How Delaying Marriage and Spacing Births Contributes to Population Control: An Explanation with Illustration

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Introduction

Most people in India are now aware that the country's population is growing rapidly, and appreciate the need for controlling its rate of growth. The national family planning program which was initiated primarily to reduce the high fertility and population growth rates in the country has failed to achieve, this, a major reason for this being the undue importance given to sterilization which has proved to be ineffective in reducing family size. In this context, it is important to know as to what other factors can slow down the high rate of growth of population so that efforts can be made to manipulate such-factors in order to check it.

India's population grew at an annual rate of only 0.56 per cent during 1901-11, by 1.26 per cent during 1941-51, and 2.24 per cent during 1961-71. However, it remained at 2.28 per cent during 1971-81 [1]. On the other hand, the death rate declined substantially - from an estimated 42.6 per thousand population during 1901-1911 to 15.0 during 1971-81. The birth rate for the corresponding periods was 49.2 and 37.2 respectively [1]. The difference between the birth and the death rated worked out to 6.6 points for 1901-11, and 22.2 points for 1971-81. Fertility then is the major factor contributing to the high growth rate.

The basic factors which determine population growth are: (i) the number of children each woman (or couple) in the population bears during her childbearing years, and (ii) the ages at which the woman has given birth to these children. While the former relationship is obvious, the latter (that is, timing or birth spacing), means that for the same number of children born per woman, mothers who give birth during their later years contribute more towards population control than those who give birth to their children early in life. In fact, the relationship has been discussed from time to time [2] [3] [4], but its significance lies in the fact that it takes into account the family size of couples which is crucial for a country like India.

Late childbearing can be achieved by effecting late marriages of girls and observing longer intervals between births. Late marriages of girls not only delay the occurrence of the first and subsequent births but also contribute to a reduction in the ultimate family size [5] [6] [7]. Though it can be said that the prevalence of adolescent sub-fecundity is greater among early marriers than among late marriers, its net effect in delaying the birth of the first child is found to be much lower than that due to the marriage itself [5] [8] [9]. For example, even if it is assumed that the first birth interval of a women who marries at age 15 is three years and that of a woman who marries at age 17 is two years, still in terms of age at birth, the child is born at age 18 in the former case and only at age 19 in the latter case. However, some studies (see for example, Jain [10]) have found a relatively higher incidence of childlessness among early marriers as compared to late marriers, though the World Fertility Survey [11] and many other studies (example, Rajaretnam [5]) have not-found any such relationship. As far as late marriage is concerned, though late marriers exhibit a 'catching-up effect', on the number of children, the age at birth of these children would almost always be higher than that of early marriers (see for example, Rajaretnam [5]). With regard to longer intervals between births, the continued use of temporary methods of contraception, prolonged periods of breast-feeding (to effect longer periods of post-partum amenorrhoea), induced abortion (so that the next child is born relatively late), and abstinence are some of the major factors. However, in practice, at least in the Indian context, most of these factors operate only after a few births.

The Illustration

The illustration given below explains in a non-technical way as to how and to what extent delaying of marriage and or spacing of births affects population growth within the context of the ultimate achievement of the same number of children by all women. This example is more appropriate for India where couples consider a minimum of three or four children as essential [12].

Let use consider a hypothetical population in which each woman bears four children during her childbearing years; the first and the third being female and the remaining two, male. Let one group of these women be assumed to have married at age 17 and the other at age 20. Let us further divide these two groups of women into two sets each based on two fertility (birth interval schedules - (i) the first schedule with a birth interval of two years between marriage and the first childbirth and three years each between the first and second births, second and third births, and third and fourth births). The second schedule will have birth intervals of three years and five years respectively. Since couples in India usually desire to have the first child as early as possible after marriage, the first birth interval is taken as two and three years as against three and five years for the subsequent births, in the first and second fertility schedules, respectively. It is to be noted that the assumptions made in respect of age at marriage, number of children per woman and birth intervals are more or less in line with the existing situation in India. It may further be assumed that each person male or female, lives for 55 years, the life expectancy obtained for India for the recent period [1].

Based on the two age-at-marriage patterns and the two fertility schedules, the timing of births (or age of mother at births) obtained for the four hypothetical groups is presented in Table 1.

Table 1: Fertility schedule for the hypothetical groups

Marriage/ Birth order	**Sex of child**	**Group 1**		**Group 2**		**Group 3**		**Group 4**	
		B. I.	**Age**	**B. I.**	**Age**	**B. I.**	**Age**	**B. I.**	**Age**
Marriage	-	-	17	-	17	-	20	-	20
1st child	F	2	19	3	20	2	22	3	23
2nd child	M	3	22	5	25	3	25	5	28
3rd child	F	3	25	5	30	3	28	5	33
4th child	M	3	28	5	35	3	31	5	38

B. I. = Birth interval. Age = Age of mother at marriage/child birth. F = Female; M = Male.

It is clear from Table 1 that the number of children born per woman and their sex order are the same in all the four groups. The only difference between the groups is the age of mother at the time of birth of these children.

It is interesting to attempt a life cycle analysis for each of these four groups by taking one female (and correspondingly, one male - to mean a couple) per group. Let these females be assumed to have been born in an initial year, say, zero. During the life cycle process, persons grow, marry, females bear children as per schedule, and pass away by age 55. Children born to these persons repeat this process of procreation. As we have considered four children (two male and two female) per woman, we can safely assume that one male an d one female are equal to a couple. The life cycle process is depicted in detail in Figures l to 4. (Figure 1 to 4 are missing).

The Life Cycle Charts

In the life cycle charts, the first horizontal line drawn just above the horizontal axis represents the first woman born in year zero. The corresponding male is not shown as it makes no difference. At the extreme left, the four vertical lines drawn from the bottom horizontal line represent the children born to this woman as per the given fertility schedule. The horizontal lines drawn from the top of these vertical lines represent the children's length of life, or life upto year 100. Among these, two correspond to females. The four vertical lines drawn from each of these two horizontal lines represent the children born to them as per the fertility schedule. The horizontal lines drawn from the top of these vertical lines represent the children's length of life, or life upto year 100, and so on. The dotted portion in the vertical lines simply means that more than one woman had given birth in that year, and one birth is differentiated from another by using the dots. The horizontal lines which meet the vertical line at the extreme right (drawn corresponding to year 100) represent the persons living at that point of time, as a result of the lone female (and a male) born in the initial years zero, and she her children, grand children and so on are subjected to the given schedule of marriage, fertility and mortality.

The figure show that approximately the first one-fifth of the exercise period effected no fertility experience, and the next one-third period no mortality experience. Thus the effective exercise period is only about 50 years. Hence for a good mix of experiences (of marriage, fertility and mortality) among people and to determine more specifically the rate of population growth, a longer projection period is required which is complex and beyond the scope of this exercise, though such an exercise will be more revealing. Table 2 gives the number of surviving persons (or population strength) in each group at year 100, as obtained from Figures 1 to 4.

Table 2: Population strength at the end of 100 years by group

Group	**Age at marriage (years)**	**Fertility schedule (birth interval in years)**	**Population at year 100**
1	17	2, 3, 3, 3	53
2	17	3, 5, 5, 5	40
3	20	2, 3, 3, 3	39

4	20	3, 5, 5, 5	25

Effect of delaying of marriage and spacing of births on population growth

It can be seen from Table 2 that even though the number of children born per woman is the same (4 children per woman) in all the four groups, there are large differences in the strength of the population between the groups in the long run due to the delay in the occurrence of births.

A shift in age at marriage from 17 to 20 (a 3-year delay) resulted in a decline of 14 persons (from 53 to 39) for birth intervals of 2,3,3,3 years between the four successive births, and 15 persons (from 40 to 25) for birth intervals of 3,5,5,5 years, at the end of 100 years. This worked out to a population decline of 26.4 per cent and 37.5 per cent respectively. This clearly shows that, other things being equal, a small delay in the age at marriage has a significant effect in reducing population growth.

Similarly, an increase in birth intervals from 2,3,3,3 years to 3,5,5,5 years (a total delay of 7 years for all the four births combined) produced a decline of 13 persons (from 53 to 40) when age at marriage was 17 years, and 14 persons (from 39 to 25) when it was 20 years. This worked out to a population decline of 24.5 per cent and 35.9 per cent respectively. This clearly demonstrates that a longer interval between births, even if there is no reduction in the ultimate family size, contributes substantially to population control.

Further, a combination of 3-year delay of marriage (from age 17 to 20) and an additional interval of 1,1,2,2 years (a total of 7 years) resulted in a reduction of 28 persons (from 53 to 25), or 53 percent in the population at the end of 100 years.

The relative importance of delaying marriage and of birth spacing on population control indicates that a delay of three years in age at marriage from 17 to 20 is equal to or better than a total additional delay of seven years in successive birth intervals from 2,3,3,3 years to 3,5,5,5 years. For, the number of persons at the end of 100 years declines to 39 in the former case, and to 40 in the latter case. This is due to the fact that 'late marriage' delays the first as well as the subsequent births considerably whereas spacing delays only the later births substantially.

Some Indirect Inferences

An important indirect inference that can be drawn from this exercise relates to the impact of sterilization on the birth control program. Let us consider Groups 1 and 2. It can be seen from Table 1 that in Group 1 the fourth child is born at age 28 whereas in Group 2, it is born at age 35. This shows that the women in Group 1 are still young at the time of their fourth childbirth. Let us assume that they all accepted sterilization. At the same time, the women in Group 2 are already aged 35 at the time of their fourth childbirth and hence may not require sterilization, or, let us assume that the also accepted sterilization. In that case, even though the women in Group 1 accepted sterilization much earlier, their contribution to the population control program will be much lower than that of the women in Group 2. This can be seen from Table 2 where the population strength at the end of the 100th year is much higher for Group 1 (53 persons) than for Group 2 (39 persons). In other words, even if the women in Group 2 did not accept sterilization, the women in Group 1 are no better than those in Group 2 in respect of their contribution to curbing population growth. The same explanation holds good for Groups 3 and 4 as well:-

The exercise further indicates that delaying marriage and spacing births also helps women to limit their family size. For example, in the same groups, the women in Group 1 are just 28 years old at the time of their fourth childbirth whereas in Group 2, they are 35. In reality, women in Group 1 are more likely to have a few more children than women in Group 2, because when the fourth child is born, further childbearing of the latter women is limited both physiologically and behaviorally by virtue of their age.

Conclusion

The exercise has clearly demonstrated that population control is not merely determined by 'family size' or the number of children born to women, but is influenced much more by the timing of births. Irrespective of the number of children produced, the timing of births has an independent impact on population control. That is, delaying marriage and/or spacing births, even if the process is gradual, will produce a considerable impact on population growth; because late-born children are late to grow, late to marry and late to reproduce, and this 'late' process will continue endlessly, generation after generation. Further, delaying the marriage of girls and spacing births also means ensuring better health of mothers and children [13]. Hence, policies and programs that encourage the postponement of marriage especially of girls, and spacing between births through temporary methods of family planing, prolonged breast-feeding, and practice, induced abortion (as allowed by law) in India will amount to a large-scale reduction of the high population growth rate besides contributing to the health of mothers and children.

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