सत्यमेव जयते

Ministry of Health and Family Welfare
Government of India

Comprehensive National Nutrition Survey

2016 – 2018

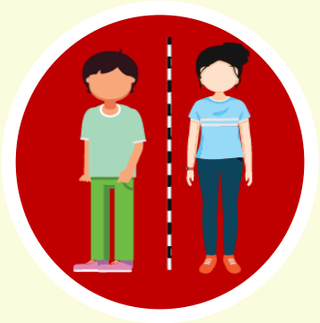
Nagaland
State Presentation

Birth to Adolescence

Largest Micronutrient Survey ever conducted: CNNS 2016-

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
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*

CINS Birth to Adolescence

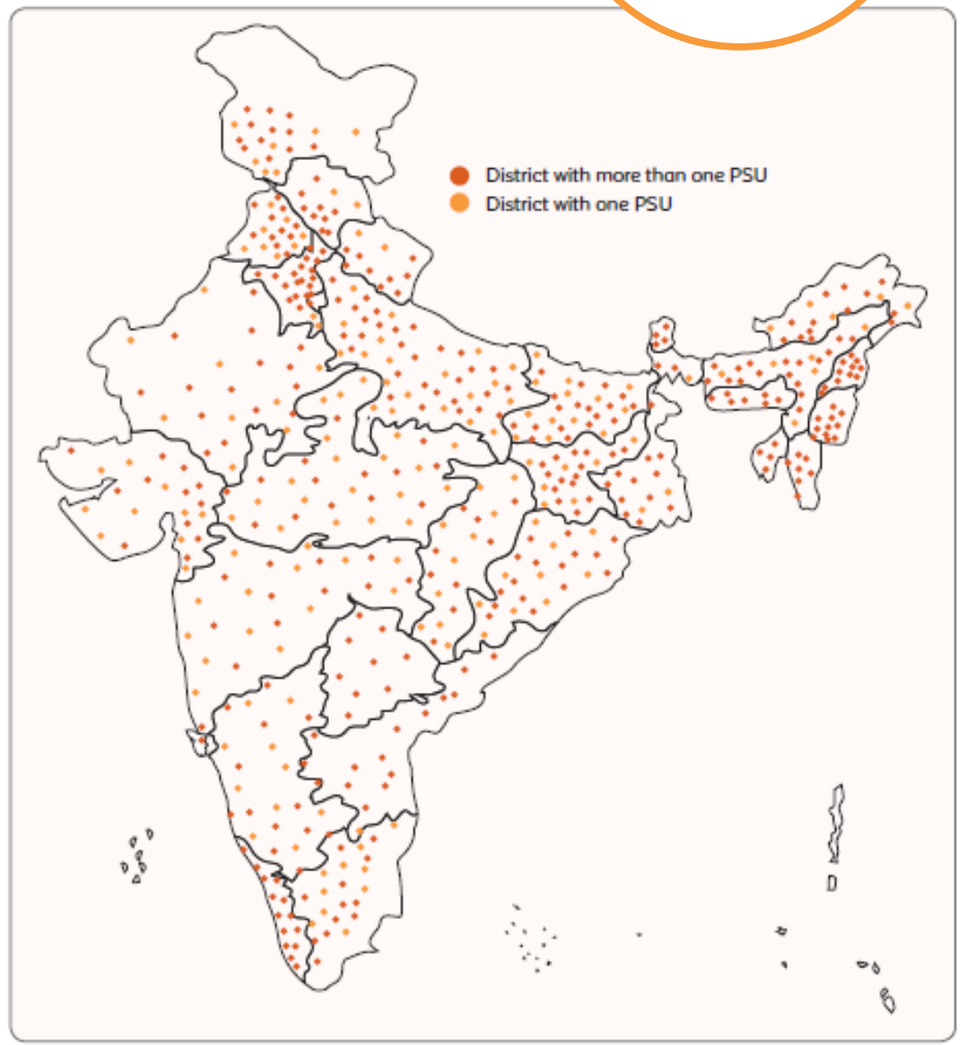
*Soumya Swaminathan, et al. (2019), The burden of child and maternal malnutrition and trends in its indicators in the states of India: the Global Burden of Disease Study 1990–2017. https://doi.org/10.1016/S2352-4642(19)30273-1

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



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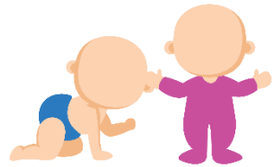
Anthropometry data

	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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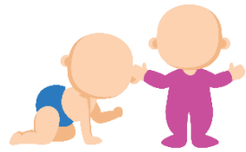
Biochemical indicators - micronutrient deficiencies and NCDs

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

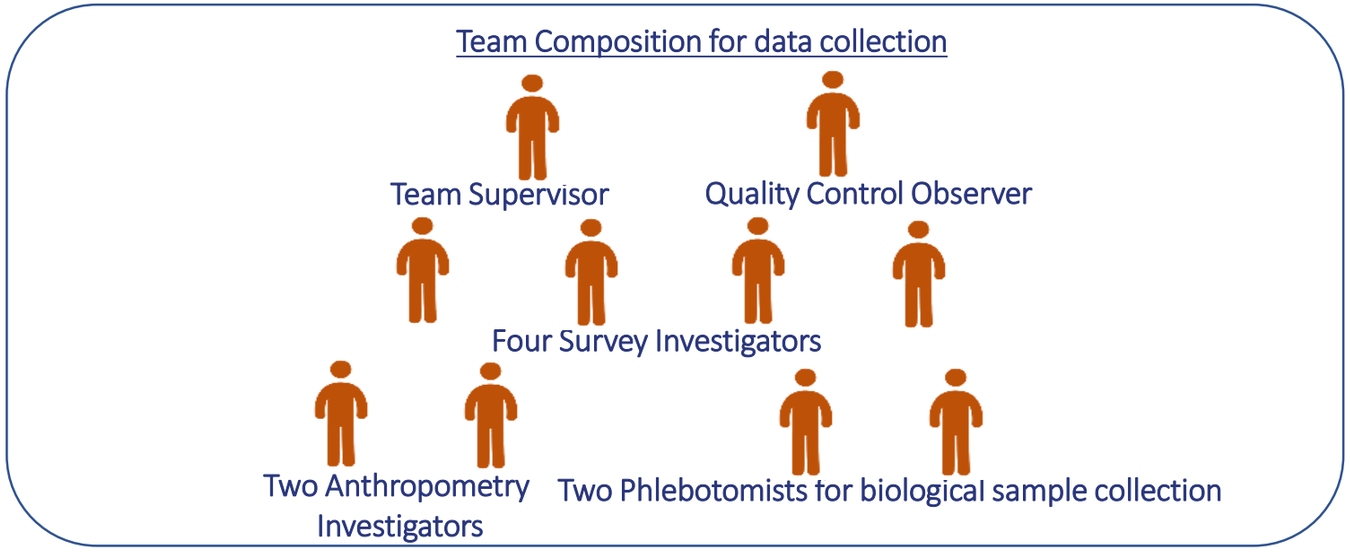
- Field work/protocol/training monitoring: by quality control team
- Biological sample quality control : by AIIMS, NIN and US CDC

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



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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

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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 Nagaland

CNNS covered 60 PSUs for data collection in Nagaland

Achieved following sample size by age groups:

	0-4 years	5-9 years	10-19 years	Total
Household and anthropometry data	1,199	1,189	1,100	**3,488**
Biological sample	231	258	232	**721**

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Period of data collection in Nagaland

CNNS data collection period: November 22, 2016 to May 21, 2017

- CNNS collected data during the autumn of 2016 through summer season of 2017
- NFHS collected data during spring through rainy season of the year 2016

Survey	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CNNS 2016-17	May, 2017										November, 2016	
NFHS 4 2016			March to October, 2016									

CNNS
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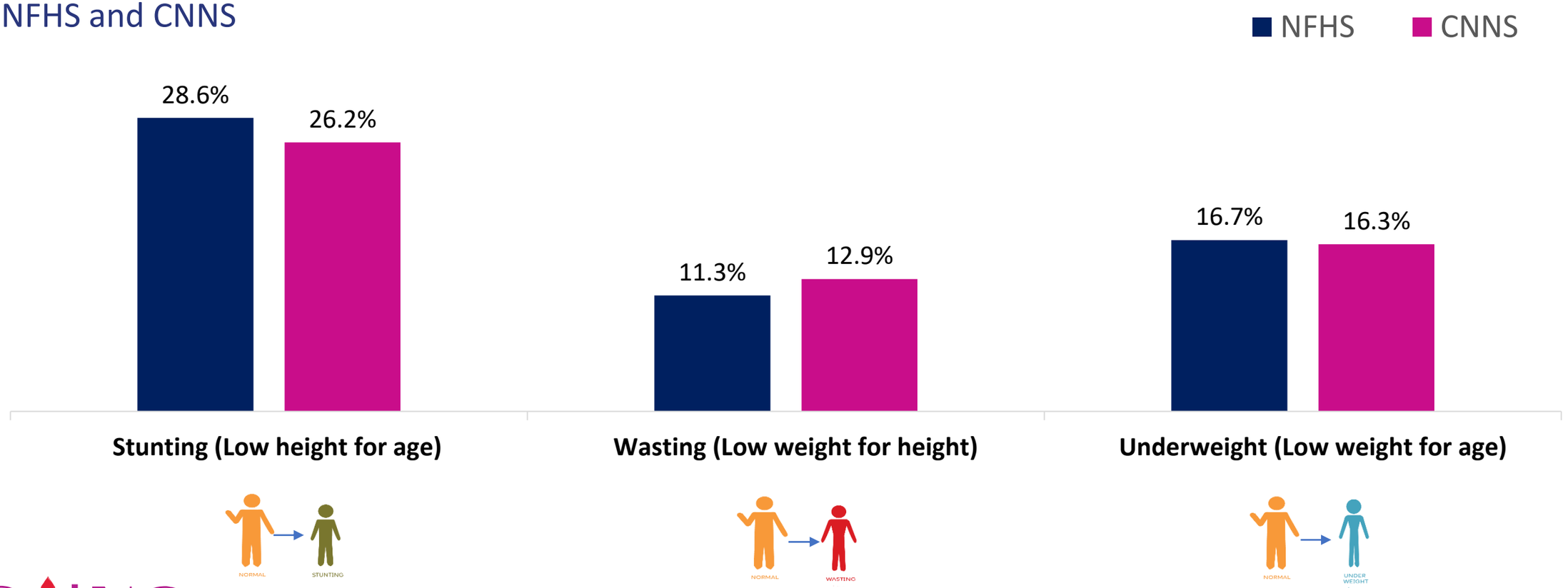
Nagaland key findings: Anthropometry (1/2)

No discernable change in prevalence of stunting, wasting and underweight in children under 5 years between NFHS and CNNS



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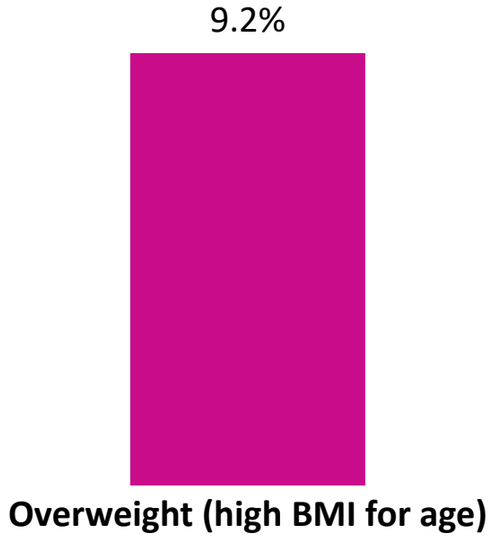
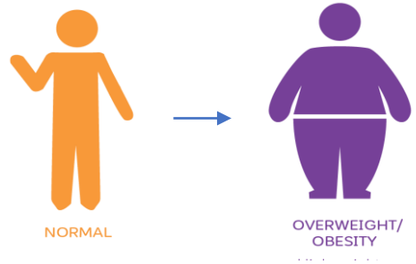
Nagaland key findings: Anthropometry (2/2)

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

1/4 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





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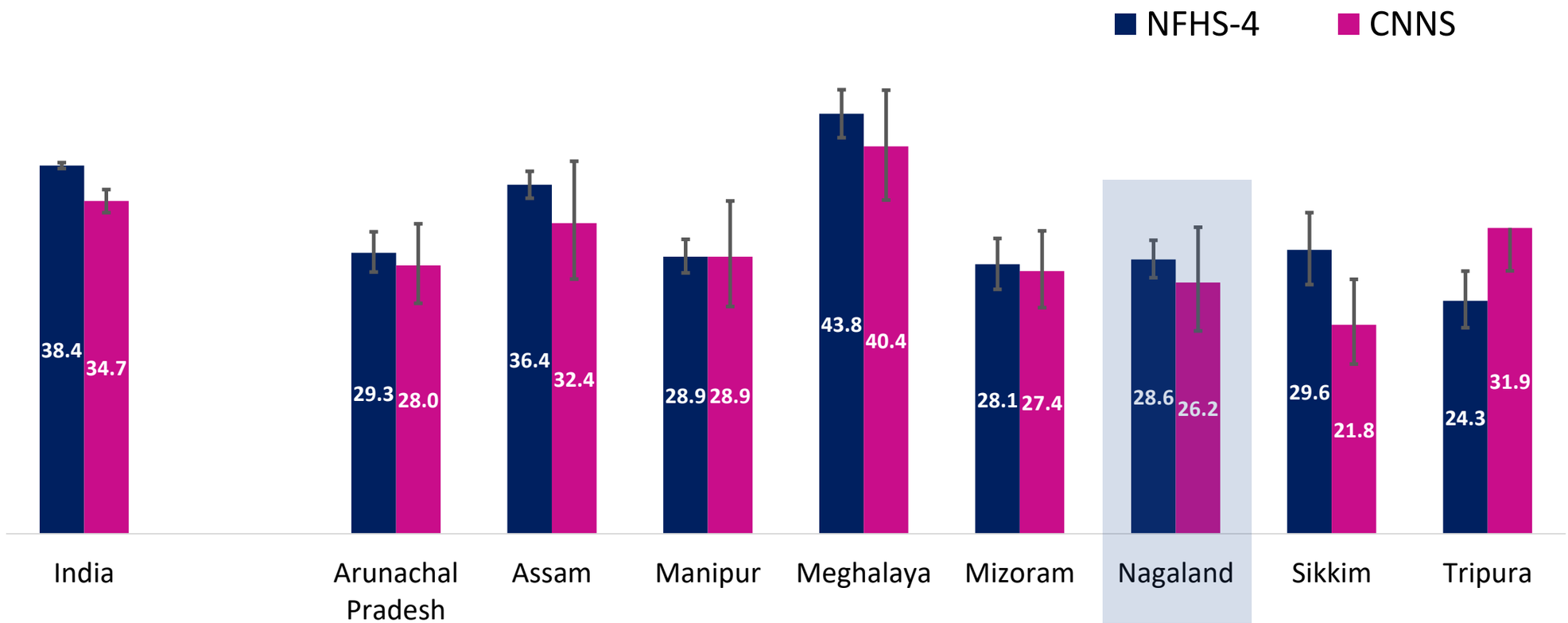
Stunting among children under five

No significant decline in prevalence of stunting was observed in CNNS (**26%**) compared to NFHS-4 (**29%**) in Nagaland

In none of the northeastern states stunting declined significantly

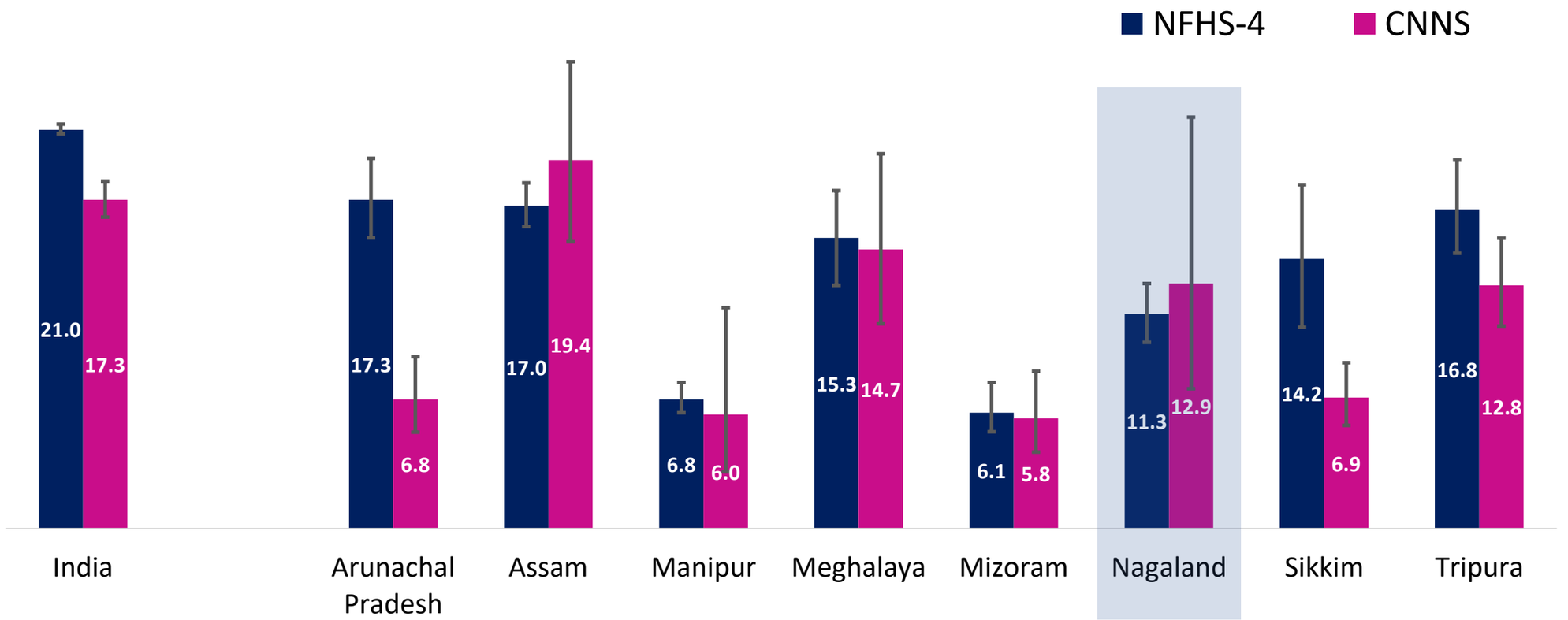


Birth to Adolescence

Wasting among children under five

Prevalence of wasting did not change significantly in Nagaland between NFHS-4 (**11%**) and CNNS (**13%**)

Except in Arunachal Pradesh and Sikkim, wasting remained nearly at the same level in the region



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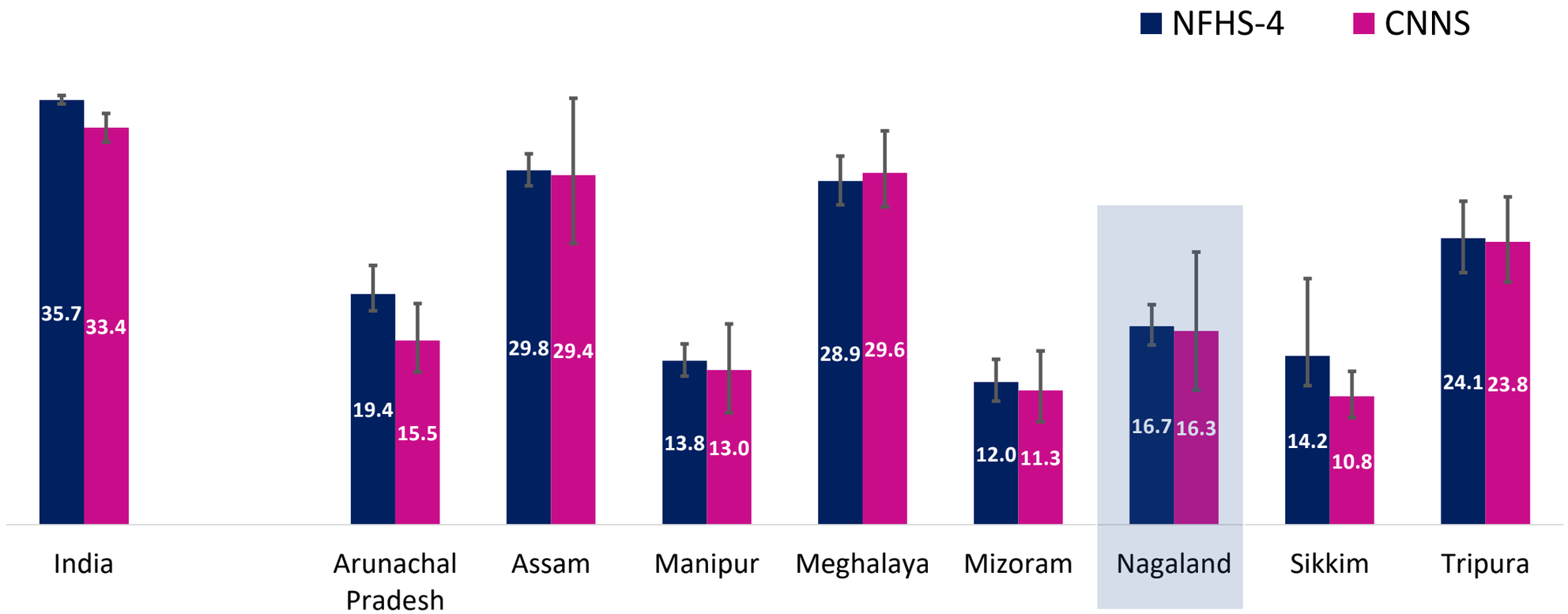
Prevalence of underweight among children under five

Underweight is a composite measure of chronic and acute malnutrition

The prevalence of underweight remained unchanged between NFHS-4 and CNNS – **17%** Vs **16%**

Prevalence remained unchanged in most of the northeastern states



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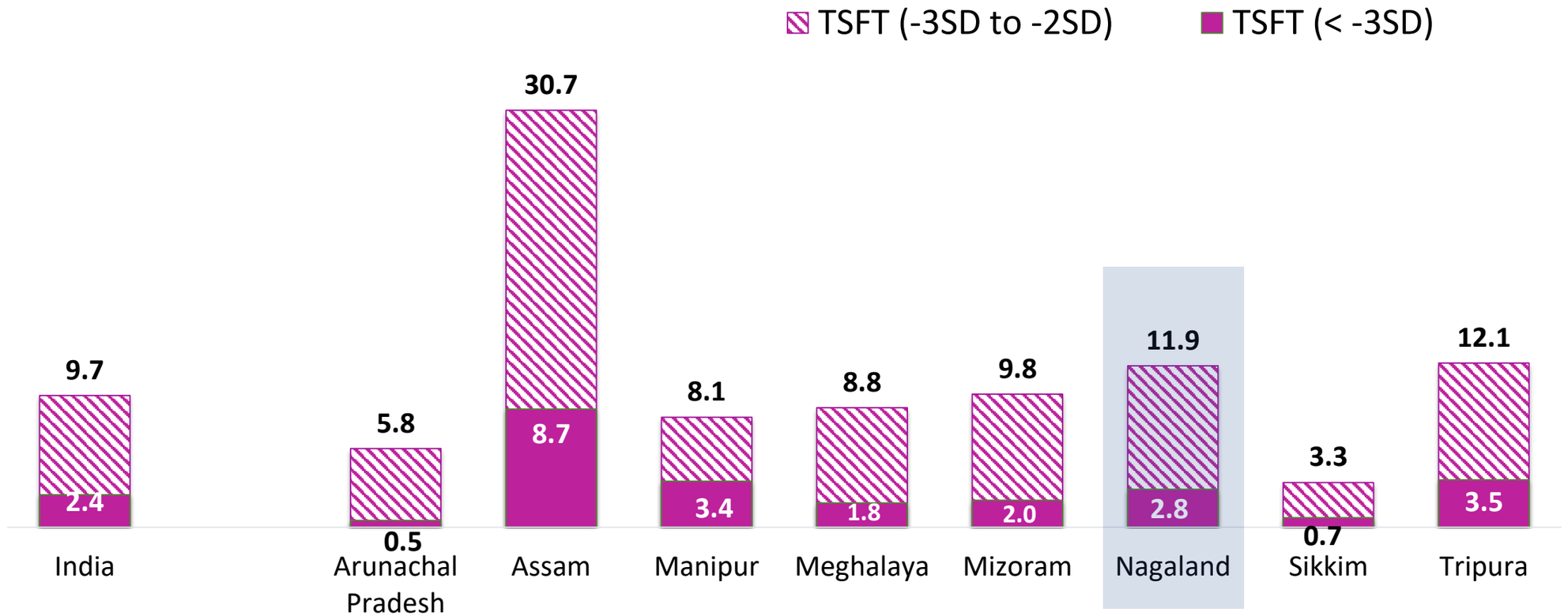
Triceps Skinfold Thickness (TSFT) for children under five

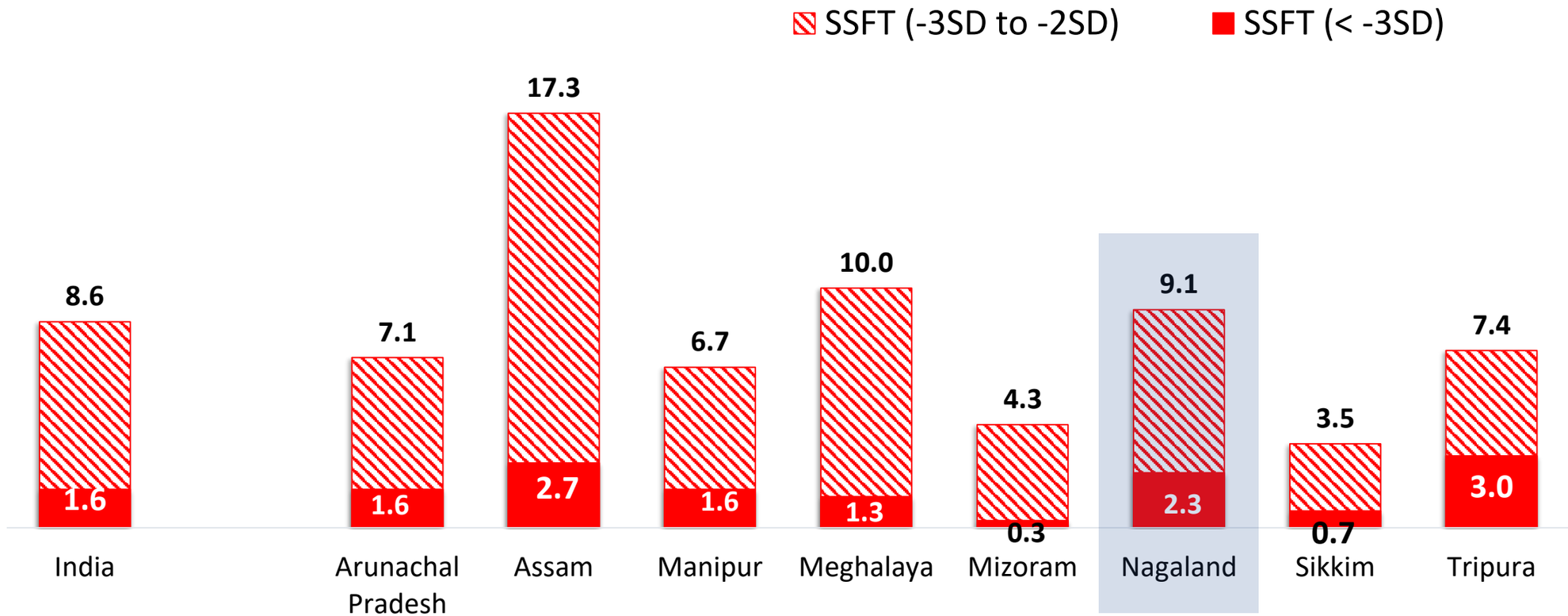
Low fat mass as reported by TSFT in Nagaland (**12%**) was moderately high among northeast states and slightly higher than the national average (**10%**); highest in Assam (**31%**) in the region



Birth to Adolescence

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

Thinness as reported by SSFT in Nagaland (**9%**) was moderately high among the northeast states and at similar level to the national average (**9%**); highest in Assam (**17%**) in the region

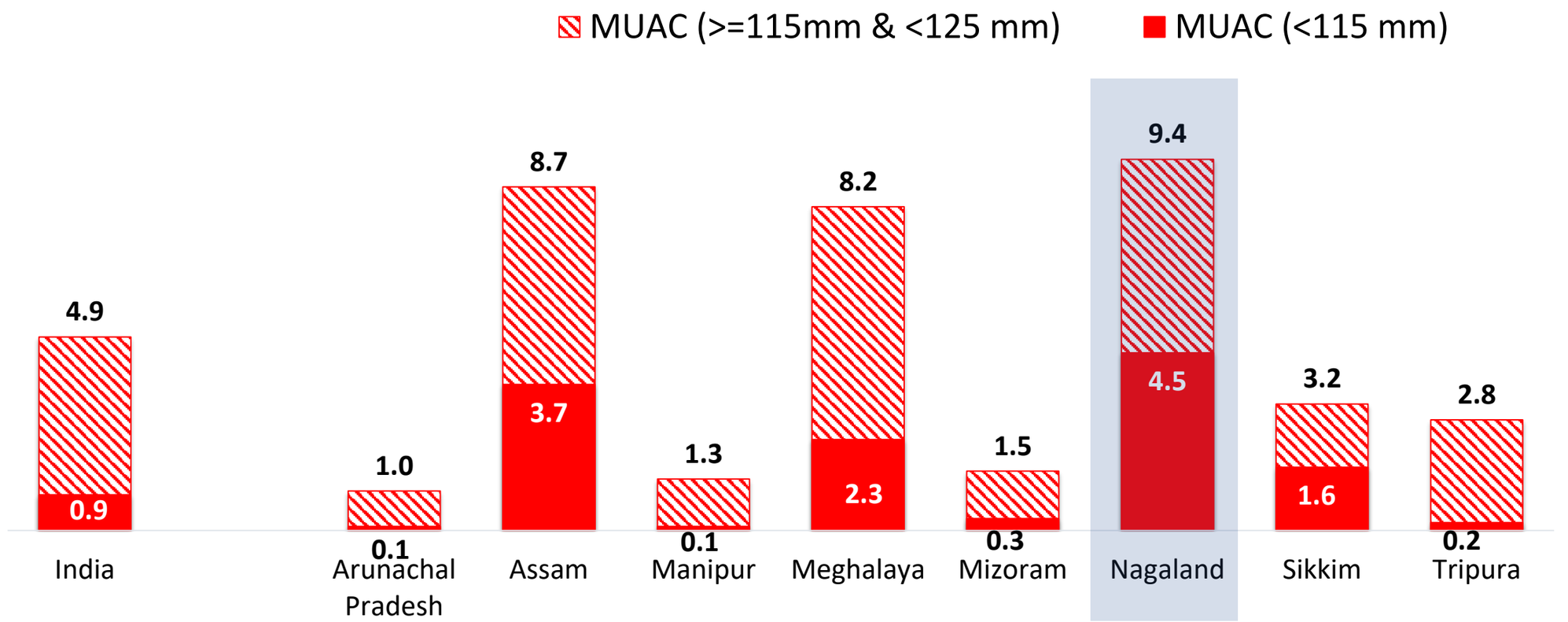


Birth to Adolescence

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

About **9%** children in Nagaland had low MUAC

Prevalence of low MUAC ranged between **1%** and **9%** across the northeastern states

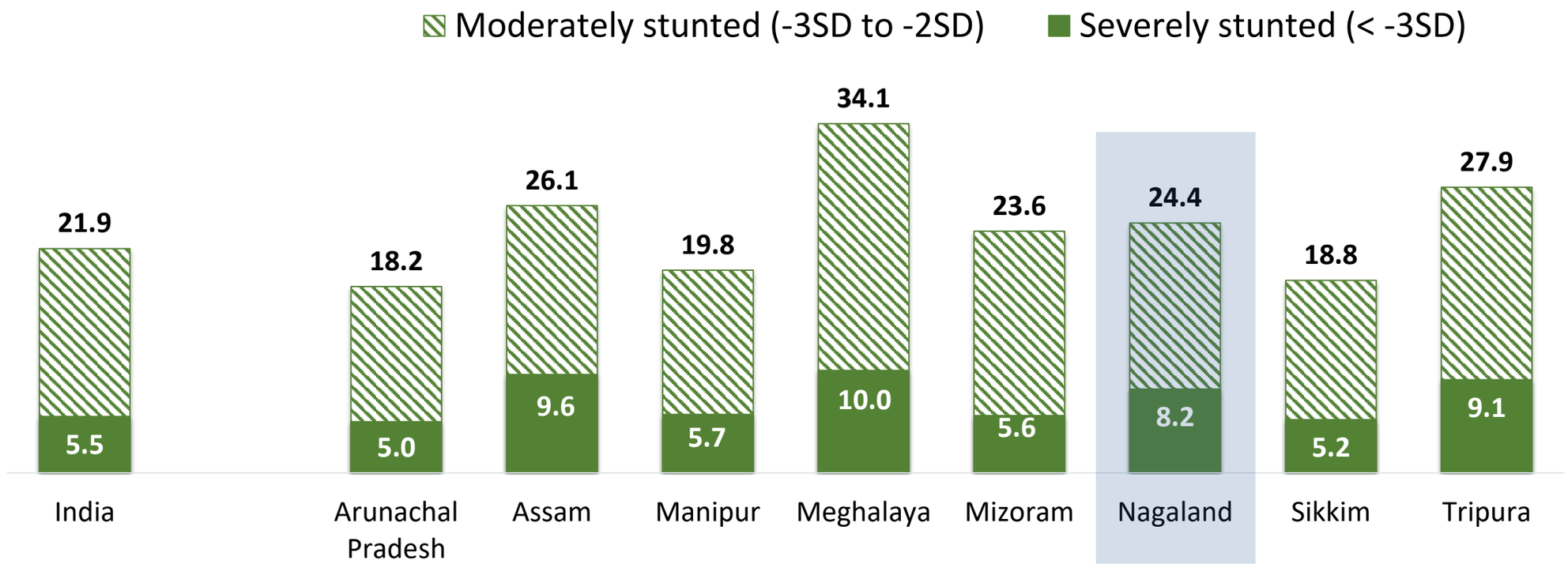


Birth to Adolescence

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

1/4 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

Prevalence of stunting among the northeast states varied, Assam, Meghalaya, Mizoram, Nagaland, Tripura were above national average

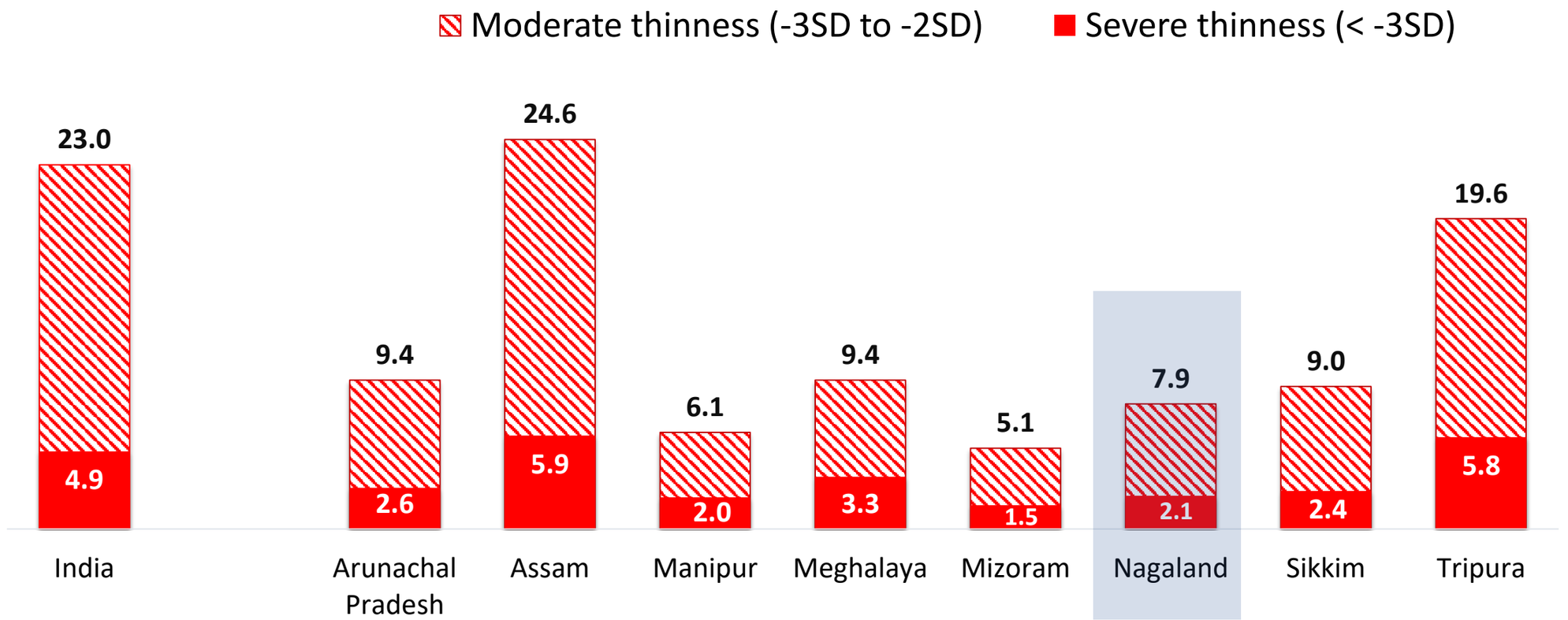


Birth to Adolescence

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

8% of children aged 5-9 years were thin in Nagaland, significantly lower than national level (**23%)**

Prevalence of thinness was highest in Assam (**25%**) followed by Tripura (**20%**) in the northeastern region



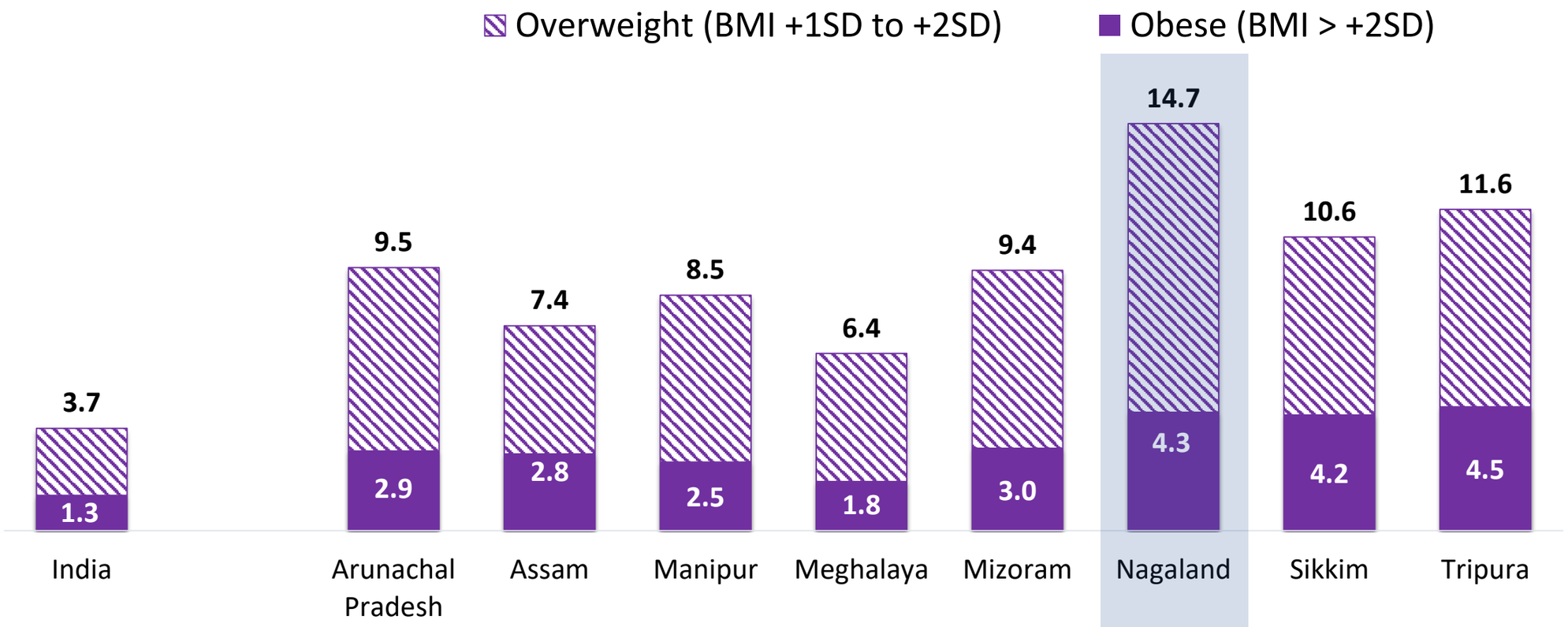
Birth to Adolescence

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 Nagaland (**15%**) was nearly four times the national average (**4%**)

Prevalence of overweight was highest in Nagaland followed by Tripura (**12%**) in this age group

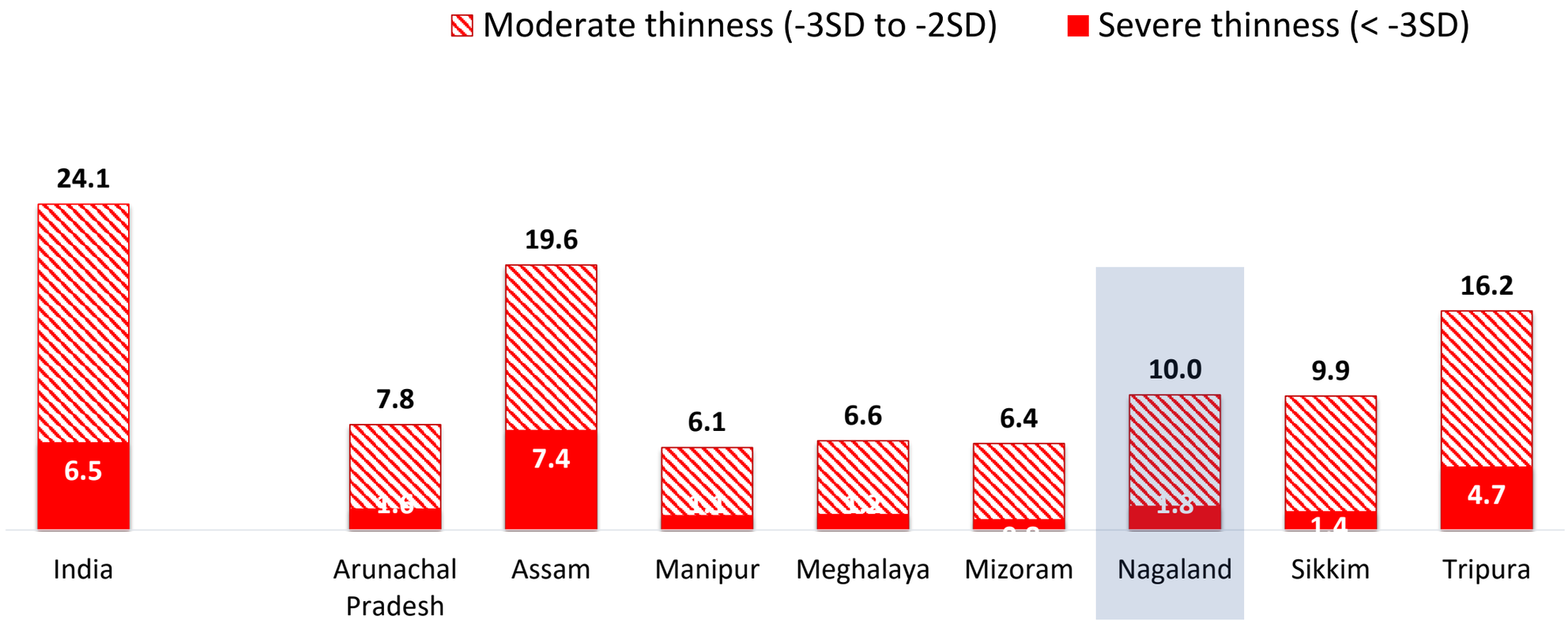


Birth to Adolescence

Thinness among adolescents aged 10-19 years substantially high

1/10 adolescents aged 10-19 years was thin in Nagaland (**10%**), significantly lower than national average (**24%**)

Prevalence of thinness was highest in Assam (**20%**) followed by Tripura (**16%**) in the northeast region.

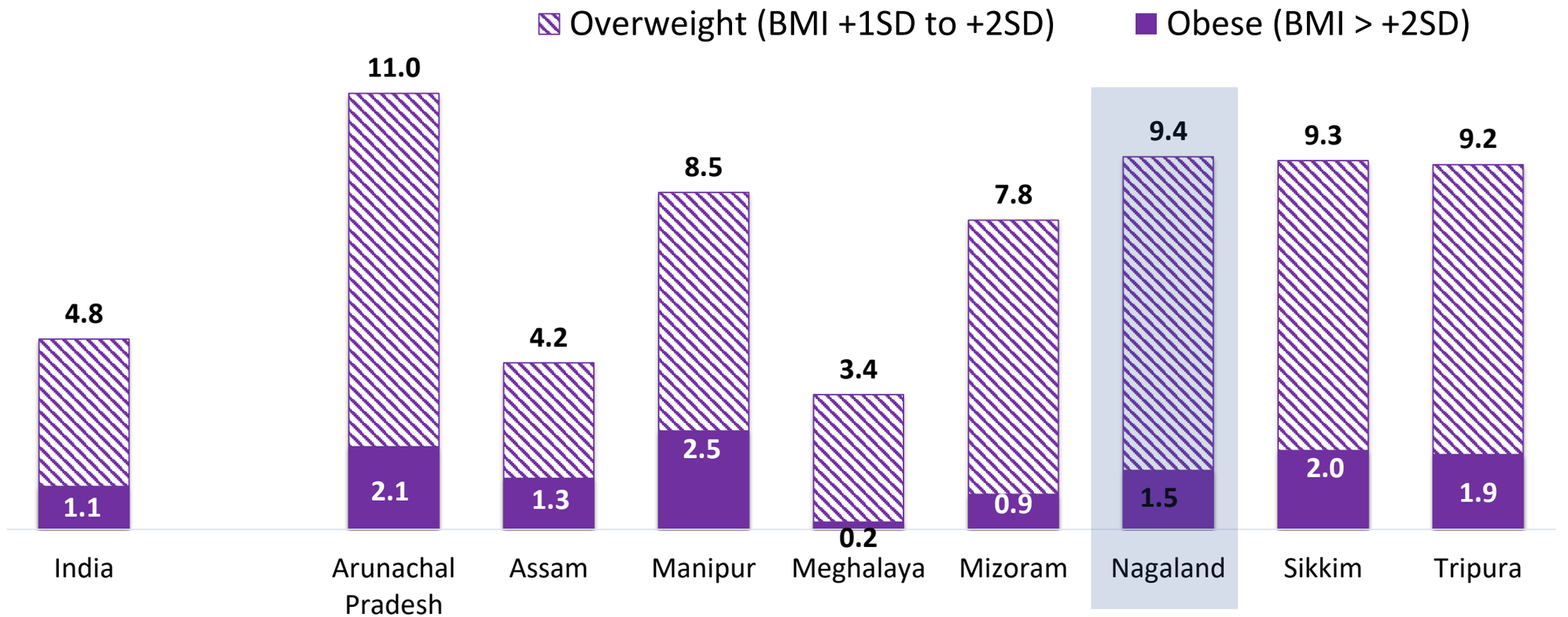


Birth to Adolescence

Prevalence of overweight among adolescents aged 10-19 years high

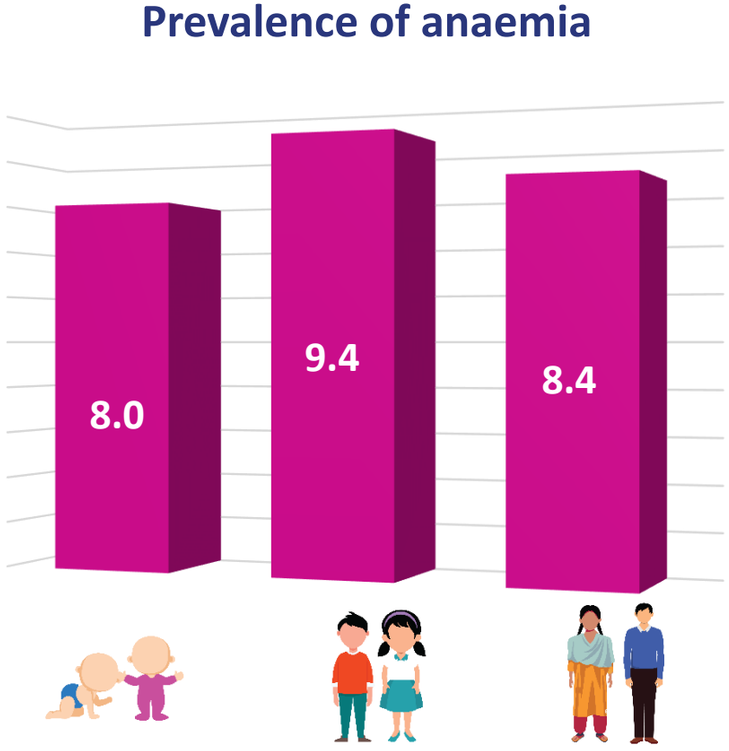
9% of adolescents were overweight in Nagaland, nearly double the national average (**5%**)

In most of the northeastern states, prevalence of overweight was significantly high, except in Assam and Meghalaya



Birth to Adolescence

Nagaland key findings: Anaemia



In Nagaland, unlike in most states, anaemia was higher among children aged 5-9 years compared to children aged 1-4 years and adolescents aged 10-19 years

Birth to Adolescence

Prevalence of Anaemia among children and adolescents

8-9% of children aged 1-9 years and **8%** of adolescents aged 10-19 years were anaemic in Nagaland, significantly lower than the national average

Prevalence of anaemia was lowest in Nagaland among the northeast states

Anaemia Cut Offs (WHO)

1-4 years: Hb<11.0 g/dl

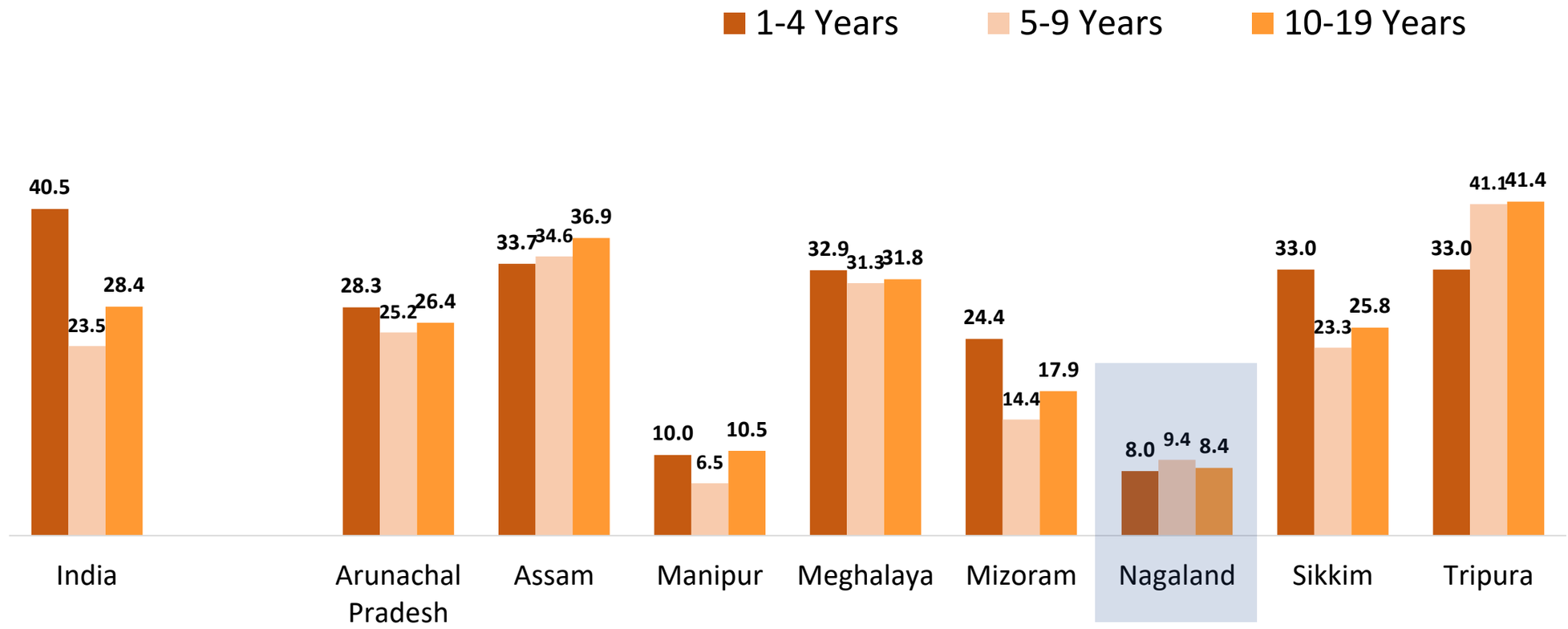
5-11 years: Hb<11.5 g/dl

12-14 years: Hb< 12 g/dl

Girls ≥15years: Hb< 12g/dl

Boys ≥15 years: Hb< 13 g/dl

(Adjusted for altitude)



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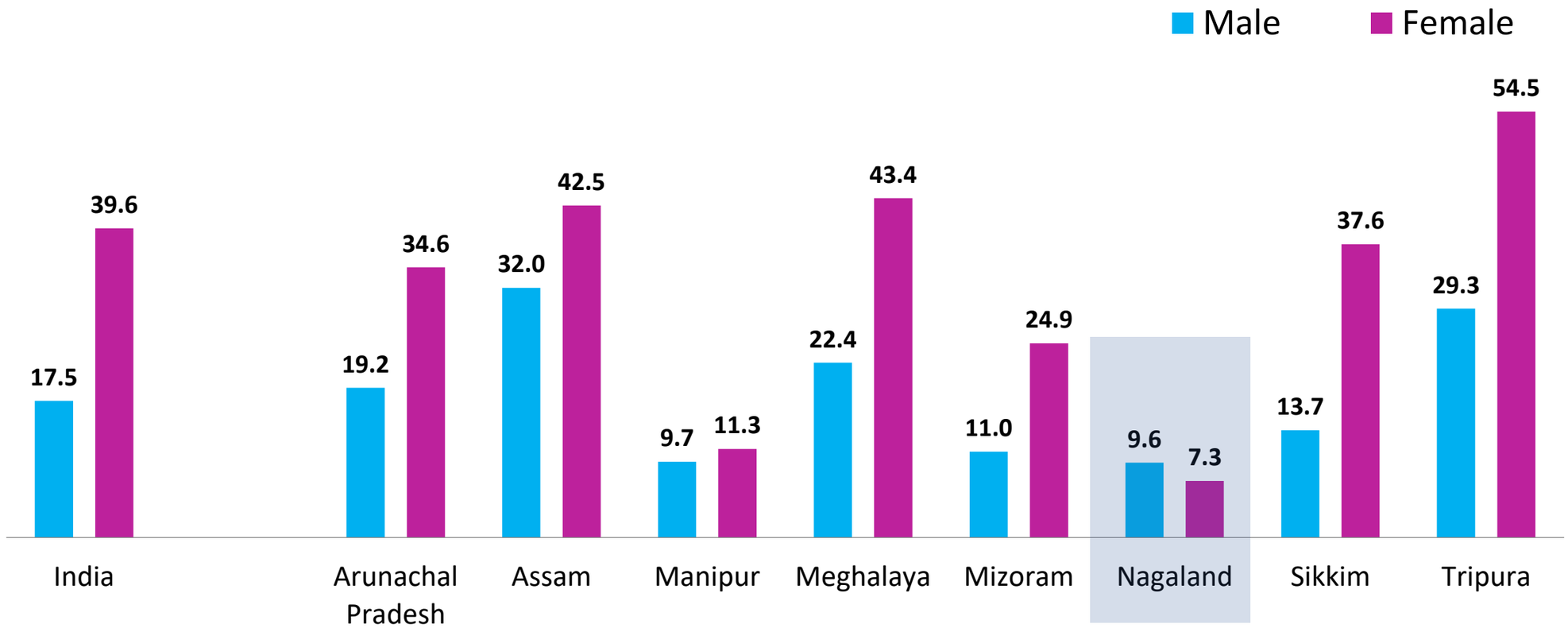
Prevalence of Anaemia among adolescents (10-19 years)

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

In Nagaland, unlike in other northeast states, adolescent boys were slightly more likely than the adolescent girls to be anaemic



Birth to Adolescence

Nagaland key findings: Vitamin A and Vitamin D deficiency

Vitamin D deficiency ranged from 2% to 7% in 1-19 years age group as per cut off by expert panel of IOM.

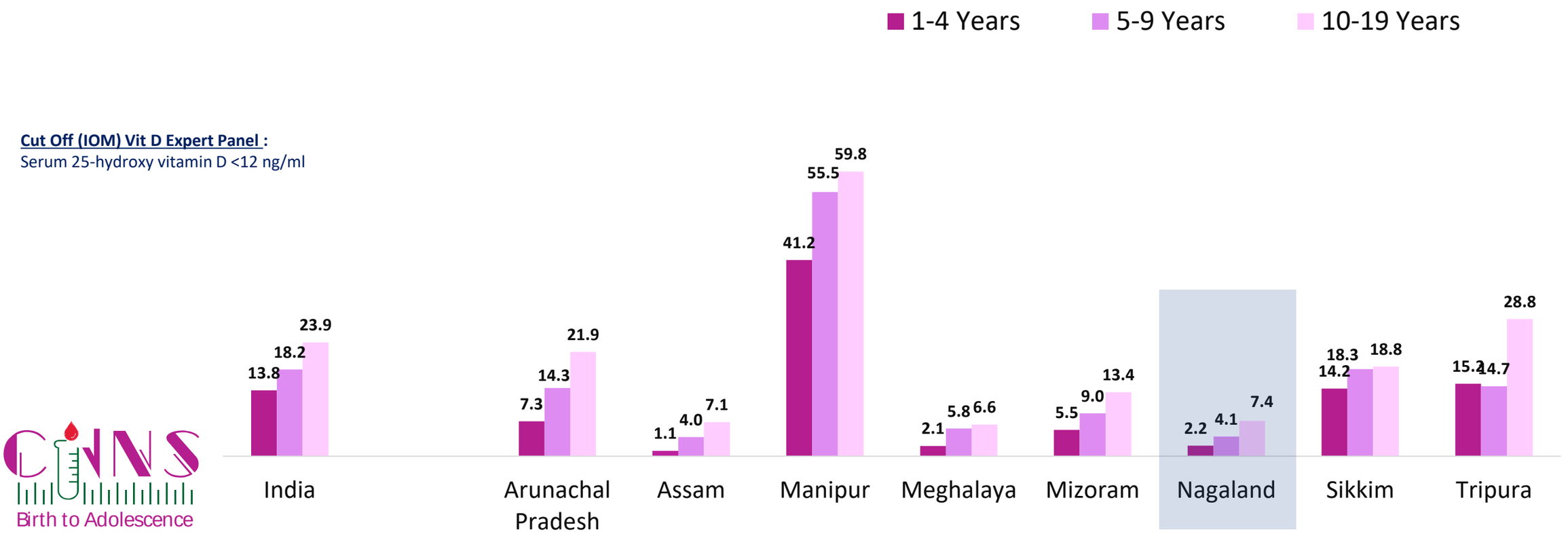
Adolescents aged 10-19 years were found to have higher level of Vitamin D deficiency than children aged 1-9 years

Birth to Adolescence

Vitamin D deficiency increases with age

2-7% of children and adolescents had Vitamin D deficiency in Nagaland; Vitamin D deficiency increased sharply with age.

Among northeast states, Manipur had the highest Vitamin D deficiency among children and adolescents.



Birth to Adolescence

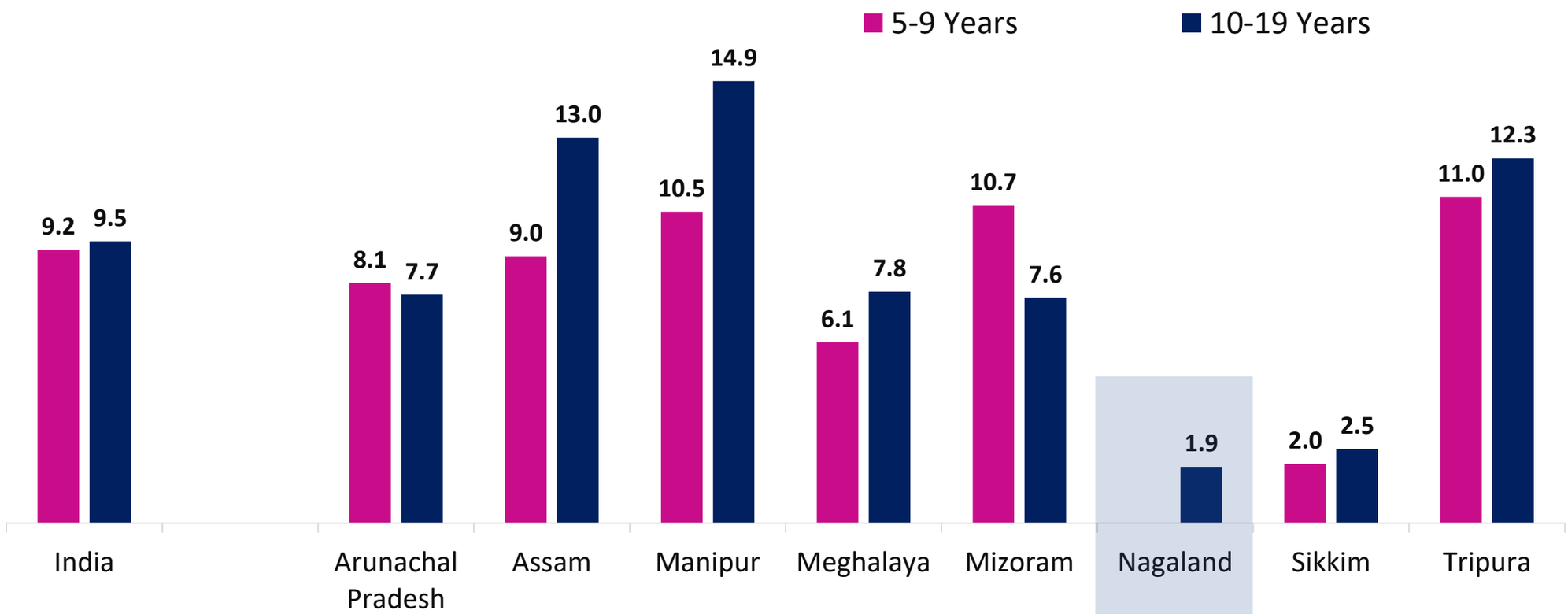
Nagaland key findings: Non-communicable diseases

2% of 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), **2%** of adolescents had increased risk of diabetes in Nagaland, lowest in the northeast region and one-fifth of national average

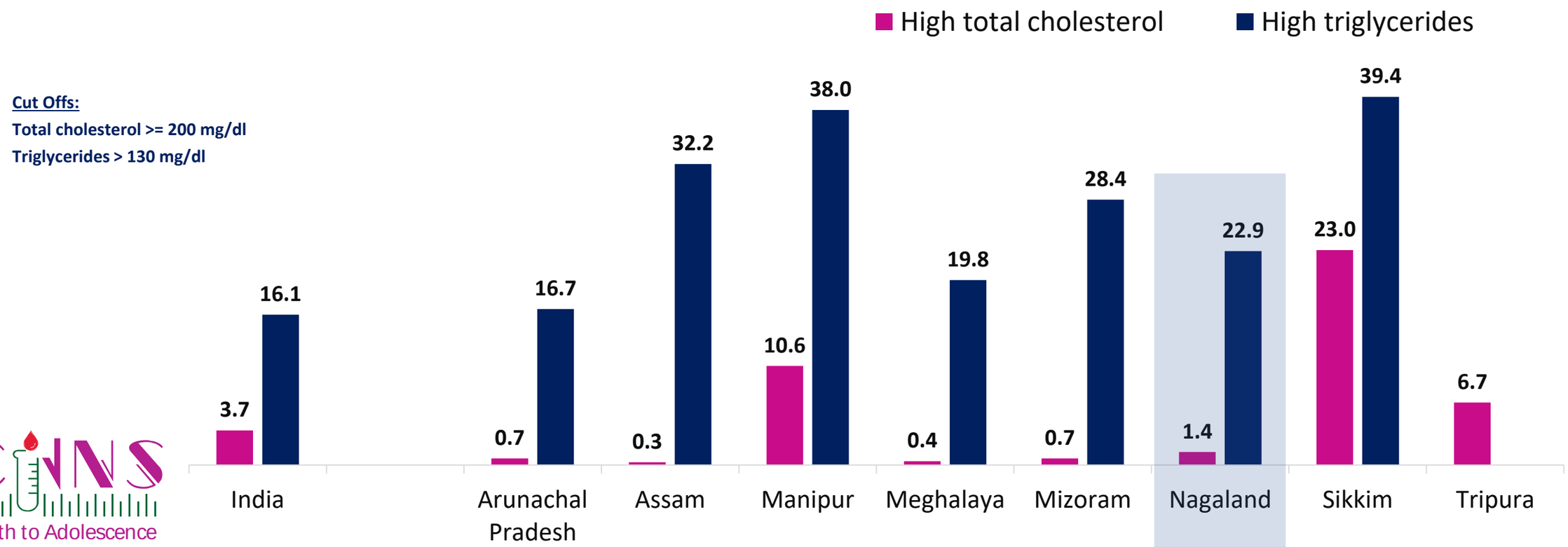


Birth to Adolescence

High total cholesterol and high triglycerides among adolescents

Elevated risk of NCDs in Nagaland among children and adolescents –**1%** had high level of total cholesterol and **23%** had high level of triglycerides

Prevalence of high total cholesterol and high triglycerides was highest in Sikkim among northeastern states

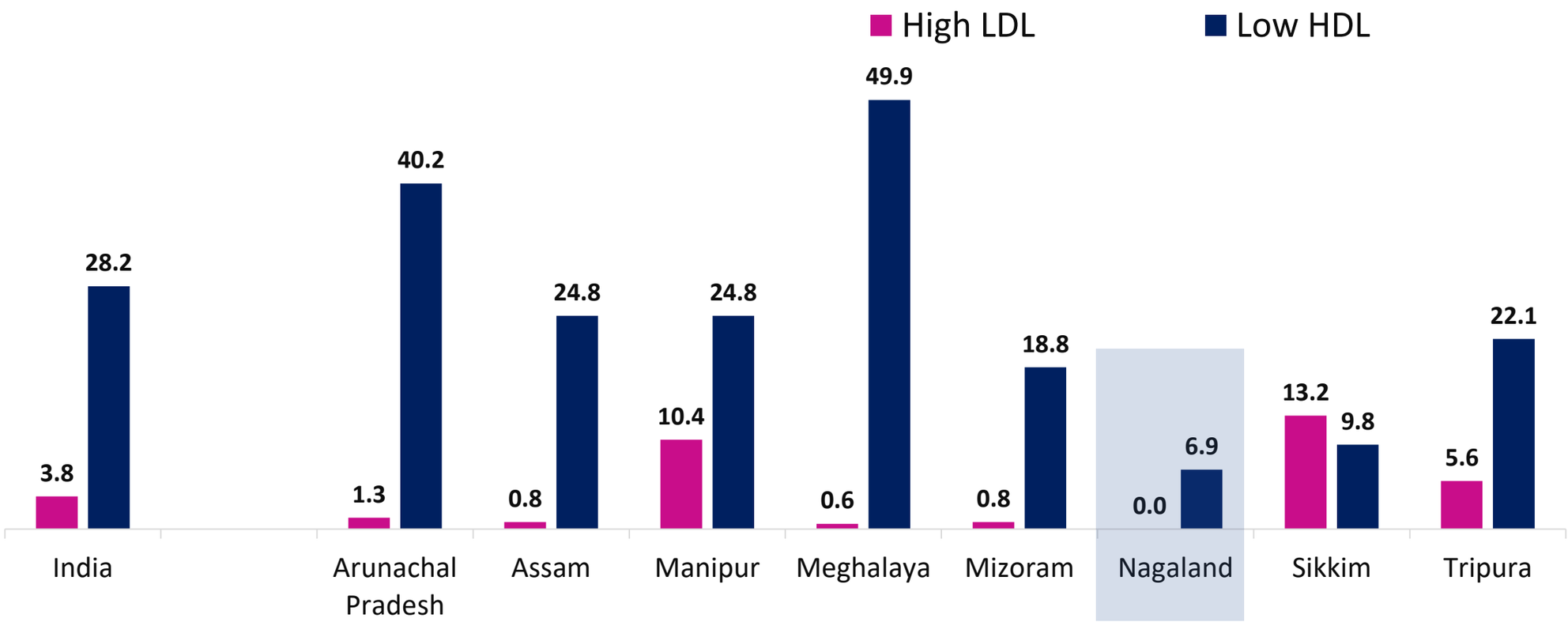


Birth to Adolescence

High LDL and low HDL among adolescents

Risk of NCDs among adolescents in Nagaland– **7%** had low level of HDL

Cut Offs:
LDL >= 130 mg/dl
HDL < 40 mg/dl



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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 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
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The survey was conducted with generous financial support from

Aditya and Megha Mittal

and technical support from

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CDSA

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