# Topic - Determining the factors that affect the infant mortality and fertility rate in Indian states using analytics

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**Abstract**

High mortality rates in India has been an issue for a very long time. This has been due to many reasons such as diseases, accidents, self-harms etc. But one among the top 10 reasons is death during birth or at infancy. This is caused due to many factors. The factors can range from unhealthy conditions in hospitals to financial issues. There are births taken place in houses due to financial short comings and unavailability of proper medical assistance. These are the factors that we know currently, but there could be more factors that causes a similar issue. The data collected from Indian government census in 2001 and 2011 is being used to find solutions and factors for the high mortality rate in infants along with its connection with fertility rate. Then EDA, Linear regression, Random Forest and Clustering is done to the finalized data. This is further represented in graphs and tables to understand the effect of the factors caused on these major issues.

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## 1. Introduction

The mortality trend has always been unstable in India, although it shows a reduction with years. In 1990, the expected mortality were 86.4 deaths per 1000 live births and the actual value came out to be 80.7 deaths per 1000 live births among kids below 1 year age group in India. But later on in 2017, the expected mortality deaths were 34.3 deaths per 1000 live births and the actual value came out to be 36 deaths per 1000 live births. So it is clear that there have been more complications for below one year groups that expected in 2017. The mortality among children can be seen to differ from state to state. In Kerala, the infant mortality rate is 12 per 1000 population as compared to the rate is 35 per 1000 population in Bihar.

The fertility rate in India has constantly reduced. In 1990, fertility rate in India was 4.04 births per woman as compared to 2017 when it has come to 2.27 births per woman. In Kerala, the fertility rate is 2.35 births per woman as compared to the rate 3.6 births per woman in Bihar.

So, it is clear that in the two states shown above the fertility rate is almost similar but there is a huge difference in infant mortality rate.

According to Institute for Health Metrics and Evaluation, the ranking of most death caused in India by neonatal disorders have reduced from $4^{th}$ to $7^{th}$ from 2007 to 2017 but it is still one among the top ten.

## 2. Details of research project

### i. Background and related research

'State of new-born health in India' (2016) - it focused on factors like rural–urban, poor–rich, facility availability and gender differentials. The outcome was that there was a requirement for improvement in the health facilities and introduction of new interventions.

'High Neonatal Mortality Rates in Rural India: What Options to Explore?' (2012)- The focus was on the rural areas and the main factor that was looked into was the effects on the neonatal mortality rate depending on birth locations. The conclusion states that there needed to be

large scale projects that will help promote home-based new-born care, creating community awareness and community mobilization along with strengthening public-private partnerships.

‘The association between neonatal death and facility birth in regions of India’ (2019) – The objective of this research article was to find out if there is a relation between neonatal deaths and facility births in different states. It turns out that there was a relation in few states like Uttar Pradesh and Bihar, but was not as robust in other states.

‘Impact of timing of breastfeeding initiation on neonatal mortality in India’ (2018) – The main aim of the study is to examine timing of initiation of breastfeeding and neonatal deaths. It was found that timely initiation of breastfeeding is beneficial for child survival within the first 28 days of birth in all of the cases of mortality that was looked up.

‘Mapping Neonatal Mortality in India: A Closer Look’ (2017) – This article shows how the mortality rate difference from state to state. As a conclusion, they succeeded to figure out this issue but stated that there is urgent need for up-to-date data on district-level neonatal mortality in India.

In the past all researches have been done regarding Neonatal deaths and related causes. But in most of them they have looked at broad factors like residence area, gender, financial background, place of birth, facility, breastfeeding and so on.

### ii. Aim

The aim of this research is to figure out the factors affecting mortality and fertility. Later on it will be ranked so as to know which of them are most prominent.

### iii. Objective

The objective will be to find the correlation of mortality with many factors like mothers’ age, marital status, religious community, educational level, occupation along with the number of deaths caused; gender, surviving rate and so on of the child in different years. The relation between fertility rate and infant mortality rate in state level and national level will also be found.

### iv. Research Questions

- What are the major factors that affect mortality rate in infants?

This question is important because infant mortality has been one among the top 10 reasons for death in India. This states that it is one among the major issues. Finding the factors and by how much they affect this issue we can try to solve this problem by coming up with new ideas which can be implemented.

- By how much does the mortality rate in infants differ from state to state?

This is very important to investigate into, since there has been a huge difference in mortality rate in infants from state to state even when the fertility rate remains almost the same. This shows that just figuring out the factors in the national level is not enough but rather needs to be investigated into state level as well.

### v. Requirements and resources

The data is collected from India government census of 2001 and 2011. Further the data 'Annual Health Survey: Mortality Schedule' which includes the major states in India provided by 'Ministry of Health and Family Welfare' and 'Department of Health and Family Welfare' (2007 – 2011).

Python and Microsoft Excel for collecting data and doing the analysis. Finally tableau and Power BI desktop will be used to do data visualisation.

### vi. Research methodology

The data that will be used for the research will be the census taken by the Indian government in 2001 and 2011. It comes under the category of Fertility Data .Future the data Annual Health Survey: Mortality Schedule which includes the major states in India provided by Ministry of Health and Family Welfare and Department of Health and Family Welfare (2007 – 2011) will also be used. These data are collected from the official website of Indian Government Census and Open Government Data (OGD) Platform India.

The collected data includes multiple data sets with many variables. It will be merged based on relevant variables which are common to form one final dataset. Treating of missing values will be by replacing with ‘not available’ since if the data is missing it means that variable is not relevant there.

Next step will be Exploratory Data Analysis (EDA). This will include multiple steps including univariate analysis, segmented analysis, bivariate analysis and a few derived metric analysis. These will be done using pivoted tables and graphs. Univariate analysis will help in knowing each factor in detail. The segmented analysis and bivariate will provide the correlation between different variables. And the derived metrics will be used to understand and figure out the data in a more concise manner.

Finally using Linear regression, Random Forest and Clustering can be used to rate the factors to find out which are the most important ones and how to tackle them. For all this the software used will be Python along with packages provided.

## 3. Expected outcome

The desired outcome will be to figure out the factors that affect mortality and fertility rates and also to find out the top reasons for the same. This will later be concluded with methods to be implemented for a better chance of survival of young children.

## 4. Timetable and milestones

| Month | Milestones to be completed |
|---|---|
| January | Finishing all classes and lectures |
| February | Deciding and finalizing topic, collecting dataset, going through existing articles and research papers of all the possible topics |
| March | Going through existing articles and research papers of the final topic in depth, Loading, Cleaning and merging data |
| April | EDA, Linear regression, Random Forest and Clustering, starting to write the Thesis |
| May | Finishing all works in Python and bringing conclusions, Writing Thesis |
| June | Completing, Rechecking and finalising the research |

This is a brief idea of the plan for each month.

## References


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