	,,
	Garasia	136.3	4.7	2.3	,,

[HA]= High Altitude

[PTG]= Particularly Vulnerable Tribal Group

SC= Scheduled Caste

ST=Scheduled Tribe

Exploratory Fertility analysis

Several independent determinants influence the fertility performance and level of fertility of a population. These determinants can be stated as social, cultural, demographic, political, religious, economic, environmental, genetic and so on. The observed interplay between these is being discussed as exploratory fertility analysis.

Fertility Differentials by Demographic Characteristics

1. *Fertility Differentials by Mothers' Age*

In general, the number of children ever born (live birth) is expected to be related with the current age of mother, i.e., the younger mothers are expected to have lesser number of children as compared to the older (Singh, 1986; NFHS-1, 1992-93). A similar picture emerges out in the present study (Table 9; Figure 4). Clustered box plot (Figure 5) shows a comparative picture of median number of pregnancy, children ever born and surviving, and its dispersion among the Bhil mothers. Mean number of children ever born and surviving

differ significantly for the cohorts of mother of different age group as one way ANOVA is significant and F value is high 105.3 and 81.3 respectively.

Table 9: Fertility Differentials (Mean Number of Children Ever Born and Surviving) Among Bhil of Rajasthan by Mothers' Age.

Current age of mother	Live Birth		Children Surviving	
	Sample size	Mean	Sample size	Mean
15-19	60	1.4	59	1.3
20-24	209	2.3	205	2.1
25-29	219	3.8	216	3.3
30-34	154	4.7	154	4.1
35-39	112	5.8	111	4.9
40-44	74	5.9	74	5.1
45-49	49	5.8	49	5.2
50-55	20	5.1	20	4.6
56+	5	5.8	4	3.8
Total	902	4.0	892	3.5

One way ANOVA

	Sum of Squares	df	F	p	Sum of Squares	df	F	p
Between Groups	1947.5	8	105.3	0.001	1327.3	8	81.3	0.001
Within Groups	2063.4	893			1801.5	883		
Total	4010.9	901			3128.8	891		

A comparative representation of average number of children ever born and surviving among the Bhil mothers of different age group is presented in Figure 4. It is apparent from the line graph that as the age of mother increases the average number of children ever born and surviving also increases. Simultaneously the gap between the graphs widen with progression of age of mother, which indicates that the child loss also increases with the age of mother.

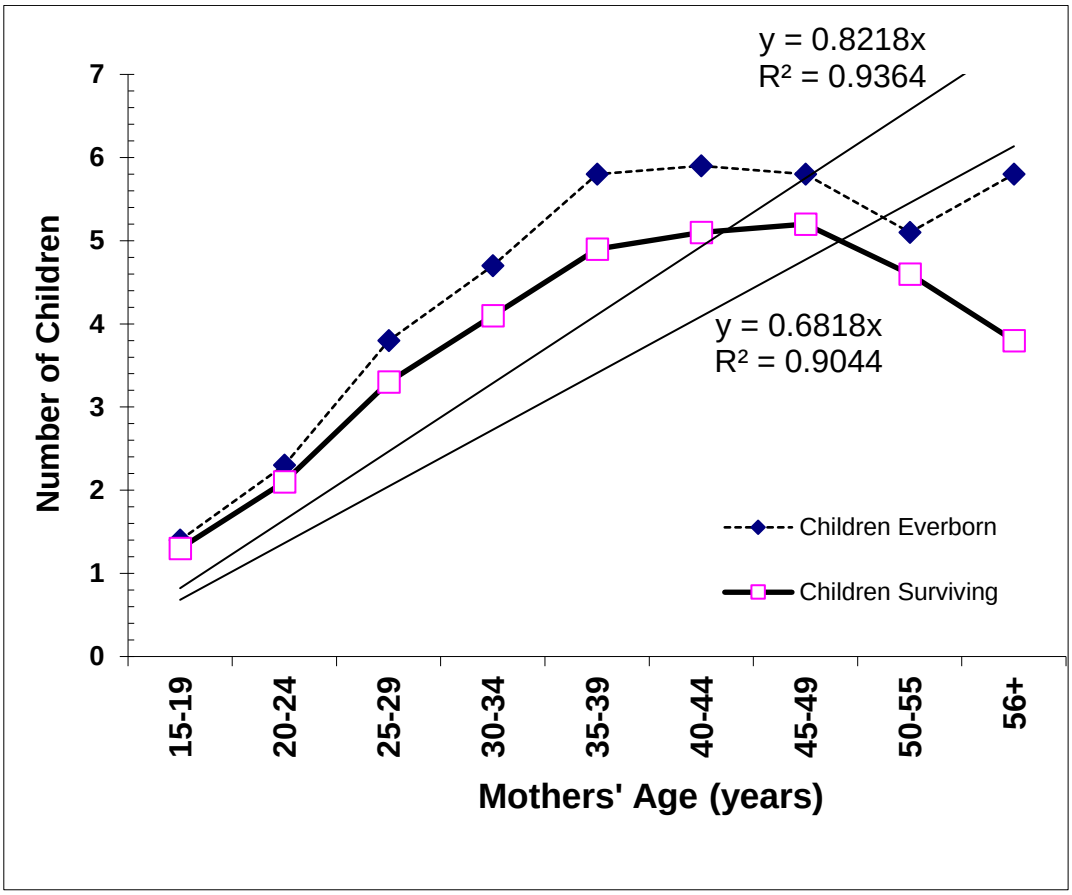

Figure 4: Line graph showing correlation of current age of mother with children ever born and surviving.

To find out the exact correlation between age of mothers and number of children ever born and surviving among Bhil, scattered diagramme are plotted as shown in Figure 6 and 7. It is clear from these diagramme that there is significant positive correlation between age of mothers and number of children ever born and surviving. The value of R^2 for number children ever born is 0.40, whereas for number of children surviving it is 0.36.

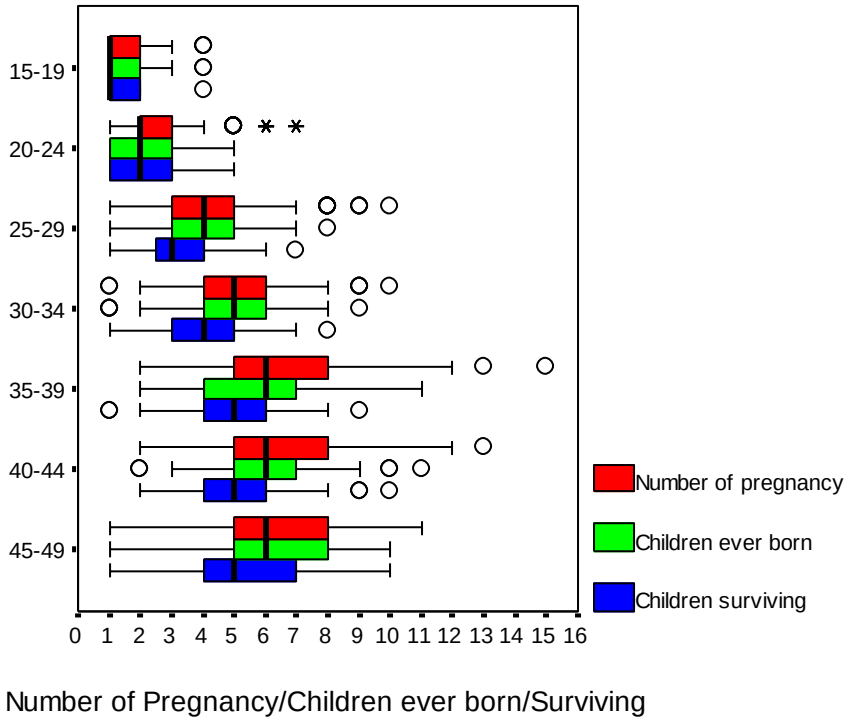

Figure 5: comparative picture of median number of pregnancy, children ever born and surviving, and its dispersion among the Bhil mothers.

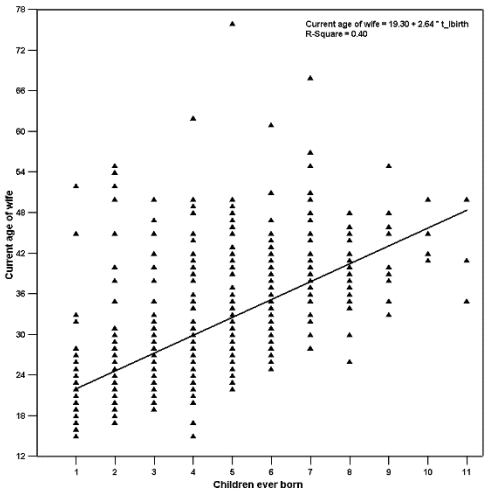

Figure 6. Scattered plot diagramme Alongwith Regression Line Showing Positive Correlation Between Mothers' Age and Number of children ever born.

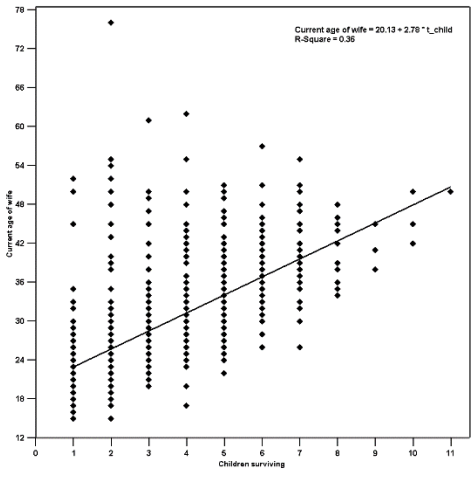

Figure 7. Scattered plot Alongwith Regression Line Showing Positive Correlation Between Mothers' Age and Number of children surviving.

2. *Fertility Differentials by Age at Marriage of Mother*

Mean number of children ever born and surviving for the cohorts of mothers according to age at marriage is presented in Table 10. It is apparent that there is significant difference in mean number of children ever born and surviving among the cohorts as one way ANOVA is significant. It can be concluded that early marriage leads to higher number of live births.

Table 10: Fertility Differentials (Mean Number of Children Ever Born and Surviving) Among Bhil of Rajasthan by Age at Marriage of Mother.

Age at Marriage of Mother	Live Birth		Children Surviving	
	Sample size	Mean	Sample size	Mean
<12	14	4.8	14	4.6
13-14	142	4.4	140	3.8
15-16	340	4.2	335	3.7
17-18	256	3.6	255	3.2
19+	156	3.8	154	3.3
Total	908	4.0	898	3.5

One way ANOVA

	Sum of Squares	df	F	p	Sum of Squares	df	F	p
Between Groups	108.2	4	6.2	0.001	76.8	4	5.6	0.001
Within Groups	3921.7	903			3061.4	893		
Total	4030.0	907			3138.3	897		

Table 11: Fertility Differentials (Mean Number of Children Ever Born and Surviving) Among Bhil of Rajasthan by Age at Marriage of Father.

Age at Marriage of Father	Live Birth		Children Surviving	
	Sample size	Mean	Sample size	Mean
<15	26	4.7	26	4.2
16-21	539	4.0	531	3.5
22-27	301	3.9	299	3.4
28+	42	3.6	42	3.3
Total	908	4.0	898	3.5

One way ANOVA

	Sum of Squares	df	F	p	Sum of Squares	df	F	p
Between Groups	23.8	3	1.7	0.147	17.4	3	1.6	0.172
Within Groups	4006.1	904			3120.8	894		
Total	4030.0	907			3138.3	897		

3. *Fertility Differentials by Age at Marriage of Father*

Fertility differential according to age at marriage of father is estimated in terms of mean number of children ever born and surviving from the couples of different age at marriage of male partner. As apparent from Table 11 that mean number of children ever born and surviving is lesser for the couples having male partner married at higher age. But, this difference is statistically insignificant as is shown by the results of one way ANOVA. It can be concluded that there is no role of age at marriage of male partner in the differential fertility among the Bhil particularly.

Table 12: Fertility Differentials (Mean Number of Children Ever Born and Surviving) Among Bhil of Rajasthan by difference in age at marriage of spouses.

Difference in age of spouses at the time of marriage (in Years)	Live Birth		Children Surviving	
	Sample size	Mean	Sample size	Mean
-3 to 0 (Husband is Younger (upto 3 years) or equal)	16	3.2	16	3.1
1	36	3.3	35	2.9
2	139	3.8	137	3.3
3	172	3.9	169	3.4
4	166	4.1	165	3.6
5	200	4.3	197	3.6
6	73	4.3	73	3.8
7	30	4.1	30	3.7
8	16	3.5	16	3.1
9	15	4.3	15	3.9
10	17	4.5	17	3.9
11+	28	3.9	28	3.6
Total	908	4.0	898	3.5

One way ANOVA

	Sum of Squares	df	F	p	Sum of Squares	df	F	p
Between Groups	69.472	11	1.4	0.154	34.360	11	0.8	0.548
Within Groups	3960.528	896			3104.005	886		
Total	4030.000	907			3138.365	897		

4. *Fertility Differentials by difference in age at Marriage of Spouses*

Difference in age at marriage of spouses is universal phenomena. In general, the female partner is younger than male, particularly in most of the Indian populations. But in few cases the female partners are elder than males. In the present study it was found that in some cases the male partners were younger (up to 3 years). However in 98.4 percent marriages, the male partners were elder (up to 11 years or more in some cases). Among Bhils, in most cases (approximately 79 percent) the male partners are elder (upto 5 years).

In the present study an attempt was made to know the impact of difference in age at marriage of spouses on the fertility. Mean number of children ever born and surviving according to difference in age at marriage of spouses is presented in the Table 12. It is apparent that differences in age of spouses have no role in the differential fertility among the Bhil as one way ANOVA is insignificant.

5. ***Fertility Differentials by marriage distance***

Among Bhil most of the marriages take place within a range of 75 Kilometer. Mean number of children ever born and surviving calculated as per marriage distance is presented in the Table 13. There is no uniform trend in the mean number of children ever born and surviving by marriage distance. Although, one way ANOVA is significant at 2% and 5% level ($p<0.05$), which indicates that there is significant difference in mean number of children ever born and surviving among the cohorts of couples with different marriage distances.

Table 13: Fertility Differentials (Mean Number of Children Ever Born and Surviving) Among Bhil of Rajasthan by Marriage Distance (in Km).

Marriage Distance (in Km)	Live Birth		Children Surviving	
	Sample size	Mean	Sample size	Mean
<5	79	3.4	78	3.1
6-25	309	4.1	306	3.7
26-50	288	3.9	285	3.4
51-75	148	4.2	146	3.6
75+	80	4.1	80	3.6
Total	904	4.0	895	3.5

One way ANOVA

	Sum of Squares	df	F	p	Sum of Squares	df	F	p
Between Groups	49.3	4	2.7	0.02	32.3	4	2.3	0.05
Within Groups	3971.6	899			3099.3	890		
Total	4020.9	903			3131.6	894		

Table 14: Fertility Differentials (Mean Number of Children Ever Born and Surviving) Among Bhil of Rajasthan by Family Type.

Family Type	Live Birth		Children Surviving	
	Sample size	Mean	Sample size	Mean
Nuclear	751	4.1	744	3.6
Joint	157	3.5	154	3.1
Total	908	4.0	898	3.5

One way ANOVA

	Sum of Squares	df	F	p	Sum of Squares	df	F	p
Between Groups	50.5	1	11.5	0.001	28.1	1	8.1	0.005
Within Groups	3979.4	906			3110.2	896		
Total	4030.0	907			3138.3	897		

6. Fertility Differentials by Family Type

Mean number of children ever born and surviving according to family type is presented in the Table 14. It is evident that nuclear families have higher mean number of children ever born and surviving in comparison to joint families. The difference is statistically significant also as one way ANOVA gives F=11.5 and 8.1 respectively for children ever born and surviving ($p<0.005$). Similarly independent *t-test* is also found significant (t=3.3, d.f. = 906, $p<0.001$ and t=2.8, d.f. = 896 $p<0.005$).

Stepwise Multivariate Regression Analyses

Children ever born (as dependent variable)

To find out the best predictor of children ever born and surviving, stepwise multivariate regression analysis was carried out (Table 15 and 16). Firstly, 'children ever born' is taken as a dependent variable which have 11 predictors as listed above (X1 to X12). It is evident from Table 15 that in the first instance there are 7 models for children ever born. According to model 1, the number of pregnancy is sole predictor of the children ever born which accounts 82.2 per cent variability (R^2= 0.822).

Table 15. Stepwise Multivariate Regression Analysis for children ever born and 11 variables as listed above.

Dependent Variable	Model	Predictors	R2	B±SE	F-value	t-value
Children ever born	1	Number of pregnancy	0.822	0.907±0.022	1308	36
	2	Number of pregnancy	0.918	0.606±0.021	1569	25
		Children surviving		0.431±0.025		18
	3	Number of pregnancy	1.000	0±0		
		Children surviving		0.936±0		
		Child death		0.527±0		
	4	Number of pregnancy	1.000	0±0		
		Children surviving		0.936±0		
		Child death		0.527±0		
		Total live birth male child		0±0		
	5	Number of pregnancy	1.000	0±0		
		Children surviving		0.936±0		

		Child death		0.527±0		
		Total live birth male child		0±0		
		Total living male children		0±0		
	6	Number of pregnancy	1.000	0±0		
		Children surviving		0.936±0		
		Child death		0.527±0		
		Total live birth male child		0±0		
		Total living male children		0±0		
		Mothers' age at marriage		0±0		
	7	Number of pregnancy	1.000	0±0		
		Children surviving		0.936±0		
		Child death		0.527±0		
		Total live birth male child		0±0		
		Total living male children		0±0		
		Age at marriage of mother		0±0		
		Current age of mother		0±0		
After exclusion of above 7 variables						
	1	Total live birth female child	0.562	0.750±0.033	1156	34
	2	Total live birth female child	0.567	0.910±0.081	589	16
		Total living female children		-0.175±0.088		-3.2

According to model 2, besides the number of pregnancies experienced by a woman, number of surviving children she has; also affects the number of children ever born and these two predictors accounts a total of 91.8 per cent variability (R^2= 0.918). Model 3 to 7 included the variables which are responsible for cent per cent variability. It should be noted that the number of pregnancy, number of surviving children and number of child deaths are sole predictors of the number of children ever born (R^2= 0.100). In this way, model 4, 5, 6 and 7 gives four more predictors of number of children ever born among the Bhil mothers. These predictors are – total live birth of male children (X8), total living male children (X10), age at marriage of mothers (X5) and current age of mothers (X4).

Table 16. Stepwise Multivariate Regression Analysis for children surviving and 10 variables as listed above.

Dependent Variable	Model	Predictors	R^2	B±SE	F-value	t-value
Children surviving	1	Children ever born	0.729	0.854±0	760	27.5
	2	Children ever born	1.000	1.069±0		1.8E+09
		Child death		-0.564±0		-9.7E+08
After exclusion of above 2 variables						
	1	Number of pregnancy	0.675	0.822±0.015	1839	42
	2	Number of pregnancy	0.765	0.610±0.016	1435	30
		Total living male children		0.367±0.029		18
	3	Number of pregnancy	1.000	0±0		
		Total living male children		0.695±0		
		Total living female children		0.695±0		
	4	Number of pregnancy	1.000	0±0		

	Total living male children		0.695±0
	Total living female children		0.695±0
	Total live birth female child		0±0
5	Number of pregnancy		0±0
	Total living male children		0.695±0
	Total living female children		0.695±0
	Total live birth female child		0±0
	Total live birth male child		0±0
6	Number of pregnancy	1.000	0±0
	Total living male children		0.695±0
	Total living female children		0.695±0
	Total live birth female child		0±0
	Total live birth male child		0±0
	Mothers' age		0±0
7	Number of pregnancy	1.000	0±0
	Total living male children		0.695±0
	Total living female children		0.695±0
	Total live birth female child		0±0
	Total live birth male child		0±0
	Mothers' age		0±0
	Fathers' age at marriage		0±0

8	Number of pregnancy	0±0
	Total living male children	0.695±0
	Total living female children	0.695±0
	Total live birth female child	0±0
	Total live birth male child	0±0
	Mothers' age	0±0
	Fathers' age at marriage	0±0
	Marriage distance	0±0

Further, when these 7 predictors are excluded from the analysis, the remaining predictors provide 2 more models according to which total live birth of female children and total living female children account for 56% variability (R^2=0.562 and 0.567).

Again, when these two variables are excluded from the analysis, remaining variables are excluded automatically. These variables are: Fathers' age at marriage and marriage distance.

Children surviving (as dependent variable)

To find out the best predictor of children surviving stepwise multivariate regression analyses was carried out, which provides two models. According to model 1, the number of children surviving is dependent on the number children ever born as it alone accounts for 72.9% variability (R^2=0.729). And, according to model 2, the sole predictors of children surviving among Bhil are children ever born and child deaths. They both account for cent percent variability (R^2=1.000).

For further analysis, these two variables (children ever born and child deaths) are excluded. The remaining predictors provide 8 models. According to model- 1, the number of surviving children is dependent on the number of pregnancy. According to model 2, beside

the number of pregnancies, the total number of living male children determines the number of surviving children. According to model 3, number of pregnancies, total number of living male children and total number of living female children are exclusively responsible for the total number of surviving children (R^2=1.000). Model 4 to 8 provide five more predictors of number of children surviving viz. Total live born female children, Total live born male children, Mothers' age, Fathers' age at marriage and Marriage distance.

DISCUSSION

The crude birth rate for the world in 2003 has been estimated as 22 (PRB, 2003). But the variation in the birth rates between the more developed regions (11) and less developed regions (24) appears striking. This difference is also responsible for demographic polarization of the world. The regional summaries show that the birth rates of Europe (10) and North America (14), where most of the developed countries are situated, are quite low. On the other hand, Africa (38), Latin America (23) and Asia (20), where most of the less developed countries located, have high birth rates. However, even within these continents, the birth rate varies substantially. Similarly, it (Birth rate) is not uniform within the country or state it varies from region to region and population to population.

Asia too, shows disparities in birthrates across regions/countries. East Asia has a low birth rate of 13 and South-Eastern Asia also shows lower birth rates (PRB, 2009). On the other end, many countries in the South-Western Asia have very high birth rates: Yemen (43), Iraq (35) Palestinian Territory (39). The South-Central Asia has a moderately high birth rate of 27. But within this region, the birth rate ranges from a low of 15 (in Kazakhistan) to a high of 42 (in Afghanistan), whereas Bangladesh (30), Bhutan (34), Nepal (34) and Pakistan (37) also seems to have high birth rates, India has a moderately high birth rate of 25. Within India too, the diversity in birth rate is evident.

In India, NFHS-3 (2007) estimated crude birth rate for the period of 2003-05, which is 23.1 for country, but it varies from 16.4 in Kerala and Tamilnadu to 32.4 in Bihar. The major State having birth rate above the national level are Madhya Pradesh (24.9), Uttar Pradesh (29.1) Meghalaya (28.7), Nagaland (28.5), Manipur (25.0), Mizoram (24.8) and Rajasthan

(25.7). In the present study, the crude birth rate of Bhil of Rajasthan is estimated as 34.05, which is higher than state and national average. Similarly, the other measures of fertility i.e. general fertility rate (GFR), age specific fertility rate (ASFR), gross reproduction rate (GRR) and total fertility rate (TFR) as well as marital fertility rates were also found to be exceptionally higher among the Bhils of Rajasthan.

Higher level of fertility among the studied population is determined by a number of intrinsic and extrinsic factors. Numerous studies have found that the Indian couples have a strong preference for sons over daughters (Bhatt and Zavier, 2004; Clark, 2000; Cleland et al. 1983; Gautam, 2006; Varma and Babu, 2007). Thus, it can be said that son preference does have an impact on fertility. However, fertility of the woman is negatively associated with her level of education (Balakrishnan, Lapierre and Krotki, 1993, Gautam 2011, Kumar and Gautam 2014). Similarly, income is also used to explain fertility differences (manifesting negative relationship) across areas and populations (Stycos, 1963; Frisancho et al, 1976; Mamdani, 1981; Mahadevan 1989; Gautam et al. 2011, Liczbinska et al. 2019). It is hypothesized that the poorest women would have higher fertility.

Child death is an important determinant of high level of fertility, an increase in child mortality rate would significantly increase fertility (Dust, 2003; Randall and Legrand, 2000; Hossain, Philips and Legrand, 2005; Alene and Worku 2008; Gautam et al. 2007; Gautam and Kshatriya 2012). In the present study too, it was found that child death is one of the important determinants of children ever born as evident from stepwise multivariate regression analysis.

Age at marriage has been found to exhibit an inverse relationship with the fertility of the women in a number of studies (Freedam, 1963; Bushfield, 1972; Nag, 1980; Audinarayana and Senthilnayaki, 1990; Islam and Khan 1995; Gulati and Sharma, 2002).

Our finding is similar to many other studies that find that older age at first marriage played a significant role in reduction in fertility (Bumpass, 1969; Andorka, 1978; Guru et al, 2003). The maternal age at first conception is an important demographic indicator which determines the overall fertility of a woman. Age at first conception starts the child bearing years. In this way, delay in the first conception is associated with low fertility.

CONCLUSSION

Tribes are indigenous people and are representatives of a particular stage of development. The information about the dynamics of their population is important especially in case of Bhil as they are largest one in context of population. A comparative understanding can be developed only on the basis of such repeated studies; hence the present analysis on fertility of Bhil is a landmark and important.

The fertility among Bhil was exceptionally high as per prevalent trend among the contemporary population in the region, especially at the level of state and nation. The exploratory analysis indicates that there are several determinants of high fertility level among the Bhil tribe of the Rajasthan viz. current age of mother, child death, mother's age at marriage etc. Education, income, son preference was not investigated in the present study but they are also important contributing factors to the fertility trends.

The investigation will help the tribe in larger context of health and socio-economic development. By different parameters of fertility comparative inferences about tribes of country as well as a comparison among tribes and others can be drawn. Here it is clear that the high fertility among Bhil as compared to other tribes as well as general population is determined by several determinants.

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