The Economic Journal of Nepal, Vol. 28, No. 1, January-March 2005 (Issue No. 108) © CEDECON-TU

Impact of Family Planning Programmes on Fertility: Alternative Methodological Perspective

*Tika Ram Aryal**

Abstract

The aim of this paper is to study the impact of family planning programme on fertility. Alternative methodology has been proposed to assess the impact of family planning. This method utilizes the data of parity progression ratio and thereby translating it into total fertility rate (TFR) and parity distributions for different fertility regimes. The data has been taken from the Nepal Family Health Survey 1996. It was found that the sterilization has changed parity distribution significantly and its impact on fertility was 0.98 births per woman. The amount of averted births was found to be 0.29, 0.13 and 0.10 per woman due to use of injectables, condoms and pills respectively, whereas an over all impact was found to be 1.66 births per woman. The expected number of children would be 4.45 per woman for the present prevailing situation of family planning whereas it would be 5.96 per woman for non-user of all the family planning methods.

INTRODUCTION

The reproduction process among females generally begins during teens of life. But there is a vast variation in the age at menarche while fertility behavior is changing over time all over the world (Aryal, 2002; Diamond and Rutenberg, 1995; Riley *et al.*, 1993).

Nepal is one of the moderately high fertility experienced developing country. Its fertility transition is of particular interest in three ways (Caldwell, 1998) i.e. "(i) the low per capita income at which it is occurring, (ii) the different topography of the country, which divides the population into those with easy access to the outside world who have joined the global economy and exhibit declining fertility and those without roads or school who are still characterized by stable high fertility, and (iii) the reliance for most fertility control on sterilization".

However, in spite of the country's adverse socio-economic, geographic conditions like predominantly rural, mountainous and hilly region, agri-based economy, land-locked, low literacy, and predominantly traditional and agrarian nature of the society, etc., the total fertility rate, crude death rate, infant and child mortality rate and maternal mortality rate

* Dr. Aryal is associated with the Central Department of Statistics, TU, Kathmandu, Nepal.

have declined remarkably in the recent decades. Total fertility rate (TFR) has remained constant and persistently high during 1971 to 1981 as 6.3 and then started declining and reached to 5.6 in 1991, 4.6 in 1996 to 4.1 births in 2001.

Measuring the level of unwanted fertility accurately and identifying the factors associated with variations in unwanted fertility provide valuable information to policy-makers concerned with the welfare of women and children and reduction in fertility. The extent of unwanted fertility is likely to vary from society to society and a group experiencing higher unwanted fertility may be helpful to family planning programs. The high proportion of unwanted fertility among females may be due to unmet needs of family planning.

Total fertility rate (TFR) is considered to be a refined and reliable measure of fertility. Recently it has been studied through parity progression ratios (PPR), which, of course, reflect the tempo of cohort fertility. This approach of measuring period fertility, called period parity progression ratio (PPPR), gives an additional advantage to look at trends in TFR as well as it facilitates to make comparison separately regarding progression of a specific parity to higher order parity (Aryal, 2002; Feeney and Yu, 1987, 1994)

The knowledge of family planning is almost universal and about 98 per cent of currently married women heard of at least one method of family planning (Shrestha, 2000). At the same time, 31 per cent of currently married women have an unmet need for family planning. Contraceptive prevalence rate- the percentage currently using contraception among couples of reproductive age (15-49)- has been reported about 29 per cent for Nepal (MOH, 1997).

Contraceptive prevalence rate- the percentage currently using contraception among couples with the women of reproductive age (15-49)- has been reported at 29 per cent in Nepal (MOH, 1997). The percentage of contraceptive use is increased rapidly in Nepal during the recent past, where the average level of contraceptive use in 1976, 1986 and 1996 was 2, 18 and 29 per cent respectively whereas the fertility level declines from 6.33 in 1976 to 4.60 in 1996. However, the departure in current fertility from the potential fertility may be taken as the over all impact of acceptance of different methods of family planning (FP) on fertility provided that the nuptuality pattern had been constant and natural fertility did not change otherwise. If the fertility is computed after excluding the women who are not exposed to conception due to use of contraception, it may be taken as the natural fertility. The extent of reduction in fertility due to the use of various contraceptive methods viz. sterilization alone, sterilization or injectables, sterilization or injectables or pills, sterilization or injectables or pills or condoms, etc. used has been assessed separately to know the amount of averted births due to family planning. Over all impact of family planning programmes (FPP) depends upon the number of users of different methods. Effectiveness varies widely and sterilization has been found most effective method followed by injectables, pills and then conventional contraceptives (CCs) (Aryal, 2002; Pathak, 1998; Ram and Pathak, 1993; Subedi, 1997; U. N., 1997).

Adequate works have not so far been done in Nepal to assess the impact of family planning methods on fertility, being a useful tool for designing policy and planning to reduce the overall level of fertility.

Therefore, the main objective of this paper is to study the impact of family planning methods on fertility. A new technique has been proposed to assess the impact of family planning on fertility by the way of translating parity progression ratio into total fertility rate (TFR) and parity distributions.

DATA AND METHODOLOGY

The data has been extracted from the Nepal Family Health Survey (NFHS) 1996. The sample was designed to provide estimates of population and health indicators including fertility and mortality rates for the country. It also provides information on nuptiality, contraception, breastfeeding, etc. Apart from other questionnaires, an individual woman's questionnaire was used to collect information from ever married (eligible) women including information on fertility such as current age of mother, age at marriage, age at childbearing for all births, date of birth of the child, survival status, age at death of child, etc. In survey, one more individual questionnaire was used to collect information on ideal family size, wanted more child and unwanted children. The survey also provides information on contraceptive use, knowledge, behavior, the potential demand for contraception, etc. The reference date was considered as Chaitra, 2052 (April, 1996) so that births occurred after the reference date has been excluded (MOH, 1997).

Impact of Family Planning on Fertility

A new approach based on parity progression ratio has been proposed to assess the extent of reduction in fertility due to the use of various FP methods. The proposed technique is given below:

For example, PPPR in the absence of sterilization may be obtained by excluding those women who are already sterilized. Let us call this group as regime II of the fertility regulation. Likewise, in the absence of sterilization or injectables, PPPR may be obtained by excluding those women who are either sterilized or used injectables and called here as regime III. Similarly, PPPR in the absence of sterilization or injectables or pills and sterilization or injectables or pills or condoms are denoted here as regimes IV and V respectively. Regime VI denotes the level of fertility in the absence of all contraception methods. The regime I represents the level of fertility in presence of contraception. PPPR thus obtained is used to calculate the value of TFR, and probability of ever having a specific order of birth or probability of ever becoming a mother of 'i' children (F_i) and probability of having a final parity 'i' (B_i) i.e. parity distribution.

A number of scholars have attempted to study the distributions of fertility through the changes in the contemporary parity distributions of women in the population (Pandey *et al.*, 1997; Pandey and Suchindran, 1995). Here parity distribution is obtained to see the pattern of birth averted from the use of FP methods. Since P_i, ($i \geq 0$) be the probability that a woman of parity 'i' is proceeding for the next higher parity ($i+1$), the probability of ever bearing 'i' children (F_i) over the reproductive age range (15-49) is obtained as

$$F_{i+1} = \coprod_{i=0}^{k} P_i \quad \text{and} \quad F_0 = 1 \qquad (1)$$

Further, if B_i denotes the probability that a woman finally have 'i' parity ($i \geq 0$) in her reproductive span (15-49), then ,

$$B_i = F_i - F_{i+1} \qquad (2)$$

The expected number of births of order i, per woman, is simply as

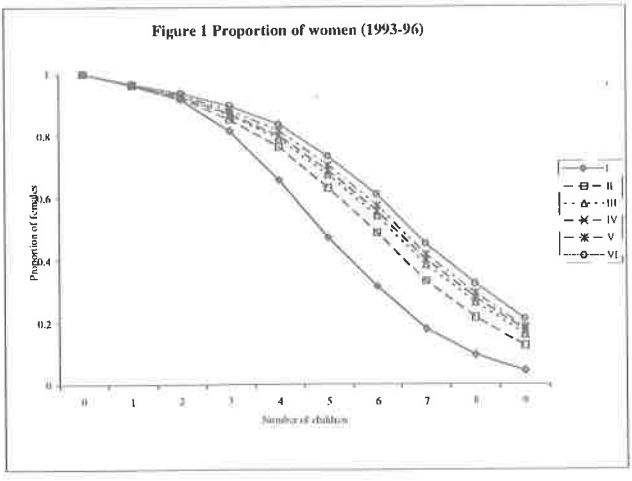
$$\frac{\sum_{i=0}^{n} F_i}{F_0} \qquad (3)$$

and the expected number of future children for a woman currently of parity i is given as

$$(F_{i+1} + F_{i+2} + F_{i+3} + \ldots)/F_i \qquad (4)$$

RESULTS AND DISCUSSIONS

The data for period of 1993-96 are used to see the impact of family planning methods on fertility under different regimes of contraception. Results presented in Table 1 explains the PPPRs (Column 2), probability of ever bearing i children (Column 3), TFR above parity i (Column 5), and expected number of future children per woman (Column 6) under the different regimes of fertility regulations. The level of fertility based on PPPRs varies according to the different regimes of fertility regulation. For example, regime I, the prevailing levels of FP method given in the second column (Table 1), which shows the values of PPPR in the presence of contraception indicated that the third and higher order PPPR decreased with the increased parity order. The application of FP as mentioned by the regime II gives the values of PPPR excluding women who were already sterilized. An impact was found to be 0.98 births per woman for the period 1993-96 (Column 5 of Table 1). It is noticeable that the change in PPPR up to the 3rd parity was found very low, which may be due to that only a few women went for sterilization and thereafter PPPR was found decreased significantly with the increased parity (Figure 1 and Table 1).



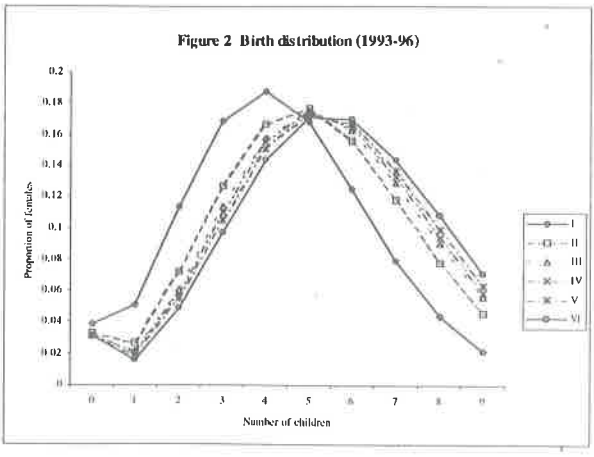
It was found that there was no significant change in the values of PPPR up to 2nd parity and thereafter it decreased significantly with the increased parity due to the use of spacing or limiting method of

contraception (regimes III to V). Similarly, amount of averted births was found to be 0.29, 0.10 and 0.13 per woman due to use of injectables, pills and condoms respectively, whereas the combined impact of sterilization and injectables was found to be 1.26 births for the period 1993-96 (Column 5 of Table 1).

Regime VI presents the fertility level where couples had not used any method of contraception and TFR was found to be 5.96 for the period 1993-96 (Column 5 of Table 1) respectively. An over all impact of FP was found to be 1.66 births per woman for the period 1993-96 that could be averted due to contraception use. Impact of sterilization was found highest (where about 50 per cent births was found averted) followed by the combined effect of injectables, pills and condoms.

Column third presents the probability of ever having 'i' children (F_i) under different regime of fertility regulation programmes. Figure 1 clearly shows that up to the 3rd parity the probability remains same for all the regimes of fertility regulation programmes and thereafter it decreased with the increased parity order and moreover a faster declining tempo for regime I followed by the regimes II, III, IV, V and VI respectively. The proportion of childlessness was found to be 2 per cent for women who had used contraception, whereas it was 0.5 per cent for women who had not used any methods (Column 4 of Table 1).

Similarly, Figure 2 shows the distribution of women according to births, which gave an upward curve to the right and downward to the left for the regimes of I, II and III of the fertility regulation programmes, whereas the shape was found reverse for remaining regimes of fertility regulations.



Column 5 of Table 1 gives TFR above the parity i (for i=1, 2, ...8) and was found to be 4.30, 5.28, 5.56, 5.65, 5.76 and 5.96 for the period 1993-96. The expected number of future children for a woman currently of parity i (i=1, 2, ...8) is presented in Column 6 of Table 1. The expected future number of children was found 5.28 (excluding sterilization), 5.56 (excluding sterilization or injectables), 5.65 (excluding sterilization or injectables or pills), 5.76 (excluding sterilization or injectables or pills or condoms) and 5.96 (non-user) for zero parity women, whereas it was 4.49, 4.78, 4.87, 4.97 and 5.16 for women who have first parity for period 1993-96. Similar interpretations may be given for women who have second, third, etc, parities for the period 1993-96 (Column 6 of Table 1).

However, in spite of a high prevalence of contraceptive use in Nepal its impact on fertility has been very less as compared to the other developing countries. This may be due to low effectiveness of contraceptive use or due to the socio-economic as well as cultural perspectives of the people.

Table 1 Parity progression ratios and probability of ever having a mother of i children under different regime of fertility regulations (1993-96)

Parity (1)	Parity progression ratio (p_i) (2)						Probability of ever having i children (F_i) (3)						Birth distribution (B_i) (4)					
(i)	I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V	VI
0	0.962	0.963	0.963	0.963	0.964	0.966	1.000	1.000	1.00	1.000	1.000	1.000	0.012	0.005	0.004	0.004	0.003	0.003
1	0.954	0.957	0.961	0.962	0.966	0.969	0.962	0.963	0.963	0.963	0.964	0.966	0.053	0.028	0.023	0.021	0.02	0.017
2	0.888	0.924	0.937	0.941	0.948	0.957	0.918	0.921	0.925	0.926	0.931	0.937	0.117	0.074	0.063	0.060	0.056	0.050
3	0.804	0.897	0.912	0.918	0.923	0.933	0.815	0.851	0.866	0.871	0.883	0.897	0.174	0.130	0.117	0.113	0.108	0.099
4	0.722	0.825	0.851	0.858	0.863	0.875	0.655	0.763	0.790	0.799	0.814	0.836	0.194	0.172	0.162	0.159	0.155	0.148
5	0.664	0.774	0.803	0.811	0.816	0.830	0.473	0.630	0.672	0.686	0.703	0.732	0.173	0.182	0.181	0.180	0.179	0.176
6	0.564	0.677	0.709	0.718	0.724	0.741	0.314	0.487	0.540	0.556	0.574	0.608	0.128	0.160	0.167	0.169	0.172	0.175
7	0.537	0.650	0.682	0.691	0.698	0.714	0.177	0.330	0.383	0.400	0.416	0.45	0.082	0.121	0.133	0.137	0.141	0.149
8	0.475	0.584	0.617	0.626	0.632	0.649	0.095	0.214	0.261	0.276	0.29	0.321	0.045	0.08	0.093	0.097	0.102	0.111
9	0.045	0.125	0.161	0.173	0.183	0.209	0.022	0.047	0.057	0.061	0.065	0.073						

Note: I, II, III, IV, V and VI denotes the different regimes of fertility regulations.

Table 1 (contd.) Total fertility rate and expected future number of children above parity i for different regime of fertility regulations (1993-96)

Parity	Total fertility above parity I (5)						Expected future children (6)					
I	I	II	III	IV	V	VI	I	II	III	IV	V	VI
0	4.30	5.28	5.56	5.65	5.76	5.96	4.45	5.28	5.56	5.65	5.76	5.96
1	3.49	4.32	4.60	4.69	4.79	4.99	3.63	4.49	4.78	4.87	4.97	5.16
2	2.57	3.40	3.67	3.76	3.86	4.05	2.81	3.69	3.97	4.06	4.15	4.33
3	1.76	2.55	2.81	2.89	2.98	3.16	2.16	3.00	3.24	3.32	3.38	3.52
4	1.10	1.79	2.02	2.09	2.17	2.32	1.69	2.34	2.55	2.62	2.66	2.77
5	0.63	1.16	1.34	1.41	1.46	1.59	1.34	1.84	2.00	2.05	2.08	2.17
6	0.32	0.67	0.81	0.85	0.89	0.98	1.01	1.37	1.49	1.53	1.55	1.61
7	0.14	0.34	0.42	0.45	0.47	0.53	0.79	1.03	1.10	1.12	1.14	1.18
8	0.05	0.13	0.16	0.17	0.18	0.21	0.48	0.58	0.62	0.63	0.63	0.65

CONCLUSIONS

It was found that the proposed technique provided method-wise impact of family planning on fertility very clearly. This technique also offered the level, trend and pattern of fertility as well as the used family planning methods. It was found that the sterilization has changed parity distribution significantly in Nepal and its impact on fertility was about 0.98 births per woman. The amount of averted births was found to be 0.29, 0.13 and 0.10 per woman due to use of injectables, condoms and pills respectively, whereas an over all impact was found to be 1.66 births per woman. The expected future number of children was found 5.28 (excluding sterilization), 5.56 (excluding sterilization or injectables), 5.65 (excluding sterilization or injectables or pills), 5.76 (excluding sterilization or injectables or pills or condoms) and 5.96 (non-user) for zero parity women, whereas it was 4.45 (all methods used) for period 1993-96. It was found that the impact of sterilization much more higher than other methods.

These findings may be useful to the policy makers to design the policies and programmes of a country for reducing the level of fertility.

References

Aryal, T.R. (2002), "Some demographic models and their applications with reference to Nepal." Unpublished Ph. D. thesis, Banaras Hindu University, Indaia.

Caldwell, J.C. (1998), "The Global fertility transition and Nepal." *Contributions to Nepalese*

Studies, Special Issues on Fertility Transition in Nepal, ed. S. Thapa, S.G. Neidell, and D.R. Dahal, vol. 25:1-7.

Diamond, I. and N. Rutenberg. (1995), "Recent trends in fertility in Botswana." *Journal of International Development*, vol. 7 (1): 145-161

Feeney, G. and J. Yu. (1987), "Period parity progression measures of fertility in China." *Population Studies*, vol. 41: 61-102

Feeney, G. and J. Yu. (1994), "Below replacement fertility in China? a close look at recent evidence." *Population Studies*, vol. 48: 381-394.

MOH. (1997), "Nepal Family Health Survey 1996: Report." Ministry of Health, HMG/ Nepal, Kathmandu, New Era and Micro International Inc.

Pandey, A. and C.M. Suchindran. (1995), "Some analytical models to estimate maternal age at birth using age specific fertility rates." *Sankhya,* Series-B, vol. 57(1):142-150.

Pandey, A., N.C. Saxena and K. K. Singh. (1997), "Estimation of parity progression ratios from birth order statistics." *Genus*, vol. LIII (1 & 2): 177-188.

Pathak, R.S. (1998), " Family planning programme effort, contraceptive prevalence and fertility: the case of Nepal in South Asia." *Nepal Population Journal*, vo. 7 (6): 45-50.

Ram, F. and K.B. Pathak. (1993), "Evaluation of family programme in India using different approaches: an assessment." Project Report, International Institute for the study of Population Sciences, Deonar, Bombay.

Riley, A.P., J.L Samuelsion and S.L. Huffman. (1993), "The relationship of age at menarche and fertility in undernourished adolescents." In Ronald Grey *et al.,* (eds.), Biomedical and demographic determinants of reproduction: 50-84.

Shrestha, D.P. (2000), Determinants of current contraceptive use among Nepalese women: an analysis of NFH survey 1991." *Nepal Population and Development Journal*, Ministry of Population and Environment, Kathmandu, HMG/Nepal.

Subedi, G. (1997), "Contraceptive use in Nepal: a national scenario from MEBDC survey." *Nepal Population Journal,* vol. 6 (5): 55-64.

U. N. (1997), "Family building and family planning evaluation." Department of Economic and Social Affairs: Population Division, ST/ESA/SER.R/148, New York, U.S.A.