

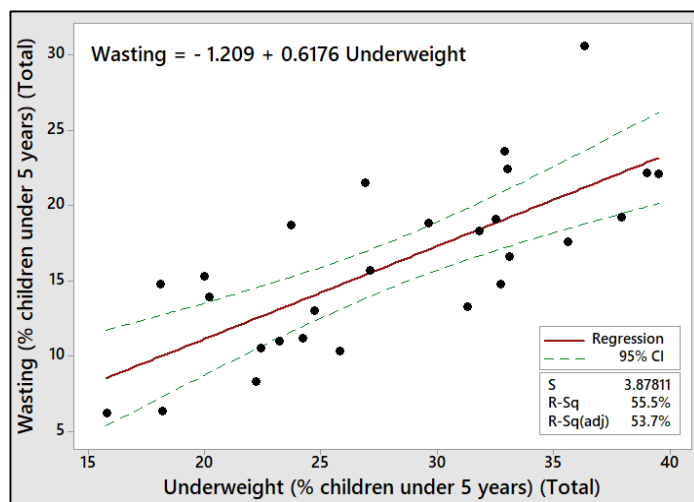
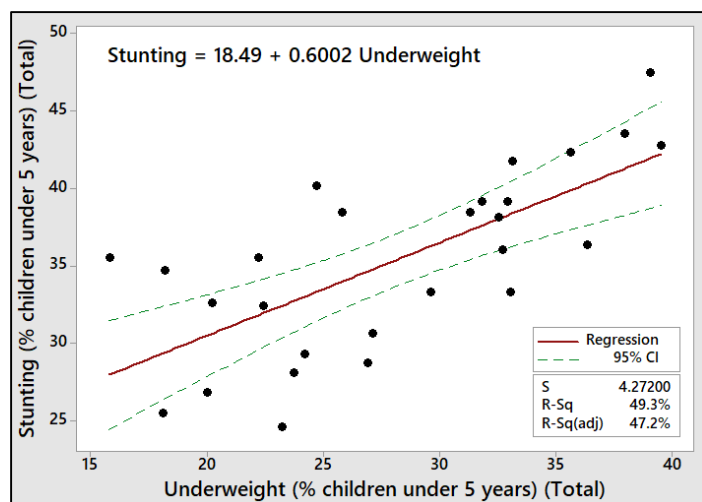
NFHS – 4 provides, for the first time, a district level data on nutritional status of children below the age of 5 years. This provides an excellent and timely opportunity to plan for eradication of child malnutrition at the district level. A quick preliminary analysis of the district level child malnutrition levels, reveals certain important aspects. This is presented below.

Table 1: - Data on stunting, wasting, severely wasting and underweight in a color coded format.

District	Stunting (%)	Wasting (%)	Severely Wasting (%)	Underweight (%)	District	Stunting (%)	Wasting (%)	Severely Wasting (%)	Underweight (%)
Assam NFHS - 3	46.5	13.7	4	36.4	Jorhat	25.5	14.8	5.4	18.1
Assam NFHS -4	36.4	17	6.2	29.8	Kamrup	33.3	18.8	5.3	29.6
Baksa	32.4	10.5	2.7	22.4	Kamrup Metropolitan	24.6	11	2.4	23.2
Barpeta	41.7	16.6	5.8	33.1	Karbi Anglong	28.1	18.7	11	23.7
Bongaigaon	39.1	23.6	12.7	32.9	Karimganj	42.3	17.6	6.1	35.6
Cachar	36.3	30.6	11.3	36.3	Kokrajhar	30.6	15.7	6.1	27.1
Chirang	40.1	13	4.4	24.7	Lakhimpur	29.3	11.2	4.4	24.2
Darang	43.5	19.2	5.3	37.9	Morigaon	38.4	10.3	0.9	25.8
Dhemaji	35.5	6.2	0.8	15.8	Nagaon	38.4	13.3	4.4	31.3
Dhubri	47.4	22.2	9.5	39	Nalbari	26.8	15.3	6.2	20
Dibrugarh	33.3	22.4	8.2	33	Sivsagar	35.5	8.3	1.5	22.2
Dima Hasao	34.7	6.3	1.3	18.2	Sonitpur	28.7	21.5	10.9	26.9
Goalpara	42.7	22.1	8.9	39.5	Tinsukia	36	14.8	2.2	32.7
Golaghat	32.6	13.9	6.5	20.2	Udalguri	39.1	18.3	8.1	31.8
Hailakandhi	38.1	19.1	6.3	32.5					

The three parameters*, stunting, wasting and underweight are strongly correlated. This relationship is brought out in figures below. There is a clear linear relationship between underweight on one hand and stunting and wasting on the other. The strength of linear regressions is not very strong, (R Sq of 0.49 and 0.55 for stunting and wasting respectively), unlike in case of, say, Odisha where both are strong, R. sq. of 0.79 for stunting and 0.76 for wasting. But it still has a bearing on program implementation. Collecting good quality data on underweight can give us a good indication of the levels of wasting and stunting as well to some extent. Hence as suggested in our [Odisha blog 1](#), we need not initiate routine measurement of height through Anganwadi workers or ASHAs. The task of estimating stunting can be left to periodical NFHS surveys which will now be taking place at 3 year intervals. At Anganwadi level recording weight and use of MUAC tapes to identify wasting will be adequate at this stage.

Figure 1: - Underweight correlation with stunting (Total) and wasting (Total)



*All parameters are for Children aged under 5 years (Total).

Figure 2 gives correlation of Severe wasting with Wasting (R. sq. of 0.78). This shows the importance of focusing on wasting so as to bring down incidence of severe wasting children first. This is desirable on three counts; first the relatively low numbers, second a higher odds ratio or chances of death in the case of wasting compared to stunting and underweight, and third a relative ease of reducing wasting given that it is episodal in nature rather than cumulative like stunting. The graph also shows that severe wasting may come to zero when wasting is around 5%. This could perhaps be the first priority in the low wasting districts.

Rearranging Table 1 in increasing order of underweight will help us identify regions of low prevalence of Underweight. As we can see in Table 2 and in Figure 2, it identifies a belt in the north-eastern part of Assam which has least incidence of Underweight expect Tinsukia and Dibrugarh. It also brings out places where Severe Wasting is low and the other indicators also perform well.

Figure 2: - Wasting correlation with severely wasting (Total)

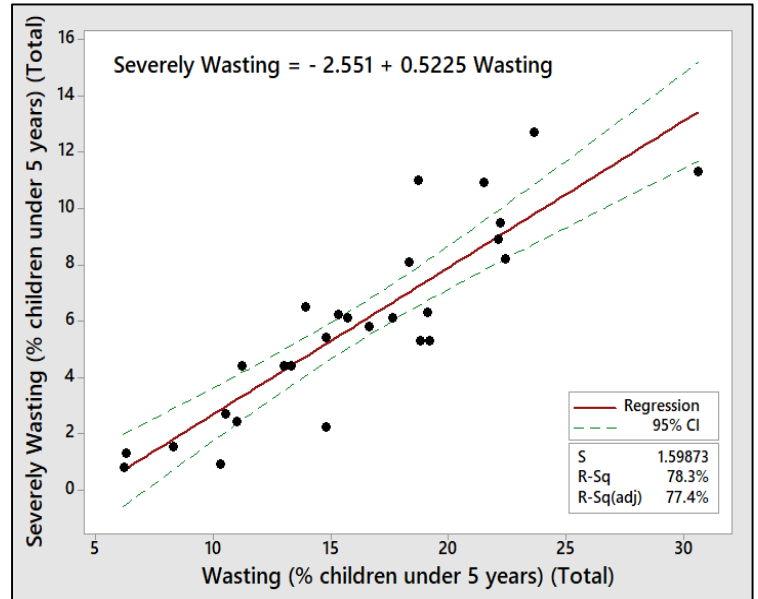


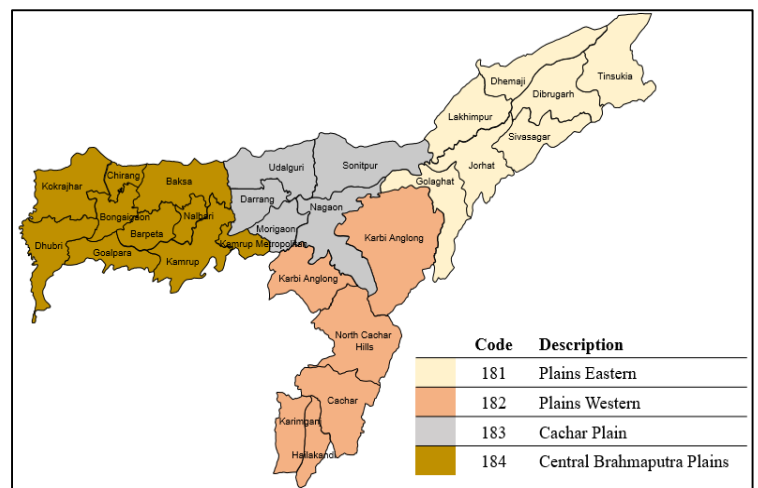
Table 2: - Districts of Assam in increasing order of underweight (Total)

District	Stunting (%)	Wasting (%)	Severely Wasting (%)	Underweight (%)
Assam NFHS - 3	46.5	13.7	4	36.4
Assam NFHS -4	36.4	17	6.2	29.8
Dhemaji	35.5	6.2	0.8	15.8
Jorhat	25.5	14.8	5.4	18.1
Dima Hasao	34.7	6.3	1.3	18.2
Nalbari	26.8	15.3	6.2	20
Golaghat	32.6	13.9	6.5	20.2
Sivsagar	35.5	8.3	1.5	22.2
Baksa	32.4	10.5	2.7	22.4
Kamrup Metropolitan	24.6	11	2.4	23.2
Karbi Anglong	28.1	18.7	11	23.7
Lakhimpur	29.3	11.2	4.4	24.2
Chirang	40.1	13	4.4	24.7
Morigaon	38.4	10.3	0.9	25.8

District	Stunting (%)	Wasting (%)	Severely Wasting (%)	Underweight (%)
Sonitpur	28.7	21.5	10.9	26.9
Kokrajhar	30.6	15.7	6.1	27.1
Kamrup	33.3	18.8	5.3	29.6
Nagaon	38.4	13.3	4.4	31.3
Udalguri	39.1	18.3	8.1	31.8
Hailakandhi	38.1	19.1	6.3	32.5
Tinsukia	36	14.8	2.2	32.7
Bongaigaon	39.1	23.6	12.7	32.9
Dibrugarh	33.3	22.4	8.2	33
Barpeta	41.7	16.6	5.8	33.1
Karimganj	42.3	17.6	6.1	35.6
Cachar	36.3	30.6	11.3	36.3
Darang	43.5	19.2	5.3	37.9
Dhubri	47.4	22.2	9.5	39
Goalpara	42.7	22.1	8.9	39.5

Figure 3 illustrates the NSSO regions of Assam. Earlier there were only two NSSO regions in Assam and it was further reorganised into four. These latest regions are plain eastern, plain western, cachar plain and central Brahmaputra plains.

Figure 3: - NSSO regions of Assam



Information given in the tables, when depicted spatially (Figures 4 a to d*), reveals strong clustering of the incidence of malnutrition for all the four parameters i.e. underweight, wasting, stunting and severe stunting. It was also observed that the clustering of the four parameters were inline with the NSSO regions of the state.

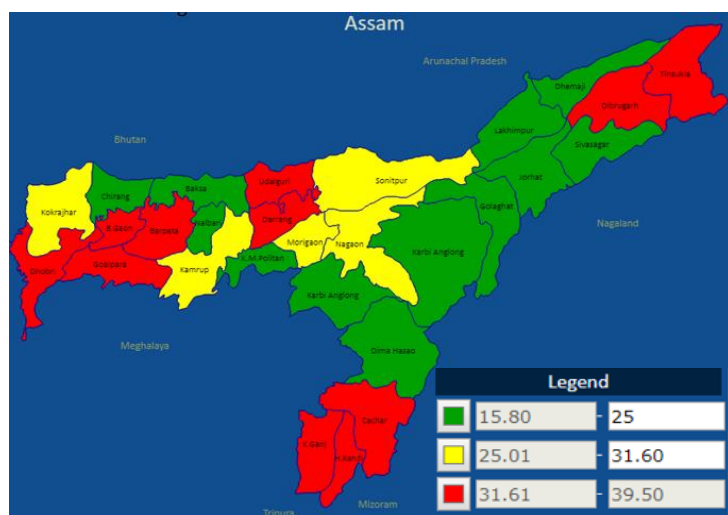


Figure 4 a: - % Underweight (Total) (under 5 years)

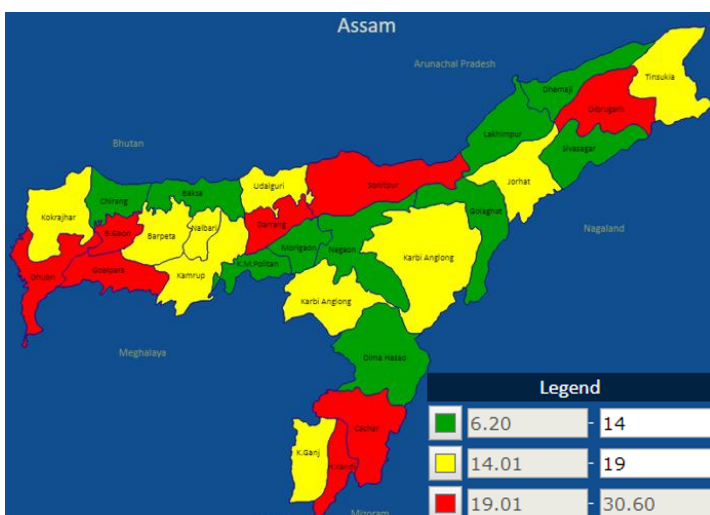


Figure 4 b: - % Wasting (Total) (under 5 years)

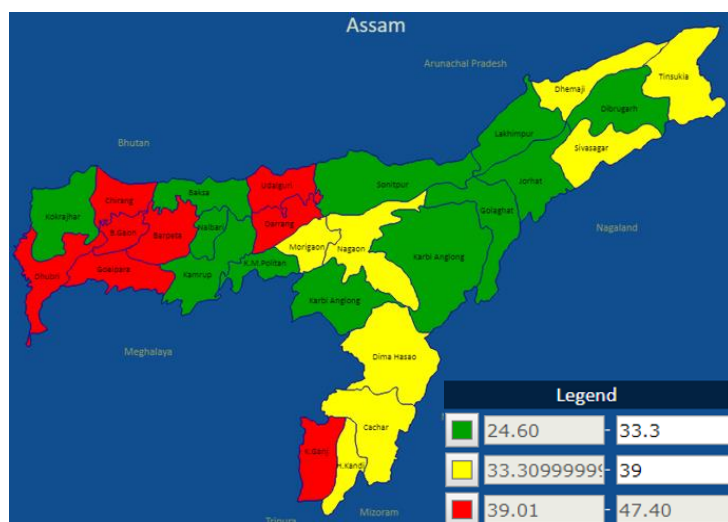


Figure 4 c: - % Stunting (Total) (under 5 years)

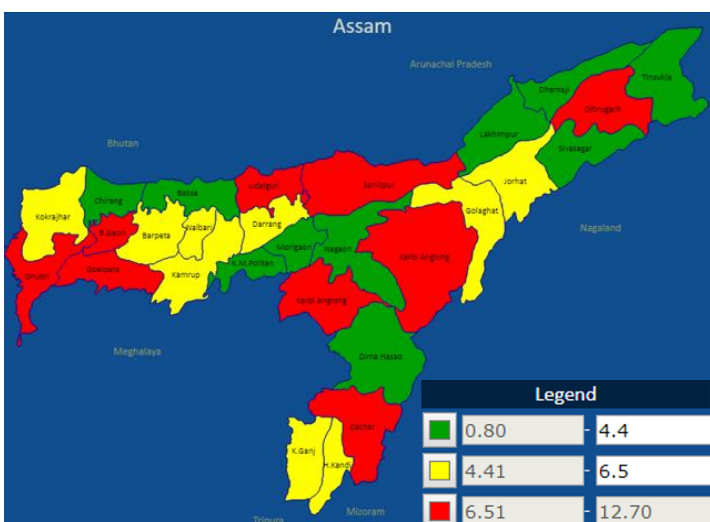


Figure 4 d: - % Severe wasting (Total) (under 5 years)

It was also observed that the districts in the south of the central Brahmaputra plain NSSO region has the highest prevalence of stunting, wasting, severe wasting and underweight. One can see a regional continuity with a rough cluster emerging in north-eastern region where incidence of malnutrition is low expect Dibrugarh and Tinsukia.

It was observed that there are clusters in each NSSO region of Assam. The Central Brahmaputra plain NSSO region has the highest districts under malnutrition. In Plain western NSSO region, Karimganj, Hailakandi and Cachar have high undernutrition. In plain eastern NSSO region, Dibrugarh and Tinsukia have high undernutrition. In cachar plain NSSO region, Darrang, Udalguri and Sonitpur have the high undernutrition. Recently the district of Sonitpur has been reorganised into Sonitpur and Bishwanath, it will be interesting to analyse the two districts for further inferences. In central Brahmaputra NSSO region, Dhubri, Bongaigaon, Goalpara and Barpeta have the high undernutrition.

*Source: <http://nfhs4.indiagis.org/nfhs4/>

Not surprisingly, the spatial patterns chime in with the IMR data available from SRS on a yearly basis in terms of the NSSO regions. Assam earlier had 2 NSSO regions eastern and Western plain and IMR data were available in a time series till 2013. After reorganization of the NSSO region, it was seen that the new regions have high IMR as compared to the old NSSO region. the reorganization of the NSSO has helped in better representation of the data in the region. Studies have also shown that child malnutrition contributes to IMR.

Table 3 : - IMR figures for Assam NSSO region (Source: - Sample Registration System* data)

Assam IMR data form SRS by NSSO regions																
State Region	Remarks	NSSO Region	IMR													
			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Cachar Plains	New Regions	183												61	54	51
Central Brahmaputra Plains	New Regions	184												54	53	51
Plains Western		182	69	70	71	69	67	69	60	57	57	57	47	47	43	
Plains Eastern		181	69	72	69	68	66	60	61	59	60	55	38	37	32	
India			58	58	57	55	53	50	47	44	42	40	39	37	34	

This time trend is reflected in the graphs below (Figures 5a and 5b)

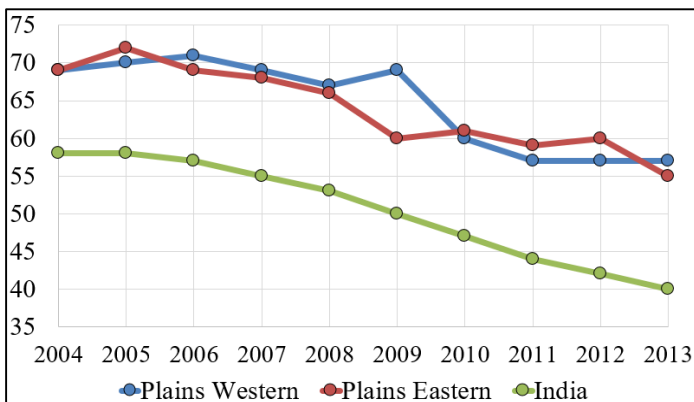


Figure 5 a : - IMR - Assam by NSSO regions,2004-13

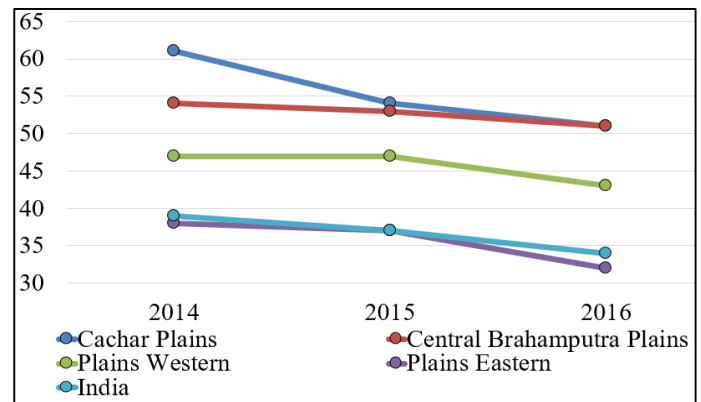


Figure 5 b : - IMR - Assam by NSSO regions, 2014-16

All the NSSO regions have their own nutritionally high burden districts and the reason for undernutrition can be different for the different NSSO regions. In eastern plain NSSO region, Dibrugarh and Tinsukia districts performs poorly in nutritional indicators as compared to the other districts. *The districts of Dibrugarh and Tinsuki also have high population of the tea tribe, who are suppressed community with different dietary pattern as compared to other people in the region. For making the eastern plain NSSO region of Assam malnutrition free early, government and other CSOs need to concentrate on the welfare of the tea tribes.*

This preliminary analysis is useful in indicating where does the shoe pinch the most. A more detailed analysis needs to be done by looking at other parameters under NFHS-4 i.e. the correlates of child malnutrition. This is presented in the next stage of the analysis where we look at the districts with the best potential to achieve the status of being “malnutrition free”.



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