Micro determinants of Human Fertility: Study of selected Physiological and Behavioural variables in SC and ST population

Dr. Satyajeet Nanda
Assistant Professor
Gujarat Institute of Development Research
Gota, Ahmedabad-380 060, India
Email: nsatyajeet@hotmail.com

ABSTRACT:

This is an endeavour to study the causal relationship of components of women's physiology and behaviour with fertility in more or less non-industrial rural populations in Orissa, an Eastern Indian state. It was found from analyses of studied physiological factors that fecundity variable like higher average years used for only child bearing emerged as a important predictor of lower fertility (except for SC women). Although variables like the length of menstrual cycle beyond optimum, ANC not received for last delivery and age at menarche more than 12 years were found to reduce fertility, but results were not very consistent when adjusted for other confounding factors. The behavioural factors of women such as higher desired family size and longer perceived ideal birth interval have been consistently associated with lower fertility. For Scheduled caste population, the association of woman's correct knowledge about probable days of conception within menstrual cycle, with lower fertility gives impression that this knowledge may provide chance to the woman or couple to go for some kind of fertility control mechanism. The verbatim and incidents studied give impression that at one hand the child survival is at demand and in other hand there seem to have a need for access to controlled and intended fertility.

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1. INTRODUCTION AND LITERATURE REVIEW:

Majority of the events in the process of human fertility operates within a biological framework. Many of the factors manifest directly through the body physiology of human beings. The factors, which are behavioural by origin and physiological in function, have been the interest of many demographers. Both at individual as well as population level, there are a number of small factors, which may affect the human fertility in differential magnitude, can be considered as the 'micro determinants'. This is an area of fertility research that has got utmost interest recently by demographers; social scientists and medical researchers like Nag, Bongaarts and Clarke etc.

Fertility in its biological process is the function of various phases such as production of gonads, successful union and fertilisation of sperm and ovum, embryo formation, implantation, successful gestation and delivery of a live birth. Each phase is affected by different factors designing the fertility and the impact may be individual or interactive (additive) in nature. There have been some studies by demographers and medical researchers on impact of some physiological factors on fertility. Pandey (1989) in his study in Jabalpur found the lower fecundability and lower proportion of fecund women among tribals than non-tribals are responsible for lower fertility of tribals. Bongaarts (1986) in his study on 'Kungs' fertility; Randal (1996) in a study on two non-industrial societies of Mali and Gray (1977) have found various diseases like malaria, venereal syphilis, gonorrhoea, genital tuberculosis and other STIs and RTIs affecting the fecundity and thereby fertility, and indirectly through prolonged spouse separation.

Das (1979) has studied about the lower level of fecundity of Juang tribes of Orissa and concluded that malnutrition, environmental factors and biological factors are responsible for this. The non-physiological factors have also been found to be responsible for differential fertility by many demographers and medical researchers. Arokiaswamy (1997) in his study has endeavoured to examine the effect of poverty and nutrition on fertility; to disentangle the linked effect of poverty and nutrition on fertility; to explain the causal dynamics; and to examine the different characteristics of the rich and poor families, and acceptors and non-acceptors of contraception. He observed that nutritional status of women had a negative impact on fertility for urban women aged over 35 years with no child loss. At the same time it was found in his study that fertility was lower among undernourished women and was affected directly and indirectly by marriage age; by contraceptive prevalence and breast-feeding as proximate variable; by poverty, child mortality, and nutritional status as intervening variables; and by education and occupation as background variables.

Mascie Tylor (1992) in a study showed that diseases other than STDs, *viz.*, malaria, TB, anaemia and leprosy can reduce fertility through different mechanisms like oligospermia, foetal mortality and menstrual disorders. Masani (1971) in another study inferred that menstrual irregularity may lead to anovulatory cycles and in turn decrease the

probability of fertilisation. Brasel (1978); Tyson (1978); Bongaarts (1986) and Zachariah (1996) have explained the effect of maternal nutrition on fertility through various mechanisms like function of reproductive endocrine system; duration, pattern and intensity of lactation affecting the post-partum amenorrhoea (PPA); weight gain and delay of menarche etc. Pinto-Aguirre (1994) in his study based on multi-state hazard approach in examining nutrition and fertility through PPA, showed that workload, malnutrition and intense lactation and strain can lead to longer PPA and so reduction of fertility. Clarke and Cumley (1962) explored the fact that the endocrinal disturbances may affect reproduction at any of the various stages- maturation of egg, growth of lining of uterus and so implantation of fertilised egg or malformation of foetus ending with abortion or stillbirth. Ellison (1990) in another study showed that late reproductive maturation is associated with lower level of ovarian function in adulthood.

Since many of the human behaviours affect the actual practice regarding its fertility and even the biology of fertility, behavioural factors have been considered important in fertility research. In addition to their role as background factors, these have also been recognised as intermediate (Davis and Blake, 1956) factors of fertility and few even have perceived as proximate determinants of human fertility (Bongaarts, 1993).

Specific factors like knowledge and attitude have often been found to be key determinants of fertility. It has been felt important to find out through micro level studies about the stages at which fertility attitudes are first formed and process through which attitudes crystallise into a definite desire to limit family size (Mari Bhat, 1993). The knowledge, attitude and practice of women as well as men directly or indirectly influence fertility. Again, these are affected by some other background factors like socio-economic background, external intervention (program factors, culture contact) etc.

There have been some studies on impact of behavioural factors on human fertility. Pillane and Ryser (1975) in a study on fertility knowledge, attitude and practice of males in Pittsburgh inferred that there is a strong association between parity and males' desired family size. They found that with the increase of age and marital duration, the parity and desired family size increases. Unger and Molina (1999) in a study on Latin women of Los Angeles found that the desired family size was associated with current family size even after controlling the effect of confounding factors in multivariate analysis. They also observed that the number of sons was positively associated with fertility.

Naik and Sharma (1985) have carried out a case study on social structure and family planning behaviour in two tribal villages of Orissa. They found that money appears to be the main incentive for the tribal people in adopting sterilisation and suggested to impart proper information, education and motivation, and to provide the full range of family planning methods, since there appears to be good scope for family planning acceptance. Pathak and Pandey (1993) have made an analysis on the tempo of fertility in Orissa, based on birth intervals. They inferred that urban couples are more likely to use contraception and increasing the age at marriage and promotion of education of females are necessary to convince couples for accepting small family norm.

Bose (1988) in his secondary analysis of Census data and some other data of 1970s and 1980s, and attributed various factors for stagnation of tribal population of Orissa. They are poverty stricken out-migration, under-nutrition, high mortality, fall in fecundity and above all under-enumeration. He observed a higher level of infant and child mortality during the 1972-1978. The higher level of family planning performance among tribals seems unexplained against the backdrop of poverty, under-nutrition and malnutrition, and higher infant and child deaths. Stein and Susser (1978); Dyson (1991) have shown impact of famine on the individual as well as group fertility. This act through mechanisms as separation factors and psychological factors leading to less coital frequency, more abstinence etc. and poor nutrition leads to still birth and abortion.

Thiagarajan (1990) in his study on fertility and family planning behaviour of male school teachers could explore some of the determinants of fertility. He found child loss, perceived ideal family size and sex composition of children consistently associated positively with fertility. Use of family planning methods showed a negative association with fertility.

2. METHODOLOGY:

2.1. Sources of Data:

Against these backdrops the current paper endeavours to examine the nature and magnitude of association of selected physiological and behavioural characteristics of women with fertility. For this study, primary data were collected from the `Angul' district of Orissa, which had a comparatively higher proportion of scheduled caste[1] (SC) and scheduled tribe (ST) population. The currently married women of the age group 13 to 49 years were chosen as the respondents. A total of about 600 such women, 300 each from scheduled castes and scheduled tribes were interviewed in the sample survey. Besides quantitative data, some qualitative information on aspects like fertility preference, perception and practice regarding health and particularly on reproductive morbidity, conception period were collected. The data collection was carried out during July, 1997-February, 1998.

2.2. Definition and Conceptualization of Physiological Variables:

For the study of some other selected physiological factors of women, the variables such as open birth interval, age at menarche, length of menstrual cycle, woman's age at last delivery, mental strain, ante-natal care (ANC) at last pregnancy, use of family planning (FP) methods, average years used for child bearing only have been used. Some of the constructed variables like average years used for child bearing only (AYCB), reproductive duration and open birth interval were standardized by the age at sterilization

[1] The variables 'scheduled caste (SC)' and 'scheduled tribe (ST)' used in the present paper are subdivision of 'caste'. Caste is an age-old categorisation of people particularly in Hindu society based on occupation. SC and ST are the two type of such categorisation, which has been mainly defined by the constitution of India afresh after the year 1956 according to special directive of the President of India. These two groups are often comparatively at a very lower level of socio-economic development than rest group of people in the society. Scheduled tribes are the tribal aborigines

and age at menopause in case of the sterilized and menopause women. The variable 'average years used for child bearing only (AYCB)' has been constructed as total reproductive duration divided by total number of conceptions. The two variables such as open birth interval and average years used only for child bearing, standardised for age at sterilisation and menopause have been studied here as fecundity variables. Increase in their values indicates the declined level of fecundity.

Age at menarche is one of the physiological factors having significant bearing on fecundity and fertility. Lower age at menarche is often associated with a better nutritional status, so a healthy reproductive physiology favouring a higher level of fecundity and fecundibility and with a higher age at menopause, so a longer biological reproductive span. Late reproductive maturation is associated with lower level of ovarian function in adulthood. In cultural domain the age at menarche has a positive relationship with age at marriage and so a negative association with the actual reproductive span. In this way age at menarche can have a negative association with fertility. Length of menstrual cycle, which also has a bearing on fertility, is found to fluctuate due to change in endocrinal function.

The endocrine system plays an important role in the reproductive cycle of women and any disturbance of the endocrinal balance may lead to abnormalities in reproductive function. Endocrinal disturbances may affect reproduction at any of the various stages-maturation of egg, growth of lining of uterus and so implantation of fertilised egg or malformation of foetus ending with abortion or still birth (Clarke and Cumley, 1962). A cycle lower and higher than a normal period can have a negative impact on fertility. Mental strain can also hinder the endocrinal function and decline fertility. During strain, the sexual and reproductive environment is often not conducive enough for fertilisation. This can have behavioural effect in a way that it may decrease frequency of coitus necessary for successful conception. Use of family planning is a direct factor affecting fertility. Antenatal care can affect the successful gestation and fate of pregnancy outcome.

Age at marriage of woman and man can have biological effect on fertility. At extreme lower and higher ages, the reproduction probability decreases due to various reasons. Often at lower ages the gonads are not sufficiently matured, the menstrual cycles are not regular (amenorrhoea), anovulatory or with less viable ova leading to lower probability of conception. Higher age at marriage is associated with higher age at childbearing when the fecundity starts declining due to structural and functional changes in gonads. Age at marriage can have negative effect on fertility in other pathways such as, at lower ages women and even men have lesser access to fertility decision and regulation due to inadequate knowledge and intervention of other family or community members.

2.3. Definition and Conceptualization of Behavioural Variables:

To study the behavioural factors of fertility, specific information has been elicited about women's perception about ideal and desired family size, birth interval and sex composition of the children, knowledge about family planning methods and probable period of conception within a menstrual cycle and fertility decision-making.

The variables mentioned above have been analysed from the direct questions of the women's questionnaire and some were rated. All the currently married women irrespective of children ever born (also infertile) have been considered for analysis. All the variables in the analyses are the current perception of the women except for the desired family size, which has been asked in the context of their beginning of family building process, that is 'just after marriage'. An ANOVA test has been carried out along with bivariate descriptive analysis of fertility level by different background as well as intermediate characteristics to examine the differential in variance. To find out the sole effect of each of the intermediate factors, controlling for other confounding factors (both independent variables and covariates), and categorical variation in fertility, the multiple classification analyses (MCA) were undertaken.

The perception regarding ideal family size and ideal birth interval and about probable period of conception within a menstrual cycle is often affected by the cultural values prevailing in the society or locality, and so these have impact over fertility. Even the knowledge and use of family planning methods, which is a proximate determinant of fertility is someway or the other, designed by individual perception and cultural folkways. The ideal and desired family size and number of sons of the women are positively related to fertility. The ideal and desired number of daughter of the women may have a positively or negative or even neutral association with fertility, since in a society where specific son preference is relatively lower, the desired number of daughter may increase fertility. The ideal and desired birth intervals are negatively associated with fertility.

Knowledge about family planning methods and probable conception period also influence women's fertility regulation behaviour. At the same time the accessibility to fertility decision-making is important regarding the intended fertility. In a patriarchal set-up, husband's characteristics makes considerable difference to the family level decision and so the fertility. Some other behavioural variables such as, desired family size is positively related to fertility and desired birth intervals are negatively associated with fertility. The attitude regarding fertility regulation can affect the fertility control and so affect fertility.

2.4. Limitations of Data:

An inherent limitation in the study of fertility perception is that the responses to some extent are affected by the environment, socio-economic and psychological condition of the respondent at the time of survey. Possible influence of personal bias cannot be ruled out. So the response may vary by time and space. Even Lesthaeghe et al. (1981) have noted the responses as 'rather slippery pieces of information'.

In some societies the very idea of individual control over fertility may be foreign, leading many respondents to answer that family size is 'up to God' or to make some similar objection. In such circumstances a numerical estimate of desired size, even if obtained, may have little meaning. In spite of potential difficulties the expressed desired family size in Third World countries is often compared with current fertility level. A desired size significantly below current levels is commonly taken as indicative of a latent desire for greater availability of facilities for family planning (Pressat and Wilson, 1985).

3. ANALYSES AND DISCUSSION:

3.1. Physiological factors affecting fertility:

3.11. General physiological characteristics of the sample women:

The Table 1 shows the percentage of the women distributed by selected physiological characteristics. By current age, 12 percent of all currently married women were then in their teens, 60 percent were in middle age group of 20-34 years and 27 percent were in the age group 35 years or above. Compared to scheduled tribes, more scheduled caste women were in their teenage and middle age. The distribution of women categorised by open birth interval (BI) standardised for age at menopause and sterilisation showed that 20 percent of women had given birth more than 5 years back. Fifty-six percent of women had given birth less than 2 years back.

Frequency distribution of women by age at last delivery showed that 21 percent of women delivered at least one pregnancy during their teenage and 6 percent of women delivered below 17 years of age which are physiologically hazardous to mother's health. About twenty-two percent of all women delivered their last pregnancy outcome at the age of 30 years or more. Of them, more than 7 percent of women had delivered at more than 36 years of age, which is also considered as high-risk fertility behaviour by age (NFHS, 1995). Scheduled tribe women are more in both categories than scheduled caste women. Another matter of risk is, 64 percent of expectant mothers for last pregnancy didn't receive any antenatal care (ANC) that is no TT vaccine or IFA Tablets. Ten percent got this at doorstep from the ANMs (auxiliary nurse midwives).

It was found that more than one-third of all women in average had used 4 years or more for childbearing only and around 32 percent of women used less than 2 years in average. Regarding the family planning use 19 percent of all women reported to be using any family planning method. Compared to scheduled tribes little more scheduled caste women reported to use any family planning method. About 15 percent of all women and comparatively little higher proportion of scheduled caste women reported to have more mental strain in their marital life.

The Table 2 presents the mean value of some of the physiological variables studied. The mean age at marriage of women is found to be quite low. Age at last delivery was found comparatively lower in case of the scheduled caste women than in scheduled tribe women. Even reproductive duration and marital duration were lower for scheduled caste women compared to the scheduled tribe women.

3.12. Bivariate analysis:

The Table 3 gives the breakdown of average children ever born (CEB) by physiological variables. The average CEB, as expected, increased with the current age of the women. It was found that the fertility has been higher for women having more regular menstrual cycles of length 28-31 days and beyond these limits, women recorded lower

level of fertility. It was found that the above mentioned trend by length of menstrual cycle is statistically significant in the middle age group women, *i.e.*, 20-34 years. The open birth interval and age at last delivery showed significant increasing trend in CEB, both in scheduled caste as well as scheduled tribe women, and also for all women. This was more consistent in higher age group women, *i.e.*, 35 years and above. The variable 'average years used for child bearing only' which is considered as a fecundity variable did not show consistent variation in CEB. For women who used an average of 2-3 years towards child bearing only, the mean CEB was found higher. This result however did not come out as significant one in MCA test.

For the women who didn't get any ANC, the fertility was found to be lowest, and it was highest for the women who got this from ANMs at their doorsteps (home). The women who used any family planning method were found to have higher fertility than those not using. This may due to the facts that majority of the family planning users have adopted sterilisation method and might be after achieving their desired family size. Average CEB was found slightly higher for women, who reported more mental strain in marital life but the difference was not found to be significant.

3.13. Multivariate Analysis:

To study the nature and magnitude of association of different physiological factors with the fertility, multiple classification analyses were carried out taking CEB as dependent variable, selected physiological variables as independent variables and woman's current age and marital duration as covariates.. The result gives the sole effect of each physiological factor on fertility, when the effect of other confounding (intermediate) factors is controlled. The Table 4 shows the result of MCA for selected physiological variables for all women. The grand mean CEB was found to be 2.80. The multiple R^2 was only 0.192 when all the independent variables were included and it increased to 0.484 when the covariates were also included. This means, all the independent predictors together could explain only 19.2 percent of the variation in the dependent variable CEB, whereas the independent variables along with the covariates could explain 48.4 percent of the variation in CEB.

The unadjusted deviation of the category mean from the grand mean CEB is shown in column 3 of the Table 4. The variable 'average years used for only child bearing' was found to be the most important predictor variable affecting the fertility (CEB) since the deviation by category means was found highest. Eta value (column 4) was also highest for this variable. Even after adjusting for other independent variables the category means (column 5) for this variables showed little variation. Beta value (column 6) however did not show any difference. When adjusted for other independents as well as covariates, the category means changed. The category mean CEB was found to be lower for women having more than 4 years of average period used for child bearing only that is a lower level of fecundity. Length of menstrual cycle beyond optimum (optimum is 28-31 days: Clarke and Cumley, 1962), and ANC not received for last delivery showed decline in category mean CEB both before and after adjusting for the independents and covariates but the effect (Eta and Beta values) showed variation. Age at menarche more than 12 years showed decline in fertility before adjustment, but after adjusting for independents and covariates the result

found different, which means that in the former case the influence of other factors were playing. However, the variation was very small and insignificant.

The Table 5 shows the result of MCA for selected physiological variables for scheduled caste women. The grand mean CEB was found to be 2.82. The multiple R^2 showed that all the independent predictors together could explain only 12.8 percent of the variation in the dependent variable CEB, whereas the independent variables along with the covariates could explain 50.6 percent of the variation in CEB.

The unadjusted deviation of the category mean from the grand mean CEB is shown in column 3 of the Table 5. The variable 'average years used for only child bearing' was found to be the most important predictor variable affecting the fertility (CEB) since the deviation by category means was found highest. Eta value (column 4) was also highest for this variable. But after adjusting for other independent variables the category means (column 5) for these variables it changed. Beta value (column 6) also showed large variation. The category mean CEB was found to be lower for women falling in to more than 4 years of average period used for child bearing that is a lower level of fecundity. When adjusted for other independents as well as covariates, the category means showed change and even the relationship also changed. So it seemed the covariates influenced the negative association of this variable with fertility. Length of menstrual cycle beyond optimum, and ANC not received for last delivery showed decline in category mean CEB both before and after adjusting for the independents and covariates but the effects (Eta and Beta values) showed variation. Age at menarche less than 13 years showed slight decline in fertility only after adjustment.

The Table 6 shows the result of MCA for selected physiological variables for scheduled tribe women. The grand mean CEB was found to be 2.77. The multiple R^2 was only 0.280 when all the independent variables were included and it increased to 0.492 when the covariates were also included. This means, all the independent predictors together could explain 28 percent of the variation in the dependent variable CEB, whereas the independent variables along with the covariates could explain 49.2 percent of the variation in CEB. Hence it justifies the inclusion of covariates such as woman's age and marital duration in the sense that without controlling their effect the real effect of the predictors cannot be ascertained.

The unadjusted deviation of the category mean from the grand mean CEB is shown in column 3 of the Table 6. The variable 'average years used for only child bearing' and length of menstrual cycle were found to be the most important predictor variables affecting the fertility (CEB) since the deviation by category means were found higher. Eta values (column 4) were also highest for this variable. After adjusting for other independent variables the category means (column 5) for this variable showed little change. Beta value (column 6) also showed smaller change. When adjusted for other independents as well as covariates, the category means showed more deviation so also the Beta values (column 8). The mean CEB for the women with menstrual cycle beyond optimum periods, was found lower than those had 28 to 31 days cycles. The other variable 'average years used for child bearing only' did not show consistent trend in fertility. For women with lower (less than 2

years) and higher (more than 3 years) average years used for child bearing only, the category mean were lower.

Only after the adjustment for the independent variables and covariates, the variable, ANC not received for last delivery showed considerable decline in category mean CEB, and the effect (Eta and Beta values) showed variation. Age at menarche more than 12 years showed decline in fertility before adjustment, but after adjusting for independents and covariates the effect narrowed down, which means that in the former case the influence of other factors were there.

3.2. Women's behavioural (perception) factors and fertility:

3.21. Behavioural characteristics of the sample women:

The Table 7 showed that around 27 percent of all women feel a family size of 4 or more children to be an ideal condition and 10 percent could not report a specific number to this question. However, a little higher proportion of Scheduled tribe women as compared to Scheduled caste women (28 per cent Vs. 26 per cent) perceived a family size of 4 or more children to be ideal. A major chunk (60 percent) of the sample women perceived an interval of 2-3 years between the subsequent births to be ideal. Scheduled caste women in this regard were less in proportion than STs. Even twenty percent of all perceived a birth interval of 4 years or more as ideal. A higher proportion of scheduled caste women fall into this category. It was again found that overall 40 percent and relatively more SC women (65 % SC Vs. 55 % ST) perceived an interval of more than one year between marriage and the first birth to be an ideal condition. Nineteen percent of all women could not report any specific period regarding this.

By sex composition of the children, it was found that 44 percent of all women perceived two sons to be an ideal composition and 11 percent reported more than 3 sons in the completed family to be an ideal situation. Compared to scheduled caste women, a higher proportion of scheduled tribe women perceived more sons in a family to be the ideal condition. Similar responses were observed regarding the desired number of sons at the beginning of family building process. Forty-two percent overall and again comparatively more ST women reported that they desired 2 or more sons at the beginning of family building process.

With regard to the access to fertility decision-making, 77 percent of all and comparatively little higher proportion of scheduled tribe women reported to take part in fertility decision. So far as contraceptive knowledge is concerned, 84 percent of all reported to have some knowledge. Only 9 percent of all women reported a more or less correct probable period (days) of conception within the menstrual cycle of a woman. Comparatively little more ST women were found to have both these knowledge.

The Table 8 gives a quick assessment of differentials in the ideal, desired and actual family size of the women and also their husbands. The reported desired family size of both husband and wife was found to be lower than the actual number of surviving

children which is again little lower than actual CEB and reported ideal family size. Comparatively, more schedule tribe women reported larger ideal and desired family size than scheduled caste women, but in practice their fertility level is slightly lower than the later.

3.22. Bivariate Analysis:

The Table 9 presents the average actual fertility (mean CEB) by the behavioural factors of the women. The women who perceived a larger family size to be an ideal condition were found to have higher fertility. This association persisted to be more significant in the middle age group women who belonged to scheduled tribe. A negative association of fertility with the women's perceived birth interval consistently emerged out in the bivariate analysis. A higher level of fertility was observed for the women who could take part in the fertility decision-making. This may be a result of the reverse causation and probably women at higher ages with more children have better access to decision making in the household. A negative association was found between the fertility and the correct knowledge of women about the probable period of conception in the women's menstrual cycle. But in case of scheduled caste women only, the factor, knowledge about the most probable period of conception showed a positive association with CEB.

The women who had some knowledge of family planning methods were found to have a significantly higher fertility. In case of the Scheduled tribe women we observed a higher magnitude of variation. It was found that fertility tends to increase with the women's perceived ideal and desired number of sons and total children. This kind of a phenomenon was found to be more significant in middle age group women.

3.23. Multivariate Analysis:

To causal relationship of the behavioural factors of women with fertility, multiple classification analyses were undertaken taking children ever born (CEB) as dependent variable, and women's selected behavioural variables along with the background factors as independent variables. The results show the sole effect of each factor on fertility, when the influences of other confounding (intermediate) factors are controlled. The variables woman's current age and marital duration were taken as covariates.

The Table 10 shows the result of MCA for Behavioural characteristics for all (SC and ST) women. The grand mean CEB was found to be 2.80. The multiple R^2 of the MCA indicates that all the independent predictors together could explain only about 6 percent of the variation in the dependent variable CEB, whereas the independent variables along with the covariates could explain about 35 percent of the variation in CEB. It shows that this is necessary to include covariates such as woman's age and marital duration to know the real effect of the predictors after controlling the effect of covariates.

The unadjusted deviation of the category mean from the grand mean CEB is shown in col. 3 of the Table b3. The variables desired family size just after marriage and ideal family size of the women were found to be the most important predictor variables affecting

the fertility (CEB) since the deviation by category means were found higher. Eta values (col. 4) were also higher for this variable. Even after adjusting for other independent variables the category means (col. 5) for the variable desired family size remained almost same. Beta value (col. 6) also did not show much difference. However, when adjusted for other independents as well as covariates, the category means (col.7) and Beta value (col. 8) for the variable ideal family size showed drastic change. For women who desired a higher family size (at the beginning of family building) and those reported a higher family size to be ideal had higher fertility i.e., the category mean increased to 2.87 and 2.83 respectively (col.7). Thus it showed that the real effect of the variables desired family size and ideal family size of the women were to raise the fertility.

The variables such as perceived ideal birth interval of 2 to 3 years showed decline in category mean CEB both before and after adjusting for the independents and covariates. The variable proper knowledge of women about probable conception days in a menstrual cycle did not show any significant change in fertility, after adjusting for independents and covariates though little decline in fertility was found before adjustment.

The Table 11 shows the result of MCA for Behavioural characteristics for scheduled caste women. The grand mean CEB was found to be 2.82. The multiple R^2 was only 0.081 when the independent variables were included and it increased to 0.364 when the covariates were also included. This means, all the independent predictors together could explain about 8 percent of the variation in the dependent variable CEB, whereas the independent variables along with the covariates could explain about 36 percent of the variation in CEB. This justifies the inclusion of covariates such as woman's age and marital duration in the sense that without controlling their effect the real effect of the predictors cannot be ascertained.

The unadjusted deviation of the category mean from the grand mean CEB is shown in col. 3 of the Table 11. The variable 'desired family size of the women just after marriage' was found to be the most important predictor variable affecting the fertility (CEB) since the deviation by category mean was found higher. Eta value (col. 4) was also higher for this variable. After adjusting for other independent variables the category means (col. 5) for these variables changed. Beta value (col. 6) also showed big difference. When adjusted for other independents as well as covariates, the category means (col.7), and Beta value (col. 8) showed drastic change. For women who desired a higher family size had higher fertility i.e., the category mean increased to 2.95 (col.7). Thus it showed that the real effect of the variable 'desired family size of the women just after marriage' was to raise the fertility. The variable 'ideal birth interval' perceived by women as 2 to 3 years showed decline in category mean CEB both before and after adjusting for the independents and covariates. The correct knowledge of women about probable conception days in a menstrual cycle showed decline in fertility only after adjusting for both independents and covariates.

The Table 12 shows the result of MCA for Behavioural characteristics for scheduled tribe women. The grand mean CEB was found to be 2.77. The multiple R^2 showed that all the independent predictors together could explain about 9 percent of the variation in the dependent variable CEB, whereas the independent variables along with the covariates could explain about 39 percent of the variation in CEB. It shows that this is necessary to include

covariates such as woman's age and marital duration to know the real effect of the predictors after controlling the effect of covariates.

The unadjusted deviation of the category mean from the grand mean CEB is shown in col. 3 of the Table 12. The variables desired family size (at the beginning of family building) and ideal family size of the women were found to be the most important predictor variables affecting the fertility (CEB) since the deviation by category means were found higher. Eta values (col. 4) were also higher for these variables. After adjusting for other independent variables the category means (col. 5) for these variables changed little. Beta value (col. 6) also shows some difference. However, when adjusted for other independents as well as covariates, the category means (col. 7) and Beta value (col. 8) showed more change. For women who desired a higher family size and those who reported a higher family size to be ideal had higher fertility i.e., the category mean increased to 2.80 and 2.88 respectively (col.7). Thus it showed that the real effect of the variables desired family size and ideal family size of the women were to raise the fertility. The variables such as perceived ideal birth interval of 2 to 3 years showed decline in category mean CEB only before adjusting for the independents and covariates.

3.3. Qualitative information on People's fertility behaviour:

Regarding the fertility preference, some of the answers coming out of the FGDs, and informal interview of local people of the study area are presented below.

- In an informal interview regarding longer interval between marriage and first birth or subsequent birth intervals almost in the absence of use of any spacing method of family planning by, various kinds of responses were obtained which are exactly translated from the local language as follows.

1. Situra scheduled tribe people of Nuamouza village, who are more or less illiterate and with a very lower socio-economic status reported,

i. *For one or two years the body would not be strong, then how can anything come.*
ii. *The fruit can come only when the tree becomes ready to bear.*
iii. *How can we know.*
iv. *Sir, no more strength we have.*
v. *Sir, automatically.*
vi. *By own control.*

2. Some local educated people, doctors and other medicine men reported,

i. *This is natural.*
ii. *There is some problems with nutrition.*
iii. *Husband starts sexual intercourse before the wife is sexually stimulated, so the physiology doesn't lead to fertilisation of the egg.*
iv. *People don't have knowledge about the most probable days of conception within a menstrual cycle.*

From majority of the above observations there comes an impression that the illiterate person perceive the fertility, solely as a function of individual's physiological capacity to

bear like any other life-forms and is not controlled by human. However only one reported that it is controlled by them but how exactly was not reported. But literate people perceived the phenomenon of fertility as mainly of behavioural in nature.

- To the question asked to some couples presently in their reproductive span, "after the last child, you don't use contraceptives and both (spouses) stay together, then how there is no further pregnancy ?" The answers were,

i. Sir, from our side.
ii. God has given that much, what more is required.

- Even during survey for quantitative data to a question on whether they need any more children now, some people responded as,

I. If god gives then what we will throw them ?
II. If we need whether the government will give us ?

- Regarding the motivation of female sterilisation, from village women and from the ANMs, different kinds of response came, viz.,

i. Some women reported that they are very angry on the ANM in their village, because she always tells them to go for sterilisation operation and never about any other methods. They reported that the ANMs are not regular and some said have never seen her.
ii. Few ANMs however reported that, "though in pen and paper target free approach (TFA) is there, but in reality, senior medical officers give them (ANMs) some target for female sterilisation and we have to cover them before the next common meeting".

- About the fertility preference and sterilisation regret, some middle to old aged women told,

i. A family should have 6 children, since, even if one or two will be taken away by 'yama' (death god), there are still 4 children and that is OK for a family.

Where as one woman told,

ii. "Due to severe weakness, being frightened, I went for sterilisation operation, though I wanted to have one more daughter".

4. CONCLUSION:

The bivariate and multivariate analyses of the potential bio-demographic factors of fertility showed that in terms of family planning (FP) behaviour of all sample women it was found that majority of the women reported to have at least heard of any modern family planning method and that too female sterilisation. Less than one fourth were currently using any family planning method and again mainly female sterilisation. These situations call for a need for intervention of spacing method of family planning for a regulated fertility.

The studied physiological factors showed that fecundity variable like higher average years used for only child bearing emerged as a important predictor of lower fertility (except for SC women). Although the length of menstrual cycle beyond optimum, ANC not received for last delivery and age at menarche more than 12 years were found to reduce fertility, but results were not very consistent when adjusted for other confounding factors.

This paper analyses the women's behavioural factors with regard to impact on fertility. The behavioural factors of women such as higher desired family size and longer perceived ideal birth interval has been consistently associated with lower fertility. For Scheduled caste population, the association of woman's correct knowledge about probable days of conception within menstrual cycle, with lower fertility gives impression that this knowledge may provide chance to the woman or couple to go for some kind of fertility control mechanism.

The verbatim and incidents presented in the paper give an impression that at one hand the child survival is at demand and in other hand there seem to have a need for access to controlled and intended fertility.

Table 1: Physiological characteristics of the sample women. **(in percentage)**

Variables	SC(N=300)	ST(N=300)	Total(N=600)
Woman's Age (in Yrs.)			
13-19	12.7	12.0	12.3
20-34	62.0	58.7	60.3
35+	25.3	29.3	27.4
Open BI (in Yrs.)			
<2	54.7	57.3	56.0
2-5	24.0	23.7	23.8
6+	21.3	19.0	20.2
Age at menarche (in Yrs.)			
<13	69.7	60.3	65.0
13+	30.3	39.7	35.0
Length of menstrual cycle			
<28	4.3	5.3	4.8
28-31	79.3	85.3	82.4
32 +	16.4	9.4	12.8
Age at last delivery (in Yrs.)			
<17	5.0	6.4	5.7
17-19	20.7	11.4	16.1
20-29	55.5	57.8	56.6
30-35	13.4	15.4	14.4
>36	5.4	9.0	7.2
Average years used only child bearing (in Yrs.)			
< 2	31.8	31.6	31.7
2-3	32.2	31.6	31.8
4+	36.0	36.8	36.5
ANC received for last pregnancy			
No	59.7	68.0	63.8
Self at health centre	30.7	20.0	25.4
Health worker at home	9.6	12.0	10.8
Family planning use			
No	79.7	82.3	81.0
Yes	20.3	17.7	19.0
Mental Strain			
Rare	49.3	49.3	49.3
Less	32.7	39.4	36.0
More	18.0	11.3	14.7

Table 2: Mean Values of selected physiological variables

Variables	SC	ST	Total
Woman's age at marriage (yrs.)	15.9	15.9	15.9
Husband's age at marriage (yrs.)	21.5	21.4	21.4
Age at last delivery (yrs.)	24.1	25.4	24.7
Reproductive duration (yrs.)	11.2	12.1	11.6
Open birth interval (yrs.)	3.5	3.2	3.3
Marital duration (yrs.)	13.0	13.4	13.2
Woman's current age (yrs.)	29.0	29.0	29.0
Husband's current age (yrs.)	34.5	34.8	34.7

Table 3: Mean CEB by physiological characteristics of the sample women.

Variables	SC	ST	Total
Current age (in yrs.)			
13-19	0.57*	0.66*	0.62
20-34	2.76	2.44	2.61
35+	4.07	4.29	4.19
Open birth interval (in yrs.)			
<2	2.48*	2.29*	2.38*c
2-5	3.18	2.39	3.23
6+	3.28	3.59	3.42
Age at menarche (in yrs.)			
<13	2.82	2.87	2.84
13+	2.82	2.67	2.71
Length of menstrual cycle			
<28 days	2.50@	1.68@	2.06b
28-31 days	2.90	2.96	2.93
32+ days	-	-	2.29
Age at last delivery (in yrs.)			
<17	1.13*	0.73*	0.91ac
17-19	1.33	1.32	1.33
20-29	3.04	2.60	2.82
30-35	3.90	4.41	4.27
36+	5.12	4.44	4.79
Average years used only child bearing (in Yrs.)			
< 2	2.22	1.55	1.98
2-3	3.64	4.11	3.88
4+	2.60	2.66	2.65
ANC received for last pregnancy			
No	2.73[b]	2.71	2.72[abc]
Self from health centre	2.98	2.78	2.90
From health worker at home	2.86	3.11	3.00
Family planning use			
No	2.57*[b]	2.54*	2.54*
Yes	3.80	3.94	3.86
Mental Strain			
Rare	2.73	2.52	2.63
Less	2.90	2.96	2.93
More	2.90	3.20	3.02
Total	2.82	2.77	2.80

Note:

a refers to significant F value (at 90 per cent CI) for age group 13-19 yrs.
b refers to significant F value (at 90 per cent CI) for age group 20-34 yrs.
c refers to significant F value (at 90 per cent CI) for age group 35 yrs. and above.
* refers to significant F value (at 90 per cent CI) for age group 13-49 yrs.

Table 3. 24: Summary result of Multiple Classification Analysis (MCA) for physiological variables for **All women**.

(Dependant variable = CEB (continuous)

Covariates- Woman's current age and Marital duration.

Grand mean CEB- 2.80, N=600.

Variables with category	N	Unadjusted Dev'n	Eta	Adjusted for Independents Dev'n	Beta	Adjusted for Independents + Covariates Dev'n	Beta
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Open birth interval (in Yrs.)							
< 2	336	-0.41		-0.48		-0.11	
2-5	143	0.44		0.22		0.31	
6+	121	0.63	0.22	1.06	0.28	-0.07	0.08
Average years used only child bearing (in Yrs.)							
< 2	193	-0.88		-0.45		0.16	
2-3	189	1.08		1.19		0.93	
4+	218	-0.15	0.37	-0.63	0.37	-0.95	0.36
Age at Menarche (in Yrs.)							
< 13	390	0.05		0.00		-0.04	
13 +	210	-0.09	0.03	0.00	0.00	0.08	0.03
Length of menstrual cycle (in days)							
< 28	29	-0.73		-0.40		-0.16	
28-31	494	0.14		0.08		0.03	
32 +	77	-0.61	0.14	-0.36	0.08	-0.15	0.03
ANC received for last Pregnancy							
No	383	-0.08		-0.06		-0.21	
Self from health centre	152	0.11		0.10		0.35	
From health worker at home	65	0.20	0.05	0.14	0.04	0.43	0.13
Multiple R^2				0.192		0.484	
Multiple R				0.438		0.696	

Table 5: Summary result of Multiple Classification Analysis (MCA) for physiological variables for **SC women**.

(Dependant variable = CEB (continuous),
Covariates- Woman's current age, Marital duration.
Grand mean CEB- 2.82, N=300.

Variables with category	N	Unadjusted Dev'n	Eta	Adjusted for Independents Dev'n	Beta	Adjusted for Independents + Covariates Dev'n	Beta
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Open birth interval (in Yrs.)							
< 2	164	-00.34		-0.46		-0.09	
2-5	72	00.36		0.19		0.26	
6+	64	0.46	0.18	0.96	0.27	-0.05	0.07
Average years used only child bearing (in Yrs.)							
< 2	98	-0.56		-0.20		0.51	
2-3	95	0.82		0.93		0.78	
4+	107	-0.22	0.28	-0.65	0.32	1.16	0.42
Age at Menarche (in Yrs.)							
< 13	209	0.00		-0.05		-0.10	
13 +	91	0.00	0.00	0.12	0.04	0.23	0.07
Length of menstrual cycle (in days)							
< 28	13	-0.13		0.05		0.20	
28-31	238	0.08		0.05		0.03	
32 +	49	-0.37	0.08	-0.25	0.05	-0.19	0.04
ANC received for last pregnancy							
No	179	-0.09		-0.13		-0.29	
Self from health centre	92	0.17		0.20		0.40	
From health worker at home	29	0.04	0.06	0.15	0.07	0.51	0.17
Multiple R^2				0.128		0.506	
Multiple R				0.358		0.711	

Table 6: Summary result of Multiple Classification Analysis (MCA) for physiological variables for **ST women**.

(Dependant variable = CEB (continuous),
Covariates- Woman's current age, Marital duration.
Grand mean CEB- 2.77, N=300.

Variables with category	N	Unadjusted Dev'n	Eta	Adjusted for Independents Dev'n	Beta	Adjusted for Independents + Covariates Dev'n	Beta
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Open birth interval (in Yrs.)							
< 2	172	-0.49		-0.51		-0.14	
2-5	71	0.52		0.24		0.32	
6+	57	0.82	0.26	1.22	0.30	0.01	0.08
Average years used only child bearing (in Yrs.)							
< 2	95	-1.22		-0.69		-0.19	
2-3	94	1.34		1.44		1.12	
4+	111	-0.09	0.46	-0.62	0.44	-0.78	0.36
Age at Menarche (in Yrs.)							
< 13	181	0.10		0.07		0.02	
13 +	119	-0.15	0.05	-0.11	0.04	-0.03	0.01
Length of menstrual cycle (in days)							
< 28	16	1.21		-0.67		-0.40	
28-31	256	0.19		0.11		0.04	
32 +	28	1.03	0.20	-0.58	0.11	-0.15	0.05
ANC received for last pregnancy							
No	204	-0.06		0.01		-0.13	
Self from health centre	60	0.01		-0.09		0.21	
From health worker at home	36	0.33	0.06	0.12	0.03	0.37	0.09
Multiple R^2				0.280		0.492	
Multiple R				0.529		0.701	

Table 7: General behavioural characteristics of the sample women. **(in percentage)**

Background characteristics	SC (N=300)	ST (N=300)	Total(N=600)
Perceived ideal family size			
Don't know	10.7	9.3	10.0
1-3	63.6	63.0	63.3
4+	25.7	27.7	26.7
Perceived ideal birth interval			
Don't know	15.7	14.7	15.2
1 yr	2.0	5.0	3.5
2-3 yrs.	56.6	63.3	60.0
4+ yrs.	25.7	17.0	21.3
Perceived ideal interval between marriage and first birth			
Don't know	19.7	18.7	19.3
1 yr.	15.0	26.3	20.7
2 yrs.	44.0	37.3	40.5
3+ yr.	21.3	17.7	19.5
Perceived ideal no. of sons			
Don't know	15.0	15.7	15.5
1	40.1	19.7	29.5
2	38.9	48.3	43.8
3+	6.0	17.3	11.2
Desired no. of sons just after marriage			
Don't know	29.3	36.0	32.5
1	33.0	17.3	25.2
2	30.4	35.7	33.0
3+	7.3	11.3	9.3
Woman takes part in fertility decision			
No	25.3	21.3	23.3
Yes	74.7	78.7	76.7
Know about any family planning method			
Yes	83.3	84.3	83.8
No	16.7	15.7	16.2
Knowledge about probable period (days) of conception			
Don't know/wrong	92.3	90.3	91.3
Right	7.7	9.7	8.7

Table 8: Mean values of Behavioural Variables:

Variables	SC	ST	Total
Woman's ideal Family Size	2.57	3.09	2.83
Woman's ideal Interval between marriage & first birth (yr.)	1.80	1.62	1.71
Woman's Ideal BI (yrs.)	2.72	2.47	2.60
Woman's Ideal no. of sons	1.43	1.73	1.58
Woman's desired no. of sons	1.26	1.43	1.35
Woman's desired family Size	2.08	2.11	2.09
Husband's desired family Size	1.87	1.73	1.80
Total conceptions	3.05	2.94	2.99
Total living children	2.33	2.22	2.28
CEB	**2.82**	**2.77**	**2.80**

Table 9: Mean CEB by behavioural characteristics of the sample women.

Variables	SC	ST	Total
Ideal family size			
Don't know	2.56	3.42[b]	2.96
1-3	2.75	2.33	2.56
4+	3.10	3.23	3.17
Ideal birth interval			
Don't know	3.02[c]	3.02	3.02[b]
1 yr.	3.66	3.13	3.28
2-3 yrs.	2.73	2.72	2.73
4+ yrs.	2.83	2.64	2.75
Ideal interval between marriage and first birth			
Don't know	3.00	3.05	3.02[a]
1 yr.	2.97	2.45	2.64
2 yrs.	2.54	2.94	2.72
3+ yrs.	3.12	2.61	2.88
Ideal no. of sons			
Don't know	2.60[b]	2.89*[b]	2.75[b]
1	2.55	1.94	2.35
2	3.15	2.80	2.95
3+	3.00	3.52	3.38
Desired no. of sons just after marriage			
Don't know	3.12	3.33*[bc]	3.24[bc]
1	2.31	1.76	2.12
2	2.86	2.50	2.67
3+	3.72	3.41	3.53
Desired family size just after marriage			
Don't know	3.14	3.34*	3.25
1	1.50	2.66	2.20
2	2.35	1.70	2.12
3+	3.00	2.75	2.86
Woman takes part in fertility decision			
No	2.46[b]	2.40	2.43*
Yes	2.94	2.87	2.91
Knowledge on probable period of Conception			
Don't know/wrong	2.81[b]	2.79	2.80
Right	2.91	2.62	2.75
Know about any family planning method			
Yes	2.84	2.88	2.86*
No	2.70	2.17	2.44
Total	2.82	2.77	2.8

Note: a refers to significant F value (at 90 per cent CI) for age group 13-19 yrs.
b refers to significant F value (at 90 per cent CI) for age group 20-34 yrs.
c refers to significant F value (at 90 per cent CI) for age group 35+ yrs.
* refers to significant F value (at 90 per cent CI) for age group 13-49 yrs.

Table 10: Summary result of Multiple Classification Analysis (MCA) for Behavioural characteristics for **All women**.

(Dependant variable = CEB (continuous),
Covariates- Woman's current age, Marital duration.
Grand mean CEB- 2.80, N=600.

Variables with category	N	Unadjusted Dev'n	Eta	Adjusted for Independents Dev'n	Beta	Adjusted for Independents + Covariates Dev'n	Beta
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ideal family size							
Don't know	60	0.17		-0.56		0.01	
1-3	350	-0.23		-0.02		-0.02	
4+	190	0.38	0.13	0.22	0.10	0.03	0.01
Ideal birth interval							
Don't know	91	0.22		0.36		0.22	
1 yr.	21	0.49		0.69		0.25	
2-3 yrs.	360	-0.07		-0.12		-0.10	
4+ yrs.	128	-0.04	0.06	-0.05	0.10	0.07	0.06
Desired family size just after marriage							
Don't know	197	0.45		0.49		0.19	
1-2	158	-0.67		-0.65		-0.35	
3+	245	0.07	0.20	0.03	0.20	0.07	0.10
Woman take part in fertility decision							
No	140	-0.36		-0.43		-0.18	
Yes	460	0.11	0.09	0.13	0.11	0.06	0.05
Knowledge on probable period of conception							
Don't know/wrong	548	0.00		0.00		0.00	
Right	52	-0.05	0.01	0.01	0.00	0.02	0.00
Multiple R^2				0.061		0.349	
Multiple R				0.247		0.591	

Table 11: Summary result of Multiple Classification Analysis (MCA) for Behavioural characteristics for **SC women**.

(Dependant variable = CEB (continuous),
Covariates- Woman's current age, Marital duration.
Grand mean CEB- 2.82, N=300.

Variables with category	N	Unadjusted Dev'n	Eta	Adjusted for Independents Dev'n	Beta	Adjusted for Independents + Covariates Dev'n	Beta
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ideal family size							
Don't know	32	-0.26		-1.85		-1.09	
1-3	191	-0.07		0.23		0.18	
4+	77	0.28	0.08	0.19	0.31	-0.01	0.18
Ideal birth interval							
Don't know	47	0.20		1.10		0.64	
1 yr.	6	0.84		1.12		1.08	
2-3 yrs.	170	-0.09		-0.28		-0.24	
4+ yrs.	77	0.01	0.08	-0.14	0.25	0.05	0.17
Desired family size just after marriage							
Don't know	89	0.32		0.57		0.22	
1-2	101	-0.49		-0.64		-0.34	
3+	110	0.19	0.17	0.13	0.24	0.13	0.12
Woman take part in fertility decision							
No	76	-0.36		-0.48		-0.35	
Yes	224	0.12	0.10	0.16	0.14	0.12	0.10
Knowledge on probable period of conception							
Don't know/wrong	277	-0.01		-0.01		0.02	
Right	23	0.09	0.01	0.11	0.02	-0.28	0.04
Multiple R^2				0.081		0.364	
Multiple R				0.284		0.603	

Table 12: Summary result of Multiple Classification Analysis (MCA) for Behavioural characteristics for **ST women.**

(Dependant variable = CEB (continuous),
Covariates- Woman's current age, Marital duration.
Grand mean CEB- 2.77, N=300.

Variables with category	N	Unadjusted Dev'n	Eta	Adjusted for Independents Dev'n	Beta	Adjusted for Independents + Covariates Dev'n	Beta
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ideal family size							
Don't know	28	0.65		0.46		0.96	
1-3	159	-0.44		0.28		-0.25	
4+	113	0.45	0.21	0.29	0.14	0.11	0.16
Ideal birth interval							
Don't know	44	0.25		0.14		-0.07	
1 yr.	15	0.36		0.54		-0.02	
2-3 yrs.	190	-0.05		0.01		0.03	
4+ yrs.	51	-0.13	0.06	0.08	0.06	-0.03	0.02
Desired family size just after marriage							
Don't know	108	0.57		0.49		0.23	
1-2	57	1.02		0.83		-0.52	
3+	135	-0.02	0.25	0.04	0.21	0.03	0.12
Woman take part in fertility decision							
No	64	-0.37		0.42		-0.01	
Yes	236	0.10	0.09	0.11	0.10	0.00	0.00
Knowledge on probable period of conception							
Don't know/wrong	271	0.02		0.00		-0.04	
Right	29	-0.16	0.02	0.04	0.01	0.37	0.05
Multiple R^2				0.091		0.387	
Multiple R				0.302		0.622	

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