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# **Mental Health Of The Pregnant Women During Covid-19**

**Exploratory Data Analysis**

**Subject Code:21ECSC210**

***Course Project: Final - Review***

# Details of the Team

Div: 'A'		A-13
Sl. No.	Name	SRN.
1	Soukhya Madan Nayak	02FE22BCS148
2	Sharanamma S Katti	02FE22BCS119
3	Abhishek Angadi	02FE22BCS005
4	Prem V	02FE22BCS072

# Course Project Problem Statement

COVID-19, short for "Coronavirus Disease 2019," is an infectious disease caused by the novel coronavirus SARS-CoV-2. It was first identified in December 2019 in Wuhan, Hubei province, China, and has since spread globally, leading to a pandemic as declared by the World Health Organization (WHO) in March 2020.

This Dataset aimed to understand the impact of COVID-19-related stresses on pregnant individuals and their infants and collected survey-based data across Canada as part of the Pregnancy during the COVID-19 Pandemic (PdP) project.

The COVID-19 pandemic has had significant impacts on public health, economies.

- **SDG 3 Target 3.3:** It aims to end epidemics of major communicable diseases by 2030, including those exacerbated by crises such as the COVID-19 pandemic. While Target 3.3 focuses on ending specific epidemics, the COVID-19 pandemic has broadly impacted global health, including mental health, particularly among vulnerable populations like pregnant women.

- **Motivations:**

Ensuring the mental health of pregnant women during the COVID-19 pandemic is motivated by several crucial factors. Firstly, protecting maternal and neonatal health is paramount; a mother's mental well-being directly impacts her baby's health, reducing the risk of complications such as preterm birth and low birth weight. Addressing mental health issues is vital for lowering maternal mortality rates. Secondly, promoting equity and access to care is essential.

# Dataset Details



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SOURCE: <https://www.kaggle.com/datasets/yeganehbavafa/mental-health-in-the-pregnancy-during-the-covid-19>

Our dataset consists of total

1. ROWS-10772
2. COLUMNS-16
3. NUMERICAL ATTRIBUTES- 10
4. CATEGORICAL ATTRIBUTES- 6

# Dataset Details



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## Mental health in the pregnancy during the COVID-19



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```
import pandas as pd
data=pd.read_csv(r"C:\Users\Sharanamma\Downloads\Pregnancy During the COVID-19 Pandemic (1).csv")
data
```

	OSF_ID	Maternal_Age	Household_Income	Maternal_Education	Edinburgh_Postnatal_Depression_Scale	PROMIS_Anxiety	Gestational_Age_At_Birth	Delivery_Date(c to month
0	1	38.3	\$200,000+	Masters degree	9.0	13.0	39.71	
1	2	34.6	\$200,000+	Undergraduate degree	4.0	17.0	NaN	
2	3	34.3	100,000—124,999	Undergraduate degree	NaN	NaN	NaN	
3	4	28.8	100,000—124,999	Masters degree	9.0	20.0	38.57	
4	5	36.5	40,000—69,999	Undergraduate degree	14.0	20.0	39.86	
...	...	...	...	...	...	...	...	
10767	10768	38.3	100,000—124,999	Undergraduate degree	10.0	18.0	NaN	
10768	10769	29.9	125,000—149,999	Undergraduate degree	NaN	NaN	NaN	
10769	10770	27.7	20,000—39,999	College/trade school	4.0	15.0	NaN	
10770	10771	23.0	20,000—39,999	College/trade school	12.0	19.0	NaN	
10771	10772	34.6	70,000—99,999	Masters degree	18.0	30.0	38.29	

10772 rows × 16 columns

Mention what the features tell about the data.

- Maternal\_Age: Maternal age (years) at intake
- Household\_Income: What is the total household income, before taxes and deductions, of all the household members from all sources in 2019
- Maternal\_Education: Maternal education
  - 1- Less than high school
  - 2- diploma
  - 3- High school diploma
  - 4- College/trade school
  - 5- Undergraduate degree
  - 6- Master's degree
  - 7- Doctoral Degree



- EPDS: Edinburgh Postnatal Depression Scale (you can find the survey on the internet)
- PROMIS\_Anxiety: Score from 7 to 35 with higher scores indicating greater severity of anxiety.
- GAbirth: Gestational age at birth (in weeks)
- Delivery\_Date: Delivery Date (Dates converted to month/year of birth)
- Birth\_Length: Birth length in cm
- Birth\_Weight: Birth weight in grams
- Delivery\_Mode: Vaginally or Caesarean-section (c-section)
- NICU\_stay: Was your infant admitted to the NICU?

# Knowing the Dataset



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- Language: Survey language
- Threaten\_Life: How much do (did) you think your life is (was) in danger during the COVID-19 pandemic? (0-100)
- Threaten\_Baby\_Danger: How much do (did) you think your unborn baby's life is (was) in danger at any time during the COVID-19 pandemic? (0-100)
- Threaten\_Baby\_Harm: How much are you worried that exposure to the COVID-19 virus will harm your unborn baby? (0-100)

<b>FEATURES</b>	<b>TYPE</b>	<b>UNIQUE VALUE</b>	<b>NULL VALUE</b>
OSF_ID	numerical	10772	0
Maternal_Age	numerical	280	111
Household_Income	string	10	251
Maternal_Education	nominal	7	177
Edinburgh_Postnatal_Depression_Scale	numerical	32	1174
PROMIS_Anxiety	numerical	30	1206
Gestational_Age_At_Birth	numerical	98	4038
Delivery_Date(converted to month and year)	string	30	4039

Birth_Length	numerical	173	5292
Birth_Weight	numerical	707	4694
Delivery_Mode	nominal	3	5235
NICU_Stay	nominal	3	5238
Language	nominal	2	0
Threaten_Life	numerical	102	0
Threaten_Baby_Danger	numerical	102	0
Threaten_Baby_Harm	numerical	102	0

# Data Preprocessing

## A. Handling Missing values

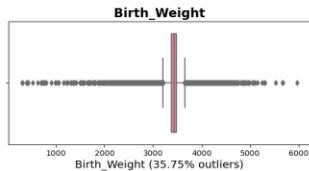
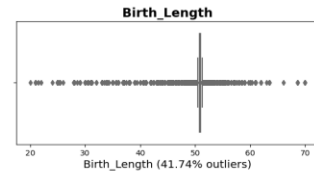
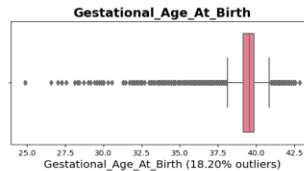
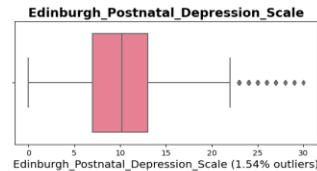
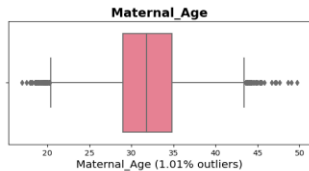
For numerical data skewness of each attributes need to be checked and then if the attribute is positively skewed null values must be substituted with mean, if negatively skewed null values must be substituted with median and for categorical data null values must be substituted with mode.

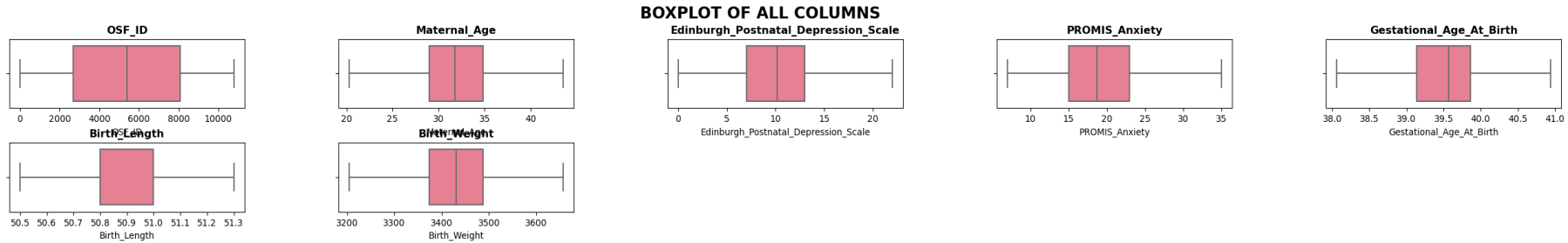
- Maternal Education - 177
- Household Income- 251
- EPDS Score - 1174
- Promise Anxiety - 1206
- Gestational age at birth - 4038
- Delivery date - 4039
- Birth length - 5292
- Birth weight - 4694
- Delivery Mode - 5235
- NICU Stay - 5238
- Maternal Age - 111

## B. Handling Outliers

After filling the null values check for the outliers for the each attributes if there are more number of outliers then that particular column can be deleted. If there are outliers in little quantity and that attribute is essential for visualization then need to go for capping technique that is finding upper and lower fence and substituting the values of lower fence to the values that are less than lower fence and substituting the values of upper fence to the values that are less than upper fence .

BOXPLOT OF ALL COLUMNS





## C. Sandardization/Normalization/String Processing

We have convert the categorical attributes into numerical format by Ordinal encoding. Ordinal encoding for the attributes delivery mode-(1-vaginally 0 – c-section), maternal education (0-collegetrade school, 2-doctoral degree,3- less than high school diploma, 4-master degree, 5-undergraduated degree), and also, we separated the column of delivery date as month and year.

# Domain Understanding

Decrease in maternal education lead to decrease in household income which in turn lead increase in depression.

Increase in threat life ,threat baby harm, threat baby danger increases the depression of the mother.

Increase in the depression leads to the hormonal imbalance in the mother which leads to variation in the birth weight and birth length of the baby, but in our data depression scale of mother had no major impact on birth length and birth weight.





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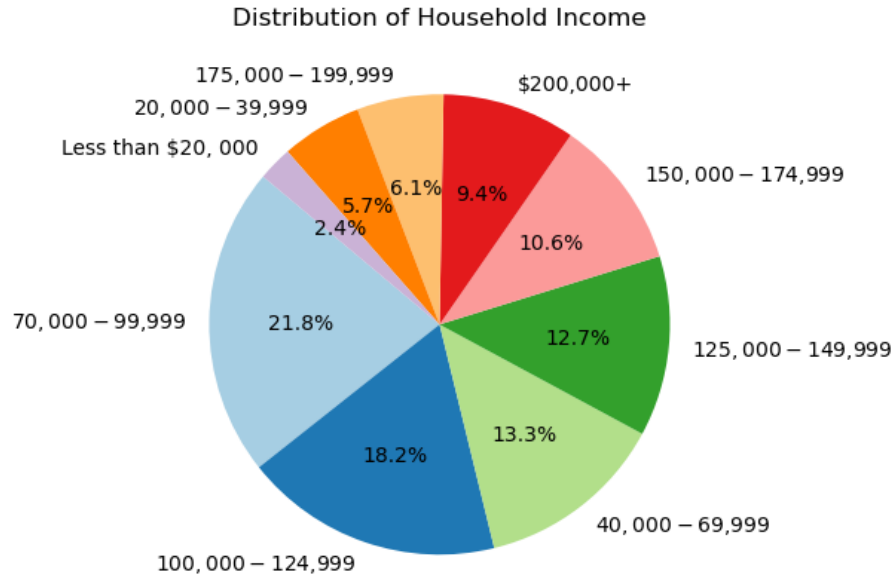
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# Proposed Hypothesis

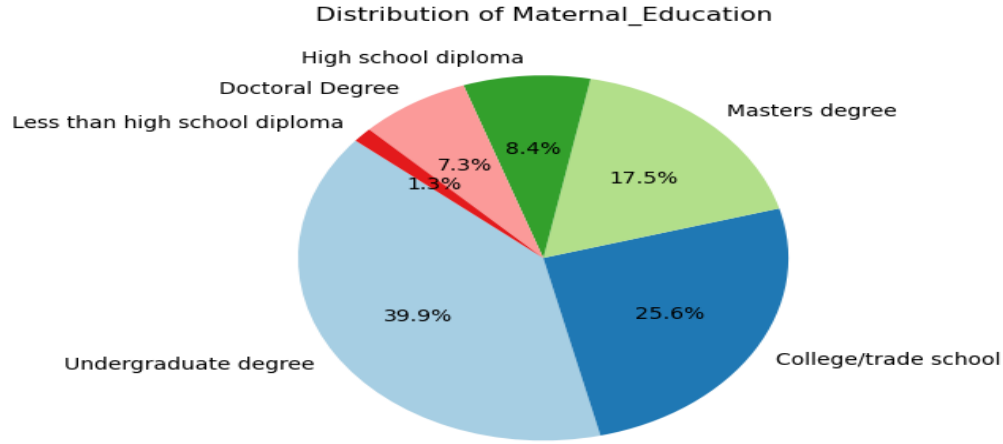
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# 1) What is the highest household income?



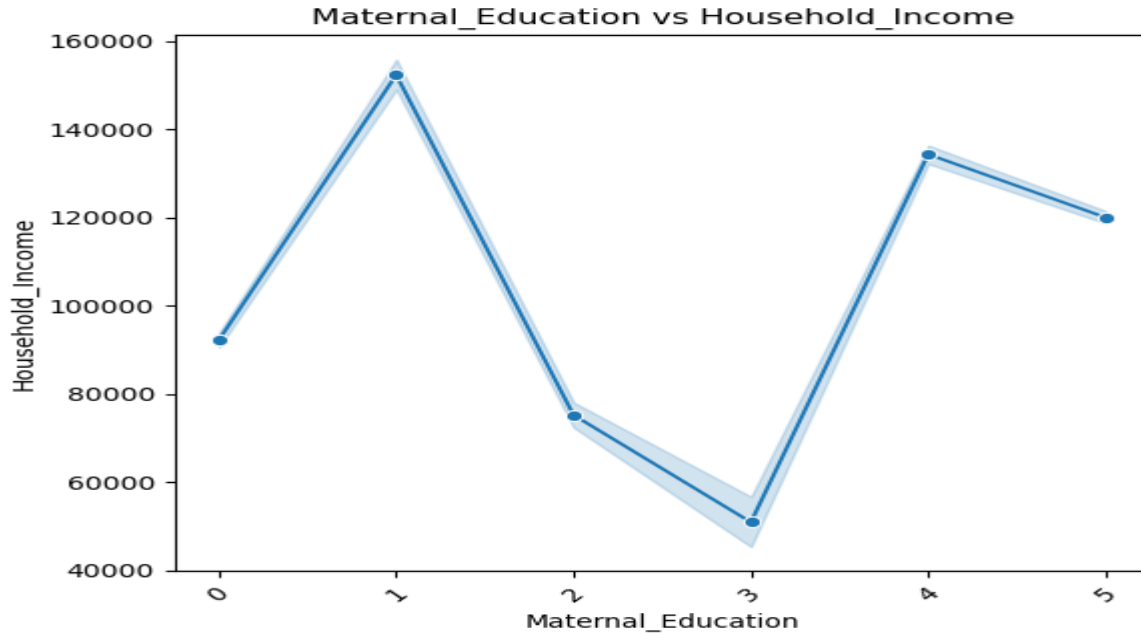
Inference: 70000-99999 is maximum and 20000-39999 is minimum

## 2) what is the hieghest rate of maternal education?



Inference: most of the women percieved undergraduated degree

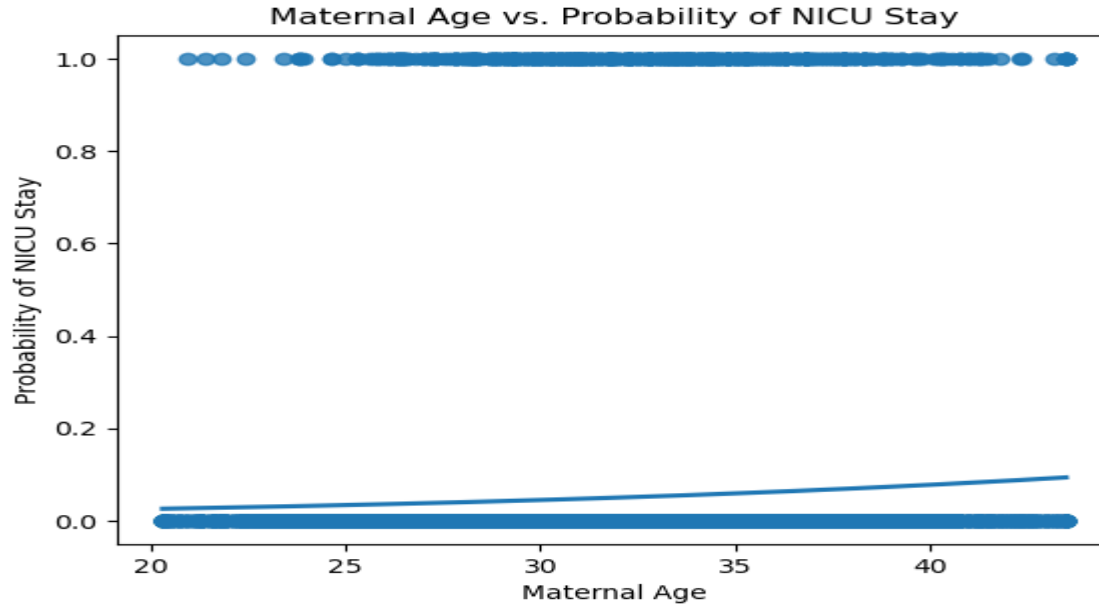
### 3) How does maternal education and household income are related?



Inference: From the above graph we can infer that the highest educated women is having with the highest household income

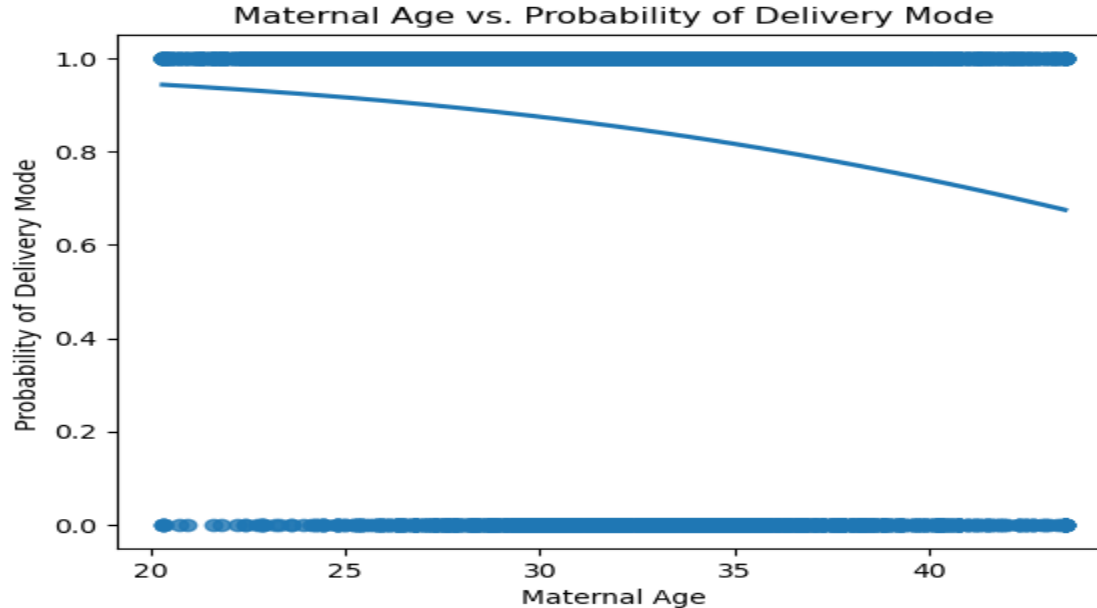
Maternal education 0: 'College/trade school' 1: 'Doctoral Degree' 2: 'High school diploma' 3: 'Less than high school diploma' 4: 'Masters degree' 5: 'Undergraduate degree'

#### 4) Is the baby NICU stay is dependent on Maternal Age



Inference: As the maternal age increases the baby gone for NICU stay

## 5) Is the Delivery\_Mode dependent on Maternal\_Age

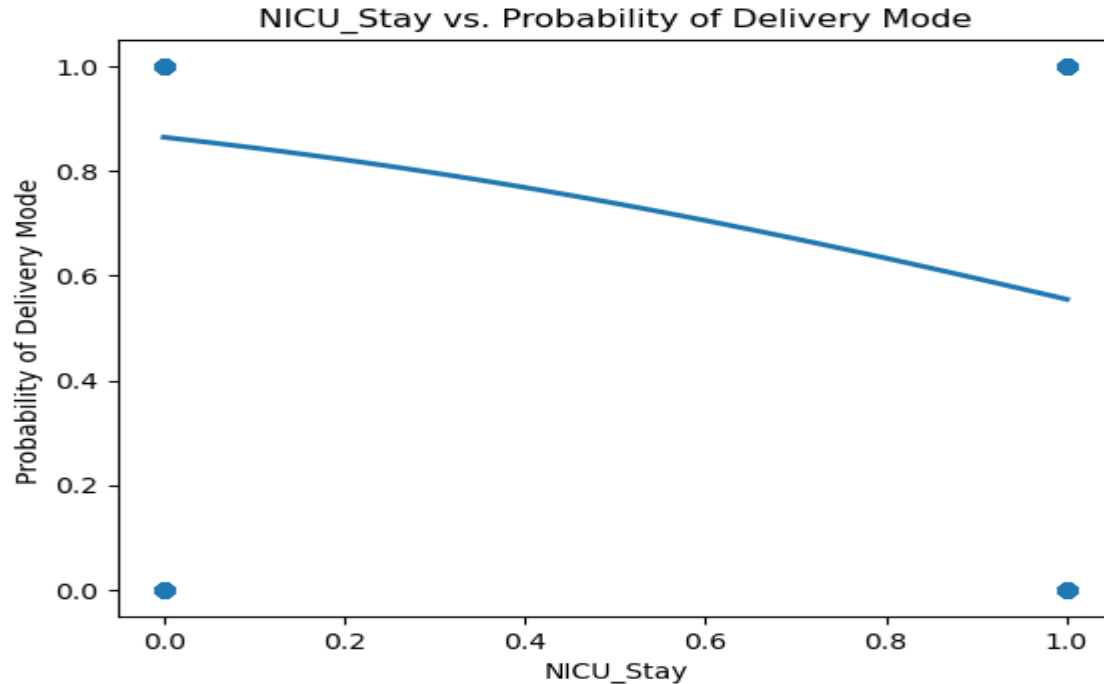


Inference: from above graph we can infer that the as the maternal age increases the mother gone for c-section

1 for vaginal section

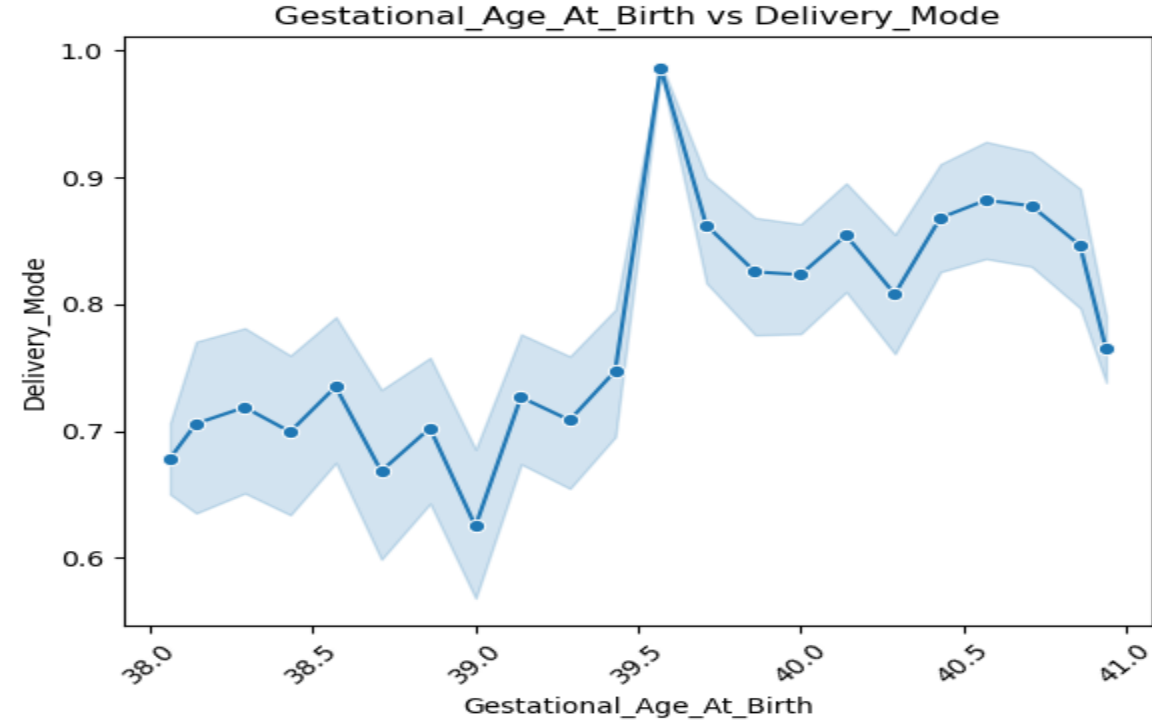
0 for c-section

**6) Does the Delivery\_Mode and NICU\_Stay have the relation ? If yes then what ?**



Inference: Mother with c-section gone for the baby with NICU stay

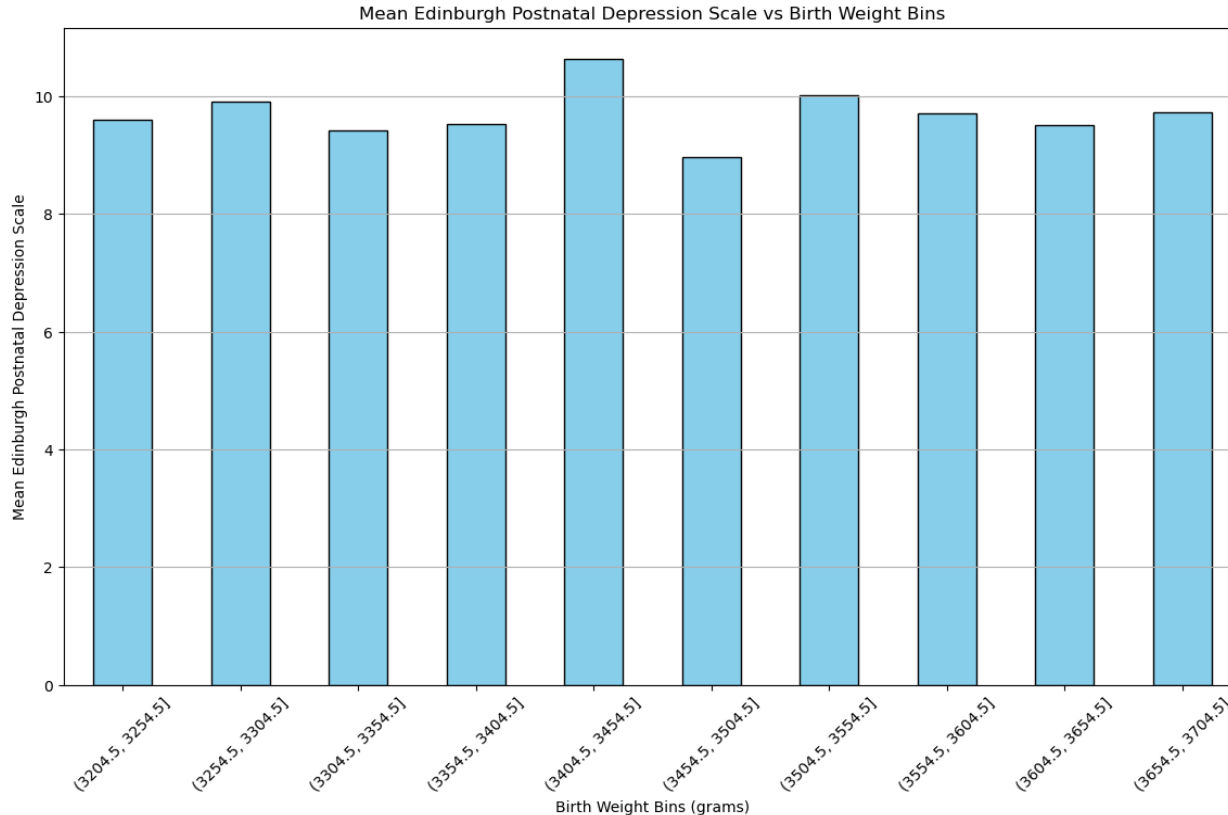
## 7) how does gestational age at birth and delivery mode are related?



Inference: As the gestational age at birth increases we can see that the mother delivers the baby vaginally

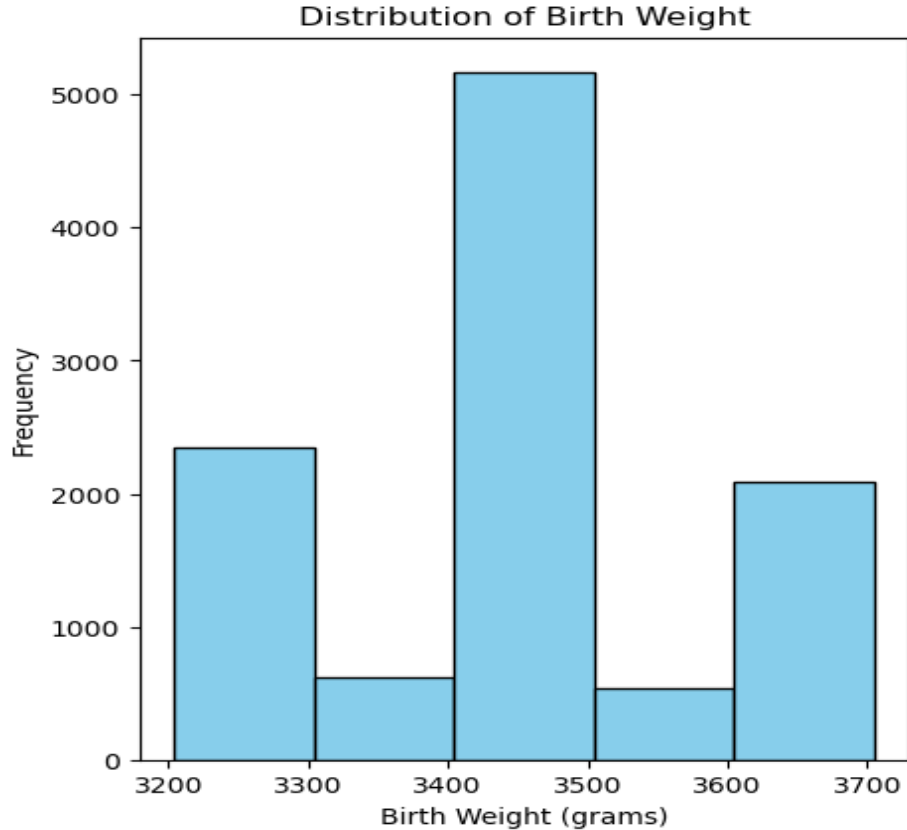


## 8)How does the birth weight of baby depends on the depression scale of the mother?



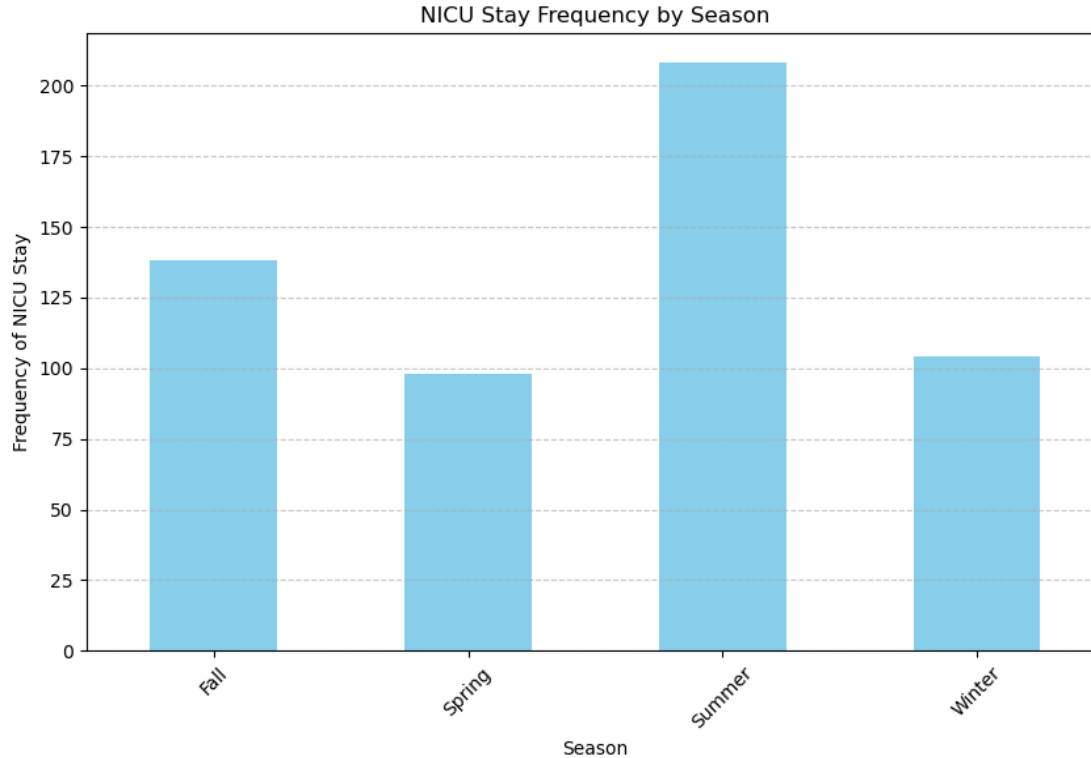
Inference: here we can see that the average weight of the healthy baby is 3500grams the mother with high depression may lead to the baby with slightly less weight or slightly more weight than average

## 9)What is the healthy weight of a baby?



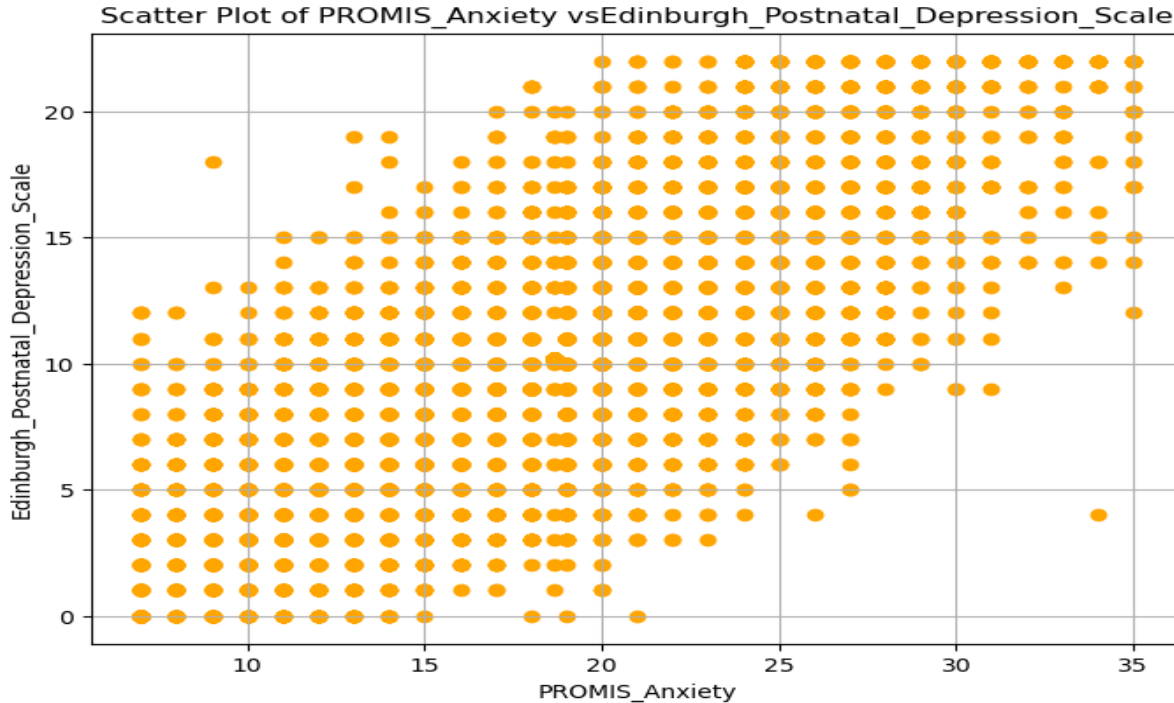
Inference: Average birth weight of healthy baby is 3500 grams

## 10)How does NICU stay varies seasonally?



Inference: NICU stay is more in summer less in spring season

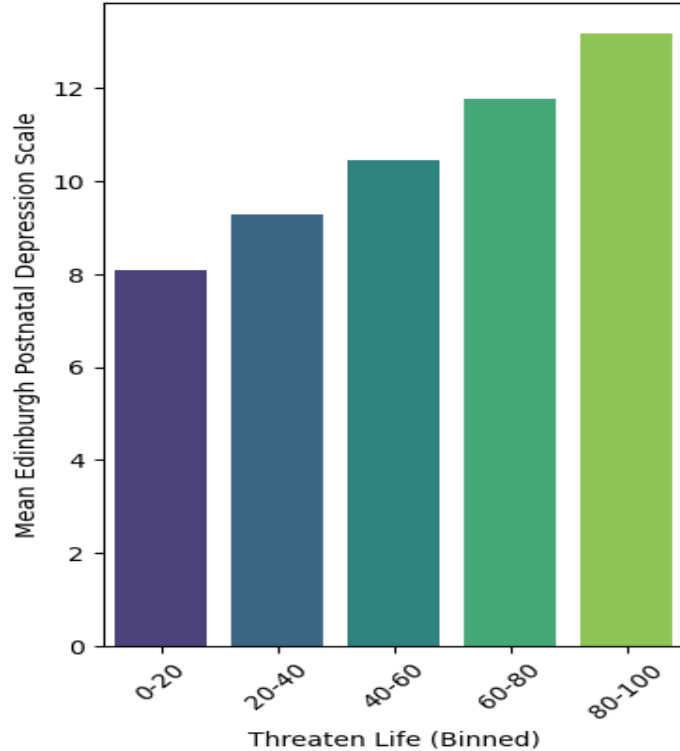
## 11) how does anxiety and depression related?



Inference: As the anxiety of the women increases depression also gets increases

## 12) How does depression related to threat life?

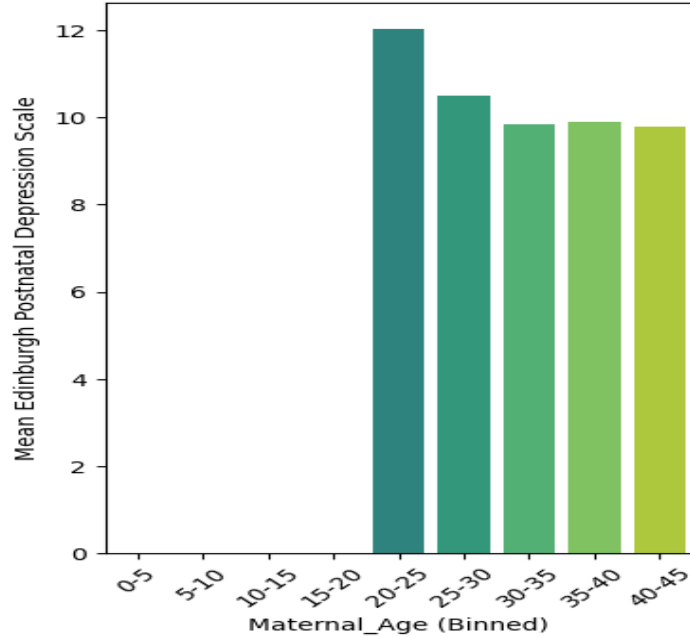
Threaten Life vs. Edinburgh Postnatal Depression Scale



Inference: From the above graph we can infer that as the mother will be more depressed as thinking of her health due to covid-19

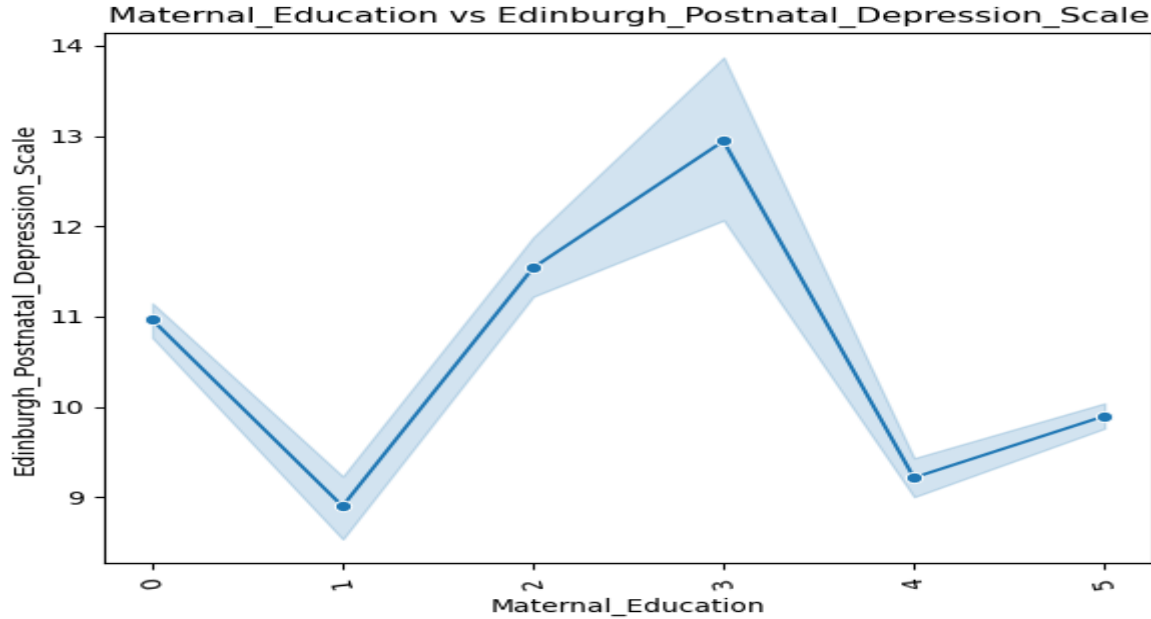
### 13) How is maternal age related to depression scale?

Maternal\_Age vs. Edinburgh Postnatal Depression Scale



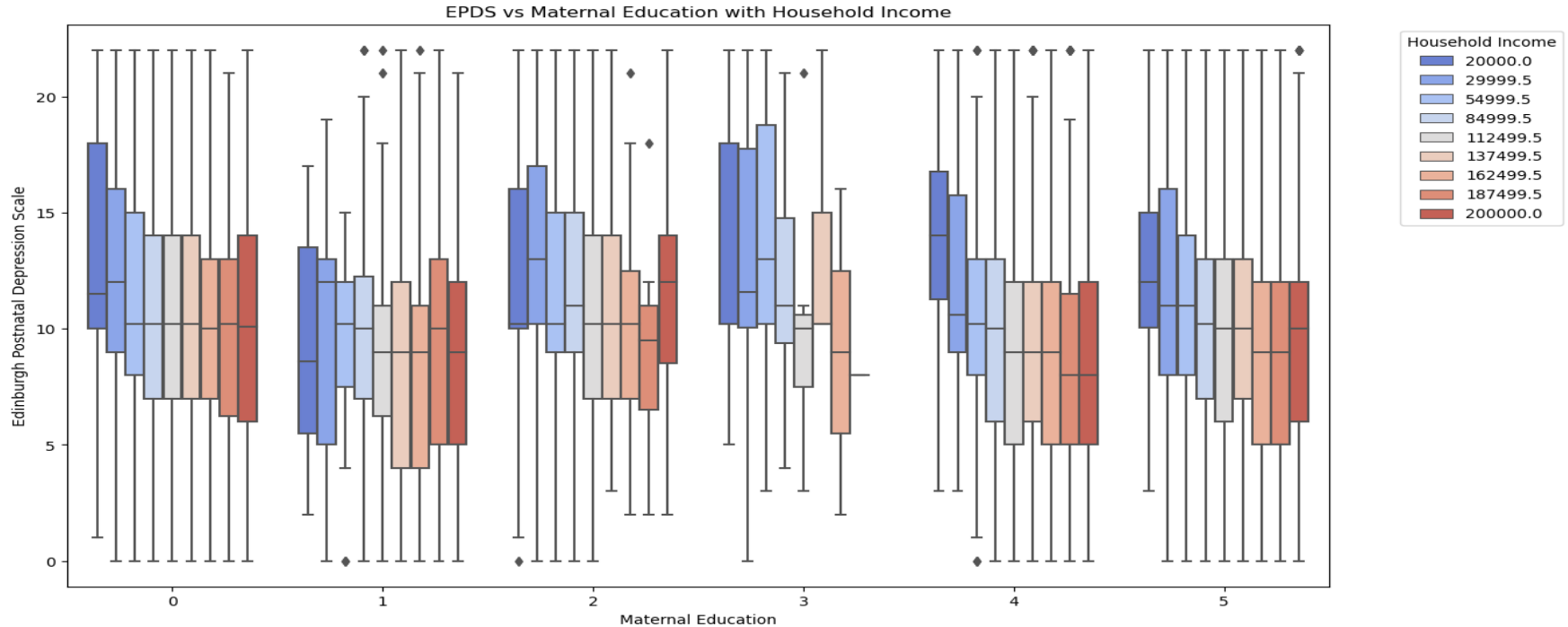
Inference: Depression scale is more to the younger women

## 14) How does maternal education effect the depression scale?



Inference: Depression scale is more for the 'Less than high school diploma' women less for the 'Doctoral Degree'

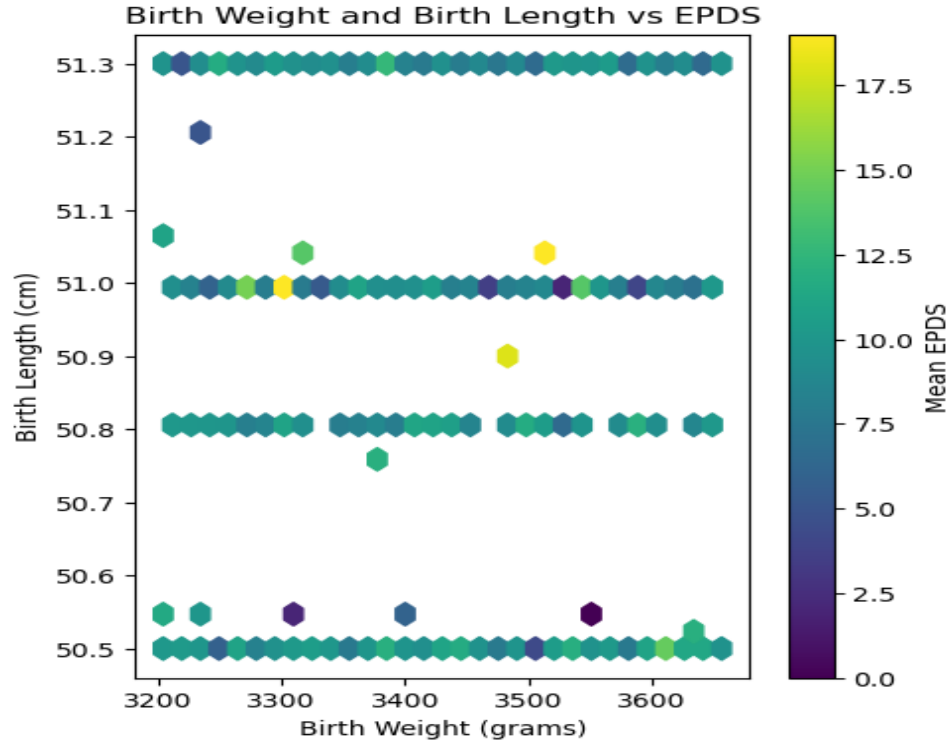
# 15) What is the relationship between maternal education, household income, and the Edinburgh Postnatal Depression?



Inference: Depression more for 'Less than high school diploma' less for 'Undergraduate degree' household income is more for 'Doctoral Degree' less for 'Less than high school diploma' from the above graph we can infer that lowset household income women with the education level 'Less than high school diploma' likely to be more depressed more

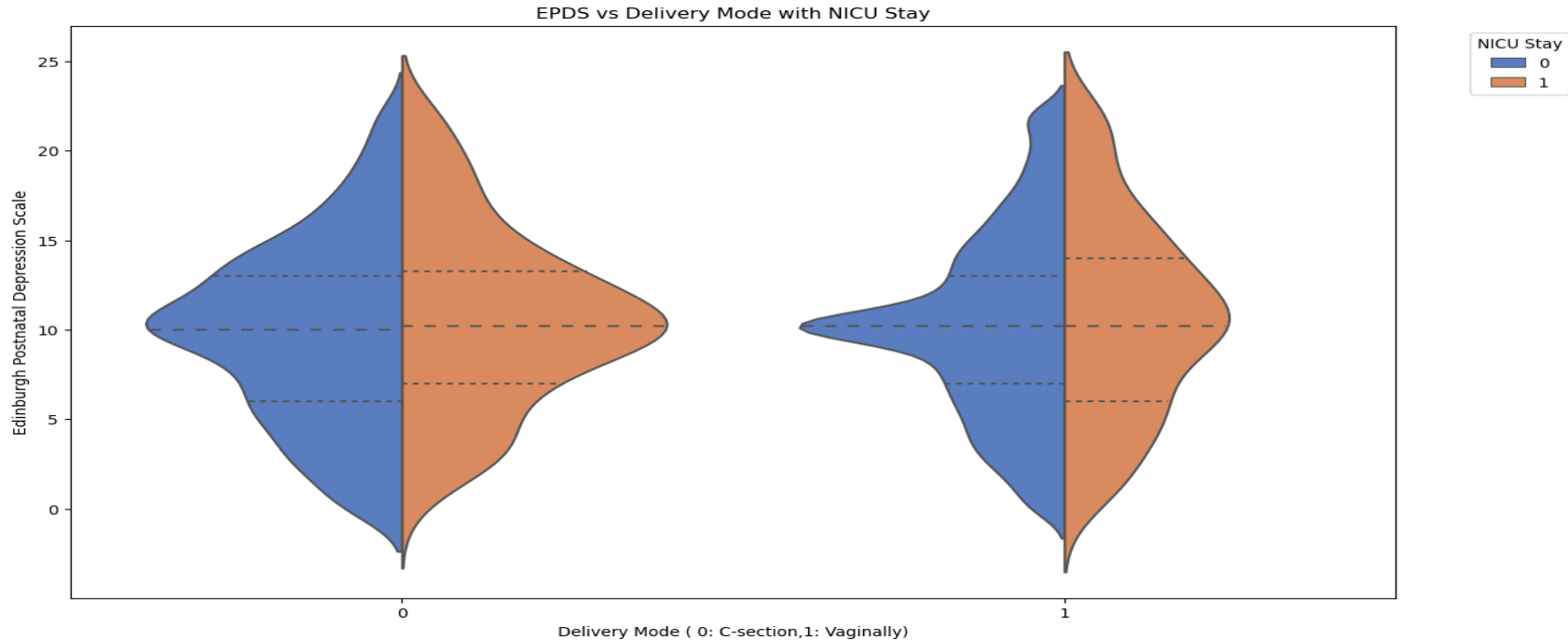


## 16) How does birth weight and birth length impact the Edinburgh Postnatal Depression Scale?



Inference: There is no much impact on birth weight and length on EPDS score but slightly difference as the EPDS score is less with the baby normal weight and length that is 3500gramd and 51cm length

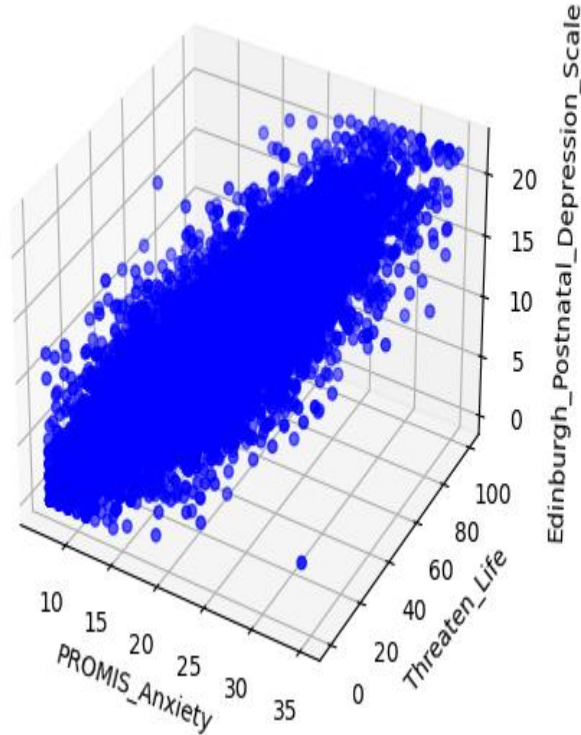
## 17) How do the mode of delivery (vaginally or c-section) and NICU stay influence EPDS scores?



Inference: There is slight tendency for higher EPDS scores among mothers whose babies stayed in the NICU, especially for those who has delivered vaginally EPDS score concentrated between 5 to 15

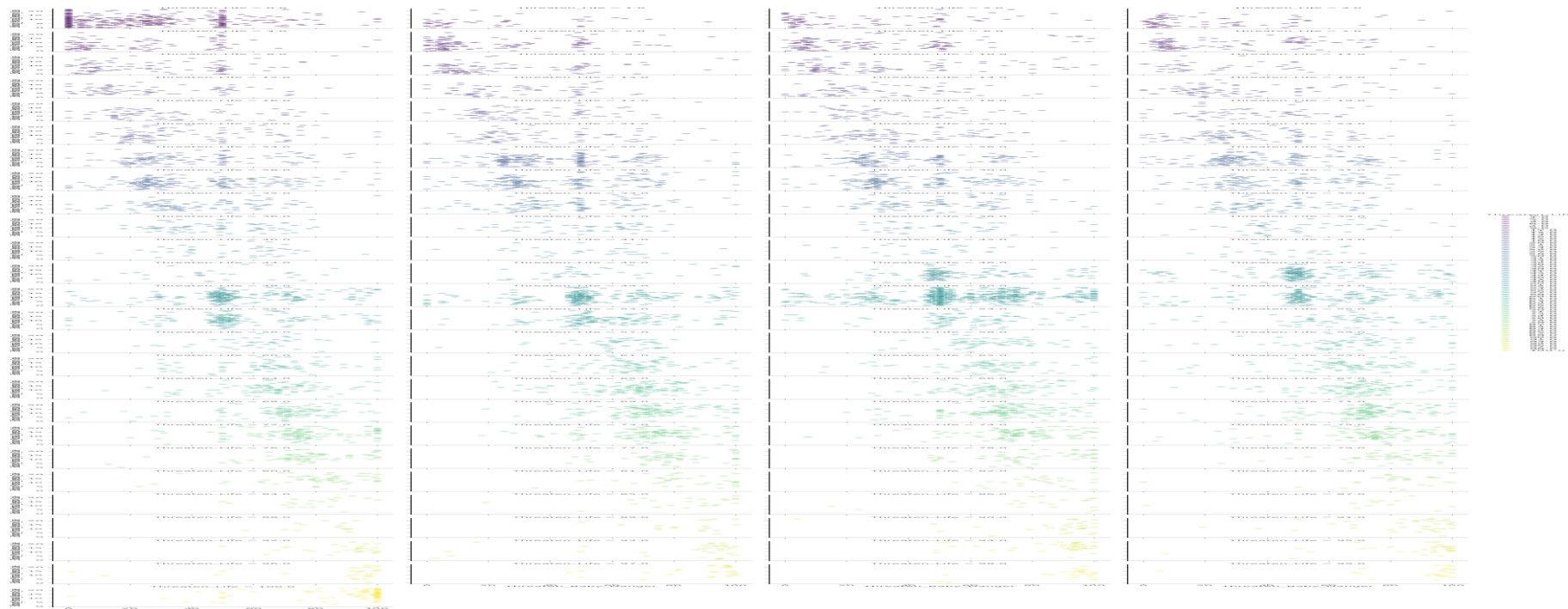
## 18) How is anxiety depression and threat life related?

3D Scatter Plot of PROMIS\_Anxiety, Threaten\_Life, and Edinburgh\_Postnatal\_Depression\_Scale



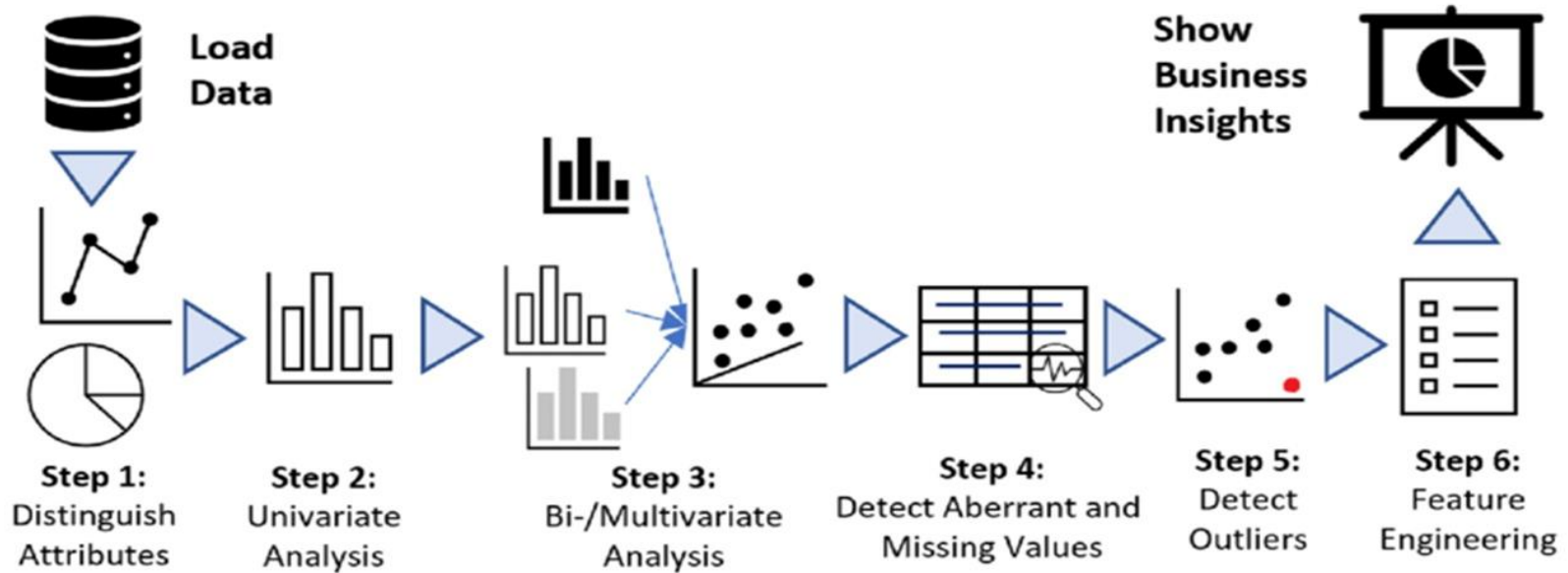
Inference: As the mother worries her life due to covid-19 her anxiety increases and depression also increases

## 19) How do the perceived threats (to life, unborn baby danger, and unborn baby harm) during the COVID-19 pandemic affect EPDS scores?



Inference: Depression increases with increase in the threat life and threat baby danger

# Implement Framework



Steps for implementation

- Data cleaning:
  - We will start by removing the feature which has high number of missing data.
  - Data distribution analysis: We will examine the distributions of each feature based on their data types.
  - Statistical analysis: We will conduct statistical analysis to identify outliers, determine central tendencies, and establish minimum and maximum values.
  - Data pre-processing: Based on the statistical findings, we will preprocess the data accordingly.
  - Univariate and multivariate analysis: We will perform analyses on the features to investigate and address our hypotheses, considering their respective categories.
  - Feature engineering: We will explore feature correlations to enhance our understanding of the dataset.
  - Machine learning modeling: Finally, we will apply a machine learning model to the dataset for predictive analysis.

# MOOC Course Details

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Campus**Team No. : A13****Div: A**

Sl. No.	Name	SRN.	Course Name	Course Link	Status
1	Soukhya Madan Nayak	02FE22BCS148	Python for Data science	<a href="https://www.udemy.com/course/python-data-science-master-course/?couponCode=NVDPRODIN35">https://www.udemy.com/course/python-data-science-master-course/?couponCode=NVDPRODIN35</a>	Completed
2	Sharanamma S Katti	02FE22BCS119	Python for Data science	<a href="https://www.udemy.com/course/python-data-science-master-course/?couponCode=NVDPRODIN35">https://www.udemy.com/course/python-data-science-master-course/?couponCode=NVDPRODIN35</a>	Completed
3	Abhishek Angadi	02FE22BCS005	Python for Data science	<a href="https://apps.cognitiveclass.ai/learning/course/course-v1:CognitiveClass+PY0101EN+v3/home">https://apps.cognitiveclass.ai/learning/course/course-v1:CognitiveClass+PY0101EN+v3/home</a>	Completed
4	Prem V	02FE22BCS072	Python for Data science	<a href="https://apps.cognitiveclass.ai/learning/course/course-v1:CognitiveClass+PY0101EN+v3/home">https://apps.cognitiveclass.ai/learning/course/course-v1:CognitiveClass+PY0101EN+v3/home</a>	Completed

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# Thank you !

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