सत्यमेव जयते

Ministry of Health and Family Welfare
Government of India

Comprehensive National Nutrition Survey

2016 – 2018

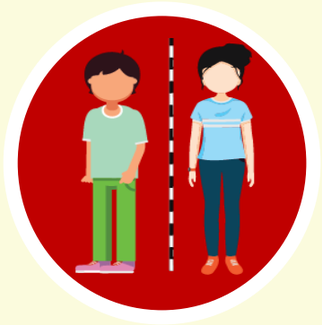
Haryana
State Presentation

Birth to Adolescence

Largest Micronutrient Survey ever conducted:

112,316
Children and adolescents interviewed

51,029
Blood, stool and urine samples collected



360
Anthropometric measurers

2500
Survey personnel in 30 states

30
Microscopists

100
Data Quality assurance monitors

200
Lab technicians

200
Trainers and coordinators

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*

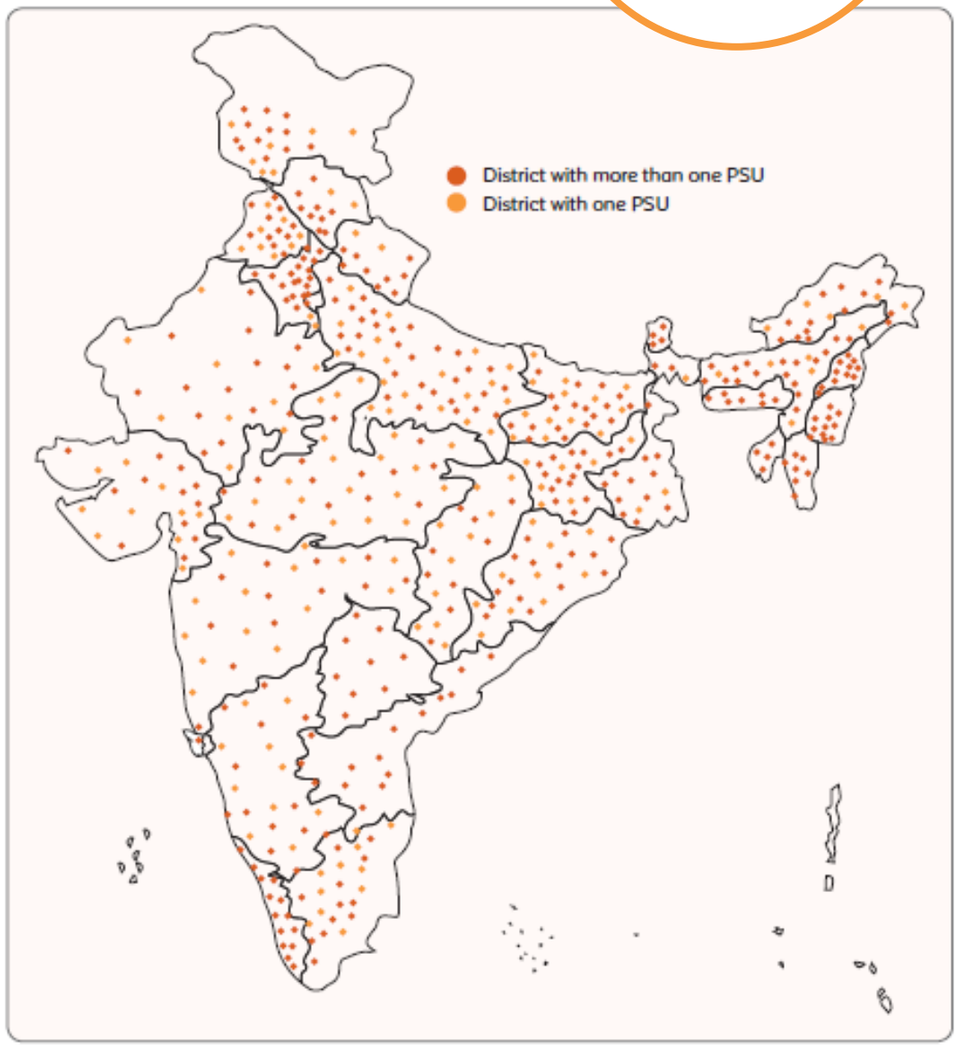
*Soumya Swaminathan, et al. (2019), The burden of child and maternal malnutrition and trends in its indicators in the states of India: the Global Burden of Disease Study 1990–2017. https://doi.org/10.1016/S2352-4642(19)30273-1

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



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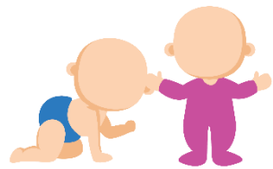
Anthropometry data

	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 (1-4 years)		
		• Waist circumference	

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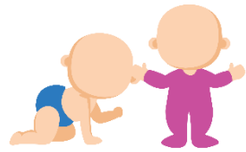
Biochemical indicators - micronutrient deficiencies and NCDs

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

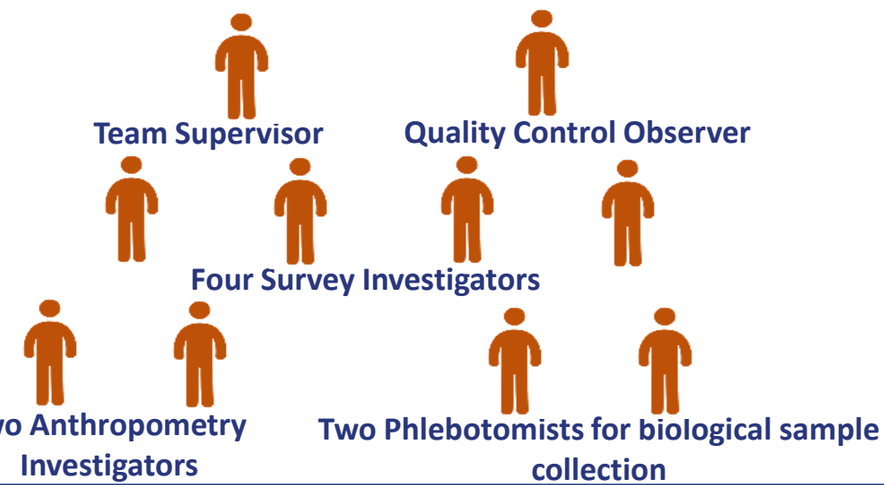
Second Level

- 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



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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 Haryana

CNNS covered 60 PSUs for data collection in Haryana

Achieved following sample size by age groups:

	0-4 years	5-9 years	10-19 years	Total
Household and anthropometry data	1,090	1,092	1,069	**3,251**
Biological sample	527	537	543	**1,607**

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Birth to Adolescence

Period of data collection in Haryana

CNNS data collection period: March 01, 2017 to June 23, 2017

- CNNS collected data during the spring through summer season of 2017
- NFHS collected data during the spring through summer season of 2015

Survey	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CNNS 2017			March to June, 2017									
NFHS 4 2015		February to June, 2015										

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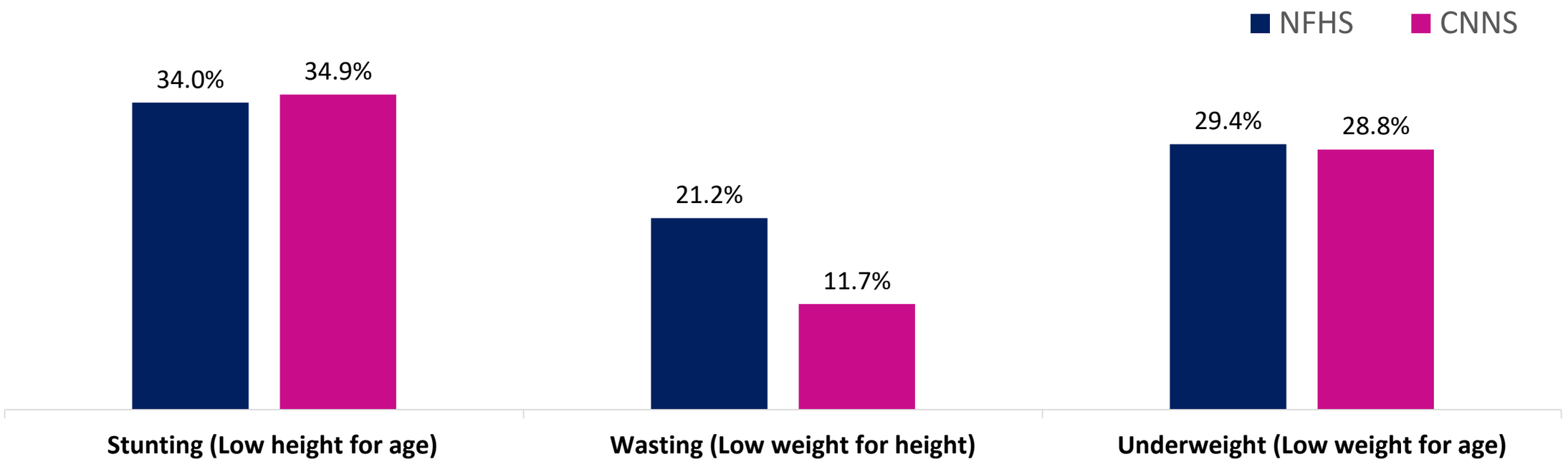
Birth to Adolescence

Haryana key findings: Anthropometry (1/2)

Prevalence of stunting and underweight remained unchanged, but wasting declined significantly in children under 5 years



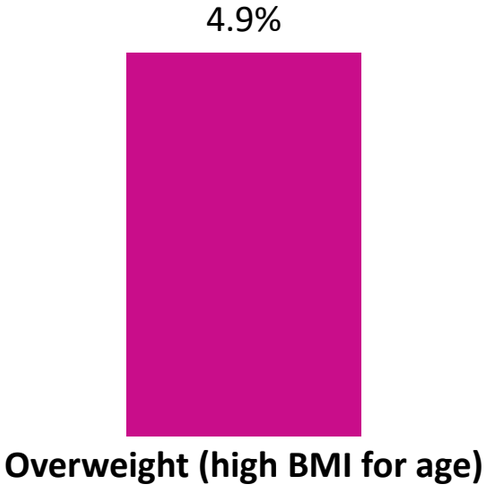
Birth to Adolescence

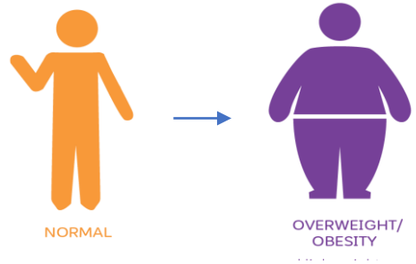
Haryana key findings: Anthropometry (2/2)

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

1/6 children aged 5-9 years was stunted. The school age period does not provide an opportunity for catch up growth in height.

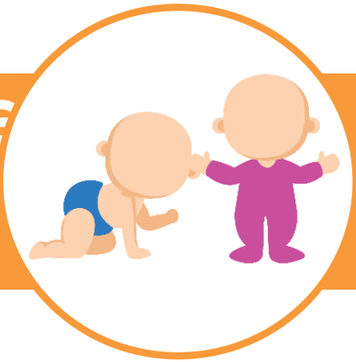
5% of adolescents aged 10-19 years were overweight or obese.





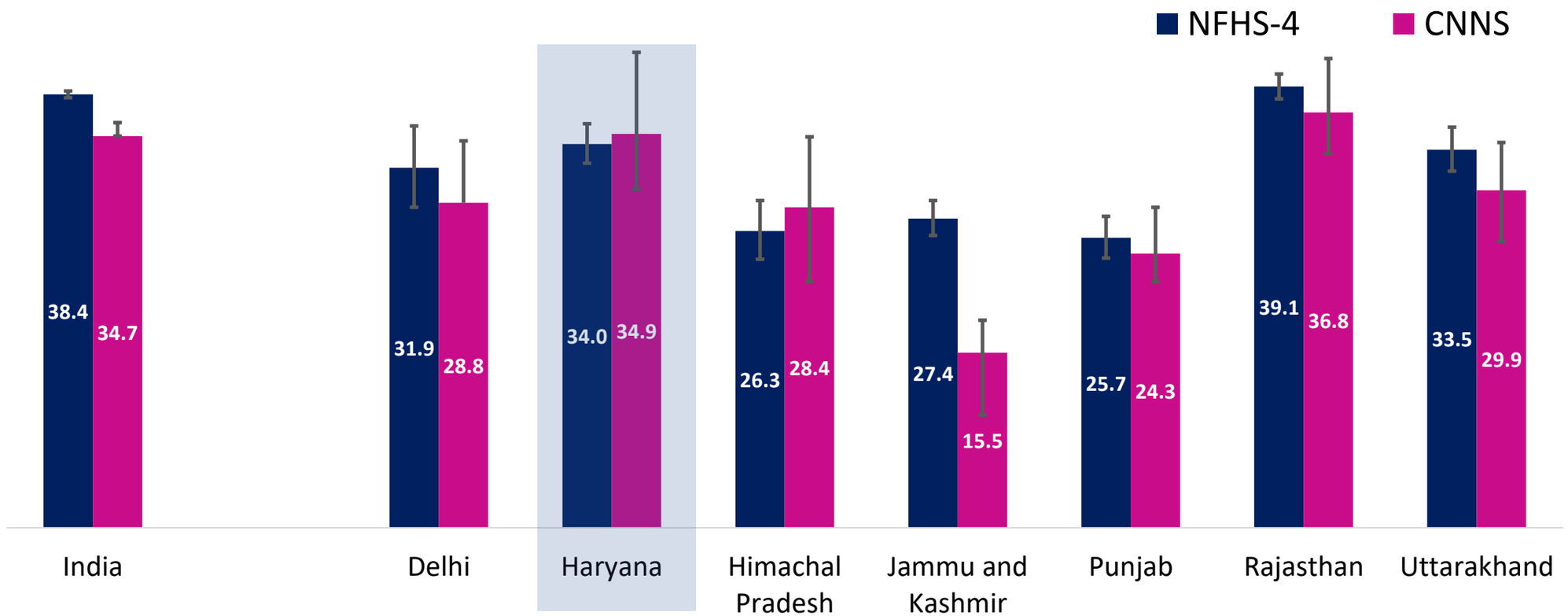
Birth to Adolescence

Stunting among children under five unchanged



Prevalence of stunting remained unchanged in CNNS compared to NFHS-4 – **35%** vs **34%** in Haryana

In most of the northern states, stunting did not decline significantly; except in Jammu and Kashmir



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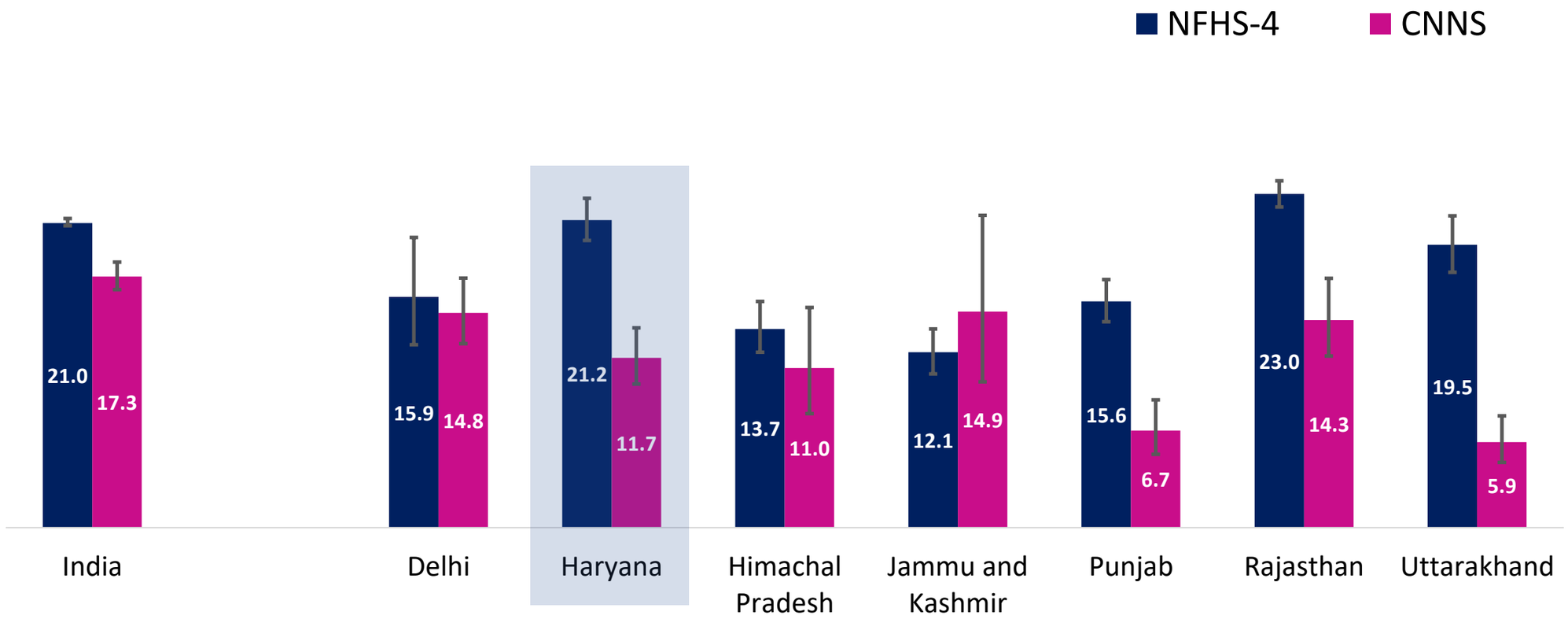
Birth to Adolescence

Wasting among children under five declined

Prevalence of wasting significantly declined in Haryana between NFHS-4 and CNNS – **21%** vs **12%**

In 4/7 northern states, wasting declined; except in Jammu and Kashmir, Himachal Pradesh and Delhi



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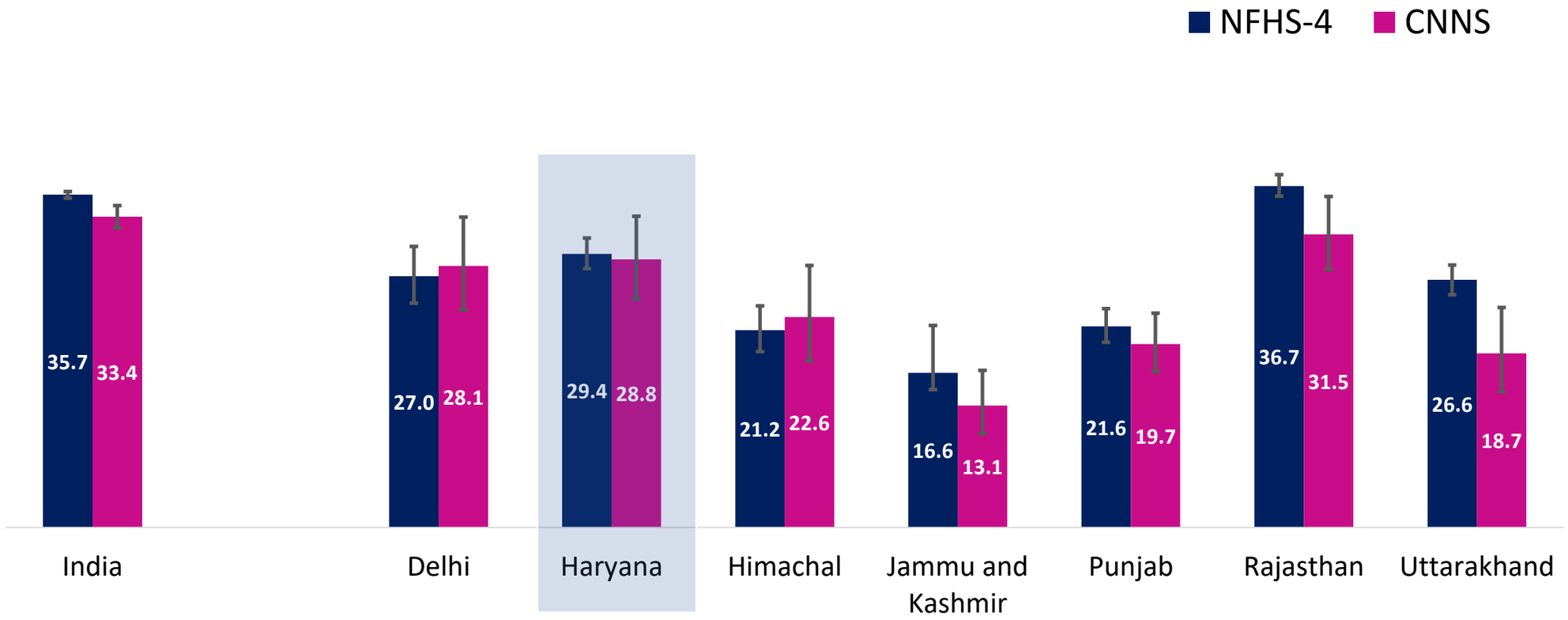
Prevalence of underweight among children under five unchanged

Underweight is a composite measure of chronic and acute malnutrition

The prevalence of underweight did not change in Haryana between NFHS-4 and CNNS – **29%**

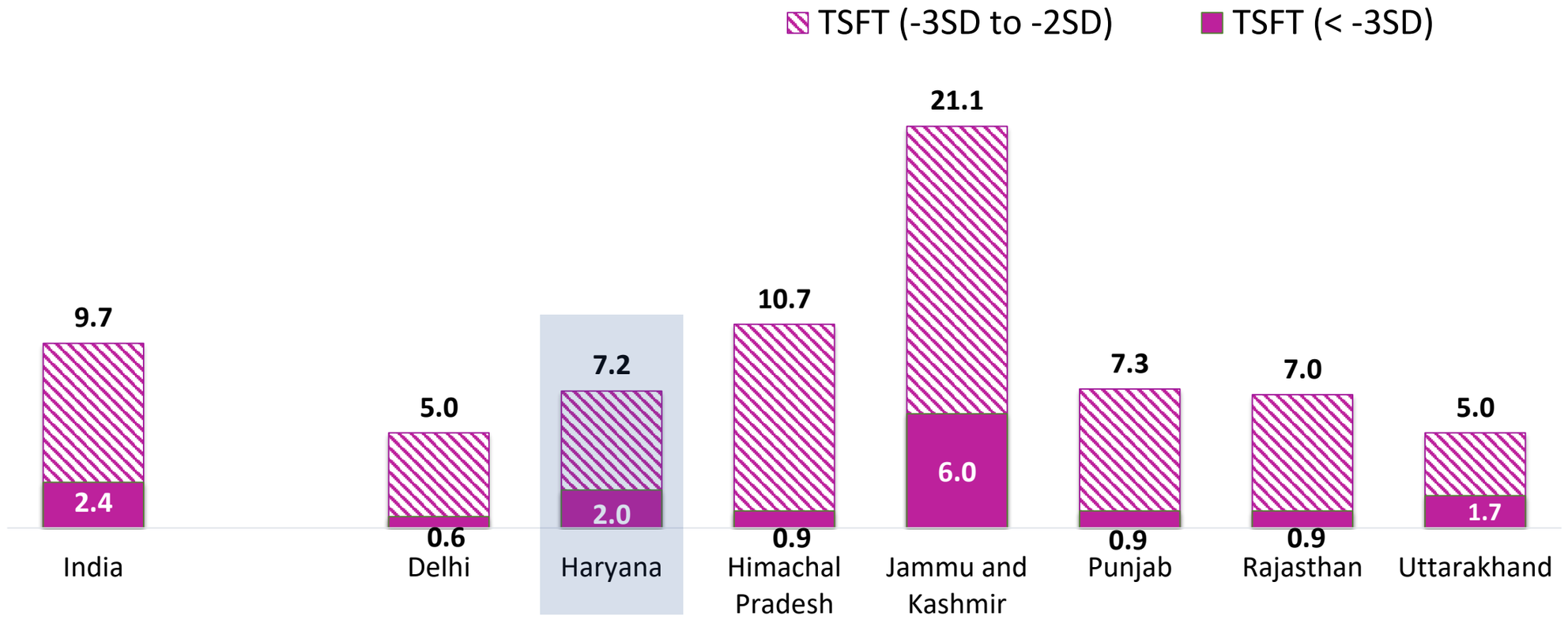
Prevalence remained unchanged in all northern states; except Uttarakhand where it declined



CNNS
Birth to Adolescence

Triceps Skinfold Thickness (TSFT) for children under five

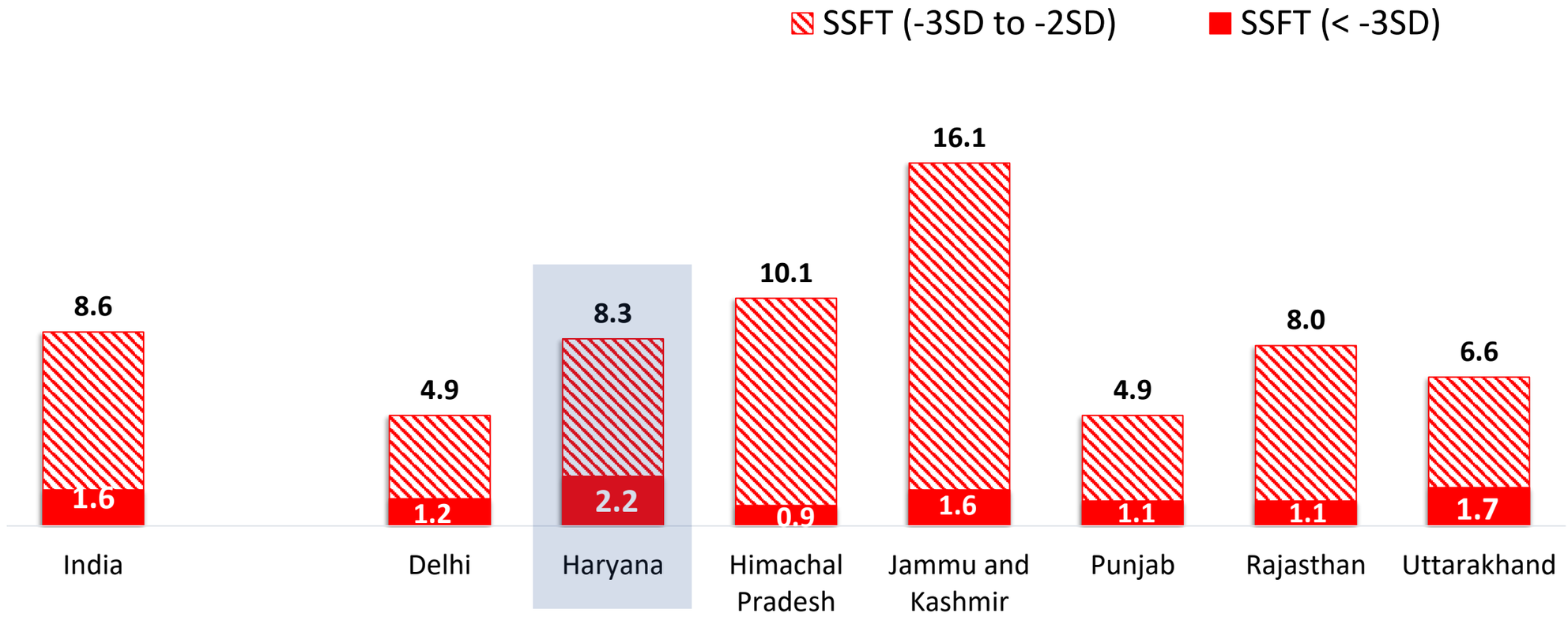
Low fat mass as reported by TSFT in Haryana (**7%**) was lower than national average (**10%**). Jammu and Kashmir (**21%**) tops the region.



Birth to Adolescence

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

Thinness as reported by SSFT in Haryana was **8%,** which is at similar level of National average (**9%**) but lower than only two northern states- Himachal Pradesh (**10%**) and Jammu & Kashmir (**16%**)

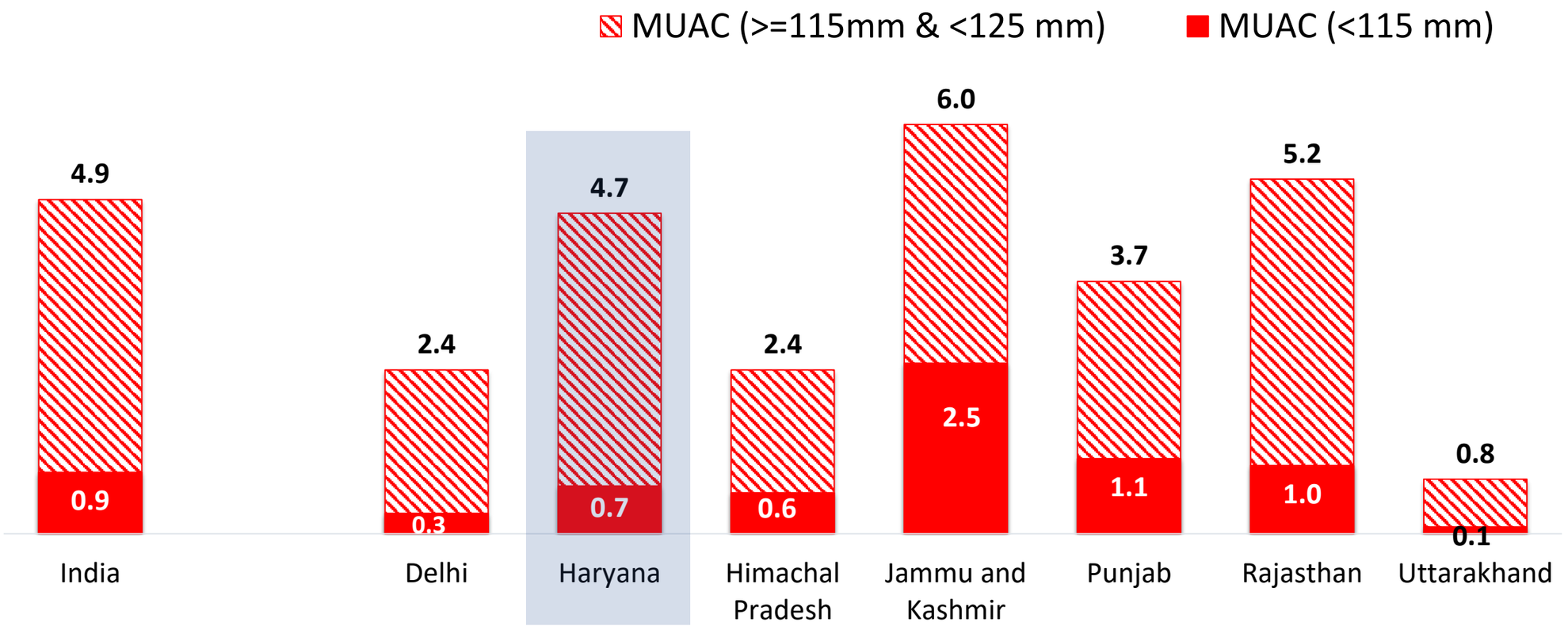


Birth to Adolescence

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

About **5%** children in Haryana had low MUAC

Prevalence of low MUAC ranged between **1%** and **6%** across the northern states

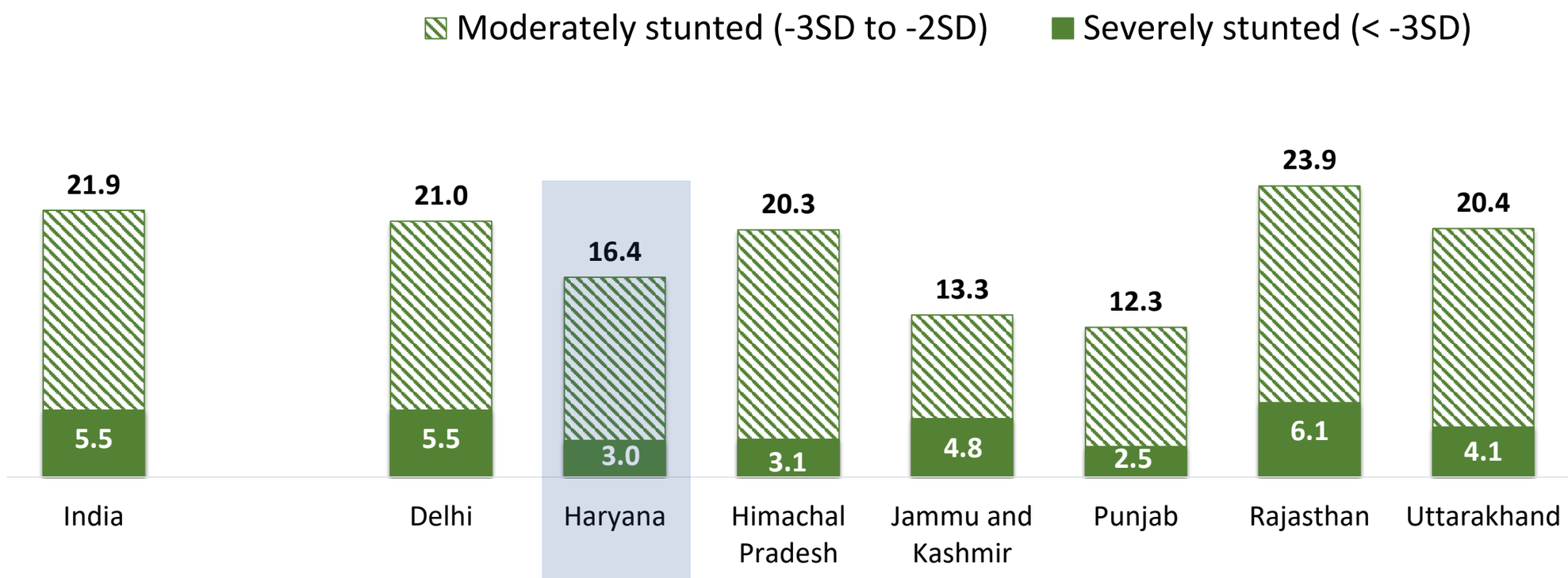


Birth to Adolescence

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

1/6 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

Haryana had lower prevalence than national average and most of the northern states, except Jammu & Kashmir and Punjab

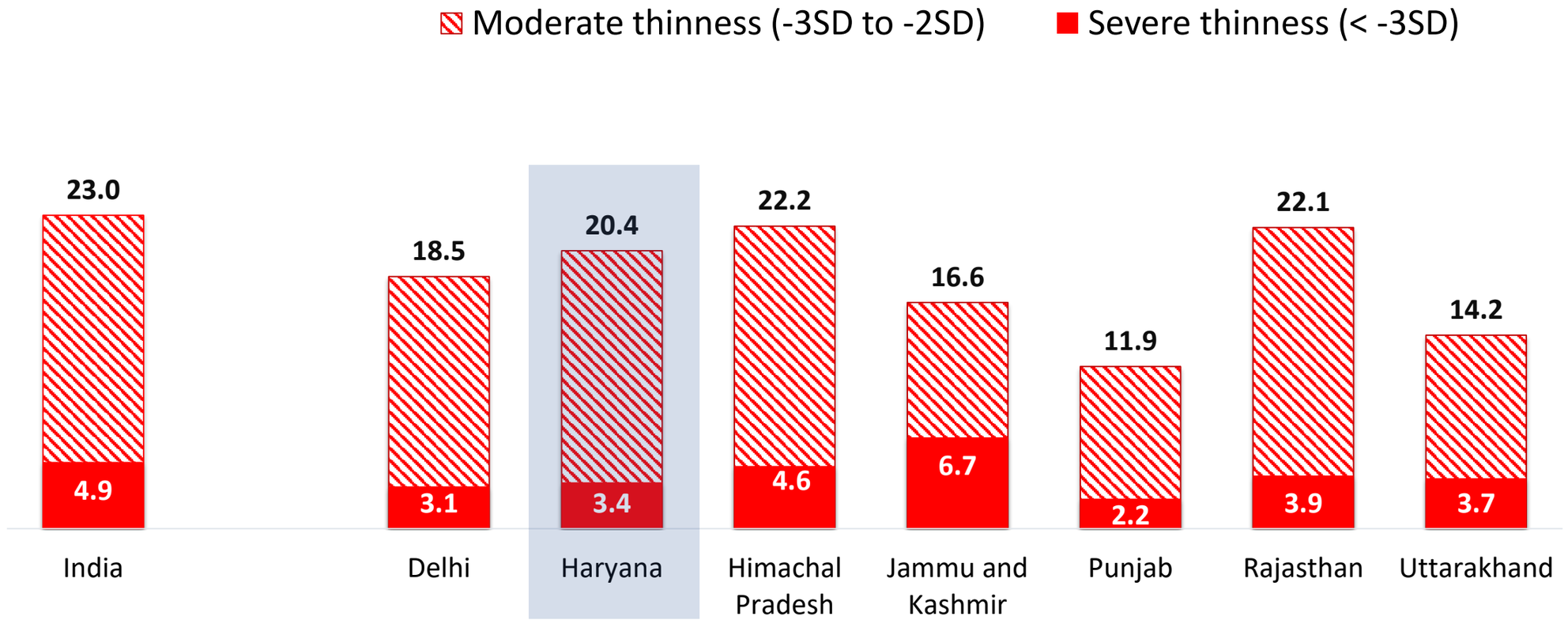


Birth to Adolescence

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

1/5 children aged 5-9 years was thin in Haryana

Prevalence of thinness in Haryana was lower than national average and Himachal Pradesh and Rajasthan in the northern region.



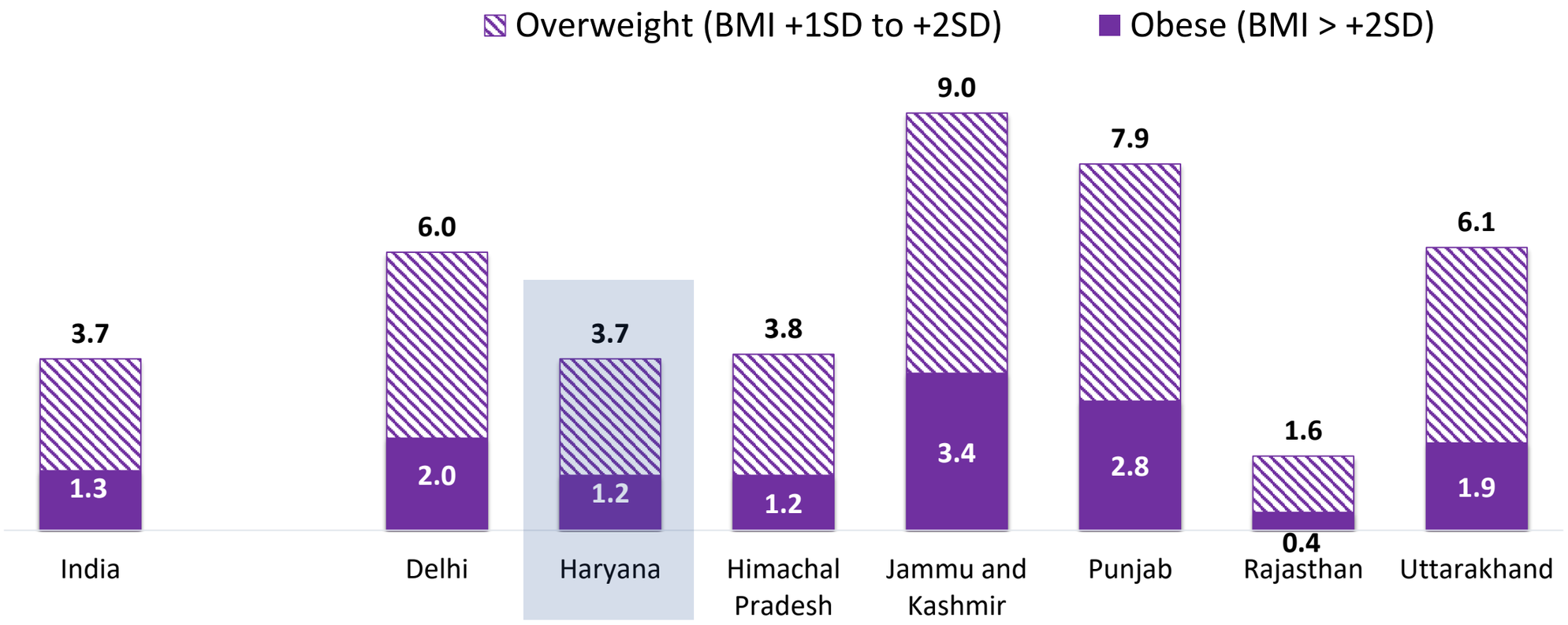
Birth to Adolescence

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 Haryana (**4%**) was at similar level of India (**4%**)

Among northern states, Haryana had lower prevalence than most of the northern states except Rajasthan (2%)

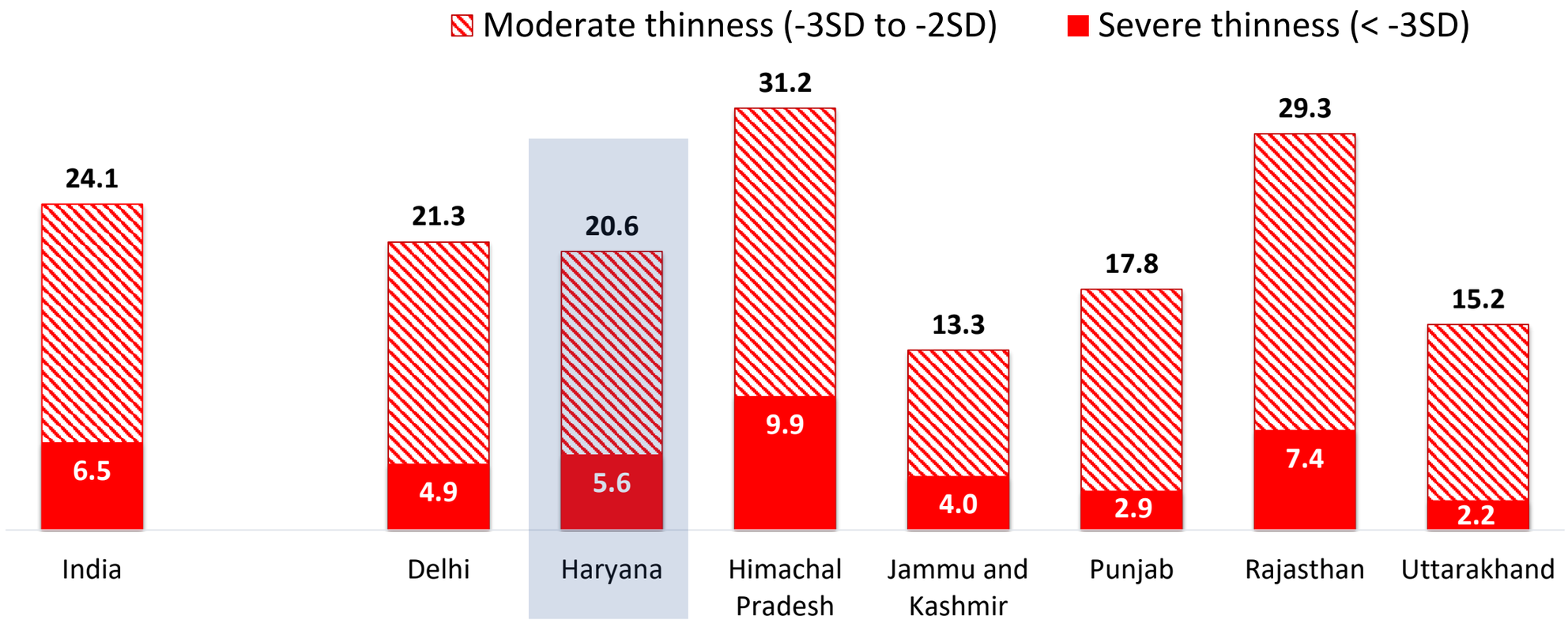


Birth to Adolescence

Thinness among adolescents aged 10-19 years substantially high

1/5 adolescents aged 10-19 years was thin in Haryana (**21%**), less than national average (**24%**)

Among the northern states, Himachal Pradesh (**31%**) and Rajasthan (**29%**) had high prevalence of thinness

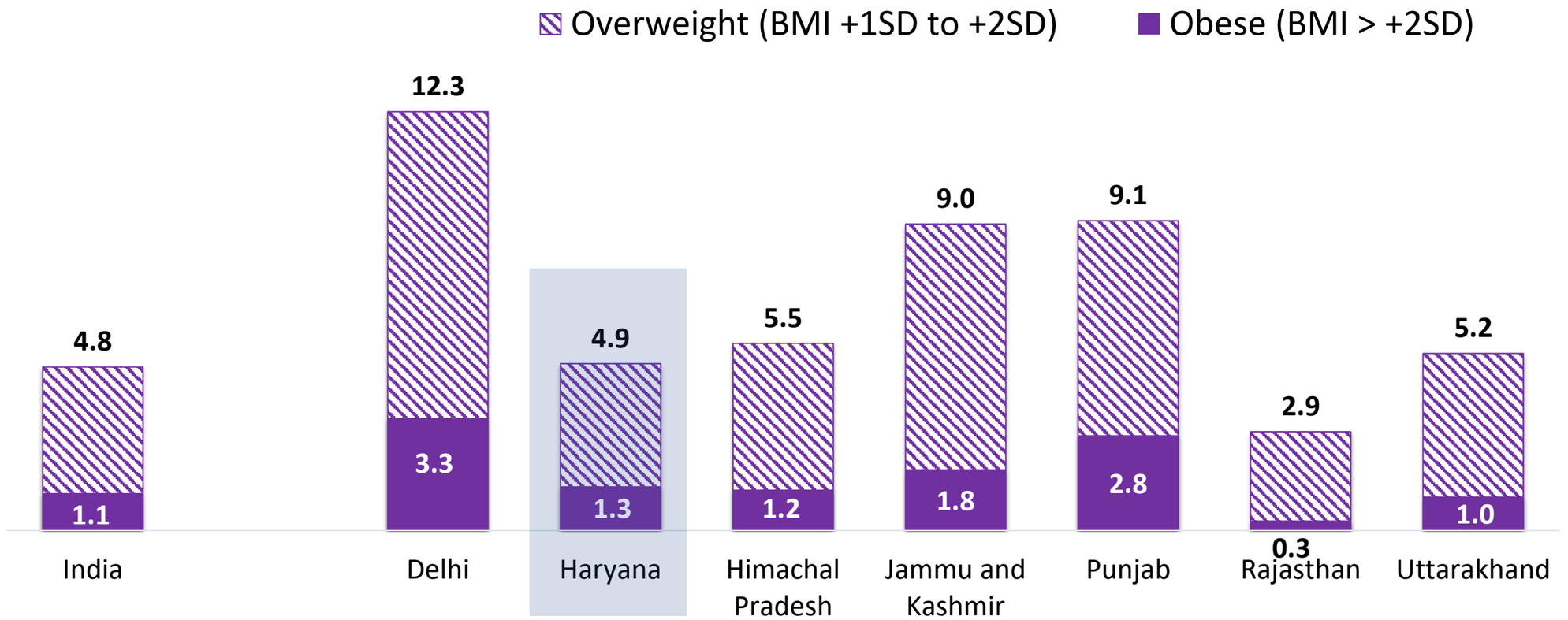


Birth to Adolescence

Prevalence of overweight among adolescents aged 10-19 years high

1/20 adolescents was overweight in Haryana (**5%**), same as the national average (**5%**)

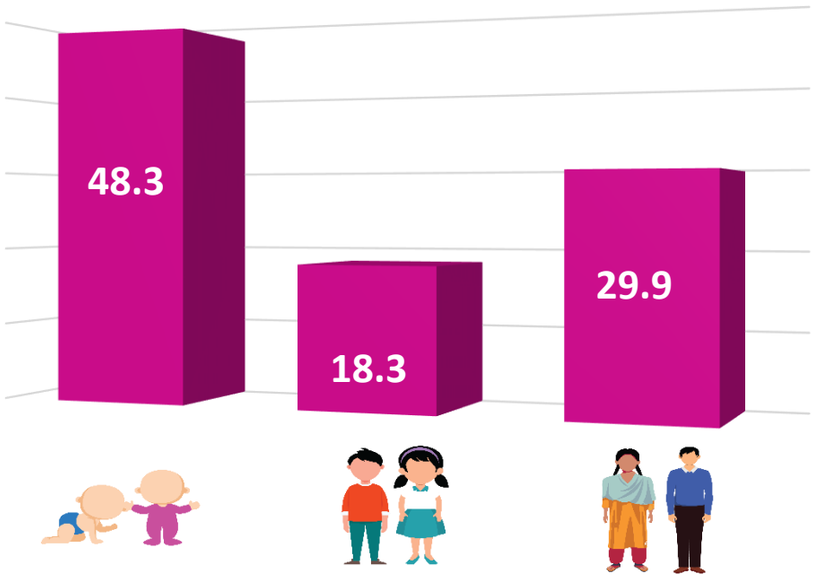
Among the northern states, Delhi had highest prevalence, also high in Jammu and Kashmir (**9%**) and Punjab (**9%**)



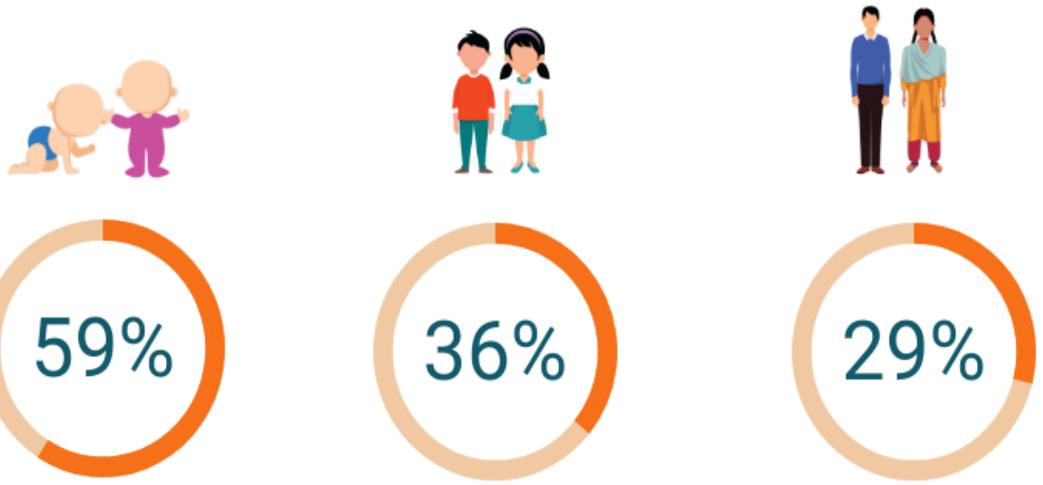
Birth to Adolescence

Haryana key findings: Anaemia and iron deficiency

Anaemia



Iron deficiency



In Haryana, 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

Findings indicate that children aged 1-4 years had higher iron deficiency (measured by serum ferritin) than other children or adolescents

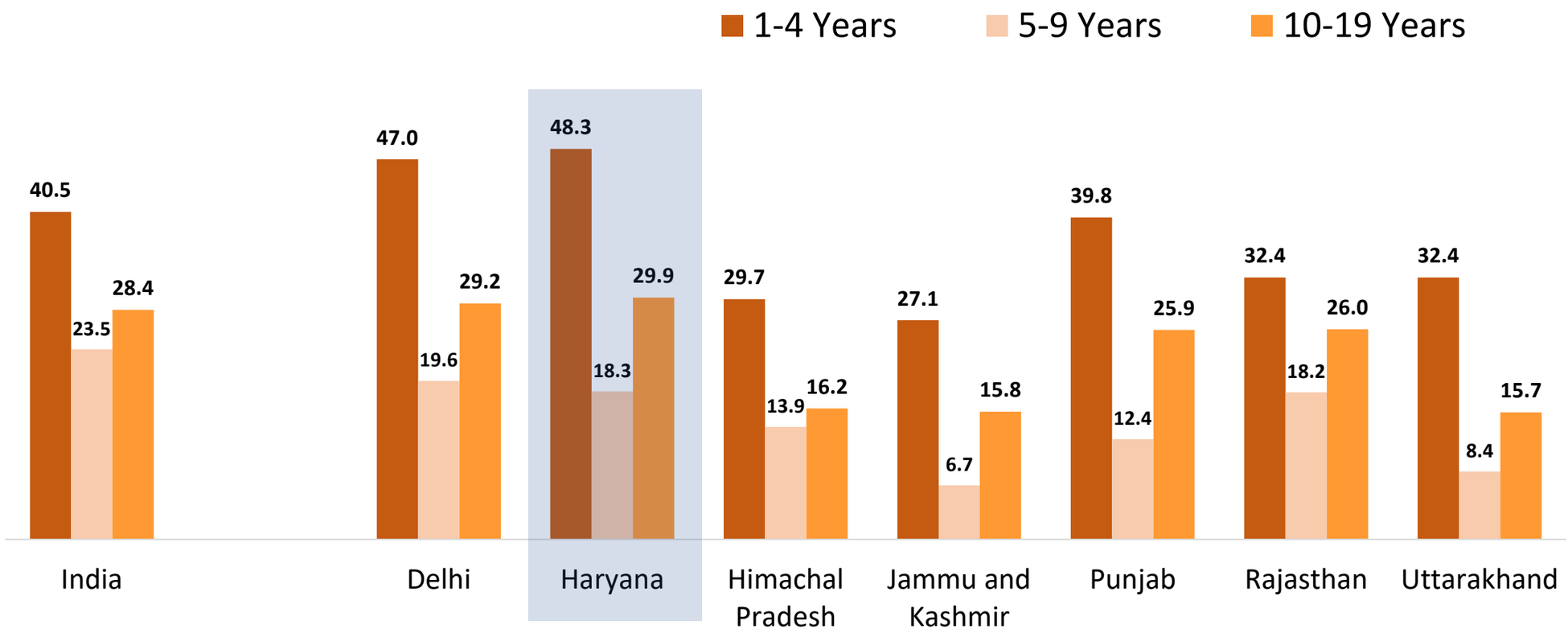
CINS
Birth to Adolescence

Prevalence of Anaemia among children and adolescents

1/2 children aged 1-4 years was anaemic in Haryana (**48%**), significantly higher than national average (**41%**)

Prevalence of anaemia was highest among children aged 1-4 years, increased 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)

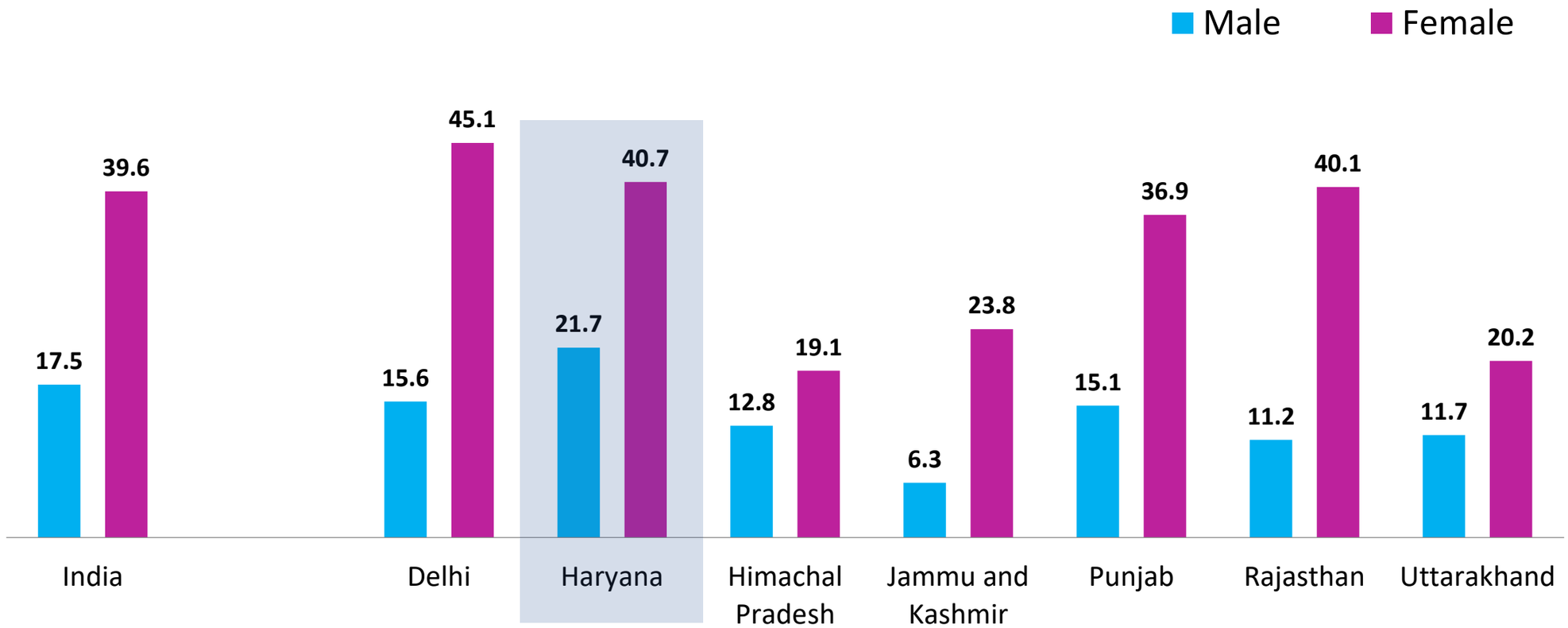


CINS
Birth to Adolescence

Prevalence of Anaemia among adolescents (10-19 years)

Overall, in the country, anaemia prevalence among adolescent girls (10-19 years) was twice that of adolescent boys

In Haryana, as in many other northern states, adolescent girls were twice more likely than adolescent boys to be anaemic

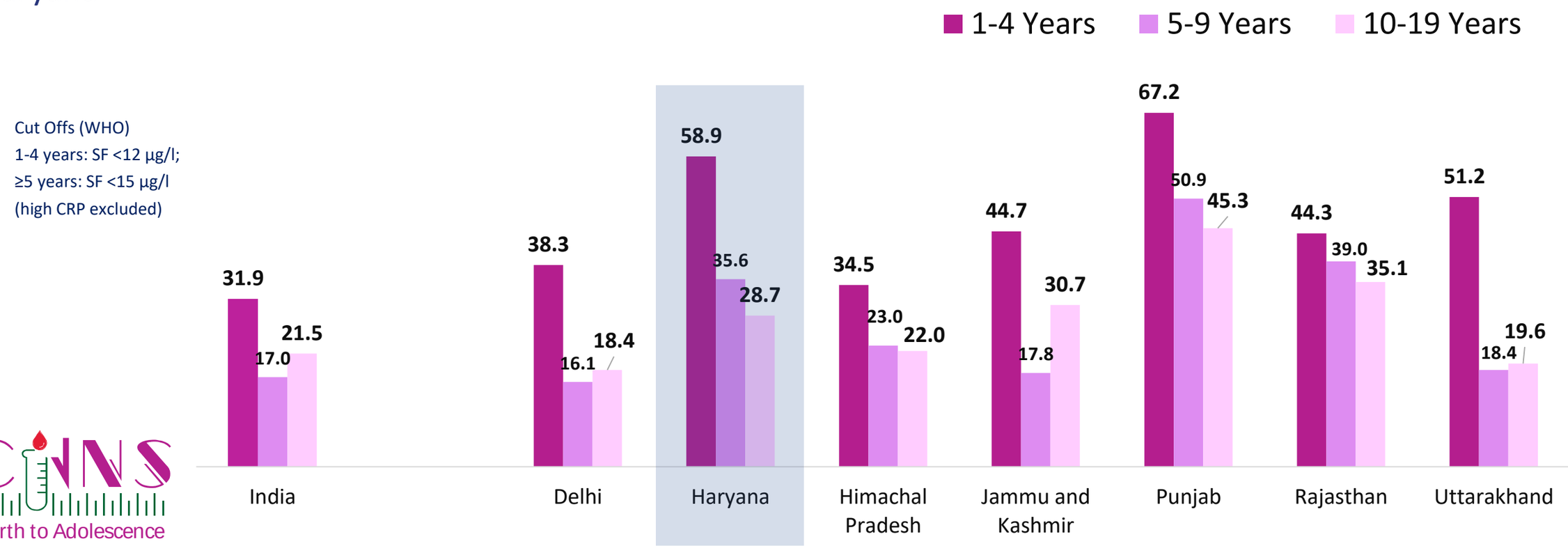


Birth to Adolescence

Iron deficiency measured by serum ferritin among children and adolescents

3/5 children aged 1-4 years had iron deficiency in Haryana (**59**%), significantly higher than the national average (**32%**); prevalence was highest among children aged 1-4 years

Among northern states, children from Punjab (**67%**) had highest prevalence of iron deficiency, followed by Haryana



Birth to Adolescence

Haryana key findings: Vitamin A and Vitamin D deficiency

Nearly **1/4** children aged 1-9 years had Vitamin A deficiency

Children aged 1-9 years (24-26%) were found to have higher levels of Vitamin A deficiency as compared to adolescents aged 10-19 years

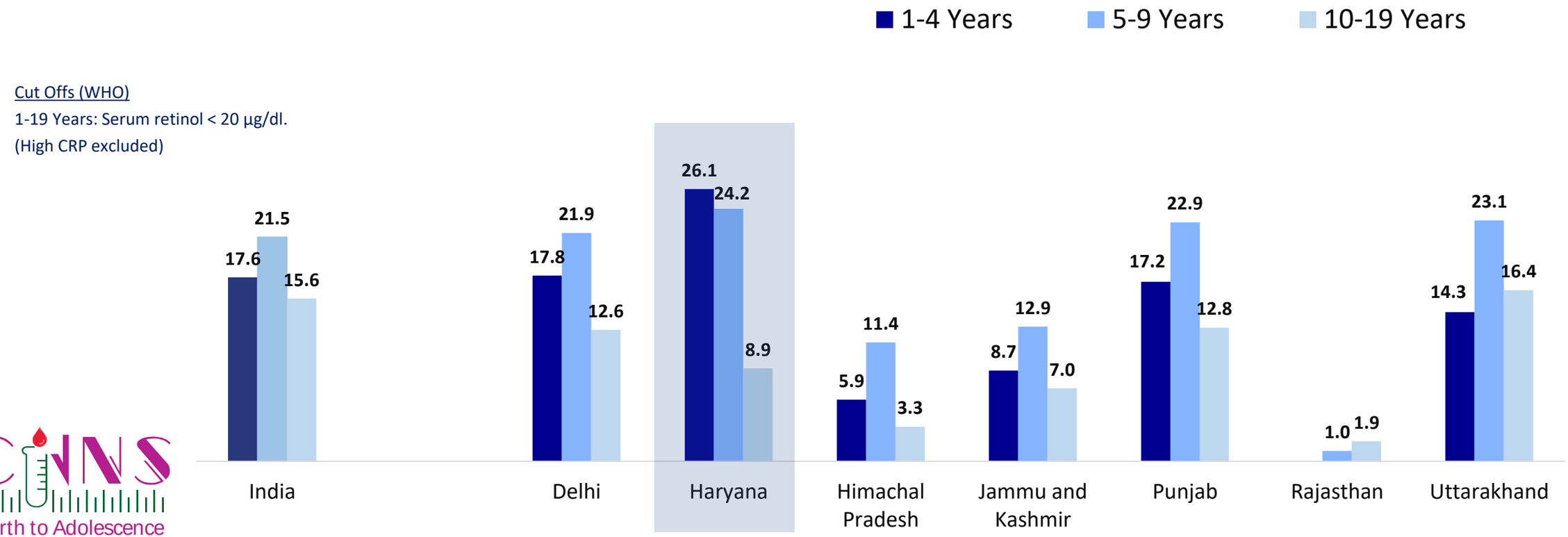
Vitamin D deficiency ranged from 28% to 54% in 1-19 years age group as per cut off by expert panel of IOM.

Vitamin D deficiency was found in increasing order from preschoolers to Adolescents – 28% in children 1-4 years, 46% in children 5-9 years and 54% in adolescents.

Vitamin A deficiency among children and adolescents

9-26% of children and adolescents had Vitamin A deficiency in Haryana, prevalence was higher among children aged 1-9 years (24-26%) than adolescents (9%)

Prevalence of Vitamin A deficiency in all age group did not show any particular pattern among northern states

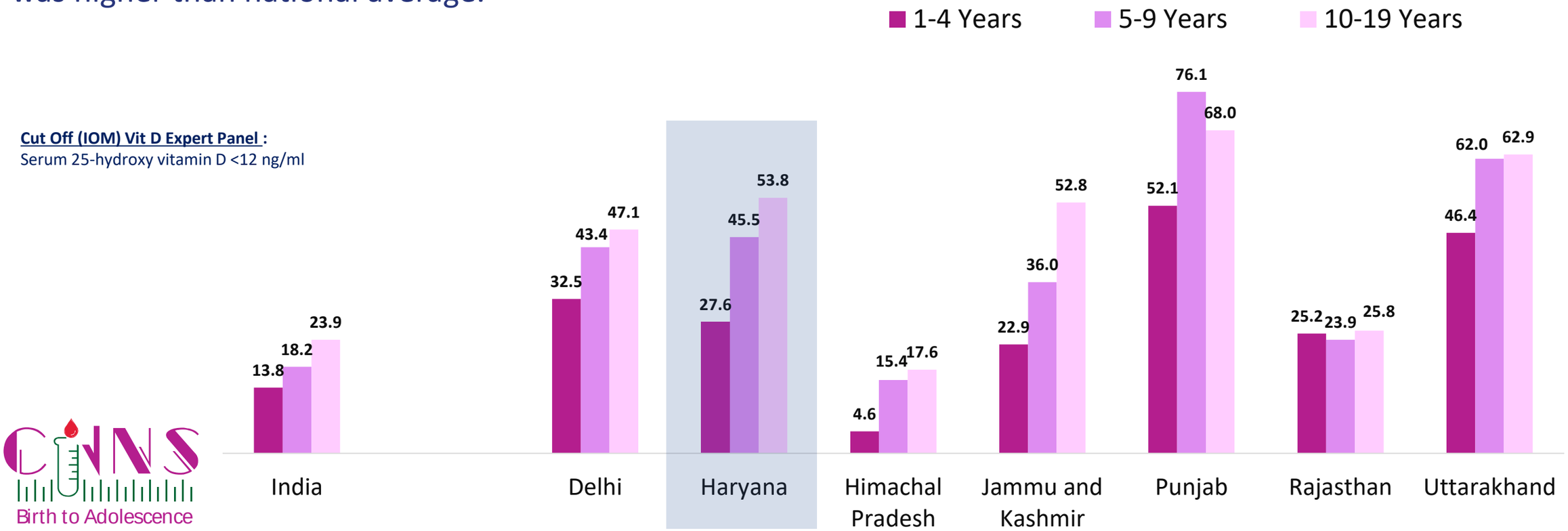


Birth to Adolescence

Vitamin D deficiency increases with age

28-54% children and adolescents had Vitamin D deficiency in Haryana, much higher than the national average (**14-24%**); Vitamin D deficiency increased sharply with age.

In most northern states, except Himachal Pradesh, Vitamin D deficiency among children and adolescents was higher than national average.



Birth to Adolescence

Haryana key findings: Non-communicable diseases

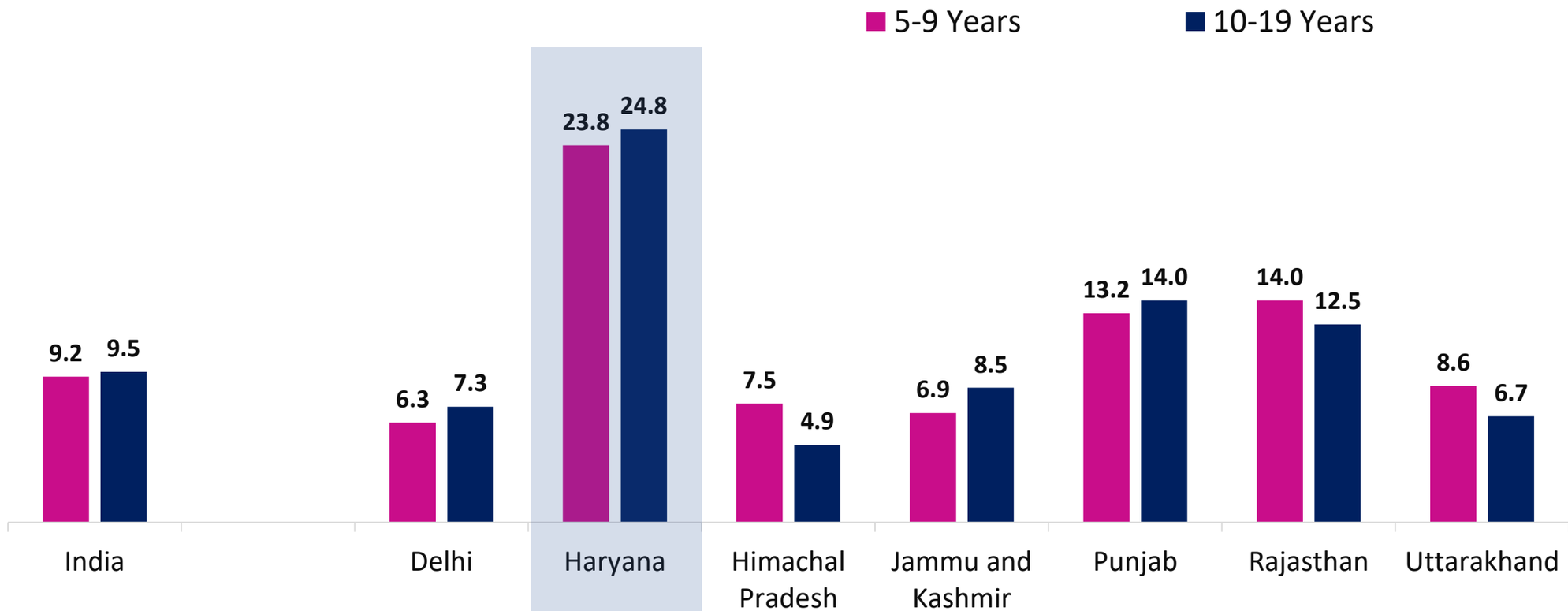
Nearly **1/4** school-age children and adolescents were found with high level of glycosylated haemoglobin (HbA1c).

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), nearly **1/4** children and adolescents had increased risk of diabetes in Haryana (**24-25**%), significantly higher than national average (**9-10%**)

Among all northern states, risk of diabetes among school-aged children and adolescents was highest in Haryana

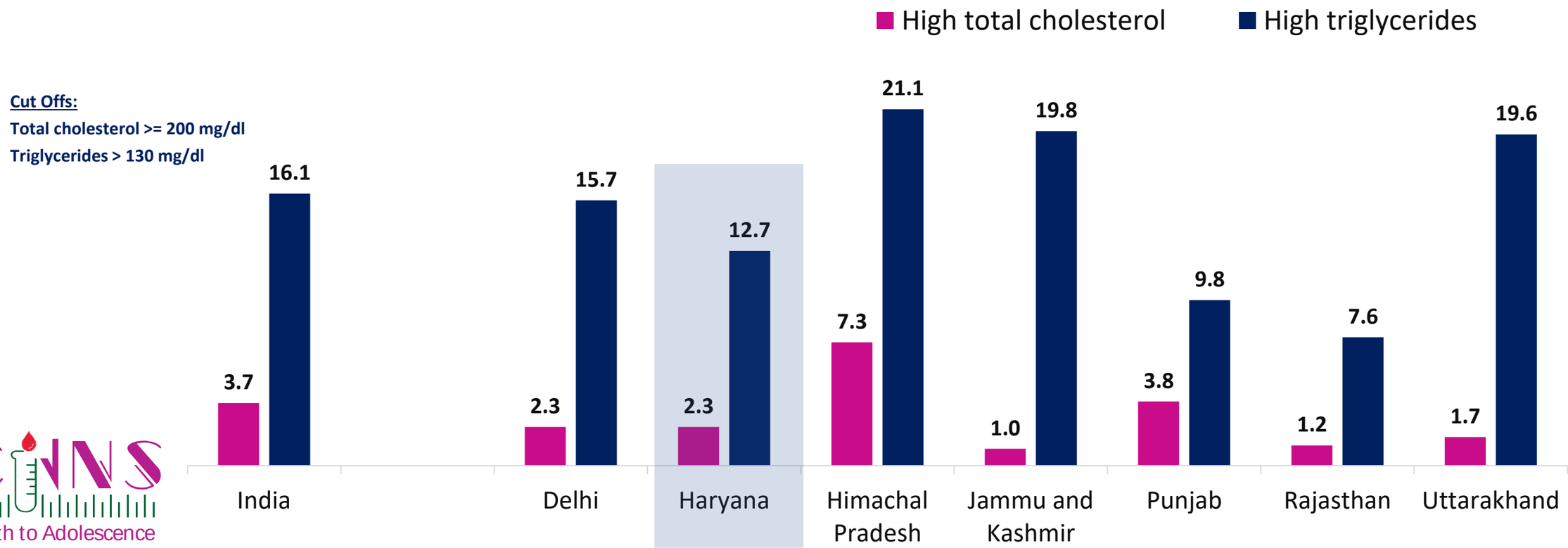


Birth to Adolescence

High total cholesterol and high triglyceride among adolescents

Elevated risk of NCDs in Haryana among adolescents – **2%** had high level of total cholesterol and **13%** with high level of triglycerides

Prevalence of high total cholesterol and high triglycerides were highest in Himachal Pradesh among northern states

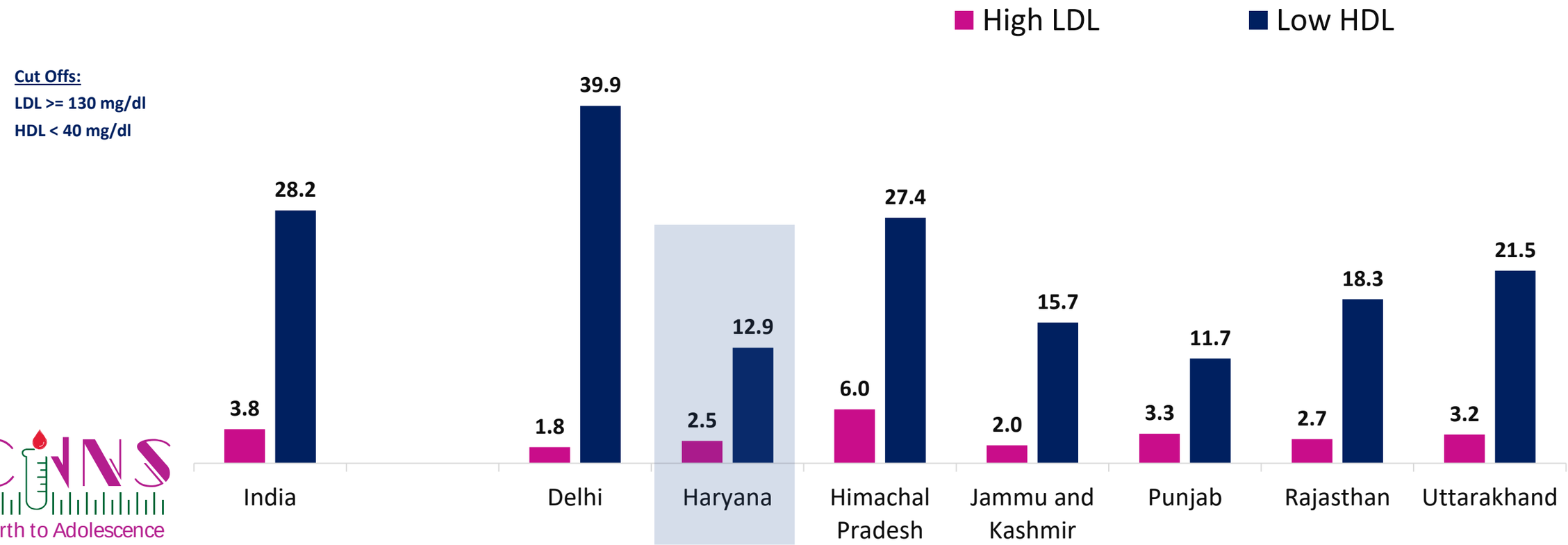


Birth to Adolescence

High LDL and low HDL among adolescents

Risk of NCDs among adolescents in Haryana was high – **2%** had high level of LDL and **13%** had low level of HDL

Among northern states, prevalence of both high LDL and low HDL was moderately high in Himachal Pradesh



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

Empowering Nation Through Nutrition

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

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POSTGRADUATE INSTITUTE OF MEDICAL EDUCATION AND RESEARCH CHANDIGARH