



## RESEARCH ARTICLE

# Association between the socio-demographic variables of women admitted for delivery to a Tertiary Care Hospital and their maternal and neonatal outcome - A cross-sectional study

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## Abstract

The adverse outcome of pregnancy, either on the mother or fetus, remains to be still high despite improvements in healthcare services. This is due to various factors, including medical, environmental or socioeconomic factors. A cross-sectional study was conducted among 300 women admitted for delivery to a tertiary care hospital at Belagavi to find the association between socio-demographic variables and their maternal and neonatal outcomes. Data was collected using tools on socio-demographic profiles and questionnaires on Maternal and neonatal health outcomes. Descriptive statistics, Chi-square test and multiple logistic regression analysis analyzed data. Majority (47%) of the mothers belonged to the age group of 24 to 29 years, 79% are Hindu, 48.67% completed Pre-University course, 98.33% are homemakers, 67.33% had a non-consanguineous marriage and 62.33% are non-vegetarian. In the study, 62.33% had a vaginal delivery, 58% were primipara and 52.67% of them were pregnant for the first time. There was a significant association between the mother's age and education level and maternal and neonatal outcome, and there was no significant association between the preterm and term with demographic characteristics. Multiple logistic regression analysis showed that women who had delivered vaginally, those pregnant for the third time had good maternal outcomes and women who had 11 to 13 antenatal visits have good neonatal outcomes. Also, women with either maternal or fetal conditions have an equal chance of undergoing Cesarean section. Birth weight and length of the baby is associated with the mother's gestational age at the time of delivery.

**Keywords:** Maternal outcome, Neonatal outcome, Low birth weight, Preterm birth, Associations.

## Introduction

The effect of the fertilization process, which takes place from the time the embryo is formed till the first few weeks of life, either to the mother or the fetus, is considered a

pregnancy outcome. These outcomes can include live birth, which may be full-term or preterm birth, stillbirth, spontaneous abortion, induced abortion and early neonatal mortality (Yeshialem E. *et al.*, 2017). During antepartum, intrapartum and postpartum period, health issues that affect the mother or baby, or both can fall under the category of adverse pregnancy outcomes like antepartum hemorrhage, hyperemesis gravidarum, postpartum hemorrhage, stillbirth, low birth weight, premature rupture of membranes, obstructed labor, hypertensive disorders of pregnancy, prematurity, uterine rupture and puerperal sepsis (CDC 24/7: saving lives, protecting people, 2016).

In low- and middle-income nations, the burden of unfavorable pregnancy outcomes is still significant and is the primary contributor to maternal and newborn morbidity and mortality as well as long-term physical and psychological consequences. Negative pregnancy outcomes are also found to be influenced by age, occupation, place of residence, and the absence of prenatal care (Tadese M. *et al.*, 2022).

Hereditary and environmental factors, current health and nutritional status, inter-pregnancy interval, maternal age, genitourinary or general disorders in women,

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socioeconomic level, and educational attainment influence pregnancy outcomes (Naik JD. *et al.*, 2016).

Approximately 810 women worldwide die every day from issues that could have been avoided during pregnancy, childbirth or the postpartum period (U. WHO & B. W. UNFPA, 2019).

Worldwide, 4.6 million children died before turning one, with 50% dying during the first day and over 75% within the first week. Each year, there are an additional 2.6 million stillbirths, 25% of which occur during labor. The majority of stillbirths and early neonatal fatalities are caused by birth-related problems that might be avoided. If sufficient prenatal, intrapartum, and neonatal services were accessible, the majority of the 6.3 million perinatal fatalities that take place yearly in underdeveloped nations could be prevented (Anggondowati T. *et al.*, 2017).

Many studies have demonstrated that when gestational age decreases, newborn mortality increases significantly. Due to myometrial stretching from previous pregnancies, high parity may increase the chance of preterm delivery (Wagura, P., *et al.*, 2018).

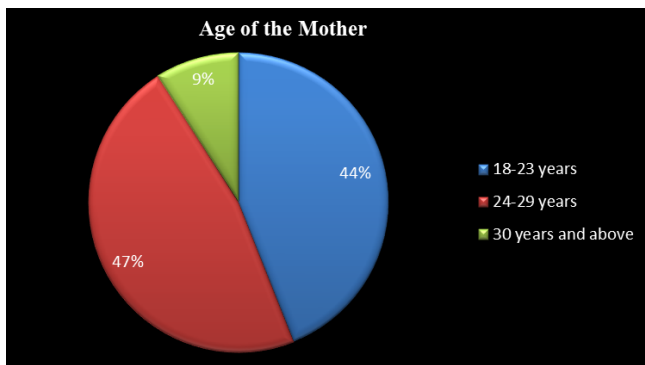
Preterm birth is a leading cause of perinatal morbidity and mortality in both developed and also developing countries (Goldenberg R. L. *et al.*, 2008).

Grand multiparity can have adverse effects on the mother and fetus, including antepartum and postpartum hemorrhage, gestational diabetes, hypertension, anemia, and preterm birth (Abdelmageed E. *et al.*, 2022).

Hence this study was undertaken to determine the association between the socio-demographic variables of women admitted for delivery and their maternal and neonatal outcomes.

**Materials And Methods**

The study used a cross-sectional research design with an evaluative approach. The study was conducted at a selected Tertiary care hospital of Belagavi city. Consecutive mothers with gestation of 28 weeks or more admitted for delivery in selected tertiary care hospitals of Belagavi city were included in the study. The sample size was 300 mothers.



Graph 1: A pie graph showing percentage distribution of age of the mother.

The study included all mothers with or more than 28 gestational weeks delivering in tertiary care hospitals of Belagavi city. The study excluded the mothers with use of vaginal antimicrobials or antibiotics and women associated with medical conditions (hypertensive disorders in pregnancy, diabetes, heart disease, antepartum hemorrhage).

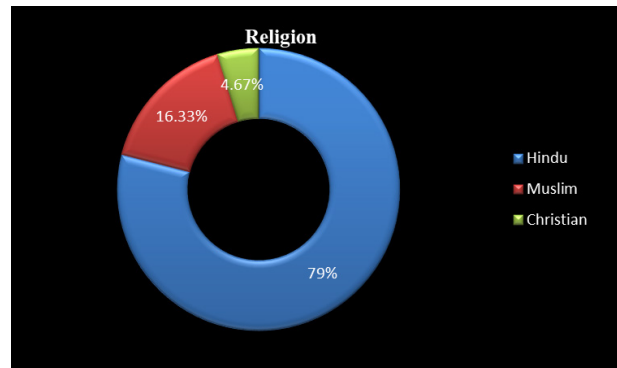
**Data collection**

After obtaining ethical clearance and formal permission from the Institutional ethical committee and also from the Medical Director and Medical Superintendent of the selected tertiary care hospital, the purpose of the study was explained to mothers and relatives and written consent was taken from every subject to collect the data. Data was collected using the Socio-demographic profile and Questionnaire on Maternal and neonatal health outcomes. Data was analyzed using Descriptive statistics, Chi-square test and multiple logistic regression analysis.

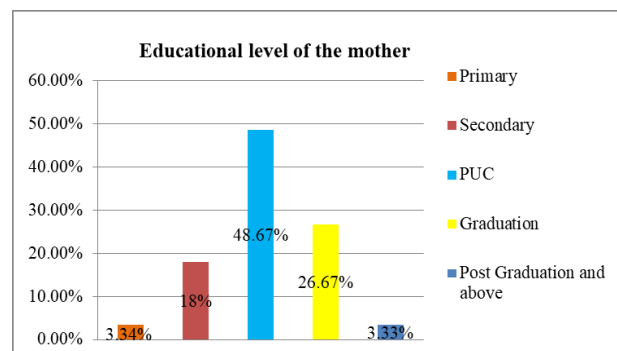
**Results**

**Demographic Characteristics of Respondents**

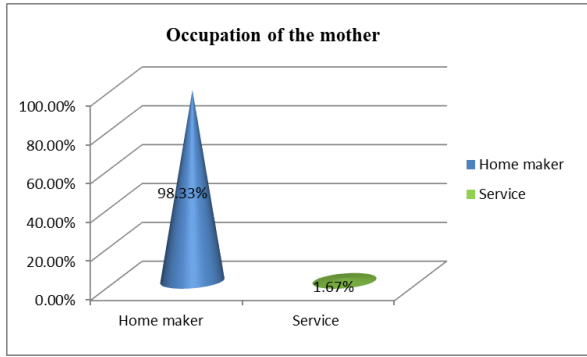
Graph 1-6 depicts that among the 300 respondents, majority (47%) of the mothers belongs to the age group of 24-29 years, 79% of them are Hindu, 48.67% have completed Pre-University Course, 98.33% are home maker, 67.33% had a non consanguineous marriage and 62.33% are non vegetarian.



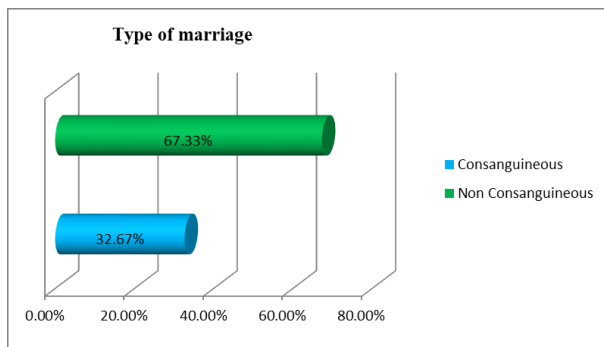
Graph 2: A doughnut graph showing percentage distribution of age of the mother.



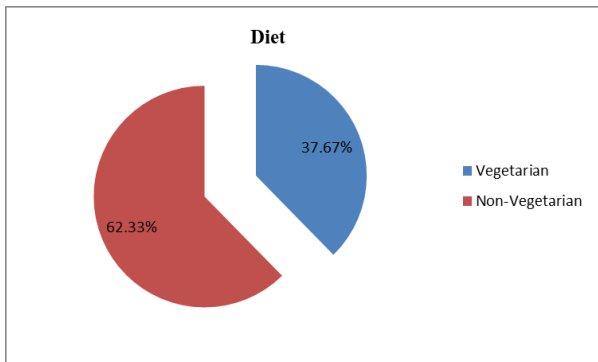
Graph 3: A column graph showing percentage distribution of the mother's educational level.



Graph 4: A column graph showing the percentage distribution of the mother's occupation.



Graph 5: A bar graph showing percentage distribution of type of marriage of the mother.



Graph 6: A pie graph showing percentage distribution of age of the mother.

**Maternal Characteristics of Respondents**

Table 1 shows that among the 300 respondents, 62.33% had vaginal delivery, 58% were primipara and 52.67% of them were pregnant for the first time.

**Association between socio-demographic variables with maternal and neonatal outcome**

Table 2 indicates that there is a significant association between the age and education level of the mother along with maternal and neonatal outcome; which means that there is no significant association between the religion,

Table 1: Maternal characteristics of respondents

Maternal characteristics	No of respondents	% of respondents
n = 300		
<b>Mode of delivery</b>		
Vaginal delivery	187	62.33
Cesarean section	113	37.67
<b>Parity -</b>		
Primipara	174	58.00
2	107	35.67
3	19	6.33
<b>Gravida</b>		
One	158	52.67
Two	89	29.67
Three	46	15.33
Four +	7	2.33
Total	300	100.00

occupation, type of marriage and diet of the mother along with maternal and neonatal outcome ( $p < 0.05$ ).

**Association between gestational age (Preterm and term) with demographic characteristics**

Table 3 shows that there is no significant association between gestational age (Preterm and term) with demographic characteristics ( $p < 0.05$ ).

**Multiple logistic regression analysis of gestational age by maternal outcomes**

Table 4 shows that the women who had delivered vaginally and those who were pregnant for the third time had good maternal outcomes ( $p < 0.05$ ).

**Multiple logistic regression analysis of gestational age by neonatal outcomes**

Table 5 indicates that the women who had 11 to 13 antenatal visits had good neonatal outcomes, and those with maternal or fetal conditions had an equal chance of undergoing Cesarean section ( $p < 0.05$ ).

**Multiple logistic regression analysis of gestational age by other parameters**

Table 6 shows that the Birth weight and length of the baby is associated with the mother's gestational age at the time of delivery ( $p < 0.05$ ).

**Comparison of gestational age (Preterm and term) with birth weight, head circumference, chest circumference and length by independent t-test**

Table 7 shows that there is a significant association between gestational age (Preterm and term) with birth weight, head circumference, chest circumference and length by independent t-test ( $p < 0.05$ ).

**Table 2:** Association between socio-demographic variables with maternal and neonatal outcome

Health outcome	Age of the mother				$c^2$ test, p-value	Education level of the mother						$c^2$ test, p-value
	18-23 years	24-29 years	30 years+	%		Primary	Secondary	PUC	Degree	PG	%	
<i>Mode of delivery</i>												
Vaginal delivery	84	86	17	62.33	0.208, 0.901	7	39	96	40	5	62.33	9.058, 0.06
Cesarean section	48	55	10	37.67		3	15	50	40	5	37.67	
<i>Parity</i>												
Primipara	103	62	9	58	45.232, 0.0001*	6	23	87	51	7	58	13.25, 0.104
2	28	66	13	35.67		4	23	53	25	2	35.67	
3	1	13	5	6.33		0	8	6	4	1	6.33	
<i>Gravida</i>												
One	91	61	6	52.67	43.262, 0.0001*	6	16	85	44	7	52.67	26.569, 0.0090*
Two	33	47	9	29.67		0	20	41	26	2	29.67	
Three	8	29	9	15.33		3	16	18	8	1	15.33	
Four +	0	4	3	2.33		1	2	2	2	0	2.33	
<i>No. of antenatal visits</i>												
4-6 Visits	6	12	1	6.33	2.5, 0.645	3	6	9	1	0	6.33	17.23, 0.0280*
7-10 visits	29	28	7	21.33		1	12	33	17	1	21.33	
11-13 visits	97	101	19	72.33		6	36	104	62	9	72.33	
<i>If underwent CS/ forceps/ vacuum delivery, what is the indication</i>												
No	82	82	18	60.67	5.916, 0.206	8	39	93	37	5	60.67	14.721, 0.065
Maternal Cause	9	22	3	11.33		1	2	17	12	2	11.33	
Fetal Cause	41	37	6	28		1	13	36	31	3	28	
<i>Is baby admitted to NICU-</i>												
Yes	26	18	3	15.67	2.945, 0.229	0	8	30	6	3	15.67	10.114, 0.0390*
No	106	123	24	84.33		10	46	116	74	7	84.33	
<i>Reason for NICU admission Immediately after birth</i>												
Prematurity	3	1	0	1.33	8.667, 0.193	0	1	2	1	0	1.33	39.729, 0.0001*
Asphyxia	2	6	0	2.67		0	1	4	0	3	2.67	
Others	21	11	3	11.67		0	6	24	5	0	11.67	
NA	106	123	24	84.33		10	46	116	74	7	84.33	
<i>Is baby treated with Oxygen</i>												
Yes	8	7	0	5	1.734, 0.42	1	3	7	1	3	5	16.101, 0.0030*
No	124	134	27	95		7	51	139	79	7	95	
Total	132	141	27	100		10	54	146	80	10	100	

\*p&lt;0.05

**Table 3:** Association between gestational age (Preterm and term) with demographic characteristics

Characteristics	Preterm	%	Term	%	Total	%	$c^2$ test, p-value	p-value
<i>Age of the mother</i>								
18-23 years	22	53.66	110	42.47	132	44.00	2.2130	0.3310
24-29 years	17	41.46	124	47.88	141	47.00		
30 years & above	2	4.88	25	9.65	27	9.00		
<i>Religion</i>								
Hindu	31	75.61	206	79.54	237	79.00	0.8000	0.6700
Muslim	7	17.07	42	16.22	49	16.33		
Christian	3	7.32	11	4.25	14	4.67		

<i>Education level of the mother</i>								
Primary	0	0.00	10	3.86	10	3.34	6.3775	0.2711
Secondary	11	26.83	43	16.60	54	18.00		
PUC	22	53.66	124	47.88	146	48.67		
Graduation	8	19.51	72	27.80	80	26.67		
Post Graduation & above	0	0.00	10	3.86	10	3.33		
<i>Occupation of Woman</i>								
Homemaker	41	100.00	254	98.07	295	98.33	0.8050	0.3700
Service	0	0.00	5	1.93	5	1.67		
<i>Type of Marriage</i>								
Consanguineous	10	24.39	88	33.98	98	32.67	1.4790	0.2240
Non-consanguineous	31	75.61	171	66.02	202	67.33		
Diet	41	100.00	259	100.00	300	100.0		
Vegetarian	15	36.59	98	37.84	113	37.67	0.0240	0.8780
Non-Vegetarian	26	63.41	161	62.16	187	62.33		
Total	41	100.00	259	100.00	300	100.0		

\*p <0.05

**Table 4:** Multiple logistic regression analysis of gestational age by maternal outcomes

<i>Maternal outcomes</i>	<i>Adjusted OR</i>	<i>95% CI for OR</i>		<i>p-value</i>
		<i>Lower</i>	<i>Upper</i>	
Mode of delivery				
Vaginal delivery	0.32	0.19	0.54	0.0001*
Cesarean section	Ref.			
Parity				
Primipara	Ref.			
2	1.03	0.20	5.23	0.9690
3	0.82	0.05	13.68	0.8880
Gravida				
One	Ref.			
Two	0.25	0.06	1.16	0.0760
Three	0.10	0.01	0.75	0.0250*
Four +	0.19	0.01	2.84	0.2290

\*p<0.05

**Comparison of gestational age (Preterm and term) with APGAR scores at 1 min and 5 min by independent t-test**

Table 8 shows that there is a significant association between the gestational age (Preterm and term) of the mother with APGAR scores of the newborn at 1 min and 5 min by independent t-test (p<0.05).

**Discussion**

In the study, the majority (47%) of the mothers belong to the age group of 24 to 29 years, 79% of them are Hindu, 48.67% completed Pre-University Course, 98.33% are homemaker,

**Table 5:** Multiple logistic regression analysis of gestational age by neonatal outcomes

<i>Neonatal outcomes</i>	<i>Adjusted OR</i>	<i>95% CI for OR</i>		<i>p-value</i>
		<i>Lower</i>	<i>Upper</i>	
No. of antenatal visits				
4-6 Visits	Ref.			
7-10 visits	2.08	0.69	6.30	0.1950
11-13 visits	0.51	0.27	0.96	0.0360*
If underwent CS/ forceps/ vacuum delivery. What is the indication				
No	Ref.			
Maternal Cause	0.10	0.03	0.34	0.0001*
Fetal Cause	0.18	0.09	0.33	0.0001*
Is baby admitted to NICU-				
No	Ref.			
Yes	1.83	0.80	4.20	0.1540
Reason for NICU admission: Immediately after birth				
Prematurity	Ref.			
Asphyxia	-	-	-	-
Others	0.52	0.03	8.04	0.6380
Is baby treated with Oxygen				
No	Ref.			
Yes	3.61	0.37	35.48	0.2710

\*p <0.05

67.33% had a non-consanguineous marriage and 62.33% are non-vegetarian.

**Table 6:** Multiple logistic regression analysis of gestational age by other parameters

Others	Adjusted OR	95% CI for OR		p-value
		Lower	Upper	
Birth weight	0.07	0.03	0.18	0.0001*
Head circumference	0.78	0.56	1.08	0.1310
Chest circumference	0.97	0.68	1.37	0.8490
Length	1.43	1.16	1.77	0.0010*
APGAR Score at 1 min.	1.07	0.67	1.73	0.7730

\*p&lt;0.05

**Table 7:** Comparison of gestational age (Preterm and term) with birth weight, head circumference, chest circumference and length by independent t-test

Parameters	Preterm		Term		t-value	p-value
	Mean	Std.Dev.	Mean	Std.Dev.		
Birth weight	3.32	0.47	3.87	0.37	-8.6333	0.0001*
Head circumference	33.29	1.05	34.71	1.77	-4.9743	0.0001*
Chest circumference	31.39	1.26	32.70	1.79	-4.4943	0.0001*
Length	45.71	1.42	47.51	1.72	-6.3746	0.0001*

\*p&lt;0.05

**Table 8:** Comparison of gestational age (Preterm and term) with APGAR scores at 1 min and 5 min by independent t-test

Parameters	Preterm		Term		t-value	p-value
	Mean	Std.Dev.	Mean	Std.Dev.		
APGAR Score at 1 min.	7.24	0.83	7.57	0.78	-2.4431	0.0151*
APGAR Score at 5 min.	8.22	0.79	8.68	0.64	-4.1213	0.0001*

\*p&lt;0.05

Among the 300 respondents, 62.33% had a vaginal delivery, 58% were primipara and 52.67% of them were pregnant for the first time.

The study showed that i) there is a significant association between the age and education level of the mother along with maternal and neonatal outcome ( $p < 0.05$ ); ii) there is no significant association between the gestational age (Preterm and term) with demographic characteristics ( $p < 0.05$ ).

Similar findings are seen in the study conducted by Naik, J.D., *et al.* (2016) where most subjects (57.71%) were from urban areas and 66.66% were Hindu. There was a significant association between pregnancy outcome with education, nature of work, socioeconomic status, age at marriage, and consanguineous marriage, a significant association was observed with maternal age, and residence and no significant association was observed with type of family transport facilities.

Multiple logistic regression analysis of gestational age by maternal outcomes showed that the women who had delivered vaginally and those who were pregnant for the third time have good maternal outcome ( $p < 0.05$ ); women who had 11 to 13 antenatal visits have good neonatal outcomes, and those women with either maternal or fetal

conditions have equal chance of undergoing Cesarean section; and it has also shown that birth weight and length of the baby is associated with the gestational age of the mother at the time of delivery ( $p < 0.05$ ).

In the study conducted by Harrison, M.S., *et al.* (2020), there is reduced adverse maternal outcomes among the women with  $\geq 4$  antenatal visits; and those women with malpresenting fetuses, obstetrically high-risk women, less education, and those with maternal or obstetric indication have increased odds of adverse outcomes.

The comparison of gestational age (Preterm and term) with birth weight, head circumference, chest circumference and length by independent t-test showed that there is a significant association between gestational age (Preterm and term) with birth weight, head circumference, chest circumference and length by independent t-test ( $p < 0.05$ ).

A similar finding is shown in the study conducted by Babilu *et al.* (2022) which showed a significant correlation between foot length with GA and other anthropometric parameters in preterm babies and in term AGA and LGA babies.

Also the comparison of gestational age (Preterm and term) with APGAR scores at 1 and 5 minutes by independent

t-test showed a significant association between the gestational age (Preterm and term) of the mother with APGAR scores of the newborn at 1 and 5 minutes by independent t-test at 0.05 level of significance.

### Conclusion

The study provides a general overview of the association between the socio-demographic variables of the women and their maternal and neonatal outcomes. This study will also help prevent adverse maternal and neonatal outcomes by identifying it as soon as possible.

### Acknowledgment

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