India Nutritional Health Analysis

(Children Under five years)

Introduction

>In this statical study, we will try to understand the different variables that contribute to the overall nutritional health of children under five years of age in **Rural & Urban** India.

>These links/variables/factors that we will study will give us a better focus on how the growth of children under the age of five vary in India when it comes to nutrition.

>As we show our data visualizations, we hope to paint a better understanding of the family health and well-being of India's rural and urban population.

Data Source (National Family & Health Survey and Survey Years)

https://data.gov.in/major-indicator/children-aged-under-5-years-who-are-underweight

Survey 3

Is an one section survey that covers both Rural & Urban together

Year Conducted:

(2013)

Survey 4

Is Broken into three sections;

Rural, Urban, & Total

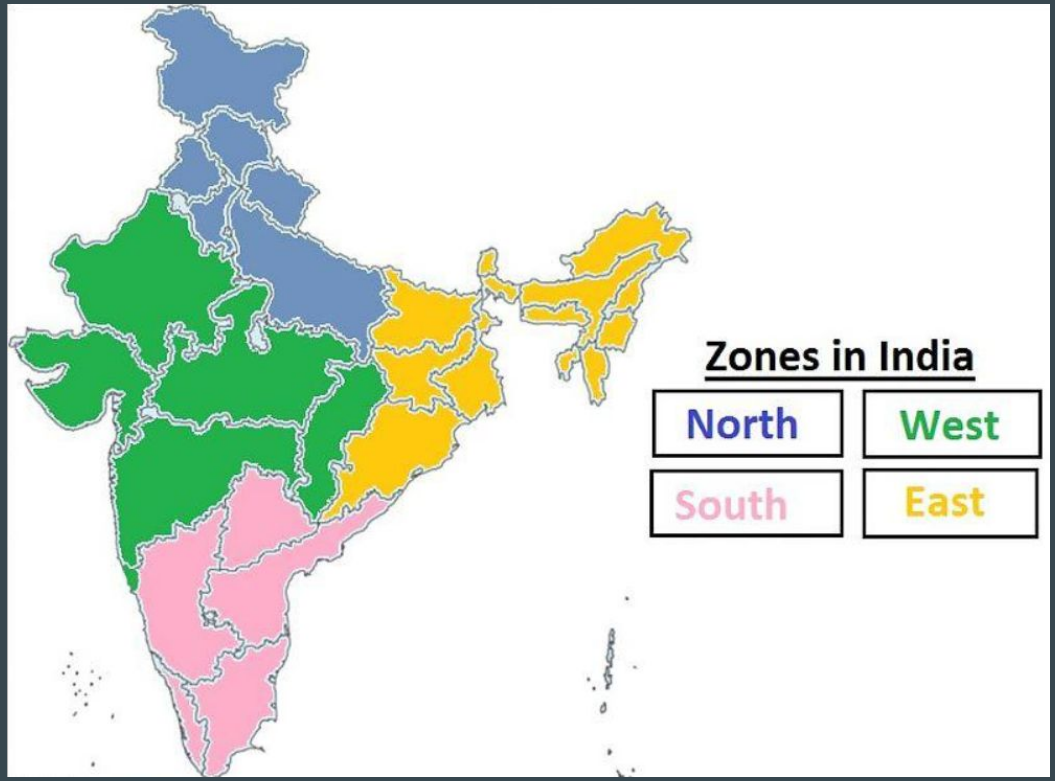
Year Conducted:

(2015-2016)

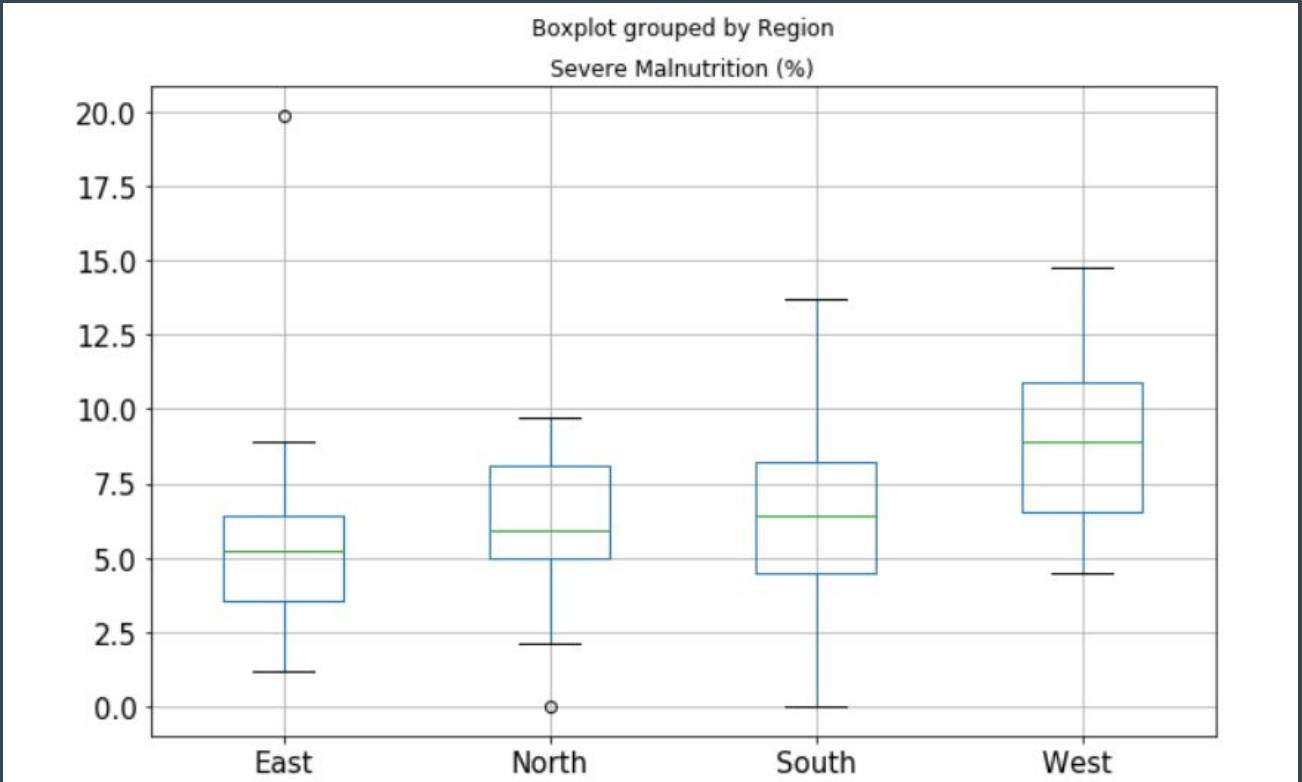
ANOVA - Analysis by Region

Regions

- North
- South
- East
- West



ANOVA - Severe Malnutrition



ANOVA - Conclusions

Null Hypothesis

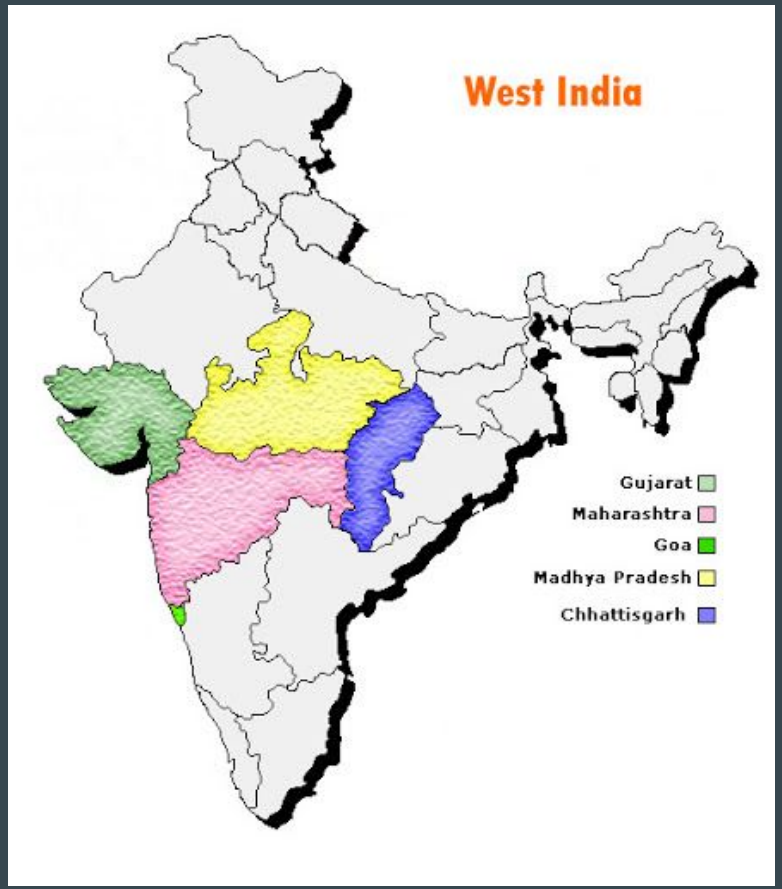
- The malnutrition mean of all regions is statistically the same

ANOVA P-Value

- 0.021937284 (P-value < 0.05)

Reject Null Hypothesis

- There is a statistical difference between Regions



Seven Analysis for Children's Nutrition in India

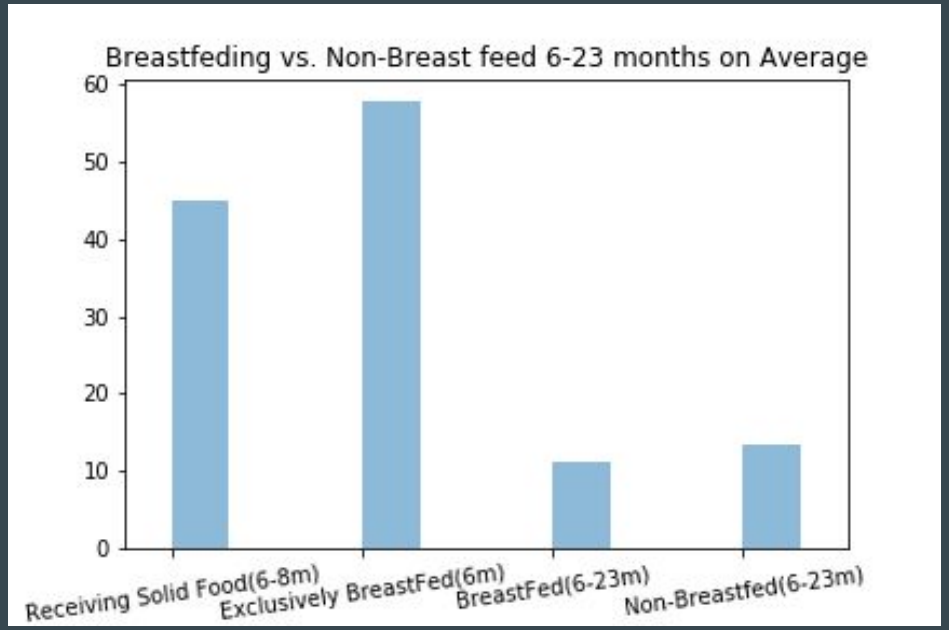
1. NFHS3 (Well Fed Vs. Under Fed) Ratio
2. NFHS4 Rural Vs. NFHS4 Urban (Well Fed Vs. Under Fed) Comparison
3. NFHS3 Vs. NFHS4 - Female Child (per 1000 male) % change
4. Top 5 & Bottom 5 States with underweight % in all Surveys
5. Correlation between Breastfed pop. to stunt growth %.
6. Severly wasted, stuned,underweight,wasted stat for overall india.
7. States with aquaduate diet over time

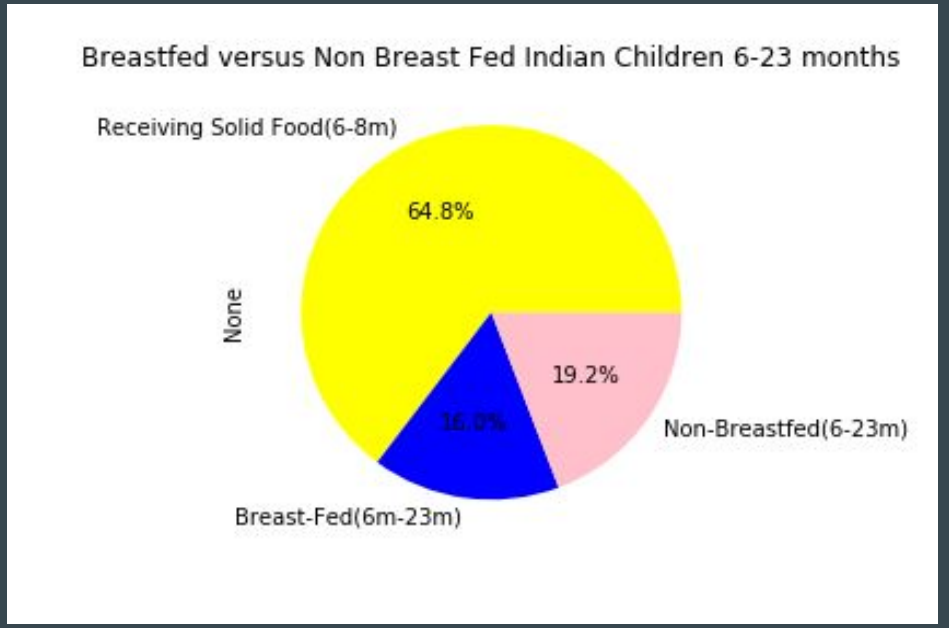
Data Cleaning & Derivations

- Cleaning the csv file to have relevant data columns
- Creating dataframes pertaining to each survey
- .fillna(0) to have data consistency.
- .drop(index)
- Column formatting
- pd.merge(merging two dataframes)
- Calculating (sum, mean, median, % changes)
- Quartile , correlation Calculations. (Lower, Upper, Outliers)
- Ratio Calculations
- nlargest
- Pd.concat
- plt.annotate

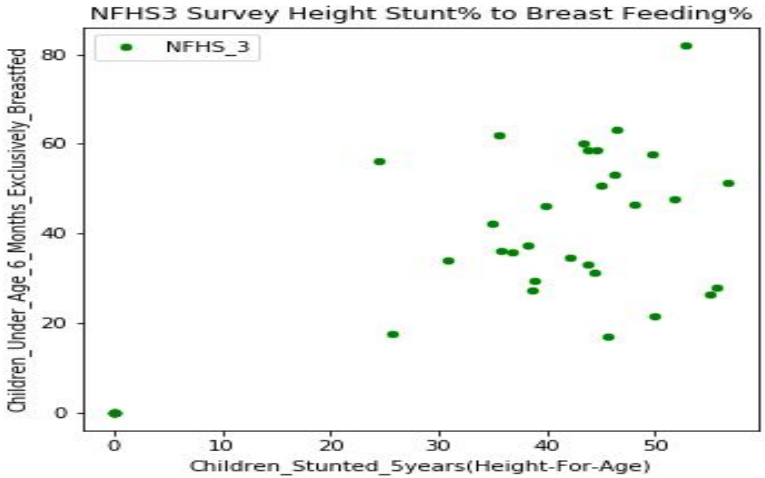
David’s Analysis: Could there be a positive/negative correlation between breastfeeding % and stunted growth % for children under the age of five in India? Weak, Medium, or Strong correlation?
Let’s Find Out

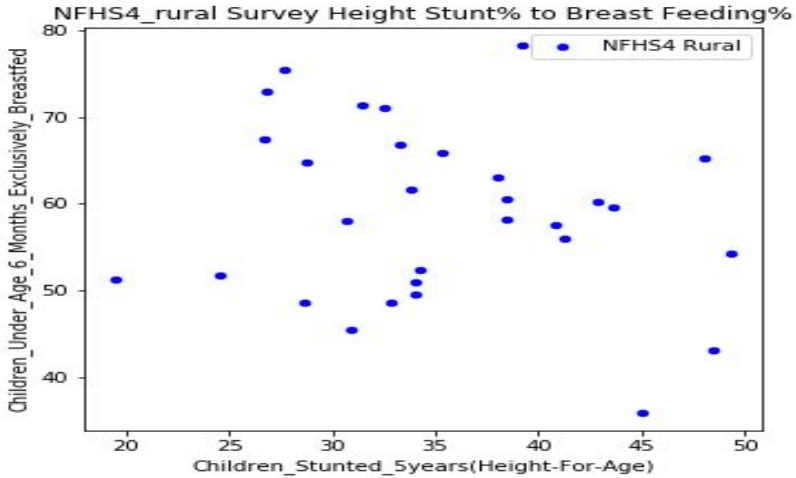
Breastfeeding Versus Non-Breastfeeding for children 6-23 months

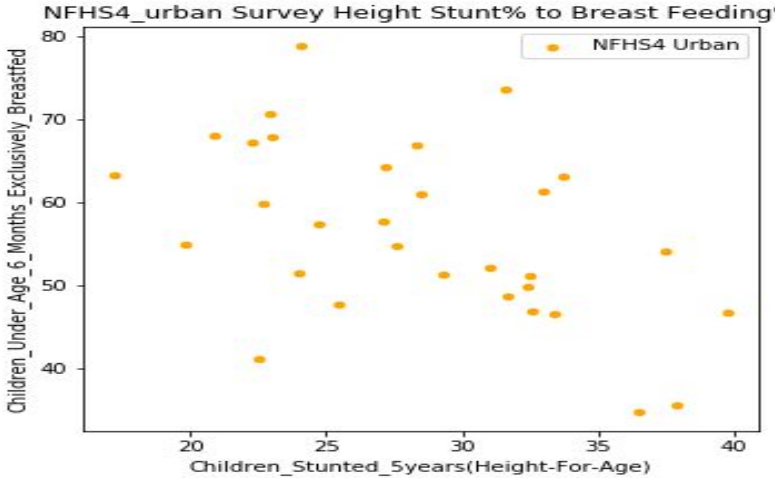


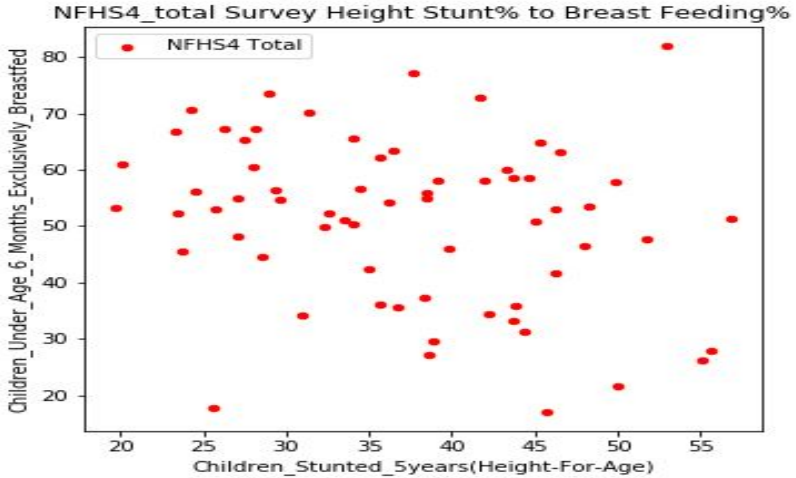


***Survey 3 didn't have information for these column indexes, this data is all from Survey-4 total.
***Due to "Exclusively BreastFed (6m)" being our most dominate average factor, it will be used for the correlation test on the next two slides..

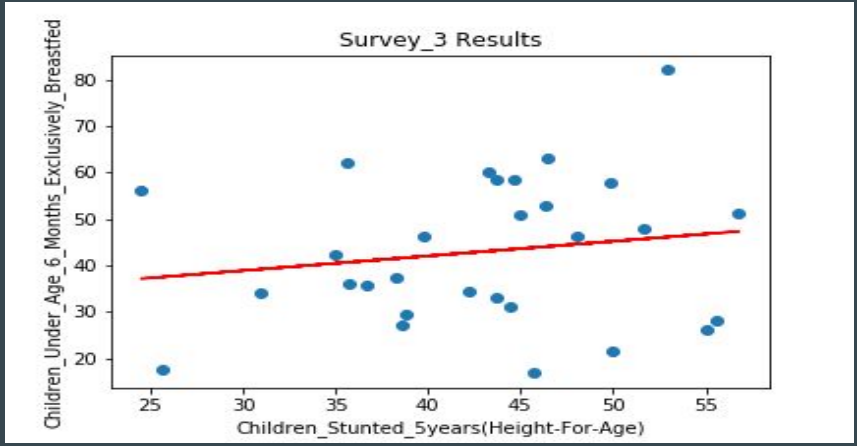

NFHS3 Survey Height Stunt% to Breast Feeding%
NFHS_3
Children_Under_Age_6_Months_Exclusively_Breastfed
Children_Stunted_5years(Height-For-Age)

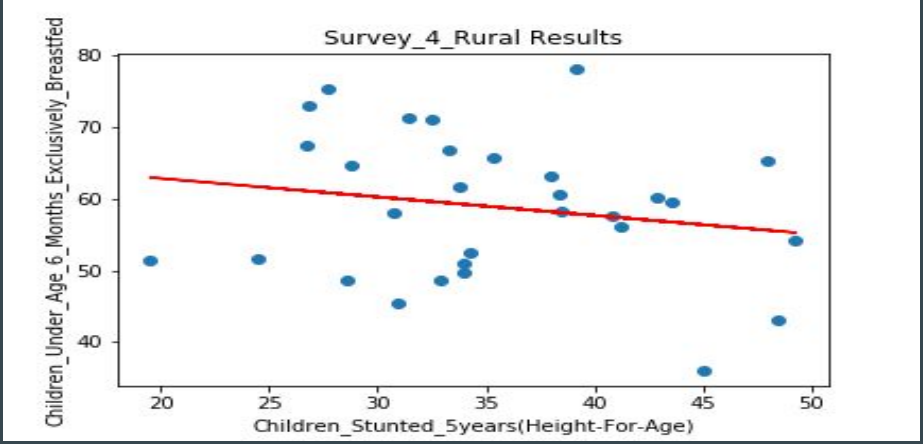

NFHS4_rural Survey Height Stunt% to Breast Feeding%
NFHS4 Rural
Children_Under_Age_6_Months_Exclusively_Breastfed
Children_Stunted_5years(Height-For-Age)

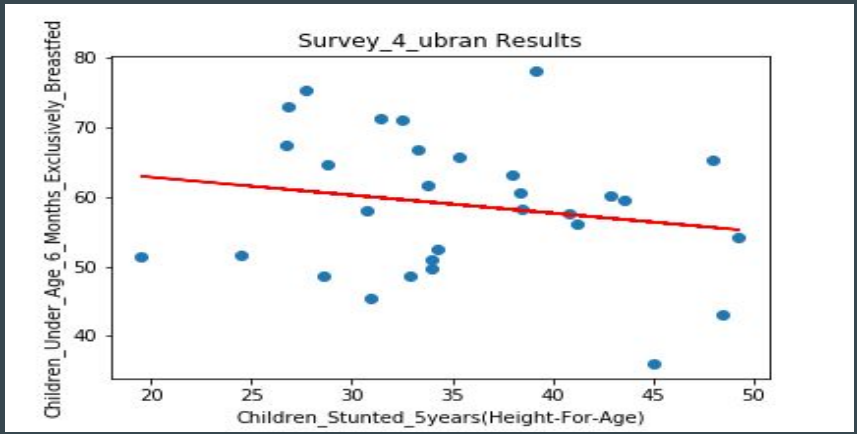

NFHS4_urban Survey Height Stunt% to Breast Feeding%
NFHS4 Urban
Children_Under_Age_6_Months_Exclusively_Breastfed
Children_Stunted_5years(Height-For-Age)

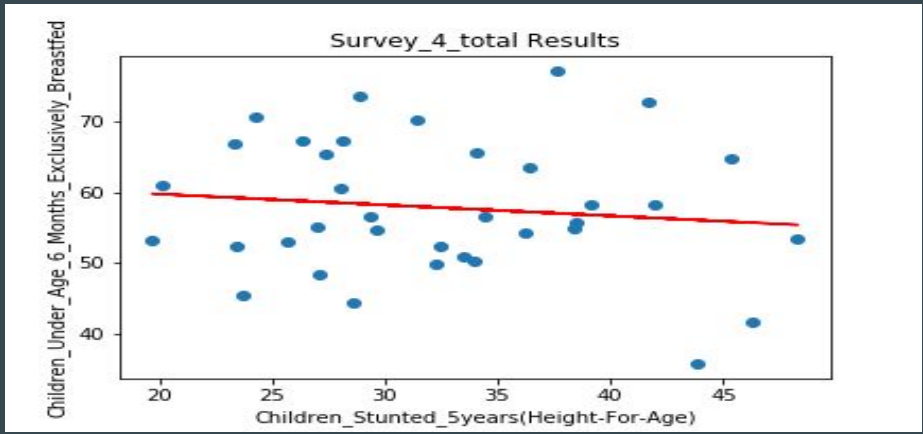

NFHS4_total Survey Height Stunt% to Breast Feeding%
NFHS4 Total
Children_Under_Age_6_Months_Exclusively_Breastfed
Children_Stunted_5years(Height-For-Age)

Regression Graphs









Final Result of David's Analysis

> For Survey 3, the R value was +0.16, which is a *weak* positive correlation

>For Survey 4_Rural, the R value was -0.19. This was a *weak* negative correlation

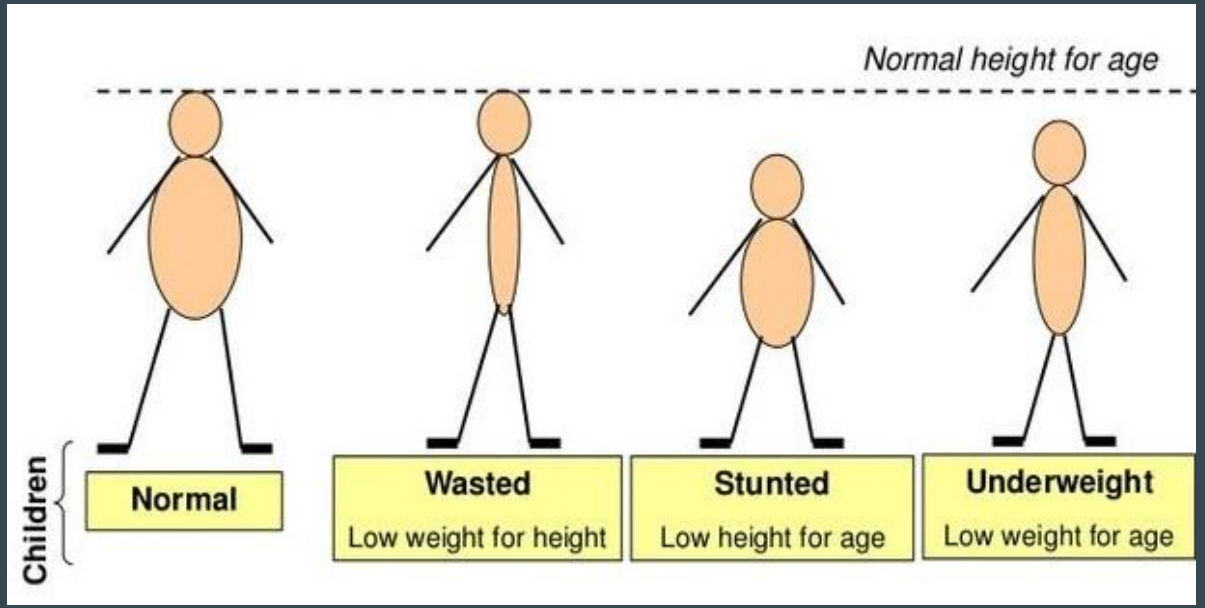
>For Survey 4_Urban, the R value was -0.19. This was a *weak* negative correlation

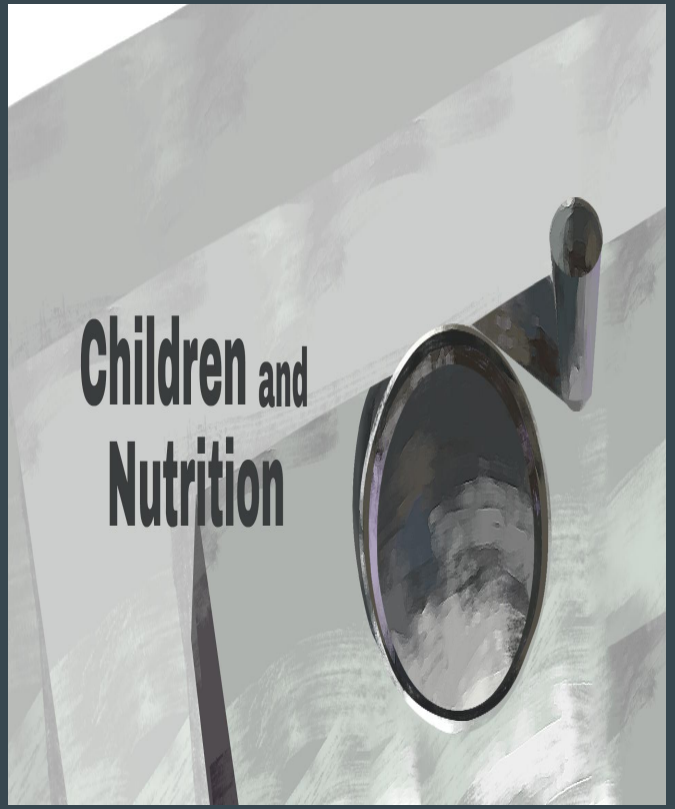
>For Survey 4_Total, The R value was -0.12. This was a *weak* negative correlation.

Overall, we *can't conclude* that Breastfeeding exclusively for six months has any correlation for nutrition, specifically when it comes to stunted growth %

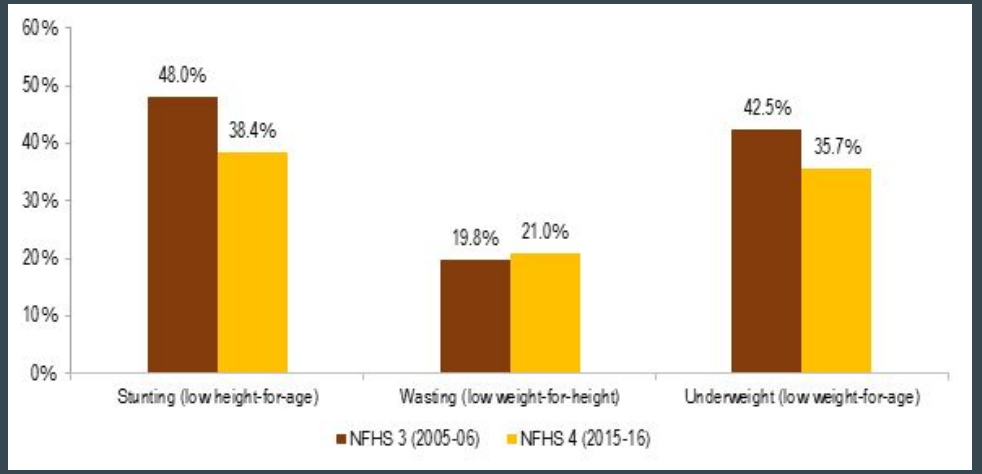
Data Analysis: In this analysis we are going to further evaluate studying the nutrition statistics of states. Here was the results via charts.

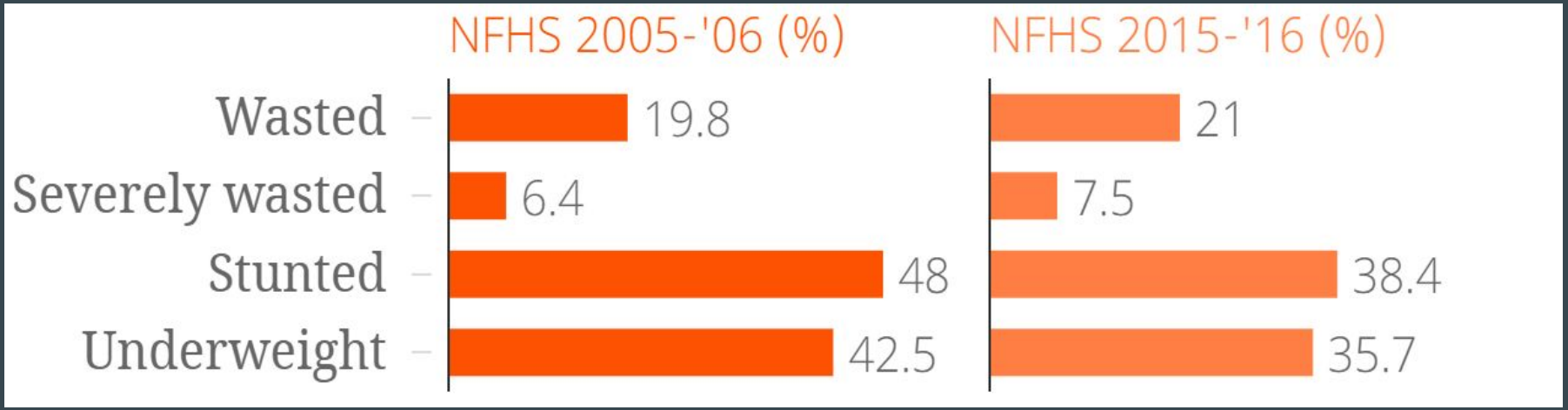
Aparna slides



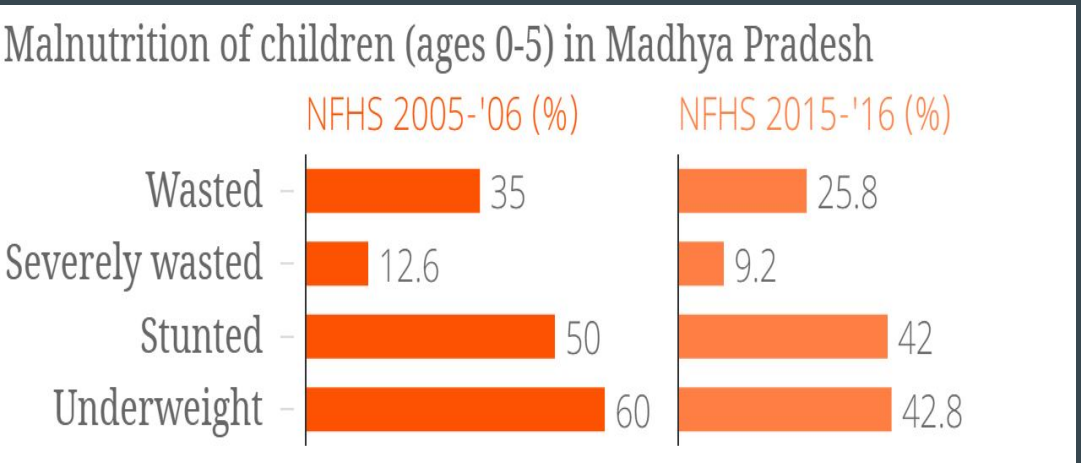


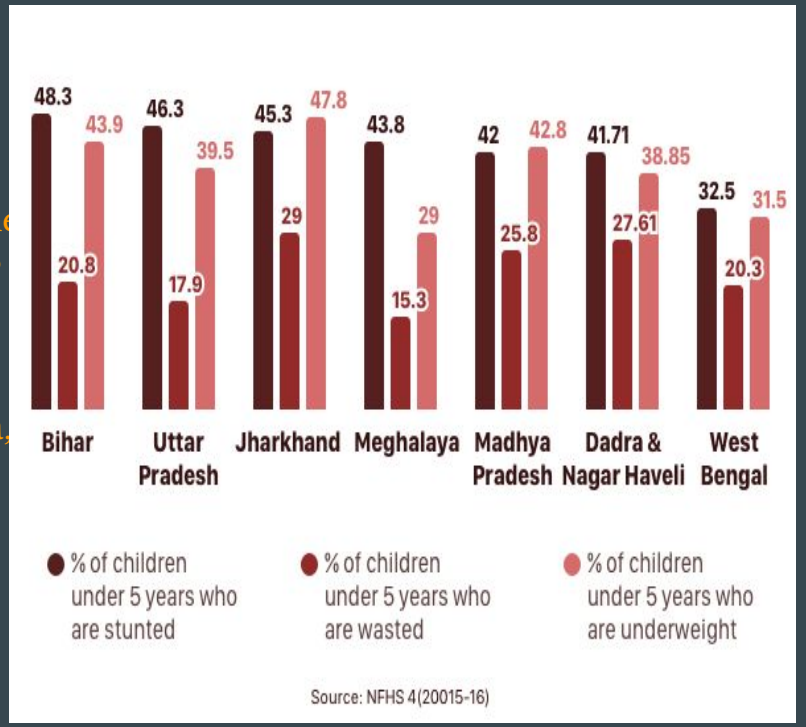
- Poverty, mother education ,population gives an impact on nutrition of child.
- India is 1 in 4 global share !
- Certainty less in 3 than 4.
- Wasting is a strong predictor of mortality below five years.
- ⅓ rd of global stuned, wasted from india



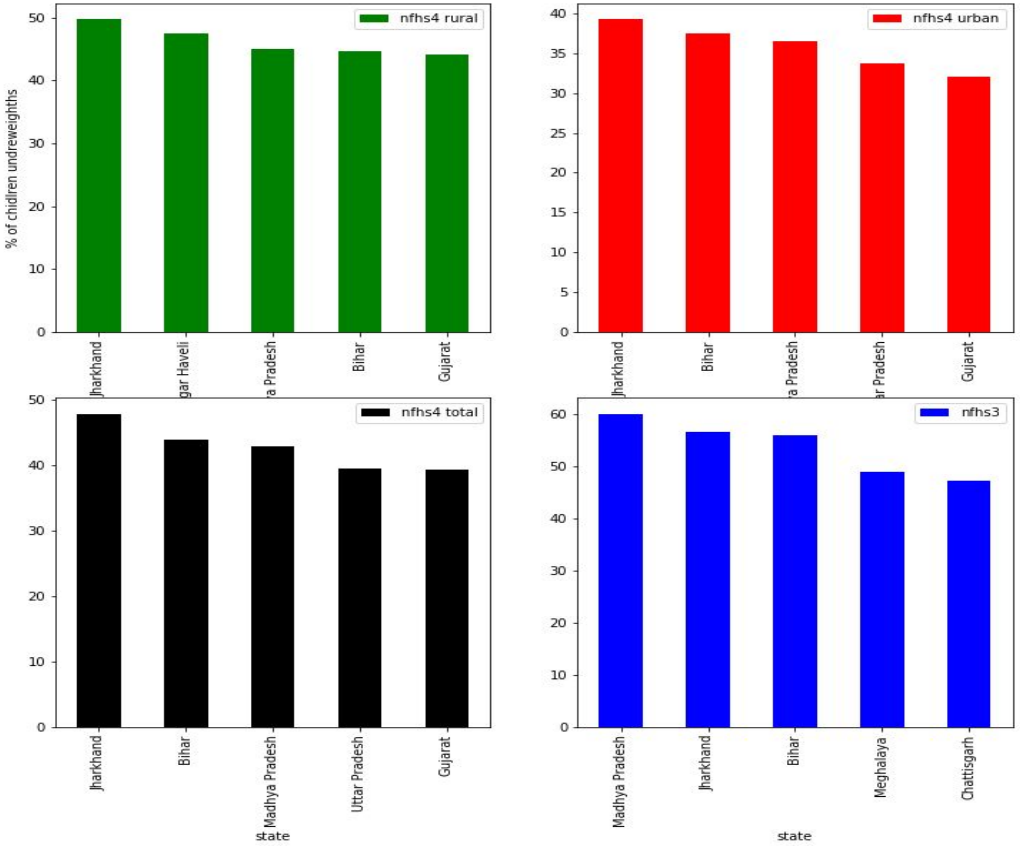


- Madhya Pradesh is one of the states where the malnutrition indicators have improved.
- Prevalence of stunted and severely wasted lowest in kerala.
- Most states showed improvements in levels of stunting; remarkable gains (among the large states) were noted in Andhra Pradesh ,MP
- UP,bihar,jharkhand,chattisgarh,meghalaya ,gujarat,Assam have stunning levels higher than national average
- wasting levels higher than national avg are west bengal,Goa,kerala, Arunachal pradesh,Gujarat ,Andhra,Tamil.N,,Madhya pradesh
- Jharkhand reported very little improvement in stunting (2.5%) but large gains in wasting (16.7%) over years





Top 5 states with higher underweight children



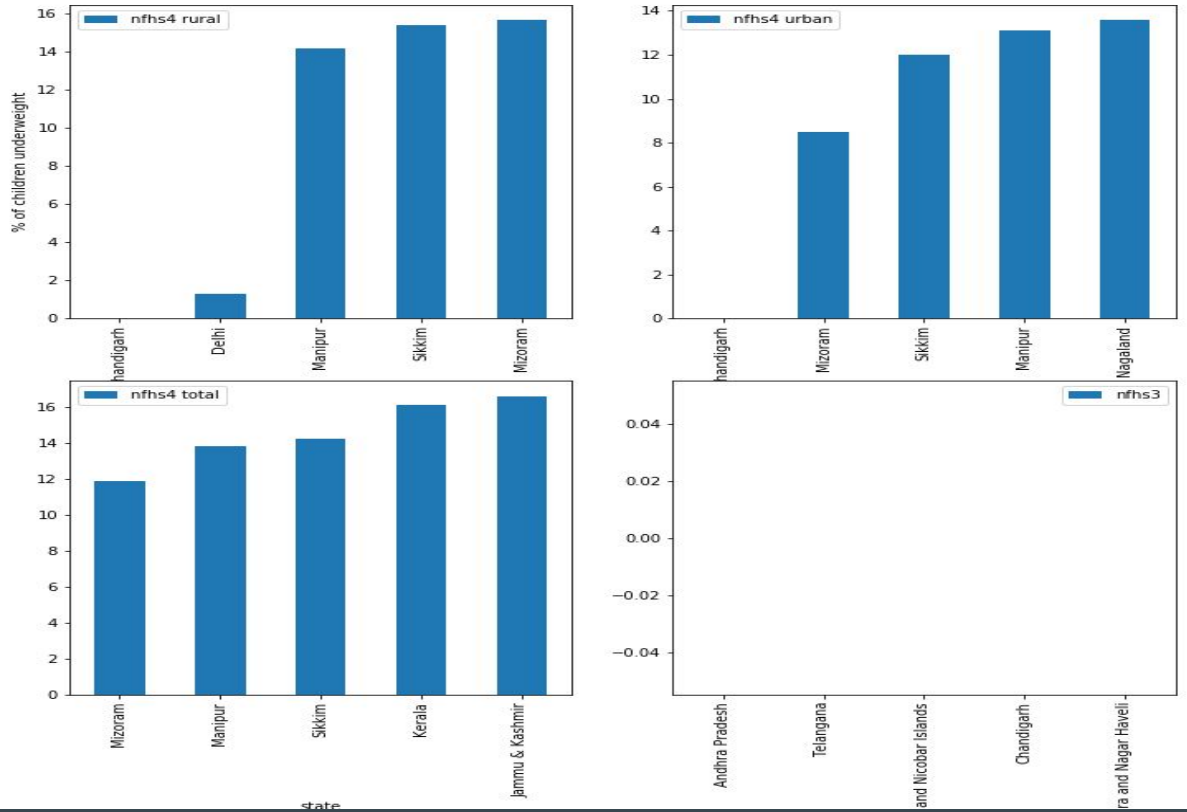
Jharkhand has highest 49.8% underweight in nfhs4.

Madhya Pradesh has 60% children in nfhs3.

Bihar and Madhya Pradesh have improved from year 2013 to 2015.

Overall, jharkand, MP, Bihar are highest among rural ,urban and survey3.

Bottom 5 states with underweight



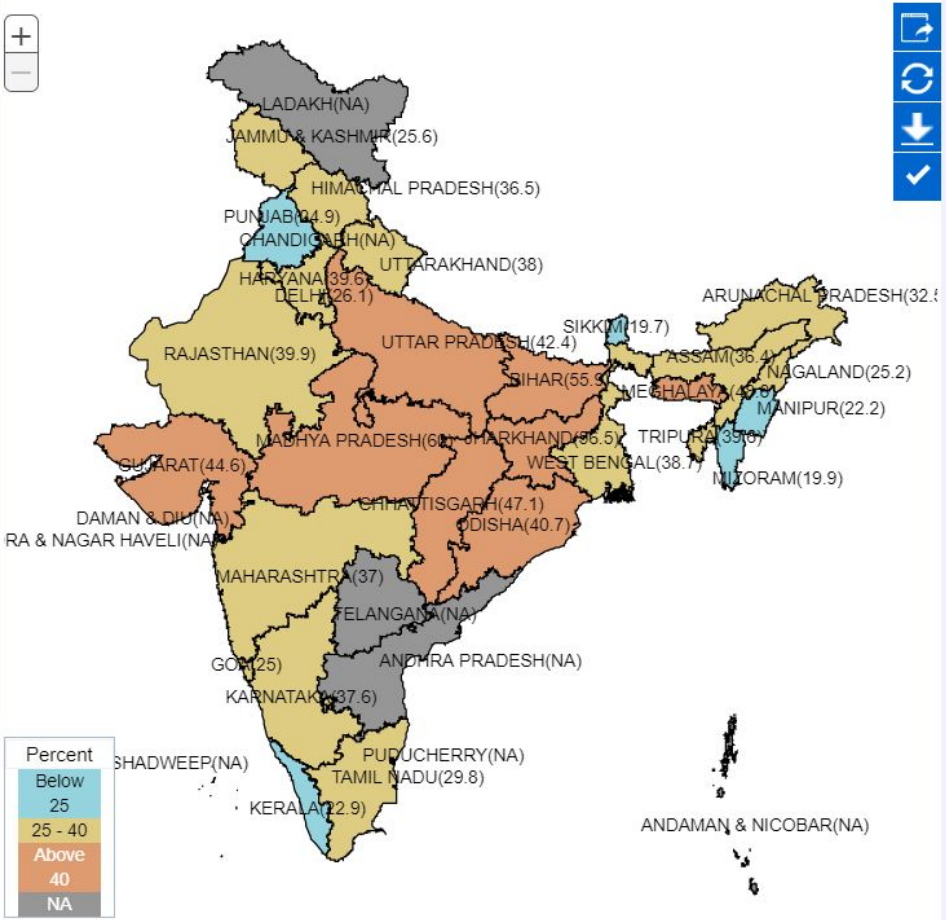
Mizoram is the best lowest of 11.9.

Manipur , Sikkim , kerala, jammu & Kashmir are best lowest.

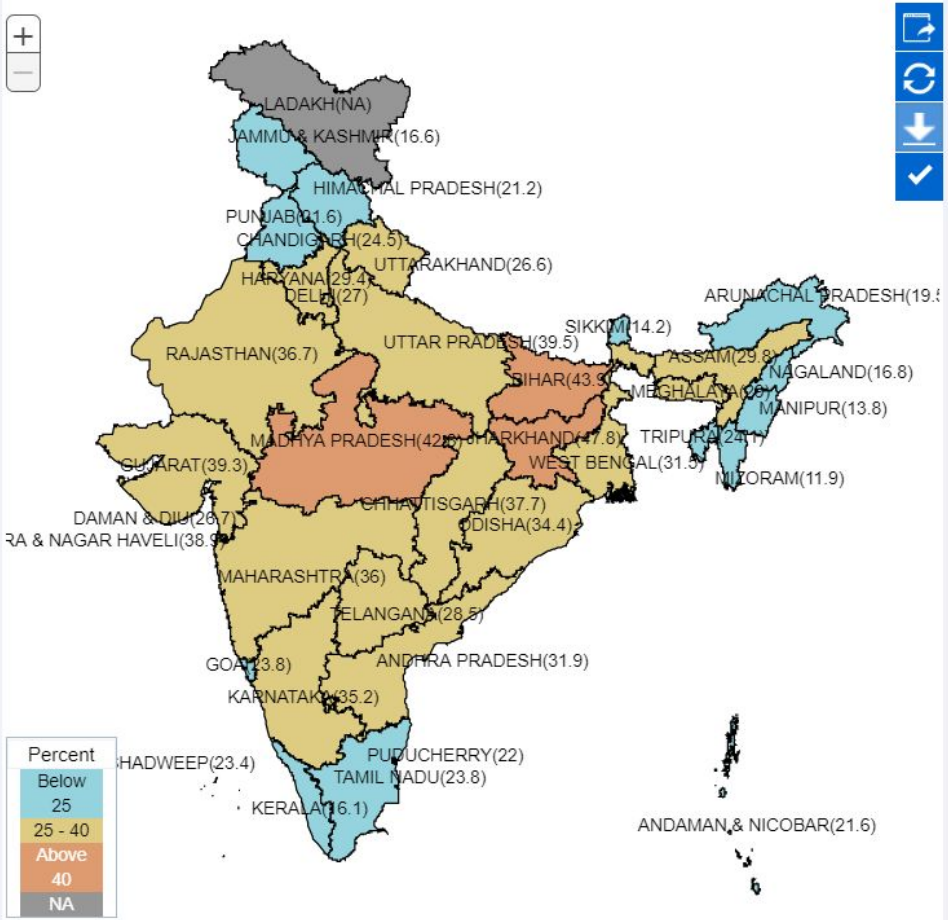
All states have decreased over years.

Mizoram has drastically reduced in rural vs urban

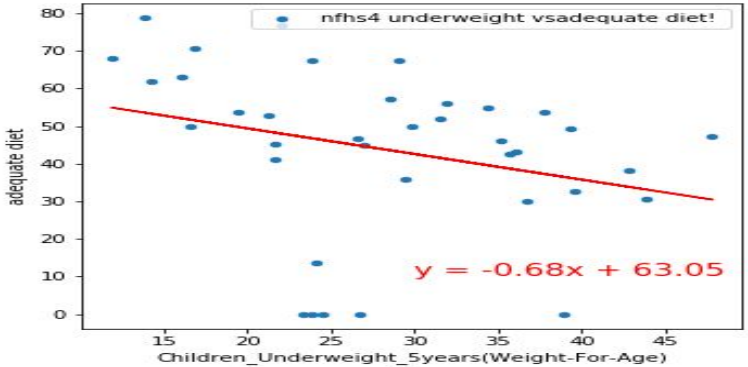
State/UT-wise percentage of Children under 5 years who are underweight as per NFHS-3

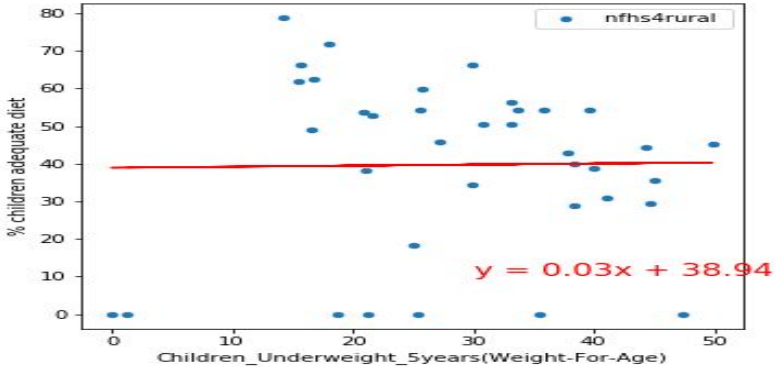


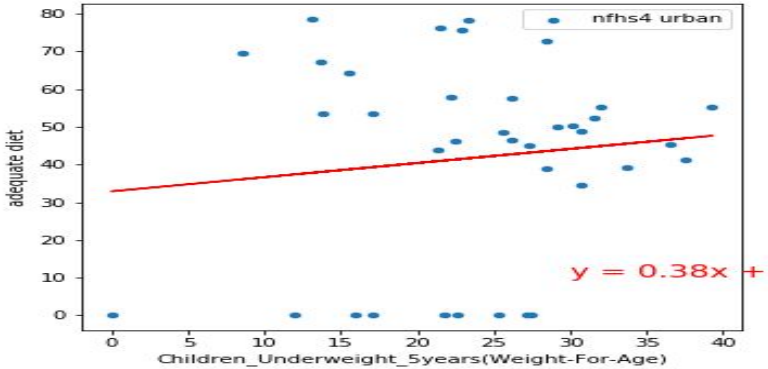
State/UT-wise percentage of Children under 5 years who are underweight as per NFHS-4

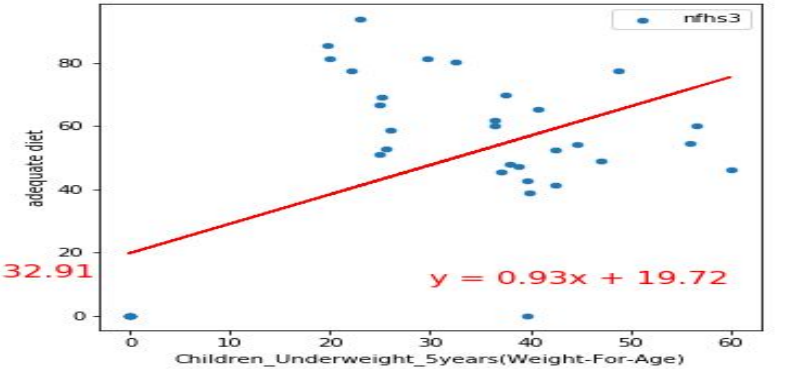


Underweights vs adequate fed(solid food plus breastmilk)









Dataframe showing 3 to 4 survey underweight vs adequate children

	state	underweight of 3	underweight of 4	aqeuate diet of 3	adeuate diet of 4
0	India	42.5	35.7	52.6	42.7
1	Andhra Pradesh	0.0	31.9	0.0	56.1
2	Assam	36.4	29.8	60.1	49.9
3	Bihar	55.9	43.9	54.5	30.7
4	Chattisgarh	47.1	37.7	49.0	53.8
5	Gujarat	44.6	39.3	54.1	49.4
6	Haryana	39.6	29.4	42.6	35.9
7	Jharkhand	56.5	47.8	60.2	47.2
8	Karnataka	37.6	35.2	69.7	46.0
9	Kerala	22.9	16.1	93.9	63.1
10	Madhya Pradesh	60.0	42.8	46.0	38.1
11	Maharashtra	37.0	36.0	45.5	43.3
12	Odisha	40.7	34.4	65.5	54.9
13	Punjab	24.9	21.6	50.9	41.1
14	Rajasthan	39.9	36.7	38.7	30.1
15	Tamil Nadu	29.8	23.8	81.2	67.5
16	Telangana	0.0	28.5	0.0	57.1
17	Uttar Pradesh	42.4	39.5	41.2	32.6
18	West Bengal	38.7	31.5	47.1	52.0
19	Arunachal Pradesh	32.5	19.5	80.2	53.6
20	Delhi	26.1	27.0	58.7	45.0
21	Goa	25.0	23.8	66.8	0.0
22	Himachal Pradesh	36.5	21.2	61.9	52.7
23	Jammu & Kashmir	25.6	16.6	52.7	50.0

Adequate diet

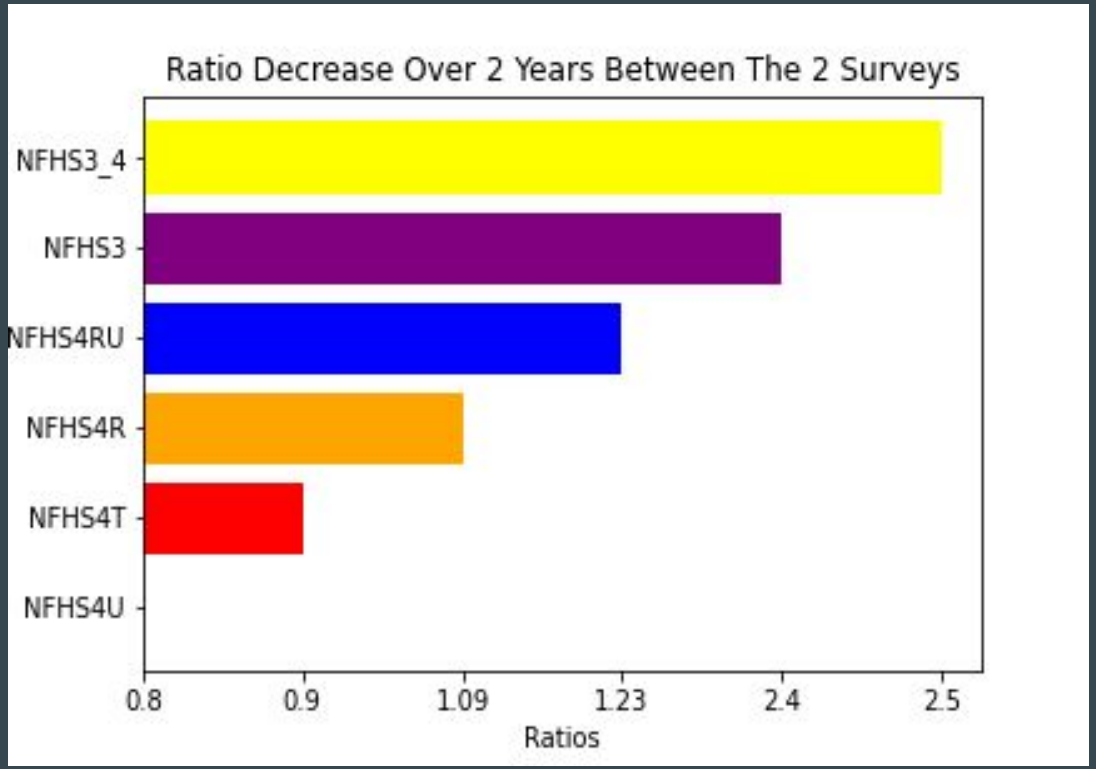
The correlation coefficient between nfhs4 underweight& adequate diet is -0.28
The correlation coefficient between nfhs4 rural underweight& adequate diet is 0.01
The correlation coefficient between nfhs4 urban underweight& adequate diet is 0.12
The correlation coefficient between nfhs3 underweight& adequate diet is 0.57

- It's strange that there is a medium correlation for survey 3 but weak correlation <0.3 for survey 4 . Meaning the no of underweight to adequate children was not a huge difference.
- Chattisgarh, west bengal have highest increase in adequate diet (solid-foods& breastmilk) of 4.8 % over the years
- Bihar , karnataka ,arunachal pradesh were top decrease in adequate diet (solid-foods & breastmilk) around 25% !
- Urban to rural andhra pradesh and tamil Nadu have increase in adequate diet around (22%) while assam and west bengal have decreased with (8%)

Nithya's Data Analysis & Conclusions.

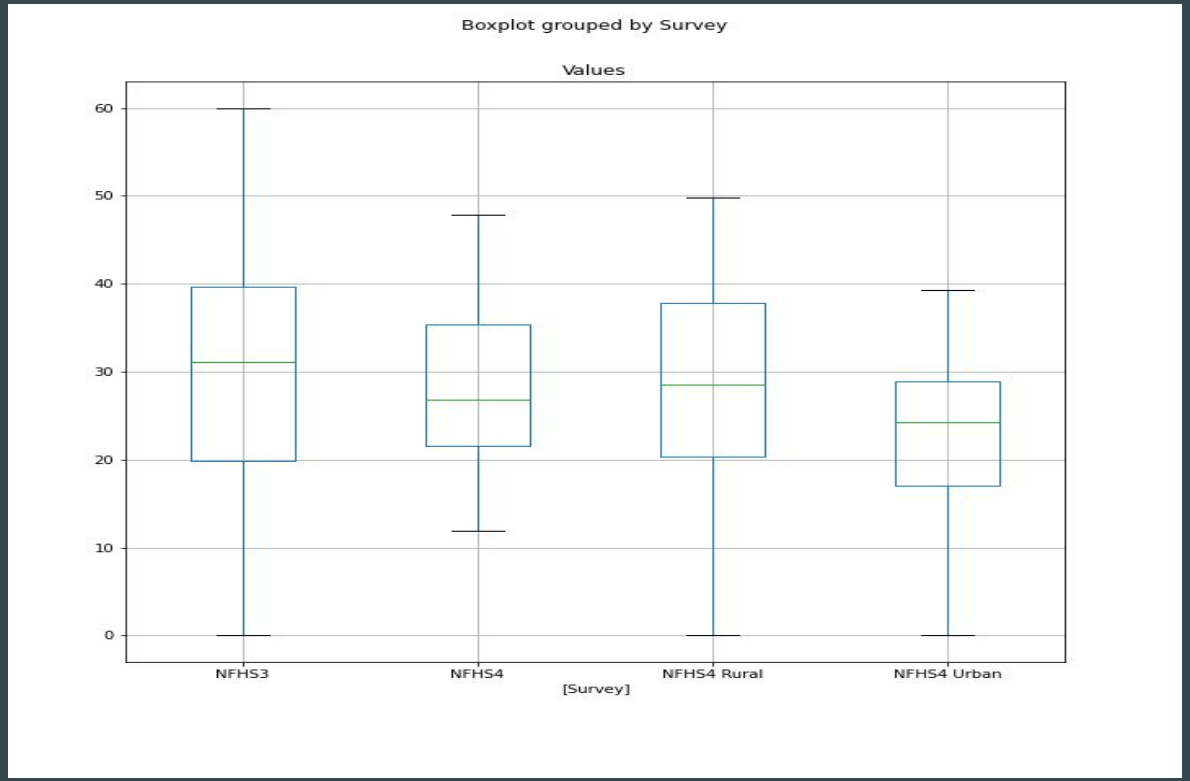
- Is there significant underfed to well fed ratio difference between the 2 conducted surveys? If so, how much?
- Is there significant underfed to well fed ratio difference between the latest survey for Rural and Urban areas?If so, find out!
- How has the female child birth ratio(per 1000 males) changed from 2013 to 2016?
- Let's look at the top 10 states showing significant change in these birth numbers.

Derive The Nutritional Variable Ratio Changes



- For Survey NFHS3 - The Underfed To Well Fed Ratio is very significant
  - 2.4
- For Survey NFHS4 Rural Area - The Underfed To Well Fed Ratio is significant.
  - 1.0
- For Survey NFHS4 Urban Area - The Underfed To Well Fed Ratio is not very significant.
  - 0.8
- For Survey NFHS4 - The Underfed To Well Fed Ratio has decreased significantly from NFHS3 Survey.
  - 0.9
- Between NFHS3 & NFHS4 - There has been a **60% decrease in the ratio difference between the Underfed and Well Fed population.**

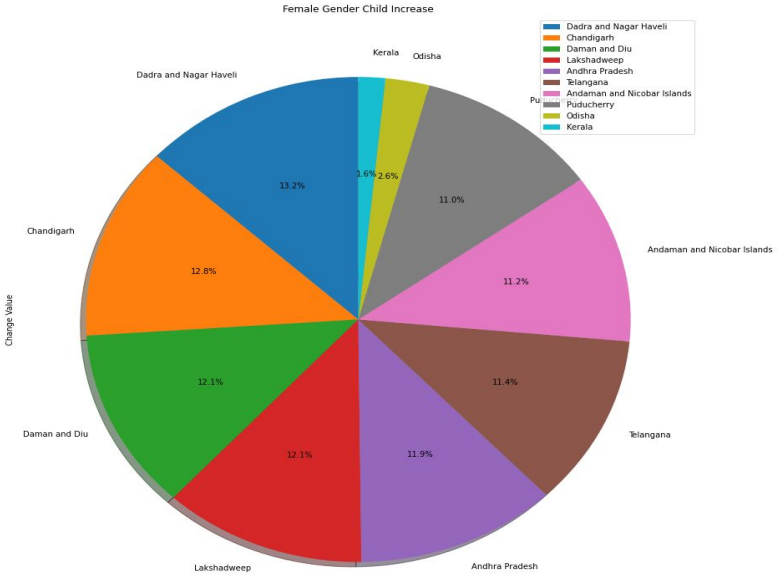
Median Underfed To Well Fed Population Across All Surveys

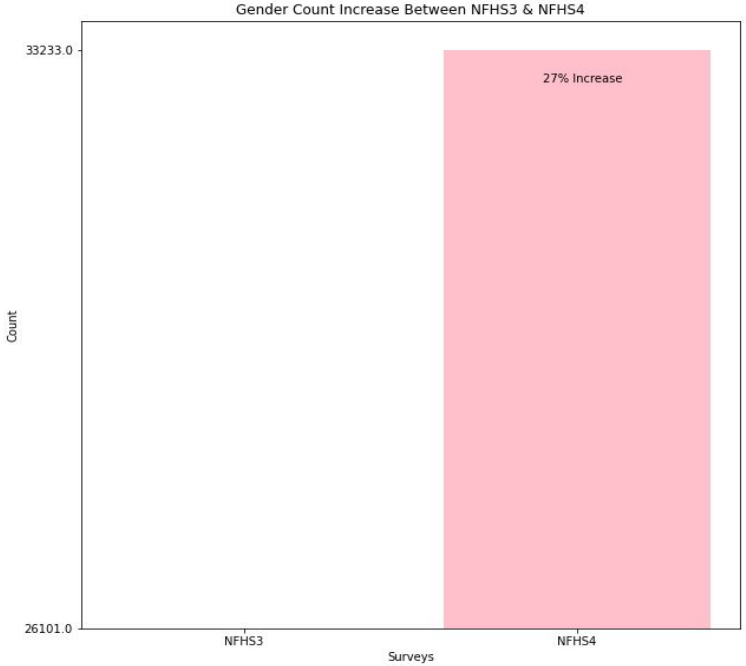


- NFHS3 - **31**
- NFHS4 - **26.8**
- NFHS4 Rural - 28
- NFH4 Urban - 24.3

Rural Nutritional health has improved positively given the overall **decrease** in the number of underfed population **from NFHS3 survey to NFHS4 survey.**

Female Child(per 1000 males) Birth % Improvement





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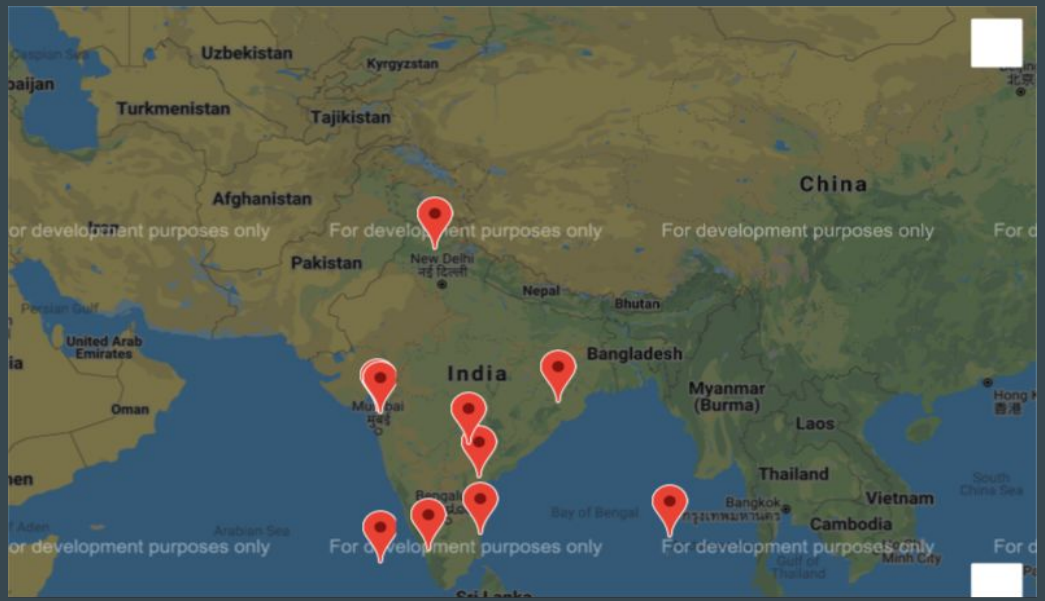
In [50]: 1 Top10_Selected_State = Female_Gender_NFHS3_NFHS4.nlargest(10, ["Change Value"])
         2 Top10_Selected_State
```

Out[50]:

	state	Gender_Aged_5years(Females per 1000 Males)NFHS3	Gender_Aged_5years(Females per 1000 Males)NFHS4	Percent	Change Value
32	Dadra and Nagar Haveli	0.0	1013.0	0.00%	1013.0
31	Chandigarh	0.0	981.0	0.00%	981.0
33	Daman and Diu	0.0	923.0	0.00%	923.0
34	Lakshadweep	0.0	922.0	0.00%	922.0
0	Andhra Pradesh	0.0	914.0	0.00%	914.0
15	Telangana	0.0	874.0	0.00%	874.0
30	Andaman and Nicobar Islands	0.0	859.0	0.00%	859.0
35	Puducherry	0.0	843.0	0.00%	843.0
11	Odisha	734.0	933.0	27.11%	199.0
8	Kerala	925.0	1047.0	13.19%	122.0

- Female Child (per 1000 males) Count in NFHS3 - 26101
- Female Child (per 1000 males) Count in NFHS3 - 33233
- **There is a 27% Increase** in the ratio with Top Ten states showing significant number increase.
- **Dadar And Nagar Haveli state showing the largest number increase. -1013**

Nithya's Conclusions



With Over all Underfed to Well Fed Ratio decreasing between the two survey years and female child birth ratio increasing we can safely say that the Rural population is catching up to the Urban health population numbers.

The National Family & Health Survey positively shows the nutritional improvement efforts taken by the govt to provide post pregnancy education, medical health & food supplies are on track to make rural to urban ratio insignificant.

Nutritional Analysis Conclusion

- ★ Breastfeeding Exclusively for the first six months has no correlation to stunted growth %
- ★ Gender :- dadra and nagar haveli have highest rural (1308) and urban is lowest among all states
- ★ Wasted and stunted growth is a strong predictor of mortality below five years which needs to improve in south asia.
- ★ Under Fed To Well Fed Ratio has decreased by 60% over the years the 2 surveys were conducted.
- ★ Female child(per 1000 males) birth has increased by 27%.
- ★ The National Family & Health Survey positively shows the nutritional improvement efforts taken by the govt to provide post pregnancy education, medical health & food supplies are on track to make rural to urban ratio insignificant.
- ★ Poshan Abhiyaan ,Aanganwadi aims to reduce the level of malnutrition by 2022 year to 20.7% from 35.7.
- ★ Aparna has worked for foundations like Cry America , Akshaya Patra , etc….who have diligent workers in villages trying to curb the malnutrition of kids. Donations to them can be done by amazon smile.

Limitations

- There is no Rural & Urban separate data set for NFHS3 survey(2013)
- Data Numbers were somewhat inconsistent.
- India is vast, so the data that is published talks to significant Rural and Urban Areas thus does not include many other smaller villages and territories.
- Data also does not talk about the measures that were taken between the two surveys to improve the nutritional health of the population in question.
- Few more survey data would be helpful to be there rather than only 2
- Age ranges were displayed inconsistently in the surveys.

Ponder

- ★ Further more insight would have been nice if the data set had more comparative variables. (More factors to look at like - medically sick, children with cognitive disabilities in rural areas & thus not meeting the nutritional needs at the same time.
- ★ Breastfed children where the mothers don’t get adequate diet.
- ★ Non breastfed children not receiving adequate diet
- ★ Remote villages not yet surveyed.