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CHILDHOOD STUNTING ACROSS DISTRICTS IN EIGHT INDIAN STATES

Burden, determinants and rate of decline

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Nutrition Reports, Issue 6, 2017

CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION

India shares the bulk of the burden of childhood stunting globally with an estimated 44 million stunted children, according to the Rapid Survey on Children [Ministry of Women and Child Development, 2014]. Hence, reducing stunting in Indian children is considered imperative to achieve the global target set by the World Health Assembly to reduce the number of stunted children by 40 per cent by 2025.

The burden and proportion of childhood stunting in India, however, vary significantly by administrative unit (region, state, district, block) and social group. For a government programme manager to take any action, there would need to be representative data on both the burden and determinants of stunting at the lowest disaggregated administrative unit (block/district) in a format that can support quick understanding and action. However, such data had been available only at state level.

For the first time, representative data on childhood stunting for Indian children have been made available at district level from the National Family Health Survey (NFHS-4). The district-wise fact sheets of the fourth round of this survey are available in public domain for 18 Indian states and provide information on the proportion of stunted Indian children and a range of potential correlates. However, given the multiple determinants of stunting, simple scorecard-based systems that use a combination of existing district-level indicators are not available from NFHS-4 or in combination with other nationally representative data sources, which could be used by a district programme manager to arrive at a course of action to reduce stunting, using his/her existing skill set that is not dependent on multivariate analyses.

Hence, this study was undertaken with the objective to devise a simple method using publically available data to answer the following three research questions:

1. Which districts contribute to the highest and lowest burden of childhood stunting?
2. What are the correlates of stunting at district level?
3. How many years would it take for each district to reduce the prevalence of stunting in children under five by 40 per cent?

METHODOLOGY

The study was conducted between January–October 2016. Publically available prevalence data for childhood stunting at district level from the fourth round of India's NFHS (2015-2016) were downloaded for all 228 districts of eight Indian states where UNICEF has programming presence – Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, Telangana and West Bengal. The numbers of stunted children less than five years of age were arrived at using the single age data available from the Census of India 2011.

To ascertain potential correlates of stunting at district level, an expert group was constituted that agreed on 25 indicators covering seven domains across three data sources – NFHS-4 2015-2016 (21 indicators), Census of India 2011 (three indicators) and National Sample Survey Organization 2011-2012 (one indicator). The first four domains are at individual level, covering the early stages of the life cycle when the human potential is set – pre-pregnancy, pregnancy, young child feeding and health care, while the remaining three domains are relevant to the household level – environment conditions, household food insecurity, access to resources and gender-related context.

Thereafter, a district-wise scorecard was generated for each state to compare the performance of districts as well as indicators

within a district, based on deviation from the median for each of the 25 indicators. Subsequently, bivariate correlations between the 25 indicators and childhood stunting (as dependent variable) were undertaken. To assess the time taken for each district to reduce stunting, two data time points were needed for which data on the prevalence of childhood stunting were available. The time points taken were the District Level Household and Facility Survey (DLHS) 2012-2013 and NFHS-4 2015-2016.

RESULTS

According to NFHS-4, the prevalence of childhood stunting across the eight study states ranged between 27 per cent in Tamil Nadu and 48 per cent in Bihar. In the 10 years between the third and fourth round of NFHS (2006 and 2016), the annual rate of reduction of stunting was ~3 per cent per year in Andhra Pradesh, Maharashtra, Telangana and West Bengal; ~2 per cent per year in Karnataka and Madhya Pradesh and less than 1.5 per cent per year in Bihar and Tamil Nadu.

Prevalence of childhood stunting
The prevalence of childhood stunting was above 40 per cent in 92 of the 228 districts, of which 36 districts are in Bihar, 32 in Madhya Pradesh, 11 in Maharashtra, nine in Karnataka, and four in West Bengal. Among these 92 districts, there were 19 where the prevalence was over 50 per cent. These districts are distributed across three states – Bihar (13), Karnataka (3) and Madhya Pradesh (3).

Number of stunted children
Nearly 75 per cent of about 19 million stunted children, the total burden of childhood stunting in the eight study states, was concentrated in four states – Bihar (6.1 million), Karnataka (2.2 million), Madhya Pradesh (2.9 million) and Maharashtra (3.2 million).

There were 10 districts with over 250,000 stunted children each – seven in Bihar, two in Maharashtra and one in West Bengal. The 10 districts were Gaya, Madhubani, Muzaffarpur, Patna, Purba Champaran, Samastipur and Sitamarhi (Bihar); Ratnagiri and Jalna (Maharashtra); and Murshidabad (West Bengal). Purba Champaran district in Bihar had the highest number of stunted children of all districts and was the only one with over 300,000 stunted children aged under five years.

Correlation between childhood stunting and selected indicators
Seven of the 25 selected indicators were more commonly correlated with childhood stunting across the eight states – women's marriage before 18 years of age; acute undernutrition among women; compliance of recommended iron and folic acid (IFA) in pregnancy; institutional deliveries; access to improved sanitation facilities; having no Census-specified assets; and female literacy.

Domain 1: Pre-pregnancy phase
In six out of the eight states (exceptions being Andhra Pradesh and Tamil Nadu), the prevalence of childhood stunting increased as the proportion of women married before achieving legal age for marriage increased; the likelihood of this increasing being higher in Karnataka (r=0.61) and Telangana (r=0.71).

In five out of the eight states (Andhra Pradesh, Bihar, Maharashtra, Telangana and West Bengal), the increase in childhood stunting had a moderate to strong correlation with the increase in acute undernutrition among women.

Domain 2: Pregnancy – use of health and nutrition services
As the compliance to recommended IFA consumption decreased, the likelihood of the proportion of stunted children increased in five states – Bihar (r=-0.51), Madhya Pradesh (r=-0.31), Maharashtra (r=-0.32), Telangana (r=-0.66) and West Bengal (r=-0.30).

An increase in childhood stunting was correlated with a decrease in institutional deliveries in five out of the eight states – Andhra Pradesh (r=-0.73), Karnataka (r=-0.59), Maharashtra (r=-0.57), Telangana (r=-0.74) and West Bengal (r=-0.48).

Domain 3: Infancy and early childhood – nutritional care

Correlations between childhood stunting and relevant indicators exist in three or fewer states.

Domain 4: Young child – health care

We were unable to see a correlation between childhood stunting and the indicators in domain 4 mainly because of data limitations.

Domain 5: Household environmental health

An increase in the prevalence of childhood stunting was correlated with a decrease in household access to improved sanitation services in five out of the eight states – Andhra Pradesh (r=-0.29), Karnataka (r=-0.62), Maharashtra (r=-0.46), Telangana (r=-0.90) and West Bengal (r=-0.74).

Domain 6: Household food security and access to essential micronutrients

Correlations between childhood stunting and indicators under this domain were limited to less than four states.

Domain 7: Household poverty and socio-economic and gender factors

Households with no Census-specified assets, a measure of household poverty, and female literacy were both correlated with childhood stunting in five states. Childhood stunting increased with increasing poverty in Bihar (r=0.38), Karnataka (r=0.51), Telangana (r=0.51) and West Bengal (r=0.50). By contrast, there was a strong likelihood of childhood stunting decreasing with increasing household poverty in Maharashtra (r=-0.20).

There was a likelihood of childhood stunting increasing with a decrease in women being educated for 10 years or more in Karnataka (r=-0.67), Madhya Pradesh (r=-0.34), Maharashtra (r=-0.54), Telangana (r=-0.86) and West Bengal (r=-0.65).

Time trend analysis was possible for 166 out of the 228 districts across six states, excluding Karnataka and Tamil Nadu. Out of the 166 districts, 68 are likely to reduce the prevalence of childhood stunting by 40 per cent by 2025. These include 42 districts from the high prevalence states of Bihar and Madhya Pradesh as a result of a more rapid pace of decline in stunting.

DISCUSSION

The analysis reveals an unequal distribution of childhood stunting across the 228 districts and eight states. Districts and states need to prioritize the immediate implementation of a strategy to reduce stunting based on both the high prevalence and burden of childhood stunting. The states of Bihar and Madhya Pradesh have a high burden of childhood stunting, while three districts in Karnataka (Gulbarga, Koppal and Yadgir) require immediate attention due to the high prevalence of stunting of over 50 per cent.

The disaggregated estimates of the 25 indicators presented in this paper support the need for a multi-pronged strategy covering both nutrition-specific and nutrition-sensitive interventions in reducing childhood stunting. Seven indicators identified across the domains of pre-pregnancy, pregnancy, household environment and socio-economic and gender contexts emerge as the most critical in driving childhood stunting in the districts of these eight states.

Evidence on infant and young child feeding and health care is limited in this analysis due to the small sample size for drawing estimates.

However, other research on essential nutrition interventions shows that indicators on infant and young child feeding, micronutrient supplementation and access to basic health care for infants cannot be undermined and are known to significantly impact child mortality and undernutrition [Bhutta, 2013].

Time trends in childhood stunting decline need to be interpreted with caution due to the small time frame available for comparison and estimates from surveys adopting different sampling methods.

CONCLUSION

This report presents a timely analysis of NFHS-4 and related data from eight states where UNICEF has programmatic interest. As the complete NFHS-4 data set will take time to be available, it is prudent that states where the data are available should utilize them in their strategy to address malnutrition. However, more disaggregated data are needed to fully comprehend the drivers of stunting in relation to infant and young child feeding and care, the drivers of severe stunting and time trends in the decline of childhood stunting.

Use of estimates in tables and maps can support visual depiction of indicators for geographic and intervention prioritization. They also serve as effective tools for advocacy for these priorities with state and federal governments. Further, they can be adapted to understand the correlates of childhood stunting to assess the rate of decline in stunting once more comparable estimates over longer time frames become available.

REPORT

INTRODUCTION

Children are considered stunted when their height is more than two standard deviations (SD) below the median height-for-age of the World Health Organization's Child Growth Standards. Stunting in early childhood is largely irreversible, adversely affecting children's survival, health, development, learning capacity, school performance and productivity in adulthood. The main causes of stunting in children are intrauterine growth restriction during prenatal life, inadequate feeding to support rapid growth and development in infancy and early childhood, frequent infections due to unhealthy environments and poor access to essential health services [Black, 2008, Victora, 2008; Dewey, 2011].

India is at the epicentre of the global childhood stunting crisis with 44 million stunted children [Ministry of Women and Child Development, 2014], shouldering nearly a third of the global burden [UNICEF, 2013]. Hence, reducing stunting in Indian children is imperative to achieving the World Health Assembly target of reducing the number of stunted children aged under five years by 40 per cent by 2025 [WHO, 2014].

The burden and proportion of childhood stunting in India, however, vary significantly by administrative unit (region, state, district, block) and social group. For a government programme manager to take effective action, there would need to be publically available representative data on both the burden and determinants of stunting at the lowest disaggregated administrative unit (block/district) in a format that can support quick understanding and action. However, such data had been available only at state level.

Stunting in children is influenced by multiple interrelated immediate (at individual level),

underlying (at household level) and basic causes (at societal level) (see Figure 1). Hence, an understanding of all causes in its totality is imperative to arrive at a corrective course of action to reduce stunting.

In the recent past, a number of indicators and indices have been developed to capture these causes and identify those driving stunting. However, such an analysis has been limited to national or state-level indicators and indices [Singh, 2014]

For the first time, representative data on childhood stunting for Indian children have been made available at district-level from the fourth round of the National Family Health Survey (NFHS-4). The district-wise fact sheets of this survey are available in public domain for 18 Indian states and provide information on the proportion of stunted Indian children and a range of potential correlates. The data can be used creatively to ascertain correlates of childhood stunting at district level and provide leads to a district programme manager to take action. However, available data are often not used in the wait for unit-level data for sophisticated analyses, which are frequently restricted to use by researchers.

Further, given the multiple determinants of stunting and unavailability of skill sets to use unit-level data for multivariate analyses at district level, simple scorecard-based systems that use a combination of existing publicly available district-level indicators are not available for use by a district programme manager to arrive at a course of action by using existing skill sets that are not dependent on sophisticated multivariate analyses.

Using published data in the public domain and applying simple analysis so that the approach can be easily replicated by district

Figure 1   Conceptual framework on intergenerational stunting
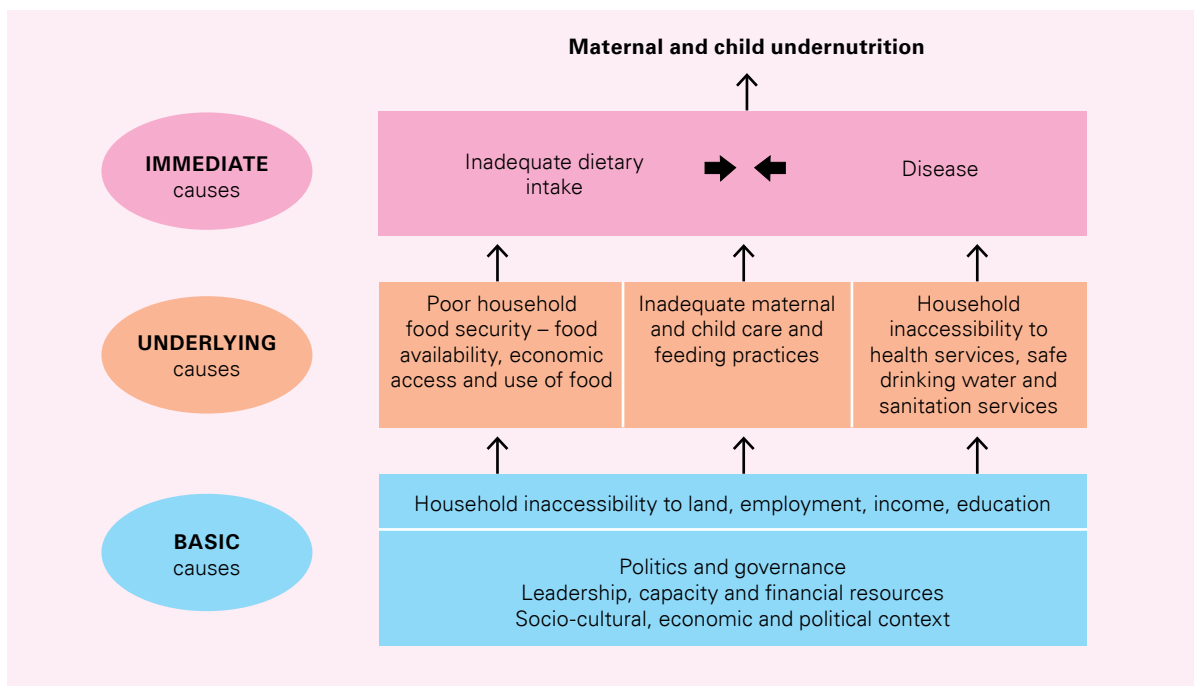
administrators for decision making, this study aimed to answer three research questions:

1. Which districts contribute to the highest and lowest burden of stunting among children aged under five years?

2. Using a life cycle approach, what are the correlates of stunting for each district?

3. How many years would it take for each district in the eight states to reduce the prevalence of stunted children under five by 40 per cent?

METHODOLOGY

Study period
The study was conducted from January to October 2016.

Study states
Eight Indian states where UNICEF has programming presence – Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, Telangana and West Bengal.

Process
As a first step, a working group was constituted (comprising policy makers, economists, academia and practitioners) to identify indicators and data sources to be used for investigating the correlates of stunting. The group selected 25 indicators that were grouped under seven domains: the first four domains are at the individual level, covering the early stages of the life cycle when the human potential is set – pre-pregnancy, pregnancy, young child feeding and health care, while the remaining three are relevant to the household level – environment conditions, household food insecurity, access to resources, and socio-economic and gender-related contexts (see Table 1, Figure 2).

The indicators measure coverage of nutrition-specific interventions (directly impacting immediate causes of undernutrition – inadequate food intake, poor feeding practices and high burden of disease) and nutrition-sensitive interventions (impacting nutrition security and increasing the impact of nutrition-specific interventions, such as water and sanitation, women's education and empowerment-related indicators) based on the conceptual framework on intergenerational stunting (see Figure 3).

We relied on representative data from publically available open sources of information, which are also used by the Indian government for decision making and from which district-level information is available on the identified indicators:

- Indicator 1-20, 24 – NFHS-4, 2015-2016 [NFHS, 2015-2016]
- Indicator 22, 23, 25 – Census of India, 2011 [Ministry of Home Affairs, 2011]
- Indicator 21 – National Sample Survey Organization 68th round, 2011-2012 [Ministry of Statistics and Program Implementation, 2012]
- Prevalence of stunting (Bihar and Madhya Pradesh) – Annual Health Survey (AHS), 2012-2013 [AHS, 2012-2013]
- Prevalence of stunting – District Level Household and Facility Survey (DLHS), 2013-2014 [DLHS, 2013-2014]

Research question 1: Which districts contribute to the highest and lowest burden of childhood stunting?
The NFHS-4 district fact sheets were used to ascertain the proportion of childhood stunting per district. Childhood stunting is defined as the percentage of children aged 0-59 months with a height-for-age below minus two standard deviation of the median height-for-age of the global growth standard [WHO, 2006].

The number of stunted children was calculated as the proportion of stunted children in a given district multiplied by the total population aged 0-59 months in that district according to Census of India 2011. While we are aware that these figures are likely to be underestimates as they were based on Census 2011 and the population would have increased since then, we have used this source nonetheless as it was publically available.

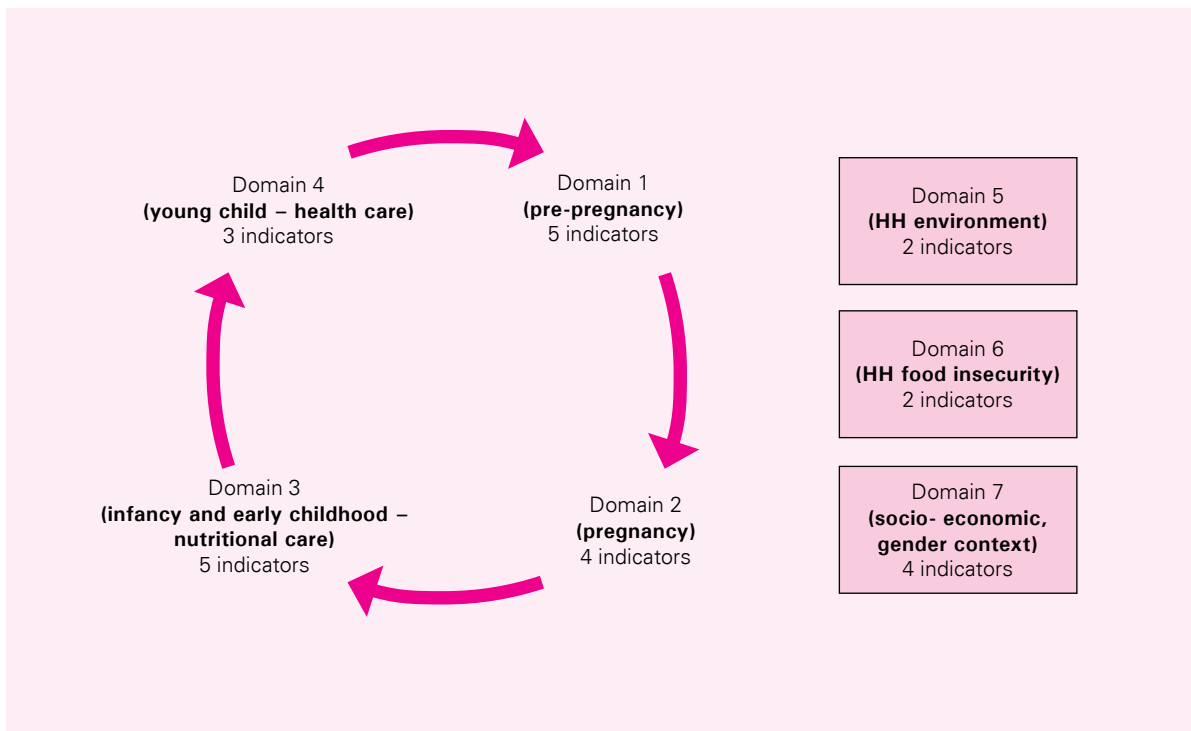**Figure 2   Distribution of indicators in the seven domains based on a life cycle approach**

Figure 3   Selected indicators within the conceptual framework on intergenerational stunting
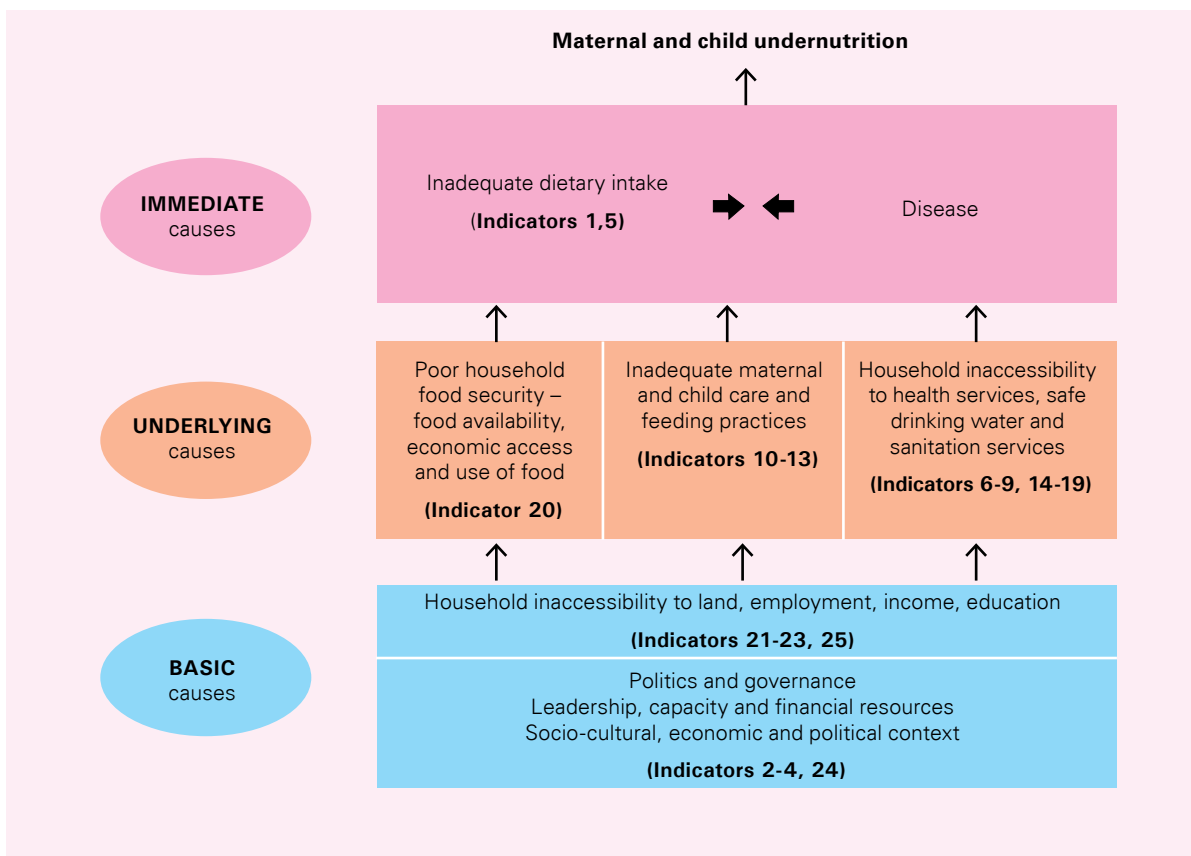
Research question 2: What are the correlates of stunting for each district?

We were unable to undertake multivariate analyses due to the unavailability of raw data. Using MS Excel, a bivariate analysis was carried out to determine the correlate of stunting with childhood stunting as the independent variable and the 25 indicators selected in consultation with the expert group as the dependent variables.

Due to the skewed distribution of the estimates across the 25 indicators, the median instead of mean, along with range, was calculated for each indicator. Out of the 25 indicators, six (women whose body mass index is below normal; non-pregnant women aged 15-49 years who were anaemic; women aged 20-24 years married before 18 years of age; women aged 15-19 years who were already mothers or pregnant at time of survey; households with none of the Census-specified assets; Scheduled Tribe/ Scheduled Caste population) are negative, that is, an increasing estimate for these indicators implies relatively poor performance. For example, as the percentage of women whose body mass index is below normal increases, the performance on this indicator would get poorer.

The other 19 indicators are positive, that is, an increasing estimate for these indicators implies relatively better performance on that indicator. For example, as the percentage of children aged under three who were breastfed within the first hour of birth increases, performance on this indicator will be considered better. Thereafter, a scorecard was generated for each state to compare performance of districts and indicators within a district, based on the deviation from the median for each of the 25 indicators. In addition, bivariate correlations between the 25 indicators and childhood stunting were undertaken. Cut-offs for strength of correlation were set at <0.3 for weak, 0.3 to <0.6 for moderate and 0.6 to 1 for strong to perfect correlation (see Table 2).

Research question 3: How many years would it take to reduce the prevalence of childhood stunting by 40 per cent?

The district estimates of the prevalence of childhood stunting were obtained from AHS 2012-2013 or DLHS 2013-2014 and NFHS-4 2015-2016 to calculate changes in prevalence of childhood stunting over time, followed by a calculation of the annual rate of reduction (ARR). The annual rate of reduction of childhood stunting was used to calculate the number of years required for each district to reduce the prevalence of childhood stunting by 40 per cent. The following formula was used to calculate ARR:

(1-(Prevalence of stunting 2015-2016/ Prevalence of stunting 2012-2013) ^ (1/3))*100 (when using AHS in the case of Bihar and Madhya Pradesh)

(1-(Prevalence of stunting 2015-2016/ Prevalence of stunting 2013-2014) ^ (1/3))*100 (when using DLHS)

RESULTS

Prevalence of childhood stunting

The prevalence of childhood stunting across the eight study states varied between 27 per cent in Tamil Nadu to 48 per cent in Bihar, according to NFHS-4 2015-2016.

Number of stunted children

Overall, the state of Bihar had the highest absolute burden of stunted children under five (6.1 million), followed by a distant second, Maharashtra (3.2 million). The absolute burden of childhood stunting in the other states is 2.9 million in Madhya Pradesh, 2.4 million in West Bengal, 2.2 million in Karnataka, 1.1 million in Andhra Pradesh, 776,500 in Telangana and 444,665 in Tamil Nadu. Bihar and Maharashtra together are home to nearly half of all stunted children in these eight states (see Figure 4).

Rate of decline

In the 10 years between the third and fourth round of NFHS (2006 and 2016), the annual rate of reduction of stunting was ~3 per cent per year in Andhra Pradesh, Maharashtra, Telangana and West Bengal; ~2 per cent per year in Karnataka and Madhya Pradesh and less than 1.5 per cent per year in Bihar and Tamil Nadu.

Correlation between childhood stunting and selected indicators

Seven of the 25 indicators – women's marriage before 18 years of age; acute undernutrition among women; compliance to recommended iron and folic acid (IFA) in pregnancy; institutional deliveries; access to improved sanitation facilities; having no Census-specified assets; and women's education to at least 10th grade – are more commonly correlated with childhood stunting across the eight states (see Table 3).

Domain 1: Pre-pregnancy phase, indicators 1-5

In six out of the eight states (exceptions being Andhra Pradesh and Tamil Nadu), childhood stunting increased as the proportion of women married before achieving legal age for marriage increased; the likelihood of stunting increasing was higher in Karnataka (r=0.61) and Telangana (r=0.71).

Figure 4   **Prevalence and estimated number of stunted children under five across eight study states, 2015-2016**
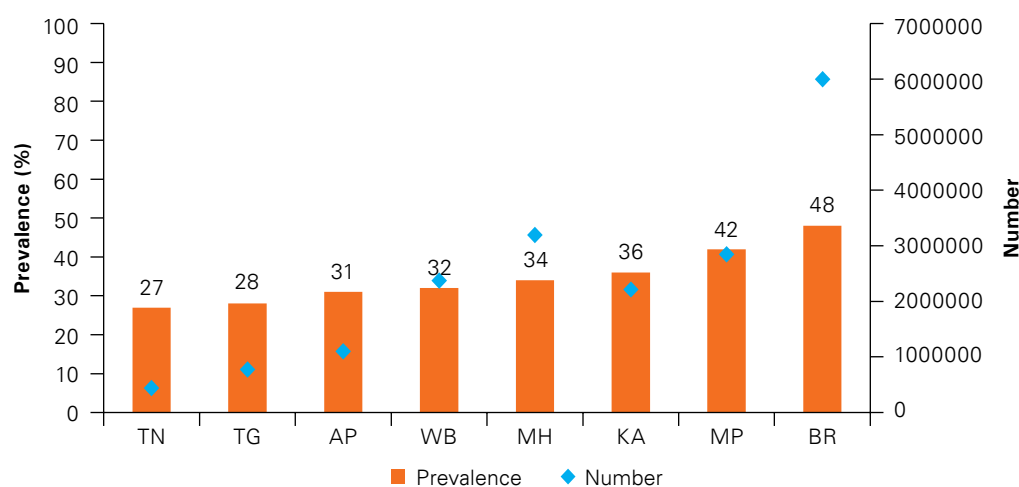
AP: Andhra Pradesh, BR: Bihar, KA: Karnataka, MH: Maharashtra, MP: Madhya Pradesh, TN: Tamil Nadu, TG: Telangana, WB: West Bengal

In five out of the eight states (Andhra Pradesh, Bihar, Maharashtra, Telangana and West Bengal), the increase in childhood stunting had moderate to strong correlation with the increase in acute undernutrition among women.

Domain 2: Pregnancy – use of health and nutrition services, indicators 6-9

There was a likelihood of the proportion of stunted children increasing with a decrease in compliance to recommended IFA consumption during pregnancy in five states – Bihar (r=-0.51), Madhya Pradesh (r=-0.30), Maharashtra (r=-0.32), Telangana (r=-0.66) and West Bengal (r=-0.30). Further, an increase in childhood stunting was correlated with a decrease in institutional deliveries in five out of the eight states – Andhra Pradesh (r=-0.73), Karnataka (r=-0.59), Maharashtra (r=-0.57), Telangana (r=-0.74) and West Bengal (r=-0.48).

Domain 3: Infancy and early childhood – nutritional care, indicators 10-14

Correlations between childhood stunting and relevant indicators under domain 3 exist in three or fewer states.

Domain 4: Young child – health care, indicators 15-17

We were unable to see a correlation between childhood stunting and the indicators under domain 4 mainly because of data limitations.

Domain 5: Household environmental health, indicators 18 and 19

Childhood stunting was likely to increase as household access to improved sanitation services decreased in five out of the eight states – Andhra Pradesh (r=-0.29), Karnataka (r=-0.62), Maharashtra (r=-0.46), Telangana (r=-0.90) and West Bengal (r=-0.74).

Domain 6: Household food security and access to essential micronutrients, indicators 20 and 21

The correlations between childhood stunting and the indicators under domain 6 were limited to fewer than four states.

Domain 7: Household poverty and socio-economic and gender factors, indicators 22-25

Two indicators – households with no Census-specified assets, a measure of household poverty, and female literacy – were correlated with childhood stunting in five states. Childhood stunting increased with increasing poverty in Bihar (r=0.38), Karnataka (r=0.51), Telangana (r=0.51) and West Bengal (r=0.50). By contrast, there was a strong likelihood of childhood stunting decreasing with increasing household poverty in Maharashtra (r=-0.20).

The likelihood of stunting increased as the proportion of women educated for 10 years or more decreased in Karnataka (r=-0.67), Madhya Pradesh (r=-0.34), Maharashtra (r=-0.54), Telangana (r=-0.86) and West Bengal (r=-0.65) (see Table 3).

Time trend analysis was possible for 166 out of the 228 districts across six states (the exceptions being Karnataka and Tamil Nadu). Out of the 166 districts, 68 are likely to reduce the prevalence of childhood stunting by 40 per cent by 2025. These include 42 districts from the high prevalence states of Bihar and Madhya Pradesh as a result of a more rapid pace of decline in stunting. However, these findings need to be interpreted with caution due to the small time frame available for comparison.

ANDHRA PRADESH

Research question 1: Which districts contribute to the highest and lowest burden of childhood stunting?

The prevalence of childhood stunting varied from 22 per cent in Guntur district to 44 per cent in Kurnool district (see Figure 5). Out of the 13 districts in Andhra Pradesh, two had a childhood stunting prevalence of over 40 per cent (Anantpur and Kurnool); the prevalence varied from 30 per cent to

Figure 5   **Prevalence and estimated number of stunted children under five by district, Andhra Pradesh, 2015-2016**
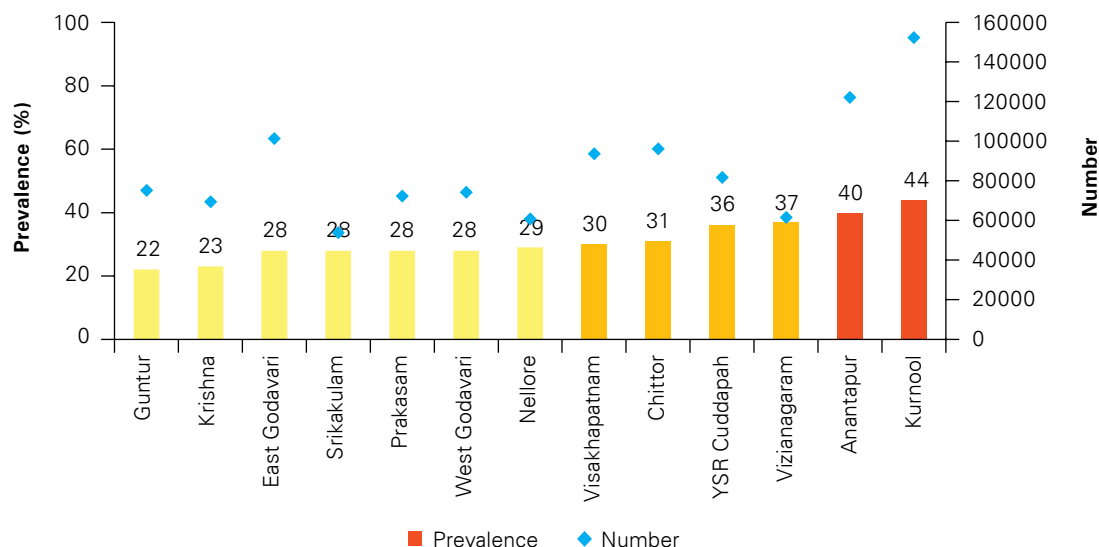
Figure 6   **Prevalence of stunting among children under five by district, Andhra Pradesh, 2015-2016**
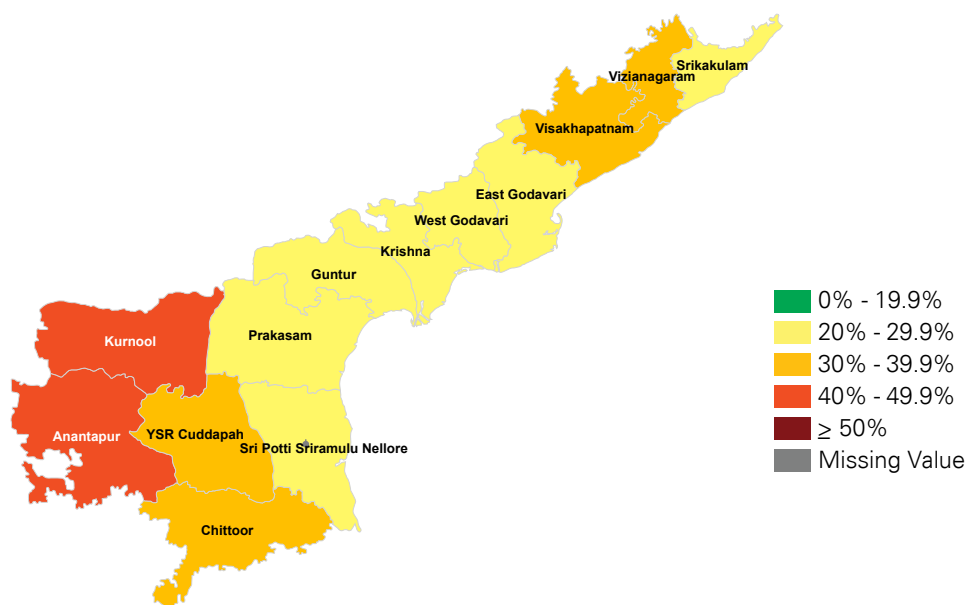
40 per cent in four districts (Chittor, Vishakapatnam, Vizianagram and YSR Cuddapah). With the exceptions of Vizianagram and YSR Cuddapah, these districts have a tribal population of over 20 per cent of the total district population. Vishakapatnam has the highest proportion of tribal population at 38 per cent.

The high prevalence districts of Kurnool (44 per cent), Anantpur (40 per cent), YSR Cuddapah (36 per cent) and Chittor (31 per cent) are contiguous and located in the south and southwestern region of the state. Vizianagaram and Vishakhapatnam districts with a prevalence over 30 per cent are also contiguous and located in the northern end (see Figure 6).

Just three districts, that is, Anantpur, Kurnool and East Godavari, accounted for just over one third (34 per cent) of the 1.1 million stunted children in the state. These three districts have over 100,000 stunted children each, with Kurnool having the highest number (152,264). The district with the lowest number of stunted children is Vizianagaram (61,583).

Research question 2: What are the correlates of stunting for each district?

Domain 1: Pre-pregnancy phase, indicators 1-5

The prevalence of anaemia among non-pregnant women aged 15 to 49 years was high across all the districts, with a median of 59 per cent; it was highest in Vizianagaram district (76 per cent) and lowest in Chittoor district (48 per cent) (indicator 1) (see Table 4).

The median for women who were married before achieving the legal age of marriage was 30 per cent; the prevalence ranged from 23 per cent (Srikakulum) to 45 per cent (Prakasam) (indicator 2). Nearly 12 per cent of women were either pregnant or had their first child at 15 to 19 years of age in half of the districts (indicator 3).

The use of modern contraceptive methods ranged from as low as 59 per cent (YSR) to 77 per cent (West Godavari); usage is above 70 per cent in only half of the districts (indicator 4).

The percentage of women with acute undernutrition, that is, BMI of <18.5 kg/m^2, ranged from about 11 per cent (Guntur) to 26 per cent (Vizianagaram) (indicator 5).

Domain 2: Pregnancy – use of health and nutrition services, indicators 6-9

Over 80 per cent of pregnant women in half the districts came under the ambit of public outreach services within the first trimester. The proportion of pregnant women receiving antenatal care (ANC) check-up in the first trimester was relatively high, ranging from 72 per cent (Chittoor) to 90 per cent (YSR) (indicator 6). But there was loss in follow-up as only 68 per cent (Guntur) and up to 88 per cent (Krishna) of pregnant women had at least four ANC visits during pregnancy (indicator 7).

Compliance of recommended IFA (>=100 tablets, syrup or equivalent) during pregnancy was relatively low, ranging from 37 per cent (Guntur) to 70 per cent (Krishna) (indicator 8). On the other hand, use of institutional delivery services was high, ranging from 76 per cent (Kurnool) to 98 per cent (Guntur) (indicator 9).

Domain 3: Infancy and early childhood – nutritional care, indicators 10-14

Timely initiation of breastfeeding (within the first hour of birth) ranged from only 29 per cent (Sri Potti Sriramulu Nellore) to 59 per cent (Vishakapatnam), with 39 per cent of babies in half the districts breastfed within one hour of birth (indicator 10).

Data on exclusive breastfeeding for infants under six months of age (indicator 11) and timely introduction of complementary feeding at six to eight months (indicator 12) were from unweighted samples.

Only 7 per cent of children aged 6 to 23 months received an adequate diet that is, the recommended variety and frequency of feeding along with breast milk or supplementary milk in half the districts. (indicator 13).

Coverage of vitamin A supplementation, on the other hand, was relatively high with a median of 74 per cent, although there was a wide variation from 55 per cent (Krishna) to 90 per cent (Srikakulm) (indicator 14).

Domain 4: Young child – health care, indicators 15-17

Coverage of full immunization among children aged 12 to 23 months was 65 per cent, 66 per cent and 76 per cent in YSR, Kurnool and Anantpur, respectively, the three districts for which data were available from weighted samples (indicator 15). Data on treatment for diarrhoea (indicator 16) and respiratory illnesses (indicator 17) in children were unavailable.

Domain 5: Household environmental health, indicators 18 and 19

Household access to an improved source of drinking water was challenging for many districts in Andhra Pradesh, with household coverage ranging from 56 per cent (YSR) to 90 per cent (Vizianagaram) (indicator 18). Household access to improved toilet facilities was even lower, ranging from as low as 32 per cent (Vizianagaram) to 69 per cent (YSR); household access to improved sanitation facilities was below 54 per cent in half the districts (indicator 19).

Domain 6: Household food security and access to essential micronutrients, indicators 20 and 21

Household use of iodized salt was over 80 per cent in most of the districts, but was a concern in YSR (39 per cent), West Godavari (40 per cent) and Vizianagaram (44 per cent) (indicator 20).

Household food expenditure to total household expenses was less than 41 per cent in half the districts (indicator 21).

Domain 7: Household poverty and socio-economic and gender factors, indicators 22-25

Limited household access to resources or poverty, measured in terms of households having no Census-specified assets, ranged from 3 per cent (YSR) to as high as 38 per cent (Visakhapatnam) (indicator 22).

The proportion of the most marginalized groups, Scheduled Tribes, in the state population was less than 5 per cent in half the districts, the exception being YSR with 57 per cent tribal population, followed by West Godavari with 35 per cent (indicator 23).

Only about one third (35 per cent) of women had completed 10 or more years of schooling in the state (indicator 24). The proportion was lowest in Kurnool (20 per cent), which also had the highest prevalence in childhood stunting, while West Godavari had the highest (96 per cent). Sex ratio was a concern in all the districts, with the worst scenario being in Anantpur (927 girls to 1,000 boys) (indicator 25).

Correlation between childhood stunting and selected indicators

Bivariate correlations for the 25 indicators found that two indicators were strongly correlated with stunting. These were acute undernutrition among women (indicator 5 under domain 1, r=0.75) and institutional delivery (indicator 9 under domain 2, r=-0.73). The prevalence of childhood stunting was highly likely to increase when acute undernutrition among women increased and the use of health facilities for delivery declined.

There was a moderate correlation between stunting and household access to improved toilet facilities (indicator 19 under domain 5, r=-0.29) and household use of iodized salt (indicator 20 under domain 6, r=-0.36) (see Table 4).

Research question 3: How many years would it take to reduce the prevalence of childhood stunting by 40 per cent?

Only two out of the 13 districts of Andhra Pradesh, namely Guntur and Sri Potti Sriramulu Nellore, saw a positive ARR from 2013-2014 to 2015-2016. At this rate, Sri Potti

Sriramulu Nellore and Guntur will reduce the prevalence of childhood stunting in another 2 years and 4 years, or by years 2018 and 2020, respectively (see Table 12).

BIHAR

Research question 1: Which districts contribute to the highest and lowest burden of childhood stunting?

The prevalence of childhood stunting was high across all 38 districts of the state and ranged from 36 per cent in Gopalganj to 57 per cent in Sitamarhi (see Figure 7). Out of the 38 districts, 13 had a prevalence above 50 per cent and 23 districts from 40 per cent to 50 per cent.

Gopalganj and Siwan, the two districts with prevalence lower than 40 per cent, are located in western Bihar, with borders contiguous with the state of Uttar Pradesh (see Figure 8).

Seven districts, that is, Gaya, Madhubani, Muzaffarpur, Patna, Purba Champaran, Samastipur and Sitamarhi, accounted for close to one third (31 per cent) of the estimated 6.1 million stunted children in the state. Each of these seven districts has over 250,000 stunted children under five years of age, with the highest number of stunted children in Purba Champaran (317,121). The district with the lowest number was Sheikhpura (37,155).

Research question 2: What are the correlates of stunting for each district?

Domain 1: Pre-pregnancy phase, indicators 1-5

The prevalence of anaemia among non-pregnant women aged 15 to 49 years ranged from 52 per cent in Buxar to 69 per cent in Supaul; over 60 per cent of non-pregnant women in half the districts were anaemic (indicator 1) (see Table 5).

The proportion of women who were married before achieving legal age of marriage ranged from 27 per cent (Saran) to 57 per cent (Supaul), with a median of 39 per cent (indicator 2). Almost 20 per cent of women were either pregnant or had their first child at 15 to 19 years of age in Madhepura, Paschim Champaran and Samastipur (indicator 3). The use of modern contraceptive methods ranged from 4 per cent (Paschim Champaran) to 42 per cent (Rohtas), with usage below 27 per cent in half the districts (indicator 4).

The percentage of acutely undernourished women, that is BMI of <18.5 kg/m^2, ranged from about 24 per cent (Bhojpur, Patna, Saran, Siwan) to 39 per cent (Purnia, Supaul) (indicator 5).

Domain 2: Pregnancy – use of health and nutrition services, indicators 6-9

More than a third (36 per cent) of pregnant women in half the districts came under the ambit of public outreach services during the first trimester. The proportion of pregnant women who received ANC check-up in the first trimester ranged from 23 per cent (Paschim Champaran and Purba) to 52 per cent (Patna) (indicator 6). There was loss of follow-up as only 8 per cent (Begusarai) to 24 per cent (Munger) of pregnant women had at least four ANC check-ups. Less than 14 per cent of pregnant women in half of Bihar's district had at least four ANC check-ups (indicator 7).

Compliance of recommended IFA consumption was abysmal with consumption ranging from 3 per cent (Madhepura and Sheohar) to 21 per cent (Patna); IFA consumption was below 9 per cent in half the districts of Bihar (indicator 8). Usage of institutional delivery services ranged from 37 per cent (Sitamarhi) to 86 per cent (Patna) (indicator 9).

Figure 7   Prevalence and estimated number of stunted children under five by district, Bihar, 2015-2016
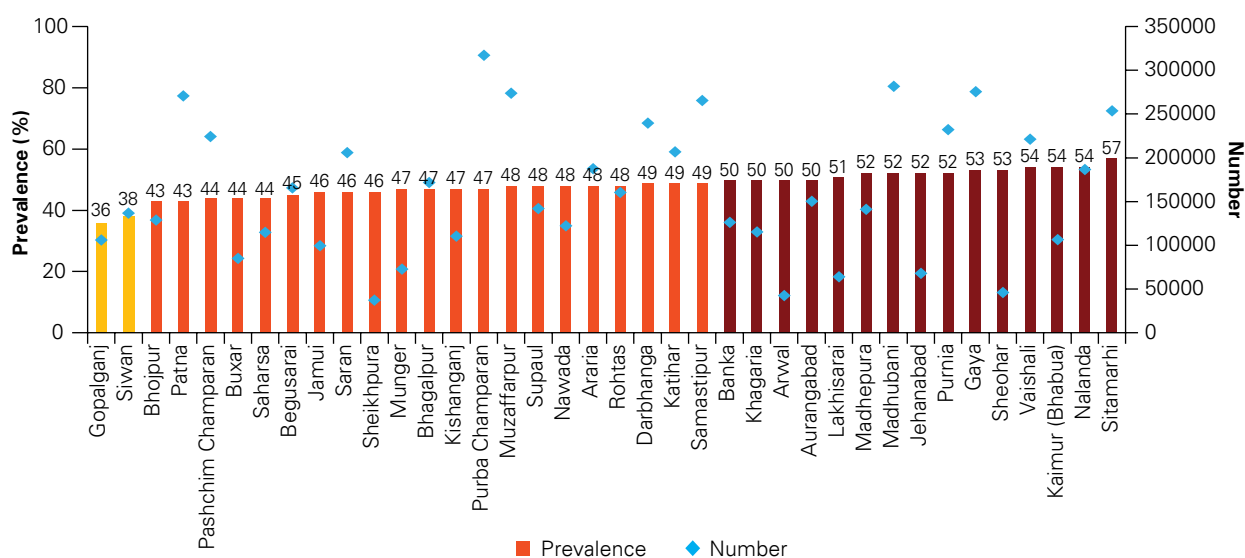
Figure 8   Prevalence of stunting among children under five by district, Bihar, 2015-2016
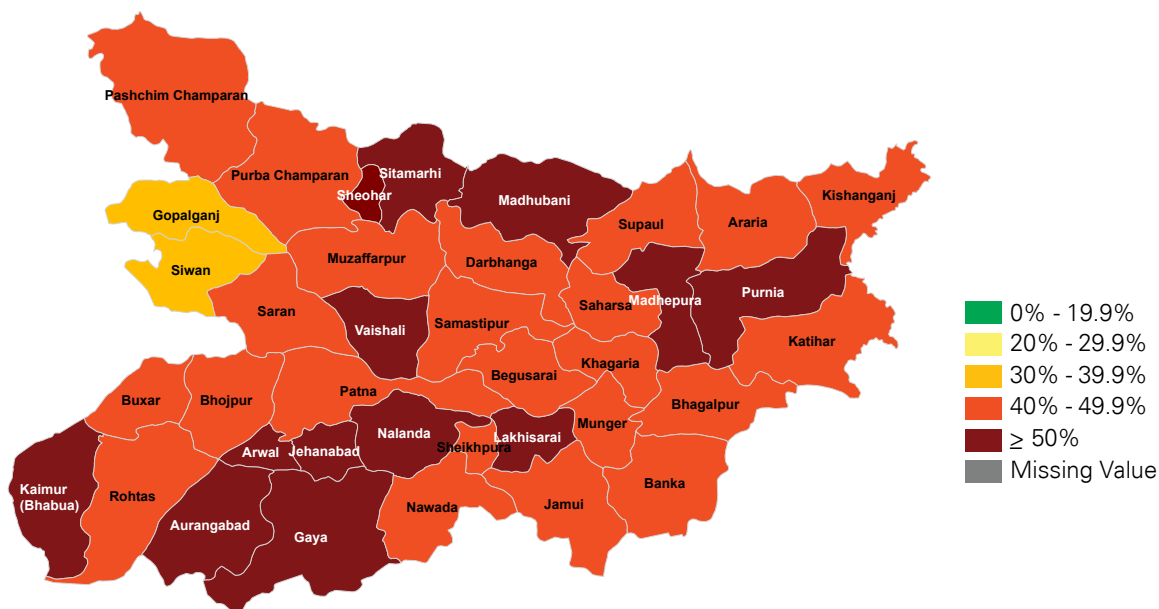
Domain 3: Infancy and early childhood – nutritional care, indicators 10-14

Timely initiation of breastfeeding ranged from 20 per cent (Rohtas) to 50 per cent (Jehanabad), with less than 35 per cent of the babies breastfed within one hour of birth in half the districts (indicator 10). Exclusive breastfeeding for infants under six months of age ranged from 33 per cent (Lakhisarai and Nawada) to 79 per cent (Muzaffarpur); the latter estimate was based on unweighted cases (indicator 11).

Timely introduction of complementary feeding ranged from 15 per cent (Saharsa) to 48 per cent (Aurangabad) (indicator 12). Just 8 per cent of children aged 6 to 23 months received an adequate diet in half the districts, that is, recommended variety and frequency of feeding along with breastmilk or supplementary milk (indicator 13).

Coverage of vitamin A supplementation ranged from 47 per cent (Purba Champaran) to 76 per cent (Vaishali) (indicator 14).

Domain 4: Young child – health care, indicators 15-17

Coverage of full immunization among children aged 12 to 23 months ranged from 29 per cent (Paschim Champaran) to 78 per cent (Saharsa), and was over 64 per cent in half the districts (indicator 15).

The proportion of children with diarrhoea receiving oral rehydration salts (ORS) ranged from 30 per cent (Muzaffarpur) to 66 per cent (Munger); about 45 per cent of the children received ORS in half the districts (indicator 16). The proportion of children seeking treatment for respiratory illnesses and fever ranged from 33 per cent (Bhojpur) to 75 per cent (Munger) (indicator 17).

Domain 5: Household environmental health, indicators 18 and 19

Household access to an improved source of drinking water was almost universal with over 90 per cent coverage across all districts, with the exception of Jamui (79 per cent) (indicator 18). However, the lack of sanitation facilities was reflected in the highest coverage of household access to improved toilet facilities being just 50 per cent in Patna (indicator 19). Only about a quarter of households had access to sanitation facilities in half the districts of the state.

Domain 6: Household food security and access to essential micronutrients, indicators 20 and 21

Household use of iodized salt was over 90 per cent in most districts of the state, with the lowest coverage being 80 per cent in Madhubani and Saran (indicator 20). Household expenditure on food to total household expenses was less than half in 19 of the 38 districts, and ranged from 38 per cent (Siwan) to 59 per cent (Lakhisarai) (indicator 21).

Domain 7: Household poverty and socio-economic and gender factors, indicators 22-25

The proportion of households having no Census-specified assets ranged from 8 per cent (Patna) to 29 per cent (Madehpura) (indicator 22). The proportion of Scheduled Caste population ranged from 9 per cent (Katihar) to 30 per cent (Gaya) (indicator 23).

More than half the women were illiterate in 50 per cent of the districts; female literacy ranged from 42 per cent (Madhepura, Purnia, Saharsa and Sitamarhi) to 63 per cent (Rohtas) (indicator 24). Sex ratio was a concern across the districts with the worst scenario in Vaishali (904 girls to 1,000 boys) (indicator 25).

Correlation between childhood stunting and selected indicators

Under domain 1, childhood stunting increased with the increasing proportion of women being married before legal age (r=0.47), women who were pregnant or already mothers in the age group 15-19 years (r=0.34), and women being acutely undernourished (r=0.43). There was a counterintuitive correlation between increasing contraceptive coverage and increasing prevalence of stunting in this domain (r=0.34).

Two out of four indicators under domain 2, that is, at least four ANC visits (r=-0.38) and recommended IFA consumption (r=-0.51), were correlated with stunting.

Timely initiation of breastfeeding among newborns had a counterintuitive correlation with stunting, that is, the prevalence of stunting increased as the practice improved (r=0.32). Similarly, the prevalence of stunting was also likely to increase as household expense on food increased (r=0.30).

Two out of the four indicators under domain 7 were correlated with stunting. As the proportion of households with no Census-specified assets (r=0.38) and Scheduled

Caste population increased (r=0.34), the prevalence of childhood stunting increased. None of the other indicators were strongly correlated with stunting (see Table 5).

Research question 3: How many years would it take to reduce the prevalence of childhood stunting by 40 per cent?

There was no change in the prevalence of stunting between 2012 and 2015 in 13 districts out of the 38 districts in Bihar. Of the remaining 25 districts where the prevalence of stunting declined over three years, 10 districts (Bhojpur, Gopalganj, Purba Champaran, Shekhpura, Kishanganj, Supaul, Bhagalpur, Lakhisarai, Samastipur and Aurangabad) will not be able to reduce stunting by 40 per cent by 2025 (see Table 13), while only 15 will be able to do so.

KARNATAKA

Research question 1: Which districts contribute to the highest and lowest burden of childhood stunting?

The prevalence of childhood stunting ranged widely in Karnataka from 19 per cent in Mandya district to 56 per cent in Koppal district. Three districts – Gulbarga, Yadgir and Koppal – had a prevalence of over 50 per cent, while the prevalence varied from 40 per cent to 50 per cent in six of the 30 districts of the state (see Figure 9). Districts with a high prevalence of stunting are located in the northern half of the state (see Figure 10)

Six districts – Chitradurga, Hassan, Raichur, Shimoga, Tumkur and Udupi – accounted for 44 per cent of the estimated 2.2 million stunted children in the state. Each of these districts had over 100,000 stunted children aged under five years, with the highest number in Chitradurga district (255,030). The district with the lowest number was Dakshina Kannada (13,849).

Research question 2: What are the correlates of stunting for each district?

Domain 1: Pre-pregnancy phase, indicators 1-5

The prevalence of anaemia among non-pregnant women aged 15 to 49 years ranged from 37 per cent in Kodagu to 58 per cent in Raichur; over 45 per cent of non-pregnant women in half the districts were anaemic (indicator 1) (see Table 6).

Women who were married before achieving legal age of marriage ranged from 6 per cent (Udupi) to 36 per cent (Bagalkot), with a median of 24 per cent (indicator 2). Less than 8 per cent of women in half the districts were either pregnant or had their first child at 15 to 19 years of age (indicator 3). The use of modern contraceptive methods ranged from 21 per cent (Dakshina Kannada) to 65 per cent (Chikkaballapura), with usage below 55 per cent in half the districts (indicator 4).

The percentage of acutely undernourished women, that is BMI of <18.5 kg/m^2, ranged from about 14 per cent (Bangalore, Mandya) to 32 per cent (Uttara Kannada) (indicator 5).

Domain 2: Pregnancy – use of health and nutrition services, indicators 6-9

In half the districts, 69 per cent of pregnant women came under the ambit of public outreach services during the first trimester. Coverage of ANC check-up in the first trimester ranged from 51 per cent (Bangalore) to 84 per cent (Davanagere) (indicator 6). While 26 districts were able to provide at least four ANC check-ups to pregnant women even though they may have missed them during the first trimester, there was loss in follow-up in six districts where the coverage was lower than ANC coverage in the first trimester (indicator 7).

Compliance of recommended IFA consumption ranged from 19 per cent

Figure 9   Prevalence and estimated number of stunted children under five by district, Karnataka, 2015-2016
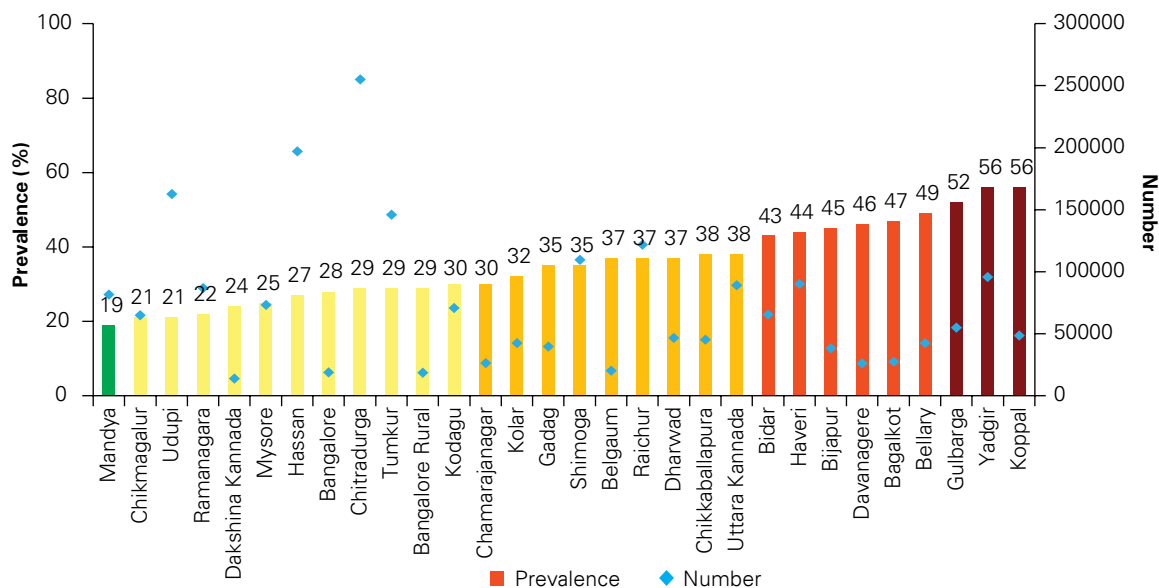
Figure 10   Prevalence of stunting among children under five by district, Karnataka, 2015-2016
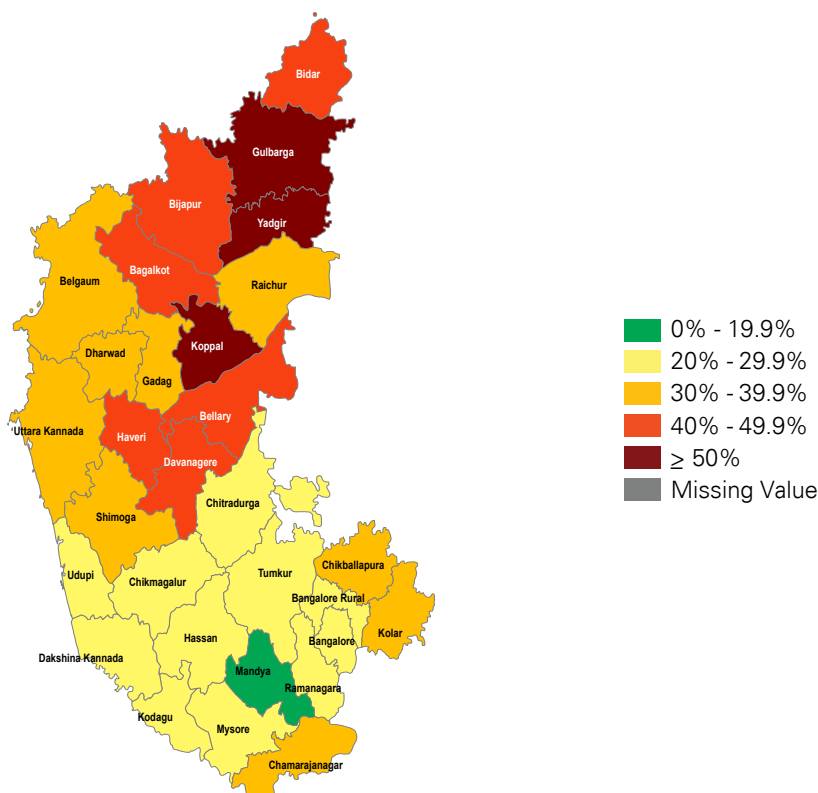
(Mandya) to 66 per cent (Davanagere); IFA consumption was below 50 per cent in half the districts (indicator 8). The use of institutional delivery services was relatively high with the lowest coverage at 80 per cent in Raichur and a median of 96 per cent (indicator 9).

Domain 3: Infancy and early childhood – nutritional care, indicators 10-14

Timely initiation of breastfeeding ranged from 42 per cent (Shimoga) to 72 per cent (Davanagere), with less than 57 per cent of the babies breastfed within one hour of birth in half the districts (indicator 10). Estimates

on exclusive breastfeeding of infants under six months of age (indicator 11), timely introduction of complementary feeding (indicator 12) and children aged 6 to 23 months receiving an adequate diet (indicator 13) were available from unweighted samples.

Coverage of vitamin A supplementation ranged from 65 per cent (Bijapur) to 95 per cent (Kolar) (indicator 14).

Domain 4: Young child – health care, indicators 15-17

Estimates on immunization coverage were from an unweighted sample in 17 out of the 30 districts. In the remaining districts, children aged 12 to 23 months who were fully immunized ranged from 47 per cent (Mysore) to 76 per cent (Bagalkot) (indicator 15).

Estimates on children affected by diarrhoea receiving ORS (indicator 16) and those seeking treatment for respiratory illnesses and fever (indicator 17) were available from unweighted samples.

Domain 5: Household environmental health, indicators 18 and 19

Household access to an improved source of drinking water ranged from 65 per cent (Udipi) to 99 per cent (Belgaum) (indicator 18). However, household access to improved toilet facilities was quite low, ranging from 18 per cent in Yadgir to 92 per cent (Dakshina Kannada) (indicator 19). Access to sanitation facilities is below 55 per cent in half the districts of the state.

Domain 6: Household food security and access to essential micronutrients, indicators 20 and 21

Household consumption of iodized salt is over 80 per cent in 24 of the 30 districts of the state, with the lowest coverage being 66 per cent in Chikkaballapura (indicator 20).

Household expenditure on food to total household expenses was less than 43 per cent in half the districts, and ranged from 28 per cent (Kodagu) to 50 per cent (Chikkaballapura) (indicator 21).

Domain 7: Household poverty, socio-economic and gender factors, indicators 22-25

Households having no Census-specified assets ranged from 3 per cent (Bangalore Rural) to 31 per cent (Yadgir) (indicator 22). The proportion of Scheduled Tribe population ranged from 1 per cent (Mandya) to 19 per cent (Raichur) (indicator 23).

Female literacy ranged from 23 per cent (Yadgir) to 68 per cent (Bangalore) (indicator 24). Sex ratio is a concern in most districts with the worst scenario in Bagalkot (928 girls to 1,000 boys) (indicator 25).

Correlation between childhood stunting and selected indicators

Three out of the 25 indicators were strongly correlated with childhood stunting. These were women married before legal age (indicator 2 under domain 1, r=0.61); household access to improved sanitation facilities (indicator 19 under domain 5, r=-0.62); and female literacy (indicator 24 under domain 7, r=-0.67). There was a high likelihood of the prevalence of childhood stunting increasing as the proportion of women married before legal age increased and female literacy and access to improved sanitation facilities decreased.

Seven out of the remaining 22 indicators were moderately correlated with stunting. Childhood stunting was likely to increase as institutional deliveries (r=-0.59), infants receiving appropriate complementary feeding (r=-0.32) and sex ratio (r=-0.37) declined. It was also likely to increase as timely initiation of breastfeeding (r=0.45), expenditure on

food (r=0.35), households with no Census-specified assets (r=0.51) and proportion of tribal population (r=0.32) increased. Of these, the correlation between childhood stunting and timely initiation of breastfeeding was counterintuitive as evidence suggests an improved nutrition status with timely initiation of breastfeeding (see Table 6).

MADHYA PRADESH

Research question 1: Which districts contribute to the highest and lowest burden of stunting?

The prevalence of childhood stunting was very high in Madhya Pradesh and ranged from 32 per cent in Balaghat district to 52 per cent in Barwani and Sheopur districts. Barwani has a significant tribal population at nearly 70 per cent, while Sheopur has over 20 per cent.

Three of the 51 districts in the state had a prevalence higher than 50 per cent, while 29 districts had a prevalence that ranged from 40 per cent to 50 per cent in (see Figure 11). Districts with a prevalence varying from 30 per cent to 40 per cent are concentrated in the western and southwestern regions of the state, with the exception of Indore, Mandsaur, Neemuch, Rajgarh and Ujjain (see Figure 12).

The estimated number of stunted children ranged widely from 23,172 in Harda district to 114,978 in Indore district. Ten of the 51 districts – Barwani, Bhopal, Dhar, Indore, Khargaone, Morena, Rewa, Sagar, Satna and Shivpuri – accounted for about one third (32 per cent) of the 3.1 million stunted children in the state. There were over 100,000 stunted children in each of five districts – Bhopal, Dhar, Khargaon, Indore and Sagar.

Research question 2: What are the correlates of stunting for each district?

Domain 1: Pre-pregnancy phase, indicators 1-5

The prevalence of anaemia among non-pregnant women aged 15 to 49 years ranged from 41 per cent (Rewa) to 70 per cent (Mandla); over 52 per cent of non-pregnant women in half the districts were anaemic (indicator 1) (see Table 7).

Women who were married before achieving the legal age of marriage ranged from 9 per cent (Balaghat) to 54 per cent (Jhabua), with a median of 32 per cent (indicator 2). Less than 7 per cent of women in half the districts were pregnant or had their first child at 15 to 19 years of age (indicator 3). The use of modern contraceptive methods ranged from 10 per cent (Jhabua) to 70 per cent (West Nimar), with usage below 52 per cent in half the districts (indicator 4).

The percentage of acutely undernourished women, that is BMI of <18.5 kg/m^2, ranged from about 19 per cent (Bhopal, Indore, Singrauli) to 44 per cent (Sheopur) (indicator 5).

Domain 2: Pregnancy – use of health and nutrition services, indicators 6-9

In half the districts, 53 per cent of pregnant women came under the ambit of public outreach services during the first trimester. Coverage of ANC check-up in the first trimester ranged from 29 per cent (Singrauli) to 82 per cent (Indore) (indicator 6). There was loss in follow-up as only 11 per cent (Sidhi) to 76 per cent (Indore) received at least four ANC check-ups; less than 35 per cent of pregnant women in half the districts received at least four ANC check-ups (indicator 7).

Figure 11   Prevalence and estimated number of stunted children under five by district, Madhya Pradesh, 2015-2016
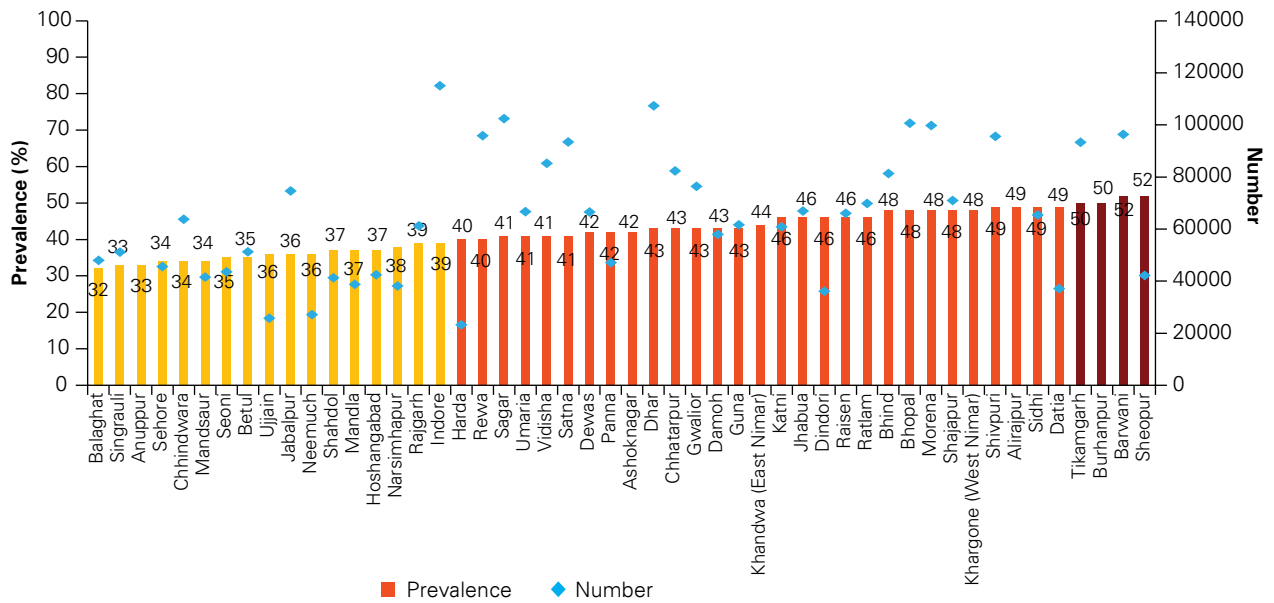
Figure 12   Prevalence of stunting among children under five by district, Madhya Pradesh, 2015-2016
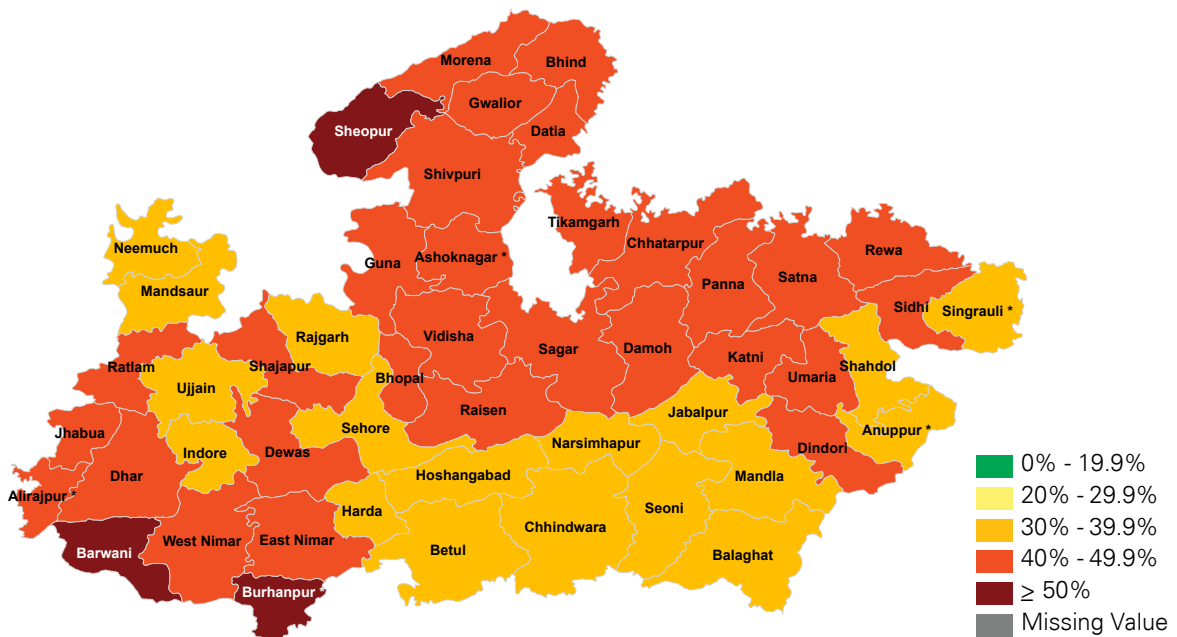
Compliance of recommended IFA consumption was abysmal with consumption ranging from 10 per cent (Sidhi) to 43 per cent (Jabalpur); IFA consumption was below 21 per cent in half the districts (indicator 8). The use of institutional delivery services ranged from 44 per cent (Singrauli) to 95 per cent (Indore) (indicator 9).

Domain 3: Infancy and early childhood – nutritional care, indicators 10-14

Timely initiation of breastfeeding ranged from 18 per cent (Bhopal and West Nimar) to 57 per cent (Shahdol), with less than 36 per cent of the babies breastfed within one hour of birth in half the districts (indicator 10). Estimates on exclusive breastfeeding in

infants under six months of age (indicator 11) and timely introduction of complementary feeding (indicator 12) were available from unweighted samples.

Just 6 per cent of children aged 6 to 23 months received an adequate diet in half the districts, that is, recommended variety and frequency of feeding along with breastmilk or supplementary milk (indicator 13).

Coverage of vitamin A supplementation ranged from 42 per cent (Vidisha) to 81 per cent (West Nimar) (indicator 14).

Domain 4: Young child – health care, indicators 15-17
Children aged 12 to 23 months who were fully immunized ranged from 23 per cent (Alirajpur) to 79 per cent (Raisen) (indicator 15). Estimates on children affected by diarrhoea receiving ORS (indicator 16) and those seeking treatment for respiratory illnesses and fever (indicator 17) were available from unweighted samples.

Domain 5: Household environmental health, indicators 18 and 19
Household access to an improved source of drinking water ranged from 56 per cent (Singrauli) to 98 per cent (Indore) (indicator 18). However, the lack of sanitation facilities was reflected in the lowest coverage of household access to improved toilet facilities at 7 per cent in Dindori and with the highest being just 74 per cent in Indore (indicator 19). Access to sanitation facilities is below 28 per cent in half the districts of the state.

Domain 6: Household food security and access to essential micronutrients, indicators 20 and 21
Household consumption of iodized salt was over 90 per cent in most districts of the state, with the lowest coverage being 72 per cent in Tikamgarh (indicator 20). Household expenditure on food to total household expenses was less than

43 per cent in half the districts and ranged from 32 per cent (Bhind) to 53 per cent (Balaghat, Barwani) (indicator 21).

Domain 7: Household poverty and socio-economic and gender factors, indicators 22-25
Households having no Census-specified assets ranged from 8 per cent (Indore) to 65 per cent (Dindori) (indicator 22). The proportion of the Scheduled Tribe population ranged from 0.4 per cent (Bhind) to 89 per cent (Alirajpur) (indicator 23).

Female literacy ranged from 9 per cent (Jhabua) to 43 per cent (Bhopal) (indicator 24). Sex ratio is a concern in most districts with the worst scenario in Bhind (837 girls to 1,000 boys) (indicator 25).

Correlation between childhood stunting and selected indicators
None of the 25 indicators were strongly correlated with childhood stunting. Only four indicators had a moderate correlation with stunting – women's marriage before legal age (indicator 2 under domain 1, r=0.31); vitamin A supplementation among children aged 9-59 months (indicator 14 under domain 3, r=-0.33); and female literacy and sex ratio (indicators 24 and 25 under domain 7, r=-0.34 and -0.29) (see Table 7). The prevalence of childhood stunting was likely to increase as the proportion of women married before legal age increased, and vitamin A supplementation among children aged 9-59 months, female literacy and sex ratio deteriorated.

Research question 3: How many years would it take to reduce the prevalence of childhood stunting by 40 per cent?
Nine out of the 45 districts for which comparable childhood stunting estimates were available across two timelines had a negative ARR, while two – Guna and Panna – demonstrated marginal improvements in reducing the prevalence of stunting.

The remaining 34 districts will achieve 40 per cent reduction in the prevalence of stunting between 2 and 30 years. Thus, 27 of the 33 districts with a positive ARR are likely to reduce the prevalence of childhood stunting by 40 per cent by 2025 (see Table 14).

MAHARASHTRA

Research question 1: Which districts contribute to the highest and lowest burden of childhood stunting?

The prevalence of childhood stunting in the 35 districts of the state ranged from 21 per cent in Mumbai (suburban) to 48 per cent in Nandurbar (see Figure 13). Nandurbar also had the highest proportion of tribal population among all districts at 69 per cent.

While none of the districts had a prevalence over 50 per cent, 11 districts had a prevalence between 40 per cent and 50 per cent. The coastal and southern region had a lower prevalence of stunting compared to the rest of the state (see Figure 14).

Just five districts – Buldana, Jalna, Nandarbar, Pune and Ratnagiri – accounted for one third (33 per cent) of the estimated 3.2 million stunted children in the state. Each of these districts had over 150,000 stunted children aged under five years, with the highest number in Jalna (285,153). The district with the lowest number was Solapur (12,244).

Research question 2: What are the correlates of stunting for each district?

Domain 1: Pre-pregnancy phase, indicators 1-5

The prevalence of anaemia among non-pregnant women aged 15 to 49 years ranged from 35 per cent (Bid, Washim) to 60 per cent (Nandurbar); nearly 47 per cent of non-pregnant women in half the districts were anaemic (indicator 1) (see Table 8).

Women who were married before achieving the legal age of marriage ranged from 5 per cent (Bhandara) to 51 per cent (Bid), with a median of 24 per cent (indicator 2). Less than 8 per cent of women in half the districts were either pregnant or had their first child at 15 to 19 years of age (indicator 3).

The use of modern contraceptive methods ranged from 38 per cent (Ratnagiri) to 76 per cent (Wardha), with usage above 65 per cent in half the districts (indicator 4).

The percentage of acutely undernourished women, that is BMI of <18.5 kg/m^2, ranged from about 15 per cent (Mumbai suburban) to 42 per cent (Nandurbar) (indicator 5).

Domain 2: Pregnancy – use of health and nutrition services, indicators 6-9

Less than 66 per cent of pregnant women in half the districts came under the ambit of public outreach services during the first trimester. Coverage of ANC check-up in the first trimester ranged from 54 per cent (Nandurbar) to 88 per cent (Pune and Nagpur) (indicator 6). The follow-up was good as more women received at least four ANC check-ups compared to those reached in the first trimester, with a median of 73 per cent (indicator 7).

Compliance of recommended IFA consumption in pregnancy ranged from 16 per cent (Dhule) to 70 per cent (Gondiya) (indicator 8). Use of institutional delivery services was over 90 per cent in most districts; Nandurbar had the lowest coverage at 56 per cent (indicator 9).

Domain 3: Infancy and early childhood – nutritional care, indicators 10-14

Timely initiation of breastfeeding ranged from 30 per cent (Buldana) to 70 per cent (Gondiya), with 58 per cent of the babies breastfed within one hour of birth in half the districts (indicator 10). Data on exclusive breastfeeding in infants under six months

Figure 13   Prevalence and estimated number of stunted children under five by district, Maharashtra, 2015-2016
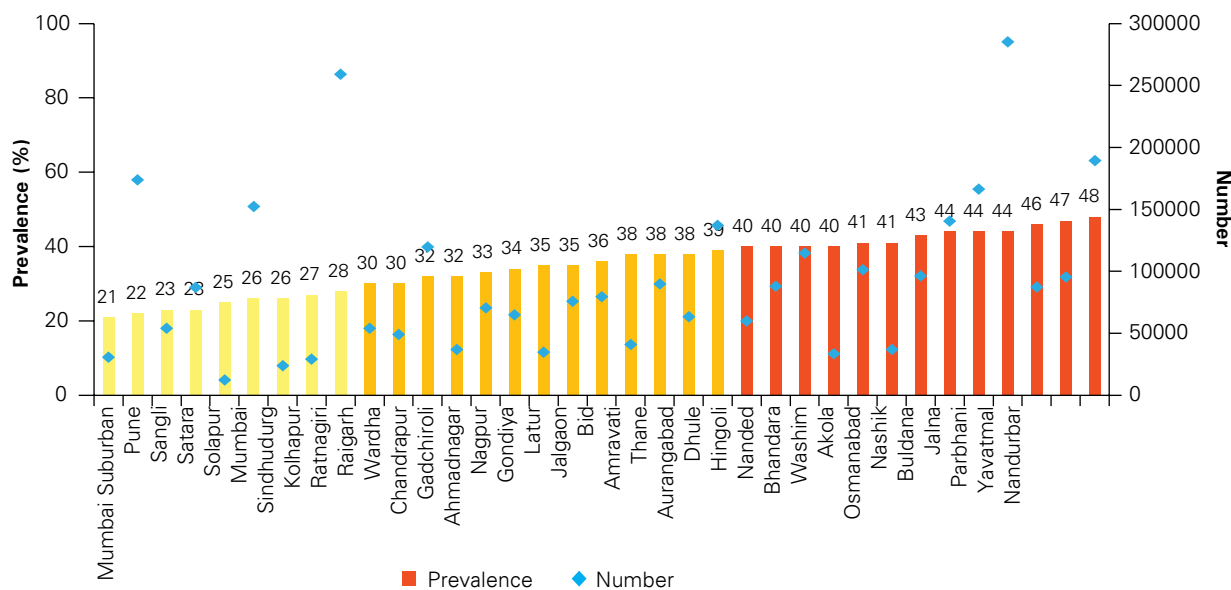
Figure 14   Prevalence of stunting among children under five by district, Maharashtra, 2015-2016
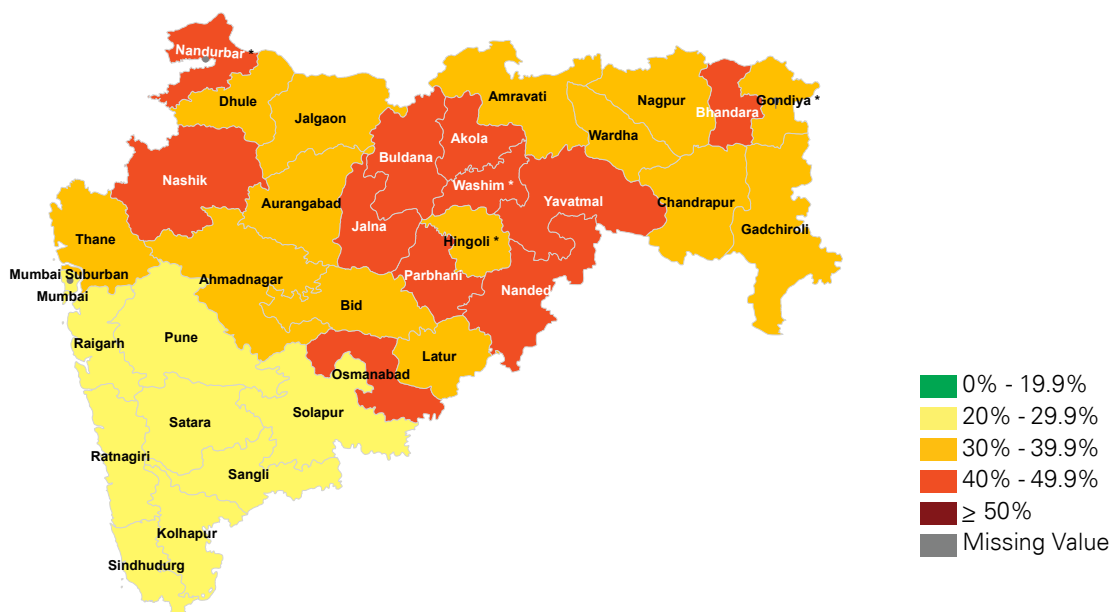
of age (indicator 11) and timely introduction of complementary foods (indicator 12) were from unweighted samples.

Very few children aged 6 to 23 months received an adequate diet, that is, recommended variety and frequency of feeding along with breastmilk or supplementary milk, across all districts of Maharashtra (indicator 13).

Coverage of Vitamin A supplementation ranged from 60 per cent (Pune) to 87 per cent (Sindhudurg) (indicator 14).

Domain 4: Young child – health care, indicators 15-17

Data on all basic health care indicators were from unweighted samples (indicators 15, 16 and 17).

Domain 5: Household environmental health, indicators 18 and19

Household access to an improved source of drinking water was high for many districts in Maharashtra, with a median coverage of 89 per cent; Jalna was the only district with coverage below 75 per cent (indicator 18).

Households with access to improved toilet facilities ranged from a low of 27 per cent (Mumbai suburban) to 78 per cent (Sindhudurg) (indicator 19). Access to sanitation facilities was below 47 per cent in half the districts of the state.

Domain 6: Household food security and access to essential micronutrients, indicators 20 and 21

Household consumption of iodized salt was over 90 per cent in almost all districts of the state (indicator 20). Household expenditure on food to total expenses was less than 43 per cent in half the districts, and lowest in Gadchiroli and Nanded at 35 per cent (indicator 21).

Domain 7: Household poverty and socio-economic and gender factors, indicators 22-25

Households having no Census-specified assets ranged from 2.2 per cent (Mumbai suburban) to 54.8 per cent (Nandurbar) (indicator 22). The proportion of Scheduled Tribe population was low across the districts of Maharashtra, with a median of 7 per cent, the exceptions being Nandurbar (69 per cent), Gadchiroli (39 per cent), Dhule (32 per cent) and Nashik (27 per cent) (indicator 23).

Less than 40 per cent of women had completed 10 or more years of schooling in half the districts (indicator 24). Sex ratio was a concern in all the districts with the worst scenario in Jalgaon (842 girls to 1,000 boys) (indicator 25).

Correlation between childhood stunting and selected indicators

Only one out of the 25 indicators, namely, households with no Census-specified assets was strongly correlated with childhood stunting (indicator 22 under domain 7, r=-0.20). Childhood stunting was likely to increase as households with no Census-specified assets, a proxy indicator for poverty, increased.

Eleven indicators were moderately correlated with childhood stunting. These included pre-pregnancy, pregnancy, environment and governance-related indicators (see Table 8). Of these, only one, namely the use of modern contraceptive methods had a counterintuitive correlation with childhood stunting (indicator 4 under domain 1, r=0.37).

Research question 3: How many years would it take to reduce the prevalence of childhood stunting by 40 per cent?

Out of the 35 districts, 13 had a positive ARR from 2013-2014 to 2015-2016, one (Ratnagiri) of which had a marginal improvement in the prevalence of stunting. The other districts with a positive ARR will reduce the prevalence of childhood stunting by 40 per cent in the next 2 to 24 years (see Table 15), but only 11 districts will achieve this by 2025.

TAMIL NADU

Research question 1: Which districts contribute to the highest and lowest burden of childhood stunting?

The prevalence of childhood stunting ranged from 17 per cent in Kanniyakumari district to 37 per cent in Ariyalur district.

Four of the 32 districts – Chennai, Thiruchirappali, Vellore and Viluppurum –

Figure 15   Prevalence and estimated number of stunted children under five by district, Tamil Nadu, 2015-2016
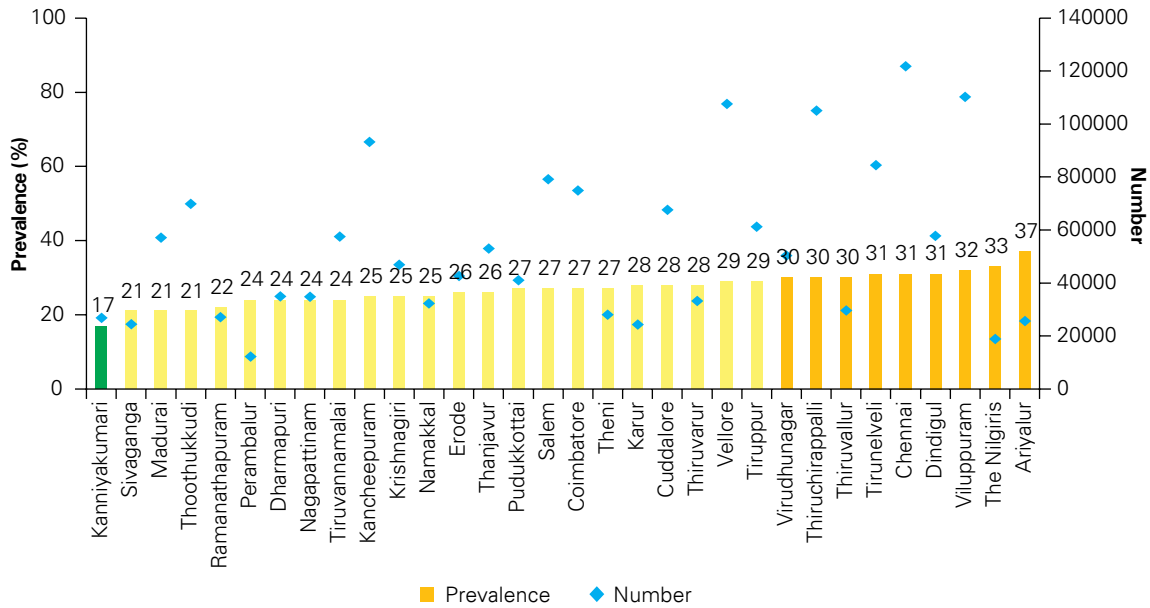
Figure 16   Prevalence of stunting among children under five by district, Tamil Nadu, 2015-2016
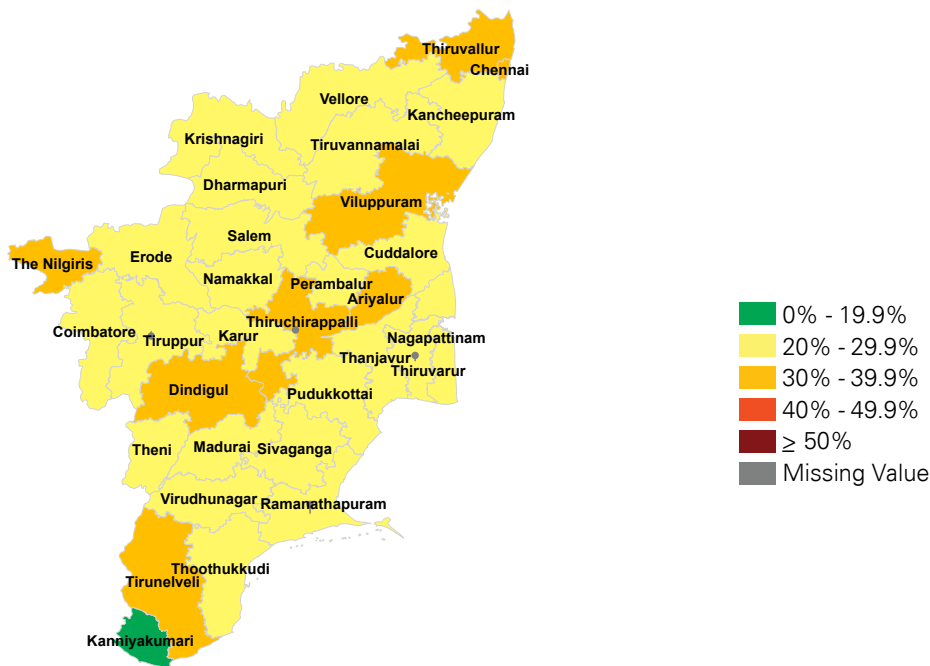
accounted for one quarter (25 per cent) of the estimated 444,665 stunted children in Tamil Nadu. Each of these districts had over 100,000 stunted children, with Chennai district having the highest number at 121,740 (see Figure 15). The district with the lowest number of stunted children was Perambular (12,185).

Research question 2: What are the correlates of stunting for each district?

Domain 1: Pre-pregnancy phase, indicators 1-5

The prevalence of anaemia among non-pregnant women aged 15 to 49 years

ranged from 46 per cent (Kanniyakumari) to 66 per cent (Thiruchirappalli); over 56 per cent of non-pregnant women in half the districts were anaemic (indicator 1) (see Table 9).

Women who were married before achieving the legal age of marriage ranged from 6 per cent (Kanniyakumari) to 28 per cent (Dharmapuri), with a median of 15 per cent (indicator 2). Teenage pregnancy was low in Tamil Nadu with the proportion of women pregnant or having had their first child at 15 to 19 years of age ranging from less than 1 percent (Chennai) to 12 per cent (Madurai) (indicator 3). The use of modern contraceptive methods ranged from 23 per cent (Virudhunagar) to 65 per cent (Coimbatore), with usage above 50 per cent in half the districts (indicator 4).

The percentage of acutely undernourished women, that is BMI of <18.5 kg/m^2, ranged from about 9 per cent (Chennai) to 24 per cent (Pudukkottai) (indicator 5).

Domain 2: Pregnancy – use of health and nutrition services, indicators 6-9
Over 60 per cent of pregnant women in half the districts came under the ambit of public outreach services during the first trimester. Coverage of ANC check-up in the first trimester ranged from 40 per cent (Virudhunagar) to 85 per cent (Tiruppur) (indicator 6). The state caught up in reaching pregnant women as the coverage of at least four ANC check-ups ranged from 66 per cent (Virudhunagar) to 93 per cent (Vellore) (indicator 7).

Compliance of recommended IFA consumption in pregnancy ranged from 37 per cent (Virudhunagar) to 81 per cent (Krishnagiri) (indicator 8). Usage of **institutional delivery** services was almost universal with a median of 99 per cent (indicator 9).

Domain 3: Infancy and early childhood – nutritional care, indicators 10-14
Timely initiation of breastfeeding ranged from 34 per cent (Perambalur) to 81 per cent (Erode), with less than 50 per cent of babies breastfed within one hour of birth in half the districts (indicator 10). Data on exclusive breastfeeding in infants under six months of age (indicator 11) and timely introduction of complementary foods (indicator 12) were from unweighted samples.

Less than 32 per cent of children aged 6 to 23 months received an adequate diet in half the districts, that is, recommended variety and frequency of feeding along with breastmilk or supplementary milk (indicator 13).

Coverage of Vitamin A supplementation among children ranged from 55 per cent (Ramanathapuram) to 90 per cent (Tiruppur) (indicator 14).

Domain 4: Young child – health care, indicators 15-17
Data on all basic health care indicators were from unweighted samples (indicators 15, 16 and 17).

Domain 5: Household environmental health, indicators 18 and 19
Household access to an improved source of drinking water was relatively high in Tamil Nadu, ranging from 76 per cent (Ramanathapuram) to 99 per cent (Thanjavur) (indicator 18). Households with access to improved toilet facilities ranged from 28 per cent (Ariyalur) to 86 per cent (Kanniyakumari) (indicator 19). Access to sanitation facilities was below 48 per cent in half the districts of the state.

Domain 6: Household food security and access to essential micronutrients, indicators 20 and 21
Household consumption of iodized salt ranged from 55 per cent (Tirunelveli) to 96 per cent (Chennai) (indicator 20). Household expenditure on food to total household expenses was less than 42 per cent in half the districts (indicator 21).

Domain 7: Household poverty and socio-economic and gender factors, indicators 22-25

Households having no Census-specified assets ranged from 2 per cent (Chennai) to 16 per cent (Salem) (indicator 22). The proportion of Scheduled Caste population ranged from 4 per cent (Kanniyakumari) to 34 per cent (Thiruvarur) (indicator 23).

Almost 50 per cent of women had completed 10 or more years of schooling in half the districts (indicator 24). Sex ratio was a concern in all the districts with the worst scenario in Cuddalore (896 girls to 1,000 boys) (indicator 25).

Correlation between childhood stunting and selected indicators

None of the 25 indicators had a strong correlation with stunting. Three indicators had a moderate correlation – anaemia among non-pregnant women (indicator 1 under domain 1, r=0.37); vitamin A supplementation (indicator 14 under domain 3, r=0.36); and Scheduled Caste population (indicator 23 under domain 7, r=0.42). Of these, the correlation between stunting and vitamin A coverage was counterintuitive (see Table 9).

TELANGANA

Research question 1: Which districts contribute to the highest and lowest burden of childhood stunting?

The prevalence of stunting ranged from 16 per cent in Hyderabad to 38 per cent in Adilabad. None of the 13 districts in the state had a prevalence higher than 40 per cent, however, there were four districts with a prevalence between 30 per cent and 40 per cent – Adilabad, Mahbubnagar, Medak and Nizamabad.

The prevalence of childhood stunting in the districts of Telangana was among the lowest in all the study districts. It is the only state of the eight states covered in this report where none of the districts had a prevalence of 40 per cent or higher. Hyderabad, located in central Telangana, was the only district with a prevalence below 20 per cent among all districts covered in this report (see Figure 17).

Just two districts, that is, Rangareddy and Mahbubnagar, accounted for about one third (32 per cent) of the estimated 776,500 stunted children in the state. Each of these districts had over 100,000 stunted children aged under five years, with the highest number in Mahbubnagar (131,384). The district with the lowest number of stunted children was Khammam (50,097).

Research question 2: What are the correlates of stunting for each district?

Domain 1: Pre-pregnancy phase, indicators 1-5

The prevalence of anaemia among non-pregnant women aged 15 to 49 years ranged from 50 per cent (Mahbubnagar) to 71 per cent (Khammam); over 56 per cent of non-pregnant women in half the districts were anaemic (indicator 1) (see Table 10).

The proportion of women who married before achieving the legal age of marriage ranged from about 10 per cent (Hyderabad) to 46 per cent (Mahbubnagar), with a median of 29 per cent (indicator 2). Nearly 11 per cent of women in half the districts were either pregnant or had their first child at 15 to 19 years of age (indicator 3).

The use of modern contraceptive methods ranged from 39 per cent (Karimnagar) to 69 per cent (Khammam), with usage above 50 per cent in half the districts (indicator 4).

The percentage of acutely undernourished women, that is BMI of <18.5 kg/m², ranged from about 13 per cent (Hyderabad) to 35 per cent (Adilabad) (indicator 5).

Figure 17 Prevalence and estimated number of stunted children under five by district, Telangana, 2015-2016
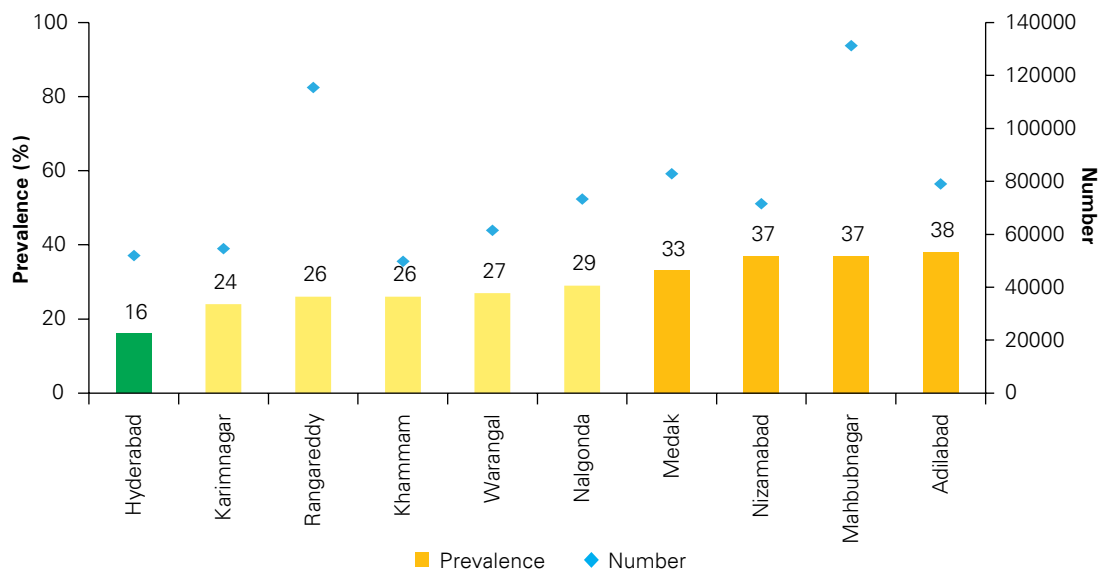
Figure 18 Prevalence of stunting among children under five by district, Telangana, 2015-2016
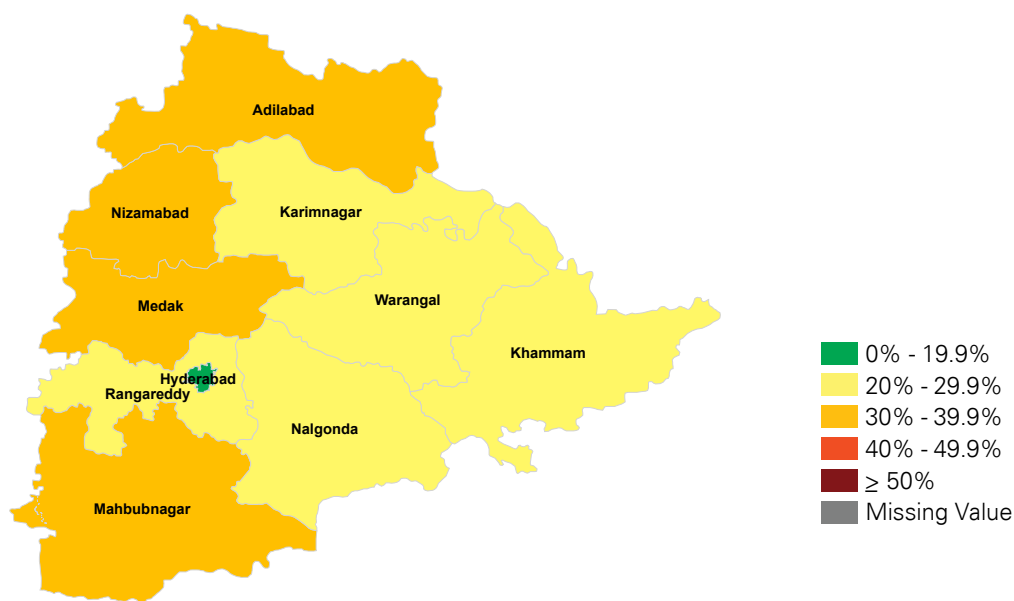
Domain 2: Pregnancy – use of health and nutrition services, indicators 6-9

Over 80 per cent of pregnant women in half the districts came under the ambit of public outreach services during the first trimester. Coverage of ANC check-up in the first trimester ranged from 71 per cent (Nizamabad) to 90 per cent (Hyderabad)

(indicator 6). There was loss to follow-up as coverage was only 60 per cent (Mahbubnagar) to 86 per cent (Hyderabad) of those receiving at least four ANC check-ups (indicator 7).

Compliance of recommended IFA consumption in pregnancy ranged from about 36 per cent (Medak, Nalgonda) to

73 per cent (Hyderabad) (indicator 8). Usage of institutional delivery services ranged from 71 per cent (Adilabad) to 97 per cent (Hyderabad) (indicator 9).

Domain 3: Infancy and early childhood – nutritional care, indicators 10-14

Timely initiation of breastfeeding ranged from 21 per cent (Adilabad) to 50 per cent (Khammam), with less than 39 per cent of the babies breastfed within one hour of birth in half the districts (indicator 10). Data on exclusive breastfeeding in infants under six months of age (indicator 11) and timely introduction of complementary foods (indicator 12) were from unweighted samples.

Less than 7 per cent of children aged 6 to 23 months received an adequate diet in half the districts, that is, recommended variety and frequency of feeding along with breastmilk or supplementary milk (indicator 13).

As many as 90 per cent of babies received vitamin A supplementation in Warangal (indicator 14).

Domain 4: Young child – health care, indicators 15-17

Data on all basic health care indicators were from unweighted samples (indicator 15, 16 and 17).

Domain 5: Household environmental health, indicators 18 and19

Household access to an improved source of drinking water was challenging for many districts in Telangana with coverage ranging from 54 per cent (Nalgonda) to 90 per cent (Hyderabad) (indicator 18).

Household with access to improved toilet facilities ranged from a low of 31 per cent (Adilabad) to 73 per cent (Hyderabad) (indicator 19). Access to sanitation facilities was below 50 per cent in half the districts of the state.

Domain 6: Household food security and access to essential micronutrients, indicators 20 and 21

Household consumption of iodized salt was over 90 per cent in most districts of the state, the exception being Mahbubnagar at 80 per cent (indicator 20). Household expenditure on food to total household expenses (indicator 21) was less than 44 per cent in half the districts.

Domain 7: Household poverty and socio-economic and gender factors, indicators 22-25

Households having no Census-specified assets ranged from 18 per cent (Rangareddy) to 32 per cent (Adilabad) (indicator 22). The proportion of Scheduled Tribe population was less than 8 per cent in half the districts, Khammam being the only district with a relatively high proportion at 27 per cent (indicator 23).

Less than 35 per cent of women in half the districts had completed 10 or more years of schooling (indicator 24). Sex ratio was a concern in all the districts with the worst scenario in Hyderabad (914 girls to 1,000 boys) (indicator 25).

Correlation between childhood stunting and selected indicators

Ten out of the 25 indicators, namely women married before legal age and acute undernutrition among women (indicators 2 and 5 under domain 1, r=0.71, 0.91); pregnant women receiving ANC check-up in the first trimester, receiving at least four ANC check-ups, consuming recommended dosage of IFA tablets and institutional deliveries (indicators 6-9 under domain 2, r=-0.81,-0.83,-0.66, -0.74); children receiving adequate diet at 6-23 months of age (indicator 13 under domain 3, r=-0.60); households with access to improved sanitation facility (indicator 19 under domain 5, r=-0.90); household expenditure on food to total expenses

(indicator 21 under domain 6, r=-0.64); and female literacy (indicator 24 under domain 7, r=-0.86), were strongly correlated with childhood stunting.

Six indicators were moderately correlated with childhood stunting. Some of the correlations, such as that of timely initiation of breastfeeding and increased prevalence of childhood stunting, were counterintuitive (see Table 10).

Research question 3: How many years would it take to reduce the prevalence of childhood stunting by 40 per cent?

Only two out of the 10 districts of Telangana, namely Hyderabad and Rangareddy, had a positive ARR from 2013-2014 to 2015-2016. While Hyderabad is likely to reduce the prevalence of childhood stunting by 40 per cent in 2017, Rangareddy will take over half a century to achieve that at the current ARR (see Table 16).

WEST BENGAL

Research question 1: Which districts contribute to the highest and lowest burden of childhood stunting?

The prevalence of childhood stunting varied widely in the 19 districts of the state, ranging from 23 per cent in Nadia to 46 per cent in Puruliya (see Figure 19). In four districts – Birbhum, Murshidabad, Puruliya and Uttar Dinajpur – the prevalence ranged between 40 per cent and 50 per cent (see Figure 19).

The prevalence of childhood stunting was lower in the southern regions of West Bengal than in the central and northern belt (see Figure 20).

Just five districts – Maldah, North and South 24 Parganas, Bardhaman and Murshidabad – accounted for 42 per cent of the estimated 2.4 million stunted children in the state.

Each of these districts had over 150,000 stunted children aged under five years, with Murshidabad having the highest number (296,745). The district with the lowest number of stunted children was Darjiling (37,820).

Research question 2: What are the correlates of stunting for each district?

Domain 1: Pre-pregnancy phase, indicators 1-5

The prevalence of anaemia among non-pregnant women aged 15 to 49 years was high across all the districts, ranging from 47 per cent (Kolkata) to 80 per cent (Puruliya); nearly 64 per cent of non- pregnant women across half the districts were anaemic (indicator 1) (see Table 11).

The proportion of women who were married before achieving the legal age of marriage also varied by district, ranging from 13 per cent (Kolkata) to 55 per cent (Maldah), with the median estimated at 40 per cent (indicator 2). In half of the districts, over 19 per cent of women were either pregnant or had their first child at 15 to 19 years of age, with Murshidabad having the highest prevalence (30 per cent) (indicator 3).

The use of modern contraceptive methods ranged from 44 per cent (Uttar Dinajpur) to 69 per cent (Bankura), with usage being 58 per cent in half of the districts (indicator 4).

The proportion of acutely undernourished women, that is BMI of <18.5 kg/m^2, ranged from as low as 7 per cent (Kolkata) to as high as 48 per cent (Puruliya) (indicator 5).

Domain 2: Pregnancy – use of health and nutrition services, indicators 6-9

About 53 per cent of pregnant women in half the districts came under the ambit of public outreach services during the first trimester. Coverage of ANC check-up in the first trimester ranged from 37 per cent (Uttar Dinajpur) to 81 per cent (Darjiling), with a

Figure 19   Prevalence and estimated number of stunted children under five by district, West Bengal, 2015-2016
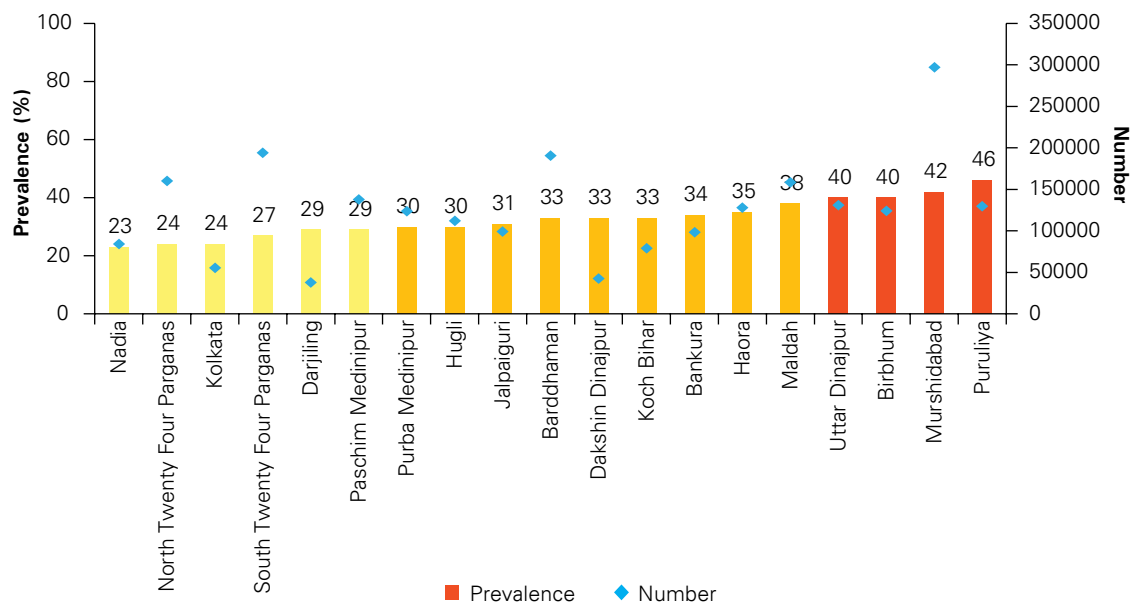
Figure 20   Prevalence of stunting among children under five by district, West Bengal, 2015-2016
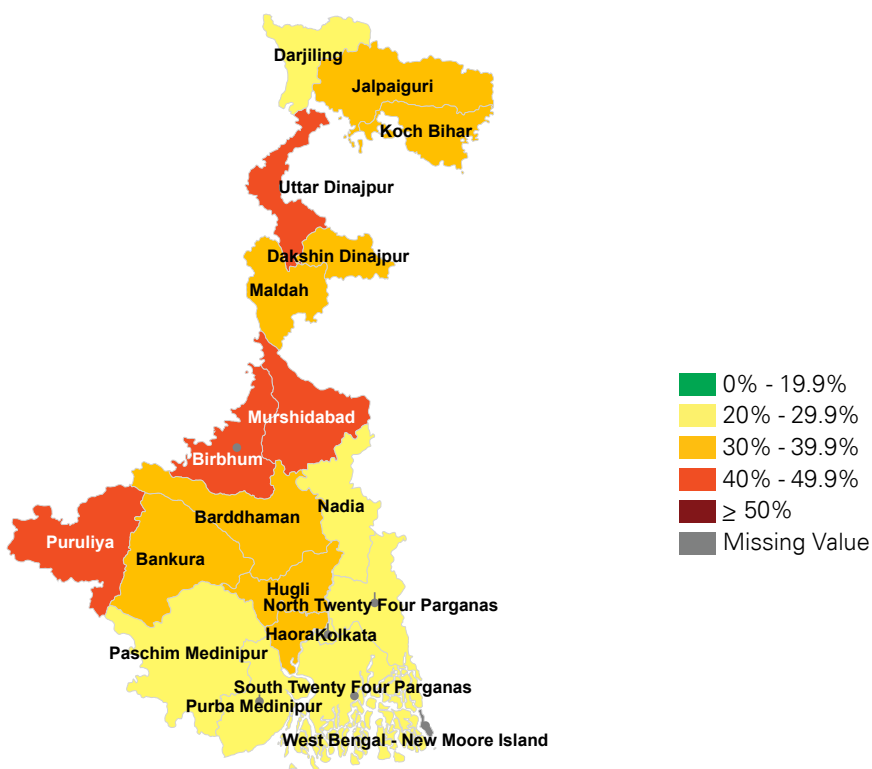
median of 52 per cent (indicator 6). There was good catch-up, as more women received at least four ANC check-ups than those reached during the first trimester; the median was estimated at 78 per cent (indicator 7).

Compliance of recommended IFA consumption in pregnancy remained relatively low across the districts, ranging from as low as 6 per cent (Uttar Dinajpur) to only 47 per cent (Bankura) (indicator 8). On the other

hand, use of institutional delivery services was relatively high, ranging from 47 per cent (Uttar Dinajpur) to 95 per cent (Kolkata) (indicator 9).

Domain 3: Infancy and early childhood – nutritional care, indicators 10-14

Timely initiation of breastfeeding ranged from 28 per cent (Purba Medinipur) to 65 per cent (Barddhaman), with less than 46 per cent of babies breastfed within one hour of birth in half of the districts (indicator 10). Data on exclusive breastfeeding in infants under six months of age (indicator 11) and timely introduction of complementary foods at 6-8 months (indicator 12) were from unweighted samples.

Less than 17 per cent of children aged 6 to 23 months received an adequate diet in half the districts, that is, recommended variety and frequency of feeding along with breastmilk or supplementary milk (indicator 13).

Coverage of vitamin A supplementation ranged from 49 per cent (Uttar Dinajpur) to 81 per cent (Bankura) (indicator 14).

Domain 4: Young child – health care, indicators 15-17

Data on all basic health care indicators were from unweighted samples (indicators 15, 16 and 17).

Domain 5: Household environmental health, indicators 18 and 19

Household access to an improved source of drinking water was high for many districts in West Bengal, with median coverage of 97 per cent; Darjiling was the only district with coverage below 75 per cent (indicator 18). However, household access to improved toilet facilities varied widely, ranging from as low as 12.3 per cent (Puruliya) to 69 per cent (Nadia and North 24 Parganas) (indicator 19). Across half the districts in the state, household access to sanitation facilities was below 50 per cent.

Domain 6: Household food security and access to essential micronutrients, indicators 20 and 21

Household use of iodized salt was over 90 per cent in almost all the districts in the state (indicator 20). Household food expenditure to total household expenses was less than 50 per cent in half the districts, with the state capital, Kolkata, having the lowest proportion of expenditure on food at 38 per cent (indicator 21).

Domain 7: Household poverty and social and gender factors, indicators 22-25

Households having no Census-specified assets ranged from 3.6 per cent (Kolkata) to 36 per cent (Maldah) (indicator 22). The proportion of the most marginalized groups, Scheduled Tribes, was over 50 per cent in Jalpaiguri and Koch Bihar (indicator 23).

In half of the districts, less than 23 per cent of women had completed 10 or more years of schooling (indicator 24). Sex ratio was a concern in all the districts with the worst scenario in Kolkata (933 girls to 1,000 boys) (indicator 25).

Correlation between childhood stunting and selected indicators

Three out of the 25 indicators were strongly correlated with stunting – acute undernutrition in women (indicator 5 under domain 1, r=0.74); household access to improved sanitation facilities (indicator 19 under domain 5, r=-0.74); and women with 10 years or more of schooling (indicator 24 under domain 7, r=-0.65).

Further, nine indicators were moderately correlated with stunting. These were three indicators under domain 1 (anaemia in non-pregnant women aged 15 to 49 years, r=0.40; women married before achieving legal age

of marriage, r=0.38; and women either pregnant or had first child at 15 to 19 years of age, r=0.44), four indicators under domain 2 (ANC check-up within first trimester, r=-0.40; women received at least four ANC check-ups, r=-0.52; women consumed recommended IFA supplements, r=-0.30; and use of institutional delivery services, r=-0.48), one indicator under domain 6 (household food expenditure, r=0.50), and one under domain 7 (households with no Census-specified assets, r=0.50) (see Table 11).

Research question 3: How many years would it take to reduce the prevalence of childhood stunting by 40 per cent?

Out of the 19 districts of West Bengal, 14 had a positive ARR from 2013-2014 to 2015-2016, of which Barddhaman had the least improvement. With the exception of Barddhaman, the other districts with a positive ARR will reduce the prevalence of childhood stunting by 40 per cent in the next 2 to 14 years (see Table 17).

DISCUSSION

Burden of childhood stunting is unequally distributed across districts and states

There is a 21 percentage point difference in the prevalence of childhood stunting between Bihar (48 per cent), the state with the highest prevalence, and Telangana, the state with the lowest prevalence (27 per cent).

This gap increases to over 40 percentage points when districts with the highest and lowest prevalence of childhood stunting are compared – 57 per cent in Sitamarhi (Bihar) and 16 per cent in Hyderabad (Telangana). The variation in stunting within states ranges from 20 per cent to 25 per cent across districts; the exception being Karnataka where the difference is exceptionally high at 37 per cent.

The prevalence of childhood stunting is above 40 per cent in 92 out of the total 228 districts, of which 36 districts are in Bihar, 32 in Madhya Pradesh, 11 in Maharashtra, nine in Karnataka, and four in West Bengal. Among these 92 districts, there are 19 where childhood stunting is over 50 per cent. These districts are distributed across three states – Bihar (13), Karnataka (3) and Madhya Pradesh (3).

Bihar also has the highest absolute burden of childhood stunting with 6.1 million stunted children and Tamil Nadu has the lowest with 444,665 stunted children. Nearly 75 per cent of the total burden of childhood stunting of about 19 million stunted children in the eight study states is concentrated in just four states – Bihar, Karnataka, Madhya Pradesh and Maharashtra.

There are 10 districts with over 250,000 stunted children each, with seven of these districts located in Bihar, two in Maharashtra and one in West Bengal. The 10 districts are Gaya, Madhubani, Muzaffarpur, Patna, Purba Champaran, Samastipur and Sitamarhi (Bihar), Ratnagiri and Jalna (Maharashtra) and Murshidabad (West Bengal).

Purba Champaran district in Bihar has the highest number of stunted children of all districts and is the only one with over 300,000 stunted children aged under five years. Nonetheless, the pace of decline is favourable in the districts of Bihar to reduce the prevalence of stunting by 40 per cent by 2025, with 15 of the 38 districts likely to achieve it, compared with only one in the 13 districts of Telangana.

This does not take away from the fact that the current scenario in Bihar is grim and requires immediate attention, with the prevalence of stunting above 30 per cent in all districts, above 40 per cent in 36 of the 38 districts and above 50 per cent in 13 of the 38 districts.

Districts and states with higher prevalence perform consistently low on pre-pregnancy and pregnancy indicators

Both Bihar and Madhya Pradesh, states with a prevalence of childhood stunting higher than 40 per cent, have very high prevalence of anaemia and acute undernutrition among women of reproductive age. Adolescent marriages are rampant in Bihar and Madhya Pradesh, with over 50 per cent of the girls married before the age of 18 years in some of the districts – 57 per cent in Supaul (Bihar) and 54 per cent in Jhabua (Madhya Pradesh).

In Karnataka and Maharashtra, adolescent marriages and acute undernutrition among women are higher in the 20 districts where childhood stunting is over 40 per cent than in districts with a lower prevalence of stunting. The situation is worsened by the low usage of modern contraceptives by eligible couples, being as low as 10 percent in Jhabua district in Madhya Pradesh.

Timely care and early inclusion in nutrition safety nets in pregnancy are critical to optimal fetal growth and development [UNDP, 2002]. The reach of maternal care services is also low in states with a higher prevalence of childhood stunting. Median coverage of receiving at least four antenatal care visits is only 14 per cent in Bihar and 35 per cent in Madhya Pradesh, compared to 82 per cent in Tamil Nadu.

There is convincing evidence on the effectiveness of antenatal IFA supplementation on improving birth weight and recent evidence suggests that consumption of recommended levels of IFA during pregnancy can lower the risk of stunting in children under two [Nisar, 2016]. IFA compliance in pregnancy is very low in most states and particularly in Bihar, ranging from a mere 3 per cent in Madhepura district to 21 per cent in Patna district.

Findings endorse the need for a multisectoral strategy to reduce childhood stunting

A multisectoral strategy is needed to focus on pre-pregnancy and maternal care and nutrition, access to sanitation services and reducing socio-economic vulnerabilities through increased access to financial resources and women's education.

Only seven of the 25 indicators – women's marriage before 18 years of age; acute undernutrition among women; compliance to recommended IFA in pregnancy; institutional deliveries; access to improved sanitation facilities; having no Census-specified assets; and female literacy – are more commonly correlated with childhood stunting across the eight states. Six out of the eight states have a positive correlation between prevalence of childhood stunting and proportion of women being married before the legal age of 18 years, while five of the eight states have a positive correlation to other indicators.

Telangana, with moderate to strong correlations between the prevalence of childhood stunting and 15 of the 25 selected indicators, has the highest number of correlations; further, 10 of these 15 correlations are strong. With these 10 indicators having a significant impact on prevalence of childhood stunting in Telangana, it is evident that there are multiple causes to childhood stunting, as in other states where there are fewer dominant indicators.

There is considerably low coverage of nutrition-sensitive interventions of access to improved sanitation facilities and women's education, which have emerged as the most commonly correlated indicators of childhood stunting. Female literacy is a concern across all eight states with the median ranging from 20 per cent in Madhya Pradesh to 49 per cent in Tamil Nadu.

Similarly, access to improved sanitation facilities is challenging in all states, with median household coverage of 25 per cent in Bihar to 55 per cent in Karnataka. There may be lessons from the relatively higher use of institutional delivery services, possibly linked to incentivization of these services to improve reach of education and sanitation services.

Evidence-based interventions that have low coverage need to be included in the strategy to reduce stunting

There are 10 essential nutrition interventions that have the potential to reduce the current total of deaths in children under five by 15 per cent and stunting by 20 per cent if the coverage is 90 per cent [Bhutta, 2013]. These include timely initiation of breastfeeding (within one hour of birth); exclusive breastfeeding (for first six months); timely introduction of complementary feeding (after six months); age-appropriate complementary feeding; adequate complementary feeding in terms of quality, quantity and frequency

for children in age group 6-24 months; safe handling of complementary foods and hygienic complementary feeding practices; adequate feeding during and after illness; immunization and micronutrient supplementation (vitamin A, iron); adequate feeding for severely undernourished children; and adequate nutrition for adolescent girls and women of reproductive age.

Disaggregated district data are available for four indicators, all of which have low coverage across states. The unavailability of data on infant and young child feeding and health care across most districts is a challenge for developing an informed strategy to reduce stunting.

LIMITATIONS

This analysis is based on the most recent district-level data available through NFHS-4 2015-2016. However, it is based on pooled estimates for each district as the raw dataset is currently unavailable. This limited the results of the bivariate correlations, which further limited identification of confounding variables and interactions. Consequently, a causal relationship between childhood stunting and the selected 25 indicators could not be established.

In addition, the annual rate of reduction for childhood stunting is calculated for a time frame of two or three years and using estimates from two surveys with different sampling techniques (NFHS-4 and AHS 2012-2013 or DLHS 2013-2014). While both surveys provide population estimates, the Annual Health Survey is a district-level survey with a much larger sample size of over 4 million households, with clinical, anthropometric and biochemical components covering 374,000 households, compared with approximately 580,000 households in NFHS-4 [Ministry of Home Affairs, 2012-2013; IIPS, 2014]. Finally, declines in stunting are unlikely to be linear throughout a time period as these tend to plateau after some years.

CONCLUSION

This report presents a timely analysis of NFHS-4 and related data from the eight states where UNICEF has programmatic interest. As availability of the complete NFHS–4 dataset will take time, it is prudent that states where the data have become available should utilize them in their strategy to address malnutrition. It is the first time that NFHS has released district-level estimates of various indicators of childhood malnutrition and other related data. Stunting is one of these indicators, while underweight and wasting are the other two facets of child malnutrition.

The analysis highlights the importance of a few variables as being critical drivers of stunting. It also brings out, district-wise, the parameters in which a district is doing well and where it is not. This report is an important programme input as it prioritizes areas for a district where more attention is needed and where ongoing efforts need to be sustained. It will be very useful as a programme tool for the district and state. In addition, the neat separation of various indicators in four life-cycle domains – pre-pregnancy, pregnancy, post-pregnancy and childhood – facilitates a cross linkage with various government schemes and other civil society interventions that may be happening in isolation.

Bihar and Madhya Pradesh with a prevalence of over 40 per cent in most districts emerge as the states where reducing childhood stunting is an immediate priority. Three districts in Karnataka with a prevalence of childhood stunting over 50 per cent need special attention within the state.

The findings suggest a multi-pronged approach with a priority focus on the pre-pregnancy and pregnancy phases of the life cycle, coupled with access to at least three services, namely improved sanitation facilities, livelihood opportunities and women's education in most states.

Districts with a higher burden of stunting and higher proportion of socially excluded groups – Scheduled Tribes and Schedules Castes – need enhanced focus on women's nutrition, access to antenatal health care, increased access to improved sanitation facilities and better income generation opportunities. At the same time, continued progress is needed to scale up all 10 essential nutrition interventions, although the lack of some of them has not been strongly correlated with childhood stunting partly because of small sample sizes or limited variation.

The policy and programme framework in these eight states supports interventions for maternal care, but the pre-pregnancy phase has been a missed opportunity for targeting nutrition interventions when it is most effective in impacting childhood stunting. It is noteworthy that acute undernutrition among women is the most commonly correlated indicator with the prevalence of childhood stunting, showing a positive correlation in six of the eight states.

The disaggregated estimates of the 25 indicators presented in this report can serve as a tool for district managers to investigate and prioritize interventions that are likely to be most effective in reducing childhood stunting in their district. However, the bivariate analysis provides only a preview to the complex web of interrelations among the drivers of childhood stunting, which can only be comprehensively understood through a multivariate analysis. The latter will be undertaken as soon as raw data for NFHS-4 become available.

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TABLES

Table 1   List of indicators used for analysing drivers of childhood stunting

Domain		Indicator	Source
1	1	Non-pregnant women aged 15-49 years who are anaemic	NFHS-4
	2	Women aged 20-24 years married before 18 years of age	NFHS-4
	3	Women aged 15-19 years who were already mothers or pregnant at time of survey	NFHS-4
	4	Currently married women aged 15-49 years using any modern contraceptive	NFHS-4
	5	Women whose body mass index is below normal (BMI <18.5 kg/m^2)	NFHS-4
2	6	Pregnant women who had antenatal check-up in first trimester	NFHS-4
	7	Pregnant women who had at least 4 antenatal care visits	NFHS-4
	8	Women who consumed iron and folic acid for 100 days or more when they were pregnant	NFHS-4
	9	Institutional delivery	NFHS-4
3	10	Children aged under 3 years breastfed within one hour of birth	NFHS-4
	11	Children aged under 6 months exclusively breastfed	NFHS-4
	12	Children aged 6-8 months receiving solids, semi-solids in addition to breastmilk	NFHS-4
	13	Children aged 6-23 months receiving an adequate diet (breastfed and non-breastfed)	NFHS-4
	14	Children aged 9-59 months received one dose vitamin A in last 6 months	NFHS-4
4	15	Children aged 12-23 months fully immunized (BCG, measles and 3 doses each of polio and DPT)	NFHS-4
	16	Children aged under five years with diarrhoea in the last two weeks who received oral rehydration salts	NFHS-4
	17	Children aged under 5 years with fever or respiratory illness in the last two weeks taken to health facility	NFHS-4
5	18	HH with improved drinking water source*	NFHS-4
	19	HH using improved sanitation facility**	NFHS-4
6	20	HH using iodized salt	NFHS-4
	21	HH expenditure on food to total HH expenditure	NSS 68 2011-2012
7	22	HH with none of the Census-specified assets	Census 2011
	23	SC/ST population	Census 2011
	24	Women attended school for 10 years or more	NFHS-4
	25	Sex ratio	Census 2011

* Piped water into dwelling/yard/plot, public tap/standpipe, tube well or borehole, protected dug well, protected spring, rainwater, community RO (reversed osmosis) plant.

** Flush to piped sewer system, flush to septic tank, flush to pit latrine, ventilated improved pit (VIP)/biogas latrine, pit latrine with slab, twin pit/composting toilet, which are not shared with any other household.

BCG: Bacillus Calmette–Guérin; DPT: diphtheria, pertussis and tetanus; HH: household; NFHS: National Family Health Survey; NSS: National Sample Survey; SC: Scheduled Caste; ST: Scheduled Tribe

Table 2   Cut-offs for correlation coefficients

0 - 0.29	None to weak
0.30 - 0.59	Moderate
0.6 - 1	Strong to perfect

Table 3   **Correlation coefficients for 25 selected indicators and childhood stunting in eight study states**

	Indicator	AP	BR	KA	MP	MH	TN	TG	WB	r = ≥0.30
1	Non-pregnant women aged 15-49 years who are anaemic	-0.18	0.06	0.08	0.16	-0.16	0.37	0.07	0.40	2
2	Women aged 20-24 years married before 18 years of age	0.02	0.47	0.61	0.31	0.36	0.10	0.71	0.38	6
3	Women aged 15-19 years who were already mothers or pregnant at time of survey	-0.06	0.34	0.26	0.29	0.27	-0.12	0.34	0.44	3
4	Currently married women aged 15-49 years using any modern contraceptive	-0.57	0.34	0.10	0.03	0.37	0.16	-0.10	-0.11	3
5	Women whose body mass index is below normal (BMI <18.5 kg/m2)	0.75	0.43	0.28	0.29	0.47	-0.10	0.91	0.74	5
6	Pregnant women who had antenatal check-up in first trimester	-0.03	-0.23	-0.09	-0.08	-0.06	0.14	-0.81	-0.40	2
7	Pregnant women who had at least 4 antenatal care visits	-0.14	-0.38	0.0	-0.21	-0.35	0.27	-0.83	-0.52	4
8	Women who consumed iron and folic acid for 100 days or more when they were pregnant	0.07	-0.51	-0.02	-0.30	-0.32	-0.14	-0.66	-0.30	5
9	Institutional births	-0.73	-0.28	-0.59	-0.13	-0.57	0.02	-0.74	-0.48	5
10	Children aged under 3 years breastfed within one hour of birth	0.07	0.32	0.45	-0.19	-0.10	0.16	-0.43	0.27	3
11	Children aged under 6 months exclusively breastfed	-	-0.16	-	-	-	-	-	-	-
12	Children aged 6-8 months receiving solids, semi-solids in addition to breastmilk	-	-0.32	-	-	-	-	-	-	-
13	Children aged 6-23 months receiving an adequate diet (breastfed and non-breastfed)	0.05	0.06	-	-0.25	-	-0.25	-0.60	-0.16	2
14	Children aged 9-59 months received one dose vitamin A in last 6 months	-0.12	-0.22	0.05	-0.33	-	0.36	-0.07	-0.02	1
15	Children aged 12-23 months fully immunized (BCG, measles, and 3 doses each of polio and DPT)	-	0.07	-	-0.02	-0.05	-	-	-	-
16	Children aged under 5 years with diarrhoea in the last two weeks who received oral rehydration salts	-	0.22	-	-	-	-	-	-	-
17	Children aged under 5 years with fever or respiratory illness in the last two weeks taken to health facility	-	0.04	-	-	-	-	-	-	-

Table 3   (contd.)

Indicator	AP	BR	KA	MP	MH	TN	TG	WB	r = ≥0.30
18 HH with improved drinking water source	0.02	0.07	0.29	0.27	**-0.36**	0.27	-0.10	-0.09	1
19 HH using improved sanitation facility	**-0.29**	-0.17	**-0.62**	-0.16	**-0.46**	-0.23	**-0.90**	**-0.74**	5
20 HH using iodized salt	**-0.36**	0.09	-0.06	-0.16	**0.42**	-0.02	**-0.48**	-0.17	3
21 HH expenditure on food to total HH expenditure	-0.15	**0.30**	**0.35**	-0.17	-0.17	-0.22	**0.64**	**0.50**	4
22 HH with none of the Census-specified assets	-0.18	**0.38**	**0.51**	0.24	-0.20	-0.09	**0.51**	**0.50**	5
23 SC/ ST population	0.21	**0.34**	**0.32**	0.06	**0.39**	**0.42**	0.27	0.13	4
24 Women attended school for 10 years or more	0.02	-0.22	**-0.67**	**-0.34**	**-0.54**	-0.21	**-0.86**	**-0.65**	5
25 Sex ratio	-0.10	-0.11	**-0.37**	-0.29	-0.06	-0.14	**0.38**	0.23	2
Number of indicators with moderate to strong correlation with childhood stunting (N=25)	5	10	11	4	10	2	15	11	

Note: Strong correlation indicated in brown; moderate correlation indicated in bold

BCG: Bacillus Calmette–Guérin; DPT: diphtheria, pertussis and tetanus; HH: household; SC: Scheduled Caste; ST: Scheduled Tribe

AP: Andhra Pradesh, BR: Bihar, KA: Karnataka, MP: Madhya Pradesh, MH: Maharashtra, TN: Tamil Nadu, TG: Telangana, WB: West Bengal

Table 4   Estimates of 25 indicators in seven domains in order of increasing prevalence of stunting (%) by district, Andhra Pradesh

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)				Domain 3 (IYCF)				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Guntur	22.1	59.0	39.1	13.6	73.5	11.3	82.4	68.4	36.7	97.5	44.3	*	*	10.9	84.9
Krishna	22.6	59.7	31.9	8.9	74.8	13.5	89.0	88.2	70.1	96.4	37.7	*	*	6.2	54.9
East Godavari	27.7	64.9	30.3	12.8	72.2	15.9	85.5	77.2	56.6	96.9	42.9	*	*	6.7	80.4
Srikakulam	28.0	72.1	22.8	11.7	67.5	20.5	82.2	72.7	65.7	91.2	27.5	*	*	3.8	89.7
Prakasam	28.2	57.7	44.5	17.1	70.9	16.9	73.5	73.7	48.2	91.4	30.9	*	*	11.3	71.4
West Godavari	28.5	60.3	30.2	7.9	76.7	14.5	84.5	71.5	44.8	97.2	34.2	*	*	(2.4)	73.9
Sri Potti Sriramulu Nellore	29.4	59.1	38.5	11.8	71.0	17.0	87.7	85.8	67.3	96.0	29.3	(71.7)	*	8.7	62.9
Visakhapatnam	30.1	66.6	29.8	9.5	69.0	18.9	78.6	82.5	56.3	85.5	58.8	*	*	10.2	63.1
Chittoor	31.4	48.4	25.9	14.7	59.5	21.0	72.0	70.4	64.1	94.0	45.6	*	*	4.4	75.2
YSR Cuddapah	36.3	57.6	27.9	10.4	59.2	18.7	90.4	83.5	57.2	93.7	39.3	(76.8)	*	6.7	81.7
Vizianagaram	36.8	75.7	29.0	17.8	71.6	25.8	79.8	70.4	55.0	90.7	40.2	(62.3)	*	10.5	78.5
Anantapur	40.3	52.8	29.6	5.2	65.3	20.2	86.2	77.5	59.6	89.9	51.3	*	*	16.4	57.4
Kurnool	44.1	54.6	42.9	12.9	65.9	21.6	80.7	71.7	52.9	75.5	32.0	(88.9)	*	1.4	70.7
Median		59.1	30.2	11.8	70.9	18.7	82.4	73.7	56.6	93.7	39.3			6.7	73.9
Correlation		-0.18	0.02	-0.06	**-0.57**	**0.75**	-0.03	-0.14	0.07	**-0.73**	0.07			0.05	-0.12

Table 4 **(contd.)**

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25[#]
Guntur	22.1	(61.7)	*	*	74.9	63.2	82.5	42.2	23.6	5.1	42.5	94.5
Krishna	22.6	(74.1)	*	*	70.0	63.2	90.5	38.7	20.9	2.9	53.1	93.5
East Godavari	27.7	(60.3)	(52.3)	*	82.1	56.8	82.3	41.4	19.7	4.1	28.2	96.8
Srikakulam	28.0	(59.2)	*	(88.1)	75.7	33.2	80.0	40.9	36.8	6.1	31.2	95.4
Prakasam	28.2	(64.0)	(56.9)	(66.2)	58.2	53.6	76.4	48.9	26.9	4.4	25.5	93.2
West Godavari	28.5	(77.7)	*	*	74.3	61.2	40.0	40.8	2.8	34.7	96.4	98.5
Sri Potti Sriramulu Nellore	29.4	(47.7)	*	*	67.7	52.7	82.2	43.4	27.1	9.7	29.4	93.9
Visakhapatnam	30.1	(66.0)	*	*	84.3	55.2	90.4	39.3	37.7	14.4	54.0	96.1
Chittoor	31.4	(67.7)	*	*	65.3	39.7	83.8	41.9	26.1	3.8	34.9	93.1
YSR Cuddapah	36.3	65.3	*	(83.7)	55.8	68.7	38.8	28.4	2.6	56.6	91.8	96.3
Vizianagaram	36.8	(49.3)	*	(84.3)	89.5	31.9	43.7	47.5	10.0	28.4	96.0	96.8
Anantapur	40.3	76.3	*	*	61.3	46.5	77.8	39.7	27.5	3.8	28.8	92.7
Kurnool	44.1	66.1	*	*	81.7	52.9	74.7	41.1	21.2	2.0	20.2	93.8
Median					74.3	53.6	80	41.1	23.6	5.1	34.9	94.5
Correlation					0.02	-0.29	**-0.36**	-0.15	-0.18	0.21	0.02	-0.10

Indicator list: 1. Anaemia among non-pregnant women (15 to 49 years); 2. Currently married women married before 18 years of age; 3. Births to women (15-19 years) of total births; 4. Married women (15-49 years) using any modern contraceptive; 5. Women with BMI <18.5 kg/m²; 6. Pregnant women who had antenatal check-up in first trimester; 7. Pregnant women who had ≥ 4 ANC check-ups; 8. Pregnant women consumed ≥100 IFA tablets (syrup or equivalent); 9. Institutional delivery; 10 Children (under three years) breastfed within an hour of birth; 11. Children (under 6 months) exclusively breastfed; 12. Children (6-8 months) receiving solids, semi-solids in addition to breastmilk; 13. Children (6 to 23 months) receiving adequate diet; 14. Children (9-59 months) received one dose vitamin A in last six months; 15. Children (12-23 months) fully immunized; 16. Children (under five years) with diarrhoea who received ORS/ ORT/zinc; 17. Children (under five years) with acute respiratory infection who sought treatment; 18. HH with improved source of drinking water within or near premises; 19. HH with access to improved toilet facilities; 20. HH using iodized salt ≥15ppm; 21. HH expenditure on food of total expense; 22. HH with none of the Census-specified assets; 23. ST population; 24. Female literacy; 25. Sex ratio (#converted to percentage).

IYCF: infant and young child feeding; HH: household; ORS: oral rehydration salts; ORT: oral rehydration therapy; ppm: parts per million; ST: Scheduled Tribe

Table 5   Estimates of 25 indicators in seven domains in order of increasing prevalence of stunting (%) by district, Bihar

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)						Domain 3 (IYCF)		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Gopalganj	35.6	59.2	28.3	6.5	8.8	25.7	38.8	20.3	13.7	75.2	32.7	61.4	37.5	7.4	67.1
Siwan	37.9	60.1	27.5	5.9	9.4	24.2	39.7	21.4	19.6	75.2	31.0	63.3	39.9	10.0	70.7
Bhojpur	43.5	61.8	32.0	7.2	26.5	24.1	42.3	16.1	10.3	80.4	28.0	{57.0}	33.2	9.0	64.7
Patna	43.5	58.0	27.7	8.6	38.0	24.0	51.9	21.7	21.1	86.4	39.0	35.4	32.0	4.0	55.7
Pashchim Champaran	43.6	57.9	37.9	19.9	3.9	27.0	22.5	14.2	14.1	64.2	32.1	48.7	41.4	9.0	59.6
Buxar	43.9	51.5	30.7	5.5	33.3	24.7	46.5	23.3	9.2	81.6	31.4	{56.2}	33.2	9.0	65.3
Saharsa	43.9	60.6	37.4	11.8	28.4	34.6	35.7	10.1	12.5	59.6	26.0	59.9	14.9	2.9	60.2
Begusarai	44.9	60.1	53.2	15.4	34.6	31.0	33.0	7.9	5.9	75.3	29.8	{27.3}	27.9	4.8	66.1
Jamui	45.9	63.1	50.8	14.9	23.2	37.5	36.4	10.4	12.7	59.4	34.4	40.2	26.8	4.5	49.9
Saran	46.1	54.1	26.9	10.4	8.0	23.9	34.2	20.5	7.2	62.0	43.6	73.8	34.9	4.9	60.0
Sheikhpura	46.4	67.2	40.4	14.0	31.3	35.6	42.4	13.4	10.4	74.6	40.1	41.2	45.1	16.9	60.5
Bhagalpur	46.6	61.6	27.0	8.2	22.9	26.2	43.4	20.1	17.5	69.4	33.7	61.7	36.5	7.2	72.7
Munger	46.6	66.7	32.6	9.1	33.6	28.8	42.1	24.4	10.2	83.5	35.0	{46.4}	39.2	11.1	68.6
Kishanganj	46.9	68.0	24.4	6.6	12.0	34.5	38.0	15.5	15.4	41.8	30.1	66.8	40.9	9.5	70.4
Purba Champaran	47.2	54.8	43.5	17.7	5.5	28.9	22.1	12.1	3.8	45.1	40.6	51.7	42.3	9.3	46.5
Muzaffarpur	47.9	52.2	35.4	13.1	9.2	33.0	25.1	10.9	4.7	62.3	36.7	{78.9}	33.1	7.8	58.9
Supaul	48.1	68.6	56.9	18.6	33.6	38.6	32.4	11.0	8.2	61.1	25.3	68.3	17.6	4.4	75.3
Araria	48.4	66.3	44.5	11.2	29.1	38.3	36.9	16.2	7.9	51.6	29.6	51.2	30.9	10.7	61.0
Nawada	48.4	59.7	40.1	10.8	29.1	33.6	43.9	13.6	8.8	67.8	42.6	32.8	45.4	14.6	57.0
Rohtas	48.5	61.6	28.3	10.2	42.4	26.9	41.5	13.9	7.1	80.7	20.4	{42.6}	29.5	0.6	59.1

Table 5   (contd.)

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)						Domain 3 (IYCF)		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Darbhanga	49.0	66.4	41.2	11.5	16.9	31.2	25.4	9.4	6.6	47.1	22.6	61.4	34.1	6.5	70.7
Katihar	49.2	64.3	38.6	14.3	26.7	32.4	33.3	8.9	6.5	51.8	44.2	{62.4}	25.6	7.9	64.5
Samastipur	49.2	59.6	49.6	19.3	12.6	29.7	29.3	11.6	9.8	73.4	37.7	44.0	19.3	5.1	63.2
Banka	49.6	67.0	45.5	10.6	25.8	32.0	40.9	16.8	17.0	70.7	35.0	{54.3}	30.9	5.7	64.0
Khagaria	49.8	60.1	46.1	16.8	27.6	31.1	33.9	13.2	6.0	71.2	32.4	48.4	25	6.8	66.6
Arwal	50.2	57.3	38.9	9.7	27.2	30.8	44.3	11.5	6.0	69.9	39.3	{43.2}	44.2	4.1	60.0
Aurangabad	50.2	54.2	38.9	9.7	27.2	30.8	44.3	11.5	6.0	69.9	39.3	{43.2}	48.3	10.7	60.0
Lakhisarai	50.6	62.4	42.8	12.4	34.4	27.6	37.3	17.9	4.5	64.1	39.2	32.7	36.8	8.3	62.1
Madhepura	51.8	57.4	56.3	19.2	23.7	32.9	35.6	9.3	2.6	60.9	47.3	64.4	24.8	3.0	57.3
Madhubani	51.8	61.7	40.9	12.0	16.2	32.0	27.3	13.8	13.3	50.3	32.6	63.2	23.8	9.7	61.2
Jehanabad	52.1	56.9	36.6	13.0	32.3	30.6	44.3	17.0	13.3	83.0	50.0	{35.9}	43.2	14.6	56.7
Purnia	52.1	68.4	36.8	12.3	30.2	38.8	35.5	12.2	9.6	61.5	43.9	{60.0}	18.6	11.7	71.9
Gaya	52.9	61.2	47.6	14.9	33.8	36.1	33.3	11.8	5.6	56.8	29.0	{28.4}	27.5	6.4	63.1
Sheohar	53.0	55.6	48.7	14.0	17.9	33.1	28.2	13.4	2.6	52.7	33.1	55.0	30.9	10.3	49.8
Vaishali	53.7	62.0	46.0	12.7	23.4	28.9	32.5	19.3	14.6	78.7	35.1	63.4	19.1	10.0	76.1
Kaimur (Bhabua)	53.8	57.3	29.8	8.8	34.1	28.6	30.0	10.1	3.3	80.1	40.9	{34.1}	23.4	4.5	48.0
Nalanda	54.1	62.8	41.7	14.7	30.1	30.7	40.2	9.0	7.1	78.5	47.1	{36.7}	29.9	7.1	58.5
Sitamarhi	57.3	59.1	49.7	11.1	31.9	33.6	32.5	16.6	4.7	37.3	34.4	38.4	38.5	8.8	56.7
Median		60.4	39.5	11.9	27.2	30.9	36.1	13.5	8.5	68.6	34.7	55.0	32.6	7.9	61.1
Correlation		0.06	**0.47**	**0.34**	**0.34**	**0.43**	-0.23	**-0.38**	**-0.51**	-0.28	**0.32**	-0.16	-0.21	0.06	-0.22

Table 5 **(contd.)**

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25#
Gopalganj	35.6	64.3	37.4	72.0	99.0	26.4	91.2	47.8	10.2	12.5	54.8	95.4
Sivan	37.9	63.3	37.0	64.5	98.4	23.6	96.2	37.7	8.8	11.6	58.7	94.0
Bhojpur	43.5	71.9	37.2	33.0	99.9	28.2	92.0	53.7	15.7	15.6	58.0	91.8
Patna	43.5	69.7	{56.4}	{64.5}	98.8	49.9	98.7	48.6	7.5	15.8	62.0	90.9
Pashchim Champaran	43.6	29.4	49.5	49.0	96.1	21.4	89.9	49.9	22.6	14.1	44.7	95.3
Buxar	43.9	63.9	{62.9}	59.0	99.7	27.9	98.4	47.7	16.7	14.8	58.6	93.4
Saharsa	43.9	78.0	43.9	64.9	99.7	16.6	93.7	46.0	17.0	16.7	41.7	93.3
Begusarai	44.9	77.1	{65}	66.2	99.1	34.2	98.3	49.8	21.3	14.6	55.2	91.9
Jamui	45.9	55.5	{53.2}	56.2	78.6	14.8	92.8	54.2	20.7	17.2	47.3	95.6
Saran	46.1	55.1	46.8	51.6	98.4	25.4	80.4	45.7	13.3	12.0	54.4	92.6
Sheikhpura	46.4	63.5	{55.9}	64.6	94.4	33.6	94.4	55.1	20.0	20.6	53.4	93.8
Bhagalpur	46.6	66.7	56.5	57.2	97.3	32.2	89.7	57.2	20.0	10.5	54.9	93.8
Munger	46.6	63.7	66.1	74.9	90.5	34.1	95.7	52.1	15.1	13.4	62.1	92.2
Kishanganj	46.9	54.9	{58.9}	{60.4}	98.8	15.9	95.9	48.3	23.9	6.7	43.9	97.1
Purba Champaran	47.2	49.3	45.2	55.7	99.4	20.5	91.7	46.2	15.3	12.7	45.1	93.3
Muzaffarpur	47.9	55.0	29.9	55.6	99.4	28.5	94.7	44.2	10.8	15.7	54.7	91.5
Supaul	48.1	65.9	37.1	59.5	99.9	15.8	98.2	46.6	26.0	15.9	44.8	94.4
Araria	48.4	53.9	47.2	51.9	99.6	12.5	95.3	50.4	22.9	13.6	46.8	95.7
Nawada	48.4	63.5	{42.4}	62.3	98.8	28.8	98.0	53.3	20.3	25.5	48.9	94.5
Rohtas	48.5	75.6	*	{88.1}	99.4	25.9	99.2	48.3	15.1	18.6	63.0	93.1
Darbhanga	49.0	52.9	44.7	54.6	99.9	27.7	91.6	48.1	17.9	15.6	45.2	93.1
Katihar	49.2	71.2	44.6	66.2	99.2	21.5	97.9	54.9	20.7	8.6	44.4	96.1
Samastipur	49.2	57.4	47.4	58.1	98.5	19.2	87.6	50.9	17.4	18.8	51.5	92.3
Banka	49.6	64.9	{58.7}	48.7	92.9	14.3	89.7	57.6	26.9	12.2	47.7	94.3

Table 5   (contd.)

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25#
Khagaria	49.8	65.9	47.3	68.7	98.8	30.8	97.2	54.3	22.3	14.8	49.6	92.6
Arwal	50.2	74.1	40.6	46.4	99.1	21.3	92.7	54.3	20.3	20.2	55.0	94.0
Aurangabad	50.2	74.1	40.6	46.4	99.1	27.1	92.7	54.3	14.8	24.1	59.7	94.4
Lakhisarai	50.6	59.1	63.8	67.4	93.8	36.8	98.9	58.6	24.4	15.3	52.6	92.0
Madhepura	51.8	62.2	41.6	53.7	100.0	15.0	96.3	49.2	28.6	17.3	41.7	93.0
Madhubani	51.8	48.9	46.0	72.8	99.6	19.1	80.0	44.4	22.7	13.1	46.2	93.6
Jehanabad	52.1	67.5	{37.8}	68.1	99.4	29.3	97.2	51.8	17.8	19.8	55.0	92.2
Purnia	52.1	65.8	50.3	66.3	99.7	14.4	95.9	55.2	19.7	12.0	42.3	95.4
Gaya	52.9	67.6	{39.2}	68.9	96.7	26.8	98.6	52.8	9.7	30.4	53.3	96.0
Sheohar	53.0	59.3	51.5	66.3	99.5	21.0	90.4	47.0	19.2	14.7	45.3	92.9
Vaishali	53.7	70.2	52.0	59.8	97.6	30.5	95.5	41.6	15.4	21.1	56.7	90.4
Kaimur (Bhabua)	53.8	70.5	{27.6}	57.2	95.3	21.5	96.5	56.8	14.0	22.7	58.4	94.2
Nalanda	54.1	65.2	{44.5}	{63.8}	97.9	31.0	97.8	53.2	22.6	21.1	53.1	93.1
Sitamarhi	57.3	62.6	38.4	61.5	100.0	20.2	95.4	50.0	21.5	11.9	42.4	93.0
Median		64.1	45.2	59.7	99.1	25.7	95.5	50.2	19.5	15.4	52.9	93.4
Correlation		0.07	0.22	0.04	0.07	-0.17	0.09	**0.30**	**0.38**	**0.34**	-0.26	-0.11

Indicator list: 1. Anaemia among non-pregnant women (15 to 49 years); 2. Currently married women married before 18 years of age; 3. Births to women (15-19 years) of total births; 4. Married women (15-49 years) using any modern contraceptive; 5. Women with BMI <18.5 kg/m²; 6. Pregnant women who had antenatal check-up in first trimester; 7. Pregnant women who had ≥ 4 ANC check-ups; 8. Pregnant women consumed ≥100 IFA tablets (syrup or equivalent); 9. Institutional delivery; 10 Children (under three years) breastfed within an hour of birth; 11. Children (under 6 months) exclusively breastfed; 12. Children (6-8 months) receiving solids, semi-solids in addition to breastmilk; 13. Children (6 to 23 months) receiving adequate diet; 14. Children (9-59 months) received one dose vitamin A in last six months; 15. Children (12-23 months) fully immunized; 16. Children (under five years) with diarrhoea who received ORS/ ORT/zinc; 17. Children (under five years) with acute respiratory infection who sought treatment; 18. HH with improved source of drinking water within or near premises; 19. HH with access to improved toilet facilities; 20. HH using iodized salt ≥15ppm; 21. HH expenditure on food of total expense; 22. HH with none of the Census-specified assets; 23. SC population; 24. Female literacy; 25. Sex ratio (#converted to percentage).

IYCF: infant and young child feeding; HH: household; ORS: oral rehydration salts; ORT: oral rehydration therapy; ppm: parts per million; SC: Scheduled Caste.

Table 6 Estimates of 25 indicators in seven domains in order of increasing prevalence of stunting (%) by district, Karnataka

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)					Domain 3 (IYCF)			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mandya	18.6	46.5	22.2	8.5	59.4	13.8	74.3	84.5	18.9	99.0	52.8	*	13.3	*	89.0
Chikmagalur	21.1	42.0	23.8	7.4	45.9	24.9	61.7	60.9	22.0	96.2	48.3	*	(6.7)	*	80.0
Udupi	21.1	45.2	6.3	1.8	31.6	27.6	73.7	84.2	39.1	97.9	48.3	*	18.8	*	78.9
Ramanagara	22.0	47.1	23.7	8.3	55.9	22.4	68.2	74.0	34.4	99.3	57.9	*	14.6	*	93.7
Dakshina Kannada	23.9	45.2	8.5	2.4	20.6	25.6	64.6	67.2	41.1	97.1	45.7	*	19.0	*	72.0
Mysore	25.1	46.0	23.4	17	55.4	19.1	64.4	65.9	50.5	94.7	51.7	*	10.4	*	71.8
Hassan	27.0	47.5	14.8	6.6	56.2	18.4	73.4	87.5	39.3	98.3	51.7	*	(4.6)	*	82.7
Bangalore	28.1	40.0	14.9	4.6	44.1	14.0	51.4	48.1	49.2	96.2	49.8	*	13.9	*	72.3
Chitradurga	28.6	43.9	23.9	8.3	63.9	22.7	70.0	67.2	44.0	95.6	59.4	*	15.7	*	74.8
Tumkur	28.6	52.0	19.3	5.2	62.3	20.3	59.7	70.6	55.1	96.4	58.6	*	5.0	*	69.5
Bangalore Rural	28.7	46.6	25.8	12	57.9	21.3	71.1	75.6	46.5	98.5	54.0	(65.5)	8.4	*	88.2
Kodagu	29.8	37.1	11.7	4.8	41.8	19.6	78.8	82.6	37.6	97.7	47.7	*	10.6	*	84.2
Chamarajanagar	30.5	44.3	32.3	8.5	51.5	26.1	79.6	77.3	51.8	96.0	71.2	*	11.5	*	88.8
Kolar	32.0	45.0	20	6.8	62.7	23.5	75.5	77.0	60.5	96.8	60.7	*	6.1	*	94.5
Gadag	34.8	41.9	22.7	4.6	59.4	21.1	54.1	78.1	43.9	92.9	50.5	*	4.3	*	80.4
Shimoga	35.3	48.4	11.6	7.6	36.6	22.7	72.9	74.4	39.0	97.9	41.8	*	5.1	*	72.4
Belgaum	36.7	41.1	34.9	9.5	58.6	20.6	78.8	78.5	62.0	97.1	70.7	*	2.8	*	85.9
Raichur	37.2	57.9	28.3	3.0	54.3	20.8	57.9	65.4	53.9	79.7	59.2	(60.3)	3.3	*	70.3
Dharwad	37.4	45.6	23.1	7.6	59.1	16.0	72.4	76.8	45.6	95.3	57.5	*	3.8	*	71.2
Chikkaballapura	37.7	54.0	23.9	7.2	64.7	24.8	75.4	92.7	47.1	91.6	59.0	*	(7.5)	*	77.8
Uttara Kannada	37.9	42.0	15.2	6.9	30.8	31.7	81.4	81.0	36.4	94.8	54.2	*	7.0	*	75.1
Bidar	42.8	44.1	21.7	7.6	59.2	26.0	67.9	69.1	48.4	98.0	66.7	(46.9)	6.6	*	72.0
Haveri	43.8	52.5	22.0	12.3	48.6	21.5	68.3	69.0	27.3	96.9	62.0	(51.1)	4.6	*	92.0

Table 6   (contd.)

| District | Prevalence (%) | Domain 1 (Pre-pregnancy) | | | | | Domain 2 (Pregnancy) | | | | Domain 3 (IYCF) | | | | |
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Bijapur	44.9	41.2	33.6	10.6	58.1	19.5	70.6	64.3	38.5	90.7	46.8	*	2.2	*	64.9
Davanagere	46.4	47.5	25.4	8.7	57.2	22.7	84.1	88.6	65.9	97.7	72.4	(68.9)	8.9	*	86.8
Bagalkot	47.3	39.9	35.8	12.3	54.9	21.3	66.8	80.1	45.3	91.9	61.6	(70.6)	6.8	*	90.2
Bellary	49.5	49.9	31.4	13.3	50.8	23.6	66.0	80.3	45.0	86.2	50.1	(56.1)	4.8	*	77.5
Gulbarga	52.2	42.5	27.9	4.2	53.7	22.5	59.1	84.6	33.6	91.3	56.4	(52.0)	2.6	*	85.6
Yadgir	55.5	47.8	35.5	8.6	47.0	27.4	61.9	63.6	24.9	90.5	66.9	(45.4)	6.1	*	78.3
Koppal	55.8	45.7	35.9	9.7	44.5	26.9	62.8	60.5	23.8	84.8	68.0	*	6.3	*	91.5
Median		45.4	**23.6**	7.6	55.2	22.5	69.2	76.2	44.0	96.2	57.0		6.2		79.5
Correlation		0.08	**0.61**	**0.26**	0.10	0.28	-0.09	-0.00	-0.02	**-0.59**	**0.45**		**-0.32**		0.05

Table 6 **(contd.)**

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25#
Mandya	18.6	(61.0)	*	*	95.5	56.8	93.6	44.0	16.0	1.2	48.7	93.3
Chikmagalur	21.1	(41.2)	*	*	81.9	62.7	84.3	43.6	13.5	4.0	40.6	96.2
Udupi	21.1	(64.6)	*	(83.3)	64.7	89.1	85.5	35.6	4.8	4.5	51.5	95.4
Ramanagara	22.0	(58.8)	*	*	93.1	60.8	83.3	48.3	21.3	5.6	45.5	96.0
Dakshina Kannada	23.9	(77.3)	*	(77.3)	85.7	92.0	74.5	34.9	5.6	3.9	51.4	94.5
Mysore	25.1	46.7	*	(82.7)	95.6	63.6	86.1	39.5	13.7	11.1	43.3	95.6
Hassan	27.0	(68.1)	*	(81.9)	91.1	64.3	94.2	44.1	13.4	1.8	45.6	96.4
Bangalore	28.1	62.1	*	*	92.0	86.2	95.9	46.5	10.2	5.3	67.6	94.6
Chitradurga	28.6	(48.7)	*	*	90.5	44.2	74.6	45.0	23.0	18.2	46.9	93.3
Tumkur	28.6	(64.8)	*	*	80.8	52.3	85.5	45.5	20.0	7.8	44.3	95.2
Bangalore Rural	28.7	(64.1)	*	*	77.5	74.4	83.0	30.1	2.6	2.0	49.6	94.0
Kodagu	29.8	68.2	*	*	81.6	82.0	90.1	28.0	11.3	10.5	50.7	97.6
Chamarajanagar	30.5	(59.5)	*	(56.2)	95.0	32.9	81.3	38.9	24.1	11.8	30.3	94.1
Kolar	32.0	(76.4)	*	*	67.3	58.1	80.6	41.3	14.8	5.1	46.5	95.4
Gadag	34.8	(46.7)	(87.0)	(77.4)	85.5	30.2	75.2	43.1	22.2	5.8	37.9	94.3
Shimoga	35.3	(45.5)	*	(68.1)	81.5	71.7	75.0	41.9	11.1	3.7	43.9	95.9
Belgaum	36.7	63.4	*	(92.9)	98.6	40.2	96.3	49.3	14.7	6.2	39.4	93.0
Raichur	37.2	65.4	*	*	83.5	27.6	81.8	42.8	20.1	19.0	28.6	94.9
Dharwad	37.4	54.9	*	*	95.4	62.0	87.7	41.5	13.9	4.7	48.8	94.2
Chikkaballapura	37.7	(63.7)	*	*	76.9	49.7	66.4	50.1	21.8	12.5	39.1	94.4
Uttara Kannada	37.9	(67.7)	*	(69.2)	69.4	66.0	88.5	42.2	16.2	2.4	46.5	94.6
Bidar	42.8	59.6	*	*	96.0	26.7	95.8	43.2	24.7	13.8	46.4	93.4
Haveri	43.8	69.3	*	(80.4)	95.1	53.5	84.4	44.6	21.5	8.8	32.2	94.5

Table 6 **(contd.)**

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25#
Bijapur	44.9	58.1	*	(89.3)	88.2	22.9	83.5	48.1	17.3	1.8	36.0	93.0
Davanagere	46.4	75.2	*	*	94.3	64.0	81.9	38.0	14.4	12.0	45.0	93.0
Bagalkot	47.3	75.9	*	*	88.3	23.0	84.6	47.2	18.1	5.1	31.7	92.8
Bellary	49.5	71.1	*	*	94.4	40.7	76.9	46.1	16.6	18.4	26.9	95.3
Gulbarga	52.2	58.6	*	*	94.9	29.1	85.8	47.8	21.7	2.5	33.4	93.5
Yadgir	55.5	61.3	*	*	91.1	18.1	87.7	NA	31.0	12.5	23.3	94.2
Koppal	55.8	72.8	*	*	92.6	48.9	84.1	45.8	20.9	11.8	28.1	95.2
Median					90.8	55.2	84.4	43.6	16.4	5.7	44.1	94.5
Correlation					0.29	-0.62	-0.06	0.35	0.51	0.32	-0.67	-0.37

Indicator list: 1. Anaemia among non-pregnant women (15 to 49 years); 2. Currently married women married before 18 years of age; 3. Births to women (15-19 years) of total births; 4. Married women (15-49 years) using any modern contraceptive; 5. Women with BMI <18.5 kg/m^2; 6. Pregnant women who had antenatal check-up in first trimester; 7. Pregnant women who had ≥ 4 ANC check-ups; 8. Pregnant women consumed ≥100 IFA tablets (syrup or equivalent); 9. Institutional delivery; 10 Children (under three years) breastfed within an hour of birth; 11. Children (under 6 months) exclusively breastfed; 12. Children (6-8 months) receiving solids, semi-solids in addition to breastmilk; 13. Children (6 to 23 months) receiving adequate diet; 14. Children (9-59 months) received one dose vitamin A in last six months; 15. Children (12-23 months) fully immunized; 16. Children (under five years) with diarrhoea who received ORS/ ORT/zinc; 17. Children (under five years) with acute respiratory infection who sought treatment; 18. HH with improved source of drinking water within or near premises; 19. HH with access to improved toilet facilities; 20. HH using iodized salt ≥15ppm; 21. HH expenditure on food of total expense; 22. HH with none of the Census-specified assets; 23. ST population; 24. Female literacy; 25. Sex ratio (#converted to percentage).

IYCF: infant and young child feeding; HH: household; NA: not available; ORS: oral rehydration salts; ORT: oral rehydration therapy; ppm: parts per million; ST: Scheduled Tribe.

Table 7   Estimates of 25 indicators in seven domains in order of increasing prevalence of stunting (%) by district, Madhya Pradesh

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)				Domain 3 (IYCF)				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Balaghat	32.1	68.8	8.6	2.2	57.2	42.4	60.2	37.7	33.2	83.7	52.2	(67.6)	*	7.9	61.8
Singrauli	33.0	53.3	34.9	11.7	34.8	19.4	29.2	20.9	18.9	43.5	33.5	59.8	(39.3)	11.2	51.7
Anuppur	33.5	62.5	27.3	8.0	47.5	26.2	45.0	35.1	30.7	77.1	43.8	(61.3)	*	10.4	66.7
Sehore	33.6	46.4	31.5	4.3	54.7	26.6	65.1	40.9	20.4	88.3	31.1	43.1	*	7.1	64.3
Chhindwara	33.6	51.9	16.3	8.1	65.0	29.1	56.6	41.9	37.5	86.1	37.4	(60.8)	*	10.3	71.1
Mandsaur	34.0	50.3	48.2	4.4	18.1	31.1	45.5	34.8	14.6	88.2	36.4	(95.1)	(19.6)	2.4	55.3
Seoni	34.7	55.5	16.3	3.8	69.7	32.4	55.2	42.0	37.4	86.0	46.3	(64.6)	*	10.4	68.3
Betul	34.7	53.8	12.5	4.9	59.5	27.2	62.0	39.8	26.8	76.0	49.2	*	*	6.6	71.7
Ujjain	35.8	47.2	41.0	9.5	34.6	26.4	56.4	40.5	19.1	88.9	19.0	57.6	(39.4)	7.7	72.9
Jabalpur	36.2	49.3	13.9	4.0	61.4	23.3	59.7	57.5	43.3	88.3	49.2	(47.7)	(49.2)	6.0	68.8
Neemuch	36.3	48.9	31.8	4.2	17.5	31.1	47.7	33.0	22.8	86.7	21.4	(60.3)	*	6.3	67.6
Shahdol	36.7	60.1	35.4	7.3	43.2	29.1	33.0	21.9	20.4	71.9	56.6	*	*	7.8	51.6
Mandla	36.9	69.9	27.3	8.8	64.2	34.0	56.1	44.7	27.6	59.2	53.0	(66.5)	*	3.2	67.6
Hoshangabad	37.2	55.9	18.4	2.5	49.6	23.0	55.2	46.3	26.7	88.8	36.7	36.5	(26.8)	1.6	69.3
Narsimhapur	37.9	50.0	27.4	12.5	50.3	25.1	43.8	34.4	33.5	85.8	30.9	(84.3)	*	9.5	64.0
Rajgarh	38.8	49.4	38.2	6.7	53.4	37.5	52.2	35.9	17.2	88.6	35.5	(51.4)	*	0.0	49.1
Indore	39.2	46.5	20.7	5.1	52.9	18.9	81.8	76.1	34.6	94.7	21.9	61.3	(60.9)	10.3	64.5
Harda	39.7	51.3	24.3	4.2	49.1	22.3	55.9	39.9	21.6	79.7	30.3	(51.2)	*	2.3	69.8
Rewa	40.4	40.8	33.6	4.3	51.4	23.2	40.2	24.4	13.7	81.6	44.8	(46.3)	(45.6)	5.0	63.4
Sagar	41.0	39.6	38.6	11.1	44.4	24.1	35.3	16.7	17.5	77.6	25.5	(60.4)	*	6.1	47.9
Vidisha	41.1	43.5	43.5	9.5	22.7	28.0	29.6	16.9	15.2	73.7	46.6	(71.7)	*	7.3	41.5
Umaria	41.1	61.0	37.3	8.2	48.3	29.3	51.8	18.1	16.4	84.5	37.2	(36.9)	*	8.6	60.9
Satna	41.2	48.5	36.1	4.4	49.0	22.2	50.1	23.1	17.1	80.7	33.0	(55.7)	*	4.1	60.4
Dewas	42.0	47.1	36.1	9.4	56.4	28.7	66.4	41.3	25.2	92.4	25.3	(64.7)	*	10.2	65.8
Panna	42.3	49.1	32.9	7.2	41.5	25.8	39.9	13.8	16.0	74.4	32.0	(55.5)	(30.5)	12.6	49.0
Ashoknagar	42.5	42.5	33.2	9.9	58.3	30.1	68.3	38.5	18.1	82.3	32.8	(30.2)	*	6.3	61.4

Table 7 (contd.)

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)				Domain 3 (IYCF)				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Dhar	42.6	55.6	30.1	9.9	52.6	30.4	61.7	29.6	14.1	78.0	20.9	(72.1)	(47.8)	14.6	70.6
Chhatarpur	42.7	48.4	43.5	8.2	50.2	28.2	36.3	19.5	16.5	81.4	37.9	(68.9)	*	10.1	53.1
Gwalior	42.8	57.8	19.4	3.8	46.7	22.2	53.8	36.4	33.3	88.0	26.9	26.4	(40.7)	2.1	62.5
Damoh	43.2	45.5	39.9	7.8	35.9	27.1	31.2	24.3	21.1	70.0	46.5	(69.6)	*	6.8	50.0
Guna	43.4	45.6	29.8	9.7	59.4	34.2	60.7	31.9	21.2	90.1	41.0	(52.5)	(16.8)	3.0	59.9
Khandwa (East Nimar)	43.6	58.3	17.6	6.1	66.9	34.7	73.0	48.5	34.4	81.8	30.6	(46.1)	(36.0)	2.7	77.8
Katni	45.5	51.8	25.5	4.3	44.3	27.2	36.6	32.7	29.4	78.4	47.0	(72.0)	*	17.5	69.2
Jhabua	45.6	57.8	54	24.4	10.4	30.4	29.4	20.9	19.5	74.5	21.0	55.8	(26.8)	7.5	51.5
Raisen	45.8	50.6	28.1	7.3	65.1	29.5	65.4	52.1	23.2	84.7	41.9	(52.4)	(22.5)	4.0	74.1
Dindori	45.8	66.8	34.9	10.3	63.0	35.8	44.9	23.5	18.9	55.8	36.8	(35.5)	*	1.8	58.7
Ratlam	46.1	53.8	46.2	8.3	24.8	33.7	54.1	38.1	23.1	86.2	19.1	(72.3)	*	11.0	67.6
Bhind	47.6	66.0	31.7	6.0	53.6	29.6	55.3	28.0	23.3	85.6	44.1	(33.3)	*	2.8	56.8
Bhopal	47.6	47.5	13.1	2.1	50.3	19.1	77.2	56.6	37.1	91.7	18.3	*	*	6.5	53.3
Morena	47.7	56.3	27	5.5	52.6	27.5	69.0	41.2	18.2	93.5	38.5	(36.6)	(27.3)	4.0	54.8
Shajapur	48.1	52.6	35.2	10.2	53.7	29.4	70.6	56.5	28.6	96.1	22.7	(53.9)	*	0.8	48.5
Khargone (West Nimar)	48.3	57.8	24.0	7.0	70.1	36.8	64.1	38.8	24.0	74.3	17.8	(62.8)	(40.1)	6.5	80.8
Shivpuri	48.6	48.7	34.0	8.6	55.4	31.4	58.5	26.0	16.5	86.9	41.9	(69.9)	*	7.8	55.1
Alirajpur	48.6	64.4	37.1	13.5	30.9	35.8	29.8	21.1	12.7	50.5	25.5	58.0	(37.1)	3.8	54.8
Sidhi	48.7	50.9	45.7	6.6	31.9	27.0	27.7	11.2	10.2	61.2	49.3	(72.7)	(30.4)	8.3	47.0
Datia	48.9	60.5	37.1	7.8	57.7	32.3	49.6	29.5	16.3	84.5	32.0	(63.9)	*	3.9	43.5
Tikamgarh	49.7	46.0	47.2	17.1	46.6	30.8	33.7	18.9	14.0	81.0	32.3	(59.8)	*	3.5	52.0
Burhanpur	50.0	66.3	24.7	7.0	56.2	28.4	52.5	40.8	28.8	76.2	42.2	48.7	(15.7)	4.0	55.6
Barwani	52.0	65.6	42.2	14.8	50.3	40.8	42.7	26.3	20.0	50.7	34.8	71.4	(26.1)	4.6	51.7
Sheopur	52.1	61.9	29.6	3.6	52.3	43.9	36.7	18.7	21.7	77.2	44.0	(63.5)	(21.4)	1.1	58.1
Median		51.9	32.4	7.3	50.9	29.1	53.2	34.6	21.15	82.1	36.0	-55.5	-30.5	6.4	60.65
Correlation		0.16	**0.31**	0.29	0.03	0.29	-0.08	-0.21	**-0.30**	-0.13	-0.19	0.03	0.39	-0.25	**-0.33**

Table 7 **(contd.)**

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Enviro-nment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25#
Balaghat	32.1	64.6	*	(85.8)	76.2	28.4	95.7	53.2	27.0	22.5	28.2	102.1
Singrauli	33.0	42.2	(25.1)	54.0	56.3	15.8	89.5	NA	39.5	32.6	20.2	92.0
Anuppur	33.5	57.8	*	(52.7)	69.3	22.2	93.2	NA	33.8	47.9	23.3	97.6
Sehore	33.6	60.0	(61.3)	(77.0)	89.3	47.1	97.8	43.1	27.6	11.1	22.5	91.8
Chhindwara	33.6	64.3	(49.1)	(75.3)	81.7	34.0	95.8	50.2	39.3	36.8	28.7	96.4
Mandsaur	34.0	43.5	43.9	77.0	69.7	28.3	98.1	43.2	24.4	2.5	17.5	96.3
Seoni	34.7	57.1	*	*	78.2	24.4	92.9	46.9	39.9	37.7	22.2	98.2
Betul	34.7	69.1	(45.5)	(67.2)	85.5	30.7	95.9	43.7	40.4	42.3	33.4	97.1
Ujjain	35.8	56.8	56.9	76.3	91.4	51.9	98.2	43.0	21.4	2.5	20.7	95.5
Jabalpur	36.2	67.5	58.5	74.7	96.6	47.5	91.2	42.0	21.4	15.2	37.3	92.9
Neemuch	36.3	47.0	(67.4)	84.3	76.0	32.0	98.4	40.8	22.7	8.6	19.6	95.4
Shahdol	36.7	40.3	*	(57.4)	66.6	16.9	89.8	43.8	33.3	44.7	18.7	97.4
Mandla	36.9	55.1	(63.0)	(50.1)	62.9	15.1	82.4	43.4	51.9	57.9	18.1	100.8
Hoshangabad	37.2	49.5	72.4	73.4	91.1	46.4	99.4	40.8	25.5	15.9	28.2	91.4
Narsimhapur	37.9	54.2	(63.0)	63.0	97.2	40.7	96.0	45.0	41.4	13.4	26.4	92.0
Rajgarh	38.8	41.6	(55.7)	(68.2)	65.8	19.0	96.0	38.1	40.7	3.5	17.0	95.6
Indore	39.2	57.8	(57.9)	(83.3)	98.4	74.2	99.8	44.0	8.1	6.6	41.4	92.8
Harda	39.7	48.6	68.6	79.3	87.7	51.4	99.2	46.5	30.0	28.0	17.8	93.5
Rewa	40.4	52.8	(51.8)	62.2	88.0	24.7	89.6	46.5	27.2	13.2	23.1	93.1
Sagar	41.0	52.7	(61.6)	58.0	81.3	26.7	91.6	40.7	36.5	9.3	22.4	89.3
Vidisha	41.1	45.7	(32.7)	65.9	94.1	24.0	93.7	45.0	35.0	4.6	12.4	89.6
Umaria	41.1	67.1	50.4	67.6	68.6	18.6	89.1	44.1	39.4	46.6	16.0	95.0
Satna	41.2	52.4	(25.8)	(69.3)	91.4	30.2	92.4	50.0	28.7	14.4	25.0	92.6
Dewas	42.0	60.3	(71.8)	68.2	93.5	47.0	99.1	33.9	27.8	17.4	22.1	94.2
Panna	42.3	26.6	(32.9)	68.2	78.1	19.8	86.3	46.1	39.1	16.8	20.5	90.5
Ashoknagar	42.5	37.2	77.8	(72.7)	91.7	19.8	90.6	NA	37.6	9.7	12.3	90.4
Dhar	42.6	65.6	64.0	82.5	86.2	35.5	98.2	51.5	41.0	55.9	20.2	96.4
Chhatarpur	42.7	41.1	(51.8)	71.2	72.7	14.5	70.5	36.5	27.4	4.2	15.3	88.3
Gwalior	42.8	52.5	50.7	80.4	97.1	56.2	97.6	37.9	13.5	3.5	32.6	86.4
Damoh	43.2	55.9	(57.1)	72.8	78.3	22.2	88.7	40.4	41.1	13.2	17.8	91.0
Guna	43.4	65.1	50.6	75.2	82.9	27.9	93.2	41.9	32.3	15.4	16.5	91.2

Table 7   **(contd.)**

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Enviro-nment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25#
Khandwa (East Nimar)	43.6	58.7	63.1	85.3	78.1	34.1	98.2	NA	43.2	35.0	16.8	94.3
Katni	45.5	46.7	*	(55.4)	90.6	23.2	79.3	38.4	36.0	24.6	23.4	95.2
Jhabua	45.6	25.0	52.2	62.6	84.9	13.0	93.6	43.8	60.2	87.0	9.3	99.0
Raisen	45.8	78.5	39.9	73.6	95.1	39.0	92.2	45.8	36.1	15.4	21.9	90.1
Dindori	45.8	49.4	(55.3)	(55.9)	71.3	6.9	78.9	41.3	64.9	64.7	13.6	100.2
Ratlam	46.1	45.2	(61.4)	72.3	88.4	33.7	95.3	43.8	35.5	28.2	17.9	97.1
Bhind	47.6	51.0	(63.9)	*	93.1	30.6	93.8	32.4	21.1	0.4	25.0	83.7
Bhopal	47.6	62.3	(71.2)	*	93.5	61.8	98.3	49.5	12.5	2.9	42.8	91.8
Morena	47.7	60.6	(57.8)	(97.3)	92.3	36.9	86.7	40.4	26.5	0.9	21.4	84.0
Shajapur	48.1	71.7	*	*	83.2	34.8	96.5	37.7	30.3	2.5	18.8	93.8
Khargone (West Nimar)	48.3	64.2	57.6	77.7	90.9	33.2	99.4	NA	44.2	39.0	17.2	96.4
Shivpuri	48.6	63.1	(47.2)	(69.2)	65.6	22.6	94.5	41.5	38.6	13.2	14.3	87.7
Alirajpur	48.6	22.6	76.5	63.5	89.1	17.6	93.9	NA	57.6	89.0	9.6	101.1
Sidhi	48.7	34.4	(70.3)	(68.2)	70.3	10.0	91.0	41.7	42.1	27.8	19.0	95.7
Datia	48.9	53.2	(49.9)	(85.4)	91.7	33.5	85.3	41.1	25.8	1.9	21.6	87.3
Tikamgarh	49.7	34.4	(46.7)	58.7	74.0	13.9	72.3	42.9	28.0	4.7	13.8	90.1
Burhanpur	50.0	43.3	59.1	72.6	93.7	40.0	99.1	NA	41.0	30.4	22.6	95.1
Barwani	52.0	41.8	54.0	71.7	84.6	21.3	97.6	53.4	54.5	69.4	16.0	98.2
Sheopur	52.1	48.7	(38.6)	(66.9)	93.0	15.4	97.3	45.2	44.5	23.5	11.8	90.1
Median		52.75	-42.05	62.8	85.85	28.35	93.85	43.2	35.75	15.6	20.2	93.7
Correlation		-0.20	0.04	0.09	0.27	-0.16	-0.16	-0.17	0.24	0.06	**-0.34**	-0.29

Indicator list: 1. Anaemia among non-pregnant women (15 to 49 years); 2. Currently married women (15-49 years) using any modern contraceptive; 3. Births to women (15-19 years) of total births; 4. Married women (15-49 years) married before 18 years of age; 5. Women with BMI <18.5 kg/m²; 6. Pregnant women who had antenatal check-up in first trimester; 7. Pregnant women who had ≥ 4 ANC check-ups; 8. Pregnant women consumed ≥100 IFA tablets (syrup or equivalent); 9. Institutional delivery; 10 Children (under three years) breastfed within an hour of birth; 11. Children (under 6 months) exclusively breastfed for at least first six months; 12. Children (6-8 months) receiving solids, semi-solids in addition to breastmilk; 13. Children (6 to 23 months) receiving adequate diet; 14. Children (9-59 months) received one dose vitamin A in last six months; 15. Children (12-23 months) fully immunized; 16. Children (under five years) with diarrhoea who received ORS/ ORT/zinc; 17. Children (under five years) with acute respiratory infection who sought treatment; 18. HH with improved source of drinking water within or near premises; 19. HH with access to improved toilet facilities; 20. HH using iodized salt ≥15ppm; 21. HH expenditure on food of total expense; 22. HH with none of the Census-specified assets; 23. ST population; 24. Female literacy; 25. Sex ratio (#converted to percentage).

IYCF: infant and young child feeding; HH: household; NA: not available; ORS: oral rehydration salts; ORT: oral rehydration therapy; ppm: parts per million; ST: Scheduled Tribe.

Table 8   Estimates of 25 indicators in seven domains in order of increasing prevalence of stunting (%) by district, Maharashtra

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)				Domain 3 (IYCF)				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mumbai Suburban	21.3	50.3	14.6	9.9	59.6	15.1	57.5	82.0	36.7	93.9	58.0	*	*	(14.2)	82.6
Pune	22.4	50.4	23.6	5.5	69.8	17.8	88.2	84.5	55.9	93.5	62.0	*	*	8.2	60.0
Sangli	23.3	51.0	25.4	13.0	51.8	21.1	67.5	65.5	39.4	95.9	52.4	*	*	6.8	64.7
Satara	23.3	48.9	22.6	5.1	62.3	30.5	70.1	68.9	33.7	96.3	66.5	*	*	1.2	62.1
Solapur	25.4	44.0	34.5	16.2	63.4	19.0	66.3	73.8	50.9	86.4	59.6	(52.5)	*	6.7	63.3
Mumbai	25.5	49.6	10.6	0.0	53.1	17.8	60.6	80.7	52.7	97.4	49.8	*	*	(6.4)	81.1
Sindhudurg	25.9	44.1	8.3	1.2	48.4	29.6	72.0	78.9	28.6	99.3	56.5	*	*	(20.2)	86.6
Kolhapur	26.9	47.2	30.9	9.5	53.2	23.4	60.6	69.1	46.5	95.4	53.9	*	*	1.7	70.4
Ratnagiri	28.3	47.4	8.6	2.3	38.3	31.7	66.7	72.0	52.4	97.8	58.1	*	*	(9.1)	73.9
Raigarh	29.9	53.1	16.6	5.9	60.0	21.8	61.2	68.9	47.2	96.0	63.6	*	*	8.7	70.1
Wardha	30.5	42.4	7.1	2.6	75.5	29.4	63.4	77.3	45.2	97.9	56.9	*	*	4.8	77.4
Chandrapur	32.2	49.0	18.6	5.4	70.6	29.9	67.3	79.9	47.0	91.7	67.2	*	*	3.6	73.2
Gadchiroli	32.5	52.0	8.8	1.5	73.8	27.9	82.0	76.6	48.1	87.7	62.4	*	*	8.3	70.3
Ahmadnagar	33.4	46.6	38.7	13.2	47.5	22.5	59.3	63.3	22.5	94.2	42.7	*	*	3.3	77.2
Nagpur	33.9	46.7	7.0	1.6	67.9	23.0	88.0	81.1	52.5	97.2	59.6	(88.0)	*	5.9	78.6
Gondiya	34.7	54.9	5.7	4.4	65.6	35.4	68.9	76.0	70.0	93.3	69.8	*	*	6.1	72.7
Latur	34.7	36.9	36.5	13.4	65.5	25.2	63.5	74.9	40.5	89.9	49.5	(47.3)	*	7.3	61.9
Jalgaon	36.4	51.6	34.2	13.8	64.2	18.9	61.5	64.6	39.7	84.2	61.9	(41.8)	*	2.6	61.4
Bid	37.8	35.3	51.2	18.2	65.3	22.9	62.0	72.9	22.3	93.7	56.4	(42.8)	*	16.3	80.0
Amravati	38.1	42.6	15.7	4.3	70.7	26.8	68.2	75.7	50.2	93.0	57.7	(60.8)	*	5.2	75.0
Thane	38.5	48.5	20.4	2.6	61.0	21.4	60.3	70.8	44.5	91.2	58.4	*	*	9.0	66.4
Aurangabad	38.6	45.2	44.3	14.9	63.0	21.5	69.6	70.6	19.8	93.5	41.6	(60.9)	*	0.0	79.7
Dhule	39.6	53.1	34.7	12.4	62.1	30.1	55.8	62.5	15.7	72.6	55.1	*	*	17.1	79.9
Hingoli	39.6	41.2	40.7	15.3	66.0	29.0	64.6	63.7	42.8	84.6	58.3	(81.8)	*	8.6	66.9

Table 8   **(contd.)**

| District | Prevalence (%) | Domain 1 (Pre-pregnancy) | | | | | Domain 2 (Pregnancy) | | | | Domain 3 (IYCF) | | | | |
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nanded	40.4	46.5	39.8	11.8	59.5	29.3	71.3	70.5	39.3	84.3	64.5	(74.7)	*	3.3	64.0
Bhandara	40.5	52.8	4.5	2.0	73.1	33.3	77.1	83.4	40.5	98.7	32.1	*	*	0.0	69.3
Washim	41.1	35.3	25.5	7.5	74.6	26.6	72.4	67.5	37.0	84.0	60.5	(60.2)	*	10.4	69.9
Akola	41.2	38.5	12.4	6.5	65.7	25.1	80.8	80.4	33.8	92.0	62.9	*	*	0.0	73.0
Osmanabad	43.3	37.0	31.1	11.0	69.0	21.9	55.3	74.8	37.4	88.2	62.9	*	*	8.9	66.8
Nashik	43.5	54.6	29.9	8.3	66.0	25.8	76.0	58.6	41.0	85.3	64.5	*	*	1.0	65.8
Buldana	43.9	41.1	36.1	8.3	69.9	28.0	72.3	74.5	21.6	82.6	30.1	*	*	0.0	64.6
Jalna	44.1	44.2	47.1	21.5	64.0	29.1	63.9	64.2	45.6	92.0	61.5	(69.8)	*	5.2	70.0
Parbhani	46.4	45.7	41.3	11.2	68.3	31.4	72.4	79.3	31.1	85.8	49.1	*	*	3.7	69.1
Yavatmal	47.4	46.1	20.8	7.0	69.9	29.0	66.3	71.4	34.8	85.3	60.9	*	*	9.8	80.4
Nandurbar	47.6	59.9	23.7	10.1	53.3	42.4	53.7	52.5	39.0	55.5	64.9	(68.0)	*	2.5	71.3
Median		46.7	23.7	8.3	65.3	26.6	66.7	72.9	40.5	92.0	58.4				70.3
Correlation		-0.16	**0.36**	0.27	**0.37**	**0.47**	-0.06	**-0.35**	**-0.32**	**-0.57**	-0.10				-0.05

Table 8 (contd.)

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25#
Mumbai Suburban	21.3	(50.1)	*	*	99.2	26.7	99.6	NA	0.5	0.8	52.9	91.4
Pune	22.4	(81.0)	*	(93.3)	95.3	63.5	95.7	39.6	0.6	3.7	52.8	88.3
Sangli	23.3	(43.4)	*	(89.9)	95.8	68.8	96.2	51.3	1.0	0.6	47.4	86.7
Satara	23.3	59.2	(49.8)	(84.7)	93.0	63.8	93.3	46.3	1.1	1.0	38.9	89.5
Solapur	25.4	64.9	*	(84.0)	86.9	49.3	96.4	44.5	0.5	1.8	35.1	88.3
Mumbai	25.5	(45.6)	*	*	99.6	39.2	98.1	36.9	0.5	1.1	43.3	91.3
Sindhudurg	25.9	(80.3)	*	(89.6)	75.1	77.6	88.1	51.8	4.2	0.8	46.0	92.2
Kolhapur	26.9	(46.9)	*	(77.4)	95.4	67.0	94.9	50.3	0.9	0.8	44.3	86.3
Ratnagiri	28.3	(73.1)	*	(88.7)	85.0	67.8	85.1	48.8	3.0	1.3	33.0	93.6
Raigarh	29.9	(47.6)	*	(70.2)	93.6	75.4	93.8	42.8	1.8	11.6	49.8	93.5
Wardha	30.5	(76.5)	*	*	93.7	56.9	98.7	39.4	1.2	11.5	42.6	91.9
Chandrapur	32.2	(60.5)	*	*	84.0	53.9	99.2	40.5	2.2	17.7	43.1	95.3
Gadchiroli	32.5	(82.0)	*	*	86.1	32.6	98.2	34.8	3.4	38.7	35.9	96.1
Ahmadnagar	33.4	43.4	(47.0)	(81.2)	86.1	50.8	94.9	48.0	0.6	8.3	44.7	85.2
Nagpur	33.9	(76.5)	*	(83.7)	95.4	71.1	94.4	38.2	0.9	9.4	53.1	93.1
Gondiya	34.7	74.4	*	*	78.8	55.4	98.8	41.5	3.4	16.2	43.9	95.6
Latur	34.7	59.4	50.3	71.2	93.0	39.7	97.4	43.9	0.5	2.3	34.1	88.9
Jalgaon	36.4	(43.2)	(60.3)	(94.9)	96.0	42.1	98.6	44.2	0.9	14.3	32.0	84.2
Bid	37.8	53.9	(66.0)	(82.3)	86.1	39.7	95.4	42.3	0.7	1.3	57.7	91.6
Amravati	38.1	(64.7)	*	(83.3)	95.8	64.5	97.1	39.4	1.1	14.0	49.0	93.5
Thane	38.5	40.9	*	(87.9)	92.0	64.7	93.5	39.4	0.9	13.9	47.1	92.4
Aurangabad	38.6	59.3	(42.5)	84.2	88.4	45.3	98.2	42.9	0.7	3.9	41.3	85.8
Dhule	39.6	40.0	(63.3)	(94.7)	93.8	32.0	96.9	41.1	0.8	31.6	29.6	89.8
Hingoli	39.6	65.9	(46.2)	(82.9)	86.0	40.3	98.9	45.1	0.6	9.5	25.1	88.2
Nanded	40.4	51.1	(49.9)	86.2	88.3	43.8	95.8	34.6	0.7	8.4	27.3	91.0
Bhandara	40.5	(81.1)	*	*	85.9	67.3	99.0	37.0	2.8	7.4	31.0	95.0

Table 8   **(contd.)**

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)			Domain 7 (Socio-economic, gender)		
		15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25#**
Washim	41.1	(67.9)	*	(96.9)	88.1	41.5	97.2	42.3	0.8	6.7	38.4	86.3
Akola	41.2	50.8	(74.4)	88.8	97.4	46.5	98.7	46.0	0.7	5.5	44.9	91.2
Osmanabad	43.3	(62.7)	(67.5)	(70.9)	89.0	27.3	98.6	45.8	0.7	2.2	37.7	86.7
Nashik	43.5	62.3	(63.6)	85.0	89.7	52.8	97.2	37.8	0.7	25.6	39.9	89.0
Buldana	43.9	64.2	(77.5)	(88.2)	86.8	45.7	99.6	46.4	0.7	4.8	32.1	85.5
Jalna	44.1	70.0	(55.1)	(65.2)	72.6	34.0	99.8	42.6	0.7	2.2	24.7	87.0
Parbhani	46.4	51.5	(61.1)	(91.3)	89.9	34.0	99.1	45.1	0.6	2.2	23.1	88.4
Yavatmal	47.4	61.6	(72.6)	(77.1)	80.8	43.7	98.0	47.0	0.9	18.5	36.6	92.2
Nandurbar	47.6	32.8	*	(73.0)	83.7	23.6	98.5	43.6	1.0	69.3	24.8	94.4
Median					89	46.5	97.4	42.9	0.78	6.72	39.9	91.0
Correlation					**-0.36**	**-0.46**	**0.42**	**-0.17**	**-0.20**	**0.39**	**-0.54**	**-0.06**

Indicator list: 1. Anaemia among non-pregnant women (15 to 49 years); 2. Currently married women married before 18 years of age; 3. Births to women (15-19 years) of total births; 4. Married women (15-49 years) using any modern contraceptive; 5. Women with BMI <18.5 kg/m^2; 6. Pregnant women who had antenatal check-up in first trimester; 7. Pregnant women who had ≥ 4 ANC check-ups; 8. Pregnant women consumed ≥100 IFA tablets (syrup or equivalent); 9. Institutional delivery; 10 Children (under three years) breastfed within an hour of birth; 11. Children (under 6 months) exclusively breastfed; 12. Children (6-8 months) receiving solids, semi-solids in addition to breastmilk; 13. Children (6 to 23 months) receiving adequate diet; 14. Children (9-59 months) received one dose vitamin A in last six months; 15. Children (12-23 months) fully immunized; 16. Children (under five years) with diarrhoea who received ORS/ ORT/zinc; 17. Children (under five years) with acute respiratory infection who sought treatment; 18. HH with improved source of drinking water within or near premises; 19. HH with access to improved toilet facilities; 20. HH using iodized salt ≥15ppm; 21. HH expenditure on food of total expense; 22. HH with none of the Census-specified assets; 23. ST population; 24. Female literacy; 25. Sex ratio (#converted to percentage).

IYCF: infant and young child feeding; HH: household; NA: not available; ORS: oral rehydration salts; ORT: oral rehydration therapy; ppm: parts per million; ST: Scheduled Tribe.

Table 9   Estimates of 25 indicators in seven domains in order of increasing prevalence of stunting (%) by district, Tamil Nadu

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)						Domain 3 (IYCF)		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Kanniyakumari	17.2	45.6	5.5	1.0	43.8	12.3	52.4	81.5	70.2	99.3	40.7	*	*	37.7	62.5
Sivaganga	20.9	53.4	12.8	6.6	43.3	20.1	66.1	86.2	69.5	99.5	40.0	*	*	37.7	60.3
Madurai	21.2	52.7	19.5	12.0	43.2	14.9	55.9	69.5	65.4	98.3	51.5	*	*	33.3	60.9
Thoothukkudi	21.2	59.0	11.4	1.8	29.7	17.9	49.3	64.8	51.6	99.1	53.7	*	*	31.7	63.1
Ramanathapuram	22.5	50.5	13.0	9.4	25.8	19.2	47.9	65.9	53.5	98.8	42.9	*	*	41.3	55.0
Perambalur	24.0	59.1	13.9	8.5	39.1	17.1	67.3	77.7	57.3	100.0	33.7	*	*	45.2	68.3
Dharmapuri	24.2	58.9	27.9	4.4	54.3	15.7	57.5	86.3	50.8	98.6	43.0	*	*	21.8	81.3
Nagapattinam	24.5	51.9	6.3	5.4	56.4	22.7	59.5	68.3	53.4	100.0	55.8	*	*	25.2	64.4
Tiruvannamalai	24.5	59.4	19.8	9.2	48.5	16.1	54.3	83.5	58.9	96.1	48.8	*	*	29.8	86.0
Kancheepuram	25.0	54.6	11.9	2.3	61.4	9.5	57.5	73.6	60.4	100.0	61.9	*	*	25.7	68.3
Krishnagiri	25.1	47.5	22.5	7.4	60.4	18.1	71.6	86.6	81.2	95.4	64.2	(54.5)	*	23.6	65.6
Namakkal	25.2	49.5	16.5	6.4	58.4	10.8	62.4	81.6	66.8	100.0	64.6	*	*	36.9	60.6
Erode	25.6	48.3	20.7	6.0	62.3	10.7	65.4	77.2	68.3	100.0	80.7	*	*	28.7	66.8
Thanjavur	26.0	58.1	11.8	3.5	47.1	15.7	73.9	90.2	64.6	98.4	53.4	*	*	32.3	70.3
Pudukkottai	26.7	55.1	12.1	4.5	38.7	23.5	58.4	76.9	60.2	99.7	38.2	(37.7)	*	37.1	68.5
Salem	27.0	55.5	19.5	6.5	51.5	12.0	69.7	78.7	63.9	97.5	44.8	*	*	31.6	67.4
Coimbatore	27.3	54.8	19.9	3.8	64.8	13.8	77.3	88.5	75.3	99.6	59.9	*	*	36.1	61.7
Theni	27.4	50.6	26.7	9.5	38.5	13.6	43.7	75.9	55.5	96.6	60.1	*	*	24.4	82.0
Karur	27.5	56.2	23.1	3.1	57.1	14.9	70.9	82.9	73.0	100.0	59.4	*	*	32.9	77.1
Cuddalore	28.2	59.8	14.3	7.8	55.1	19.3	60.7	85.5	63.9	98.2	54.0	*	*	25.0	59.5
Thiruvarur	28.4	58.7	7.2	2.4	54.5	19.8	68.2	83.4	70.3	99.6	54.8	*	*	36.0	70.3
Vellore	29.0	55.8	11.6	3.4	63.5	14.4	82.2	92.5	69.4	100.0	71.2	(43.5)	*	37.5	74.7
Tiruppur	29.4	58.9	15.1	4.7	63.0	11.9	84.6	89.5	68.1	100.0	58.7	*	*	35.2	89.7

Table 9 **(contd.)**

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)				Domain 3 (IYCF)				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Virudhunagar	29.9	56.0	17.6	4.4	23.0	14.6	40.2	65.9	36.6	96.0	48.8	*	*	29.0	80.2
Thiruchirappalli	30.0	66.1	12.6	5.5	42.6	17.9	63.0	85.8	59.8	98.3	43.8	*	*	30.3	73.1
Thiruvallur	30.1	55.7	16.0	3.9	62.8	11.3	73.6	91.6	71.4	99.5	64.1	*	*	19.6	63.3
Tirunelveli	30.8	60.0	6.0	2.2	35.3	18.9	41.6	71.4	45.0	99.0	53.8	*	*	28.5	64.1
Chennai	30.9	54.7	12.8	0.5	60.1	9.4	61.8	78.3	70.1	100.0	40.5	*	*	13.8	60.0
Dindigul	31.1	51.0	19.9	6.7	59.6	14.1	76.0	88.8	67.1	99.3	75.4	*	*	37.5	65.2
Viluppuram	31.8	62.7	20.5	7.2	49.8	18.6	60.0	79.5	61.7	99.2	46.0	*	*	31.2	68.3
The Nilgiris	33.1	51.2	18.7	1.7	55.8	12.7	72.7	88.8	57.3	99.8	50.7	*	*	32.5	81.2
Ariyalur	37.0	57.2	12.8	8.1	35.7	16.9	46.7	79.1	52.3	98.5	45.2	*	*	32.0	77.7
Median		55.6	14.7	5.1	52.9	15.3	62.1	81.6	63.9	99.3	53.6			31.9	67.9
Correlation		**0.37**	0.10	-0.12	0.16	-0.10	0.14	0.27	-0.14	0.02	0.16			-0.25	0.36

Table 9   (contd.)

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)				Domain 7 (Socio-economic, gender)	
		15	16	17	18	19	20	21	22	23	24	25#
Kanniyakumari	17.2	55.1	*	81.9	91.9	85.6	88.9	41.2	13.2	4.0	73.9	96.4
Sivaganga	20.9	(69.9)	*	(82.6)	86.9	47.6	66.3	43.5	5.6	17.0	50.2	96.0
Madurai	21.2	(61.0)	*	(88.3)	78.6	54.4	81.8	43.3	6.7	13.5	48.9	93.2
Thoothukkudi	21.2	(47.7)	*	(85.5)	92.7	50.4	67.7	45.0	6.7	19.9	46.8	96.3
Ramanathapuram	22.5	(59.0)	*	76.3	76.2	45.4	67.5	48.0	5.3	18.4	43.2	96.1
Perambalur	24.0	(70.4)	(67.0)	(81.6)	89.1	37.2	84.0	36.5	5.5	31.0	48.6	91.3
Dharmapuri	24.2	51.6	*	*	97.2	37.7	81.3	39.7	15.1	16.3	47.6	91.3
Nagapattinam	24.5	(39.0)	*	(65.9)	91.4	43.1	79.8	45.0	9.0	31.5	46.7	95.9
Tiruvannamalai	24.5	62.1	(66.6)	(80.1)	96.4	31.0	72.2	41.4	15.5	22.9	43.3	93.0
Kancheepuram	25.0	(56.8)	*	*	78.6	68.0	91.1	39.1	9.4	23.7	58.0	95.9
Krishnagiri	25.1	81.6	(54.6)	(84.6)	92.0	43.8	82.6	39.1	12.2	14.2	50.8	92.6
Namakkal	25.2	(57.3)	*	*	92.4	49.6	89.0	45.4	6.5	20.0	48.6	91.4
Erode	25.6	81.9	*	(78.7)	97.5	61.1	87.3	39.8	13.7	16.4	49.0	95.3
Thanjavur	26.0	74.6	*	83.3	98.6	46.9	78.5	41.1	6.0	18.9	48.0	95.7
Pudukkottai	26.7	54.3	*	(65.6)	84.7	35.2	85.1	45.2	4.8	17.6	48.7	96.0
Salem	27.0	73.6	*	(81.1)	93.2	46.2	88.3	46.8	16.0	16.7	51.6	91.6
Coimbatore	27.3	(80.7)	*	(93.2)	95.7	57.6	90.7	41.7	10.8	15.5	51.6	95.6
Theni	27.4	(56.8)	*	*	96.2	47.0	61.2	46.1	9.4	20.7	43.5	93.4
Karur	27.5	87.4	(34.5)	(80.8)	96.4	47.9	89.0	43.1	3.7	20.8	47.7	93.9
Cuddalore	28.2	(64.2)	*	(78.5)	97.4	38.6	73.6	42.1	7.0	29.3	46.5	89.6
Thiruvarur	28.4	72.0	*	(86.1)	97.8	45.2	76.0	44.7	5.3	34.1	48.8	95.8
Vellore	29.0	74.0	*	(82.7)	86.6	53.4	87.0	39.7	8.6	21.9	49.7	94.4
Tiruppur	29.4	93.2	*	*	97.6	51.6	93.1	NA	8.3	16.0	44.4	95.2

Table 9   (contd.)

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)			Domain 7 (Socio-economic, gender)		
		15	16	17	18	19	20	21	22	23	24	25#
Virudhunagar	29.9	(54.4)	*	*	84.0	36.5	62.8	42.1	8.1	20.6	39.8	95.5
Thiruchirappalli	30.0	(70.0)	*	(90.6)	97.2	46.5	80.2	43.0	7.7	17.1	53.6	94.7
Thiruvallur	30.1	(78.9)	*	(89.2)	85.3	66.6	92.9	38.0	9.4	22.0	56.6	94.6
Tirunelveli	30.8	(49.8)	*	(84.7)	97.4	45.8	54.9	39.4	7.8	18.5	40.0	96.0
Chennai	30.9	(86.1)	*	*	77.4	82.3	96.4	33.2	2.1	16.8	70.7	95.0
Dindigul	31.1	80.0	*	(77.7)	96.4	42.6	81.3	41.4	8.6	20.9	42.0	93.4
Viluppuram	31.8	72.1	(62.5)	(81.5)	96.2	32.4	87.0	41.1	12.1	29.4	42.5	94.1
The Nilgiris	33.1	78.7	*	*	94.9	63.0	87.2	41.9	10.8	32.1	61.1	98.5
Ariyalur	37.0	(60.6)	*	*	96.6	28.1	62.8	42.2	7.9	23.3	42.7	89.7
Median					94.1	46.7	82.2	41.9	8.2	20.0	48.6	94.9
Correlation					0.27	-0.23	-0.02	-0.22	-0.09	**0.42**	-0.21	-0.14

Indicator list: 1. Anaemia among non-pregnant women (15 to 49 years); 2. Currently married women (15-49 years) using any modern contraceptive; 3. Births to women (15-19 years) of total births; 4. Married women (15-49 years) married before 18 years of age; 5. Women with BMI <18.5 kg/m²; 6. Pregnant women who had antenatal check-up in first trimester; 7. Pregnant women who had ≥ 4 ANC check-ups; 8. Pregnant women consumed ≥100 IFA tablets (syrup or equivalent); 9. Institutional delivery; 10 Children (under three years) breastfed within an hour of birth; 11. Children (under 6 months) exclusively breastfed; 12. Children (6-8 months) receiving solids, semi-solids in addition to breastmilk; 13. Children (6 to 23 months) receiving adequate diet; 14. Children (9-59 months) received one dose vitamin A in last six months; 15. Children (12-23 months) fully immunized; 16. Children (under five years) with diarrhoea who received ORS/ ORT/zinc; 17. Children (under five years) with acute respiratory infection who sought treatment; 18. HH with improved source of drinking water within or near premises; 19. HH with access to improved toilet facilities; 20. HH using iodized salt ≥15ppm; 21. HH expenditure on food of total expense; 22. HH with none of the Census-specified assets; 23. SC population; 24. Female literacy; 25. Sex ratio (#converted to percentage).

IYCF: infant and young child feeding; HH: household; NA: not available; ORS: oral rehydration salts; ORT: oral rehydration therapy ppm: parts per million; SC: Scheduled Caste

Table 10 Estimates of 25 indicators in seven domains in order of increasing prevalence of stunting (%) by district, Telangana

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)						Domain 3 (IYCF)		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Hyderabad	15.7	54.6	10.5	6.4	55.5	12.9	90.4	85.8	73.1	97.2	40.8	*	*	26.1	73.9
Karimnagar	24.3	52.9	12.7	4.4	38.6	23.3	83.4	73.7	47.3	97.0	35.9	*	*	2.9	73.6
Rangareddy	26.2	55.1	22.8	8.6	68.6	19.3	89.0	77.3	53.8	95.3	32.0	*	*	6.3	70.9
Khammam	26.5	71.0	30.9	16.9	69.1	20.2	83.9	79.2	56.4	94.2	49.5	*	*	14.4	81.8
Warangal	26.6	57.1	27.7	13.7	50.8	24.3	85.5	84.7	70.4	96.0	45.2	*	*	6.5	90.3
Nalgonda	28.9	56.2	36.8	15.4	68.0	24.9	77.8	72.8	36.5	94.8	35.1	*	*	6.9	82.2
Medak	33.4	58.1	31.6	7.5	49.1	29	79.2	68.3	36.4	91.3	49.4	*	*	11.9	75.4
Nizamabad	36.6	56.4	23.9	8.5	47.0	26.5	70.5	71.2	49.6	92.6	30.7	*	*	4.8	75.3
Mahbubnagar	37.1	50.4	45.6	15.1	64.3	28.3	82.1	60.2	48.4	78.4	34.6	(55.1)	*	7.6	74.4
Adilabad	38.3	63.4	31.7	12.9	48.2	35.1	72.6	68.3	41.6	70.8	20.8	(54.0)	*	6.3	75.5
Median		56.3	29.3	10.75	53.15	24.6	82.75	73.25	49	94.5	35.5			6.7	75.4
Correlation	0.07	**0.71**	**0.34**	-0.10	**0.91**		**-0.81**	**-0.83**	**-0.66**	**-0.74**	-0.43			-0.60	-0.07

Table 10   (contd.)

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25#
Hyderabad	15.7	71.3	*	(89.5)	90.5	73.2	98.9	37.4	8.9	1.2	58.4	91.4
Karimnagar	24.3	(84.3)	(66.5)	(75.2)	69.9	53.9	98.8	41.8	8.8	2.8	45.5	93.5
Rangareddy	26.2	68.1	*	(84.5)	80.7	51.2	98.4	42.0	7.8	4.1	55.4	93.3
Khammam	26.5	(62.4)	*	*	84.5	50.3	99.2	43.3	8.1	27.4	36.0	95.8
Warangal	26.6	(67.0)	(57.9)	66.5	73.3	46.9	97.4	46.4	9.0	15.1	43.6	92.3
Nalgonda	28.9	(69.0)	*	(80.8)	54.4	50.1	90.5	47.8	8.5	11.3	34.8	92.3
Medak	33.4	(81.4)	*	62.3	85.2	53.3	98.2	45.0	9.7	5.6	35.3	95.2
Nizamabad	36.6	64.2	*	77.9	82.3	42.3	95.4	46.5	9.6	7.6	35.8	94.8
Mahbubnagar	37.1	45.0	*	(73.8)	71.0	32.8	80.4	43.9	8.4	9.0	30.9	92.5
Adilabad	38.3	(70.0)	(61.1)	72.7	85.0	30.7	97.1	43.9	11.2	18.1	28.3	93.4
Median					81.5	50.2	97.8	43.9	8.8	8.3	35.9	93.4
Correlation					-0.10	-0.90	-0.48	0.64	0.51	0.27	-0.86	0.38

Indicator list: 1. Anaemia among non-pregnant women (15 to 49 years); 2. Currently married women married before 18 years of age; 3. Births to women (15-19 years) of total births; 4. Married women (15-49 years) using any modern contraceptive; 5. Women with BMI <18.5 kg/m²; 6. Pregnant women who had antenatal check-up in first trimester; 7. Pregnant women who had ≥ 4 ANC check-ups; 8. Pregnant women consumed ≥100 IFA tablets (syrup or equivalent); 9. Institutional delivery; 10 Children (under three) breastfed within an hour of birth; 11. Children (under 6 months) exclusively breastfed; 12. Children (6-8 months) receiving solids, semi-solids in addition to breastmilk; 13. Children (6 to 23 months) receiving adequate diet; 14. Children (9-59 months) received one dose vitamin A in last six months; 15. Children (12-23 months) fully immunized; 16. Children (under five years) with diarrhoea who received ORS/ ORT/zinc; 17. Children (under five years) with acute respiratory infection who sought treatment; 18. HH with improved source of drinking water within or near premises; 19. HH with access to improved toilet facilities; 20. HH using iodized salt ≥15ppm; 21. HH expenditure on food of total expense; 22. HH with none of the Census-specified assets; 23. ST population; 24. Female literacy; 25. Sex ratio (#converted to percentage).

IYCF: infant and young child feeding; HH: household; ORS: oral rehydration salts; ORT: oral rehydration therapy; ppm: parts per million; ST: Scheduled Tribe.

Table 11 Estimates of 25 indicators in seven domains in order of increasing prevalence of stunting (%) by district, West Bengal

District	Prevalence (%)	Domain 1 (Pre-pregnancy)					Domain 2 (Pregnancy)						Domain 3 (IYCF)		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nadia	23.3	57.4	40.5	21.9	52.5	11.9	68.3	91.6	36.3	93.1	50.8	*	*	32.8	76.2
North 24 Parganas	23.8	62.6	36.0	18.7	50.7	11.5	52.0	79.3	21.5	86.9	33.3	*	*	13.9	56.5
Kolkata	24.2	46.7	13.1	4.8	57.5	7.3	76.2	84.8	42.2	95.0	47.8	*	*	13.6	63.7
South 24 Parganas	27.3	67.6	49.7	19.3	60.4	18.9	49.5	75.6	23.7	52.1	59.3	*	*	24.8	76.6
Darjiling	29.1	48.5	20.4	10.1	66.1	15.4	81.2	65.9	42.4	94.5	37.7	*	*	10.7	53.9
Paschim Medinipur	29.4	67.3	52.1	15.6	62.0	29.9	49.7	84.0	26.0	77.7	48.1	*	*	31.8	73.4
Purba Medinipur	29.9	59.3	43.1	19.6	59.5	19.4	41.9	79.3	29.7	74.1	28.0	*	*	17.4	71.3
Hugli	30.1	64.2	31.9	19.6	61.8	18.3	52.3	76.6	33.1	91.3	37.5	*	*	19.3	70.6
Jalpaiguri	31.2	67.0	32.7	9.7	48.2	26.1	57.0	80.7	24.0	84.0	48.3	*	*	14.6	73.0
Barddhaman	32.5	63.8	40.1	14.4	56.1	24.0	68.0	83.3	35.9	82.6	64.6	*	*	20.5	66.2
Dakshin Dinajpur	32.9	76.9	44.4	19.5	53.2	24.9	52.4	69.4	39.6	79.5	43.4	*	*	15.5	79.0
Koch Bihar	32.9	69.3	41.2	23.6	60.8	24.8	58.0	74.4	20.3	81.2	39.4	(57.6)	*	17.7	75.7
Bankura	34.0	66.9	38.3	16.6	69.0	33.3	65.8	89.5	46.7	85.6	54.1	*	*	23.0	81.0
Haora	34.6	58.6	24.4	7.2	50.7	16.5	74.2	86.6	38.3	86.6	46.3	*	*	20.0	70.8
Maldah	37.8	59.3	54.8	24.9	51.8	23.9	42.5	52.6	19.3	55.0	43.3	(63.7)	*	6.0	55.9
Uttar Dinajpur	40.4	61.7	39.1	17.4	43.6	25.7	36.9	43.1	6.1	47.0	44.2	67.8	*	15.2	49.1
Birbhum	40.5	64.8	52.0	24.9	65.5	30.3	50.8	78.1	22.7	86.3	54.6	*	*	30.3	71.1
Murshidabad	41.9	58.1	52.6	29.5	60.9	21.1	49.1	72.1	22.7	63.8	45.5	*	*	13.4	67.0
Puruliya	45.5	79.9	38.3	21.7	50.5	47.5	52.5	68.6	34.9	72.9	59.4	(50.7)	(61.9)	18.6	77.1
Median		63.8	40.1	19.3	57.5	23.9	52.4	78.1	29.7	82.6	46.3			17.7	71.1
Correlation		**0.40**	**0.38**	**0.44**	**-0.11**	**0.74**	**-0.40**	**-0.52**	**-0.30**	**-0.48**	**0.27**			**-0.16**	**-0.02**

Table 11 (contd.)

District	Prevalence (%)	Domain 4 (Health care)			Domain 5 (Environment)		Domain 6 (HH food insecurity)		Domain 7 (Socio-economic, gender)			
		15	16	17	18	19	20	21	22	23	24	25[#]
Nadia	23.3	93.2	*	(76.3)	95.0	68.5	95.8	50.9	5.4	32.7	24.6	96.0
North 24 Parganas	23.8	(88.7)	*	*	92.0	69.0	97.3	46.2	6.4	24.3	35.2	95.6
Kolkata	24.2	(66.7)	*	*	96.2	50.2	98.5	38.4	4.5	5.6	49.6	93.3
South 24 Parganas	27.3	94.8	*	81.7	97.7	51.7	94.6	51.5	16.0	31.4	22.8	96.3
Darjiling	29.1	(84.2)	*	*	71.0	61.0	98.6	45.5	9.5	38.7	32.2	95.3
Paschim Medinipur	29.4	92.2	*	(86.6)	96.5	40.9	91.8	54.4	21.9	34.0	24.3	96.3
Purba Medinipur	29.9	(92.6)	*	(52.2)	98.9	66.9	86.6	48.5	22.1	15.2	28.6	94.6
Hugli	30.1	(88.4)	*	*	98.5	54.6	98.8	47.2	9.3	28.5	26.2	95.2
Jalpaiguri	31.2	81.7	(79.9)	79.8	85.2	49.2	92.1	48.3	12.5	56.5	22.7	95.5
Barddhaman	32.5	82.3	*	*	96.6	46.6	97.3	51.7	12.1	33.8	26.4	95.1
Dakshin Dinajpur	32.9	83.2	*	(76.5)	99.4	43.9	92.1	51.9	13.1	45.2	21.7	95.7
Koch Bihar	32.9	(76.6)	*	81.6	97.9	49.6	89.4	52.7	9.4	50.8	20.9	94.8
Bankura	34.0	96.2	*	(85.5)	96.4	29.5	88.8	49.9	21.3	42.9	23.2	94.9
Haora	34.6	73.8	*	(81.0)	96.5	60.0	97.5	48.8	7.5	15.1	33.1	96.2
Maldah	37.8	69.5	*	73.6	82.9	44.0	93.6	53.7	16.8	28.8	19.2	95.0
Uttar Dinajpur	40.4	66.0	(67.6)	61.1	97.5	31.8	97.3	53.6	10.9	32.3	17.0	95.3
Birbhum	40.5	91.4	*	*	97.4	28.0	94.2	52.1	16.0	36.4	22.1	95.9
Murshidabad	41.9	78.9	(60.0)	71.9	97.5	50.6	93.5	52.7	9.6	13.9	22.2	96.8
Puruliya	45.5	87.4	*	(69.2)	82.7	12.3	93.9	49.6	32.5	37.8	15.7	95.3
Median					96.5	49.6	94.2	50.9	12.1	32.7	23.2	95.3
Correlation					-0.09	-0.74	-0.17	0.50	0.50	0.13	-0.65	0.22

Indicator list: 1. Anaemia among non-pregnant women (15 to 49 years); 2. Currently married women married before 18 years of age; 3. Births to women (15-19 years) of total births; 4. Married women (15-49 years) using any modern contraceptive; 5. Women with BMI <18.5 kg/m²; 6. Pregnant women who had antenatal check-up in first trimester; 7. Pregnant women who had ≥ 4 ANC check-ups; 8. Pregnant women consumed ≥100 IFA tablets (syrup or equivalent); 9. Institutional delivery; 10 Children (under three years) breastfed within an hour of birth; 11. Children (under 6 months) exclusively breastfed; 12. Children (6-8 months) receiving solids, semi-solids in addition to breastmilk; 13. Children (6 to 23 months) receiving adequate diet; 14. Children (9-59 months) received one dose vitamin A in last six months; 15. Children (12-23 months) fully immunized; 16. Children (under five years) with diarrhoea who received ORS/ ORT/zinc; 17. Children (under five years) with acute respiratory infection who sought treatment; 18. HH with improved source of drinking water within or near premises; 19. HH with access to improved toilet facilities; 20. HH using iodized salt ≥15ppm; 21. HH expenditure on food of total expense; 22. HH with none of the Census-specified assets; 23. ST population; 24. Female literacy; 25. Sex ratio (#converted to percentage).

IYCF: infant and young child feeding; HH: household; ORS: oral rehydration salts; ORT: oral rehydration therapy; ppm: parts per million; ST: Scheduled Tribe.

Table 12   **Estimated number of years to reduce prevalence of childhood stunting by 40% by district, Andhra Pradesh**

District	Prevalence 2015-2016 (%)*	Prevalence 2013-2014 (%)**	Target (after 40% reduction)	ARR	Additional years to achieve target
Sri Potti Sriramulu Nellore	29.4	41.9	17.6	16.2	2
Guntur	22.1	27.1	13.3	9.7	4
Prakasam	28.2	26.2	16.9	-3.7	NA
Srikakulam	28.0	25.7	16.8	-4.4	NA
Vishakapatnam	30.1	26.1	18.1	-7.4	NA
West Godavari	28.5	22.7	17.1	-12.0	NA
Anantpur	40.3	32.0	24.2	-12.2	NA
YSR Cuddapah	36.3	28.6	21.8	-12.7	NA
Kurnool	44.1	34.2	26.5	-13.6	NA
Vizianagram/Vijayanagara	36.8	28.4	22.1	-13.8	NA
Chittoor	31.4	22.6	18.8	-17.9	NA
East Godavari	27.7	19.0	16.6	-20.7	NA
Krishna	22.6	12.8	13.6	-32.9	NA

*NFHS-4 2015-2016

**DLHS 2013-2014

ARR: annual rate of reduction

NA: not available

Table 13   Estimated number of years to reduce prevalence of childhood stunting by 40% by district, Bihar

District	Prevalence 2015-2016 (%)*	Prevalence 2012-2013 (%)**	Target (after 40% reduction)	ARR	Additional years to achieve target
Jamui	45.9	63.1	27.5	10.1	4
Patna	43.5	59.4	26.1	9.9	4
Buxar	43.9	59.2	26.3	9.5	4
Munger	46.6	61.4	28.0	8.8	5
Siwan	37.9	49.3	22.7	8.4	5
Arwal	50.2	64.6	30.1	8.1	5
Begusarai	44.9	57.8	26.9	8.1	5
Saharsa	43.9	55.2	26.3	7.4	5
Jehanabad	52.1	64.6	31.3	6.9	6
Araria	48.4	57.4	29.0	5.5	7
Rohtas	48.5	57.3	29.1	5.4	7
Khagaria	49.8	58.0	29.9	5.0	8
Muzaffarpur	47.9	55.8	28.7	5.0	8
Darbhanga	49.0	56.5	29.4	4.6	9
Pashchim Champaran	43.6	50.1	26.2	4.5	9
Bhojpur	43.5	48.7	26.1	3.7	11
Gopalganj	35.6	39.6	21.4	3.5	11
Purba Champaran	47.2	52.2	28.3	3.3	12
Sheikhpura	46.4	50.5	27.8	2.8	14
Kishanganj	46.9	50.9	28.1	2.7	15
Supaul	48.1	51.4	28.9	2.2	18
Bhagalpur	46.6	48.9	28.0	1.6	25
Lakhisarai	50.6	52.8	30.4	1.4	28
Aurangabad	50.2	52.1	30.1	1.2	33
Samastipur	49.2	51.0	29.5	1.2	34
Kaimur (Bhabua)	53.8	53.8	32.3	0.0	NA
Madhepura	51.8	52.1	31.1	0.0	NA
Katihar	49.2	48.7	29.5	-0.3	NA
Vaishali	53.7	52.9	32.2	-0.5	NA
Gaya	52.9	51.6	31.7	-0.8	NA
Nalanda	54.1	52.4	32.5	-1.1	NA
Banka	49.6	47.2	29.8	-1.7	NA
Saran	46.1	42.8	27.7	-2.5	NA
Sitamarhi	57.3	52.4	34.4	-3.0	NA
Nawada	48.4	40.6	29.0	-6.0	NA
Purnia	52.1	43.7	31.3	-6.0	NA
Madhubani	51.8	39.7	31.1	-9.3	NA
Sheohar	53.0	35.2	31.8	-14.6	NA

*NFHS-4 2015-2016

**AHS 2012-2013

ARR: annual rate of reduction

NA: not available

Table 14   Estimated number of years to reduce prevalence of childhood stunting by 40% by district, Madhya Pradesh

District	Prevalence 2015-2016 (%)*	Prevalence 2012-2013 (%)**	Target (after 40% reduction)	ARR	Additional years to achieve target
Mandsaur	34.0	65.1	20.4	19.5	2
Shahdol	36.7	65.3	22.0	17.5	2
Sagar	41.0	70.5	24.6	16.5	2
Harda	39.7	67.7	23.8	16.3	2
Seoni	34.7	58.8	20.8	16.1	2
Indore	39.2	60.7	23.5	13.6	3
Jabalpur	36.2	55.6	21.7	13.3	3
West Nimar	48.3	71.8	29.0	12.4	3
Sehore	33.6	49.7	20.2	12.2	3
Ujjain	35.8	52.0	21.5	11.7	3
Dindori	45.8	64.8	27.5	10.9	4
Umaria	41.1	57.7	24.7	10.7	4
Raisen	45.8	64.0	27.5	10.6	4
Tikamgarh	49.7	67.8	29.8	9.8	4
Bhind	47.6	64.2	28.6	9.5	4
Vidisha	41.1	53.9	24.7	8.6	5
Chhatarpur	42.7	56.0	25.6	8.6	5
Rajgarh	38.8	48.8	23.3	7.4	5
Neemuch	36.3	45.5	21.8	7.3	6
Shivpuri	48.6	59.3	29.2	6.4	6
Dhar	42.6	51.5	25.6	6.1	7
Hoshangabad	37.2	44.7	22.3	5.9	7
Datia	48.9	58.7	29.3	5.9	7
Bhopal	47.6	55.5	28.6	5.0	8
Mandla	36.9	42.9	22.1	4.9	8
Jhabua	45.6	52.9	27.4	4.8	8
Morena	47.7	55.0	28.6	4.6	9
Dewas	42.0	47.8	25.2	4.2	9
Shajapur	48.1	54.7	28.9	4.2	10
Sheopur	52.1	57.5	31.3	3.2	12
Barwani	52.0	57.2	31.2	3.1	13
Gwalior	42.8	46.4	25.7	2.7	15
Chhindwara	33.6	35.2	20.2	1.5	26
Balaghat	32.1	33.4	19.3	1.3	30
Panna	42.3	42.8	25.4	0.4	102
Guna	43.4	43.6	26.0	0.2	261
Rewa	40.4	39.1	24.2	-1.1	NA
East Nimar	43.6	42.0	26.2	-1.3	NA
Sidhi	48.7	46.4	29.2	-1.6	NA
Betul	34.7	30.9	20.8	-3.9	NA
Katni	45.5	40.3	27.3	-4.1	NA

Table 14   (contd.)

District	Prevalence 2015-2016 (%)*	Prevalence 2012-2013 (%)**	Target (after 40% reduction)	ARR	Additional years to achieve target
Damoh	43.2	36.5	25.9	-5.8	NA
Narsimhapur	37.9	27.9	22.7	-10.8	NA
Ratlam	46.1	33.4	27.7	-11.3	NA
Satna	41.2	26.9	24.7	-15.3	NA

*NFHS-4 2015-2016

**AHS 2012-2013

ARR: annual rate of reduction

NA: not available

Table 15   **Estimated number of years to reduce prevalence of childhood stunting by 40% by district, Maharashtra**

District	Prevalence 2015-2016 (%)*	Prevalence 2013-2014 (%)**	Target (after 40% reduction)	ARR	Additional years to achieve target
Mumbai (Suburban)	21.3	37.7	12.8	24.8	2
Sindhudurg	25.9	41.2	15.5	20.7	2
Solapur	25.4	34.2	15.2	13.8	3
Kolhapur	26.9	33.8	16.1	10.8	4
Pune	22.4	28.1	13.4	10.7	4
Mumbai	25.5	30.8	15.3	9.0	4
Chandrapur	32.2	38.9	19.3	9.0	4
Satara	23.3	27.8	14.0	8.5	5
Sangli	23.3	26.6	14.0	6.4	6
Raigarh	29.9	33.8	17.9	5.9	7
Gadchiroli	32.5	35.3	19.5	4.0	10
Aurangabad	38.6	39.9	23.2	1.6	24
Ratnagiri	28.3	28.5	17.0	0.4	114
Nagpur	33.9	32.9	20.3	-1.5	NA
Gondiya	34.7	32.6	20.8	-3.2	NA
Wardha	30.5	28.4	18.3	-3.6	NA
Nashik	43.5	40.5	26.1	-3.6	NA
Amravati	38.1	33.3	22.9	-7.0	NA
Bhandara	40.5	33.3	24.3	-10.3	NA
Ahmadnagar	33.4	27.3	20.0	-10.6	NA
Bid	37.8	29.8	22.7	-12.6	NA
Jalna	44.1	34.6	26.5	-12.9	NA
Jalgaon	36.4	28.4	21.8	-13.2	NA
Yavatmal	47.4	37	28.4	-13.2	NA
Buldana	43.9	32.5	26.3	-16.2	NA
Washim	41.1	27.6	24.7	-22.0	NA
Hingoli	39.6	26.4	23.8	-22.5	NA
Osmanabad	43.3	28.2	26.0	-23.9	NA
Akola	41.2	26.7	24.7	-24.2	NA
Dhule	39.6	25.2	23.8	-25.4	NA
Latur	34.7	21.2	20.8	-27.9	NA
Parbhani	46.4	25.3	27.8	-35.4	NA
Thane	38.5	20.9	23.1	-35.7	NA
Nanded	40.4	19.3	24.2	-44.7	NA
Nandurbar	47.6	14.0	28.6	-84.4	NA

*NFHS-4 2015-2016

**DLHS 2013-2014

ARR: annual rate of reduction

NA: not available

Table 16 **Estimated number of years to reduce prevalence of childhood stunting by 40% by district, Telangana**

District	Prevalence 2015-2016 (%)*	Prevalence 2013-2014 (%)**	Target (after 40% reduction)	ARR	Additional years to achieve target
Hyderabad	15.7	29.4	9.4	26.9	1
Rangareddy	26.2	26.6	15.7	0.8	53
Karimnagar	24.3	23.0	14.6	-2.8	NA
Nizamabad	36.6	33.2	22.0	-5.0	NA
Mahbubnagar	37.1	33.6	22.3	-5.1	NA
Khammam	26.5	21.7	15.9	-10.5	NA
Nalgonda	28.9	18.0	17.3	-26.7	NA
Medak	33.4	20.5	20.0	-27.6	NA
Adilabad	38.3	20.6	23.0	-36.4	NA
Warangal	26.6	11.7	16.0	-50.8	NA

*NFHS-4 2015-2016

**DLHS 2013-2014

ARR: annual rate of reduction

NA: not available

Table 17   Estimated number of years to reduce prevalence of childhood stunting by 40% by district, West Bengal

District	Prevalence 2015-2016 (%)*	Prevalence 2013-2014 (%)**	Target (after 40% reduction)	ARR	Additional years to achieve target
Kolkata	24.2	41.7	14.5	23.8	2
Jalpaiguri	31.2	50.0	18.7	21.0	2
Darjiling	29.1	41.7	17.5	16.5	2
Pachim Medinipur	29.4	41.4	17.6	15.7	3
Purba Medinipur	29.9	39.7	17.9	13.2	3
Bankura	34.0	45.1	20.4	13.2	3
North 24 Parganas	23.8	30.2	14.3	11.2	4
Nadia	23.3	28.3	14.0	9.3	4
Haora	34.6	41.0	20.8	8.1	5
South 24 Parganas	27.3	31.8	16.4	7.3	5
Koch Bihar	32.9	37.1	19.7	5.8	7
Hugli	30.1	33.6	18.1	5.4	7
Uttar Dinajpur	40.4	42.9	24.2	3.0	14
Bardhaman	32.5	32.8	19.5	0.5	87
Birbhum	40.5	40.5	24.3	0.0	NA
Murshidabad	41.9	41.2	25.1	-0.8	NA
Maldah	37.8	35.6	22.7	-3.0	NA
Dakshin Dinajpur	32.9	30.7	19.7	-3.5	NA
Puruliya	45.5	35.8	27.3	-12.7	NA

*NFHS-4 2015-2016

**DLHS 2013-2014

ARR: annual rate of reduction

NA: not available

ACKNOWLEDGEMENTS