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Comprehensive National Nutrition Survey: Preliminary Factsheets

Ministry of Health and Family Welfare

Government of India

UNICEF

Population Council

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन

सत्यमेव जयते

Ministry of Health and Family Welfare
Government of India

POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण - देश रोशन

Comprehensive National Nutrition Survey

Andhra Pradesh

Preliminary Factsheet

2016

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Andhra Pradesh where the CNNS was conducted from August 22 through December 1, 2016 and gathered household and anthropometry data from 1,173, 1,218 and 1,126 and biological samples from 443, 636 and 561 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Andhra Pradesh, survey and anthropometry data were collected by SIGMA Research and Consulting Pvt Ltd and Super Religare Laboratories (SRL) Ltd collected biological samples.

Andhra Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	34.3	28.3	26.8	32.6	31.5
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	15.4	13.3	10.9	15.3	14.4
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	18.9	15.2	16.8	17.2	17.1
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	5.5	6.2	7.0	5.6	5.9
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	33.7	33.2	28.4	34.7	33.5
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	11.5	8.0	8.3	10.2	9.8
	Children aged 6-59 months with MUAC <12.5cm (%)	4.6	3.2	3.8	4.0	3.9
	Children aged 6-59 months with MUAC <11.5cm (%)	1.2	0.4	0.6	0.9	0.8
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	11.0	11.2	7.7	11.9	11.1
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	2.7	0.5	1.5	1.7	1.7
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	3.9	4.9	3.9	4.5	4.4
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.2	0.9	0.6	0.5	0.5
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	2.3	2.4	1.1	2.6	2.3

[1] Below -2 standard deviations (SD), based on the WHO standards

[2] Below -3 standard deviations, based on the WHO standards

[3] Based on WHO standards

Andhra Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.2	0.0	0.0	0.1	0.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	3.2	3.7	3.0	3.5	3.4
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	0.0	0.2	0.1	0.1	0.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	8.2	4.3	4.8	6.7	6.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.2	0.0	0.0	0.2	0.1

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	22.1	20.3	17.4	22.3	21.2
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	4.9	3.7	4.0	4.4	4.3
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	25.1	16.2	20.5	20.9	20.8
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.2	3.2	5.0	4.7	4.8
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	8.0	8.5	13.2	6.9	8.2
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	3.8	2.8	4.2	3.1	3.3

[1] Below -2 standard deviations (SD), based on the WHO standards

[2] Below -3 standard deviations, based on the WHO standards

[3] Based on WHO standards

Andhra Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	24.0	20.7	19.0	23.4	22.4
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	21.6	9.5	12.7	18.3	16.7
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.8	16.0	15.8	21.1	19.8
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.7	6.6	6.0	8.2	7.7
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.8	0.0	2.9	2.9	2.9
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.7	3.9	4.4	5.8	5.4
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	7.9	10.9	16.1	7.4	9.4
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	7.2	9.9	11.2	7.1	8.3
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	7.6	10.5	13.6	7.3	8.9
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.6	2.3	4.5	1.8	2.4
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.9	3.3	2.6	1.6	1.8
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.7	2.7	3.5	1.7	2.2

[3] Based on WHO standards

Andhra Pradesh – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	39.7 (31.0-49.1)	19.2 (12.6-28.1)	21.3 (16.2-27.4)
Prevalence of anaemia – males[4,5] (%)	38.3 (30.6-46.6)	19.4 (11.6-30.5)	11.7 (7.1-18.7)
Prevalence of anaemia – females[4,5] (%)	41.5 (27.4-57.1)	18.9 (12.1-28.4)	33.3 (26.6-40.8)
Prevalence of low serum ferritin[5,6] (%)	13.1 (8.9-18.8)	10.6 (7.0-15.8)	14.9 (10.3-21.0)
Prevalence of folate deficiency[5,7] (%)	62.7 (56.5-68.6)	68.7 (61.2-75.4)	82.8 (77.2-87.3)
Prevalence of vitamin B12 deficiency[5,8] (%)	10.8 (6.3-17.9)	8.4 (5.5-12.5)	20.5 (15.9-26.1)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	4.9 (2.8-8.5)	10.3 (7.1-14.6)	16.0 (11.7-21.5)
Prevalence of vitamin A deficiency[5,10] (%)	20.9 (11.7-34.4)	22.8 (14.6-33.8)	13.1 (8.2-20.3)
Prevalence of zinc deficiency[11] (%)	10.0 (5.9-16.4)	9.4 (6.3-13.9)	20.1 (15.0-26.3)
Median urinary Iodine concentration(µg/l)[5]	150	138	131

[4] CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5] WHO standard cut-off

[6] For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7] Erythrocyte folate < 151 ng/ml

[8] Serum vitamin B12 < 203 pg/ml

[9] Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10] Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11] For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Andhra Pradesh – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	3.6 (1.3-9.4)	1.2 (0.5-2.9)
	Prevalence of high LDL cholesterol[13] (%)	5.4 (2.8-10.2)	3.1 (1.9-5.2)
	Prevalence of low HDL cholesterol[14] (%)	12.4 (9.0-16.7)	16.9 (12.3-22.8)
	Prevalence of high triglycerides[15]	25.5 (18.5-34.0)	15.4 (12.0-19.5)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	5.1 (2.5-10.1)	4.0 (1.9-8.4)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.5 (0.1-3.7)	0.0 (0.0-0.0)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	13.6 (9.2 – 19.7)	13.4 (10.4-17.0)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	34.5 (19.4-53.6)	30.3 (17.9-46.6)

[12] Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13] LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14] HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15] For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16] Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17] Cut-off taken from Global International Diabetes Federation

[18] Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19] For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20] High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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Arunachal Pradesh

Preliminary Factsheet

2018

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Birth to Adolescence

About the CNNS

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CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Arunachal Pradesh, where the CNNS was conducted from April 28 through October 3, 2018 and gathered household and anthropometry data from 1,268, 1,181 and 1,073 and biological samples from 840, 665 and 582 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Arunachal Pradesh, survey and anthropometry data were collected by Gfk Mode Pvt. Ltd. and Super Religare Laboratories (SRL) Ltd collected biological samples.

Arunachal Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	29.6	26.2	22.0	29.9	28.0
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	13.0	8.3	9.2	11.2	10.7
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	7.4	6.3	7.8	6.5	6.8
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	1.6	1.7	1.7	1.6	1.7
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	16.6	14.3	16.1	15.3	15.5
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	4.0	2.1	3.1	3.1	3.1
	Children aged 6-59 months with MUAC <12.5cm (%)	0.3	1.7	1.2	1.0	1.0
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	0.1	0.2	0.0	0.1
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	2.4	2.6	2.0	2.6	2.5
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.1	0.1	0.5	0.0	0.1
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	4.8	6.8	4.0	6.3	5.8
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.5	0.5	0.4	0.6	0.5
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	2.2	2.2	3.7	1.7	2.2

[1] Below -2 standard deviations (SD), based on the WHO standards

[2] Below -3 standard deviations, based on the WHO standards

[3] Based on WHO standards

Arunachal Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.5	0.6	0.0	0.7	0.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	8.6	5.4	1.5	9.0	7.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	2.6	0.6	0.0	2.2	1.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	3.6	2.6	7.1	1.8	3.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.5	0.4	1.4	0.1	0.5

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	21.5	15.2	13.9	19.8	18.2
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	6.8	3.4	3.0	5.7	5.0
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	8.9	9.9	10.3	9.1	9.4
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.6	2.7	4.6	1.9	2.6
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	9.9	9.1	15.0	7.5	9.5
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	3.2	2.7	6.5	1.6	2.9

[1] Below -2 standard deviations (SD), based on the WHO standards

[2] Below -3 standard deviations, based on the WHO standards

[3] Based on WHO standards

Arunachal Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	11.9	6.5	11.6	8.4	9.3
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	9.5	1.9	8.1	4.6	5.8
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	10.8	4.4	9.9	6.8	7.8
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.6	2.7	1.7	2.3	2.1
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.0	0.0	0.0	0.8	0.5
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.3	1.5	0.8	1.6	1.4
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	12.0	14.6	14.4	12.8	13.2
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	5.7	10.7	7.3	8.6	8.1
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.2	12.9	10.9	11.0	11.0
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.1	3.7	2.6	3.7	3.4
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.7	0.7	1.3	0.4	0.7
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.1	2.4	2.0	2.3	2.2

[3] Based on WHO standards

Arunachal Pradesh – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	28.3 (21.9-35.8)	25.2 (19.8-31.6)	26.4 (20.7-32.9)
Prevalence of anaemia- males[4,5] (%)	30.6 (23.1-39.2)	24.1 (17.9-31.7)	19.2 (12.0-29.2)
Prevalence of anaemia- females[4,5] (%)	25.8 (17.9-35.7)	26.1 (19.5-33.9)	34.6 (28.0-41.8)
Prevalence of low serum ferritin[5,6] (%)	14.9 (10.8-20.3)	7.7 (5.2-11.4)	18.3 (14.4-23.1)
Prevalence of folate deficiency[5,7] (%)	38.0 (30.9-45.6)	35.3 (29.1-42.0)	47.9 (40.9-54.9)
Prevalence of vitamin B12 deficiency[5,8] (%)	7.0 (4.6-10.6)	4.1 (2.5-6.7)	12.5 (8.4-18.0)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	7.3 (4.7-11.2)	14.3 (10.6-19.0)	21.9 (16.9-27.9)
Prevalence of vitamin A deficiency[5,10] (%)	14.8 (10.1-21.0)	14.7 (10.3-20.4)	9.5 (6.4-13.9)
Prevalence of zinc deficiency[11] (%)	8.4 (5.4-13.0)	9.2 (6.3-13.2)	20.1 (15.7-25.3)
Median urinary Iodine concentration(µg/l)[5]	266	230	243

[4] CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5] WHO standard cut-off

[6] For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7] Erythrocyte folate < 151 ng/ml

[8] Serum vitamin B12 < 203 pg/ml

[9] Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10] Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11] For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Arunachal Pradesh – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	1.3 (0.6-2.7)	0.7 (0.3-1.5)
	Prevalence of high LDL cholesterol[13] (%)	2.5 (1.2-5.0)	1.3 (0.7-2.5)
	Prevalence of low HDL cholesterol[14] (%)	38.7 (31.1-46.9)	40.2 (33.7-46.9)
	Prevalence of high triglycerides[15]	33.1 (27.0-39.8)	16.7 (12.4-22.2)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	9.0 (6.1-13.2)	9.7 (7.1-13.1)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	2.1 (0.6-7.7)	0.3 (0.1-1.3)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	8.1 (5.5-11.9)	7.7 (5.1-11.6)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	0.9 (0.4-2.2)	0.6 (0.2-2.3)

[12] Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13] LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14] HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15] For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16] Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17] Cut-off taken from Global International Diabetes Federation

[18] Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19] For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20] High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

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See CNNS results online: **www.NutritionINDIA.info**

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सत्यमेव जयते

Ministry of Health and Family Welfare
Government of India

POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Assam

Preliminary Factsheet

2016

CNNS
Birth to Adolescence

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The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Assam where the CNNS was conducted from July 12 through November 2, 2016 and gathered household and anthropometry data from 1,476, 1,455 and 1,386 and biological samples from 419, 539 and 496 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Assam, survey and anthropometry data were collected by Gfk Mode Pvt. Ltd. and Super Religare Laboratories (SRL) Ltd collected biological samples.

Assam – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	34.2	30.6	28.7	32.8	32.4
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	17.1	13.1	11.9	15.4	15.1
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	19.7	19.0	18.5	19.4	19.4
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	7.9	7.8	6.2	8.0	7.8
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	30.8	28.0	26.6	29.7	29.4
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	12.5	10.2	10.0	11.5	11.3
	Children aged 6-59 months with MUAC <12.5cm (%)	8.5	8.9	8.9	8.7	8.7
	Children aged 6-59 months with MUAC <11.5cm (%)	2.7	4.6	4.2	3.7	3.7
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	14.2	12.4	13.6	13.2	13.3
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	4.5	4.7	5.8	4.5	4.6
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	25.1	36.3	22.3	31.6	30.7
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	7.0	10.3	6.4	8.9	8.7
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.1	0.7	1.1	0.3	0.4

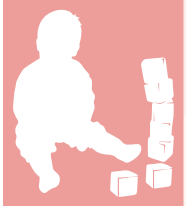
[1] Below -2 standard deviations (SD), based on the WHO standards

[2] Below -3 standard deviations, based on the WHO standards

[3] Based on WHO standards

Assam – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	14.6	19.8	16.2	17.4	17.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	2.9	2.5	2.9	2.6	2.7
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	0.6	1.1	2.0	0.8	0.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.2	0.0	0.7	0.0	0.1



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	25.7	26.4	25.1	26.2	26.1
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	11.1	8.1	7.8	9.8	9.6
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	25.5	23.7	15.7	25.5	24.6
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.6	5.2	4.3	6.1	5.9
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	7.8	6.9	10.0	7.1	7.4
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	2.5	3.1	4.3	2.6	2.8

[1] Below -2 standard deviations (SD), based on the WHO standards

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Assam – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	27.1	21.1	25.0	24.0	24.1
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	17.2	9.1	12.0	13.8	13.5
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.7	16.4	18.2	19.8	19.7
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	10.1	8.9	11.9	9.3	9.5
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.6	4.2	5.7	4.2	4.4
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	7.7	7.0	8.6	7.2	7.4
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.1	7.5	9.8	5.5	5.8
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	1.3	2.6	8.7	1.0	1.9
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.9	5.6	9.3	3.6	4.2
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.7	2.7	2.2	2.2	2.2
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.0	0.3	0.0	0.2	0.1
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.9	1.7	1.0	1.4	1.3

[3] Based on WHO standards

Assam – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	**33.3** (24.9-43.0)	**34.6** (24.8-46.0)	**37.0** (29.8-44.7)
Prevalence of anaemia- males[4,5] (%)	**34.7** (23.0-48.6)	**34.9** (24.2-47.4)	**32.0** (23.5-41.9)
Prevalence of anaemia- females[4,5] (%)	**31.7** (21.9-43.5)	**34.3** (23.3-47.4)	**42.5** (32.8-52.9)
Prevalence of low serum ferritin[5,6] (%)	**8.6** (4.6-15.4)	**3.5** (1.9-6.4)	**11.5** (8.5-15.4)
Prevalence of folate deficiency[5,7] (%)	**60.3** (48.7-70.9)	**62.8** (50.2-73.9)	**73.3** (62.5-82.0)
Prevalence of vitamin B12 deficiency[5,8] (%)	**2.6** (1.1-5.6)	**3.1** (1.4-6.6)	**10.0** (6.4-15.3)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	**1.1** (0.4-3.2)	**4.0** (1.9-8.5)	**7.0** (4.3-11.2)
Prevalence of vitamin A deficiency[5,10] (%)	**20.8** (10.5-37.1)	**16.6** (9.3-27.9)	**14.3** (8.5-23.0)
Prevalence of zinc deficiency[11] (%)	**26.8** (18.2-37.6)	**18.2** (12.6-25.6)	**33.9** (26.1-42.8)
Median urinary Iodine concentration(µg/l)[5]	**133**	**99**	**100**

[4] CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5] WHO standard cut-off

[6] For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

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Assam – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	4.2 (0.9-18.1)	0.4 (0.1-1.5)
	Prevalence of high LDL cholesterol[13] (%)	8.2 (1.6-33.2)	0.8 (0.3-2.0)
	Prevalence of low HDL cholesterol[14] (%)	24.1 (15.9-34.7)	24.8 (19.6-31.0)
	Prevalence of high triglycerides[15]	57.1 (46.0-67.5)	32.2 (27.0-37.9)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	6.4 (3.5-11.3)	8.9 (5.3-14.6)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	1.8 (0.7-4.3)	1.3 (0.3-5.2)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	9.0 (3.8-20.0)	13.0 (7.1-22.8)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	4.4 (1.0-16.7)
	Prevalence of high serum creatinine[19,20] (%)	16.8 (4.9-43.9)	16.7 (4.2-48.0)

[12] Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13] LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

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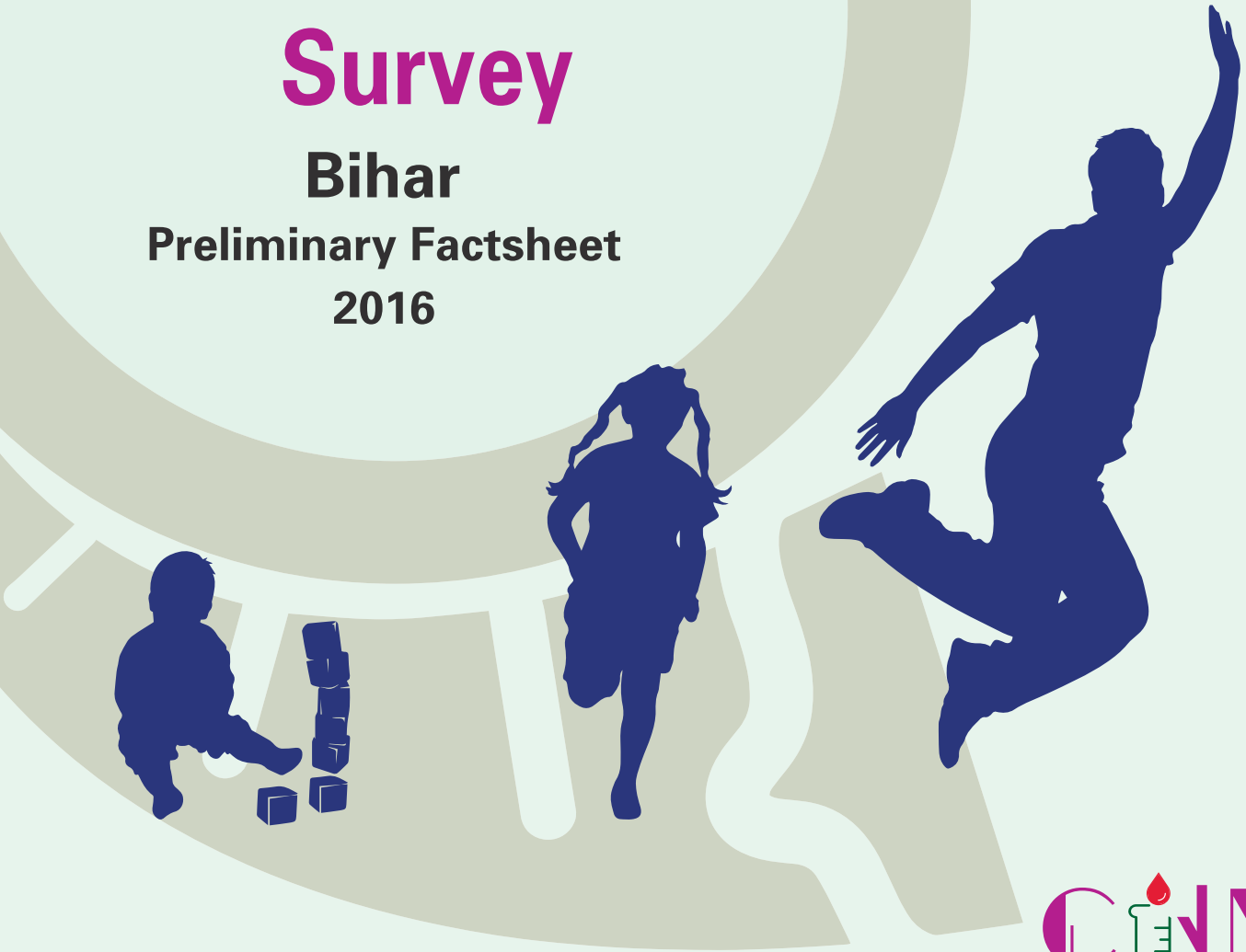

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CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Bihar where the CNNS was conducted from August 11 through December 13, 2016 and gathered household and anthropometry data from 1,407, 1,422 and 1,379 and biological samples from 623, 758 and 713 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Bihar, survey and anthropometry data were collected by KANTAR Public and Super Religare Laboratories (SRL) Ltd collected biological samples.

Bihar – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	41.3	42.7	40.0	42.2	42.0
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	16.3	20.1	17.5	18.2	18.1
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	14.8	14.3	18.5	14.2	14.5
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	2.8	5.5	6.7	3.9	4.2
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	33.9	43.6	34.8	39.1	38.7
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	11.3	11.5	13.9	11.2	11.4
	Children aged 6-59 months with MUAC <12.5cm (%)	4.1	7.5	6.4	5.7	5.8
	Children aged 6-59 months with MUAC <11.5cm (%)	0.8	1.2	1.5	0.9	1.0
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	13.7	12.3	11.9	13.1	13.0
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	2.4	1.6	2.2	2.0	2.0
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	6.0	5.2	5.9	5.6	5.6
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	1.5	0.6	1.8	1.0	1.1
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.2	1.5	1.1	0.8	0.8

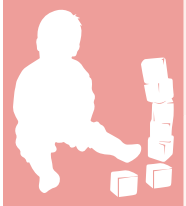
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Bihar – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.1	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	5.0	6.5	5.2	5.8	5.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	0.8	1.5	0.1	1.2	1.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.9	2.1	2.7	1.9	2.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.1	0.0	0.0



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	27.8	29.2	27.5	28.6	28.5
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	9.0	9.0	6.7	9.2	9.0
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	25.7	17.6	21.0	21.4	21.4
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	3.8	4.4	5.5	4.0	4.2
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	1.1	0.5	3.3	0.5	0.8
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	0.3	0.0	0.8	0.1	0.2

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Bihar – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	30.0	16.0	21.5	23.1	23.0
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	29.5	17.3	20.7	22.9	22.6
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	29.8	16.6	21.1	23.0	22.8
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	7.0	2.8	7.6	4.6	4.9
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.6	4.0	3.2	4.9	4.7
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.4	3.3	5.2	4.7	4.8
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	1.5	1.3	4.2	1.2	1.4
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.7	2.3	2.1	2.5	2.5
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.0	1.7	3.1	1.7	1.9
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD5 (%)	0.0	0.0	0.2	0.0	0.0
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.4	0.0	0.2	0.2	0.2
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.2	0.0	0.2	0.1	0.1

[3]Based on WHO standards

Bihar – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	43.9 (38.1-49.8)	27.6 (22.3-33.6)	28.0 (24.1-32.4)
Prevalence of anaemia- males[4,5] (%)	43.0 (34.8-51.6)	24.0 (17.0-32.8)	18.7 (14.2-24.3)
Prevalence of anaemia-females[4,5] (%)	44.7 (36.8-52.8)	31.1 (25.1-37.9)	35.5 (28.7-43.0)
Prevalence of low serum ferritin[5,6] (%)	20.2 (14.1-28.0)	7.8 (4.7-12.9)	12.6 (9.5-16.5)
Prevalence of folate deficiency[5,7] (%)	6.1 (3.6-10.1)	6.5 (4.0-10.4)	11.7 (8.2-16.3)
Prevalence of vitamin B12 deficiency[5,8] (%)	13.8 (8.1-22.5)	14.2 (10.1-19.8)	24.7 (19.2-31.2)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	22.7 (15.8-31.6)	25.8 (19.3-33.4)	35.7 (26.5-46.0)
Prevalence of vitamin A deficiency[5,10] (%)	23.5 (16.0-33.1)	28.3 (18.1-41.5)	21.9 (13.3-33.8)
Prevalence of zinc deficiency[11] (%)	19.8 (14.5-26.5)	16.1 (12.5-20.4)	23.7 (17.5-31.3)
Median urinary Iodine concentration(µg/l)[5]	259	176	189

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Bihar – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	0.5 (0.1-2.1)	1.0 (0.4-2.3)
	Prevalence of high LDL cholesterol[13] (%)	2.6 (0.9-7.5)	0.4 (0.1-1.7)
	Prevalence of low HDL cholesterol[14] (%)	37.8 (30.2-45.9)	36.2 (30.0-42.9)
	Prevalence of high triglycerides[15]	40.9 (32.6-49.6)	14.4 (10.9-18.7)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	6.6 (4.2-10.2)	6.2 (4.2-9.0)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.5 (0.1-1.7)	0.0 (0.0-0.2)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	4.1 (2.1-8.0)	3.4 (1.6-7.1)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	3.6 (1.6-7.8)	1.6 (0.7-3.7)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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Ministry of Health and Family Welfare
Government of India

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PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Chhattisgarh

Preliminary Factsheet

2017-18

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Chhattisgarh where the CNNS was conducted from September 28, 2017 through April 26, 2018 and gathered household and anthropometry data from 1,201, 1,204 and 1,085 and biological samples from 703, 627 and 534 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Chhattisgarh, survey and anthropometry data were collected by KANTAR Public and Super Religare Laboratories (SRL) Ltd collected biological samples.

Chhattisgarh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	36.9	33.6	26.0	37.7	35.4
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	13.3	9.3	6.1	12.8	11.4
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	20.2	18.3	16.6	20.0	19.3
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	5.9	4.0	4.0	5.3	5.0
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	41.5	38.4	30.1	42.6	40.0
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	11.6	12.5	10.4	12.4	12.0
	Children aged 6-59 months with MUAC <12.5cm (%)	4.0	3.7	2.0	4.3	3.8
	Children aged 6-59 months with MUAC <11.5cm (%)	0.1	0.2	0.2	0.2	0.2
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	13.4	8.7	3.3	13.1	11.2
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.8	1.1	0.2	1.1	0.9
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	15.4	16.2	10.0	17.2	15.8
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	3.1	3.8	3.0	3.6	3.4
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.2	0.5	0.8	0.2	0.3

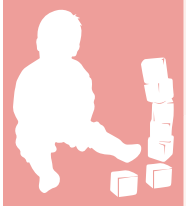
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Chhattisgarh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	11.0	12.4	10.3	12.0	11.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.7	2.2	1.0	2.2	1.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	0.7	0.8	0.7	0.8	0.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	20.2	21.9	17.4	22.0	21.0
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	5.0	5.4	3.7	5.6	5.2
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	26.4	21.0	21.7	24.2	23.7
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.6	5.2	7.3	5.5	5.9
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	1.8	1.7	3.4	1.3	1.8
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	0.6	0.1	0.7	0.3	0.3

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Chhattisgarh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	28.8	13.9	16.0	22.4	21.1
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	18.7	11.0	13.9	14.8	14.6
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	24.6	12.7	15.2	19.2	18.4
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	12.3	4.1	2.7	9.4	8.0
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.8	0.7	3.2	1.3	1.7
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.3	2.7	2.9	6.0	5.4
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	5.2	3.9	8.0	3.6	4.5
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.1	3.7	4.7	3.7	3.9
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.7	3.8	6.7	3.6	4.2
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.1	1.3	4.0	0.5	1.2
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.8	0.0	0.8	0.3	0.4
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.0	0.8	2.7	0.4	0.9

[3]Based on WHO standards

Chhattisgarh – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	40.7 (34.2-47.6)	28.9 (22.1-36.8)	31.3 (25.5-37.6)
Prevalence of anaemia- males[4,5] (%)	39.8 (32.2- 48.1)	29.4 (20.7- 39.9)	20.7 (14.1-29.4)
Prevalence of anaemia- females[4,5] (%)	41.8 (32.6-51.7)	28.4 (20.6-37.7)	41.6 (32.3-51.5)
Prevalence of low serum ferritin[5,6] (%)	38.4 (31.7-45.6)	28.4 (22.4-35.2)	31.3 (25.2-38.1)
Prevalence of folate deficiency[5,7] (%)	43.6 (33.6-54.2)	60.1 (50.7-68.8)	68.1 (60.4-74.9)
Prevalence of vitamin B12 deficiency[5,8] (%)	21.2 (16.0-27.4)	26.9 (20.6-34.3)	47.1 (40.6-53.8)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	10.5 (7.3-15.0)	18.5 (14.2-23.8)	21.6 (16.0-28.3)
Prevalence of vitamin A deficiency[5,10] (%)	26.6 (22.5-31.3)	29.3 (23.4-36.0)	25.7 (20.5-31.6)
Prevalence of zinc deficiency[11] (%)	18.6 (12.5-27.0)	17.1 (12.7-22.5)	36.3 (29.1-44.1)
Median urinary Iodine concentration(µg/l)[5]	234	234	204

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Chhattisgarh – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	0.9 (0.3-2.7)	1.8 (0.6-5.0)
	Prevalence of high LDL cholesterol[13] (%)	0.3 (0.1-1.3)	1.1 (0.4-3.0)
	Prevalence of low HDL cholesterol[14] (%)	35.7 (28.8-43.3)	46.6 (40.3-53.0)
	Prevalence of high triglycerides[15]	25.3 (19.9-31.4)	8.4 (5.7-12.2)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	14.6 (10.7-19.5)	12.3 (7.9-18.5)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	1.3 (0.5-3.0)	1.3 (0.3-6.5)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	13.4 (9.6-18.5)	13.2 (9.3-18.4)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.4 (0.1-2.8)	0.3 (0.0-2.5)
	Prevalence of high serum creatinine[19,20] (%)	0.9 (0.3-2.7)	0.6 (0.1-4.0)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

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Ministry of Health and Family Welfare
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Comprehensive National Nutrition Survey

Delhi

Preliminary Factsheet

2016

CNNS
Birth to Adolescence

About the CNNS

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CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Delhi where the CNNS was conducted from March 25 through September 27, 2016 and gathered household and anthropometry data from 1,741, 1,745 and 1,572 and biological samples from 602, 729 and 670 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Delhi, survey and anthropometry data were collected by Indian Institute of Health Management Research (IIHMR), Jaipur and Super Religare Laboratories (SRL) Ltd collected biological samples.

Delhi – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	28.1	29.6	28.9	23.8	28.8
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	9.7	9.6	9.7	8.7	9.7
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	13.9	15.7	14.8	13.1	14.8
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	3.2	3.2	3.2	3.1	3.2
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	28.4	27.7	28.2	23.7	28.1
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	6.3	6.0	6.2	6.2	6.2
	Children aged 6-59 months with MUAC <12.5cm (%)	1.7	3.2	2.4	1.4	2.4
	Children aged 6-59 months with MUAC <11.5cm (%)	0.4	0.2	0.3	0.4	0.3
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	4.2	4.5	4.3	3.6	4.3
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.8	0.5	0.7	0.2	0.6
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	5.3	4.7	5.0	7.8	5.0
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.7	0.5	0.6	0.3	0.6
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.7	1.4	1.0	1.5	1.1

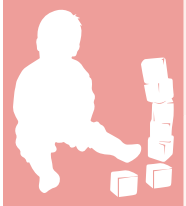
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Delhi – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.2	0.3	0.2	0.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	5.5	4.2	4.9	6.2	4.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.4	1.0	1.2	0.9	1.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	2.2	4.2	3.3	0.9	3.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.5	1.0	0.7	0.2	0.7



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	18.0	24.0	21.2	12.0	21.0
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	5.8	5.1	5.5	2.3	5.5
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	19.0	18.0	18.5	18.7	18.5
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.5	1.8	3.1	4.2	3.1
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	7.2	4.9	6.1	4.2	6.0
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	2.6	1.4	2.0	1.9	2.0

[1]Below -2 standard deviations (SD), based on the WHO standards

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Delhi – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	21.3	26.1	23.5	21.0	23.5
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.8	14.1	18.3	26.5	18.5
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	21.9	20.5	21.2	23.6	21.3
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.8	4.3	5.1	3.7	5.1
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.4	0.8	4.8	1.9	4.7
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.9	2.7	5.0	2.8	4.9
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	17.2	13.4	15.7	6.5	15.5
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.7	6.8	8.3	7.4	8.3
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	14.0	10.3	12.4	6.9	12.3
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.4	3.7	3.6	1.7	3.5
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.5	3.6	3.1	1.3	3.0
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.0	3.7	3.4	1.5	3.3

[3]Based on WHO standards

Delhi – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	47.0 (38.3-55.8)	19.6 (14.8-25.4)	29.2 (24.1-34.8)
Prevalence of anaemia- males[4,5] (%)	47.0 (36.0-58.2)	16.4 (12.2- 21.7)	15.5 (10.9- 21.7)
Prevalence of anaemia- females[4,5] (%)	47.0 (33.8-60.5)	23.0 (14.9-33.6)	45.1 (35.5- 55.1)
Prevalence of low serum ferritin[5,6] (%)	38.3 (29.4-48.0)	16.1 (11.9-21.4)	18.4 (13.0-25.3)
Prevalence of folate deficiency[5,7] (%)	1.3 (0.5-3.4)	1.5 (0.5-4.0)	3.7 (1.9-7.1)
Prevalence of vitamin B12 deficiency[5,8] (%)	7.8 (4.7-12.6)	10.8 (6.7-17.0)	31.2 (24.9-38.4)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	32.5 (24.2-42.0)	43.4 (35.4-51.9)	47.1 (39.3-55.0)
Prevalence of vitamin A deficiency[5,10] (%)	17.7 (9.8-29.9)	21.9 (14.5-31.8)	12.6 (7.3-20.7)
Prevalence of zinc deficiency[11] (%)	18.9 (12.7-27.3)	28.6 (21.5-37.0)	42.6 (35.6-49.8)
Median urinary Iodine concentration(µg/l)[5]	241	236	188

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[9]Erythrocyte folate < 151 ng/ml

[10]Serum vitamin B12 < 203 pg/ml

[11]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[12]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[13]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Delhi – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	2.7 (1.3-5.5)	2.3 (0.9-6.1)
	Prevalence of high LDL cholesterol[13] (%)	2.9 (1.7-5.0)	1.8 (0.8-4.1)
	Prevalence of low HDL cholesterol[14] (%)	31.2 (25.3-37.7)	39.9 (33.9-46.3)
	Prevalence of high triglycerides[15]	33.8 (27.3-40.9)	15.7 (11.4-21.2)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	4.5 (2.7-7.5)	5.3 (3.1-9.0)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.7 (0.1-4.6)	0.0 (0.0-0.0)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	6.3 (4.0-9.9)	7.3 (4.9-10.8)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	3.2 (1.4-7.0)	3.2 (1.7-6.0)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

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CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Goa where the CNNS was conducted from July 6 through September 13, 2016 and gathered household and anthropometry data from 1,036, 1,063 and 1,021 and biological samples from 339, 398 and 393 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Goa, survey and anthropometry data were collected by SIGMA Research and Consulting Pvt Ltd and Super Religare Laboratories (SRL) Ltd collected biological samples.

Goa – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	21.1	18.0	20.6	18.3	19.6
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	5.6	4.9	5.6	4.9	5.3
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	16.1	15.6	16.3	15.3	15.8
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	4.8	5.3	4.8	5.5	5.1
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	21.3	19.3	19.6	21.2	20.3
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	4.9	5.5	5.1	5.4	5.2
	Children aged 6-59 months with MUAC <12.5cm (%)	1.7	2.7	2.1	2.4	2.2
	Children aged 6-59 months with MUAC <11.5cm (%)	0.1	0.5	0.4	0.1	0.3
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	4.5	4.8	5.4	3.7	4.6
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.4	0.5	0.7	0.1	0.4
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	3.4	6.6	5.3	4.5	4.9
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.6	0.9	0.7	0.8	0.7
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	2.1	2.1	2.5	1.7	2.1

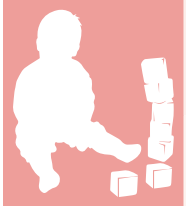
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Goa – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.0	0.3	0.0	0.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	5.6	6.8	4.9	7.8	6.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	0.3	1.0	0.2	1.2	0.7
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	4.8	3.9	4.2	4.5	4.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	1.0	0.3	0.9	0.4	0.7



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	13.8	14.6	13.3	15.3	14.2
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	4.0	3.5	3.4	4.3	3.8
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.6	19.6	21.1	21.2	21.1
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.7	6.1	5.5	5.3	5.4
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	15.1	13.9	13.0	16.5	14.5
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	5.6	5.3	4.6	6.6	5.5

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Goa – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	20.4	16.4	16.6	20.8	18.4
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	28.7	22.7	24.9	26.9	25.9
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	24.2	19.3	20.3	23.7	21.8
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	9.6	4.1	4.3	10.4	7.0
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.3	4.3	7.0	5.7	6.4
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	9.0	4.2	5.5	8.2	6.7
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	17.0	19.9	17.4	19.6	18.4
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.2	9.4	9.1	9.5	9.3
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	13.4	15.1	13.7	14.8	14.2
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	7.1	4.8	6.0	6.0	6.0
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.7	3.5	2.7	4.7	3.6
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	5.6	4.2	4.5	5.4	4.9

[3]Based on WHO standards

Goa – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	22.1 (16.6-28.9)	10.8 (6.5-17.6)	13.6 (8.7-20.6)
Prevalence of anaemia - males[4,5] (%)	24.7 (16.1-35.9)	15.6 (8.6-26.7)	6.1 (2.4-14.6)
Prevalence of anaemia - females[4,5] (%)	19.3 (10.9-31.9)	4.7 (2.0-10.8)	22.7 (14.6-33.5)
Prevalence of low serum ferritin[5,6] (%)	11.9 (7.4-18.7)	5.5 (3.0-9.8)	13.6 (9.2-19.8)
Prevalence of folate deficiency[5,7] (%)	16.6 (9.9-26.7)	29.1 (23.0-36.1)	48.4 (42.3-54.5)
Prevalence of vitamin B12 deficiency[5,8] (%)	3.2 (1.0-9.2)	3.9 (1.8-8.1)	14.0 (10.3-18.6)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	18.2 (12.7-25.3)	23.3 (16.9-31.2)	21.5 (15.1-29.7)
Prevalence of vitamin A deficiency[5,10] (%)	2.4 (0.8-6.8)	7.3 (3.4-14.9)	3.6 (1.6-7.6)
Prevalence of zinc deficiency[11] (%)	25.6 (15.7-39.0)	11.4 (6.8-18.4)	25.8 (18.8-34.4)
Median urinary Iodine concentration(µg/l)[5]	142	138	137

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Goa – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	**5.9** (3.5-9.6)	**7.9** (5.3-11.7)
	Prevalence of high LDL cholesterol[13] (%)	**11.0** (7.5-15.8)	**15.3** (11.1-20.7)
	Prevalence of low HDL cholesterol[14] (%)	**15.4** (11.0-21.0)	**17.5** (13.0-23.1)
	Prevalence of high triglycerides[15]	**22.0** (16.6-28.5)	**13.1** (9.1-18.5)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	**1.8** (0.7-4.3)	**9.4** (5.7-15.1)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	**2.4** (1.0-5.5)	**0.0** (0.0-0.0)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	**26.4** (21.0-32.5)	**24.5** (19.1-30.8)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	**0.0** (0.0-0.0)	**0.0** (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	**0.6** (0.2-1.7)	**2.2** (0.9-4.9)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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Ministry of Health and Family Welfare
Government of India

POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Gujarat

Preliminary Factsheet

2017-18

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Gujarat where the CNNS was conducted from November 18, 2017 through March 26, 2018 and gathered household and anthropometry data from 1,069, 1,094 and 1,026 and biological samples from 700, 577 and 534 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Gujarat, survey and anthropometry data were collected by Indian Institute of Health Management Research (IIHMR), Jaipur and Super Religare Laboratories (SRL) Ltd collected biological samples.

Gujarat – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	39.2	39.0	33.8	42.7	39.1
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	16.4	11.5	12.8	15.1	14.2
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	17.9	15.9	13.9	19.0	17.0
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	6.9	7.0	5.9	7.6	6.9
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	36.3	31.7	27.3	38.7	34.2
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	11.3	8.9	7.7	11.9	10.2
	Children aged 6-59 months with MUAC <12.5cm (%)	3.3	6.3	3.7	5.3	4.7
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	0.8	0.2	0.5	0.4
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	12.3	8.8	6.3	13.6	10.7
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.3	0.5	0.8	1.1	1.0
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	20.0	18.8	19.0	19.7	19.4
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	10.2	8.2	8.2	10.0	9.3
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.7	0.4	1.1	0.2	0.5

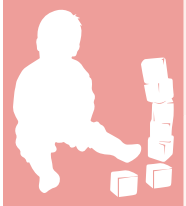
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Gujarat – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.0	0.4	0.0	0.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	12.2	10.8	10.2	12.4	11.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.6	2.1	0.3	2.8	1.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	2.2	0.2	1.3	1.2	1.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	25.0	28.0	23.7	28.1	26.4
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	6.1	4.1	4.5	5.5	5.1
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.2	20.0	16.8	23.9	21.2
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	3.8	2.8	2.0	4.2	3.3
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	5.2	5.8	7.4	4.3	5.5
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	1.8	1.3	2.3	1.1	1.6

[1]Below -2 standard deviations (SD), based on the WHO standards

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Gujarat – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	37.5	26.5	26.3	36.0	32.3
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	33.1	22.4	27.4	27.9	27.7
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	35.6	24.6	26.8	32.6	30.2
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	14.8	8.7	9.8	13.2	11.9
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	12.7	5.2	10.3	7.8	8.9
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	13.8	7.1	10.0	10.9	10.5
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	6.9	9.4	15.0	3.8	8.1
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.0	6.3	11.6	4.5	7.6
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	7.8	8.0	13.4	4.1	7.9
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.6	2.5	3.4	1.2	2.1
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.5	0.2	2.2	0.6	1.3
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.0	1.4	2.8	1.0	1.7

[3]Based on WHO standards

Gujarat – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	38.5 (31.2-46.4)	28.8 (22.1-36.5)	33.4 (25.8-41.9)
Prevalence of anaemia- males[4,5] (%)	41.9 (31.8-52.7)	30.0 (21.6-40.0)	21.0 (14.0-30.1)
Prevalence of anaemia- females[4,5] (%)	34.1 (26.9-42.2)	27.5 (20.5-35.7)	45.8 (36.2-55.7)
Prevalence of low serum ferritin[5,6] (%)	55.7 (47.5-63.6)	37.9 (30.8-45.6)	34.9 (28.9-41.3)
Prevalence of folate deficiency[5,7] (%)	39.5 (32.4-47.0)	54.8 (48.3-61.2)	59.3 (51.3-66.8)
Prevalence of vitamin B12 deficiency[5,8] (%)	29.2 (20.1-40.3)	27.6 (17.0-41.6)	47.6 (37.1-58.4)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	25.2 (18.6-33.1)	29.0 (22.7-36.2)	35.4 (28.8-42.5)
Prevalence of vitamin A deficiency[5,10] (%)	14.6 (9.5-21.7)	26.4 (19.4-34.8)	16.8 (11.7-23.6)
Prevalence of zinc deficiency[11] (%)	20.0 (14.3-27.3)	23.6 (17.9-30.4)	55.1 (48.5-61.6)
Median urinary Iodine concentration(µg/l)[5]	188	188	180

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

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Gujarat – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	3.3 (1.9-5.5)	4.4 (2.3-8.3)
	Prevalence of high LDL cholesterol[13] (%)	3.4 (1.9-5.9)	6.0 (3.2-11.0)
	Prevalence of low HDL cholesterol[14] (%)	24.3 (15.7-35.6)	25.5 (19.2-32.8)
	Prevalence of high triglycerides[15]	27.6 (23.4-32.2)	17.4 (10.8-26.9)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	20.8 (15.5-27.2)	20.9 (16.8-25.7)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	1.3 (0.5-3.4)	2.9 (1.6-5.1)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	16.8 (13.0-21.3)	18.8 (14.5-24.0)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.1 (0.0-1.1)
	Prevalence of high serum creatinine[19,20] (%)	3.8 (1.7-8.0)	4.0 (2.0-7.8)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

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सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Haryana

Preliminary Factsheet

2017

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Haryana where the CNNS was conducted from March 1 through June 23, 2017 and gathered household and anthropometry data from 1,090, 1,092 and 1,069 and biological samples from 527, 537 and 543 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Haryana, survey and anthropometry data were collected by Indian Institute of Health Management Research (IIHMR), Jaipur and Super Religare Laboratories (SRL) Ltd collected biological samples.

Haryana – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	37.2	32.3	36.8	33.9	34.9
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	12.1	11.2	13.5	10.7	11.7
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	13.1	10.2	`14.2	10.4	11.7
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	3.1	1.0	2.5	1.9	2.1
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	29.9	27.4	28.8	28.7	28.8
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	8.3	9.8	11.6	7.6	9.0
	Children aged 6-59 months with MUAC <12.5cm (%)	4.0	5.4	6.5	3.7	4.7
	Children aged 6-59 months with MUAC <11.5cm (%)	0.3	1.2	0.2	1.0	0.7
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	11.0	8.2	12.3	8.3	9.7
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	2.9	1.9	4.3	1.4	2.4
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	8.2	6.1	8.0	6.8	7.2
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	1.5	2.6	2.4	1.8	2.0
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	2.3	1.1	2.9	1.1	1.7

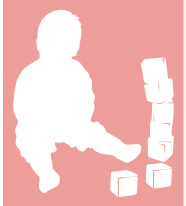
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Haryana – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	10.7	5.7	9.6	7.6	8.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	2.2	2.2	2.4	2.1	2.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.4	1.0	1.1	1.2	1.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.0	0.0	0.2	0.1



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	14.5	18.8	17.1	16.1	16.4
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	2.3	3.8	4.1	2.4	3.0
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.7	17.8	15.1	23.1	20.4
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.2	2.5	3.3	3.5	3.4
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	3.7	3.6	5.0	3.0	3.7
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	1.4	0.9	1.4	1.1	1.2

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Haryana – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.5	23.1	24.8	21.8	22.8
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	21.8	13.4	19.3	17.5	18.1
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.2	18.6	22.3	19.8	20.6
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.0	6.2	2.9	6.9	5.6
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.1	2.8	4.3	6.4	5.8
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.5	4.6	3.6	6.7	5.6
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	6.1	3.1	8.8	2.7	4.8
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.5	3.9	4.9	3.9	4.2
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	5.3	3.5	7.0	3.3	4.5
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.1	1.2	4.1	0.4	1.7
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.5	0.0	0.5	1.0	0.8
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.8	0.6	2.5	0.7	1.3

[3]Based on WHO standards

Haryana – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	48.3 (40.3-56.3)	18.3 (14.2-23.2)	29.9 (24.8-35.5)
Prevalence of anaemia- males[4,5] (%)	49.8 (38.6-61.0)	14.7 (9.2-22.6)	21.7 (16.1-28.6)
Prevalence of anaemia-females[4,5] (%)	46.3 (36.7-56.3)	23.2 (17.3-30.4)	40.7 (32.3-49.6)
Prevalence of low serum ferritin[5,6] (%)	58.9 (48.9-68.2)	35.6 (28.7-43.2)	28.7 (22.7-35.6)
Prevalence of folate deficiency[5,7] (%)	14.6 (9.1-22.6)	23.5 (18.2-29.7)	33.5 (25.9-42.1)
Prevalence of vitamin B12 deficiency[5,8] (%)	11.6 (7.5-17.5)	8.6 (6.0-12.1)	34.3 (28.3-41.0)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	27.6 (19.5-37.5)	45.5 (37.1-54.2)	53.8 (46.2-61.3)
Prevalence of vitamin A deficiency[5,10] (%)	26.1 (14.3-42.7)	24.2 (13.8-39.0)	8.9 (5.0-15.3)
Prevalence of zinc deficiency[11] (%)	6.2 (2.4-15.0)	9.1 (4.9-16.3)	19.4 (13.5-27.1)
Median urinary Iodine concentration(µg/l)[5]	252	247	292

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Haryana – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	3.0 (1.4-6.1)	2.3 (1.2-4.2)
	Prevalence of high LDL cholesterol[13] (%)	2.1 (1.0-4.5)	2.5 (1.3-4.8)
	Prevalence of low HDL cholesterol[14] (%)	12.3 (8.1-18.2)	12.9 (9.3-17.7)
	Prevalence of high triglycerides[15]	23.3 (17.9-29.7)	12.7 (8.0-19.4)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	6.0 (3.6-9.8)	6.4 (4.0-10.0)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.0 (0.0-0.0)	0.2 (0.0-1.1)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	23.8 (18.1-30.6)	24.8 (19.1-31.4)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	1.0 (0.2-4.1)	0.3 (0.1-1.1)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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NATIONAL HEALTH MISSION
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Comprehensive National Nutrition Survey

Himachal Pradesh

Preliminary Factsheet

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Birth to Adolescence

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CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

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CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Himachal Pradesh where the CNNS was conducted from July 6 through October 17, 2016 and gathered household and anthropometry data from 1,193, 1,204 and 1,147 and biological samples from 355, 491 and 456 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Himachal Pradesh, survey and anthropometry data were collected by Indian Institute of Health Management Research (IIHMR), Jaipur and Super Religare Laboratories (SRL) Ltd collected biological samples.

Himachal Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	32.7	23.6	18.8	28.8	28.4
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	5.7	7.9	6.4	6.7	6.7
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	11.5	10.6	14.7	10.9	11.0
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	3.4	2.7	4.7	3.0	3.1
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	22.1	23.2	16.8	22.8	22.6
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	4.9	6.0	2.2	5.6	5.4
	Children aged 6-59 months with MUAC <12.5cm (%)	1.5	3.5	1.6	2.5	2.4
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	1.3	0.4	0.6	0.6
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	5.7	9.7	6.0	7.6	7.5
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.9	0.5	0.4	0.8	0.8
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	9.3	12.2	9.7	10.7	10.7
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.3	1.6	2.9	0.8	0.9
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.1	1.2	0.7	0.6	0.6

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Himachal Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	9.0	11.2	7.6	10.2	10.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.4	0.3	1.3	0.9	0.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.4	2.8	1.3	2.1	2.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.2	0.0	0.0

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	17.8	22.5	9.8	20.8	20.3
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	3.7	2.6	2.1	3.2	3.1
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	27.0	17.9	18.3	22.4	22.2
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.9	4.3	3.3	4.6	4.6
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	5.1	2.7	8.5	3.6	3.8
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	1.2	1.2	2.0	1.2	1.2

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Himachal Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	30.1	38.5	14.5	35.1	34.4
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	32.7	21.6	13.5	28.1	27.4
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	31.4	30.8	14.0	31.8	31.1
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	9.5	16.2	7.3	13.1	12.9
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	7.0	5.8	2.4	6.6	6.4
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.3	11.5	4.7	10.1	9.8
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	12.0	3.7	11.8	7.7	7.8
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	3.6	2.2	5.5	2.8	2.9
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	7.9	3.1	8.5	5.4	5.5
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.7	1.2	1.7	1.5	1.5
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.3	0.2	1.1	0.8	0.8
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.5	0.8	1.4	1.1	1.1

[3]Based on WHO standards

Himachal Pradesh – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	29.7 (20.6-40.7)	13.9 (9.6-19.9)	16.2 (11.0-23.1)
Prevalence of anaemia- males[4,5] (%)	27.5 (15.2-44.7)	15.0 (8.8-24.6)	12.8 (7.0-22.2)
Prevalence of anaemia- females[4,5] (%)	32.7 (19.7-49.0)	12.7 (5.6-26.1)	19.1 (11.0-31.1)
Prevalence of low serum ferritin[5,6] (%)	34.5 (23.1-48.0)	23.0 (15.9-31.9)	22.0 (13.5-33.9)
Prevalence of folate deficiency[5,7] (%)	4.6 (1.5-13.6)	2.3 (1.0-5.5)	5.6 (2.1-14.2)
Prevalence of vitamin B12 deficiency[5,8] (%)	6.9 (3.3-14.0)	13.5 (7.7-22.5)	32.7 (24.7-41.8)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	4.6 (2.3-9.0)	15.4 (8.8-25.5)	17.6 (12.0-25.0)
Prevalence of vitamin A deficiency[5,10] (%)	5.9 (2.2-14.9)	11.4 (5.7-21.4)	3.3 (1.6-7.0)
Prevalence of zinc deficiency[11] (%)	41.1 (25.1-59.2)	37.7 (23.4-54.5)	51.6 (40.7-62.4)
Median urinary Iodine concentration(µg/l)[5]	101	168	166

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Himachal Pradesh – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	2.7 (1.3-5.5)	7.3 (4.2-12.5)
	Prevalence of high LDL cholesterol[13] (%)	3.5 (1.8-6.8)	6.0 (3.1-11.3)
	Prevalence of low HDL cholesterol[14] (%)	14.6 (10.5-20.0)	27.4 (15.2-44.3)
	Prevalence of high triglycerides[15]	34.1 (27.0-42.0)	21.1 (15.9-27.4)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	3.8 (1.5-9.4)	1.4 (0.6-3.4)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.4 (0.1-1.5)	0.0 (0.0-0.0)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	7.5 (4.1-13.2)	4.9 (2.7-8.6)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.1 (0.0-1.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	0.8 (0.3-2.3)	0.6 (0.1-3.9)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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Government of India

POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

India

Preliminary Factsheet

2016-18

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the country. The CNNS was conducted from February 26, 2016 through October 24, 2018 and gathered household and anthropometry data from 38,081, 38,366 and 35,869 and biological samples from 17,234, 17,601 and 16,194 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. The survey and anthropometry data were collected by four survey agencies, KANTAR Public, Gfk Mode Pvt. Ltd, SIGMA Research and Consulting Pvt Ltd and Indian Institute of Health Management Research (IIHMR), Jaipur. The biological samples were collected by Super Religare Laboratories (SRL) Ltd.

India – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	35.4	34.0	27.3	37.0	34.7
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	13.4	12.9	9.7	14.2	13.2
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	18.3	16.3	16.3	17.6	17.3
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	5.1	4.8	4.7	5.0	4.9
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	32.5	34.4	25.8	35.7	33.4
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	10.2	10.0	7.6	10.9	10.1
	Children aged 6-59 months with MUAC <12.5cm (%)	3.8	6.1	3.4	5.3	4.9
	Children aged 6-59 months with MUAC <11.5cm (%)	0.5	1.2	0.6	0.9	0.9
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	11.2	9.7	6.9	11.6	10.5
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.6	1.7	1.1	1.8	1.7
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	9.4	10.1	8.3	10.1	9.7
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	2.2	2.6	1.8	2.6	2.4
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	1.0	0.9	1.3	0.9	1.0

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

India – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.1	0.0	0.2	0.0	0.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	8.4	8.9	6.3	9.3	8.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.5	1.6	0.7	1.9	1.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	2.0	1.5	2.5	1.5	1.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.2	0.1	0.3	0.1	0.2

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	21.6	22.1	17.8	23.1	21.9
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	5.8	5.3	3.7	6.1	5.5
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	25.7	20.3	19.8	24.0	23.0
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.9	3.9	4.7	4.9	4.9
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	4.2	3.3	7.5	2.6	3.7
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	1.8	0.9	2.8	0.9	1.3

[1] Below -2 standard deviations (SD), based on the WHO standards

[2] Below -3 standard deviations, based on the WHO standards

[3] Based on WHO standards

India – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	31.8	22.8	22.7	28.8	27.4
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	26.3	14.2	17.7	20.7	20.0
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	29.4	18.9	20.5	25.3	24.1
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	10.0	6.0	7.0	8.3	8.0
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	7.0	2.3	4.9	4.5	4.6
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.7	4.3	6.0	6.6	6.5
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	5.3	5.2	10.5	3.6	5.3
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.4	4.1	8.8	2.8	4.3
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.9	4.7	9.7	3.2	4.8
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.2	1.4	2.5	0.9	1.3
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.9	0.7	1.8	0.5	0.8
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.1	1.1	2.2	0.7	1.1

[3] Based on WHO standards

India – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	40.6 (38.6-42.6)	23.5 (21.8-25.2)	28.4 (26.8-30.0)
Prevalence of anaemia – males[4,5] (%)	40.6 (37.9-43.3)	22.2 (20.2-24.4)	17.5 (15.9-19.4)
Prevalence of anaemia – females[4,5] (%)	40.5 (37.7-43.3)	24.7 (22.4-27.2)	39.5 (36.9-42.2)
Prevalence of low serum ferritin[5,6] (%)	32.1 (29.6-34.7)	17.0 (15.5-18.6)	21.5 (19.8-23.3)
Prevalence of folate deficiency[5,7] (%)	23.4 (20.8-26.2)	28.2 (25.6-31.0)	36.7 (33.5-40.0)
Prevalence of vitamin B12 deficiency[5,8] (%)	13.8 (11.7-16.2)	17.2 (15.3-19.3)	30.9 (28.4-33.5)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	13.7 (12.0-15.6)	18.2 (16.5-20.1)	23.9 (21.9-26.0)
Prevalence of vitamin A deficiency[5,10] (%)	17.5 (15.3-20.0)	21.5 (18.7-24.6)	15.6 (13.1-18.4)
Prevalence of zinc deficiency[11] (%)	19.0 (17.0-21.2)	16.8 (15.3-18.3)	31.7 (29.4-34.1)
Median urinary Iodine concentration(µg/l)[5]	212	176	173

[4] CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5] WHO standard cut-off

[6] For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7] Erythrocyte folate < 151 ng/ml

[8] Serum vitamin B12 < 203 pg/ml

[9] Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10] Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11] For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

India – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	3.2 (2.4-4.3)	3.7 (2.7-5.0)
	Prevalence of high LDL cholesterol[13] (%)	3.3 (2.6-4.2)	3.8 (2.9-5.6)
	Prevalence of low HDL cholesterol[14] (%)	26.1 (23.9-28.4)	28.2 (26.1-30.5)
	Prevalence of high triglycerides[15]	34.0 (31.8-36.3)	16.1 (14.4-17.9)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	10.3 (9.2-11.5)	10.4 (9.2-11.7)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	1.2 (0.8-1.8)	0.6 (0.4-0.8)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	9.2 (8.0-10.6)	9.5 (8.5-10.6)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.1 (0.1-0.2)	0.2 (0.1-0.4)
	Prevalence of high serum creatinine[19,20] (%)	7.0 (5.8-8.6)	6.6 (5.3-8.4)

[12] Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13] LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14] HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15] For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16] Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17] Cut-off taken from Global International Diabetes Federation

[18] Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19] For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20] High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

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Comprehensive National Nutrition Survey

Jammu & Kashmir

Preliminary Factsheet

2018

CNNS
Birth to Adolescence

About the CNNS

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CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Jammu & Kashmir where the CNNS was conducted from May 23 through August 11, 2018 and gathered household and anthropometry data from 1,156, 1,172 and 1073 and biological samples from 387, 413 and 582 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Jammu & Kashmir, survey and anthropometry data were collected by Indian Institute of Health Management Research (IIHMR), Jaipur and Super Religare Laboratories (SRL) Ltd collected biological samples.

Jammu & Kashmir – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	17.4	13.8	14.6	15.7	15.5
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	6.7	5.1	4.7	6.2	5.8
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	12.7	16.7	12.9	15.4	14.9
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	7.8	6.1	6.7	6.9	6.9
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	16.6	10.1	9.4	14.2	13.1
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	7.3	2.8	3.9	5.2	4.9
	Children aged 6-59 months with MUAC <12.5cm (%)	5.6	6.4	5.9	6.1	6.0
	Children aged 6-59 months with MUAC <11.5cm (%)	2.5	2.6	2.9	2.4	2.5
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	8.6	8.8	7.3	9.1	8.7
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	3.0	3.4	2.7	3.4	3.2
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	16.9	24.8	21.0	21.2	21.1
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	6.3	5.8	7.5	5.6	6.0
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.8	0.7	1.4	0.5	0.7

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Jammu & Kashmir – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	14.7	17.4	13.6	16.8	16.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	2.1	1.2	2.2	1.5	1.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	3.6	1.1	4.2	1.8	2.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.2	0.0	0.4	0.0	0.1

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	13.5	13.1	5.0	15.5	13.3
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	4.3	5.3	1.0	5.7	4.8
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	17.6	15.7	11.0	18.2	16.6
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	7.1	6.4	2.9	7.8	6.7
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	9.5	8.4	12.8	8.0	9.0
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	4.3	2.6	4.3	3.2	3.4

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Jammu & Kashmir – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	19.0	16.6	13.4	18.9	17.8
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	11.0	4.6	11.8	6.5	7.8
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	15.4	11.4	12.6	13.6	13.4
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.5	3.6	2.4	5.7	5.0
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.4	0.1	5.0	2.0	2.8
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.0	2.1	3.7	4.1	4.0
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	12.1	7.9	15.4	8.6	10.0
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.4	9.3	8.0	6.5	6.9
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	8.7	8.5	11.9	7.7	8.6
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.1	1.3	3.0	1.3	1.7
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.1	2.1	2.2	1.4	1.6
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.6	1.6	2.6	1.4	1.6

[3]Based on WHO standards

Jammu & Kashmir – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	27.2 (19.8-36.1)	6.7 (4.4-10.1)	15.8 (11.3-21.7)
Prevalence of anaemia- males[4,5] (%)	27.5 (18.8-38.2)	7.0 (4.0-12.2)	6.3 (3.4-11.3)
Prevalence of anaemia- females[4,5] (%)	26.9 (18.0-38.3)	6.4 (3.6-11.0)	23.8 (16.4-33.2)
Prevalence of low serum ferritin[5,6] (%)	44.9 (36.7-53.4)	17.8 (13.0-23.9)	30.7 (23.3-39.2)
Prevalence of folate deficiency[5,7] (%)	5.9 (2.5-13.5)	5.6 (2.4-12.5)	8.8 (4.9-15.2)
Prevalence of vitamin B12 deficiency[5,8] (%)	7.9 (4.7-13.2)	10.8 (6.0-18.5)	25.5 (17.3-35.8)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	22.6 (16.1-30.8)	36.0 (28.0-45.0)	52.8 (42.6-62.8)
Prevalence of vitamin A deficiency[5,10] (%)	8.8 (4.8-15.4)	12.9 (8.6-18.9)	7.0 (3.9-12.3)
Prevalence of zinc deficiency[11] (%)	21.1 (14.8-29.0)	24.7 (17.2-34.1)	38.6 (29.4-48.6)
Median urinary Iodine concentration(µg/l)[5]	221	194	207

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Jammu & Kashmir – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	1.7 (0.8-3.6)	1.0 (0.3-3.4)
	Prevalence of high LDL cholesterol[13] (%)	0.9 (0.3-2.7)	2.0 (0.8-4.7)
	Prevalence of low HDL cholesterol[14] (%)	12.3 (7.8-18.8)	15.7 (11.5-21.0)
	Prevalence of high triglycerides[15]	50.2 (41.5-58.9)	19.8 (14.6-26.1)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	7.6 (4.6-12.5)	9.7 (6.7-13.8)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.2 (0.0-1.5)	0.0 (0.0-0.0)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	6.9 (3.6-12.8)	8.5 (4.6-15.0)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	2.7 (0.9-7.9)	0.2 (0.0-1.7)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Jharkhand

Preliminary Factsheet

2017

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Jharkhand where the CNNS was conducted from March 3 through July 4, 2017 and gathered household and anthropometry data from 1,226, 1,230 and 1,093 and biological samples from 681, 590 and 520 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Jharkhand, survey and anthropometry data were collected by KANTAR Public and Super Religare Laboratories (SRL) Ltd collected biological samples.

Jharkhand – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	35.4	37.3	23.6	38.3	36.2
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	13.5	15.1	7.0	15.3	14.1
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	29.1	29.1	22.1	30.2	29.1
	Children under age 5 years who are severely wasted (weight-for-height)[2](%)	5.8	7.1	5.6	6.5	6.4
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	39.6	47.4	30.0	45.0	42.9
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	14.1	17.4	9.6	16.4	15.5
	Children aged 6-59 months with MUAC <12.5cm (%)	4.2	9.2	3.3	6.7	6.2
	Children aged 6-59 months with MUAC <11.5cm (%)	0.1	1.4	0.3	0.7	0.6
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	12.2	12.8	5.8	13.6	12.5
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.6	0.5	0.9	1.2	1.2
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	10.6	9.1	9.2	10.1	9.9
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.8	1.6	1.1	1.2	1.1
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.2	0.5	1.4	0.2	0.4

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Jharkhand – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	10.6	12.0	9.6	11.4	11.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.7	1.1	2.5	1.3	1.5
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	0.8	1.0	3.8	0.4	0.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.1	0.1	0.4	0.0	0.1

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	22.2	27.5	16.4	26.1	24.9
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	5.3	11.6	3.3	9.2	8.5
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	28.6	27.2	29.8	27.6	27.9
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.4	4.5	10.1	4.2	4.9
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	0.4	0.6	1.9	0.3	0.5
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	0.2	0.4	0.6	0.2	0.3

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Jharkhand – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	37.1	28.2	30.8	32.9	32.6
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	26.2	17.4	20.2	22.0	21.7
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	33.0	23.9	25.7	28.8	28.4
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	10.2	5.4	8.5	7.7	7.8
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.5	1.5	2.6	3.6	3.4
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.4	3.9	5.7	6.2	6.1
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.2	2.0	3.9	1.8	2.1
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.0	1.4	4.0	1.1	1.7
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.1	1.8	4.0	1.6	1.9
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.0	0.3	0.3	0.2	0.2
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.7	0.0	0.0	0.4	0.3
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.3	0.2	0.2	0.3	0.2

[3]Based on WHO standards

Jharkhand – Key Indicators of Micronutrient Deficiencies

		CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of anaemia[4,5] (%)	43.8 (38.5-49.2)	34.4 (27.2-42.4)	34.0 (29.1-39.2)
	Prevalence of anaemia- males[4,5] (%)	42.9 (36.8-49.2)	31.8 (26.2-38.1)	16.3 (10.4-24.8)
	Prevalence of anaemia- females[4,5] (%)	45.3 (37.7-53.1)	37.1 (25.0–51.1)	51.7 (43.7-59.7)
	Prevalence of low serum ferritin[5,6] (%)	13.5 (8.5-20.8)	5.1 (3.5-7.2)	10.1 (6.0-16.5)
	Prevalence of folate deficiency[5,7] (%)	5.3 (3.1-8.8)	12.5 (7.2-20.9)	23.8 (15.1-35.4)
	Prevalence of vitamin B12 deficiency[5,8] (%)	17.6 (11.0-27.0)	12.9 (6.9-23.0)	22.0 (14.4-32.2)
	Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	19.2 (13.1-27.2)	20.0 (11.4-32.7)	29.6 (22.9-37.4)
	Prevalence of vitamin A deficiency[5,10] (%)	42.7 (33.1-52.9)	42.3 (31.7-53.5)	29.8 (20.8-40.7)
	Prevalence of zinc deficiency[11] (%)	28.5 (18.9-40.5)	21.9 (16.0-29.0)	49.8 (40.0-59.7)
	Median urinary Iodine concentration(µg/l)[5]	150	122	121

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Jharkhand – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	0.7 (0.2-2.3)	1.3 (0.5-3.3)
	Prevalence of high LDL cholesterol[13] (%)	2.0 (0.6-5.9)	1.4 (0.6-3.2)
	Prevalence of low HDL cholesterol[14] (%)	13.1 (8.0-20.6)	23.6 (20.1-27.6)
	Prevalence of high triglycerides[15]	28.4 (17.3-43.0)	18.1 (14.2-22.9)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	11.0 (8.0-15.1)	8.8 (5.7-13.4)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	3.5 (1.3-8.7)	1.8 (0.7-4.3)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	15.8 (8.5-27.6)	12.8 (6.3-24.2)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.6 (0.2-1.8)	1.0 (0.2-5.0)
	Prevalence of high serum creatinine[19,20] (%)	8.8 (3.0-23.2)	8.6 (3.0-22.2)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

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Birth to Adolescence

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See CNNS results online: **www.NutritionINDIA.info**

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सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Karnataka

Preliminary Factsheet

2018

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Karnataka where the CNNS was conducted from June 6 through September 18, 2018 and gathered household and anthropometry data from 949, 993 and 912 and biological samples from 517, 467 and 417 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Karnataka, survey and anthropometry data were collected by SIGMA Research and Consulting Pvt Ltd and Super Religare Laboratories (SRL) Ltd collected biological samples.

Karnataka – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	31.9	33.1	19.9	38.6	32.5
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	12.0	12.9	7.4	14.8	12.4
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	20.2	18.5	19.9	19.1	19.3
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	5.6	3.6	3.0	5.3	4.6
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	30.7	33.9	23.6	36.6	32.4
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	8.9	10.0	7.3	10.5	9.5
	Children aged 6-59 months with MUAC <12.5cm (%)	1.8	6.3`	3.0	4.6	4.1
	Children aged 6-59 months with MUAC <11.5cm (%)	0.2	1.7	0.5	1.2	1.0
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	8.2	9.5	6.2	10.1	8.8
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.9	1.7	0.6	1.7	1.3
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	3.7	5.6	3.7	5.2	4.7
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[5] (%)	0.4	1.8	0.2	1.5	1.1
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	4.9	1.1	4.5	2.2	3.0

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Karnataka – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.6	0.0	0.8	0.0	0.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	3.2	4.3	4.3	3.5	3.7
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	0.1	0.3	0.5	0.1	0.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	8.3	4.0	7.9	5.4	6.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.6	0.1	1.2	0.0	0.4

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	22.8	20.2	14.5	24.7	21.5
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	4.7	4.3	2.4	5.5	4.5
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	30.3	26.1	21.4	31.3	28.2
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.4	7.0	5.2	7.4	6.7
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	3.3	4.3	6.2	2.7	3.8
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	1.6	0.6	2.4	0.5	1.1

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

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Karnataka – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	35.1	25.1	23.5	32.3	29.8
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	32.3	15.6	20.1	26.0	24.2
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	33.7	20.9	21.9	29.4	27.2
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	9.3	11.2	3.4	13.1	10.3
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	11.1	3.6	4.0	9.0	7.5
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	10.2	7.8	3.7	11.2	9.0
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	6.8	6.3	7.2	6.3	6.6
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	6.1	10.9	14.6	5.8	8.4
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	6.5	8.3	10.7	6.1	7.4
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.0	1.1	1.5	0.9	1.0
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.8	5.0	8.0	1.4	3.4
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.4	2.8	4.6	1.1	2.1

[3]Based on WHO standards

Karnataka – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	**34.7** (28.1-42.0)	**14.8** (10.5-20.5)	**17.2** (13.0-22.5)
Prevalence of anaemia - males[4,5] (%)	**34.4** (27.0-42.5)	**11.4** (7.3-17.4)	**8.8** (4.7-15.9)
Prevalence of anaemia - females[4,5] (%)	**35.1** (25.8-45.7)	**17.8** (11.0-27.6)	**25.6** (19.1-33.4)
Prevalence of low serum ferritin[5,6] (%)	**49.8** (41.8-57.9)	**31.2** (23.8-39.8)	**30.5** (25.2-36.3)
Prevalence of folate deficiency[5,7] (%)	**35.8** (27.8-44.6)	**50.5** (40.9-60.0)	**70.4** (62.4-77.4)
Prevalence of vitamin B12 deficiency[5,8] (%)	**15.5** (10.8-21.8)	**15.4** (10.9-21.4)	**45.5** (36.0-55.4)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	**4.8** (2.6-8.5)	**8.5** (5.3-13.2)	**15.6** (11.5-20.8)
Prevalence of vitamin A deficiency[5,10] (%)	**9.6** (5.7-15.7)	**14.5** (8.3-24.2)	**8.5** (5.0-14.1)
Prevalence of zinc deficiency[11] (%)	**20.2** (14.0-28.2)	**19.8** (15.5-24.8)	**46.8** (39.3-54.5)
Median urinary Iodine concentration(µg/l)[5]	**282**	**247**	**234**

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Karnataka – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	1.8 (0.9-3.3)	1.7 (0.8-3.6)
	Prevalence of high LDL cholesterol[13] (%)	3.3 (2.0-5.5)	4.1 (2.6-6.5)
	Prevalence of low HDL cholesterol[14] (%)	27.8 (21.7-34.8)	38.9 (32.4-45.8)
	Prevalence of high triglycerides[15]	22.1 (17.6-27.4)	12.4 (8.9-17.2)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	5.0 (3.1-8.1)	7.1 (4.4-11.3)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	10.2 (6.7-15.3)	15.9 (11.0-22.3)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	0.0 (0.0-0.0)	1.1 (0.1-7.1)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

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Comprehensive National Nutrition Survey

Kerala

Preliminary Factsheet

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CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Kerala where the CNNS was conducted from October 8, 2017 through April 10, 2018 and gathered household and anthropometry data from 898, 907 and 843 and biological samples from 523, 431 and 382 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Kerala, survey and anthropometry data were collected by SIGMA Research and Consulting Pvt Ltd and Super Religare Laboratories (SRL) Ltd collected biological samples.

Kerala– Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	20.6	20.4	19.5	21.4	20.5
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	6.1	4.2	4.1	6.1	5.2
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	14.2	10.8	10.3	14.6	12.6
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	2.7	2.7	1.3	4.0	2.7
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	20.2	17.1	16.8	20.3	18.7
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	1.9	4.5	2.1	4.0	3.2
	Children aged 6-59 months with MUAC <12.5cm (%)	1.7	1.7	0.5	2.7	1.7
	Children aged 6-59 months with MUAC <11.5cm (%)	1.2	0.5	0.2	1.4	0.9
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	4.3	3.6	3.3	4.6	4.0
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.4	0.5	0.0	0.8	0.4
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	5.0	6.7	4.3	7.1	5.8
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	1.4	0.9	0.2	2.1	1.2
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	1.0	1.0	0.9	1.1	1.0

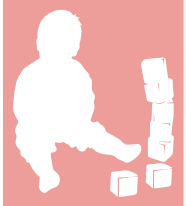
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Kerala – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.2	0.4	0.3	0.4	0.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	17.5	13.7	13.6	17.8	15.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	2.4	1.8	1.7	2.5	2.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	0.4	0.7	0.5	0.6	0.5
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	10.7	11.6	9.7	12.5	11.2
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	0.5	1.7	0.6	1.5	1.1
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	18.5	13.8	14.1	18.3	16.3
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.1	2.7	2.9	5.0	4.0
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	10.7	8.3	9.9	9.2	9.6
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	6.0	1.9	5.4	2.8	4.0

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Kerala – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	20.7	20.0	18.5	21.9	20.3
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	30.2	9.5	18.2	21.3	19.8
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	24.8	15.5	18.3	21.6	20.1
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.3	3.3	4.1	7.2	5.8
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	9.1	3.2	6.4	5.9	6.1
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.7	3.3	5.1	6.7	5.9
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	8.8	9.9	11.3	7.8	9.4
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	10.0	9.2	9.1	10.1	9.6
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.3	9.6	10.3	8.7	9.5
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.3	2.4	1.8	1.8	1.8
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.5	2.5	0.8	4.9	3.0
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.2	2.4	1.4	3.1	2.3

[3]Based on WHO standards

Kerala – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	12.6 (9.1-17.1)	3.1 (1.4-6.7)	9.1 (5.5-14.8)
Prevalence of anaemia- males[4,5] (%)	12.2 (8.1-17.8)	3.3 (1.2-8.8)	4.1 (1.8-9.2)
Prevalence of anaemia-females[4,5] (%)	13.1 (7.5-21.9)	2.9 (1.1-7.0)	13.7 (8.4-21.5)
Prevalence of low serum ferritin[5,6] (%)	35.2 (27.8-43.3)	18.0 (12.8-24.7)	25.3 (19.6-31.9)
Prevalence of folate deficiency[5,7] (%)	18.4 (13.3-24.9)	27.1 (20.2-35.3)	53.2 (45.5-60.8)
Prevalence of vitamin B12 deficiency[5,8] (%)	3.4 (1.2-9.2)	0.9 (0.2-3.7)	2.3 (0.9-5.5)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	11.8 (7.7-17.7)	22.6 (18.0-27.9)	31.6 (24.8-39.3)
Prevalence of vitamin A deficiency[5,10] (%)	17.1 (11.6-24.4)	26.5 (18.3-36.7)	13.2 (8.2-20.8)
Prevalence of zinc deficiency[11] (%)	9.0 (6.3-12.7)	4.8 (2.4-9.3)	17.2 (13.1-22.2)
Median urinary Iodine concentration(µg/l)[5]	205	192	184

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Kerala – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	15.4 (10.8-21.3)	13.9 (9.7-19.3)
	Prevalence of high LDL cholesterol[13] (%)	16.3 (11.3-23.0)	14.9 (10.4-20.9)
	Prevalence of low HDL cholesterol[14] (%)	10.8 (7.6-15.2)	20.6 (16.0-26.1)
	Prevalence of high triglycerides[15]	16.6 (12.2-22.1)	7.7 (5.1-11.7)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	18.7 (13.2-25.9)	32.2 (25.1-40.3)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	2.1 (0.9-4.8)	0.5 (0.1-1.9)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	6.8 (4.3-10.5)	7.2 (4.2-11.9)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	0.0 (0.0-0.0)	0.5 (0.1-3.5)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

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Ministry of Health and Family Welfare
Government of India

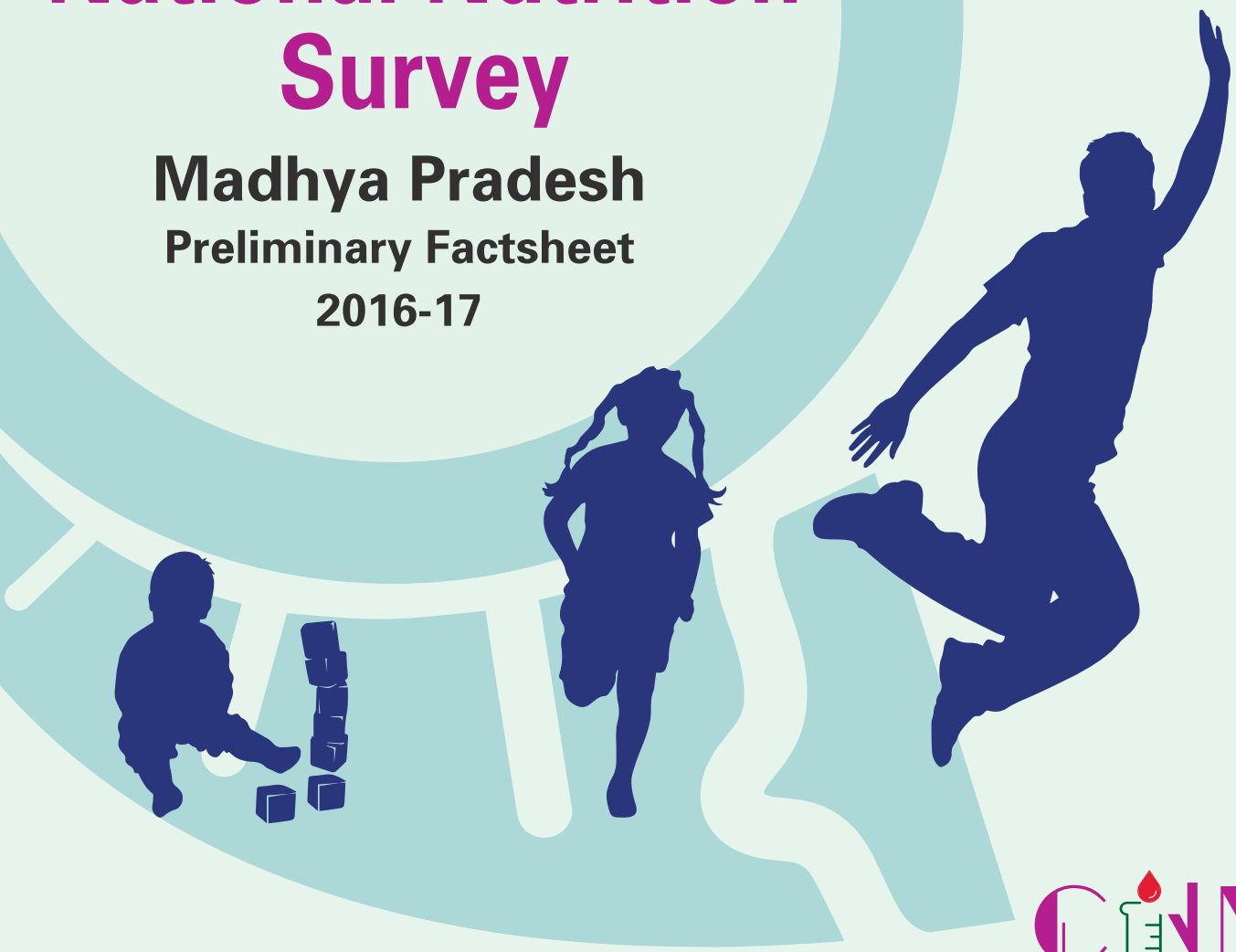
POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Madhya Pradesh

Preliminary Factsheet

2016-17



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Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Madhya Pradesh where the CNNS was conducted from October 5, 2016 through February 5, 2017 and gathered household and anthropometry data from 1,152, 1,199 and 1,137 and biological samples from 455, 622 and 593 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Madhya Pradesh, survey and anthropometry data were collected by KANTAR Public and Super Religare Laboratories (SRL) Ltd collected biological samples.

Madhya Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	40.5	38.5	33.6	40.6	39.5
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	16.8	11.5	14.8	13.9	14.1
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	22.1	17.2	13.2	20.8	19.6
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	8.3	4.9	3.2	7.3	6.6
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	40.1	37.4	32.7	39.9	38.7
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	10.6	14.3	8.9	13.2	12.5
	Children aged 6-59 months with MUAC <12.5cm (%)	4.1	7.7	3.6	6.4	5.9
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	2.5	0.7	1.4	1.3
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	13.7	12.9	6.9	14.6	13.3
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.1	5.6	1.3	3.8	3.4
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	9.0	10.0	7.8	9.8	9.5
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	2.1	4.1	1.1	3.5	3.1
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.4	0.0	0.7	0.1	0.2

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Madhya Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.1	0.0	0.5	0.0	0.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	12.0	14.9	4.2	15.3	13.5
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	2.3	5.3	0.2	4.5	3.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.5	0.3	1.8	0.7	0.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	24.1	18.3	20.6	21.3	21.1
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	6.9	3.7	4.0	5.5	5.3
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	28.7	15.1	21.7	21.8	21.8
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.9	3.8	4.9	5.4	5.3
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	1.8	1.1	2.6	1.2	1.4
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	1.1	0.3	1.4	0.6	0.7

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Madhya Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS 	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	41.1	29.7	27.6	37.6	35.9
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	34.5	21.1	22.0	28.2	27.0
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	38.5	25.5	25.0	33.5	32.0
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	12.3	9.1	11.5	10.7	10.8
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	9.5	1.7	2.8	5.7	5.1
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	11.2	5.5	7.5	8.5	8.3
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	1.4	1.6	4.8	0.8	1.5
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	1.9	1.8	5.1	1.1	1.8
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	1.6	1.7	4.9	0.9	1.7
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.4	0.2	1.0	0.1	0.3
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.3	0.2	1.4	0.0	0.3
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.4	0.2	1.2	0.1	0.3

[3]Based on WHO standards

Madhya Pradesh – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	53.5 (41.8-64.8)	22.0 (18.1-26.5)	21.2 (16.8-26.4)
Prevalence of anaemia- males[4,5] (%)	60.4 (48.1-71.5)	22.7 (16.6-30.3)	15.4 (11.8-19.8)
Prevalence of anaemia- females[4,5] (%)	47.4 (33.6-61.6)	21.2 (16.2-27.1)	28.7 (19.5-40.1)
Prevalence of low serum ferritin[5,6] (%)	45.9 (28.8- 64.1)	25.2 (18.0-34.0)	22.1 (17.4-27.7)
Prevalence of folate deficiency[5,7] (%)	57.6 (36.8-76.1)	62.4 (50.3-73.0)	74.5 (61.6-84.2)
Prevalence of vitamin B12 deficiency[5,8] (%)	11.6 (6.8-19.1)	22.4 (16.7-29.3)	42.0 (33.9-50.6)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	7.7 (4.2-13.5)	19.7 (14.3-26.4)	23.0 (15.8-32.4)
Prevalence of vitamin A deficiency[5,10] (%)	*	13.4 (3.5-40.2)	13.2 (4.2-34.6)
Prevalence of zinc deficiency[11] (%)	22.3 (11.5-38.7)	12.3 (6.9-21.0)	19.9 (13.4-28.6)
Median urinary Iodine concentration(µg/l)[5]	132	135	189

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

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Madhya Pradesh – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	0.3 (0.1-1.6)	0.6 (0.1-2.7)
	Prevalence of high LDL cholesterol[13] (%)	0.4 (0.1-1.3)	1.7 (0.7-3.7)
	Prevalence of low HDL cholesterol[14] (%)	26.1 (18.8-34.9)	27.0 (17.5-39.2)
	Prevalence of high triglycerides[15]	35.8 (26.3-46.6)	10.0 (6.1-16.0)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	16.9 (11.8-23.6)	10.8 (6.0-18.9)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.0 (0.0-0.0)	0.8 (0.2-3.5)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	12.6 (5.7-25.6)	13.5 (9.0-19.8)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.5 (0.1-3.3)	0.1 (0.0-0.6)
	Prevalence of high serum creatinine[19,20] (%)	3.0 (1.0-8.6)	1.6 (0.6-4.3)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

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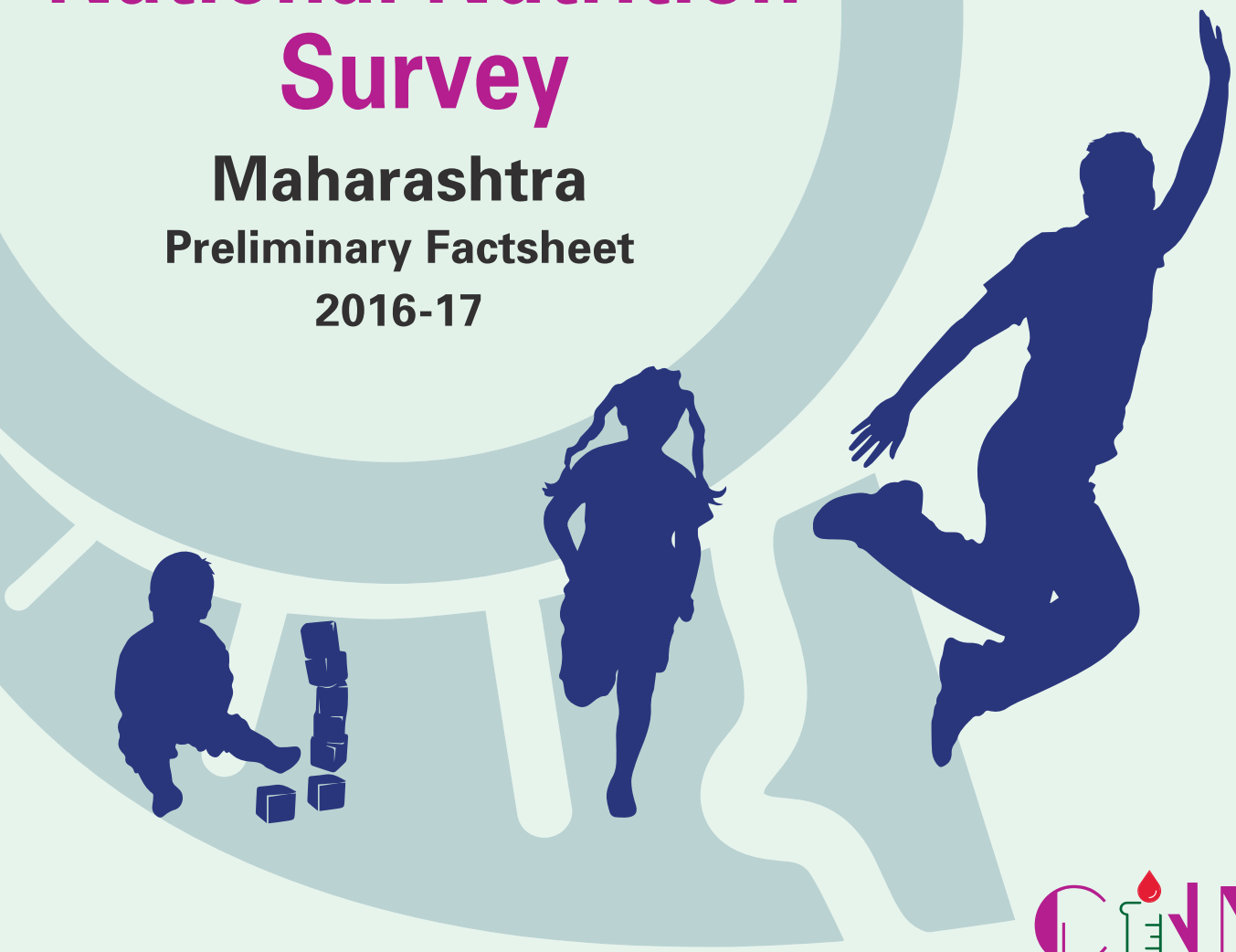

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CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Maharashtra where the CNNS was conducted from November 14, 2016 through May 17, 2017 and gathered household and anthropometry data from 1,922, 1,957 and 1,910 and biological samples from 873, 959 and 895 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Maharashtra, survey and anthropometry data were collected by SIGMA Research and Consulting Pvt Ltd and Super Religare Laboratories (SRL) Ltd collected biological samples.

Maharashtra – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	37.3	30.9	29.7	38.1	34.1
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	17.4	11.0	11.4	16.8	14.3
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	17.9	15.8	18.8	15.1	16.9
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	4.9	5.5	6.7	3.9	5.2
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	30.2	31.7	26.5	34.8	30.9
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	10.8	8.7	9.2	10.3	9.8
	Children aged 6-59 months with MUAC <12.5cm (%)	2.4	3.7	2.5	3.5	3.0
	Children aged 6-59 months with MUAC <11.5cm (%)	0.5	0.0	0.6	0.0	0.3
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	7.5	5.3	5.0	7.7	6.4
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.9	0.5	0.8	0.6	0.7
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	4.6	3.8	3.8	4.6	4.2
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[5] (%)	1.4	1.1	1.0	1.5	1.2
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.7	0.4	1.0	0.1	0.5

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Maharashtra – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	4.0	4.1	3.1	4.8	4.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	0.4	0.4	0.4	0.5	0.4
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.2	1.4	2.3	0.5	1.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.0	0.2	0.2	0.2

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	25.1	24.3	22.5	26.6	24.7
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	4.8	4.5	5.0	4.3	4.6
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	26.8	20.0	22.8	23.9	23.4
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.7	3.3	5.8	4.3	5.0
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	7.5	6.1	9.0	4.8	6.8
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	3.1	1.4	2.5	2.0	2.2

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Maharashtra – Key Anthropometric Indicators

	Anthropometric profile	Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	33.0	23.3	26.0	30.4	28.4
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	26.0	12.1	16.7	23.5	20.0
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	29.7	18.4	21.4	27.5	24.6
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	10.3	7.8	9.5	8.9	9.1
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.2	2.6	6.5	4.9	5.7
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	9.3	5.5	8.0	7.2	7.6
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	10.0	4.7	11.7	4.0	7.5
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	6.4	6.1	9.8	2.6	6.3
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	8.3	5.3	10.7	3.4	6.9
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.8	1.6	3.2	1.4	2.2
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.9	1.7	1.7	0.8	1.3
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.9	1.7	2.5	1.1	1.8

[3]Based on WHO standards

Maharashtra – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	41.6 (35.3-48.2)	21.5 (16.7-27.2)	28.3 (23.2-33.9)
Prevalence of anaemia- males[4,5] (%)	41.6 (34.3-49.3)	17.2 (12.4-23.4)	21.0 (14.9-28.6)
Prevalence of anaemia- females[4,5] (%)	41.6 (33.2-50.4)	26.0 (19.2-34.0)	38.4 (30.3-47.1)
Prevalence of low serum ferritin[5,6] (%)	49.0 (40.3-57.8)	29.1 (23.0-36.0)	31.2 (25.6-37.3)
Prevalence of folate deficiency[5,7] (%)	42.2 (34.1-50.8)	56.8 (50.0- 63.3)	71.7 (65.9-76.8)
Prevalence of vitamin B12 deficiency[5,8] (%)	11.8 (7.0-19.3)	15.8 (11.6-21.3)	37.7 (30.7-45.3)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	12.8 (8.1-19.7)	17.6 (12.7-23.9)	22.1 (16.8-28.6)
Prevalence of vitamin A deficiency[5,10] (%)	9.4 (4.1-19.9)	8.9 (4.6-16.6)	8.1 (4.1-15.2)
Prevalence of zinc deficiency[11] (%)	12.3 (7.6-19.3)	8.1 (5.0-12.8)	25.1 (19.4-31.8)
Median urinary Iodine concentration(µg/l)[5]	136	123	120

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Maharashtra – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	0.8 (0.3-2.2)	0.6 (0.2-1.5)
	Prevalence of high LDL cholesterol[13] (%)	2.4 (1.4-4.3)	2.9 (1.6-5.3)
	Prevalence of low HDL cholesterol[14] (%)	17.4 (14.1-21.2)	24.7 (19.8-30.3)
	Prevalence of high triglycerides[15]	19.1 (15.7-23.1)	6.4 (3.7-10.8)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	10.4 (6.7-15.8)	13.9 (10.1-18.9)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	2.4 (1.3-4.3)	0.4 (0.1-3.1)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	8.0 (5.4-11.6)	8.7 (6.2-12.1)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	5.0 (2.5-9.8)	1.8 (0.8-4.1)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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Ministry of Health and Family Welfare
Government of India

POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Manipur

Preliminary Factsheet

2017-18

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Manipur, where the CNNS was conducted from October 15, 2017 through February 21, 2018 and gathered household and anthropometry data from 1,206, 1,207 and 1,153 and biological samples from 844, 698 and 698 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Manipur, survey and anthropometry data were collected by Gfk Mode Pvt. Ltd. and Super Religare Laboratories (SRL) Ltd collected biological samples.

Manipur – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	29.8	27.9	17.6	33.3	28.9
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	12.7	7.8	5.4	12.4	10.4
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	6.6	5.5	4.3	6.7	6.0
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	4.2	1.8	1.6	3.6	3.0
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	13.4	12.4	8.5	14.7	13.0
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	3.3	2.7	2.1	3.3	3.0
	Children aged 6-59 months with MUAC <12.5cm (%)	0.8	1.7	1.5	1.2	1.3
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	0.2	0.0	0.1	0.1
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	4.4	2.5	2.3	4.0	3.5
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.4	0.1	0.1	0.3	0.2
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	8.5	7.7	3.7	9.8	8.1
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	4.2	2.5	0.6	4.5	3.4
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.7	0.6	1.0	0.6	0.7

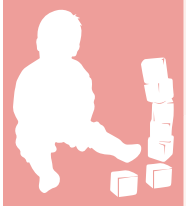
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Manipur – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	8.0	5.2	4.4	7.6	6.7
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.8	1.3	0.1	2.2	1.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.8	2.6	2.5	2.0	2.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.2	0.4	0.1	0.2



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	20.4	19.3	12.2	22.6	19.8
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	6.0	5.4	1.9	7.0	5.7
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	7.5	4.7	3.9	6.9	6.1
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.4	1.6	0.2	2.6	2.0
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	11.6	5.5	8.7	8.4	8.5
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	4.0	1.0	2.8	2.4	2.5

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Manipur – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	6.9	6.3	6.9	6.4	6.6
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	6.7	4.2	6.0	5.2	5.5
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	6.8	5.4	6.5	5.9	6.1
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	0.5	1.5	1.9	0.8	1.1
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.0	0.0	0.4	1.4	1.0
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.2	0.9	1.2	1.0	1.1
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.6	10.3	10.4	9.8	10.0
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	5.7	7.1	7.0	6.1	6.4
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	7.8	9.0	8.9	8.2	8.4
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.1	3.6	4.5	2.9	3.4
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.7	0.9	1.6	1.2	1.3
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.5	2.5	3.2	2.2	2.5

[3]Based on WHO standards

Manipur – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	10.0 (7.3-13.8)	6.5 (4.4-9.5)	10.5 (7.6-14.4)
Prevalence of anaemia- males[4,5] (%)	12.8 (8.5-18.7)	7.7 (4.7-12.2)	9.7 (5.8-15.9)
Prevalence of anaemia-females[4,5] (%)	7.0 (4.8-10.1)	5.5 (3.4-8.8)	11.3 (7.5-16.8)
Prevalence of low serum ferritin[5,6] (%)	17.4 (11.4-25.6)	10.5 (6.5-16.4)	12.6 (7.8-19.8)
Prevalence of folate deficiency[5,7] (%)	6.4 (3.9-10.2)	6.8 (4.4-10.4)	6.7 (4.3-10.3)
Prevalence of vitamin B12 deficiency[5,8] (%)	4.3 (1.9-9.4)	5.9 (2.4-13.7)	11.0 (6.4-18.1)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	41.2 (33.7-49.0)	55.5 (47.4-63.3)	59.8 (51.7-67.4)
Prevalence of vitamin A deficiency[5,10] (%)	17.1 (10.2-27.4)	22.6 (15.6-31.5)	12.5 (8.9-17.2)
Prevalence of zinc deficiency[11] (%)	26.6 (20.7-33.4)	35.3 (28.7-42.7)	52.8 (45.8-59.8)
Median urinary Iodine concentration(µg/l)[5]	170	164	186

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[13]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Manipur – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	9.2 (5.9-14.2)	10.6 (7.4-14.9)
	Prevalence of high LDL cholesterol[13] (%)	8.7 (6.2-12.2)	10.4 (7.5-14.2)
	Prevalence of low HDL cholesterol[14] (%)	21.8 (16.9-27.6)	24.8 (19.6-30.9)
	Prevalence of high triglycerides[15]	54.7 (47.5-61.7)	38.0 (30.1-46.7)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	22.0 (16.8-28.2)	21.3 (17.2-26.0)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	2.7 (1.4-5.0)	2.5 (1.5-4.3)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	10.5 (8.0-13.6)	14.9 (10.9-20.1)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.7 (0.2-2.0)	0.7 (0.3-1.8)
	Prevalence of high serum creatinine[19,20] (%)	18.3 (13.0-25.3)	15.3 (10.2-22.3)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

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सत्यमेव जयते

Ministry of Health and Family Welfare
Government of India

POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Meghalaya

Preliminary Factsheet

2018

CNNS
Birth to Adolescence

About the CNNS

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CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Meghalaya, where the CNNS was conducted from June 16 through October 21, 2018 and gathered household and anthropometry data from 1,116, 1,088 and 989 and biological samples from 505, 441 and 393 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Meghalaya, survey and anthropometry data were collected by Gfk Mode Pvt. Ltd. and Super Religare Laboratories (SRL) Ltd collected biological samples.

Meghalaya – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	37.9	42.9	28.2	42.1	40.4
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	14.5	20.0	9.0	18.4	17.2
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	18.0	11.3	10.9	15.3	14.7
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	5.3	4.5	0.7	5.5	4.9
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	29.8	29.4	20.6	30.9	29.6
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	9.2	6.6	4.3	8.5	7.9
	Children aged 6-59 months with MUAC <12.5cm (%)	6.9	9.5	2.0	9.1	8.2
	Children aged 6-59 months with MUAC <11.5cm (%)	2.8	1.8	0.8	2.5	2.3
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	15.9	10.6	4.7	14.4	13.2
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	4.2	3.4	0.4	4.3	3.8
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	9.3	8.4	3.7	9.6	8.8
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	2.9	0.7	0.6	1.9	1.8
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	1.0	1.3	2.1	1.0	1.2

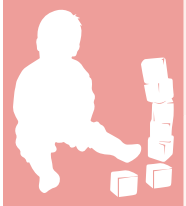
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Meghalaya – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.1	0.1	0.7	0.0	0.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	9.8	10.1	5.1	10.7	10.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.1	1.4	1.7	1.2	1.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.2	1.7	1.6	1.4	1.4
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.1	0.3	0.0	0.0



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	35.7	32.2	22.7	36.3	34.1
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	10.2	9.8	2.4	11.5	10.0
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	11.4	7.1	10.2	9.2	9.4
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.5	1.9	1.5	3.6	3.3
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	8.1	4.5	4.5	6.8	6.4
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	3.3	0.2	1.5	1.8	1.8

[1]Below -2 standard deviations (SD), based on the WHO standards

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Meghalaya – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	6.0	6.4	13.3	5.0	6.2
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	12.1	1.0	6.3	7.8	7.5
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	8.7	4.4	9.8	6.1	6.7
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.6	1.1	6.1	0.6	1.4
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.3	0.5	1.3	0.9	1.0
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.5	0.9	3.7	0.7	1.2
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.2	5.0	6.6	4.3	4.6
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	0.2	4.3	3.0	1.6	1.9
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.4	4.7	4.8	3.2	3.5
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.6	0.1	1.7	0.1	0.4
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.4	0.0	0.8	0.1	0.2

[3]Based on WHO standards

Meghalaya – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	32.8 (19.8-49.0)	31.3 (22.7-41.5)	31.8 (19.4-47.5)
Prevalence of anaemia- males[4,5] (%)	33.5 (19.7-50.8)	30.5 (20.4-42.9)	22.4 (11.9-38.2)
Prevalence of anaemia- females[4,5] (%)	31.9 (17.1-51.4)	32.5 (21.8-45.3)	43.4 (26.1-62.6)
Prevalence of low serum ferritin[5,6] (%)	24.9 (14.0-40.4)	12.0 (7.9-17.8)	13.7 (8.2-22.1)
Prevalence of folate deficiency[5,7] (%)	26.0 (15.1-41.0)	57.0 (45.1-68.2)	61.5 (50.3-71.5)
Prevalence of vitamin B12 deficiency[5,8] (%)	8.5 (3.9-17.4)	5.0 (1.9-12.6)	9.7 (5.0-18.2)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	2.1 (0.8-5.3)	5.8 (3.2-10.5)	6.6 (3.6-11.6)
Prevalence of vitamin A deficiency[5,10] (%)	6.4 (2.7-14.1)	9.9 (5.4-17.5)	5.6 (2.5-11.7)
Prevalence of zinc deficiency[11] (%)	14.4 (7.5-25.9)	23.3 (17.3-30.8)	49.3 (37.0-61.6)
Median urinary Iodine concentration(µg/l)[5]	264	187	208

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

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Meghalaya – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	1.4 (0.2-7.8)	0.4 (0.1-1.4)
	Prevalence of high LDL cholesterol[13] (%)	3.2 (1.2-8.0)	0.6 (0.2-1.6)
	Prevalence of low HDL cholesterol[14] (%)	50.9 (40.0-61.8)	49.9 (38.0-61.7)
	Prevalence of high triglycerides[15]	30.8 (23.7-39.0)	19.8 (13.2-28.7)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	4.8 (1.9-11.6)	2.6 (1.0-6.4)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	8.8 (2.3-28.4)	3.0 (0.5-16.9)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	6.1 (2.9-12.1)	7.8 (3.4-16.9)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	0.7 (0.2-3.0)	0.5 (0.1-2.3)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

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CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Mizoram where the CNNS was conducted from March 28 through June 11, 2016 and gathered household and anthropometry data from 1,009, 1,026 and 966 and biological samples from 307, 440 and 379 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Mizoram, survey and anthropometry data were collected by Gfk Mode Pvt. Ltd. and Super Religare Laboratories (SRL) Ltd collected biological samples.

Mizoram – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	28.2	26.6	22.0	32.2	27.4
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	6.7	6.8	5.5	7.8	6.8
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	5.6	6.1	5.3	6.2	5.8
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	1.7	2.7	1.9	2.4	2.2
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	10.2	12.4	8.1	14.0	11.3
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	1.7	1.3	0.5	2.3	1.5
	Children aged 6-59 months with MUAC <12.5cm (%)	1.0	2.1	1.3	1.7	1.5
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	0.6	0.3	0.3	0.3
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	3.4	3.9	2.3	4.8	3.6
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.5	0.9	0.4	0.9	0.7
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	9.1	10.6	9.8	9.9	9.8
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	1.2	2.7	1.2	2.6	2.0
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.7	0.5	0.6	0.7	0.6

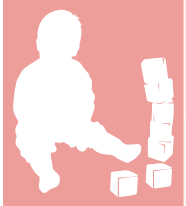
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Mizoram – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.1	0.3	0.2	0.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	4.3	4.2	2.1	6.0	4.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	0.2	0.4	0.0	0.6	0.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.8	1.6	2.0	1.5	1.7
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	21.9	25.3	15.8	30.1	23.6
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	6.1	5.2	2.8	8.0	5.6
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	6.5	3.7	5.4	4.9	5.1
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.9	1.1	1.9	1.3	1.5
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	10.7	8.1	12.7	6.7	9.4
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	3.5	2.6	4.2	2.0	3.0

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Mizoram – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	9.2	7.5	4.6	10.9	8.3
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	5.3	2.9	4.2	4.1	4.1
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	7.3	5.5	4.4	8.2	6.4
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	0.3	1.0	0.4	0.9	0.7
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.1	0.6	0.4	1.3	0.8
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	0.7	0.8	0.4	1.1	0.8
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	10.5	9.4	12.3	8.1	9.9
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.0	6.7	7.0	3.3	5.3
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	7.4	8.2	9.6	6.2	7.8
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.2	0.8	2.7	0.5	1.5
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.4	0.2	0.0	0.6	0.3
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.3	0.6	1.3	0.6	0.9

[3]Based on WHO standards

Mizoram – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	24.7 (18.2-32.6)	14.4 (9.5-21.2)	17.9 (13.0-24.1)
Prevalence of anaemia - males[4,5] (%)	26.3 (17.2-37.9)	13.3 (8.3-20.8)	11.0 (6.0-19.2)
Prevalence of anaemia - females[4,5] (%)	23.2 (16.4-31.8)	15.6 (10.0-23.4)	24.9 (17.1-34.6)
Prevalence of low serum ferritin[5,6] (%)	3.9 (1.7-8.7)	2.1 (0.9-5.2)	9.4 (6.1-14.4)
Prevalence of folate deficiency[5,7] (%)	18.1 (11.6-27.0)	20.5 (13.7-29.6)	22.2 (15.4-30.8)
Prevalence of vitamin B12 deficiency[5,8] (%)	6.1 (3.4-10.6)	4.3 (2.4-7.5)	10.6 (6.8-16.3)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	5.3 (2.0-13.1)	9.0 (5.9-13.6)	13.4 (8.9-19.7)
Prevalence of vitamin A deficiency[5,10] (%)	39.0 (28.4-50.7)	46.8 (38.4-55.3)	21.5 (15.5-29.2)
Prevalence of zinc deficiency[11] (%)	4.6 (1.6-12.3)	5.0 (2.3-10.7)	6.8 (3.7-12.3)
Median urinary Iodine concentration(µg/l)[5]	243	239	233

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Mizoram – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	2.3 (0.9-5.9)	0.7 (0.2-2.4)
	Prevalence of high LDL cholesterol[13] (%)	2.1 (0.8-5.3)	0.8 (0.2-2.4)
	Prevalence of low HDL cholesterol[14] (%)	21.9 (16.0-29.1)	18.8 (11.1-29.9)
	Prevalence of high triglycerides[15]	44.7 (37.6-52.0)	28.4 (22.3-35.3)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	19.7 (13.3-28.1)	23.7 (17.4-31.3)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	2.9 (1.4-6.1)	2.5 (1.1-5.2)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	10.7 (7.0-16.1)	7.6 (4.9-11.4)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.1 (0.0-0.9)
	Prevalence of high serum creatinine[19,20] (%)	16.9 (10.5-26.1)	15.0 (8.6-24.8)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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Government of India

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सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Nagaland

Preliminary Factsheet

2016-17

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Nagaland where the CNNS was conducted from November 22, 2016 through May 21, 2017 and gathered household and anthropometry data from 1,199, 1,189 and 1,100 and biological samples from 231, 258 and 232 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Nagaland, survey and anthropometry data were collected by Gfk Mode Pvt. Ltd. and Super Religare Laboratories (SRL) Ltd collected biological samples.

Nagaland – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	27.1	25.3	20.7	27.6	26.2
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	11.8	9.8	7.6	11.7	10.8
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	12.7	13.0	9.2	13.8	12.9
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	4.3	6.4	4.2	5.6	5.3
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	16.6	16.0	12.3	17.3	16.3
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	5.1	4.8	2.5	5.6	5.0
	Children aged 6-59 months with MUAC <12.5cm (%)	11.5	9.0	6.3	11.4	10.3
	Children aged 6-59 months with MUAC <11.5cm (%)	6.9	4.0	2.5	6.4	5.5
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	14.3	10.4	10.3	13.1	12.5
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	7.9	3.3	2.7	6.5	5.7
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	12.5	11.2	8.8	12.7	11.9
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	2.9	2.7	3.5	2.6	2.8
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	1.3	0.8	1.9	0.8	1.1

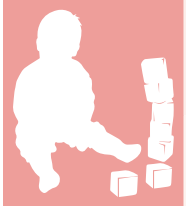
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Nagaland – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.1	0.0	0.2	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	10.6	7.5	7.2	9.7	9.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	2.3	2.4	2.1	2.4	2.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	4.2	1.5	2.1	3.2	2.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.4	0.0	0.7	0.0	0.2



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	27.7	21.1	21.5	25.3	24.4
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	9.0	7.6	5.8	9.1	8.3
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	7.2	8.6	9.7	7.3	7.9
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.0	2.3	2.1	2.1	2.1
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	13.1	16.2	14.7	14.7	14.7
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	4.4	4.3	5.9	3.8	4.3

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Nagaland – Key Anthropometric Indicators

	Anthropometric profile	Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	14.6	11.8	10.4	14.6	13.4
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	8.3	2.7	6.1	5.2	5.5
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	12.1	7.6	8.2	10.8	10.0
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	3.3	2.0	4.4	2.2	2.8
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.0	0.0	1.4	0.0	0.5
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.4	1.1	2.9	1.3	1.8
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	12.9	12.9	14.2	12.4	12.9
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	5.3	4.2	5.3	4.5	4.8
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.9	8.8	9.8	9.2	9.4
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.5	0.8	2.1	2.4	2.3
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.0	0.7	0.7	0.1	0.3
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.1	0.7	1.4	1.5	1.5

[3]Based on WHO standards

Nagaland – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	8.0 (4.3-14.5)	9.4 (3.0-25.6)	8.4 (4.7-14.7)
Prevalence of anaemia- males[4,5] (%)	7.1 (2.0-22.0)	3.1 (0.9-10.0)	9.6 (4.1-21.0)
Prevalence of anaemia-females[4,5] (%)	8.6 (3.7-18.7)	14.2 (3.8-40.8)	7.3 (3.0-16.7)
Prevalence of low serum ferritin[5,6] (%)	*	*	*
Prevalence of folate deficiency[5,7] (%)	74.1 (59.4-84.8)	*	88.9 (70.0-96.5)
Prevalence of vitamin B12 deficiency[5,8] (%)	*	0.0 (0.0-0.0)	2.3 (0.4-12.7)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	2.2 (0.4-11.9)	4.1 (1.1-13.7)	7.4 (1.8-26.2)
Prevalence of vitamin A deficiency[5,10] (%)	*	*	*
Prevalence of zinc deficiency[11] (%)	*	2.1 (0.4-10.6)	4.3 (1.1-14.7)
Median urinary Iodine concentration(µg/l)[5]	100	139	NA

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Nagaland – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	1.2 (0.1-9.1)	1.4 (0.1-11.3)
	Prevalence of high LDL cholesterol[13] (%)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of low HDL cholesterol[14] (%)	25.2 (16.3-36.7)	6.9 (2.3-18.7)
	Prevalence of high triglycerides[15]	55.4 (42.6-67.6)	22.9 (15.3-32.8)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	10.8 (5.4-20.6)	0.7 (0.1-5.8)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	*	1.9 (0.3-11.7)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	*	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	*	*

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

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Birth to Adolescence

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See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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Ministry of Health and Family Welfare
Government of India

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सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Odisha

Preliminary Factsheet

2017-18

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Odisha where the CNNS was conducted from November 21, 2017 through February 21, 2018 and gathered household and anthropometry data from 1,314, 1,343 and 1,271 and biological samples from 927, 790 and 764 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Odisha, survey and anthropometry data were collected by SIGMA Research and Consulting Pvt Ltd and Super Religare Laboratories (SRL) Ltd collected biological samples.

Odisha – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	27.7	30.4	20.0	30.4	29.1
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	7.4	8.6	4.1	8.6	8.0
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	14.4	13.4	6.4	15.0	13.9
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	2.5	2.4	0.8	2.7	2.4
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	26.0	32.3	14.3	31.3	29.2
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	6.2	4.8	2.7	5.9	5.5
	Children aged 6-59 months with MUAC <12.5cm (%)	1.2	3.1	0.2	2.4	2.2
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	0.7	0.0	0.4	0.4
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	4.8	2.7	1.6	4.1	3.8
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.3	0.7	0.0	0.6	0.5
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	11.4	13.2	8.6	12.9	12.3
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.9	3.1	0.4	2.3	2.0
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	1.9	0.3	2.5	0.9	1.1

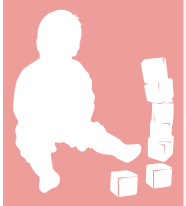
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Odisha – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.8	0.0	0.6	0.3	0.4
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	13.8	14.8	9.3	15.0	14.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.3	1.9	0.6	1.8	1.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.4	1.5	3.3	1.2	1.4
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.2	0.5	0.2	0.2



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	24.5	18.2	14.7	22.4	21.4
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	5.9	3.5	3.7	4.9	4.7
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	20.7	16.8	12.7	19.7	18.8
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.6	2.9	1.5	4.1	3.8
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	8.7	6.8	18.2	6.2	7.8
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	3.7	2.0	8.9	2.0	2.9

[1]Below -2 standard deviations (SD), based on the WHO standards

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Odisha – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	23.0	20.0	14.1	22.7	21.5
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	17.1	11.9	8.2	15.4	14.3
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	20.6	16.3	11.3	19.7	18.5
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.8	6.1	2.5	5.9	5.4
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.3	1.3	0.4	2.0	1.8
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	3.8	3.9	1.5	4.3	3.9
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	10.9	7.6	24.6	7.0	9.3
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	6.4	5.0	13.7	4.1	5.7
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.1	6.4	19.5	5.8	7.8
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.2	2.3	9.1	1.2	2.3
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.4	0.9	4.5	0.5	1.2
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.9	1.7	6.9	0.9	1.8

[3]Based on WHO standards

Odisha – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	37.2 (30.8-44.2)	27.2 (22.1-33.0)	29.5 (24.8-34.6)
Prevalence of anaemia- males[4,5] (%)	36.2 (28.7-44.5)	26.9 (21.6-33.0)	18.3 (14.3-23.2)
Prevalence of anaemia-females[4,5] (%)	38.2 (30.0-47.2)	27.5 (21.1-35.0)	40.4 (33.4-47.8)
Prevalence of low serum ferritin[5,6] (%)	30.4 (24.6-36.9)	13.1 (9.0-18.7)	20.4 (16.9-24.5)
Prevalence of folate deficiency[5,7] (%)	34.4 (28.2-41.1)	47.9 (41.1-54.7)	68.5 (62.0-74.2)
Prevalence of vitamin B12 deficiency[5,8] (%)	7.2 (4.7-11.1)	5.8 (3.8-8.7)	15.6 (11.8-20.4)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	6.7 (4.3-10.2)	12.4 (9.2-16.6)	18.4 (13.8-24.1)
Prevalence of vitamin A deficiency[5,10] (%)	19.8 (14.5-26.4)	18.3 (13.3-24.6)	19.1 (14.2-25.2)
Prevalence of zinc deficiency[11] (%)	18.7 (13.4-25.4)	15.8 (12.0-20.6)	42.4 (35.6-49.4)
Median urinary Iodine concentration(µg/l)[5]	197	196	205

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Odisha – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	3.7 (2.2-6.0)	3.9 (2.4-6.4)
	Prevalence of high LDL cholesterol[13] (%)	3.4 (1.9-6.0)	4.3 (2.7-6.8)
	Prevalence of low HDL cholesterol[14] (%)	22.9 (18.2-28.3)	26.4 (21.7-31.7)
	Prevalence of high triglycerides[15]	27.5 (22.6-33.1)	9.1 (6.5-12.8)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	19.2 (14.6-24.9)	18.9 (14.3-24.6)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	1.6 (0.9-3.0)	0.6 (0.2-1.7)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	10.1 (7.4-13.6)	12.6 (9.7-16.2)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.3 (0.0-2.5)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	0.2 (0.1-1.1)	1.2 (0.5-2.9)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

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CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

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CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Punjab where the CNNS was conducted from September 20, 2017 through March 4, 2018 and gathered household and anthropometry data from 1,004, 1,048 and 997and biological samples from 571, 538 and 534 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Punjab, survey and anthropometry data were collected by Indian Institute of Health Management Research (IIHMR), Jaipur and Super Religare Laboratories (SRL) Ltd collected biological samples.

Punjab – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	28.6	19.6	23.7	24.7	24.3
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	10.5	5.1	5.8	9.2	8.0
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	9.0	4.1	6.7	6.7	6.7
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	3.0	1.4	2.3	2.2	2.3
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	22.9	16.2	15.8	21.9	19.7
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	6.9	2.5	4.1	5.2	4.8
	Children aged 6-59 months with MUAC <12.5cm (%)	3.6	3.9	2.2	4.6	3.7
	Children aged 6-59 months with MUAC <11.5cm (%)	0.8	1.4	0.6	1.4	1.1
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	11.8	6.8	5.0	11.7	9.4
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.4	1.8	0.9	2.0	1.6
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	7.3	7.3	6.3	7.8	7.3
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	1.2	0.6	0.8	0.9	0.9
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	2.2	2.7	2.2	2.5	2.4

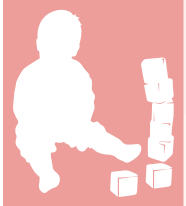
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Punjab – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.1	0.0	0.1	0.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	4.5	5.3	5.9	4.4	4.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.1	1.2	1.0	1.2	1.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	3.6	0.8	3.7	1.5	2.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.2	0.0	0.1	0.1



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	11.2	13.9	14.7	11.1	12.3
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	2.6	2.4	3.5	2.0	2.5
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	14.0	8.9	12.6	11.6	11.9
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.1	2.4	3.3	1.7	2.2
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	7.9	8.0	8.2	7.8	7.9
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	3.0	2.5	2.9	2.8	2.8

[1]Below -2 standard deviations (SD), based on the WHO standards

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Punjab – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	21.4	19.0	17.6	21.7	20.3
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	13.0	17.2	16.2	14.5	15.0
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	17.6	18.1	17.0	18.2	17.8
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.5	2.6	5.8	3.5	4.2
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.4	1.5	2.0	1.2	1.4
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	3.6	2.1	4.0	2.4	2.9
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	12.3	6.9	11.4	9.2	9.9
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	10.1	6.3	8.3	8.3	8.3
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	11.3	6.6	9.9	8.7	9.1
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.7	2.8	3.1	2.5	2.7
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.9	2.0	2.3	2.6	2.5
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.8	2.4	2.7	2.6	2.6

[3]Based on WHO standards

Punjab – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	39.7 (31.0-49.2)	12.4 (9.4-16.2)	25.9 (20.3-32.4)
Prevalence of anaemia- males[4,5] (%)	36.6 (26.5-48.1)	12.2 (8.5-17.2)	15.1 (10.6-21.0)
Prevalence of anaemia-females[4,5] (%)	43.1 (32.9-53.9)	12.7 (7.9-19.7)	36.9 (29.9-44.5)
Prevalence of low serum ferritin[5,6] (%)	67.2 (61.3-72.6)	50.9 (45.4-56.3)	45.3 (36.5-54.4)
Prevalence of folate deficiency[5,7] (%)	9.7 (4.3-20.5)	12.9 (7.2-22.2)	18.8 (11.6-29.0)
Prevalence of vitamin B12 deficiency[5,8] (%)	17.1 (12.4-22.9)	32.3 (25.0-40.7)	46.4 (38.5-54.5)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	52.3 (43.1-61.3)	76.1 (67.5-83.0)	68.0 (59.5-75.5)
Prevalence of vitamin A deficiency[5,10] (%)	17.2 (11.5-24.9)	22.9 (17.0-30.2)	12.8 (9.0-18.0)
Prevalence of zinc deficiency[11] (%)	21.0 (13.9-30.4)	25.2 (19.8-31.5)	51.8 (44.3-59.3)
Median urinary Iodine concentration(µg/l)[5]	188	183	190

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Punjab – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	2.2 (1.2-4.1)	3.8 (1.9-7.6)
	Prevalence of high LDL cholesterol[13] (%)	1.9 (0.9-3.6)	3.3 (1.6-7.0)
	Prevalence of low HDL cholesterol[14] (%)	11.7 (7.8-17.0)	11.7 (8.8-15.4)
	Prevalence of high triglycerides[15]	24.4 (20.3-29.0)	9.8 (7.1-13.5)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	8.9 (6.0-13.0)	9.7 (6.4-14.5)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.0 (0.0-0.0)	0.2 (0.0-1.5)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	13.2 (9.6-17.8)	14.0 (10.3-18.7)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	0.2 (0.1-1.1)	2.0 (0.8-5.0)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

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Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

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Government of India

POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Rajasthan

Preliminary Factsheet

2016-17

CNNS
Birth to Adolescence

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CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Rajasthan where the CNNS was conducted from October 18, 2016 through January 3, 2017 and gathered household and anthropometry data from 1,222, 1,277 and 1,217 and biological samples from 445, 674 and 639 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Rajasthan, survey and anthropometry data were collected by Indian Institute of Health Management Research (IIHMR), Jaipur and Super Religare Laboratories (SRL) Ltd collected biological samples.

Rajasthan – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	40.6	32.4	24.9	39.6	36.8
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	14.6	11.5	6.6	14.7	13.2
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	14.8	13.8	13.1	14.6	14.3
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	4.2	3.1	1.6	4.1	3.6
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	33.2	29.5	23.7	33.3	31.5
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	9.5	9.4	7.4	9.9	9.4
	Children aged 6-59 months with MUAC <12.5cm (%)	5.5	4.7	3.2	5.6	5.2
	Children aged 6-59 months with MUAC <11.5cm (%)	0.9	1.1	0.1	1.2	1.0
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	15.1	9.0	8.3	13.2	12.3
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.8	1.5	0.2	2.0	1.7
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	5.1	9.2	3.7	7.8	7.0
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.2	1.7	0.2	1.1	0.9
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	1.6	2.6	0.4	2.5	2.1

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Rajasthan – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.1	0.0	0.0	0.1	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	9.2	6.7	5.2	8.7	8.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.4	0.7	0.0	1.3	1.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	2.9	1.4	1.3	2.4	2.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.4	0.0	0.0	0.3	0.2

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	23.3	24.7	19.8	25.0	23.9
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	6.6	5.6	3.6	6.8	6.1
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.5	21.5	19.3	22.7	22.1
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.3	3.4	4.3	3.8	3.9
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	1.6	1.5	3.5	1.1	1.6
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	0.6	0.1	1.3	0.1	0.4

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Rajasthan – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	36.6	29.8	23.5	35.5	33.2
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	32.9	15.2	23.3	24.2	24.0
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	35.1	23.6	23.4	30.8	29.3
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	13.8	5.8	7.4	10.3	9.8
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.4	2.3	5.4	4.0	4.4
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	10.7	4.3	6.5	7.7	7.5
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.8	4.3	6.6	2.8	3.5
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.3	1.5	6.4	0.6	1.9
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.6	3.1	6.6	1.9	2.8
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.2	0.4	1.5	0.0	0.3
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.5	0.3	1.7	0.0	0.4
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.3	0.3	1.6	0.0	0.3

[3]Based on WHO standards

Rajasthan – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	**33.1** (23.1-44.8)	**18.2** (14.8-22.3)	**26.0** (20.5-32.4)
Prevalence of anaemia- males[4,5] (%)	**35.3** (23.4-49.4)	**20.4** (15.1-26.9)	**11.2** (5.9-20.1)
Prevalence of anaemia- females[4,5] (%)	**30.7** (18.1-47.1)	**15.8** (10.6-22.8)	**40.1** (31.7-49.1)
Prevalence of low serum ferritin[5,6] (%)	**43.4** (22.4-67.1)	**39.0** (28.4-50.6)	**35.1** (26.1-45.3)
Prevalence of folate deficiency[5,7] (%)	**32.4** (23.1-43.3)	**35.2** (24.5-47.6)	**52.7** (40.6-64.5)
Prevalence of vitamin B12 deficiency[5,8] (%)	**15.8** (8.2-28.2)	**22.7** (16.1-30.9)	**47.4** (39.2-55.7)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	**23.3** (11.8-40.8)	**23.9** (17.5-31.7)	**25.8** (19.5-33.2)
Prevalence of vitamin A deficiency[5,10] (%)	*	**1.0** (0.1-7.2)	**1.9** (0.4-8.3)
Prevalence of zinc deficiency[11] (%)	**9.5** (3.2-24.8)	**6.5** (3.2-12.6)	**22.6** (16.1-30.7)
Median urinary Iodine concentration(µg/l)[5]	**208**	**176**	**194**

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

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[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Rajasthan – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	0.7 (0.3-2.0)	1.2 (0.4-3.7)
	Prevalence of high LDL cholesterol[13] (%)	2.5 (1.0-6.2)	2.7 (1.3-5.4)
	Prevalence of low HDL cholesterol[14] (%)	15.4 (10.5-22.2)	18.3 (13.8-23.8)
	Prevalence of high triglycerides[15]	23.3 (18.4-29.0)	7.6 (5.3-10.9)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	8.0 (4.4-13.9)	13.6 (8.7-20.7)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	0.0 (0.0-0.0)	1.1 (0.3-4.6)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	14.0 (10.1-18.9)	12.5 (9.4-16.4)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.5 (0.1-1.9)	1.2 (0.3-5.1)
	Prevalence of high serum creatinine[19,20] (%)	2.6 (0.8-8.6)	0.5 (0.1-4.0)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

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Comprehensive National Nutrition Survey

Sikkim

Preliminary Factsheet

2018

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CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Sikkim, where the CNNS was conducted from July 8 through October 7, 2018 and gathered household and anthropometry data from 1,123, 1,107 and 996 and biological samples from 805, 660 and 629 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Sikkim, survey and anthropometry data were collected by Gfk Mode Pvt. Ltd. and Super Religare Laboratories (SRL) Ltd collected biological samples.

Sikkim – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	22.0	21.5	17.1	23.7	21.8
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	7.2	7.0	4.0	8.4	7.1
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	7.6	6.3	7.0	6.9	6.9
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	1.3	0.8	1.5	0.9	1.1
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	11.5	10.2	10.1	11.1	10.8
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	2.8	1.9	2.3	2.3	2.3
	Children aged 6-59 months with MUAC <12.5cm (%)	1.9	4.4	1.8	3.8	3.2
	Children aged 6-59 months with MUAC <11.5cm (%)	0.9	2.2	0.2	2.2	1.6
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	4.2	6.5	6.1	5.1	5.4
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.4	1.8	0.2	2.2	1.6
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	2.8	3.6	1.9	3.8	3.3
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.9	0.4	1.0	0.5	0.7
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	5.6	3.8	4.9	4.5	4.6

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Sikkim – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	1.1	0.8	0.5	1.1	0.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	5.4	1.8	3.7	3.4	3.5
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	0.9	0.4	1.0	0.5	0.7
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	6.4	4.1	4.3	5.6	5.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.3	0.5	0.3	0.3

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	19.1	18.4	15.1	20.0	18.8
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	4.4	6.1	4.8	5.3	5.2
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	10.7	7.1	8.3	9.2	9.0
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.4	3.6	1.8	2.6	2.4
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	13.1	7.9	16.7	8.4	10.6
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	5.9	2.3	7.7	3.0	4.2

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Sikkim – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	14.5	10.2	14.2	11.8	12.3
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	14.5	1.0	6.0	7.1	6.8
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	14.5	5.3	10.0	9.5	9.6
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.0	0.5	2.4	1.0	1.3
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	3.8	0.0	1.0	1.9	1.7
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.9	0.2	1.7	1.4	1.5
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.5	10.6	21.4	7.1	10.1
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	2.1	13.2	4.5	9.5	8.4
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	6.1	12.0	12.8	8.3	9.2
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.0	2.0	5.7	1.7	2.5
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.2	2.6	0.7	1.8	1.6
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.7	2.3	3.1	1.7	2.0

[3]Based on WHO standards

Sikkim – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	32.9 (27.8-38.5)	23.3 (19.0-28.3)	25.8 (18.0-35.6)
Prevalence of anaemia – males[4,5] (%)	36.7 (27.9-46.5)	22.1 (16.9-28.4)	13.7 (8.3-21.9)
Prevalence of anaemia – females[4,5] (%)	29.3 (22.6-37.0)	25.0 (19.2-31.9)	37.6 (25.3-51.6)
Prevalence of low serum ferritin[5,6] (%)	27.8 (23.5-32.5)	7.7 (5.5-10.6)	21.2 (16.6-26.6)
Prevalence of folate deficiency[5,7] (%)	0.1 (0.0-1.0)	0.3 (0.0-1.9)	0.8 (0.2-3.1)
Prevalence of vitamin B12 deficiency[5,8] (%)	6.5 (4.1-10.2)	4.9 (3.1-7.8)	16.0 (10.6-23.3)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	14.2 (9.3-21.0)	18.4 (13.4-24.8)	18.8 (14.0-24.7)
Prevalence of vitamin A deficiency[5,10] (%)	2.7 (1.5-4.8)	5.4 (3.2-8.9)	4.7 (2.4-9.0)
Prevalence of zinc deficiency[11] (%)	22.3 (15.0-31.9)	17.7 (13.4-29.9)	36.8 (30.7-43.3)
Median urinary Iodine concentration(µg/l)[5]	273	251	242

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Sikkim – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	23.6 (17.8-30.8)	23.0 (14.3-34.8)
	Prevalence of high LDL cholesterol[13] (%)	12.4 (8.7-17.3)	13.2 (8.1-20.9)
	Prevalence of low HDL cholesterol[14] (%)	3.4 (1.9-5.9)	9.8 (6.4-14.7)
	Prevalence of high triglycerides[15]	64.6 (56.6-17.8)	39.4 (32.2-47.1)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	21.7 (17.7-26.4)	25.8 (19.7-33.0)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	1.3 (0.6-2.7)	0.8 (0.3-2.2)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	2.0 (1.2-3.4)	2.5 (1.2-5.2)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	27.1 (21.0-34.1)	20.1 (13.6-28.5)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Tamil Nadu

Preliminary Factsheet

2018

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Tamil Nadu where the CNNS was conducted from May 4 through August 10, 2018 and gathered household and anthropometry data from 1,906, 1,897 and 1,861 and biological samples from 507, 556 and 557 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Tamil Nadu, survey and anthropometry data were collected by SIGMA Research and Consulting Pvt Ltd and Super Religare Laboratories (SRL) Ltd collected biological samples.

Tamil Nadu – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	21.0	18.5	18.5	20.8	19.7
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	6.3	5.3	6.5	5.2	5.8
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	22.3	19.2	19.8	21.5	20.7
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	8.6	7.5	6.5	9.5	8.1
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	24.3	22.8	21.0	25.8	23.5
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	8.2	4.7	6.2	6.7	6.5
	Children aged 6-59 months with MUAC <12.5cm (%)	3.4	3.4	3.6	3.2	3.4
	Children aged 6-59 months with MUAC <11.5cm (%)	0.3	1.2	0.8	0.7	0.7
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	8.7	3.8	7.0	5.6	6.3
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.1	0.9	1.1	0.9	1.0
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	9.9	9.8	10.4	9.4	9.9
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	2.1	1.2	2.7	0.7	1.7
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.1	1.1	0.3	0.9	0.6

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Tamil Nadu – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	6.6	11.5	8.0	10.0	9.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	0.6	1.7	0.3	1.9	1.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	0.9	0.6	0.6	0.9	0.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	9.5	9.8	8.2	11.0	9.7
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	2.2	2.2	1.5	2.8	2.2
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	23.6	14.4	17.9	20.5	19.2
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	7.3	4.4	4.0	7.6	5.9
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	8.7	10.4	11.4	7.8	9.5
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	5.2	3.1	5.2	3.2	4.2

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Tamil Nadu – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	26.4	16.6	19.0	24.6	21.6
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	23.5	13.6	16.1	20.4	18.1
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	25.1	15.2	17.7	22.6	20.0
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	12.5	3.3	6.2	10.0	7.9
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	7.9	2.0	5.2	4.2	4.7
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	10.5	2.6	5.7	7.2	6.4
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	16.6	18.4	17.9	17.1	17.5
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	8.4	12.6	14.6	6.4	10.7
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	13.0	15.6	16.4	12.0	14.3
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.5	5.2	3.9	4.9	4.4
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.9	2.7	3.5	1.1	2.3
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.8	4.0	3.7	3.1	3.4

[3]Based on WHO standards

Tamil Nadu – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	27.6 (21.7-34.5)	10.4 (6.8-15.5)	16.4 (12.8-20.9)
Prevalence of anaemia - males[4,5] (%)	23.4 (16.5-32.1)	9.6 (5.4-16.6)	7.5 (4.6-12.0)
Prevalence of anaemia - females[4,5] (%)	31.3 (21.6-43.0)	11.2 (5.9-20.0)	26.4 (20.4-33.4)
Prevalence of low serum ferritin[4,5] (%)	41.9 (35.0-49.2)	20.3 (14.6-27.5)	26.1 (21.4-31.5)
Prevalence of folate deficiency[4,5] (%)	23.8 (16.3-33.5)	41.5 (30.0-53.9)	63.0 (54.1-71.2)
Prevalence of vitamin B12 deficiency[5,8] (%)	6.6 (3.5-12.2)	7.4 (3.8-13.8)	18.9 (15.0-23.4)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	1.5 (0.6-3.4)	5.4 (3.1-9.2)	9.8 (6.8-13.9)
Prevalence of vitamin A deficiency[5,10] (%)	13.2 (8.3-20.5)	10.0 (6.1-15.8)	14.3 (7.7-25.2)
Prevalence of zinc deficiency[11] (%)	19.9 (13.4-28.5)	21.8 (16.2-28.6)	46.3 (38.2-54.7)
Median urinary Iodine concentration(µg/l)[5]	315	342	312

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Tamil Nadu – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	**3.7** (2.0-6.8)	**6.9** (3.2-14.1)
	Prevalence of high LDL cholesterol[13] (%)	**6.0** (3.3-10.6)	**9.5** (5.3-16.4)
	Prevalence of low HDL cholesterol[14] (%)	**16.7** (11.2-24.3)	**23.4** (18.2-29.6)
	Prevalence of high triglycerides[15]	**20.4** (14.7-27.5)	**11.8** (7.3-18.4)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	**7.4** 4.5-12.0)	**9.2** (5.6-15.0)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	**3.2** (1.4-7.5)	**1.0** (0.4-2.2)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	**6.3** (3.6-10.8)	**7.8** (5.3-11.4)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	**0.0** (0.0-0.4)	**0.2** (0.1-1.1)
	Prevalence of high serum creatinine[19,20] (%)	**0.1** (0.0-0.7)	**0.1** (0.0-0.8)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

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CNNS
Birth to Adolescence

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सत्यमेव जयते

Ministry of Health and Family Welfare
Government of India

POSHAN Abhiyaan
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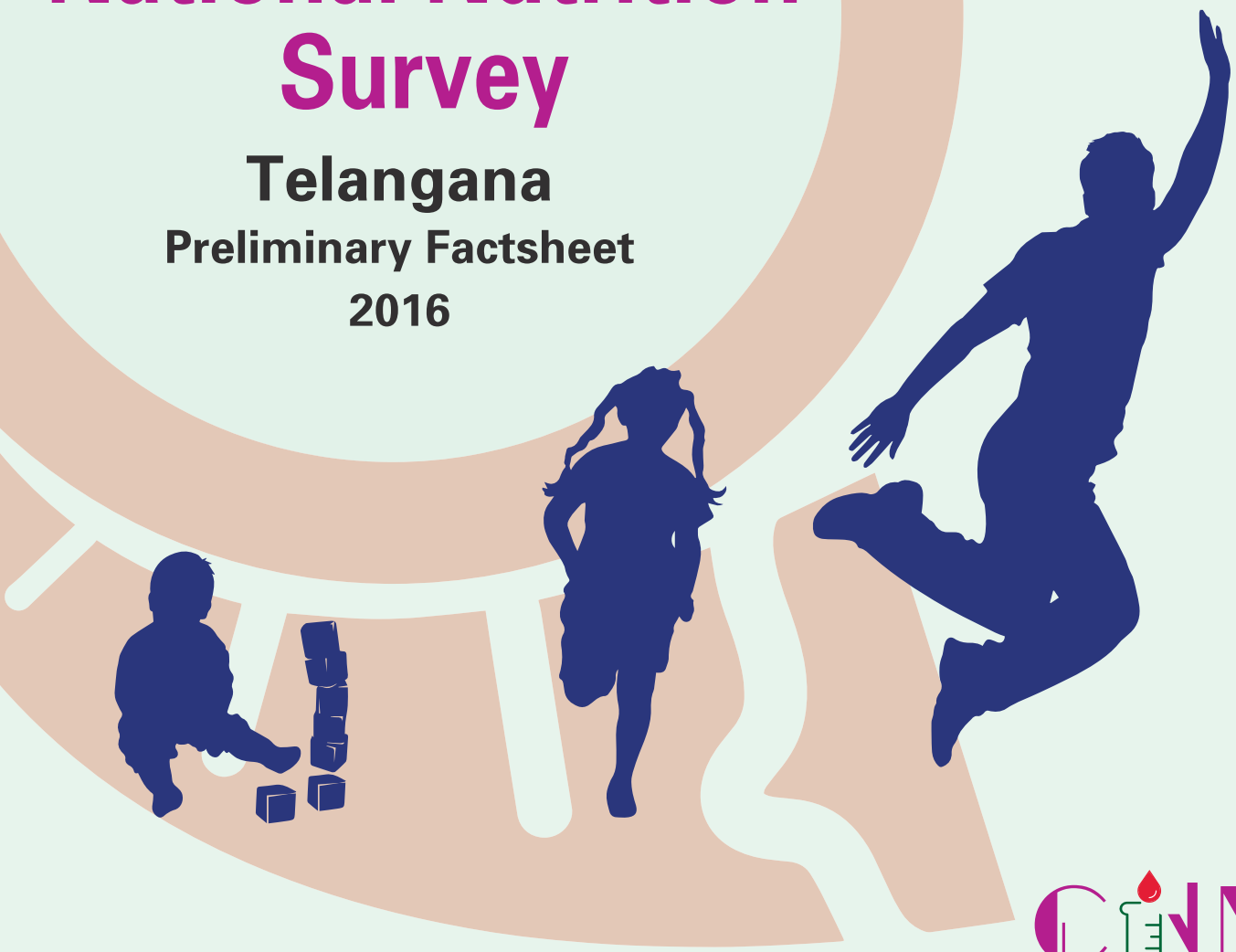
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Telangana

Preliminary Factsheet

2016



CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Telangana where the CNNS was conducted from February 26 through July 24, 2016 and gathered household and anthropometry data from 1,039, 1,006 and 979 and biological samples from 435, 476 and 447 children aged 0-4 years (1-4 years for biological sample), 5-9years, and adolescents aged 10-19 years, respectively. In Telangana, survey and anthropometry data were collected by SIGMA Research and Consulting Pvt Ltd and Super Religare Laboratories (SRL) Ltd collected biological samples.

Telangana – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	28.5	30.1	15.7	38.2	29.3
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	10.1	7.3	4.6	11.5	8.7
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	19.7	16.0	17.8	18.0	17.9
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	5.9	5.3	5.1	5.9	5.6
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	31.9	29.7	19.7	38.0	30.8
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	9.1	5.5	5.2	8.7	7.3
	Children aged 6-59 months with MUAC <12.5cm (%)	5.7	4.7	3.4	6.5	5.2
	Children aged 6-59 months with MUAC <11.5cm (%)	0.5	1.3	0.2	1.4	0.9
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	16.3	10.0	9.4	15.7	13.2
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	4.0	1.8	2.0	3.5	2.9
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	2.8	4.8	3.7	3.8	3.8
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.9	1.6	1.0	1.4	1.3

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Telangana – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.1	0.2	0.1	0.1	0.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	4.5	3.1	3.5	4.1	3.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	0.6	1.2	1.2	0.6	0.9
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	3.6	1.6	3.1	2.3	2.7
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.2	0.0	0.3	0.0	0.1

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	15.6	15.3	13.5	16.6	15.5
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	2.7	2.3	1.9	2.8	2.5
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	31.4	24.2	22.9	31.1	28.1
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	9.9	5.1	6.4	8.5	7.7
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	5.5	4.2	11.0	1.5	4.9
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	1.9	0.9	3.1	0.5	1.4

[1]Below -2 standard deviations (SD), based on the WHO standards

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Telangana – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	33.2	23.4	23.8	30.9	28.6
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	35.4	21.8	22.6	32.6	29.1
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	34.2	22.7	23.3	31.6	28.8
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	14.3	9.0	10.2	12.6	11.8
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.2	2.6	7.0	4.9	5.6
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	11.7	6.2	8.7	9.4	9.1
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	5.3	5.8	9.9	3.4	5.5
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	4.8	7.0	11.0	3.0	5.8
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	5.1	6.3	10.4	3.3	5.7
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.5	2.8	4.1	1.2	2.1
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.6	1.9	2.9	0.3	1.2
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.1	2.4	3.6	0.8	1.7

[3]Based on WHO standards

Telangana – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	37.8 (32.8-43.1)	27.2 (22.2-32.9)	32.1 (28.1-36.5)
Prevalence of anaemia- males[4,5] (%)	39.3 (31.7-47.4)	26.9 (20.8-34.0)	18.5 (13.2-25.3)
Prevalence of anaemia- females[4,5] (%)	36.5 (29.2-44.4)	27.7 (21.7-34.7)	46.0 (38.5-53.7)
Prevalence of low serum ferritin[5,6] (%)	33.4 (26.2-41.4)	22.7 (18.6-27.4)	26.0 (21.4-31.3)
Prevalence of folate deficiency[5,7] (%)	46.8 (39.3-54.4)	45.8 (38.8-52.9)	63.7 (57.4-69.6)
Prevalence of vitamin B12 deficiency[5,8] (%)	12.4 (8.7-17.4)	13.2 (10.0-17.3)	29.1 (24.1-34.6)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	9.6 (6.1-14.9)	5.5 (3.6-8.3)	8.8 (5.6-13.5)
Prevalence of vitamin A deficiency[5,10] (%)	26.5 (19.6-34.9)	35.0 (27.6-43.2)	19.7 (14.7-25.8)
Prevalence of zinc deficiency[11] (%)	10.1 (6.7-14.8)	9.3 (6.5-13.0)	27.9 (22.4-34.2)
Median urinary Iodine concentration(µg/l)[5]	299	290	254

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Telangana – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	**0.8** (0.3-2.8)	**1.4** (0.6-3.5)
	Prevalence of high LDL cholesterol[13] (%)	**0.7** (0.2-2.8)	**1.7** (0.7-3.7)
	Prevalence of low HDL cholesterol[14] (%)	**16.2** (12.3-21.1)	**25.1** (20.4-31.1)
	Prevalence of high triglycerides[15]	**21.9** (17.7-26.8)	**12.4** (9.4-16.2)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	**8.0** (5.1-12.4)	**8.6** (5.3-13.7)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	**0.0** (0.0-0.0)	**1.1** (0.3-3.5)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	**15.4** (11.5-20.3)	**15.2** (11.6-19.7)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	**0.1** (0.0-1.0)	**0.0** (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	**23.6** (16.4-32.7)	**24.3** (16.7-33.8)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

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Comprehensive National Nutrition Survey

Tripura

Preliminary Factsheet

2017-18

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Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

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CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Tripura, where the CNNS was conducted from October 21, 2017 through May 4, 2018 and gathered household and anthropometry data from 1,133, 1,086 and 1,063 and biological samples from 505, 420 and 396 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Tripura, survey and anthropometry data were collected by Gfk Mode Pvt. Ltd. and Super Religare Laboratories (SRL) Ltd collected biological samples.

Tripura – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	32.5	31.4	24.2	34.8	31.9
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	14.4	12.3	10.8	14.3	13.4
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	14.0	11.6	12.8	12.8	12.8
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	6.2	4.4	5.3	5.2	5.3
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	22.7	24.8	15.3	26.9	23.8
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	7.9	7.1	3.7	8.9	7.5
	Children aged 6-59 months with MUAC <12.5cm (%)	3.1	2.4	1.4	3.2	2.8
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	0.5	0.4	0.2	0.2
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	8.8	5.8	5.1	8.0	7.2
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.3	1.0	1.6	1.0	1.1
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	13.4	10.8	14.4	11.2	12.1
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	3.3	3.6	5.1	2.9	3.5
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	5.8	3.9	4.3	5.0	4.8

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Tripura – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	2.3	1.9	1.9	2.2	2.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	9.1	5.8	6.6	7.7	7.4
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	3.9	2.1	1.3	3.6	3.0
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	8.8	5.9	9.2	6.7	7.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	1.7	2.3	3.1	1.6	2.0

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	29.6	26.1	24.6	29.1	27.9
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	11.8	6.3	6.9	10.0	9.1
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	24.4	14.6	14.8	21.4	19.6
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	7.1	4.5	4.1	6.4	5.8
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	13.5	9.5	20.1	8.3	11.6
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	6.8	2.2	9.6	2.6	4.5

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Tripura – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	22.6	18.2	16.3	22.2	20.5
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	12.8	10.5	12.4	11.3	11.7
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	18.1	14.5	14.4	17.1	16.3
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.8	6.4	3.5	7.0	6.1
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.2	2.2	2.8	3.4	3.2
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	5.1	4.3	3.2	5.3	4.7
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	11.6	10.8	21.0	7.5	11.2
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	7.6	6.1	10.8	5.2	6.9
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.8	8.5	16.0	6.5	9.2
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.8	2.4	5.7	2.1	3.1
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.5	0.5	1.5	0.1	0.5
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.3	1.5	3.6	1.2	1.9

[3]Based on WHO standards

Tripura – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	33.0 (25.9- 41.0)	41.1 (33.4- 49.2)	41.4 (33.6- 49.7)
Prevalence of anaemia- males[4,5] (%)	34.6 (24.9- 45.7)	39.9 (30.7- 49.9)	29.3 (21.9- 37.9)
Prevalence of anaemia-females[4,5] (%)	31.3 (22.2- 42.2)	42.4 (32.2- 53.3)	54.5 (44.2- 64.5)
Prevalence of low serum ferritin[5,6] (%)	16.1 (10.2-24.6)	8.7 (4.8-15.1)	11.8 (7.5-18.0)
Prevalence of folate deficiency[5,7] (%)	1.0 (0.1-7.0)	1.4 (0.6-3.3)	3.8 (1.7-8.6)
Prevalence of vitamin B12 deficiency[5,8] (%)	6.0 (2.8-12.3)	2.9 (1.1-7.2)	9.7 (6.1-15.0)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	15.3 (8.9-25.1)	14.7 (9.8-21.5)	28.8 (21.1-37.9)
Prevalence of vitamin A deficiency[5,10] (%)	20.8 (15.9-26.8)	26.1 (20.7-32.5)	19.2 (13.1-27.2)
Prevalence of zinc deficiency[11] (%)	17.1 (11.6-24.5)	18.7 (12.7-26.8)	39.3 (31.6-47.6)
Median urinary Iodine concentration(µg/l)[7]	218	150	149

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Tripura – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	3.4 (1.5-7.8)	6.7 (3.3-13.1)
	Prevalence of high LDL cholesterol[13] (%)	3.4 (1.5-7.6)	5.6 (2.6-11.4)
	Prevalence of low HDL cholesterol[14] (%)	21.4 (16.9-26.8)	22.1 (16.3-29.1)
	Prevalence of high triglycerides[15]	46.4 (39.0-53.9)	28.9 (23.6-34.8)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	21.1 (16.2-27.2)	16.5 (11.8-22.5)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	4.3 (2.4-7.5)	4.9 (1.7-13.6)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	11.0 (6.9-17.2)	12.3 (7.7-19.1)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	2.2 (0.9-5.3)	1.4 (0.6-3.3)
	Prevalence of high serum creatinine[19,20] (%)	7.8 (4.0-14.8)	9.0 (4.9-16.1)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

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CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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Ministry of Health and Family Welfare
Government of India

POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Uttarakhand

Preliminary Factsheet

2017-2018

CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Uttarakhand where the CNNS was conducted from September 21, 2017 through February 28, 2018 and gathered household and anthropometry data from 1,134, 1,154 and 1,077 and biological samples from 579, 587 and 519 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Uttarakhand, survey and anthropometry data were collected by KANTAR Public and Super Religare Laboratories (SRL) Ltd collected biological samples.

Uttarakhand – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	30.4	29.4	23.3	32.4	29.9
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	9.9	9.7	7.8	10.5	9.8
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	5.1	6.7	5.4	6.1	5.9
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	0.8	2.0	1.6	1.4	1.4
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	16.9	20.6	15.3	20.0	18.7
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	3.0	3.8	1.9	4.0	3.4
	Children aged 6-59 months with MUAC <12.5cm (%)	0.0	1.6	0.4	0.9	0.8
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	0.1	0.3	0.0	0.1
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	2.4	3.3	4.1	2.3	2.8
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	0.0	0.3	0.3	0.1	0.1
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	5.2	4.9	4.2	5.3	5.0
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	2.6	0.8	0.3	2.2	1.7
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	3.8	4.1	5.1	3.5	4.0

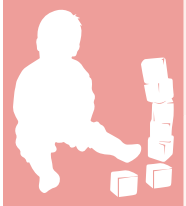
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Uttarakhand – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.3	0.3	0.7	0.1	0.3
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	5.4	7.7	6.0	6.8	6.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	2.1	1.3	0.2	2.2	1.7
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	4.5	4.8	8.1	3.3	4.7
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.6	0.5	1.0	0.4	0.6



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	22.4	18.3	16.5	21.9	20.4
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	4.1	4.1	3.8	4.2	4.1
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	16.1	12.2	12.5	14.8	14.2
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	4.7	2.6	1.8	4.4	3.7
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	6.8	5.4	10.1	4.5	6.1
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	2.3	1.5	3.0	1.5	1.9

[1]Below -2 standard deviations (SD), based on the WHO standards

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Uttarakhand – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	21.9	18.1	14.2	22.1	20.1
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	10.2	8.1	10.2	8.8	9.1
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	16.9	13.6	12.5	16.2	15.3
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	3.5	3.2	2.1	3.8	3.4
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	1.2	0.4	0.8	0.8	0.8
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	2.5	1.9	1.6	2.5	2.2
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	6.2	6.0	14.9	3.0	6.1
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	3.6	4.4	12.5	1.3	4.0
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	5.1	5.2	13.9	2.2	5.2
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.4	1.2	5.0	0.0	1.3
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.8	0.6	2.2	0.2	0.7
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	1.2	0.9	3.8	0.1	1.0

[3]Based on WHO standards

Uttarakhand – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	32.5 (24.4-41.8)	8.4 (5.5-12.5)	15.7 (11.4-21.2)
Prevalence of anaemia- males[4,5] (%)	32.0 (22.9-42.8)	7.3 (4.0-13.0)	11.7 (6.7-19.7)
Prevalence of anaemia-females[4,5] (%)	33.0 (23.7-43.8)	9.5 (5.1-16.9)	20.2 (13.4-29.3)
Prevalence of low serum ferritin[5,6] (%)	50.9 (42.0-59.7)	18.4 (13.3-24.8)	19.6 (13.8-27.0)
Prevalence of folate deficiency[5,7] (%)	17.7 (6.1-41.3)	17.3 (9.2-30.3)	19.5 (10.5-33.3)
Prevalence of vitamin B12 deficiency[5,8] (%)	19.1 (8.2-38.3)	14.2 (9.4-20.9)	27.4 (19.7-36.8)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	46.7 (30.5-63.5)	62.0 (49-73.5)	62.9 (47.9-75.7)
Prevalence of vitamin A deficiency[5,10] (%)	14.3 (8.0-24.4)	23.1 (14.2-35.4)	16.4 (10.1-25.4)
Prevalence of zinc deficiency[11] (%)	22.5 (14.5-33.3)	21.6 (15.9-28.7)	29.2 (21.9-37.7)
Median urinary Iodine concentration(µg/l)[5]	166	183	199

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

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[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Uttarakhand – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	**3.5** (1.7-6.9)	**1.7** (0.8-3.2)
	Prevalence of high LDL cholesterol[13] (%)	**1.7** (0.8-3.6)	**3.2** (1.9-5.4)
	Prevalence of low HDL cholesterol[14] (%)	**15.5** (11.5-20.7)	**21.5** (16.5-27.5)
	Prevalence of high triglycerides[15]	**35.1** (27.5-43.5)	**19.6** (14-2-26.4)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	**12.8** (8.8-18.1)	**12.3** (8.1-18.2)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	**1.7** (0.4-6.9)	**0.3** (0.0-1.9)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	**8.6** (5.7-12.6)	**6.7** (4.4-10.3)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	**0.0** (0.0-0.0)	**0.0** (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	**0.7** (0.2-2.4)	**0.1** (0-0.8)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

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Ministry of Health and Family Welfare
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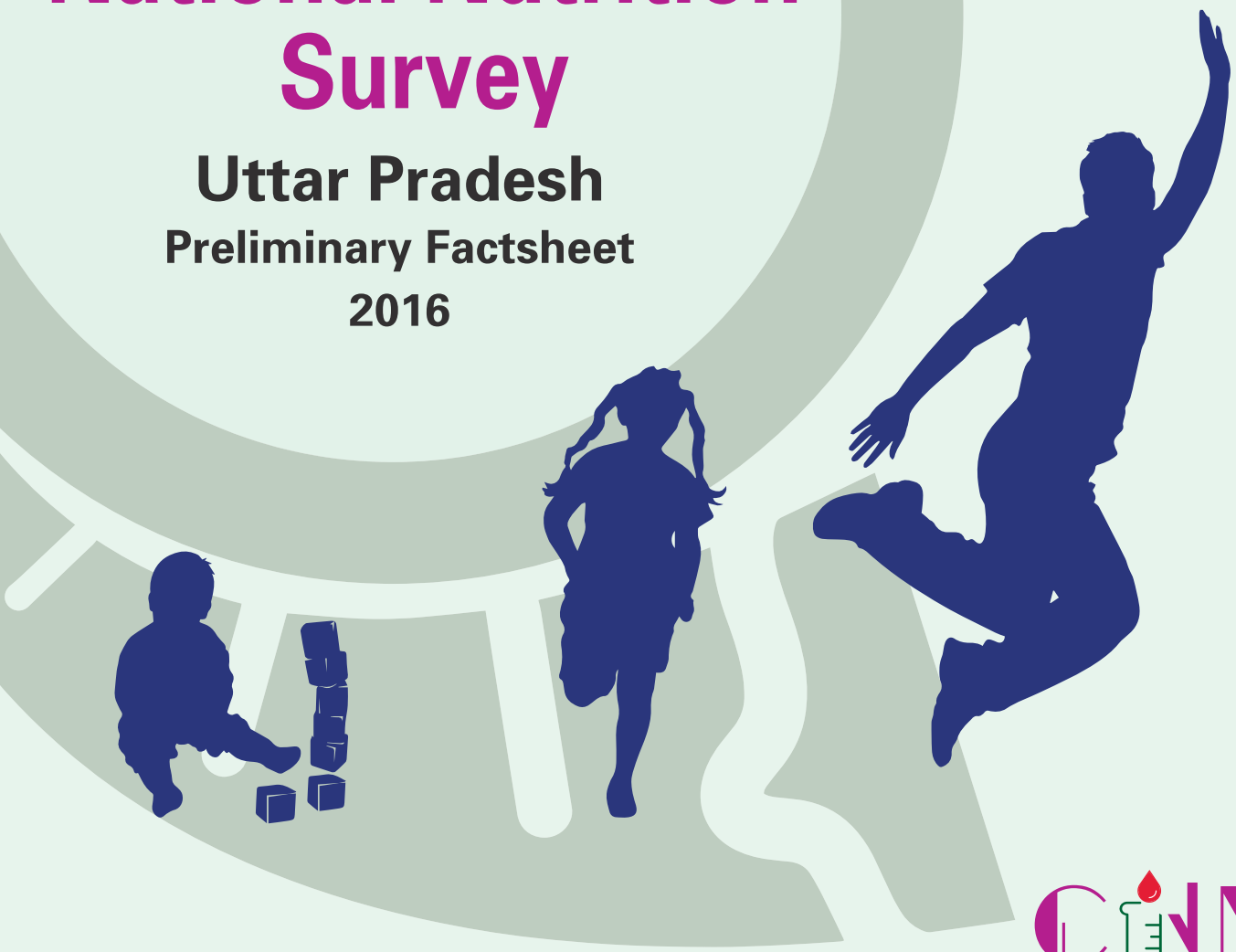
POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सही पोषण – देश रोशन

Comprehensive National Nutrition Survey

Uttar Pradesh

Preliminary Factsheet

2016



CNNS
Birth to Adolescence

About the CNNS

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering 112,316 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative data for nutritional status and micronutrient deficiencies among children and adolescents from birth to 19 years and estimates of biomarkers for non-communicable diseases (NCDs) among those aged 5-19 years.

CNNS captures data across three age groups – children under 5, children aged 5–9 years and adolescents aged 10–19 years.

Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

Several national and international organizations provided technical and quality assurance support. The Population Council has served as the lead agency to implement the survey. The Centre for Disease Control (CDC) in Atlanta, USA, the All India Institute of Medical Sciences (AIIMS), New Delhi, the National Institute of Nutrition (NIN), Hyderabad, and Clinical Development Services Agency (CDSA), New Delhi provided quality assurance support for the biomarker component. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Kalawati Saran Children's Hospital, New Delhi, provided concurrent monitoring support for the household survey and anthropometric measurements.

CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of Uttar Pradesh where the CNNS was conducted from April 6 through September 27, 2016 and gathered household and anthropometry data from 1,965, 1,996 and 1,799 and biological samples from 558, 698 and 581 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In Uttar Pradesh, survey and anthropometry data were collected by KANTAR Public and Super Religare Laboratories (SRL) Ltd collected biological samples.

Uttar Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	38.5	39.2	31.8	40.1	38.8
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	13.7	17.3	11.2	16.2	15.4
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	19.2	17.7	17.9	18.6	18.5
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	4.9	4.5	4.8	4.7	4.7
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	34.3	39.5	29.7	38.1	36.8
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	12.1	12.6	7.4	13.2	12.4
	Children aged 6-59 months with MUAC <12.5cm (%)	5.2	8.3	5.2	7.0	6.7
	Children aged 6-59 months with MUAC <11.5cm (%)	0.5	1.4	0.9	1.0	0.9
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	12.5	12.8	9.2	13.3	12.7
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.7	1.4	1.3	1.6	1.5
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	14.0	13.8	15.8	13.6	13.9
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	3.0	3.6	2.0	3.5	3.3
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	0.7	0.3	0.5	0.5	0.5

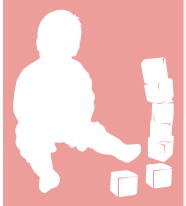
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Uttar Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.1	0.0	0.0	0.1	0.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	10.3	10.1	7.9	10.6	10.2
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	2.7	1.5	0.8	2.3	2.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	0.5	1.0	0.9	0.7	0.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.2	0.1	0.2	0.2	0.2



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	21.4	20.9	16.2	22.2	21.2
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	6.3	4.8	3.2	6.1	5.6
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	28.1	23.7	21.6	26.8	25.9
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.5	3.1	5.9	4.6	4.8
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	2.3	0.8	4.7	0.9	1.6
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	0.7	0.2	2.0	0.1	0.5

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

Uttar Pradesh – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	32.1	22.6	21.5	28.4	27.4
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	23.6	10.8	12.9	17.2	16.4
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	28.6	17.0	17.4	23.5	22.5
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	10.0	4.7	6.6	7.5	7.3
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.6	1.7	3.5	3.9	3.9
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.6	3.3	5.1	5.9	5.8
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	0.8	3.1	5.5	1.3	2.0
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	1.8	2.7	7.8	1.2	2.3
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	1.2	3.0	6.6	1.3	2.1
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.4	1.3	1.0	0.8	0.8
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.0	0.0	0.0	0.0	0.0
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	0.2	0.7	0.5	0.4	0.4

[3]Based on WHO standards

Uttar Pradesh – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	43.1 (36.4-50.0)	21.9 (16.6-28.2)	31.6 (27.3-36.4)
Prevalence of anaemia- males[4,5] (%)	41.4 (31.9-51.7)	20.8 (14.4-28.9)	17.3 (12.5-23.5)
Prevalence of anaemia- females[4,5] (%)	44.8 (34.6-55.4)	22.9 (15.4-32.8)	44.8 (36.6-53.4)
Prevalence of low serum ferritin[5,6] (%)	24.6 (17.6-33.3)	9.0 (6.4-12.5)	17.2 (12.4-23.3)
Prevalence of folate deficiency[5,7] (%)	6.2 (3.3-11.6)	4.5 (2.5-7.7)	5.2 (3.1-8.5)
Prevalence of vitamin B12 deficiency[5,8] (%)	23.5 (15.3-34.1)	31.2 (25.1-38.0)	42.1 (34.8-49.8)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	12.6 (7.2-21.1)	12.3 (8.2-17.9)	19.4 (14.5-25.4)
Prevalence of vitamin A deficiency[5,10] (%)	16.9 (11.2-24.7)	28.7 (21.3-37.4)	18.8 (12.7-26.9)
Prevalence of zinc deficiency[11] (%)	22.7 (14.6-33.6)	18.3 (13.4-24.6)	26.3 (19.7-34.2)
Median urinary Iodine concentration(µg/l)[5]	205	158	148

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

Uttar Pradesh – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	0.9 (0.4-1.9)	1.3 (0.5-3.8)
	Prevalence of high LDL cholesterol[13] (%)	1.4 (0.7-2.6)	1.5 (0.6-3.9)
	Prevalence of low zHDL cholesterol[14] (%)	43.3 (37.3-49.5)	39.9 (33.5-46.6)
	Prevalence of high triglycerides[15]	37.1 (31.1-43.6)	16.1 (12.0-21.3)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	4.2 (2.3-7.5)	3.2 (1.5-6.7)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	1.1 (0.2-5.4)	0.0 (0.0-0.0)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	5.1 (2.9-8.8)	4.5 (2.8-7.0)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
	Prevalence of high serum creatinine[19,20] (%)	7.4 (4.9-11.0)	8.1 (5.1-12.6)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

The survey was conducted with generous financial support from Aditya and Megha Mittal.

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Comprehensive National Nutrition Survey

West Bengal

Preliminary Factsheet

2018

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Birth to Adolescence

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Methodology: The CNNS adopted a multi-stage, stratified, probability proportion to size cluster sampling design. Survey questions were administered at both the household and respondent levels. The household questionnaire captured information on the usual residents and visitors who stayed in the house the previous night, socio-economic characteristics and water and sanitation facilities in the households. Through the individual questionnaire data were collected on the respondent's background characteristics, hygiene practices, infant and young child feeding practices (IYCF), dietary diversity, morbidity status, and cognitive development of children. Computer Assisted Personal Interview (CAPI) tools were used to collect survey data.

CNNS provides for the first time biomarkers of micronutrient deficiencies and non-communicable diseases across 30 states of India.

Indicators: Several anthropometric measurements were collected from survey participants including measurements of height, weight, Mid-Upper Arm Circumference (MUAC) and Triceps Skinfold Thickness (from participants aged 0-19 years), Subscapular Skinfold Thickness (from participants aged 1-19 years) and waist circumference and handgrip strength (from participants aged 5-19 years). In order to estimate prevalence of micronutrient deficiencies, and NCDs among survey participants, biological samples were collected from about half of the survey participants aged 1-19 years. A robust quality assurance and monitoring mechanism was established to ensure data quality during fieldwork.

CNNS collected detailed anthropometric measurements from over 110,000 children and adolescents and biological samples (blood, urine and stool) from over 50,000 children and adolescents.

Stakeholders: Under the overall leadership and guidance of the Ministry of Health and Family Welfare (MoHFW) and Technical Advisory Committee (TAC) designated by the MoHFW and in collaboration with the United Nations Children's Fund (UNICEF), the CNNS was implemented by multiple partners. Aditya and Megha Mittal provided financial support for the survey.

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CNNS measured new anthropometric indicators such as MUAC, triceps & subscapular skinfold thickness to provide an additional insight into the nutritional status of children in India.

Data: This fact sheet provides information on key indicators for the state of West Bengal where the CNNS was conducted from June 1 through October 24, 2018 and gathered household and anthropometry data from 1,777, 1,806 and 1,473 and biological samples from 1047, 929 and 756 children aged 0-4 years (1-4 years for biological sample), 5-9 years, and adolescents aged 10-19 years, respectively. In West Bengal, survey and anthropometry data were collected by KANTAR Public and Super Religare Laboratories (SRL) Ltd collected biological samples.

West Bengal – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years who are stunted (height-for-age)[1] (%)	23.6	27.1	19.4	26.6	25.3
	Children under age 5 years who are severely stunted (height-for-age)[2] (%)	6.5	8.1	6.3	7.4	7.2
	Children under age 5 years who are wasted (weight-for-height)[1] (%)	21.3	18.9	19.7	20.2	20.1
	Children under age 5 years who are severely wasted (weight-for-height)[2] (%)	4.9	3.7	5.1	4.2	4.3
	Children under age 5 years who are underweight (weight-for-age)[1] (%)	29.0	33.0	24.4	32.4	30.9
	Children under age 5 years who are severely underweight (weight-for-age)[2] (%)	7.7	6.9	6.9	7.4	7.3
	Children aged 6-59 months with MUAC <12.5cm (%)	0.6	3.5	1.5	2.2	2.0
	Children aged 6-59 months with MUAC <11.5cm (%)	0.0	0.0	0.1	0.0	0.0
	Children aged 6-59 months with MUAC-for-age <-2 SD[3] (%)	6.5	5.9	6.0	6.3	6.2
	Children aged 6-59 months with MUAC-for-age <-3 SD[3] (%)	1.0	0.7	0.4	0.9	0.8
	Children under age 5 years with triceps skinfold thickness-for-age <-2 SD[3] (%)	6.1	7.8	7.4	6.8	6.9
	Children under age 5 years with triceps skinfold thickness-for-age <-3 SD[3] (%)	1.6	1.6	1.8	1.5	1.6
	Children under age 5 years with triceps skinfold thickness-for-age >+2 SD[3] (%)	1.0	0.8	2.2	0.6	0.9

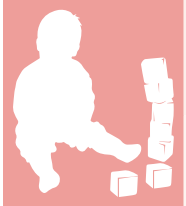
[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

West Bengal – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN UNDER AGE 5 YEARS	Children under age 5 years with triceps skinfold thickness-for-age >+3 SD[3] (%)	0.1	0.1	0.8	0.0	0.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-2 SD[3] (%)	5.3	4.3	4.8	4.8	4.8
	Children aged 1-4 years with subscapular skinfold thickness-for-age <-3 SD[3] (%)	1.3	1.0	0.4	1.3	1.1
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+2 SD[3] (%)	1.8	1.4	4.9	0.9	1.6
	Children aged 1-4 years with subscapular skinfold thickness-for-age >+3 SD[3] (%)	0.6	0.4	0.9	0.4	0.5



Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
CHILDREN AGED 5-9 YEARS	Children aged 5-9 years who are stunted (height-for- age)[1] (%)	14.3	23.2	12.5	20.5	19.0
	Children aged 5-9 years who are severely stunted (height-for-age)[2] (%)	3.5	4.7	2.4	4.6	4.2
	Children aged 5-9 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	28.4	28.2	18.6	30.6	28.3
	Children aged 5-9 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	8.8	5.9	3.6	8.1	7.3
	Children aged 5-9 years who are overweight or obese (BMI for age) z-score >+1 standard deviations[3] (%)	6.0	3.0	12.8	2.4	4.4
	Children aged 5-9 years who are obese (BMI for age) z-score >+2 SD[3] (%)	2.6	1.0	6.0	0.8	1.8

[1]Below -2 standard deviations (SD), based on the WHO standards

[2]Below -3 standard deviations, based on the WHO standards

[3]Based on WHO standards

West Bengal – Key Anthropometric Indicators

Anthropometric profile		Sex		Residence		
		Male	Female	Urban	Rural	Total
ADOLESCENTS AGED 10-19 YEARS	Adolescents aged 10-14 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	35.2	27.3	23.6	33.2	31.3
	Adolescents aged 15-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	24.9	11.9	13.6	19.3	18.2
	Adolescents aged 10-19 years who are moderate or severely thin (BMI for age) z-score <-2 SD[3] (%)	30.7	20.3	19.3	27.0	25.5
	Adolescents aged 10-14 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	10.9	7.6	6.6	9.9	9.3
	Adolescents aged 15-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	6.7	2.6	4.3	4.7	4.6
	Adolescents aged 10-19 years who are severely thin (BMI for age) z-score <-3 SD[3] (%)	9.1	5.3	5.6	7.6	7.2
	Adolescents aged 10-14 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.1	8.0	15.9	6.8	8.6
	Adolescents aged 15-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.2	3.6	14.2	4.5	6.3
	Adolescents aged 10-19 years who are overweight or obese (BMI for age) z-score > +1 SD[3] (%)	9.2	6.0	15.2	5.8	7.6
	Adolescents aged 10-14 years who are obese (BMI for age) z-score > +2 SD[3] (%)	3.0	1.7	3.5	2.0	2.3
	Adolescents aged 15-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.2	0.6	4.0	0.8	1.4
	Adolescents aged 10-19 years who are obese (BMI for age) z-score > +2 SD[3] (%)	2.6	1.2	3.7	1.5	1.9

[3]Based on WHO standards

West Bengal – Key Indicators of Micronutrient Deficiencies

INDICATORS	CHILDREN AGED 1-4 YEARS Total (95% Confidence Interval)	CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
Prevalence of anaemia[4,5] (%)	45.7 (39.8-51.8)	34.2 (29.2-39.6)	45.5 (38.3-53.0)
Prevalence of anaemia- males[4,5] (%)	49.2 (39.8-58.5)	34.3 (27.1-42.3)	29.6 (21.9-38.7)
Prevalence of anaemia- females[4,5] (%)	41.8 (34.5-49.4)	34.1 (28.0-40.7)	62.0 (53.1-70.1)
Prevalence of low serum ferritin[5,6] (%)	21.1 (16.7-26.3)	5.4 (3.7-7.9)	16.9 (12.5-22.3)
Prevalence of folate deficiency[5,7](%)	0.3 (0.1-1.1)	0.3 (0.1-0.9)	0.0 (0.0-0.2)
Prevalence of vitamin B12 deficiency[5,8] (%)	1.9 (0.4-8.7)	3.7 (1.8-7.2)	3.7 (2.2-6.1)
Prevalence of serum 25-hydroxy vitamin D <12ng/ml[9] (%)	7.0 (4.5-10.8)	10.2 (7.1-14.4)	19.5 (14.3-26.0)
Prevalence of vitamin A deficiency[5,10] (%)	5.0 (3.2-7.8)	3.9 (2.3-6.6)	4.9 (2.5-9.5)
Prevalence of zinc deficiency[11] (%)	15.2 (11.1-20.6)	14.4 (10.8-18.9)	26.6 (20.7-33.5)
Median urinary Iodine concentration(µg/l)[5]	239	238	150

[4]CNNS estimated anaemia using the gold standard method, i.e., haemoglobin concentration in venous whole blood sample analysed by cyanmethaemoglobin method in the laboratory using automated haematology counter. These estimates cannot be directly compared with other large scale surveys in India that estimate anaemia from capillary blood using Hemo Cueanalyser.

[5]WHO standard cut-off

[6]For children aged 12-59 months: serum ferritin <12 µg/l; for children/adolescents aged ≥5 years: serum ferritin <15 µg/l; all cases with C-reactive protein> 5 mg/L were excluded

[7]Erythrocyte folate < 151 ng/ml

[8]Serum vitamin B12 < 203 pg/ml

[9]Vitamin D deficiency; Institute of Medicine (IOM) standard cut-off

[10]Serum retinol < 20 µg/dl; all cases with C-reactive protein> 5 mg/L were excluded

[11]For children aged 1-9 years: serum zinc < 65 µg/dl; for adolescent girls: serum zinc <70 µg/dl if fasting, < 66 µg/dlif non-fasting; for adolescent boys: serum zinc <74 µg/dl if fasting, <70 µg/dl if non-fasting; International Zinc Nutrition Consultative Group cut-off

West Bengal – Key Indicators of Non-Communicable Disease Risks

		CHILDREN AGED 5-9 YEARS Total (95% Confidence Interval)	ADOLESCENTS AGED 10-19 YEARS Total (95% Confidence Interval)
INDICATORS	Prevalence of high total cholesterol[12] (%)	24.1 (16.4-33.8)	20.0 (13.6-28.5)
	Prevalence of high LDL cholesterol[13] (%)	13.1 (7.8-21.1)	12.3 (7.3-20.2)
	Prevalence of low HDL cholesterol[14] (%)	9.0 (6.7-12.1)	11.7 (8.5-16.0)
	Prevalence of high triglycerides[15]	67.1 (61.5-72.2)	42.5 (34.3-51.2)
	Prevalence of high fasting plasma glucose[16,17] (indicative of prediabetes) (%)	21.7 (17.0-27.2)	22.1 (17.3-27.7)
	Prevalence of very high fasting plasma glucose,[17,18] (indicative of diabetes) (%)	1.0 (0.5-2.1)	0.6 (0.2-1.5)
	Prevalence of glycosylated haemoglobin concentration 5.7-6.4%[17] (indicative of prediabetes)	5.7 (3.6-8.7)	6.3 (4.0-10.0)
	Prevalence of glycosylated haemoglobin concentration ≥ 6.5%[17] (indicative of diabetes)	0.0 (0.0-0.0)	0.0 (0.0-0.3)
	Prevalence of high serum creatinine[19,20] (%)	24.8 (17.8-33.5)	22.8 (15.0-33.2)

[12]Total cholesterol ≥ 200 mg/dl; Cut-offs taken from National Cholesterol Education Program

[13]LDL ≥ 130 mg/dl; Cut-offs taken from National Cholesterol Education Program

[14]HDL < 40 mg/dl; Cut-offs taken from National Cholesterol Education Program

[15]For children aged 5-9 years: serum triglycerides > 100 mg/dl; and for adolescents aged 10-19 years: serum triglycerides > 130 mg/dl; cut-offs taken from National Cholesterol Education Program.

[16]Plasma glucose > 100 mg/dl &<126 mg/dl, indicative of prediabetes

[17]Cut-off taken from Global International Diabetes Federation

[18]Plasma glucose ≥ 126 mg/dl, indicative of diabetes

[19]For children aged 5-12 years: serum creatinine > 0.7 mg/dl; for adolescents aged > 12 years: serum creatinine > 1.0 mg/dl

[20]High serum creatinine was found clustered in few districts. Such clustering has also been reported in public health literature.

NOTES

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children, and adolescents in rural and urban areas across 30 states of India.

CNNS
Birth to Adolescence

The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

See CNNS results online: **www.NutritionINDIA.info**

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