



Prevalence of Preterm Birth and Frequency of Risk Factors at Al-Jomhouri Teaching Hospital, Taiz, Yemen, 2023: (A Retrospective Cross-Sectional Study)

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Abstract

Background

The World Health Organization (WHO) defines Preterm Birth (PTB) as “a live birth taking place before the expected 37 weeks of gestation”. Annually, approximately 15 million infants are born prematurely, constituting significantly to infant mortality during the initial four weeks of life, responsible for 40% of deaths among children under the age of five.

Study Objectives

To determine the incidence and risk factors of preterm labor among women attended Al Gomhori Hospital, Taiz. Over a year (From Jan 1st to Dec 31st 2023).

Study design

This was a descriptive cross-sectional study.

Methods and Materials

A questionnaire was developed for this study, including details on maternal age, gestational age, pregnancy complications, and infections. This data was collected and entered into SPSS.

Results

The study included 198 women who experienced preterm birth. The total delivery during the study period was 3600 deliveries making the prevalence of preterm birth as 5.5% in the hospital. The majority of participants were aged 20–29 years (37%), more than half of the participants resided in urban areas (53%), and 47% lived in rural areas, with no significant difference ($\chi^2 = 0.727$, $p = 0.394$), and housewives were predominant occupation. The

mean gravidity was 3.39 ± 2.64 and the mean parity was 1.97 ± 2.20 . A history of previous preterm birth was reported by 34.8% of women ($\chi^2 = 18.2$, $p < 0.001$), and recurrent miscarriages by 35.3% ($\chi^2 = 17.0$, $p < 0.001$).

There were 25% had hypertension, and very few had diabetes (0.5%) or heart disease (1%) ($\chi^2 = 277$, $p < 0.001$). Urinary or genital infections were present in 52% of women ($\chi^2 = 0.182$, $p = 0.670$), and anaemia in 53% ($\chi^2 = 0.505$, $p = 0.477$). Only 5.1% of women smoked and low family income was reported by 58% of participants ($\chi^2 = 4.55$, $p = 0.033$). Vaginal bleeding occurred in 16% ($\chi^2 = 90.7$, $p < 0.001$), premature rupture of membranes (PROM) in 33% ($\chi^2 = 23.4$, $p < 0.001$). BMI distribution was underweight 36%, normal 19%, overweight 24%, and obese 21% ($\chi^2 = 13.7$, $p = 0.003$). The mean gestational age at delivery was 31.77 ± 2.45 weeks.

Conclusion

The prevalence of preterm birth observed in this study is lower than that reported in the global studies. The maternal age shows increasing trend from < 20 year up to 29 years and then declined reached the lowest frequency at age ≥ 40 years. There was a slight increase of women residing in urban setting compared to rural residing women with no significant difference. The majority of women are multiparous, housewives, and had middle socioeconomic status. There was a significant association between previous preterm birth, recurrent miscarriage and occurrence of preterm birth. Chronic illnesses such as hypertension, DM and heart disease were significantly associated with preterm births. Vaginal bleeding, premature rupture of membranes and low family income and low BMI showed significant link with preterm labor.

Keywords: Preterm birth, Risk factors, Obstetrics, Gynecology, Retrospective Study

Introduction

Background

Preterm birth, defined as birth between 20 wk and 36 wk of gestation, is the leading cause of neonatal mortality in nonanomalous fetuses and is the leading cause of long-term neurodevelopmental impairment [1, 2, 3]. It is estimated that 15 million preterm births occur globally each year [4, 5, 6]. Despite considerable investment in research and strategies to prevent preterm birth, little impact has been made on this goal, and there have not been substantial changes in the rates of preterm birth over the past decade [1, 5].

Preterm birth is categorized based on gestational age at delivery. Births occurring between 34 weeks and 36 weeks and 6 days are classified as late preterm births, whereas those between 32 weeks and 33 weeks and 6 days are referred to as moderate preterm births [4]. Births occurring before 32 weeks are categorized as early preterm births. In the United States, the majority of preterm births (approximately 71%) fall under the late preterm category, whereas about 16% occur before 32 weeks [4].

Preterm birth may be spontaneous or medically indicated [7, 8, 9]. In spontaneous preterm birth (representing approximately two-thirds of preterm births), painful contractions and progressive cervical effacement and dilation lead to early delivery, whereas in medically indicated preterm birth, the patient is delivered early due to complications of pregnancy or medical conditions in which the risk to the mother or fetus of continuing with the pregnancy is greater than the risk of delivery at that gestational age [9].

This article deals primarily with spontaneous preterm birth. However, there is some overlap between the conditions, and individuals who have one of these subtypes of preterm birth have increased risks both for recurrence and for the other subtype [8, 9].

Problem Statement

Preterm birth (delivery before 37 weeks of gestation) is a critical global public health issue and a leading cause of neonatal mortality and childhood disability. In Yemen, a country experiencing prolonged conflict and a fragile healthcare system, the burden is acute.

Although recent data is limited, studies from other Yemeni governorates indicate a high prevalence of preterm birth, such as 12.5% in Ibb. Key risk factors identified in these settings include obstetric history, hypertension, and inadequate antenatal care. However, there is a significant lack of localized data for Taiz, Yemen's third-largest city. The ongoing conflict has severely strained Taiz's health services, leading to facility damage, resource shortages, and overwhelmed staff, which likely exacerbates risks for adverse pregnancy outcomes like preterm labor.

Therefore, this study aims to determine the incidence and identify the specific risk factors associated with preterm labor among women delivering at Al Gomhori Hospital in Taiz. The findings are essential for developing targeted interventions to improve maternal and neonatal health in this conflict-affected region.

Justification for the Research

This research is justified for several key reasons:

- **Addressing a Critical Knowledge Gap:** No recent, hospital-based studies on preterm labor incidence and risk factors were found specifically for Taiz. Research from similar settings in Yemen shows high prevalence and specific local risk factors, but these findings cannot be directly applied to Taiz without local validation.
- **Public Health Urgency in a Crisis Setting:** Preterm birth is a major driver of neonatal and child mortality. In conflict-affected Yemen, where healthcare access is limited, understanding and preventing preterm birth is even more critical to reduce death and disability.
- **Informing Local Policy and Practice:** Evidence generated from Al Gomhori Hospital can directly inform hospital protocols and regional health strategies. For example, identifying the most common modifiable risk factors (e.g., specific infections, gaps in antenatal care) allows for the creation of targeted prevention programs and staff training.
- **Resource Optimization in a Fragile System:** In a resource-limited setting, it is crucial to use available funds and personnel efficiently. This study will help prioritize the most impactful interventions for preventing preterm birth.

Significance of the Study

This research will provide valuable insight into the burden of preterm labour in a major hospital in Yemen. By identifying prevalent risk factors and patterns, the study can guide improvements in antenatal care services, inform public health strategies, and contribute to the development of preventive programs. Furthermore, it may serve as a baseline for future research and help allocate resources toward high-risk populations to reduce neonatal mortality rates in Taiz and similar settings.

Study Objectives

Main Objective

General Objective: To determine the prevalence of preterm birth and the frequency of risk factors among women who delivered at Al-Jomhuri Teaching Hospital, Taiz, Yemen during study period

Specific Objectives

- 1- To determine the prevalence of preterm birth among all deliveries at Al-Jomhuri Teaching Hospital.
- 2- To describe the socio-demographic characteristics of women with preterm birth.
- 3- To describe the obstetric, medical, and current pregnancy characteristics of women with preterm birth.
- 4- To describe the frequency of risk factors among women with preterm birth.
- 5- To describe the factors associated with severity levels of preterm birth (extremely, very, moderate, late).

Literature Review

Overview

Prematurity is a term for the broad category of neonates born at less than 37 weeks' gestation. Preterm birth is the leading cause of neonatal mortality and the most common reason for antenatal hospitalization [1]. For premature infants born with a weight below 1000 g, the three primary causes of mortality are respiratory failure, infection, and congenital malformation.

Confirmation of gestational age is based on physical and neurologic characteristics. The Ballard Scoring System remains the main tool clinicians use after delivery to confirm gestational age by means of physical examination [2].

Epidemiology and Risk Factors

In the United States, preterm birth complicates approximately 10.4% of pregnancies. This incidence has not changed substantially over the past several decades [1]. Risk factors for preterm birth include a history of prior preterm birth, multifetal gestations, African descent/Black race, lower socioeconomic status and socioeconomic deprivation, smoking, drug use, Maternal chronic diseases short interpregnancy interval, low and high maternal ages, congenital uterine anomalies, and low prepregnancy weight [4, 12, 19, 20, 21, 22]. Interestingly, obesity appears to be associated with a lower risk of spontaneous preterm birth, but it increases the risks for medically indicated preterm birth [19]. Of concern is the considerable disparity in preterm birth, with non-Hispanic Blacks having double the preterm birth rates of non-Hispanic Whites [23, 24].

Genetic factors appear to increase the risk for preterm birth [25, 26]. Some studies have found increased risks for preterm birth among women who themselves were born preterm [27]. However, other researchers have found this effect only in non-Hispanic Black women [28]. In addition, women who have first-degree relatives who delivered preterm are more likely to deliver preterm [29].

Early studies indicated that periodontal disease in pregnancy is associated with preterm birth [30]. However, results of subsequent studies have conflicted with that finding and have not shown that treating periodontal disease in pregnancy reduces the incidence of preterm birth [31, 32].

Consequences of Preterm Birth

Preterm birth has significant short- and long-term implications for the infant and is a leading cause of neonatal morbidity and mortality, with long-term morbidity that is often lifelong and associated with a shortened lifespan [2, 33, 34]. Common short-term complications include respiratory distress syndrome, intraventricular hemorrhage, neonatal jaundice, necrotizing enterocolitis, sepsis, and prolonged neonatal intensive care unit admissions. Long-term sequelae often involve neurodevelopmental impairment, such as cerebral palsy, blindness, deafness, and chronic lung disease [33, 35]. With increasing gestational age at delivery, the rates of these sequelae drop considerably [36]. Beyond the medical outcomes, preterm birth imposes a profound psychosocial burden on parents and families and results in immense economic costs to society.

The strongest risk factor for spontaneous preterm delivery is a history of a prior preterm delivery [42, 43]. However, most patients who present with preterm labor and subsequently deliver preterm have no such history [44]. Importantly, many patients who will deliver preterm are in their first pregnancies and, therefore, their risk remains unquantified [45]. These patients may be erroneously considered at low risk. In addition, a spontaneous preterm delivery in a twin pregnancy increases the risk for preterm delivery in subsequent pregnancies, with the magnitude of that risk increasing with earlier gestational age of the preceding twin delivery [46].

Subjects and Methods

Study Design

A descriptive cross-sectional hospital-based study was conducted to determine the prevalence of preterm birth and describe the frequency of common risk factors among women with preterm deliveries at Al-Jomhuri Teaching Hospital, Taiz, Yemen

Study Setting and Period

The study was conducted in the Obstetric Emergency Department of Al-Jomhuri Teaching Hospital, Taiz, Yemen. Al-Jomhuri Teaching Hospital is considered the main public referral hospitals in Taiz City, providing Comprehensive Emergency Obstetric and Neonatal Care (CEmONC) services free of charge. Data were collected retrospectively from the hospital records of all deliveries that occurred between 1 January 2023 and 31 December 2023.

Study population and Sample Size

The study included all eligible preterm birth cases recorded at Al-Jomhuri Teaching Hospital between 1 January 2023 and 31 December 2023. A total coverage sampling technique was employed, whereby all cases meeting the inclusion criteria were included in the study. A total of 198 preterm deliveries were identified during the study period.

Inclusion Criteria:

- 1- All women who delivered before 37 completed weeks of gestation at Al-Jomhuri Teaching Hospital during the study period.
- 2- Cases with complete and accessible medical records.
- 3- Cases with accurate gestational age by (LMP) or first trimester ultrasonography.

Exclusion Criteria:

- 1- Cases of intrauterine fetal death (IUFD).
- 2- Fetuses with major congenital anomalies.
- 3- Cases with incomplete or missing medical records.
- 4- Cases in which gestational age could not be accurately determined.

Study Variables**Dependent Variable**

- Preterm birth.

Independent Variables**Section 1: Socio-demographic Factors**

- Maternal age.
- Residence.
- Occupation.

Section 2: Obstetric Factors

- Gravidity.
- Parity.
- Previous preterm birth.
- History of recurrent miscarriage.
- History of cervical incompetence.
- History of uterine anomalies.

Section 3: Maternal Medical Factors

- Anemia.
- Chronic hypertension.
- Diabetes mellitus.
- Kidney disease.
- Heart disease.

Section 4: Current Pregnancy Complications

- Urinary tract infection
- genital tract infection.
- Vaginal bleeding during pregnancy.
- Premature rupture of membranes (PROM).
- Multiple pregnancy.
- Polyhydramnios.

Section 5: Behavioral factor:

- Smoking.

Other Recorded Variables:

- Maternal body mass index (BMI) at delivery
- Gestational age at delivery calculated by (LMP) Or first trimester USG.

Data Collection

Data were collected retrospectively through a comprehensive review of eligible patients' medical records. A structured data extraction form was developed by the researcher after reviewing relevant literature and previous studies on preterm birth per chance and risk factors. The form was used to collect information on socio-demographic characteristics, obstetric and medical history, and common maternal and obstetric risk factors. Data were extracted from hospital records and entered into a standardized data collection sheet for analysis.

The data collection process was conducted by the researcher under the supervision of the research supervisor to ensure the accuracy and completeness of the collected data.

Data Analysis

Data were entered, cleaned, and analyzed using the Statistical Package for Social Sciences (SPSS) version 24. Descriptive statistics were used to summarize the study data. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using means and standard deviations (SD) or medians and interquartile ranges (IQR), as appropriate. The prevalence of preterm birth was calculated as the proportion of preterm births among all deliveries during the study period. Results were presented in tables and figures.

Operational Definitions

- Preterm Birth: Delivery occurring before 37 completed weeks of gestation, regardless of the mode of delivery.
- Previous Preterm Birth: A documented history of delivery before 37 completed weeks of gestation in a previous pregnancy.
- Recurrent Miscarriage: A history of two or more pregnancy losses before fetal viability.
- Hypertensive Disorders of Pregnancy: Any documented diagnosis of hypertension during pregnancy, including chronic hypertension, gestational hypertension, preeclampsia, eclampsia, or superimposed preeclampsia.

- Diabetes Mellitus: Any documented diagnosis of pregestational or gestational diabetes mellitus.
- Heart Disease: Any documented maternal cardiac disease before or during pregnancy.

Urinary Tract Infection (UTI):

A urinary tract infection was defined as any documented diagnosis of urinary tract infection during the current pregnancy, based on clinical assessment, urine analysis, urine culture, or documented treatment in the medical record.

Anemia:

Hemoglobin level below 11 g/dL during pregnancy, as documented in the medical record.

Multiple Pregnancy:

A pregnancy involving two or more fetuses.

Cervical Incompetence:

Cervical incompetence is the inability of the cervix to retain a pregnancy in the absence of uterine contractions due to painless cervical dilatation.

Uterine Anomalies:

Uterine anomalies are congenital malformations resulting from abnormal development, fusion, or resorption of the Müllerian ducts.

Premature Rupture of Membranes (PROM):

Rupture of the fetal membranes before the onset of labor.

Body Mass Index (BMI):

Body mass index is a measure of body fat based on weight in relation to height and is expressed as kilograms per square meter (kg/m²).

Gestational Age:

The duration of pregnancy in completed weeks as documented in the medical record based on the last menstrual period and/or obstetric ultrasonography.

Polyhydramnios:

Polyhydramnios is defined as an abnormal increase in the volume of amniotic fluid, diagnosed by an amniotic fluid index greater than 24 cm or a single deepest vertical pocket exceeding 8 cm on ultrasound

Validity and Reliability of the Data Extraction Form

The data extraction form was developed by the researcher after an extensive review of relevant literature and previous studies on preterm birth and its associated risk factors. The tool was reviewed by the research supervisor to ensure its content validity and relevance to the study objectives. A pilot study was conducted on a sample of medical records prior to the main study to assess the clarity, completeness, and applicability of the data collection form. Based on the pilot study findings, necessary modifications were made to improve the tool. Furthermore, all data were collected using a standardized data extraction form by the same researcher to ensure consistency and reliability of the collected data.

Ethical Considerations

Official permission to conduct the study and access medical records was obtained from the administration of Al-Jomhouri Teaching Hospital, Taiz, Yemen, prior to data collection. Data were collected retrospectively from hospital records using a structured data extraction form and were used solely for research purposes. No patient names, identification numbers, or other personal identifiers were recorded. Confidentiality and privacy of all patient information were strictly maintained throughout the study, and all collected data were kept secure and used only for scientific research purposes.

Results

1- Demographic Characteristics

The study included 198 women who experienced preterm birth. Table 4.1 summarizes their demographic characteristics. The total delivery during the study period was 3600 deliveries making the prevalence of preterm birth is 5.5% in the hospital. The majority of participants were aged 20–29 years (37%), followed by 30–39 years (31%), with women <20 years constituting 25% and ≥ 40 years 6.6%. The age distribution was statistically significant ($\chi^2 = 41.7$, $p < 0.001$), indicating that certain age groups were more heavily represented. Slightly more than half of the participants resided in urban areas (53%), and 47% lived in rural areas, with no significant difference ($\chi^2 = 0.727$, $p = 0.394$). Regarding occupation, housewives were predominant (79%), with only 9.1% employed and 12% in other occupations ($\chi^2 = 188$, $p < 0.001$), reflecting the socioeconomic profile of the population.

Table (1):**Distribution of Demographic characteristics**

	Characteristic	N = 198	Chi-Square	p-values
Age	< 20	50 (25%)	41.7	0.000
	20 - 29	74 (37%)		
	30 - 39	61 (31%)		
	=> 40	13 (6.6%)		
Residence	Urban	105 (53%)	0.727	0.394
	Rural	93 (47%)		
Occupation	Housewife	157 (79%)	188	0.000
	Employed	18 (9.1%)		
	Other	23 (12%)		

2- Obstetric History

The mean number of previous pregnancies was 3.39 ± 2.64 (median 3; IQR: 1–5), and the mean number of prior deliveries was 1.97 ± 2.20 (median 1; IQR: 0–3). Both variables showed highly significant different from the hypothesized median (Wilcoxon W = 19,701 and 8,515, respectively; $p < 0.001$), indicating considerable variability in reproductive history. A history of previous preterm birth was reported by 34.8% of women ($\chi^2 = 18.2$, $p < 0.001$), and recurrent miscarriages by 35.3% ($\chi^2 = 17.0$, $p < 0.001$), highlighting prior adverse obstetric events as common characteristics in this cohort.

Table (2):**Obstetric History**

	Overall (N=198)		Chi-Square	Wilcoxon W	p-values
Number of previous pregnancies	Mean (SD)	3.39 (2.64)		19701	0.000
	Median (Q1, Q3)	3 (1, 5)			
Number of previous deliveries	Mean (SD)	1.97 (2.20)		8515	0.000
	Median (Q1, Q3)	1 (0, 3)			
Previous preterm birth	Yes	69 (34.8%)	18.2		0.000
History of recurrent miscarriages	Yes	70 (35.3%)	17.0		0.000

1- Clinical and Medical Characteristics

Most women (73%) reported no chronic diseases, while 25% had hypertension, and very few had diabetes (0.5%) or heart disease (1%) ($\chi^2 = 277$, $p < 0.001$). Urinary or genital infections were present in 52% of women ($\chi^2 = 0.182$, $p = 0.670$), and anaemia in 53% ($\chi^2 = 0.505$, $p = 0.477$). Only 5.1% of women smoked, yet smoking distribution was significant ($\chi^2 = 160$, $p < 0.001$). Low family income was reported by 58% of participants ($\chi^2 = 4.55$, $p = 0.033$). Vaginal bleeding occurred in 16% ($\chi^2 = 90.7$, $p < 0.001$), premature rupture of membranes (PROM) in 33% ($\chi^2 = 23.4$, $p < 0.001$), and cervical incompetence was rare (1%, $\chi^2 = 190$, $p < 0.001$). BMI distribution was as follows: underweight 36%, normal 19%, overweight 24%, and obese 21% ($\chi^2 = 13.7$, $p = 0.003$), reflecting heterogeneity in nutritional status.

Table (3):

Clinical and Medical History

	Overall (N=198)		Chi-Square	p-values
Chronic Diseases	None	145 (73%)	277	0.000
	Hypertension	50 (25%)		
	Diabetes	1 (0.5%)		
	Heart disease	2 (1.0%)		
Urinary or genital infections	Yes	102 (52%)	0.182	0.670
Anaemia	Yes	104 (53%)	0.505	0.477
Smoke	Yes	10 (5.1%)	160	0.000
Family Income Level	Low	114 (58%)	4.55	0.033
	Moderate	84 (42%)		
Vaginal Bleeding	Yes	32 (16%)	90.7	0.000
Water broke early	Yes	65 (33%)	23.4	0.000
Cervical Incompetence	Yes	2 (1.0%)	190	0.000
BMI Level	Underweight	71 (36%)	13.7	0.003
	Normal	37 (19%)		
	Overweight	48 (24%)		
	Obese	42 (21%)		

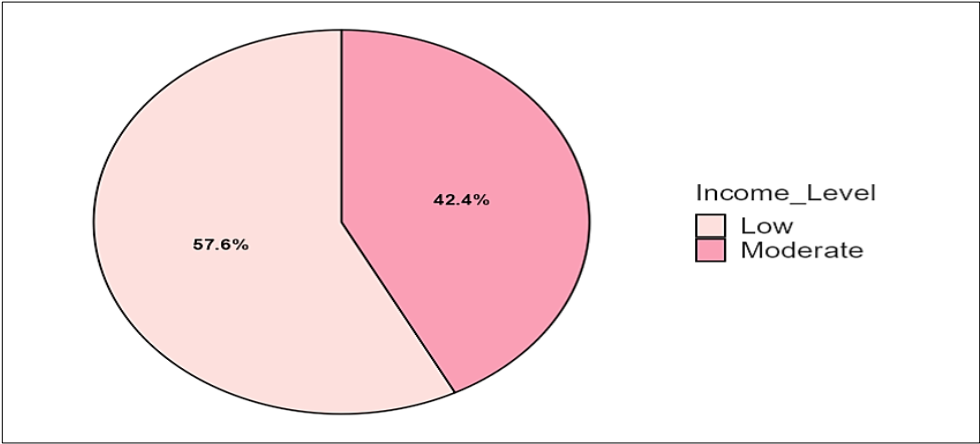


Figure (1): Socioeconomic status

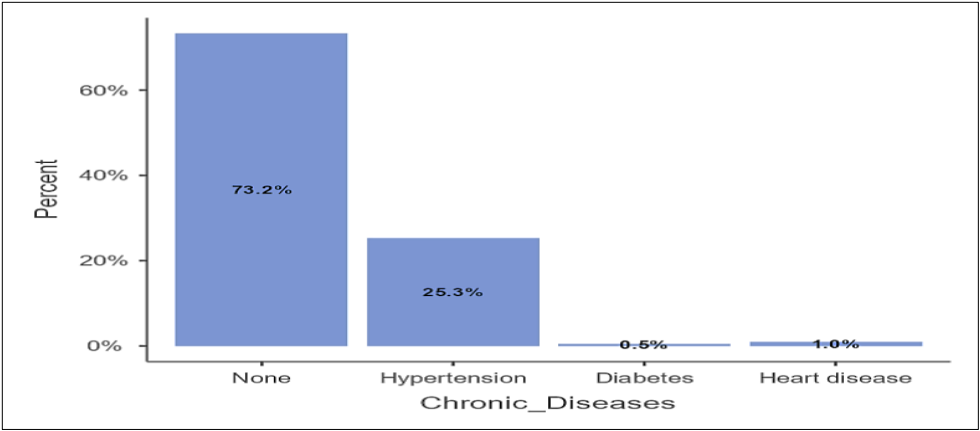


Figure (2): Chronic disease

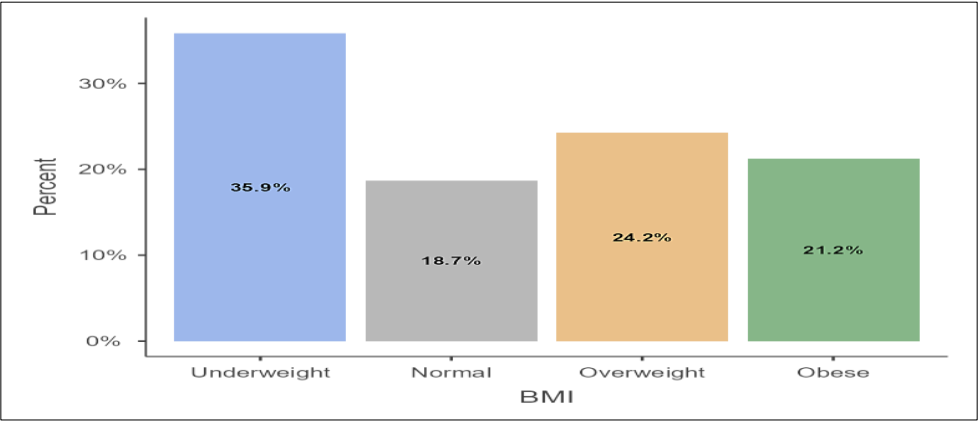


Figure (3): BMI

1- Gestational Age, Maternal Weight, and BMI

The mean gestational age at delivery was 31.77 ± 2.45 weeks (range 24–35 weeks; $W = 12.261$, $p < 0.001$), confirming the cohort's preterm status. Maternal weight averaged 60.34 ± 13.18 kg (range 30–100 kg; $W = 12.207$, $p < 0.001$), and mean BMI was 24.2 ± 7.4 (range 10.4–45.4; $W = 12.202$, $p < 0.001$), indicating both undernutrition and obesity were present.

Table (4):

Gestational Age, Maternal Weight, and BMI

	Overall (N=198)		Wilcoxon W	p-values
Gestational age at delivery (week)	Mean (SD)	31.77 (2.45)	12.261	0.000
	Range	24 - 35		
Mother Weight	Mean (SD)	60.34 (13.18)	12.207	0.000
	Range	30- 100		
BMI Score	Mean (SD)	24.2 (7.4)	12.202	0.000
	Range	10.4 - 45.4		

2- Levels of Preterm Birth

The distribution of preterm birth severity (Table 5) showed late preterm as the most common category (33.8%), followed by very preterm (30.3%) and moderate preterm (29.3%). Extremely preterm births were less frequent (6.6%). The Chi-square test confirmed a significant difference in distribution ($\chi^2 = 36.8$, $p < 0.001$), demonstrating that certain preterm levels were more prevalent.

Table (5):

Levels of Preterm Birth

	Level	N = 198		Chi-Square	p-values
		Count	Proportion		
preterm	Late preterm	67	33.8%	36.8	0.000
	Moderate preterm	58	29.3%		
	Very preterm	60	30.3%		
	Extremely preterm	13	6.6%		

3- Prevalence of Key Risk Factors

The most frequent maternal risk factors included low family income (58%), anaemia (53%), and urinary or genital infections (52%). Other notable factors were underweight BMI (36%), recurrent miscarriages

(35.3%), previous preterm birth (34.8%), and PROM (33%). Less frequent conditions were chronic diseases (26.5%), overweight BMI (24%), vaginal bleeding (16%), smoking (5.1%), and cervical incompetence(01)

Table (6):

Prevalence of Key Risk Factors

summarize	Yes Cases	Total Cases	Prevalence
Low family income level	114	198	58
Anaemia	104	198	53
Urinary or genital infections	102	198	52
BMI Level (Underweight)	71	198	36
recurrent miscarriages	70	198	35.3
Previous preterm birth	69	198	34.8
Water broke early	65	198	33
Chronic Diseases	53	198	26.5
BMI Level (Overweight)	48	198	24
Vaginal Bleeding	32	198	16
Smoke	10	198	5.1
Cervical Incompetent	2	198	1

4- Multivariate Analysis of Factors Associated with Preterm Birth Severity

Table 6 shows the results of a multivariate ordered logistic regression evaluating predictors of preterm birth level. Significant risk factors increasing the odds of more severe preterm birth included:

Table (7):

Multivariate Ordered logistic regression (Analysis of factors associated with preterm level

		Odds ratio	p-values	[95% conf.interval]	
Previous preterm birth	Yes	1.244	0.400	0.749	2.066
recurrent miscarriages	Yes	0.957	0.781	0.699	1.309
chronic diseases	Hypertension	1.317	0.000	1.269	1.366
	Diabetes	1.008	0.988	0.331	3.074
	Heart disease	0.372	0.248	0.069	1.990
Urinary or genital infections	Yes	1.457	0.583	0.380	5.587
anemia	Yes	0.712	0.004	0.565	0.897
smoke	Yes	1.032	0.714	0.872	1.222

		Odds ratio	p-values	[95% conf.interval]	
Family income level	Low	1.109	0.000	1.073	1.146
Vaginal bleeding	Yes	1.768	0.259	0.658	4.753
Premature rupture of membranes (water broke early)	Yes	0.837	0.617	0.418	1.678
BMI_C	Underweight	1.793	0.073	0.947	3.394
	Overweight	0.573	0.010	0.374	0.877
	Obese	0.780	0.000	0.714	0.853
/cut1		-0.522	-0.619	-0.426	
/cut2		0.796	0.419	1.173	
/cut3		3.039	1.802	4.276	

- Hypertension (OR = 1.317; 95% CI: 1.269–1.366; $p < 0.001$)

- Low family income (OR = 1.109; 95% CI: 1.073–1.146; $p < 0.001$)

Protective factors associated with lower odds of more severe preterm birth included:

- Anaemia (OR = 0.712; 95% CI: 0.565–0.897; $p = 0.004$)

- Overweight BMI (OR = 0.573; 95% CI: 0.374–0.877; $p = 0.010$)

- Obese BMI (OR = 0.780; 95% CI: 0.714–0.853; $p < 0.001$)

Other factors, including previous preterm birth, recurrent miscarriages, diabetes, heart disease, urinary infections, smoking, PROM, and vaginal bleeding, were not statistically significant in the multivariate model.

Discussion

The present study aimed to investigate preterm Labor in Al Jomhory Hospital Taiz, governorate. It should be considered that this study is the first one carried out in the hospital therefore, no previous data can be compared with. However, the data obtained in this study is compared to the available regional and global investigations.

Sociodemographic characteristics

The present study showed that the most frequent age of women who experienced preterm birth was the age group between 20-29 years old (37%) followed by age group between 30-39 years (31%). The least age group affected by preterm birth was those who aged more than 40 years (6.6%). Our results are supported with data from another study by Mohan et al [47] from India who reported that women aged between 20-30 years old

experienced the maximum rate of preterm birth in 50.1% of the total sample of 358 women. Another study analyzed the rate and risk factors of preterm birth among, low- and low-middle-income countries in Africa [48] reported that the age between 20-35 years represented the most frequent age among the population sample from different regions for example the frequency in Zambia (67.8%), Kenya (73.1%), Pakistan (90.3%) and India (97.3%). It is reported that the age group between 20-35 years when analyzed in univariate found that the risk of preterm birth in this age group is 1.3 times higher when compared to women age < 20 years (aOR 1.26, 95% CI 1.15-1.30). When mothers above 35 years the risk was 1.2 times higher (aOR 1.20, 95% CI 0.98-1.47) [49]. In contrast, some studies reported that the risk of preterm births was higher among mothers younger than 20 years. Several other studies have also reported linking both younger and older maternal age with preterm births [50,51]. A study conducted in Bangladesh [52] found women aged < 20 years to be a protective for preterm births.

However, our study found that the incidence of preterm births increased from the age of < 20 years to reach a maximum between 20-30 years and then decreased to reach the lowest rate at ≥ 40 years.

The present study revealed that the frequency of those women from urban residence were slightly higher than rural residence (53% vs 47%) with no significant difference (P 0.39). These data suggest that the risk of preterm births is no longer increased by residency. A study by Etil et al [53] found similar results as rural 47.3% and urban setting in 52.7% with no significant difference (P 0.186).

The present study showed that the majority of women (79%) were housewives and the employed women accounted only for 9.1%. There is evidence in the literature that women employment emerged as a noteworthy predictor of preterm birth. Mothers who were unemployed demonstrated a significant difference (AOR= 0.657, 95% CI 0.443-0.975, P0.03) being 0.657 times less likely to deliver preterm compared to those who were employed [53]. A study from Indonesia [54] revealed that working mothers faced 16.2 times higher risk of delivering late preterm in comparison to housewives (AOR 16.2, 95% CI 2.315-123, 444). These data suggest that as working of women during pregnancy increases, the risk of preterm birth increases. However, our data showed that the most common mother's

occupation was housewives, closely similar to a study from Mukalla, Yemen by Dahman H [55] which reported that 97% of the study sample were housewives.

The present study found that the mean parity was 1.97 ± 2.2 times suggesting that multiparous women predominant. It is reported in a study by Gurung et al [57] that the risk of preterm births was more frequent among multiparous mothers. Another study by Mayo JA from California [58] reported corresponding results. A study from Mukalla, Yemen [56] found that 62% of women who experienced preterm birth were multiparous ($P = 0.002$) and reported the parity is a significant risk factor of preterm births (AOR 2.139, 95% CI 1.249 - 3.662, $P = 0.006$). However, another study found contradictory results and reported that the risk of preterm births is more frequent in primiparous women [59]. Additionally, a study by Delnord M [60] found that primiparity has been linked as an obstetric risk factor for preterm birth. The discrepancy with our results could be attributed to small sample size.

Obstetrics and clinical data

The present study found that the history of previous preterm birth had been recorded among more than a third of women studied (34.8%). The previous history of preterm birth is considered a strong risk factor for repeat preterm birth. A study from Mukalla [56] showed a history of previous preterm birth was present among 10% of the study population.

Regarding to medical comorbidity, the present study found that chronic disease was observed in 27% of cases as hypertension (23%), DM (0.5%) and heart disease (1%). Our data are consistent with another investigation by Etil et al [104] who showed that hypertension, preeclampsia, DM and other chronic disease are strongly associated with the increasing risk of preterm birth. Preeclampsia in particular is a statistically significant predictor of preterm birth (AOR 0.254 $p < 0.00$, 95% CI 0.185-0.348). This implies that mothers without preeclampsia were 0.254 times less likely to experience preterm birth than those with preeclampsia [53]. A study from Mukalla Maternity and child hood Hospital (MCH) in Yemen [56] revealed that mothers with preeclampsia (AOR 4.120, 95% CI 1.818-9.340, $P < 0.00$) were 4.12 times more likely to deliver preterm babies than those without. These results are in line with our study, the odds ratio for hypertension is

(OR 1.317, 95% CI 1.269-1.366, P 0.00), which implies that women with hypertensive disorders during pregnancy are 1.377 times more likely to deliver preterm.

Our data showed that urogenital infection was recorded among more than half of patients (52%) (OR 1.457, 95% CI 0.380-5.857) suggesting that urogenital infection increase the likely of preterm birth by 1.457 times more than those women without such infection. These results are in line with all investigation carried out for preterm birth and urinary and vaginal infection. A study from Mukalla [56] reported that urinary tract infection (UTI) was found in 59% of women experienced preterm birth, which supports our results.

Our study found that anemia was diagnosed among 53% of the study sample (OR 0.712, 95% CI 0.565-0.897). This finding is corroborated by other studies which showed severe anemia increased the risk of preterm births significantly [60]. It is suggested that only severe anemia can cause preterm birth but there is no evidence to support mild anemia. However, further studies in this area is recommended.

There were almost a third of women had premature rupture of membranes (33%) and 16 had antepartum hemorrhage. Both of these factors increasing the risk of preterm birth. These results are similar to another study from Yemen [56] which reported that PROM increases the risk of preterm birth by 5.11 times higher. PROM increase the release of prostaglandin which enhances cervical ripening causing preterm births.

The present study found that 36% of cases had underweight (BMI <18 kg/m²). (OR was 1.793, 95% CI 0.947-3.394) indicating that women who are underweight have 1.793 times chance of experiencing preterm birth. These data are supported by another study by Shah et al [62] who reported that pre-pregnancy low BMI is strongly associated with increased risk of preterm birth with a relative risk (RR) being greater than 2.5. In contrast, it is reported by another study [63], that pre-pregnancy BMI had little or no relationship with the risk of preterm birth overall.

Our data found that smoking was present among 5.1% of our study population. Another study [57] found that smoking was observed among 14.5%. The observation that 5.1% of women with preterm births were

smokers in this study provides a critical insight into one of the preventable contributors to adverse pregnancy outcomes. While this percentage appears modest, it aligns with broader evidence linking maternal smoking to increased risk of preterm delivery.

Prevalence of preterm labor

The observed prevalence of preterm birth at Al jomhory Hospital, Taiz, is 5.5%, which is relatively low when compared with findings from other studies conducted both within Yemen and globally. A recent study conducted at Jiblah University Hospital in Ibb, Yemen, reported a preterm birth prevalence of 12.5%, more than double the rate observed in Al jomhory Hospital [64]. This discrepancy may reflect regional differences in maternal health, access to antenatal care, socioeconomic status, or hospital protocols. It may also be influenced by sample size, study period, or diagnostic criteria used to define preterm birth. According to a systematic analysis published in The Lancet, the global average prevalence of preterm birth in 2020 was approximately 10.6%, with higher rates in low- and middle-income countries, particularly in sub-Saharan Africa and South Asia [65]. The Middle East and North Africa (MENA) region reported an average preterm birth rate of around 9.2%, still significantly higher than the 5.5% observed in Taiz [65]. The United Nations also highlights that 1 in 10 babies worldwide are born preterm, reinforcing the global burden of this condition [65]. Several factors could contribute to the comparatively low prevalence at Al Jomhory Hospital including effective antenatal care programs and early identification of high-risk pregnancies. It is possible that underreporting or differences in gestational age assessment methods, also hospital-level factors, such as under-reporting, diagnostic referral bias, or limitations in gestational age dating using last menstrual period (LMP), especially in resource-limited settings might influence the rate. Hospital (5.5%) is lower than regional and global estimates (~10.6%).

Conclusion:

- The prevalence of preterm birth observed in this study is lower than that reported in the global studies.
- The maternal age shows increasing trend from < 20 year up to 29 years and then declined reached the lowest frequency at age ≥ 40 years.
- There was a slight increase of women residing in urban setting compared to rural residing women with no significant difference.

- The majority of women are multiparous, housewives, and had low socioeconomic status.
- There was a significant association between previous preterm birth, recurrent miscarriage and occurrence of preterm birth.
- Chronic illnesses such as hypertension, DM and heart disease were significantly associated with preterm births.
- Vaginal bleeding, premature rupture of membranes and low family income and low BMI showed significant link with preterm labor.

Recommendations

- The relatively low rate is encouraging but warrants further investigation to validate the findings and understand the underlying causes.
- Future research should include larger, multicenter studies across Yemen to assess national trends and standardize definitions and data collection methods.
- Antenatal care is too important to diagnose and treat the associated co morbidity.
- Understanding the protective factors at Al Gomhory Hospital could inform policy and practice improvements in other regions with higher preterm birth rates.
- Routine screening for tobacco use during antenatal visits should be emphasized, along with counseling and cessation support.
- Community education campaigns can help address cultural barriers and raise awareness about the risks of smoking and secondhand smoke during pregnancy.
- Further research is needed to explore the role of environmental tobacco smoke, especially in households where male smoking is prevalent.
- Routine antibiotic administration is not recommended for women in preterm labor with intact amniotic membranes and no clinical signs of infection.
- Routine delivery by caesarean section for the purpose of improving preterm newborn outcomes is not recommended, regardless of cephalic or breech presentation.

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