

Fertility Trend and the Impact of Family Planning in Bihar State

Dilip Kumar¹, Ajit Kumar²

¹Associate Professor and ² Research Investigator
Population Research Centre, Patna University, Patna (Bihar)

Abstract

Policy makers and Family Planning administrators felt a need to assess the family planning as the programme impact on fertility on yearly basis. As such, probably the most widely used measure of family planning impact is the number of births averted by a programme in a given year. The impact of family planning on fertility in India has been assessed through the indirect technique of Prevalence Method. With the emergence of the National Family Health Survey to monitor family planning and health activities, this method becomes a useful tool. An attempt is made to yield estimates of birth prevention by age group as well as by types of contraceptive method used in India.

In the study, the standard method-specific use-effectiveness levels weight observation has been used with prevalence level by method specific for the programme and non-programme contraception where non-programme contraception is also known as natural method of family planning. Of the total births averted by programme contraception, 82.6 percent of births were averted by Sterilization users in 2005-06 while the spacing methods users contributed to only 17.4 per cent of the birth prevention. With regard to the births averted by non-programme contraception, the main contribution was made by the users of Rhythm of 63.6 percent, which was followed by the users of Withdrawal of 32.5 percent and by the other methods of 3.9 percent. Of the total birth averted in India, the contribution of programme contraception and non-programme contraception is 84.7 percent and 15.3 percent in 2005-06. The programme contraception has dominance role to control fertility however the non-programme contraception use should also be enhanced at the places where accessibility of programme contraception is poor.

Key Words: Total Fertility Rate (TFR), Prevalence method, Birth averted, Programme and Non-programme contraception, Natural and Gross potential fertility rates.

Introduction

“Nothing exists until it is measured” the physicist Niels Bohr famously stated in 1930. He was referring to quantum mechanics, but the idea is also relevant to public health as “Nothing monitored until it is measured.” The public health is the “collective action for sustained population-wide health improvement” presumes the ability to measure and monitor the health of populations. Epidemiology, demography and biostatistics are the key disciplines of public health.

Among the developing nations, India was the first country to recognize the threat of unchecked population growth and first to initiate population control programme. Family Planning administrators and policy makers felt an increasing need to evaluate the family planning as the programme impact on fertility at yearly basis. As such, probably the most widely used measure of family planning impact is the number of births averted by a programme in a given year. An estimation of the number of births averted is typically obtained by subtracting observed fertility (i.e. fertility with programme) from potential fertility (i.e. fertility without the programme) and multiplying the differences by the appropriate base of the population. Since potential fertility is unobservable, it has to be estimated indirectly. Gross and net potential fertility are two major types of potential fertility to be used in the study. The gross potential fertility is the fertility that would prevail if all use of programme contraception were eliminated, without switching to the non-programme contraception. The net potential fertility is the fertility that actually would be observed if there had never been a programme. In that situation, many of the persons who would have been programme users would have obtained supplies from non-programme sources. This substitution would tend to make net potential fertility lower than the gross potential fertility.

The use of contraception greatly reduces the likelihood of conceiving, but except in the case of sterilization, the chance is not inevitable. To take the contraceptive failure into account, some methods introduce a consequence for accidental failure. The simplest way to do this consists of multiplying potential fertility by ‘e’, the contraceptive use-effectiveness. In the present study Prevalence Model has been used in India to evaluate the number of births averted by programme and non-programme contraception efforts.

Prevalence Model

The prevalence model is based on age-specific and method specific prevalence rates of both programme and non-programme contraceptives. This information helps in getting the gross potential fertility and subsequently the number of births averted by programme and non-programme contraceptive efforts. The prevalence model was applied to family planning data to define programme and non-programme contraceptive prevalence, specific for method and age in some of the studies (Hanoomanjee, E; 1985, Ann, TB; 1985).

Age-specific model: The age-specific model requires information on prevalence of programme and non-programme contraception by age, age-specific fertility rates which have been taken from the NFHS (2005-06) data of India. The Census figures have been used for the female population of

reproductive age. Bongaarts, J (1993) provides new estimates of gross and net impact on fertility reductions from family planning (FP) programs for 31 developing countries in Africa, Latin America, and Asia. A comparison is made of net and gross measures, and the interaction with the level of development is identified. The conclusion is reached that Family Planning has been crucial in reducing fertility in many countries. Without Family Planning, the total annual number of births in the late 1980s would have been 164 million instead of 120 million. There is no agreed upon measure for determining the impact of Family Planning on fertility and estimates has ranged from 3-40%. Discrepancies in results are due to the use of multiple methodologies, of which some are unsuitable or unreliable for normal evaluation due to difference research objectives and due to conceptual differences in measurement of gross versus net impact. Gross impact refers to the reduction due to the use of contraception available from program sources. Net impact measures the reduction achieved by the presence of the program. Net and gross impact varies within each country, with net impact the smaller of the two. Gross impact usually was measured with statistics on acceptors. The measures of gross potential fertility, gross natural fertility and births averted are obtained as follows;

$$NAF_a = AF_a / \{1 - C_a (u_a' + u_a'')\} \quad (1)$$

$$PAF_a = AF_a \{1 - C_a (u_a'')\} / \{1 - C_a (u_a' + u_a'')\} \quad (2)$$

$$BA_a = (PAF_a - AF_a) POP_a \quad (3)$$

$$BAN_a = (NAF_a - PAF_a) POP_a \quad (4)$$

Where;

- a = age group of women, a = 15-19
- u_a' = prevalence of programme contraception, by age.
- u_a'' = prevalence of non-programme contraception, by age.
- AF_a = age-specific fertility rate.
- PAF_a = potential age-specific fertility rate.
- NAF_a = natural age-specific fertility rate.
- BA_a = birth averted by programme contraception, by age.
- BAN_a = birth averted by non-programme contraception, by age.
- POP_a = number of women in age group a.
- C_a = elasticity coefficient by age.

In order to estimate the gross potential fertility and natural fertility, information on elasticity coefficient of sterility and use-effectiveness by age of women is utilized.

$$C(15 - 19) = 0.620$$

$$C(20 - 24) = 0.620$$

$$C(25 - 29) = 0.823$$

$$C(30 - 34) = 0.940$$

$$C(35 - 39) = 1.022$$

$$C(40 - 44) = 1.309$$

The method-specific model: It drives the number of births averted by each programme and non-programme method through the data on prevalence and use-effectiveness of contraception for both sectors. Estimates of births averted are obtained by the following equations:

$$BA_m = BA. u_m' . e_m' / (u' . e') \quad (5)$$

$$BAN_m = BAN. u_m'' . e_m'' / (u'' . e_m'') \quad (6)$$

Where;

u_m' = prevalence of programme method 'm'.

u_m'' = prevalence of non-programme method 'm'.

e_m' = use-effectiveness of programme method 'm'.

e_m'' = use-effectiveness of non-programme method 'm'.

$u' = \sum_m u_m'$

$u'' = \sum_m u_m''$

$e' = \sum_m u_m' \cdot e_m' / u'$

$e_m'' = \sum_m u_m'' \cdot e_m'' / u''$

Data Estimates

The National Family Health Survey conducted in 1992-93 (NFHS-1), 1998-99 (NFHS-2) and 2005-06 (NFHS-3) and the NFHS-4 of 2015-16 is in progress. In the first two surveys, only ever-married were interviewed, whereas in the third survey, women of all marital statuses were interviewed. The number interviewed, ever-married 15-49 year old women were 89,506 in 1993; 90,303 in 1999; and 98,923 in 2006. All the NFHS surveys were conducted under the stewardship of the Ministry of Health and Family Welfare (MoHFW), Government of India, New Delhi.

The data of the National Family Health Survey (NFHS) in India during 2005-06 were utilized to estimate the number of births averted by programme and non-programme sources. The prevalence information by age and method was obtained for currently married females who are currently using and contraceptive method. The projected Census female population of 2006 of reproductive ages 15-44 years was used for the study.

The data problem arose when programme and non-programme methods were to be sorted out. Some of the programme methods and contraceptive services, such as condoms and pills, are available outside the programme at the private clinic. However, the data of such services are not available. It was thus assumed that all modern methods were offered by the programme and were termed programme methods. All traditional methods were considered non-programme methods. This assumption is fairly reasonable because modern contraceptives, such as condoms and pills, are supposed to be widely distributed through the programme that also affects the results in rural as well as in urban areas.

Barriers in data quality

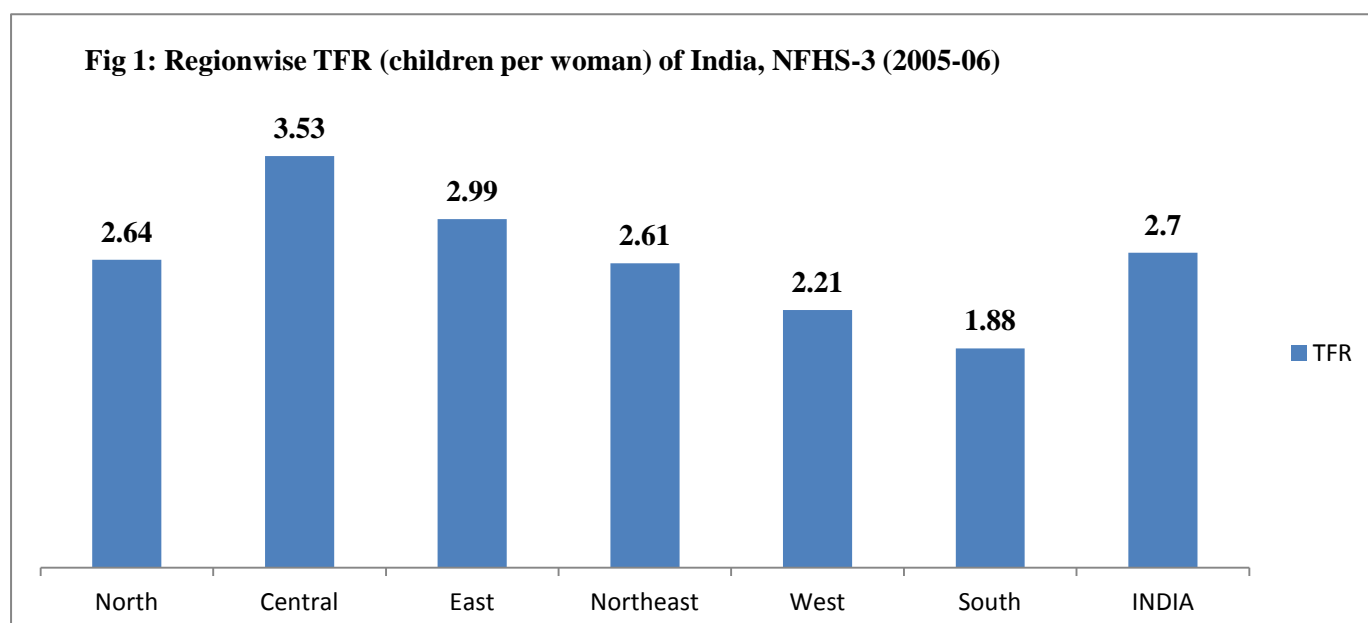
There were changes in the geographical boundaries of several states over the study period, which affects our ability to assess trends over time. Between the 1999 and 2006 surveys, three new states- Jharkhand, Chhattisgarh and Uttarakhand- were formed from Bihar, Madhya Pradesh and Uttar Pradesh, respectively. The 1999 NFHS contains sufficiently detailed geographic information to allow mapping of its data to the 2006 state definitions, which enables direct comparisons between the later

two surveys for these six states. However, the 1993 NFHS lacks the same level of geographic specificity, and therefore its data cannot be mapped similarly.

In addition, there were two differences in geographic coverage between the first and later two surveys, which also limits comparative and trend analysis. The first NFHS sampled only the Jammu region of the State of Jammu & Kashmir, whereas the later two presented the entire State. Thus, this State also lacks comparable data between the first and later two surveys so, like the six States affected by changes in definition just mentioned. It must be kept in mind, then, that time trends for these seven states-Jammu & Kashmir plus the six states affected by changes in definition-cover roughly half the period used to assess trends for all other states. Second, the small Northeast state of Sikkim was not included in the first NFHS. Because of their size, six small Northeast States-Manipur, Nagaland, Sikkim and Tripura have been combined in the study.

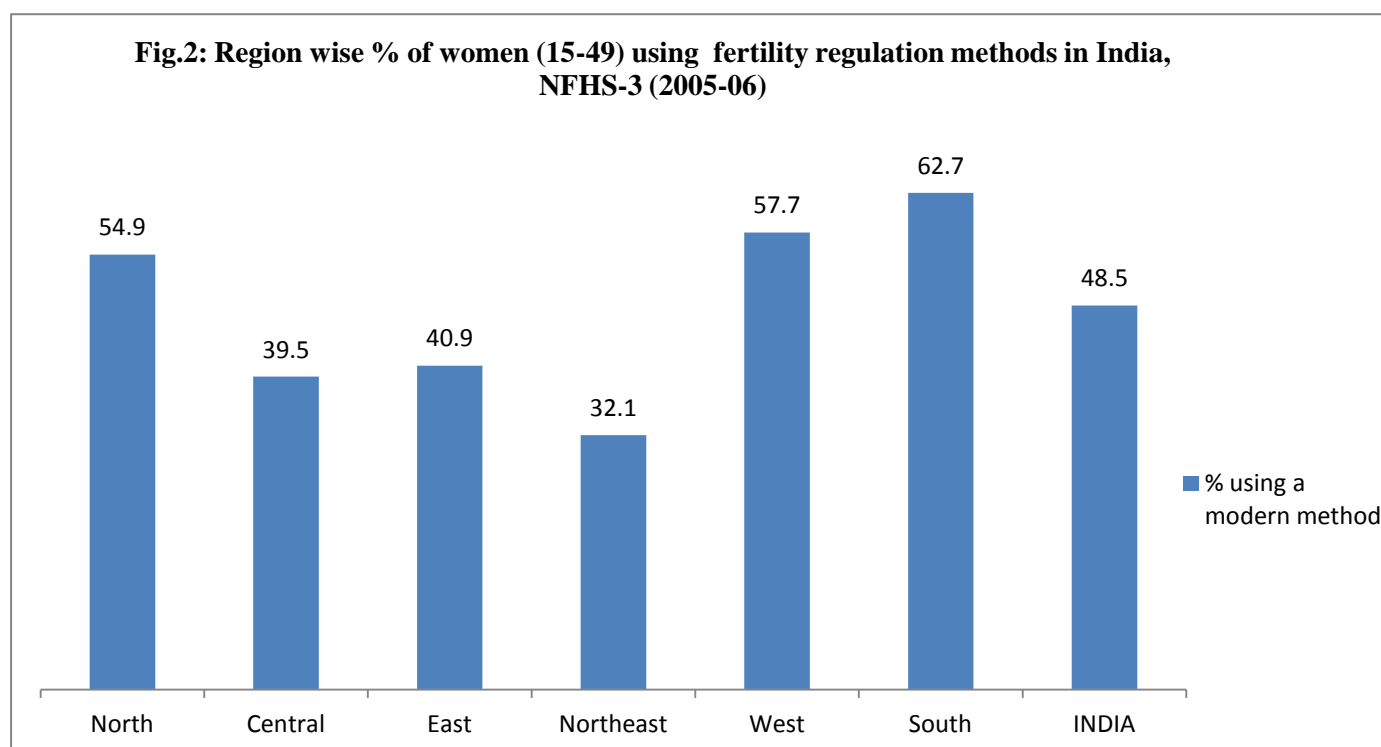
Region wise TFR and use of fertility regulation methods in India

The region wise Total Fertility Rate (TFR) is based on the survey results of NFHS-3 during 2005-06 (Fig.1). The northern region of India consists of the States namely; Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan and Uttarakhand. The central region has the States of Chhattisgarh, Madhya Pradesh and Uttar Pradesh. The East region of India consists of the States like; Bihar, Jharkhand, Orissa and West Bengal. The northeast region has the States of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The west region consists of the States like; Goa, Gujarat and Maharashtra. The south region of India has the States namely; Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. The replacement level fertility (TFR=2.1) of central region is the highest of 3.53 which is followed by the north, east and northeast regions of India. The replacement level fertility is below 2.1 is in the southern region of India. The western region of India is almost near to the replacement level of fertility.



The fertility regulation methods among married women are pill, IUD, injectables, condoms (male and female), sterilization (male and female), the diaphragm, foam and jelly. The use of fertility regulation

methods in northern region of India is about 55 percent (Fig.2). In the east and central regions of India, it is around 41 percent to have higher level of TFR (Singh, Susheela et al.: 2009). The northeast region has shown the lowest level of the use of fertility regulation methods (32 percent) with the moderate level of TFR. The use of fertility regulation methods ranged from around 58 percent to 63 percent in west to south regions of India which has low level of TFR in India. Much attention is needed to be given in all the States barring of the States in the regions of south and west regions to regulate the fertility control effectively.



Results

The application of the Prevalence Model yielded the estimates of gross natural fertility and gross potential fertility of India (Table 1). The difference between gross potential and gross natural fertility, on the one hand, and observed fertility, on the other hand, provided the basis for estimating births averted by programme and non-programme contraception for the country (Table 2). The results show that young fertile women below 24 years of ages averted the births by non-programme methods are more than that of programme methods. The births averted by programme contraception are concentrated among women of the ages of 24 years and above in India. The findings confirm an earlier study where mean age of use was found to be high in the early thirties (Kumar, Dilip; 1990, Prasad, R and et al.; 1995). It is noted that, in general, the effectiveness or impact of the program resembles an oval-shaped curve, i.e., in the initial phases pregnancy reduction increased to reach a plateau and then declined in the remaining phases. Continual follow-up is necessary for an extended time period to analyze any additional trends in fertility reduction. The method specific birth prevention by both programme and non-programme contraception was evaluated for the country (Tables 3).

The silent feature is that it is not based on the service statistics and most of the data are obtained from the national level survey.

Table 1: Prevalence of Programme and non-programme contraception, observed fertility rates and estimated natural and gross fertility rates by age-group in Bihar, 2005-06

Age group	Prevalence of		Observed fertility	Elasticity coefficient	$1 - C_a (u'_a + u''_a)$	$1 - C_a (u''_a)$	Natural fertility rate	Gross potential fertility rate
	Programme contraception	Non-programme contraception					NAF _a	PAF _a
a	u'_a	u''_a	AF _a	C _a				
15-19	1.9	2.4	128	0.62	0.97334	0.98512	131.5	129.5
20-24	14.6	3.9	274	0.62	0.8853	0.97582	309.5	302.0
25-29	27	3.8	204	0.823	0.746516	0.96872	273.3	264.7
30-34	21.7	3.7	106	0.94	0.76124	0.96522	139.2	134.4
35-39	23.1	3.7	27	1.022	0.726104	0.96218	37.2	35.8
40-44	20.9	3.5	16	1.309	0.680604	0.95418	23.5	22.4

Table 2: Gross fertility and gross birth averted by the programme and non-programme contraception in Bihar, 2005-06

Age group	Female population	Gross fertility effect of:		Birth averted by			
		Programme contraception	Non-programme contraception	Programme methods		Non-programme methods	
a	POP _a	PAF _a - AF _a	NAF _a - PAF _a	BA _a	Percent	BAN _a	Percent
15-19	4764000	0.00155	0.00196	7380	1.8	9322	11.3
20-24	3490000	0.02802	0.00748	97776	23.7	26118	31.8
25-29	3042000	0.06072	0.00855	184721	44.7	25998	31.6
30-34	2951000	0.02840	0.00484	83819	20.3	14292	17.4

35-39	2754000	0.00878	0.00141	24176	5.8	3872	4.7
40-44	2404000	0.00643	0.00108	15461	3.7	2589	3.2
Total	19405000			413333	100.0	82191	100.0

Table 3: Estimated birth averted by programme and non-programme contraception in Bihar, 2005-06

Methods	Prevalence of		Use effectiveness of		Estimated birth averted by			
	Programme contra- ception	Non- programme contra- ception	Programme e contra- ception	Non- programme e contra- ception	Programme contraception		Non-programme contraception	
	u_m'	u_m''	e_m'	e_m''	BA_m	%	BAN_m	%
Oral pills	1.3		0.9		17427	4.2		
IUD	0.6		0.95		8490	2.1		
Condom	2.3		0.7		23981	5.8		
Tubectomy	23.8		1.0		354498	85.7		
Vasectomy	0.6		1.0		8937	2.2		
Rhythm		3		0.5			51369	62.5
Withdrawal		1.8		0.5			30822	37.5
Other methods		0		0.5			0	0
Total	28.3	4.8			413333	100.0	82191	100.0

Table 4: Prevalence of Programme and non-programme contraception, observed fertility rates and estimated natural and gross fertility rates by age-group in Bihar, 2015-16

Age group	Prevalence of		Observed fertility	Elasticity coefficient	$1 - C_a(u_a' + u_a'')$	$1 - C_a(u_a'')$	Natural fertility rate	Gross potential fertility
	Programme	Non-						

	contraception	programme contraception						rate
							NAF _a	PAF _a
a	u _a '	u _a ''	AF _a	C _a				
15-19	1.5	0.2	77	0.62	0.9895	0.9988	77.8	77.7
20-24	6.4	0.6	273	0.62	0.9566	0.9963	285.4	284.3
25-29	16.2	0.9	185	0.823	0.8593	0.9926	215.3	213.7
30-34	17.2	0.5	91	0.94	0.8336	0.9953	109.2	108.6
35-39	15.9	0.6	38	1.022	0.8314	0.9939	45.7	45.4
40-44	16.6	0.3	12	1.309	0.7788	0.9961	15.4	15.3

Table 5: Gross fertility and gross birth averted by the programme and non-programme contraception in Bihar, 2015-16

Age group	Female population	Gross fertility effect of:		Birth averted by			
		Programme contraception	Non-programme contraception	Programme methods		Non-programme methods	
a	POP _a	PAF _a - AF _a	NAF _a - PAF _a	BA _a	Percent	BAN _a	Percent
15-19	5707000	0.00072	0.00010	4130	1.5	551	3.4
20-24	5308000	0.01132	0.00106	60108	21.2	5635	35.1
25-29	4498000	0.02871	0.00159	129115	45.5	7173	44.6
30-34	3351000	0.01765	0.00051	59143	20.8	1719	10.7
35-39	2942000	0.00743	0.00028	21851	7.7	825	5.1
40-44	2859000	0.00335	0.00006	9573	3.4	173	1.1
Total	24665000			283921	100.0	16076	100.0

Table 6: Estimated birth averted by programme and non-programme contraception in Bihar, 2015-16

Methods	Prevalence of		Use effectiveness of		Estimated birth averted by			
	Programme contra- ception	Non- programme contra- ception	Programme e contra- ception	Non- programme e contra- ception	Programme contraception	Non-programme contraception		
	u_m'	u_m''	e_m'	e_m''	BA_m	%	BAN_m	%
Oral pills	0.8		0.9		9047	3.2		
IUD	0.5		0.95		5969	2.1		
Condom	1		0.7		8796	3.1		
Tubectomy	20.7		1		260109	91.6		
Vasectomy	0		1					
Rhythm		0.2		0.5			4019	25
Withdrawal		0.6		0.5			12057	75
Other methods		0		0.5		0.0	0	0
Total	23	0.8			283921	100.0	16076	100

Conclusion

Of the total births averted by programme contraception, 82.6 percent of births were averted by Sterilization users in 2005-06 while the spacing methods users contributed to only 17.4 per cent of the birth prevention. The spacing methods of family planning need to be strengthened for the greater use. With regard to the 2752594 births averted by non-programme contraception, the main contribution was made by the users of Rhythm (63.6 percent) that was followed by the users of withdrawal (32.5 percent) and by the other methods (3.9 percent). Of the total birth averted in India, the contribution of programme contraception and non-programme contraception was 84.7 percent and 15.3 percent in 2005-06. The programme contraception has the dominance role to control fertility however the non-programme contraception use should also be enhanced at the places where accessibility of programme contraception is poor. Some of major issues affecting the implementation of the Family Planning Programme in India are a) lack of integration of the Family Planning Programmes with other National Health Mission (NHM) components, resulting in dilution of roles, responsibilities and accountability of programme managers at grassroots levels b) slow progress of the programme to undertake effective measures to increase median age at marriage and first childbirth c) insufficient view of the programme to alter fertility preferences of eligible couples through effective behavior change communication among rural and socio-economically disadvantaged groups d) over emphasis on permanent family planning method particularly such as, female sterilization ignoring other reversible birth spacing methods.

References

Ann, TB.1985: Application of the prevalence model: the case of Malaysia. In: Studies to enhance the evaluation of family planning programmes by United Nations. Department of International Economic and Social Affairs. Population Division [DIESA] New York, United Nations, 224-6. Population Studies No.87 ST/ESA/SER.A/87.

Bongaarts, John.1985: 'A Prevalence Model for Evaluating the Fertility Effect of Family Planning Programmes: Age-specific and Method specific Results', Studies to Enhance the Evaluation of Family Planning Programmes, United Nations, New York, ST/ESA/SER.A/87, pp.246.

_____.1993:'The fertility impact of family planning programs', New York, Population Council,
Research Division Working Papers No. 47, pp. 35.

Hanoomanjee, E. 1985: Application of the prevalence mode: the case of Mauritius. In: Studies to enhance the evaluation of family planning programmes by United Nations. Department of International Economic and Social Affairs. Population Division [DIESA] New York, United Nations, 227-30. Population Studies No.87 ST/ESA/SER.A/87.

Kumar, Dilip.1990:‘Evaluation of Family welfare and MCH Programmes in Some PHCs of Patna district’, Population Research Centre, Patna University, Patna, PRC Mimeograph Series No. 118, pp.91.

_____.2015: **‘High Fertility Trend and Maternal Health in India: A Review of Progress’**, Population Research Centre, Patna University, Patna, PRC Mimeograph Series No. 228, pp.15.

National Family Health Survey (NFHS-III), 2005-06: India: Volume I. International Institute for Population Sciences (IIPS) and Macro International. 2007. Mumbai: IIPS.

Measurement and Health Information Systems, World Health Organization, Avenue Appia 20, CH-1211 Geneva 27, Switzerland. Ref. No. 04-014951(Submitted: 21 October 2004 – Final revised version received: 17 January 2005 – Accepted: 31 Jan. 2005).

Ministry of Health and Family Welfare, Government of India, ‘Concurrent Evaluation of Family Welfare Programme’, Third Report, New Delhi, pp.60.

Ministry of Health and Family Welfare (Statistics Division), Government of India, Family Welfare Statistics in India, 2009.

Prasad, R and et al.1995: Operations Research on Spacing Methods in Bihar (A Diagnostic Study), Population Research Centre, Department of Statistics, Patna University, Patna, pp.202.

Singh, Susheela et al., Barriers to Safe Motherhood in India, New York: Guttmacher Institute, June 2009, pp.35.