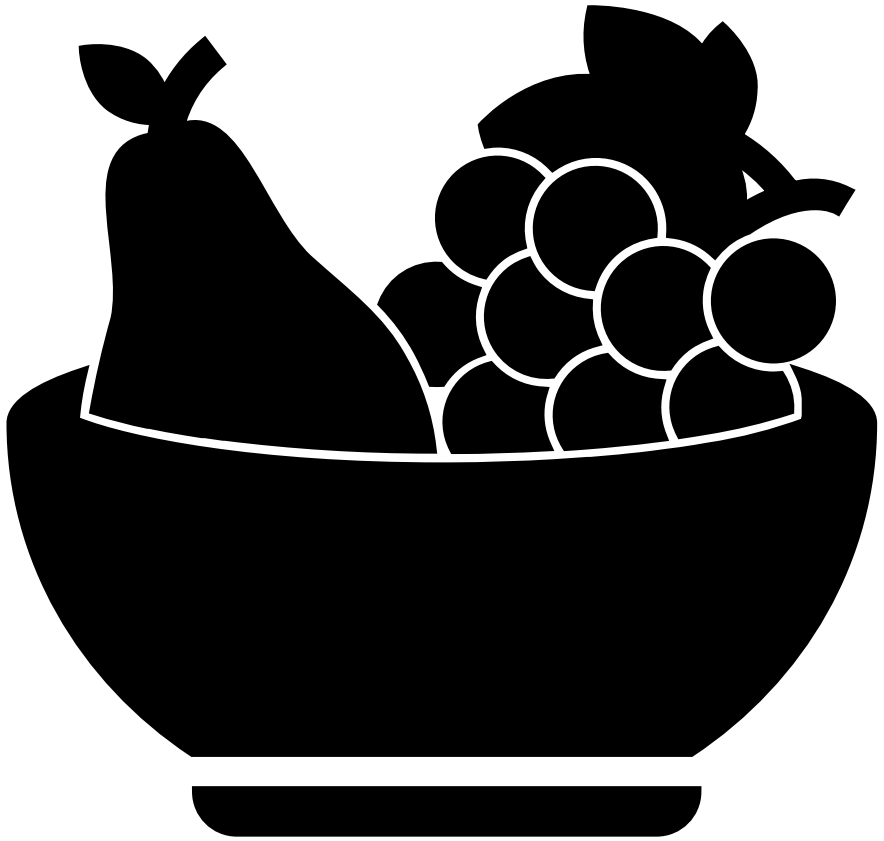


Comprehensive National Nutrition Analysis (2016-2018)

Insights in Nutritional Status and Malnutrition Trends in Indian Children and Adolescents

SIMRAN SHARMA

OBJECTIVE

- **Analyze Nutritional Status**: Assess the nutritional status of children and adolescents in India by analyzing key anthropometric indicators, such as height, weight, and MUAC, from the CNNS 2016-18 data.
- **Examine Gender and Residence Disparities**: Investigate the impact of gender (male/female) and residence (urban/rural) on nutritional indicators and their correlation with micronutrient deficiencies and non-communicable disease risks.
- **Micronutrient Deficiency & NCD Risk Evaluation**: Analyze the prevalence of micronutrient deficiencies and risks for non-communicable diseases (NCDs) in children and adolescents, based on data collected from biological samples.
- **State-Level Comparison**: Provide a comparative analysis of nutritional and health indicators across various states in India to identify regional variations in health outcomes.
- **Data-Driven Policy Recommendations**: Use the insights from the data to propose actionable recommendations for improving the nutritional status and reducing health risks among children and adolescents, particularly in underserved areas.

COLLECTION OVERVIEW

- The upcoming datasets provide a comprehensive understanding of micronutrient deficiencies, non-communicable disease risks, and anthropometric variations across different demographics in India.
- The datasets allow for cross-sectional analysis by rural/urban residence and gender, enabling more targeted and effective health interventions

Collection: NDAP- Comprehensive National Nutrition Survey (CNNS) [2016-18]

COLLECTION OVERVIEW
DATASET 1

Key Indicators of Micronutrient Deficiencies and Non-Communicable Disease Risks

- **Focus**: Micronutrient deficiencies and the risk of non-communicable diseases (NCDs).
- **Key Indicators**:
  - **Deficiencies**: Anaemia, Iron, Folate, Vitamin B12, Vitamin D, Vitamin A, Zinc.
  - **Health metrics**: Blood glucose, cholesterol, triglycerides, HbA1c, serum creatinine.
- **Demographics**: Children (1-4 years), Children (5-9 years), Adolescents (10-19 years).
- **Geography**: National-level data, categorized by state.
- **Purpose**: To assess the nutrition and health status of children and adolescents across India, guiding public health policies.

COLLECTION OVERVIEW
DATASET 2

Key Anthropometric Indicators by Residence

- **Focus**: Anthropometric data for children and adolescents segmented by residential area (Urban vs. Rural)
- **Key Indicators**:
  - Height-for-age (stunting), weight-for-height (wasting), body mass index (BMI) for age.
  - Differentiation between rural and urban populations.
- **Demographics**: Children (1-4 years), Children (5-9 years), Adolescents (10-19 years).
- **Geography**: National and state-specific data with urban/rural segmentation.
- **Purpose**: To highlight rural-urban disparities in nutrition and health, contributing to targeted interventions

COLLECTION OVERVIEW
DATASET 3

Key Anthropometric Indicators by Sex

- **Focus**: Anthropometric data differentiated by sex for children and adolescents.
- **Key Indicators**:
  - Height-for-age (stunting), weight-for-height (wasting), BMI-for-age, and sex-specific growth patterns.
- **Demographics**: Children (1-4 years), Children (5-9 years), Adolescents (10-19 years), gender-segmented.
- **Geography**: National and state-specific data with sex-based analysis.
- **Purpose**: To explore gender-based disparities in growth and nutrition, informing gender-sensitive public health strategies.

MICRONUTRIENT DEFICIENCIES AMONG CHILDREN AND ADOLESCENTS (2016-18)

Micronutrient Deficiencies Among Children and Adolescents (2016-18)

State
All

Age Group
All

Prevalence
All

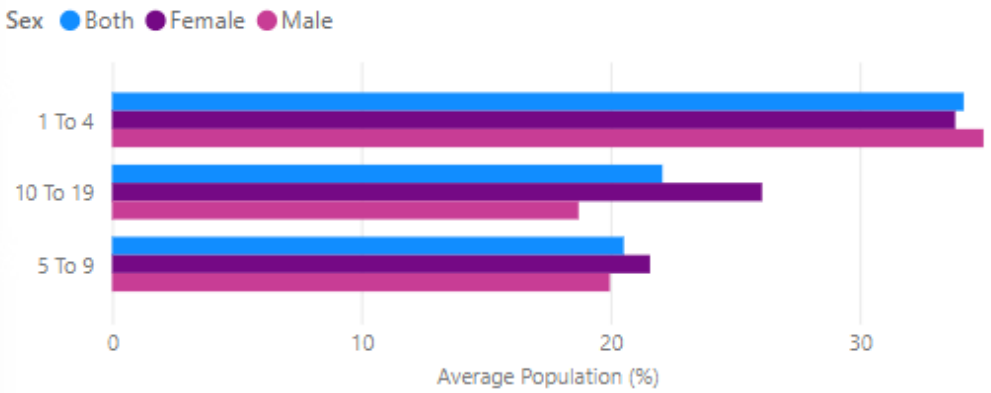
Sex
All

Mizoram
State with Highest Average Vitamin A Deficiency

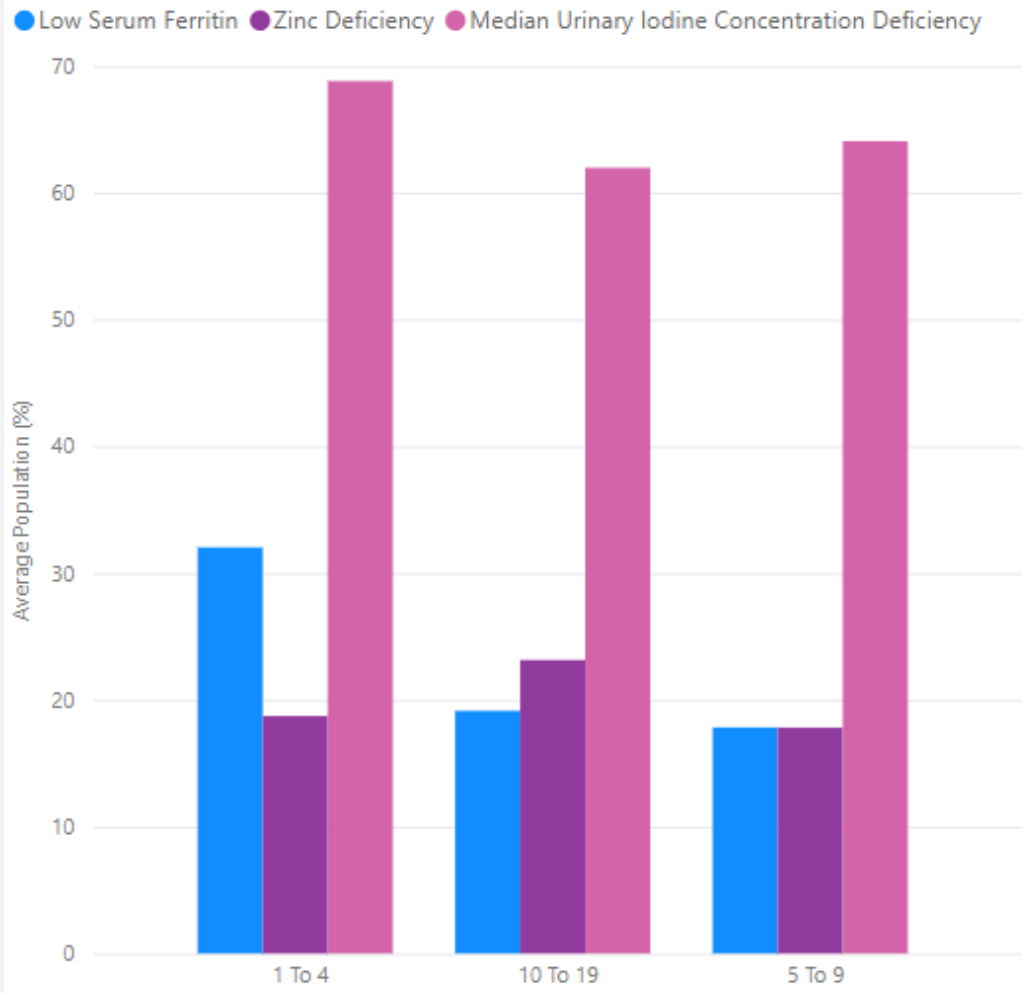
Punjab
State with Highest Average Low Serum Ferritin

West Bengal
State with Highest Average Prevalence of Anaemia

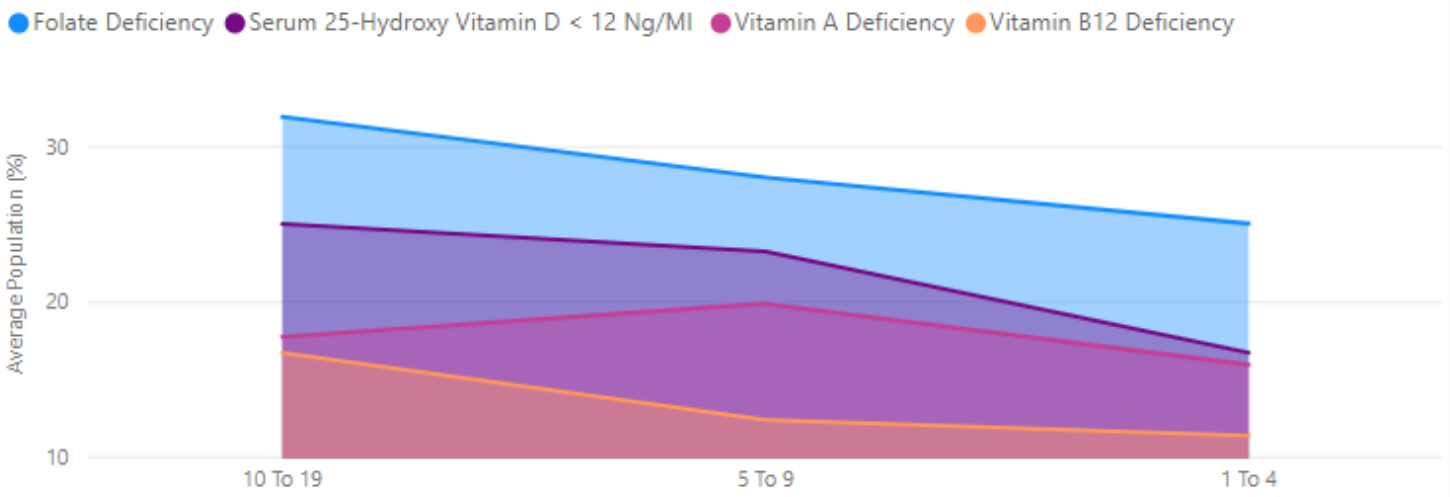
Anaemia across Age Groups by Sex



Mineral Deficiencies across Age Groups



Vitamin Deficiencies across Age Groups



MICRONUTRIENT DEFICIENCIES
KEY PERFORMANCE INDICATORS

The dashboard highlights three critical KPIs:

- **State with Highest Average Vitamin A Deficiency** (Mizoram): Chosen to spotlight regions needing targeted interventions for eye health and immunity.
- **State with Highest Average Low Serum Ferritin** (Punjab): Reflects iron storage levels, emphasizing anemia prevention and overall energy metabolism.
- **State with Highest Average Prevalence of Anaemia** (West Bengal): Selected to address widespread iron deficiency, a major public health concern.

These metrics were chosen for their direct impact on children’s and adolescents' growth, development, and well-being, providing actionable insights for resource allocation and policy formulation.

MICRONUTRIENT DEFICIENCY INSIGHTS – PART 1

- **Age Group and Anaemia**: Children aged 1-4 have the highest average prevalence of anaemia across both sexes, with males slightly more affected than females.
- **Gender and Anaemia Trends**: Females aged 10-19 show significantly higher average anaemia prevalence (26.08%) compared to males in the same age group (18.72%).
- **Vitamin A Deficiency**: Mizoram has the highest average Vitamin A deficiency prevalence among states, highlighting a potential area for targeted nutritional interventions.
- **Low Serum Ferritin Prevalence**: Punjab leads in low serum ferritin deficiency, with younger children aged 1-4 having the highest average prevalence (32.02%).
- **Anaemia Across Age Groups**: Anaemia prevalence decreases with age, showing a sharp decline from 34.18% (1-4 years) to 22.09% (10-19 years).

MICRONUTRIENT DEFICIENCY INSIGHTS – PART 2

- **Vitamin Deficiencies in Adolescents**: Adolescents aged 10-19 have the highest folate deficiency (31.89%) and Vitamin D deficiency (25%), necessitating age-specific supplementation programs.
- **Mineral Deficiencies**: Median urinary iodine concentration deficiency is most severe across all age groups, peaking at 68.8% among children aged 1-4.
- **Zinc Deficiency**: Adolescents (10-19 years) show slightly higher zinc deficiency (23.14%) compared to younger age groups, indicating growing micronutrient demands in this phase.
- **Anaemia and Sex Distribution**: While both genders are affected, females consistently show higher deficiency percentages in most categories, especially during adolescence.
- **Geographical Variations**: West Bengal has the highest average anaemia prevalence, emphasizing the need for geographically targeted health policies and interventions.

METABOLIC HEALTH AND RISK INDICATORS AMONG CHILDREN AND ADOLESCENTS (2016-18)

Metabolic Health and Risk Indicators Among Children and Adolescents (2016-18)

State with Highest Average High Serum Creatinine

Andhra Pradesh

Sex: All

State: All

Age Group: All

Prevalence: All

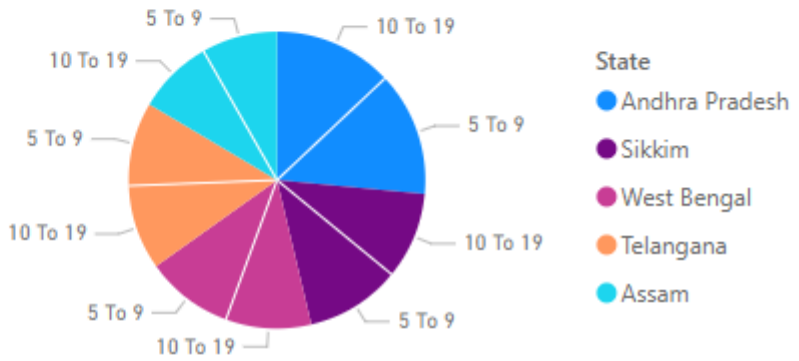
State with Highest Average Prediabetes Risk (High Fasting Plasma Glucose)

Sikkim

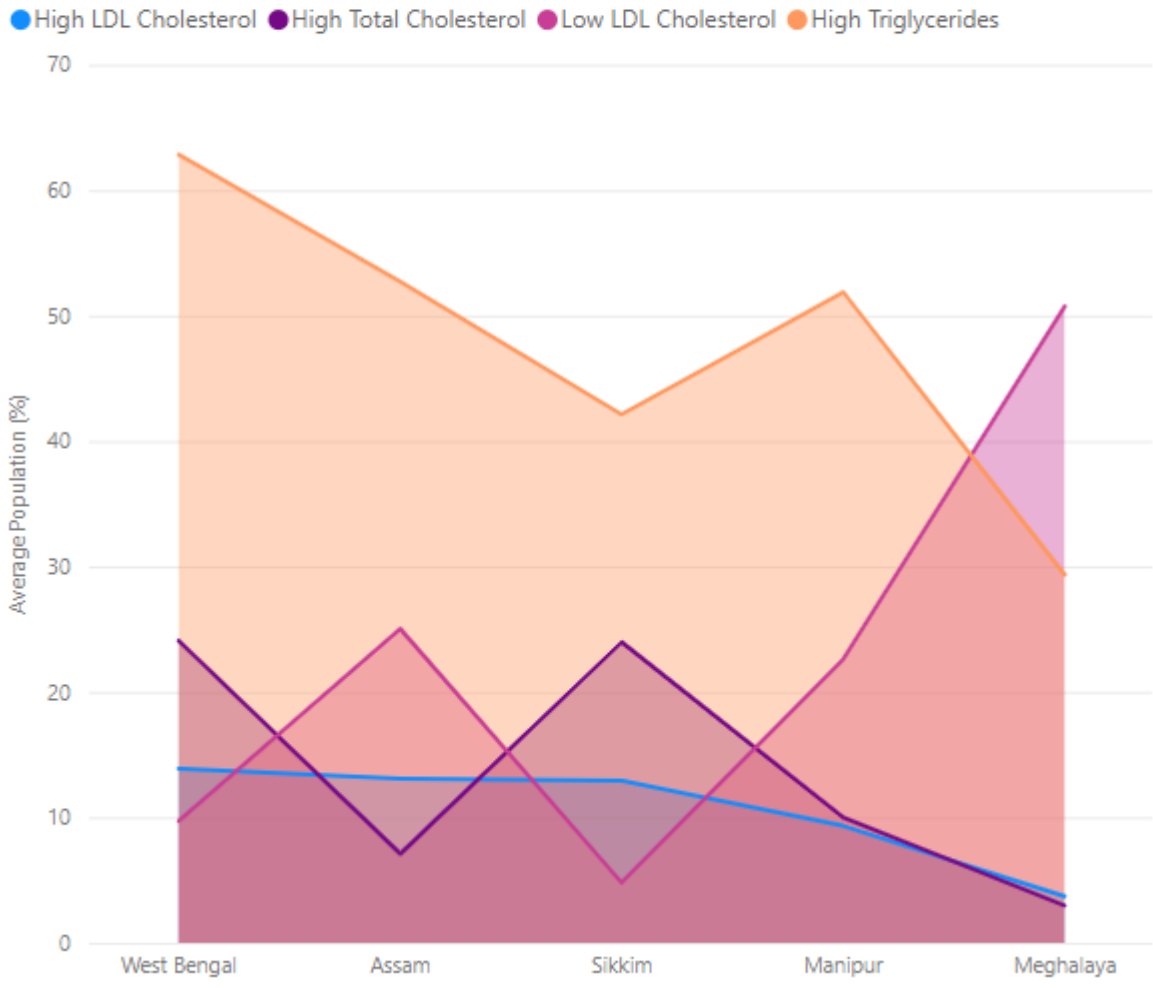
State with Highest Average High LDL Cholesterol

Kerala

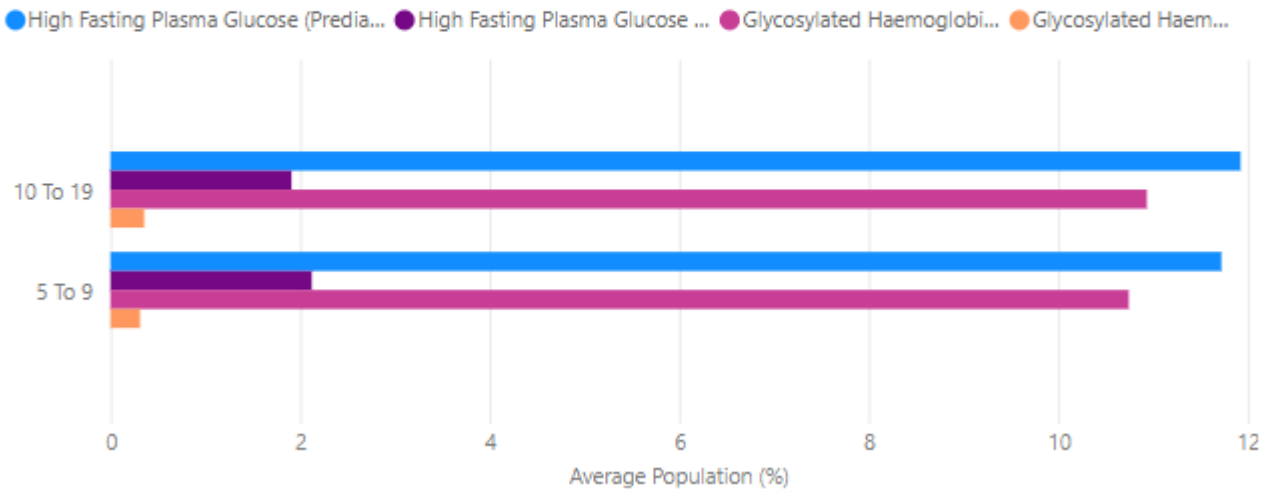
Top 5 States: Kidney Function by Age Group



Top 5 States: Lipid Profile Indicators



Blood Glucose and Diabetes Indicators across Age Groups



METABOLIC HEALTH AND RISK INDICATORS
KEY PERFORMANCE INDICATORS

The dashboard highlights three crucial KPIs:

- **State with Highest Average Prediabetes Risk** (Sikkim): Chosen to identify regions where early interventions can mitigate the risk of Type 2 diabetes.
- **State with Highest Average High Serum Creatinine** (Andhra Pradesh): Reflects kidney function anomalies, crucial for understanding metabolic health disparities.
- **State with Highest Average High LDL Cholesterol** (Kerala): Indicates cardiovascular risk, helping target regions for dietary and lifestyle improvements.

These metrics were selected to address critical health indicators among children and adolescents, providing insights for regional healthcare prioritization and policy-making.

METABOLIC HEALTH INSIGHTS – PART 1

- **Prediabetes Risk in Adolescents**: Adolescents aged 10-19 show the highest prediabetes risk (11.92%) with elevated fasting plasma glucose levels, highlighting the need for early intervention strategies.
- **Diabetes Indicators Across Ages**: Children aged 5-9 show slightly higher diabetic-level fasting plasma glucose (2.12%) compared to adolescents (1.91%), suggesting early onset risk in younger age groups.
- **High LDL Cholesterol**: Kerala leads in average high LDL cholesterol prevalence, emphasizing the need for dietary and lifestyle modifications to reduce cardiovascular risks.
- **Lipid Profile Variations**: West Bengal has the highest prevalence of high triglycerides (62.83%), posing significant cardiovascular health risks in children and adolescents.
- **Kidney Function by Age**: Andhra Pradesh shows the highest prevalence of kidney function abnormalities, with children aged 5-9 being slightly more affected (35.83%) than adolescents (34.43%).

METABOLIC HEALTH INSIGHTS – PART 2

- **State-Specific Metabolic Risks**: Sikkim consistently ranks among the top states for high fasting plasma glucose and kidney function abnormalities, indicating concentrated metabolic health risks.
- **Gender Trends in Glycosylated Haemoglobin**: Glycosylated haemoglobin levels (5.7–6.4) are prevalent across all age groups, requiring continuous monitoring for prediabetes and diabetes progression.
- **Lipid Profile Imbalances**: Meghalaya shows an inverse trend with the lowest high LDL cholesterol (3.70%) and the highest low LDL cholesterol (50.73%), suggesting distinct regional lipid health trends.
- **Kidney Function by State**: Andhra Pradesh and Sikkim dominate kidney function indicators, stressing the importance of state-specific interventions for children and adolescents.
- **Lipid Profiles in Adolescents**: Adolescents exhibit a higher prevalence of high total cholesterol, necessitating interventions focusing on balanced diets and physical activity for long-term cardiovascular health.

CHILD AND ADOLESCENT GROWTH AND MALNUTRITION INSIGHTS BY SEX (2016-18)

Child and Adolescent Growth and Malnutrition Insights by Sex (2016-18)

State: All

Age Group: All

Sex: All

State with Highest Average Stunted Population

Meghalaya

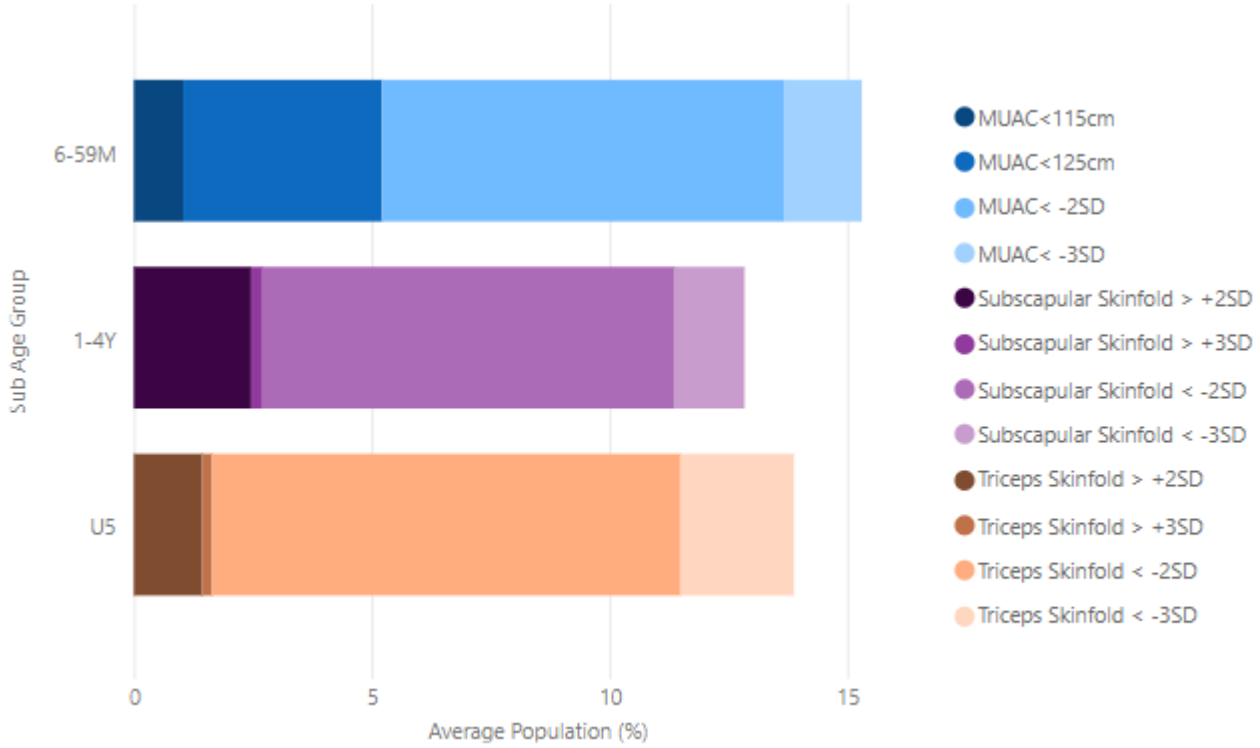
State with Highest Average Thinness Prevalence (Age 5-9)

West Bengal

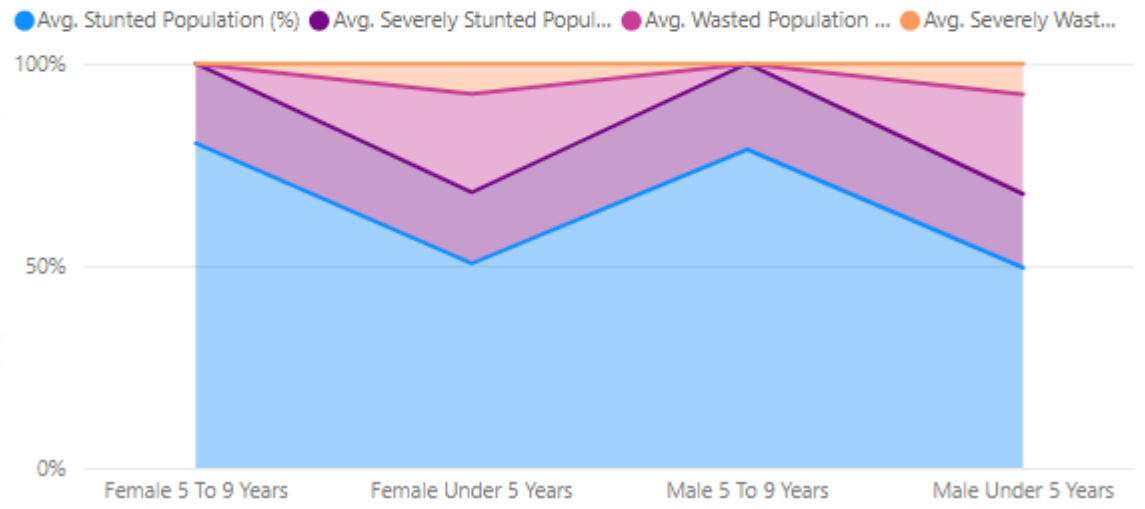
State with Highest Average Thinness Prevalence (Age 10-19)

Madhya Pradesh

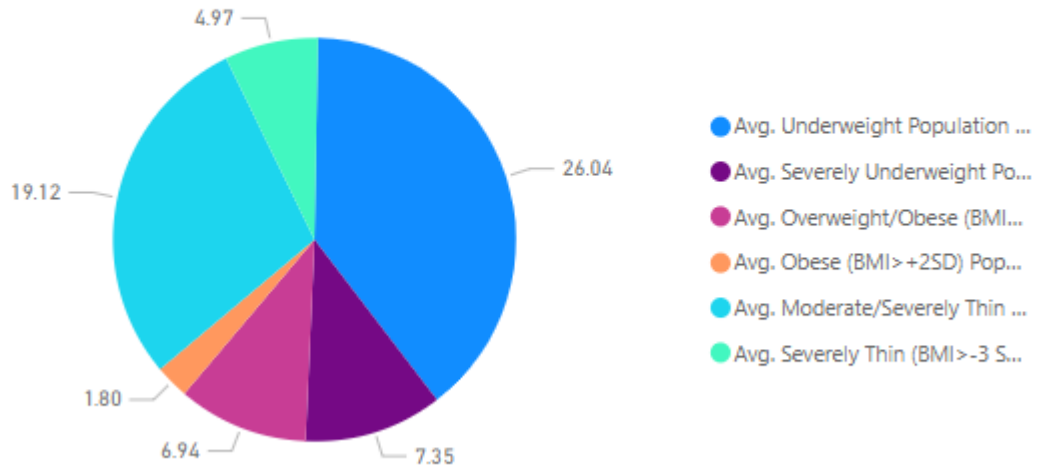
Anthropometric Measurements by Age Group



Malnutrition Indicators by Age Group



Distribution of BMI-Based Nutritional Categories



GROWTH AND MALNUTRITION INSIGHTS - SEX
KEY PERFORMANCE INDICATORS

The dashboard highlights three crucial KPIs:

- **State with Highest Average Stunted Population (Meghalaya)**: Chosen to identify regions with chronic malnutrition and growth deficits.
- **State with Highest Average Thinness Prevalence [5-9 Years] (West Bengal):** Reflects acute malnutrition among young children, highlighting immediate health risks.
- **State with Highest Average Thinness Prevalence [10-19 Years] (Madhya Pradesh):** Indicates undernutrition among adolescents, crucial for long-term developmental outcomes.

These metrics were selected to address significant malnutrition indicators among children and adolescents, providing actionable insights for targeted interventions, resource allocation, and effective policy-making.

GROWTH AND MALNUTRITION INSIGHTS – PART 1 (BY SEX)

- **State-Level Malnutrition Trends**: Meghalaya has the highest stunted population, while West Bengal and Madhya Pradesh show severe thinness prevalence among specific age groups.
- **Age Group Vulnerabilities**: Children under 5 years face the highest stunting and wasting rates, highlighting critical intervention needs during early childhood.
- **Sex-Based Differences**: Male children under 5 years exhibit higher rates of stunting and wasting compared to females, emphasizing gender-based nutritional disparities.
- **Malnutrition Indicator Distribution**: Severe malnutrition indicators (stunting and wasting) significantly affect under-5 and 5-to-9-year-old groups, requiring focused health and nutrition programs.
- **MUAC Indicators**: 8.44% of children aged 6-59 months have MUAC less than -2 SD, indicating widespread acute malnutrition.

GROWTH AND MALNUTRITION INSIGHTS – PART 2 (BY SEX)

- **Anthropometric Measurements**: Triceps and subscapular skinfold data show alarming malnutrition levels among younger age groups, suggesting targeted anthropometric monitoring.
- **BMI-Based Nutrition Categories**: Underweight (26.04%) and moderately thin populations (19.2%) dominate, overshadowing obesity concerns (6.94%), indicating malnutrition at both ends of the spectrum.
- **Chronic Malnutrition**: Severe underweight rates (7.35%) point to chronic nutritional deficiencies across various demographics.
- **Regional Variations**: Nutrition categories vary significantly across states and age groups, underscoring the importance of localized nutrition policies.
- **Policy Implications**: The high prevalence of stunted and wasted children calls for immediate action on early childhood nutrition and health programs.

CHILD AND ADOLESCENT GROWTH AND MALNUTRITION INSIGHTS BY RESIDENCE (2016-18)

Child and Adolescent Growth and Malnutrition Insights by Residence (2016-18)

State: All

Age Group: All

Residence: All

State with Highest Average Stunted Population

Bihar

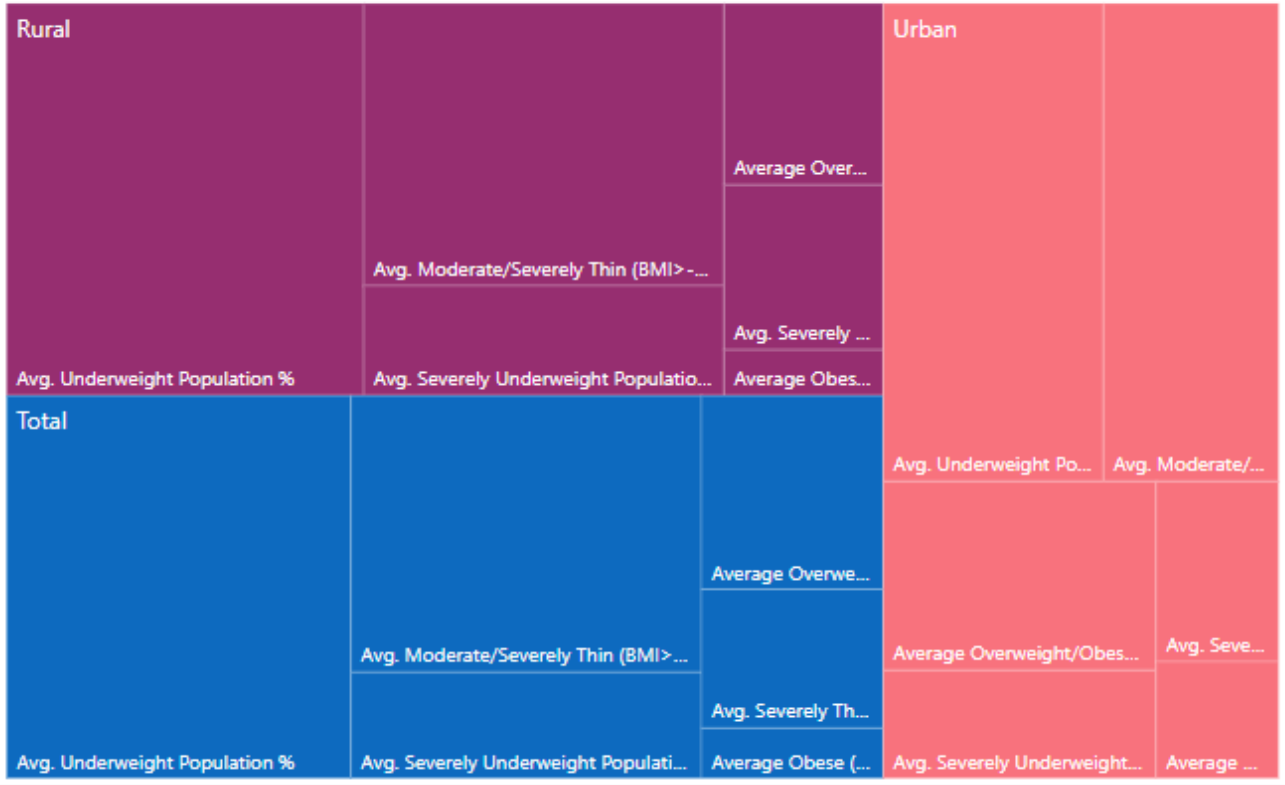
State with Highest Average Thinness Prevalence (Age 5-9)

Jharkhand

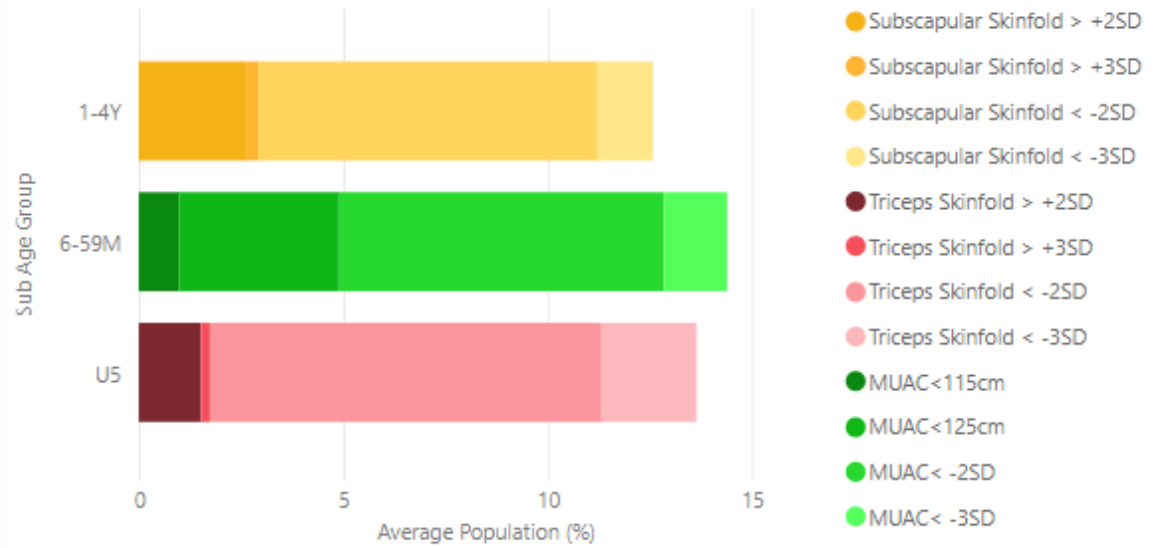
State with Highest Average Thinness Prevalence (Age 10-19)

Madhya Pradesh

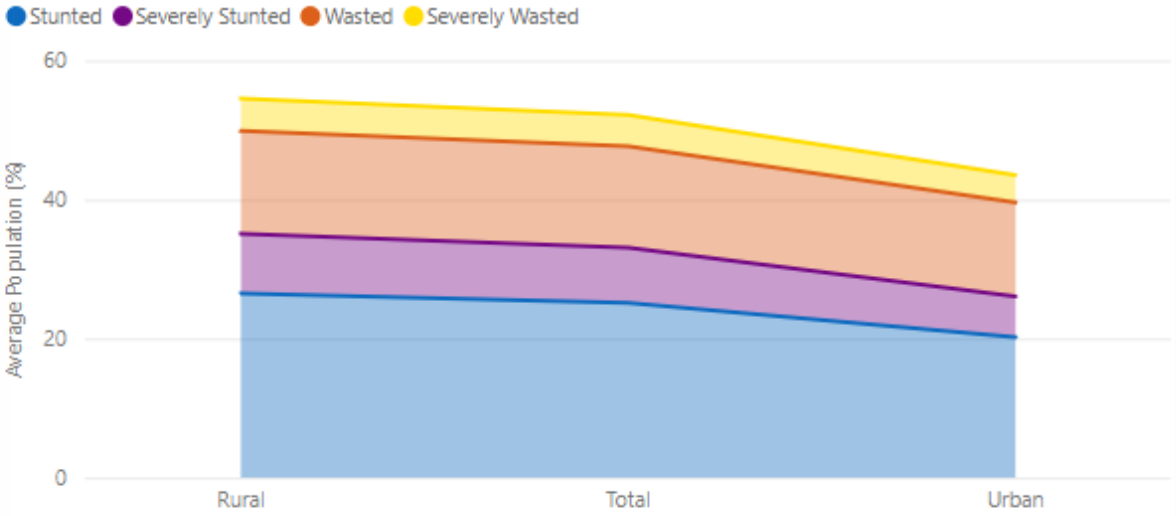
Distribution of BMI-Based Nutritional Categories across Residence



Anthropometric Measurements by Age Group



Malnutrition Indicators by Residence



GROWTH AND MALNUTRITION INSIGHTS - RESIDENCE
KEY PERFORMANCE INDICATORS

The dashboard highlights three crucial KPIs:

- **State with Highest Average Stunted Population (Bihar):** Chosen to spotlight chronic malnutrition affecting growth and cognitive development.
- **State with Highest Average Thinness Prevalence [5-9 yrs] (Jharkhand):** Focuses on acute malnutrition in school-aged children, critical for developmental years.
- **State with Highest Average Thinness Prevalence [10-19 yrs] (Madhya Pradesh):** Targets adolescent malnutrition, a crucial period for physical and reproductive health.

These KPIs emphasize geographical malnutrition disparities and prioritize addressing severe impacts on children and adolescents' health and societal development.

GROWTH AND MALNUTRITION INSIGHTS – PART 1
(BY RESIDENCE)

- **State-Level Malnutrition**: Bihar has the highest stunted population, while Jharkhand and Madhya Pradesh lead in thinness prevalence for 5-9 and 10-19 age groups, respectively.
- **Urban vs. Rural Stunting**: Rural areas report higher stunting (26.53%) and severe stunting (8.54%) compared to urban areas, emphasizing rural malnutrition challenges.
- **Wasting Prevalence**: Wasting and severe wasting rates are marginally higher in rural areas than urban, highlighting acute malnutrition issues in rural communities.
- **BMI-Based Insights**: Urban areas exhibit higher overweight and obesity rates (10.18% and 2.81%), indicating rising urban lifestyle-related nutritional issues.
- **Thinness Concentration**: Rural areas have higher severely thin populations (4.3%) compared to urban areas, reflecting disparities in nutrition access.

GROWTH AND MALNUTRITION INSIGHTS – PART 2
(BY RESIDENCE)

- **Age-Specific Anthropometric Challenges**: Children under 5 years show the highest triceps skinfold issues (-2 SD: 9.58%, -3 SD: 2.32%), highlighting early-life malnutrition risks.
- **MUAC Indicators**: Acute malnutrition affects 7.95% of children aged 6-59 months (-2 SD), with higher prevalence in rural settings.
- **Underweight Trends**: Rural areas (27.65%) surpass urban areas (20.77%) in underweight prevalence, pointing to chronic malnutrition.
- **Obesity Concerns**: Urban obesity prevalence (2.81%) is double that of rural (1.44%), reflecting divergent nutritional issues in urbanized settings.
- **Policy Implications**: The data underscores a dual burden of malnutrition, with rural areas requiring basic nutritional interventions and urban areas needing obesity management strategies.

NUTRITIONAL INSIGHTS RECOMMENDATIONS

- **Prioritize Rural Interventions**: Focus resources on rural areas where malnutrition indicators like stunting and wasting are significantly higher.
- **Target Vulnerable Age Groups**: Implement tailored programs for children under 5 and adolescents, addressing critical growth stages.
- **Promote Nutritional Awareness**: Educate communities on balanced diets and early detection of malnutrition, emphasizing high-risk populations.
- **Strengthen Data-Driven Policies**: Use insights from dashboards to create region-specific and gender-sensitive nutrition improvement strategies.
- **Leverage Technology**: Deploy digital platforms to monitor malnutrition trends, improve intervention delivery, and track progress effectively.
- **Collaborate for Impact**: Partner with NGOs and health organizations to maximize outreach and efficacy of nutrition programs.

CONCLUSION

Addressing malnutrition requires a multi-faceted approach, combining data-driven strategies, community education, and targeted interventions. The dashboards provide crucial insights into regional and demographic disparities, helping to prioritize resources and design effective programs.

By focusing on vulnerable groups, leveraging technology, and fostering collaboration, we can make significant progress in combating malnutrition. Together, these efforts will ensure healthier growth for children and adolescents, paving the way for a stronger and more equitable future.