Credence Services in India: In the Perspectives of C-Section

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1. Abstract

India's healthcare system, which caters to a massive population of 1.4 billion, has undergone remarkable transformations over the years exemplifying resilience and progress as a developing nation. Despite enduring a varied degree of challenges, recent data showcases visible advancements. The Indian government has initiated multiple programs to improve the healthcare system. The National Health Mission improves the availability of medical equipment and supplies. The doctor-population ratio in the country has shown a significant improvement from 0.9 : 1000 in 2019 to 1.19 : 1000 in 2023 indicating a positive growth in healthcare accessibility and services.

In our research we aim to thoroughly investigate Cesarean sections (C-sections) in pregnancy within the Indian healthcare context with a significant emphasis on the beneficial outcomes of this surgical intervention. This investigation seeks to uncover the various dimensions of C-sections, identifying it not just as a medical procedure but as a critical service offered within the healthcare sector that carries positive externalities for both patients and healthcare providers. As a starting point, we identify an exhaustive list of elements (factors) of pregnancy such as medicines, technologies, and procedures, categorizing them as high-risk and low risk for the patient. The research will study for any differences in the way these processes are carried out or any differences in outcomes in public and private hospitals in India. Our primary research will include information gathering, interactions and responses from the medical professionals who are based out of Kerala. With a focus on the positive externalities of C-sections, we assume the benevolence of doctors, aiming to maximize both the patient's and their own utility. We will also explore ways to leverage available resources to generate positive externalities by proposing solutions to bridge identified gaps. This may involve redistributing resources from hospitals with surpluses to those lacking resources. Additionally, the research will emphasize the importance of rational as well as benevolent behavior from the partners and families of the patients for maximizing patient utility alongside doctors' benevolence.

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Rooted in '**Dharmaarthashshtra**', which emphasizes wealth creation, wellness, wiseness, and the value of life, the analysis aims to enhance doctor-patient trust, minimize contract-based agreements, and fine-tune the healthcare system for improved maternal and neonatal healthcare services in India.

2 Problem

Childbirth is the most significant transition of a woman's life, marking her incredible power that she holds to bring a new life into the world. This experience is beautiful but has numerous challenges and complications too. Some women have to bear the intense pain of labor and some have to go through surgeries i.e. C sections, both of which affects a woman physically and mentally.

Through our research we are trying to deepen our understanding on pregnancy, with focus on Cesarean sections, by analyzing all elements (medications, tests, procedures and treatments) in pregnancy. We investigate the decision making process of doctors and patients in going for C sections over natural birth and why in today's scenario a large number of pregnancies are high risk in nature. Additionally we highlight the importance of the support system for pregnant women, crucial roles of her family members and husband in supporting her throughout this journey. Our study also addresses the issues that are faced by doctors and how the government can help them through various policies and measures. At the end we will look at the cultural and ethical values rooted in 'Dharmaarthashshtra', aimed at improving maternal and neonatal healthcare.

3 Motivation to Work on the Problem

Healthcare sector helps to improve the health of the people and maternal healthcare, pregnancy and C-sections outcomes are a very crucial part of this sector. We strongly believe that there is a need to extract positive externalities in the current system and that can happen only when we properly understand every aspect of pregnancy to the best of our capabilities regarding why we have many high-risk pregnancies and what are the ways to reduce the risky nature of pregnancy.

We want to highlight the benevolence of doctors who always work hard to ensure the best possible results for their patients given the available resources and recognize the incredible strength shown by a mother who goes through an intense physical and emotional childbirth experience, symbolizing a new rebirth for her. Rather than understanding situations from a fault finding perspective, we believe that this perspective will create immense useful information generation.

4 Objectives

Our study aims to explore pregnancy and Cesarean sections, considering both medical and moral perspectives. We'll examine the factors influencing low and high-risk pregnancies, seeking to understand their causes and potential mitigation strategies. Additionally, we'll investigate the circumstances under which Cesarean sections are recommended and their long-term effects on both mother and baby. We'll compare the processes in public and private hospitals in India to uncover any differences. Furthermore, we'll analyze the role of doctors, technology, and the importance of government intervention in addressing healthcare challenges. Finally, we'll explore the impact of family support, partners, and ethical values on pregnancy outcomes.

5 Literature Review

The literature surrounding Cesarean sections in the context of the Indian healthcare system reflects a complex interplay of factors, including healthcare infrastructure, policy initiatives, medical practices, and patient outcomes. This review aims to synthesize existing research and provide a comprehensive understanding of the current state of C-sections in India.

India's healthcare system serves a vast and diverse population of over 1.4 billion people, presenting unique challenges and opportunities. Previous studies have highlighted the impact of government initiatives such as the National Health Mission in improving healthcare accessibility and infrastructure. According to the logical evaluation framework utilized by Kumar (2021) to assess effectiveness, significant improvements were observed subsequent to the mission's launch. Fund allocation saw a nearly fivefold increase, while the number of auxiliary nurse midwives doubled, and the number of nurses tripled. The count of accredited social health activists rose to approximately one million. Institutional deliveries surged from 38.7% in 2005–2006 to 78.9% in 2015–2016. Notably, the infant mortality rate decreased from 58 in 2005 to 33 per 1,000 live births in 2017, and the maternal mortality ratio also exhibited a decline from 254 in 2004–2006 to 122 per 100,000 live births in 2015–2017. However, it is noteworthy that out-of-pocket health expenditure remains notably high, constituting 69.3% of the total health expenditure.

Research on C-section trends in India indicates a rising prevalence over the past few decades. Factors contributing to this trend include changing maternal demographics, increased medicalization of childbirth, and evolving clinical guidelines. Percentage of C-section deliveries increased in public health facilities by 46.8% in South India during 2005–06 and 2015–16 (Sengupta 2021).

6 Methodology

6.a Data Collection

Our research is based entirely on the primary information that was gathered through detailed discussions with four experienced gynecologists, three based in Kerala and one in Maharashtra in India. These discussions, lasting approximately 40 minutes to an hour each, covered various aspects of pregnancy care from the first week to the 39th week. We focused on various aspects of managing pregnancies, including factors, treatments, and guidelines for both high-risk and low-risk categories.

Key topics explored included the rising prevalence of high-risk pregnancies, guidelines for Cesarean section versus natural delivery, reasons for voluntary C-sections, and the long-term impacts of C-sections on mothers and babies. Additionally, we examined differences in pregnancy care between public and private hospitals, medical risks, operating theater protocols, and technological advancements enhancing pregnancy safety.

The information also encompasses insights into government-led interventions necessary to reduce the workload on gynecologists and enhance maternal healthcare services. We asked the doctors' opinions on the roles of family members and husbands in managing pregnancies, considering ethical values outlined in 'Dharmaarthashshtra.'

6.b Analysis

6.b.1 Comprehensive Review of High and Low-Risk Elements Across Trimesters in Pregnancy

Figure 1 (in next page) shows a comprehensive chart covering various aspects of pregnancy in a concise manner. Every terminology used in the chart is explained in this and subsequent sections.

A **high-risk pregnancy** is the one in which there are increased health risks either for the pregnant person or the fetus or both. While **a low-risk pregnancy** is the one in which everything goes as expected, the test results at every stage are normal, the pregnant person is under 30 and they have no prior health conditions. However, it must be kept in mind that a pregnancy is typically seen as normal in a retrospective fashion only, i.e., after everything actually went normally.

The following points elaborate the various elements of pregnancy at different time points in pregnancy.

Note: The factors whose occurrence in the patient/foetus may lead to high risk pregnancies are highlighted as High-risk.

Figure1: Comprehensive List of Various Elements of Pregnancy Care

Trimesters	Weeks	Factors	Tests/Treatment	Whether it leads to C-section/ normal delivery	Long term Heath Issues for Mother	Impact on Baby	Role of Partners/Family	Issues faced by doctor	Allied Services
Preconception (Before Pregnancy)	Before Conception	Diet, Health advice, hypertension, infertility, medical disorders	Preconception Counselling, medications				a) Emotional Support b) Healthy lifestyle encouragement	a) Low doct. patient ratio b) Extreme workload c) Staff shortages d) Resource scarcity - blood bank availability, lab facilities e) Delayed pediatricians and anesthetists availability - in peripheral hospitals e) Violent behaviour of families if mortality	a) Pharmacy b) Hospital Hygeine c) Pathological Tests d) Telemedicines e) Physiotherapy f) Transportation assistance
		foetus neural tube defects	Folic Acid Medicines						
First Trimester (Wk.1- Wk.12)	First Visit	neonatal tetanus	Tetanus Toxoid Injection				a) Emotional Support b) Accompany to appointments c) Healthy lifestyle encouragement d) Help with household chores e) Take care of children		
		supplements	Iron Calcium Tablets						
		Pregnancy location, foetal development	Viability Scan (sonography)						
		ectopic pregnancy							
		Diabetes	Test - Blood test Treatment - Insulin Therapy, medications						
		anaemia	Test- Blood tests Treatment- medications						
		STDs, hyperthyroidism							
		urinary tract infection	Test- Urine test Treatment- medications						
	Upto 28 wks (Mthly Visits)	blood pressure, weight, abdominal examination, discomfort	Routine checkups						
	11 - 13 wks	fetal Down Syndrome	NT Scan NIPT diagnostic test						
Second Trimester (Wk. 13-Wk. 26)	18 - 20 wks	fetal heart & lung anomalies, fetal growth	Anomaly Scan				Same as above		
	24 wks	Diabetes, hyperthyroidism	Test - Blood test Treatment - medications						
Third Trimester (Wk. 27-Wk. 39)	28 Wks - 36 Wks (Visits evry 2 wks)	blood pressure, weight, abdominal examination, discomfort	Routine checkups	Malrepresentation- Elective C-section	Adhesions Risk, Hernia Formation, Scar Endometriosis, High risk future pregnancies	No signf. impact	Same as above		
	36 Wks - Delivery (Wkly Visits)	palpation, Big Baby, IUGR	Routine checkups	Malrepresentation- Elective C-section					
	36 Wks - Delivery	heamodilution, gestational thrombocytopenia	Test- blood test						
		cardiac evaluation, preeclampsia, gestational hypetension	Test- ECG	Elective C-section	Same as above	Same as above			
Delivery	37 Wks - 41 Wks	Uncomplicated Case		normal delivery	Natural route - Best for uncomplicated cases	babies more agile in long term, mother care not delayed	Mental Support before and during delivery		
		Labor Complications		Emergency C-section	Same as for C-section	Same as above for C-section			
		Obstructed Labor							
Postpartum	Post Delivery	Postpartum Recovery	Hospitalisation (normal delivery - 1 day) (C-section - 3 days)		Same as for C-section	Same as above for C-section	Accompany in hospital & appointments		
		Postnatal Chekup	blood test, urine test, physical examination		Ensures physical recovery, control complications	Monitor health and growth			

(Note: Red Boxes correspond to factors whose occurrence leads to high-risk pregnancies)

1) **Before Conception**:
    a) At the beginning of pregnancy, **preconception counseling** is very important. The healthcare provider interacts with the potential mother (and their partners) to discuss plans for becoming pregnant and to assess potential risk and plan for medical care. Nowadays, with more cases of infertility, genetic issues, hypertension, diabetes and other medical disorders, preconception counseling is very crucial. It covers everything from diet to exercise to medications to general do's and don'ts for the nine-month period and is helpful for both high-risk and low-risk pregnancies.
    b) **Folic Acid Supplementation**: Ideally, 400 micrograms of Folic acid medications are recommended to patients 3 months before conception. These medications are important to prevent *neural tube defects* in the baby. However, for patients who have had congenital babies (for example, a baby with deformed parts of the brain, this birth defect is known as *anencephaly*), they may be recommended higher doses such as 4 milligrams.

2) **First Trimester (Week 1- Week 12):**
    a) **First Visit**:
        i) The patients, who did not go to the doctor before conception, are administered **folic acid medication** for the first three months of pregnancy.
        ii) In the first visit itself, the first dose of **tetanus toxoid injection** is also given to protect infants from *neonatal tetanus*.
        iii) **Iron and Calcium Tablets** may be recommended as supplements.
        iv) **Viability Scan (Ultrasonography)** is the **first scan** done in the first visit to verify the pregnancy, confirm the pregnancy location in the uterus, determine foetal development and to rule out *ectopic pregnancy* High-risk . An *ectopic pregnancy* is the one in which the fertilized egg implants outside the uterus.
        v) **Blood tests** are done to check the hemoglobin, platelet count, clotting time, diabetes , anemia, STDs, kidney diseases, hyperthyroidism, etc High-risk. Patients with diabetes are recommended medications, insulin therapy, etc. to control it. Patients with anemia are also recommended medications.Those who may not be able to afford medications may be recommended iron rich foods such as peanuts, jaggery, etc. in case of anemia. Also, **urine tests** are done to diagnose urinary tract infection High-risk.

b) **Routine checkups** are advised to patients, in which patients are asked to visit for the checkup every 1 month up to 28 weeks. These routine checkups include **blood pressure**, **weight**, **abdominal examination**, and diagnosis for any discomfort. BP check is used to check for patients with chronic hypertension High-risk. Typically, a BP above 140/90 is considered a symptom of hypertension. Weight checkups are important for obese patients. Abdominal examinations are important to monitor foetal growth and positioning.

c) **At 11 Weeks - 13 Weeks**:

i) **NT Scan (Nuchal Translucency)** is the **second scan**, which is done at around the 12th week of pregnancy, sometime between 11th and 13 weeks. Associated with this test is a blood test called the **double marker test**, which includes the beta scan and the PAPP-A scan which is evaluated using a computer algorithm. This test is a screening test to assess the risk of *Down Syndrome* and *chromosomal abnormalities* High-risk in the feotus. If this test comes positive, a diagnostic test called **NIPT** is done to confirm for down syndrome. The pregnancies for which these tests come out to be positive may be terminated.

3) **Second Trimester (Week 13 - Week 26)**:

a) **At 18 Weeks - 20 Weeks**:

i) At around 18-20 weeks, a **third scan**, called **Anomaly Scan,** is done, which can rule out the anomalies in the foetus related to heart and lungs High-risk. In this case also, if the test comes out to be positive, a pregnancy may be terminated.

b) **At 24 weeks**:

i) The **blood investigations** (blood sugar, thyroid, etc.) are done again at around 6 months into pregnancy. They are important because diabetes and hypertension High-risk have a tendency to develop in the later half of the pregnancy, that is, after 6 months. The placental hormones come into full-fledged action after 6 months. Also, because pregnancy itself is a **diabetogenic condition**, those mothers who have a tendency to develop diabetes may develop it after 6 months.

4) **Third Trimester (Week 27 - Week 39)**:

a) **Routine checkups** for BP, weight, abdominal examination and any discomfort need to be done **every 15 days**, from week 28 to week 36.
b) From week 36 onwards, **weekly visits** for these checkups are advised. At this stage, abdominal examination becomes very important because using palpation, any growth retardation (*IUGR - Intrauterine growth restriction*) for the baby or a *big baby* can be identified High-risk. Diabetes can cause a big baby, while IUGR may be caused by placental insufficiency, which can be due to hypertension. Also, the patient is asked to observe **foetal movements (Daily Foetal Kick Count)**. If the kick counts are found to be lesser than normal, the patient is asked to report to the hospital.
c) In the 36th Week, again all **blood investigations** are repeated. There is a possibility of *haemodilution* at this stage of pregnancy, because of which the hemoglobin can go down. Also, because of *gestational thrombocytopenia*, platelets can go down for some patients.
d) It is also advised to patients to do an **ECG (Electrocardiogram)**. To check the heart condition of the patient, it is important to show the ECG of the patient to the anesthetist because it may not be known before whether the patient will go for vaginal delivery or C-section.

5) Delivery (Between 37 Weeks - 41 Weeks):

a) Based on the risky nature of the pregnancy, if the pregnancy is uncomplicated then normal delivery is chosen. Otherwise, an **elective C-section** is chosen. In emergency cases during normal delivery, an **emergency C-section** is chosen during the labor itself. The reasons for going for C-section are discussed in a subsequent section.
b) Generally, at the 39th week, a per-vaginal examination is done and subsequently, labor is induced in the patient. After starting the labor pain, the *primigravida* (a woman who is pregnant for the first time) will deliver after 12 hours while the second or third gravida will deliver after around 8 hours.
c) Generally, in cases of complications in pregnancy due to diabetes, the labor is induced at around 38 weeks of pregnancy. In case of hypertension, it is induced at around 37 weeks. These are important because the most common complication which can arise in hypertensive pregnancy is **intracranial intracerebral bleed** High-risk. Intracranial bleeding due to hypertension is the second most frequent cause of maternal mortality, the first being *postpartum hemorrhage*.

6) Postpartum (After Delivery):

a) For patients who underwent normal delivery and without any complications, they are generally discharged from the hospital within a day.

While the patients who underwent C-section delivery, they need to be in the hospital for around 3 days. In vaginal delivery, the mother is ambulatory and she can take care of the baby herself. While in C-section, the postoperative pain is higher, so it takes a day for the mother to get ambulated and take care of the baby.

b) The **postnatal check ups** of the mother and baby are done to ensure complete physical recovery for the mother and monitor health and growth of the baby.

Also, it is advised that the pregnant person should do ANC (Antenatal Care) visits every month for the first 28 weeks, every 15 days from 29th to 36th weeks and then every week till delivery. However, if it might not be possible to do each and every visit, then **at least four to five ANC visits** must be done.

6.b.2 Why are many high risk pregnancies occurring today ?

Our interactions with the four gynecologists suggest the emphasis on the following reasons behind the increase in the frequency of high-risk pregnancies nowadays.

1. **Lifestyle changes and Nutritional changes**: The modern lifestyle of today is characterized by sedentary habits, lack of physical activity and poor diet habits. It has been observed that a large number of high-risk patients are obese and have higher BMI. In Indian families typically, once a woman becomes pregnant, it is also seen that they engage less in physically engaging chores once they are around three months into their pregnancy. Then, it becomes difficult for them to bear the extreme body strain all of a sudden during the time of delivery.
2. **Advancing Maternal Age:** A significant trend highlighted by the doctors is the increasing age at which women are choosing to have families, because of pursuing education and career aspirations. Therefore, the childbearing is delayed, and particularly beyond the age of 35, pregnancies are often associated with higher risks of maternal and fetal complications, including fertility and age-related issues.
3. **Pre-existing Medical Conditions**: As a consequence of lifestyle and nutritional changes, there is an increasing trend of diabetes and hypertension among people. Also, these lifestyle choices are thought to have impacts at the hormonal levels, which can lead to reproductive medical problems like *Polycystic Ovary Syndrome (PCOS)*, possibly leading to conditions pertaining to infertility.
4. **Previous Deliveries**: A significant number of high-risk pregnancies come from second or more gravida, that is, women who have had two or more confirmed pregnancies but had some complications in their previous pregnancies. One doctor said that around 50% of the high-risk pregnancies are from this category only.

6.b.3 What are the primary reasons for recommending a C-section?

To understand the main reasons behind recommending a cesarean section, gynecologists highlight both **elective (planned)** and **emergency (unplanned)** scenarios, each driven by distinct indications and considerations. An **elective C-section** is when the decision for delivery through C-section was made before the onset of labor. An **emergency C-section** is performed when there is a sudden and urgent need for delivery due to maternal or fetal complications that cannot be managed safely with vaginal delivery or with further delay. Emergency C-section is of higher risk as compared to elective C-section because of higher risk of bleeding, anesthesia risk and by the very fact that it is done on an urgent basis.

1. Reasons for recommending an **Elective Cesarean Section**:
    - **Previous Cesarean Section**: When a woman has a history of a previous cesarean delivery, they are often recommended elective C-sections because of the risk of uterine rupture that is associated with *vaginal birth after cesarean* (known as VBAC). If the patient already had two previous C-sections, then C-section is absolutely recommended. Also, there are two types of C-section cuts - *lower transverse*, which is done by transverse incision in the lower abdomen and the *classical cesarean*, which is the vertical incision from the umbilical to the lower abdomen. Classical cesarean section is the absolute indication for elective cesarean section.
    - **Malpresentation or Breech Presentation:** There are cases which involve abnormal fetal presentation, or breech presentation, in which the baby's buttocks or feet are positioned to exit the birth canal first. These cases necessitate elective C-sections.
    - **Placenta Previa**: There can be complications, known as *placenta previa*, in which the placenta partially or fully covers the cervix. In these conditions, elective C-sections are almost always recommended to prevent severe bleeding during vaginal delivery.
    - **Infertility Patients:** For women with a history of infertility spanning 10 to 12 years, if they conceive successfully, gynecologists generally go for C-section to not at all compromise the safety of both the mother and the long awaited baby.
2. Reasons for recommending **Emergency Cesarean Section:**
    - **Labor Complications:** If complications, such as fetal distress, *cephalopelvic disproportion* (when the baby's head is too large to pass through the mother's pelvis), or prolonged labor, arise, gynecologists may opt for emergency C-sections.
    - **Obstructed Labor:** If, as the labor progresses, the baby becomes stuck in the birth canal leading to obstructed labor, emergency C-sections are performed to speed up the delivery to prevent maternal and fetal distress.
    - **Maternal Health Concerns**: If the health of the mother deteriorates, due to conditions such as *eclampsia* (seizures during pregnancy), renal or liver

dysfunction, or uncontrollable bleeding, doctors may go for emergency C-sections.

Therefore, in cases when it is absolutely necessary to go for C-section, otherwise the health of the mother and the baby may be drastically compromised, **C-sections have large positive externalities**. In uncomplicated cases, normal delivery is the best way as nature has given it.

One important piece of information, that we learnt based on our interactions with the gynecologists, was that sometimes the pregnant person (and/or their families) herself asks for a C-section to avoid the labor pain in normal delivery. In private hospitals, since money is involved, these requests are sometimes accepted. However, in public hospitals, these requests are generally not accepted. The doctors motivate the patient and give them some drugs for pain relief. The post-operative pain is higher in C-section and hence, normal delivery is the best choice for low-risk cases.

6.b.4 Post Operative and Long term Implications of C-section: Mother and Baby

(i) Post-Operative Complications: In the immediate postoperative period, complications such as bleeding, hemorrhage, and postpartum infections are concerns. However, advancements in medical care have led to effective management strategies, including the use of drugs to control uterine bleeding and proper antibiotics to reduce the risk of infections.

(ii) **Long-Term Implications for the Mother:** One common issue that women, who have undergone a C-section, may face is the formation of *adhesions*, where nearby structures like the bladder can get adherent to the uterus. So, when this woman may need another procedure like *hysterectomy* (removal of uterus), this issue becomes problematic. However, this issue is generally tackleable. Other rare complications include *hernias* (weakening of the abdominal wall) at the C-section scar and *scar endometriosis* (endometriotic deposits are present at the site of the scar), which can cause pain and discomfort to the patient and need medical attention.

(iii) **Implications on the baby**: Babies generally do not have any long term implication as to whether they were delivered through a normal delivery or a C-section. However, doctors have said that for low-risk cases, it is better to go for normal delivery from the baby point of view also. One doctor stated that, *"Suppose you (the baby) are able to successfully come out through a vaginal delivery, you have passed your first test, because you have passed the most dangerous journey without much problem. So, those babies innately will have some more ability to go through the stresses of life."* . In the short term however, since the mothers need a larger recovery time post a C-section delivery, so the care to the baby immediately after the delivery from the mother's side gets a bit delayed. This is not an issue in vaginal delivery because the mother is ambulatory after the delivery and she can do everything related to the baby by herself.

6.b.5 Differences in Public and Private Hospitals with regards to Pregnancy Care

From the insights provided by the interactions with doctors, some differences emerge between the healthcare provided in public and private hospitals, particularly concerning pregnancy and C-section.

In private hospitals, well-off people come, so they can be prescribed medicines or supplements as and when needed. However, public hospitals cater to a diverse socioeconomic background, often experiencing overcrowding and the people who seek affordable treatment. So, these people may not be able to afford medicines all the time. So, these people are advised on food habits. For example, if the patient is anemic, or has less haemoglobin, in private hospitals she may be prescribed medicines, but in public hospitals, patients are advised about eating jaggery, peanuts, to stay hydrated and other iron-rich foods. However, relying only on food habits may have effects on the pregnancy outcome. One gynecologist, who worked in both the public and private sector, said that when she used to work in a government hospital, they used to get babies of around 2.5 to 3 kgs (maximum) and rarely to 3.5 kgs (any baby beyond 3kg is considered to be a very healthy baby). However, in private hospitals, almost every baby is above 3 kgs. So, this is a difference. And this difference is not because of the hospital itself, but it is because of the crowd which comes to the hospital, because of differences in nourishment.

Also, in the private sector, more money is involved. So, better facilities like an AC room and good, neat wards are there. But in a government hospital, these physical qualities may not be up to date. However, gynecologists say that both in government as well as private hospitals, the quality of pregnancy care and delivery is equally good.

Another difference is in the rates of C-section. The government recommended CS rate is less than 15%. However, a gynecologist who works in a Taluk hospital (which is a public hospital) in Kerala, said that in her hospital, the CS rate is around 25%. But she emphasized that there are some hospitals in the private sector in which cesarean rates are as high as 50-70%. A major reason for higher cesarean rates in private hospitals are because some patients voluntarily ask for C-sections to avoid pains during normal delivery. Another potential reason behind higher cesarean rates in private hospitals was highlighted by a gynecologist that in private hospitals, most patients are under a single doctor. A lady in labor requires constant monitoring. But, they attend the patient only when they are called. In such a setup, there is more probability of a cesarean section. However, in public hospitals, some 10-12 doctors with a senior doctor in charge are always there. So, there is a higher chance of general delivery occurring in such a setup.

As far as the hospital and OT protocols are concerned, almost similar protocols are followed in both public and private hospitals.

We were also able to obtain some statistics through the *first and second MDNMSR Trivandrum meetings of 2024* that the doctor had shared. **These statistics also indicate a higher trend of CS rates in private hospitals.**

STATISTICS OF DECEMBER 2023

Total number of deliveries = 2498				
	Government		Private	
	Normal	CS	Normal	CS
	712	409	582	695
Total	1221		1277	
Primary CS rate	28.66%		37.15%	

STATISTICS OF FEBRUARY 2024

Total number of deliveries = 2196				
	Government		Private	
	Normal	CS	Normal	CS
	611	481	541	563
Total	1092		1104	
Primary CS rate	19.32%		25.27%	

6.b.6 OT Protocols

These are the protocols/ guidelines followed in the operating theater to carry out the delivery process crucial for maintaining patient's safety and minimizing risks. And based on our interactions with doctors, we found that almost similar guidelines are followed in

both public and private hospitals with slight differences, and these protocols are followed seriously in both public and private hospitals

- Before starting the procedure, a written consent is signed by the patient, and the patient's relative is also informed about the potential complications that may arise in surgery, what anesthesia will be given, and the details in the consent form.
- The most important thing before the C-section is to check the blood group of the patient and blood availability in the blood bank. For high-risk cases, blood is grouped and cross-matched so that high-risk patients can get immediate blood transfusion during complications, and other basic investigations such as BP, Haemoglobin, and vitals will be checked.
- In both public and private hospitals, injectable antibiotics are given approximately 1 hour before the procedure; this antibiotic will prevent the patient from surgical infections. To ensure the safety and comfort of the C-section patients, antacids and anti-medics are also given.
- OT checklist will be signed to confirm the correct patient identification, surgical procedure to be followed, if antibiotics and proper dose of anesthesia are given or not, and what complications they are expecting.
- Before starting the surgery, OT has to be properly sterilized, and the doctors present have to see the counts of the number of instruments and mops they are using and a second count is done after the procedure to match with the first count to ensure no instruments have been left behind, this will prevent from any foreign object being left inside patient's body. Two slipper changes are done in government hospitals, but in private there is no such rule. All these are followed because patients are prone to infection and sepsis. Government hospitals are required to be clean frequently because of high patient volume, which can result in the accumulation of dirt and unhygienic conditions.
- After each surgery, the operating theater has to be properly cleaned and sterilized using bleach to prevent infectious diseases. Everyone present in the OT, surgeons, nurses, and anesthetists, must thoroughly wash their hands before the procedure, sanitize their hands, and use sterile gloves to maintain hygiene.
- If the C-section is required to be carried out, then in the OT, only 4-5 members are allowed: a doctor, nursing assistant, anesthetist, pediatrician(called after half an hour), and one cleaning staff member. One bystander or relative is allowed with the patient. The patient and bystander must wear a clean white dress and slippers to keep the environment sterile.

- After delivering the baby, the same identification mark will be put on both mother and baby, and the baby's foot impression and the mother's thumb impression will be taken on the same document; this will ensure that babies don't get exchanged.
- Postoperative antibiotics and analgesics are given to prevent infection and reduce pain effectively, such as Injection Taxim given in doses of 500 mg and 1 gram intravenously (IV) every hour (IVHQ), Injection Amikacin(500mg) and Injection Metrogel(500mg). Analgesics such as Tramadol, Penicillin, and Paracetamol infusion are given to reduce post-operative pain.

6.b.7 Technological Advancements to Improve Mother and Child Health Outcomes

Healthcare sector has made significant progress in the area of pregnancy. With the use of advanced technologies, various diagnostic tests are used to detect anomalies or any early pregnancy problem, which is beneficial for a healthy mother and baby.
These are some of the scans performed during the course of pregnancy-

1. **Viability Scan (Sonography)** - Also known as dating scan, the most important element in the First trimester of pregnancy; done after 8 weeks, it tells whether the conception was on time or not, confirms pregnancy location, rules out *ectopic pregnancy* and helps in calculating the Expected Date of Delivery.
2. **Nuchal Translucency and Nasal Bone Scan(NTNB)** - This scan is conducted between the 11th and 14th week of gestation. This scan tells if the baby has any defect in the brain or if there are some chromosomal anomalies like *Down Syndrome*. If it comes out to be positive, the doctor goes for higher diagnostic tests. Associated with this, blood tests, which include a beta scan and the PAPP-A, are performed and evaluated with a computer algorithm. A double marker test is also done to rule out Down syndrome conditions. If it comes positive, then the NIPT(Non-Invasive Prenatal Testing) test is done.
3. **Congenital anomaly scan** - An anomaly scan conducted in the 20th week(b/w 18-20 weeks). It helps to detect any congenital abnormalities in the baby, particularly in the brain, spine, and heart and also checks the placenta position. The pregnancy may be terminated if the results come out positive.
4. **aPTT(activated Partial Thromboplastin Time) and pt/INR(Prothrombin Time and International Normalized Ratio) test** - These are plasma-based tests and tell the coagulation factors in the body. It is helpful in high-risk pregnancies as it detects blood clotting conditions/ disorders. During C-sections, particularly in

emergency situations, the coagulation status of pregnant women is required to be known to avoid any potential bleeding risk.

5. **NST(Nonstress Test) Pregnancy Screening -** conducted through an NST machine to check if the baby is compromised or healthy inside the womb. It measures fetal heart rate in response to its movements. According to that NST graph, the doctors judge whether the baby is good or not. It is usually done after 28 weeks of pregnancy. There are two types of NST: reactive and nonreactive NST, and nonreactive NST is one of the other reasons for the emergency cesarean section.
6. **ECG (Electrocardiogram)-** is used to detect any heart conditions in pregnant women who may have increased stress on their hearts during pregnancy. It will help to manage both mother's and baby's health throughout pregnancy.

Above were some tests and scans conducted to detect any underlying health conditions. Now, for patients who are facing difficulty in pregnancy, various technological advancements have been made, such as **Assisted Reproductive Technologies(ART)** procedures such as IVF, Surrogacy, infertility treatments, and surgeries. Significant technological advancements in neonatal care have made the survival of babies possible. Usually 37-week babies are good, but now the survival rate for babies is 60% for 26-week babies, and by 32 weeks, the survival rate increases to 80%. In such cases, babies' lungs won't be developed due to premature birth, so due to technological care drugs can be given to mature the lungs of the baby to prevent respiratory distress after delivery, and similarly laser eye treatments are there for such preterm babies.

6.b.8 Vital Role of Family Support During Pregnancy

Pregnancy is a challenging and life-changing process that a woman goes through, affecting her mentally, physically, and emotionally. A constant support to women, starting from pregnancy care to labor and then care of the newborn, is a very important job. It is not only a journey of 9 months but also the support and care that a new mother needs in her postpartum period. A woman goes through a wide range of emotions and health issues, so the husband and the family members should constantly care for and support her as every woman has different experiences in pregnancy, she may get irritated and frustrated at some times, but it is the husband who should handle and calm down her and maintain a supportive and patient environment for her.

Pregnant women should always be accompanied to the hospital by family members, particularly if there are issues that might need hospitalization. So, either the partner or a

family member should stay with her during hospital visits and stays. If the pregnant woman has multiple children, then it is important for family members to take care of her so that she can focus on her health and not stress out much. If support isn't there, then she will not focus on their health at that moment and delay her treatment to look after the children and visit the hospital at a later, more crucial stage.

Emotional support is a very crucial thing in the pregnancy journey. First-time pregnant women may get anxious and perplexed in the labor room, so to support her, the government has now allowed a companion with her in the labor room, either her mother, spouse, or any close relative, to support her and calm her down; this will be helpful to improve her childbirth experience.

After the birth, it is essential not to let the mother get exhausted from handling all the responsibilities of the newborn alone. The father should get involved in the baby's everyday care and support her wife. A constant companionship and sharing responsibilities will have better health benefits for the baby and the mother and increase the recovery speed of pregnant women.

6.b.9 Current Issues Faced by the Doctors and Generation of Positive Externalities

Some of the issues currently faced by the doctors that they mentioned during our interactions are:

1. **Low-doctor patient ratio:** The current doctor patient ratio is low, and sometimes that puts a lot of strain on the doctors already working. One doctor said that, *"Once I worked for 56 hours continuously without sleep, without napping, just on breakfast, not even dinner or lunch. And you cannot work so long with full concentration. So there are some things which may affect your mind and there may be negligence over that period and it is also not in your hand."* This issue is even more pronounced in peripheral hospitals, such as Taluk hospitals. Another doctor who worked in a two gynecologist setup said that, *"In our hospital with two gynecologists how we can run a 24-7 hospital. I will take today's duty, the other doctor will take the next day's duty and every day one by one comes it's not possible right."*.
2. **Inadequate Lab Services:** Lab services are not available for 24-7, especially in peripheral hospitals. One doctor working at a peripheral hospital said that after 7 p.m., laboratory services cease until the next day at 7 a.m., limiting diagnostic capabilities during crucial periods.
3. **Limited Pediatrician and anesthetist availability:** In peripheral hospitals, only one pediatrician and anesthetist are available, and even in emergency situations, their response time can be up to one hour.

4. **Lack of Blood Storage Facility:** The absence of a blood bank or storage facility poses significant challenges during emergencies.
5. **Violent Behavior of families:** Sometimes, when due to an emergency situation and unfortunately, the health of the patient deteriorates or a mortality happens, the families put blame on the doctor and there have been instances where people beat the doctors.

   These were some main issues that the doctors highlighted. Some of these issues need government support, while others, along with government support, need a handshake between large hospitals and peripheral hospitals. In Kerala, the health service association, Kerala Health Service Association decided and forwarded to the government the concept of **delivery points**. In this concept, deliveries do not take place in small hospitals. Instead, a few bigger hospitals should be made as delivery points, in which the resources are pooled together to ensure availability of 24-7 services. Another major initiative in Kerala is in the form of MDNMSR (Maternal Death and Near-Miss Surveillance and Response) meetings, which involves the government and the Kerala Federation of Obstetrics and Gynaecology to properly understand the reasons behind near-miss cases and mortality cases to be able to prevent them in the future. Nevertheless, **the aim of this section is not to find faults in the system but to highlight how these doctors have been able to spread positive externalities with the current resources available in a really efficient manner**.

6.b.10 Government Improvements to Support Doctors and Patients

To support doctors and patients and improve the pregnancy healthcare system, the government has implemented many policies, some of which are as follows-

1. **LaQshy** policy is a central government policy that is partly implemented in Kerala. This program, launched in December 2017, is aimed at enhancing maternal and newborn health outcomes, enhancing the quality of care provided during delivery and immediately in the postpartum period to provide a positive birth experience in public health facilities. There will be a listed standard for everything. A patient attending OPD who comes to the labor room will be allowed one bystander with them, and they will be taken care of in every need.
2. **Janani Shishu Suraksha Karyakaram (JSSK)** was implemented by the government of India in June 2011. It was funded by the National Health Mission, NHM, and the government gives the money. It aims to help pregnant ladies who come for delivery at government hospitals. With this program, all the investigations, all the pre-scans, everything is free for the patient.

However, there are still some issues faced by doctors and patients, so to enhance their efficiency in providing healthcare services, the government should try to implement the following measures.

1. Increase the number of seats in medical institutions to have more trained doctors to provide 24-7 services and improve the low doctor-patient ratio. Increasing the number of seats for medical students will increase the number of residents, reducing the workload for them so that they can work in full mind and with the utmost capacity.
2. Essential medications and treatment should be constantly available in both primary healthcare centers and community healthcare centers, particularly in rural areas.
3. Adequate staff, such as nursing staff, should be increased in government hospitals, and the number of healthcare professionals should also be increased to distribute the workload.

6.b.11 Importance of Values in Maternal and Neonatal Outcomes: In The Context of 'Dharmaarthashshtra'

In the journey of pregnancy and childbirth, the focus often leans towards medical treatments and financial aspects. But there's more to it than just that. It's about the deep connection between a mother and her baby, something very sacred, rooted in the principles of Dharmaarthashshtra.

A mother, when she gives birth, not only brings a new life into the world but the course of pregnancy is as if the **mother herself has a 'rebirth'**. It is a transformative experience for her, embodying immense sanctity and significance. She goes through all the pain herself and it is a testament of her power, resilience and sacrifices. Amongst the celebration of a new child, we often forget the silent struggles faced by her from the beginning of pregnancy to the complications faced during and after delivery. Therefore, we believe that sensitizing families, partners and the general public to these immensely hard struggles is important. It is important because we must make sure that from our side, as much as possible, the pain is reduced both at the physical level and at the emotional level.

A new child as a citizen of India is born. We must make sure that the child has the dignity of life. Are we aware of our rights and obligations in this regard? This is a very important question, especially in this sensitive issue. Yes, there are laws and regulations to ensure maternal and neonatal health, however they may not be very useful unless the values and benevolence to care for mother and babies don't come from within. Doctors, medical staff, pregnant person, partners, their families, general public and the government - the benevolence of every single entity counts to create a society where every mother and child is supported and valued, not just for the sake of legal obligations but with the true essence of compassion, empathy and sanctity.

6.c Inferences

The key inferences that can be drawn from our analysis are the following:

1. **Factors Contributing to High-Risk Pregnancies:** The rise in high-risk pregnancies highlights the need for promoting healthier lifestyles. This should be inculcated in the people from their childhood itself and parents play a huge part in developing these habits in children.
2. **C-section vs Normal Delivery**: C-sections play a really important role in imparting positive externalities in high-risk pregnancy cases to save mother's and baby's life when normal delivery is not favorable. However, in low-risk cases, doctors almost always prefer that the patient should go for normal delivery because it has the best postoperative outcomes for both the mother and the baby.
3. **Impact of Technology**: The integration of advanced technologies in maternal and child healthcare has significantly improved the detection of anomalies during pregnancy. From early diagnostic scans to advanced treatments like ART procedures, these procedures contribute to positive outcomes even in high risk cases.
4. **Positive Externalities by Doctors:** Despite some issues faced by the doctors and lack of manpower and resources, doctors have always put in their whole-hearted effort in bringing the best pregnancy outcomes. However, families of patients should understand that doctors are also humans and not exhibit violent behavior when situations are not favorable in emergency cases.
5. **Role of family and partners:** Family support plays a vital role throughout the pregnancy journey, from prenatal care to postpartum recovery. Having a supportive spouse and family members ensures the pregnant woman receives emotional, practical, and physical assistance, leading to improved maternal and neonatal outcomes.
6. **Importance of Values:** The principles of Dharmaarthashshtra remind us of the profound significance of compassion, empathy, and support in the journey of pregnancy and childbirth. It tells us that pregnancy is as significant as the **'rebirth'** of the mother herself and it is crucial to create an environment for the dignity of life of the baby as a citizen of India.

6.d Study Specific Suggestions

Based on our analysis, the key suggestions that emerge are as follows.

1. One important suggestion that comes out of our analysis is that when we asked the doctors why many pregnancies are of high risk nature these days, they said that a major reason behind this is the lifestyle choices of the people. Nowadays, diabetes and hypertension have become very common because of high consumption of junk foods and sweets. Also, the lifestyle of people has become more sedentary and they engage less in physical exercise, yoga and meditation. So, recommending the patients yoga and meditation after the pregnancy has started doesn't prove to have

large positive externalities. **This habit of eating healthy food and ensuring physical fitness should come from the childhood of the person itself. Therefore, there is a need to educate the parents today regarding the importance of bringing up their child in such a way so that these qualities become innate to the child behavior and they value the importance of remaining physically and mentally fit.**

2. We also believe that women (and their families) should have access to the information, in a simpler understandable fashion, regarding various elements of pregnancy. This **information generation** helps to put emphasis on the importance of various tests, medications and treatments during the course of pregnancy. Our interaction also revealed that sometimes, people with limited financial means may miss some antenatal care visits because they have to pay for the tests and transportation costs. Even though these financial hardships are understandable, missing out on important tests can have negative impacts on pregnancy outcomes. Therefore, this easy and simple access to information helps to put stress on the importance of ANC visits.
3. The **need to sensitize partners, families and the general public** regarding the hardships faced by the pregnant person can foster empathy and benevolence in the people. Pregnancy education imparting camps can play a crucial role in this sensitization. These camps can put stress on the role played by husbands and families during the pregnancy of a woman, as well as doctors can give talks as a source of information generation about various aspects of pregnancy and postnatal care.

7 Summary and Conclusion:

In summary, pregnancy encompasses a series of stages that demand careful attention and management to ensure the health of both mother and baby. High-risk pregnancies, influenced by factors like lifestyle choices and maternal age, require lifestyle improvement and heightened medical supervision, while low-risk pregnancies proceed smoothly with regular prenatal care. The decision to opt for a cesarean section depends on various factors, with medical professionals weighing maternal and fetal health considerations to make the best choice. Despite challenges such as limited resources and occasional family tensions, healthcare providers work diligently to offer quality care. Technological advancements in prenatal diagnostics aid in early detection of anomalies, while family support remains crucial throughout the pregnancy journey. By addressing challenges and fostering a supportive environment by sensitizing people on these issues, we can enhance maternal and neonatal health outcomes, ensure a safe and dignified pregnancy experience for every woman and provide quality of life to the baby as a new citizen of India.

8 References

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9 Appendix

The following documents contain the transcripts of the interactions with the gynecologists:

1. *https://docs.google.com/document/d/1LotMzWp8h9jR5jH_WIT-NihBmQzvpH4VdyozFfopkT0/edit?usp=sharing*
2. *https://docs.google.com/document/d/1hJOq5DK_cj1jNvoysmXyzmJjPZfsmvNVIERHlv0rr2c/edit?usp=sharing*
3. *https://docs.google.com/document/d/1oJ9chyMrVaqWYXmKMuh_I4XZomvsMohaD-Crg2aIMMc/edit?usp=sharing*
4. *https://docs.google.com/document/d/1jsjfuIuOK7ej-mNAXxE2_uoMZwNQ70KXsoRD2Ih2Pgc/edit?usp=sharing*

The following link contains the OT checklist provided by a gynecologist:

https://drive.google.com/file/d/1mjW3HD2Jq6VdA1HRlSgoDgZOUQ11aRZo/view?usp=drive_link