

An Ingenious Remote Health Monitoring System to Prevent Maternal Mortality due to Covid-19 in Rural Areas - India.

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Abstract— India contributes to 15 percent of the global maternal death toll. About 44,000 Indian women die each year due to complications arising during childbirth. Over 80 per cent of maternal deaths in India are due to six medical causes, including haemorrhage, eclampsia, obstructed labour, sepsis, unsafe abortion and pre-existing conditions, such as anaemia and malaria. About 70 percent of these can be prevented with regular monitoring by attending the regular prenatal appointments so that the doctor can monitor the blood pressure closely but in the rural areas, the women have no proper access to the hospitals as they have to commute long distances due to very few availability of gynaecologists in their surroundings. Considering the covid-19 pandemic, India is one of the most affected countries with more than one million reported cases since January. To slowdown the spread of the virus, The Indian government implemented a national lockdown in late-March, which continued until May. As coronavirus cases continued to rise across the country, several states have re-imposed lockdowns and stringent restrictions have been imposed in some of their districts in order to contain the spread of the novel coronavirus which makes it more difficult for a pregnant woman as they are more susceptible to be infected by the virus if they happen to commute to the hospitals on a regular basis. Besides that, many villages don't have proper transport facilities and travelling regularly through public transport may affect their health especially in the third trimester.

Index Terms— Maternal Mortality, Novel Coronavirus, Covid-19, Health Monitoring bands, Covid-19 Lockdown, Prenatal period appointments, Pregnancy in Rural women.

1 INTRODUCTION

In India, pregnancies amongst women in rural areas can often lead to miscarriage due to lack of maternal care. The two major problems affecting the mothers in rural areas are (i) Malnutrition and (ii) Unregulated fertility. In addition to this, 25 percent of pregnant women in rural areas have at least one bout of urinary tract infection. The World Health Organisation suggests that at least one Indian woman dies every five minutes during pregnancy and child birth. Pregnant women in the rural areas face this issue as a consequence of the absence of focus on emergency obstetric care, missing trained midwives, lack of management capacity in health system and absence of comprehensive maternal care services. Most of these women cannot afford to spend tons of money in taking care of themselves. Maternal mortality could be prevented by taking proper precautions. While pregnant women in urban areas go for regular check-ups and get an ultrasound scan to know the well being of their baby but the women in rural areas, neither have the money nor a hospital in their locality. They're often forced to travel long distances and get themselves checked. Some women find it really difficult to travel and consult a gynaecologist due to lack of funds so they neglect it rather than seeking help. Due to the lopsided nature of maternal care in rural areas of India, women often suffer from severe complications which include excessive bleeding, infections and pregnancy induced hypertension.

On the other hand, the Novel Coronavirus has everyone anxious and in fear, particularly the pregnant women. Some reports suggest that pregnant women are susceptible to the virus while others claim that pregnant women do not appear to be riskier than other healthy adults. Nothing is certain and hence,

like any other individual, pregnant women are advised to reduce social contact with social distancing. It's a well known fact that in some women, pregnancy alters how the body fights some viral infections. Though evidence for coronavirus is still insufficient, it is for this reason that pregnant women are advised to be extra cautious during this pandemic.

The stringent restrictions which have been imposed in the country in order to contain the spread of the virus has affected the maternal care in the rural areas in myriad ways since many villages in the country have no proper medium of transport. Besides that, it's very unsafe for these women to rely on a public transport since there's no proper sanitation in the buses and travelling regularly would affect their health, especially in the third trimester. To make things better for these women, equipment and technical competence must be strengthened to handle obstetric emergencies in the rural areas.

2 MOTIVATION FOR PROBLEM

The COVID-19 pandemic and strict lockdown in India have affected reproductive services such as maternal health, family planning, and abortion services adversely. While medical facilities and retail chemists were exempted from the lockdown, the curbs on movement, as well as enhanced fear of infection among patients and health providers, resulted in low availability of services. Due to this, the situation of the pregnant women from the rural areas has worsened and most women tend to neglect certain alarming signs during their 9 month period. Ignoring the troubling signs, taking home remedies, self medication,

not going for regular antenatal checkup and skipping the check-up, especially when the woman is nearing delivery are the most dangerous mistakes made by a pregnant woman. Pregnancy signs could mean that there is something serious and the woman may need instant medical intervention. But as said earlier, women in the rural areas neglect it due to the inability to meet the costs related to visiting a health facility and also due to lack of knowledge of antenatal care as well as long distances to health centers and lack of transportation.

In order to ease their situation, fit bands or the health bands (wearable computing device) can be used to sense the heart rate and the blood pressure of the patient and also to keep a track on the patient's nutritional information. The data collected from this device is stored in an application which can be monitored by the hospital which requires continuous monitoring of these data which is normally monitored by a medical transcriptionist (intermediate). The transcriptionist will keep the doctor informed in case of an emergency and will take necessary actions to enhance the patient's health during their maternity period. Any medicine which has been prescribed would be catered to the patient at their door step. By doing this the pregnant women won't have the need to travel long distances and everything could be monitored while they are at their homes.

3 PROBLEMS FACED BY PREGNANT WOMAN IN RURAL AREAS DUE TO MALNUTRITION

Malnutrition is so prevalent in the rural parts of the country. Having said that, the pregnant and lactating women are particularly vulnerable to malnutrition. Malnutrition during pregnancy can result in complications like:

- Maternal depletion
- Anaemia
- Post-partum haemorrhage
- Toxaemia of pregnancy
- Low birth weight in baby

Ensuring the patient's nutritional status is an important element of the Maternal Health Care system.

4 PROBLEM FORMULATION

The idea of implementing the fitbands or the hBands can be done only with the help of the team since most of the people living in villages have very little exposure to technology, it is important to educate and raise awareness amongst the pregnant women on how to use the hBands which helps in assessing blood pressure and heart rate. This device acts as a communication tool between Health stations and prenatal woman. Generation of report and Assessment would be done using R programming.

Role of team during execution:

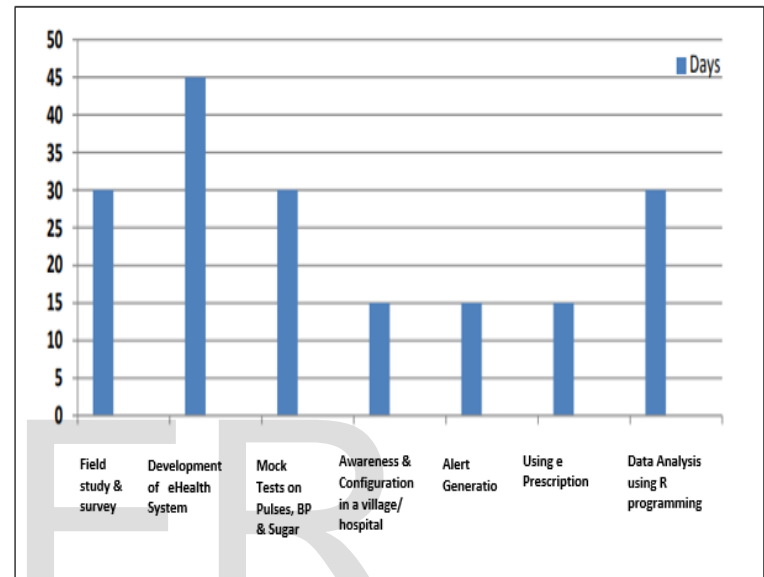
1. Configuring the wearable health band system to prenatal Women
2. Awareness of using Hbands towards assessing blood pressure and heart rate

3. Controlling and commuting between Health stations and prenatal woman
4. Generating Report and Assessment Using R programming

Role of team after installation:

1. Predictive analysis on vulnerable health issues with prenatal and maternal women
2. E-Prescription management with Health centers and Parma care centres.

TIMELINE – IMPLEMENTATION OF FIT BAND



5 IMPACT OF THE RESEARCH ON STUDENTS / TEACHERS

This research will create awareness among the rural prenatal women in maintaining their blood pressure and Heart rate. The students will have the impact of enlightening the health of the rural women by using the current technologies in an easy way. The students are intended to work towards the social benefits. In this materialistic world where people are engrossed in their own world of technology, by converting this research into an efficient project, the students would have learnt to pay heed to the people in need by using the same technology and making this world a better place to live in. In dire situations, we humans fail to ensure the humane treatment of the people who are in need by not being able to think clearly or act. In emergencies, we often look to people around us for cues about what we should do. But with the help of technology, people can take necessary actions to help their fellow neighbours anytime and anywhere by acting fast.

Final impact in the village :

To decrease the mortality rate by taking proper precautionary measures amongst pregnant women and infants who are susceptible to get infected due to covid-19.

6 CONCLUSION

This research emphasizes the importance of using Fit Bands as a commutation tool to bridge the gap between the patient and the doctor especially during this pandemic where pregnant women should mandatorily follow the social distancing norms.. Usage of these health bands eliminates the 'transport factor' during the prenatal period and ensures complete safety of the woman's health. In this system there is considerable scope for improving the readiness of services to detect and manage obstetric emergencies.

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