

Fuzzy Analysis to Minimize the Issues Faced by Women during Delivery

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Abstract: In this study, we will examine the social, family and work place challenges that women faces during delivery which results in caesarean delivery. These factors have a significant impact on the choice of caesarean delivery. In general, social factors play an important role in delivery. Major factors affecting women in pregnancy has been identified by discussing with medical experts. Social issues including mother age, weight of mother and lifestyle, while work place issues include support in work place, long working hour and travel time and family issues include support in family, domestic violence and family belief. In this study, we use the Fuzzy Logic Control (FLC) methodology to find some meaningful result to the challenges faced by women during delivery by incorporating above mentioned FLC model. By defining rule bases for the above mentioned social, work place and family factors using FLC, we were able to identify the feasible ways to reduce their challenges in social, work place and family which leads to caesarean delivery.

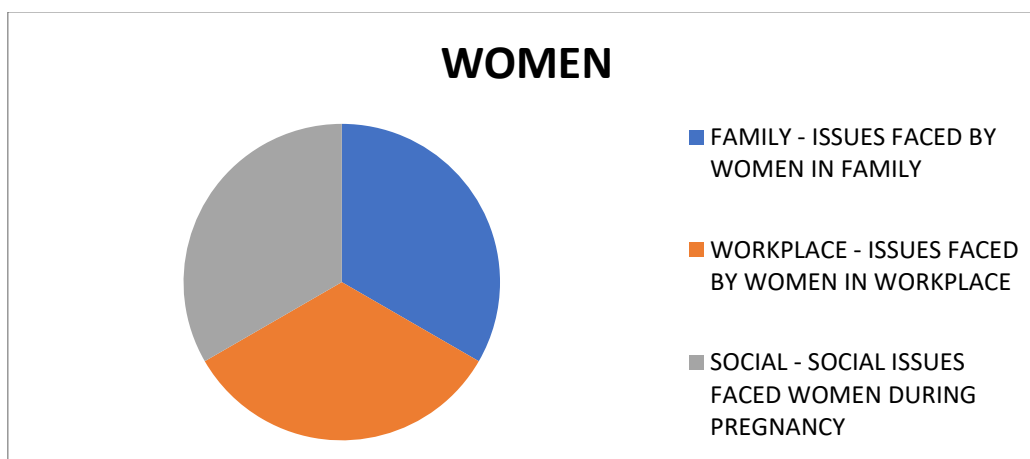
Keywords: Difficulties faced by women, social issues, work place issues, family issues, fuzzy logic control (FLC).

INTRODUCTION:

Bringing a child into the world is a miraculous experience, but it is not without its fair share of challenges. From conception to gestation to motherhood each step of pregnancy has its own set of difficulties. In the context of a society, pregnancy can bring about a range of challenges and issues that may affect both the expecting mother and the community as a whole. This problem can be complex and multifaceted and often requires supportive social networks to address and overcome. Women faces a very big

problem in the delivery process that is women can deliver a baby through vaginal birth or caesarean delivery. Nowadays caesarean delivery is very common among many women. Caesarean delivery is a life saving option to save mother or baby. But now in many cases women deliver through c-section for many non medical reasons such as social, mental, family related issues, and work place problem, economic condition, medical oriented problem. In this problem we analyze three non medical reasons which is related to caesarean delivery.

FACTORS AFFECTING WOMEN DURING PREGNANCY WHICH LEADS TO C-SECTION



One of the main challenges related to pregnancy within in a social content is the stigma and judgment that pregnant individual may face. Society can often have rigid expectation of how a pregnant person should behave and the choices they should make. This lead to the feeling of isolation, shame and pressure to conform to social norms. Additionally these are the practical challenges that pregnant individual may encounter. Financial difficulties, access to health care and workplace discrimination are just a few of the issues that can arise. These challenges can have a significant impact on well being of women and their unborn child.

SOCIAL ISSUES:

Pregnancy can also be accompanied by social challenges such as discrimination or judgment from others. Some women face problem due to their age, marital status or socio economic status. Pregnancy is natural and beautiful process, but when it comes to social context, it can also present a range of challenges for women. Society plays a significant role in shaping how pregnancy is perceived and experienced. Furthermore, with in social content, there may be issues related to financial stability. Women facing limited financial resources may struggle to afford prenatal care, nutritious food and other essential items for their well being. Pregnant women face many social problem which leads to caesarean delivery. Due to their lifestyle that is eating unhealthy food, lack of physical activity, consumption of alcohol, smoking, lack of proper sleep may lead to c section delivery.

Some of the social reason which leads to caesarean delivery:

1. Age of mother (S1)
2. Life style of mother (S2)
3. Weight of mother (S3)

AGE OF MOTHER (S1)

Advanced maternal age is the main factor which influences caesarean delivery. Increased maternal age refers to deterioration of physiological function including genital tract, the uterine emasculative and the hormonal system. There is evidence which

supports increased maternal age decline the physical ability to perform vaginal birth. Hence, the higher caesarean rate might be due to advanced maternal age.

LIFESTYLE OF MOTHER (S2)

Gaining an appropriate amount of weight during pregnancy helps your baby grow to a healthy size. But gaining too much or too little may leads to serious health problems for baby and mother. According to experts gaining too much weight during pregnancy raises the chance of developing gestational diabetes and high blood pressure during pregnancy. If the mother is obese at the time of pregnancy then the mother likely to have is c-section delivery.

WEIGHT OF MOTHER (S3)

Gaining an appropriate amount of weight during pregnancy helps your baby grow to a healthy size. But gaining too much or too little may lead to serious health problems for baby and mother. According to experts gaining too much weight during pregnancy raises the chance of developing gestational diabetes and high blood pressure during pregnancy. If the mother is obese at the time of pregnancy, then the mother likely to have a c-section delivery

ISSUES IN WORK PLACE:

Pregnant women face many problems in work place. Nature of job is very important some women work in a place where they have to stand for a very long time which is very difficult for them during pregnancy. Some women work as domestic workers such women will get tired because of their physical work. Many women work hard to meet their financial need. Some women will be doing work in office before system, sitting for a long also creates a problem and women's sitting for more time tends to put on weight which may lead to caesarean delivery. Long working hour for women tends to create stress in women. Travel time and the mode of transport also play a important role in caesarean delivery. During pregnancy women need support in work place. Lacks of support from colleagues create stress in women which in turn may be reason for caesarean delivery.

1. Long working hour (W1)
2. Travel time (W2)
3. Support in work place (W3)

LONG WORKING HOUR (W1)

Nowadays most of the women are working. Every women run in their life to meet financial need and also to achieve their goals. Women works for long hour, they work in shifts. Women during pregnancy need some rest but as working women they cannot take rest. Maternal women works for a long time get physically tired and stressed which is not good for baby and the mother.

TRAVEL TIME (W2)

Women have to travel very long for their work place. It is normal to travel 30 minutes to reach the office. But if it's beyond 1 or 2 hours it is very difficult for the women to travel. Travelling for a long time aggravate back pain and leg pain. Travelling very long makes the women physically weak. Physical deterioration makes the women unfit for vaginal birth.

SUPPORT IN WORK PLACE (W3)

During pregnancy women expects peaceful workspace. Peaceful work environment is essential for the healthy development of baby. If women lack the support in workplace she will get stressed and some women goes to depression which affects the baby health. Women expect emotional support to share their feeling. Lack of support leads to stress, anxiety and depression.

FAMILY ISSUES:

Pregnant women expects support from their family member especially their husband. He should be very careful in choosing hospitals. Husband should take care of pregnant wife. Lack of support from family members leads to stress and the women will not have proper bond with child, which is not good for the fetus. Domestic violence in family may also be the reason for caesarean delivery. Family financial situation plays a important role in delivery. Women should be strong to deliver a baby. Women should eat nutritious food during pregnancy. Family should have proper income to

provide the women with proper food, good health care etc., sometime family belief plays an important role in delivery. Some people in family want the women to deliver the baby in particular date and time. At that time due to their belief women has to undergo caesarean delivery which is not needed.

1. Family belief. (F1)
2. Lack of family support. (F2)
3. Domestic violence. (F3)

FAMILY BELIEF (F1)

One striking reason was superstitious belief in auspicious birth dates, which are challengeable for obstetricians to deal with. Some families believe in the time of baby birth. They want their baby to be born on auspicious day and time. So they request the health practitioners to do c-section at particular time. Some families play a big role deciding the delivery choice. During pregnancy women has no chance to express her choice because family member choose the doctor of their choice. That again contributes to the rise in c-section delivery.

LACK OF FAMILY SUPPORT (F2)

In some family the family members create hindrance to the pregnant ladies. During pregnancy women expects family support especially husband support. Women need love and care from husband. If the women doesn't get support from the family, they will lack in the nutrition, time for their self care, access to health care etc., so that will result in serious health problems in women. Women with lack in nutrition will be physically unfit for vaginal birth.

DOMESTIC VIOLENCE (F3)

In some family women tend to face domestic violence in their house may be from their partners or family members. It is very harmful to pregnant women that make the women physically and mentally stressed. Women will be physically drained, injured because of the violence. If the women is stressed during pregnancy it will directly impact the child development. If the child

development is not good then it creates a serious problem for both fetus and the mother.

METHODOLOGY- FUZZY LOGIC CONTROL (FLC)

Lotfi a zadeh (1965) first presented the membership function in the first paper on fuzzy sets. Fuzzy logic control (FLC) is the most active research area in the application of fuzzy set theory, fuzzy reasoning and fuzzy logic. The application of FLC extends from industrial process control to biomedical instrumentation and securities. The idea behind the fuzzy logic controller is to write the rules that operating the controller in heuristic manner, mainly in if a then b format. The fuzzy system in fuzzy controllers made up of input that stands in for “conditions” and output that stands for “action”. However, we expect that the out will also have to be crisp set if the input is crisp set. Formulation usually starts by explaining the basics of fuzzy logic, including fuzzy sets, membership functions, fuzzification, inference rules and defuzzification.

MATHEMATICAL FORMULATION:

A fuzzy tech 5.81 software professional edition has been used in this research. It suggests using a FLC to analyze and find solution. A fuzzy inference engine is created by framing the condition and rules for each input using fuzzy tech software and fuzzy logic to extract the print screen of results from the data shown in the figure 1.1. The parameters are selected as linguistic variables proposed with three level and they are as follows (low, medium, and high).

CONSTRUCTION OF FUZZY LOGIC CONTROL (FLC):

Fuzzy logic controller (rule-based expert system) is constructed basically, which combines, fuzzy set theory and control theory. The fuzzy inference system is shown in fig (1.1). Nine inputs and three outputs are within our suggested fuzzy inference system and then three outputs are taken as inputs to get the final output value.

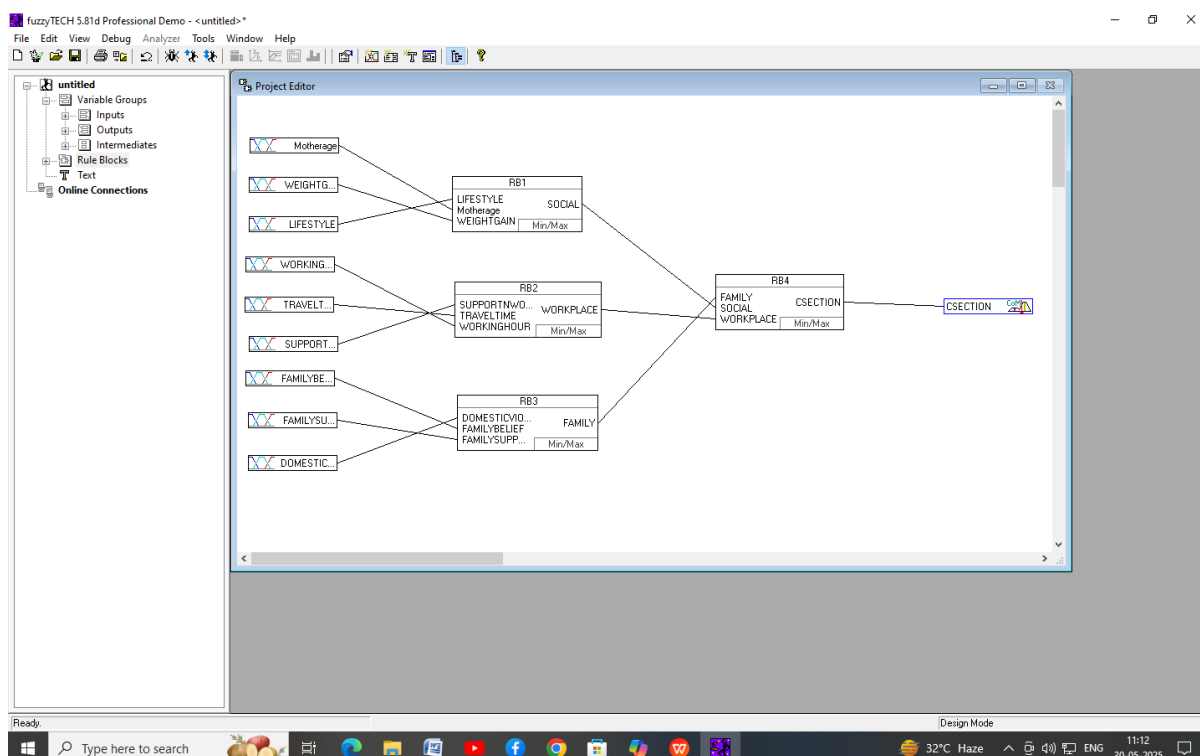


FIGURE 1.1 FUZZY INFERENCE ENGINE FOR SUGGESTED PROBLEMS

The membership function of the input variable “mother age” is constructed by three linguistic fuzzy sets {low, medium, high} from 18 to 40 ages

with derived unit as years and corresponding membership function is shown in fig (1.2).

The membership function of the input variable such as a lifestyle, is constructed by three linguistic

variables {low, medium, high} from 0 to 1 and shown in fig (1.2)

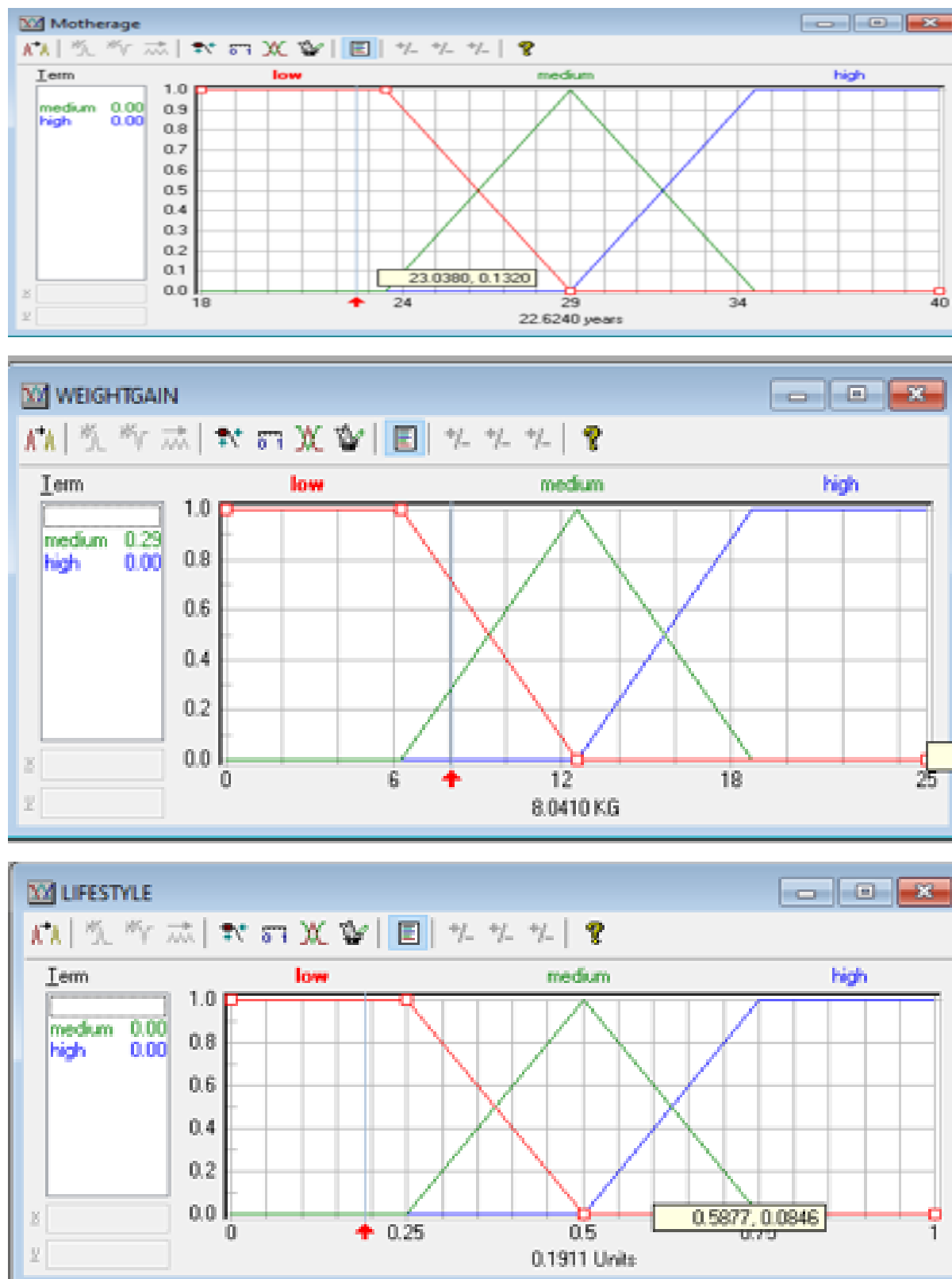


FIG1.2 EFFECTS OF SOCIAL FACTOR ON CAESAREAN DELIVERY

The membership function of work place input variable long working hour, travel time, support in work place are constructed with three linguistic variable {low, medium, high} from 6 to 12 for long working hour, 0 to 3 for travel time and 0 to 1 for support in workplace.

The membership functions of input variable of family factor such as family belief, family support, and domestic violence are constructed with three linguistic variables {low, medium, high} from 0 to 1.

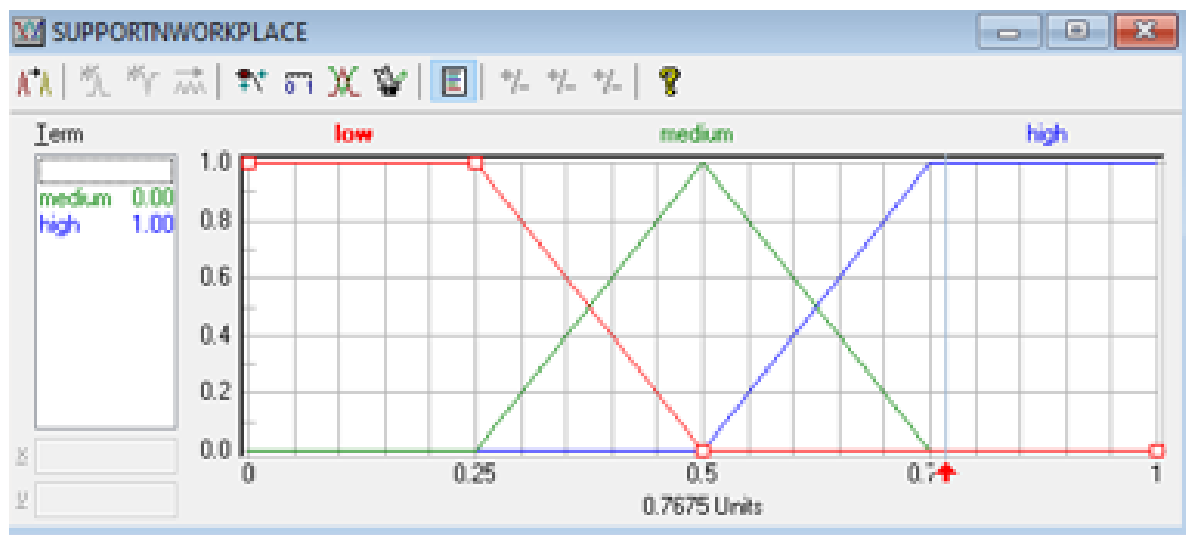


FIG 1.3 EFFECTS OF WORKPLACE ON CAESAREAN DELIVERY

RULE BASE 1:

The rule base for the social factor influencing caesarean delivery is given as follows, suppose

mother age is high, lifestyle is medium and weight gain is high possibility of caesarean delivery is also high. In the same way, the remaining rules can be understood from the table 1.1

TABLE 1.1 RULE BASE FOR SOCIAL FACTOR INFLUENCING CAESAREAN DELIVERY

#	IF LIFESTYLE	Motherage	WEIGHTGAIN	THEN DoS SOCIAL
1	low	low	low	1.00 low
2	low	low	medium	1.00 low
3	low	low	high	1.00 medium
4	low	medium	low	1.00 low
5	low	medium	medium	1.00 medium
6	low	medium	high	1.00 medium
7	low	high	low	1.00 high
8	low	high	medium	1.00 high
9	low	high	high	1.00 high
10	medium	low	low	1.00 low
11	medium	low	medium	1.00 medium
12	medium	low	high	1.00 medium
13	medium	medium	low	1.00 medium
14	medium	medium	medium	1.00 medium
15	medium	medium	high	1.00 medium
16	medium	high	low	1.00 medium
17	medium	high	medium	1.00 high
18	medium	high	high	1.00 high
19	high	low	low	1.00 medium
20	high	low	medium	1.00 high
21	high	low	high	1.00 high
22	high	medium	low	1.00 medium
23	high	medium	medium	1.00 medium
24	high	medium	high	1.00 high
25	high	high	low	1.00 high
26	high	high	medium	1.00 high
27	high	high	high	1.00 high
28				
29				
30				
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35				
36				
37				

RULE BASE 2:

The rule base for factors in work place influencing caesarean delivery is shown in table 1.2. Suppose if support in work place is medium, travel time is low

and working hour is low then the possibility of caesarean delivery is low. Similarly the remaining rule can be understood from table 1.2.

TABLE 1.2 RULE BASE FOR WORK PLACE FACTOR INFLUENCING CAESAREAN DELIVERY

#	IF	TRAVELTIME	WORKINGHOUR	THEN	DcS	WORKPLACE
1	low	low	low	1.00	low	low
2	low	low	medium	1.00	medium	medium
3	low	low	high	1.00	high	high
4	low	medium	low	1.00	medium	medium
5	low	medium	medium	1.00	medium	medium
6	low	medium	high	1.00	high	high
7	low	high	low	1.00	medium	medium
8	low	high	medium	1.00	high	high
9	low	high	high	1.00	high	high
10	medium	low	low	1.00	low	low
11	medium	low	medium	1.00	low	low
12	medium	low	high	1.00	medium	medium
13	medium	medium	low	1.00	medium	medium
14	medium	medium	medium	1.00	medium	medium
15	medium	medium	high	1.00	medium	medium
16	medium	high	low	1.00	medium	medium
17	medium	high	medium	1.00	medium	medium
18	medium	high	high	1.00	high	high
19	high	low	low	1.00	low	low
20	high	low	medium	1.00	low	low
21	high	low	high	1.00	medium	medium
22	high	medium	low	1.00	low	low
23	high	medium	medium	1.00	medium	medium
24	high	medium	high	1.00	medium	medium
25	high	high	low	1.00	medium	medium
26	high	high	medium	1.00	medium	medium
27	high	high	high	1.00	high	high

RULE BASE 3:

The rule base for factors in family influencing caesarean delivery is shown in table 1.3. Suppose if domestic violence is medium, family belief is

medium and family support is medium then the possibility of caesarean delivery is medium. Similarly the remaining rule can be understood from table 1.3

TABLE 1.3 RULE BASE FOR FAMILY FACTOR INFLUENCING CAESAREAN DELIVERY

#	IF	FAMILYBELIEF	FAMILYSUPPORT	THEN	DcS	FAMILY
1	low	low	low	1.00	medium	medium
2	low	low	medium	1.00	medium	medium
3	low	low	high	1.00	low	low
4	low	medium	low	1.00	medium	medium
5	low	medium	medium	1.00	low	low
6	low	medium	high	1.00	low	low
7	low	high	low	1.00	high	high
8	low	high	medium	1.00	medium	medium
9	low	high	high	1.00	low	low
10	medium	low	low	1.00	high	high
11	medium	low	medium	1.00	medium	medium
12	medium	low	high	1.00	low	low
13	medium	medium	low	1.00	medium	medium
14	medium	medium	medium	1.00	medium	medium
15	medium	medium	high	1.00	low	low
16	medium	high	low	1.00	medium	medium
17	medium	high	medium	1.00	medium	medium
18	medium	high	high	1.00	high	high
19	high	low	low	1.00	high	high
20	high	low	medium	1.00	medium	medium
21	high	low	high	1.00	medium	medium
22	high	medium	low	1.00	high	high
23	high	medium	medium	1.00	medium	medium
24	high	medium	high	1.00	medium	medium
25	high	high	low	1.00	high	high
26	high	high	medium	1.00	high	high
27	high	high	high	1.00	high	high

RULE BASE 4:

The rule base for the factors influencing caesarean delivery is shown in table 1.4. Suppose the factors

influencing socially are low, workplace are low and family are high then possibility of c-section delivery are low.

TABLE 1.4 RULE BASE FOR FACTOR INFLUENCING C-SECTION DELIVERY:

#	FAMILY	SOCIAL	WORKPLACE	THEN	DuS	CSECTION
1	low	low	low	1.00	low	
2	low	low	medium	1.00	low	
3	low	low	high	1.00	medium	
4	low	medium	low	1.00	medium	
5	low	medium	medium	1.00	medium	
6	low	medium	high	1.00	medium	
7	low	high	low	1.00	medium	
8	low	high	medium	1.00	high	
9	low	high	high	1.00	high	
10	medium	low	low	1.00	low	
11	medium	low	medium	1.00	medium	
12	medium	low	high	1.00	medium	
13	medium	medium	low	1.00	low	
14	medium	medium	medium	1.00	medium	
15	medium	medium	high	1.00	medium	
16	medium	high	low	1.00	high	
17	medium	high	medium	1.00	medium	
18	medium	high	high	1.00	medium	
19	high	low	low	1.00	low	
20	high	low	medium	1.00	low	
21	high	low	high	1.00	medium	
22	high	medium	low	1.00	medium	
23	high	medium	medium	1.00	medium	
24	high	medium	high	1.00	high	
25	high	high	low	1.00	medium	
26	high	high	medium	1.00	high	
27	high	high	high	1.00	high	
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RESULT AND DISCUSSION:

The following figure illustrated the factors such as social, work place and family influencing c-section delivery.

TABLE 1.5 EFFECTS OF VARIOUS FACTOR INFLUENCING C-SECTION DELIVERIES

Input:	Output:	Intermediate:
DOMESTICVIOLENCE..... 0.5000	CSECTION..... 0.2500	FAMILY low..... 0.0000
FAMILY SUPPORT..... 0.5000		FAMILY medium..... 1.0000
LIFESTYLE..... 0.5000		FAMILY high..... 0.0500
Motherage..... 25.0000		SOCIAL low..... 0.2223
SUPPORTINWORKPLACE..... 0.5000		SOCIAL medium..... 0.2227
TRAVELTIME..... 1.0000		SOCIAL high..... 0.0000
WEIGHTGAIN..... 7.0000		WORKPLACE low..... 0.6667
WORKINGHOUR..... 8.0000		WORKPLACE medium..... 0.3333
		WORKPLACE high..... 0.0000

In the above table 1.5 parameters shown in the left column such as mother age, weight gain during pregnancy, lifestyle, support in work place, travel time, long working hour, family belief, domestic violence and

family support are the factors influencing c-section delivery taken as input values. From the above input values, we get the output with low and output 2 with high with value 0.7534.

Membership values of the parameter were mentioned clearly in the rule base. If any changes made in input values shows different results.

TABLE 1.6 EFFECTS OF VARIOUS FACTOR INLUENCING C-SECTION DELIVERIES

Inputs	Output:	Intermediate:
DOMESTICVIOLENCE 1.0000	CSECTION 0.7534	FAMILY low 0.0000
FAMILYBELIEF 1.0000		FAMILY medium 0.0000
FAMILY SUPPORT 0.2534		FAMILY high 0.8564
LIFESTYLE 0.8531		SOCIAL low 0.0000
Motherage 32.5730		SOCIAL medium 0.2393
SUPPORTINWORKPLACE 0.2484		SOCIAL high 0.5485
TRAVELTIME 1.8682		WORKPLACE low 0.0000
WEIGHTGAIN 16.8790		WORKPLACE medium 0.5000
		WORKPLACE high 0.6242

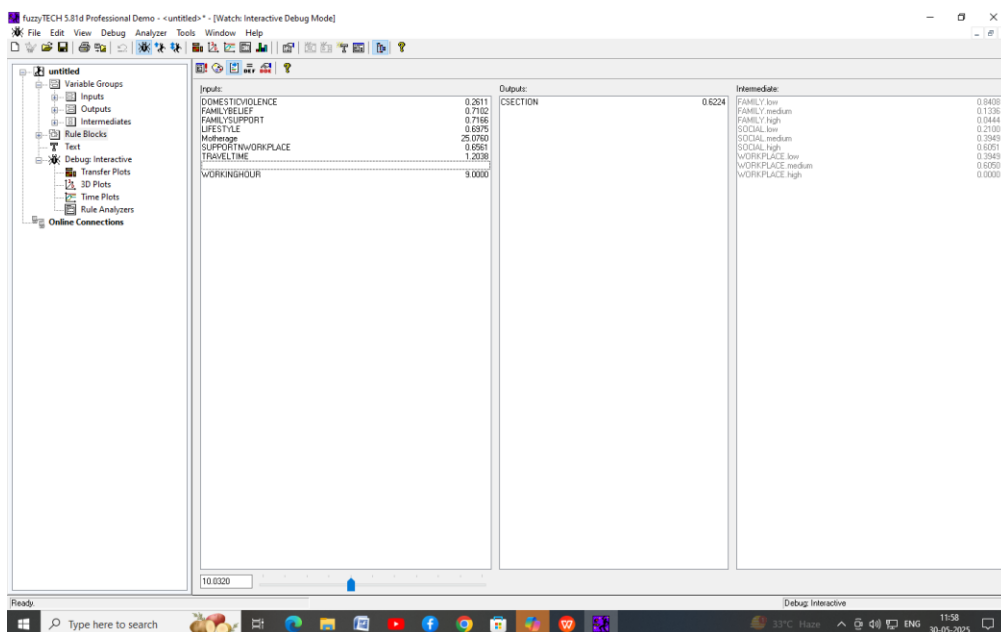
In the above table 1.6, if the social factors are high, work place factors are high and family factors are high then the output shows the result high. This shows if all these factor values are high then the possibility of c-section delivery is also high.

TABLE 1.7 EFFECTS OF VARIOUS FACTOR INLUENCING C-SECTION DELIVERIES

Inputs	Output:	Intermediate:
DOMESTICVIOLENCE 0.0000	CSECTION 0.1250	FAMILY low 1.0000
FAMILYBELIEF 0.0000		FAMILY medium 0.0000
FAMILY SUPPORT 0.5949		FAMILY high 0.0000
LIFESTYLE 0.1961		SOCIAL low 0.9298
Motherage 20.3440		SOCIAL medium 0.0000
SUPPORTINWORKPLACE 0.8790		SOCIAL high 0.0000
WEIGHTGAIN 6.6886		WORKPLACE low 1.0000
WORKINGHOUR 6.9000		WORKPLACE medium 0.0000
		WORKPLACE high 0.0000

In the above table if the input parameter value is medium, such as family belief is medium, lifestyle, mother age, weight gain are medium, travel time, family support, support in work place are medium them the result shows output value to be low with 0.2500. This shows that the possibility of c-section is low. So if all these input parameter such as mother age, weight gain, lifestyle, working h Our, family belief etc are maintained in medium level then we have the more possibility to have normal delivery.

TABLE 1.8 EFFECTS OF VARIOUS FACTOR INLUENCING C-SECTION DELIVERIES



In the above table, the parameter such as domestic violence is low; factors like mother age, travel time, weight gain, working hour are low. From the table, we understand change in two factor i.e. family belief, lifestyle make the output value to be high. So we can understand that these

two factors influence the possibility of c-section delivery. In this manner, we have taken eight cases of input data selected out of fifteen cases which impact more changes in the result and we get some meaningful result as given in the following table 1.9.

TABLE 1.9 OUTPUT RESULTS FOR THE FACTORS AFFECTING WOMEN IN DELIVERY

NOTE: L-LOW, M-MEDIUM, H-HIGH

FACTORS		CAS E 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	case 9	case 10	case 11
	MOT HER AGE(S 1)	32.5 7	20.943	25.07 6	20.592	30	22.55	25.7	32	25	30	25.592
	WEIG HT GAIN DURI NG PREG NANC Y(S2)	16.8 79	6.688	10.03 2	7.245	7.24	5.414	7.82	10.27	16.879	7.24	10.245
	LIFEST YLE(S 3)	0.93 31	0.156	0.697 5	0.5223	0.468 2	0.168 8	0.191 1	0.1911	0.9331	0.4682	0.5223
INPUT	SUPP ORT IN WOR	0.24 84	0.879	0.656 1	0.6561	0.509 6	0.775	0.767 5	0.2484	0.2484	0.5096	0.6561

	K PLACE (W1)											
	TRAVEL TIME(W2)	1.9682	0.3057	1.203	1.203	2.2548	1.5	1.5	1.5	1.9682	0.3048	1.203
	LONG WORKING HOUR (W3)	9.975	6.86	9	9	9	8.96	9.669	9.96	9.975	9	9
	FAMILY BELIEF(F1)	1	0	0.71	0.2102	0.7893	0.5669	1	1	1	0.7893	0.2102
	FAMILY SUPPORT(F2)	0.2834	0.8949	0.7166	0.7166	0.2038	0.5223	0.3217	0.3217	0.2834	0.2038	0.7166
	DOMESTIC VIOLENCE(F3)	1	0	0.2611	0.2611	0.9873	0.2643	0.2643	0.953	1	0.9873	0.2611
OUTPUT	OUTPUT1(SOCIAL FACTOR)	0.2993(0.6496(H))	0.9299(L)	0.2100(L) 0.3949(M) 0.6051(H)	0.8408(L) 0.1592(M) 0.0892(H)	0.1272(L) 0.7453(M) 0.1592(H)	0.5987(L) 0.1720(M)	1(L)	0.3567(L) 0.4140(M) 0.1860(H)	0.2567(L) 0.5140(M) 0.1860(H)	0.1272(L) 0.7453(M) 0.1592(H)	0.8408(L) 0.1592(M) 0.0892(H)
	OUTPUT2(WORK PLACE)	0.3500(0.6242(H))	1(L)	0.3949(L) 0.6050(M)	0.3949(L) 0.6050(M)	0.9616(M)	0.0254(L) 0.9746(M)	0.5540(M)	0.0254(L) 0.9746(M)	0.154(L) 0.8746(M)	0.6640(M)	0.3949(L) 0.6050(M)
	OUTPUT3(FAMILY)	0.864(H)	1(L)	0.8408(L) 0.1336(M) 0.6051(H)	0.8664(L) 0.0444(M)	1(H)	0.7324(L) 0.2676(M)	0.2868(M) 0.7132(H)	0.2868(M) 0.7132(H)	0.3868(M) 0.6132(H)	0.3868(M) 0.6132(H)	0.8664(L) 0.0444(M)
	OUTPUT4	0.7534	0.125	0.6224	0.2732	0.5116	0.2253	0.2529	0.5624	0.4534	0.3245	0.2932

Based on Table 1.9, considering the social factor of maternal age (S1), we observe that in Case 1 the mother's age is 32.57, while in Case 9 it is significantly lower at 25 while the value of other factors remain same in both cases. So from we observe significant change in the maternal age has

great impact on the result. From this comparison, we can infer that an increase in the mother's age (S1) correlates with a higher likelihood of C-section delivery. This suggests that maternal age has a notable impact on the mode of delivery. Specifically, Case 1 shows that when S1 is high, the

probability of a C-section is also high. Conversely, in Case 9, where the value of S1 is lower, the chance of undergoing a C-section is comparatively reduced.

This trend may be attributed to the increasing age of first-time mothers, often influenced by career priorities and other socio-economic factors. As a result, pregnancies are being delayed, which could contribute to a higher risk of complications that necessitate C-section deliveries. Therefore, it is important for women to be aware of the potential health implications associated with delayed pregnancies and to consider planning for childbirth at a younger age where possible, in order to minimize the risk of C-section and associated complications.

Based on the data from the table, the *LIFESTYLE* (F3) plays a significant role in determining the likelihood of a C-section delivery. In **Case 1**, the value of F3 is **0.9331**, indicating a poor lifestyle, while in **Case 8**, the value drops significantly to **0.1911**, suggesting a healthier lifestyle. This notable difference shows a **strong correlation** between a lower F3 value and a reduced probability of C-section delivery.

This analysis suggests that maintaining a healthy lifestyle during pregnancy can **drastically reduce the chances of requiring a C-section**. To achieve this:

- **Pregnant women** should prioritize their **physical health** and maintain a **balanced lifestyle**.
- They should **avoid junk food** and follow a **nutritious diet**.
- It's important to follow **guidelines from elders** and medical professionals regarding lifestyle habits.
- **Family members** play a critical role in supporting the expectant mother—ensuring she:
 - Eats properly,
 - Gets sufficient sleep,
 - Engages in regular, safe exercise.

By fostering a healthy and supportive environment, the risk associated with C-section deliveries can be significantly minimized. In the analysis of workplace factors influencing C-section deliveries, travel time (W2) appears to play a significant role. Comparing Case 5 and Case 10, we observe that the travel time value drops from 2.2548 to 0.3042, indicating that even a slight reduction in travel time can have a considerable impact on the final outcome. This suggests that longer travel durations, especially those exceeding two hours, may contribute to increased stress and fatigue among pregnant women, which in turn can influence the likelihood of a C-section delivery. Prolonged commuting during pregnancy can lead to physical strain and mental stress, both of which are detrimental to maternal health.

Given these findings, it is essential for organizations to implement pregnancy-friendly policies in the workplace. Providing options such as work-from-home arrangements, flexible working hours, and extended maternity leave can significantly reduce travel-related stress. Additionally, strict adherence to labor laws and the development of company-specific guidelines tailored to the needs of pregnant employees can create a supportive work environment. These measures not only promote the well-being of expecting mothers but also help lower the chances of surgical deliveries by addressing one of the contributing factors—long travel times.

The analysis of Case 3 and Case 11 under the family factor highlights the significant influence of family belief on the likelihood of Caesarean deliveries. Initially, the value of the factor "Family Belief" (F1) was 0.71, and when decreased to 0.2102, it resulted in a considerable impact on the outcome. This demonstrates that even a moderate rise in belief-based influence can greatly affect the decision to opt for a C-section, especially when driven by superstition or cultural pressure rather than medical necessity. Therefore, it is essential to address this issue through concrete measures.

The government must take strict action to monitor deliveries conducted in hospitals, ensuring that

Caesarean sections are performed only when medically necessary. Health practitioners who perform C-sections based solely on family requests without clinical justification should face legal consequences. In addition, awareness campaigns must be launched to educate families about the physical, emotional, and long-term health effects women may face due to unnecessary C-sections. Families need to understand the importance of prioritizing the mother's well-being over unscientific beliefs.

Ultimately, both policy enforcement and public education are keys to address this issue. Hospitals should be required to document valid medical reasons for every C-section, with regular audits to ensure compliance. The family's role in influencing such decisions must be reformed through awareness and cultural change. In conclusion, to effectively reduce the rate of non-medical Caesarean deliveries, the government must enforce strict regulations, and families must shift toward informed, health-based decision-making.

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