

Prevalence and Risk Factors for Preterm birth among Postnatal Women in Western Kenya

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Abstract

Introduction: Preterm birth is one of the largest unmet medical needs contributing to the global burden of disease. This study assessed the prevalence and risk factors associated with preterm birth among postnatal women aged 15 to 49 years in selected public hospitals in the Western region of Kenya.

Methods: A cross-sectional study design was employed. 353 postnatal mothers were sampled for the study. Chi-square test and logistic regressions were used to identify significant factors associated with preterm birth among the respondents.

Findings: Fifty-six (15.9%) of the postnatal women had preterm births during their last delivery. Chi-square test and Regression analysis indicated that the history of abortion ($p=0.000$), was the most significant in the determination of the risk of preterm births. However, the history of hypertension ($p=0.007$), and multiple pregnancies ($p=0.015$), were also strongly associated with preterm births.

Conclusion and recommendations: Midwives should carry out effective antenatal care interventions such as early screening and management of pregnant women with a previous history of abortion, multiple pregnancies, and hypertension in pregnancy. They should also intensify health education in pregnancy to reduce the prevalence of preterm births.

Introduction

World Health Organization (WHO) defines preterm birth as the birth of a baby before 37 completed weeks of gestation (Howson, Kinney, & Lawn, 2012). Every year, an estimated 15 million babies are born preterm and this number is rising (WHO, 2018).

Prematurity is the leading direct cause of neonatal mortality (Zang et al., 2012; Broek,

Jean-baptise, & Neilson, 2014). Preterm births account for 35% of neonatal deaths globally (Ayebare, Ntuyo, Malande, Nalwadda, 2018). Therefore, it is a major public health concern globally associated with 6-10% births in high-income countries and up to 15% in low-income countries (Beck et al., 2010). Africa and Asia bear the biggest



burden of preterm births at 85% (Watson-Jones et al., 2007).

There are several complications associated with preterm birth (Mahajan & Magon, 2017; Blencowe, 2012; Beck et al., 2010; & Goldenberg et al. 2008). It also contributes to both perinatal and early neonatal mortalities, especially in developing countries (Lawn et al., 2015). Preterm birth is expensive in health care due to long-term care of children with disability attributed to it (Bayingana et al., 2010). In low-income settings, half of the babies born prematurely die due to lack of feasible, cost-effective care (Blencowe, 2012). Reduction of preterm birth remains complex due to non-criterion in the prediction of at-risk women in pregnancy or delivery (Olson et al., 2015)

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The etiology of preterm birth is multifactorial and largely poorly understood (Porpora et al., 2019).

There are several risk factors associated with preterm birth. In our study area, there is limited literature on this topic. It was justified to assess the prevalence and risk factors associated with preterm delivery among postnatal women in selected public hospitals in the Western region of Kenya.

Methods

A cross-sectional descriptive design assessed the prevalence and the risk factors associated with preterm births among postnatal women in five teaching and referral hospitals in Western Kenya. The inception period for the study was May 2019. 1500 deliveries which were the total estimated monthly deliveries in the five hospitals were targeted and calculated proportionately.

The final sample size was 359 considering a 10% non-response rate was achieved with 118, 72, 51, 62, and 56 respondents respectively for Jaramogi Oginga Odinga, Kisumu, Migori, Homa-Bay, and Siaya County Teaching and Referral Hospitals. Post-natal women aged 15-49 years old who were willing to participate in the study underwent selection by systematic random sampling. Mothers who were unable to consent and or respond, those who were not within the reproductive age bracket, or who were not delivered within the hospitals of the study were excluded.

Data collection was performed through researcher administered structured questionnaires. Training for the research assistants was done and pretesting conducted



Table 1: Socio-demographic Characteristics of the Respondents (n=353)

	Variable Category	Frequency	%
Age in Years	< 18	46	13%
	≥ 18	307	87%
Education Level	Primary	126	35.7%
	Secondary	138	38.8%
	College	75	21.2%
	University	15	4.2%
Religion	Christianity	346	98%
	Muslim	6	1.7%
	Other	1	0.3%
Occupation	Unemployed	97	27.5%
	Formal employment	44	12.5%
	Business	129	36.5%
	Other	83	23.5%
Marital Status	Married	284	80.5%
	Others	69	19.5%
No of children	<5	275	77.9%
	≥ 5	78	22.1%
Alcohol consumption	Yes	16	4.5%
	No	337	95.5%
Smoking	Yes	2	0.6%
	No	351	99.4%

at Kisumu, Siaya, Migori as well as Homa-Bay County Teaching and Referral Hospitals.

Findings

Three Hundred and Fifty Three (353) mothers participated in this study giving a 98.3% response rate.

Socio-demographic characteristics

Age

A majority of the respondents (307; 87%) were over 18 years of age.

Level of education

Respondents who attained either primary or secondary level of education were 126 (35.7%) and 138 (38.8%) respectively. Only 15 (4.2%) had a university education.

Religion

Majority 346 (98%) were Christians while 6 (1.7%) were Muslims and 1 (0.3%) others

Occupation

A majority (129, 36.5%) were small scale traders, 97 were unemployed (27.5%) and 44 (12.5%) were informal employment.

Marital status

A majority of the respondents (284; 80.5%) were married.

Number of children

275 (77.9%) of the respondents had less than five children.

History of alcohol consumption and smoking

Of the respondents, 16 (4.5%) reported a history of alcohol consumption and only two (0.6%) had a history of smoking.

Maternal characteristics of the respondents (See Annex 1)*ANC visits*

A majority (342; 96.9%) of the respondents attended at least one ANC visit during their last pregnancy.

Parity

Thirty-one (8.8%) of the respondents were para 1, 244 (69.1%) were between para 2 to 4 while 78 (22.1%) were para 5 or more.

Age at first pregnancy

A majority, 194 (55%) were below 18 years of age during their first pregnancy.

Maternal weight at fourth ANC

Two hundred and ninety-eight (84.4%) others weighed below 75 kg at 4th ANC. The

weights ranged from 46kg to 138kg with a mean of 69.01 (SD ±13) kg.

History of preeclampsia (PET)

Eleven (11; 3.1%) respondents had a history of preeclampsia toxemia.

Pregnancy-induced hypertension (HTN)

Twenty-two (6.2%) mothers reported pregnancy-induced hypertension. HTN was found to be significantly associated with preterm birth (p=0.000) in our study.

History of antepartum hemorrhage (APH)

Thirty-nine (11%) mothers reported a history of APH.

History of abortion

Thirty-eight (10.8%) women reported a previous history of abortion. In this study, the history of abortion predicted preterm birth (p=0.000).

HIV Status

Sixty-six (18.7%) of the respondents reported they were HIV positive during their last pregnancy.

History of PPRM

Thirty-five (9.9%) of the women had a history of preterm premature rupture of membranes (PPROM).

VDRL status

Ten (2.8%) respondents reported a positive VDRL during pregnancy.

History of malaria

One hundred and ten (31.2%) of the respondents reported MIP.

History of urinary tract infections (UTI)

One hundred and eleven (31.4%) of the respondents reported a history of UTI during pregnancy.

Child spacing interval

Most of the respondents (213, 60.3%) spaced their children with an interval of 2 years or more.

History of family planning (FP) use

A majority, 205 (58.1%) of the mothers reported a history of FP use.

Most recent pregnancy type

Three hundred and thirty-seven (95.5%) of the postnatal women had a single pregnancy while 16 (4.5%) reported multiple pregnancies.

Fetal factors

Weight of the baby at birth

Sixty-eight (19.3%) of the babies weighed less than 1.5 kg at birth. Weight of the baby was a significant ($p=0.000$) risk factor for preterm birth.

Sex of the baby

One hundred and sixty-four (46.5%) of the babies were male while 189 (53.5%) were female.

Other factors

History of cervical disease

Four (1.1%) of the respondents reported a history of cervical disease.

Hospital attended

Migori County Referral Hospital had the lowest number of post-natal mothers included in the study proportionately (50, 14.2%); however, it recorded the highest number of mothers with a history of pre-term babies at (19, 33.9%) which is 5.4% of all the mothers interviewed.

Incidentally, Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH)

had the highest proportion of post-natal mothers in the survey (118, 33.4%) but recorded only nine mothers with a history of pre-term births. This translates to 2.5% of all the mothers interviewed and 16.1% of all the pre-term cases.

Prevalence of preterm delivery

Fifty-six (15.9%) of the post-natal women had preterm births. On cross-tabulation, a majority of the women who had preterm births (23, 41.1%) had primary as the highest level of education. Forty-five (80.4%) were aged 18-38 years. Most of them (46, 82.1%) were married. They were predominantly (55, 98.2%) Christians. Casual laborer was (1, 1.7%); self-employed (2, 3.6%). None of the pre-term mothers had a history of smoking (0%); while 2 (3.6%) reported a history of alcohol consumption.

Most (39, 69.6%) of the postnatal women with preterm birth had between one and three children. Only two (3.6%) had more than 6 children. Most (34; 60.7%) of the respondents reported their first pregnancy at between 15 and 19 years of age. Only seven (12.5%) had their first pregnancy at over 24 years of age.

Factors Associated with Preterm Delivery among Postnatal Women in Selected Public Hospitals

Pearson's Chi-square test indicated that the risk factors for preterm birth were parity ($p=0.015$), hypertension ($p=0.007$), history of

abortion ($p=0.000$) and multiple pregnancy type ($p=0.006$).

Table 2: Variables significantly associated with preterm birth (PTB)

Variable	Category	Preterm Births		Chi-square	p-value
		Yes	No		
Parity	Para 1	0	31	10.416	0.015
	Para 2-4	39	205		
	Para >5	17	61		
History of HTN	No	48	283	7.387	0.007
	Yes	8	14		
History of abortion	No	41	274	17.784	0.000
	Yes	15	23		
Most recent pregnancy type	Single	52	285	10.312	0.006
	Multiple	4	12		

* $p<0.05$

A regression analysis conducted while controlling for the type of pregnancy, the number of children at the time of the survey, sex of the babies and a history of

hypertension, found the history of abortion ($p=0.011$), to be the most significant risk factor for pre-term births. Most preterm babies tended to be underweight ($p=0.000$).

Table 3: Regression for variables significantly associated with preterm births (PTB)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	HTNHx(1)	-.188	.798	.055	1	.814	.829
	Abortion(1)	-1.325	.523	6.409	1	.011	.266
	PGType			.000	2	1.000	
	PGType(1)	-21.436	5.891E3	.000	1	.997	.000
	PGType(2)	-22.294	2.195E4	.000	1	.999	.000
	SexofBaby			.491	2	.782	
	SexofBaby(1)	-22.338	2.195E4	.000	1	.999	.000
	SexofBaby(2)	.291	.415	.491	1	.483	1.338
	WgtofBaby			24.205	3	.000	
	WgtofBaby(2)	3.684	1.317	7.829	1	.005	39.788
	WgtofBaby(3)	3.461	.890	15.121	1	.000	31.861
	WgtofBaby(4)	1.257	.571	4.847	1	.028	3.516
	Hospital			17.292	4	.002	
	Hospital(1)	3.162	1.250	6.399	1	.011	23.619
	Hospital(2)	-.252	.661	.145	1	.704	.778
	Hospital(3)	.643	.596	1.166	1	.280	1.903
	Hospital(4)	1.624	.532	9.313	1	.002	5.072
	Children			.444	3	.931	
	Children(1)	-20.286	6.628E3	.000	1	.998	.000
	Children(2)	-.795	1.272	.390	1	.532	.452
Children(3)	-.665	1.333	.249	1	.618	.514	
Constant	21.536	2.195E4	.000	1	.999	2.255E9	

a. Variable(s) entered on step 1: HTNHx, Abortion, PGType, SexofBaby, WgtofBaby, Hospital, No. of Children.



Discussion

Prevalence of preterm births

The prevalence rates of preterm births are highest in low- and middle-income countries, and increasing in some middle- and high-income countries (Gravett, Rubens, & Nunes, 2010). The highest rates occurred in Africa and North America; 11.9% and 10.6%, respectively. We found 15.9% prevalence of preterm birth, being consistent with the above findings. Similar findings were reported in India and locally (Shubhada et al., 2013; Irungu, 2001). Even higher prevalence of preterm birth was reported in Maiduguri, North Eastern Nigeria, 32.9% (Bello et al., 2020), and in Indonesia 35% (Hidayat, Ajiz, Achadiyani, Krisnadi, 2015). The variation in the findings could be due to the difference in the study areas and period as well as the quality of healthcare and health care seeking behaviour in the specific regions.

Socio-demographic characteristics

Mother's age was not a significant risk factor for preterm birth in our study. A study in Rwanda corroborated these findings (Bayingana et al., 2010). Low or no education is associated with high susceptibility to preterm births (Heaman et al., 2013; Bayingana et al., 2010). Twenty-three (41.1%) of the respondents who reported preterm births had a primary level of education, (Shah et al. 2014; Cnattingius, Villamor, & Johansson, 2013) supported this finding.

Almost all of the respondents with a preterm delivery were Christians (55, 98.2%). This is because data were collected in an area that is predominantly Christian and had data been collected in a Muslim area it would have revealed Muslims being a significant proportion.

Among the 56 mothers with a history of preterm births, the majority (20; 36.5%) were running small-scale businesses. A lower socioeconomic status in the current findings may have increased the risk of preterm births. These findings are consistent with other studies (Mahajan and Magon, 2016; Shah *et al.*, 2014; Alijahan et al., 2014; Khalajinia & Jandaghi, 2012). A higher-income was also a risk factor for preterm birth but a protective factor for mortality of preterm birth (Xu, Dai, Xu, 2015). Similar to our findings, other studies also found no significant difference between maternal occupation and preterm birth (Jandaghi *et al.*, 2012; Kamburova & Georgieva, 2016). In our study, parity was a significant ($p=0.015$) risk factor in preterm birth. This observation is similar in other studies (Ayebare et al., 2018; Derakhshi et al., 2014; Kamburova & Georgieva, 2016; Cnattingius, Villamor, & Johansson, 2013).

None of the preterm mothers had a history of smoking (0%); while (3.6%; 2) reported a history of alcohol consumption. Similar to our finding, there was no significant association between the use of cigarette or drinking alcohol and preterm birth (Wagura, 2014). Twenty five percent of the mothers with a history of multiple pregnancies reported preterm births. History of multiple pregnancies was a significant ($p=0.006$) risk factor associated with preterm birth in our study. This finding corroborates another study in Kenya (Wagura, 2018).

Maternal factors

Attendance of ANC was not a significant risk factor to preterm birth in our study. This finding was corroborated in a study in Kenya



(Wagura et al., 2018). In Beijing, Gaza and United States of America, the USA an increased risk of preterm delivery was reported among women who did not get antenatal care (Elshibly, et al., 2015; Zhang et al., 2012; Debiec et al., 2010). The differences may be explained by the context.

A majority (34; 60.7%) of the respondents who had preterm births had first pregnancy between 15 to 19 years of age. This finding resonates with a study in Rio de Janeiro, Brazil (Vieira et al., 2012). The finding is corroborated in other studies (Temu *et al.*, 2016; Shrestha, L. & Shrestha, P., 2013; Heaman et al., 2013; Gibbs, Wendt, Peters, & Hogue, 2012; Shrim et al. 2011, Olugbenga, 2010).

Among the fourteen with a history of hypertension in pregnancy 8 (57.1%) and four (57.1) of the respondents who had preeclampsia in the last pregnancy both had preterm births. These findings clearly show a relationship between both hypertension and preterm delivery. In our study history of hypertension in pregnancy was a significant (0.007) risk factor in preterm birth. This finding was supported in a study (Wagura, 2018; Gebreslasie, 2016).

However, preeclampsia was not a significant risk factor for preterm birth. This latter finding contravenes other studies (Ayebare et al., 2018; Watson et al., 2013; Zhang et al. 2012; De Souza Rugolo LMS, 2011; and Jammeh et al., 2011). Again, the study design may explain the variation. In our study, those mothers who were very sick and were excluded. Therefore, this may have also contributed.

In this study, 39 (11%) of respondents reported antepartum hemorrhage (APH). APH had no significant relationship with preterm birth. Dissimilar findings were reported (Wagura, 2018; Alijahan et al., 2014)). The possible explanation is the difference in study design

because the last a case-control while ours was a cross-sectional study design. Besides, there is context variation in all the studies.

Thirty-eight (10.8%) of the respondents reported a history of abortion in the previous pregnancies. History of abortion was significantly ($p=0.011$) associated with preterm birth. Similar observations were made (Mahajan & Magon, 2017).

Ninety nine percent (35) of these postnatal women experienced preterm premature rupture of membrane, PPRM. There was no significant association between PPRM and preterm birth. Dissimilar to our observation, it was a significant risk factor of PTB in studies in Kenya and India (Wagura, 2018; Mahajan & Magon, 2017). The variation in the findings might be associated with contexts of the studies and study methodology.

The most common medical conditions among the respondents were malaria (110; 31.2%) and urinary tract infections (UTI's) (111; 31.4%). Twenty-one (23.6%) of those who had malaria experienced preterm birth. Comparable to the (297; 84.1%) of those who had term births, (89; 30%) were also diagnosed with malaria. Only 10 (2.8%) of the postnatal women had VDRL in the antenatal period. Sixty-six (18.7%) of the postnatal women were HIV positive. 17 (18.1%) of those who had preterm birth were diagnosed with UTI in pregnancy.

Similar to our findings; genitourinary infections were not significantly related to preterm birth (Wagura, 2018; Bayingana et al., 2010). Contrary to this finding UTI was a significant risk factor of preterm birth in Ardabil/ Iran (Alijahan et al., 2014). Also, HIV was significantly related to preterm birth (Gebreslasie, 2016). Differences may be attributed to the disparity in health care delivery systems and care given to mothers diagnosed with related conditions. The



majority 213 (60.3%) of the respondents had children after more than 2 years while 140 (39.7%) had children within less than two years. Inter-pregnancy interval was not significantly related to preterm birth. This finding is supported by other studies (Wagura, 2018). Dissimilar to our finding, in Bulgaria, mothers >35 years of age who delivered premature babies after their third child had significant differences for premature births in regards to the birth order (Kamburova & Georgieva, 2016). The variation may be in study context another is the age of the mothers under consideration. One hundred and forty (148) of all the respondents were not on any family planning method just before the last pregnancy. History of family planning use was not a significant risk factor to preterm birth.

Fetal factors

The study reported 68 (19.3%) babies with < 1.5 kg while 285 (80.7%) had > 1.5 kg. This finding was consistent with other studies (Gebreslasie, 2016). Further, the birth weight of the baby was significant ($p=0.000$) in the determination of the risk of preterm birth.

Out of the 56 preterm babies, 35 (62.5%) were males while 37.5% (21) were females. Male predominance was also reported in

another study (Mahajan & Magon, 2017). On the contrary, Moshi and Wanyoro (2018) reported more female than male preterm babies in Migori County. Our study did not report gender as a significant risk factor for preterm birth. This finding was not supported by other studies elsewhere (Mahajan & Magon, 2017; Challis, Newnham, Petraglia, Yeganegi, & Blocking, 2013).

Limitations of the study

It was facility-based and therefore deliveries in the community were not considered. Also, data was only collected at one point in time.

Conclusion

Previous history of abortion had the strongest association with preterm birth among the postnatal women in the selected public hospitals. However, the history of hypertension and multiple pregnancies were also associated with preterm births. Therefore, midwives should practice effective antenatal care interventions like early screening of women with a previous history of abortion and multiple pregnancies. Further, hypertension and infections in pregnancy should be diagnosed and managed timely. Emphasis should also be on maternal health education.



Recommendation

Enhancement of the preconception counselling in the antenatal care clinics may reduce non-modifiable factors related to preterm births. The midwives should also discuss with highly vulnerable women with a

history of abortion or preterm birth about the signs of preterm labour, the symptoms, and the risk factors. Medical conditions like hypertension and infections in pregnancy should be diagnosed early and managed effectively. Further, an emphasis on health education during pregnancy will be helpful.

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Annex 1

Maternal, Fetal Characteristics and Other Factors of the Respondents (n=353)

Variable	Variable category	Frequency	%
Maternal Factors			
ANC visit for last pregnancy	No	11	3.1%
	Yes	342	96.9%
Parity	Para 1	31	8.8%
	Para 2-4	244	69.1%
	Para >5	78	22.1%
Age at 1 st pregnancy	< 18 years	194	55%
	> 18 years	159	45%
Maternal weight at 4 th ANC	<75 kg	298	84.4%
	>75 kg	55	15.6%
Hgb level at 4 th ANC	<11 g/dL	108	30.6%
	>11 g/dL	245	69.4%
History of PET	No	342	96.9%
	Yes	11	3.1%
Pregnancy induced HTN	No	331	93.8%
	Yes	22	6.2%
History of APH	No	314	89%
	Yes	39	11%
History of Abortion	No	315	89.2%
	Yes	38	10.8%
HIV Status	Negative	287	81.3%
	Positive	66	18.7%
History of PPROM	No	318	90.1%
	Yes	35	9.9%
VDRL Status	Negative	343	97.2%
	Positive	10	2.8%
History of Malaria	No	243	68.8%
	Yes	110	31.2%



History of UTI	No	242	68.6%
	Yes	111	31.4%
Child spacing interval	< 2years	140	39.7%
	>2 years	213	60.3%
History of FP use	No	148	41.9%
	Yes	205	58.1%
Most recent pregnancy type	Single	337	95.5%
	Multiple	16	4.5%
Fetal Factors			
Weight of baby at Birth	<1.5 kg	68	19.3%
	>1.5 kg	285	80.7%
Sex of the baby	Male	164	46.5%
	Female	189	53.5%
Other Factors			
History of cervical disease	No	349	98.9%
	Yes	4	1.1%
Hospital Attended	Migori CRH	50	14.2%
	Siaya CRH	57	16.1%
	Homa-Bay CRH	57	16.1%
	Kisumu CRH	71	20.1%
	JOOTRH	118	33.5%

