

# Analysis of Complications for Expectant Women and Comparative Study of Maternal Mortality in India

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## Abstract

*From the first maternal level up to the delivery, there is high risk in women's health factors. Nowadays, severe maternal problems lead to crucial health issues in pregnant women. These problems may occur either during pregnancy or delivery time or after delivery according to the women health conditions. These crucial issues will become a risk for the mother's and baby's life. These maternal conditions during delivery are not easy to detect at the early stage of pregnancy. In this paper, some of the important pregnancy complications are addressed with their symptoms and treatment. Based on the study, different methodologies are discussed to prevent and avoid pregnant women's complications and for childbirth. The main aim of this study is to improve the maternal and fetal outcomes irrespective of the places. In this paper, a sample dataset in India is taken to show the Maternal Mortality Rate (MMR) by considering the values from the year 2010 to 2030. More analysis of MMR can be done by considering different countries, which will be helpful to solve the occurrence of risk factors either during or after pregnancy. Consequently, this analysis may avoid pregnancy death rates. The main work is to improve the maternal and fetal outcomes by strengthening the pregnant women health. Future work will be applying different machine learning methodologies to detect the risk level of severe maternal morbidity.*

**Keywords—** Maternal Mortality Rate, Fatal outcomes, Neonatal mortality, Ectopic Pregnancy, Eclampsia.

## I. INTRODUCTION

Severe pregnancy complications are expected, which may create health problems during pregnancy. The health problems include either the mother's health or infant's health or of both. Women may have health issues which commonly arise either during pregnancy or even before pregnancy or after. This leads to complications in women health.

Pregnant women may face many problems that include their health, their infant's health, or both without any knowledge or awareness on it. Women's diseases or crucial health conditions before pregnancy can often lead to complications throughout pregnancy. During delivery time and the postnatal period, maternal health refers to the mother's health. While substantial progress has been made over the past three years from 2017, about 285000 women died during and after pregnancy and childbirth that was unacceptably high in number. Few problems like high blood pressure, excessive blood loss, infection, thyroid, illegal abortions

and obstructed labor are the direct causes. The Secondary causes i.e which causes deaths during pregnancy, such as anemia, malaria and heart disease are the most mutual primary causes of maternal death. Most of the maternal deaths may be prevented with the help of doctors and trained health experts.

In a year more than half a million women die from causes of pregnancy. In developing countries 99% of them contribute to deaths between 15 and 49 years old. . In some developed countries, 12% women die due to pregnancy or delivery complications. This is the approximate lifetime risk of maternal mortality. It is challenging to get the information of epidemiological problems that decreases maternal delivery mortality at professional doctors in the hospital and even at numerous maternal deaths happening at home during childbirth. A woman can have other complications before pregnancy but they are aggravated during pregnancy time that should take as part of care for the woman. There are many complications that occur for almost all maternal fatalities are bleeding, severe nausea, baby's activity level declining, and contractions in early, water breaking in mother, any flu symptoms.

Pregnancy and childbirth are a result of several physiological and psycho-social adjustments [10] and during this phase, both moms and paths will face many new challenges. As a result, conception and postpartum are times of elevated psychiatric illness exposure. The most common psychological conditions during pregnancy and post-partum are depression and anxiety, and the symptoms can vary from mild to extreme. However, we do not yet understand why some women are more "at-risk" of experiencing signs of depression or anxiety, while others remain resilient even in the face of adversity.

Other risk factors refer to complications that appear throughout gestation, and the outcome are classified as follows. The first class consists of those with extreme exposure to teratogenic stimuli or accidental exposure. The second classification includes obstetric illnesses during the current pregnancy such as pre-eclampsia or eclampsia, gestational diabetes and gestational hemorrhaging pregnancy, and asthma or any other gestational hemorrhaging. The final group is clinical events linked to the third party, with a focus on infectious diseases during diagnosis current gestational medicals situations. The everyday use of resources is used to detect the high-risk factors for low-risk pregnancy outcomes.

The consequence of a pre-pregnancy care case is often a high risk pregnancy. Among other cases, a medical condition during pregnancy leads to a high chance of pregnancy for you or your child. Relevant factors that could lead to a pregnancy at high risk include:

- Increased maternal age: The risk of pregnancy is higher for mothers older than 35 years old.
- Lifestyle choices: It can put a pregnancy at risk by smoking cigarettes, consuming alcohol and using illegal drugs.

Maternal well-being problems are those which cannot be easily reduce are High blood pressure, obesity, diabetes, epilepsy, thyroid disease, cardiac or blood defects, poorly manages asthma and infections can increase the complications of pregnancy. Complications from pregnancy: During breastfeeding, different complications that occur can pose risks. Examples include an abnormal position of the placenta, foetal development smaller than the percentile of the 10th gestational age (restriction of foetal growth) and rhesus sensitization (Rh), a potentially dangerous condition that can develop when your blood group is Rh negative

and your baby's blood group is Rh positive. Several births: Pregnancy threats are greater for women bearing twins or higher order multiples.

## II. RELATED WORK

Mario W.L et al. [1], have done research on predicting postpartum depression using a methodology called Emotion-aware smart systems. The significant advance is in the monitoring of complex emotion-conscious computing disorder such as postpartum depression [7]. Which provides care specialists with excellent guidance on critical factors that will support the decision-making process to control the mental state of the pregnant woman before and after birth. To improve the correctness of more complex indicators, related to resolving, the study has made on other ensemble classifiers. The study for other associated diseases like psychological illnesses is also suggested for the gestation period.

Eugenia Arrieta et al. [2], have made early prediction on severe maternal morbidity problems. The main advantage of this work is to expect the risk levels for severe maternal morbidity. So it is possible to detect early prediction and detection for the women by giving a proper treatment by medical work in decision-making system, that gives timely intrusion of women. This will help to decrease the risk levels of both mother and baby during the maternal phase and also help in reducing public and economic repercussions. This work uses logistic regression for Severe Maternal Morbidity (SMM) detection. This work provides timely and acceptable care to each patient risks levels.

Mario W.L Moreira, Joel J.P.C et al. [4], suggested an approach for personalized pregnancy care. Early diagnosis of chronic disorders such as hypertensive disorder is discussed in this role. It raises a huge threat to women's health care. The lack of evidence was due to the disparity between the outcomes of success and loss of delivery for both mothers and newborn babies. In this paper they have used machine learning technique for assessing the real data referring to hypertensive disorder in pregnancy. They concluded that average one dependence estimator algorithm gives better result and can help in decision making process.

Ahmed et al. [8], developed a multifunctional platform for better health care. To professionally stratify subjects to recognize complex situations and improve decision-making, the creation of multifunctional platforms for clinical data abstraction, combination, management and analysis will help clinicians. Significant changes in attaining the goals of delivering lower-cost [6], real-time, more modified and population-based medicine [25] have been done in this work. They addressed the critical issues like misdiagnoses, overtreatment, repetitive, under-utilized data, one size fits approach, cost significant and spending. Healthcare quality and transformation by intelligently examining the vast number and amount of organized clinical data are available.

Michael P Carson, Edward H Springel et al. [16], have researched hypertension, which is one of the common medical problems encountered during pregnancy. In this work, hypertensive disorder during pregnancy is classified into 4 categories: Chronic hypertension [3], Preeclampsia, eclampsia and Gestational Hypertension. They explained different complications that effect different organ systems in gestational hypertension like considering life threatening complications in preeclampsia, acute fatty liver of pregnancy, thrombotic purpura and hemolytic- uremic syndrome.

Chris Tremonti, Jennifer Beddoe, Mark A. Brown [17], introduced a home blood pressure [17] checking device for expectant women. The exact role of using this home blood pressure is to save the maternal outcomes. With additional to this, a validated home blood pressure device is given for any person to effectively use other non-validated strategies. The data has recommended the clinics to perform their own analysis for patients with home blood pressure machine prior to home use is a simple protocol, even if machines are for validate the general usage.

Ebony B. Carter, Shayna N Conner et al. [18], made work on fetal development on pregnancy outcomes in women with severe problems in preeclampsia. Preeclampsia is focused on early gestational age. In this work, women who have preeclampsia and early gestational age should be managed as severe preeclampsia rather than remoter gestational age [26]. The objective is to estimate the pregnancy outcome with severe preeclampsia in women from small gestational age that differ from each other. So in this paper they shown the similarity with the women with sPE without SGA fetus.

Anish Keepanasseril, Brajesh Kumar Yadav, Dilip Kumar Maurya. [19], have done a case-control study for expectant women in South India. They focused on antenatal risk factors in women. They identified the women with preeclampsia who have persistence of hypertension should be monitored early. In this work women are evaluated with the effect of antihypertensive on postpartum should stay in hospital [6]. They have concluded that the women with preeclampsia uses prophylactic magnesium, sulphate and heavy antenatal systolic blood pressure, this is more likely to have antihypertensive during postpartum period.

Edward Antwi, Mary Amoakoh-Coleman, et al. [23], presented a systematic review on gestational hypertension and preeclampsia. With the knowledge and expectations from advanced countries, estimate models for gestational hypertension and preeclampsia have been developed. The purpose of this analysis was to classify and evaluate the methodological consistency of gestational hypertension and preeclampsia prediction models concerning their use in common source settings.

Esinilla et al. [29], presented an approach on wearable devices with Preeclampsia. Preeclampsia is a condition with high blood pressure during pregnancy. The emphasis of this work is on the use of the process of decision analysis for the early diagnosis of preeclampsia in women at risk. A real dataset including health center data [4] for pregnant women with a high risk analysis of preeclampsia. In addition, this research paper presents not only the suggested procedure, but also a prototype wearable application that follows the rules for the diagnosis of preeclampsia in women at risk. The established wearable application can be applied easily to other conditions, such as diabetes or hypertension.

Kira Nahum Sacks et al. [30], made a study comparing with the incidence in hospitals due to neuropsychiatric disease. In this work, perinatal deaths, multiple gestational and child congenital malformations were included. With this, multivariate logical regression is used to control the confounders and maternal clusters. They have concluded that it is independent risk to exposure maternal gestational diabetes for longer time period neuropsychiatric morbidity in young once.

### **III. COMPLICATIONS FOR EXPECTANT WOMEN**

Most of the women die as a result of complications throughout and after pregnancy and childbirth. During pregnancy, these situations arise, and most are preventable or treatable. Other problems can occur

before pregnancy but are exacerbated during pregnancy if they are not appropriately treated. Some of the problems are:

- Serious bleeding
- Infections
- High blood pressure during gestation
- Complications of pregnancy
- Unhealthy abortion

Infections such as malaria and other related chronic conditions such as heart disorders or diabetes are induced with the rest of the problems on a patient. The following is the table where we can see few complications expected by the women during pregnancy and we can also see their symptoms and how they can treat the mother and child if they are effected with such complication. These are few symptom where we can observe based on different criteria like person history and their daily life style. This table has been analyzed by different factors of data set form past 5 to 6 years calculating the complications faced by the women during pregnancy in different hospitals.

<b>Complications</b>	<b>Symptoms</b>	<b>Treatment</b>
Anaemia	Shortness of breath, Looks pale, Feels faint, Feels tired or weak	Treating the root source of anaemia helps to return the number of red blood cells that are healthy. By taking iron and folic acid additions, women with pregnancy-induced anaemia can be treated. To ensure that anaemia does not happen again, the doctor will monitor the iron levels during the pregnancy.
Ectopic Pregnancy	Shoulder ache, Vaginal blood loss, Feeling dizzy or faint, Abdominal pain	During an ectopic birth, the embryo can not mature. The abstraction of ectopic tissue in order to prevent organ injury. Drugs or surgery can be used to treat this issue.

Gestational diabetes	Extreme thirst, Hunger, Fatigue	Pregnant women with diabetes can regulate blood sugar levels by following a doctor's balanced meal plan. To retain blood sugar levels under control, some women may also need insulin. It is necessary to do so because poorly measured diabetes raises the risk of: <ul style="list-style-type: none"> <li>• Preeclampsia</li> <li>• Newborn baby with low blood sugar levels, breathing and jaundice issues.</li> <li>• Early delivery</li> <li>• Caesarean birth</li> </ul>
High blood pressure	High blood pressure without other symbols and symptoms	The health of the mother and child should be carefully monitored to ensure that preeclampsia is not caused by high blood pressure.
Miscarriage	Vaginal spotting or bleeding, Abdominal pain	Miscarriage cannot be precluded in most situations. Often, in order to extract pregnancy tissue from the uterus, a woman must undergo surgery. For emotional healing, therapy may be helpful.
Preterm labour	Pelvic stress [10] and cramping. Back pain burning to the abdomen	Medicines may avoid the progression of labour. Sometimes, bed rest is recommended. A woman gives birth early. It is called "preterm birth" to give birth before 40 weeks. Preterm genetic is a significant risk factor for preterm births.
Preeclampsia	High blood pressure, Swelling of the body like hands and face, Dizziness, Headaches, Stomach pain, Blurred vision	If it is too early to give birth, the doctor will closely observe the mother and child's health condition. In order to reduce the blood pressure, medication and bed rest either at home or in the hospital are required. Medicines could also be used to prevent seizures occurrence for the mother

TABLE I. COMPLICATIONS OF EXPECTED WOMEN

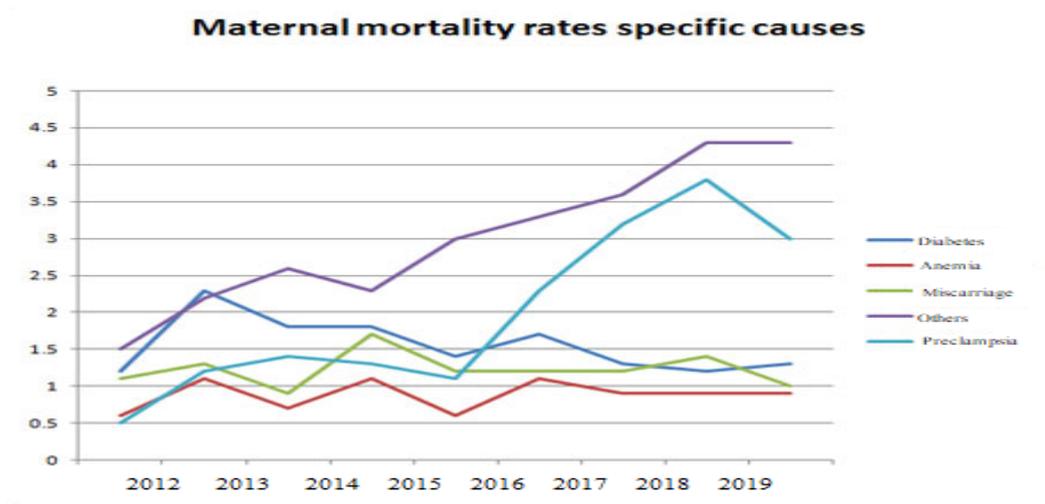


Fig 1. Comparative analysis of different problems faced by pregnant women in different hospital

**IV. FINDING AND DISCUSSION**

More than half a million women die every year due to pregnancy associated causes, 99% of them are in developed countries, which is an important origin of death among women aged between 15 to 49. In some developed countries, 1 in 15 women dies due to complications either during pregnancy or childbirth. This is the approximate lifetime risk of maternal mortality. It is difficult to get the information who is having delivery at home with the professional presence that decreases the maternal mortality rate with numerous maternal deaths occurring at home during childbirth. The overall correlation with professional presence with maternal mortality is combined with techniques that are used with trained birth attendance to minimize both the incidence.

From figure 1, we can decline Maternal Mortality Rate(MMR) of India from 2010 to 2030. According to Sample Registration System (SRS) reports released by the Registrar General of India for the period 2010-13, the maternal mortality ratio in the country came to 167 from 178 per 1,00,000 live births. Under the Millennium Development Goal (MDG), the aim is to reduce MMR by three quarters between 2000 and 2015. So between 2014 to 2015, it has been reduced to 140. Again, this mean value was reduced to 130 by 2017. So according to the Office of Registrar, the ratio has declined from 130 to 122 by 2019. India's present MMR is below 100 for 2020 and is targeting to below 70 by 2030. This is how we can calculate the ratio by using the following formula:

$$\text{Maternal Mortality Rate (MMR)} = \frac{\text{Number of Maternal Deaths}}{\text{Lakhs Live Births}} \dots (1)$$

The success ratio is been calculated by number of maternal births success for both mother and child. Unsuccessful is been calculated by maternal deaths for every year. By this w can calculate the maternal

mortality rate by considering the maternal deaths and live births. By this we can use any one of the technique to identify the problem and solve the risk prediction in women at early stage.

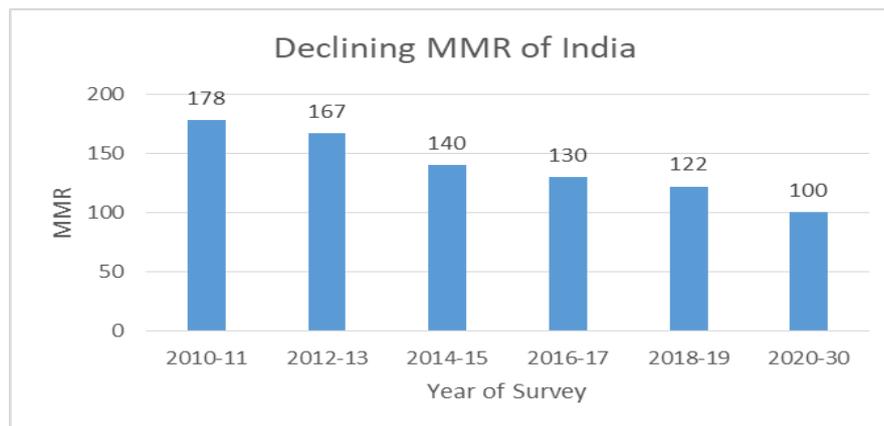


Fig.2. Comparative analysis of Maternal Mortality in India

#### 4.1 Maternal Mortality

Pregnancy and childbirth complications are a significant cause of death and disability in developing countries for the women of reproductive age between 15 to 49 years. About 70% of maternal deaths globally arise from one of five causes: bleeding, sepsis, early abortion, eclampsia, and obstructed labor. About 20% of maternal deaths are triggered by pre-existing conditions that are exacerbated by pregnancy. Some of the crucial diseases are Viral hepatitis and HIV/AIDS.

#### 4.2 Neonatal Mortality

Infectious illnesses, birth asphyxia, birth faults and the sequelae of preterm delivery and intrauterine development limits are the principal direct causes of neonatal death. During the early neonatal phase, the key causes of death during the first week are asphyxia, pneumonia, and preterm birth complications. Infections cause the deaths due to birth faults during late neonatal that are 10-28 days. During the neonatal period, more than 15 percent of children born in developed countries obtain an infection that results in 40 to 50 percent of all neonatal deaths of expectant women.

#### 4.3 Fetal Mortality

In the early stages of development, the fetus is especially susceptible to adverse influences. It is possible to successfully alter specific dietary, infectious, and other environmental variables, but several factors cannot be solved easily. Intrapartum and antepartum fetal deaths include late fetal deaths. Intrapartum casualties predominate in conditions where fetal mortality is greatest. Typically, they accompany labour and childbirth complications and are more simply avoided than antepartum fetal deaths, which arise before labour begins. Risks such as maternal diseases, obstetric problems, and innovative maternal age are associated with antepartum fetal deaths.

## V. CONCLUSION

The analysis details about the problems during pregnancy, delivery, and after childbirth. Early detection of diseases in pregnant women will give an important and better result by monitoring the diseases. The main advantage in this work is to identify different type of problems faced by women during and after pregnancy. We can analyze the different problems that the expectant women in this study face. In this, we have taken an example of the maternal mortality rate of India, by considering the number of maternal deaths to the lakhs that live birth from 2010 to 2030. In this survey, we can predict the MMR ratio in India, which is decreasing. Our future work is focused on the analysis of different methodologies or models applied for risk prediction in women during and after pregnancy. In future work, we can develop a model to improve maternal and fetal outcomes by early diagnosis and treating the women with priority.

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