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BIRTH INTERVAL APPROACH TO ESTIMATE THE TOTAL FERTILITY RATE OF MIGRANT COUPLES

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ABSTRACT

The total fertility rate is generally calculated from the number of births to women by their age, and thus by the age specific fertility rates (ASFR), which is mostly based on the information of ASFR for non migrant couples or for the mixture of migrant and non-migrant couples both. This article gives a simple procedure to estimate the Total Fertility Rate (TFR) of migrated couples by using the information on birth interval. This study gives a picture of how the temporary separation of couples where males leaving their wives at home due to the migration affects fertility through a theoretical procedure proposed under reasonable circumstances. The proposed procedure has been applied to an observed set of data relating to migrants from a rural area.

KEYWORDS: Birth Intervals, Fecundability, Migrant Couples, Total Fertility Rate

INTRODUCTION

Human fertility is a complex biological phenomenon. It is influenced by biological variables as well as by a number of socio-economic, demographic and cultural factors. In developing countries like India, the male migrant, mostly moves without their family at least at the beginning period of start of migration and they use to visit their home at some certain interval of time. Such temporary separation between couples caused by Migration, especially in developing countries plays an important role in changing the socio-economic, cultural and other conditions of the people and hence affects the fertility of migrant couples (Goldstein et. al. [2]; Mishra et. al. [3] and Yadava and Yadava [7]).

A number of probability models have been derived to study the fertility behaviour of a migrated couple based on the number of births occurred during a fixed period of time (Singh et.al.[6] and Yadava et.al.[8]). Also, the use of birth interval data has been widely practiced to estimate fecundability and to provide indices for detecting current and frequent changes in fertility patterns of women during the reproductive ages (Yadava et.al.[9]) but only a few model based approaches have been done to study the fertility behaviour of such migrated couples based on birth intervals data. Models based on birth interval data provide better indicators for detecting current changes in fertility behaviour of a couple rather the fertility indices based on the number of births (Chakraborty [1]).

The wives of migrated husbands get less exposure time for conception as compared to a non-migrant couple, although, the effect of such separation on fertility depends on the proportion of separated wives from their husbands and the duration of separation. Also, due to a high coital frequency among the migrated couples, it has been observed that the fertility performance of both types of couples (migrated and non- migrated) is not much different regardless of a big difference in exposure time between and non-migrated couples, (Singh *et.al.*, [6] and Yadava and Yadava [7]).

This study attempts to develop a simple procedure to estimate the total fertility rate (TFR) of migrant couples based on closed birth interval data. Here, a couple is defined as migrant when one of the partners (spouse) is staying at some distant place and visit his/her spouse after certain interval of time. The procedure is applied to an observed real data set, collected from the rural areas. The study gives some reasonably consistent estimate of TFR.

PROCEDURE FOR THE ESTIMATION OF TFR

Total fertility rate (TFR) is defined as

$$TFR = \sum_{x=\alpha}^{\beta} f_x = \int_{\alpha}^{\beta} f_x dx \tag{1}$$

where,

f_x = age specific fertility rate (ASFR) of female of age x

α = lower limit of the reproductive period

β = upper limit of the reproductive period

Thus, the total exposure period for a female to conceive is (β - α), if both the partners are living together. Instead of computing the total fertility rate by summing age specific fertility rates, the birth interval analysis considers the progression from one birth to the next in the course of a woman's reproductive life. The procedure for computing the total fertility rate through birth interval approach rests on the principle that since the female reproductive span is limited in extent, a woman's total fertility rate can be viewed in terms of the interval between her first exposure to the risk of giving birth and her first birth, and then in terms of the average interval between subsequent births. If all birth occurs at the same length of the interval in the population under consideration, the average total fertility rate in the population would be equal to the ratio of the length of the reproductive span from beginning of the first interval to end of last to the length of the interval (Preston, S. et.al. [4]).

Assuming fecundability p to be constant across women between the ages α and β and zero outside, the expected interval between conceptions comes out to be $(\frac{1}{p} + 9 + s_b)$ (Preston, S. et.al.[4]), where s_b is non-susceptible period after a birth. On average, assuming no fetal loss, a birth will thus occur $(\frac{1}{p} + 9)$ months after marriage and then every $(\frac{1}{p} + 9 + s_b)$ months thereafter. Usually, the nature of First Birth Interval has been found to be different in terms of waiting time for conception, fecundability, age at marriage, etc. than other closed birth intervals (CBI) having a component of post partum non-susceptible period. Taking this into account and by dividing the time left after the first birth by the average birth interval and adding the first birth, the TMFR appears as:

$$TMFR = 1 + \frac{\beta - \alpha - \left(\frac{1}{p} + 9\right)}{d_i} \tag{2}$$

where,

di is i th closed birth interval (CBI) between i th to (i-1) th birth.

If $i = 0$, then the birth interval is the first birth interval (FBI) from marriage to first birth.

But, where marriage is a legal prerequisite for cohabitation and, if we assume that every woman "marries" (i.e., begin here exposure to the risk of conception) at age $\alpha_{m,}$say, ($\alpha_m > \alpha$) and that there is one to one correspondence between a conception and a live birth, then the marital duration for female to conceive would be (β - α_m). Thus the total period of exposure for a female to have a risk of conception is (β - α_m). Then the average total fertility rate will be

$$TFR = 1 + \frac{\beta - \alpha_m - \left(\frac{1}{p} + 9\right)}{d_i} \tag{3}$$

This result has been given by Preston (2001). But in the above expression, α_m should be replaced by α_1, say, where α_1 is age at first birth since the first birth has been added in the calculation of TFR separately and hence the total period of exposure is to be taken from age at first birth to the upper limit of reproductive age.

Now, in case of a migrant couple if we assume that a migrant husband visits his home after one year and stays for about *t* months, then the exposure period for conception during the reproductive span would be

$$\frac{\left\{(\beta - \alpha_1) - \left(\frac{1}{p} + 9\right)\right\}t}{12}$$

Further, from figure. 1, it is clear that if the husband visits his home next year, her wife is not exposed to the risk of conception in that year as she is in PPA due to conception in the first year period. In that case, a female is exposed to the risk of conception only for *t* months in two years and hence the exposure period during the whole reproductive span would be

$$\frac{\left\{(\beta - \alpha_m) - \left(\frac{1}{p} + 9\right)\right\}t}{24} \tag{4}$$

Further, to find the average birth interval for the migrant couples, an expression for estimating CBI's for such couples found by Yadava *et.al*. [10]) may be utilised which is given as,

$$d_{ic}^{*} = 1.25 + \frac{(1 - Sp^{*})(2.25 - 1.25q^{*})}{p^{*}} = E(x) \tag{5}$$

Where

S= Proportion of females exposed to the risk of conception during the visit of their husbands

p*= Probability of conception during the visit period which is taken as y months in a year

$$q^{*} = (1 - p^{*})$$

Thus TFR for a migrant couple would be

$$TFR = 1 + \frac{\left\{(\beta - \alpha_1) - \left(\frac{1}{p} + 9\right)\right\}\frac{t}{24}}{d_{ic}^{*}} \tag{6}$$

A conception may result either in a live birth or in a foetal loss. Let α be the proportion of conception not resulting in live births. Then average CBI (dic**) is calculated by

$$d_{ic}^{**} = 1.25Sp^{*}(1-\alpha) + \frac{(1 - Sp^{*} + \alpha Sp^{*})(1 + 1.25p^{*} - 1.25\alpha p^{*})}{p^{*}(1-\alpha)} = E(x)$$

and then TFR for a migrant couple would be

$$TFR = 1 + \frac{\left\{(\beta - \alpha_1) - \left(\frac{1}{p} + 9\right)\right\}\frac{t}{24}}{d_{ic}^{**}} \quad \textbf{(7)}$$

ILLUSTRATION

For the application purpose, we take $p^* = 0.414, S = 0.35$ (as taken by Yadava *et.al.* [10]). If we take, $t = 2$ months, i.e. when husband visits his wife in a year stays at home for two months, then the values of TFR for different values α and β are given in the following table

Table 1

α_1 / β	30	40	45
18	1.4	1.53	1.65
21	1.33	1.45	1.58
25	1.23	1.35	1.48

From the above table, we see that if the lower limit of reproduction period (α_1) is the 21 years and value of the upper limit of the reproduction, i.e. the time of menopause (β) is 40 years, and then the value of TFR came out to be 1.45.

CONCLUSIONS

In this study, we obtained some consistent estimates of TFR for migrant couples through the proposed procedure under several alternative reasonable circumstances. The administrators and population policy makers can fruitfully imply it to a region or nation, where a large number of couples practice in such a migration process.

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APPENDIX

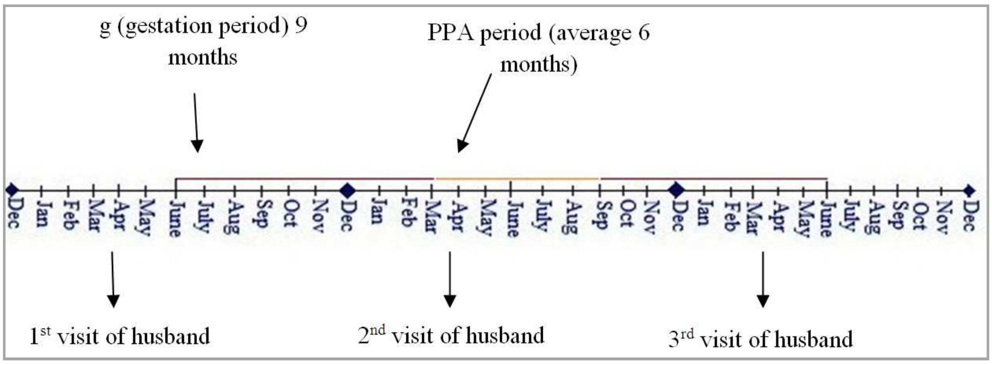

Figure 1: Exposure Period for Wife of a Migrant Husband