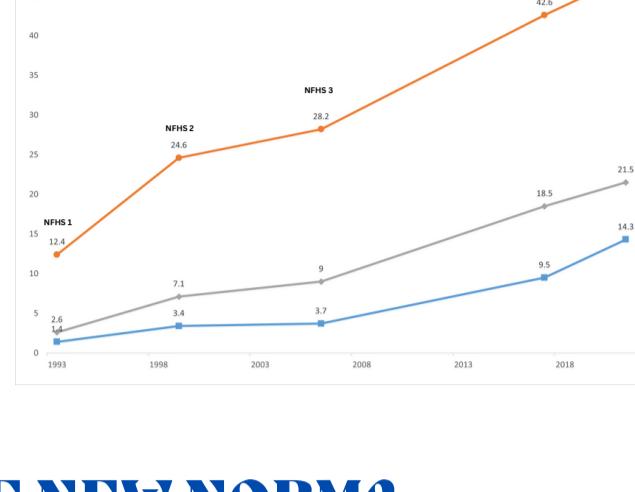


Birth of a Problem?

Unnecessary C-sections sweeping the nation- an investigation.

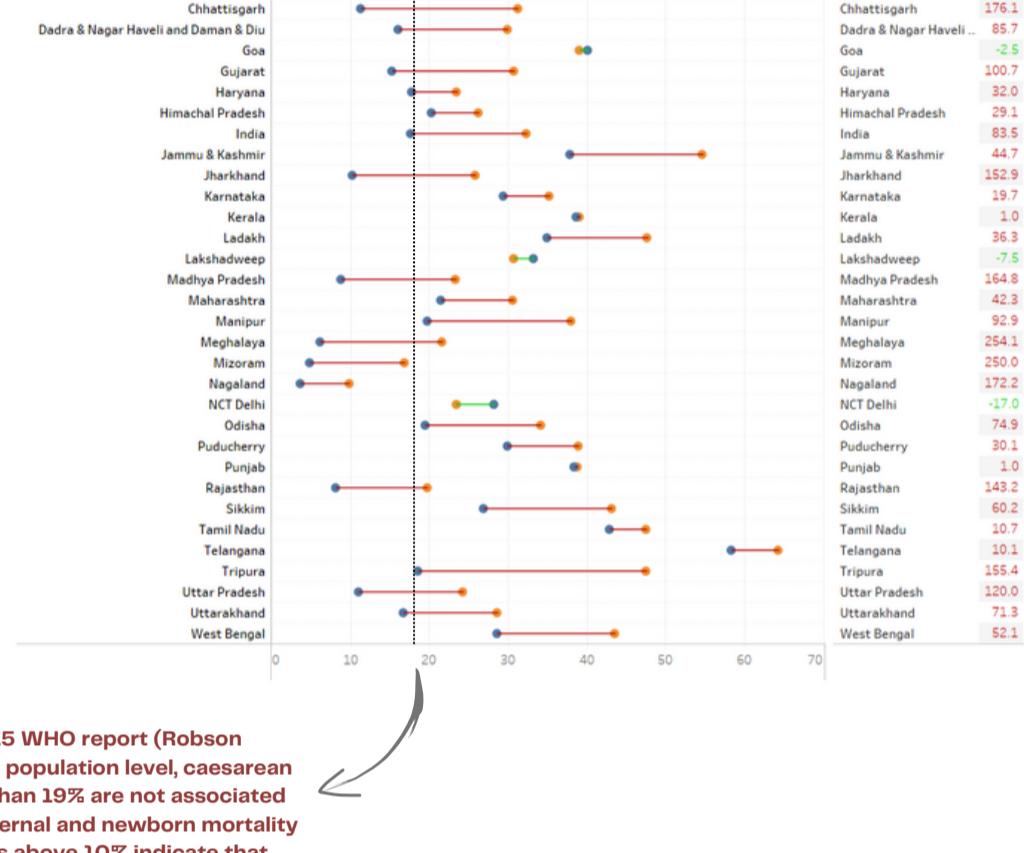
C-SECTIONS ON THE RISE!

Across the different iterations of the NFHS survey, a distinctly increasing trend is visible nationally, with the percentage increase being higher in private than public



IS CAESAREAN THE NEW NORM?

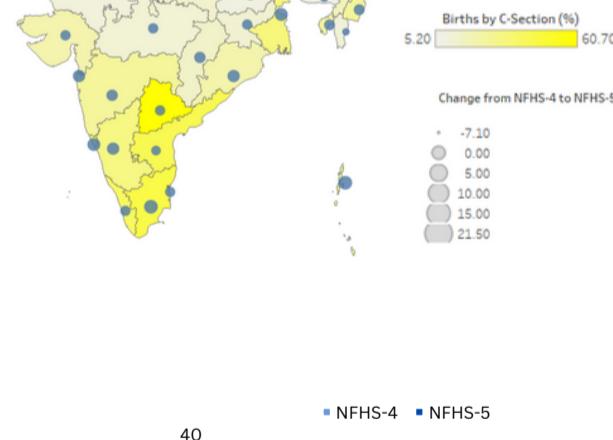
% of caesarean performed in private facilities is significantly greater than that performed at public healthcare

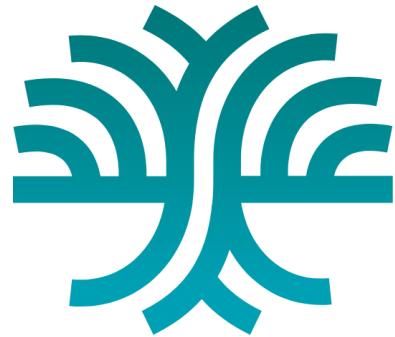


According to 2015 WHO report (Robson Classification), "At the population level, caesarean section rates higher than 19% are not associated with reductions in maternal and newborn mortality rates." Instead, rates above 10% indicate that operations are being performed for purposes other than the mothers' obstetric needs

NATIONAL ENDEMIC

States with the highest rates of elective caesarean include: **Telangana, Andhra Pradesh, Lakshwadeep, Kerala and Tamil Nadu**





Birth of a Problem

Unnecessary C-sections sweeping the nation - an Investigation

A Data-Visualization Project by

Team 2

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Submitted to Professor Venkatesh Rajamanickam, Plaksha University
Plaksha University Technology Leaders Program, 2022-2023.

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Executive Summary

As part of our data visualization project, we were given the NFHS-5 dataset and a cleaned version of it by Mr.Pratap Vardhan. We were asked to make a visually rich story. This write-up contains the entirety of our work. First, we define our problem statement, which we arrived at after going through the dataset and the related scholarly articles and journals. Then we present the final work, which we implemented as an Infographic. This is a detailed report on the Methodology we followed throughout the project, the design choices we made, why we made them, and the references we used. In the Appendix, we have attached all the tools and resources used to complete this project.

Problem statement

One of the glaring trends we observed after looking at the dataset is the rise of C-sections in India and how the numbers have reached almost 50% in private hospitals. Compared to other topics, this was relatively neglected, and that incited us to investigate further. Primarily, we want to show that the number of C-sections being performed in India is increasing at an alarming rate and then understand the factors driving this change.

Methodology

Phase 1:

In our first team meeting, we created the following framework of steps to follow for the assignment:

1. Decide on an Impactful story
2. Decide the structure and flow of the story
3. From the given data, identify the variables related to our story
4. Clean the data to fit our needs
5. Analyze the correlation between the variables and find out factors that drive our story
6. Keeping the design principles in mind, divide the team and make necessary visualizations that support our story.

We put more emphasis on coming up with an impactful story. After much contemplation, we concluded with the hypothesis “The increase in reported domestic violence in India is high due to an increase in women empowerment.” Although on the surface, it looked like our story was viable, when we reached the next steps of analyzing the data, we failed to find a strong correlation between the variables that we decided upon. This forced us to discontinue this story and move on to the next phase.

Learnings:

We understood that the emphasis should be on deriving insights from the data. The story can be derived from insights, but it can't be the other way around.

Phase2:

We divided our work as follows:

1. Research for the story: Ask good questions and look for trends in the data; look at scholarly articles that have analyzed the same data.
2. Identify the variables, clean the data and check the correlations.
3. Decide on the story structure.
4. Keeping the design principles in mind, divide the team and make necessary visualizations that support our story.

We presented the work to the class and incorporated the feedback in the next phase.

Learnings:

Based on the given feedback:

1. To reduce the cognitive load on the readers and in some cases to clearly show the data, annotate the graph.
2. Understanding that the sample size of data varies depending on the question being asked.
3. Guard against claims that we are making through data.

Phase3:

Here, we incorporated the received feedback as follows:

1. We toned down the claims that were made in Phase 2 and changed the story to a more grounded and open-ended one.
2. We edited the graphs based on the feedback given by Mr. Pratap and Professor Venkat.

Learnings:

The lessons we learned from the entire process were the importance of feedback and reiterations.

Design Choices

Graph1: Time Series

- The original data was given as categorical. But we recognized that we could capture more information if we could change it into temporal data. We then plotted using a time series graph which works best for temporal data. By doing this modification, we were able to gather insights that were not originally present, like the increasing rate of C-section deliveries, even in public hospitals from NFHS-4 to NFHS-5.
- Since there were only a few data points, we removed the grid lines and directly annotated the graph to reduce cognitive load on the reader's part and the amount of ink used.
- We used color to differentiate between Private, Public, and Total.

Graph2: Choropleth

- We used a choropleth map since we needed to show the visual change over space and show how the C-section rates compare among different states of India.
- We have encoded the variation of C-section rates among different states of India using the intensity of the color and the change of C-section rates from NFHS4 to NFHS5 using the size of the circles.
- We used yellow and blue colors for their contrasting nature and the popping effect.

Graph3: Grouped bar graph

- Bar Graphs are good when you want to show how a quantitative variable varies across a categorical one. We used a grouped bar graph to compare between NFHS4 and NFHS5 datasets.
- In this graph, we have encoded three elements: C-section rates, Wealth strata, and the NFHS report used to derive it.
- We chose a subtle difference of color for NFHS-4 vs. 5 because they're representing the same quantity, and our primary objective was to show how C-section rates change as per the wealth strata.
- Shades of blue were used because it aligns with the color scheme of the presentation.
- Gridlines were removed to maximize the data-ink ratio.

Graph4: Dumbbell chart

- We chose dumbbell charts because they work the best to compare two variables based on specific criteria, and we wanted to compare the C-section rates of Urban vs. Rural populations and also for Private vs. Public hospitals.
- The line color signifies whether the change is leading to a positive or a negative impact rather than a percentage increase or decrease. We used Red for bad and Green for good as it aligns with the existing mental models.
- Blue and Orange were used for dots as they're good for contrast, and they align well with the color scheme of the entire infographic.
- Percentage Change text has been integrated into this graph to show the numbers to reduce the cognitive load of the reader. Text is colored similarly to the line as both of them are encoded for the same element.

Graph5:

- We wanted to show proportions, and the first thing that came into our mind was a pie chart; then we created this visualization which is a derivation of a pie chart because we wanted to add a human element to it.
- We wanted to keep the graphical elements to a minimum and yet to mobilize all of them, which is why we picked baby icons and color-coded them to show proportions.
- Black color settles perfectly in the background, blue is a positive color that aligns with our color scheme, and red just pops out for babies who are being negatively impacted.

Bibliography

[1] NFHS-5 Dataset:

<http://rchiips.org/nfhs/>

[2] Cleaned dataset by Mr.Pratap Vardhan:

<https://github.com/pratapvardhan/NFHS-5>

[3] Cesarean deliveries have become an ‘epidemic’ in India — record 300% jump in last decade:

<https://theprint.in/health/caesarean-deliveries-have-become-an-epidemic-in-india-record-300-jump-in-last-decade/334291/#~:text=In%20private%20hospitals%2C%20C%2Dsections,doubled%20to%2033.8%20per%20cent.>

[4] Soaring Number of C-Section Deliveries a Concern for Maternal, Children Health:

<https://science.thewire.in/health/nfhs-5-caesarean-deliveries-increasing-concern-maternal-neonatal-health/>

[5] Changing the Discourse on Cesarean Births in India: Issues emerging from NFHS-5 (2019–2021):

<https://doi.org/10.1007/s43545-022-00406-8>

Team

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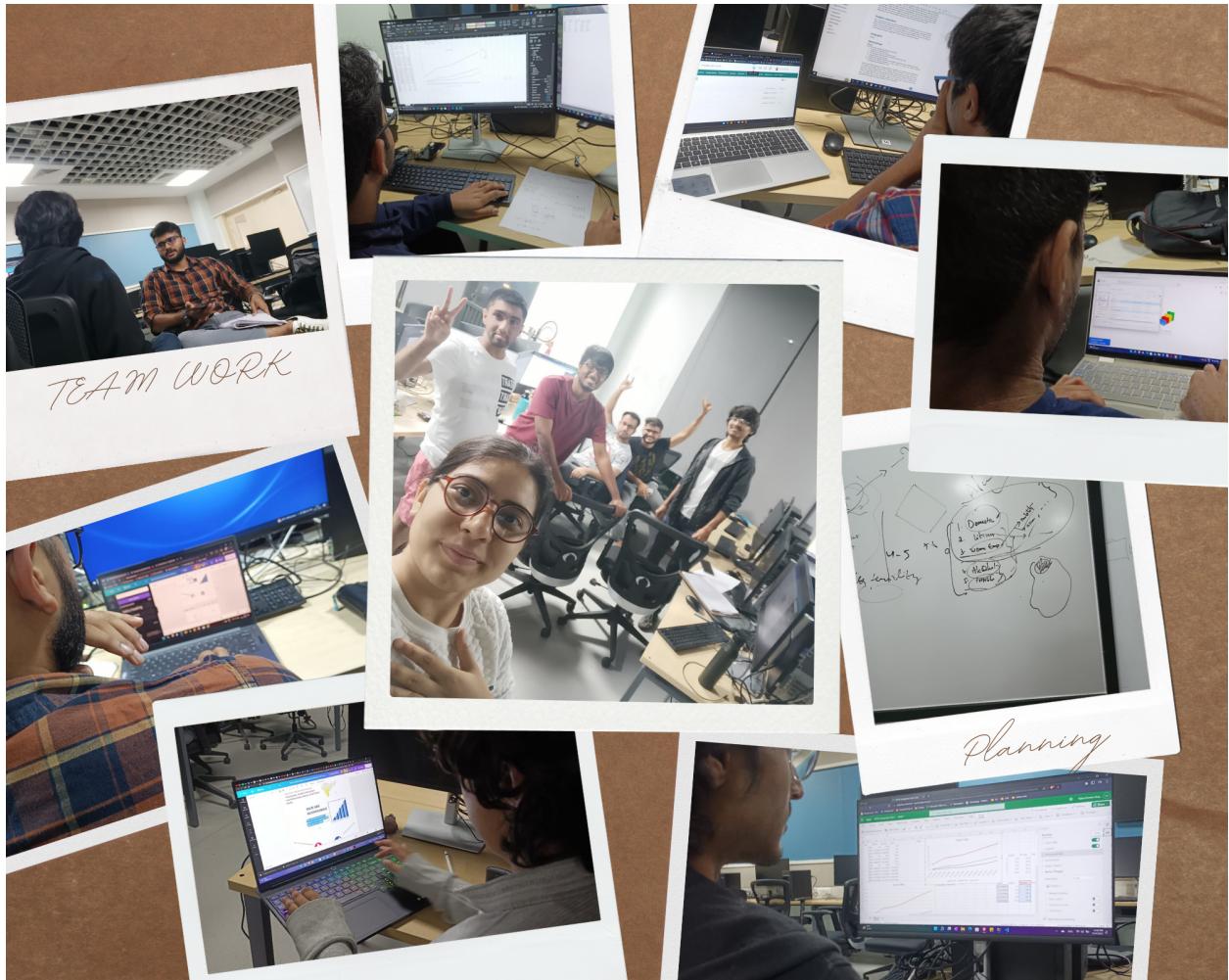
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Gallery



Appendix

This appendix contains links to all the visualizations and presentations that were made as a part of the project and the list of resources, codes and datasets used.

Resources:

- Data cleaning:
 - Python
 - Excel
- Visualization tools:
 - Excel
 - Python
 - Tableau
 - Canva
- List of all the codes and datasets used:
<https://drive.google.com/drive/folders/1ShuHdKkASeeS283SWWPJN3nb8c9GeS6>