Original Article

Pregnancy wastage and its socio-demographic determinants in Maharashtra: Analysis of a District-Level Household Survey-4, 2012-13

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Abstract

Background: Stillbirth is a major contributor to perinatal mortality, and abortion is one of the important causes of maternal mortality. Understanding the true magnitude and associated factors is important to devise appropriate public health strategies to curb the issue. **Objective:** To determine the magnitude of pregnancy wastage (abortion and stillbirth) and socio-demographic factors associated with the study population. **Methods:** The secondary data analysis was performed on DLHS-4 data of 45,690 women in the reproductive age group in Maharashtra. Magnitude of lifetime pregnancy wastage and last pregnancy wastage was estimated as proportion and rates per 1000 pregnancies. Univariate and bivariate analysis were performed using Statistical Package for the Social Science (SPSS). The last pregnancy wastage indicator was cross-tabulated with socio-demographic indicators to understand the correlation. **Results:** Lifetime pregnancy wastage among the study population was found to be 12.4% (1.5% stillbirth, 3.8% induced abortion, and 7.1% spontaneous abortion). The magnitude of pregnancy wastage for the last reported pregnancy was 3.9% (0.7% stillbirth, 1.5% induced abortions, and 1.7% spontaneous abortion). Stillbirth was significantly associated with place of residence and woman remunerated in the last 12 months. Induced abortion was significantly associated with the age of woman, education, place of residence, caste, age at marriage, and husband education. Spontaneous abortion was significantly associated with age, literacy status, and remunerated in the last 12 months. **Conclusion:** The study finding indicates a higher number of stillbirths and abortions that emphasizes the urgent need of formulating appropriate strategies to reduce pregnancy wastage.

Keywords: stillbirth, abortion, pregnancy wastage, induced abortion, spontaneous abortion

Introduction

Maternal and neonatal mortality is considered a serious concern globally from public health perspective[(1)]. Globally, maternal mortality ratio has toned down from 342 maternal deaths per 100,000 live births in 2000 to 211 deaths per 100,000 live births in 2017[(2)]. It shows the dire need of working synergistically on this issue in order to provide safest backyard for survival of women. Globally, every year around four million neonates die in the first four weeks of life, and three million of those deaths occur during the first seven days of life. Almost 98% of these deaths were reported to occur in developing nations. The risk of neonatal deaths in developing nations is six times higher than that in developed nations. Most neonatal deaths occur in South East Asia, where the birth rate is higher, compared to other parts of the world[(3)]. It is estimated that more than 3.3 million babies are stillborn every year; one out of every three occur during delivery, which can be prevented[(3)]. India is the world's second largest democratic nation, with 16% of the global population. However, India has the largest number of maternal and under-five deaths worldwide.

A total of 45,000 maternal deaths occurred in 2015, and India is one of the six countries contributing 50% of the world's maternal mortality[(4)]. Amongst these, abortion contributes to 10% of maternal deaths[(5)]. According to SRS 2017, Infant Mortality Rate (IMR) for India was 30, and for Maharashtra, was 17. The Maternal Mortality Ratio (MMR) of India was 103 in 2017-19, and Maharashtra was 38[(6)]. As per the past evidence, abortions contribute to maternal mortalities, and stillbirth is the major contributor to perinatal wastage. It continues to be higher in India, with reported rates ranging from 10.4 to 41.9 per thousand births[(7)].

The population-based data showed a significant burden of stillbirth and provided insights into issues of induced abortions and miscarriages[(8)]. In the global view, induced abortion is restricted by law and even criminalized in several countries. However, it was legalized under the Medical Termination of Pregnancy (MTP) Act, 1971 in India, which has created a framework to protect women from the grave risk of unsafe abortions and the complications occurring due to it. Spontaneous abortions in the early period were unnoticed and unreported to the public health system, leading to difficulty in

understanding the magnitude of such abortion events. Similarly, inadequate reporting of stillbirths is a worrisome situation that may worsen, fueling high perinatal mortality. Hence, estimating the actual burden of pregnancy wastage with sufficient data is crucial to formulate an effective policy that ensures safe abortions and lowers the number of stillbirths and induced abortions.

Currently, no community-level study has been identified estimating the magnitude of pregnancy wastage in Maharashtra. This study will be helpful in devising the plan for the specific interventions to tackle the issue of abortions and stillbirths. Therefore, this study aimed to understand the magnitude of pregnancy wastage in reproductive age group women in Maharashtra, exploring associated factors for pregnancy wastage. The primary objective of the study was to determine the magnitude of pregnancy wastage (both abortions and stillbirths) in the study population. The secondary objective was to determine association between pregnancy wastage and socio-demographic factors.

Material and Methods

This is a secondary data analysis of District Level Household Survey-4 (DLHS-4), 2012-2013. DLHS is a cross-sectional survey conducted across all 26 states and Union territories in India, conducted by the Ministry of Health and Family Welfare, Government of India. The survey used multistage stratified sampling technique[9]. Data for Maharashtra state was acquired from the International Institute for Population Sciences (IIPS), Mumbai and was analyzed for present study. The survey collected data from 45,690 women of the reproductive age group in Maharashtra. The magnitude of pregnancy wastage was estimated in terms of lifetime pregnancy wastage and the last pregnancy wastage; which were calculated as both proportions and rate per 1000 pregnancies. The lifetime pregnancy wastage rate was calculated as the total number of pregnancy wastage (abortions and stillbirths) divided by the total number of pregnancies that occurred among the study population during their lifetime per 1000 pregnancies. Similarly, the last pregnancy wastage rate was calculated as the total number of pregnancy wastage (abortions and stillbirths) during their last pregnancy divided by the total number of last pregnancies that occurred among the study population per 1000 pregnancies. Last pregnancy wastage indicators (dependent variables) were cross-tabulated with independent variables such as age, literacy, educational level, residence of woman, caste, religion, tribal-nontribal status, marital status, age at marriage, husband education, and woman remuneration status for the last 12 months to determine association. Chi-square test was used to determine the association. Analysis was conducted using Statistical Package for Social Sciences (SPSS) software.

Results

A) Socio-Demographic profile of the study population

A total of 45,690 women aged 15 to 49 years were included in the survey data. As shown in Table 1, approximately 55% and 45% of the study population resided in rural and urban areas, respectively. The mean age of the study population was 33.02 years, and the highest proportion (38.5%) belonged to the age group above 35 years. The mean age at marriage was 18.6 years. Around 80% of women had ever attended school, and more than 66% had completed secondary level schooling. The highest proportion (42.3%) of the study population belonged to the Other Backward Class (OBC) category, followed by Scheduled Caste (SC) (19.1%) and Scheduled Tribe (ST) (14.2%). About 25.1% of women were observed to be involved in any work and received remuneration for the same. Similarly, 29.6% population belonged to the Below Poverty line (BPL) category.

Table 1: Socio-demographic profile of the study population

Indicator	Frequency	Percentage
Background characteristics of women		
Mean age of study population (years)	33.02	
Mean age at marriage (years)	18.6	
Mean age at first birth (years)	20.4	
Area of residence (n=45690)		
Rural	25088	54.9
Urban	20602	45.1
Age of woman (n= 45690) (in years)		
15-20	2735	5.9
21-25	7853	17.1
26-30	9073	19.8
31-35	8452	18.5
36 and above	17577	38.47

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Table 1: Socio-demographic profile of the study population

Indicator	Frequency	Percentage
Women ever attended school (n = 45687)		
Yes	36445	79.8
No	9242	20.2
Education of woman (n = 36497)		
Illiterate	2727	7.47
Primary Education	5081	13.9
Secondary Education (till 12th)	24196	66.2
Graduation and above	4493	12.3
Marital Status (n = 45690)		
Married	42938	94
Married but guana not performed	322	0.7
Separated/deserted/divorced	772	1.7
Widow	1658	3.6
Religion (n = 45685)		
Hindu	36072	79
Muslim	5535	12.1
Buddhist	3238	7.1
Christian	234	0.5
Jain	358	0.8
Other	248	0.5
Caste (n = 42299)		
Scheduled Caste (SC)	8087	19.1
Scheduled Tribe (ST)	5986	14.2
Other Backward Class (OBC)	17903	42.3
Other	10323	24.4
Proportion of women done any work in last 12 months (n = 45687)		
Yes	11462	25.1
No	34225	74.9
Household ownership (n= 45685)		
Owned	40159	87.9
Rented	4686	10.3
Other	840	1.8
Economic status (n = 45684)		
Below Poverty Line (BPL)	13534	29.6
Above Poverty Line (APL)	31948	69.9
Don't Know	202	0.4
Background characteristics of husband		
Husband ever attended school (n = 45690)		
Yes	39680	86.8
No	5705	12.5
Don't Know	305	0.7
Husband education (n = 39726)		
Illiterate	2870 7.2	
Primary Education	4614	11.6
Secondary Education (till 10th)	18021	39.4
Secondary Education (till 12th)	6921	17.4
Graduation and above	6746	17
Diploma and other	554	1.4

B) Magnitude of pregnancy wastage (stillbirths and abortions)

1. Lifetime pregnancy wastage

As shown in table 2, around 12.4% of women (1.5% stillbirth, 3.8% induced abortion, and 7.1% spontaneous abortion) had ever experienced the pregnancy wastage in their lifetime.

Table 2: Proportion of women reported life time stillbirth, induced and spontaneous abortions

Sr. No	Indicator	Category	Frequency	Percentage (%)
1	**Stillbirth**	Yes	695	1.5
		No	44645	98.4
	Total		**45340**	
2	**Abortions**			
	Induced	Yes	1769	3.8
	Spontaneous	Yes	3232	7.1
	None	No	40366	88.9
	Total		**45367**	

Table 3 indicated the lifetime pregnancy wastage rate per 1000 pregnancies for stillbirth, induced abortion, spontaneous abortions, as well as for total pregnancy wastage. The stillbirth, induced abortion and spontaneous abortion rates were 8.6, 21 and 43.6 per 1000 pregnancies, respectively. The total lifetime pregnancy wastage rate was 73.3 per 1000 pregnancies.

Table 3: Lifetime pregnancy wastage rate per 1000 pregnancies

Sr. No	Indicator	Frequency	Rate per 1000 pregnancies
1	Total stillbirths	909	8.6
2	Total induced abortions	2203	21
3	Total spontaneous abortions	4581	43.6
4	Total pregnancy wastage (1+2+3)	7693	73.3
5	Total lifetime pregnancies of study population	104847	

2. Pregnancy wastage for last reported pregnancy

Table 4 depicts the magnitude of pregnancy wastage for the last reported pregnancy among the study population. Around 96.1% of cases were identified as live births and 0.7%, 1.5%, and 1.7% were identified as stillbirths, induced abortions, and spontaneous abortions, respectively. The total pregnancy wastage rate was calculated as 39.3 per 1000 pregnancies.

Table 4: Proportion of pregnancy wastage as per last pregnancy

Sr. No	Indicator	Frequency	Percentage	Rate per 1000 pregnancies
1	Total stillbirths	95	0.7	7
2	Total induced abortions	202	1.5	15
3	Total spontaneous abortions	231	1.7	17
4	Total pregnancy wastage (1+2+3)	528	3.9	39.3
5	Live births	12894	96.1	961
6	Total number of last pregnancies in study population	13422		

A) Pregnancy wastage and socio-demographic determinants

Table 5 shows the association between pregnancy wastage and socio-demographic factors.

Table 5: Bivariate analysis of socio-demographic factors and pregnancy wastage as per the last pregnancy

Indicators	Stillbirth % (n)			Induced Abortion % (n)			Spontaneous Abortion % (n)		
	Yes	No	*p*	Yes	No	*p*	Yes	No	*p*
Age of woman (in years)									
15-20	1.1 (13)	98.9 (1184)	0.22	0.4 (5)	99.6 (1192)	<.001	2.8 (34)	97.2 (1163)	0.22
21-25	0.7 (40)	99.3 (5417)		1.3 (71)	98.7 (5386)		1.7 (93)	98.3 (5364)	
26-30	0.5 (24)	99.5 (4457)		1.7 (76)	98.3 (4405)		1.5 (69)	98.5 (4412)	
31-35	0.9 (15)	99.1 (1655)		1.9 (31)	98.1 (1639)		1.4 (23)	98.6 (1647)	
36 and above	0.5 (5)	99.5 (612)		3.1 (19)	96.9 (598)		1.9 (12)	98.1 (605)	
Woman literacy									
Illiterate	0.6 (5)	99.4 (500)	0.74	0.8 (5)	99.2 (500)	0.15	3 (15)	97 (490)	0.03
Literate	0.7 (82)	99.3 (11338)		1.6 (183)	98.4 (11237)		1.7 (195)	98.3 (11225)	
Woman education									
Illiterate	0.6 (5)	99.4 (502)	0.27	0.8 (5)	99.2 (500)	<.001	3 (15)	97 (490)	0.144
Primary Education	0.6 (8)	99.4 (1227)		1.4 (17)	98.6 (1218)		1.6 (20)	98.4 (1215)	
Secondary Education (till 12th)	0.8 (68)	99.2 (8466)		1.4 (118)	98.6 (8416)		1.7 (142)	98.3 (8392)	
Graduation and Above	0.4 (6)	99.6 (1645)		2.9 (48)	97.1 (1603)		2 (33)	98 (1618)	
Place of residence									
Rural	0.9 (65)	99.1 (7348)	0.009	1.1 (78)	98.9 (7335)	<.001	1.7 (129)	98.3 (7284)	0.85
Urban	0.5 (30)	99.5 (5979)		2.1 (124)	97.9 (5885)		1.7 (102)	98.3 (5907)	
Religion									
Hindu	0.8 (78)	99.2 (10173)	0.061	1.6 (159)	98.4 (10092)	0.84	1.7 (172)	98.3 (10079)	0.766
Muslim	0.3 (7)	99.7 (2013)		1.3 (26)	98.7 (1994)		1.7 (35)	98.3 (1985)	
Buddhist	1.1 (10)	98.9 (929)		1.5 (14)	98.5 (925)		2 (19)	98 (920)	
Other	0	100 211		1.5 (5)	98.5 (206)		2.4 (5)	97.6 (206)	

To be Cont...

Table 5: Bivariate analysis of socio-demographic factors and pregnancy wastage as per the last pregnancy

Indicators	Stillbirth % (n)			Induced Abortion % (n)			Spontaneous Abortion % (n)		
	Yes	No	*p*	Yes	No	*p*	Yes	No	*p*
Caste or Tribe									
Caste	0.7 (82)	99.3 (11038)	0.061	1.5 (168)	98.5 (10952)	0.195	1.7 (187)	98.3 (10933)	0.642
Tribe	0.9 (11)	99.1 (1157)		1 (12)	99 (1156)		2.1 (24)	97.9 (1144)	
Other	0.2 (5)	99.8 (1127)		1.9 (22)	98.1 (1110)		1.8 (20)	98.2 (1112)	
Caste									
Scheduled Caste (SC)	0.9 (21)	99.1 (2412)	0.92	1.2 (29)	98.8 (2404)	<.001	1.5 (37)	98.5 (2396)	0.114
Scheduled Tribe (ST)	0.8 (14)	99.2 (1789)		0.8 (14)	99.2 (1789)		2.3 (42)	97.7 (1761)	
Other Backward Classes (OBC)	0.7 (37)	99.3 (4977)		1.4 (70)	98.6 (4944)		1.7 (87)	98.3 (4927)	
Other	0.7 (22)	99.3 (3088)		2.2 (69)	97.8 (3041)		1.4 (45)	98.6 (3065)	
Economic status									
Below Poverty Line (BPL)	0.7 (29)	99.3 (3963)	0.805	1.2 (49)	98.8 (3943)	0.136	1.7 (68)	98.3 (3924)	0995
Above Poverty Line (APL)	0.7 (66)	99.3 (9304)		1.6 (153)	98.4 (9217)		1.7 (162)	98.3 (9208)	
Don't Know	0	100 (58)		0	100 (58)		1.7 (5)	98.3 (53)	
Woman remuneration activity since last year									
Yes	1.1 (25)	98.9 (2263)	0.016	1.6 (37)	98.4 (2251)	0629	2.5 (57)	97.5 (2231)	0.002
No	0.6 (70)	99.4 (11064)		1.5 (165)	98.5 (10969)		1.6 (174)	98.4 (10960)	
Marital status									
Married	0.7 (93)	99.3 (13195)	0.511	1.5 (201)	98.5 (13087)	0.647	1.7 (231)	98.3 (13058)	0.308
Widowed	1.3 (5)	98.7 (65)		1.3 (5)	98.7 (65)		0	100 (64)	
Divorced/Deserted/ Separated	1.8 (5)	98.2 (59)		0	100 (64)		0	100 (70)	
Age at marriage (in years)									
upto 15	0.7 (8)	99.3 (1131)	0.899	1.1 (13)	98.9 (1126)	0.022	1.7 (19)	98.3 (1120)	0.179
16-20	0.7 (58)	99.3 (8335)		1.3 (113)	98.7 (8280)		1.7 (140)	98.3 (8253)	
21-25	0.7 (22)	99.3 (3163)		1.9 (61)	98.1 (3124)		2.1 (66)	97.9 (3119)	
26-30	1 (5)	99 (504)		2.2 (11)	97.8 (498)		0.8 (4)	99.2 (505)	
31 and above	0	100 (67)		4.5 (5)	95.5 (64)		0	100 (67)	

To be Cont...

Table 5: Bivariate analysis of socio-demographic factors and pregnancy wastage as per the last pregnancy

Indicators	Stillbirth % (n)			Induced Abortion % (n)			Spontaneous Abortion % (n)		
	Yes	No	*p*	Yes	No	*p*	Yes	No	*p*
Husband education									
Illiterate	0.9 (5)	99.1 (548)	0.149	1.4 (8)	98.6 (545)	<.001	1.8 (10)	98.2 (543)	0.733
Primary Education	1 (11)	99 (1120)		1.1 (13)	98.9 (1118)		1.7 (19)	98.3 (1112)	
Secondary Education (upto 10th)	0.8 (47)	99.2 (5808)		1.1 (64)	98.9 (5791)		1.9 (109)	98.1 (5746)	
Secondary Education (upto 12th)	0.7 (17)	99.3 (2539)		2.1 (53)	97.9 (2503)		1.4 (37)	98.6 (2519)	
Graduation and above	0.3 (8)	99.7 (2341)		2.3 (55)	97.7 (2294)		1.9 (44)	98.1 (2305)	

(*Data Source: DLHS-4 Maharashtra reproductive age group woman data)

Bivariate analysis for the combined pregnancy wastage had no significant association with any of the socio-demographic indicators. However, the separate analysis of each type of pregnancy wastage (stillbirth, induced abortion, and spontaneous abortion), showed significant association (Table 5).

Stillbirths showed a significant association with place of residence (p=0.009), and women remunerated in the last 12 months (p=0.016). Induced abortions were significantly associated with the women's age, education, age at marriage, place of residence, caste and husband's education. Spontaneous abortions were significantly associated with the age of the woman (p=0.02), woman literacy (p=0.03), and woman remunerated in the last 12 months (p=0.002).

Discussion

The magnitude of pregnancy wastage

The study revealed that lifetime pregnancy wastage is higher. About 12.4% women in reproductive age group (1.5% stillbirth, 7.1% spontaneous abortion, and 3.8% induced abortion) experienced any of the three types of pregnancy wastage in their lifetime. Stillbirth rate was 8.6 per 1000 pregnancies while the induced abortion rate was 21 per 1000 pregnancies, and the spontaneous abortion rate was 43.6 per 1000 pregnancies. Thus, the study population's total lifetime pregnancy wastage rate is 73.3 per thousand pregnancies.

The pregnancy wastage rate for the last pregnancy was 39.9 per thousand pregnancies. The stillbirth rate, induced abortion rate, and spontaneous abortion rate for the last pregnancy were 7, 15, and 17 per thousand pregnancies, respectively.

Similar to present study findings, study by Chauhan et al. showed that 11.57 % of the study population tended to abort the child[10]. Doke et al. studied the adverse pregnancy outcomes in rural Maharashtra among both tribal and non-tribal women, and found 2.95% spontaneous abortions, 2.39% induced abortions, and 1.55% stillbirths[11] which was slightly higher than the proportion we found.

Socio-demographic factors associated with last pregnancy wastage

Stillbirth: Women in rural areas reported a higher proportion of stillbirths than in urban areas, similar to the study done by Altijani et al.[12]. This may indicate that health care provision in terms of timely treatment, timely referral, and overall high-risk pregnancy screening need to be strengthened. Though it has not been mentioned in the data about type of work woman had performed in last year, it emerged as a significant factor for stillbirths. This indicates that the woman's work may be very strenuous and stressful, which could cause health hazards, especially during pregnancy. A study done by Altijani et al. revealed an association between maternal age and stillbirth, which is contrary to the current study.

In the context of socio-demographic factors, similar to our study finding, socio-economic status, caste, and religion were not significantly associated with stillbirths in the study by Newtonraj et al. in 2017[13].

Induced abortion: Induced abortions increased with an increase in the age of women. The highest induced abortions were reported in the age group 36 and above. Similarly, as the education level of women and husband increases, the proportion of induced abortions has also increased. This could be explained as education exposing women to various methods for pregnancy termination and being more open to the acceptance of abortion. Induced abortions are more in urban areas than rural areas, which could be because of more exposure and accessibility to induced abortion services, methods and a more open attitude towards acceptance of induced abortion in urban areas. Similar findings were reported by Pallikadavath et al.[14]. Open category population

had higher induced abortions, and tribal population had lesser events. However, this correlation needs to be further explored with respect to sex-selective abortion, as many studies have revealed the higher sex-selective abortions in economically advanced, wealthier families, highly educated populations, and higher caste groups. The study also revealed that religion, economic status, and woman remuneration had no association with induced abortion. Similar observations were seen in a study done by Behera et al.[15].

Spontaneous abortion: Spontaneous abortions were significantly associated with the age of the woman (p=0.02), woman literacy (p=0.03), and woman remunerated for the last 12 months (p=0.002). Spontaneous abortions were more in the adolescent age group (less than 20 years) population as well as in more than 36 years age group. Medical research has proven that pregnancies among the early age and 35 + age group are high risk and are prone to spontaneous abortions gradually. The illiterate population had reported more spontaneous abortions than the literate population, and women who were remunerated for the last 12 months had a high proportion of spontaneous abortions compared to non-remunerated women. There could be chances that strenuous work might lead to spontaneous abortions.

Conclusion

The study finding indicates a higher number of stillbirths and abortions, considering around 2 million annual pregnancies in Maharashtra. This emphasizes the urgent need to devise an appropriate strategy to reduce pregnancy wastage. Associated factors found for the pregnancy wastage in this study could help devise specific strategies to reduce the stillbirths and abortions.

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