"DETERMINANTS OF PERINATAL MORTALITY IN TERTIARY CARE HOSPITAL"

Thesis Submitted to

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For the award of the degree of

Doctor of Philosophy

In the Faculty of Nursing

By

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Registration No: KLEU/Ph.D.-18-19/DO1218007

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Even the most analytical thinkers are predictably irrational; the really smart ones acknowledge and address their irrationalities.

- ***Dan Ariely***

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ABBREVATIONS

Sr. No	Abbreviations	Expanded forms
1.	END	Early Neonatal Death
2.	PMR	Perinatal Mortality Rate
3.	NMR	Neonatal Mortality Rate
4.	MSB	Macerated Stillbirth
5.	FSB	Fresh Stillbirth
6.	SBR	Stillbirth Rate
7.	MMR	Sample Registration System (SRS)
8.	PNMR	Perinatal & Neonatal Mortality Rate
9.	HIC	High Income Countries
10.	LMICs	Low- And Middle-Income Countries
11.	PM	Perinatal Mortality
12.	HIV	Human immunodeficiency virus
13.	CLIP	Community Level Interventions for Pre-eclampsia
14.	SRS	Sample Registration System
15.	NICU	Neonatal Intensive Care Unit
16.	HDP	Hypertensive Disorders of Pregnancy
17.	SBs	Stillbirths
18.	APH	Antepartum Haemorrhage

19.	LBW	Low Birth Weight
20.	BP	Blood Pressure
21.	ANC	Antenatal Care
22.	CI	Class Interval
23.	NTG	Non-Tribal Group
24.	TG	Tribal Group
25.	DLHS	District Level Household and Facility Survey
26.	HELLP	Haemolysis, Elevated Liver Enzymes, Low Platelet Count
27.	DIC	Disseminated Intravascular Coagulation
28.	ACC	American College of Cardiology
29.	GHTN	Gestational Hypertension
30.	PVTG	Particularly Vulnerable Tribal Groups
31.	ACOG	American College of Obstetricians and Gynaecologists
32.	PPH	Postpartum Haemorrhage
33.	SCH	Secondary Chronic Hypertension
34.	RR	Relative risk
35.	PCR	Polymerase Chain Reaction
36.	RDS	Respiratory Distress Syndrome
37.	IUD	Intra Uterine Death
38.	PTB	Pre-Term Birth
39.	SGA	Small For Gestational Age

40.	KHDSS	Kersa Health and Demographic Surveillance System
41.	JNC	Joint National Committee
42.	HTN	Hypertension
43.	PE	Pre Eclampsia
44.	NFHS	National Family Health Survey
45.	CI	Confidence Interval
46.	AOR	Adjusted Odds Ratio
47.	ICU	Intensive Care Unit
48.	FGR	Fetal Growth Retardation
49.	OR	Odds Ratio
50.	GDM	Gestational Diabetes mellitus
51.	SBP	Systolic Blood Pressure
52.	DBP	Diastolic Blood Pressure
53.	HTN	Hypertension
54.	IADPSG	International Association of Diabetes and Pregnancy Study Groups
55.	ANC	Antenatal Care
56.	TT	Tetanus Toxoid
57.	VLBW	Very Low Birth Weight
58.	PDHS	Pakistan Demographic and Health Surveys
59.	CINAHL	Cumulated Index To Nursing And Allied Health Literature

60.	RR	Risk Ratio
61.	IEC	Institutional Ethical Committee
62.	EMBASE	Excerpta Medica Database
63.	PIH	Pregnancy Induced Hypertension
64.	ARR	Adjusted Risk Ratio
65.	ASD	Autism Spectrum Disorder
66.	RCT's	Randomized controlled trials
67.	ANC	Antenatal Care
68.	DM	Diabetes Mellitus
69.	GDM	Gestational Diabetes Mellitus
70.	CHC	Community Health Centre
71.	LSCS	Lower Segment Caesarean Section
72.	APGAR	Appearance, Pulse, Grimace, Activity, And Respiration
73.	NICU	Neonatal Intensive Care Unit
74.	WHOMCS	World Health Organization Multi Country Survey
75.	CHIPS	Control Of Hypertension During Pregnancy Study
76.	ARF	Acute Renal Failure
77.	ARDS	Acute Respiratory Distress Syndrome
78.	CHF	Congestive Heart Failure
79.	PPH	Postpartum Haemorrhage
80.	HB	Haemoglobin

81.	FGM	Fetal Growth Monitoring
82.	CHTN	Chronic Hypertension
83.	MNH	Maternal And Newborn Health Registry
84.	KLES	Karnataka Lingayat Education Society

ABSTRACT

Background: Every 16 seconds a stillborn is born worldwide. That amounts to more than 5000 women and families who experience a devastating loss each day[1]. Stillbirths are more common in low- and middle-income countries.

According to the statistics, Belagavi, Ballari, and Gadag (282,151 and 75 respectively) have reported a high frequency of neonatal fatalities (death within 7 days).However, Karnataka has the dubious distinction of having the highest stillbirth rate in the nation, with 12 deaths per 1,000 live births, according to the Sample Registration Survey (SRS). Stillbirths and perinatal mortality rate are the only two indicators where Karnataka's figures are higher than those of India.[24]

2020 noted 21 infant deaths per 1,000 live births in the State's rural regions, compared to 16 in the urban area.[26]

A lack of studies and data are missing to determine the precise numbers and trends of stillbirths and neonatal deaths in Belagavi, Karnataka.

Thus, the current study is undertaken to help the decision-makers to identify problems and track temporal and geographical trends and disparities in maternal health services to implement the health care services as per the needs of the society.

Objectives

1. To study the incidence and associated risk factors of perinatal mortality in a selected tertiary care hospital.
2. To find out the association between perinatal mortality with maternal and neonatal factors

Materials and Method: The study design adopted for the present study was case series design with descriptive approach. The setting for the study was tertiary care hospitals of northern Karnataka. Using the consecutive Sampling technique 3508 laboring mothers were surveyed. Data was collected by using Modified Maternal Newborn Health (MNH) Registry.

Results: In the current study, 3508 deliveries had been registered out of which 128 deaths of the fetuses/neonates were found giving the perinatal mortality rate of 36.48 per 1000 births. Of 103 stillbirths 69/103 were fresh stillbirths (FSB) and 34/103 were macerated stillbirths (MSB). The stillbirth rate in the present study was 29.3 per 1000 births. Out of 128 perinatal deaths, early neonatal deaths accounted for 25/128 giving the early neonatal death rate of 7.12 per 1000 births.

Conclusion: This study, performed in tertiary care hospitals, found that most stillbirths were preventable and were most often associated with maternal hypertension, antepartum hemorrhage and LBW as well as asphyxia in labor.

Appropriate obstetric care including antenatal and intrapartum screening for these conditions, including fetal heart rate monitoring in labor and utilization of appropriate intervention, often involving cesarean delivery, could potentially prevent many of these stillbirths.

Keywords: Perinatal mortality, perinatal determinants, Early neonatal death, stillbirths, Newborn outcome.

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CHAPTER I

INTRODUCTION

1.1) Background

Every 16 seconds a stillborn is born worldwide. That amounts to more than 5000 women and families who experience a devastating loss each day[1]. Stillbirths are more common in low- and middle-income countries.

The perinatal period commences at or more than 28th weeks of gestation and ends seven completed days after birth. Perinatal and maternal health is closely linked. Perinatal mortality includes stillbirths and Early neonatal deaths[2].

Stillbirth is defined as the death or loss of a fetus at or more than 28 weeks of gestation with no signs of life. Early neonatal death is defined as the loss or death of a newborn within the first week of life[3].

An estimated 2.6 million stillbirths occur worldwide every year, of which over 40% of intrapartum-related stillbirths are likely to be underestimated, because of the lack of vital registration in many countries[2].

Despite significant advancements in medical science on a worldwide scale, we still lose 40 out of every 1000 live births, or about 1 million, of the 26 million infants that are born annually.[2] Because of the lack of vital registration in many countries, stillbirths are likely to be underestimated[4-5].

Due to cultural taboos and social stigma, poor reporting, lack of uniform definitions and classification systems, and absence of vital registration in many

countries, stillbirths are likely to be underreported.[4-5] Effective maternal and newborn care throughout the course of pregnancy, labor, and the postpartum phase is directly related to perinatal survival[6].

Neonatal deaths and stillbirths are not considered as serious issues in many societies, mainly because they are so common. In many cultures, this circumstance has been accommodated by delaying the recognition of the birth as complete and delaying the naming of the child until the newborn infant has survived the critical first few days.[7]

Risk factors such as short inter-pregnancy intervals, low socio-economic status, lower education, lack of antenatal care, history of stillbirth, smoking, alcohol use, multiple pregnancies, obesity, hypertension, diabetes, HIV, fetal growth restriction, and post-term pregnancy can go untreated in many low- and middle-income countries (LMICs) with inadequate availability to diagnostic tools and high-quality maternal care, which leads to high stillbirth rates[8-9].

In high-income countries, the risk of perinatal mortality related to maternal complications has been well managed with effective interventions. These findings cannot necessarily be withstood with LMIC, with significant restrictions in human resources, diagnostic capacity, and availability of obstetric interventions with NICU care.[10-13]

The occurrence of stillbirth affects mothers, family members, care providers, communities, and society. Parents undergo various levels of stress that often persist for a long period after the death of their baby but could be managed by respectful maternity services, including bereavement care.[14]

About four million women are suffering from depression associated with a previous stillbirth. Fatalism hinders efforts to avoid stillbirths, while stigma and taboos heighten suffering for families.[14]

Early neonatal mortality was linked to inadequate obstetric care and critical staff shortages, according to South African research by Lawn et al.[14] and Pattinson et al.[15] identified the best interventions to lower newborn deaths linked to intrapartum as antenatal care, skilled birth attendance, and emergency obstetric care.[7]

Numerous research has looked at stillbirths and neonatal deaths in nations with limited resources.[4-5,14-15]. According to a study from the Democratic Republic of the Congo, the incidence of perinatal deaths there is seven times higher than in high-income nations.[15] Inadequate intrapartum monitoring, inappropriate clinical management, higher rates of delaying treatment, delaying transfer from the referring hospital, delaying care at the hospital.[14-15] There is no level of standardization that enables comparisons within and between countries, so risk factors vary depending on the information accessible at specific facilities.

However, such studies are necessary to understand the epidemiological patterns of these conditions and their effect on perinatal mortality and to prioritize interventions in low-resource settings. Thus, this study is undertaken to find out the determinants of perinatal mortality in tertiary care facilities.

1.2) Need for the study

Stillbirths are variably defined as 20 completed gestational weeks in some high-income countries to ≥ 28 gestational age weeks in many low- and middle-income countries (LMIC).[14,16]

98% of the world's total 2.6 million stillbirths at or before 28 weeks of gestation take place in LMIC. Even stillbirths at or after 28 weeks of gestation are not consistently recorded in many LMICs, but rates of 30 to 40 per 1000 births are frequently stated. It appears probable that many or most of the stillbirths in LMIC are potentially avoidable given the 10- to 20-fold difference in stillbirth rates between HIC and LMIC. [14,16]

Perinatal mortality has a multifaceted etiology and is influenced by the standard of medical care given to expectant mothers and their unborn children.[17-19] In developing countries, the PMR is five times greater than in developed ones (10 per 1000 total births against 50 per 1000 in developed and developing countries, respectively).[18,19] Stillbirths account for around 3.3 million of the projected 6 million perinatal deaths globally, and more than 97% of these deaths take place in low- and middle-income nations. [18,19]

Perinatal mortality happens as a result of poor maternal health, inadequate antenatal care, improper management during labor and the first few hours of life, and inadequate neonatal care. Progresses of quality improvement in health services are expected to reduce perinatal mortality rates. Various studies from all over India have quoted a perinatal mortality rate of one twenty per thousand live births, which is alarmingly high as compared to ten to twenty per thousand live births in developed

countries like Sweden where the perinatal mortality is mere four per thousand live births.[19-20] Stillbirths account for about 60% of perinatal mortality.[21]

The top five districts in northern Karnataka with the highest rates of infant mortality were Belagavi, Kalaburagi, Vijayapura, Davangere, and Raichur, according to statistics released by the Health Department. Karnataka recorded eleven thousand two hundred and twelve infant deaths (within a year of birth), including 1850 neonatal deaths (within twenty-eight days of birth). However, considering that more than two-thirds of baby fatalities in the state go unreported each year, the death toll might really be substantially higher.[22-23]

According to the statistics, Belagavi, Ballari, and Gadag (282,151 and 75 respectively) have reported a high frequency of neonatal fatalities (death within 7 days).

However, Karnataka has the dubious distinction of having the highest stillbirth rate in the nation, with 12 deaths per 1,000 live births, according to the Sample Registration Survey (SRS). Stillbirths and perinatal mortality rate are the only two indicators where Karnataka's figures are higher than those of India.[24]

The stillbirth rate is a sensitive marker of equity of health care and quality. In every province, there are countries making more rapid advancements in thwarting stillbirths.[25]

Since the National Rural Health Mission was implemented, neonatal health in India has significantly improved. In addition to the Janani Suraksha Yojana, the nation has started a number of new programs to enhance neonatal treatment.[23-24]

The perinatal mortality rate in the State is 30 per 1,000 live births. This exceeds the national norm of 26 per 1,000 live births. Karnataka only performs poorly on two health metrics: stillbirths and perinatal deaths.[24]

Since over two-thirds of infant fatalities in the state go unreported every year, the death toll could be much higher.[23]

According to the Sample Registration System (SRS) bulletin for 2020, female babies and rural regions of the state have higher death rates.[26] 2020 noted 21 infant deaths per 1,000 live births in the State's rural regions, compared to 16 in the urban area.[26]

A lack of studies and data are missing to determine the precise numbers and trends of stillbirths and neonatal deaths in Belagavi, Karnataka.

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Title of the study

Determinants of perinatal mortality in selected tertiary care hospital.

1.3) Objective

1. To study the incidence and associated risk factors of perinatal mortality in a selected tertiary care hospital.
2. To find out the association between perinatal mortality with maternal and neonatal factors

1.4) Operational Definitions

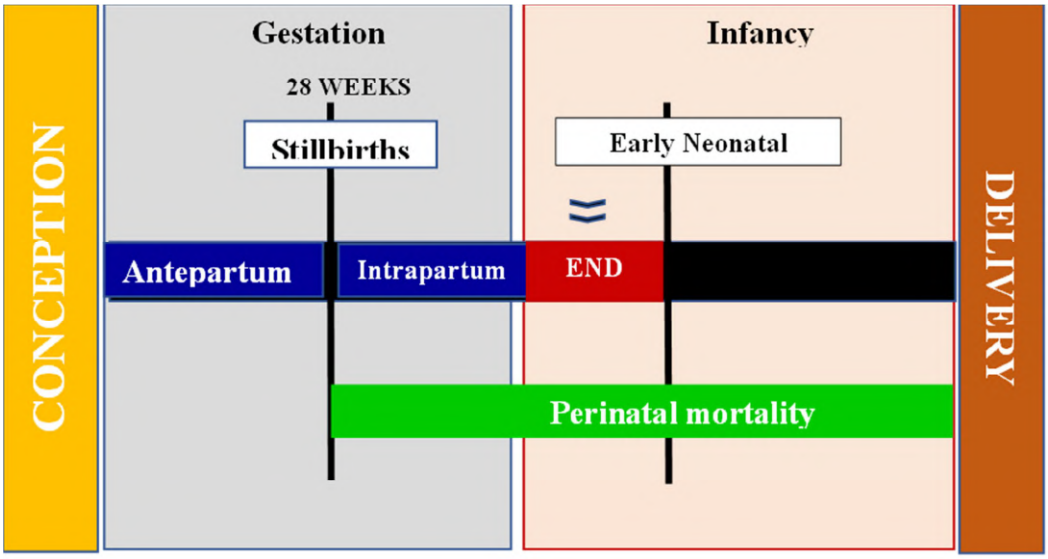


Figure 1: Perinatal Mortality and Gestational age

Perinatal Mortality: In the present study perinatal mortality is defined as any death during pregnancy (from 28 weeks of gestation), delivery until one month of postpartum.

Stillbirth: In the present study stillbirth is the death or loss of a baby before or during delivery.

Intrapartum stillbirth: In the present study Intrapartum stillbirth is defined as any fetal death after 28 weeks gestation at the onset of labor but before delivery newborn weighing 1000gm or more.

Early neonatal death: In the present study early neonatal death is defined as any fetal death occurring from the first day to the seventh day of life

Neonatal death: A neonatal death is defined as a death during the first 28 days of life (0-27 days).

Determinants: In the present study determinants refers to the factors or variables which determine perinatal mortality.

Perinatal mortality determinants could be antenatal, intranasal, or postnatal.

Conclusion:

This chapter has dealt with the research approach, research design, variables, setting of the study, population, sample, sampling technique, and development of the tool, description of the tool and method of data collection.

1.5) Conceptual Framework

The proximate determinants framework identifies the specific mechanism through which different factors lead to an event of interest such as neonatal mortality. A conceptual framework on the factors responsible for maternal and neonatal deaths has been provided by UNICEF[29]. According to UNICEF, the conceptual framework illustrates that health outcomes are determined by interrelated factors, encompassing healthcare services and healthy behaviors, disease control, nutrition, hygiene, and water, sanitation among others.

These elements are classified as being proximate (individual), deep (family, community, and district), and fundamental. (societal). A level's factors affect lower levels. The framework is designed to be helpful in analyzing the factors that contribute to maternal and newborn mortality and morbidity as well as in devising efficient interventions to improve maternal and neonatal health[30-31].

This framework serves as one of the models for the factors that cause health inequalities and purposefully upset the balance of health. Health-related hypotheses

sought to define the variables that affect health outcomes as well as to establish the link between these risk factors and results.

The present study aims at determining the factors responsible for perinatal mortality. The conceptual framework of the present study is developed by the investigator based on the framework provided by UNICEF.

At the Societal level: At the lowest ie. at the societal level basic causes responsible for the deteriorating health of the mother are present. Education, Residence, caste, religion, Socioeconomic status, Access to water & toilet, and Indoor air pollution are some of the factors that determine the utilization of resources for maternal health.

On the other hand, inadequate and/or inappropriate knowledge, and discriminating attitudes limit access to the actual resources are present. These resources are any means by which a pregnant woman can get assistance before, during, and after labor. Resource availability is dependent on the lowest level of the framework. community resources are available and the woman is able to access the said resources then the MMR PMR is lowered.

At the Household/community level: These resources are identified as the lack of education, health information, and life skills, insufficient access to maternity services, inadequate maternal health services, inadequate access to nutritious foods as well as poor water/ sanitization and hygiene.

Direct causes: Some of the direct causes considered by the framework that impact perinatal mortality rates include congenital factors, obstetric risks, disease and infections as well as inadequate dietary intake.

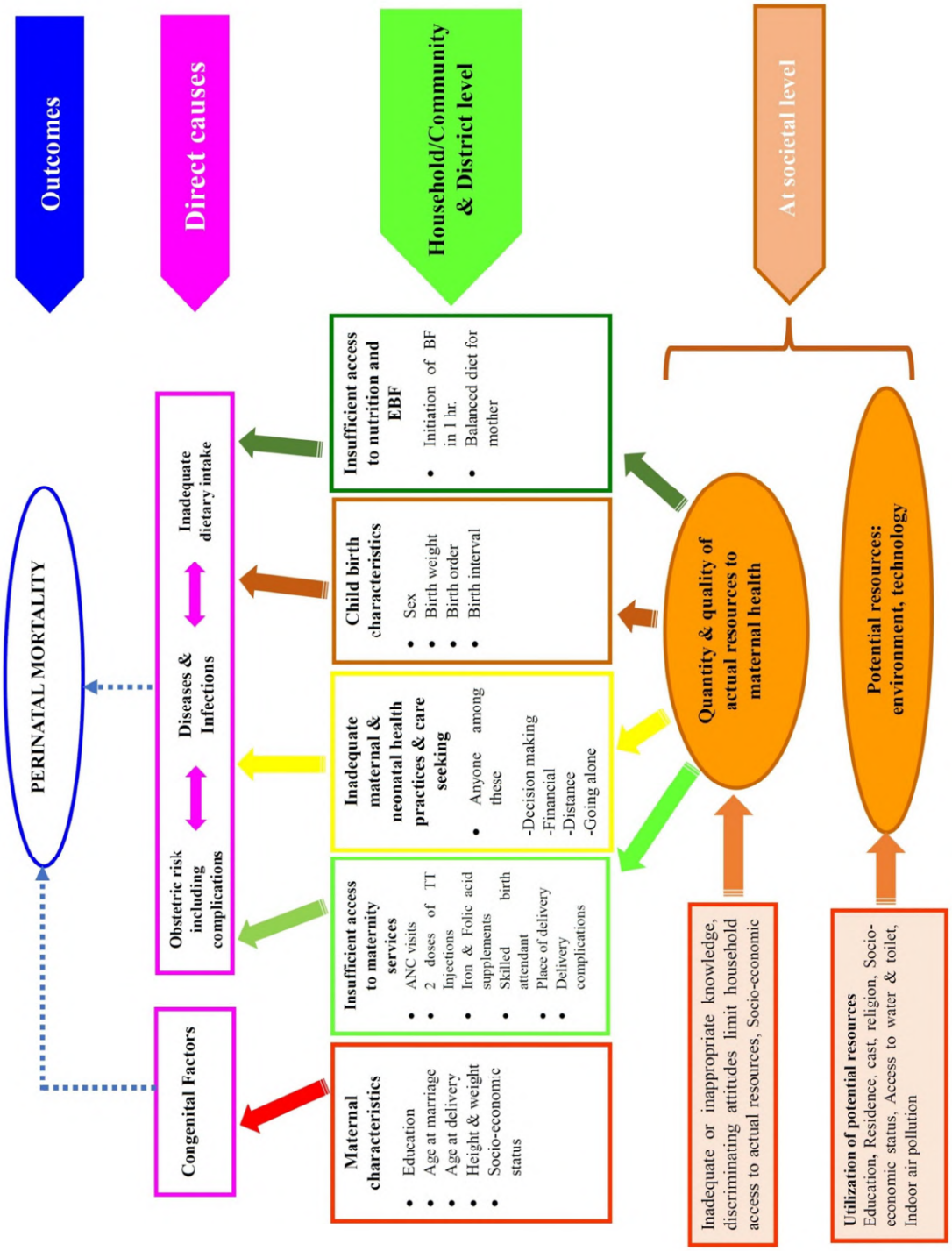


Figure 2 Conceptual Frame work for neonatal mortality and morbidity

CHAPTER II

REVIEW OF LITERATURE

The review of the literature is an analysis of written works that give information pertinent to the study's topic and includes appropriate, and methodical inquiry, inspection, and summation of the examined content. This overviewed information is explained in the following reviews:

A prospective observational study was conducted in two sites to know the percentage of SBs that are potentially preventable in low-income countries. Stillbirths were assigned to preventable and non-preventable categories using the criteria. Results revealed that at ≥20 gestation weeks out of 872 stillbirths, 55.5% were considered to be actually preventable. Of the six hundred and forty-nine stillbirths at ≥28 gestation weeks with ≥1000 g birthweight, 73.5% were deemed to be potentially preventable. The most common conditions associated with a potentially preventable stillbirth at ≥28 weeks of gestation and ≥1000 g birthweight were antepartum hemorrhage (31.4%), hypertension in pregnancy (50.2%), 52.8% small for gestational age, 15.7% of deaths resulted after hospital admission (15.7%). The study concluded that most of the stillbirths in Indian and Pakistan sites were deemed to be preventable and were associated with hypertensive disorders during pregnancy, (APH)antepartum hemorrhage, Small for gestational age, and intrapartum death.[32]

A comparative cross-sectional study was conducted to compare adverse perinatal outcomes and their associated factors among women with adult and advanced maternal age pregnancy in Ethiopia. Using Systematic random sampling 348 adult and 176 advanced-aged pregnant mothers were surveyed with a structured

questionnaire. 29 % of advanced-aged mothers had adverse perinatal outcomes compared to adult-aged women (14.5%). LBW babies with preterm birth and low Apgar score were found significantly higher among the advanced maternal age group. The odds of adverse perinatal outcomes of 2.01% were higher among advanced maternal-age mothers when compared to adult-aged mothers. The study concluded that adverse perinatal outcomes were more among mothers with advanced gestational ages. Adverse perinatal outcomes were significantly associated with Maternal education, pregnancy interval with complications in present pregnancy. The study recommended that there should be good access to education, family planning awareness, and early detection and management of obstetric complications.[33]

The INTERCOVID Multinational Cohort Study was carried out to estimate the associated risks with COVID-19 during pregnancy on maternal and perinatal outcomes as compared with not-infected, concomitant pregnant mothers from March-October 2020. Results of the study inferred that there were 706 mothers who were diagnosed with COVID-19 infection and 1424 normal mothers were enrolled. 48.6% of mothers with COVID infection were obese and 40% of normal mothers were obese without infection. Mothers with COVID-19 infection were at higher risk for severe infections, preeclampsia/eclampsia, ICU admission, maternal mortality, preterm birth, severe perinatal morbidity, and mortality index. Asymptomatic women with COVID-19 remained at higher risk only for preeclampsia and maternal morbidity. Among mothers with COVID-19 infection, 13% (54) of their babies tested positive. Cesarean delivery was associated with an increased risk for neonatal test positivity. The study concluded that COVID-19 in pregnancy was associated with substantial increases in MMR and neonatal complications when pregnant women with and without COVID-19 diagnosis were compared. The findings of the cohort alert pregnant mothers and

clinicians to implement strictly all the recommended COVID-19 preventive measures.[34]

A Prospective Observational Study was done with the objective to compare severe preeclampsia and eclampsia in tribal and nontribal women of West Bengal, India from May to April 2015. Using the detailed case proforma 200 consecutive mothers were selected. Results showed that a total of 67 mothers had eclampsia and 133 mothers were suffering from severe preeclampsia giving the incidence of 1.78% & 3.53% respectively. Hypertensive disorders were common among tribal groups. primiparous mothers were more in the nontribal group (16.30%). Mothers with BP >150/100 mm of Hg (51 in the tribal group and 98 in the nontribal group) were on antihypertensives. Incidence of low birth weight was significantly ($p < 0.001$) higher in the Tribal group (60%) as compared to the non-tribal group (45.9%). neonatal death was recorded in the Tribal group in the study. The incidence of preterm births was significantly higher in the NT group than T group. The study concluded that mothers with Hypertensive disorders in pregnancy remain an important maternal health problem in India. Tribal women are at higher risk of developing severe preeclampsia and eclampsia than nontribal women. Awareness is required for both the tribal and non-tribal groups and proper ANC checkups will improve the maternal & perinatal outcomes in these groups.[35]

A case-control study was carried out to evaluate the disease pattern and risk factors associated with the disorder and assess the maternal and fetal outcomes of HTN in pregnancy in Lucknow, UP, India. Cases were classified according to the National High Blood Pressure Education Program Working Group (2000) as having 65 mild preeclampsia, 32 severe preeclampsia, and 45 eclampsia cases were enrolled.

31 healthy pregnant normotensive mothers were enrolled in the study as controls. Results revealed that clinical features like 90% of cases had edema, and 26.76% had Proteinuria. 47% had increased levels of bilirubin, 6.4% had visual disturbances, 11.3 % had vaginal bleeding and HELLP syndrome was reported in 2.80%. Maternal deaths occurred in 2.8% of cases, all of which were from the eclampsia group. 16.9% of Stillbirths were reported with 4.23% of early neonatal deaths. The study concluded that hypertensive disorders during pregnancy were most likely to cause adverse perinatal outcomes as compared to normotensive mothers.[36]

Prospective cross-sectional hospital-based study was done from January 2016-January 2019 to determine the incidence of HDP and associated maternal and perinatal mortality and morbidity rates along with factors influencing it among pregnant women beyond 20 gestational weeks. Results revealed that out of five thousand four hundred and sixty deliveries, 27.6% mothers had gestational hypertension, 27.6% had mild preeclampsia, 33.6% mothers had severe preeclampsia, and 11.2% had eclampsia. 13.4% cases required NICU admission and 2.9% ended up in maternal deaths. perinatal mortality rate was 60 per 1000 births. While there was no correlation between perinatal mortality with parity or delivery method, perinatal deaths were more common in unbooked cases, preterm HDP, and considerably more common with SBP 160 mmHg, DBP 110 mmHg, and 2+proteinuria. HDP-related maternal and perinatal morbidity and death may be decreased by routine prenatal screening for HDP in all pregnant women and with appropriate and prompt therapies in women at risk.[37]

Facility-based retrospective cohort study was conducted to determine the survival status, incidence and predictors of perinatal mortality among mothers with pregnancy induced hypertension at antenatal clinics selected hospitals of Gamo zone from 1st January 2018 to 31st December 2018. Epi data version 3.02 and exported to SPSS V 25 were used for data analysis. Kaplan Meier survival curve together with the log-rank test was utilized to test the survival time. Study revealed that the rate of perinatal mortality was 124/1000 births. The cumulative proportion of surviving at the end of the fourth, eighth, twelve, and sixteenth weeks of follow-up among the exposed was 96.9%, 93.5%, 82.1%, and 61.6% respectively. The study concluded that mothers suffering from hypertensive disorders during pregnancy were likely to have more stillbirths. Multipara, lower gestational age, less number of antenatal care visits, LBW, antepartum onset of pregnancy-induced hypertension, and highest maternal systolic blood pressure level were the independent predictors of perinatal mortality.[38]

A prospective cohort was conducted with the objective to know type of hypertension affecting pregnant women and impact on perinatal outcome. Total of 120 women with hypertensive disorders of pregnancy (HDP) at gestation ≥28 weeks who delivered in selected institute were enrolled. Results observed that PE was most prevalent during pregnancy accounted for 44.2%, 27.50% eclampsia 23.3% gestational hypertension, and 5% of chronic hypertension. Among preeclamptic mothers 61.8% had Fetal growth retardation, preterm births accounted up to 65.5%, 74.6% had LBW and NICU admissions 54.1%. Among eclamptic mothers IUGR was recorded 42.9%, LBW recorded up to 80%, and 78.6% NICU admission. Apgar score was low among Eclampsia group at 1 minute, NICU admissions, and those requiring ventilator with odds ratio of 3.10 (95% CI: 1.37, 7.03), 4.48 (95% CI: 1.64, 12.24), and 4.09 (95% CI: 1.6, 10.46), respectively. Perinatal mortality among eclampsia, PE,

and gestational hypertension groups were 10, 9, and 2 respectively, with overall rate of 16.9%. Study concluded that hypertensive disorders are associated with increased risk of adverse perinatal outcomes as compared to PIH and Chronic Hypertension, vigilant antenatal care, necessitating screening, timely intervention, and referral.[39]

A hospital-based longitudinal case-series study to determine the optimum mode of delivery, as well as factors associated with the mode of delivery, in women admitted with eclampsia at selected hospitals in Kenya. A total of 53 patients diagnosed with eclampsia were treated and followed up to 6 weeks postpartum. However, 9.4% was the PMR. Parity was statistically associated with increased odds of adverse cesarean delivery ($p = 0.020$, OR = 4.7, 95% CI = 1.3–17.1) and perinatal outcomes ($p = 0.004$, OR = 9.1, 95% CI = 2.0–40.8). The study concluded that there is no benefit of emergency cesarean section for women with eclampsia. This study showed that vaginal delivery and induction of labor can be successfully achieved in pregnant women with eclampsia. Maternal and perinatal mortality from eclampsia can be prevented through prompt and effective care.[40]

A prospective study was carried out in labour room and N.I.C.U. of Rural Hospital, Loni for two years aim was to study the causes of perinatal deaths and the trends of early neonatal deaths. Results showed that the rate of perinatal mortality was 72.4% and 36.18 per 1000 live births was early neonatal mortality. Preterm babies and low birth weight babies contributed more in perinatal deaths. Asphyxia was found as most common cause of END. Study concluded that Birth asphyxia, RDS, septicemia were the leading causes of END. 2/3rd of all early neonatal deaths observed during first 72 hours of life out of which majority were in the first twenty-four hours of life.

Deaths due to birth asphyxia, RDS and congenital malformations were more in the 1st four days of life and those with septicemia occurred were observed later.[41]

A systematic review and meta-analysis of studies done on the effects of the pandemic on maternal, fetal, and neonatal outcomes. MEDLINE and Embase were used in accordance with PRISMA guidelines, from Jan 2020-Jan 2021, for case-control studies, cohort studies, and brief reports. Findings showed 3592 citations, of which 40 studies were included. It was observed that identified significant increases in stillbirth, of 168 295 pregnancies during and 198 993 before the COVID-19 and maternal death, 2 studies LMIC, (1 237 018 and 2 224 859 pregnancies) during versus before the pandemic. Preterm births were not significantly changed overall, whereas spontaneous preterm birth also decreased. The study concluded that The COVID-19 pandemic has resulted in worsening maternal and fetal outcomes worldwide, including a rise in maternal mortality, stillbirths, ruptured ectopic pregnancies, and mother depression. Some results reveal a significant difference between setups with high and low resources. Prioritizing safe, accessible, and equitable maternity care is urgently required in both the strategic response to the current epidemic and in response to upcoming health crises.[42]

A prospective maternal and newborn health registry in Belgaum, Karnataka State, India with the aim to inform public health policymakers about pregnancy outcomes in our district so that appropriate interventions to improve these outcomes could be undertaken and to position the district to be a leader in pregnancy-related public health research. From 2008 through 2014, we demonstrated continued improvements in both the coverage for enrollment and the accuracy of reporting pregnancy outcomes within the defined catchment area in Belgaum, India. Nearly

100% of women enrolled had follow-up at birth and 99% had a 42-day follow-up. Furthermore, we facilitated earlier enrollment of women during pregnancy while achieving timelier follow-up and decreased time of reporting from the date of the pregnancy event. The study concluded that understanding the elements of the system used to create the registry is important to improve the quality of the results. Tracking pregnancies with their outcomes is an important step toward reducing maternal and perinatal mortality.[43]

Open dynamic cohort design was carried out with the aim at estimating perinatal mortality and its predictors in Eastern Ethiopia using data from Kersa Health and Demographic Surveillance System (KHDSS). Results inferred that PM rate of 26.72 deaths per 1000 births; 95%CI 24.88 to. Rural residence (adjusted OR (AOR)=3.43; 95%CI 2.04 to 5.76), birth weight (low birth weight, AOR=3.98; 95% CI 3.04 to 5.20; big birth weight, AOR=2.51; 95% CI 1.76 to 3.57), not having antenatal care (ANC) (AOR=1.67; 95% CI 1.29 to 2.17) were associated with higher odds of perinatal mortality whereas the parity (multipara, AOR=0.46; 95%CI 0.34 to 0.62; grand multipara, AOR=0.31; 95%CI 0.21 to 0.47) was associated with lower odds of perinatal mortality. The study concluded that perinatal mortality rate was relatively high. Birth weight, parity, place of residence, and ANC were found to be perinatal mortality predictors. It may be essential for lowering perinatal mortality to develop initiatives that improve rural populations' access to and utilization of ANC services, as well as that of primipara women and newborns with low and large birth weights.[44]

A survey was carried out to describe inequalities in the Stillbirth Rate (SBR), Neonatal Mortality Rate (NMR), and uptake of maternal and newborn health services

between tribal and less disadvantaged groups in eastern India. Data was retrieved from the surveillance system a demographic covering of about 1 million population was studied. Results revealed that Particularly Vulnerable Tribal Groups had a higher NMR 59 per 1000 births as compared to OBC 31/1000 births. The uptake of facility-based services like institutional births was 25% as compared to OBC's 69 %. However, of the maternity vehicle used by the mothers 65% belonged to PVTG vs. OBC 34%. ASHA workers' number of visits was similar in both groups. The study concluded that in terms of birth outcomes, PVTGs were considered highly disadvantaged. interventions that were targeted to reduce geographical barriers to hospital-based care and root causes of high poverty and illiteracy in PVTGs are a priority. To improve socio-economic status broader policies should be framed to achieve population-level Impact.[45]

A descriptive cross-sectional study was carried out to explore the pattern and causes of perinatal deaths using the data of perinatal mortality for 3 years from September 2020 to June 2021. Results revealed that of 145 perinatal deaths from 144 mothers, 63.5% of babies were males. 6.9%(10) mothers had no history of ANC visits, 22.9% (32) had maximum 2-3 visits. At least 1 cause of death was identified 78.6% (114) and 21.4%(31) cases were unknown. The cause of death out of 28 macerated SBs, 50%(14) were not identifiable, and preterm labor was the cause of death in 14.3%(4). Of 53 of the fresh stillbirths, intrapartum hypoxia was identified as the cause of death among 37.7% (20) cases, preterm labor in 17% (9), and 15 (28.3%) cases were left unknown. Among 64 early neonatal deaths, prematurity was the cause of death in 50% (32) cases, birth asphyxia, and infections each in 17.2% (11). The study concluded that Prematurity and preterm labor was identified as the commonest

cause of END. The exact causal relationship of perinatal deaths should be investigated which can be useful to develop prevention strategies.[46]

Population-based cohort was carried out to investigate the associations between preconception thyrotropin levels and pregnancy outcomes among Chinese women aged 20 to 49 years from the National Free Pre-pregnancy Checkups Project in China. Results revealed that total 5 840 894 mothers were enrolled. Results showed that a total of 5 840 894 ladies had signed up. Thyrotropin levels were 1.60 (1.06-2.37) mIU/L on average. In the present research, perinatal outcomes included PTB (6.56% of preterm births were observed), birth defects (0.02%), and perinatal infant mortality (0.33%). Both low (.001), SGA, and perinatal infant mortality were found in comparison to the reference group. The study concluded that both low and high maternal thyrotropin levels were significantly linked to an increased chance of unfavorable pregnancy outcomes. According to the findings, the ideal thyrotropin levels prior to conception may range between 0.37 mIU/L and 2.50 mIU/L in order to avoid unfavorable pregnancy results.[47]

A retrospective case-control study to investigate thyroid dysfunction assessed in the second half trimester contributed to neonatal outcomes of pregnancy in different subtypes of gestational hypertension disease. Results revealed that LBW & gestational weeks were significantly lower, while SPE and E groups had a higher incidence of preterm birth than those in the PIH group. Most mothers with SPE had Thyroid dysfunction. Mothers with thyroid dysfunction had significantly higher incidences of both preterm birth ($P = 0.008$) and low birth weight($P = 0.047$). study concluded that thyroid dysfunction and severe and early-onset preeclampsia are linked to an increased chance of preterm birth and low neonatal weight. Our findings suggest

that thyroid hormone monitoring in preeclamptic women may aid in the early detection of poor neonatal outcomes.[48]

An Executive Summary for The Lancet's Series on Ending preventable stillbirths: This five-paper series on preventing stillbirths examines the current situation with stillbirths, finds lost opportunities, and suggests actions for quick advancement towards the 2030 goals for maternal, neonatal, and child survival. High number of avoidable deaths: It is believed that 2. 6 million stillbirths take place each year, with 98% of those deaths taking place in LMIC and 75% of those occurring in South Asia and Sub-Saharan Africa. 1. 3 million stillbirths, or 50% of all pregnancies, happen during labor and delivery. The majority are preventable and are caused by obstetric complications, non-communicable illnesses, and maternal infections (particularly syphilis and malaria). Few of these are caused by congenital diseases, but some of these can be avoided. 1. 3 million stillbirths, or 50% of all pregnancies, happen during labor and delivery. The majority are preventable and are caused by obstetric complications, non-communicable illnesses, and maternal infections (particularly syphilis and malaria). Few of these are caused by congenital diseases, but some of these can be avoided.[49]

A systematic literature search was done to examine the risk of adverse pregnancy, perinatal, and early childhood outcomes among women with SCH treated with levothyroxine. 7 randomized controlled trials and 6 observational studies were included in the systematic literature. Results inferred that out of 7 studies, only 1 study was completely blinded, others showed a number of bias-inducing factors, including a lack of participant or research staff blinding. Few observational studies failed to control the confounding factor, participant selection, and selective reporting

of findings, there was a moderate to severe risk of bias. Levothyroxine treatment during pregnancy among women with SCH was linked with a lower risk of miscarriage (RR 0.79) and neonatal death (RR: 0.35). The study concluded that to address the advantages of levothyroxine use among pregnant women with SCH, additional studies are required due to the dearth of accessible data and heterogeneity of the included studies.[50]

A descriptive study is conducted to evaluate the trends in institutional delivery, PMR, NMR, and their risk factors in two Research sites, Belgaum and Nagpur, India. For 36 geographic clusters, 48 months of data from a prospective, population-based surveillance system that registers all pregnant permanent residents in the study area and their pregnancy outcomes regardless of where they deliver were analyzed. Descriptive data were stratified by level of delivery care and key risk factors. Results revealed that 64,803 deliveries were recorded in Belgaum and 39,081 in Nagpur. Institutional deliveries increased from 92.6% to 96.1% in Belgaum and from 89.5% to 98.6% in Nagpur. PNMR was 40.8 per 1000 births in Nagpur and 34.6 in Belgaum. The rate of Sb's was 21.1 per 1000 births in Nagpur and 16.3 per 1000 births in Belgaum. There was no change in NMR. The study concluded that there was a significant reduction in stillbirths and PMR due to increases in institutional deliveries, particularly in hospitals.[51]

A prospective population-based survey was carried out to describe baseline demographics and health outcomes prior to initiation of the CLIP trial and to improve knowledge of population-level health, in particular of maternal and neonatal outcomes related to hypertensive disorders of pregnancy, in 8 clusters in Bagalkot and Belgaum districts in Karnataka. Maternal and Newborn Health registry was used to collect data.

Results inferred that from 5448 mother's delivery outcomes were collected. 96% institutional deliveries took place which were attended largely by skilled birth attendants. NMR was 25 per 1000 births, and PM was 50 per 1000 births. Interventions like Early registration and close follow-up and monitoring procedures were recommended by the Maternal and Newborn Health registry allowed for negligible lost to follow-up. Regional rates of maternal and neonatal health in the Karnataka cities of Belgaum and Bagalkot are provided by this population-level study. In order to inform policy and practice, the mortality ratios and morbidity data can be used to plan interventions and track effectiveness metrics. To monitor inequities identified in rural areas and assess maternal health advancements and problems, comprehensive regional epidemiologic data, such as that presented here, is crucial.[52]

A retrospective cohort study from the Consortium on Safe Labor was done to compare maternal and neonatal outcomes among women suffering from hypertensive disorders during pregnancy. A total of 4918 mothers with GHTN, 5274 mothers with PE, 2531 mothers with chronic hypertension, and control subjects were 15,221. Mothers suffering from GHTN had the higher risk for blood transfusion aOR 4.6; (95%[CI], 3.4 – 6.3), ICU admission aOR, 25.7;(95% CI, 9.8 – 67.3), and lowest risk for SB aOR, 0.1; (95% CI, 0.04 – 0.4); mothers suffering from preeclampsia had the greatest risk for postpartum hypertension aOR, 9.6; (95% CI, 7.2– 12.9). Neonates borne to mothers with GHTN had the highest risk for ventilator requirements aOR, 7.5;(95% CI, 4.6 –12.4). The study concluded that there was an increased risk of neonatal morbidity associated with gestational hypertension, compared with mothers having mild chronic HTN and those with mild PE.[53]

A hospital-based prospective observational study was conducted to determine the maternal and neonatal outcome of PE without severity feature among mothers managed at a tertiary referral hospital in Ethiopia. A total of 5400 deliveries were involved in the study, among which 3% (164) women were diagnosed with PE without severe features. Gestational age between 28 to 33 weeks plus six days were presented with preeclampsia without severe features 31.1% (51), while 68.9% (113) presented between 34 weeks to 36 weeks of gestation. 31.7% (52) of women had maternal complications of which, 19.5% (32) progressed to preeclampsia with severe features. Patients with early preeclampsia without severe features had a P value of 0.0001 (95% CI 2.01-13.6) and 0.0001 (95% CI 5.75-115.6) and were 5.22 and 25.9 times more likely to experience maternal and perinatal complications than those with late-onset preeclampsia after 34 weeks.[54]

A cross-sectional study was done to determine the association of adverse obstetrical and perinatal outcomes with advanced maternal-age pregnancy. Results revealed that advanced maternal age in pregnancy was significantly associated with PIH [AOR 4.15, 95% CI (2.272–7.575), $p < 0.001$], cesarean delivery [AOR 2.722, 95% CI (1.777–4.170), $p < 0.001$] and APH [AOR 2.54, 95% CI (1.32–4.91), $P = 0.005$]. Furthermore, advanced maternal age was also highly associated with adverse perinatal outcomes like LBW [AOR 3.137, 95% CI (1.324–7.433), $p = 0.009$], preterm delivery [AOR 3.622, 95% CI (1.469–8.930), $p = 0.005$], perinatal death [AOR 2.54, 95% CI (1.141–5.635), $p = 0.022$] and low APGAR score at 5 minutes [AOR 7.507, 95% CI (3.134– 17.98), $p < 0.001$]. The study concluded that Advanced maternal age is markedly associated with adverse maternal and perinatal outcomes. Counseling of eligible couples, about the risks of advanced maternal age in pregnancy by ASHA workers plays an important role in reducing obstetrical complications and

perinatal outcomes. Additionally, healthcare professionals must stress the use of contraception to prevent pregnancy in this age group in order to improve the health of mothers who are older.[55]

A document review was conducted to assess the association between different management options of preeclampsia and perinatal death among 241 preeclamptic mothers' medical files who have been admitted and delivered in Ethiopia from 2011 to 2016. Results reported that 76.59% loss of neonates from preeclamptic women, and 23.4% of death among neonates from severe preeclamptic women than mild preeclamptic women ($p = 0.01$). Perinatal death among mothers with diastolic blood pressures greater than 110 mmHg at admission was nearly 3 times (AOR) = 2.824; 95%CI (1.154–6.038) had perinatal deaths as compared to women with diastolic blood pressures below 110 mmHg. The study concluded that, among inpatient preeclamptic women the magnitude of perinatal death was remarkably high. Maternal diastolic blood pressure at admission was significantly associated with perinatal death.[56]

A comprehensive literature search was carried out using Google Scholar, MEDLINE, and Embase to summarize the clinical manifestations of maternal and perinatal outcomes of COVID-19 during pregnancy. Eligibility criteria included peer-reviewed publications written in English and quantitative real-time polymerase chain reaction (PCR) or dual fluorescence PCR-confirmed SARS-CoV-2 infection. 18 articles reporting data from hundred and eight pregnancies between December 2019 - April 2020 were included. The majority of cases were reported to include women who presented in the third trimester with fever (68%) and coughing (34%), according to the findings. Lymphocytopenia (59%) and increased C-reactive protein (70%) were

noted, and 91% of the women gave birth via cesarean section. There were three admissions for mothers to the ICU, but no mothers passed away. There was also a report of one IUD and one neonatal death. Although the majority of mothers were released from the hospital without experiencing any significant complications, the study found that severe maternal morbidity due to COVID-19 and perinatal deaths were reported. The possibility of COVID-19 vertical transmission was not completely eliminated. Measures to prevent neonatal infection are necessary, as well as careful monitoring of pregnancies with COVID-19.[57]

Population-level cross-sectional study to estimate the risk for adverse perinatal outcomes for women who met the International Association of Diabetes and Pregnancy Study Groups (IADPSG) criteria but not the two-step criteria for gestational diabetes mellitus (GDM). Results revealed that Women who met the IADPSG criteria had an increased risk for all adverse perinatal outcomes compared with women who did not have GDM. Women with GDM by two-step criteria also had an increased risk of most outcomes. However, their risk for large-for-gestational-age neonates and for shoulder dystocia was actually lower than that of women who met IADPSG criteria. The study concluded that Women who met IADPSG criteria but who were not diagnosed with GDM based on the current two-step diagnostic strategy, and were therefore not treated, had an increased risk for adverse perinatal outcomes compared with women who do not have GDM. The current strategy for diagnosing GDM may be leaving women who are at risk for adverse events without the dietary and pharmacological treatments that could improve their pregnancy outcomes.[58]

A retrospective, single-center study was done to comprehend the clinical characteristics and obstetric and neonatal outcomes of pregnant patients with COVID-

19. Results revealed that 7 patients, admitted to Hospital from 1st Jan to Feb 8, 2020, were included in our study. The patients' mean ages ranged from 29 to 34 years, and the mean gestational age was 39 weeks plus 1 day. Clinical manifestations were 86% of mothers had fever, 14% had cough, shortness of breath and diarrhea. The average gestational age of the mothers was 39 weeks and all had C-sections within three days of their initial presentation. The outcomes for the expectant mothers and newborns were favorable. One of the three newborns who underwent SARS-CoV-2 testing was found to have the virus 36 hours after birth. According to the study's findings, patients who had the infection in the late stages of pregnancy looked to have extremely favorable maternal, fetal, and neonatal outcomes. These outcomes were attained by intense, aggressive therapy, which may be the best course of action in the absence of more reliable data. These patients with COVID-19 during pregnancy shared many of the same clinical traits as adults without pregnancy who have been described in the literature.[59]

A comprehensive review was conducted to assess the adverse perinatal effects of intrahepatic cholestasis in pregnant women with elevated blood bile acid concentrations and assess if these conditions enhanced the risk of stillbirth and premature delivery. Since June 1st, 2018, databases like PubMed, Web of Science, and Embase have been used. Studies identifying intrahepatic cholestasis of pregnancy based on pruritus and increased serum bile acid concentrations, with or without increased liver aminotransferase concentrations, were required to meet the inclusion criteria. Case-control, cohort, population-based, and randomized controlled trials reporting bile acid concentrations and perinatal outcomes with at least 30 individuals qualified as eligible research. Results showed that out of 4936 cases of intrahepatic cholestasis during pregnancy, 0-91% (45) experienced stillbirth, compared to 0.32%

(519) of the 163947 control pregnancies. The highest total bile acid content was linked to stillbirth in singleton pregnancies [ROC AUC]: 083 [95% CI: 074-092]). When it came to singleton pregnancies, the prevalence of stillbirth was 3 (0.13%) of 2310 intrahepatic cholestasis of pregnancy cases in women with serum total bile acids of less than 40 mol/L compared to 4 (0.28%) of 1412 cases with total bile acids of 40-99 mol/L and compared to 18 (3.44%) of 524 cases for bile acids of 100 mol/L or more. The study came to the conclusion that women who have intrahepatic cholestasis during pregnancy and singleton pregnancies had a higher risk of stillbirth when serum bile acid concentrations are 100 mol/L or above. Given that most pregnant women with intrahepatic cholestasis have bile acids below this concentration, it is likely safe to reassure them that their risk of stillbirth is comparable to that of pregnant women in general, as long as they continue to undergo bile acid testing up until delivery.[60]

A retrospective observational study was done to identify a prenatal diagnosis of congenital limb differences, evaluate Neonatal outcome characteristics, and identify predictors of worse perinatal outcomes. Results reviewed that, 6.7% stillbirths were observed, and 56.7% had live-born delivery. Rates of preterm delivery and transfer to the Neonatal Intensive Care Unit were 42.4 and 25.4%, respectively. One hundred twenty-four cases of congenital limb abnormalities were found, of which 84.1% (104 cases) were studied. A fetal syndrome was identified among 63.5% of patients; clubfoot and longitudinal reduction defects were the most frequent malformations. In total, 38 patients (36.5%) underwent termination. The study came to the conclusion that preterm birth and high rates of stillbirth are connected with congenital limb abnormalities, which usually occur bilaterally. It is necessary to receive multidisciplinary care and be referred to a perinatal center.[61]

A study was conducted, Chengalpattu To study the risk factors, prevalence and epidemiological parameters of antenatal mothers on hypertensive disorders of pregnancy including mild, severe preeclampsia, eclampsia, and chronic hypertension at Chengalpattu Medical College Hospital. Results inferred that Out of 450 hypertensive pregnancies, the majority were suffering from severe preeclampsia (39.6%). There were 17.3%(78) women had gestational hypertension, 27.8%(125) women with mild preeclampsia, 39.6%(178) women with severe preeclampsia, 64 women with eclampsia out of which 52 were AP eclampsia (11.6%), 1 case was IP eclampsia (0.2%) and 11 women were PP eclampsia (2.4%). 1%(5) women were chronic hypertensives. According to the study's findings, complications can have an impact on all of the maternal systems, including the hematological, renal, and central neurological systems. In addition to this, the fetus takes the brunt of the insult. Prematurity, low birth weight, stillbirths, intrauterine deaths, and limitations on intrauterine growth are all examples of fetal difficulties. Simple blood pressure monitoring and appropriate follow-up of the mother during pregnancy can, however, avoid such severe consequences.[62]

A study was done to identify and quantify the disparities in stillbirth risk factors, causes and fertility risk behaviors. Data were derived from the Pakistan Demographic and Health Surveys (PDHS). Results revealed that the overall ARR for stillbirth was found to be -12.52% annually. Highest wealth quantile, metropolitan locations, educated moms, and mothers under the age of 20 were associated with high ARR. The wealth quintiles, education, and mother's age showed the greatest relative inequalities. Stillbirth causes were 33% unexplained antenatally, 21% unexplained intrapartum, 21% accounted for intrapartum asphyxia with 19% of antepartum maternal disorders. Mothers who were older than 34 and had a higher birth order

exhibited high fertility risk behavior. The study came to the conclusion that antenatal care, birth spacing, and family planning programs need to be promoted in underdeveloped nations in order to increase child survival.[63]

A meta-analysis of demographic and health surveys to measure perinatal mortality rate in Eastern Africa, Western Africa, Southern Africa and Central Africa and country-specific differences. Results revealed that the estimate for perinatal mortality rate per 1000 births across twenty one countries in the four sub-regions of SSA was 34.7 (95% CI: 32.6, 36.8). it was observed that 34.5 (95% CI: 32.2, 36.8) in Eastern Africa with the highest rate observed in Tanzania [39.5 (95% CI: 35.8, 43.4)]. 35.7 (95% CI: 32.2, 39.3) was in Western Africa reported, with the highest rate observed in Nigeria [40.9 (95% CI: 38.3, 43.2)]. Southern Africa reported 30.3 (95% CI: 26.5, 34.0), with the highest rate observed in Lesotho [49.6 (95% CI: 42.3, 57.8)]. Central Africa reported 30.7 (95% CI: 28.0, 33.3), with the highest rate observed in Equatorial Guinea [37.3 (95% CI: 30.5, 45.1)]. The study concluded that to witness a reduction in perinatal mortality, interventions that focus on improving access to high-quality of antenatal and postnatal care, as well as strengthening health care systems within countries in sub-Saharan Africa.[64]

A hospital-based observational study was conducted to know the causes of stillbirths in fetuses at 22 weeks of gestation or with birthweight at least 500 grams in Africa. Investigations included placental macroscopic examination, histological analysis, and fetal blood culture. Results revealed that a total of 354 stillbirths were documented. The mean age of the mother was 27 years 38%, 27%, and 2% of them had syphilis, HIV, and hypertension respectively. Of the 341 fetuses 18% experienced intrauterine growth restriction. Of the 298 cases with complete samples, pathological

placental disorders accounted for 19%, maternal medical conditions for 21% of the cases, and placental or fetal infections for 16% or 19% of the causes of stillbirth. Of these, 9% of the patients had inflammation of the fetal membrane and the placenta, and 9% of the cases had circulatory issues. Structural, genetic, or fetal abnormalities were discovered to be the cause of 2% (6) of stillbirths. Uncertain causes of death were present in 18% of cases. According to the study's findings, specialized investigations of stillbirths can commonly identify the stillbirth's cause without a fetal autopsy. Prioritizing actions aimed at lowering stillbirths globally will require more studies based on such investigations.[65]

Hospital-based cross-sectional study was conducted to assess fetal and neonatal outcomes of mothers with hypertensive disorders of Pregnancy. Before being employed in the study, the checklists from the study on the prevalence of hypertensive disorders in pregnancy among mothers visiting the delivery ward of the hospital were used as a base. Results revealed that the health of fetuses and newborns can be negatively affected by preeclampsia and eclampsia. In contrast to multiparous women, nulliparous women were about five times more likely to experience an adverse outcome (AOR 4.85; 95% CI: 0.064-12.442). The study concluded that Pregnancy hypertension is linked to a higher chance of unfavorable fetal and neonatal outcomes. Therefore, getting a timely diagnosis and the right treatment is crucial.[66]

To compare the results for women with Indigenous babies getting treatment through a new service to moms receiving routine care, a prospective cohort study was conducted. Results showed that 6.9% of women who received the new service had a decreased likelihood of giving birth to a preterm baby than 11.6% of women receiving traditional care. After adjusting for covariates, the new service significantly reduced

the chance of having a preterm birth (OR = 057, 95% CI 037, 089; matched, n = 690: OR = 050, 95% CI 031, 083). According to the study's findings, the preterm birth gap may be closed via focused initiatives that enhance Indigenous control of maternity services and offer continuity of midwifery care, an integrated approach to supporting family services, and a community-based center.[67]

A cross-sectional study was conducted to determine the causes of poor perinatal outcomes in pregnant women with hypertension disorders at selected teaching and referral hospitals, in Ethiopia. Results revealed that there was 2.3% incidence of hypertensive disorders during pregnancy was found, out of the 7, 347 deliveries made during the study period, 72.5% of mothers had normal delivery and 26.1% of mothers had Caesarean sections. It was observed that there were 111.1 perinatal deaths for every 1000 live births. Poor perinatal outcomes were found to be related to variables like ANC visits, referral status, types of HDP, diastolic BP, maternal complication, Birth weight, and maternal outcome. Multiple logistic regression revealed that maternal outcome and fetal weight at birth were independent predictors of a poor perinatal outcome. According to our research, tertiary hospitals, where quality obstetric care is expected and emergency obstetric and newborn care standards are established, had higher rates of perinatal mortality.[68]

A Demographic and Health Survey dataset of Nepal was analyzed to assess the favorable causes of perinatal death. Results inferred that the perinatal mortality rate PMR was 42 per 1000 births over the research period, while the EPMR was 49 per 1000 births. According to multivariable analyses, women who resided in the mountains did not use birth control, were between the ages of fifteen to twenty-four years old, and had no formal education had higher perinatal mortality. Additionally,

households that admitted to open defecation or using biomass as a fuel source for cooking had a markedly higher risk of experiencing PM. The study came to the conclusion that efforts to increase the use of contraceptives and decrease biomass as a source of cooking fuel are necessary in order to achieve the stated goal of 12 perinatal deaths per 1000 births by 2030.[69]

A secondary study of surveillance data from two significant population-based cluster RCTs in Ghana was conducted with the purpose of evaluating the impact of facility birth factors on various mortality outcomes and service quality**.** Results showed that there was no correlation between greater rates of facility births within a cluster and lower rates of any type of mortality. Women were less likely to experience intrapartum stillbirth and composite mortality outcomes when they lived close to facilities that offered comprehensive emergency obstetric care (CEmOC), emergency newborn care, high-quality routine care, or facilities with providers who were qualified (14/2 per 1000 deliveries at >20 km vs 10/4 per 1000 deliveries at 1 km; odds ratio [OR] 1-13, 95% CI 106-121) than those who did not. The study's conclusions include that only environments that can protect straightforward deliveries and offer emergency obstetric and infant care should be recommended for facility births.[70]

Justification

- All stillbirths of any gestational age are potentially preventable.
- Following the gestational age/birthweight cutoffs, the most common reasons for a stillbirth not being considered potentially preventable were the presence of a major congenital anomaly, an undiagnosable fetal infection, and no signs before delivery to alert the clinician to a potential stillbirth.
- Prematurity was identified as the commonest cause of early neonatal deaths and preterm labor was the commonest cause responsible for perinatal deaths overall.
- Place of residence, ANC, parity, and birth weight were identified as predictors of perinatal mortality.
- Recent studies reported that in this pandemic COVID-19 is associated with high prevalence of preterm birth, preeclampsia, and caesarean section compared to non—COVID pregnancies.
- Maternal and perinatal mortality from eclampsia can be prevented through prompt and effective care.
- The World Health Assembly endorsed a target of 12 or fewer stillbirths per 1000 births in every country by 2030.
- Thus, there is a scope to conduct research to understand the determinants of perinatal mortality.

CHAPTER III

MATERIALS AND METHODS

This chapter deals with the different steps undertaken by the investigator. It includes the description of the research approach, research design, setting, population, sample and sample size, sampling technique, sampling criteria, selection of tool, data collection procedure and the plan for data analysis.

3.1 Research Approach

A descriptive research approach was used in this study to examine the determinants of perinatal mortality.

3.2 Study Design

The study design adopted for the present study is a case series study design. It was a prospective cohort. All the neonates born to the mother were followed up till the 7th day of birth.

3.3 Study Population

All the pregnant mothers delivering in the labor room and maternity wards of selected tertiary care hospitals, Belagavi city.

3.4 Sampling Technique

Consecutive mother's delivery with gestation of 28weeks or newborn weighing 1000gm or more.

3.5 Sample Size

- The total **sample size was 3416 which was rounded up to 3500**
- Sample size was determined by using following formula

$$n = Z_{1-\alpha/2} \diagup d^2 * SD^2$$

- Sample size is computed considering 30 per 1000 perinatal mortality, usually taken at a 95% Confidence Interval as 1.96 with tolerable error (in the present study d is 28%)
- Considering the above formula, the sample size is calculated as 3416 and rounded off 3500.

3.6 Sampling Criteria

Inclusion criteria: mothers who were:

- All mothers with 28 gestational weeks and more delivered in tertiary care hospitals with 1000gm of birth weight.

Exclusion criteria: Mothers who were:

- Mothers of the baby suffering from systemic diseases.

3.7 Study Variables

- **Socio-demographic variables**: Demographic characteristics included in the study are will be Age, Educational Qualification, Occupation, Gestation, Parity, Height, Weight

- **Independent variable:**
  - ✓ Gestational age,
  - ✓ Weight of the mother,
  - ✓ Health of the mother
- **Dependent variables:** Birth outcome like the weight of the newborn, Apgar score, etc.
- **Extraneous variables**
  - ✓ Family problem
  - ✓ Domestic violence
- **Outcome Variables:** Determinants of Perinatal Mortality.

3.8 Setting of the study

The research took place in the labor room and postnatal ward of KLE's Dr. Prabhakar Kore Hospital and Medical Research Center in Belagavi, Karnataka, India. This is a tertiary care facility that receives patients from all around the country. The labor room and the postnatal ward, this population could be a good approximation of India's overall population.

3.9 Ethical and administrative deliberations

Approval from the Institutional Ethical Committee (IEC): Ethical clearance was obtained from the Institutional Ethical Committee of KLE University, Belagavi (Annexures I).

Hospital authority: Formal permission was obtained from the medical superintendent of the selected tertiary care Hospital, Belagavi (Annexure II).

Patient's consent: Written informed consent was obtained from the mothers after explaining the procedure and their role in the study (Annexure III).

3.10 Data collection instruments and Procedure

3.10.1 Portrayal of the tool: The following tools were used

Modified Maternal Newborn Health (MNH) Registry

The Global Network for Women's and Children's Health Research created this standardized tool which was modified for the present study(Annexure III). It has five Sections.

MNH registry was divided into 5 parts

Section I : Socio demographics of mother

Section II : Status of Mother and delivery outcome

Section III : Neonatal Conditions & outcomes

Section IV : Neonatal Treatment

Section V : Follow-up form

3.10.2 Data collection procedure

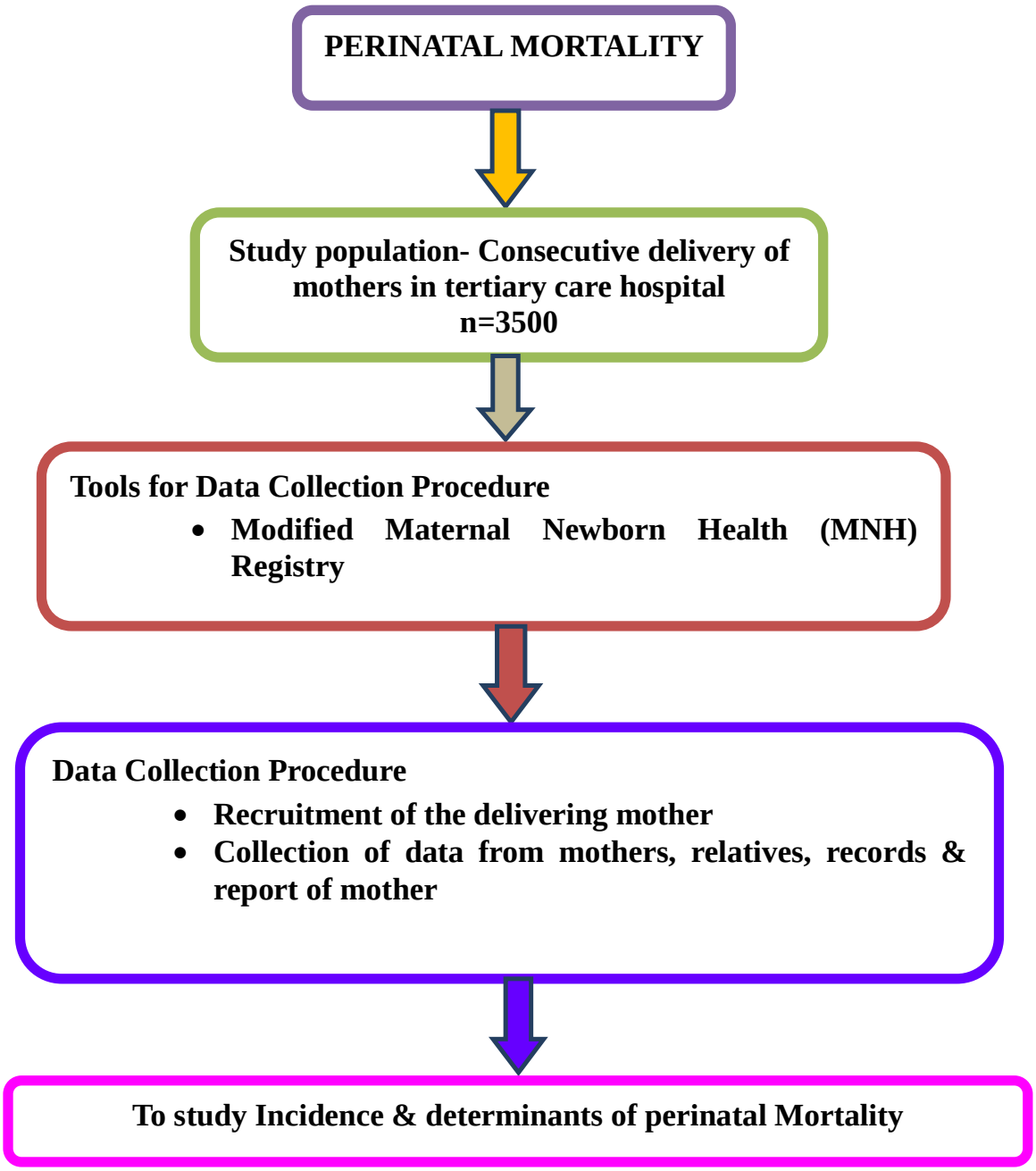
- Approval from the Institutional Ethics Committee was obtained
- Permission was obtained from the following authorities:
    - Medical Superintendent, KLE's Dr. Prabhakar Kore Charitable Hospital, Belagavi

- Consecutively selected mothers from labor room, post operative ward and maternity ward were briefed about the study and consent forms were distributed to obtain signatures at bed side.
- The purpose of the study was explained to mothers and relatives during data collection and consent was taken from every subject.
- Data collection started by administering the Maternal and Newborn Health registry questionnaire.
- Mothers with C-sections and babies who were admitted to NICU were followed up in the hospital till 7^{th} day
- Mothers with normal delivery were followed up in the hospital till 5^{th} day
- At the discharge, mothers were told to inform their newborn health to Asha workers or health assistants in specific areas.
- Consecutive mother's delivery with a gestation of 28 weeks or newborns weighing 1000gm or more were selected.

Conclusion

This chapter has dealt with the research approach, research design, variables, setting of the study, population, sample, sampling technique, development of the tool, description of the tool, and method of data collection.

Figure 3: Flow chart data collection procedure



CHAPTER IV

DATA ANALYSIS AND RESULT INTERPRETATION

In this chapter, data was collected from 3508 delivered mothers and followed up until 7th day to study the incidence and associated risk factors of perinatal mortality in a selected tertiary care hospital.

Descriptive analysis was carried out by frequency and proportion for categorical variables. Binary logistic regression analysis was performed to test the association between the explanatory variables and outcome variables. The odds ratio along with 95% CI is presented. P-value < 0.05 is considered an association between an outcome variable and an explanatory variable. IBM SPSS version 22 was used for statistical analysis.

The objectives of the study were

1. To study the incidence and associated risk factors of perinatal mortality in a selected tertiary care hospital.
2. To find out the association between perinatal mortality with maternal and neonatal factors.

The findings obtained were presented in the form of tables and figures which represented as follow:

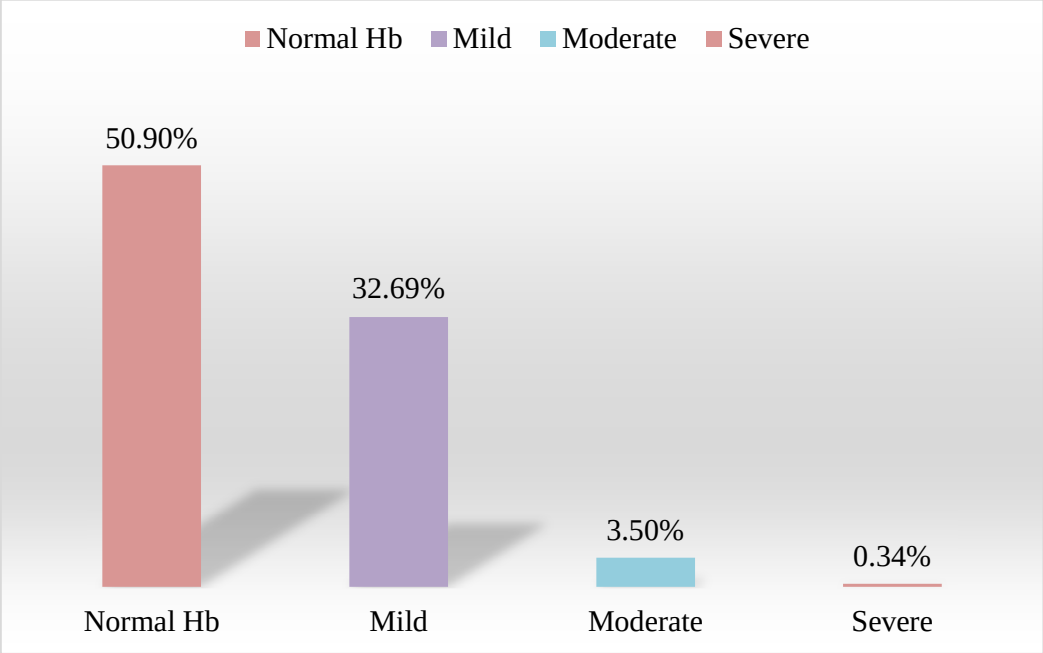
- **SECTION I:** Description of demographic characteristics
- **SECTION II:** Findings related to Perinatal mortality rate
- **SECTION III**: Description of maternal determinants of perinatal mortality

- **SECTION IV**: Description of factors responsible for perinatal mortality
- **SECTION V**: Findings related to Birth weight and Perinatal Mortality
- **SECTION V**I: Area wise distribution of perinatal death
- **SECTION VII:** Multiple logistic regression analysis of prevalence of perinatal mortality by gestational age
- **SECTION VIII:** Association between perinatal mortality with maternal parameters in pregnancy
- **SECTION IX:** Logistic regression analysis of prevalence of perinatal mortality by pregnancy parameters
- **SECTION X:** Multiple logistic regression analysis of prevalence of perinatal mortality by signs of maceration
- **SECTION XI:** Association between perinatal mortality with neonatal conditions and outcome
- **SECTION XII:** Association between perinatal mortality with determinants of PM

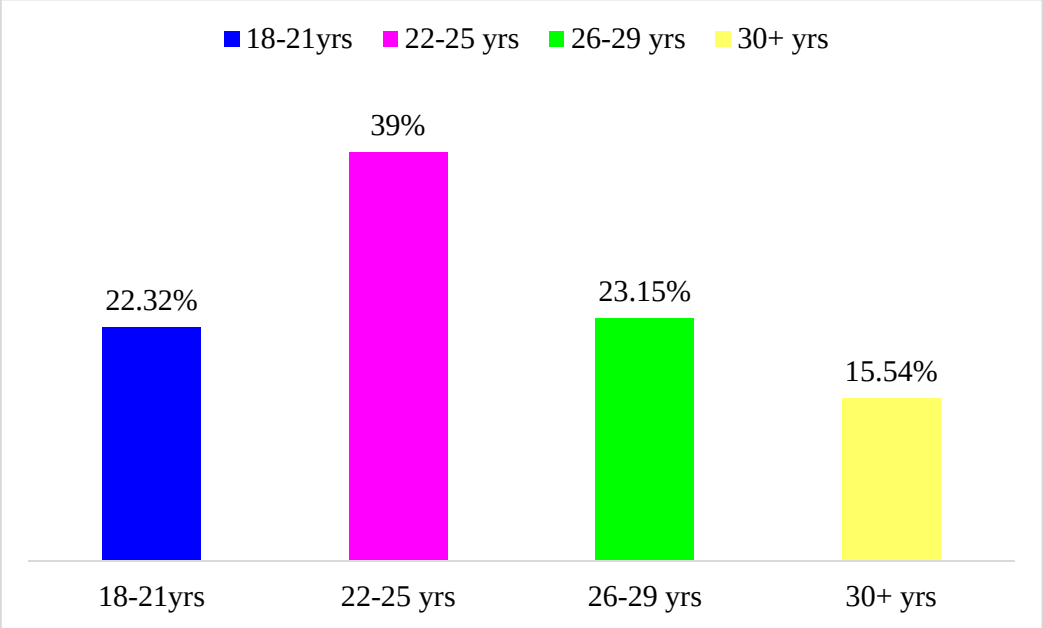
4.1 SECTION I: DESCRIPTION OF DEMOGRAPHIC CHARACTERISTICS IN HDP AND NHDP GROUP

This section deals with description of demographic characteristics of subjects and it is presented in frequency and percentage with the use of table and Roc curve

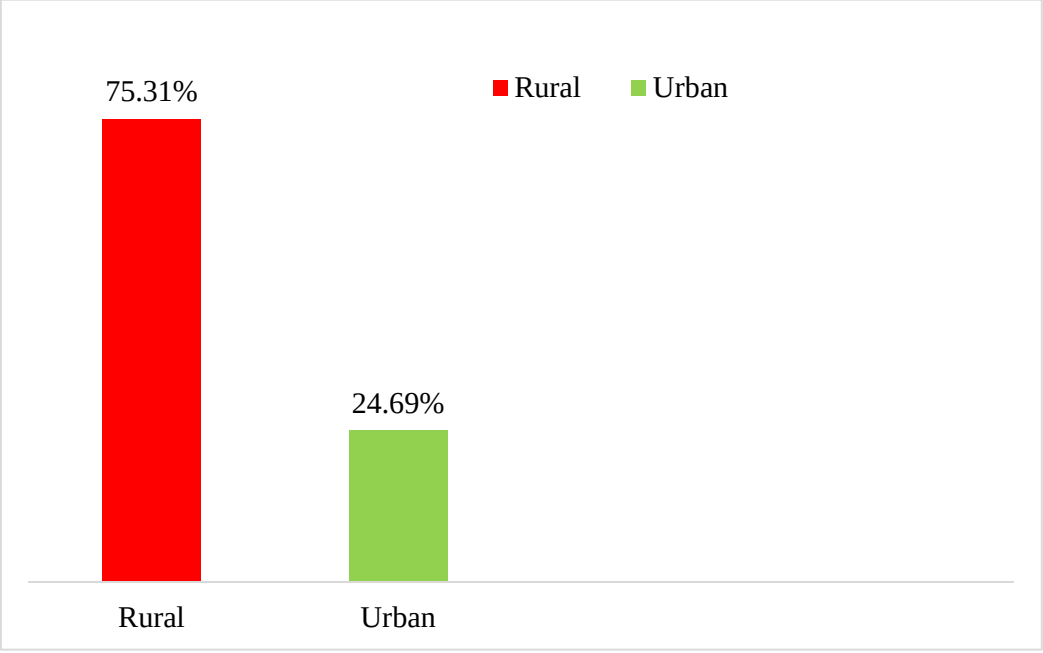
Section 1: Distribution of socio-demographic variables of mother (n=3508)



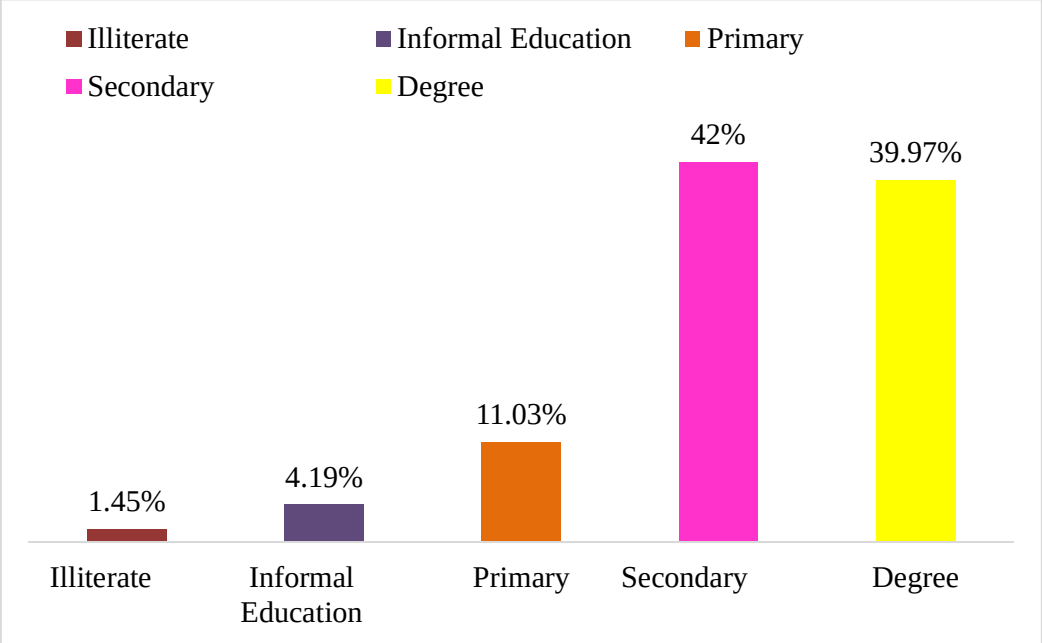
GRAPH 1: BAR GRAPH SHOWING DISTRIBUTION OF LEVEL OF MATERNAL HEMOGLOBIN



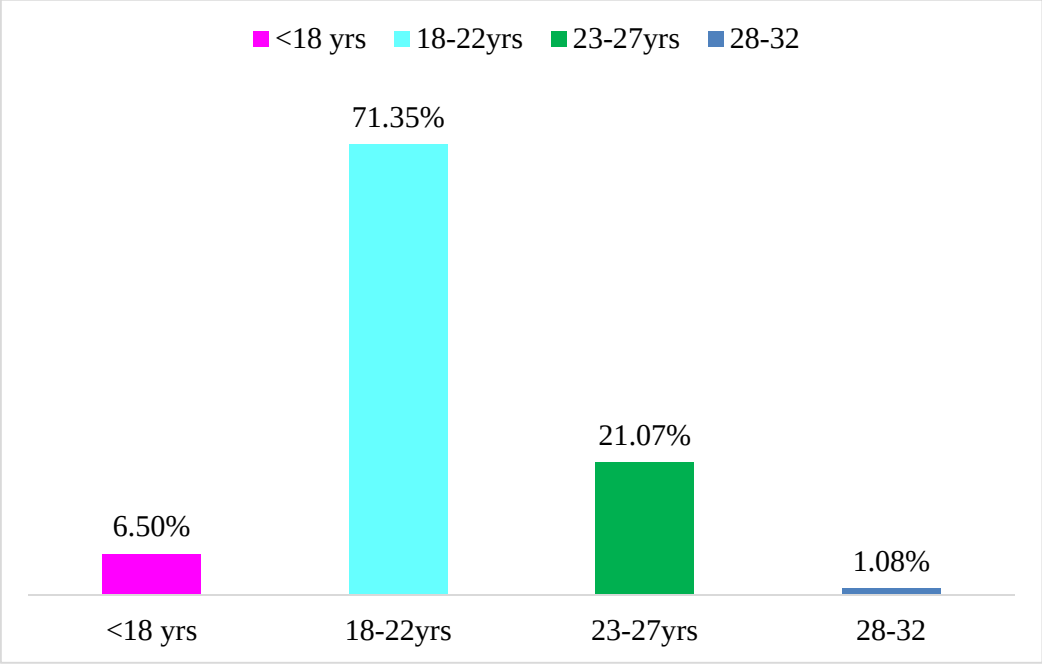
GRAPH 2: BAR GRAPH SHOWING DISTRIBUTION OF MATERNAL AGE GROUP AT THE TIME OF DELIVERY



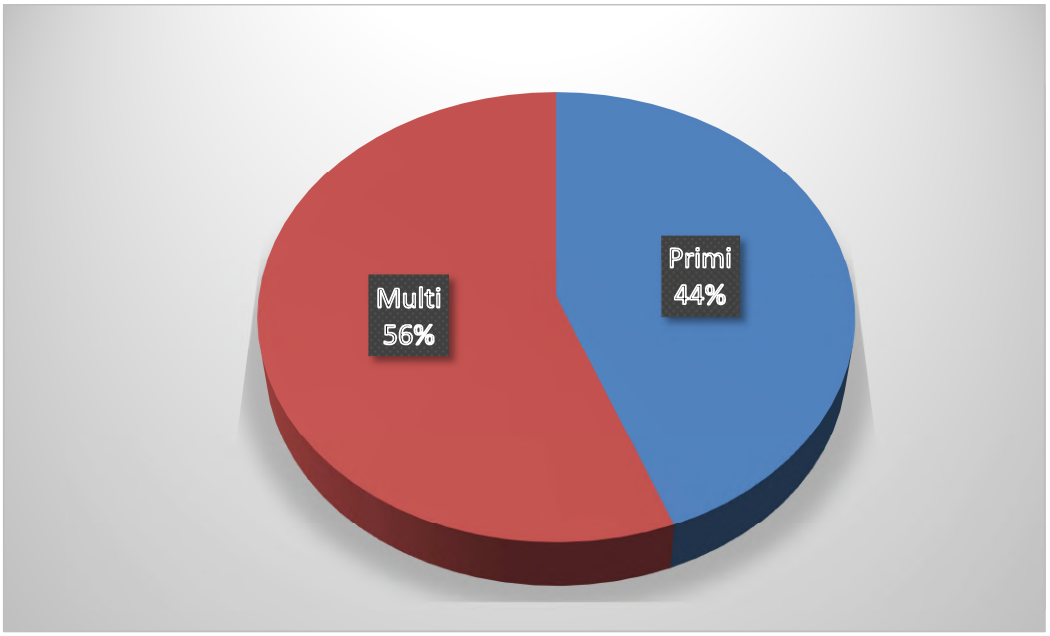
GRAPH 3: BAR GRAPH SHOWING DISTRIBUTION OF MOTHERS BY AREA OF RESIDENCE



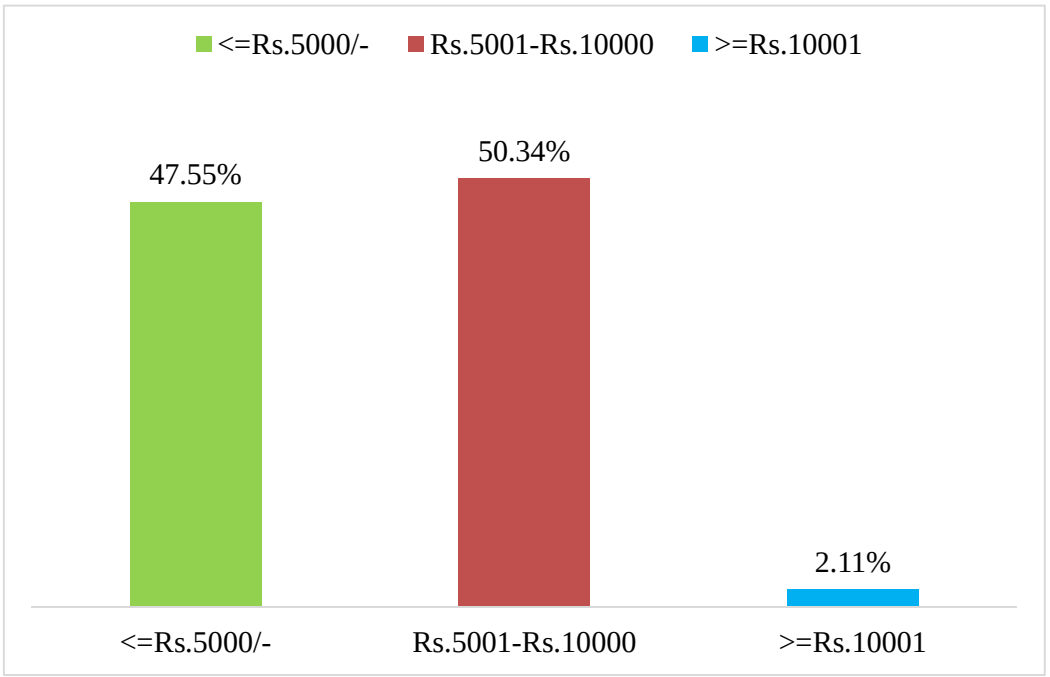
GRAPH 4: BAR GRAPH SHOWING DISTRIBUTION OF MOTHERS BY THEIR LEVEL OF EDUCATION



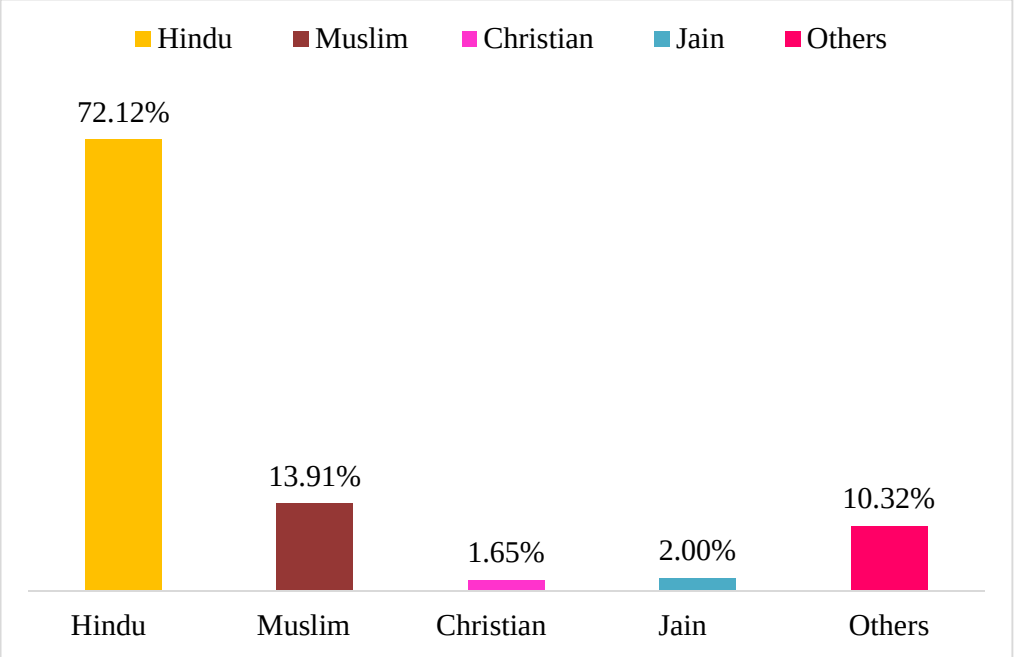
GRAPH 5: BAR GRAPH SHOWING DISTRIBUTION OF MOTHERS BY THEIR AGE AT MARRIAGE



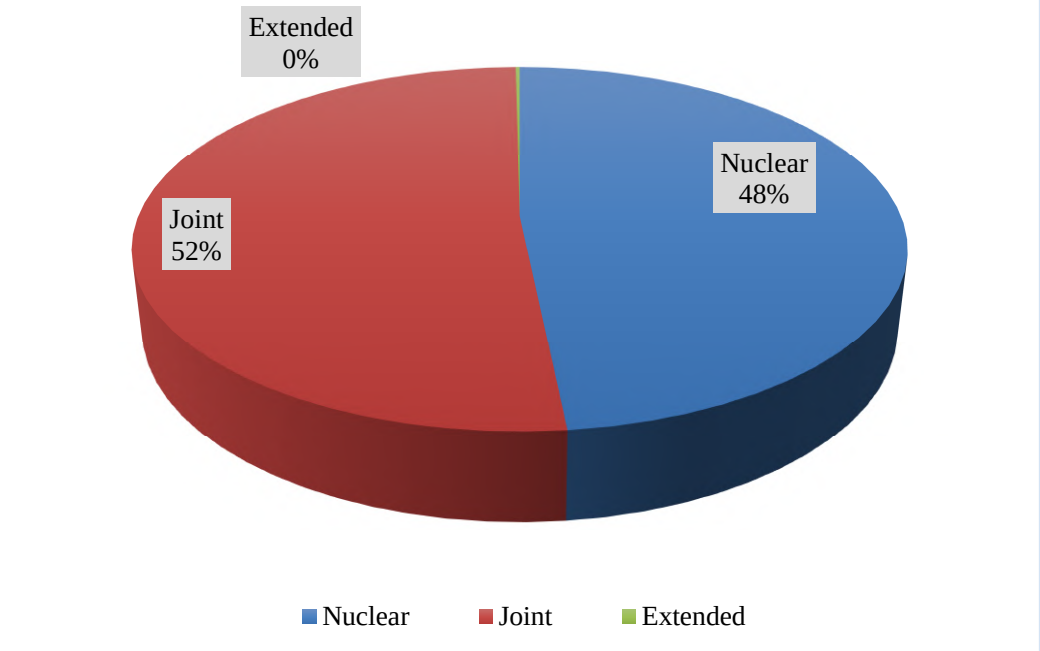
GRAPH 6: PIE GRAPH SHOWING DISTRIBUTION OF MOTHERS BY THEIR OBSTETRIC SCORE



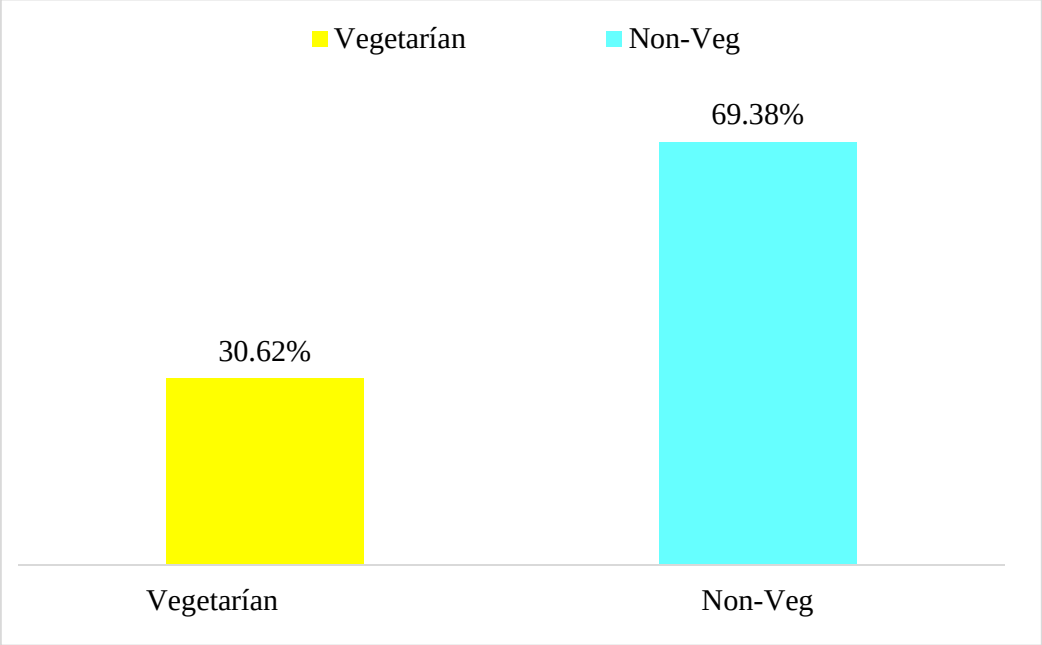
GRAPH 7: BAR GRAPH SHOWING DISTRIBUTION OF MOTHERS BY THEIR MONTHLY EXPENDITURE & SAVINGS



GRAPH 8: BAR GRAPH SHOWING DISTRIBUTION OF MOTHERS BY THEIR RELIGION



GRAPH 9: PIE GRAPH SHOWING DISTRIBUTION OF MOTHERS BY TYPE OF FAMILY



GRAPH 10: BAR GRAPH SHOWING DISTRIBUTION OF MOTHERS BY THEIR FOOD HABITS

SECTION 1: REPRESENT THE DEMOGRAPHIC CHARACTERISTICS OF THE MOTHER.

- Out of 3508 mothers 50% had a normal level of Hb, 32% of mothers were suffering from mild anemia, 3.50% of mothers were moderately anemic, and 0.34% of mothers were severely anemic.

- Among the respondents 39% of the mothers were between 22-25 years of age, 23% of the mothers were between 26-29 and 22% were in 18-21 years of age, 16% of them were between age 30 and above at the time of delivery

- Majority of respondents ie. 75% were residing in rural area and 25% were residing in urban area.

- Among the respondents, 42% of them completed secondary school, 40% of them were completed Degree, 11 % of them completed primary education and 4.19% of them were having informal education, 1.45% of there were illiterate.

- Among the study population, 71.35% of them age group at marriage was between 18-22 years, 21.07% of them were between 23-27 years, 6.50% of them were between <18 years and 2.08% of them were between the age group of 28-32 years.

- Among the study population, 56% of them were multi and 44.13% of them were Primi mother.

- Majority of the participants had monthly income between 5001-10000 ie 50% and 47% of them had <5000, 3% had monthly income >10000 rupees respectively.

- Religion-wise distribution- 72.09% of the mothers were Hindu, 14% of them were Muslim, 2% of them were Jain, and 2.65% of them were Christian.

- Among the study population, 97.88% of them were housewives and 2.12% of them were employees

- Family-wise, 51.43% of them were belonging to a joint family, and 48.38% of them were a nuclear family.

- In the study population, 69.44% of them were non-vegetarian, and 30.56% of them were vegetarian.

SECTION 2: TABLE NO 1: PERINATAL MORTALITY RATE n=3508

Details	Number
Total deliveries	3508
Total Perinatal deaths	128
PNMR	**36.48 per 1000 births**
Total stillbirths	103
Stillbirth rate	**29.3 per 1000 births**
FSB	69
MSB	34
Total Early Neonatal Death	25
Early Neonatal deaths(END) rate	**7.12 per 1000 births**

Section 2: Represents perinatal mortality rate. To assign the cause of death categories from the MNH registry were used to identify stillbirths and early neonatal deaths. In the current study of 3508 deliveries 128 deaths of the fetuses/neonates were found giving the perinatal mortality rate of 36.48 per 1000 births. Of 103 stillbirths 69/103 were fresh stillbirths (FSB) and 34/103 were macerated stillbirths (MSB). The stillbirth rate in the present study was 29.3 per 1000 births. Out of 128 perinatal deaths, early neonatal deaths accounted for 25/128 giving the early neonatal death rate of 7.12 per 1000 births.

SECTION 3: TABLE NO 2: MATERNAL DETERMINANTS OF PERINATAL MORTALITY **n=128**

MATERNAL CONDITIONS	FREQUENCY	%
1. Anemia	101	78.9
2. APH	11	8.6
3. Hypertensive disorders	102	79.7
4. GDM	12	9.4
5. Thyroid disorders	50	39.1
6. PPH	8	6.3
7. Unplanned Hospitalization	14	10.9
8. Infections	7	5.4
9. Signs of fetal distress during labor	21	16.4
10. Induction of labor	8	6.3
11. Cord Complication	9	7.0
12. Prolonged/protracted labour	61	47.6
13. Meconium-Stained liquor	6	4.6
14. Amniotic Fluid disorders (1. Poly 2. Oligo)	24	18.8
15. Previous C Section	2	1.5
16. Rh -ve Pregnancy	12	9.3
17. Cardiac disease	2	1.5
18. Malpresentations	15	11.7
19. Difficult delivery	61	47.6

Section 3 depicts maternal determinants responsible for perinatal mortality. In the present study, 78.9% of mothers were suffering from anemia, 11.86% of mothers had APH(placenta previa) 79.7% had Hypertensive disorders during pregnancy, 9.4% mothers had gestational diabetes mellitus during pregnancy, 39.1% mothers had thyroid disorders.

6.3% of mothers end up with postpartum hemorrhage, 10.9% of mothers had unplanned hospitalization, 5.4% of mothers contracted the infection during pregnancy, and 16.4% of fetal distress during labor resulted.

6.3% of mothers labor was induced, 7% of mothers had cord complications during labor, 47.6% of mothers had prolonged/protracted labor, 4.6% of mothers presented with meconium-stained labor, and 18.8% of mothers had Amniotic fluid disorders.

1.5% of mothers had a history of previous C-sections, 9.3% of mothers had Rh -ve pregnancy, and 1.5% of mothers were suffering from cardiac diseases.

11.7% of mothers had malpresentation, and 47.6% of mothers had difficult delivery are the important risk factors which contributed in perinatal mortality.

SECTION 4: TABLE NO 3: FACTORS RESPONSIBLE FOR PERINATAL MORTALITY **n=128**

FACTORS	FREQUENCY	%
Birth Asphyxia	25	13.8
Hypothermia	11	6.1
Preterm births	38	21.1
LBW	37	21
IUGR	13	7
Sepsis	8	4
Unknown (Milk Aspiration)	04	2
RDS	16	9
Tachycardia	4	2
Pulmonary Hemorrhage	4	2
Congenital anomalies	11	6
Jaundice	17	9

Section 4 summarizes fetal/neonatal factors responsible for perinatal mortality. In the current study, 13.8% of neonates were suffering from Birth Asphyxia, 6.1% of neonates had hypothermia, and 21.1% of births were preterm with gestational age between $28^{0/6}$ to $36^{6/7}$.

21% of newborns were low birth weight babies, 7% of them had intrauterine growth retardation, 4% of neonates had sepsis, and 2% of unknown causes were responsible for death of neonates.

9% of the newborn were suffering from respiratory distress syndrome, 2% of neonates had tachycardia & pulmonary hemorrhage, 6% of the neonates had congenital anomalies, and 9% of newborns were suffering from jaundice.

SECTION 5: TABLE NO 4: BIRTH WEIGHT AND PERINATAL MORTALITY RATE n=3508

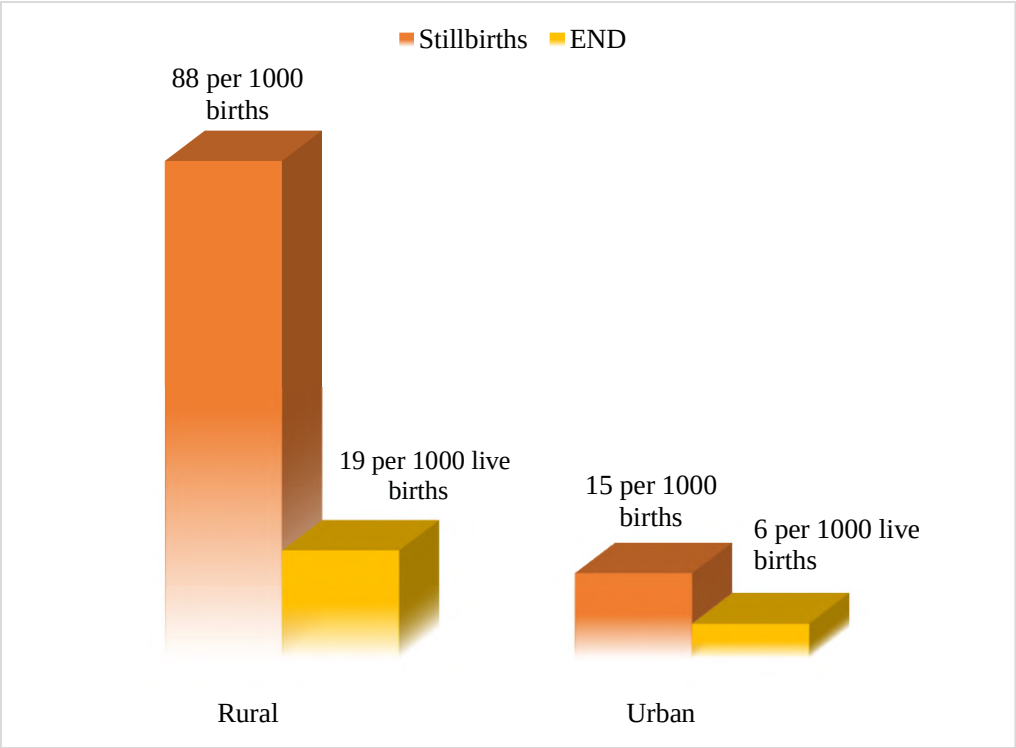
Weight in grams	Total Births	Stillbirths per 1000 births/live births	END per 1000 births/live births	Perinatal mortality rate per 1000 births/live births
VLBW(1000-1499g)	205	40	9	13.9
LBW (1500-2499g)	909	34	6	11.4
Normal ≥2500g	2394	29	10	11

Section 5 depicts birth weight distribution and its significant contribution to perinatal mortality. It was observed that there were 40/128 stillbirths and 9/128 early neonatal deaths occurred with a perinatal mortality rate of 13.9 per 1000 live births among very low birth weight babies with birth weight ranging between 1000-1499gram.

Among Low-birth-weight babies with birth weight between 1500-2499gram resulted in 34/128 stillbirths and 6 early neonatal deaths with a perinatal mortality rate of 11.4 per 1000 births.

Among normal birthweight which is ≥2500 grams presented with 29/128 stillbirths and 10 early neonatal deaths with a perinatal mortality rate of 11 per 1000 births.

SECTION 6: AREA-WISE DISTRIBUTION OF PERINATAL DEATH



GRAPH 11: AREA-WISE DISTRIBUTION OF PERINATAL DEATH

In section 6 it was reported that rural areas had significantly higher perinatal mortality as compared to urban areas. In the current study, the stillbirth rate was 88 per 1000 births and the early neonatal death rate was 19 per 1000 births in rural area was reported.

Whereas in stillbirth rate of 15 per 1000 births and an early neonatal death rate of 6 per 1000 births in urban areas respectively.

SECTION 7; TABLE NO 5: MULTIPLE LOGISTIC REGRESSION ANALYSIS OF PREVALENCE OF PERINATAL MORTALITY BY GESTATIONAL AGE n=3508

Gestational age	Adjusted OR	95%CI for OR		P-value
		Lower	Upper	
Term ($37^{+0/6}$ – $39^{+6/7}$ weeks)	Ref.			<.001
Early preterm ($28^{+0/6}$ -$31^{+6/7}$ weeks)	36.01	23.25	55.76	<.001
Preterm ($32^{+0/6}$ -$36^{+6/7}$ weeks)	4.44	2.91	6.78	<.001
Post-term ($40^{+0/7}$ and above weeks)	0.88	0.52	1.48	0.624

At the level of significance *P<0.05

Section 7 represents a multiple logistic regression analysis of the prevalence of perinatal mortality by gestational age. Results revealed that the odds of early preterm with gestational age ($28^{+0/6}$ -$31^{+6/7}$ weeks) was 36.01 times statistically higher in contributing perinatal mortality 36.01(95% CI:23.25-55.76).

Odds of preterm with gestational age between ($32^{+0/6}$ -$36^{+6/7}$ weeks) reported 4.44 times of statistically significant contribution in perinatal mortality 4.44(95%CI:2.91-6.78).

Post-term deliveries with gestational age between ($40^{+0/7}$ and above weeks) contributed 0.88 times significantly in perinatal mortality.

SECTION 8; TABLE NO 6: ASSOCIATION BETWEEN PERINATAL MORTALITY WITH MATERNAL PARAMETERS IN PREGNANCY

pregnancy parameters	No mortality	%	Still births	%	Early Neonatal deaths	%	Total	%	Chi-square	p-value
Mode of delivery										
Vaginal	1092	92.23	45	7.35	5	0.42	1184	33.75	47.9960	0.0001*
Vacuum	48	94.12	3	5.88	0	0.00	51	1.45		
Forceps	101	99.02	1	0.98	0	0.00	102	2.91		
Elective	340	98.84	2	0.58	2	0.58	344	9.81		
Emergency	1747	95.62	52	3.39	18	0.99	1827	52.08		
MTP										
No	3323	94.94	100	4.34	25	0.71	3500	99.77	20.8030	0.0001*
Yes	5	62.50	3	37.50	0	0.00	8	0.23		
Anaemia										
No	1938	95.28	61	3.98	15	0.74	2034	57.98	2.2120	0.3310
Yes	1390	94.30	29	5.02	10	0.68	1474	42.02		
APH										
No	3244	95.36	98	4.03	21	0.62	3402	96.98	56.2230	0.0001*
Yes	84	79.25	5	16.98	4	3.77	106	3.02		
Evidence of HTN										
None	2161	98.77	20	0.91	7	0.32	2188	62.37	213.3770	0.0001*
GHTN	272	91.28	20	6.71	6	2.01	298	8.49		
PE	564	88.82	34	10.08	7	1.10	635	18.10		
SPE	262	85.34	23	14.01	2	0.65	307	8.75		
Chronic HTN	69	86.25	6	10.00	3	3.75	80	2.28		
PPH										
No	3295	95.04	95	4.24	25	0.72	3467	98.83	22.5900	0.0001*
Yes	33	80.49	8	19.51	0	0.00	41	1.17		
Unplanned Hospitalization										
No	3320	94.86	103	4.43	25	0.71	3500	99.77	0.4340	0.8050
Yes	8	100.00	0	0.00	0	0.00	8	0.23		
Malpresentations										
None	3216	94.95	96	4.37	23	0.68	3387	96.55	5.2020	0.7360
Transverse lie	13	100.00	0	0.00	0	0.00	13	0.37		
Breech	91	91.00	7	7.00	2	2.00	100	2.85		
Oblique	4	100.00	0	0.00	0	0.00	4	0.11		
Face presentation	4	100.00	0	0.00	0	0.00	4	0.11		

Signs of fetal distress during labour										
No	3122	95.04	92	4.38	19	0.58	3285	93.64	13.3710	0.0010*
Yes	206	92.38	11	4.93	6	2.69	223	6.36		
Induction of labour										
No	3300	94.88	102	4.43	24	0.69	3478	99.14	3.0040	0.2230
Yes	28	93.33	1	3.33	1	3.33	30	0.86		
Cord Complication										
No	3308	94.92	100	4.36	25	0.72	3485	99.34	4.2160	0.1220
Yes	20	86.96	3	13.04	0	0.00	23	0.66		
Birth Trauma or Difficult Delivery										
No	3324	94.86	103	4.42	25	0.71	3504	99.89	0.2170	0.8970
Yes	4	100.00	0	0.00	0	0.00	4	0.11		
Amniotic fluid disorder										
None	3076	94.97	87	4.29	24	0.74	3239	92.33	7.1440	0.1280
Poly	57	89.06	7	10.94	0	0.00	64	1.82		
Oligo	195	95.12	9	4.39	1	0.49	205	5.84		
Meconium-Stained liquor										
No	3041	94.68	91	4.61	23	0.72	3212	91.56	3.3010	0.5090
Yes	287	96.93	12	2.39	2	0.68	296	8.35		
Insufficient or Excess weight gain										
No	3321	94.89	102	4.40	25	0.71	3500	99.77	1.2880	0.5250
Yes	7	87.50	1	12.50	0	0.00	8	0.23		
GDM/ Overt DM										
No	2835	94.34	91	4.89	23	0.77	3005	85.66	12.0580	0.0020*
Yes	493	98.01	12	1.59	2	0.40	503	14.34		
Thyroid disorders										
Normal	2372	94.80	53	4.52	17	0.68	2502	71.32	9.3140	0.0540
Hyper	913	95.10	4	4.27	6	0.63	960	27.37		
Hypo	43	93.48	46	2.17	2	4.35	46	1.31		
Previous C Section										
0	2747	94.59	101	4.65	22	0.76	2904	82.78	2.7260	0.6050
1	578	96.17	02	3.33	3	0.50	601	17.13		
2	3	100.00	0	0.00	0	0.00	3	0.09		
Cardiac disease										
No	3304	94.89	102	4.42	24	0.69	3482	99.26	3.6460	0.1620
Yes	24	92.31	1	3.85	1	3.85	26	0.74		
Rh -ve Preg										
No	3202	94.87	68	4.50	21	0.62	3375	96.21	11.6800	0.0003*
Yes	126	94.74	7	2.26	4	3.01	133	3.79		
Total	3328	94.87	28	4.42	25	0.71	3508	100.00		

Section 8 reported an association between perinatal mortality with maternal parameters in pregnancy. Results inferred that mode of delivery (vaginal, instrumental, emergency, and elective C-section), MTP(Medical termination of pregnancy), Antepartum hemorrhage(APH), Hypertensive disorders during pregnancy, post-partum hemorrhage(PPH), signs of fetal distress during labor, GDM/Overt DM, Rh -ve pregnancy were having significant association with perinatal mortality.

Factors like Anemia, Unplanned hospitalization, malpresentation, induction of labor, cord complication, Birth trauma/difficult delivery, Amniotic fluid disorders, Insufficient or Excess weight gain, thyroid disorders, previous C-sections, cardiac diseases were not having significant statistical association with perinatal mortality.

SECTION 9: TABLE NO 7: LOGISTIC REGRESSION ANALYSIS OF PREVALENCE OF PERINATAL MORTALITY BY PREGNANCY PARAMETERS

Pregnancy parameters	Adjusted OR	95% CI for OR		p-value
		Lower	Upper	
Mode of delivery				
Vaginal	Ref.			
Vacuum	0.15	0.05	0.51	0.0020*
Forceps	0.02	0.00	0.14	0.0001*
Elective	0.03	0.01	0.08	0.0001*
Emergency	0.12	0.09	0.17	0.0001*
Anaemia				
No	Ref.			
Yes	0.20	0.16	0.26	0.0001*
APH				
No	Ref.			
Yes	4.47	2.42	8.24	0.0001*
Evidence of HTN				
None	Ref.			
GHTN	0.90	0.56	1.44	0.6530
PE	0.96	0.71	1.32	0.8110
SPE	1.64	1.10	2.44	0.0150*
Chronic HTN	1.63	0.76	3.51	0.2140
PPH				
No				
Yes	1.69	0.68	4.17	0.2570
Unplanned Hospitalization				
No	Ref.			
Yes	0.00	0.00	.	0.9990
None	Ref.			
Transverse lie	1.13	0.50	2.56	0.7730
Breech	0.00	0.00	.	0.9990
Oblique	0.00	0.00	.	0.9990
Face presentation	1.53	0.86	2.72	0.1490
Signs of fetal distress during labour				
No	Ref.			
Yes	0.69	0.14	3.38	0.6500

Induction of labour				
No	Ref.			
Yes	2.72	0.63	11.69	0.1790
Cord Complication				
No	Ref.			
Yes	0.00	0.00	.	0.9990
No	Ref.			
Yes	0.69	0.14	3.38	0.6500
Birth Trauma or Difficult Delivery				
None	Ref.			
Poly	1.44	0.55	3.79	0.4550
Oligo	0.40	0.19	0.83	0.0140*
Meconium Stained liquor				
No	Ref.			
Yes	0.34	0.17	0.70	0.0030*
Insufficient or Excess weight gain				
No	Ref.			
Yes	2.26	0.14	37.25	0.5690
GDM/ Overt DM				
No	Ref.			
Yes	0.11	0.05	0.21	0.0001*
Thyroid disorders				
Normal	Ref.			
Hyper	0.23	0.17	0.32	0.0001*
Hypo	0.42	0.12	1.50	0.1800
Previous C Section				
0	Ref.			
1	0.63	0.39	1.03	0.0670
2	0.00	0.00	.	0.9990
Cardiac disease				
No	Ref.			
Yes	0.39	0.08	1.92	0.2460
Rh -ve Preg				
No	Ref.			
Yes	0.31	0.14	0.71	0.0050*

The multiple regression analysis of perinatal mortality by different modes of delivery shows that the odds of Vacuum, Forceps, Elective C-section, and Emergency C-section have a significance of 0.15(95% CI 0.05-0.15), 0.02(95% CI 0.00-0.14), 0.03(95% CI 0.01-0.08), 0.12(95% CI 0.09-0.17) respectively as compared to vaginal birth.

Perinatal mortality is higher in vacuum delivery i.e., 0.15 times significantly higher as compared to vaginal birth. Perinatal mortality is higher in emergency cesarean section i.e., 0.12 times significantly higher as compared to vaginal birth.

The multiple regression analysis of perinatal mortality by the anemic status of the mother shows the odds of 0.20(95% CI 0.16 to 0.26).

The multiple regression analysis of perinatal mortality among mothers who had antepartum hemorrhage shows an odds of 4.47(95% CI 0.16 to 0.26).

The multiple regression analysis of perinatal mortality among mothers who had hypertensive disorders during pregnancy shows an odds of 1.64 (95% CI 1.10 to 2.44). Perinatal mortality is higher in severe pre-eclampsia i.e., 1.64 times significantly higher as compared to normotensive mothers.

The multiple regression analysis of perinatal mortality among mothers who had amniotic fluid disorders shows an odds of 1.44 (95% CI 0.55 to 3.79). Perinatal mortality is higher among mothers who had polyhydramnios i.e., 1.64 times significantly higher as compared to normal mothers.

The multiple regression analysis of perinatal mortality among mothers who had gestational diabetes mellitus shows an odds of 0.11(95% CI 0.05 to 0.21).

Perinatal mortality is higher among mothers who had GDM i.e., 0.11 times significantly higher as compared to normal mothers.

The multiple regression analysis of perinatal mortality among mothers who had Thyroid disorders shows an odds of 0.42 (95% CI 0.12 to 1.50). Perinatal mortality is higher among mothers who had hypothyroidism i.e., 0.42 times significantly higher as compared to normal mothers.

SECTION 10: TABLE NO 8 MULTIPLE LOGISTIC REGRESSION ANALYSIS OF PREVALENCE OF PERINATAL MORTALITY BY MATERNAL PARAMETERS

Signs of maceration	Adjusted OR	95% CI for OR		p-value
		Lower	Upper	
Signs Of Maceration				
No	Ref.			
Yes	27.91	4.91	158.54	0.0001*
Maternal infection				
No	Ref.			
Yes	-	-	-	-
Infection				
No	Ref.			
Yes	-	-	-	-
Mode of transportation to hospital				
Ambulance	Ref.			
Bus	0.04	0.03	0.05	0.0001*
Car	0.07	0.05	0.09	0.0001*
Scooter	0.06	0.03	0.10	0.0001*
Auto	0.04	0.03	0.06	0.0001*
Walking	0.07	0.01	0.51	0.0090*

The multiple regression analysis of perinatal mortality by types of stillbirths shows an odds of 27.91 (95% CI 4.91 to158.54) Perinatal mortality is higher among mothers who had polyhydramnios i.e., 27.91 times significantly higher as compared to normal mothers.

The multiple regression analysis of perinatal mortality by different means of transportation shows that the odds of Bus, Car, Scooter, and to have a significance of 0.04 (95% CI 0.03 to 0.05), 0.07 (95% CI 0.05 to 0.09), 0.06 (95% CI 0.03 to 0.10), 0.04 (95% CI 0.03 to 0.06) respectively as compared to transportation by ambulance.

SECTION 11: TABLE 9: ASSOCIATION BETWEEN PERINATAL MORTALITY WITH NEONATAL CONDITIONS AND OUTCOME

Neonatal conditions and outcome	No mortality	%	Still births	%	Early Neonatal deaths	%	Total	%	Chi-square	p-value
Fetal/Neonatal Status										
Jaundice	3	50.00	3	50.00	0	0.00	6	0.17	2176.3460	0.0001*
Stillbirth	18	13.74	56	82.44	5	3.82	131	3.73		
Born dead	3	23.08	8	61.54	2	15.38	13	0.37		
Born Alive	3304	98.39	36	1.07	18	0.54	3358	95.72		
Sex of the baby										
Male	1799	95.08	79	4.18	14	0.74	1892	53.93	0.6120	0.7360
Female	1529	94.62	76	4.70	11	0.68	1616	46.07		
Birth weight										
Normal	2354	98.33	30	1.25	10	0.42	2394	68.24	750.0060	0.0001*
Small	113	54.85	84	40.78	9	4.37	206	5.87		
Small to normal	861	94.82	41	4.52	6	0.66	908	25.88		
Baby have breathing difficulty at or soon after birth?										
No	3208	94.77	154	4.55	23	0.68	3385	96.49	5.3400	0.0690
Yes	120	97.56	1	0.81	2	1.63	123	3.51		
Low Apgar Score										
No	3163	94.76	153	4.58	22	0.66	3338	95.15	7.1150	0.0290*
Yes	165	97.06	2	1.18	3	1.76	170	4.85		
Resuscitation at birth										
No	3170	94.77	153	4.57	22	0.66	3345	95.35	7.0680	0.0290*
Yes	158	96.93	2	1.23	3	1.84	163	4.65		
Was baby resuscitated with bag and mask?										
No	3176	94.83	99	4.51	22	0.66	3349	95.47	4.5960	0.1000
Yes	152	95.60	4	2.52	3	1.89	159	4.53		
Was baby placed on mother's chest after delivery?										
No	3255	94.82	102	4.49	24	0.70	3433	97.86	2.1140	0.3470
Yes	73	97.33	1	1.33	1	1.33	75	2.14		
Informal Education										
No	3327	94.89	102	4.39	25	0.71	3506	99.94	9.8490	0.0070*
Yes	1	50.00	1	50.00	0	0.00	2	0.06		

Had fits/seizures										
No	3326	94.89	100	4.39	25	0.71	3505	99.91	5.9550	0.0510
Yes	2	66.67	3	33.33	0	0.00	3	0.09		
Causes of death										
None	3327	95.17	93	4.15	24	0.69	3496	99.66	227.6800	0.0001*
Prematurity	0	0.00	3	100.00	0	0.00	3	0.09		
Asphyxia	0	0.00	3	100.00	0	0.00	3	0.09		
Others specify	1	25.00	2	50.00	1	25.00	4	0.11		
No official cause assigned	0	0.00	2	100.00	0	0.00	2	0.06		
Information from mother in determining cause of stillbirth (Suspect)										
No	3326	94.92	101	4.37	25	0.71	3504	99.89	19.7090	0.0001*
Yes	2	50.00	2	50.00	0	0.00	4	0.11		
Place of death										
No	3321	95.38	86	3.96	23	0.66	3482	99.26	251.0010	0.0001*
Yes	7	26.92	17	65.38	2	7.69	26	0.74		
NICU admissions										
No	2497	98.31	24	1.57	3	0.12	2540	72.41	225.5900	0.0001*
Yes	831	85.85	79	11.88	22	2.27	968	27.59		
Total	3328	94.87	103	4.42	25	0.71	3508	100.00		

In section level 11 table 10 represents the association between perinatal mortality with neonatal conditions and outcome.

Factors like neonatal status (Born alive/dead or stillbirths), birth weight, Low Apgar score, resuscitation at birth, informal education of mother, cause of death, Information from mother in determining the cause of stillbirth (Suspect), place of death, NICU admission were showing statistically significant association with perinatal mortality.

Factors like Sex of the baby, resuscitation with bag and mask, baby placed on mother's chest after delivery, history of fits/seizures were not having statistically significant association with perinatal mortality

TABLE 10: ASSOCIATION BETWEEN PERINATAL MORTALITY WITH DETERMINANTS OF PERINATAL MORTALITY

Determinants of PM	No mortality	%	Still births	%	Early Neonatal deaths	%	Total	%	Chi-square	p-value
Birth Asphyxia										
No	3307	94.97	103	4.45	20	0.57	3482	99.26	127.7490	0.0001*
Yes	21	80.77	0	0.00	5	19.23	26	0.74		
Temp										
Normal	3328	94.92	103	4.42	23	0.66	3506	99.94	278.7990	0.0001*
Hyperthermia	0	0.00	0	0.00	2	100.00	2	0.06		
Delivery										
Normal	3328	95.09	103	4.43	17	0.49	3500	99.77	1117.1080	0.0001*
Early Preterm	0	0.00	0	0.00	5	100.00	5	0.14		
Late preterm	0	0.00	0	0.00	3	100.00	3	0.09		
LBW										
No	3264	94.94	103	4.51	19	0.55	3438	98.00	65.1440	0.0001*
Yes	64	91.43	0	0.00	6	8.57	70	2.00		
SGA, IUGR										
No	3312	95.20	19	4.25	19	0.55	3479	99.17	194.3430	0.0001*
Yes	16	55.17	84	24.14	6	20.69	29	0.83		
Sepsis										
No	3328	95.00	103	4.42	20	0.57	3503	99.86	697.5940	0.0001*
Yes	0	0.00	0	0.00	5	100.00	5	0.14		

Milk Aspiration										
No	3328	94.95	103	4.42	22	0.63	3505	99.91	418.3180	0.0001*
Yes	0	0.00	0	0.00	3	100.00	3	0.09		
RDS										
No	3274	94.95	103	4.50	19	0.55	3448	98.29	76.7330	0.0001*
Yes	54	90.00	0	0.00	6	10.00	60	1.71		
Tachycardia										
No	3325	94.89	103	4.42	24	0.68	3504	99.89	33.4900	0.0001*
Yes	3	75.00	0	0.00	1	25.00	4	0.11		
Pulmonary Haemorrhage										
No	3328	94.92	103	4.42	23	0.66	3506	99.94	278.7990	0.0001*
Yes	0	0.00	0	0.00	2	100.00	2	0.06		
Congenital Anomalies										
None	3282	95.10	92	4.26	22	0.64	3451	98.38	42.8550	0.0001*
Neural Tube Defect	4	50.00	7	50.00	0	0.00	8	0.23		
Abdominal wall defect	42	89.36	4	8.51	1	2.13	47	1.34		
others	0	0.00	0	0.00	2	100.00	2	0.06		
Total	3328	94.87	103	4.42	25	0.71	3508	100.00		

Table 12 depicts association between perinatal mortality with determinants of perinatal mortality. In the current study factors like Birth asphyxia, temperature, term/preterm/post-term, Low birth weight, Small for gestational age/intrauterine growth retardation, Sepsis, Milk aspiration, Respiratory distress syndrome, Tachycardia, Pulmonary hemorrhage, Congenital anomalies had a statistically significant association with perinatal mortality.

CHAPTER V

DISCUSSION

This chapter deals with the discussions and a brief framework of the study findings, conclusions, implications, and recommendations. Discussions are either supported or contested by the literature or critical analysis[71].

To study the incidence and associated risk factors of perinatal mortality in a selected tertiary care hospital. Investigator found that the rate of perinatal death in the study region was not excessive, but it was nevertheless not acceptable. This is due to majority of these deaths occur in those who present late and only surrounding mothers will witness the comprehensive care which is provided during pregnancy is remarkable.

Discussion

Demographic characteristics

- Out of 3508 mothers 50% had a normal level of Hb, 32% of mothers were suffering from mild anemia, 3.50% of mothers were moderately anemic, and 0.34% of mothers were severely anemic.
- Among the respondents 39% of the mothers were between 22-25 years of age, 23% of the mothers were between 26-29 and 22% were in 18-21 years of age, 16% of them were between age 30 and above at the time of delivery
- Majority of respondents ie. 75% were residing in rural area and 25% were residing in urban area.

- Among the respondents, 42% of them completed secondary school, 40% of them were completed Degree, 11 % of them completed primary education and 4.19% of them were having informal education, 1.45% of there were illiterate.

- Among the study population, 71.35% of them age group at marriage was between 18-22 years, 21.07% of them were between 23-27 years, 6.50% of them were between <18 years and 2.08% of them were between the age group of 28-32 years.

- Among the study population, 56% of them were multi and 44.13% of them were Primi mothers.

- Majority of the participants had monthly income between 5001-10000 ie 50% and 47% of them had <5000, and 3% had monthly income >10000 rupees respectively.

- Religion-wise distribution- 72.09% of the mothers were Hindu, 14% of them were Muslim, 2% of them were Jain, and 2.65% of them were Christian.

- Among the study population, 97.88% of them were housewives and 2.12% of them were employees

- Family-wise, 51.43% of them were belonging to a joint family, and 48.38% of them were a nuclear family.

- In the study population, 69.44% of them were non-vegetarian, and 30.56% of them were vegetarian.

SECTION 2: PERINATAL MORTALITY RATE

- Section 2: Represents perinatal mortality rate. To assign the cause of death categories from the MNH registry were used to identify stillbirths and early neonatal deaths. In the current study, 3508 deliveries had been registered out of which 128 deaths of the fetuses/neonates were found giving the perinatal mortality rate of 36.48 per 1000 births. Of 103 stillbirths 69/103 were fresh stillbirths (FSB) and 34/103 were macerated stillbirths (MSB). The stillbirth rate in the present study was 29.3 per 1000 births. Out of 128 perinatal deaths, early neonatal deaths accounted for 25/128 giving the early neonatal death rate of 7.12 per 1000 births.
- In the SRS bulletin in 2016[73], it was reported that the state's perinatal mortality rate was higher than the country's average of 26 per 1,000 births. These findings contradict with findings of the present study and other studies[71-72]. The current study demonstrates a decrease in the perinatal mortality rate due to community-level interventions (CLiP trial,), registration of every pregnancy, early detection of high-risk cases, administration of low-dose aspirin(81g) for prevention of preterm births etc.
- Similar studies[74-77] were conducted in various states, and differences in the results were noted. This could be a result of the sample size, the type of facility, or the type of treatment given during delivery. As most of the studies are hospital-based, there is wide variation region-wise as per the findings of the previous reports.

SECTION 3: MATERNAL DETERMINANTS OF PERINATAL MORTALITY

- Section 3 depicts maternal determinants responsible for perinatal mortality. In the present study 78.9% of mothers were suffering from anemia, 11.86% of mothers had APH (placenta previa) 79.7% had Hypertensive disorders during pregnancy, 9.4% of mothers had gestational diabetes mellitus during pregnancy, 39.1% of mothers had thyroid disorders.
- 6.3% of mothers end up with postpartum hemorrhage, 10.9% of mothers had unplanned hospitalization, 5.4% of mothers contracted an infection during pregnancy, and 16.4% of fetal distress during labor resulted. 6.3% of mothers labor was induced, 7% of mothers had cord complications during labor, 47.6% of mothers had prolonged/protracted labor, 4.6% of mothers presented with meconium-stained labor, 18.8% of mothers had Amniotic fluid disorders.
- 1.5% of mothers had a history of previous C-sections, 9.3% of mothers had Rh -ve pregnancy, and 1.5% of mothers were suffering from cardiac diseases.
- 11.7% of mothers had malpresentation, and 47.6% of mothers had difficult delivery are the important risk factors that contributed to perinatal mortality.
- These findings are in line with other studies[71,72,78]. Interventions to reduce stillbirths associated with hypertensive disorders during pregnancy and APH, PPH, small for gestational age, as well as intrapartum deaths, are not intricate or expensive. Interventions like high-quality prenatal care, transfer to a facility of a higher standard, labor monitoring, and access to a cesarean section should be available within a functional perinatal healthcare system.[78-81] Antenatally administration of low-dose aspirin should prevent some of the deaths from hypertensive disorders[82]. Blood pressure and fetal growth monitoring will determine those at risk from pre-eclampsia/ eclampsia and/or growth

restriction.[70-81] Antepartum hemorrhage (Placenta praevia) is discoverable by USG. An appropriately timed C-section for hemorrhage and pre-eclampsia and various other conditions should prevent the majority of the stillbirths in fetuses found to be at risk[83].

- Perhaps some studies[84] were in contrast with the present findings. This is because of poor monitoring and lack of antenatal care services etc.

SECTION 4: FETAL/NEONATAL FACTORS RESPONSIBLE FOR PERINATAL MORTALITY

- Section 4 summarizes fetal/neonatal factors responsible for perinatal mortality. In the current study, 13.8% of neonates were suffering from Birth Asphyxia, 6.1% of neonates had hypothermia, and 21.1% of births were preterm with gestational age between $28^{0/6}$ to $36^{6/7}$.
- 21% of newborns were low birth weight babies, 7% of them had intrauterine growth retardation, 4% of neonates had sepsis, and 2% of unknown causes were responsible for the death of neonates.
- 9% of the newborn were suffering from respiratory distress syndrome, 2% of neonates had tachycardia & pulmonary hemorrhage, 6% of the neonates had congenital anomalies, and 9% of newborns were suffering from jaundice.
- Similar findings were noted in other studies.[71,74,75] This may be because of the implementation of interventions like helping babies breathe to combat birth asphyxia, prevention of preterm births & hypothermia, and optimum maternal nutrition utilization of micro and macronutrient supplementation prior to conception was advised.

- However, the finding of the present study contradicts other studies[84]. Mainly it may be due to most of the hospitals being referral hospitals, lack of monitoring in the antenatal period and detection of high-risk cases, minimum ANC visits, and lack of effective utilization of antenatal care services, lack of universal access to safe, affordable, and timely skilled birth attendants.[85-87] etc.
- **SECTION 5: BIRTH WEIGHT AND PERINATAL MORTALITY RATE**
- Current study findings inferred that there were 40/128 stillbirths and 9/128 early neonatal deaths occurred with a perinatal mortality rate of 13.9 per 1000 live births among very low birth weight babies with birth weight ranging between 1000-1499gram.
- As per the findings of the present study, there was a decline in the trend of very low birth weight babies with birth weight ranging between 1000-1499gram and this is because the effective implementation of kangaroo care, administration of low-dose aspirin to prevent some of the deaths from hypertensive disorders[82]. Blood pressure and fetal growth monitoring will determine those at risk from pre-eclampsia/ eclampsia and/or growth restriction.[80-81] Antepartum hemorrhage (Placenta praevia) is discoverable by USG. An appropriately timed C-section for hemorrhage and pre-eclampsia and various other conditions should prevent the majority of the stillbirths in fetuses found to be at risk[83].
- The risk factors for low birth weight, which include a low percentage of ANC visits or no visits, parity, younger maternal age, hypertensive disorders during pregnancy, and antepartum hemorrhage, were comparable to those found in several previous studies[88]. The fact that risk factors for preterm birth, low birth

weight, and the combination of preterm birth and LBW are comparable across studies suggests that monitoring those women who have these risk factors may be crucial for improving their pregnancy outcomes.[88]

- Due to the overlap of both outcomes, risk factors responsible for preterm delivery and LBW baby are comparable to those for each condition separately.

SECTION 6: AREA-WISE DISTRIBUTION OF PERINATAL DEATH

- The findings of the present study pose that perinatal mortality was witnessed more in rural areas compared to urban ones. The stillbirth rate was 88 per 1000 births and the early neonatal death rate was 19 per 1000 births in rural area was reported.
- Whereas the stillbirth rate is 15 per 1000 births and the early neonatal death rate of 6 per 1000 births in urban areas respectively. The findings of the present study are in line with the other studies.[90]
- Anemia, Hypertensive disorders(eclampsia & pre-eclampsia), Thyroid disorders, Amniotic fluid disorders, malpresentation, and difficult delivery were the important cause of perinatal death in the present study as observed in many other studies [71,76,79,88,91,100]
- Both rural and urban communities have facilities accessible to them, but usage of these facilities is lower in rural than in urban areas, particularly.
- Implementation of integrated interventions and measuring the effect of interventions, especially to monitor programmatic progress and quality of care can help in bringing down the mortality

- **SECTION 7: DESCRIPTION OF MULTIPLE LOGISTIC REGRESSION ANALYSIS OF THE PREVALENCE OF PERINATAL MORTALITY BY GESTATIONAL AGE**
- The findings of the present study indicate that the odds of early preterm with gestational age ($28^{+0/6}$ -$31^{+6/7}$ weeks) was 36.01 times statistically higher in contributing perinatal mortality 36.01(95% CI:23.25-55.76).
- These results are in line with the other studies' findings. A study done by Ananth CV[94] reported that Stillbirth rates were increased by gestational ages of 28 to 31, 32 to 33, 34 to 36, 37 to 38, and 42 to 44 weeks. Neonatal mortality rates increased at 34 to 36, 37 to 38, and 42 to 44 weeks.
- At least 25% of the pregnancies had risk factors like Anemia which was most common (79%) and hypertension was seen in 79.9% of the pregnancies. These results are in line with other studies[95-96]
- The global epidemics of obesity and noncommunicable diseases, notably hypertension and diabetes, are affecting pregnancies in all regions, especially when combined with advanced maternal age[97]
- There are estimates that attribute about 10% of SBs to these disorders.[98] Primary prevention of these disorders along with improved detection and management of affected women where possible before pregnancy will help improve perinatal outcomes[99].
- **SECTION 8 & 9: ASSOCIATION BETWEEN PERINATAL MORTALITY WITH MATERNAL PARAMETERS IN PREGNANCY & LOGISTIC REGRESSION ANALYSIS**
- Results of the present study imply the association between perinatal mortality with maternal parameters in pregnancy. Results inferred that mode of delivery

(vaginal, instrumental, emergency, and elective C-section), MTP (Medical termination of pregnancy), Antepartum hemorrhage (APH), Hypertensive disorders during pregnancy, post-partum hemorrhage (PPH), signs of fetal distress during labor, GDM/Overt DM, Rh -ve pregnancy were having significant association with perinatal mortality.

- GDM is a known risk factor[93] and had a higher risk (adjusted relative risk 3.9, 1.7 to 8.9), but a population-attributable risk of only 2.0% because of the low prevalence in this cohort reported in a study carried out by Gardosi[92]
- There is evidence that antenatal hemorrhage, especially placental abruption, increases the risk of stillbirth[91–92]. Current study findings support this association and highlight the importance of a prompt, in-depth evaluation of any antepartum hemorrhage.

SECTION 11: TABLE 10: ASSOCIATION BETWEEN PERINATAL MORTALITY WITH NEONATAL CONDITIONS AND OUTCOME

- In the present study factors like neonatal status (Born alive/dead or stillbirths), birth weight was significantly associated with perinatal mortality. These results are consistent with other studies[102-104]. preterm birth and Low birth weight is significantly associated with increased risk of co-morbidities such as hypertensive disorders during pregnancy and placenta abruption, which in turn causes placental insufficiency, preterm labor, intra uterine growth restriction, small for gestational age and other poor obstetric outcomes[104-106].
- In the current study there was statistically significant association was found with Low apgar score. This finding is in track with studies done in Punjab, Loni, South Korea[23], Sweden[24] and meta-analysis done in Portugal[55]. It is

evidenced that, placental insufficiency can cause perinatal morbidity like prematurity, poor fetal growth and LBW. Also, it was found that advanced age of the mother is directly associated with increased risk of birth asphyxia or low Apgar score[107,32,108].

- It was observed that informal education of mother had significant association with perinatal mortality. adverse neonatal outcome was observed among mothers who had no formal education was higher when compared with women who had higher secondary and above educational level. This result is in line with findings of studies held in Uttar Pradesh[36], Shillong[37], Rajasthan[39], Haryana[35] Ethiopia[33,37].
- This may be a result of the interaction between uneducated individuals with little financial resources, which results in traditional dietary practices and a lack of decision-making ability to acquire high-quality maternal health services. In addition, uneducated mothers could be unaware to attend ANC and institutional delivery, and less likely to practice essential newborn care (like exclusive breastfeeding) and dietary behavioral chnages[107].
- Factors like resuscitation at birth, cause of death, Information from mother in determining cause of stillbirth (Suspect), place of death, NICU admission were showing statistically significant association with perinatal mortality.
- These results are consistent with another studies[102-104]. This may be due to the evidence that advanced maternal age is associated with increased risk of co-morbidities such as chronic hypertension, pregnancy induced hypertension and placenta abruption, which in turn causes placental insufficiency, preterm labor, IUGR, SGA and other poor obstetric outcomes[80,95,32].

TABLE 12: ASSOCIATION BETWEEN PERINATAL MORTALITY WITH DETERMINANTS OF PM

- Preterm births with low birth weight, Birth asphyxia with/without meconium aspiration, jaundice, respiratory distress syndrome, and growth retardation were the important cause of death in this study as observed in many other studies.
- The results of the studies conducted at Loni[29], Mysore[30], and Punjab[31] are consistent with the present study.
- The factors responsible for these can be identified during the antenatal period as most of these can present with conditions that may be associated with Preterm births with low birth weight, birth asphyxia etc.

CHAPTER VI

CONCLUSIONS

This study, performed in tertiary care hospital, found that most stillbirths were preventable and were most often associated with maternal hypertension, antepartum hemorrhage and LBW as well as asphyxia in labor.

Appropriate obstetric care including antenatal and intrapartum screening for these conditions, including fetal heart rate monitoring in labor and utilization of appropriate intervention, often involving cesarean delivery, could potentially prevent many of these stillbirths.

Research to prevent the placental pathology (maternal vascular malperfusion) often underlying these conditions has great potential to identify interventions to reduce stillbirths.[22-25]

The intrapartum stillbirth rate, a direct measure of access to quality intrapartum care, should be collected and reported to increase local accountability.

A global classification system and audits for perinatal deaths are urgently needed to understand causes and focus prevention efforts.

Improved data is especially key to enable tracking of the content and quality of antenatal and intrapartum care.

Implication for Nursing

a. Nursing Practice

Greater use of midwives by developing countries could considerably improve maternal-neonatal survival. Because it is projected that interventions that can be completely provided by midwives would be able to save more lives than many other interventions.

Nevertheless, substantial barriers prevent midwives in these contexts from achieving their full potential for life-saving.

Investment in midwives needs to include investing not only in quantity but so must the quality of their education, training, working conditions, and regulations.

b. Nursing Education

Nurses play an integral role in providing and advocating for best practices for safe and effective care that meet the health, emotional, and social needs of the mother, newborn, and family. The nursing curriculum should enable nursing students to develop advanced knowledge and acquire skills in the practice of maternal and newborn healthcare. The study findings suggest that the course content in the curriculum should cover a range of perinatal mortality and morbidity measurement techniques in maternal and newborn health. In-service education programs and workshops on methods of imparting effective antenatal care, safe delivery, measuring of perinatal mortality rates, types of autopsies, and measures to prevent perinatal mortality should be conducted for nursing personnel so that they can upgrade their knowledge and skills and apply it in their practice. Nursing students should also be encouraged for the effective utilization of research-based practice in the clinical areas.

c. Nursing Administration

Currently, nurse administrators have difficult tasks that need them to be knowledgeable about current events, new techniques, and technology. The nurse administrator should provide in-service training programs for midwives focusing on the importance of educating mothers prior to pregnancy and delivery for good birth outcomes in order to prevent complications and promote the well-being of the patients. There is a glaringly large gap in knowledge regarding factors responsible for perinatal mortality and timely management of preventable as well as nonpreventable factors.

d. Nursing Research

There is a need for nursing research in the areas of methods and timing of imparting education to couples regarding preventable and nonpreventable disease-risk factors associated with perinatal mortality. There is a lack of consistency in educating new mothers and partners on signs and symptoms to watch for and when to seek care.

Research explains new technologies and assessments to initiate different measures to help mothers and their families to prevent perinatal death. To address perinatal death in the right way, health professionals must feel safe and well-trained. It is necessary to train nurses to face these circumstances with confidence, compassion, and confidence.

Recommendations

- Longitudinal study can be conducted with Follow-up during pregnancy & postnatally.
- A standardized complete diagnostic autopsy can be carried out

- Evaluations of the issues that existed before conception regarding preventable stillbirths.
- (MITS-minimally invasive tissue sampling) should be used to know the specific cause of death.

Limitation

- Autopsies, placental tissue histology, and fetal serological studies are not performed
- Establishment of the cause of death in stillbirths can be challenging because of the unavailability of investigations and the non-performance of an autopsy.

CHAPTER VII

SUMMARY

The current study was undertaken by the investigator to assess the determinants of perinatal mortality.

Objectives

1. To study the incidence and associated risk factors of perinatal mortality in a selected tertiary care hospital.
2. To find out the association between perinatal mortality with maternal and neonatal factors.

The study design adopted for the present study is case series observational research design. Using the consecutive sampling technique 3508 mothers were selected from the labor room and maternity wards of the selected tertiary care hospital, Belagavi. Participants were selected based on the inclusion criteria like mothers with 28 gestational weeks and more delivered in tertiary care hospitals with 1000gm of birth weight.

Ethical clearance was obtained from the Institutional Ethical Committee of KLE University, Belagavi. Written informed consent was obtained from the mothers after explaining the procedure and their role in the study. The purpose of the study was explained to mothers and relatives during data collection and consent was taken from every subject

Data collection was started by administering the Maternal and Newborn Health registry questionnaire. Mothers with C-sections and babies who were admitted to NICU were followed up in the hospital till the 7th day. Mothers with normal delivery were followed up in the hospital till the 5th day. At the discharge, mothers were told to inform their newborn health Asha workers or health assistants in a specific area.

Descriptive analysis was carried out by frequency and proportion for categorical variables. Binary logistic regression analysis was performed to test the association between the explanatory variables and outcome variables. The odds ratio along with 95% CI is presented. P-value < 0.05 is considered an association between an outcome variable and an explanatory variable. IBM SPSS version 22 was used for statistical analysis.

Demographic characteristics of subjects

Section 1: Represent the demographic characteristics of the mother.

- Out of 3508 mothers 50% had a normal level of Hb, 32% of mothers were suffering from mild anemia, 3.50% of mothers were moderately anemic, and 0.34% of mothers were severely anemic.

- Among the respondents 39% of the mothers were between 22-25 years of age, 23% of the mothers were between 26-29 and 22% were in 18-21 years of age, 16% of them were between age 30 and above at the time of delivery

- Majority of respondents ie. 75% were residing in rural area and 25% were residing in urban area.

- Among the respondents, 42% of them completed secondary school, 40% of them were completed Degree, 11 % of them completed primary education and 4.19% of them were having informal education, 1.45% of there were illiterate.

- Among the study population, 71.35% of them age group at marriage was between 18-22 years, 21.07% of them were between 23-27 years, 6.50% of them were between <18 years and 2.08% of them were between the age group of 28-32 years.

- Among the study population, 56% of them were multi and 44.13% of them were Primi mother.

- Majority of the participants had monthly income between 5001-10000 ie 50% and 47% of them had <5000, 3% had monthly income >10000 rupees respectively.

- Religion-wise distribution- 72.09% of the mothers were Hindu, 14% of them were Muslim, 2% of them were Jain, and 2.65% of them were Christian.

- Among the study population, 97.88% of them were housewife and 2.12% of them were employees

- Family-wise, 51.43% of them were belonging to joint family, 48.38% of them were nuclear family.

- In study population, 69.44% of them were non-vegetarian, 30.56% of them were vegetarian.

Section 2: Represents perinatal mortality rate.

To assign the cause of death categories from MNH registry were used to identify stillbirths and early neonatal deaths. In the current study of 3508 deliveries 128 deaths of the fetuses/neonates were found giving the perinatal mortality rate of 36.48 per 1000 births. Of 103 stillbirths 69/103 were fresh stillbirths (FSB) and 34/103 were macerated stillbirths (MSB). Stillbirth rate in the present study was 29.3 per 1000 births. Out of 128 perinatal deaths, early neonatal deaths accounted 25/128 giving the early neonatal death rate of 7.12 per 1000 births.

Section 3 depicts maternal determinants responsible for perinatal mortality.

In the present study, 78.9% of mothers were suffering from anemia, 11.86% of mothers had APH(placenta previa) 79.7% had Hypertensive disorders during pregnancy, 9.4% of mothers had gestational diabetes mellitus during pregnancy, 39.1% of mothers had thyroid disorders.

6.3% of mothers end up with postpartum hemorrhage, 10.9% of mothers had unplanned hospitalization, 5.4% of mothers contracted an infection during pregnancy, and 16.4% of fetal distress during labor resulted.

6.3% of mothers labor was induced, 7% of mothers had cord complications during labor, 47.6% of mothers had prolonged/protracted labor, 4.6% of mothers presented with meconium-stained labor, 18.8% of mothers had Amniotic fluid disorders.

1.5% of mothers had a history of previous C-sections, 9.3% of mothers had Rh -ve pregnancy, 1.5% of mothers were suffering from cardiac diseases.

11.7% of mothers had malpresentation, 47.6% of mothers had difficult delivery are the important risk factors that contributed to perinatal mortality.

Section 4 summarizes fetal/neonatal factors responsible for perinatal mortality.

In the current study, 13.8% of neonates were suffering from Birth Asphyxia, 6.1% of neonates had hypothermia, and 21.1% of births were preterm with gestational age between $28^{0/6}$ to $36^{6/7}$.

21% of newborns were low birth weight babies, 7% of them had intrauterine growth retardation, 4% of neonates had sepsis, and 2% of unknown causes were responsible for the death of neonates.

9% of the newborn were suffering from respiratory distress syndrome, 2% of neonates had tachycardia & pulmonary hemorrhage, 6% of the neonates had congenital anomalies, and 9% of the newborn were suffering from jaundice.

Section 5 depicts birth weight distribution and its significant contribution to perinatal mortality.

It was observed that there were 40/128 stillbirths and 9/128 early neonatal deaths occurred with a perinatal mortality rate of 13.9 per 1000 live births among very low birth weight babies with birth weight ranging between 1000-1499gram.

Section 6 it was reported that rural areas had significantly higher perinatal mortality as compared to urban areas.

In the current study stillbirth rate was 88 per 1000 births and the early neonatal death rate was 19 per 1000 births in rural area was reported.

Whereas in stillbirth rate 15 per 1000 births and an early neonatal death rate of 6 per 1000 births in urban areas respectively.

Section 7 represents a multiple logistic regression analysis of the prevalence of perinatal mortality by gestational age.

Results revealed that the odds of early preterm with gestational age ($28^{+0/6}$ - $31^{+6/7}$ weeks) was 36.01 times statistically higher in contributing perinatal mortality 36.01(95% CI:23.25-55.76).

Odds of preterm with gestational age between ($32^{+0/6}$ -$36^{+6/7}$ weeks) reported 4.44 times of statistically significant contribution in perinatal mortality 4.44(95%CI:2.91-6.78).

Section 8 reported an association between perinatal mortality with maternal parameters in pregnancy.

Results inferred that mode of delivery (vaginal, instrumental, emergency, and elective C-section), MTP(Medical termination of pregnancy), Antepartum hemorrhage(APH), Hypertensive disorders during pregnancy, post-partum hemorrhage(PPH), signs of fetal distress during labor, GDM/Overt DM, Rh -ve pregnancy were having significant association with perinatal mortality.

SECTION 9: LOGISTIC REGRESSION ANALYSIS OF PREVALENCE OF PERINATAL MORTALITY BY PREGNANCY PARAMETERS

The multiple regression analysis of perinatal mortality by different modes of delivery shows that the odds of Vacuum, Forceps, Elective C-section, and Emergency C-section have a significance of 0.15(95% CI 0.05-0.15), 0.02(95% CI 0.00-0.14),

0.03(95% CI 0.01-0.08), 0.12(95% CI 0.09-0.17) respectively as compared to vaginal birth.

SECTION 11: TABLE 10: ASSOCIATION BETWEEN PERINATAL MORTALITY WITH NEONATAL CONDITIONS AND OUTCOME

Factors like neonatal status(Born alive/dead or stillbirths), birth weight, Low APGAR score, resuscitation at birth, informal education of mother, cause of death, Information from the mother in determining the cause of stillbirth (Suspect), place of death, NICU admission were showing statistically significant association with perinatal mortality.

TABLE 12: ASSOCIATION BETWEEN PERINATAL MORTALITY WITH DETERMINANTS OF PM

In the current study factors like Birth asphyxia, temperature, term/preterm/post-term, Low birth weight, Small for gestational age/intrauterine growth retardation, Sepsis, Milk aspiration, Respiratory distress syndrome, Tachycardia, Pulmonary hemorrhage, Congenital anomalies had a statistically significant association with perinatal mortality.

CHAPTER VIII

RECOMMENDATIONS AND STRATEGIES FOR PREVENTABLE PERINATAL DEATHS

Access to care All maternity care providers identify women with modifiable risk factors for perinatal-related death and work individually and collectively to address these.	Strategies to address modifiable risk factors include: • Improving uptake of peri-conceptual folate • Pre-pregnancy care for known medical diseases such as diabetes. • Access to antenatal care • Accurate height and weight measurement in pregnancy with advice on ideal weight gain • Prevention and appropriate management of multiple pregnancies • Antenatal recognition and management of fetal growth restriction • Prevention of preterm birth and management of threatened preterm labor • Following evidence-based recommendations for indications for induction of labor • Advice to women and appropriate management of decreased fetal movements
Offer education to all clinicians and midwives so they are proficient at screening women, and are aware of local services and pathways to care, for the following:	• Domestic violence • Family problems • Mental health

That multi-disciplinary fetal surveillance training be mandatory for all clinicians involved in intrapartum care.	• This training includes risk assessment for mothers and babies throughout pregnancy as well as intrapartum observations (online programs or workshops). • The aims include strengthening supervision and support to promote professional judgment, interdisciplinary conversations, and reflective practice (educational meetings -discussion of abnormal CTG).
There is observational evidence that improved detection of fetal growth restriction, accompanied by timely delivery, reduces perinatal morbidity and mortality	• a. assessment and appropriate referral for risk factors for fetal growth restriction at the first antenatal visit and throughout pregnancy • accurate measurement of maternal height and weight at first antenatal assessment • ongoing assessment of fetal growth by measuring fundal symphysial height in a standardized way, recorded at each antenatal appointment, preferably by the same person • plotting of fundal height on a tool for detection of fetal growth restriction, such as a customized growth chart, from 26 weeks gestation

The team approach to care Women with complex medical conditions require a multidisciplinary approach to care, including a multidisciplinary management plan for the pregnancy, birth, and postpartum period. This plan must be communicated to all relevant caregivers. Each woman requiring such care should be assigned a key clinician to facilitate her care. Pregnant women who are admitted to the hospital for medical conditions not related to pregnancy need to have specific pathways for perinatal care.	• Simulation-based training for the midwives can be initiated

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ANNEXURES

ANNEXURE I

ETHICAL CLEARANCE LETTER

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Formerly known as KLE University)
(Deemed-to-be-University established u/s 3 of the UGC Act, 1956)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
JNMC Campus, Nehru Nagar, Belagavi-590 010, Karnataka State, India
☎: 0831-2444444 FAX: 0831-2493777 Web: http://www.kledeemeduniversity.edu.in E-mail: info@kledeemeduniversity.edu.in

Ref.No.KAHER/EC/19-20/ 2906/9007 28th June 2019

To,
Ms. Uma Kole
Part-Time Ph.D. Research Scholar,
2018-19 Batch, Faculty of Nursing,
KAHER, Belagavi.

Dear Research Scholar

The KAHER Ethics Committee on Human Subjects for Ph.D. Research Project met on 14th **May 2019** to consider your application for approval of the research project **"Determinants of Perinatal Mortality in tertiary care hospital."**

As there are no ethical issues involved in your proposed research project, the committee has provided approval for this research project.

You are requested to report to Ethical Committee of the following:

1. Any deviation from or change of the protocol.
2. Any changes in study documents.

(Dr. Anita Dalal)
Member-Secretary
Ethical Committee (Human) for Ph. D. Research
KAHER, Belagavi.

(Dr. B.C. Kotintot)
Chairman
Ethical Committee (Human) for Ph. D. Research
KAHER, Belagavi.

CC to: - The Director Research Foundation, KAHER, Belagavi.
- The Director Academic Affairs, KAHER, Belagavi.
- The Registrar, KAHER, Belagavi.
- Special Officer to Hon. Vice Chancellor, KAHER, Belagavi.

ANNEXURE II

PERMISSION LETTERFROM HOSPITAL AUTHORITY

LETTER SEEKING PERMISSION TO CONDUCTPROJECT

From:
Mrs. Uma Kole
Ph. D. Scholar, Asst. Prof.
Department of OBG(N)
KAHER, Institute of Nursing Sciences,
Belagavi

To:
The Medical Superintendent
Dr Prabhakar Kore Charitable Hospital,
Belagavi

Through:
The Dean, Faculty of Nursing
Principal, Institute of Nursing Sciences,
Belagavi

Subject: Request for permission to conduct project in Dr Prabhakar Kore Charitable Hospital, Belagavi

Respected Sir/Madam

I, the undersigned Mrs. Uma Kole, Ph. D. Scholar, Faculty of Nursing, have to submit a project to KAHER Belagavi as a part of partial fulfilment for the award of Ph. D. in Nursing.

The topic chosen for my project is titled as **"Determinants of Perinatal mortality in a tertiary care hospital".**

I humbly request your good office to grant me the permission to conduct the above project in your esteemed hospital where I require labour and maternity ward patients. My study involves assessing determinants of perinatal mortality.

I shall be grateful for your kind consideration and hearty co-operation towards the above request. Kindly do the needful.

Thanking you.

Yours sincerely,

Mrs. Uma Kole

Permitted 14/8/19

Signature of Guide

Dean Faculty of Nursing
KAHER, Institute of Nursing Sciences,
Belagavi

ANNEXURE III

Kannada Consent

ಸಮ್ಮತಿ ಪತ್ರ

ಆಸ್ಪತ್ರೆಯಲ್ಲಿ ಗರ್ಭಾವಸ್ಥೆ ಹಾಗೂ ಹೆರಿಗೆಯ ನಂತರ ತಾಯಿ ಹಾಗೂ ನವಜಾತ ಶಿಶುವಿನ ಮರಣದ ಕಾರಣಗಳ ಕುರಿತು ಸಂಶೋಧನೆ

ಸಂಶೋಧಕರ ಹೆಸರು: ಶ್ರೀಮತಿ ಉಮಾ ಕೋಲೆ

ಮಾರ್ಗದರ್ಶಕರು: ಡಾ. ಸುಧಾ ರೆಡ್ಡಿ

ಸಹಮಾರ್ಗದರ್ಶಕರು : ಡಾ. ಅನಿತಾ ದಲಾಲ

ಪರಿಚಯ:

ನನ್ನ ಹೆಸರು ಶ್ರೀಮತಿ ಉಮಾ ಕೋಲೆ, ಕೆ.ಎಲ್.ಇ ವಿಶ್ವವಿದ್ಯಾನಿಲಯದಲ್ಲಿ ಡಾಕ್ಟರೇಟ್ ಪದವಿಗಾಗಿ ವ್ಯಾಸಂಗ ಮಾಡುತ್ತಿದ್ದೇನೆ. ಆಸ್ಪತ್ರೆಗಳಲ್ಲಿ ಗರ್ಭಾವಸ್ಥೆ ಹಾಗೂ ಹೆರಿಗೆಯ ನಂತರ ತಾಯಿ ಹಾಗೂ ನವಜಾತ ಶಿಶುವಿನ ಮರಣದ ಕಾರಣಗಳ ಕುರಿತು ಸಂಸೋಧನೆಯನ್ನು ಮಾಡುತ್ತಿದ್ದೇನೆ. ಆದಕಾರಣ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮ್ಮ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆಯ ವಿಚಾರವಾಗಿ ನಿಮ್ಮ ಪರವಾನಿಗೆಯನ್ನು ಕೇಳುತ್ತಿದ್ದೇನೆ.

ಪ್ರಕ್ರಿಯೆಯ ವಿವರಗಳು:

ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ೨೦ ರಿಂದ ೩೦ ನಿಮಿಷಗಳವರೆಗೆ ತಾಯಿಯ ಆರೋಗ್ಯ ಮಾಹಿತಿ ಗರ್ಭಧಾರಣೆಯ ಸಮಯದಲ್ಲು ಹೆರಿಗೆಯ ಸಮಯದಲ್ಲಿ ಮತ್ತು ಗರ್ಭಧಾರಣೆಯ ಫಲಿತಾಂಶ, ಸಾಮಾಜಿಕ ಸಂಖ್ಯಾಶಾಸ್ತ್ರ ವಿಚಾರವಾಗಿ ಕೆಲವೊಂದು ಸಿದ್ಧಪಡಿಸಿದ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಿ ಮಾಹಿತಿ ಪಡೆದುಕೊಳ್ಳಲ್ಲಿದ್ದೇವೆ.

ಆಗಬಹುದಾದ ಲಾಭಗಳು:

ಸಂಶೋಧನಾ ಅಧ್ಯಯನಗಳು ಹೊಸ ಜ್ಞಾನವನ್ನು ಪಡೆಯಲಿಕ್ಕಾಗಿ ರೂಪಿಸಲಾಗಿರುತ್ತದೆ. ಈ ಹೊಸ ಮಾಹಿತಿಯು ಮುಂದೆ ಭವಿಷ್ಯದಲ್ಲಿ ಜನರಿಗೆ ಉಪಯೋಗವಾಗುತ್ತದೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿನೀವು ಭಾಗವಹಿಸುವುದರಿಂದ ನೇರವಾಗಿ ನಿಮಗೇ ನಿಮ್ಮ ಮಗುವಿಗೆ ಲಾಭವಾಗದೇ ಇರಬಹುದು ಆದರೆ ಆಸ್ಪತ್ರೆಗಳಲ್ಲಿ ಪೆರಿನೆಟಲ್ ಮರಣದ ಕಾರಣಗಳ ತಿಳುವಳಿಕೆ ಮೂಡಿಸುತ್ತದೆ ಹಾಗೂ ಮುಂದೆ ಆಗುವ ಅನಾಹುತಗಳನ್ನು ತಪ್ಪಿಸಬಹುದು.

ಅಪಾಯ:

ನಾವು ನಡೆಸುತ್ತಿರುವ ಸಂಶೋಧನೆ ಸುರಕ್ಷಿತವಾಗಿದ್ದು ನಿಮ್ಮ ಮೇಲೆ ಯಾವುದೇ ಅಡ್ಡ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ

ಮಾಹಿತಿ ಗೌಪ್ಯತೆ:

ನಿಮಗೆ ಸಂಬಧಿಸಿದ ಎಲ್ಲಾ ಮಾಹಿತಿಯನ್ನು ಗೌಪ್ಯವಾಗಿ ಇಡಲಾಗುವುದಿಲ್ಲ

ಹಿಂತೆಗೆಯುವಿಕೆ/ವಾಪಸಾತಿ:

ನಿಮ್ಮನ್ನು ಸಂಶೋಧನಾ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ಕೇಳಿಕೊಳ್ಳಲಾಗುತ್ತಿದೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವುದು ಸ್ವಯಂ ಪ್ರೇರಿತವಾಗಿರುತ್ತದೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸದೇ ಇರುವ ನಿರ್ಧಾರ ತೆಗೆದುಕೊಳ್ಳಲು ನಿಮಗೆ ಅಧಿಕಾರವಿರುತ್ತದೆ ಅಥವಾ ಒಪ್ಪಿದ ನಂತರವೂ ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಯಾವುದೇ ರೀತಿಯ ದಂಡ ಭರಿಸದೇ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವ ನಿರ್ಧಾರವನ್ನು ಹಿಂಪಡೆಯಬಹುದಾಗಿದೆ.

ಭಾಗವಹಿಸುವ ಖರ್ಚು:

ಈ ಸಂಶೋಧನೆಯ ಖರ್ಚು ವೆಚ್ಚಗಳನ್ನು ಅಧ್ಯಯನದ ಸಂಶೋಧಕರು ಭರಿಸುತ್ತಾರೆ. ನಿಮಗೆ ಯಾವುದೇ ರೀತಿಯ ಖರ್ಚು ವೆಚ್ಚಗಳನ್ನು ಭರಿಸಲು ಹೇಳುವುದಿಲ್ಲ

ಮಾಹಿತಿಯ ಬಳಕೆಗೆ:

ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ನೀವು ಭಾಗವಹಿಸಲು ಇಚ್ಛಿಸಿದರೆ ಮಾತ್ರ ನಿಮ್ಮನ್ನು ಸೇರಿದಲಾಗುವುದು. ನಾನು ನಿಮಗೆ ಗರ್ಭಾವಸ್ಥೆ ಹಾಗೂ ಹೆರಿಗೆಯ ನಂತರ ತಾಯಿ ಹಾಗೂ ನವಜಾತ ಶಿಶುವಿನ ಮರಣದ ಕಾರಣಗಳ ಕುರಿತು ಕೆಲವೊಂದು ಸಿದ್ಧಪಡಿಸಿದ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳುತ್ತೇನೆ. ಅದಕ್ಕೆ ತಕ್ಕಂತೆ ನೀವು ಉತ್ತರಿಸಬೇಕಾಗುತ್ತದೆ. ಈ ಎಲ್ಲ ಪ್ರಕ್ರಿಯೆಯು ಪೂರ್ಣವಾಗಿ ನೋವುರಹಿತವಾಗಿರುವುದು. ನಿಮಗೆ ಈ ಸಂಶೋಧನೆಯನ್ನು ಯಾವ ಹಂತದಲ್ಲಾದರೂ ಬಿಡಬೇಕೆನಿಸಿದಲ್ಲಿ ಬಿಡಬಹುದು.

ಪ್ರಶ್ನೆಗಳು:

ನಿಮಗೆ ಈ ಸಂಶೋಧನೆಯ ಬಗ್ಗೆ ಏನಾದರೂ ವಿವರಗಳು ಬೇಕಾದಲ್ಲಿ ಈ ಕೆಳಗೆ ಸಂಶೋಧಕರನ್ನು ಸಂಪರ್ಕಿಸಬಹುದು.

ಶ್ರೀಮತಿ ಉಮಾ ಕೋಲೆ
ಕೆ.ಎಲ್.ಇ ಪುಷ್ಪಾವತಿ ಮಹಾವಿದ್ಯಾಲಯ,
ಬೆಳಗಾವಿ -೫೯೦೦೧೦ (ಮೊ) ೮೬೬೦೬೪೪೯೨೧

ಅಥವಾ
ಡಾ. ಸುಧಾ ರೆಡ್ಡಿ
ಪ್ರಾಂಶುಪಾಲರು, ಕೆ.ಎಲ್.ಇ ಪುಷ್ಪಾವತಿ ಮಹಾವಿದ್ಯಾಲಯ,
ಬೆಳಗಾವಿ

ಅಥವಾ
ಡಾ. ಅನಿತಾ ದಲಾಲ
ಪ್ರಸೂತಿ ಮತ್ತು ಸ್ತ್ರೀರೋಗ ತಜ್ಞೆ
ಕೆ.ಎಲ್.ಇ ಜೆ.ಎನ್.ಎಮ್.ಸಿ ಬೆಳಗಾವಿ

ANNEXURE IV

निवडक रुग्णालयांमधील प्रसूतिपूर्व आणि प्रसूतिनंतर होणाऱ्या शिशुच्या मृत्युची निर्धारित कारणे

संशोधन अभ्यासक: श्रीमती. उमा कोले
पर्यवेक्षक: प्राध्यापक, डॉ. सुधा रेड्डी
सह मार्गदर्शक: प्राध्यापक, डॉ. अनिता दलाल

माहिती पत्रक

परिचय

मी श्रीमती. उमा कोले, पीएच डी. संशोधन अभ्यासक, के एल ई विश्वविद्यालय, बेळगांवी यांच्या प्रसूतिपूर्व आणि प्रसूतिनंतर होणाऱ्या शिशुच्या मृत्युची निर्धारित जन्मपूर्व कारणे नामक अभ्यासक्रमात सहभाग घेण्याकरिता आपली सहमती दर्शविण्यास आम्ही आपल्याला विनंती करित आहोत.

प्रक्रिया स्पष्टीकरण

या अभ्यासक्रमात आपल्याला गर्भावस्था, प्रसुती आणि गर्भधारणेच्या परिणामाबद्दल काही प्रश्नांची उत्तरे देणे आवश्यक आहे. ही संपूर्ण प्रक्रिया 20-30 मिनिटे घेईल.

संभाव्य फायदे

यामध्ये आपल्यासाठी कोणतेही त्वरित आणि थेट लाभ नसतील, परंतु आपला सहभाग जन्मजात मृत्युची निर्धारित कारणीभुत परिस्थितीचा अभ्यास करण्यास मदत करण्याची शक्यता आहे. जरी, प्रकल्पाचा भाग म्हणून आपल्या बाळाला अतिरिक्त फायदे नसले तरीही, विकासशील देशांमध्ये जन्माला आलेल्या इतर बाळांना फायदा होऊ शकतो अशा इतर कार्यक्रमांचे नियोजन करण्यात प्रकल्प मदत करेल.

संभाव्य धोके:

अभ्यासक्रम आयोजित करण्यासाठी वापरण्यात आलेली कार्यरत साधने सुरक्षित आहेत आणि यामुळे आपल्याला कोणतेही नुकसान होणार नाही.

गुप्तता:

आपली ओळख उघड केली जाणार नाही आणि सर्व माहिती सांकेतिक भाषेत संकलित केली जाईल जेणेकरुन कोणालाही आपली ओळख कळणार नाही.

माघार

अभासक्रमातील सहभाग स्वैच्छिक आहे. कोणत्याही वेळी जर आपण अभ्यासक्रमात सहभागी होऊ इच्छित नसल्यास आपण नाकारु शकता. आपल्या गर्भधारणा किंवा प्रसुती दरम्यान आरोग्य देखभाल मिळविण्यासाठी आपल्याला संशोधन अभ्यासक्रमात असण्याची आवश्यकता नाही.

सहभागाची किंमत

अभ्यासक्रमाची किंमत संशोधकांद्वारे घेतली जाईल. या अभ्यासक्रमात सहभागी होण्यासाठी आपल्याला कोणतेही अतिरिक्त खर्च नाहीत.

सहभागाचे पैसे

या अभ्यासक्रमात सहभागी होण्यासाठी आपल्याला किंवा (आपल्या बाळाला)कोणतेही लाभांश नसतील.

माहितीपूर्ण संमती

या संशोधन अभ्यासक्रमात, आपल्याला सामाजिक, जनसांख्यिकिय पैलू, कारणे आणि गर्भधारणेच्या (बाळावर) परिणामांशी संबंधित काही प्रश्नांची उत्तरे द्यावे लागतील. या प्रश्नांची उत्तरे देण्यासाठी लागणारा वेळ 20 ते 30 मिनिटांचा असेल. ही आपली निवड आहे की कोणत्याही क्षणी या अभ्यासक्रमात सहभागी होण्यापासुन आपण थांबवु शकता.

प्रश्न: या अभ्यासक्रमासंबंधित आपल्याला कोणतेही प्रश्न असतील तर आपण संपर्क साधु शकता:

श्रीमती. उमा कोले
पी एच डी. संशोधन अभ्यासक,
काहेर, नर्सिंग विज्ञान संस्था,
नेहरु नगर, बेळगांवी–590010
मोबाईल नंबर: 2660644921
ई–मेल आय डी:

किंवा

प्राध्यापक, डॉ. सुधा रेड्डी
डीन फॅकल्टी, नर्सिंग
प्राचार्य, काहेर, नर्सिंग विज्ञान संस्था,
नेहरु नगर, बेळगांवी–590010
मोबाईल नंबर: 9448354712

प्राध्यापक, डॉ. अनिता दलाल
प्रसुतीशास्त्र व स्त्री रोग तज्ञ विभाग, काहेर, जे एन एम सी,
नेहरु नगर, बेळगांवी–590010
मोबाईल नंबर: ९४४८१४०३४३

ANNEXURE IV

DATA COLLECTION PROFORMA

DODC **Maternal Newborn Health Registry-Perinatal form** **DOD**

Name of Mother:
Mobile No:
A. Maternal Information Code No:
1. Maternal age at enrollment:
2. Did mother enroll prior to delivery?
3. Area of Residence : Rural/Urban
Home Address
4. Level of maternal schooling
1 Illiterate 2. Informal Education 3. Primary
4.Secondary 5. Degree
5. Age at Marriage
6. Obstetric score:
a. MTP b. Spontaneous abortion c. Gravida d. Parity
7. Occupation of Wife
8. Monthly Expenditure & savings
9. Religion
a. Hindu b. Muslim c. Christian d. Jain d. Others
10. Type of family: a. Nuclear b. Joint c. Extended
11. Food Habits: a. Vegetarian b.Non Vegetarian
12. Maternal height:
13. Maternal weight:
B. Status of mother & delivery outcome
1. Gestational age:
2. Did mother have any antenatal care?
a)Yes b)No
3. If yes, how many antenatal visits did she have?
4. Did mother receive any of the following *during this pregnancy*: (Yes-1) (No-0)
a.....Tetanus toxoid vaccine
b.....Iron ☐
c.....Vitamins, calcium ☐
d.....HIV test ☐
e.....Blood pressure measurement..... ☐ 3 ☐
f. .....Urine test for protein
g.....Ultrasound for gestational age/other ..... ☐
h.....If yes for ultrasound

5. What was the mode of delivery?
1 Vaginal (**without** forceps/vacuum)
2 Vaginal (with forceps/vacuum)
3 C-section→ a. When was it performed?
a. Elective b. Emergency
Indication.....
4☐ Miscarriage
5☐ Medical termination of pregnancy (MTP)
6. Did mother have any of the following during this pregnancy?
a. Anemia
b. Severe Antepartum hemorrhage
c. Evidence of hypertensive disease /severe pre-eclampsia/eclampsia
d. Severe postpartum hemorrhage
e. Unplanned hospitalization
f. Transverse lie, Oblique lie, Breech lie
g. Signs of fetal distress during labor
h. Obstructed/ prolonged labor
i. Obstructed/prolonged labor/failure to progress/
j. Induction of labor
k. Cord Complication
l. Birth trauma/Difficult delivery
m. Poly/Oligo
n. Meconium-stained liquor

7. Where their signs of maceration?
8. Major malformation at birth
If yes: a. Neural tube defect
b. Abdominal wall defect
c. Others
9. Maternal infection (If Yes →Specify)
10. If other information might be helpful in determining cause of stillbirth please describe
11. Mode of Transportation to hospital

C. Neonatal Conditions and Outcome

1. Fetal/Neonatal outcome

1. Miscarriage (<20 weeks)
2. Jaundice
3. Stillbirth
4. Born alive, died before visit →If dead
   a. Within 24 hrs. b.Within how many days
5. Born alive, alive at visit

2. Sex of the baby: 1. Male 2. Female

3. Birth weight:

4. Apgar Score:

5. If birth weight is unknown, estimate the weight (Check one)

a. Very small (<1000g) **b.** Small (1000-1499g)
c. Small to normal (1500-2499g) d. Normal ≥2500g
e. Don't know

6. Did the baby have breathing difficulty at or soon after birth?

7. Breathed weakly or did not cry at birth

8. Required resuscitation at birth?

9. Was baby resuscitated with bag and mask?

10. Was baby placed on mother's chest after delivery?

11. Was the baby bathed within 6 hours after delivery?

12. Did baby breastfeed within 1 hour after delivery?

13. Had fits/seizures <2days of birth

14. Had fits/seizures ≥2days of birth

15. Fever or low temperature

16. Causes of death assigned by medical provider (if available)

1. Prematurity
2. Asphyxia
3. Sepsis
4. Congenital anomalies
5. Others specify.....
6. no official cause assigned

17. If other information might be helpful in determining cause of stillbirth please describe

18. Where did the death occur?

1. Hospital
2. Clinic/Health center
3. Home in village
4. Others

D. Neonatal treatment (complete for all infants)

1. Neonatal treatment provided.

1.....Antibiotics
1.....Oxygen
2.....Mechanical ventilation
3.....Medicinal eye care
4.....Vitamin K

Follow up Form

A. INFANT STATUS

1. Status of infant:
   a. Alive
   b. Died → Specify reason
   c. Unknown (try to identify baby's status)

2. Did baby have any adverse conditions after delivery? (Check for each)

a. Congenital anomalies (birth defect)
1. If yes, specify:

_____

b. Severe jaundice (palms/soles)
d. Hospitalization

C. FORM COMPLETION

1. Date visit completed:
2. Location of data collection:
   1|__|Home 2|__|Health Center

ANNEXURE V

PUBLICATIONS

Original Article

Maternal and Neonatal Outcomes in Hypertensive Disorders during Pregnancy: A Hospital-Based Study

Uma Kole, Sudha Raddi, Anita Dalal[1]

Department of OBG Nursing , KLE Academy of Higher Education and Research, Institute of Nursing Sciences, [1]Department of OBG, JNMC, Belagavi, Karnataka, India

Abstract

Context: Pregnancy is a physiological phenomenon, and each pregnancy is unique and valuable in its own way. Hypertensive diseases during pregnancy begin throughout pregnancy and disappear entirely after birth. Hypertensive disorders in pregnancy (HDP), including pregnancy-induced hypertension (HTN), chronic HTN (CHTN), (superimposed) preeclampsia, and eclampsia, are responsible for increased perinatal morbidity and mortality.

Aim: The aim of this study was to investigate the prevalence and perinatal effects in women with hypertensive disease during pregnancy.

Setting and Design: Hospital based cross section study was conducted on pregnant women.

Methods and Materials: A hospital-based cross-sectional study was carried out from September 2019 to August 2021 on women whose pregnancies were complicated by HTN disorders. Mothers of the baby suffering from systemic diseases were excluded from the study.

Statistical analysis used: Descriptive and inferential statistical analysis was conducted.

Results: In the present study results the prevalence of gestational HTN at 8.49%, preeclampsia at 18.10%, severe preeclampsia at 8.75%, and CHTN was 2.28%. It was shown that the prevalence of hypertensive disease is 38%. A significant difference was found between the maternal age group of mothers suffering from HTN disorders during pregnancy with mean gestational age in weeks $F = 124.6477$, $P = 0.0001$ at a 5% level. Furthermore, a significant statistical difference was observed with different maternal age groups having different mean Apgar scores at 1 min with $F = 81.0233$, $P = 0.0001$.

Conclusion: Prenatal HTN is one of the leading causes of maternal and neonatal death. Despite having all of the resources and several government programs in both urban and rural areas, many women suffer from HDP in both locations (rural and urban). Hence, management, as well as awareness among pregnant women regarding hypertensive diseases in pregnancy, is required.

Keywords: Eclampsia, Hypertensive disorders, Perinatal outcome, Preeclampsia, Pregnancy induced hypertension, Pregnancy

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INTRODUCTION

Pregnancy is a physiological phenomenon, and each pregnancy is unique and valuable in its own way. Hypertensive diseases during pregnancy begin throughout pregnancy and disappear entirely after birth.[1] Hypertensive disorders in pregnancy (HDP), including pregnancy-induced hypertension (HTN), chronic HTN (CHTN), (superimposed) preeclampsia, and eclampsia, are responsible for increased perinatal morbidity and mortality.[2]

Preterm deliveries are caused by almost 8%–10% of HDP,[3] and premature birth is recorded by 50% of women with severe preeclampsia or eclampsia.[4] Preeclampsia and eclampsia are the leading causes of perinatal fatalities in underdeveloped nations, accounting for 25% of all cases.[5] Many research studies on maternal and neonatal problems are conducted in developed nations.

The incidence of hypertensive disorders is outweighed in developing countries.[6] The etiopathogenesis of hypertensive disorder of pregnancy is vasospasm and endothelial dysfunction as a consequence of uteroplacental blood flow. This results in decreased placental perfusion, leading to decreased supply of oxygen and nutrients necessary for the growth and development of the fetus and well-being. This directly increases the incidence of intrauterine growth restriction (IUGR), and low birth weight, and so does the perinatal mortality and morbidity. Decreased perfusion of major organs can cause brain edema, bleeding, and seizures are a risk for mothers.[7]

For any disease process to be prevented, methods for identifying those who are highly susceptible to the disorder must be available. Despite the fact that numerous clinical and biochemical tests have been proposed for the early detection or prediction of preeclampsia, the majority of them are still either too costly or sophisticated to be widely utilized in the majority of developing countries. Currently, there is no preeclampsia screening test available that is both accurate and affordable and which can be suggested for use in the majority of developing nations. There is insufficient evidence to support the widespread use of uterine artery Doppler and first-trimester maternal blood indicators for the early diagnosis of preeclampsia, particularly in settings with limited resources.[8]

Furthermore, there is a lack of thorough epidemiological data on prenatal mortality and morbidity in underdeveloped nations, particularly in rural regions. Health improvements cannot be assessed without precise population data. Furthermore, without proper vital registration centers, rates are frequently underestimated. Existing Indian health registration systems have been unable to capture all pregnancies and their outcomes, particularly in rural regions where the majority of Indians live.[9] Inequities in health-care facilities between urban and rural regions may be responsible for a newborn death rate differential of 47–370 per 1000, which is connected with hypertensive problems in pregnancy.[10] In contrast, the incidence and risk of adverse perinatal outcomes from hypertensive disease during pregnancy vary by country, population, and race/geographic location. Therefore, the aim of this study was to investigate the prevalence and perinatal effects in women with hypertensive disease during pregnancy.

SUBJECTS AND METHODS

A hospital-based cross-sectional study was carried out from September 2019 to August 2021 on women whose pregnancies were complicated by HTN disorders. Mothers of the baby suffering from systemic diseases were excluded from the study.

- Gestational HTN was diagnosed in hypertensive women over 20 weeks gestation with no development of proteinuria or systemic evidence of preeclampsia
- CHTN was diagnosed in hypertensive women before pregnancy or <28 weeks of gestation
- Preeclampsia is defined as women with blood pressure ≥140/90 mmHg, with or without proteinuria at least twice at 4-h intervals at 28 weeks of gestation.

Eclampsia is diagnosed when a seizure occurs in a woman with high blood pressure, which is not thought to be due to any other cause.

Data collection

Face-to-face interviews were conducted at tertiary care hospitals in Belagavi city. Data were collected on demographic characteristics, maternal age, educational qualification, registered cases (from the first visit), occupation, parity, gestational age (GA), weight gain, mode of delivery, birth weight, and Apgar score.

Table 1: Prevalence of evidence of hypertension

Types of HTN	Number of respondents	Percentage of respondents
GHTN	298	8.49
PE	635	18.10
SPE	307	8.75
CHTN	80	2.28
Total	1320	100.00

HTN: Hypertension, GHTN: Gestational HTN, PE: Preeclampsia, SPE: Severe preeclampsia, CHTN: Chronic HTN

RESULTS

Results revealed the prevalence of gestational HTN (GHTN) at 8.49%, preeclampsia at 18.10%, severe preeclampsia at 8.75%, and CHTN at 2.28%. The study found out the prevalence of hypertensive disease is 38% [Table 1].

According to the findings around 12 per 1000 live births/ births of perinatal mortality is observed among women suffering from hypertensive disorders which were avoidable with proper prenatal monitoring and care.

Table 2 revealed that a statistical difference was found with birth weight as compared to the maternal age group of mothers suffering from HTN disorders during pregnancy $F = 3.8459$, $P = 0.0092$, mean Apgar score at 1 min and at 5 min $F = 81.0233$, $P = 0.001$ and $F = 63.5466$ $P = 0.001$, GA in weeks $F = 124.6477$, $P = 0.0001$, and mean placental weight $F = 24.2539$, $P = 0.0001$ at 5% level.

Table 3 revealed the association between demographic profiles with the prevalence of evidence of HTN.

Considering the maternal age group out of 783, between 18 and 21 years of age 26.17% (78) were suffering from GHTN, 25.67% (163) had preeclampsia, 25.08% (77) had eclampsia, and 11.25% (9) were suffering from CHTN.

Table 2: Distribution of perinatal mortality

Distribution of perinatal mortality-1320			
Hypertensive disorders in pregnancy	Early neonatal death	Stillbirth	PM per 1000 live births (%)
GHTN	6	20	11.6
PE	7	64	
SPE	3	43	
CHTN	8	3	

HTN: Hypertension, GHTN: Gestational HTN, PE: Preeclampsia, SPE: Severe PE, CHTN: Chronic HTN

The association between maternal age and the prevalence of hypertensive disorders during pregnancy was statistically significant with Chi-square – 43.3900, $P = 0.0001$. Similarly, a statistically significant association was found between the area of residence and the prevalence of hypertensive disorders during pregnancy.

The association between an obstetrical score of a mother and the prevalence of hypertensive disorders was statistically significant with Chi-square – 20.0310, $P = 0.0001$. The association between religion and the prevalence of hypertensive disorders during pregnancy is statistically significant with Chi-square – 28.2040, $P = 0.0300$. The association between the type of family and prevalence of hypertensive disorders during pregnancy was found statistically significant with Chi-square – 40.1700, $P = 0.0001$ Table 4.

DISCUSSION

In the present study, the prevalence of HDP is 38%. It was observed that there were 8.49% (298) of mothers suffering from gestational HTN, 18.10% (635) and 8.75% (307) had preeclampsia and preeclampsia, and 2.28% (80) had CHTN. A study done by Mehta *et al.* found a 6.9% of prevalence.[11] Subki *et al.* reported a prevalence of gestation HTN at 29.5%, preeclampsia at 54.9%, and eclampsia at 8%.[12]

In our study, it was shown that birth weight is much lower at a younger age – 22 to 25 years – than it is at a later age (26 to 29 years). Panda *et al.* reported findings that were comparable concerning both young and elderly mothers' significant perinatal mortality with low birth weight problems.[13]

It was shown that preterm or extremely preterm births accounted for nearly three-fourths of perinatal

Table 3: Comparison of maternal age groups with birth weight, gestational age, Apgar, and placental weight by one-way ANOVA

Maternal age group	Birth weight		GA		Apgar 1		Apgar 5		Placental weight	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
18–21 years	2637.33	568.05	38.68	1.75	6.92	1.10	8.00	1.45	373.97	72.20
22–25 years	2585.67	589.43	37.13	2.88	6.25	1.96	7.40	2.19	368.59	228.35
26–29 years	2665.37	560.96	36.73	3.37	5.81	2.35	6.82	2.67	339.94	97.57
30+ years	2647.39	700.80	36.53	3.64	5.74	2.54	6.74	2.91	329.90	102.88
Total	2606.49	584.18	36.91	3.36	6.31	1.92	7.48	2.17	332.56	86.99
F	3.8459		124.6477		81.0233		63.5466		24.2539	
P	0.0092*		0.0001*		0.0001*		0.0001*		0.0001*	
Pair-wise comparisons by Tukey multiple *post hoc* procedures										
18-21 years versus 22-25 years	0.5758		0.0001*		0.0001*		0.0001*		0.9146	
18-21 years versus 26-29 years	0.9209		0.0001*		0.0001*		0.0001*		0.0001*	
18-21 years versus 30+years	0.9997		0.0001*		0.0001*		0.0001*		0.0001*	
22-25 years versus 26-29 years	0.0061*		0.0001*		0.0110*		0.1293		0.0035*	
22-25 years versus 30+years	0.9166		0.1270		0.0012*		0.0002*		0.0007*	
26-29 years versus 30+years	0.9977		0.0220*		0.0012*		0.0004*		0.0001*	

SD: Standard deviation, GA: Gestational age, * significance p value <0.05

Table 4: Association between demographic profile with the prevalence of evidence of hypertension

Demographic profile	None	Percentage	GHTN	Percentage	PE	Percentage	SPE	Percentage	CHTN	Percentage	Total	χ^2	*P*
Maternal Hb													
Normal Hb	1328	60.69	180	60.40	358	56.38	161	52.44	44	55.00	2071	16.7420	0.1600
Mild	786	35.92	103	34.56	245	38.58	129	42.02	34	42.50	1297		
Moderate	65	2.97	14	4.70	27	4.25	15	4.89	2	2.50	123		
Severe	9	0.41	1	0.34	5	0.79	2	0.65	0	0.00	17		
Maternal age group													
18-21	456	20.84	78	26.17	163	25.67	77	25.08	9	11.25	783	43.3900	0.0001*
22-25	859	39.26	86	28.86	261	41.10	127	41.37	35	43.75	1368		
26-29	534	24.41	65	21.81	127	20.00	65	21.17	21	26.25	812		
30+	339	15.49	69	23.15	84	13.23	38	12.38	15	18.75	545		
Age at marriage													
<18	143	6.54	16	5.37	40	6.30	25	8.14	4	5.00	228	12.7800	0.3850
18–22	1542	70.48	214	71.81	470	74.02	219	71.34	58	72.50	2503		
23–27	482	22.03	61	20.47	121	19.06	58	18.89	17	21.25	739		
28–32	21	0.96	7	2.35	4	0.63	5	1.63	1	1.25	38		
Area of residence													
Rural	1601	73.17	233	78.19	505	79.53	236	76.87	67	83.75	2642	16.2510	0.0030*
Urban	587	26.83	65	21.81	130	20.47	71	23.13	13	16.25	866		
Education level													
Illiterate	33	1.51	4	1.34	10	1.57	4	1.30	0	0.00	51	22.5100	0.3140
Informal education	106	4.84	11	3.69	22	3.46	7	2.28	1	1.25	147		
Primary	228	10.42	44	14.77	72	11.34	36	11.73	7	8.75	387		
Secondary	463	21.16	65	21.81	136	21.42	77	25.08	14	17.50	755		
Degree	871	39.81	108	36.24	261	41.10	119	38.76	43	53.75	1402		
Others	487	22.26	66	22.15	134	21.10	64	20.85	15	18.75	766		
Obstetric score													
Primi	910	41.59	140	46.98	318	50.08	150	48.86	30	37.50	1548	20.0310	0.0001*
Multi	1278	58.41	158	53.02	317	49.92	157	51.14	50	62.50	1960		
Monthly expenditure and savings													
≤5000	1158	52.93	126	42.28	253	39.84	101	32.90	30	37.50	1668	78.8910	0.0001*
5001–10,000	992	45.34	163	54.70	370	58.27	193	62.87	48	60.00	1766		
≥10,001	38	1.74	9	3.02	12	1.89	13	4.23	2	2.50	74		
Religion													
Hindu	1611	73.63	210	70.47	446	70.24	204	66.45	59	73.75	2530	28.2040	0.0300*
Muslim	270	12.34	43	14.43	107	16.85	55	17.92	13	16.25	488		
Christian	43	1.97	1	0.34	7	1.10	4	1.30	3	3.75	58		
Jain	43	1.97	8	2.68	11	1.73	8	2.61	0	0.00	70		
Others	221	10.10	36	12.08	64	10.08	36	11.73	5	6.25	362		
Type of family													
Nuclear	1106	50.55	134	44.97	275	43.31	147	47.88	35	43.75	1697	40.1700	0.0001*
Joint	1082	49.45	163	54.70	359	56.54	156	50.81	44	55.00	1804		
Extended	0	0.00	1	0.34	1	0.16	4	1.30	1	1.25	7		
Food habits													
Vegetarian	689	31.49	97	32.55	167	26.30	99	32.25	22	27.50	1074	7.6320	0.1060
Nonvegetarian	1499	68.51	201	67.45	468	73.70	208	67.75	58	72.50	2434		
Total	2188	100.00	298	100.00	635	100.00	307	100.00	80	100.00	3508		

Hb: Hemoglobin, HTN: Hypertension, GHTN: Gestational HTN, PE: Preeclampsia, SPE: Severe PE, CHTN: Chronic HTN, * significance p value <0.05

mortality (61%) in women with the antepartum start of HDP, which was statistically significant with $P = 0.0092$. According to Endeshaw and Berhan's report, 71% of all perinatal fatalities in women with HDP were in preterm or extremely preterm deliveries.[14] Neonatal morbidity was higher in women with severe preeclampsia; according to Panda *et al.*,[13] the majority of the difficulties were due to premature births. It follows that HDP most likely exposed a number of infants to preterm birth and associated problems. Cincotta RB and Brennecke[15] claim that women with HDP are more likely to give birth prematurely. Reported that women with HDP are more likely to birth their babies prematurely. A higher risk of perinatal mortality in infants with prenatal HDP, as described by Chhabra and Gandhi,[16] may be congruent with the finding of a strong association between lower GA, low birth weight, and perinatal death.

The findings showed that mothers with HTN problems who were younger – <25 years old – had preterm births with low birth weight and low Apgar scores, among other things. In addition, a reduced placental weight incidence was noted, which might have a negative impact on the fetus's growth and development and lead to IUGR. According to research by Akbar *et al.*,[17] neonates primarily had preterm-related issues when their mothers had severe preeclampsia.

The pathogenesis of hypertensive illness is significantly influenced by maternal characteristics, such as maternal age. It has been shown that moms under the age of 25 years are more prone than mothers between the ages of 26 and 30 years to suffer from HTN problems. Women from rural areas showed a greater prevalence of HTN disorders during pregnancy as compared to moms in urban areas. According to Panda *et al.*,[13] maternal mortality was observed among women from lower and middle-class socioeconomic backgrounds as well as among women older than 35 years. Preeclampsia has long been considered an illness of primiparity. Accordingly, the majority of the moms were anemic or undernourished and belonged to lower socioeconomic classes.

Primi mothers have a 44.18% higher prevalence of hypertensive disease pathology. According to Shruthi and Thenmozhi,[18] 60.7% of the moms with HTN were primigravida. The majority of them did not finish high school and did not get routine prenatal care due to a lack of access to health centers' factors.

Results inferred that HDP is associated with a greater threat of poor perinatal outcomes regardless of where the women live. Women with Pregnancy induced hypertension (PIH), preeclampsia, and eclampsia had 53.18% emergency cesarean section and have premature babies with low birth weight. When compared with all labor, 39.3% had a lower-segment cesarean section as the mode of delivery reported by Shruthi and Thenmozhi.[18] A similar finding was reported by Levine *et al.*,[19] in which the abdominal route (including Lower segment Caesarian -Section (LSCS) and hysterectomy) is the common method of termination of pregnancy with a slightly higher incidence rate than our study (65.6%).

Patients with a poor knowledge level are more likely to have a high incidence of severe chronic hypertension , superimposed preeclampsia, and eclampsia in this series, according to Indonesian research.[19] These findings demonstrated that a lack of awareness as well as a healthy lifestyle has a crucial role in the development of HTN problems during pregnancy. These disparities might be caused by socioeconomic level, racial factors, and other demographic factors such as parity and age.

Women who acquire hypertensive issues early in pregnancy, according to prior research, are difficult to control. The potential advantage of delayed delivery in terms of greater fetal maturity must be weighed against the danger of hypoxia and severe growth limitation.[1] To enhance the result, it suggests that mothers with HTN problems should be properly counseled and managed with suitable neonatal critical care facilities.

When summing up the maternal parameters such as maternal age, area of residence, obstetric care, monthly saving, religion, and type of family plays a vital role in one pregnancy and significantly affects its outcome. These variables are mostly preventable if there is improved knowledge of routine antenatal follow-up, prompt identification, and referral so that essential intervention may be carried out at the right time to avoid fetal and maternal health disasters.

Recommendations

Pregnancy is an opportunistic time for health-care providers to promote positive health activities, thus optimizing the health of pregnant women with potential short- and long-term benefits for both mother and child. Physical exercise during pregnancy could prevent excessive gestational weight gain, promote insulin sensitivity, and reduce systemic inflammation and oxidative stress, leading to improved endothelial function, as well as promoting placental angiogenesis, factors that lower the risks of developing Pre eclampsia (PE) during pregnancy.[20,21]

CONCLUSION

One of the major factors of maternal and neonatal mortality is HTN during pregnancy. Despite having all of the resources and several government programs in both urban and rural areas, many women suffer from HDP in both locations (rural and urban). This condition affects all women, from illiterate to literate, regardless of where they live. We must prioritize excellent prenatal care and offer enough health education, registration of all pregnant women, early diagnosis of high-risk pregnancies, and effective and prompt management to reduce maternal, fetal, and perinatal fatalities.

Limitations

The study had certain limitations as it was a hospital-based study; hence, the results of the study could be generalized to hospitals only. For the community, a further community-based study should be done using a larger sample size.

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Conflicts of interest

There are no conflicts of interest.

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Maternal and neonatal determinants of perinatal mortality in selected tertiary care hospital of North Karnataka

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Abstract:

INTRODUCTION: Goal 3 of sustainable development aims to ensure healthy lives and promote well-being for all people of all ages. One of the components for achieving this objective is the improvement of maternal and child health, with the perinatal mortality (PM) rate serving as an indicator. This study aimed to know the probable cause of perinatal death at a medical center of tertiary care to reduce the incidence of perinatal death and enhance the quality of care.

OBJECTIVE: The objective of this study was to study the incidence and associated risk factors of PM in a selected tertiary care hospital.

MATERIALS AND METHODS: A prospective case series study was conducted from August 2019 to September 2021 among all pregnant mothers who delivered in selected tertiary care hospitals of Belagavi city among 3508 participants.

RESULTS: In the present study, results revealed that 29 per 1000 births and 7.12 per 1000 live births of END. The incidence of PM was 36.48 per 1000 births in the present study. There was a positive correlation between maternal weight in kg versus the birth weight of the baby ($R = 0.091$, $P < 0.001$). Results inferred that maternal anemia, antepartum hemorrhage, hypertensive disorders, thyroid disorders, amniotic fluid infections, and placental insufficiency were identified as primary causes of stillbirth.

CONCLUSION: There is a region-wise wide variation in the rate of PM. There was an inverse relationship between birth weight and stillbirth, neonatal death, and perinatal death rate. Low birth weight babies contributed more than three times to stillbirths, early neonatal deaths, and perinatal deaths as compared to babies with normal birth weight.

Keywords:

Determinants, early neonatal death, India, perinatal mortality, stillbirth

Introduction

Perinatal mortality (PM) occurs when a fetus dies between 28 weeks of gestation and in the 1st week following delivery. Around 7.5 million babies are estimated to die each year during the perinatal period,[1] with 98.0% of these deaths occurring in developing countries. The under-5 mortality rate has decreased in India over the last two decades, neonatal mortality has decreased at a much slower pace, owing to large contributions from perinatal deaths. Newborn deaths, or babies who die within the first 28 days of life, continue to account for a quarter of all children's deaths.[2]

PM is five times higher in developing countries than in developed countries, with 10 deaths per 1000 total births in developed countries, 50 deaths per 1000 in developing countries, and more than 60 deaths per 1000 in the least developed countries. PMR is 50 per 1000 births in Asia.[3] With a PM rate of 23 per 1000 total births, India significantly contributes to the global burden (SRS

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data 2016). With 5.92 million stillbirths in 2015, India accounted for 22.6% of the global stillbirth burden.[4] WHO formulated the Every Newborn Action Plan to reduce the stillbirth rate to < 12 per 1000 births by 2030.[5]

Maternal age, gestational period, complications during pregnancy and labor, previous adverse obstetric history, maternal disease, poor economic status, and cigarette smoking are all risk factors for high-risk pregnancies. Common risk factors for PM in developing countries include labor onset, mode of delivery, gestational age, pregnancy-induced hypertension, and insufficient antenatal care visits.[6] In addition, maternal hemoglobin levels and anticonvulsant and antihypertensive medication were frequently implicated in PM.[7]

Neonatal deaths and stillbirths are not considered a problem in many societies, owing to their frequency. Numerous communities have adapted to this situation by deferring recognition of the birth and naming the child until after the newborn infant has survived the initial period. Primary and secondary care health workers frequently lack the skills necessary to meet the needs of newborn infants, as countries' recognition of opportunity is still developing, and their experience in this area is, therefore, limited.[8]

In the past few decades, the mortality rate for children under the age of 5 has decreased significantly worldwide. However, the rate of decline in neonatal mortality is much slower, and by 2012, neonatal mortality will account for 44% of under-5 mortality.[9] Three-fourths of neonatal deaths are attributable to PM, and the day of birth is the most difficult time for a newborn's life. To reduce neonatal mortality, it is essential to evaluate factors associated with PM or predisposition to causes of PM.[10]

PM may be decreased by identifying maternal risk factors and treating them effectively and promptly. Identifying areas where clinical care and public health measures could enhance perinatal outcomes will help health-care providers and policymakers better understand the determinants of perinatal death at this level of care. The goal of this study was to assess the rate and risk factors for PM in selected tertiary care facilities of Belagavi.

The objectives of our study

The objectives of this study were to study the incidence and associated risk factors of PM in a selected tertiary care hospital.

Materials and Methods

It was a prospective case series research. At participating study hospital, the researcher screened all pregnant women at the time of presentation to the hospital for delivery between August 2019 and September 2021. Women at 28 weeks of gestation and more or babies weighing at least 1000g were approached for enrolment in the study. Mothers of infants with systemic illnesses were excluded from the study. The sample size was calculated using the formula sample size (n) = $Z^2_{1-\alpha}$ PQ/ d^2. The sample size is computed considering 30 per 1000 PM. Usually taken at a 95% confidence interval (CI) as 1.96 with tolerable error (in the present study d is 20%). Considering the above formula, the sample size was calculated as 3508.

Ethical permission

Ethical clearance was obtained from the institutional ethical committee Ref. No. KAHER/EC/19-20/2906/9007 dated 28.06.2019 for data collection.

Data collection

Using the consecutive sampling technique, face-to-face interviews were conducted at tertiary care hospitals of Belagavi. The modified Maternal Newborn Health Registry was used for data collection. Data were collected on demographic characteristics, and medical and obstetric history were recorded from medical data abstraction (when available) and maternal recall.

Results

In the present study, results revealed that 29 per 1000 births of stillbirths and 7.12 per 1000 live births of END. The incidence of PM was 36.48 per 1000 births live births.

There was a positive correlation between maternal weight in kg versus the birth weight of the baby ($R = 0.091$, $P < 0.001$). There was a positive correlation between placental weight versus birth weight of the baby ($R = 0.419$, $P < 0.001$). There was a positive correlation between the gestational week versus the birth weight of the baby ($R = 0.419$, $P < 0.001$) [Table 1].

Table 2 revealed that perinatal mortality was higher i.e., 13 times significantly higher in gestational ages between 28-37 as compared to term [Table 2].

Results inferred that there is a statistically significant association was found between prenatal deaths and newborn risk factors such as congenital abnormalities, birth asphyxia, hypothermia, low birth weight (LBW), small for gestational age, intrauterine growth restriction, sepsis, respiratory distress syndrome, tachycardia, and pulmonary hemorrhage.

According to the results, a statistically significant relationship was found between newborn factors such as neonatal jaundice, birth weight, cry at delivery,

resuscitation, informal education, asphyxia, and neonatal intensive care unit (NICU) hospitalization and PM.

Results inferred that maternal anemia, antepartum hemorrhage, hypertensive disorders, thyroid disorders, amniotic fluid infections, and placental insufficiency were identified as primary causes of stillbirth.

Discussion

This study was a prospective one, during which we came across 3508 cases.

Table 3, the number of stillbirths was observed to be 29 per 1000 births out of 3508 total births. There were 25 fatalities out of the 3508 live births, for an early neonatal mortality rate of 7.12 per 1000 live births. Thus, the total PM was found to be 36.48 per 1000 live births.

The PM rate and the early neonatal death rate were found to be 128.03 and 31.94 per 1000, respectively, in record-based research that was carried out in a rural medical college in West Bengal in 2005 by Paul and Bag.[10] Siddalingappa *et al.*'s (2013)[11] research in Mysore indicated that there were 28.93 perinatal deaths for every 1000 live births. According to Ghorat *et al.*, early neonatal death was 7.4 per 1000 live births, while PM and stillbirth rates were 16.6 and 9.1 per 1000 births, respectively (2016). According to Kananura[12] *et al.* (2016) from Ethiopia, the newborn death rate was 34 per 1000 live births.[13] Mehkarkar and Vijay (2017) Loni found a PM rate of 72.4/1000.[14]

Table 1: Correlation maternal weight (kg), height (cm), body mass index versus birth weight of the baby in the study population (n=3508)

Parameter	Pearson rank correlation (r_s)	P
Maternal weight (kg) versus birth weight of the baby	0.091	<0.001
Placental weight versus birth weight of the baby	0.419	<0.001
Gestational week versus birth weight of the baby	0.608	<0.001

Table 2: Multiple logistic regression analysis of the prevalence of perinatal mortality by gestational age

GA (weeks)	Adjusted OR	95% CI for OR		P
		Lower	Upper	
22-27	Reference			
28-31	13.60	6.70	27.64	0.0001*
32-37	13.91	9.08	21.30	0.0001*
38-40	1.71	1.09	2.69	0.0190*
41-42	0.35	0.24	0.50	0.0001*

*Significance *P<0.05. GA: Gestational age, OR: Odds ratio, CI: Confidence interval

Table 3: Stillbirths, early neonatal death rate, and perinatal mortality rate

Mortality	Total births	Per 1000 births/live births
Stillbirths	103	29.3
Early neonatal deaths	25	7.12
Perinatal mortality	128	36.48

Since most studies are hospital-based, there is a significant regional difference in the reports. In our research, we found that primiparae had a significant risk of stillbirths and early infant deaths. The risk of perinatal death is quite significant for moms between the ages of >18 and 25 years.

It is evident that LBW infants had a very high PM rate, and that all death rates were inversely correlated with birth weight [Tables 1 and 2]. According to Nitin Sudhakar Mehkarkar and Vijay (2017)[13] research on LBW infants, these fatalities account for roughly 75% of stillbirths and early neonatal deaths.

In our studies, we found that there was a positive correlation between maternal weight in kg versus the birth weight of the baby (R = 0.091, P < 0.001). There was a positive correlation between placental weight versus birth weight of the baby (R = 0.419, P < 0.001). There was a positive correlation between the gestational week versus the birth weight of the baby (R = 0.419, P < 0.001).

According to research by Tan *et al.*, the majority of macerated stillbirths occurred in preterm infants and 54% were born prematurely.[15] According to Singh *et al.*,[16] 66% of neonatal deaths were due to preterm.[11] According to Pradeep *et al.* (1995)[17], preterm and LBW infants accounted for more than 85% of perinatal deaths.[12]

In the present study, the odds of respondents with very preterm birth is OR = 13.60, 95% CI: 6.70–27.64, P = 0.0001. The majority of deaths were caused by preterm birth.

It was observed that 19.23% of early neonatal deaths had occurred due to birth asphyxia. Birth asphyxia with/without meconium aspiration accounted for 40.57% of early neonatal deaths reported by Mehkarkar and Vijay. Ghorat *et al.* (2016).[18] Reported asphyxia and sepsis were the other major causes of PM.

There was significant statistical association was found between early neonatal death due to sepsis, respiratory distress syndrome, pulmonary hemorrhage, and congenital anomalies.

In the present study, 8.57% of early neonatal deaths occurred due to LBW. It is evident that the majority

of stillbirth and early neonatal deaths had significant growth restrictions 24.14% and 20.69%, respectively.

There was significant statistical association was found between early neonatal death due to sepsis, respiratory distress syndrome, pulmonary hemorrhage, and congenital anomalies.

The most common primary fetal cause of stillbirth, as identified was intrauterine hypoxia, followed by growth disorders and fetal infection. Hypertensive disease was the primary maternal cause, followed by anemia. Furthermore, there was a significant statistical association was found between neonatal conditions such as neonatal jaundice, birth weight, cry at birth, resuscitation, informal education, causes of death, causes of stillbirth, and NICU admission.

In the present study, most intrauterine mortalities (54.7%) happened during the 28–38th weeks of gestation and the mean gestational age was 38.05 weeks. Shiva in 2005[19] reported that 51.7% of intrauterine mortalities occurred in the second trimester, while 48.3% of them were in the third trimester; moreover, the mean gestational age was reported to be 29.6 weeks.

In some studies, the most prevalent causes of neonatal mortality were LBW (prematurity), congenital anomalies, and asphyxia during labor, respectively.[20,21] In other studies, educational level and quality of perinatal care were considered the leading causes of PM,[11,12] as mothers' educational level can affect their use of perinatal care. In addition, low quality of perinatal care can have a great impact on timely diagnosis and choice of proper treatment for eliminating the risk factors of PM.

Conclusion

In the present study, results revealed that 29 per 1000 births of stillbirths and 7.12 per 1000 live births of END. The incidence of PM was 36 per 1000 births live births. There is region-wise wide variation in the rate of PM. There was an inverse relationship between birth weight and stillbirth, neonatal death, and perinatal death rate. LBW babies contributed more than three times to stillbirths, early neonatal deaths, and perinatal deaths as compared to babies with normal birth weight. Preterm babies contributed significantly more than term babies in stillbirths, early neonatal deaths, and perinatal deaths.

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Conflicts of interest
There are no conflicts of interest.

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