

## Original Research Article

# Risky behavioral factors associated with preterm deliveries among women of childbearing age (15-49 years) at Pumwani Maternity Hospital, Nairobi County, Kenya

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## ABSTRACT

**Background:** Worldwide, pre-term delivery (PTD) or pre-term birth (PTB) is on the rise. World Health Organization (WHO) data shows an increase from 2 million in 1990 to 2.2 million in 2012 with about 60% of the preterm deliveries occurring in developing countries and 12.3% in Kenya. The study objective was to determine risky behavioral factors associated with preterm deliveries among women of childbearing age (15-49 years) at Pumwani Maternity Hospital (PMH).

**Methods:** Maternity delivery register (MDR) was used to identify and recruit eligible study participants. A sampling frame constituting of serial numbers assigned to the mothers was made. Data was collected using pretested and structured questionnaire and a data abstraction tool. The statistical package for social sciences (SPSS) version 23 was used to perform statistical analysis. Descriptive statistics were used to summarize categorical variables. Chi-square was used to examine the differences among the categorical variables. Prevalence adjusted odds ratios (PAOR) with their respective 95% confidence interval (CI) was used to estimate the strengths of associations.

**Results:** The study recorded proportional differences among the study variables in their association with preterm deliveries. Among them, 100%, 40%, 22.2% and 17.1% of the mothers who used firewood, charcoal, kerosene and gas/electricity respectively had preterm deliveries.

**Conclusions:** There was no statistically significant association between the study variables (general maternal smoking, maternal smoking during pregnancy, husband smoking, husband smoking during pregnancy, main household type of fuel) and preterm delivery.

**Keywords:** Risky behavioral factors, Preterm deliveries, Maternal smoking

## INTRODUCTION

Preterm delivery (PTD) is a multifactorial syndrome that has been on the increase worldwide. It's a complex triad of events that lead to preterm birth. Factors that cause preterm births can broadly be classified as maternal medical, obstetric, risky behavioral factors, fetal factors, social-economic and demographic factors. A lot of effort is being put into research on how to prevent preterm births. Prevention in child death is one of seventeen sustainable

development goals (SDG)-3 (formerly MDG-4) which advocated for an increase in child survival.<sup>1</sup> Many developing countries are facing socio-economic burden brought about by preterm births.<sup>2</sup>

Preterm delivery (PTD) is defined as all births before 37 completed weeks of gestation or fewer than 259 days since the first day of a woman's last menstrual period.<sup>3</sup> Of the estimated 130 million babies born each year globally, approximately 15 million are

born preterm which is about 11 % of all deliveries.<sup>4</sup> Prematurity is a major determinant of neonatal mortality and morbidity as well as a significant contributor to long term adverse health outcomes.<sup>5</sup> For instance, of the estimated 3.1 million neonatal deaths that occurred globally in 2010, about 1.08 million (35%) were directly related to preterm birth.<sup>6</sup> Complications of preterm birth are the single largest direct cause of neonatal deaths and the second most common cause of under-5 deaths after pneumonia. Prematurity is a major hindrance to the attainment of the SDG number 3--formerly MDG-4 target given its contribution to neonatal mortality. To accelerate achievement of this SGD, there is a need to determine factors associated with preterm birth in order to reduce preterm births.<sup>7</sup>

Worldwide, almost 1 million die due to complications associated with prematurity. More than 60% of the 15 million preterm deliveries occur in Africa and South Asia. In contrast, the United States is among the top 10 nations which has many preterm births. In Africa, around 12% of births are premature compared with 9% in the developed countries.<sup>8</sup> Countries with a high number of preterm deliveries per year are in the Asian continent with India at 3,519,100 and China at 1,172,300 preterm deliveries in 2012. African countries with high rates of preterm deliveries are Nigeria at 773,600, the Democratic Republic of Congo at 341,400 while Kenya is at 193,000. For countries in Africa, the rate is double or triple compared to developed countries and this creates pressure on the parents and the health system. The rate per 100 live births is higher in Sub Saharan Africa (SSA) countries with Malawi leading at 18.1%, Congo at 16.7%, Zimbabwe at 16.6%, and Kenya at 12.3%. Developed countries have a low PTD rate per 100 live births with countries such as Belarus at 4.1, Finland at 5.5, and Japan and Sweden at 5.9 per 100 live births.

A study found that when other variables are controlled, women who cook with biomass fuels are significantly more likely to have a preterm birth than women who cook with cleaner fuels (OR=1.44; 95 percent CI: 1.04, 1.97) Women who cook with biofuels are twice as likely to have had two or more stillbirths as women who cook with

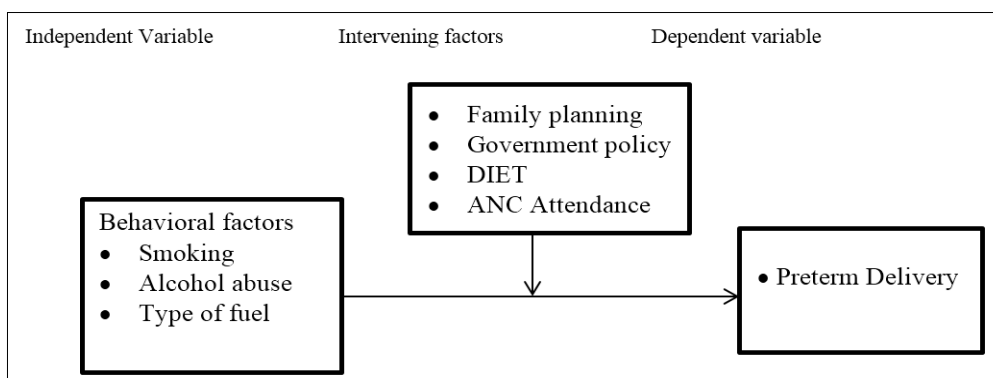
cleaner fuels (RRR=2.01; 95 percent CI: 1.11, 3.62). The adjusted impact of active cigarette smoking was positive (OR=1.23) but not statistically significant.<sup>9</sup> In Denmark, poverty, lack of education, and smoking contributed to a high number of PTD. Women who had <10 years of education and smoked had the highest number of PTD compared with those who had >12 years of education in Denmark.<sup>10</sup> A study in Japan investigated the effects of physical activity during pregnancy on preterm delivery and mode of delivery. Compared to the medium group, no significant difference was found in the incidence of preterm delivery in the low and high groups, however, that of the very low group increased significantly (OR=1.16, 95% confidence interval [CI],1.05–1.29, p=0.004).<sup>11</sup>

**Problem statement**

Preterm birth is a global problem with World Health Organization (WHO) estimating the prevalence to range between 5-18% across 184 countries. Locally, studies conducted in Kenyatta National Hospital found the rate of preterm deliveries to be at 15.7% in 2001 and 18.3% in 2014, while nationally it stands at 12.3%. There are multiple factors associated with PTD but understanding the epidemiology of these factors remains limited in Kenya. The factors can be maternal medical, obstetrics, social, foetal, economic, and demographic related. PTD causes a lot of emotional problems, coupled with financial constraints to the family. Prematurity is also associated with poor neurodevelopment, autism spectrum disorders, and chronic illnesses in adulthood like hypertension and type II diabetes. To contribute to a significant reduction in the number of preterm deliveries, it will be important to determine the associated factors with a view of designing suitable interventional programs. Pumwani maternity hospital was selected since it is an obstetric and referral hospital for delivery of expectant mothers in Nairobi, and adjoining counties. It is the largest maternity hospital in the country. The objective of the study was to determine risky behavioral factors associated with preterm deliveries among women of childbearing age (15-49 years).

**Conceptual frame work**

The frame work is given in Figure 1.



**Figure 1: Conceptual framework.**

## METHODS

### *Study design*

This study employed a hospital-based cross-sectional study design. In cross-sectional designs, the outcomes of the participants and the exposures are measured. The study was conducted at Pumwani Maternity Hospital (PMH). This is the largest obstetric hospital in the republic of Kenya and it was started in 1928 to serve the population of Nairobi.

The hospital is located in the Pumwani ward which is in Kamukunji constituency, Nairobi County. The study population comprised all mothers aged between 15 to 49 years who delivered at Pumwani maternity hospital during the study period.

### *Sample size and sampling techniques*

The sample was determined through the use of Fishers' formula of 1998.<sup>12</sup>

$$n = Z^2 Pq/d^2$$

$n$ =the desired sample size,  $Z^2$ =a standard deviation of 95% and a confidence interval of 1.96,  $P$ =proportion preterm deliveries in Kenya 12.3%,  $q=1-P$ ,  $d$ =degree of accuracy desired at 0.05.

$$n = \frac{(1.96)^2 \times 0.123 \times 0.877}{(0.05)^2} = 165.75 = 166 \text{ mothers}$$

To account for non-respondents and we take 15% of the sample size.

$$166 \times 15/100 = 24.5 = 25$$

Total sample size = 166+25 =191 mothers

Hospital delivery records (HDRs) were used to identify and select 191 eligible study participants. Systematic random sampling was adopted. Pumwani maternity hospital has 50 to 70 deliveries per day on average. The desired sample size per day was 20 mothers. The first mother was randomly selected and then every 3<sup>rd</sup> mother was systematically selected.

### *Validity and reliability research tools*

For validity and reliability, a pilot study was conducted at Kayole 1 health center to test the validity and reliability of the questionnaire. This involved 24 mothers who delivered at Kayole 1 health center and was between the ages of 15—49 years. The reliability was checked through the test-retest method during piloting. The reliability was tested using Cronbach alpha which was acceptable at 0.7.

The data was collected using a structured questionnaire, information abstracted from the maternal and neonatal medical records. The information captured involved demographics, social, medical, obstetric, and neonatal data from the client. All the required information was collected within 12 hours after delivery.

### *Data analysis*

Statistical package for social sciences (SPSS) version 23 was used to perform statistical analysis. Descriptive statistics, proportions were used to summarize categorical variables. Chi-square of Fishers' exact tests was used to examine the differences among the categorical variables.

Prevalence odds ratios (PORs) and 95% confidence interval (CI) were used to estimate the strengths of associations between the independent and dependent variables.

### *Ethical considerations*

This study involved human subjects aged between 15—49 years who had delivered hence ethical consideration was imperative. Permission for the research was sought from the Pumwani maternity hospital ethics review board, Mount Kenya university ethical review committee, NACOSTI, participating mothers and from guardians of mothers regardless of their age.

During study period, the PI had access to private and confidential information from the medical records of the mother. To mitigate the potential effects of this, the PI ensured safety of the information by treating such information with confidentiality it deserves. The PI also used serial numbers assigned to the mothers and names or contact details of the respondents were not recorded anywhere on the questionnaires.

## RESULTS

### *Prevalence of preterm deliveries*

The prevalence of preterm delivery among women of child bearing age (15-49 years) at PMH was assessed.

From the findings, 166 women of child bearing age (15-49 years) at PMH participated in the study out of which 37 had preterm deliveries. This presented a prevalence of 22.3%.

### *Risky behavioral factors associated with preterm deliveries*

The study sought to reveal the risky behaviors of the mothers associated with preterm deliveries.

**Table 1: Association between risky behaviors and preterm delivery.**

Parameter		Preterm (n=37)	Term (n=127)	Total	OR (95% CI)	P value
<b>Drinking alcohol</b>						
<b>Yes</b>	Count	6	24	30	0.847	0.814
	%	20.0	80.0	100.0		
<b>No</b>	Count	31	105	136		
	%	22.8	77.2	100.0		
<b>Alcohol during pregnancy</b>						
<b>Yes</b>	Count	1	9	10	0.416	0.633
	%	10.0	90.0	100.0		
<b>No</b>	Count	4	15	19		
	%	21.1	78.9	100.0		
<b>Smoking</b>						
<b>Yes</b>	Count	1	4	5	0.868	1.000
	%	20.0	80.0	100.0		
<b>No</b>	Count	36	125	161		
	%	22.4	77.6	100.0		
<b>Smoking during the pregnancy</b>						
<b>Yes</b>	Count	0	4	4	0.345	0.2
	%	0.0	100.0	100.0		
<b>No</b>	Count	1	0	1	0.547	0.352
	%	100.0	0.0	100.0		
<b>Husband smoking</b>						
<b>Yes</b>	Count	5	28	33		
	%	15.2	84.8	100.0		
<b>No</b>	Count	32	98	130		
	%	24.6	75.4	100.0		
<b>Husband smoking during pregnancy</b>						
<b>Yes</b>	Count	1	8	9	0.475	1.00
	%	11.1	88.9	100.0		
<b>No</b>	Count	5	19	24		
	%	20.8	79.2	100.0		
<b>Main type of fuel</b>						
<b>Firewood</b>	Count	1	0	1		
	%	100.0	.0	100.0		
<b>Charcoal</b>	Count	8	12	20		
	%	40	63.2	100.0		
<b>Kerosene</b>	Count	14	49	63		
	%	22.2	77.5	100.0		
<b>Gas/electricity</b>	Count	14	68	82		
	%	17.1	82.9	100.0		

## DISCUSSION

The study assessed some risky behaviors associated with preterm delivery. The study recorded proportional differences among the study variables in their association with preterm deliveries. Among them, 20% and 10% of the mothers who took alcohol and took alcohol during pregnancy respectively had preterm deliveries. In addition, 20%, 15.2%, 11.1% of mothers who smoke, whose husbands smoke and whose husbands smoke during pregnancy respectively had preterm deliveries. The association between drinking alcohol and drinking alcohol

during pregnancy and preterm delivery were statistically insignificant. Substance abuse like alcohol intake and smoking contributed to 33% of preterm in Sweden.<sup>13</sup> Alcohol consumption during the second and third trimesters, but not during the first trimester, was associated with an increased risk of preterm delivery. Heavy alcohol consumption ( $\geq 300$  g ethanol/week) during the second and third trimesters was associated with a four-fold higher risk compared with non-drinkers. Light alcohol consumption (1–149 g ethanol/week) tended to be associated with a lower risk of preterm delivery.<sup>14</sup>

Further, the study shows that 100%, 40%, 22.2% and 17.1% of the mothers who used firewood, charcoal, kerosene and gas/electricity respectively had preterm deliveries.

The association between the main type of fuel and preterm delivery was statistically insignificant. However, most of the mothers who had preterm deliveries used biomass fuels. This implies that biomass fuels increase the risk of preterm delivery. Women who cook with biomass fuels are substantially more likely to have had a stillbirth than women who cook with cleaner fuels. Women who cook with biofuels are twice as likely as those who cook with cleaner fuels to have had two or more preterm deliveries.<sup>15</sup>

## CONCLUSION

The association between drinking alcohol, drinking alcohol during pregnancy, smoking, and smoking during pregnancy for the mother or the husband and preterm delivery were statistically insignificant. The association between the main type of fuel and preterm delivery was statistically insignificant. Most of the mothers who had preterm deliveries used biomass which increase the risk of preterm delivery.

## Recommendations

The study recommends that there is need for pre-conception care to be included in maternal child health. There is need for awareness creation on the risky behaviors especially among the pregnant mothers so as to reduce the likelihood of preterm delivery among the mothers. More research should be conducted on the association of emotional factors with PTD.

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