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

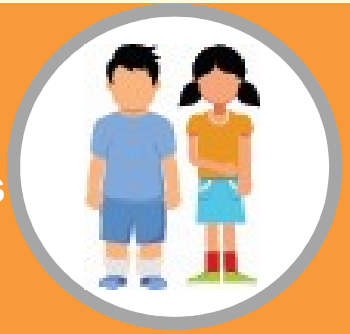
2016 - 2018

Andhra Pradesh
State Presentation

CNNS
Birth to Adolescence

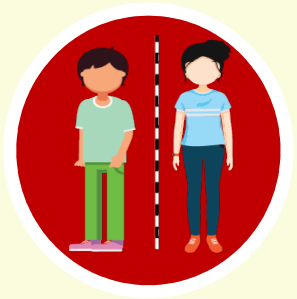
Largest Micronutrient Survey ever conducted: CNNS 2016-18

112,316
Children and adolescents interviewed



51,029
Blood, stool and urine samples collected

2500
Survey personnel in 30 states



360
Anthropometric measurers

30
Microscopists

100
Data Quality assurance monitors

200
Trainers and coordinators

200
Lab technicians

900
Interviewers

360
Phlebotomists

Justification and Objectives

- To assess the prevalence of malnutrition in both children and adolescents with special focus on assessment of micronutrient deficiencies through biochemical measures.
- To identify determinants and associations of various risk factors for anaemia in both children and adolescents.
- To assess biomarkers for hypertension, diabetes, cholesterol and kidney function and their associations with various risk factors for Non-Communicable Diseases (NCDs).

Malnutrition is responsible for 68% of total under five mortality in India*

CINNS Birth to Adolescence

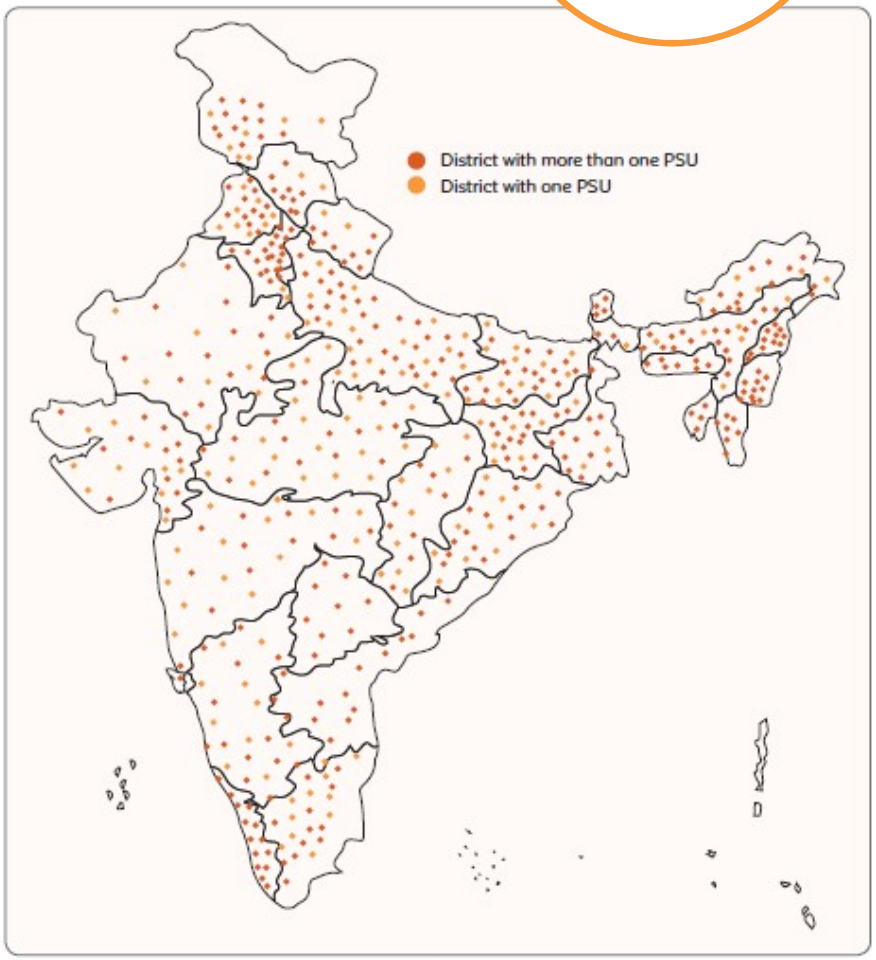
*Soumya Swaminathan, et al. (2019), The burden of child and maternal malnutrition and trends in its indicators in the states of India: the Global Burden of Disease Study 1990–2017. https://doi.org/10.1016/S2352-4642(19)30273-1

Survey Design

CNNS is a cross-sectional, household survey using a multi-stage sampling design.

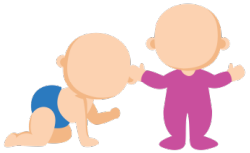
CNNS covered **2035 Primary Sampling Units (PSUs)** from more than **82%** of all districts from the Census 2011 (516 out of 628 districts) across 30 states:

- 160 Districts- one PSU
- 356 Districts- two or more PSUs



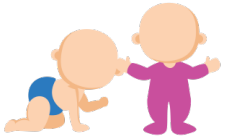
CNNS
Birth to Adolescence

Anthropometry data

	Pre-school children (0-4 years)	School-age children (5-9 years)	Adolescents (10-19 years)
			
Anthropometric measurements	• Height • Weight • Mid-upper arm circumference (MUAC) • Triceps skinfold • Subscapular skinfold (1-19 years)		
		• Waist circumference	

CINS
Birth to Adolescence

Biochemical indicators - micronutrient deficiencies and NCDs

Indicator Group			
Anaemia and haemoglobinopathies	• Haemoglobin • Variant haemoglobins		
Inflammatory biomarkers	• C-reactive protein		
Protein	• Serum protein and albumin		
Micronutrients	• Iron: Serum ferritin, serum transferrin receptor • Vitamin A: Serum retinol • Zinc: Serum zinc • B-vitamins: Erythrocyte folate, serum B12 • Vitamin D: Serum 25 (OH) D • Urinary Iodine		
Non-communicable diseases		• Blood Pressure • Blood glucose, HbA1c • Lipid profile: Serum cholesterol, LDL, HDL, and triglycerides • Renal function: Serum creatinine, urinary protein creatinine ratio	

Monitoring and Supervision

Three-tiers of Data Quality Assurance

Third Level

- Field work/protocol/training monitoring: by quality control team
- Biological sample quality control : by AIIMS, NIN and US CDC

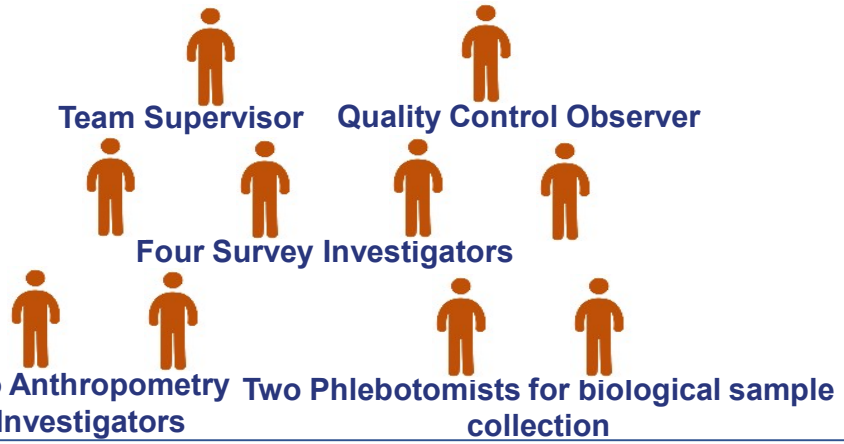
Second Level

- 3-member Data Quality Assurance (DQA) team for re-interviews & observations
- Concurrent monitoring of biological sample collection, storage and transportation by CDSA

First Level

- Internal monitoring by the Quality Control Observer
- Daily supervision of the field work by Team Supervisor

Team Composition for data collection



CINNS Birth to Adolescence

Quality Assurance Measures for Data Quality

Evaluation of Interviewers
prior to employment

Survey team
- Written and oral test
- Mock interview
- Ethics test

Anthropometry team
- Standardisation
- Selection based of demonstrated capacity measured by technical error of measurements (TEM)

Quality Assurance Measures

	DQA team conducted consistency checks, and provided feedback on real time basis
	No more than 4 interviews allowed in a day by an interviewer
	Daily SMS based monitoring/ alerts system for biological sample (from PSUs, collection points and reference labs).
	Sample transportation in thermal insulation bags maintaining temperature at 2-8° Celsius for up to 16 hours
	Time and temperature monitoring of samples by digital data loggers

CINS
Birth to Adolescence

Agencies engaged in the implementation of CNNS

Survey Implementation by MoHFW, Government of India and supported by UNICEF

Technical support: US Centre for Disease Control and UNICEF	Regular review and technical guidance: Technical advisory group constituted by MoHFW
Quality assurance and external monitoring: AIIMS, PGIMER, NIN, KSCH and CDSA	Overall field coordination, training, quality monitoring, data management and analysis: Population Council
Biological sample collection, transportation & analysis: SRL Limited	Survey and anthropometric data collection: IIHMR, Kantar Public, Gfk Mode and Sigma Consulting

Sample size in Andhra Pradesh

CNNS covered 60 PSUs for data collection in Andhra Pradesh

Achieved following sample size by age groups:

	0-4 years	5-9 years	10-19 years	Total
Household and anthropometry data	1,173	1,218	1,126	**3,517**
Biological sample	443	636	561	**1,640**

CNNS
Birth to Adolescence

Period of data collection in Andhra Pradesh

CNNS data collection period: August 22, 2016 to December 1, 2016

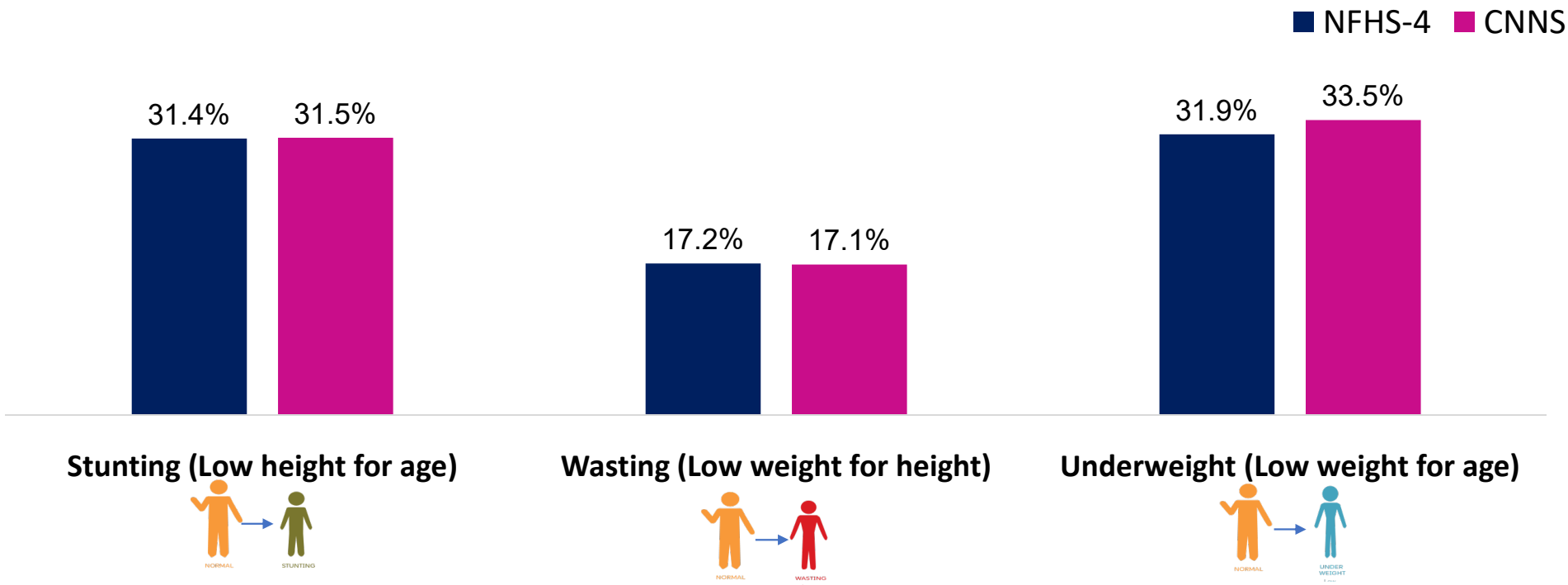
- CNNS collected data during the monsoon season through winter season of 2016
- NFHS collected data during the summer through monsoon season of 2015.

Survey	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CNNS 2016								August to December, 2016				
NFHS 4 2015					May to August, 2015							

CNNS
Birth to Adolescence

Andhra Pradesh key findings: Anthropometry (1/2)

No change in stunting, wasting and underweight in children under 5 years



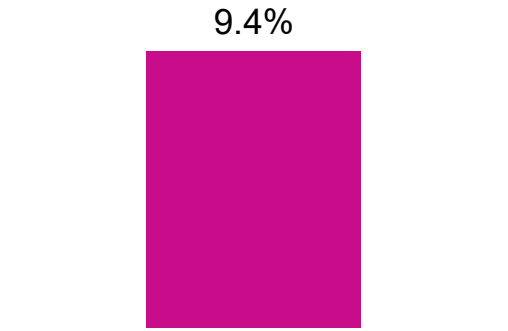
CNNS
Birth to Adolescence

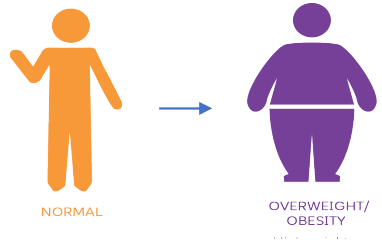
Andhra Pradesh key findings: Anthropometry (2/2)

1/5 adolescents aged 10-19 years was thin for their age (BMI-Age <-2SD)

1/5 children aged 5-9 years was stunted. The school age period does not provide an opportunity for catch up growth in height.

9% of adolescents aged 10-19 years were overweight or obese.



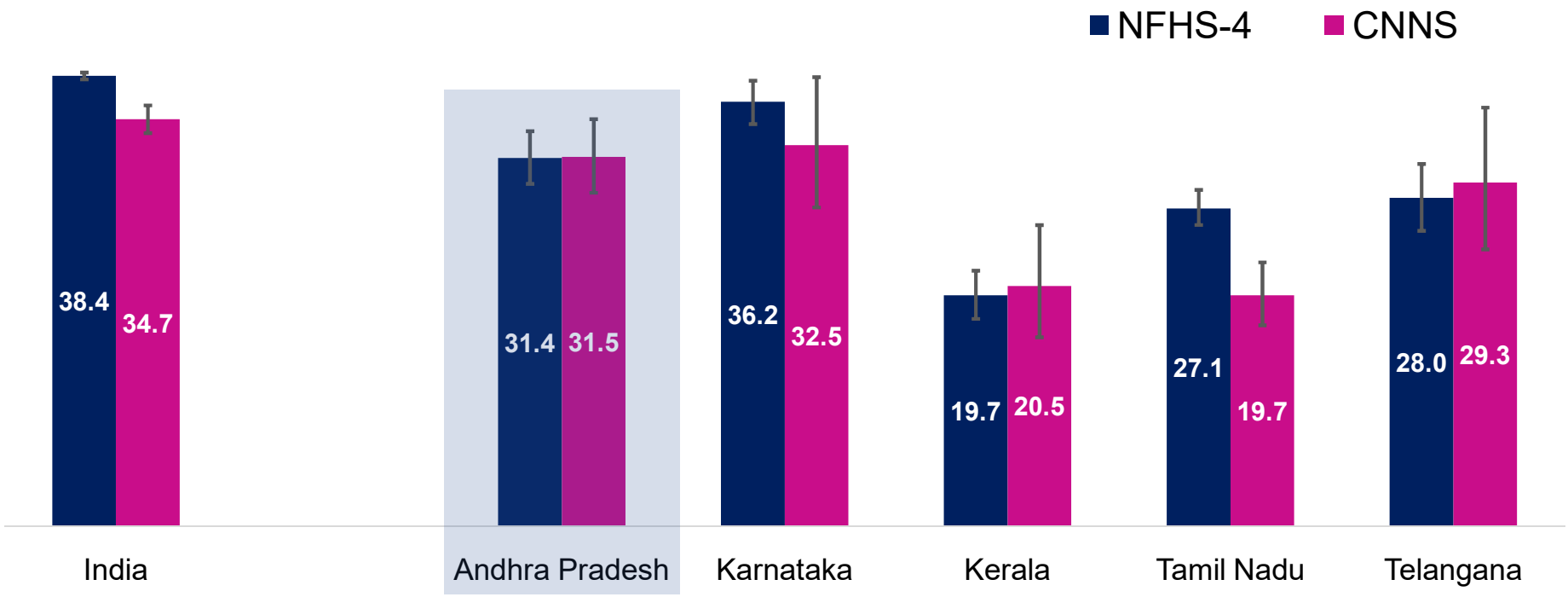


Birth to Adolescence

No change in stunting among children under five

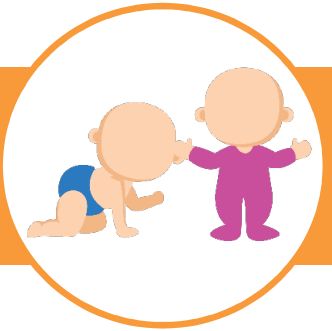
No change in stunting was observed in CNNS compared to NFHS-4 – **32%** vs **31%** in Andhra Pradesh

Among all southern states decline in stunting was observed only in Tamil Nadu



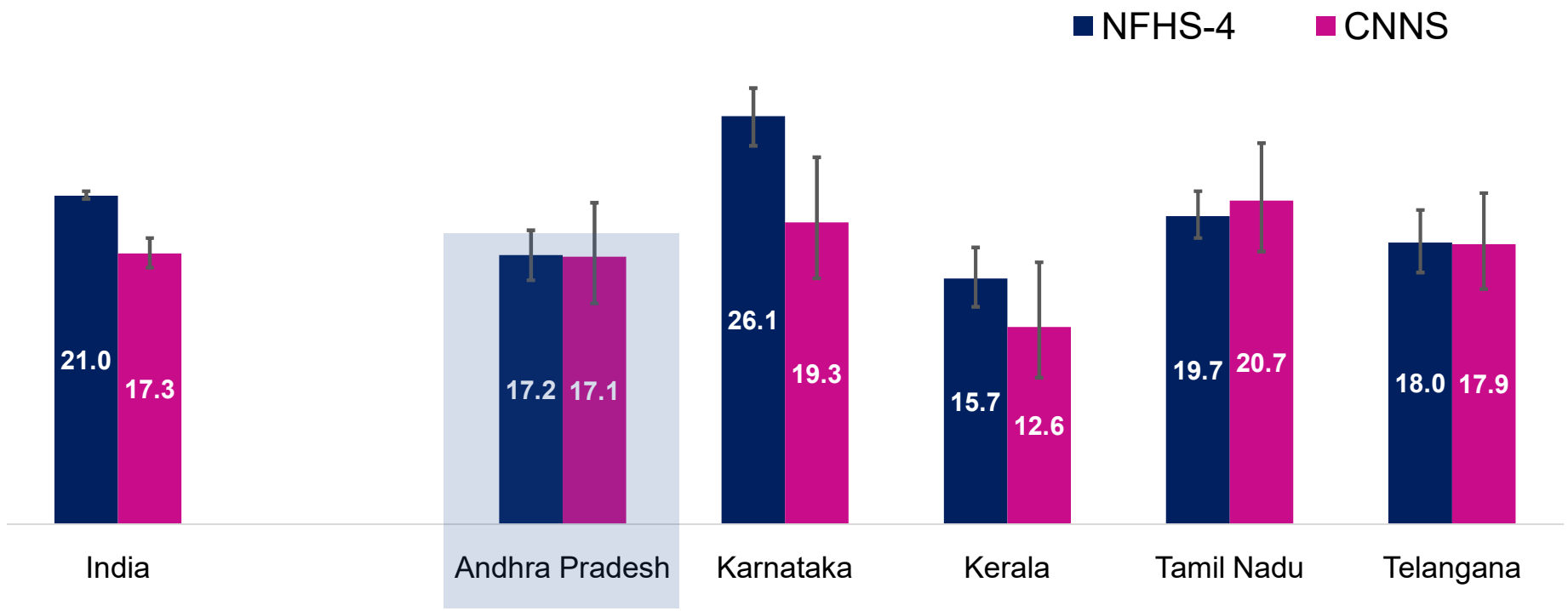
CNNS
Birth to Adolescence

Wasting among children under five did not change



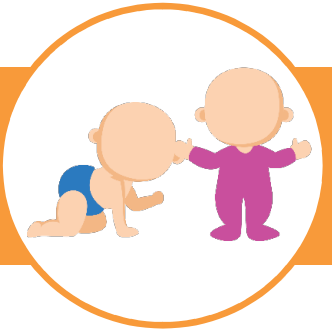
Prevalence of wasting unchanged in Andhra Pradesh between NFHS-4 and CNNS – **17%**

Wasting did not change significantly in any of the southern states except Karnataka



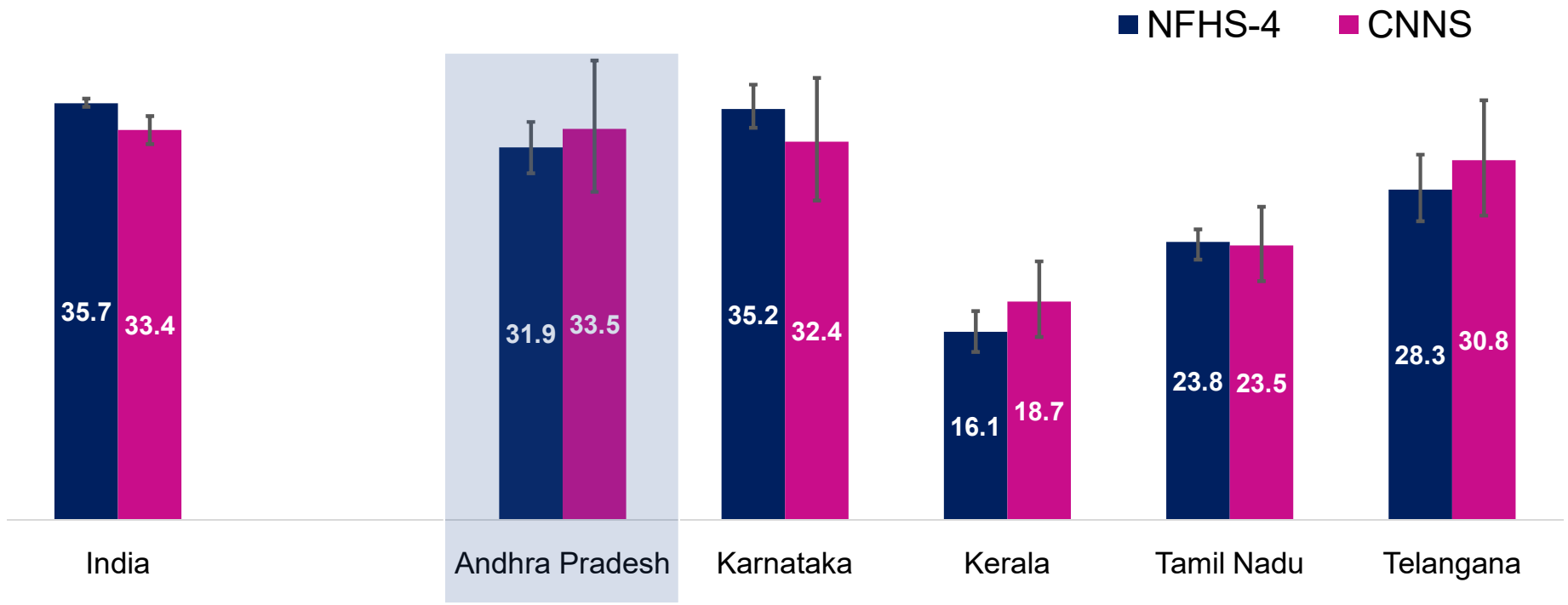
CNNS
Birth to Adolescence

Prevalence of underweight among children under five unchanged



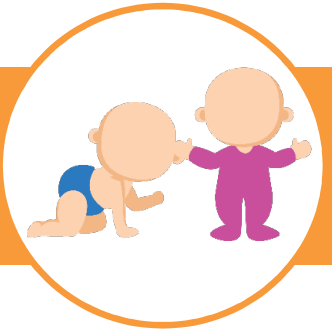
Underweight is a composite measure of chronic and acute malnutrition

Prevalence of underweight did not change significantly in Andhra Pradesh or in any southern states

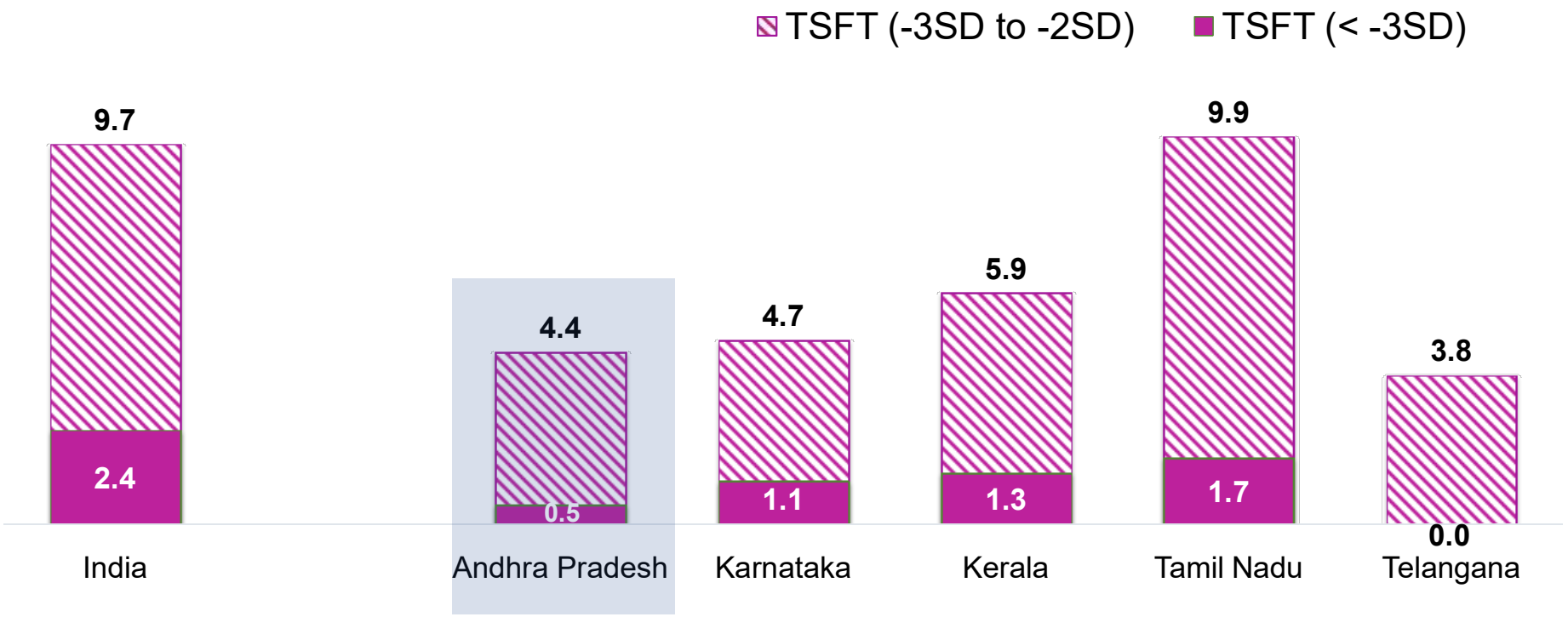


CNNS
Birth to Adolescence

Triceps Skinfold Thickness (TSFT) for children under five



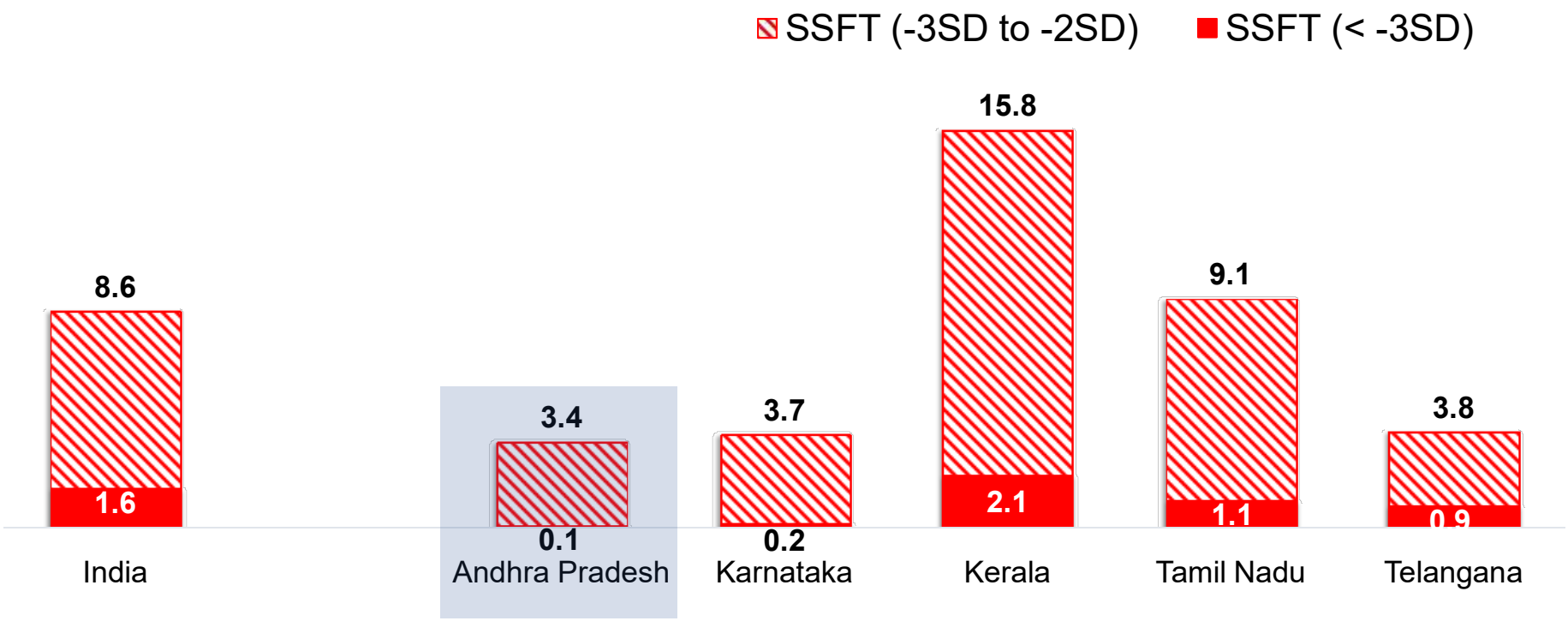
Low fat mass as reported by TSFT in Andhra Pradesh (**4%**) along with most other southern states, much lower than national average (**10%**)



CINNS Birth to Adolescence

Subscapular Skinfold Thickness (SSFT) for children aged 1-4 years

Thinness as reported by SSFT in Andhra Pradesh (**3%**) was significantly lower than the national average (**9%**) and Kerala (**16%**) and Tamil Nadu (**9%**) among the southern states

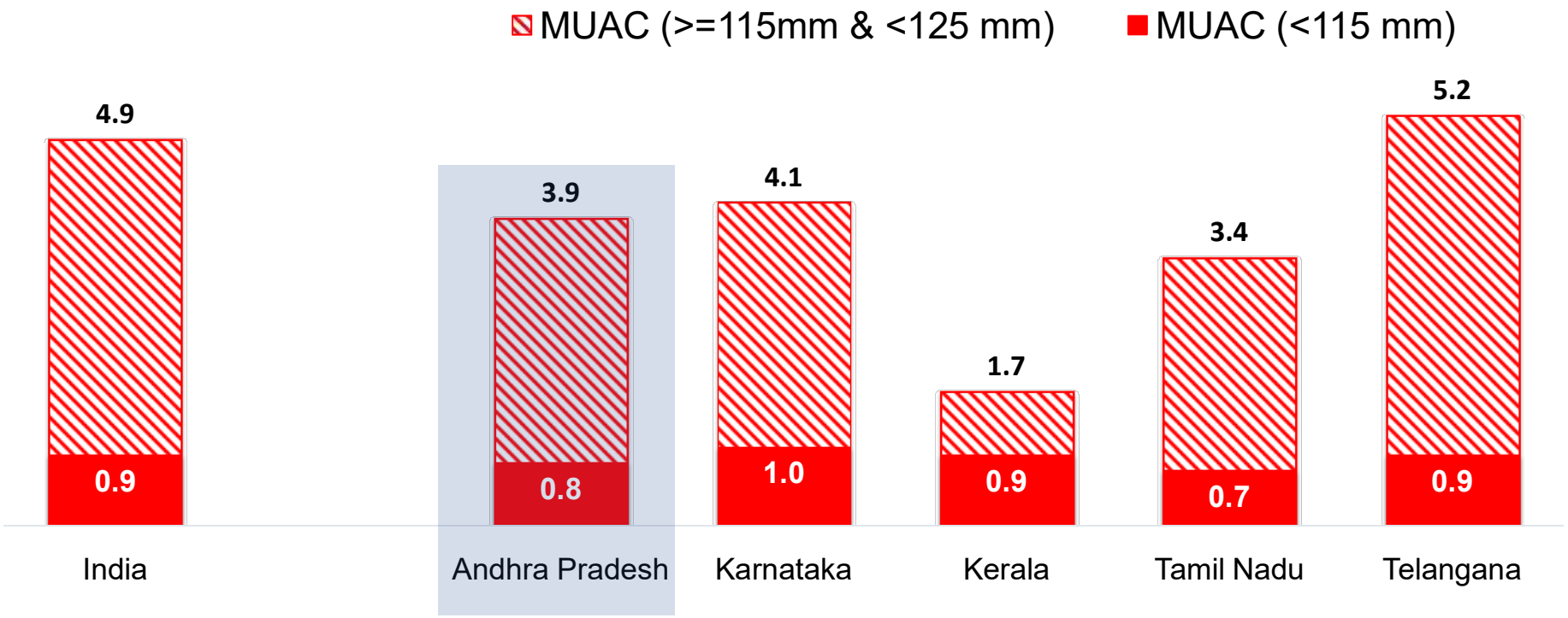


Birth to Adolescence

Mid Upper Arm Circumference (MUAC) for children aged 6-59 months

About **4%** children in Andhra Pradesh had low MUAC, similar to national average (**5%**)

Prevalence of low MUAC ranged between **2%** and **5%** across the southern states

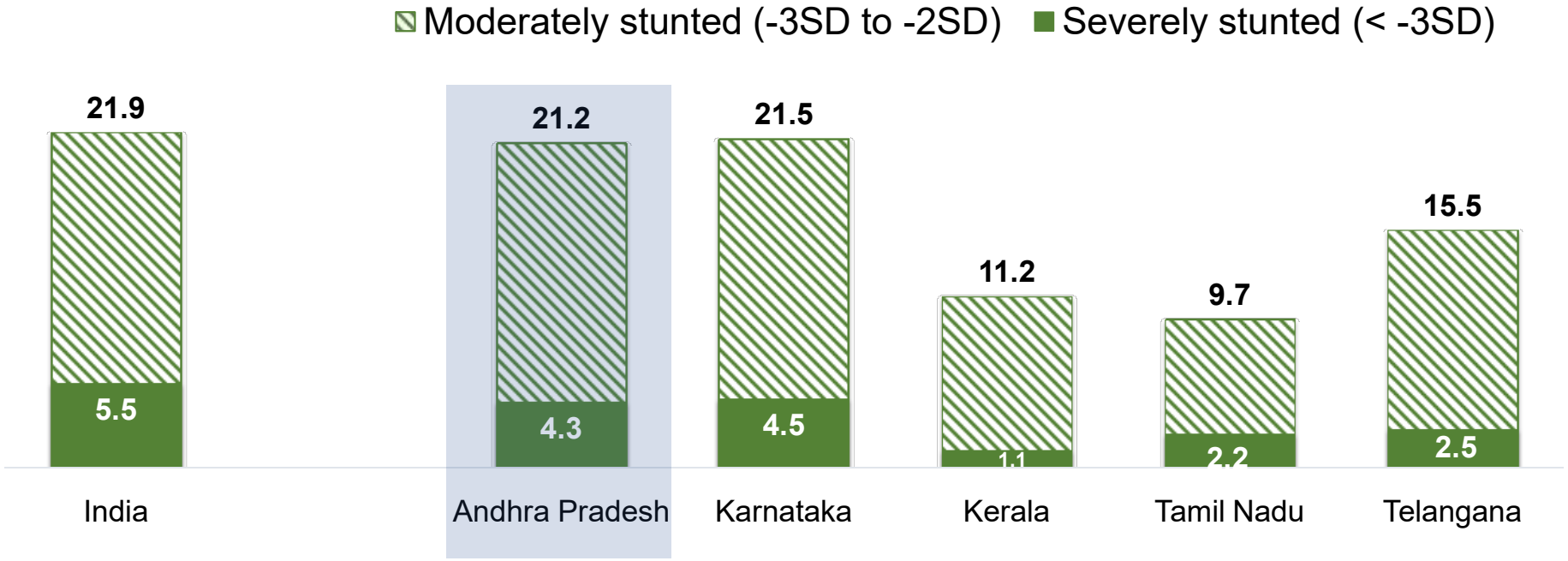


CINNS Birth to Adolescence

Stunting among school-age children (5-9 years)

1/5 of children aged 5-9 years was stunted; significant proportion of children who were stunted in childhood remained stunted into their schooling age reducing their potential capacity for education

Andhra Pradesh had similar prevalence of stunting compared to India and state of Karnataka in the southern region

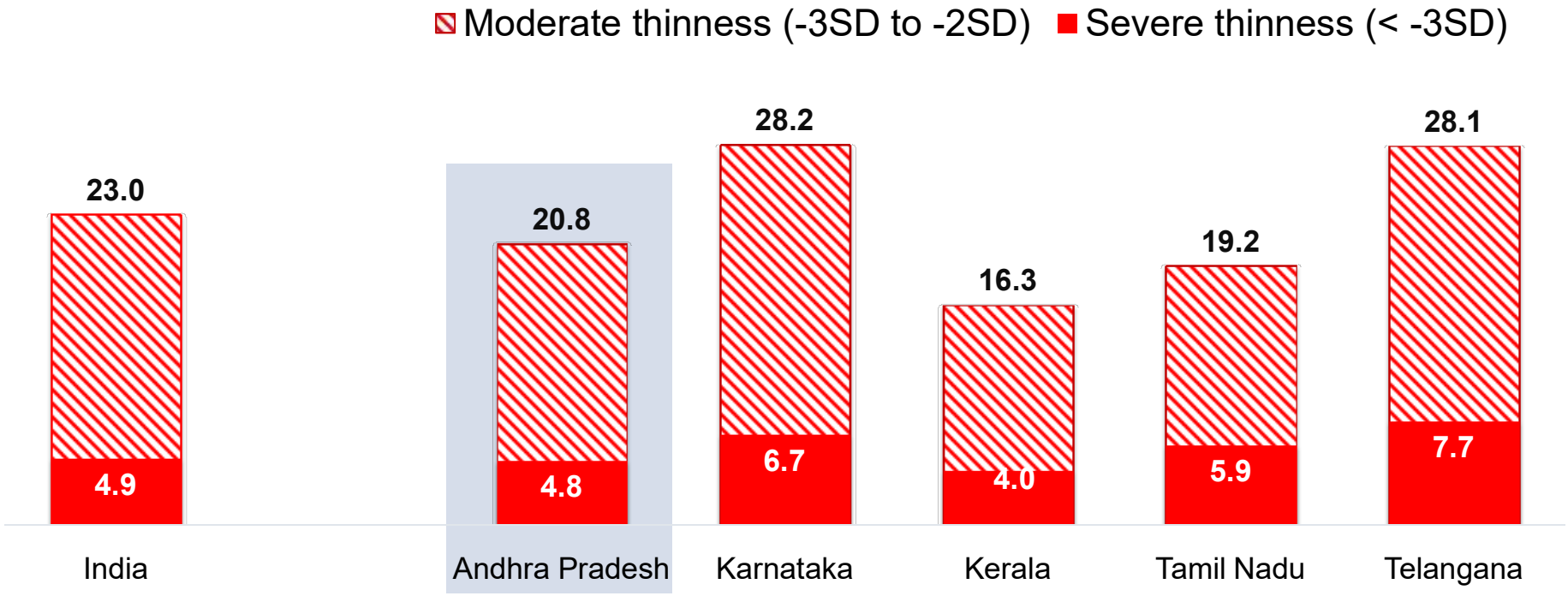


CINS Birth to Adolescence

Thinness among school-age children (5-9 years)

1/5 children aged 5-9 years was thin

Prevalence of thinness in Andhra Pradesh was similar to national average and significantly lower than Telangana and Karnataka in the southern region



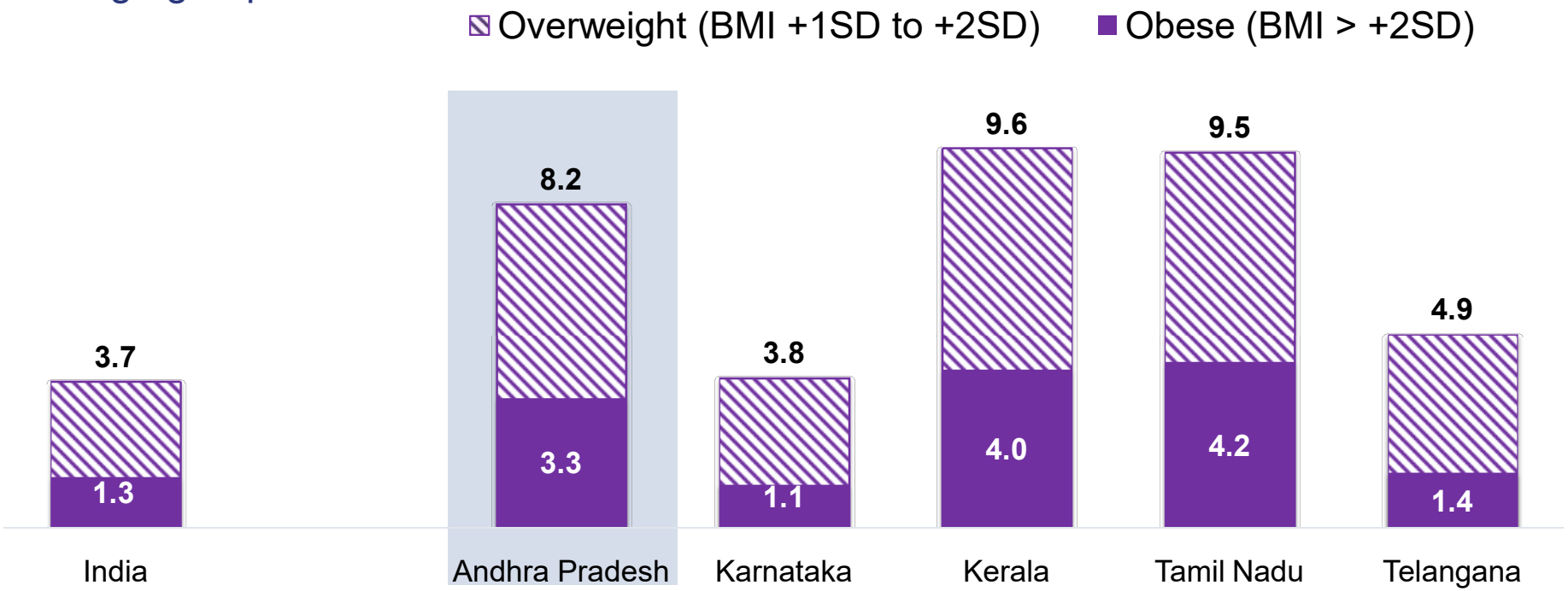
Birth to Adolescence

Overweight and obesity among school-age children (5-9 years) increasing

Overweight and obesity are on rise even among children aged 5-9 years

Prevalence of overweight in Andhra Pradesh was more than double the national average

Among southern states, Andhra Pradesh, Kerala and Tamil Nadu reported high prevalence of overweight in this age group

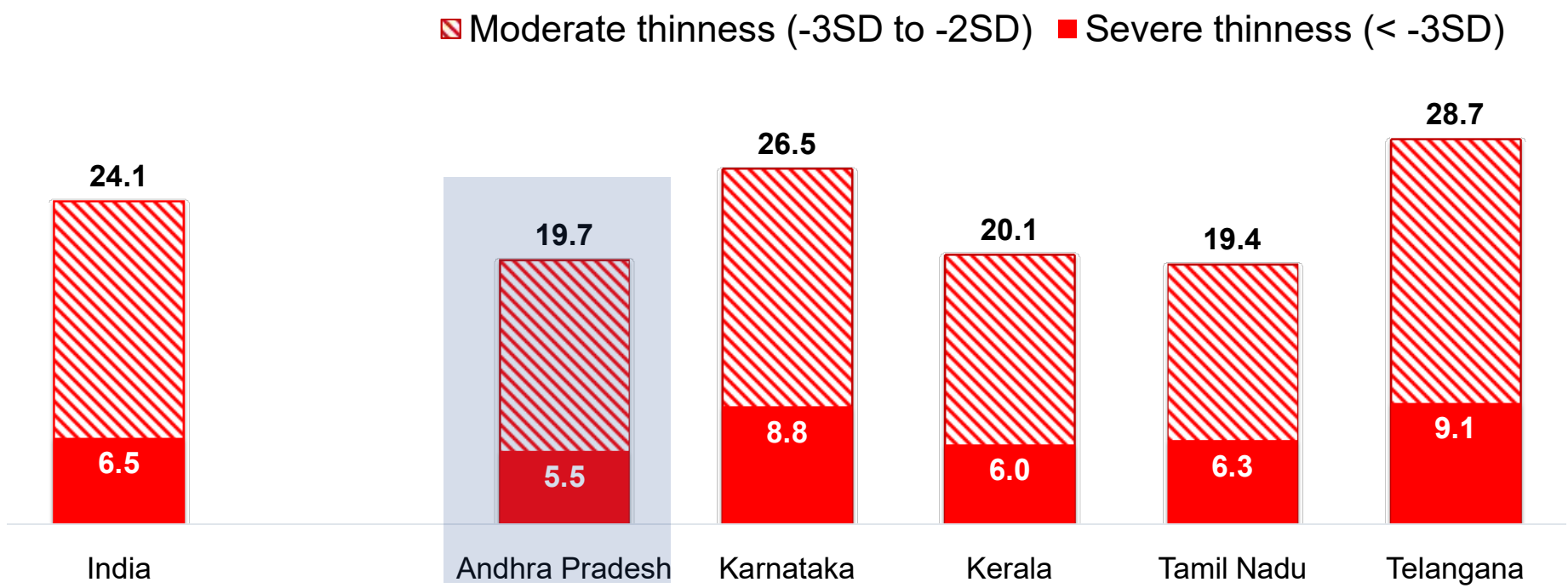


CINS Birth to Adolescence

Thinness among adolescents aged 10-19 years substantially high

1/5 adolescents aged 10-19 years was thin in Andhra Pradesh (**20%**), slightly less than national average (**24%**)

Among the southern states, Telangana (**29%**) and Karnataka (**27%**) had high prevalence of thinness

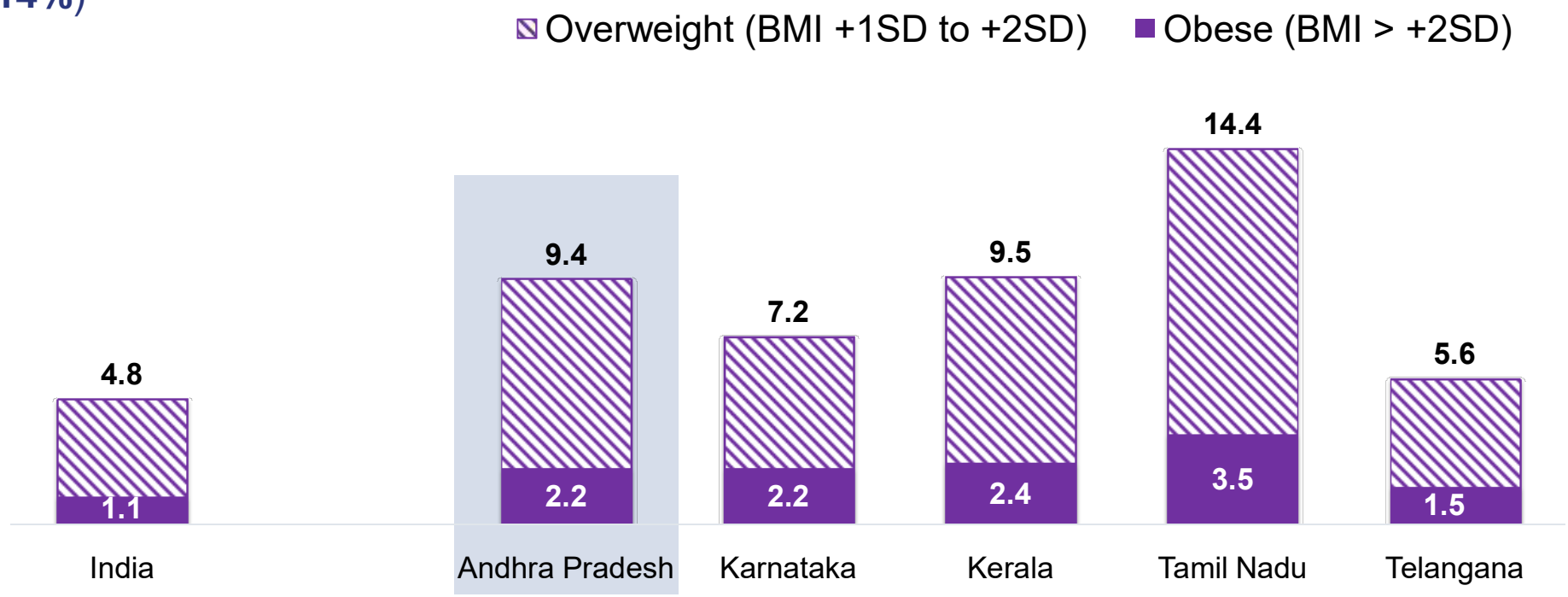


CINS Birth to Adolescence

Prevalence of overweight among adolescents aged 10-19 years high

Nearly **1/10** adolescents was overweight in Andhra Pradesh **(9%),** double than national average (**5%**)

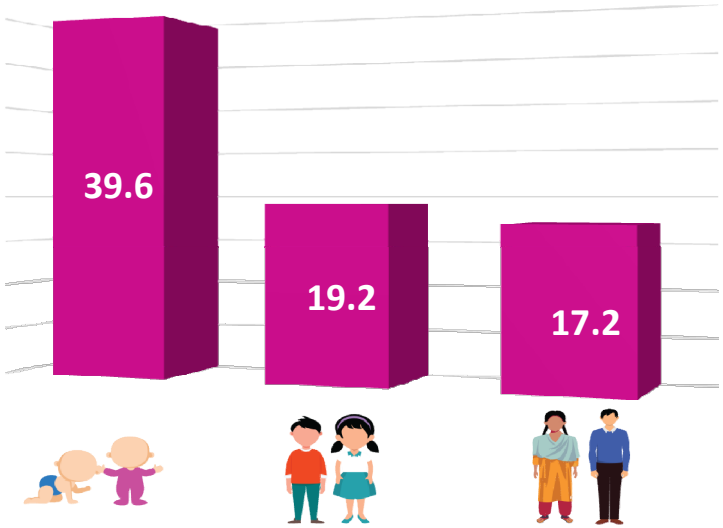
Among the southern states, Andhra Pradesh had high prevalence, also high in Kerala (**10%**) and Tamil Nadu (**14%**)



CINS Birth to Adolescence

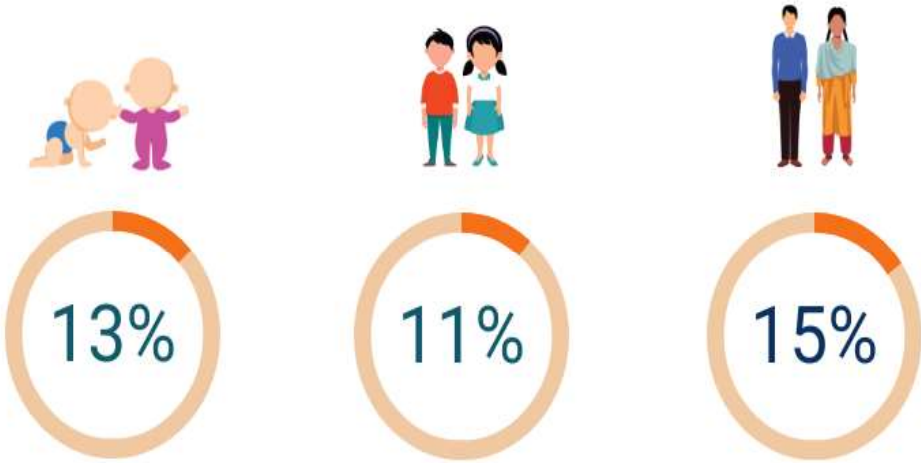
Andhra Pradesh key findings: Anaemia and iron deficiency

Anaemia



In Andhra Pradesh, like in most states, anaemia was significantly higher among children aged 1-4 years compared to children aged 5-9 years and adolescents aged 10-19 years

Iron deficiency



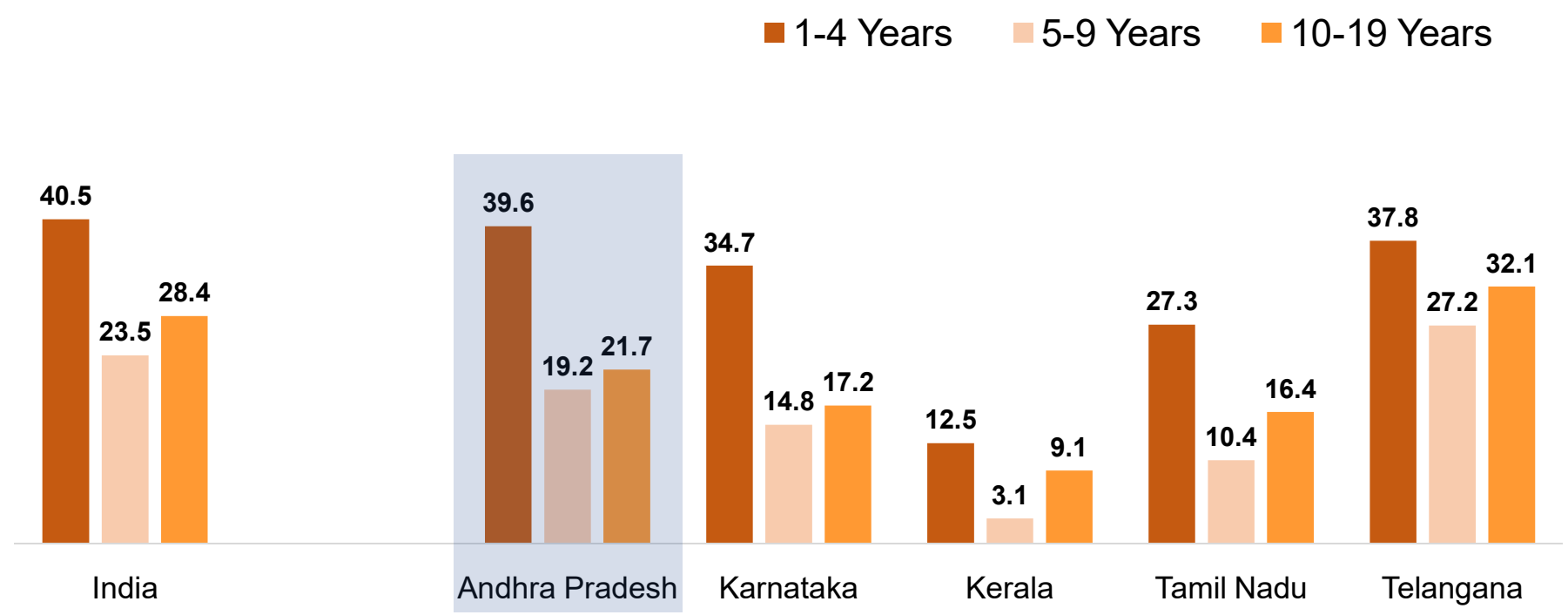
Findings indicate that unlike in many other states, prevalence of iron deficiency (measured by serum ferritin) was low in all age groups in Andhra Pradesh

CINS
Birth to Adolescence

Prevalence of Anaemia among children and adolescents

2/5 children aged 1-4 years were anaemic in Andhra Pradesh, similar to national average (**41%**)

Prevalence of anaemia was highest among children aged 1-4 years, increased slightly again in adolescence



Anaemia Cut Offs (WHO)

1-4 years: Hb<11.0 g/dl

5-11 years: Hb<11.5 g/dl

12-14 years: Hb< 12 g/dl

Girls ≥15years: Hb< 12g/dl

Boys ≥15 years: Hb< 13 g/dl

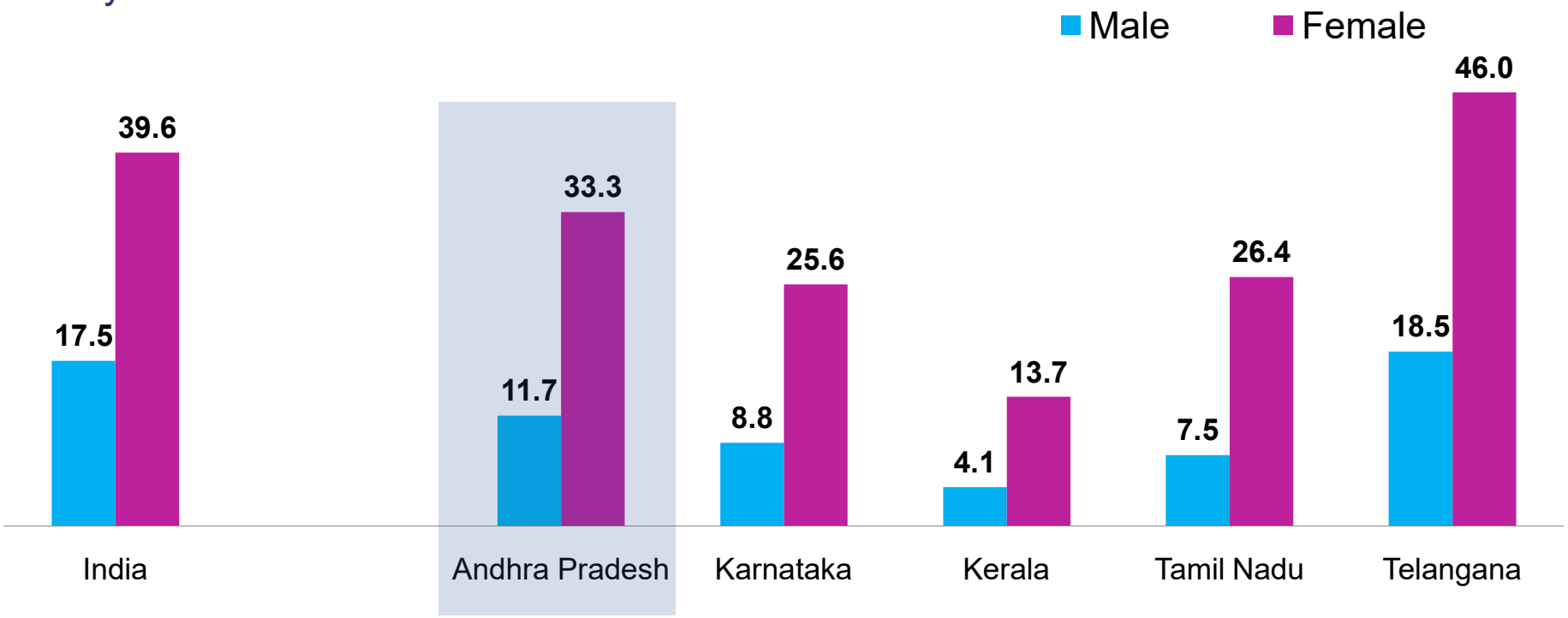
(Adjusted for altitude)

CINNS Birth to Adolescence

Prevalence of Anaemia among adolescents (10-19 years)

Overall, in the country, anaemia prevalence among adolescent girls was twice than adolescent boys

In Andhra Pradesh, as in many other southern states, adolescent girls were three times more likely than adolescent boys to be anaemic

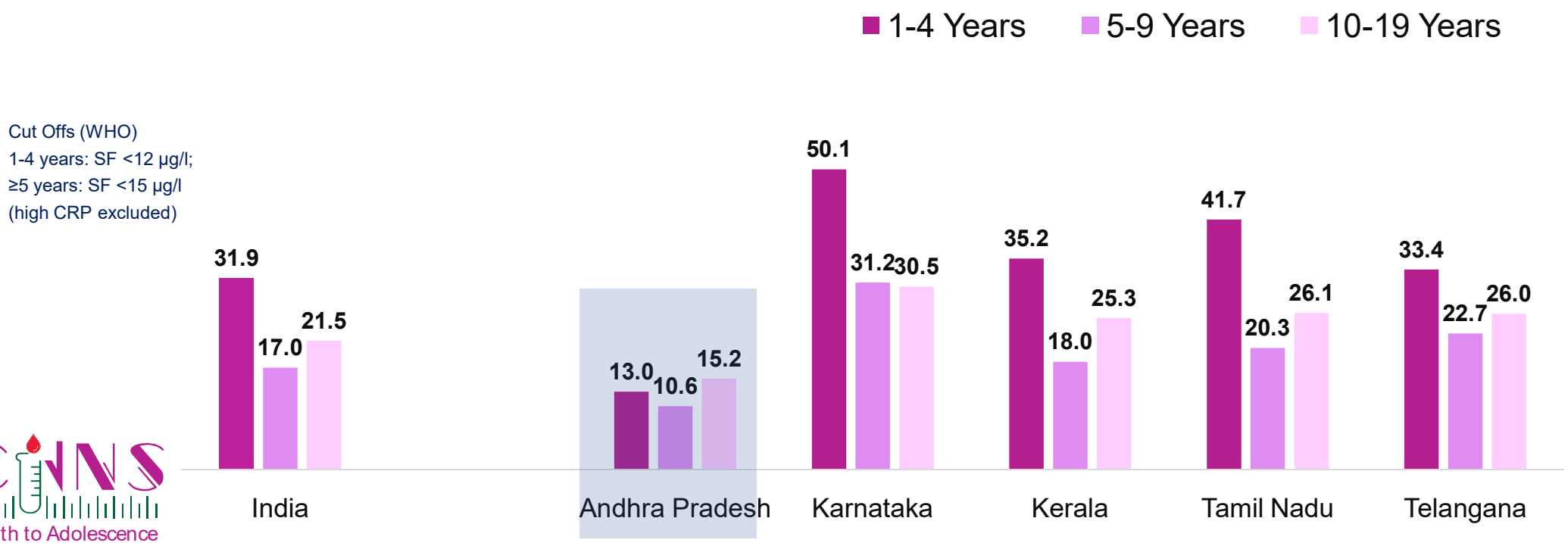


CINNS Birth to Adolescence

Iron deficiency measured by serum ferritin among children and adolescents

13% of children aged 1-4 years had iron deficiency in Andhra Pradesh, much lower than the national average (**32%**); prevalence was highest among adolescents

Among southern states, children from Karnataka had highest prevalence of iron deficiency



CINS
Birth to Adolescence

Andhra Pradesh key findings: Vitamin A and Vitamin D deficiency

Vitamin A deficiency was high (21%) in children 1-4 years

Adolescents had significantly lower prevalence of vitamin A (13%) compared to school-age children (23%).

Vitamin D deficiency ranged from 5% to 16% in 1-19 years age group as per cut off by expert panel of IOM.

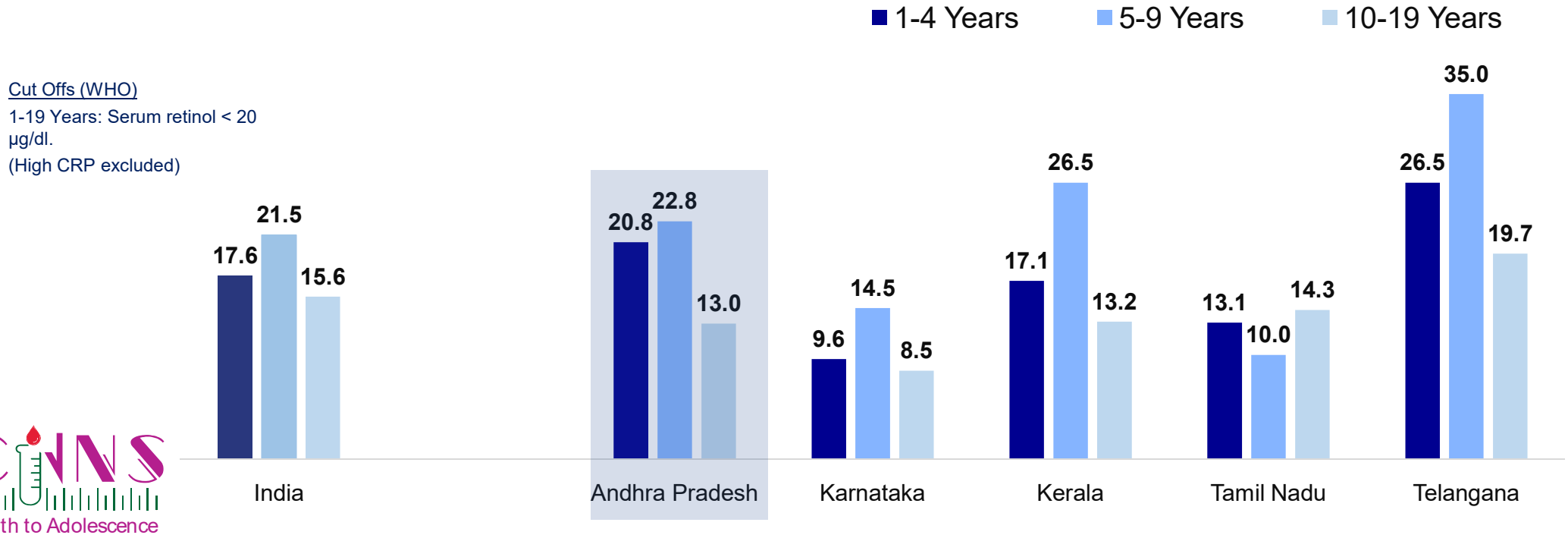
Vitamin D deficiency was found in increasing order from preschoolers to adolescents – 5% in children 1-4 years, 10% in children 5-9 years and 16% in adolescents.

Birth to Adolescence

Vitamin A deficiency among children and adolescents

The vitamin A deficiency prevalence varies from **13% to 23%** in children and adolescents in Andhra Pradesh, similar to the national average (**18-22%**)

Among southern states, Karnataka and Andhra Pradesh had lower prevalence of Vitamin A deficiency than other three states

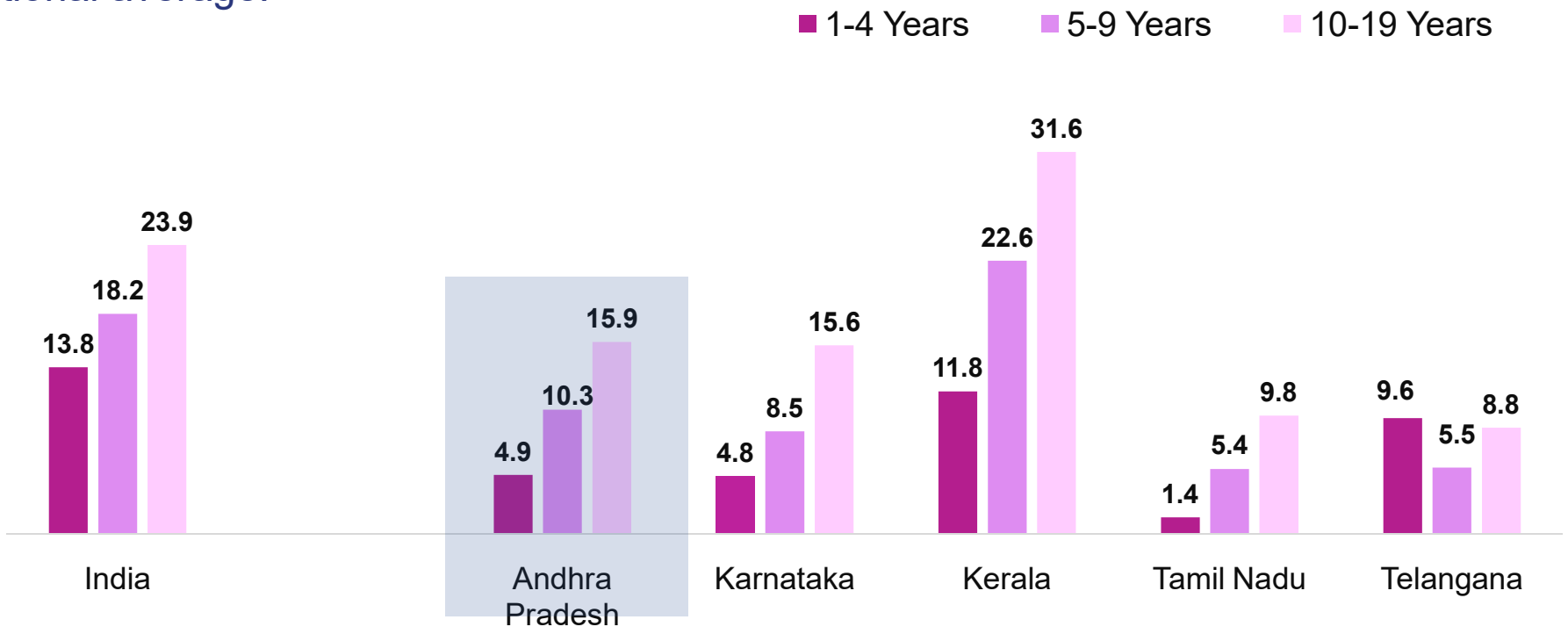


Birth to Adolescence

Vitamin D deficiency increases with age

5-16% children and adolescents had Vitamin D deficiency in Andhra Pradesh, much lower than the national average (**14-24%**); Vitamin D deficiency increased sharply with age.

In most southern states, except Kerala, Vitamin D deficiency among children and adolescents was lower than national average.



CINS Birth to Adolescence

Andhra Pradesh key findings: Non-communicable diseases

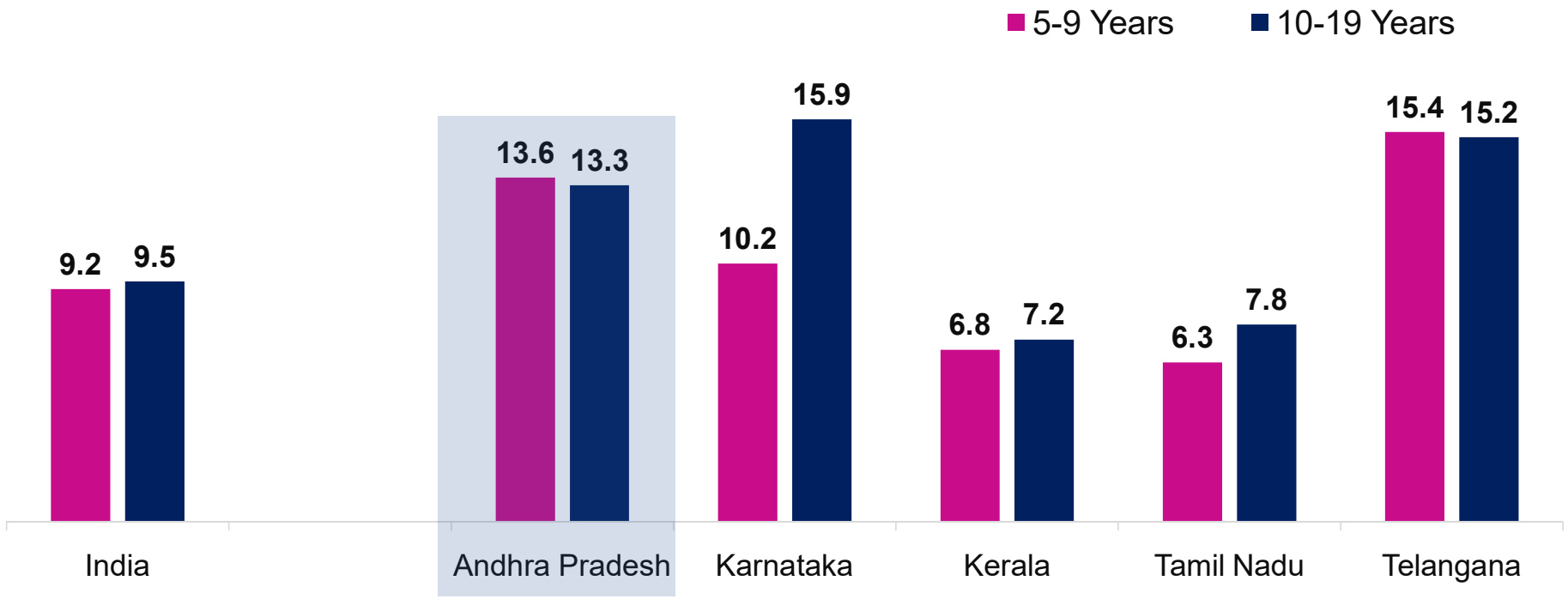
Around 13% school-age children and adolescents were found with high level of glycosylated haemoglobin (HbA1c).

Other indicators of risks of NCDs, such as level of cholesterol, triglycerides, LDL and HDL point to increased risks of NCDs among adolescents.

Risk of diabetes among school-age children and adolescents

Based on Glycosylated hemoglobin (HbA1c), **14%** school-age children and **13%** of adolescents had increased risk of diabetes in Andhra Pradesh, higher than the country as a whole (**9-10%**)

Among all southern states, risk of diabetes was the lowest in Tamil Nadu and Kerala

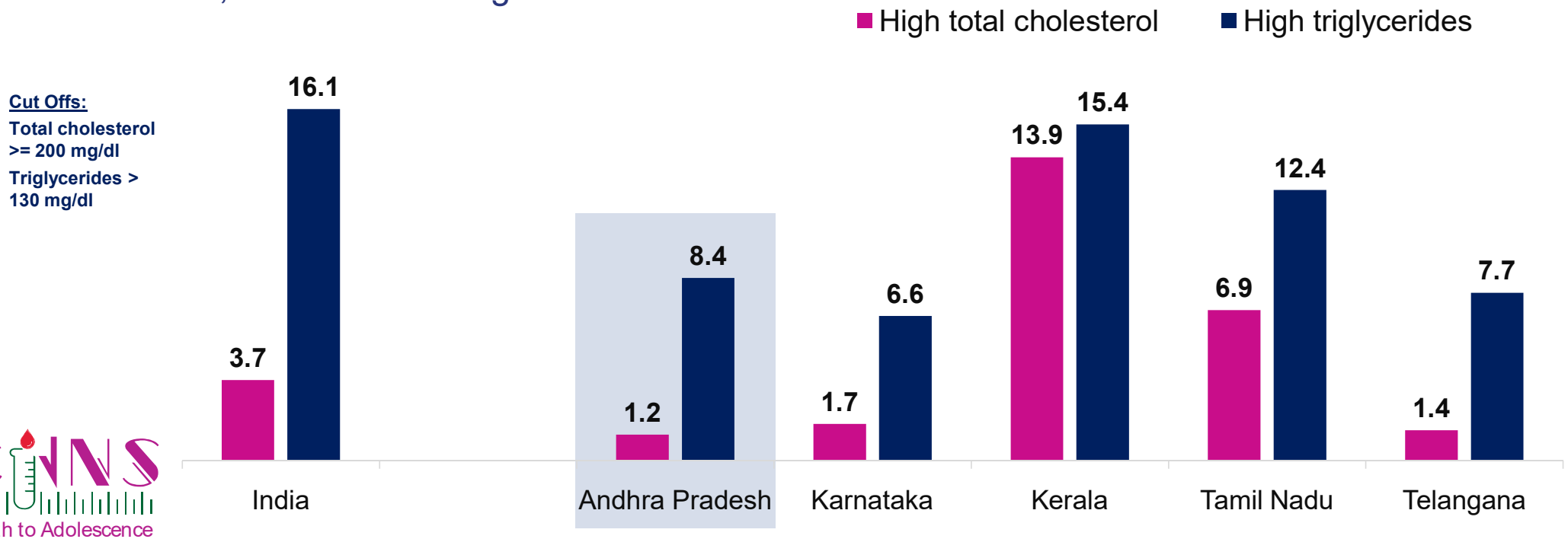


CINS Birth to Adolescence

High total cholesterol and high triglycerides among adolescents

Elevated risk of NCDs in Andhra Pradesh among adolescents – **1%** had high level of total cholesterol and **8%** with high level of triglycerides

Prevalence of total cholesterol and high triglycerides did not show any particular pattern in southern states , but both were high in Kerala

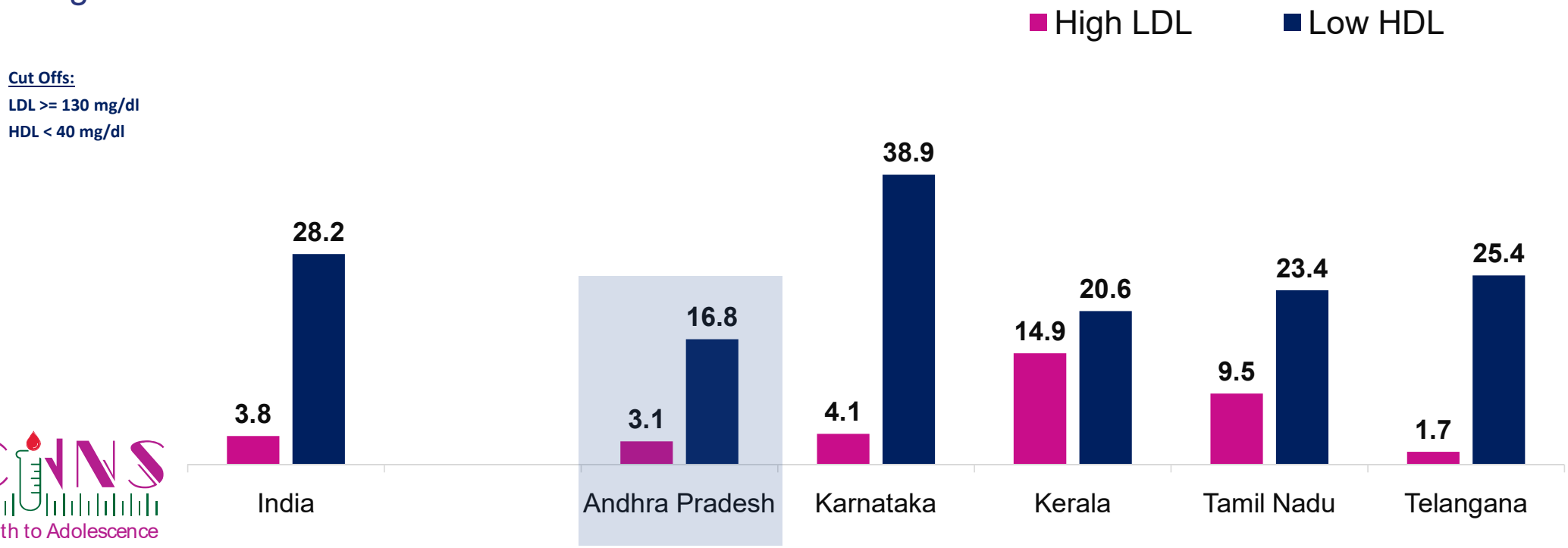


Birth to Adolescence

High LDL and low HDL among adolescents

Risk of NCDs among adolescents in Andhra Pradesh was moderately high – **3%** had high level of LDL and **17%** had low level of HDL

Among the southern states, in Kerala and Tamil Nadu, prevalence of both high LDL and low HDL was high



Birth to Adolescence

Preliminary Policy Discussions from CNNS

- Only about half of anaemia is caused by iron deficiency. Programmes must address all causes of anaemia but continue to address iron deficiency in children under five and adolescent girls (population with largest burden).
- Vitamin A deficiency is still high. Along with Vitamin A supplementation, interventions such as dietary diversification and fortification can be taken to scale to address the burden.
- Vitamin D deficiency is an emerging public health issue among urban children and adolescents. Scaling up of fortification efforts can be considered. Further research is required to uncover the effects of pollution and other factors to design better programmes.
- Urinary Iodine data need to be examined in conjunction with salt consumption data for the population and level of iodine in salt at the household level.
- Control of NCDs such as diabetes and cardiovascular disease must start in the early ages to instil lifelong healthy habits as adult diseases start in childhood.

CNNS Birth to Adolescence

The survey was conducted with generous financial support from

Aditya and Megha Mittal

and technical support from

unicef | for every child

POPULATION COUNCIL
Ideas. Evidence. Impact.

AIIMS New Delhi

CDSA

CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

icmr NIN
INDIAN COUNCIL OF MEDICAL RESEARCH
NATIONAL INSTITUTE OF NUTRITION