ESTIMATES OF TOTAL FERTILITY RATE AFTER ADJUSTMENT OF QUANTUM AND TEMPO EFFECT ON FERTILITY

Sandip Chakraborty[1]

Introduction and Objectives:

Estimates of fertility are among the most widely used demographic statistics. In many developing countries, policy makers, program managers and demographers to determine whether and how fertility is moving in the desired downward direction avidly watch recent levels and trends in fertility. In the developed nations the fertility is in the historic lows, these same statistics are examined for signs of an upturn in fertility back to the replacement level needed to prevent future declines in population size. For measuring the human reproduction, it is very much needed for the demographers, policy makers to understand the strength and weakness of these available fertility indicators.Total Fertility Rate is now used more often than any other indicator. The Total Fertility Rate is defined as the average number of births a woman would have if she were to live through out reproductive span and bear children at each age at the rates observed in a particular year or period. The advantage of the Total Fertility Rate is that it measures current fertility and therefore gives up-to-date information on levels and trends in fertility. Another reason for the popularity of the Total Fertility Rate is its ease of interpretation compared with some other measures. Now the basic question is whether the Total Fertility Rate is totally free from error or not. The simplicity and wide availability of the Total Fertility Rate have contributed to a neglect of some deficiencies in this fertility indicator. The demographic literature on the measurement of fertility includes many criticisms of and alternatives to the conventional Total Fertility Rate, but there is no agreement on alternative approaches available. In past the Total Fertility Rate in India is obtained only from Sample Registration system. But after the arrival of National Family Health Survey there are two estimates of Total Fertility rate. One from Sample Registration System and another is from National Family Health Survey. But Total Fertility Rates obtained from these two

[1] PhD Scholar, International Institute for Population Sciences, Deonar, Mumbai-400 088

types of data are completely different. So, for the policymakers and programme managers it is very difficult to take a particular estimate for policymaking. This difference may be due to the change in the mean age of childbearing, because due to different types of policies about women there may be a change in the age of childbearing. The estimate obtained from National Family Health Survey is not an estimate for one year; it is an estimate on the basis of data of last three years. So in this three years there may be a change in the mean age of childbearing. But Sample Registration System gives us the up to date estimate. In India where young cohort mostly dominates the mean age at birth such distortion should be adjusted before simulating or aiming the expected impact of any programme variable on the size of current fertility. A country like India that has broad base of population from reproductive group will be delayed to achieve the target regarding stable population in the presence of distortions. This is even true for states with low fertility states in the country. Therefore, it would be important in future, if a study established some kind of relationship, showing the long term influences from tempo and quantum distortions of fertility together on ultimate stable population size and the time of its occurrence. The main objectives of the study are:

a) Error adjustment in Total Fertility Rate in context of India.

b) Applicability of Bongaarts-Feeney model considering linear and exponential change in the mean age of childbearing in context of India.

Material and Methods

The analysis is based on secondary data, which is collected from three rounds of National Family Health Survey data (NFHS-I, II and III). In general, a change of r years in the mean age at first birth during year t implies that observed births may be expressed as (1-r) times the births that would have been observed had there been no change in the timing of births. Inverting this relationship gives

$$B_{adjusted} = B_{observed} / (1-r)$$

Where $B_{adjusted}$ denotes the number of births that would have been observed if no tempo change had occurred and $B_{observed}$ denotes the observed number of births.

The argument above has been made for first order births only, but applies equally to births of other orders. In the analysis the adjustment formula is applied to births of each order individually and combine the result to obtain an estimate of the tempo effect for all births. Extending the adjustment formula derived for number of births to Total Fertility Rates (TFR) , the adjustment formula for Total Fertility Rate at order 'i' is given by

$$TFR^1_I = TFR_i / (1-r_i)$$

Where TFR_i is the observed Total Fertility Rate in any given year, r_i is the change in mean age of childbearing at order 'i' between the beginning and end of the year, and TFR^1_i is the Total Fertility Rate that would have been observed had there been no change in the timing of births. Where,

$$TFR_i\,(y) = \Sigma\, AOSBR\,(x, i, y)$$

is simply the sum over ages x =15-49 of the age –order-specific i-th birth rates AOSBR(x,i,y) for birth order i and year y. The adjustment made to TFR_i depends solely on the timing changes during the year in which TFR_i is measured, and it is independent of timing changes before or after this year. Summing over all birth orders gives the adjusted TFR^1 :

$$TFR^1 = \Sigma\, TFR^1_i$$

These equations can also be applied to periods longer or shorter than one year, provided r_i equals the annualized rate of change in the mean age of childbearing at order i.The mean age of childbearing can be expressed as the weighted average with ASFRs as the weight:

$$m = \Sigma\,(x + 2.5) * {}_5f_x \,/\, \Sigma\, {}_5f_x$$

where m is the mean age of childbearing , x = 15,20,25,35,40,45 and (x+2.5) represents the midpoint of each age interval and ${}_5f_x$ represents the age specific fertility rates for five year age group.To obtain a rate of change in mean age of childbearing (MAC) at each order for calendar year y, average the values for years y-1 and y to obtain a value for the beginning of year y, and the values for years y and y+1 to obtain a value for the end of year y and subtract the former from the latter. This reduces to, $r_i(t)=0.5*(MAC_i(y+1)-MAC_i(y-1))$.

Age at childbearing here is multidimensional, represented not by a single index (such as the mean age of childbearing), but by the mean age of childbearing for births of each

order. When we speak of increasing or decreasing age at childbearing, therefore, we necessarily refer to the overall tendency of these birth order specific mean ages, which do not necessarily change at the same rate. Larger changes in quantum of higher order births have been observed in many countries that affect mean age of childbearing for births of all order independently of changes in tempo. To see the importance of this consideration, mean age of childbearing for births of all order may be expressed as a weighted average of mean age of childbearing for births of each order and it is given by

$MAC = MAC_1\ w_1 + MAC_2\ w_2 + MAC_3\ w_3 + MAC_{4+}\ w_{4+}$, where MAC denotes mean age of childbearing for all birth orders and $w_i = TFR_i / TFR$. To find the linear and exponential change in the mean age of childbearing usual linear and exponential methods have been used.

Findings and Conclusion

From the analysis we may say that if the change in the mean age of childbearing is exponential, Bongaarts-Feeney formula for adjusting Total Fertility Rate in context of India does not give any different picture of fertility in three periods of National Family Health Survey. But if we consider that the change in the mean age of childbearing is linear than the adjusted Total Fertility Rate is totally different from the National Family Health Survey values. This technique may be used as a procedure for solving the dispute between Total Fertility Rate observed from Sample Registration system and Total Fertility Rate observed from National Family Health Survey, though it requires further studies. If it is possible then it is very much useful for the programme managers and policy makers to take a proper decision about different types of policy.