ASSESSING POTENTIAL FOR INDUCED ABORTION AMONG INDIAN WOMEN

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Abstract:

There is some evidence that women use induced abortion as a means of contraception as well as for sex selection beyond its justified use in case of undesirable pregnancies or pregnancies with foetal defects. An attempt is made here towards providing an indirect assessment of the magnitude of induced abortion among Indian women given the fact that the direct reporting on this phenomenon in large-scale surveys suffers from gross under-reporting. The assumptions used here are that induced abortion could be used as a means of contraception (i.e. in terms of termination of untimely/unwanted pregnancies) or as a means of attaining the preferred sex composition of children. This aspect is important while looking for evidence to support the hypothesis that the imbalance in child sex ratio is a consequence of sex-selective abortions and reflects the dissonance in the levels of contraception and the declines in fertility. Specifically, this paper uses the information on the age-specific unmet need pattern as well as the age schedule of fertility. To compute the deviant reproductive behaviour, it uses the distribution of sex composition of children within each children ever born (CEB) category of women of specific ages. All this information is available only for currently married women in National Family Health Survey, 1998-99; NFHS-2 and hence they form the sample base of our analysis. We are able to provide separate estimates for use of abortion for sex selection to get both desired sex composition and its use as a contraceptive method to avoid unwanted births. It was found that, in India, induced abortion due to sex selection is 74 per 1000 live births and that due to contraception is 115 per thousand live births. In total there are 189 induced abortions per 1000 live births. This estimation process also gives an idea of the proportion of abortions that are taking place due to sex selection and the proportion of abortions that occur on purely contraceptive grounds. It can be said that of the total amount of induced abortions that occur, 39 per cent of abortions are for sex selection while remaining 61 percent are for avoiding unwanted pregnancies. It is possible that the estimates of abortion being used as a contraceptive could be slightly on the higher side if contraceptive use has been under-reported in surveys. At the over all level the estimates are consistent, suggesting high level of use of abortion as a contraceptive method in the country, and this has serious implications for health policy in general and women's well being in particular. This has to be addressed at policy level and there is a need to reduce/restrict use of induced abortion as a method of contraception.

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Introduction

Rising incidence of induced abortion in India has been a matter of concern because of its adverse consequences on women's health. This is because sizeable proportions of women are likely to have unsafe abortions, due to the presence of a large number of illegal abortion providers in the county. The social and cultural context within which induced abortions are performed and the levels and characteristics of women resorting to abortions are important (Barreto et.al 1992). Research on induced abortion has to be revived in the wake of this reminder that it is a major cause of maternal deaths and abortion related complications account for half of all maternal deaths (Royston and Armstrong, 1989). Abortions also contribute towards the imbalance in the sex composition of children when these induced abortions are sex-selective. Despite abortion being legalised in India since 1971, knowledge about abortion is piecemeal and inadequate, particularly because of the poor quality of the vital registration system as well as limitations in eliciting abortion related information in population level data sources.

Evidence relating to abortion is available from studies on sex ratio at birth and through surveys. Declining sex ratio at birth in India provides evidence of the practice of sex selective abortions in India (Sudha and Rajan 1999; Arnold et al 2002). Wide spread use of ultra sound or amniocentesis for sex determination and sex selective abortion was noted in many parts of India especially Gujarat, Haryana and Punjab (Arnold et al 2002). Though this study was able to bring out the practice of sex selective abortion through sex determination tests, even the authors admit that these are underestimates of prevalence of abortion in these communities. This is because there is again a tendency among women to under report use of amniocentesis/sonography tests if they have actually used it for sex selective abortion. However it is mainly the declining sex ratio at birth due to misuse of medical technology which has brought abortion centre stage, and not the women's right to access safe abortion care services.

On the other hand the gross under-estimate of government statistics on MTPs (Jesani and Iyer 1995) along with inaccurate reporting in surveys (IIPS and ORC Macro 2000, IIPS 2001) leave us with no feasible estimates on the prevalence of induced abortion nor its characteristic features. Other available estimates can at best be termed as '*guesstimates'*. However, efforts have been made to obtain indirect estimates of induced abortion (Mishra et.al, 1998 and Johnston and Hill, 1996) that seem realistic, but their reliability depends on how well the pregnancy history has been recorded in the surveys they are based on.

There is some evidence that women use induced abortion as a means of contraception as well as for sex selection beyond its justified use in case of undesirable pregnancies or pregnancies with foetal defects (Gupte et.al. 1997). The consequences of induced abortion are less known because women resorting to it do not tend to report them. About 4.5 to 16.9 per cent of maternal deaths can be accounted for by septic abortions (Bhatia, 1988, RGI, 1988 and Reddy, 1992). This gives us reasons to believe that the practice of clandestine abortions is a reality and as a result women bear the unfortunate health consequences of death or possibly related reproductive morbidity. Further, the mismatch between declining fertility levels and the reported levels of contraceptive use provides some reason to believe that abortions are being used as contraception but adequate evidence towards this is lacking.

In the absence of any reliable reporting on induced abortion by women in surveys conducted, the direct estimates on its prevalence are redundant. Therefore several indirect methods are proposed to assess the levels of induced abortion. Prior to Bongaarts and Potter's (1983) decomposition model of proximate determinants of fertility, Kumar (1974) made an attempt to estimate rates of pregnancy, foetal death and induced abortions with internal consistency. This method is based on an equation expressing General fertility rate (G) in terms of pregnancy rate (R) given by:

$$G= Rx/(100+bR)$$

Where $b=l_1x+l_2y+l_3z$ with l_1, l_2 and l_3 are the average years of non-exposure following live birth, foetal death and induced abortion respectively. The author uses the estimates of l_1, l_2 and l_3 given by Potter (1963). This method has the disadvantage of less than accurate assumption on lengths of gestation as well as direct use of data on years of non-exposure following a conception.

The aggregate fertility model of Bongaarts and Potter (1983) suggests an indirect estimate of total abortion rate with the assumption of total fecundity to be 15.3. The shortcoming of this method is that it can only provide a total abortion rate under the assumption of natural fertility levels and these are declining. An application of this by Johnston (2002) in case of India had resulted in over-estimates of abortions because of the same assumption of maximum potential fertility per woman to be 15.3. An alternative approach by Mishra et.al (1998) estimates the induced abortion potential based on the information on ill-timed and unwanted pregnancies and derives the Total Induced Abortion Rate (TIAR) assuming one third of the potential to result in induced abortion as evidenced by Huntington *et. al.* (1996). These estimates too are admittedly under-estimates because of the inherent bias in reporting of unwanted and ill-timed births. Again, all these methods have the limitation that they use the information on pregnancy obtained through the reporting of pregnancy outcomes which under-reports induced abortions.

These approaches adopted for assessing induced abortions have two distinct pathways; one in terms of pregnancies and another in terms of births. A pregnancy-based approach has the inherent limitation of assuming the pregnancy outcomes to be reliable and that discrepancy is in merely substituting spontaneous abortion for induced abortions. In that case, the levels of induced abortion do not exceed the reported abortion (induced as well as spontaneous) by women. However, since abortion is an event between pregnancy and birth, any effort at abortion estimation could be derived based on missing births. Factors like contraception and abortion restrict pregnancy which otherwise result in live birth. Hence missing births may include contraceptive led missing pregnancies as well as pregnancies not resulting in live births. However, when abortion is used as contraception to restrict births, such restriction could be to limit or to attain desired sex composition of children. When it is to limit child bearing, couples use abortion to avoid experiencing unwanted fertility. But, for attaining desired sex composition of children, abortion is used to avoid the birth of a child of the unwanted sex. This exercise to measure induced abortions proposes to adjust for both possible use of abortion to restrict unwanted fertility as well as realising desired sex composition of children. Where, the former is derived based on the information on unmet need for limiting family size and the latter is derived based on the systematic pattern of distribution of the sex composition of children within a given category of children ever born.

Objectives

This study is primarily intended towards providing an indirect assessment of the magnitude of induced abortion among Indian women given the fact that the direct reporting on this phenomenon in large-scale surveys suffers from gross under-reporting. The assumptions used here are that induced abortion could be used as a means of contraception (i.e. in terms of termination of untimely/unwanted pregnancies) or as a means of attaining the preferred sex composition of children. This aspect is important while looking for evidence to support the hypothesis that the imbalance in child sex ratio is a consequence of sex-selective abortions and reflects the dissonance in the levels of contraception and the declines in fertility. The evidence regarding the mismatch between the contraceptive prevalence and levels of fertility raises suspicion on under-reporting of contraceptive use, which could perhaps be due to use of induced abortion as contraception.

The `*who*' and `*why*' of induced abortion in India needs to be captured based on an analysis of its characteristics and determinants. The characteristic pattern elaborated here is in terms of differentials in experience of induced abortions. These cover residential background, educational level of women and the standard of living of the household. Besides, estimates at the state level are also attempted. In addition, the characteristic component here will provide insights into the extent to which induced abortion is used as an alternate to contraception or as a measure of sex-selection. Besides this, the estimate obtained here will factor in the lifetime experience of induced abortion per woman and could well be computed in terms of induced abortions per thousand live births.

Data

The National Family Health Survey-II (1998-99) data set is used to obtain a precise estimate of the extent of induced abortion, its characterisation in terms of sex-selection as well as its contraceptive intentions. This survey covered 26 states in India and 90,303 ever-married women in the 15-49 age group were interviewed. The survey data sets are rich in information provided by women with regard to their reproductive behaviour and intentions, which serves as input for such indirect estimation. Specifically, this paper uses the information on the age-specific unmet need pattern as well as the age schedule of fertility. To compute the deviant reproductive behaviour, it uses the distribution of sex composition of children within each children ever born (CEB) category of women of specific ages. All this information is available only for currently married women in NFHS-2 and hence they form the sample base of our analysis.

Methodology

As discussed earlier the estimates of induced abortion potential in this study are based on births reported instead of commonly used measures/estimates based on pregnancies reported in the survey. We present below methods used to gauge the extent of induced abortion as a consequence of the unmet need for contraception as well as the deviance in observed reproductive behaviour from expected sex compositions within different family size preferences.

Induced abortion due to reproductive behaviour like sex-selective abortion is assessed in the following manner. Here we name any departure from the expected norm of sex composition as the observed '**deviance**'. The deviant reproductive behaviour is measured here in terms of the sex composition of children ever born (CEB) to women in the reproductive age groups. This deviance can have two components namely sex selective abortion and differential stopping according to desired sex composition. The share of deviance due to such differential stopping could be accounted for by the differential expression of desire for additional children by women of different parities in accordance with the sex composition. This means that differential stopping could be evaluated on the basis of differences observed in proportion of women desiring additional children by the sex composition of children within a given parity. After removing the share of differential stopping according to desired sex composition out of the deviance component, the remaining deviance may well be attributed to sex selective abortion.

To elaborate further, for a given age, women can be of different parities and women of a given parity may be distributed according to several possible combination of sex of their children. Such sex composition of children is examined independently for women in all the seven age groups and an index of deviance from the expected norm is computed. The expected norm is nothing but the theoretical distribution of the possible sex composition within a given CEB category according to the binomial law and sex ratio at birth of 106 males per 100 females. While considering the children ever born criterion, the index of deviance is a weighed sum of deviations in number of women experiencing different possible compositions of CEB vis-à-vis the theoretical pattern of this composition described by the binomial rule for women of different parities. Assuming that the current force of fertility[1] is without any deviant behaviour, the potential age-specific fertility is obtained by dividing them with the complement of this index of deviance. The observed age-specific fertility schedule is a realised one, which includes all kinds of fertility regulation adopted in terms of stopping/eliminating behaviour. Hence, the potential age-specific fertility levels could always be more than the observed. The deviance component is then derived based on the observed difference between the theoretical distribution of women with sex combinations of children within a CEB category and the observed one. The gap between the potential fertility and the observed fertility derived here can only be due to deviant reproductive behaviour, which otherwise could account for sex-selective abortion as well as differential stopping behaviour of women. As it concerns birth, the

[1] Force of fertility simply refers to the age specific fertility schedule, which describes the risk of having children at specific ages through the reproductive ages.

index of deviance is in terms of the distance from a theoretical sex ratio at birth i.e. 106 male births per 100 female births. **(see Annexure I for illustration).** The index of deviance thus computed needs to be segregated into components like that of sex selection and differential stopping. The differential stopping component is assessed based on the observed differential between the expressed desire for additional children among women who have delivered children of both sexes within the specific CEB category. This is measured by taking the ratio of the proportion desiring additional children in a specific sex combination category and applying it to all women of a given parity. This ratio is suitably weighed according to distribution of women of specific parities within different ages. Such a differential stopping measure estimates the proportion of deviance that is due to differential stopping which is used to disintegrate the original index of deviance into sex selection and differential stopping. One aspect to be noted is that comparison on the levels of practice of sex selections across any characteristics (e.g. residence, state etc.), estimated by this method should not be read as simple averages, that is distributed below and above the All India average of the phenomenon. This magnitude of sex selection reflects both the due influence of the prevailing levels of fertility as well as the age/parity pattern of deviant behaviour.

Induced abortion due to the unmet need for contraception is assessed by estimating the natural force of fertility based on the given level of age specific fertility rates (ASFR) and the age-specific contraceptive prevalence rates (otherwise stated as the met need of contraception). The natural force of fertility is then given by f_{oi}/C where f_{oi} is the observed fertility rate of the age group i and $C=1-1.02*U_i$ where U_i is the contraceptive prevalence at age i (Bongaarts, 1993). The difference between this age specific natural force of fertility and the observed one provides us the extent to which contraception suppresses fertility. Using this equation in terms of the quantum of fertility suppressed due to the 'met need' of contraception i.e. the age specific contraceptive prevalence or Ui, we can estimate the levels of fertility that would have been suppressed as a result of any unmet need for contraception. As this quantum of fertility is not suppressed due to contraception, it could be safely assumed as the quantum of unwanted fertility, a part of which might be pre-disposed with alternative means of fertility control. Huntington et al (1996) study found that when the reported levels of unwanted pregnancies were high and the atmosphere around induced abortion was restrictive, as in Egypt, Ghana and Cote d'Ivoire, then 25, 55 and 65 per cent of the women, respectively, who reported unwanted pregnancies attempted an abortion. In India, abortion has been legally available since 1972 and therefore it can be assumed that except for some segments of the population the atmosphere regarding abortion is not too restrictive. It can therefore be conservatively assumed that *at least* a third of those women who had an unwanted pregnancy in India would attempt an abortion, based on the observation made by Huntington et al (1996). This is to assume the least and the modest level of conversion of unwanted pregnancies to induced abortions given the least restrictive environment for induced abortion in India for last thirty years. Following the computation of this age specific quantum of fertility that is avoided not due to contraception but otherwise, a sum of this over the seven reproductive ages will give us the total induced abortion rate (TIAR). This is interpreted as the number of induced abortion per woman in the reproductive age during her entire reproductive span given the pattern of ASFR and the age-specific met and unmet need for contraception.

Sex composition of children ever born

Table1 below lists CEB and the composition of currently married woman interviewed during the NFHS-2 survey. Among women with one child, 53 per cent had a son while the remaining 47 per cent had a daughter. Similarly for women who had given birth to two children, 30 per cent had delivered only sons while only 17 per cent had birthed two daughters. This clearly demonstrates the extent of deviant reproductive behaviour; more male births than female births. This is what was is attributed as deviance arising due to sex selective abortions as well as sex selective stopping pattern adopted by the couples.

The extent of deviant reproductive behaviour remains high among women with 3 children. It is well known that more and more couples prefer a two to three child family. It is mainly between the 2^{nd} and 3^{rd} birth that a couple is likely to go for sex selection or sterilisation in order to attain the desired sex composition of their family. Here one can see how a couple with 2 children but no sons; tries for a third child preferably a son and ends up having 1 son and 2 daughters or 3 daughters and no sons. Prevalence of deviant reproductive behaviour starts declining for women with 4 children onwards and the pattern almost disappears in the case of women with 6 children.

Table 1
Sex composition of children ever born to currently married women, India, 1998-99

Children Ever Born	Sex composition of children	Distribution	N
	1 son, 0daughter	53.4	6399
1	0 son, 1daughter	46.6	5589
	Total	**100.0**	**11988**
	1 son, 1daughter	52.7	9429
2	2 son, 0daughter	30.4	5432
	0 son, 2daughter	16.9	3023
	Total	**100.0**	**17884**
	3 son, 0daughter	13.6	2234
	0 son, 3daughter	7.9	1299
3	2 son, 1 daughter	45.3	7429
	1 son, 2 daughter	33.2	5439
	Total	**100.0**	**16401**
	4 son, 0 daughter	6.6	767
	0 son, 4 daughter	3.7	429
4	3 son, 1 daughter	25.4	2945
	1 son, 3 daughter	22.9	2659
	2 son, 2 daughter	41.4	4797
	Total	**100.0**	**11597**
	5 son, 0 daughter	3.2	232
	0 son, 5 daughter	3.1	225
5	4 son, 1 daughter	14.7	1067
	1 son, 4 daughter	16.1	1166
	3 son, 2 daughter	30.2	2188
	2 son, 3 daughter	32.7	2367

	Total	**100.0**	**7245**
6	6 son, 0 daughter	2.0	92
	0 son, 6 daughter	1.7	79
	5 son, 1 daughter	8.7	407
	1 son, 5 daughter	11.6	542
	4 son, 2 daughter	22.3	1040
	2 son, 4 daughter	25.7	1200
	3 son, 3 daughter	28.0	1308
	Total	**100.0**	**4668**

Source: Based on NFHS-II (1998-99)

It is evident that a reliable estimate of missing births due to sex selection process can be obtained by analysing the deviant reproductive behaviour. Since the role of sex selection process is low among women with more children, women with more than 6 children have been excluded from the analysis. This might well be a limitation of this exercise but is justified on the ground that deviant behaviour is more intense when choices are restrictive in terms of the number of children.

Sex selective stopping pattern

As mentioned earlier the deviant reproductive behaviour observed above could be due to a sex selective stoppage rule as well as sex selective abortion. We provide below an illustration of the sex selective stopping pattern among Indian women. Information on desire for additional children gives the extent of sex selective stopping pattern in the population. Visibly, with the predominance of male children there is less of desire for additional children as compared to women having more female children within a given parity group of women. This pattern of differential stopping may be varied across states given their prevailing fertility levels as that is the choice within which couples can practice differential stopping. One such instance could be the case of Kerala where the progression beyond parity three and above will be negligible and differential stopping could therefore be less sensitive compared with other states.

Table 2
Desire for more children by current sex composition among currently married women, India, 1998-99

CEB	Sex Comp	% desiring more children	No more children	Others	Total	N
1	1m 0f	70.6	25.1	4.3	100	6399
	0m 1f	76.0	20.2	3.8	100	5589
2	1m 1f	22.8	73.5	3.8	100	9428
	2m 0f	18.6	79.0	2.4	100	5432
	0m 2f	49.8	46.1	4.1	100	3022
3	3m 0f	10.8	86.8	2.5	100	2233
	0m 3f	44.2	50.3	5.5	100	1299
	2m 1f	8.8	88.7	2.5	100	7429
	1m 2f	18.5	78.1	3.4	100	5439
	4m 0f	7.2	87.5	5.3	100	767

4	0m 4f	44.6	48.5	6.9	100	428
	3m 1f	6.8	89.7	3.5	100	2946
	1m 3f	15.2	80.7	4.1	100	2659
	2m 2f	7.7	89.0	3.4	100	4797
5	5m 0f	8.2	86.3	5.6	100	233
	0m 5f	38.7	54.7	6.7	100	225
	4m 1f	4.8	88.5	6.7	100	1067
	1m 4f	16.3	78.6	5.1	100	1166
	3m 2f	5.9	89.9	4.3	100	2188
	2m 3f	8.6	87.0	4.4	100	2367

Source: Based on NFHS-II (1998-99)

Deviant Reproductive Behaviour and Induced Abortion

Results of the analysis giving index of deviation based on deviation of observed births from a theoretical binomial distribution and corresponding age specific sex adjusted fertility rates (ASSAFR) is given in Table 3.

Table 3
Age specific sex adjusted fertility rates from all births

Age Group I	Index of Deviation d_I	Proportion of deviance due to sex selective stopping S_i	Adjusted index of deviation d_i (1-Si)	ASFR f_i	ASSAFR p_i = fi /(I-d_i)
15-19	0.0580	0.507	0.028	0.1070	0.107
20-24	0.0568	0.678	0.019	0.2100	0.188
25-29	0.1064	0.631	0.039	0.1430	0.117
30-34	0.1407	0.410	0.083	0.0690	0.052
35-39	0.1550	0.255	0.115	0.0280	0.017
40-44	0.1648	0.203	0.131	0.0080	0.004
45-49	0.1931	0.333	0.129	0.0030	0.005
				$\Sigma f_i = 2.84$	$\Sigma p_i = 2.96$

Source: Based on NFHS-II (1998-99)

Births missing per ever married woman in her life time due to sex selective abortions = Σ fi - Σp_i = .12

Difference between observed total fertility rate and expected total fertility rate based on age sex adjusted fertility rate gives the number of births missing due to sex selective abortion. It can be seen for example that 0.12 births per woman are missing in the country, which could be attributed to sex selection, which in turn provides an estimate of 43 sex-selective abortions per 1000 live births.

Table 4 gives missing births per woman and births missing per 1000 live births due to sex selective abortions. The practice of sex selective abortion seems to be of equal magnitude in both rural and urban areas when we compare this measure per woman. However, translating the same per 1000 live births, the urban prevalence of sex selective abortion is substantially higher in comparison with the rural areas. Similarly, with the increasing educational level of women, the practice of sex selective abortion is going higher and higher. The trend in sex-selective abortions per 1000 live births by standard of living

(SLI) groups indicates an estimate of 35 per 1000 live births in low SLI category as compared with the same being 58 in the higher SLI group.

Table 4
Births missing due to sex selective abortions per woman and per live birth by selected characteristics, India

	Observed TFR Σf_I	Expected TFR Σp_I	Missing births per woman	Missing births per 1000 live birth
1 Place of Residence				
Rural	3.07	3.20	0.13	42
Urban	2.27	2.41	0.14	60
2 Educational Level				
Illiterate	3.43	3.52	0.09	27
Primary	2.63	2.74	0.11	43
Secondary	2.26	2.38	0.12	55
Higher	1.98	2.15	0.17	87
3 Standard of Living				
Low	3.37	3.45	0.08	35
Medium	2.85	3.98	0.13	45
High	2.10	2.22	0.12	58
Total	**2.84**	**2.96**	**0.12**	**43**

Source: Based on NFHS-II (1998-99)

Table 5
Births missing due to sex selective abortions per woman and per 1000 live births

	Observed TFR Σf_I	Expected TFR Σp_i	Sex selective abortions per woman	Sex Selective abortions per 1000 live birth
Andhra Pradesh	2.25	2.42	0.17	74
Assam	2.31	2.49	0.18	79
Bihar	3.49	3.55	0.06	17
Gujarat	2.72	2.83	0.11	39
Haryana	2.88	2.99	0.11	39
Karnataka	2.12	2.31	0.19	88
Kerala	1.96	2.21	0.25	127
Madhya Pradesh	3.31	3.42	0.11	32
Maharashtra	2.52	2.68	0.16	64
Orissa	2.46	2.55	0.09	35
Punjab	2.21	2.38	0.17	71
Rajasthan	3.77	3.84	0.07	17
Tamil Nadu	2.19	2.34	0.15	70
West Bengal	2.30	2.31	0.01	3
Uttar Pradesh	3.99	4.14	0.15	67
All India	**2.84**	**2.96**	**0.12**	**74**

Source: Based on NFHS-II (1998-99)

This analysis presents a picture of the regional pattern of sex selective abortions contrary to common expectation. This could very well be due to the difference in practice of sex selection and sex-selective abortions. The extent of sex selective abortions is the least in the state of West Bengal followed by Rajasthan, Bihar, Orissa and Madhya Pradesh. The practice of sex selective abortion (not to be equated with the magnitude of sex selection) is to the tune of 127 per 1000 live births in Kerala followed by Assam, Andhra Pradesh, Karnataka, Punjab, Tamil Nadu and Uttar Pradesh, where the range is between 70 and 90 per 1000 live births[redacted] These estimates of the magnitude of sex selective abortions may sound unreasonable while related with the existing literature but it may be read in the context of sex selective abortions and not sex selections. Moreover, these stated magnitudes might not necessarily reflect on the absolute number of sex-selective abortions, as they will depend largely on the level of fertility. Such comparisons on the levels of practice of sex selections across states based on the missing births estimated by this method should not be read as simple averages to be distributed below and above the All India average of the phenomenon. This magnitude of sex selection has the due influence of the prevailing levels of fertility as well as the age/parity pattern of deviant behaviour.

Unmet need for Contraception and Induced Abortion

To study the extent to which induced abortion is used as a contraceptive method, force of natural fertility (ASFNR) is calculated using ASFR and age specific unmet need for contraception. The difference between ASFR and ASNFR gives the extent of fertility suppressed due to use of contraception. This is adjusted with the unmet need for contraception to obtain the age specific fertility schedule not suppressed though contraception i.e. potential age specific induced abortion rate (PASIAR). As mentioned earlier, here the assumption is one third of derived excess fertility is due to abortions. This analysis is aimed at estimating the induced abortions where it is used as a contraceptive method (Table 6).

Table 6
Estimation of potential age specific induced abortion rate, India

Age Group I	ASFR f_I	Met need Propn. p_i	ASNFR n_i= $(fi/(1-(1.02*_{i)})$	Fertility suppressed through contraception $d_i= (n_i-f_i)$	Unmet need Propn. u_I	PASIAR $b_i = (d_i/p_i)*(u_i/3_{)}$
15-19	0.107	0.080	0.117	0.010	0.271	0.0107
20-24	0.210	0.260	0.286	0.076	0.244	0.0237
25-29	0.143	0.493	0.288	0.145	0.186	0.0182
30-34	0.069	0.627	0.191	0.122	0.141	0.0092
35-39	0.028	0.674	0.090	0.062	0.102	0.0031
40-44	0.008	0.649	0.024	0.016	0.057	0.0005
45-49	0.003	0.572	0.007	0.004	0.031	0.0001

Source: Based on NFHS-II (1998-99)

Here the total induced abortion rate (TIAR) = $5*\Sigma b_i$= 0.327

The number of induced abortions per woman during her entire reproductive span given the pattern of age specific fertility and age specific met and unmet need for contraception is 0.327. On an average one third of married women are likely to practice abortion to avoid unwanted pregnancies in their lifetime. It is to be noted that this rate will be affected if the level of contraceptive use is under reported in the survey but we expect that this is more or less accurate.

Table 7
Induced abortions rates due to unmet need for contraception in India

	Total abortions per woman	Total abortions per 1000 live births
1 Place of Residence		
Rural	0.291	116
Urban	0.355	128
2 Educational Level		
Illiterate	0.375	109
Primary	0.322	122
Secondary	0.292	129
Higher	0.270	136
3 Standard of Living		
Low	0.376	112
Medium	0.335	118
High	0.280	133
Total	0.327	115

Source: Based on NFHS-II (1998-99)

Table 8
Induced abortion due to unmet need for contraception in major states, India

	Total Abortions per woman	Abortions per 1000 live birth
Andhra Pradesh	0.176	78
Assam	0.261	113
Bihar	0.431	123
Gujarat	0.218	65
Haryana	0.185	64
Karnataka	0.243	115
Kerala	0.243	124
Madhya Pradesh	0.345	104
Maharashtra	0.323	128
Orissa	0.267	109
Punjab	0.202	91
Rajasthan	0.392	104
Tamil Nadu	0.247	113
West Bengal	0.311	135
Uttar Pradesh	0.525	132
All India	**0.327**	**115**

Source: Based on NFHS-II (1998-99)

It can be seen that 115 abortions per 1000 live births take place in India to avoid unplanned pregnancies. Table 7 shows that the use of abortion as a contraceptive is higher in urban areas than in rural area, higher amongst the lower educated than among highly educated women and in high SLI category as compared to low SLI categories.

When compared to other states, the practice of using of abortion to avoid unplanned pregnancies is the highest in West Bengal (135 per 1000 live births), a state which has a high level of use of natural family planning methods in India. Such practices were relatively higher in Uttar Pradesh, Maharashtra, Kerala and Bihar. At the same time use of abortion as a method of contraception was lower in Punjab and Haryana, where we had earlier observed a high level of use of abortion for sex selection.

Conclusion

We are able to provide separate estimates for use of abortion for sex selection to get both desired sex composition and its use as a contraceptive method to avoid unwanted births. It was found that, in India, induced abortion due to sex selection is 74 per 1000 live births and that due to contraception is 115 per thousand live births. In total there are 189 induced abortions per 1000 live births. This estimation process also gives an idea of the proportion of abortions that are taking place due to sex selection and the proportion of abortions that occur on purely contraceptive grounds (see table 9). It can be said that of the total amount of induced abortions that occur, 39 per cent of abortions are for sex selection while remaining 61 percent are for avoiding unwanted pregnancies.

Table 9
Summary of abortion estimates obtained for selected states in India

	Induced abortion per 1000 birth for		Total Induced abortions per 1000 live births	Percentage of induced abortion due to sex selection
	Sex selection	Contraception		
Andhra Pradesh	74	78	152	48.7
Assam	79	113	192	41.1
Bihar	17	123	140	12.1
Gujarat	39	65	104	37.5
Haryana	39	64	103	37.9
Karnataka	88	115	203	43.3
Kerala	127	124	251	50.6
Madhya Pradesh	32	104	136	23.5
Maharashtra	64	128	192	33.3
Orissa	35	109	144	24.3
Punjab	71	91	162	43.8
Rajasthan	17	104	121	14.0
Tamil Nadu	70	113	183	38.3
West Bengal	3	135	138	2.2
Uttar Pradesh	67	132	199	33.7
All India	74	115	189	39.2

Source: Based on NFHS-II (1998-99)

It is possible that the estimates of abortion being used as a contraceptive could be slightly on the higher side if contraceptive use has been under-reported in surveys. At the over all level the estimates are consistent, suggesting high level of use of abortion as a contraceptive method in the country, and this has serious implications for health policy in general and women's well being in particular. This has to be addressed at policy level and there is a need to reduce/restrict use of induced abortion as a method of contraception.

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Annexure- I: Procedure used to get index of deviation used for computing missing births due to sex selection

Step 1

Estimation of probability of having a certain sex composition within a given CEB category in each age group is assumed to follow a binomial distribution. Here for a woman of parity `n' in age group `$_i$ ' the chances of having x sons and n-x daughters is given by

$$P_{(i)}(x) = {}_nC_x p^x q^{n-x}$$

Where I ==1,2,3, ---7
n= 1,2,.. 5
p= probability of having a male child in a birth is 106/200= 0.514
q = probability of having a female child in a birth = 1-p =0.486.

The above probabilities are derived under the assumption of sex ratio at birth to be 106 males per 100 females.

To illustrate for a woman in age group 30-34 years with CEB=3, the probability of having 1 son and 2 daughters is

$$P_{(4)}(3) = 3C_1 p^1 q^2$$

Step 2

Computation of deviance for each composition within each age group: This deviance is the modulus difference between observed no of cases and expected number of cases as a ratio of observed number of cases

$${}^j d_{(i)} = (o_{(i)} - e_{(i)})/o_{(i)}$$

To illustrate: If there are 3335 women with 3 children in 30-34 age group and if the 1074 women among them were observed to be having 1 son and 2 daughter, the deviance is given as

$${}^3d_{(4)} = (3335 * P_{(4)}(3) - 1074)/3335$$

Step 3:

Computation of total deviations by CEB in each age group. This is the sum of all deviations within a given CEB in each age group given by ${}^jD$ (i).

Step 4

Computation of weighted index of deviation in each age group. For a woman in age group i the (women with CEB greater than 5 not considered).

$D_{(i)} = (o_{(1)}\,{}^1D_{(i)} + o_{(2)}\,{}^2D_{(i)} + \ldots + o_{(5)}\,{}^5D_{(i)})/(o_{(1)} + o_{(2)} + \ldots o_{(5)})$

Where o (I) s are the proportional share of women of different parities and sum of all Oi s are equal to 1.

Step 5:

The index of deviance $D_{(i)}$ has to be decomposed based on the differential stopping measured in the following manner:

The differential stopping is assessed based on the differences in proportion desiring additional children among women of a specific parity according to sex combination of children. The proportion of this deviance attributable to differential stopping is adjudged and the remainder of deviance is used for assessment of sex-selective induced abortions.

Step 6:

The differential stopping was measured based on a ratio of the proportion not desiring additional children among women with different sex combination of children within a given parity to the overall proportion of women not desiring additional children in that parity category. However, where the number of women in a given sex combination were below 10, that particular combination was ignored in our computation to avoid distortion of results.

Step 7

This ratio is averaged across parities within each age using the parity distribution of women within each age as weights.

Step 8

We designate this proportion of deviance thus calculated to be attributed to differential stopping and the rest of the deviance to sex selective abortion (say Si).

Step 9

Given a deviance $D_{(i)}$ and the designated proportion in step 8 as $P_{(i)}$, we get the deviance attributed to sex selection as $Si=\{ D_{(i)*} (1-P_{(i)})\}$.