

Title: Miscarriage and its association with violence, alcohol and tobacco consumption in India: Evidence from NFHS 4 (2015-16)

INTRODUCTION

Miscarriage is defined as the spontaneous or accidental expulsion of the foetal life that occurs at an early stage of pregnancy. Most of the times it happens within 14 weeks of pregnancy. 20% of all pregnancies which is approximately one out of five, results in miscarriage. Genetic abnormality of the foetus mainly leads to miscarriages. The most common symptoms of miscarriage are heavy or light vaginal bleeding. Hormonal imbalance and structure of the cervix contribute as a cause of miscarriages by 17% and 10% respectively. There are also other causes like smoking, infections, exposure to toxins, number of pregnancies or diabetes. According to NFHS-4, 6% of the total pregnancies in India resulted in miscarriages. Miscarriages are particularly high for women age 15-19 years and women living in urban areas than rural areas. Also, it is seen that women of highest wealth indexes are more prone to miscarriages. Among the 1% women aged 15-49 who drink alcohol, 18 percent drink alcohol almost every day and 35 percent drink alcohol about once a week. According to NFHS-4, 6.8% women use tobacco in India. In India, 29.5% women aged 15-49 have experienced violence once, out of which 3.9% are have experienced violence during pregnancy.

According to a study, a women drinking four or more drinks per week have increased risk of miscarriage. For miscarriages occurring prior to 10 weeks of gestation, the relationship with alcohol intake during pregnancy is the strongest. women who drank only spirits had doubled the increased risk of miscarriage compared to women who abstained. (Avalos et al., 2014). Meta-analysis of data from 231,808 pregnant women found that those exposed to alcohol during pregnancy have a greater risk of miscarriage compared to those haven't. Women who had of 5 or fewer drinks per week, each additional drink per week was associated with a 6% increase in miscarriage risk (Sundermann et al., 2019). A study on maternal and paternal alcohol consumption shows during the presumed day of conception, 13% of the women who miscarried and 11% of the women with healthy pregnancy outcome had drunk on average 3-4 drinks a week. The mean consumption was one drink a week by the women who miscarried and half a drink a week who has healthy delivery (Halmesmäkl et al., 1989). The reason for foetal loss often is unknown. But in some cases certain risk factors like alcohol exposure during pregnancy has been examined as one potential risk factor for spontaneous abortion. Women who consumed at least one alcoholic beverage per day during pregnancy had more spontaneous abortions, mainly during the second trimester, than did women who did not drink or drank lesser amounts. (Harlap and Shiono, 1980).

Passive smoking exposure during pregnancy increased the risk of miscarriage by 11% in case of a meta-analysis study. The risk of experiencing miscarriage is greater in case of active smoking. The risk of miscarriage increased with the amount smoked (1% increase in relative risk per cigarette smoked per day) (Pineles et al., 2014). Out of a total of 1793 women reported never previously smoking, 7.3% had a pre-term birth and 0.9% a late miscarriage (Farrell et al., 2006).

A study on 207 Swedish pregnant women married to or cohabiting with Swedish born men, 95% women abused during pregnancy had been abused previously and 4.3% of the pregnant women had been exposed to serious violence. Among the abused women, a higher proportion of them had undergone one or more abortions than in the non-abused group (Hedin & Janson, 2000). Mean scores of psychological abuse, physical violence, forced sex, and PTSD were significantly higher in the miscarriage group than in the live birth group. A study on pregnant women of Guatemala city aged 15-47 says post adjustment for other confounding factors, physical or sexual victimisation by a male intimate partner in the last 12 months was significantly associated with miscarriage. Miscarriage was experienced by 10% of the women experiencing intimate partner violence (Johri et al., 2011). Physical and/or sexual domestic

violence during last pregnancy was reported by 10% and 6.2% of the women, respectively. Women who experienced physical violence were 2.5 times as likely to have experienced a miscarriage than women who did not report physical violence (Nur, 2014). Three out of four (75.6%) Bangladeshi women experienced violence from husbands. After being assessed individually, miscarriage was more likely among victimised women (Silverman et al., 2007). In this study, the association of miscarriages in India are analysed in respect to alcohol and tobacco use and domestic violence during pregnancy.

The objective of the study is to assess the impact of intimate partner violence, alcohol and tobacco consumption on miscarriage.

DATA AND METHODOLOGY

The data source used in this study is the 4th round of National Family and Health Survey (NFHS) data of 2015-2016. All four NFHS surveys have been conducted under the supervision of the Ministry of Health and Family Welfare (MoHFW), Government of India. International Institute for Population Sciences (IIPS), Mumbai was designated as the nodal agency for all of the surveys by MoHFW. NFHS provides information on population, health, and nutrition for India and each state and union territory. The NFHS-4 sample selection done by a stratified two-stage sampling technique. The 2011 census served as the sampling frame for the selection of PSUs. In all, 28,586 Primary Sampling Units (PSUs) were selected across the country in NFHS-4, of which fieldwork was completed in 28,522 clusters. In the second stage, in every selected rural and urban cluster, 22 households were randomly selected with systematic sampling. In NFHS-4, four survey questionnaires (household questionnaire, woman's questionnaire, man's questionnaire, and biomarker questionnaire) were used in 17 local languages using Computer Assisted Personal Interviewing (CAPI).

Bivariate analysis with chi-square test was carried out with different socioeconomic determinants and major risk factors. Further, logistic regression with interaction terms was implemented to examine the effect of major risk factors to pregnancy.

$$\text{Logit}(Y) = \ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \dots \beta_i x_i + \varepsilon_i$$

Where P denotes the probability of an event to occur β_0 is the intercept on Y axis β_i are the regression coefficient x_i denotes the predictors and ε_i denotes the error term.

Statistical analysis was carried out using STATA 15.

MAJOR FINDINGS

The early age groups 15-19, socially backward groups and secondary education attainment showed a higher prevalence of miscarriage. The results from logistic regression elucidates that younger age groups, consumption of alcohol and tobacco are significantly associated with higher odds of miscarriage, whereas religion, place of residence and wealth index have no significant association with miscarriage. Violence during pregnancy can also be associated with miscarriage.

Common study limitations reflect challenges inherent to this research, including difficulty recruiting participants early enough in pregnancy to observe miscarriage and collecting and quantifying information about alcohol consumption during pregnancy that accurately reflects use. Future studies evaluating change in alcohol use in pregnancy are needed to provide insight into how alcohol consumption prior to pregnancy recognition impacts risk.

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