ORIGINAL ARTICLE

A Model for Predicting Unsafe Induced Abortion among Women in India

Jai Kishun[1], Anup Kumar[2]

[1]Assistant Professor, Department of Biostatistics & Health Informatics, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh - 226014, India; [2]Assistant Professor, Department of Biostatistics & Health Informatics, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh - 226014, India

Corresponding Author

Anup Kumar, Assistant Professor, Department of Biostatistics & Health Informatics, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh - 226014, India
E Mail ID: anup.stats@gmail.com

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Abstract

Background: Unsafe abortion is one of the major cause of maternal morbidity and mortality. Approximately 15.6 million abortions take place every year in India of which a significant proportion is unsafe. **Objective**: To explore risk factors associated with unsafe induced abortion. **Method**: National Family Health Survey-IV data have 82,369 women aged between 15-49 years who responded about their aborted /miscarriage/stillbirth is used. Out of these total women, 8,878 were induced aborted and found eligible. **Result**: Of the total induced aborted, 30.6% of women are unsafe induced abortion. Women age between 35-49 years are 53% more likely to have unsafe induced abortion than age between 15-19 years. Women living in rural areas have 26% less likely to unsafe abortion than women living in urban areas. Women who have knowledge about the fertile period are 35% less likely to have unsafe abortion than no correct knowledge. Unsafe induced abortion is found increasing as education and wealth index are increasing. **Conclusion**: Unsafe induced abortion is a large contributor to maternal morbidity and mortality. Awareness of contraceptives use, Medical Termination of Pregnancy (MTP) and Comprehensive Abortion Care (CAC) service should be increased through media exposure.

Keywords

Induced Abortion; Unsafe Abortion; Contraception; Logistic Models

Introduction

Induced abortion is the purposely termination of a human pregnancy. Generally, people adopt either clinic or medication abortion process. Clinical abortion would be safe but, medication abortion may be safe or unsafe. Abortion may have serious health consequences and cause complications such as hemorrhage, sepsis and uterine perforation (1,2,3). The occurrence of abortion and unintended pregnancy in India is high. An estimated 15.6 million abortions were performed in 2015. Majority of induced abortions (81%) carried out using the medication abortion process and other remaining uses the clinical abortion process (4,5,6). Induced abortion in India is legal by medical termination of pregnancy act, 1971 (Act No. 34 of 1971) (7).

Usually, data on MMA or a significant survey of public and private health facilities is used to estimate abortion rate (5,6,8). Desire to limit family size, birth spacing, son preference, medical reasons, poverty, violence and belief system are major factors of abortion (10,11,12). In this study, some other potential factors of abortion such as women's age, place of residence and educational level, wealth index, religion, ecological zone, caste, marital status,

use of modern contraceptives, media exposure and knowledge of fertile period are explored. This study was designed to explore the predictors of unsafe induced abortion from self-reported data provided by women age between 15-49 years, who were interviewed during year 2015-16 in NFHS-IV in India.

Aims & Objectives

1. To explores the risk factors associated with the unsafe abortion in India using national level data.
2. Visual representation of significant risk factors through multiple correspondence analysis.

Material & Methods

Study Type: A national level cross-sectional study.

Study Population: The NFHS-4 (2015-16) surveyed 572,000 households in 640 districts of India. A total of 82369 women who responded on the outcome of interest (i.e. women terminate the pregnancy) in this survey. Out of these total women, 8,878 were induced aborted and found eligible for this study, other women are excluded as they had incomplete information about selected exposure and outcome variable.

Study Duration: Data collection was conducted during 20 January 2015 to 4 December 2016.

Study Variables: This study has restricted the analysis to a subpopulation of women who have responded to the question "Did that pregnancy end in a miscarriage, an abortion, or a stillbirth". The outcome of interest was women responded to an abortion. The dependent/outcome variable was unsafe induced abortion. Unsafe abortion defined from three variables/questions i.e. 1. Where was the abortion performed? 2. Who performed the abortion? and 3. Have you ever used anything or tried in any way to delay or avoid getting pregnant? Induced abortion is considered as safe if the pregnancy was terminated by a "medical provider" in a "medically safe location" and ever used contraception. Unsafe induced abortion defined as the termination of pregnancy by a woman through the use of the nonmedical method, nonmedical provider and never use of contraception.

Data Analysis: Sampling weight was used to ensure the actual representativeness of the survey results at the national level and as well as at the domain level. The association between the exposure variables and the outcome variable was explored using univariate and multiple logistic regression analysis. Variables whose p-values were found ≤0.05 in univariate analysis, included for multiple correspondence analysis and its plot is given for pictorial representation of risk factors of unsafe abortion.

Results

Proportion and association of unsafe abortion with demographic characteristic

[Table 1] presents the demographic characteristic of women and its significance for unsafe abortion by logistic regression. Woman's age, marital status, place of residence, religion, caste, educational level, wealth index were significant predictors of the unsafe abortion. Of the total abortion, 30.4% of women found to have unsafe abortion, majority of them belong to age between 15-24 years (32.54%). Women age between 15-24 years was 27% and age between 25-35 years was 16% more likely to have unsafe abortion than reference category age between 35-49 years. Married women (30.17%), other women seem more vulnerable to perform unsafe abortion (Approx. 40% women). Women, who were married and residing in urban areas were 32% and 26% less likely to have unsafe abortion as compared to women other than married and residing in rural areas respectively. In religion, the majority of unsafe abortion taken place in Hindu (31.67%) followed by Muslim (29.52%) and Christian (24.94%). Religion wise comparison shows, Hindu, Muslim, Christian were more likely, while Sikh less likely to have unsafe abortion as compared reference category other (i.e. Buddhism, Jainism, not stated). Unsafe abortion among educated women shows that as the education increases, proportion of unsafe abortion deceases, while in wealth index categories as the wealth of women increases, proportion of unsafe abortion decreases.

Predictors of unsafe induced abortion i.e. knowledge/information, and contraceptives use.

[Table 2] presents the descriptive analysis on abortion characteristics and its significance for unsafe abortion by logistic regression. Majority of the induced abortion occurred in the women who had their sexual encounter at first union (50.8%). Almost 97% of women who adopted abortion were married but when looking at their knowledge about fertile period 82.4% responded "No" means they do not have complete information. 84.70% of women have media exposure (either by reading newspapers or listened to the radio or watched television or used the internet etc.) related to contraception use, family planning, etc. All participants included in the

study, uses some kind of contraceptive, among all these approx. 31% of women go for unsafe abortion.

Predictors of unsafe induced by multiple logistic regression and its visual representation

[Table 3] presents the factors combined from results of table 1 and table 2 through multiple logistic regression. Age of women, wealth index, number of living children, contraception and pattern of contraception use were found significant. The visual representation is presented though multiple correspondence analysis. Multiple correspondence analysis (MCA) is a nonlinear multivariate analysis method that integrates ideas from multidimensional scaling as a graphical technique that minimizes distances between connecting points in a graph plot and allows one to analyse the pattern of relationships of several categorical dependent variables (13,14,15). Dimension 1 of the plot accounts for 64.8% of the variance in the data and Dimension 2 accounts for 5.4% of the variance [Figure 1]. It is also evident from the MCA plot that the unsafe abortion is being done by female having poorer/poorest wealth index, having two or more than two children, using traditional method of contraception and age of women is more than 35 years, the chance of using unsafe abortion is more. Accordingly, female having middle/richer/richest wealth index, having no or one children, using modern method of contraception and age of women is less than 35 years, the chance of using safe abortion is more. When looking dimension wise, in the right side of first dimension it can be seen that variables like younger women with no child, no method of contraception use and pattern of contraception (currently using/used before last birth/used since last birth) appears separately and are associated to each other and have to be included in the interpretation of dimension 1. Similarly, for other variable and dimensions. This interpretation of the plot is based on points found in approximately the same direction and in approximately the same region of the space. Interpreting of each dimension is considered as the contribution of variables to that dimension.

Discussion

Each year 70,000 women dies because of unsafe abortion world-wide and 19 million women at the risk of degradation and diseases, infertility, chronic pelvic pain, genital trauma (16,17). A significant proportion of induced abortions results from unintended pregnancies (18).

Women age between 15-24 and 22-34 years were more likely to have an unsafe abortion than age group 35-49 women. Older women were more possible to have had more pregnancies/births, and more children, which may result in the largest rate of induced abortions. This study finding, corroborate some earlier studies of India and as well as some other countries (19,20,21,22,23,24), while contradict of some findings (25). Due to marriage in younger age and/or smaller gap between children, possibility of distorted offspring and unwed pregnancy. But due to absence of financial, social, and psychological support drives women to opt for cheaper and easier accessible unsafe abortion services. This finding also shows that the women with higher education and wealth index be less likely to go for unsafe abortion. This finding contradict the earlier studies reported that rich and well-educated women are more likely to have an unsafe abortion than are poor and illiterate women. However, there is no clear and established evidence on this issue, especially in low- and middle-income countries (19). Safe abortion services are not easily affordable in India due to limited legal facilities and practitioners to provide these services and local circumstances do not ensure access of safe abortion. Overall 30.6% of the induced abortions were unsafe and it varying across the states in India. Empowered Action Group (EAG) states found more vulnerable for unsafe induced abortion as it varies lowest 3.2% in Chhattisgarh to highest 34.9% in Uttar Pradesh. The proportion of unsafe induced abortions were high (1,4,6,8). Other studies, in Nepal (19,20), Ghana (1) and Ethiopia (21) found similar results in relation to unsafe abortion.

Conclusion

Unsafe induced abortion is a large contributor to maternal morbidity and mortality in India. Age, wealth index, no. of living children, method of contraception use and pattern of contraception use were found significant predictors for unsafe induced abortion. Media exposure should be increase to talk about benefits of contraceptive use and its methods. Health committees working at ground level should provide Medical Termination of Pregnancy (MTP) service in rural areas to increase the number of providers offering Comprehensive Abortion Care (CAC) services and reduce unwanted pregnancy, abortion rate, and unsafe abortion rates. We sought

to explore the factors of unsafe induced abortion among Indian women. Woman's education level and correct knowledge of fertile period will also avert unwanted abortion.

Recommendation

It is suggested that modern contraceptives and safe abortion services should be made available and easily obtainable to women who need these services in the framework of health. Public awareness should be intensified on India's abortion law to destigmatize abortion care-seeking through media exposure. The government should attempt to address unwanted pregnancies and the occurrence of unsafe induced abortions through promoting the use of modern contraceptives. The presence of abortion services in country through reproductive health intentional plan, and capacity building of trainee midwives in the health training institutions on all-inclusive abortion care (9).

Limitation of the study

Secondary data available at public domain were taken for this study, which was based on self-reported by women through interviews. Respondent recall lapse and deliberate misreporting may also occur. The regional findings of this study may also be done.

Relevance of the study

The study helps to understand the risk factors associated with the unsafe abortion among the study population in India, which can aid to identify the lacunae in health system and information education and communication (IEC) program. It will also help to plan and implement appropriate health strategies so as to reduce unsafe abortion which is on rising toll in current time.

Authors Contribution

All the authors have contributed significantly for the analysing data as well as repairing the final document.

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Data Availability: The data sets and country report used in this study is available in the public domain online at www.dhsprogram.com.

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Tables

TABLE 1 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS WHO HAD INDUCED ABORTION IN INDIA (N=8878).

Demographic Characteristics of women who adopted abortion (no. of women in specific characteristics), N=8878		Percentage of unsafe abortion & 95% CI [LL-UL]	Odds Ratio & 95% CI [LL-UL]	P-Value
Age Group	15-24 years (2053)	32.54 [30.54-34.59]	1.27 [1.11-1.47]	<0.001
	25-34 years (5129)	30.57 [29.32-31.84]	1.16 [1.03-1.31]	<0.001
	35-49 years (1696)	27.48 [25.39-29.64]	1	0.02
Marital Status	Married (8606)	30.17 [29.20-31.14]	0.68 [0.53-0.87]	<0.001
	Other (272)	38.97 [33.32-44.86]	1	
Place of Residence	Urban (2987)	26.35 [24.79-27.95]	0.74 [0.67-0.82]	<0.001
	Rural (5891)	32.51 [31.32-33.71]	1	
Religion	Hindu (6722)	31.67 [30.57-32.79]	2.13 [1.53-2.98]	<0.001
	Muslim (1389)	29.52 [27.16-31.96]	1.93 [1.36-2.73]	<0.001
	Christian (397)	24.94 [20.87-29.36]	1.53 [1.02-2.28]	<0.001
	Sikh (129)	16.28 [10.69-23.36]	0.90 [0.51-1.59]	0.04
	Others (Buddha, Jain etc.) (241)	17.84 [13.41-23.04]	1	0.7
Caste	SC (1628)	31.88 [29.65-34.17]	1.26 [1.11-1.45]	<0.001
	ST (991)	32.80 [29.93-35.76]	1.32 [1.13-1.54]	<0.001
	OBC (3564)	31.71 [30.19-33.25]	1.25 [1.12-1.40]	<0.001
	General (2695)	27.01 [25.36-28.71]	1	<0.001
Highest Educational level	No education (1844)	36.61 [34.43-38.82]	2.17 [1.83-2.58]	<0.001
	Primary (1130)	35.13 [32.39-37.95]	2.04 [1.69-2.46]	<0.001
	Secondary (4771)	29.18 [27.90-30.48]	1.55 [1.33-1.81]	<0.001
	Higher (1133)	21.01 [18.71-23.45]	1	<0.001
Employment	All Year (255)	31.37 [25.91-37.25]	1.06 [0.81-1.38]	0.02
(All year/seasonal)	Seasonal (179)	40.78 [33.78-48.08]	1.59 [1.18-2.16]	0.68

	Occasional (27)	37.04 [20.88-55.81]	1.36 [0.62-2.98]	<0.001
	No work/Information not available (8417)	30.17 [29.19-31.15]	1	0.44
Wealth Index	Poorest (1212)	43.32 [40.55-46.12]	2.58 [2.20-3.03]	<0.001
	Poorer (1861)	34.01 [31.89-36.19]	1.74 [1.50-2.02]	<0.001
	Middle (2083)	29.24 [27.31-31.22]	1.40 [1.21-1.62]	<0.001
	Richer (1975)	27.14 [25.21-29.13]	1.26 [1.08-1.46]	<0.001
	Richest (1747)	22.84 [20.92-24.85]	1	<0.001

TABLE 2 BACKGROUND CHARACTERISTICS OF RESPONDENTS WHO INDUCED ABORTION (N=8878 IN INDIA) AND THE DISTRIBUTION OF RESPONDENTS BY ABORTION CHARACTERISTICS, KNOWLEDGE/INFORMATION, AND CONTRACEPTIVES USE.

Abortion Characteristics of women who adopted abortion (no. of women in specific characteristics), N=8878		Percentage of unsafe abortion & 95% CI [LL-UL]	Odds Ratio & 95% CI [LL-UL]	P-Value
Age at first sex	<18 years (2968)	36.29 [34.57-38.03]	0.66 [0.60-0.73]	<0.001
	>= 18 years (5848)	27.39 [26.26-28.55]	1.00	
Children ever born	No Children (770)	23.25 [20.37-26.33]	0.53 [0.44-0.64]	<0.001
	One Children (2265)	25.52 [23.76-27.34]	0.60 [0.53-0.68]	<0.001
	Two Children (2963)	30.24 [28.61-31.91]	0.76 [0.68-0.84]	<0.001
	More than two children (2880)	36.42 [34.68-38.19]	1.00	<0.001
No. of living children	No Children (2584)	23.14 [21.55-24.80]	0.49 [0.40-0.59]	<0.001
	One Children (3940)	31.09 [29.66-32.55]	0.73 [0.60-0.88]	<0.001
	Two Children (1824)	37.06 [34.87-39.30]	0.95 [0.78-1.16]	<0.001
	More than two children (530)	38.30 [34.24-42.50]	1.00	0.60
Adopted Medical Termination of Pregnancy	No (8770)	30.63 [29.67-31.60]	2.54 [1.49-4.33]	<0.001
	Yes (108)	14.81 [9.08-22.41]	1.00	
Current used method of contraception	No method (4436)	28.13 [26.82-29.47]	0.91 [0.82-1.00]	<0.001
	Traditional method (1153)	40.16 [37.35-43.01]	1.56 [1.35-1.79]	0.06
	Modern method (3289)	30.13 [28.58-31.72]	1.00	<0.001
Pattern of contraceptive use	Currently using (4442)	32.73 [31.36-34.12]	1.36 [1.23-1.50]	<0.001
	Used since last birth (1054)	33.87 [31.06-36.77]	1.43 [1.23-1.66]	<0.001
	Used before last birth (3382)	26.35 [24.88-27.85]	1.00	<0.001
Knowledge about fertile period	No (7309)	28.77 [27.74-29.82]	0.65 [0.58-0.73]	<0.001
	Yes (1569)	38.18 [35.80-40.60]	1.00	
Media Exposure	No (1360)	38.82 [36.26-41.44]	1.56 [1.38-1.76]	<0.001
	Yes (7518)	28.92 [27.90-29.95]	1.00	

TABLE 3 SIG. CORRELATES OF "INDUCED UNSAFE ABORTION": LOGISTIC REGRESSION MODEL (FORWARD LR).

Demographic and Biological Characteristics of Women		β	Exp (β) and 95% C.I. for EXP(β) [LL-UL]	P-Value
Age Group	15-24 years	0.72	2.06 [1.75 - 2.43]	0.00
	25-34 years	0.37	1.45 [1.28 - 1.66]	0.00
	35-49 years		1.00	0.00
Wealth Index	Poorest	0.77	2.16 [1.82 - 2.56]	0.00
	Poorer	0.38	1.47 [1.26 - 1.71]	0.00
	Middle	0.21	1.24 [1.06 - 1.44]	0.01
	Richer	0.17	1.18 [1.02 - 1.38]	0.03
	Richest		1.00	0.00
No. of living children	No Children	-0.36	0.70 [0.55 - 0.89]	0.00
	One Children	-0.40	0.67 [0.57 - 0.78]	0.00
	Two Children	-0.21	0.81 [0.72 - 0.92]	0.00
	More than two children		1.00	

Current used method of contraception	No method	-0.12	0.89 [0.79 - 1.00]	0.04
	Traditional method	0.48	1.61 [1.39 - 1.86]	0.00
	Modern method		1.00	0.00
Pattern of contraceptive use	Currently using	0.31	1.36 [1.23-1.50]	0.00
	Used since last birth	0.42	1.52 [1.30 - 1.77]	0.00
	Used before last birth		1.00	0.00

Figures

FIGURE 1 MULTIPLE CORRESPONDENCE ANALYSIS PLOT