

# Determination of Demographic and Maternal Risk Factors of Preterm Deliveries among Mothers

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**Abstract:** Background: Worldwide, preterm birth accounts for 1 million deaths of infants each year and 60% of these deaths occur in developing countries. In addition to the significant health consequences on the infant, preterm birth can lead to economic costs. The risk factors of preterm birth may vary from region to region within the same country due to variation in socioeconomic status and health care service coverage. Therefore, this study aimed to identify determinants of preterm birth in Kanyakumari district. Methods and Materials: An institutional-based case-control study was conducted. The eligible 50 cases and 50 controls were selected for this study. Cases were women who gave birth after 28 weeks and before 37 completed weeks of gestation, and controls were women who gave birth at and after 37 weeks of gestation from the first day of the last normal menstrual period. Data were collected by a structured interviewer-administered questionnaire. The collected data was entered and analysed in SPSS 20, based on the objectives of the study using appropriate descriptive and inferential statistics. Multivariable logistic regression was used to identify determinants of preterm birth at P-value <0.05. Conclusion: This study found that the prevalence rate of preterm birth was 18% and the independent predictors of preterm birth were some maternal bases to the occurrence of a preterm birth. Mothers having Lack of nutritious diet intake, Cephalo Pelvic Disproportion / Contracted Pelvis and Gestational Diabetes Mellitus were reported as the most important maternal predictors of a preterm birth. Antenatal care services such as counselling the mother on the benefit of dietary supplementation during pregnancy, antenatal care follow up and lengthening birth interval should be integrated into the existing health extension packages. New and inclusive strategies such as the establishment of comprehensive mobile clinic services should also be designed to reduce the burden of preterm birth among women living in the rural community.

## 1. Introduction

“Risk factors are like fire, if controlled it will help you;  
If uncontrolled it will rise up and destroy you”

-Theodore Roosevelt

Preterm birth is a significant public health problem across the world and is the world number one cause of neonatal death and the second leading cause of all child death amongst children under 5 years of age. A number of factors have been identified that are linked to a higher risk of a preterm birth. Although significant improvements in treating infants born preterm and improving survival have been made, little success has been attained in understanding the factors and preventing preterm birth. Preterm labour may not be completely prevented but a mother can endorse a better healthy pregnancy. Some preventive actions should be taken to reduce the risks of adverse pregnancy outcomes. The preventive measures include prenatal care, healthy diet, zinc supplementation, weight gain during pregnancy is recommended about 11 Kg to 16 Kg who have normal weight according to body mass index table (BMI) and if mother is overweight she might not or should lose weight. Defining risk factors for prediction of preterm birth is a reasonable goal for several reasons. First, identification of at-risk women allows initiation of risk-specific treatment. Second, the risk factors might define a population useful for studying specific interventions. Finally, identification of risk factors might provide important insights into mechanisms leading to preterm birth. Yet, data regarding preterm births and risk factors are not routinely collected in hospitals. Therefore, to obtain insight into the risk factors for preterm deliveries, prompted the researcher to conduct this study.



### Statement of the problem

A case control study to determine the demographic and maternal risk factors of preterm deliveries in selected hospitals of Kanyakumari district.

### Objectives

- 1) To find out the prevalence of pre term deliveries among mothers.
- 2) To determine the demographic risk factors by comparing the risk factors between cases and controls.
- 3) To determine the maternal risk factors by comparing the risk factors between cases and controls.

### Operational Definition

#### Determinants

It refers to the demographic, maternal, environmental and neonatal risk factors which results or causes the pre term deliveries and is measured by the checklist prepared by the researcher.

**Pre term deliveries**

It is a process in which mother delivers the newborn before 37 completed weeks of gestation through normal vaginal delivery or Cesarean section.

**Cases:** It refers to the mothers who had live birth at a gestational age between 28 and 37 weeks of gestation.

**Controls:** It refers to the mothers who had live birth at a gestational age after 37 weeks of gestation.

**Mothers**

It refers to all the mothers who had given birth to live newborn.

**2. Methodology****Research approach**

A survey approach will be applied in which the primary objective of the research is to identify the risk factors that can cause the pre term deliveries. In this study, the researcher wants to assess the demographical, environmental, maternal and neonatal factors of pre term deliveries.

**Research design**

The research design selected for this study is Retrospective case control research design.

**Study Setting**

An unmatched case-control study was conducted at Jeyaharan hospital in southern Tamilnadu. Cases were defined as all selected mothers who gave a live preterm birth (<37 0/7 weeks), whereas controls were also defined as all selected mothers who gave live from 37 weeks and above of gestation ( $\geq 37$  0/7 weeks). All selected mothers who gave live (<37 0/7 weeks) for case and term birth ( $\geq 37$  0/7 weeks) for control were considered as the study population.

**Sampling Methods and Procedure**

Study participants were selected by consecutive sampling techniques until the sample sizes were accomplished. Cases will be all women giving birth at a gestational age between 28 and 37 weeks. For every case, one control will be obtained. Controls will be all women who had a live birth after 37 weeks of gestational age. Once a mother with a preterm birth was recruited as a case group, the next consecutive mother with a term birth was selected as the control group at the same condition in respective hospital and recruitment was continued until the required sample size is fulfilled. In case a selected mother did not fit the criteria or declined to consent, the next mother was selected.

**Data Collection Methods and Procedure**

Data were collected through a face-to-face interview by using pretested structure questionnaires, and also review maternal and neonatal medical charts were checked to take and confirm for some important variables within 48 hours after they gave birth. Data were collected from participants after they were fully recovered from delivery process, who are ambulant, stable, and fit for interview and measurements almost within 48 hours after giving birth. The overall

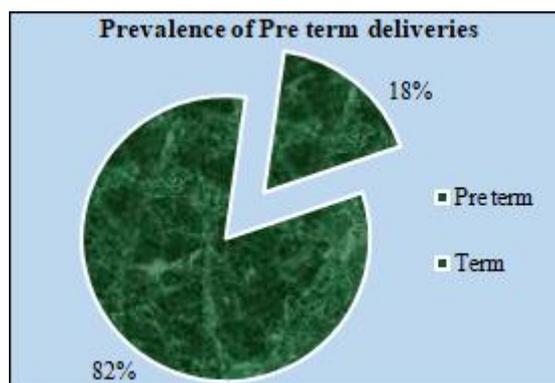
estimated time to take information from each mother was needed for almost 25-30 minutes.

**Data Management and Analyses**

The collected data was entered and analyzed in SPSS 20, based on the objectives of the study using appropriate descriptive and inferential statistics. Descriptive statistics were employed to describe the characteristics of the study participants in relation to outcome variable by using cross tabulation expressed as frequency and percentage for the case and control groups, respectively. Both univariate and multivariate analyses were employed by using logistic regression model to identify determinants of a preterm birth that are statistically significant.

**Ethical Consideration**

Ethical clearance was obtained from the ethical review committee to carry out this study. Also, a formal letter of permission was secured before starting data collection process. An informed verbal consent was obtained from the mothers after fully explaining the purpose of the study throughout the data collection period. Participants were informed about the right not to participate in or withdraw from the study at any time through the interviews.

**3. Results**

**Figure 1:** Prevalence of preterm deliveries

**Table 1:** Frequency and Percentage Distribution of Demographic Variables of Cases and Controls

Variables	Cases (n=50)		Controls (n=50)	
	f	%	f	%
<b>Age</b>				
Upto 20	-	-	-	-
21-30	9	18.0	6	12.0
31-35	37	74.0	33	66.0
Above 35	4	8.0	11	22.0
<b>Educational Status</b>				
Non literate	-	-	-	-
Primary	-	-	-	-
High school	22	44.0	22	44.0
Secondary	20	40.0	18	36.0
Hr Secondary	8	16.0	10	20.0
Graduates and Above				
<b>Occupation</b>				
Employed in organised sector	10	20.0	5	10.0
Employed in unorganised sector	17	34.0	21	42.0
Business	3	6.0	3	6.0
Homemaker	20	40.0	21	42.0

<b>Nature of Work</b>				
Heavy workers	-	-	-	-
Moderate workers	24	48.0	26	52.0
Sedentary workers	26	52.0	24	48.0
<b>Monthly Income</b>				
≥123,322	-	-	-	-
61,663-123,321	-	-	-	-
46129-61,662	-	-	-	-
>30,831-46,128	-	-	-	-
18,497-30,830	15	30.0	30	60.0
6,175-18,496	35	70.0	20	40.0
≤ 6174	-	-	-	-
<b>Religion</b>				
Hindu	24	48.0	18	36.0
Christian	26	52.0	32	64.0
Muslim	-	-	-	-
<b>Area of Residence</b>				
Urban	-	-	-	-
Semiurban	27	54.0	27	54.0
Rural	23	46.0	23	46.0
<b>Type of Family</b>				
Nuclear	29	58.0	36	72.0
Joint	21	42.0	14	28.0
<b>Type of marriage</b>				
Consanguineous	-	-	-	-
Non Consanguineous	50	100.0	50	100.0

The data presented in Table1 reveals that majority of the mothers (74%, 66%) were between 31-35 years of age, educated upto high school(44%, 44%), homemakers (40%,42%), moderate workers (48%, 52%), having family monthly income of 6,175-18,496 (70%, 40%), & Christians (52%,64%) lives in semi urban area, living in nuclear family (58%, 72%) and had consanguineous marriage (100%,100%). There was no statistically significant difference (P>0.05) between the groups. Hence they are comparable and homogenous groups.

**Obstetric Characteristics of Mothers**

**Table 2:** Frequency and Percentage Distribution of Obstetric Variables of Cases and Controls

Variables	Cases (n=50)		Controls (n= 50)	
	f	%	f	%
	<b>Gravida</b>			
Primi	28	56.0	34	68.0
Second	22	44.0	16	32.0
Three				
<b>Parity</b>				
1	35	70.0	36	72.0
2	15	30.0	14	28.0
3				
<b>No of Living Children</b>				
1	35	70.0	36	72.0
2	15	30.0	14	28.0
More than 2	-	-	-	-
<b>No of abortion</b>				
0	37	74.0	30	60.0
1	13	26.0	20	40.0
3	-	-	-	-
<b>No of Antenatal Check ups</b>				
No Visits	-	-	-	-
1-3 visits	50	100.0	50	100.0
>3	-	-	-	-
<b>Menstrual Cycle</b>				

Regular	21	42.0	26	52.0
Irregular	29	58.0	24	48.0
<b>Mode of Delivery</b>				
Spontaneous vaginal delivery	33	66.0	33	66.0
Assisted vaginal delivery	-	-	-	-
LSCS	17	34.0	17	34.0
<b>Pre Pregnancy BMI</b>				
Less than Normal	-	-	-	-
Normal	35	70.0	47	94.0
Overweight	15	30.0	3	6.0
Obese				
<b>Hb</b>				
<10	30	60.0	28	56.0
≥10	20	40.0	22	44.0
<b>Intake of Iron &amp; Folic Acid</b>				
Yes	50	100.0	50	100.0
No				
<b>Duration of Intake of Iron &amp; Folic Acid</b>				
<100 days	-	-	-	-
100 days	-	-	-	-
>100 days	50	100.0	50	100.0
<b>Immunization Taken During Pregnancy</b>				
Yes	50	100.0	50	100.0
No	-	-	-	-

The data presented in Table2 reveals that majority of the mothers (56%, 68%) were primigravidae, primiparous (70%, 72%), had one child (70%, 72%), had no abortion (74%, 60%) and attended three antenatal visits(100%, 100%). Similarly majority of the mothers had spontaneous vaginal delivery (66%, 66%), had normal Pre-pregnancy index (70%, 94%) and had less hemoglobin (60%, 56%). It also revealed that all the mothers have taken iron and folic acid (100%, 100%), duration of more than 100 days (100%, 100%) and have taken TT immunization during pregnancy (100%, 100%) in both cases and controls respectively.

**Table 3:** Frequency and Percentage Distribution of Neonatal Variables of Cases and Controls

Variables	Cases (n=50)		Controls (n= 50)	
	f	%	f	%
<b>Gestational Age in Weeks</b>				
32	10	20.0		
33	-	-		
34	6	12.0		
35	22	44.0		
36	12	24.0		
37	-	-	-	-
38			22	44.0
39			28	56.0
<b>Gender</b>				
Male	30	60.0	26	52.0
Female	20	40.0	24	48.0
<b>Length of the baby</b>				
<150 cm	50	100.0		
≥150 cm	-	-	50	100.0
<b>Rh incompatibility</b>				
Present	10	20.0	5	10.0
Absent	40	80.0	45	90.0
<b>Congenital Anomalies</b>				
Present	-	-	-	-
Absent	50	100.0	50	100.0
<b>APGAR score at one Minute</b>				

0-3	-	-		
4-6	50	100.0	18	36.0
7-10	-	-	32	64.0
<b>APGAR score at 5 Minutes</b>				
0-3	-	-	-	-
4-6	-	-	-	-
7-10	50	100.0	50	100.0
<b>Need for medical intervention</b>				
Required	8	16.0	-	-
Not Required	42	84.0	50	100.0
<b>Need for Surgical intervention</b>				
Required	-	-	-	-
Not Required	50	100.0	50	100.0

Table 3 depicts that, majority of the mothers' gestational age was >38 weeks (59.6 & 87.1%), did not have Rh incompatibility (93.3 & 95.7%), had normal Apgar Score (96.2 & 98.6 %), and did not have any IUGR (99 & 98.1%) among cases and controls respectively. Regarding gender of the babies, 55.8 % in cases and 45% in controls were female babies.

**Table 4: Demographic Risk Factors of Pre Term Deliveries**

Risk Factors	Cases (n= 104)	Controls (n= 209)	Odds Ratio	95% Confidence interval		P value
	f (%)	f (%)		Lower	Upper	
< 21 Years	-	-	-	-	-	-
Advanced Age (> 35Yrs)	-	-	-	-	-	-
Illiterate ( Below Higher Sec)	24 (48.0%)	23 (46.0%)	1.084	.494	2.377	.841
Rural	-	-	-	-	-	-
Family Income < 10000/ Month	-	-	-	-	-	-
Short stature (<150 cm)	20 (40.0%)	19 (38.0%)	1.088	.487	2.430	.838

Tab 4, reveals that, there was no significant difference between cases and controls with regard to age, educational status, family income, residence and their height (p>0.05).

**Table 5: Personal Risk Factors of Pre Term Deliveries**

Risk Factors	Cases (n= 104)	Controls (n= 209)	Odds Ratio	95% Confidence interval		P value
	f (%)	f (%)		Lower	Upper	
Heavy physical work	-	-	-	-	-	-
History of smoking	-	-	-	-	-	-
History of Alcohol consumption	-	-	-	-	-	-
History of Usage of illicit drugs	-	-	-	-	-	-
Lack of nutritious dietary intake	18 (36.0%)	9 (18.0%)	2.563	1.017	6.457	.043

Table 5 reveals that, mothers taking Lack of nutritious dietary intake were more in cases (36%) than the controls (18%) with OR 2.563. i. e. mothers with Lack of nutritious dietary intake are more than two times more likely to cause preterm deliveries. Whereas other factors such as Heavy physical work, History of smoking, History of Alcohol consumption and History of Usage of illicit drugs were not found in both the groups- cases and controls.

**Table 6: Preexisting Medical Conditions (Risk Factors - Before Pregnancy)**

Risk Factors	Cases (n= 50)	Controls (n= 50)	Odds Ratio	95% Confidence interval		P value
	f (%)	f (%)		Lower	Upper	
Anemia	20 (40.0%)	10 (20.0%)	<b>2.667</b>	<b>1.090</b>	<b>6.524</b>	<b>.029</b>
Diabetes mellitus	7 (14.0%)	4 (8.0%)	1.872	.512	6.848	.338
Hypertension	11 (22.0%)	6 (12.0%)	2.068	.700	6.116	.183
Thyroid dysfunction	-	-	-	-	-	-
Cardio vascular disease	-	-	-	-	-	-
Asthma	-	-	-	-	-	-
Hepatic diseases	-	-	-	-	-	-
Renal diseases	-	-	-	-	-	-
Overweight/obese	<b>15</b> 30.0%	<b>3</b> 6.0	<b>6.714</b>	<b>1.803</b>	<b>24.998</b>	<b>0.002</b>
Under weight	-	-	-	-	-	-
Sexually transmitted infections	-	-	-	-	-	-
Vaginal infections	-	-	-	-	-	-
Urinary tract infections	11 (22.0%)	10 (20.0%)	1.128	.431	2.956	.806
<b>iii) Hemorrhagic Disorders</b>						
Platelet disorders	-	-	-	-	-	-
Hemophilia	-	-	-	-	-	-

Table 6 reveals that, Preexisting Medical Conditions such as Anaemia and Obesity were found to be risk factors as frequency of these factors were significantly higher in cases

than the controls with O R > 1 ( p<0.05), indicating that mothers with these factors are more likely to have pre term deliveries.

**Table 7: Obstetrical Risk Factors of Pre term Deliveries**

Risk Factors	Cases (n= 50)	Controls (n= 50)	Odds Ratio	95% Confidence interval		P value
	f (%)	f (%)		Lower	Upper	
<b>Obstetric History (Past and Present)</b>						
<b>Lack of Antenatal Visits ( &lt;3 visits)</b>	-	-	-	-	-	-
History of Close Birth Spacing (Less than 1 year)	-	-	-	-	-	-
History of infertility & Treatment	9 (18.0%)	5 (10.0%)	1.976	.612	6.380	1.329
History of Still Birth	-	-	-	-	-	-
History of Abortion	13 (26.0%)	13 (26.0%)	-	-	-	-
History of Contraceptives Usage	14 (28.0%)	9 (18.0%)	1.772	.685	4.579	1.412 <sup>a</sup>
History of any Sexually Transmitted infections during Pregnancy	-	-	-	-	-	-
Vaginal Infection	-	-	-	-	-	-
History of Previous preterm delivery	8 (16.0%)	2 (4.0%)	4.571	.919	22.730	.046
Cephalo pelvic disproportion/ contracted pelvis	<b>18</b> <b>36.0%</b>	<b>4</b> <b>8.0%</b>	<b>6.469</b>	<b>2.000</b>	<b>20.917</b>	<b>.001</b>
Problems in the uterus	-	-	-	-	-	-
Problems in the cervix	5 10.0%	4 8.0%	1.278	.322	5.066	.727
Hemorrhage during early pregnancy	-	-	-	-	-	-
Placenta Previa	18 36.0%	11 22.0%	1.994	.824	4.827	.123
Abruption placenta	-	-	-	-	-	-
<b>Medical conditions complicating pregnancy</b>						
Anaemia during pregnancy ( Hb <10)	24 (48.0%)	10 (20.0%)	<b>3.692</b>	<b>1.520</b>	<b>8.970</b>	<b>.003</b>
Uterine fibroids during pregnancy	-	-	-	-	-	-
Gestational Diabetes Mellitus	<b>17 (34.0%)</b>	<b>8 (16.0%)</b>	<b>2.705</b>	<b>1.040</b>	<b>7.036</b>	<b>.038</b>
Pregnancy Induced Hypertension	19 (38.0%)	11 (22.0%)	2.173	.902	5.237	.081
Hyperemesis Gravidarum	15 (30.0%)	12 (24.0%)	1.357	.559	3.295	.499
Oligohydramnios	10 20.0%	9 18.0%	1.139	.419	3.097	.799
Polyhydramnios during pregnancy	14 28.0%	8 16.0%	2.042	.769	5.419	.148
Premature rupture of membrane	10 20.0%	5 10.0%	2.250	.709	7.141	.161
Rupture of uterus	-	-	-	-	-	-
Abnormalities of Placenta ( If yes specify)	-	-	-	-	-	-

Table 9 reveals that, Cephalo pelvic disproportion/ contracted pelvis, Anaemia during pregnancy ( Hb <10) and Gestational Diabetes Mellitus were found to be risk factors as frequency of these factors were significantly higher in

cases than the controls with OR > 1 ( p<0.05), indicating that mothers with these factors are more likely to have pre term deliveries.

**Table 10: Psychosocial Risk Factors of Pre term Deliveries**

Risk Factors	Cases (n= 50)	Controls (n= 50)	Odds Ratio	95% Confidence interval		P value
	f (%)	f (%)		Lower	Upper	
<b>Psychosocial Factors</b>						
Lack of social support	9 (18.0%)	8 (16.0%)	1.152	.405	3.277	.790
Husband- Alcoholic	-	-	-	-	-	-
Husband- Unemployed	-	-	-	-	-	-
Perceived Stress – (High)	-	-	-	-	-	-
Excessive Fear/ Anxiety of delivery	-	-	-	-	-	-
Stressful life events (death of loved ones)	7 (14.0%)	5 (10.0%)	1.465	.432	4.969	.538
Domestic violence	-	-	-	-	-	-
Emotional abuse by partner	-	-	-	-	-	-
Sexual abuse by partner	-	-	-	-	-	-
Physical Abuse	-	-	-	-	-	-

Table 10 reveals that, there was no significant difference between cases and controls with regard to psycho social factors such as lack of social support, alcoholic unemployed husband ,perceived stress – (high),excessive fear/ anxiety of

delivery, stressful life events (death of loved ones) domestic violence, emotional abuse by partner, sexual abuse by partner and physical abuse (  $p>0.05$ ).

**Table 11:** Risk Factors of Pre Term Deliveries using Univariate and Multivariate Logistic Regression ( n= Cases 50, Controls- 50)

Risk Factors	Univariate Analysis		Multivariate Analysis	
	Unadjusted OR (95%CI)	p-value	Adjusted OR (95%CI)	p-value
Lack of nutritious diet intake	2.563 (1.02 - 6.46)	.043	2.289 (.58 -9.07)	.239
Obesity / Overweight	6.714 (1.80 - 25.00)	0.002	2.493 (.41 - 15.04)	.319
Cephalo Pelvic Disproportion / Contracted Pelvis	6.469 (2.00 -20.92)	.001	20.317 (4.04 - 102.10)	.000
Gestational Diabetes Mellitus	2.705 (1.04 - 7.04)	.038	1.181 (.28 -4.98)	.820
Anemia (Pre pregnancy)	2.667 (1.09 - 6.52)	.029	.000 (.000 - .001)	.999
Anemia (during pregnancy)	3.692 (1.52 - 8.97)	.003	.000 (.000 - .001)	.999

Table 11 depicts that, factors such as Lack of nutritious diet intake, Cephalo Pelvic Disproportion / Contracted Pelvis, Gestational Diabetes Mellitus, Anemia ( Pre pregnancy) and Anemia (during pregnancy) were found to be significant risk factors while using **Unadjusted OR (OR >1, with  $p< 0.05$ ).** However only Cephalo Pelvic Disproportion / Contracted Pelvis was found to be significant risk factors while using Multivariate Analysis- **Adjusted OR (OR >1, with  $p< 0.05$ ).**

#### 4. Conclusion

This study found that the prevalence rate of preterm birth was 18% and the independent predictors of a preterm birth were some maternal bases to the occurrence of a preterm birth. Mothers having Lack of nutritious diet intake, Cephalo Pelvic Disproportion / Contracted Pelvis and Gestational Diabetes Mellitus were reported as the most important maternal predictors of a preterm birth. The essential strategies should be stressed on improving antenatal care services and promoting early detection and clinical managements which are crucial for those pregnant mothers experiencing any obstetric complications during their expected antepartum and intrapartum care service providing times. In addition to this, encouraging mothers to utilize contraceptive and providing health education on a preterm birth and obstetric complications may lead to decline the burden of a preterm birth and its consequences.

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