

## Nutritional health status and morbidity pattern among (0-59)-month children in India: A study with the latest data of NFHS

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### ABSTRACT

**Background:** Morbidity and malnutrition incidences among pre-school children are considered as good indicators towards future development of a country.

**Aims:** The main objective of the study is to find out the incidences of morbidity, under nutrition and anaemia among the children in India and to find out the association of these incidences with basic amenities, socio-economy, child's birth weight and mother's health.

**Data:** The data has been obtained from the National Family Health Survey (NFHS-4). The sample size is 144646 of (0-59)-month children.

**Results:** The study reveals that in India, prevalence of under-five morbidity, namely, diarrhoea, fever, and cough are 8.6%, 12.9% and 11.8% respectively. Percentages of underweight, stunted and anaemic children are 32.4%, 35.6% and 56.0%. The study shows a strong relationship between basic amenities, awareness, socio-economy, child's birth weight and mother's health status with the occurrences of children's diarrhea, fever, cough, under nutrition and anemia.

**Conclusions:** Clean toilet facility, hygienic cooking fuel, literacy and wealth are the key to the health status of the incidences of diarrhea, fever, cough, under nutrition and anemia, of children.

**Keywords:** Pre-school children, under nutrition, morbidity, anaemia, basic amenities, Socio- economy, birth weight, mother's health

## INTRODUCTION

Development and growth of any country depend on healthy human resource. Children are the assets for tomorrow's productivity, because today's children are tomorrow's citizen. India is the second most populous country in the world and 181 million populations have increased during the last decade from 2001 to 2011 according to census of India. It is estimated that 26 million children are born every year, but during the same period, the net increase in the child population is only 5.05 million. Mortality rate, especially infant and under-five mortality rate is declining over the years, yet there are some states where these rates are very high (SRS Bulletin, 2013). This shows that despite the progress in health care sector in India, the youngest generation, especially in the age group of 0-6 years, continuously losing their lives due to inadequate nutrition and proper care. Under-5 mortality rate is 56 out of 1000 live birth and infant mortality rate is 41 per thousand live births in 2012.

Under five morbidity profile has a far-reaching consequence on future development of country (Srivastava et al., 2012). Most of the childhood illnesses are caused by acute respiratory infections, diarrhea, measles, malaria, malnutrition or a combination of these conditions (UNICEF, 1999). The other major diseases affecting this age group are mostly anemia, skin infections, ear discharge, eye infections, traumatic injuries etc. The attributes that can be associated with these diseases are mostly overcrowding, poor sanitation, lack of basic amenities, lack of awareness about proper childcare among parents of these children.

Globally, the under-five mortality rate has decreased in the last few decades from 91 in 1990 to 43 deaths per 1000 live births in 2015; for India it was from 126 in 1990, which reduced to 48 per 1000 live births in 2015 (WHO, 2007; Park, 2017). Several socio-cultural factors and improper utilization of health care services are known to be responsible for causing higher rates of morbidity and mortality in children (Giri et al., 2008).

Health and development of an infant not only depends on nutrition but also on mother's education and indoor environment at home. A malnourished child has a greater risk of dying from common childhood diseases. This is a well-known fact, but a child living in poorly ventilated house, where bio-fuel cooking is a regular practice, has even greater chances of dying due to respiratory problems (Srivastava and Srivastava, 2008). Acute Respiratory Infection (ARI) is one of the

leading causes of under-five child mortality and mainly in the developing countries (Williams et al., 2002).

Keeping in view the above facts, this study was carried out with the following objectives of finding out

- (i) the morbidity profile of under five children in India along with its distribution over zones and states;
- (ii) the nutrition profile of under five children by different states along with zone and state wise prevalence of under nutrition and anaemia in India, and
- (iii) the association of morbidity, nutritional status and anaemia with basic amenities, socio-economy and child and mother's health.

## METHODOLOGY

The data has been accessed from the fourth round National Family Health Survey (NFHS-4) of 2015-16. The survey was coordinated by International Institute for Population Sciences (IIPS) in collaboration with the Ministry of Health and Family Welfare (IIPS, 2017). In our study, morbidity, nutritional status and anaemia of (0-59)-month old children are taken as a dependent variable. The sample size is 1,44,646. For assessing the three morbidity status of children, namely diarrhea, fever and cough are considered. It should be noted that the morbidity data were collected based on mother's perceptions of illness without validation by medical personnel. To be more precise, mother of children was asked if their children were suffering from these diseases during the two weeks preceding the survey by recall method. For nutritional status, nutritional indices, which were assessed through 'z'-score such as weight for age and height for age has been used for nutritional assessment. Z-score value '-2' was used as a cut-off point for prevalence estimation (WHO, 2006). Z-score is defined as the deviation of the value observed for an individual from the median of the reference population, divided by the standard deviation (SD) of the reference population, i.e.,

$$Z\text{-score} = \frac{(\text{observed value}) - (\text{median of the reference population})}{(\text{SD of the reference population})}$$

The classifications of Z-score (followed by NCHS/WHO) are below normal ( $< -2$ ), normal ( $-2 < + 2$ ) and above average ( $\geq + 2$ ). Several independent variables like basic amenities, awareness of mother, socio-economic status, children's birth weight and mother's health status have been considered. For basic amenities, we have considered only sources of drinking water, type of cooking fuel and for sanitation, only through the use of 'type of toilet facilities'. Awareness of

mother has been judged by TV watching, Newspaper reading and listening to radio. For socio-economic data, places of residence are taken as “rural” and “urban”. Mother’s educational status are grouped into four categories such as illiterate (those who can neither read nor write), primary (literate up to class IV standard), secondary (class V to class X standard) and the fourth group is class XI and onwards (i.e. Higher Secondary, Graduate or Post graduate etc) and then secondary and higher education categories are clubbed into one category. Religion has been classified into four groups such as Hindu, Muslim, Christian and Others where ‘others’ include the rest of the religious groups besides Hindu, Muslims and Christians. Wealth index of the family has been classified into three groups. These are poor, medium and rich. Mother’s BMI are computed by using the formula  $wt/ht^2$  (weight is in kg. and height is in meter). A BMI value less than 18.5 indicates chronic energy deficiency or under nutrition (WHO, 2000). Child’s birth weight has been classified into three categories namely very low (<1500 gms), low ( $\geq 1500$  gms and <2500 gms) and normal (2500 gms or above). Mother’s nutritional status was measured through BMI (WHO, 1998), which has been classified into four categories, namely, Underweight (<18.5) Normal 18.5-24.99, overweight (25.0-29.99) and obese (30.0 and above) which is again clubbed into three categories, namely underweight, normal and ‘overweight or obese’. Anaemia is grouped into anaemic (<11.0 g/dl) and non-anaemic ( $\geq 11.0$  g/dl). Child’s birth weight has been classified into three categories namely very low (<1500 gms), low ( $\geq 1500$  gms and <2500 gms) and normal (2500 gms or above). To see the relative and effective intervention, the risk of morbidity, nutritional status and anaemia were regressed on basic amenities, awareness and socio-economic variables, child and mother’s health status by using categorical logistic regression analysis. Dependent variables are taken as binary. So, children’s morbidity status, nutritional status and anaemia were considered as ‘1’ and absence of these are coded as ‘0’. An estimated odd ratio of ‘1’ indicates that the nature of dependent variable is not different from the reference category. If the estimated odd ratio is >1, the probability of becoming affected is more in this category compared to the reference category and if it is <1, then it is just opposite to that of ‘>1’ case.

## RESULTS

Table 1 shows that the morbidity status of (0-59)-month old children in India. The morbidity status has been judged through the prevalence percentage of diarrhea, cough, and fever. India has been divided into six zones i.e. North-east, East, Central, West, North and South zones. Diarrhea, fever

and cough percentages were 5.6, 10.9, 12.8 in North- east zone, 8.7, 12.5, 11.0 in East zone, 12.2, 15.7, 12.8 in Central zone, 8.9, 11.2, 9.1 in West zone, 9.0, 13.0, 12.3 in North zone and 8.6, 10.8, 10.9 in South zone respectively. The highest and the lowest status of each morbidity was seen in Central and West zones respectively. In state-wise distribution, the morbidity statuses have been the highest in Uttarakhand and Meghalaya out of 36 states and Union territories in India. The lowest percentage of morbidity status was seen in Sikkim state of North-east zone.

Table 2 shows that the nutritional and anemic status of 0-59 month's children in India. Out of six zones, the highest percentage of underweight and stunted were observed in East and Central zones whereas the highest percentages of overweight and tall are found in South zone. The lowest percentage of underweight and stunted children were in North-east south zones respectively and the lowest percentages of overweight and tall children were in Central zone. By looking state wise, we see that the highest percentages of underweight and stunted children are in Jharkhand and Bihar, both being in the East zone. The corresponding lowest percentages are in Mizoram and Kerala. Regarding overweight and tall children, the states with the highest percentages are in Sikkim and Daman & Diu respectively and the lowest percentages are in Dadra & Nagar Haveli and Lakshadweep union territories for overweight and Lakshadweep union territory for tall. The highest and the lowest anemic status are perceived in Central and North-east zone respectively. The corresponding states are Dadra & Nagar Haveli and Mizoram respectively. If we ignore the union territories, then the highest percentage of anemic children are found in Jharkhand state.

Table 3 shows the relationship pattern between different morbidity with nutritional status and anemic condition of 0-59-month children in different zones and total India. In India, it is seen that percentage of diarrhea is more prevalent among the underweight children (9.5%) than non-underweight children (8.7%). Similarly, anemic children suffer more from diarrhea (9.2%) than non-anemic children (8.6%). Interestingly, while comparing stunted and non-stunted children, the prevalence of diarrhea is found to be just opposite – 8.8 per cent among stunted as against 9.0 per cent among non-stunted. However, the difference is not much marked. In case of cough, the differences are not much for any of the nutritional parameters. So, cough possibly does not depend on the nutritional status. In case of fever also the effect of nutritional status is not much except for among underweight and non-underweight children.

Tables 4A through 4C give the distribution of the percentage of children with the different types of morbidities by categorical groups with respect to (i) basic amenities and awareness (Table 4A), (ii) socio-economic conditions (Table 4B) and (iii) birth weight and mother's status of health (Table 4C).

**Basic Amenities and Awareness:** Only three types of basic amenities have been considered here. These are protected water, improved toilet, and cooking fuel facilities. Results show that 81.9 per cent households use protected water and only 10.1 per cent do not use protected water. But the morbidity results are not uniform. Percentage of children suffering from diarrhea, fever and anaemia are 9.1, 13.0 and 56.4 respectively among households who use protected water. These percentages are more than the corresponding percentages who do not use protected water. However, percentages of stunted and underweight children among households who use protected water are less than the corresponding percentages among households not using protected water. The picture is similar with children having cough. The results are statistically significant at 1% level only for diarrhea, fever and cough. There may be other reasons, such as proper cleaning of hands and utensils and safe preservation of cooked food are responsible for these mixed results.

Most of the households use improved toilet facilities. Improved toilet facilities have improved the morbidity percentages except for fever and cough. There has been substantial improvement in case of underweight and stunted children. The percentages dropped by more than 10 percentage points. All the results are significant at 1% level except for fever. Thus, toilet facility has more positive effect on health status than drinking water facilities.

Only 36.1 per cent women are using clean cooking fuel and 63.9 per cent women are using non-clean cooking fuel. Percentage of children who are suffering from diarrhea, underweight, stunted and anaemia are significantly less among the children of mothers who are using clean cooking fuel than its counterpart and these results are statistically significant.

75.6 per cent mothers are watching TV and 24.4 per cent mothers are not watching. Percentage of children who are suffering from diarrhea, underweight, stunting and anaemia are lower than those children whose mothers are not watching TV and these results are statistically significant at 1% level of significant. The result shows that only 37.2 per cent mothers are reading newspaper and it is seen that newspaper reading has a significant effect on reducing under nutrition, stunting and

anaemia among their children. At present, percentage of mothers listening to radio is very less (15.1%). Among the children of mothers, who listen to radio, it is seen that the rates of under nutrition and anaemia are significantly less compared to the children of mothers who do not listen to radio.

**Socio-economic Conditions:** Rural children suffer more in all respects, though the differences in the percentages are not much and all the results are significant at 1% level. This is due to a very high sample size. Only for the case of underweight, the difference in the percentages is quite substantial. Results show that 72.7 per cent mothers are living in rural area.

So far as underweight, stunted and anemia are concerned, education shows profound positive effect. For diarrhea, fever and cough, the change is not very clear, however all the results are statistically significant at 1% level.

Religion wise distribution is quite revealing. The Christians and 'other' religion group children have less morbidity percentages in most of the times. If we forget these two groups and compare between Hindus and Muslims only, then we can see that the Hindus are in an advantageous position for the morbidity types like diarrhea, fever and cough and are at less advantageous position in the other three cases and all the results are significant at 1% level.

Fever and cough do not depend on wealth. These may depend on other factors like hygienic habit, contact with other infected persons etc. In all other cases, there has been a sharp decline in the morbidity percentages as wealth index increases and these are significant.

**Birth Weight and Mother's health status:** Birth weight is the most significant factor for morbidity percentages. The percentages of children with each of the morbidity decrease as the birth weight increased from low to medium and then medium to high. Needless to say, that all these are found to be statistically significant at 1% level.

Let us now come to the relation between mother's health conditions with the morbidity status of their children. BMI of mother are divided into three subgroups – underweight, normal and overweight or obese. Once again significant negative relation is found between the BMI level of mother and the morbidity percentages of children for Diarrhea, underweight, stunted and anemia.

Again, percentages of children with fever and cough do not seem to change much, though all of them are found to have significant relation at 1% level.

Children of Non-anemic mothers suffer less from morbidity than the children of anemic mothers and all these results are statistically significant except fever.

We have also carried out logistic regressions in which each of the morbidity status have been considered as the depended variable and drinking water, toilet facility, cooking fuel, awareness by TV or newspaper, place of residence, education, religion, wealth index, birth weight, mothers BMI and anemic condition are considered as independent variables. These are to see the joint effect of these variables on different morbidity status (Table 5).

We see that fever and cough do not move along with the other morbidity status. Fever and cough are only transient phenomenon. The striking feature is that only wealth and birth weight have expected significant effect on fever and cough. Some other variables also have significant effect on occurrences of fever and cough. But these are not in the expected direction.

For other four morbidity status, let us investigate the effect of each of the independent variables. As we have seen earlier, drinking water has mixed effect. Drinking clean water do not seem to improve the morbidity status. In fact, the effect is the reverse. Toilet facility and clean cooking fuel have expected significant effect on all the four morbidity status. Awareness through TV and newspaper have similar result. Place of residence again has unexpected relation with the morbidity status. Is it because the cities are more polluted, have less playground and more provisions with unhygienic fast food? Education significantly improves the condition of underweight, stunted and anemia, but fails to improve diarrhea. The status of morbidity significantly becomes less for Christians and others. Again, wealth index and child birth weight have the most significant expected effect on the morbidity status. Mother's BMI and anemic conditions have also significant effect on the morbidity of children in the sense that higher BMI and non-anemic mothers have children with fewer occurrences of these four morbidities.

## DISCUSSION

The above study gives evidences on levels and determinants of morbidity prevalence in India. It is seen that in India, the morbidity status of preschool children for diarrhea, cough and fever are 8.6%, 12.9% and 11.8% respectively. Between six zones, the highest percentages of morbidity status are seen in central zone and the lowest morbidity status is seen in west zone. According to conventional methods of classifying causes of death, an estimated 70 per cent of the deaths of children (aged 0-4 years) worldwide are due to diarrheal infection, acute respiratory infection and malaria (World Development Report, 1993; Pelletier et al., 1995). In our study, it is seen that in India, maximum incidence of diarrhea has been observed in Uttar Pradesh (15.7%) while the least is seen in Kerala (3.5%). The highest percentages of malnutrition i.e. underweight, overweight, stunted and tall are observed in North - East and South zones. The lowest percentage is seen in North zone. Out of 36 states and Union Territories, the highest and the lowest nutritional status are observed in Meghalaya and Kerala states respectively. The highest anemic status is perceived in Central zone. The highest and the lowest percentages of anemia are noticed in Haryana and Mizoram states respectively. Though, Prevalence's remained more than 50.0 per cent in almost all the states excepting Odisha (48.1%), Chhattisgarh (42.7%) and Kerala (36.0%). The maximum prevalence of anemia is seen in Haryana (70.4%) while the least is observed in Kerala (36.0%).

Based on chi square results, we see that there is a strong relationship between basic amenities like drinking water, toilet facilities, cooking fuel, awareness, socio-economy with diarrhea, fever, cough, nutritional and anemic status. Diarrhea, fever, cough and anemia have decreased in 'not protected' water and on the contrary, nutritional status was improved in protect water. The percentage of diarrhea, fever, cough, under nutrition and anemia were positively related with 'not cleaned' toilet facility and cooking fuel, illiteracy, and poor wealth index group. Religion group shows that the highest percentage of morbidity status is seen among Muslims. Regarding mother's health status, under nutrition and anaemia are indirectly related. Logistic regression result shows a significant association between drinking water, toilet facilities, awareness, mother's health and anemic status group with child morbidity and under nutrition or anaemia (David, 1993). It is also seen that in India, educational uplift has no remarkable effect on awareness about morbidity because it is the lowest among illiterate group than higher educated persons. Now the question is why? It may be because burden of the ailments is reported through self-reporting method. Illiterate

people may not have a clear understanding about the actual conditions of ill-health or may not be able to report it properly. Among the educated people, understanding about health is different because their access to health, availability of health care is better. That is why, due to variation in understanding, morbidity status differs from subject to subject and it may be the reason for difference from illiterate people to literate. Regarding under nutrition, it is seen that during ten-year gap, no significant changes among under nutrition of pre-school children in India occurred, because still 30 to 40 percent (approx.) pre-school children are under nourished. Underweight and stunting have decreased only by 10 percent from NFHS-3. It is also seen that less developed states remained as less developed during this period. The reason is not clear that why the rate of reduction of under nutrition in India is very slow like other developing countries (Svedberg, 2006; WHO, 2007). But one of the possible reasons may be due to unequal food distribution within the family. And this unequal intra-household food distribution within the family may have an adverse effect to pre-school children (NNMB, 2006). The study reveals that, in India, 56% of 6-59-month children are anaemic. In the previous national level data (NFHS-3), which was conducted about ten years back, show the percentage of anaemic children have reduced by 13.5 units during this ten-year gap.

Slow rate of progress over the past decade and the current high levels of undernourishment have recognized India as a country with the worst child health problem in the world. The present study concludes that along with the deprivation of nutritional health, multiple morbidities among pre-school children are still a major public health problem. So, to prevent this, there is a need for community-based nutrition programmes linked with health, water and sanitation. Other relevant intervention programmes should be taken with priority strategy that can bring measurable improvements in children's nutritional status, survival and development.

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**Table I. Morbidity status of (0-59)-month old children in India**

Zones and States	Morbidity status (%)			
	N	Diarrhea	Fever	Cough
<b>North-east</b>	<b>19503</b>	<b>5.6</b>	<b>10.9</b>	<b>12.8</b>
Arunachal Pradesh	1700	7.2	9.9	10.6
Assam	6028	2.8	8.6	8.9
Manipur	3276	5.8	8.6	13.4
Meghalaya	2119	12.5	26.6	24.2
Mizoram	3469	5.4	9.8	15.1
Nagaland	1223	8.4	10.3	13.6
Sikkim	839	2.1	2.7	3.6
Tripura	849	4.6	12.0	12.6
<b>East</b>	<b>29560</b>	<b>8.7</b>	<b>12.5</b>	<b>11.0</b>
Bihar	11499	9.9	12.2	4.8
Jharkhand	6346	6.9	13.1	10.9
Orissa	8064	9.4	12.3	11.7
West Bengal	3651	6.2	13.1	12.9
<b>Central</b>	<b>36585</b>	<b>12.2</b>	<b>15.7</b>	<b>12.8</b>
Madhya Pradesh	14643	10.0	11.6	10.6
Chhattisgarh	5981	8.3	12.8	12.2
Uttar Pradesh	15961	15.7	20.4	15.0
<b>West</b>	<b>12109</b>	<b>8.9</b>	<b>11.2</b>	<b>9.1</b>
Goa	334	3.6	13.5	13.5
Gujarat	4903	9.1	9.3	9.2
Maharashtra	6418	9.3	12.9	9.1
Dadra & Nagar Haveli	210	4.3	4.3	5.7
Daman & Diu	244	4.9	9.0	5.3
<b>North</b>	<b>28819</b>	<b>9.0</b>	<b>13.0</b>	<b>12.3</b>
Haryana	5199	7.6	8.8	7.9
Himachal Pradesh	1713	6.3	10.6	11.4
Jammu & Kashmir	4282	9.5	15.6	16.8
New Delhi	813	11.3	13.5	11.9
Chandigarh	144	4.2	10.4	9.0
Uttarakhand	2764	19.1	26.4	24.5
Punjab	4052	7.2	13.9	14.6
Rajasthan	9852	7.8	10.2	8.4
<b>South</b>	<b>18070</b>	<b>8.6</b>	<b>10.8</b>	<b>10.9</b>
Andhra Pradesh	1841	6.6	8.5	5.7
Telangana	1591	8.6	18.8	16.2
Karnataka	4999	4.7	8.1	6.5
Kerala	1931	3.5	11.3	9.6
Tamil Nadu	6091	8.1	11.5	14.9
Poducherry	866	7.6	11.0	11.3
Lakshadweep	243	5.8	13.2	12.3
Andaman & Nicobar Island	508	4.5	7.7	11.2
<b>India</b>	<b>144646</b>	<b>8.6</b>	<b>12.9</b>	<b>11.8</b>

**Table 2. Nutritional status of (0-59)-month old children in India**

Zones and States	Nutritional status (%)							Anaemic status (%)	
	N	Under-weight	Normal	Overweight	Stunted	Normal	Tall	N	Anaemic
<b>North-east</b>	<b>19503</b>	<b>19.5</b>	<b>79.5</b>	<b>0.9</b>	<b>30.7</b>	<b>65.5</b>	<b>3.8</b>	<b>17622</b>	<b>34.6</b>
Arunachal Pradesh	1700	15.0	83.4	1.6	26.6	66.9	6.4	1540	50.0
Assam	6028	26.5	72.9	0.6	34.1	62.8	3.1	5420	35.5
Manipur	3276	12.9	86.4	0.7	26.0	71.8	2.3	2949	25.3
Meghalaya	2119	28.3	70.8	0.8	42.9	52.8	4.4	1900	46.1
Mizoram	3469	12.5	86.4	1.2	28.3	67.7	4.1	3197	22.3
Nagaland	1223	14.3	84.6	1.1	24.4	72.0	3.5	1095	24.8
Sikkim	839	14.4	83.7	1.9	29.8	62.7	7.5	749	57.0
Tripura	849	24.1	75.0	0.8	23.1	73.7	3.2	772	46.9
<b>East</b>	<b>29560</b>	<b>39.7</b>	<b>59.8</b>	<b>0.5</b>	<b>40.2</b>	<b>57.2</b>	<b>2.6</b>	<b>26824</b>	<b>58.8</b>
Bihar	11499	41.8	57.9	0.3	45.1	52.3	2.6	10407	62.2
Jharkhand	6346	45.7	53.9	0.4	42.7	54.3	2.9	5703	68.7
Orissa	8064	35.4	63.8	0.8	34.4	63.0	2.6	7378	48.1
West Bengal	3651	32.3	67.2	0.3	32.8	65.1	2.1	3336	54.8
<b>Central</b>	<b>36585</b>	<b>38.1</b>	<b>61.6</b>	<b>0.2</b>	<b>40.2</b>	<b>57.5</b>	<b>2.3</b>	<b>32514</b>	<b>62.1</b>
Madhya Pradesh	14643	41.6	58.2	0.2	40.6	56.7	2.7	13294	68.3
Chhattisgarh	5981	38.1	61.7	0.2	38.3	59.3	2.2	4972	42.7
Uttar Pradesh	15961	34.9	64.8	0.3	40.5	57.6	1.9	14248	63.2
<b>West</b>	<b>12109</b>	<b>37.8</b>	<b>61.7</b>	<b>0.5</b>	<b>36.6</b>	<b>59.2</b>	<b>4.2</b>	<b>11147</b>	<b>56.9</b>
Goa	334	22.5	76.9	0.6	19.8	74.0	6.3	312	48.1
Gujarat	4903	40.8	58.8	0.4	39.4	56.8	3.8	4469	63.1
Maharashtra	6418	36.8	62.7	0.5	35.5	60.2	4.3	5991	51.4
Dadra & Nagar Haveli	210	36.2	63.8	0.0	42.4	54.3	3.3	186	84.9
Daman & Diu	244	27.9	71.3	0.8	27.5	63.5	9.0	219	70.8
<b>North</b>	<b>28819</b>	<b>29.6</b>	<b>72.4</b>	<b>0.7</b>	<b>31.4</b>	<b>64.8</b>	<b>3.8</b>	<b>26147</b>	<b>61.1</b>
Haryana	5199	28.8	70.5	0.7	31.6	64.1	4.3	4705	70.4
Himachal Pradesh	1713	19.1	80.3	0.6	24.7	72.3	3.0	1564	57.1
Jammu & Kashmir	4282	15.2	83.1	1.7	26.1	67.8	6.1	3912	58.3
New Delhi	813	24.8	74.8	0.4	28.8	67.7	3.6	738	61.8
Chandigarh	144	23.6	76.4	0.0	29.2	68.1	2.8	133	73.7
Uttarakhand	2764	24.3	74.8	0.8	30.0	65.8	2.1	2488	59.1
Punjab	4052	21.2	78.0	0.8	25.2	72.0	2.8	3722	57.3
Rajasthan	9852	35.7	64.0	0.3	38.0	59.0	3.1	8885	60.2
<b>South</b>	<b>18070</b>	<b>28.0</b>	<b>71.0</b>	<b>1.0</b>	<b>30.0</b>	<b>65.4</b>	<b>4.6</b>	<b>16698</b>	<b>53.6</b>
Andhra Pradesh	1841	32.4	67.2	0.4	33.0	65.3	1.7	1707	57.2
Telangana	1591	30.6	69.1	0.3	30.0	67.9	2.0	1451	63.9
Karnataka	4999	36.1	63.2	0.7	38.2	57.1	4.7	4635	60.5
Kerala	1931	17.3	81.4	1.3	19.7	74.6	5.7	1766	36.0
Tamil Nadu	6091	24.7	74.0	1.3	26.9	67.1	5.9	5653	51.5
Poducherry	866	20.9	77.9	1.2	26.1	69.6	4.3	808	43.6
Lakshadweep	243	21.0	79.0	0.0	23.9	74.5	1.6	210	51.0
Andaman & Nicobar Island	508	21.3	77.2	1.6	25.6	70.7	3.7	468	50.9
<b>India</b>	<b>144646</b>	<b>32.4</b>	<b>67.0</b>	<b>0.6</b>	<b>35.6</b>	<b>61.1</b>	<b>3.3</b>	<b>130982</b>	<b>56.0</b>

**Table 3. Relationship between different Morbidity with Nutritional status and anemic Condition of (0-59)-month old children in different zones and total India**

Nutritional status	Conditions	Zones of India						India
		North-east	East	Central	West	North	South	
		Types of Morbidity						
		Percentage distribution of diarrhea						
Underweight	Underweight	6.0	9.2	12.5	8.7	8.6	6.4	9.5
	Others	5.5	8.3	12.0	9.0	9.1	6.4	8.7
Stunted	Stunted	5.5	8.5	11.9	8.9	8.1	6.1	8.8
	Others	5.7	8.8	12.4	8.9	9.4	6.5	9.0
Anemia	Anemic	6.2	8.4	12.5	9.2	9.1	6.6	9.2
	Others	5.2	9.1	11.8	8.5	8.9	6.2	8.6
<b>Percentage distribution of cough</b>								
Underweight	Underweight	13.4	10.5	12.4	9.0	10.6	10.1	11.1
	Others	12.6	11.0	13.0	9.1	12.9	11.2	12.1
Stunted	Stunted	12.8	10.3	12.4	8.8	11.2	10.5	11.2
	Others	12.8	11.4	13.1	9.3	12.8	11.0	12.1
Anemia	Anemic	13.2	10.6	12.5	9.1	11.6	11.0	11.5
	Others	12.4	11.5	13.2	9.2	13.2	10.8	12.1
<b>Percentage distribution of fever</b>								
Underweight	Underweight	12.4	12.8	15.7	11.3	11.9	10.9	13.1
	Others	10.5	12.4	15.6	11.2	11.4	10.7	12.7
Stunted	Stunted	10.9	12.5	15.6	10.7	12.2	10.3	12.7
	Others	10.9	12.6	15.7	11.6	13.3	11.0	12.9
Anemia	Anemic	11.8	12.5	15.9	11.0	12.4	10.6	12.9
	Others	10.3	12.6	15.4	11.5	13.7	11.0	12.8

**Table 4A. Percentage distribution of morbidity, status of health and anaemic condition by basic amenities and awareness of (0-59)-month old children in India**

Morbidity, under nutrition and anemia among children and their mother's nutritional status														
Basic amenities														
Drinking water	Total		Diarrhea		Fever		Cough		Underweight		Stunted		Anemia	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Protected Water	128951	89.1	11701	9.1	16776	13.0	15098	11.7	41760	32.4	45827	35.5	71269	56.4
Not protected water	15695	10.9	1235	7.9	1832	11.7	1919	12.2	5126	32.7	5663	36.1	8542	52.6
Result of $\chi^2$ test	---	---	24.959 df=1 sig.= 0.000		22.316 df=1 sig.= 0.000		3.624 df=1 sig.= 0.057		0.485 df=1 sig.= 0.486		1.801 df=1 sig.= 0.180		74.447 df=1 sig.= 0.000	
Toilet facilities														
Improved	80199	55.4	6847	8.5	10475	13.6	9725	12.1	20352	25.4	23500	29.3	41407	52.0
Not improved	64447	44.6	6089	9.4	8133	12.6	7292	11.3	26534	41.2	27990	43.4	38764	61.1
Result of $\chi^2$ test	---	---	36.381 df=1 sig.= 0.000		6.216 df=1 sig.= 0.013		22.661 df=1 sig.= 0.000		4069.206 df=1 sig.= 0.000		3111.449 df=1 sig.= 0.000		1081.460 df=1 sig.= 0.000	
Cooking fuel														
Clean	52233	36.1	8523	8.4	6654	12.7	5248	12.0	12395	23.7	14099	27.0	26660	52.4
Non-clean	92413	63.9	4413	12.9.29	11954	12.9	10769	11.7	34491	37.3	37391	40.5	63511	58.1
Result of $\chi^2$ test	---	---	24.553 df=1 sig.= 0.000		1.148 df=1 sig.= 0.284		3.063 df=1 sig.= 0.082		2814.339 df=1 sig.= 0.000		2640.418 df=1 sig.= 0.000		408.43 df=1 sig.= 0.000	
Awareness														
TV watching	109319	75.6	9466	8.7	14090	12.9	13127	12.0	31839	29.1	35233	32.2	58792	54.2
Not watching	35327	24.4	3470	9.8	4518	12.8	3890	11.0	15047	42.6	16257	46.0	19507	61.5
Result of $\chi^2$ test	---	---	44.380 df= 1 sig. = 0.000		0.237 df= 1 sig. = 0.626		25.544 df= 1 sig. = 0.000		2229.699 df= 2 sig. = 0.000		2216.741 df= 2 sig. = 0.000		517.918 df= 1 sig. = 0.000	
Newspaper read	53831	37.2	4800	8.9	7229	13.4	6883	12.8	13241	24.6	15046	28.0	27290	50.8
Not reading	90815	62.8	8136	9.0	11379	12.5	10134	11.2	33645	37	36444	40.1	48484	59.1
Result of $\chi^2$ test	---	---	0.073 df= 1 sig. = 0.786		24.378 df= 1 sig. = 0.000		86.225 df= 1 sig. = 0.000		2438.979 df= 2 sig. = 0.000		2197.962 df= 2 sig. = 0.000		843.693 df= 1 sig. = 0.000	
Listening Radio	21881	15.1	2010	9.2	2942	13.4	2929	13.4	5843	26.7	6921	31.6	11383	52.5
Not listening	122765	84.9	10926	8.9	15666	12.8	14088	11.5	41043	33.4	44569	36.3	62953	56.6
Result of $\chi^2$ test	---	---	1.867 df= 1 sig. = 0.172		7.762 df= 1 sig. = 0.005		65.297 df= 1 sig. = 0.000		398.173 df= 2 sig. = 0.000		179.755 df= 2 sig. = 0.000		119.346 df= 1 sig. = 0.000	

**Table 4B. Percentage distribution morbidity, health status and anemic condition by socio-economic conditions of (0-59)-month old children in India**

Socio-economy	Morbidity, under nutrition and anemia among children and their mother's nutritional status													
	Total		Diarrhea		Fever		Cough		Underweight		Stunted		Anemia	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Place														
Rural	105086	72.7	9621	9.2	13683	13.0	12503	11.9	36254	34.5	39771	37.8	59725	57.0
Urban	39560	27.3	3315	8.4	4925	12.4	4514	11.4	10632	26.9	11719	29.5	20449	53.4
Result of $\chi^2$ test	---	---	21.235 df=1 sig.= 0.000	8.369 df=1 sig.= 0.004	6.576 df=1 sig.= 0.010	762.497 df=1 sig.= 0.000	847.641 df=1 sig.= 0.000	136.949 df=1 sig.= 0.000						
<b>Education</b>														
Illiterate	34167	23.6	3123	9.1	4136	12.1	3425	10.0	15114	44.2	16260	47.6	21015	64.2
Primary	94021	65.0	1923	9.7	2742	12.6	2503	12.6	17599	33.2	18318	41.8	10553	58.3
Sec & high	16458	11.4	7890	8.7	11730	12.2	11089	12.2	24173	26.7	26912	29.7	42829	52.4
Result of $\chi^2$ test	---	---	20.320 df=1 sig.= 0.000	33.005 df=1 sig.= 0.000	132.284 df=1 sig.= 0.000	3838.204 df=1 sig.= 0.000	3846.179 df=1 sig.= 0.000	1316.548 df=1 sig.= 0.000						
<b>Religion</b>														
Hindu	108841	75.2	9838	9.0	13614	12.5	12214	11.2	37518	34.5	39638	36.4	62413	57.7
Muslim	19270	13.3	1918	10.0	2943	15.3	2527	13.1	5827	30.2	6868	35.6	10147	57.6
Christian	10218	7.1	722	7.1	1309	12.8	1533	15.0	1978	19.4	3137	30.7	4168	35.1
Others	6317	4.4	458	7.3	742	11.7	743	11.8	1563	24.7	1847	29.7	3443	55.6
Result of $\chi^2$ test	---	---	91.817 df=3 sig.= 0.000	119.080 df=3 sig.= 0.000	167.895 df=3 sig.= 0.000	1216.470 df=3 sig.= 0.000	250.289 df=3 sig.= 0.000	1773.601 df=3 sig.= 0.000						
<b>Wealth Index</b>														
Poor	60428	41.8	5688	9.4	7746	12.8	6984	11.6	25501	42.2	27164	45.0	36295	59.9
Middle	31214	21.6	2789	8.9	4137	13.3	3779	12.1	9510	30.5	10919	35.0	16927	55.2
Higher	53004	36.6	4459	8.4	6725	12.7	6254	11.8	11875	22.4	13407	25.3	26949	52.1
Result of $\chi^2$ test	---	---	34.679 df=2 sig.= 0.000	5.809 df=2 sig.= 0.055	6.076 df=2 sig.= 0.048	5120.198 df=2 sig.= 0.000	4766.347 df=2 sig.= 0.000	638.809 df=2 sig.= 0.000						

**Table 4C. Percentage distribution of morbidity, nutritional status and anemic condition by birth weight and mother's health status of (0-59)-month old children in India**

Mother's health status through	Morbidity, under nutrition and anemia among children and their mother's nutritional status													
	Total		Diarrhea		Fever		Cough		Underweight		Stunted		Anemia	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
<b>Birth-weight</b>														
Very Low (<1500 gms)	1370	0.9	177	12.9	250	18.2	236	17.2	753	55.0	712	52.0	806	62.9
Low (<2500 gms)	22792	15.8	2317	10.2	3287	14.4	3067	13.5	10229	44.9	10094	44.3	13164	60.0
Normal (2.5 or above)	120484	83.3	10442	8.7	15071	12.5	13714	11.4	35904	29.8	40684	33.8	66201	55.2
Result of $\chi^2$ test	---	---	79.751 df=2 sig.= 0.000		98.335 df=2 sig.= 0.000		119.171 df=2 sig.= 0.000		2310.533 df=2 sig.= 0.000		1087.027 df=2 sig.= 0.000		186.539 df=2 sig.= 0.000	
<b>BMI</b>														
Under weight	34201	23.6	3375	9.9	4528	13.2	3984	11.6	15741	46.0	15131	44.2	21225	61.7
Normal	87976	60.8	7762	8.8	11045	12.6	10164	11.6	26877	30.6	30767	35.0	48421	55.5
Overweight or obese	22469	15.5	1799	8.0	3035	13.5	2869	12.8	4268	19.0	5592	24.9	10525	49.3
Result of $\chi^2$ test	---	---	61.699 df=2 sig.= 0.000		20.114 df=1 sig.= 0.000		26.055 df=1 sig.= 0.000		4878.491 df=1 sig.= 0.000		2253.828 df=1 sig.= 0.000		798.032 df=1 sig.= 0.000	
<b>Anemia</b>														
Not-anemic	34167	23.6	5535	8.6	8234	12.1	7805	12.1	18821	29.2	21470	33.3	27496	46.8
Anemic	16458	11.4	7401	9.2	10374	12.2	9212	11.5	28065	35.0	30020	37.4	45863	63.5
Result of $\chi^2$ test	---	---	18.358 df=1 sig.= 0.000		0.911 df=1 sig.= 0.340		13.022 df=1 sig.= 0.000		551.632 df=1 sig.= 0.000		267.842 df=1 sig.= 0.000		3633.239 df=1 sig.= 0.000	

**Table 5. Results of logistic regression between basic amenities, socio-economy, birth weight, mother's health status and its relationship with morbidity, health status and anaemic conditions of (0-59)-month old children in India**

<b>Drinking water</b>	<b>Diarrhea</b>	<b>Fever</b>	<b>Cough</b>	<b>Underweight</b>	<b>Stunted</b>	<b>Anemia</b>
Not protected <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Protected	1.151**	1.122***	0.975	1.064**	1.091***	1.047*
<b>Toilet Facilities</b>						
Not improved <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Improved	0.966	1.064**	1.047*	0.825***	0.877***	0.921***
<b>Cooking fuel</b>						
Not clean <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Clean	1.006	0.991	1.030	0.923***	0.921***	0.981
<b>Awareness</b>						
<b>TV watching</b>						
No <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.922**	1.012	1.035	0.919	0.868	0.958
<b>Newspaper reading</b>						
No <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.120**	1.119**	1.123**	0.972*	0.959	0.932
<b>Listening Radio</b>						
No <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.060*	1.032	1.140**	0.862**	0.948**	0.949**
<b>Socio-economy (Place)</b>						
Rural <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Urban	0.937*	0.898***	0.879***	1.154***	1.062***	0.997
<b>Education</b>						
Illiterate <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Primary	1.127**	1.165***	1.259***	0.905	0.906	0.924
Sec & high	1.024	1.084**	1.208***	0.709***	0.689***	0.917***
<b>Religion</b>						
Hindu <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Muslim	1.101**	1.240***	1.198***	0.891***	1.035*	0.843***
Christian	0.866**	1.065	1.365***	0.640***	1.034	0.637***
Others	0.835**	0.921*	1.018	0.817***	0.916**	0.990
<b>Wealth Index</b>						
Poor <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Middle	0.977	0.979	0.947*	0.814***	0.852***	0.956*
Higher	0.957	0.921**	0.887***	0.646***	0.636***	0.947*
<b>Birth-weight</b>						
Very Low (<1500 gms) <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Low (<2500 gms)	0.755**	0.762***	0.747***	0.684***	0.760***	0.975
Normal (2.5 or above)	0.657**	0.642***	0.598***	0.397***	0.527***	0.941
<b>Mother's health (BMI)</b>						
Under weight <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Normal	0.908**	0.949*	0.977	0.608***	0.810***	0.830***
Overweight or obese	0.851**	1.036	1.080**	0.410***	0.632***	0.670***
<b>Anemic status</b>						
Not-anemic <sup>R</sup>	1.00	1.00	1.00	1.00	1.00	1.00
Anemic	1.295**	1.143***	0.992	1.285***	1.291***	1.847***