

## Prevalence of Preterm Birth and its Associated Factors among Mothers Delivered in Jimma University Specialized Teaching and Referral Hospital, Jimma Zone, Oromia Regional State, South West Ethiopia

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### Abstract

**Background:** Being born before 37 weeks gestational age or before 259 days since the first day of a woman's last menstrual period is defined as preterm birth according to the WHO. Being born too early is now the leading cause of death in children around the world. Preterm deliveries were responsible for 1 million out of the 6.3 million deaths of children under 5 in 2013. While the greatest burden is felt in developing countries, it is a problem everywhere. Its negative impacts stretch further when taking into account the health of mothers and the lives of the children who manage to survive.

**Objective:** To determine the prevalence of preterm birth and its associated factor in Jimma University specialized teaching and Referral hospital south west Ethiopia, 2015.

**Methodology:** Institution based, cross-sectional study was conducted to assess the prevalence of preterm birth and associated factors among mothers who gave births in JUSH from May 25<sup>th</sup> to June 25<sup>th</sup>, 2015. The final sample size was being 220 mothers selected by systematic sampling technique were being employed to select study participants. Data was being collected from the mothers through face to face interview using structured questionnaire. The collected data was being coded, sorted and processed using manual compilation and analysed using descriptive parameters (SPSS version 16.0) and other electronic devices.

**Result:** The prevalence rate of preterm birth was 25.9%. Rural place of residency (OR=2.281, CI:(1.22-4.263), P=0.010), Substance intake during pregnancy (OR=0.530, CI:(0.281-0.998), P=0.049), History of abortion (OR=0.282, CI:(0.14-0.565), P<0.001), History of the Still Birth (OR=0.213, CI:(0.103-0.441), P<0.001), History of Preterm Labor (OR=0.206, CI:(0.108-0.393), P<0.001), Pre-mature rupture of membrane (OR=0.255, CI:(0.134-0.483), P<0.001), History of bleeding during pregnancy (OR=0.216, CI:(0.11-0.423), P<0.001), UTI during pregnancy (OR=0.488, CI:(0.243-0.981), P=0.044), Hypertension during pregnancy (P=0.003), Congenital abnormality of the new born (OR=0.195, CI:(0.45-0.84), P=0.029), History of twins delivery (OR=0.239, CI:(0.085-0.677), P=0.007), History of congenital abnormality (OR=0.159, CI:(0.038-0.66), P=0.011), History of low birth weight (OR=0.085, CI:(0.04-0.18), P<0.001), History of preterm birth including the current (OR=0.005, CI:(0.002-0.018), P<0.001) were determined as significant risk factors for preterm birth.

**Conclusion and Recommendation:** Identifying pregnant women at the risk of preterm delivery and proving quality healthcare, community health education and awareness campaigns may decrease the rate of preterm birth and its consequences. Not only this, further researches should be performed to find out other possible associations that could lead to preterm birth with a larger sample size.

**Keywords:** Preterm birth; Association factors; Pregnant women; Gestational age

### Introduction

#### Background

Being born before 37 weeks gestational age or before 259 days since the first day of a woman's last menstrual period is defined as preterm birth according to the WHO definition [1].

Gestational age at birth is now recognized as a reference standard related to the outcome and prognosis of the preterm infant, together

with birth weight. Mild prematurity refers to 32-36 weeks, which could be further subdivided into mild (32-33 weeks) and moderate (34-36 weeks) preterm birth. Mild prematurity accounts for the great majority of all preterm births (Canada: 85%). Birth at 28-31 weeks' gestation is defined as very preterm and accounts for less than 1% of all deliveries. Immediate survival is expected with a significant proportion of short to long-term morbidity. Below 28 weeks is regarded as extremely preterm (less than 5% of all preterm births) where early neonatal mortality is high with up to 50% of severe handicaps occurring among survivors born below 26 weeks [2].

Preterm birth can also be defined by birth weight: low birth weight less than 2500 g, very low birth weight 1500 g, and extremely low birth weight less than 1000 g [3].

Being born too early is now the leading cause of death in children around the world. Preterm deliveries were responsible for 1 million out of the 6.3 million deaths of children under 5 in 2013. While the greatest burden is felt in developing countries, it is a problem everywhere. Its negative impacts stretch further when taking into account the health of mothers and the lives of the children who manage to survive [4].

An estimated 15 million babies are born too early every year. That is more than 1 in 10 babies. Almost 1 million children die each year due to complications of preterm birth. Many survivors face a lifetime of disability, including learning disabilities and visual and hearing problems. Globally, prematurity is the leading cause of death in children under the age of 5. And in almost all countries with reliable data, preterm birth rates are increasing. Inequalities in survival rates around the world are stark. In low-income settings, half of the babies born at 32 weeks (two months early) die due to a lack of feasible, cost-effective care, such as warmth, breastfeeding support, and basic care for infections and breathing difficulties. In high-income countries, almost all of these babies survive [5].

Preterm birth is a significant global burden with 15.1 million babies born before 37 weeks of pregnancy every year across the world, which represents one in ten babies. Of these, 790,400 are born extremely preterm, that is before 28 weeks of pregnancy are completed [6].

Prematurity are now the second-leading cause of death in children less than 5 years and the single most important cause of death in the critical first month of life. For the babies who survive, many face a lifetime of significant disability. Given its frequent occurrence, it is likely that most people will experience the challenge, and possible tragedy, of preterm birth at some point in their lives, either directly in their families or indirectly through friends even for the countries [7].

Despite declining global rates, new-born deaths represent a growing proportion of all under-five deaths. This highlights that progress has been slower in tackling mortality in the first four weeks of life (neonatal period) as opposed to mortality in babies and children over one-month old. In addition, preterm survivors often suffer from lifelong disabilities, such as visual and hearing impairments, chronic lung disease, long term cardiovascular ill-health, learning and behavioural impairments. Prematurity therefore has a far-reaching impact on their development and on their health as children and adults [1,8].

Approximately 45-50% of preterm births are idiopathic, 30% are related to preterm rupture of membranes (PROM) and another 15-20% is attributed to medically indicated or elective preterm deliveries. Estimation of preterm birth rates and, ideally, their proper categorization (e.g. spontaneous versus indicated) are essential for accurate determination of global incidence in order to inform policy and programs on interventions to reduce the risk of premature labor and delivery [9].

Many factors may increase the risk of premature birth, however, including: Having a previous premature birth, Pregnancy with twins, triplets or other multiples, An interval of less than six months between pregnancies, Conceiving through in vitro fertilization, Problems with the uterus, cervix or placenta, Smoking cigarettes or using illicit drugs, Poor nutrition, not gaining enough weight during pregnancy, Some

infections, particularly of the amniotic fluid and lower genital tract, Some chronic conditions, such as high blood pressure and diabetes, Being underweight or overweight before pregnancy, Stressful life events, such as the death of a loved one or domestic violence, Multiple miscarriages or abortions, Physical injury or trauma. In fact, many women who have a premature birth have no known risk factors [10].

Preterm birth is a global problem affecting families across the world. More than 60% of preterm births occur in South Asia and sub-Saharan Africa. However, the problem of preterm births is universal, with both the United States and Brazil ranking among the top 10 countries with the highest number of preterm births in the world. Nearly 3 million babies are born every year in Ethiopia and 10% of them are born prematurely or with low birth weight. New-born death contributes to 42% of under-five mortality. Preterm babies are the most vulnerable and at risk of death and disability within minutes of birth. Preterm birth is a leading cause of new-born mortality globally as well as in Ethiopia. More than 75 per cent of preterm babies may be saved with simple inexpensive measures that do not need high technology. World Prematurity Day will also highlight the important work of the every New-born action plan, that aims to improve new-born health and to reduce maternal and child mortality by uniting the work of all actors, including parent and community groups [11].

Prematurity is increasingly recognized as a key public health priority in high-, middle-, and low-income countries. Though the particular challenges and burden of preterm birth varies by setting, rates are raising both nationally and globally. This study was being important for different stakeholders addressing the issues related to association factors. A finding from the study was providing information for the international and local advocacy, policy makers/policy reform, an updated research agenda and to develop strategies and guidelines. In summary, these levels of stakeholders, government, health professionals and community was potentially having great use of this study's findings. The objective of this study is to assess the prevalence of preterm birth and its associated factor in Jimma University specialized teaching and Referral hospital, Jimma zone, south west Ethiopia [12-15].

## Method and Materials

The study was conducted in JUSTH, Jimma, Oromia Regional State starting from May 25<sup>th</sup> to June 25<sup>th</sup>, 2015. Jimma is the town of Jimma zone which is one of 18 zone of the Oromia Regional State found at 352 Km from Addis Ababa, the capital city of Ethiopia, in the South western part of the country. There are two public hospitals found in the town which are called JUSTH and Shenan gibe hospital.

Jimma University specialized teaching hospital is one of the oldest public hospitals in the country. Geographically, it is located in Jimma city 352 km southwest of Addis Ababa. Currently it is the only teaching and referral hospital in the south-western part of the country, providing services for approximately 15000 inpatients, 160000 outpatient attendants, 11000 emergency cases, and 4500 deliveries in a year coming to the hospital from the catchment population of about 15 million people. It is a teaching hospital with a total capacity of about 450 beds [17-21].

It accommodates a total of more than 550 staffs out of which 395 are health professionals including 36 specialists, 77 residents, 150 medical interns, 30 dental interns, around 10 pharmacists and the rest are nurses and medical laboratory technologists. Maternity ward is one of the wards of the hospital, the maternity, labor and delivery ward have

31 beds for high risk pregnancies in addition to four first stage beds and two second stage couches. The service is rendered by internists, medical residents, medical interns, and nurse.

Facility based, cross-sectional descriptive study was employed. Sample size was determined using single population estimation formula with assumption of 95% confidence interval, 5% and considering the 51% proportion of previous study. Considering non-response rate of 10%, final total sample sizes was 220 and systematic sampling technique was being employed and study subjects were select every two mothers until the sampled population fills. Selection of the first sample was used through simple random lottery method. All mothers who gave births in Jimma University specialized teaching and referral hospital during the study period was used as the study population.

### Data collection instrument

Data collection instruments were developed after review of relevant literatures. The instrument were grouped and arranged according to the particular objectives that they can address. It is composed of socio-demographic questions, and association factors questions related to enabling factors. The questionnaire was being prepared in English and translated to local language and then back translated to English questionnaire version.

### Data collection methods

For the sampled mothers the purpose of the study and importance of participation was being informed and verbal consent was ensured. Data was collected from the mothers through face to face interview using structured questionnaire.

### Data quality control measures

Training was given for data collectors on the objectives of the study, the contents of the questionnaire, issues related to the confidentiality of the responses and the rights of respondents.

The questionnaire was being pre-tested in Seka district hospital which is 22 km from Jimma town on 10% (20 mothers) eligible who were give birth, to assess the reliability of data collection instruments. Findings were being discussed among data collectors and supervisor so that, the tool was being modified before actual data collection and the final interview was being conducted at convenient time by using of the modified questionnaire.

The collected data was being checked by principal investigator and data collectors every day at the end of each data collection day and if necessary, corrective measures were being made for the area where difficulty identified.

### Data processing, analysis and presentation

The collected data was being coded, sorted and processed using manual compilation and analyzed using descriptive parameters (SPSS

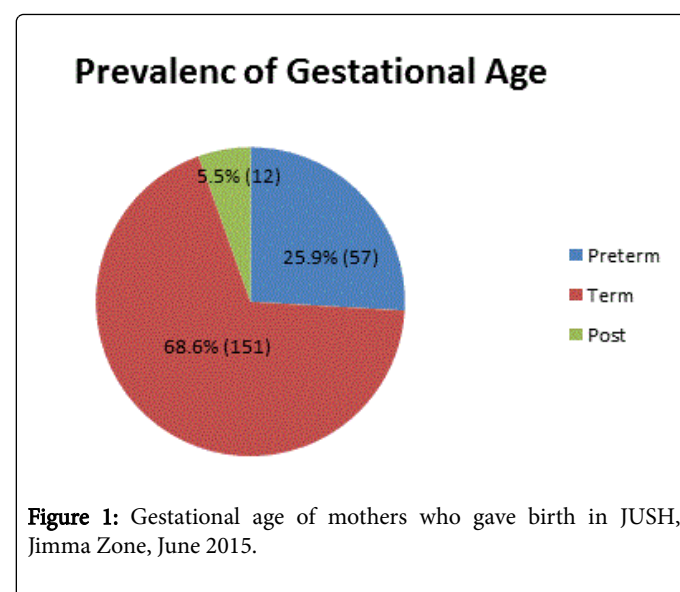
version 16.0) and other electronic devices. The processed data were being interpreted and presented using simple frequency tables, text and graphs. Associations were also done.

### Ethical Considerations

Written permission letter was being obtained from Jimma University SRP office to Jimma University specialized teaching and referral hospital. Permission was obtained from Jimma University specialized teaching and referral hospital administrator to conduct the study and lastly consent were obtained from respondents and confidentiality of the data was ensured by omitting the name of the respondents.

### Result

Data on gestation at birth was available for a total of 220 women and give response rate of 100%. Of these 68.6% (151) Delivered at term (37-41 weeks), and post term 5.5% (12) (greater than or equal to 42 weeks of gestation) and prevalence of preterm birth was 25.9% (57) delivered preterm (less than 37 weeks of gestation), and among the mothers who are preterm [Figure 1].



The majority of women were between 25-34 age group which accounts 35 (61%) followed by the age group of 15-24 years 13 (23%); and almost majority of mothers are married 48 (84%), Oromo in Ethnicity 47 (82%), Occupational Status 40 (70%) were house wife and most of the mothers were illiterate which accounts 28 (49%), most of the mothers get monthly family income in the range of 651-1400 Ethiopian Birr 25 (40%) and concerning the family size, 25 (44%) of the mothers had greater than 5 family in the house (Table 1).

Socio-demographic characteristics of mothers					
Variables		Preterm NO (%)	Term NO (%)	Post NO (%)	Total
Age of respondent	15-24	13 (23)	52 (34)	2 (17)	67

	25-34	35 (61)	85 (56)	7 (58)	127
	35-44	9 (16)	13 (9)	3 (25)	25
	>=45	0	1 (1)	0	1
	Total	57 (100)	151 (100)	12 (100)	220
Ethnic background of respondent	Oromo	47 (82)	101 (67)	5 (42)	153
	Amhara	4 (7)	16 (11)	3 (25)	23
	Gurage	0	13 (9)	1 (8)	14
	Others (Kaffa,Yem, Dawuro)	6 (11)	21 (14)	3 (25)	30
	Total	57 (100)	151 (100)	12 (100)	220
Marital status	Single	3 (5)	6 (4)	1 (8)	10
	Married	48 (84)	141 (93)	11 (92)	200
	Widowed	1 (2)	0	0	1
	Divorced	5 (9)	4 (3)	0	9
	Total	57 (100)	151 (100)	12 (100)	220
Religion	Orthodox	8 (14)	29 (19)	7 (58)	44
	Muslim	42 (74)	107 (71)	4 (33)	153
	Protestant	7 (12)	14 (9)	1 (9)	22
	Others	0	1 (1)	0	1
	Total	57 (100)	151 (100)	12 (100)	220
Residency	Urban	26 (46)	87 (58)	9 (75)	122
	Rural	31 (54)	64 (42)	3 (25)	98
	Total	57 (100)	151 (100)	12 (100)	220
Occupational Status	Student	3 (5)	8 (5)	0	11
	House wife	40 (70)	91 (60)	5 (42)	136
	Un employee	4 (7)	4 (3)	2 (16)	10
	Gov't /NGO	3 (5)	31 (21)	5 (42)	39
	Other/merchant, garden and daily labour)	7 (12)	17 (11)	0	24
	Total	57 (100)	151 (100)	12 (100)	220
Educational Status	Illiterate	28 (49)	44 (29)	1 (8)	73
	Read and write	1 (2)	3 (2)	1 (8)	5
	01-Apr	8 (14)	25 (17)	1 (8)	34
	05-Aug	4 (7)	15 (10)	3 (25)	22
	09-Oct	9 (16)	24 (16)	1 (8)	34
	11-Dec	2 (4)	7 (5)	0	9
	Diploma/Degree	4 (7)	33 (22)	5 (43)	42
	Master	1 (100)	0	0	1

	Total	57 (100)	151 (100)	10 (100)	220
Level of family income	150-650	23 (40)	57 (38)	1 (8)	81
	651-1400	25 (44)	53 (35)	6 (51)	84
	1401-2350	7 (12)	23 (15)	2 (17)	32
	23551-3550	0	10 (7)	1 (8)	11
	3551-5000	0	4 (3)	1 (8)	5
	>=5001	2 (4)	4 (3)	1 (8)	7
	Total	57 (100)	151 (100)	12 (100)	220
Family size	01-Feb	13 (23)	44 (29)	2 (17)	59
	03-Apr	19 (33)	65 (43)	8 (66)	92
	>=5	25 (44)	42 (28)	2 (17)	69
	Total	57 (100)	151 (100)	10 (100)	220

**Table 1:** Distribution of Socio-Demographic characteristics of mothers at JUSH, Jimma zone, Oromia regional state, Ethiopia, June 2015.

### Factors affecting preterm birth associated with socio-demographic data

In the binary logistic regression, for the base for comparison, I used the first as a reference point and association was made if P-value is less than 0.05, the statistical analysis showed the following factors were not significantly associated with preterm birth: maternal age, ethnic background, marital status, religion, occupational status, family size, and level of family income. But significant associations were found in (those respondents who was live in rural ( $P=0.010$ ,  $OR=2.281$ ,  $CI: (1.22-4.263)$ ) is two time (2x) had preterm birth as compared to live in urban place of residency and women who had Diploma and Degree educational background ( $P=0.002$ ,  $OR=0.169$ ,  $CI: (0.054-0.525)$ ) were 83% less likely had preterm birth as compared to those who had no educational background (illiterate mothers). Risk factors associated with preterm delivery was presented the using (Table 2).

Concerning maternal, medical and obstetrics factors: 28.5% (10) mothers who were had preterm birth were encounter spouse abuse/ domestic violence, 34.8% (23) were took medication, 25.3% (19) were take any substance including khat, 30.9% (22) Mothers were involved in heavy physical works during pregnancy. Concerning in the mode of delivery, the greater part 30.5% (40) of deliveries were caesarean section, and were as 19.1% (17), spontaneous vaginal deliveries and 17.3% (13) mothers were had prime gravida and 30.3% (44) multi gravida respectively. Majority of mothers are multi para 38% (27) having greater than or equal to three pregnancy and 32.3% (21) birth interval greater than 3 years followed by between 1-3 years 27.7% (20). Mothers who had hyper emesis gravid arum 20% (18) during pregnancy, 47.7% (21) had history of Abortion previously, 53.8% (21) had previous history of still birth, and 48.5% (32) had preterm labor, 16.6% (3) previous history of cesarean section, 41% (38) mothers were had pre mature rupture of membrane, 51% (26) had bleeding during pregnancy, 38% (17) had urinary tract infection (UTI) during pregnancy, 33% (2) chronic hypertension, 41% (27) were had pre-eclampsia during pregnancy state respectively, 43% (3) mothers were

had diabetes mellitus (DM), 28% (12) were previous history of hospitalization during pregnancy and 24% (44) were had history of ANC follow up during pregnancy respectively of mothers who were give preterm birth. The results for statistical analysis were summarized in (Table 2).

Variables		OR (95% CI)	P-Value
Residency	Rural	2.281 (1.22-4.263)	0.01
Educational Status	Diploma/Degree	0.169 (0.054-0.525)	0.002

**Table 2:** The association of socio demographic characteristics with preterm birth in JUSH, Jimma Zone, Oromia regional state, Ethiopia, June, 2015.

### Factors affecting preterm birth associated with maternal and obstetrics risk factors data

The results for statistical analysis of maternal and prenatal care characteristics of the subjects in current pregnancy in relation with preterm birth are summarized in Table 2. By applying binary logistic, it was observed that, the odds of delivering a preterm birth was not statistically significant among the women with suffering from Spouse abuse/Domestic, Medication Intake during Pregnancy, and women involved in heavy physical works, Mode of delivery, parity, Birth interval, hyperemesis gravid arum, History of previous C/S, History of DM, Presence of chronic disease during pregnancy, History of hospitalization and ANC follow up during pregnancy were not statistically significant. But, Women with who hadn't substance intake during pregnancy ( $P=0.049$ ,  $OR=0.530$ ,  $CI: (0.281-0.998)$ ) were 47% had less likely preterm birth as compared to mothers who had history of substance intake during pregnancy and those respondents who had multi-gravida were two (2x) times more likely had preterm birth as compared to Primi-gravida (Table 3).



Maternal factors (medical and obstetrics characteristics)					
Variables		Preterm No (%)	Term No (%)	Post No (%)	Total
Spouse abuse/Domestic violence	Yes	10 (28.5)	20 (57.1)	5 (14.2)	35
	No	47 (25.4)	131 (70.8)	7 (3.7)	185
Medication intake during pregnancy	Yes	19 (25.3)	53 (70.6)	3 (4)	75
	No	38 (26.2)	98 (67.5)	9 (6.2)	145
Substance intake during pregnancy	Yes	23 (34.8)	42 (63.6)	1 (1.5)	66
	No	34 (22)	109 (70.7)	11 (7.1)	154
Hard working during pregnancy	Yes	22 (30.9)	46 (64.7)	3 (4.2)	71
	No	35 (23.4)	105 (70.4)	9 (6)	149
Mode of delivery	Normal	17 (19.1)	66 (74.1)	6 (6.7)	89
	C/S	40 (30.5)	85 (64.8)	6 (4.5)	131
Gravida	Primi gravida	13 (17.3)	56 (74.7)	6 (8)	75
	Multi-gravida	44 (30.3)	95 (65.5)	6 (4.1)	145
Parity	0	0	2 (100)	0	2
	1	18 (18.9)	70 (73.6)	7 (7.3)	95
	2	12 (23)	36 (69.2)	4 (7.6)	52
	>3	27 (38)	43 (60.5)	1 (1.4)	71
Birth interval	<1 year	3 (27.2)	8 (72.8)	0	11
	1-3 years	20 (27.7)	51 (71)	1 (1.3)	72
	>3 years	21 (32.3)	40 (61.5)	4 (6.1)	65
	New	13 (18)	52 (72.2)	7 (9.7)	72
History hyper emesis gravid arum	Yes	18 (20)	70 (77.8)	2 (2.2)	90
	No	39 (30)	81 (62.3)	10 (7.7)	130
History of abortion	Yes	21 (47.7)	23 (52.3)	0	44
	No	36 (20.4)	128 (72.7)	12 (6.8)	176
History of the still birth	Yes	21 (53.8)	18 (46.2)	0	39
	No	36 (19.8)	133 (73.4)	12 (6.6)	181
History of preterm labor	Yes	32 (48.5)	33 (50)	1 (1.5)	66
	No	25 (16.2)	118 (76.6)	11 (7.2)	154
History of previous C/S	yes	3 (16.6)	14 (77.7)	1 (5.5)	18
	No	54 (26.7)	137 (67.8)	11 (5.4)	202
Pre-mature rupture of membrane	Yes	38 (41)	55 (59)	0	93
	No	19 (15)	96 (75.6)	12 (9.4)	127
History of bleeding during pregnancy	Yes	26 (51)	25 (49)	0	51
	No	31 (18.3)	126 (74.5)	12 (7.2)	169

Urinary Tract Infection during pregnancy	Yes	17 (38)	28 (62)	0	45
	No	40 (23)	123 (70)	12 (7)	175
Hypertension during pregnancy	HTN	2 (33)	4 (67)	0	6
	Pre-eclampsia	27 (41)	37 (57)	1 (2)	65
	No HTN	28 (19)	110 (74)	11 (7)	149
History of DM of the respondent	Yes	3	4	0	7
	No	54 (25)	147 (69)	12 (6)	213
Presence of chronic disease	Yes	2 (18)	9 (78)	0	11
	No	55 (26)	142 (68)	12 (6)	209
History of hospitalization during pregnancy	Yes	12 (28)	29 (67)	2 (5)	43
	No	45 (25)	122 (69)	10 (6)	177
History of ANC follow up	Yes	44 (24)	132 (71)	10 (5)	186
	No	13 (38)	19 (56)	2 (6)	34

**Table 3:** Distribution of Maternal risk factors (medical and obstetrics characteristics) for preterm birth among study subject at JUSH, Jimma Zone, Oromia regional state, Ethiopia, June 2015.

Women who weren't previously experienced of abortion ( $P < 0.001$ ,  $OR = 0.282$ ,  $CI: (0.14-0.565)$ ) were 71.8% were less likely had preterm birth as compared to mothers who had previous history of abortion, Based on the results obtained from logistic regression analysis; history of still birth ( $P < 0.001$ ,  $OR = 0.213$ ,  $CI: (0.103-0.441)$ ) 78.7%, those who had history of preterm labor ( $P < 0.001$ ,  $OR = 0.206$ ,  $CI: (0.108-0.393)$ ) 79.4%, Pre-mature rupture of membrane ( $P = 0.000$ ,  $OR = 0.255$ ,  $CI: (0.134-0.483)$ ) 74.5%, History of bleeding during pregnancy ( $P < 0.001$ ,  $OR = 0.216$ ,  $CI: (0.11-0.423)$ ) 78.4% and history of UTI during pregnancy ( $P < 0.001$ ,  $OR = 0.44$ ,  $CI: (0.243-0.981)$ ) 56% less likely had preterm birth as compared to those who had not history of previous still birth, history of preterm labor, previous history of Pre-mature rupture of membrane, History of bleeding during pregnancy,

and history of UTI during pregnancy respectively and significantly strong associated and were identified as significant risk factors for preterm birth delivery and mothers being with chronic hypertensive during pregnancy is a risk factor for preterm birth delivery.

Regarding the fetal factors the following Table 5 was show. Among preterm new born who had delivered with congenital abnormalities were 62% (5), History of Twins delivery including the current 56% (9), History of Congenital Abnormality 67% (6), History of Low Birth Weight including the current 68% (30), History of Preterm Birth including the current 83% (53), and sex of new born were 28% (33) males and 24% (24) females respectively (Table 4).

Fetal Factors					
Variables		Preterm	Term	Post	Total
		No (%)	No (%)	No (%)	
Congenital abnormality of the new born	Yes	5 (62)	2 (25)	1 (13)	8
	No	52 (25)	149 (70)	11 (5)	212
History of twins delivery including the current	Yes	9 (56)	7 (44)	0	16
	No	48 (24)	144 (70)	12 (6)	204
History of congenital abnormality	Yes	6 (67)	3 (33)	0	9
	No	51 (24)	148 (70)	12 (6)	211
History of low birth weight including the current	Yes	30 (68)	14 (32)	0	44
	No	27 (15)	137 (78)	12 (7)	176
History of preterm birth including the current	Yes	53 (83)	11 (17)	0	64

	No	4 (2)	140 (90)	12 (8)	156
	M	33 (28)	80 (66)	7 (6)	120
Sex of the new born	F	24 (24)	71 (71)	5 (5)	100

**Table 4:** Distribution of fetal risk factors for preterm birth among study subject at JUSH, Jimma Zone, Oromia regional state, Ethiopia, June 2015.

### Factors affecting preterm birth associated with fetal factors

Risk factors associated with preterm delivery using logistic regression analysis are presented in Table 3. Those respondent mothers who had not current new born congenital abnormality ((P=0.029, OR=0.195, CI: (0.45-0.84)) 80.5%, who had not history of twins

delivery including the current (P=0.007, OR=0.239, CI: (0.085-0.677)) 76.1% less likely had preterm birth as compared to who had history and current congenital abnormality and history of twins delivery respectively (Table 5).

Variables		OR (95% CI)	P-Value
History of abortion	NO	0.282 (0.14-0.565)	<0.001
Substance intake during pregnancy	NO	0.530 (0.281-0.998)	0.049
Gravida	Multi-gravida	2.078 (1.037-4.162)	0.039
History of bleeding during pregnancy	NO	0.216 (0.11-0.423)	<0.001
History of the still birth	No	0.213(0.103-0.441)	<0.001
Urinary Tract Infection	NO	0.488 (0.243-0.981)	0.044
History of preterm labor	NO	0.206 (0.108-0.393)	<0.001
Pre-mature rupture of membrane	NO	0.255 (0.134-0.483)	<0.001

**Table 5:** The association of maternal risk factors with preterm birth in JUSH, Jimma Zone, Oromia regional state, Ethiopia, June, 2015.

Women without a previous experience of congenital abnormality ((P=0.011, OR=0.159, CI: (0.038-0.66)) 98.9%, history of preterm birth (P=<0.001, OR=0.005, CI: (0.002-0.018)) 99.9% and women with no previous history of low birth weight ((P=<0.001, OR=0.085, CI: (0.04-0.18)) 99.9% significantly were less likely to deliver preterm infant (Table 6).

Variables		OR (95% CI)	P-Value
Congenital abnormality of the new born	NO	0.195 (0.45-0.84)	0.029
History of twins delivery	NO	0.239 (0.085-0.677)	0.007
History of congenital abnormality	NO	0.159 (0.038-0.66)	0.011
History of low birth weight	NO	0.085 (0.04-0.18)	<0.001
History of preterm birth	NO	0.005 (0.002-0.018)	<0.001

**Table 6:** The association of fetal risk factors with preterm birth in JUSH, Jimma Zone, Oromia regional state, Ethiopia, June, 2015.

### Discussion

The present study was designed to investigate the prevalence of preterm birth and its association factors that contributed to preterm birth in JUSH in study period, although the prevalence of preterm birth found in current study (i.e. 25.9%) is greater than the rates reported for African (11.9%), North America (10.6%), Europe where (6.2%), several Northern European countries to 18.1%, South-Eastern

and South Asia where (13.4%), Iran (5.1%), India the preterm birth percentage was 5.8%. In Nigeria the prevalence of preterm births were 16.9%, Preterm Birth in Malawi data on gestation at birth was a total of 2,149 women. Of these 80.5% (1729/2149) delivered at term (37-41 weeks), 16.3% (351/2149) delivered preterm (37 weeks), and 3.2% (69/2149) delivered post term (41 weeks gestation), preterm birth rate of 11.1% occurred in Sub-Saharan Africa and Jimma 51% of these babies were born below 37 completed weeks of gestation. The low rate of preterm birth found in present study might reflect success of different programs introduced by federal Ministry of Health to improve health service quality delivered to pregnant women including pre-pregnancy and pregnancy health care in the last decade [1,3,13,16,17,21,22].

The present study has shown that preterm delivery was significantly associated with rural place of residency, mothers who are illiterate, substance intake during pregnancy, gravida of the mothers, history of previous abortion, history of the still birth, history of preterm labor, pre-mature rupture of membrane, history of bleeding during pregnancy, urinary tract infection during pregnancy, hypertension disorders during pregnancy, congenital abnormality of the new born, history of twins delivery, history of congenital abnormality, history of low birth weight including the current, history of preterm birth, were the potential risk factors of preterm birth among the women who delivered in the JUSH in the study period.

The study found that being a rural residency increased the risk of preterm birth by two folds and this could be related to the poor economic situation faced by residences and distance from health



facility that put pregnant women under social and economic stress that might contribute to preterm birth. There is a consensus in the literature regarding the role of low socioeconomic status in higher preterm birth rates. I concluded that low educational level of mothers was associated with twice the risk of preterm birth.

Previous low-birth-weight infant (21.3%) were more likely than those without a previous poor birth outcome to experience preterm delivery. Mothers with the highest percentage of preterm delivery were under 18 years of age or 35 and older (11.7% and 11.4%), had less than 12 years of education (12.2%), had multiple-infant pregnancies (62.8%) (14). Were as in my study, approximately previous low birth weight baby was 20%, and women who hadn't educational background 33.2% is significant risk factors for preterm birth.

Experience of previous preterm birth was identified as the most significant risk factor for preterm birth with 83% of ( $P \leq 0.001$ ,  $OR = 0.085$ ). This is in line with the findings of studies where women with previous preterm delivery were at increased risk for their next pregnancy [14]. The recurrence risk in women with a previous preterm delivery 42% depending on the number and gestational age of previous deliveries. The mechanism for this has not been well understood, however, the likelihood of such experience among the women with prior spontaneous labor as well as those with inducing preterm birth is rising [14,16].

Persisting or recurrent intrauterine infection during several pregnancies along with the disorders associated with preterm birth (e.g. gestational diabetes, hypertension) that tend to last from one pregnancy to the next, might explain many repetitive spontaneous and induced preterm births. Other important risk factors were hypertension that increased the risk of preterm birth. Hypertension increases resistance of uterine vessels and reduce utero placental fluid, which in turn causes intrauterine growth restriction [17]. Moreover, the high rate of disorders like placenta abruption and preeclampsia and intrauterine growth restriction among women with hypertension may results in surgical operations and preterm birth [15,16].

This figure for present study was 41% preterm (premature) rupture of membrane is the most common cause of preterm birth. Similar to present study preterm rupture of membrane has been reported to be related significantly to preterm birth [3,12,14,16,18].

Women experiencing physical and emotional abuse were 30.9% that agrees well with previous report where 2.9% was observed for such women [16]. This issue found inconsistent results. These reports were not having significant relationship between domestic violence and preterm birth.

Hyper emesis gravid arum occurs in approximately 40.9% ( $p = 1.714$ ) of pregnancies. Some studies have found hyper emesis to be a risk factor for preterm delivery [16,17]. However, in this study isn't significant risk factor for premature birth in women who suffered from hyper emesis gravid arum.

Vaginal bleeding in pregnancy increased 20% of delivering immature babies, which is in agreement with the findings where the risk of preterm birth was higher in women with bleeding or spotting during their pregnancy [16]. The reason for vaginal bleeding during the first half of pregnancy is unknown in most cases. However, those with bleeding in second half of pregnancy have placenta abruption or placenta previa [16]. Vaginal bleeding as an indication of serious consequences of pregnancy may cause fetal or maternal emergencies leading to induced preterm birth.

The infection of the urinary system is the most prevalent bacterial infections occurred during pregnancy [12,15,16,21]. Similar to my results, has considered urinary system infection as a risk factor for premature birth [16]. Infection may raise release of inflammatory chemokine's and cytokines such as interleukins and tumor necrosis factors. Microbial Endotoxins and pro inflammatory cytokines stimulate the production of prostaglandins (other inflammatory mediators) and matrix-degrading enzymes that finally result in stimulation of uterine contractions, preterm rupture of the membrane, and preterm birth

Factors like maternal substance use during pregnancy, previous history of abortion and congenital abnormality of new born were found to be significant risk factors resulting in preterm birth.

Previous preterm deliveries were also found to play a role in the occurrence of preterm delivery among the local population here. This finding accordance with, that the prior history of preterm delivery potentiates the risk of having future preterm deliveries has been reported before [19].

Mothers with a positive history of stillbirth had 53.8% risk of having preterm birth than women who did not. In contrast, that history of stillbirth could be considered as a risk factor for subsequent preterm birth [19].

## Conclusion

A total of 220 mothers was give birth and response rate of 100%. Of these 68.6% (151) Delivered at term (37-41 weeks), and post term 5.5% (12) (greater than or equal to 42 weeks of gestation) and prevalence of preterm birth was 25.9% (57) delivered preterm (less than 37 weeks of gestation), and among the mothers who are preterm, majority of mothers are married and Oromo in ethnicity. however, preterm birth was significantly associated with rural place of residency, mothers who are illiterate, substance intake during pregnancy, gravida of the mothers, history of previous abortion, history of the still birth, history of preterm labor, pre-mature rupture of membrane, history of bleeding during pregnancy, urinary tract infection during pregnancy, hypertension disorders during pregnancy, congenital abnormality of the new born, history of twins delivery, history of congenital abnormality, previous history of low birth weight, history of preterm birth were identified as the most important risk factors for preterm birth. Identifying pregnant women at the risk of preterm delivery and proving quality healthcare, community health education and awareness campaigns may decrease the rate of preterm birth and its consequences.

## Recommendation

Efforts should be made through public awareness programs about the possible risk factors of preterm delivery. Not only this, further researches should be performed to find out other possible associations of genetic and other which a fetus suffers during the gestational period, which could lead to preterm birth. Therefore, it is necessary to conduct an appropriate prevention programme to reduce the incidence of preterm birth in Jimma, south west Ethiopia.

Ethiopian Federal ministry of Health in collaboration with international and local advocacy, policy makers/policy reform, stakeholders, non-governmental organization, health professionals and communities work together to tackle the problems.

Finally, further studies should be conducted with a larger sample size to verify the findings of this study. More focused studies need to be conducted that tackle certain group of variables independently, such as demographic variables and familial tendency for preterm birth.

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## Authors' Contributions

Mr. Israel Bekele; wrote the proposal, participated in data collection, analyzed the data and drafted the paper, Tigist Demeke and Mr. Kebebe Adugna approved the proposal, participated in data analysis and revised subsequent draft of the paper. All authors read and approved the final manuscript.

## Competing Interests

The authors declare that they have no competing interests.

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