

NNMB Nutrition surveys: Assessment Methods

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Why Nutrition assessment is required?

- **Epidemiological diet and nutrition data is significantly correlates with morbidity & mortality.**
- **Nutrition data is useful to know diet related problems like undernutrition, and diet related non-communicable diseases like hypertension, diabetes, CVDs and some types of cancers etc.**
- **High intake of fruits and vegetables (fiber diet) reduce the risk of gastro-intestinal disorders like constipation, colon cancer and others.**
- **Fish or soya consumption is also associated with low prevalence of breast cancer and CHD.**
- **It also helps to establish relation between a particular nutrient and morbidity.**
- **It may also helps in the formation of various preventive strategies.**

Nutritional challenges in India

- **Malnutrition is one of the most important public health Problems, it arises either from deficiency or excess or imbalance of a single or various nutrients in the body.**

The following are the nutritional challenges:

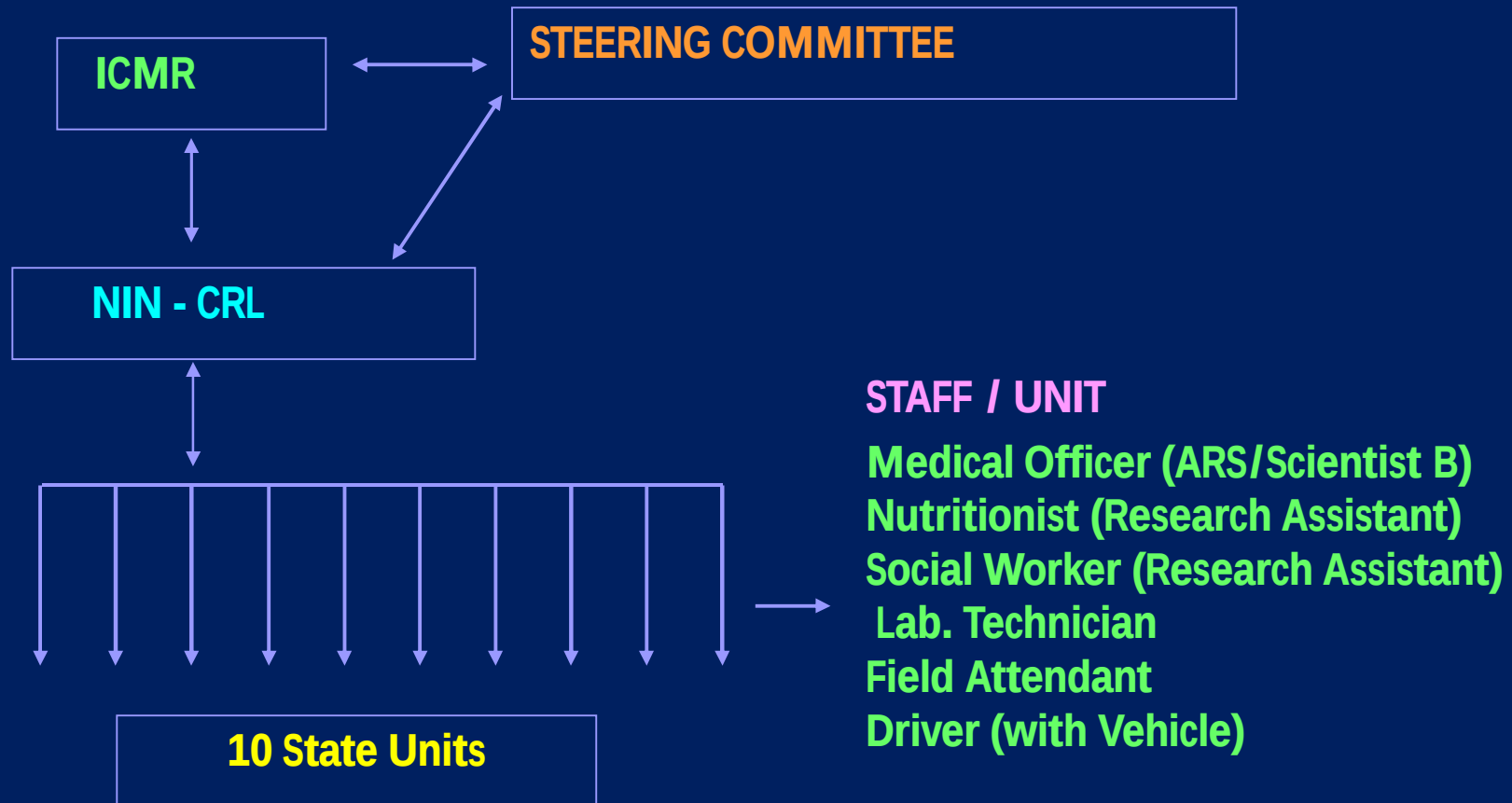
- ❖ **Protein energy malnutrition (PEM)**
- ❖ **Low birth weight (LBW)**
- ❖ **Chronic energy deficiency (CED)**
- ❖ **Micronutrient deficiencies (MND)**
 - Vitamin A deficiency (VAD)
 - Iron deficiency anemia (IDA)
 - Iodine deficiency disorders (IDD)
 - Zinc deficiency
- ❖ **Diet and nutrition related chronic diseases**
 - Overweight and obesity
 - Insulin resistance
 - Type 2 Diabetes
 - Cardiovascular diseases (CVD), Cancers

OBJECTIVES OF NATIONAL NUTRITION MONITORING BUREAU (NNMB)

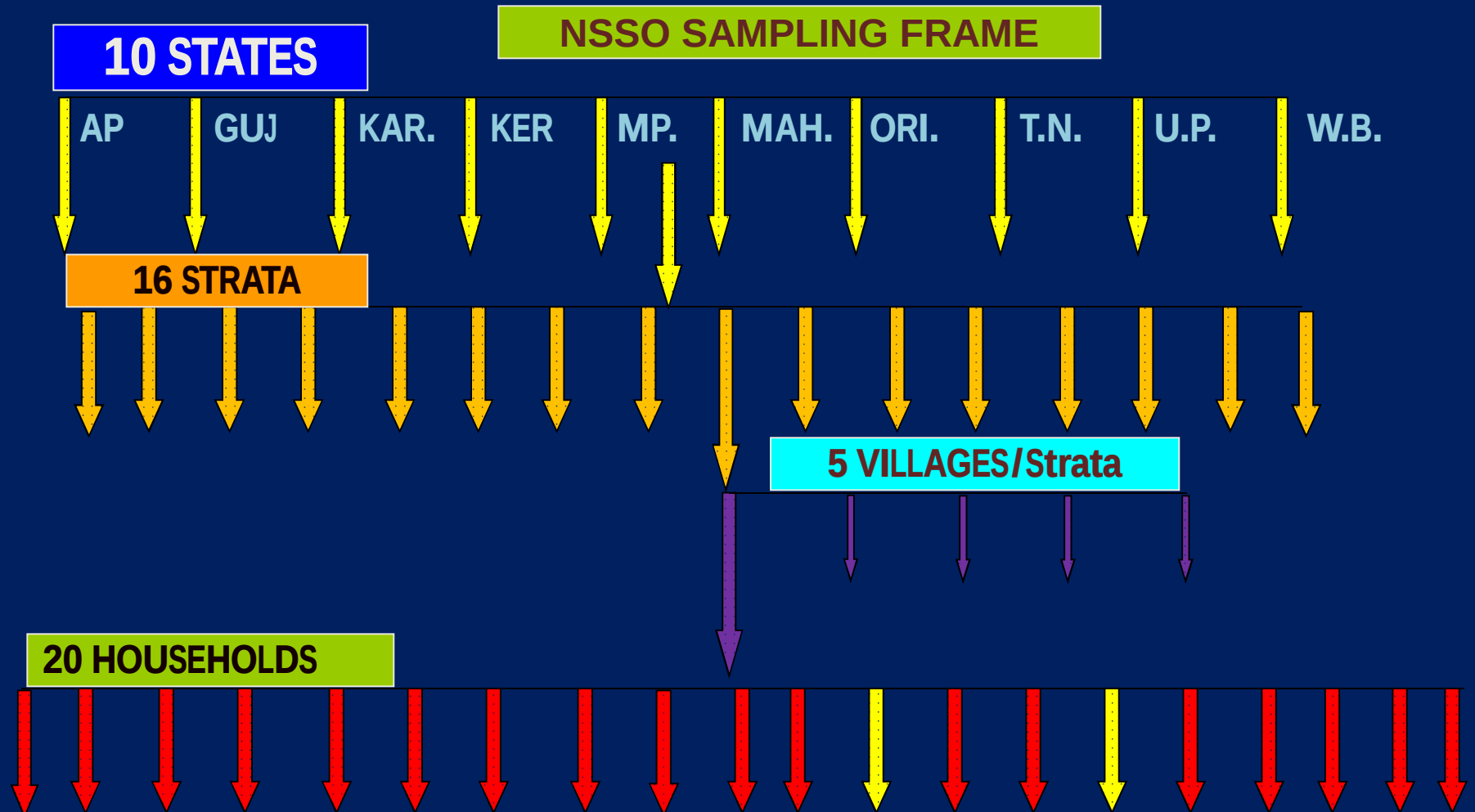


- 1. To collect diet and nutritional status of various communities viz., urban, rural and tribal areas using a standard and uniform methodology, and**
- 2. To evaluate ongoing National Nutrition Programmes periodically, to identify their strengths and weaknesses and recommend mid-course corrections, if any.**

ORGANIZATION CHART OF NNMB



NNMB SAMPLING FRAME FROM 1980 - 2005



Nutritional Assessment :20 HHs

Dietary Assessment : 10 HHS

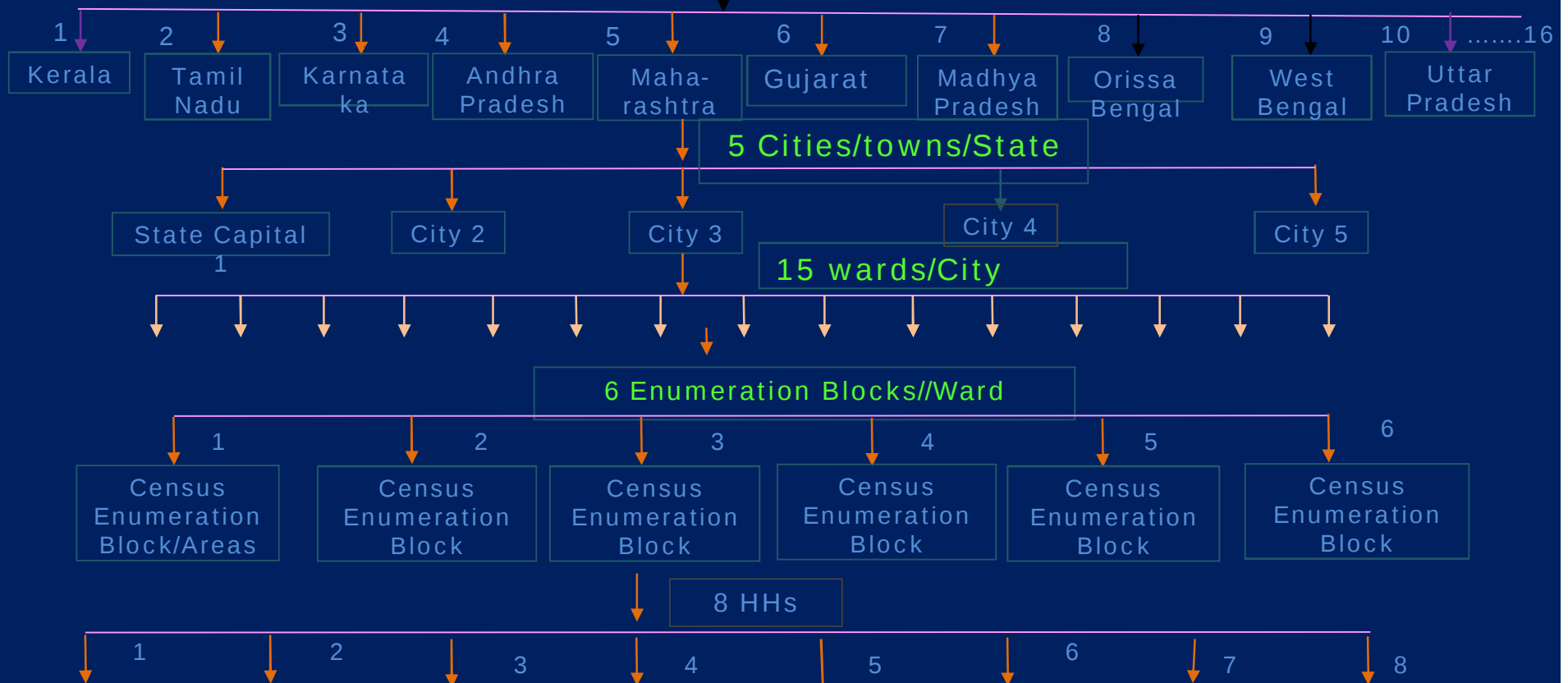
TOTAL COVERAGE /STATE

Nutritional Assessment :1600HHs

Dietary Assessment : 800HHs

NNMB URBAN SAMPLING FRAME 2013 - 15

16 NNMB States (10 old + 6 New States) in India



All the proposed investigations will be done among the available individuals in all the selected HHs

Flow Chart: Showing study design-selection of cities, urban wards and Census enumeration Block from each of the selected wards for the present survey to be carried out in the 10 NNMB states

PARAMETERS COLLECTED DURING 1975 - 2005

- ❖ **Family based survey - all the subjects in the selected HHs were covered.**
- 1. Household demographic and socio-economic particulars**
- 2. Weighment and 24 hour recall diet surveys were carried out**
- 3. Nutritional anthropometry (height, weight, MUAC, FFT at triceps measured).**
- 4. Clinical examination for nutritional deficiency signs**
- 5. Estimation of Hemoglobin was done among men and NPNL women in some of the studies.**

ADDITIONAL PARAMETERS COLLECTED 2006-2012

- 1. Measurement of blood pressure (BP measurement)**
- 2. Abdominal & Central obesity (Measurement of WC & HC)**
- 3. Estimation of fasting blood glucose**
- 4. Assessment of Knowledge and practices about NCDs and risk behaviours (alcohol and tobacco consumption)**

ADDITIONAL PARAMETERS COLLECTED 2013 -2015

1. Lipid profile (Total cholesterol)

- Total cholesterol
- Triglycerides
- HDL
- LDL

2. Body composition

- Fat fold thickness at triceps, biceps, Sub-scapular and Supra-iliac regions
- Bioelectric Impedance

LIST OF STUDIES CARRIED OUT BY NNMB AND REPORTS ARE AVAILABLE IN THE NNMB WEBSITE (www.nnmbindia.org)

Sl. No.	Year	Type of survey	Diet surveys		Anthropo- Metry & Clinical
			Weighment	24h recall	
1.	1975-79	Rural baseline	3102	1562	33048
2.	1980-81	Rural & Urban	5228	2381	52350
3.	1983-84	NSSO linked	4048	nil	19517
4.	1985-87	Tribal baseline	3460	14324	41576
5.	1988-90	Rural 1 st Repeat	6018	1200	55092
6.	1991-92	Rural Annual	5654	1719	22619
7.	1993-94	Urban Slums	792	799	5447
8.	1994-95	NCAER linked	1200	1257	16140
9.	1996-97	Rural 2 nd Repeat	6551	14391	60601
10.	1998-99	Tribal 1 st Repeat	8036	32023	90885
11.	2000-01	Rural Annual	7131	30968	51239

LIST OF STUDIES CARRIED OUT BY NNMB AND REPORTS ARE AVAILABLE IN THE NNMB WEBSITE (www.nnmbindia.org)

Sl. No.	Year	Type of Survey	Haemo-globin	VAD	IDD	Serum vitamin A	Salt test - Iodine
12.	2002-04	MND Rural	16096	71591	28437	4608	5209
Sl. No.	Year	Type of survey	Diet surveys		Anthropo-Metry & Clinical	Blood Pressure	Haemo-globin
			Weigh-ment	24h recall			
13.	2004-06	Rural Annual	7078	30244	51705	25,625	6726
14.	2007-09	Tribal 2 nd Repeat	10077	41507	115113	47409	Nil
15.	2010-12	Rural 3 rd Repeat	11910	49338	86898	48959	FBG: 32831
	1975-012	Rural, Tribal & Urban	80,285	2,21,713	7,02,230	1,21,993	

The following parameters included in the current Urban Nutrition surveys in 16 states (2013-15)

Expected coverage

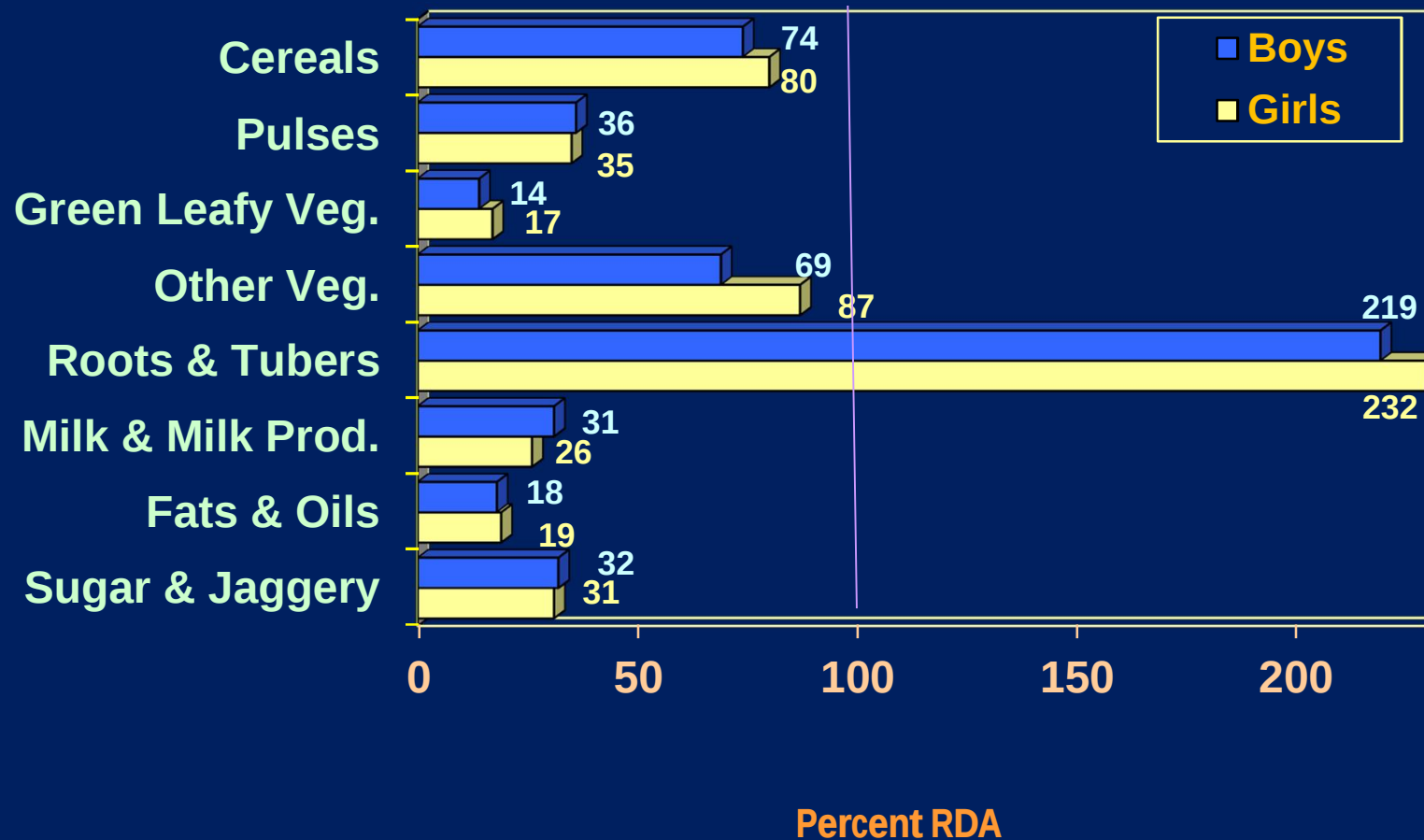
- Weightment diet surveys only
- 24 hour recall diet surveys
- Nutrition Assessment
- IYCF mothers of <5 year Children
- Blood pressure:
- Fasting Blood glucose

New parameters added

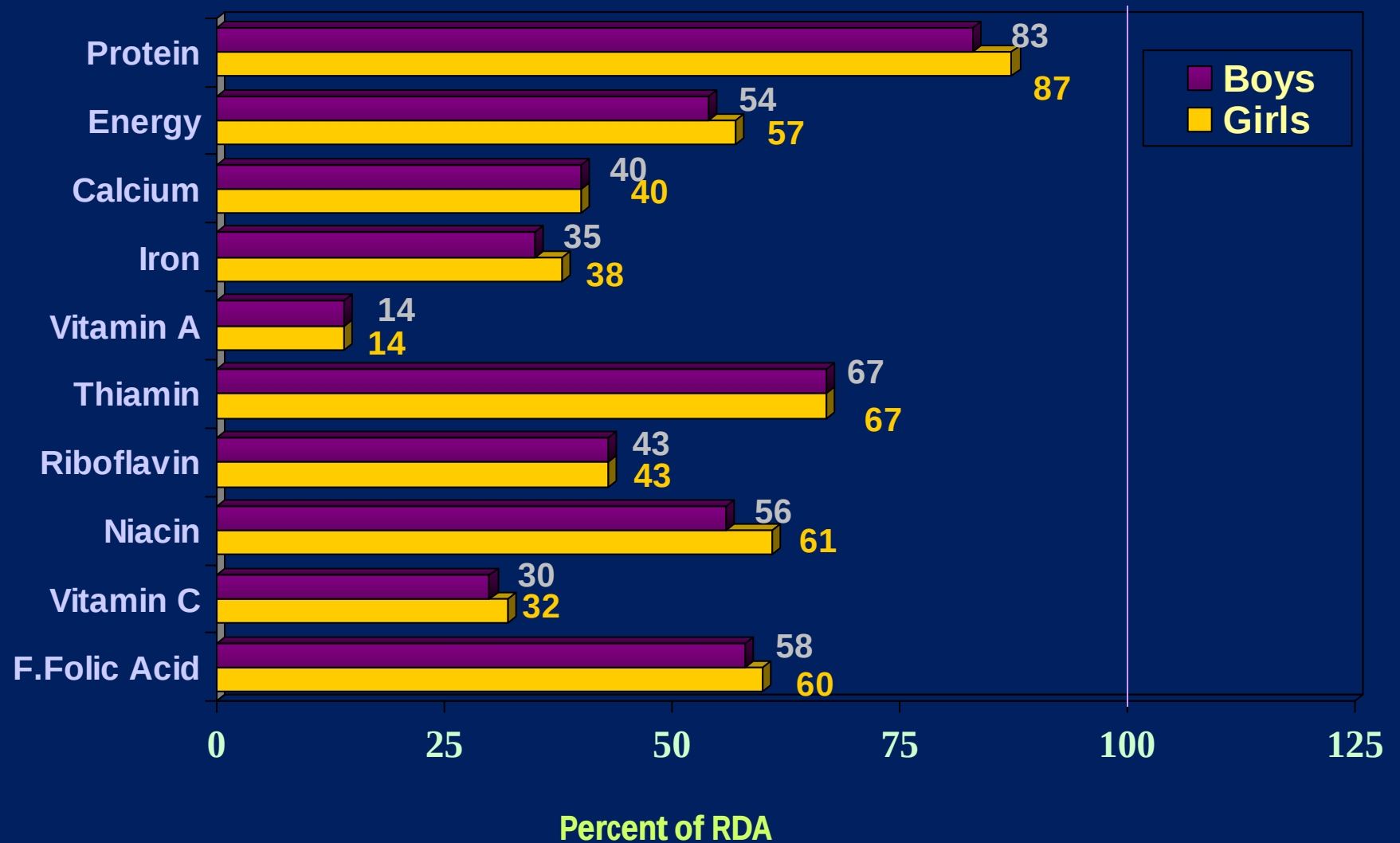
- LDX Lipid profile
- Body composition (BIA)
- 24 hour Physical Activity

SALIENT OBSERVATIONS OF NNMB

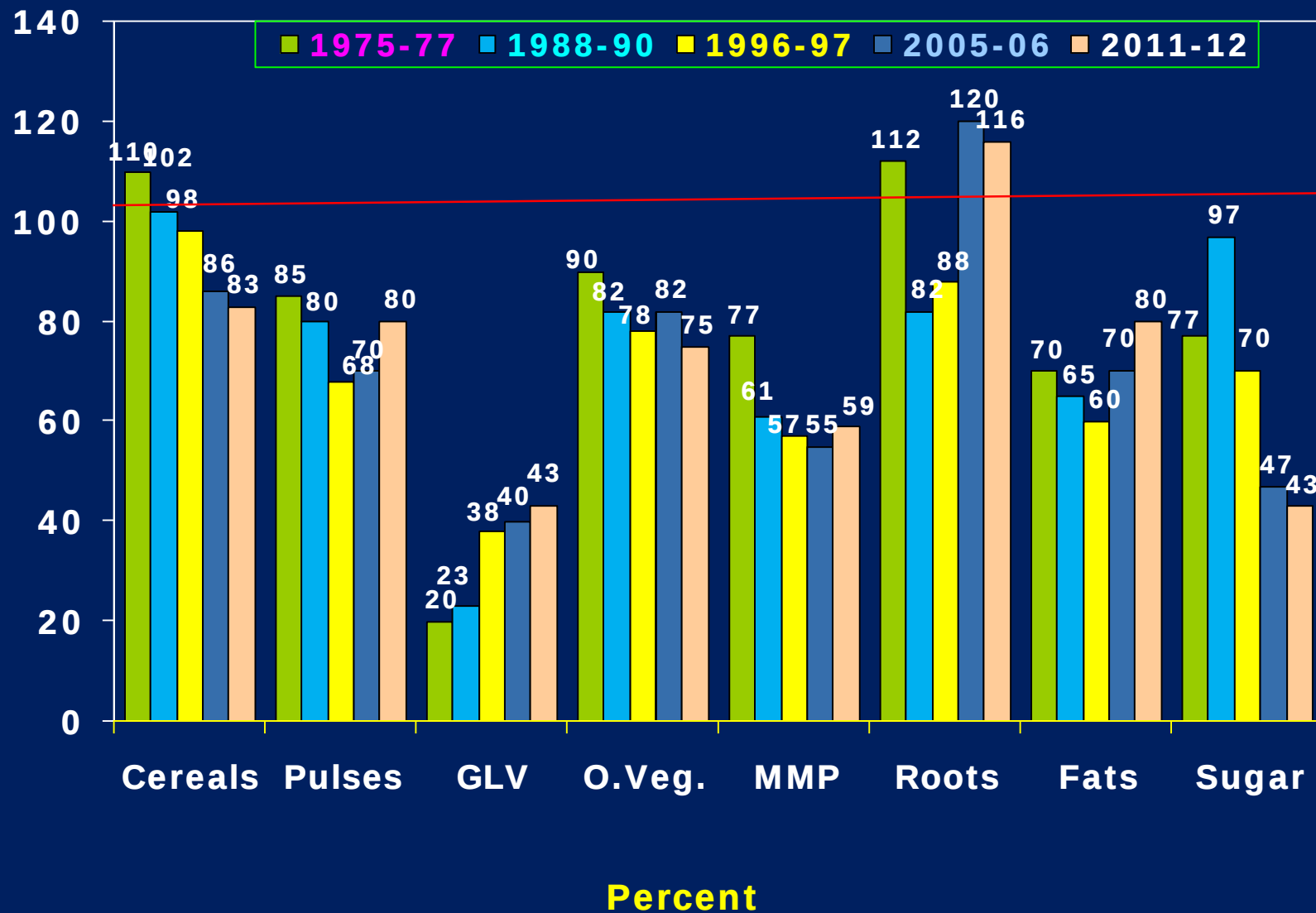
Average Daily Food Intake (% RDA) among 1-3 Year Children : By Gender



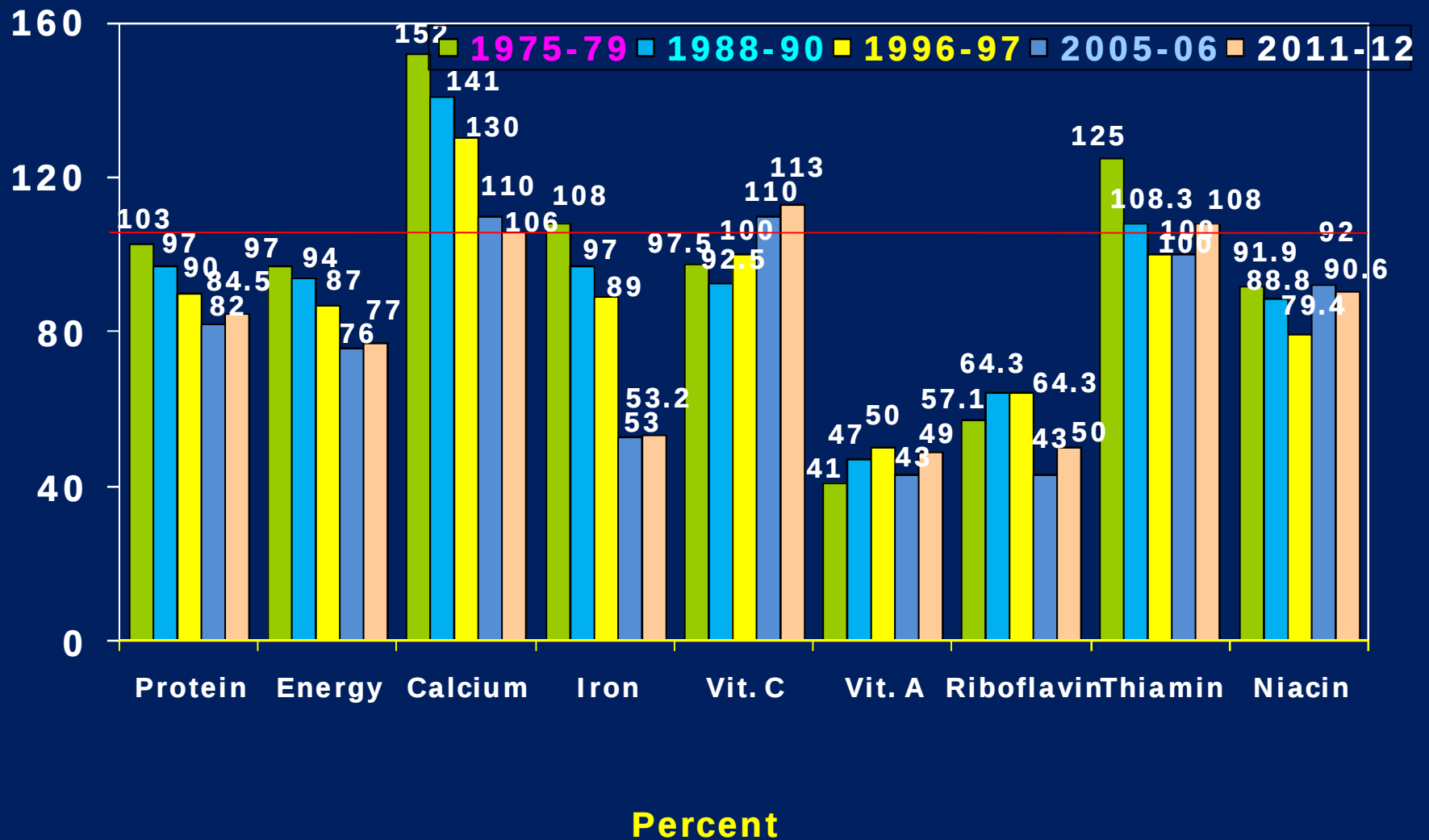
Median Intake of Nutrients (as % RDA) Among 1-3 year children : By gender



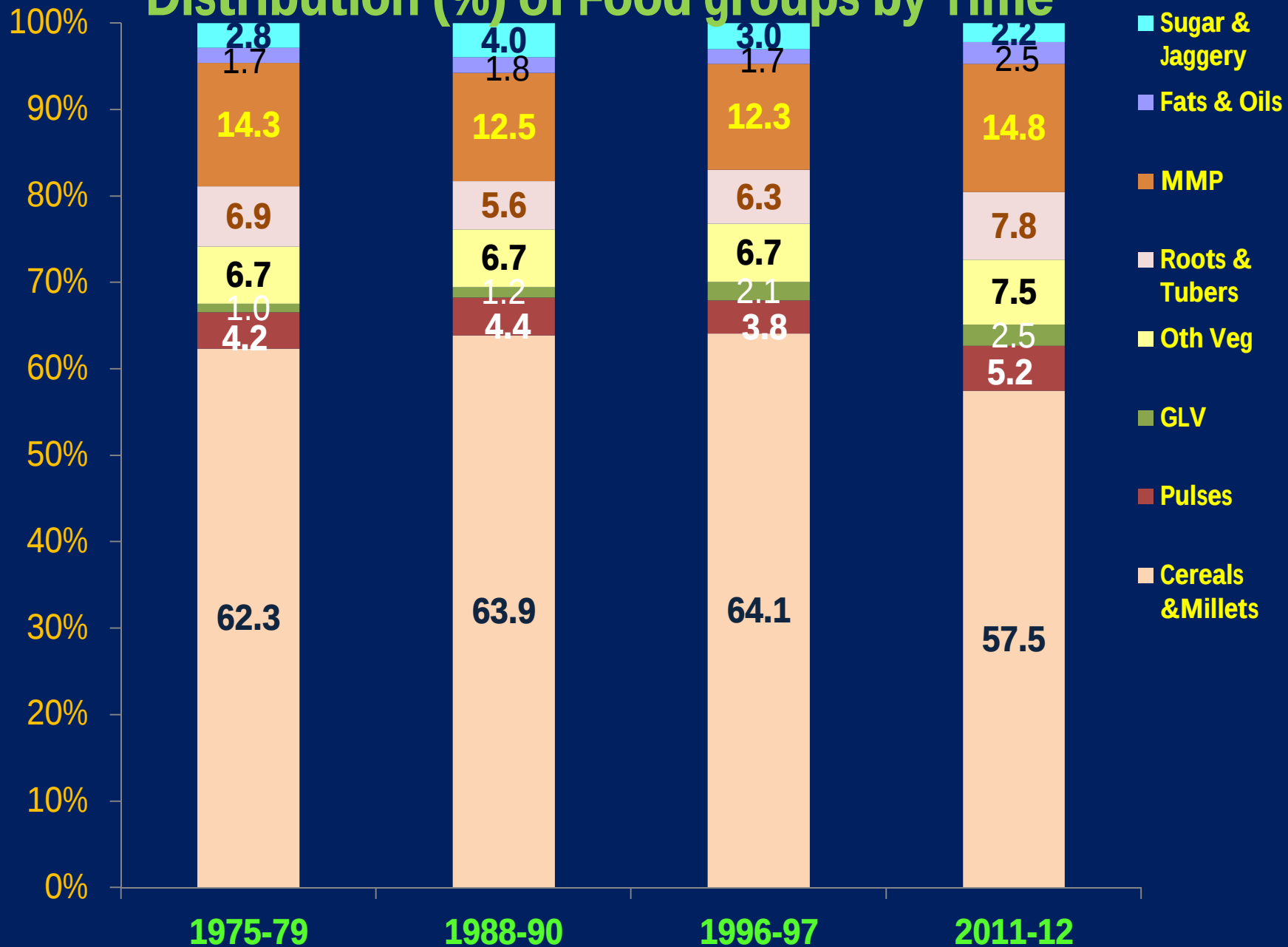
Average Intake of Foodstuffs (per CU/day) as % of RDI by Period of Survey



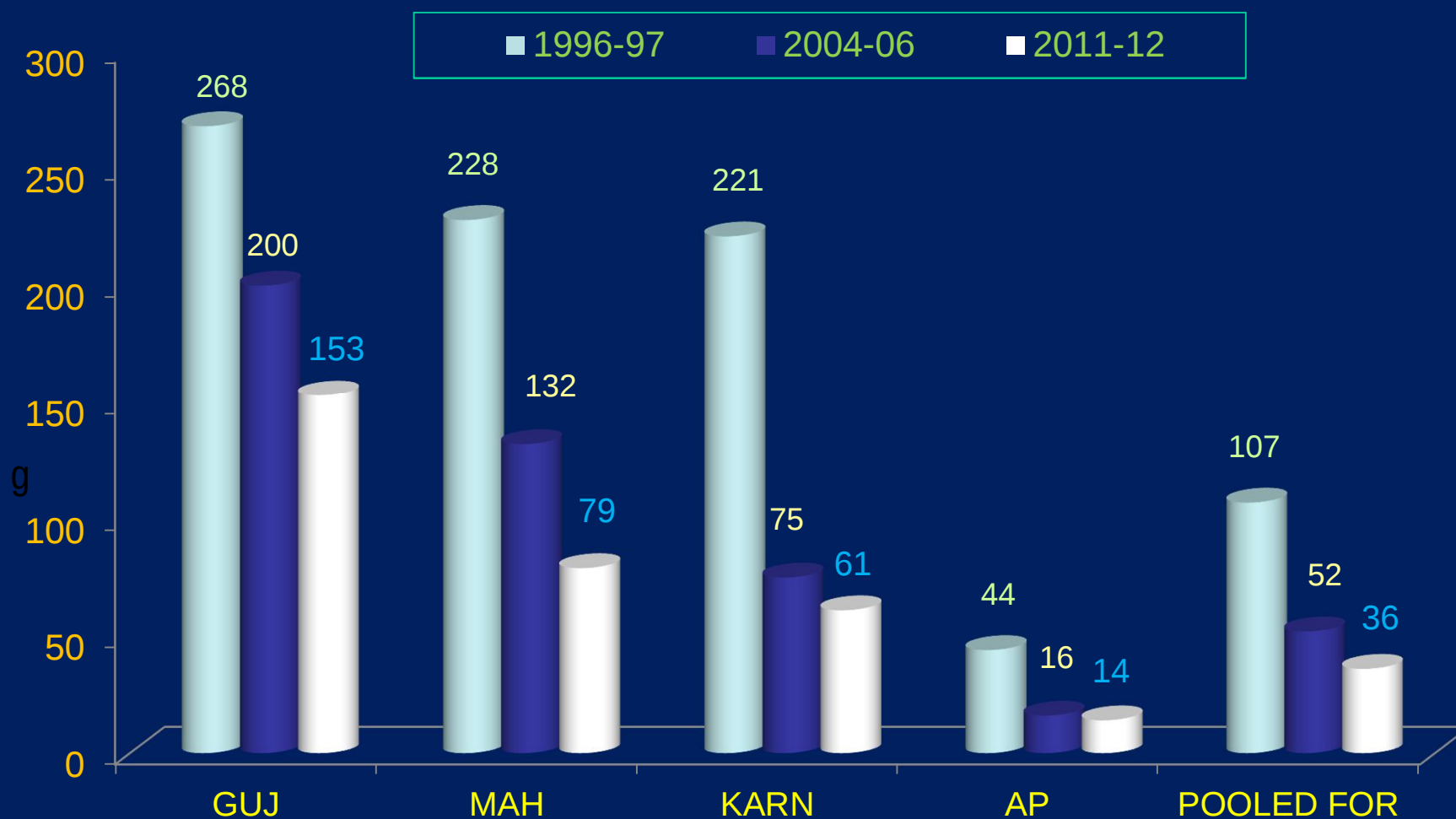
Average Intake of Nutrients (per CU/day) as % of RDI by Period of Survey



Distribution (%) of Food groups by Time

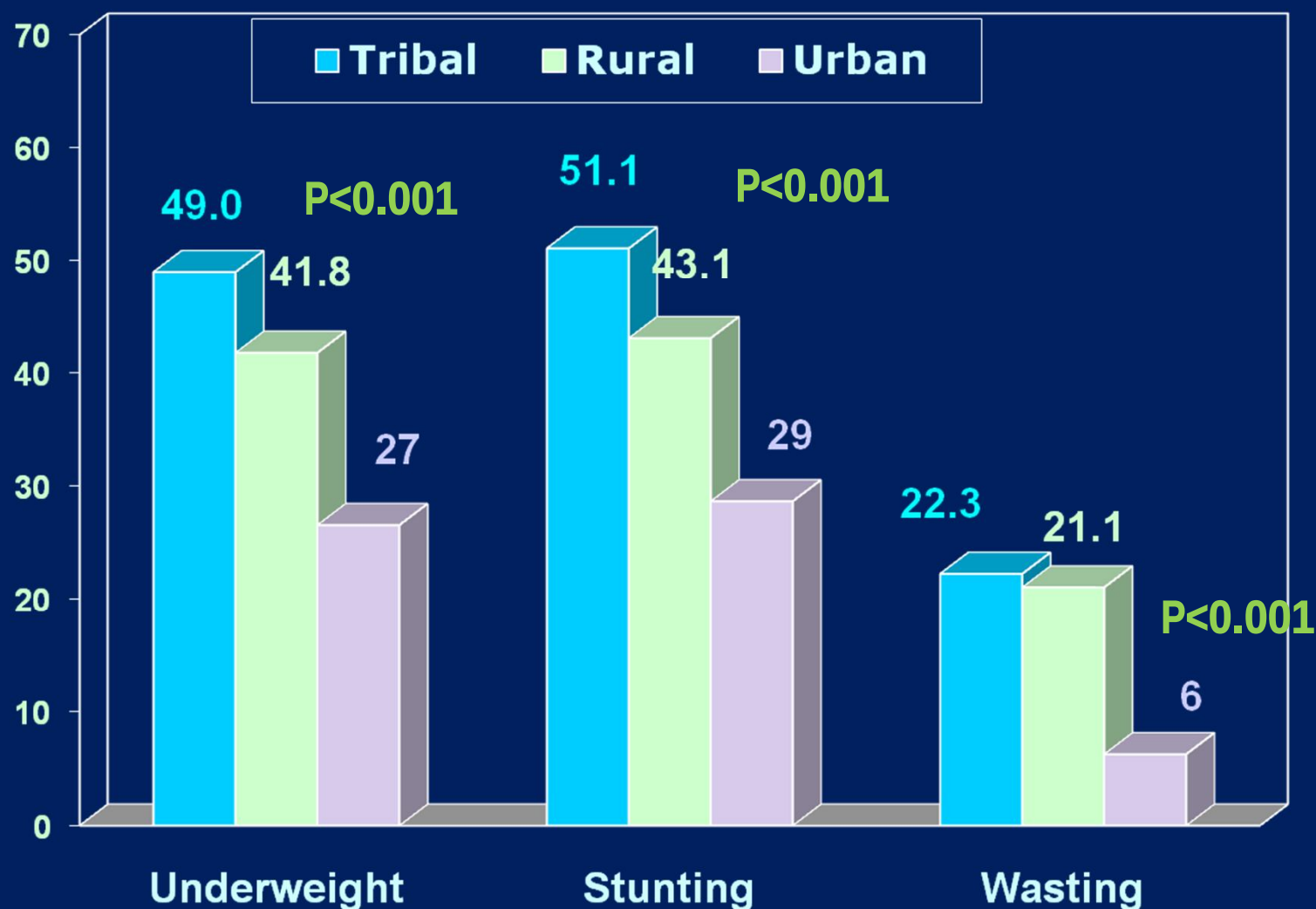


TIME TRENDS IN THE CONSUMPTION OF MILLETS (g/CU/day) AMONG RURAL POPULATION



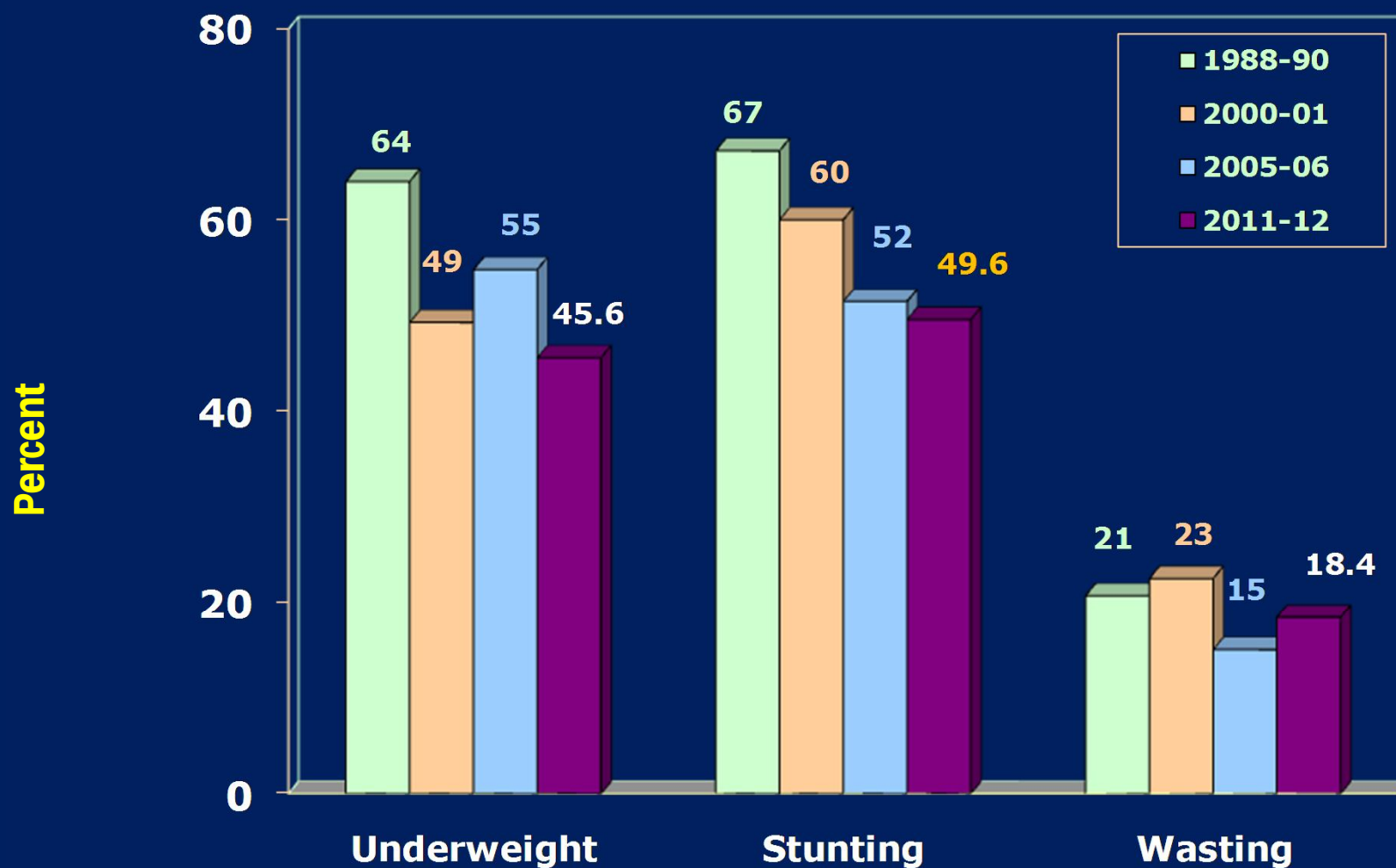
There was a significant reduction observed in consumption of millets among rural and tribal population in India , while it was increased in urban population over a period of two decades– NNMB Surveys

Prevalence (%) of undernutrition among Tribal, Rural and urban under five year Children in India



NNMB SURVEYS: Tribal 2008-09, Rural 2011-12 and Urban 2013-15 (Preliminary data)

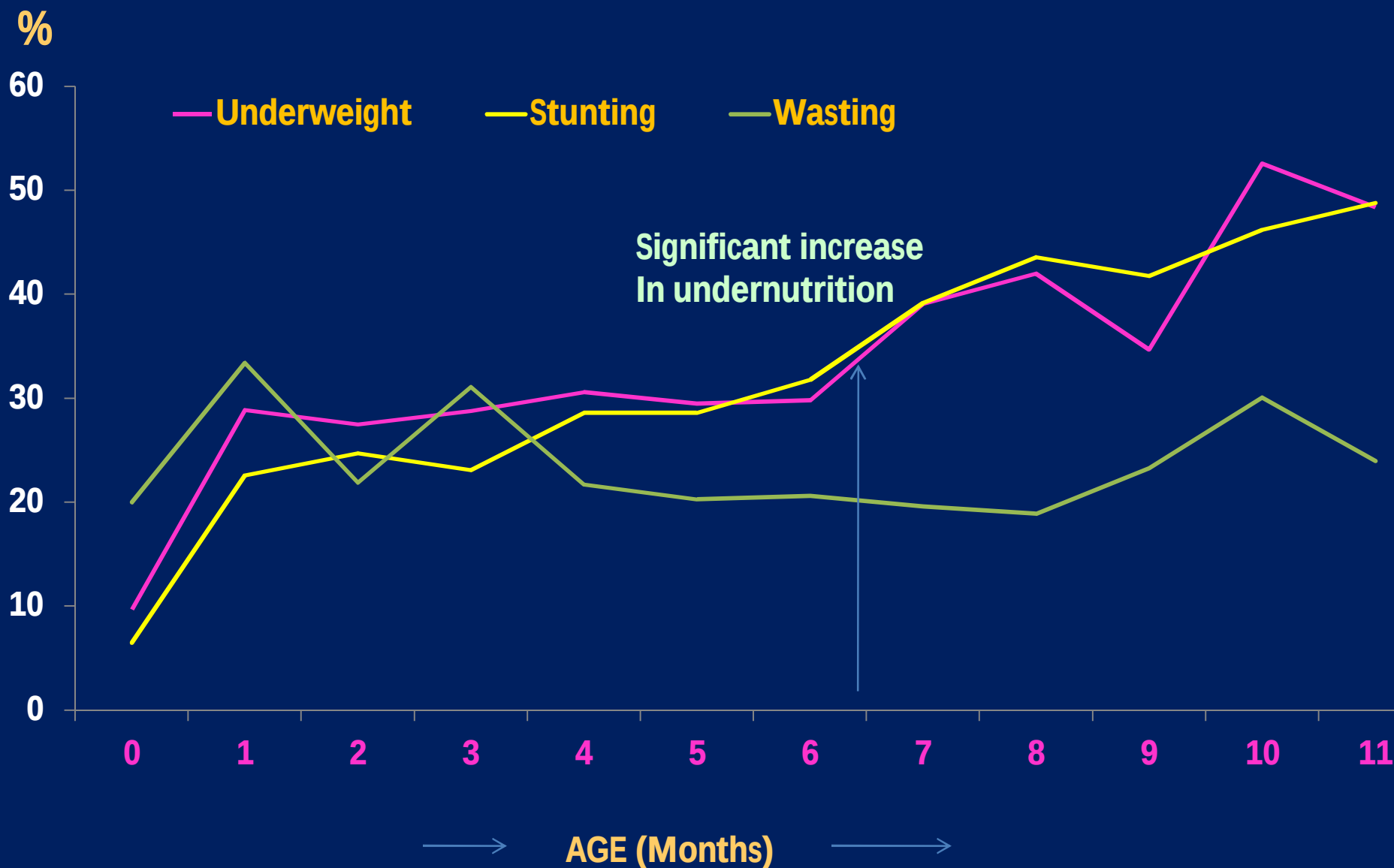
Time trends in the prevalence of Undernutrition among under five year Rural children in India



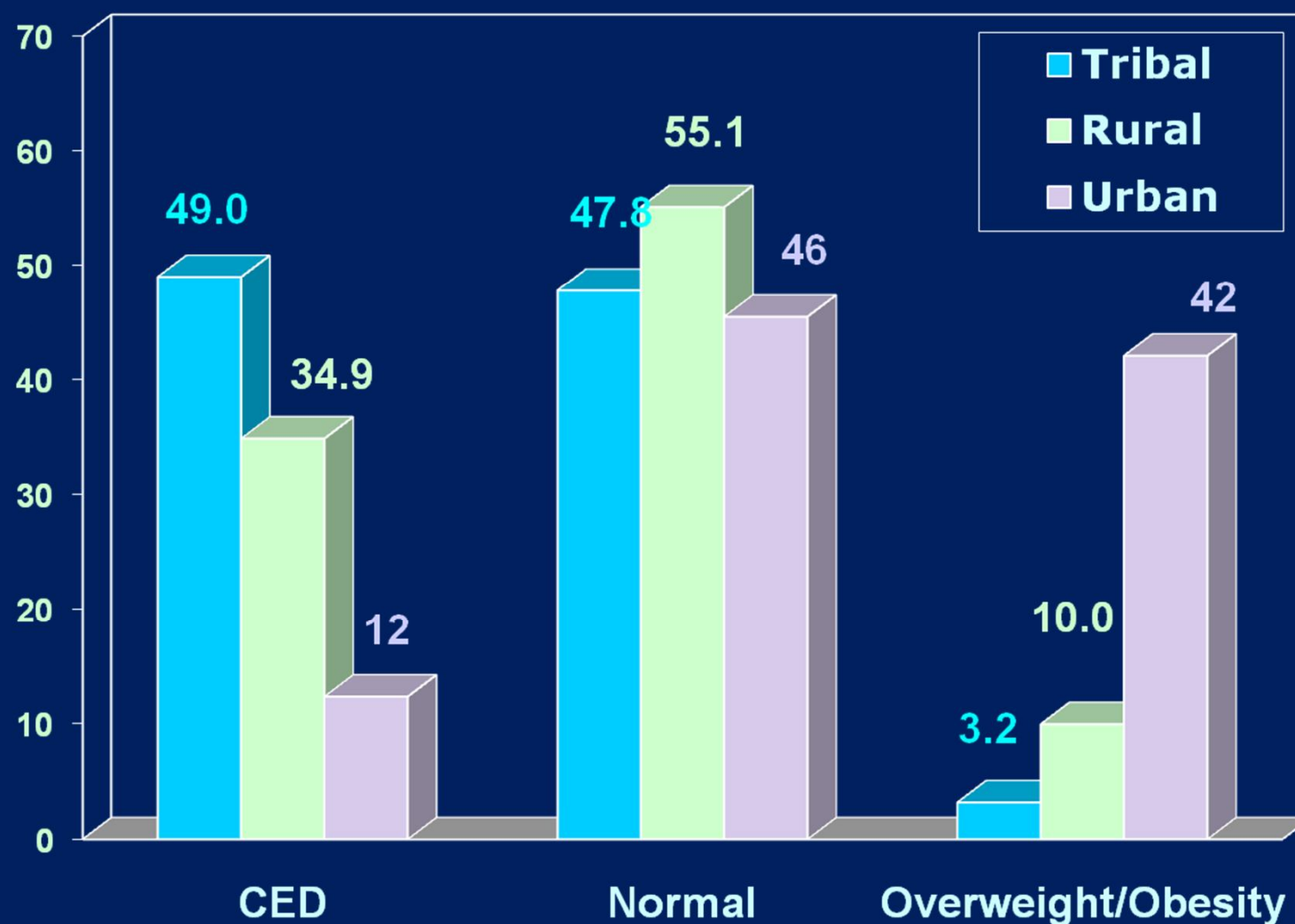
UNDERNUTRITION (< Median - 2SD)

PREVALNCE (%) OF **UNDERNUTRITION** AMONG INFANTS BY AGE (MONTHS): NNMB SURVEYS

Due to faulty feeding practices undernutrition is increasing from 6 months of age onwards

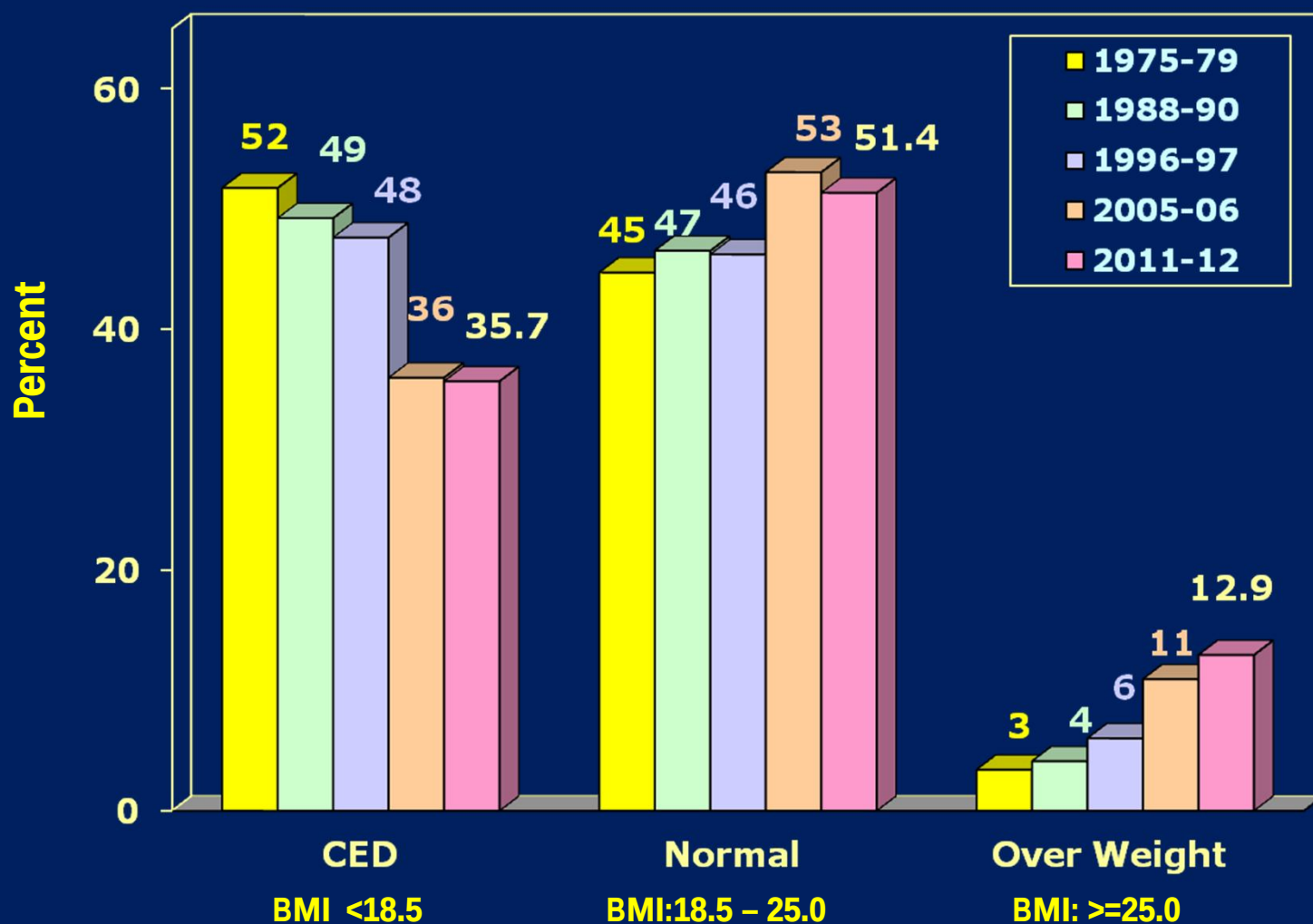


Prevalence (%) of CED and Overweight/Obesity among urban, Rural and Tribal women in India

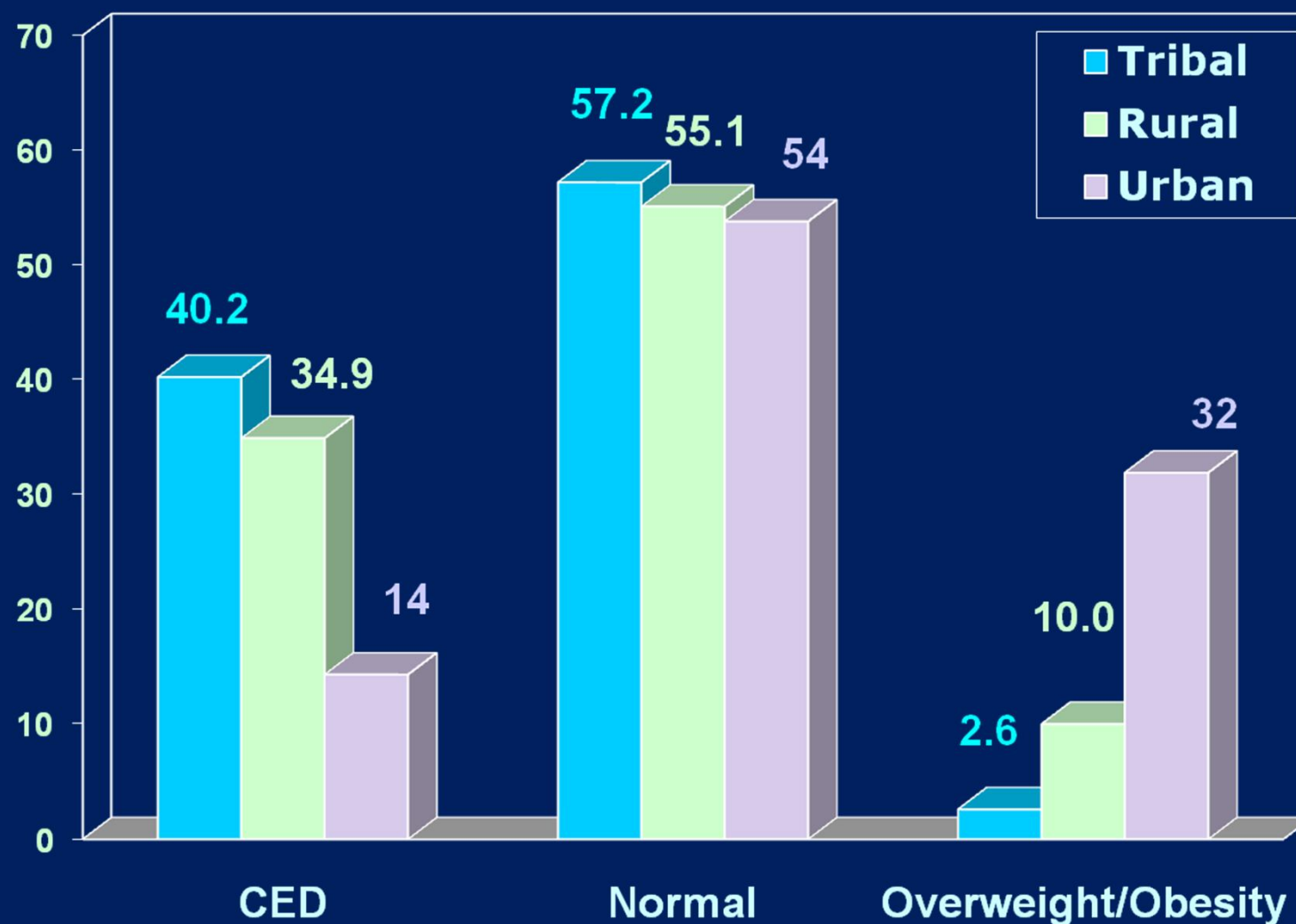


NNMB SURVEYS: Tribal 2008-09, Rural 2011-12 and Urban 2013-15 (Preliminary data)

Distribution (%) of Adult Women according to BMI Grades by Period of Survey

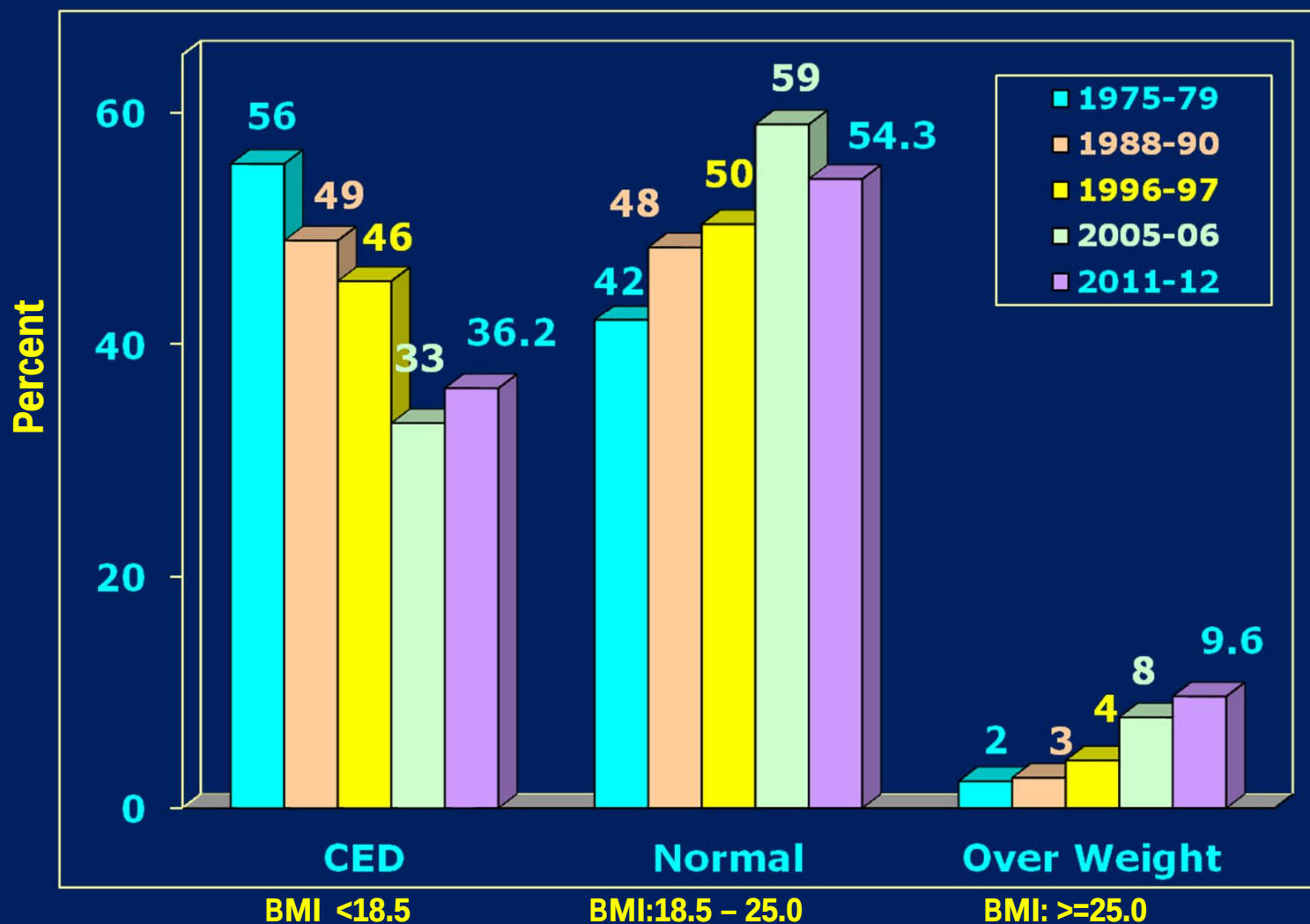


Prevalence (%) of CED and Overweight/Obesity among urban, Rural and Tribal men in India



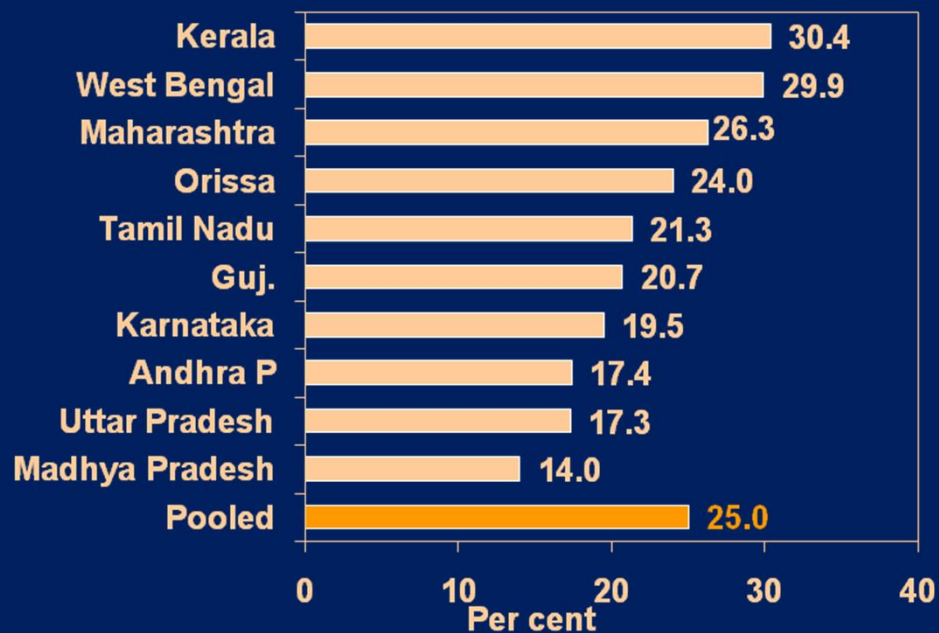
NNMB SURVEYS: Tribal 2008-09, Rural 2011-12 and Urban 2013-15
(Preliminary data)

Distribution (%) of Adult Men according to BMI Grades by Period of Survey

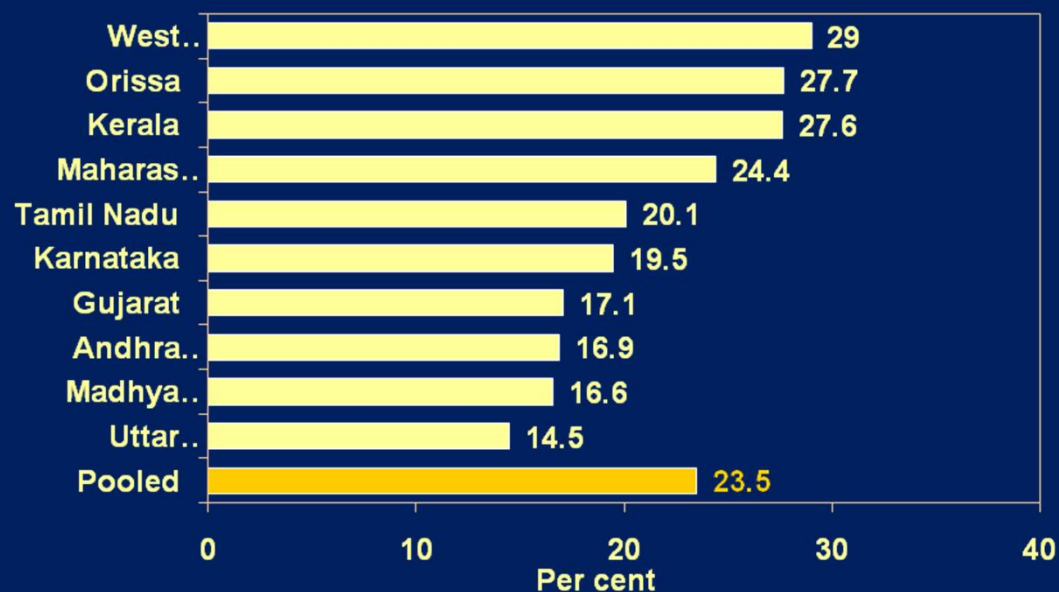


PREVALENCE (%) OF HYPERTENSION AMONG RURAL MEN AND WOMEN IN 10 NNMB STATES

Men

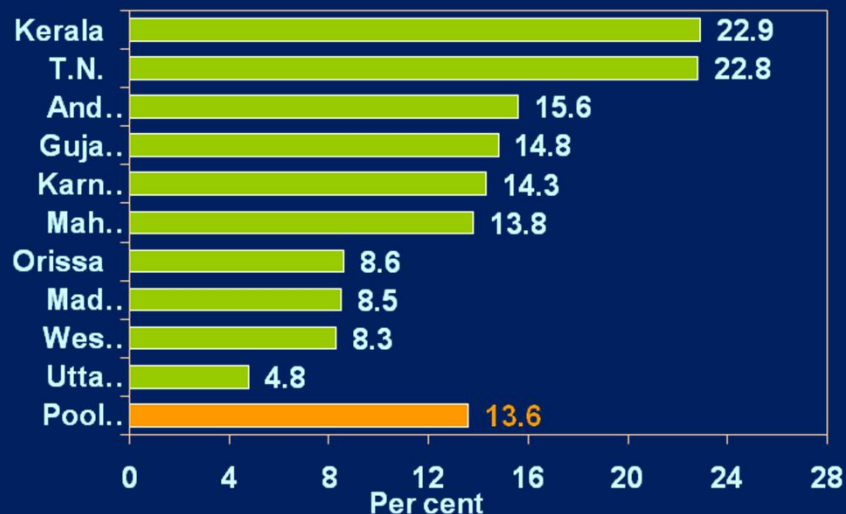


Women



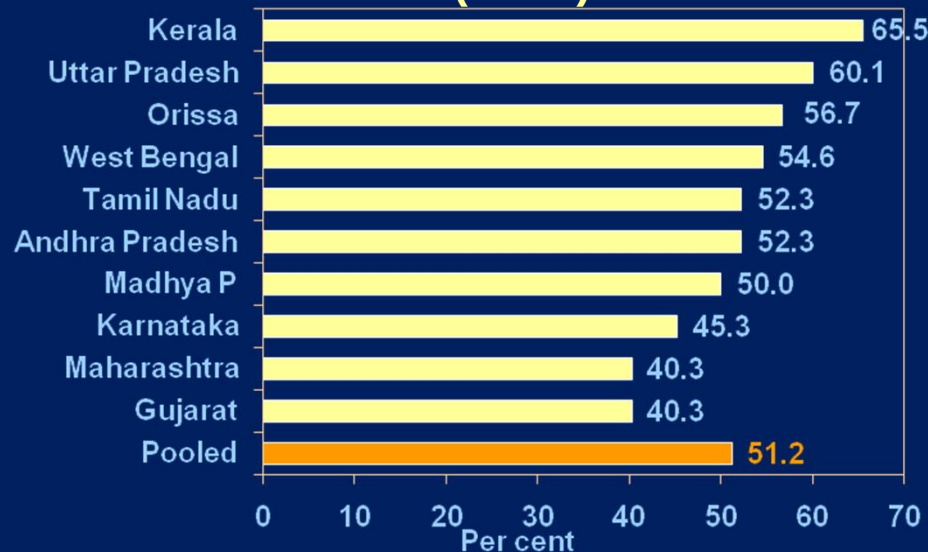
Prevalence (%) of Abdominal and Central obesity among Rural men and women by State: NNMB Rural 2011-12

WC (≥ 102 cm)

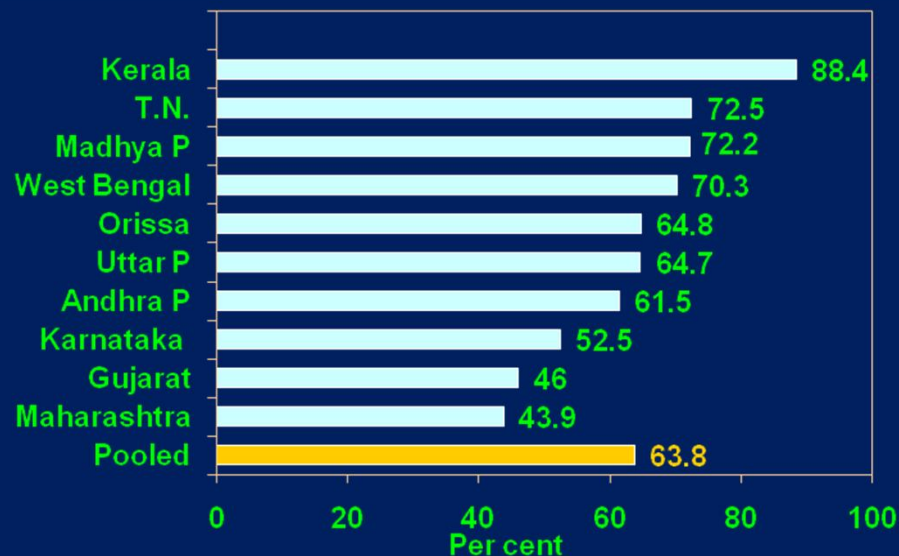
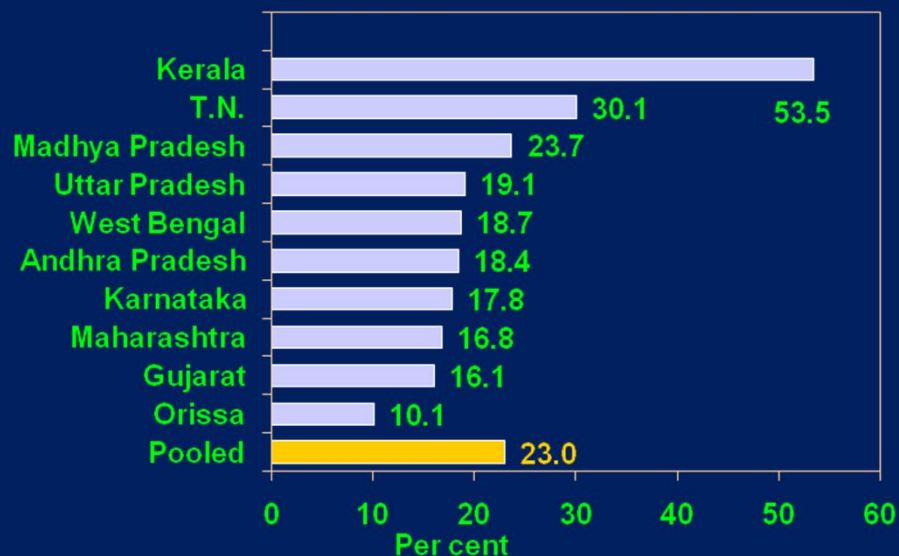


Men

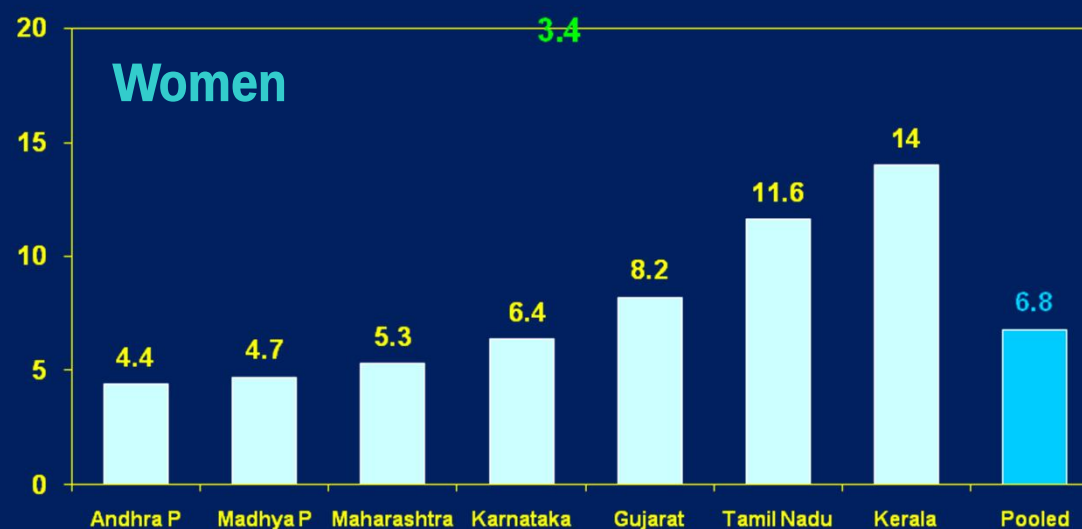
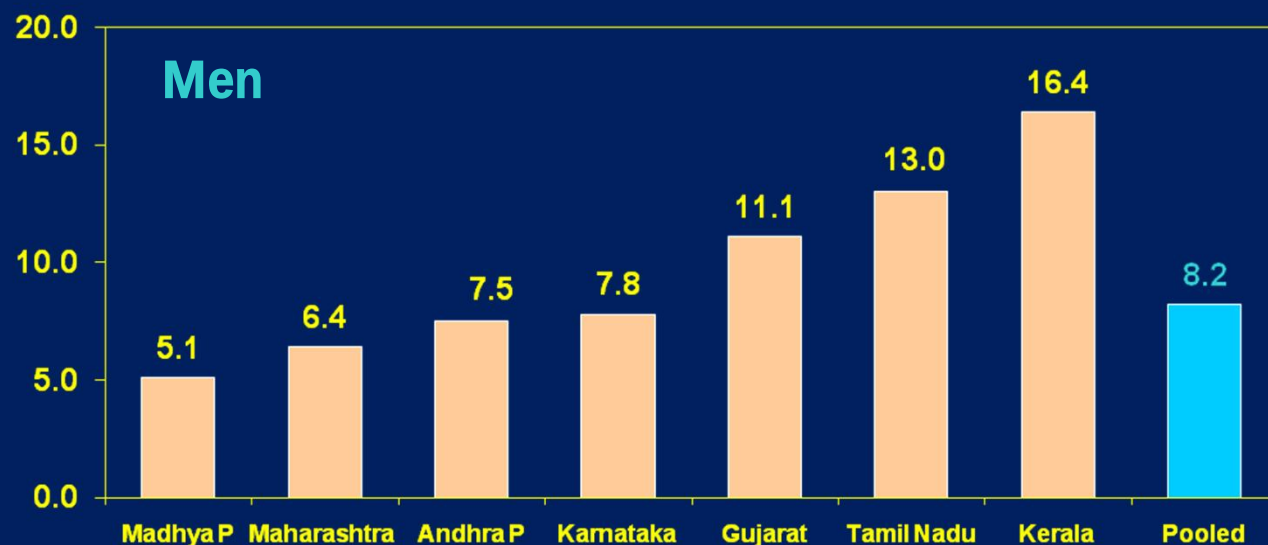
WHR (≥ 0.95)



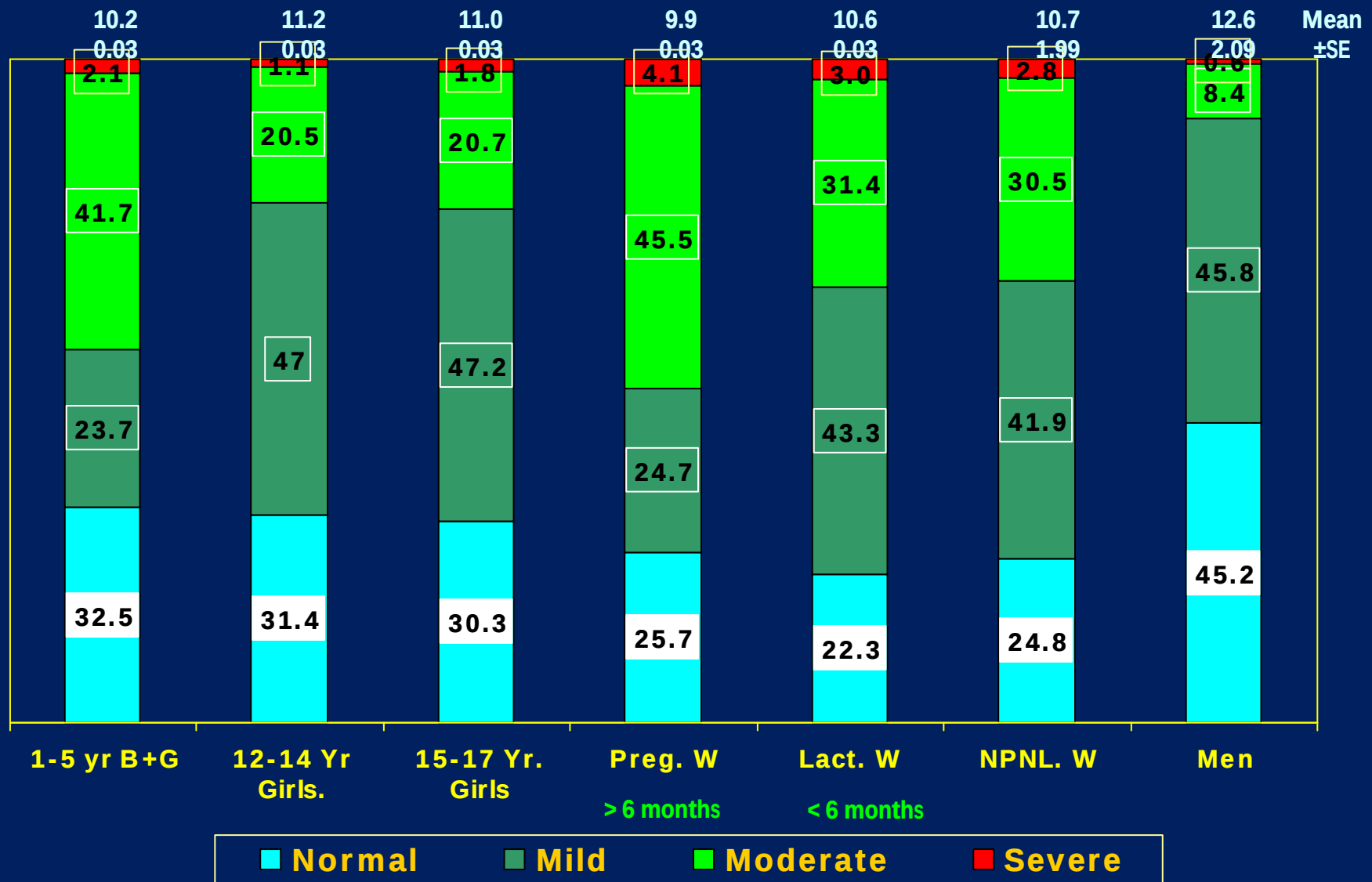
Women



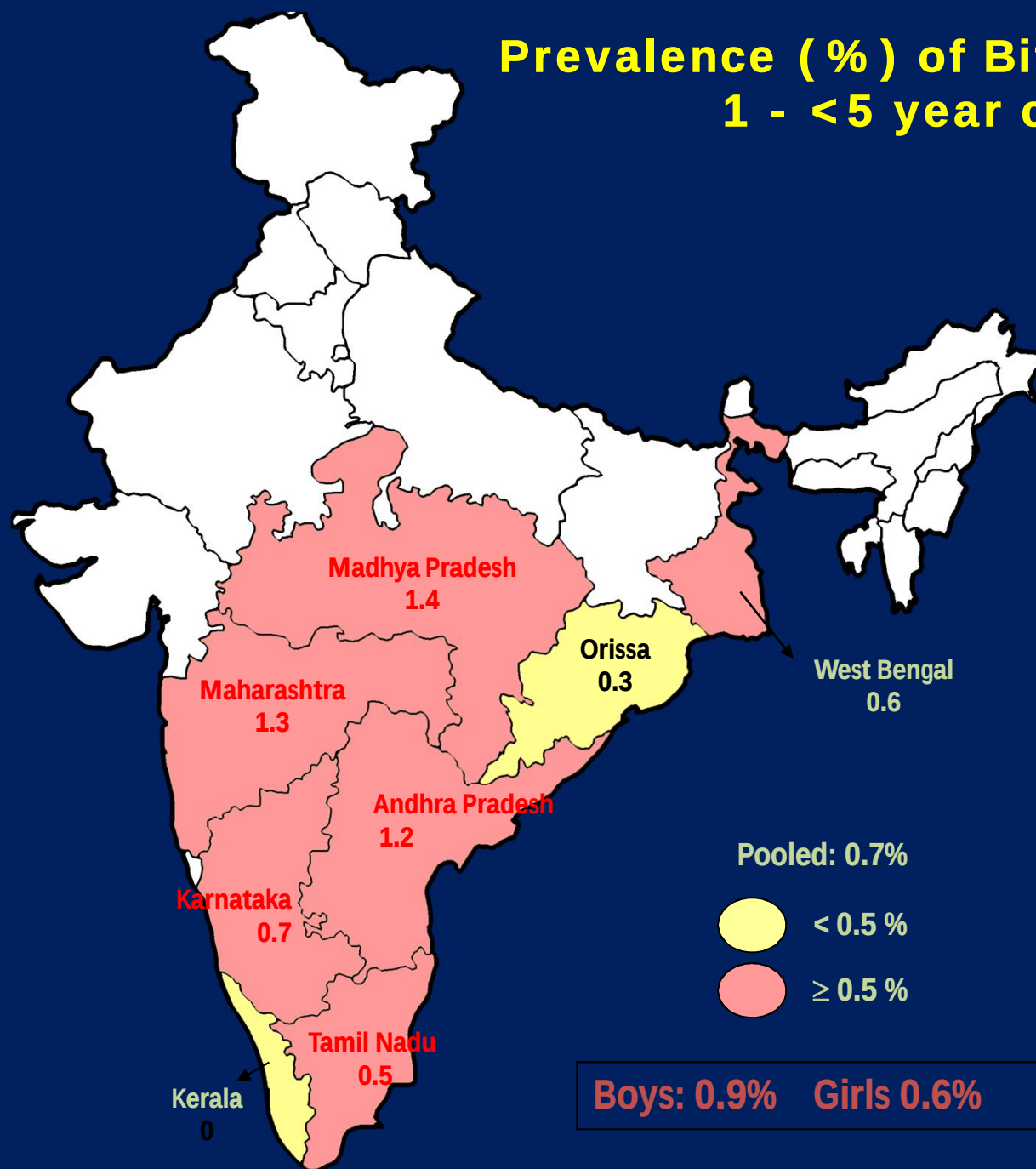
Prevalence (%) of Diabetes among Rural men and women by state: NNMB Rural 2011-12



Prevalence (%) of Anaemia by Age, Gender & Physiological Groups



Prevalence (%) of Bitot spots among 1 - <5 year children



Pooled: 0.7%

 < 0.5 %

 ≥ 0.5 %

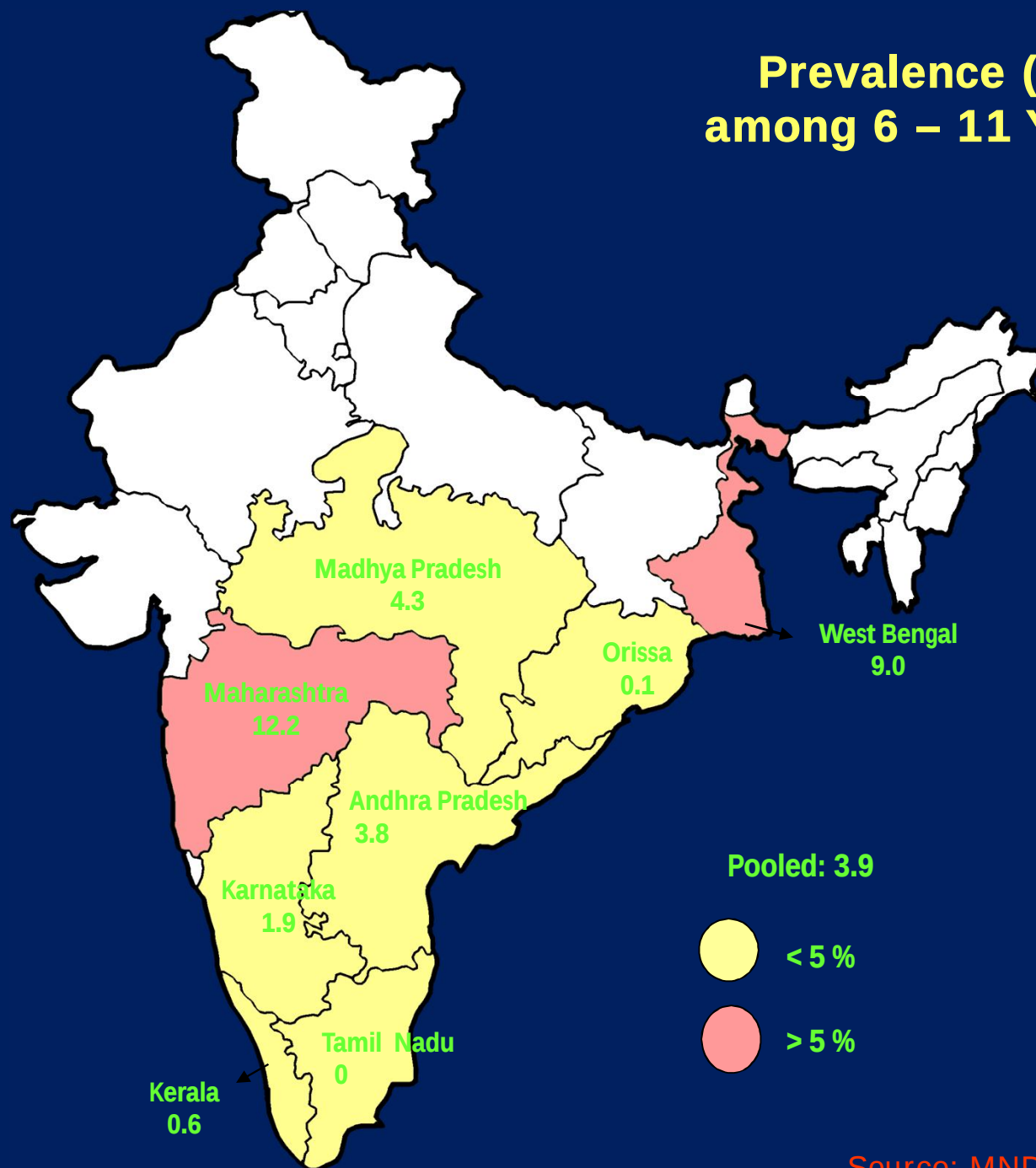
Boys: 0.9% Girls 0.6%

**Distribution (%) of 1- 5 Yr. Children with Blood Vit. A Levels of < 20
 μ G/dL, Median Dietary Intake of Vit. A (as % RDA) and
 Extent of Coverage for Suppl. of Massive Dose Vit. A – By State**

STATES	Blood Vitamin A < 20 μ g/dL	Dietary Intake of Vitamin A < 50% of RDA	Receipt of Massive Dose Vitamin A		
			1 or 2 Doses	No. of Doses	
				One	Two
Kerala	79.4	91.8	38.5	28.4	10.1
Tamil Nadu	48.8	81.9	50.6	20.2	30.4
Karnataka	52.1	90.4	56.6	42.1	14.5
AP	61.5	92.9	49.3	14.2	35.1
Maharashtra	54.7	88.8	52.1	29.4	22.7
MP	88.0	87.4	52.3	19.1	33.2
Orissa	57.7	77.5	80.0	38.8	41.2
West Bengal	61.2	80.6	50.6	46.8	3.8
<i>Pooled</i>	<i>61.8</i>	<i>86.3</i>	<i>55.4</i>	<i>30.3</i>	<i>25.1</i>

Source: NNMB-MND Survey : 8 States, 2003

Prevalence (%) of IDD among 6 – 11 Year Children



Source: MND-NNMB, Tech Rep 22, 2003

Prevalence of Total Goitre (%) in Select Districts of Different Regions of the Country

Districts	Northern		North-Eastern		Eastern		Central		Southern	
	PREV.	Current	PREV.	Current	PREV.	Current	PREV.	Current	PREV.	Current
1	41.6	10.4	65.8	5.4	35.2	22.9	44.0	3.4	54.0	12.4
2	41.2	9.6	40.2	4.6	33.2	23.1	36.6	14.5	64.4	11.5
3	27.4	8.5	26.5	8.4	64.3	40.1	40.9	14.5	28.0	9.3
4	44.7	17.2	68.6	4.8	20.9	21.9	35.0	8.2	32.9	9.5
5	45.7	14.4	68.6	5.2	37.8	26.7	55.6	10.2	32.1	7.7
6	30.0	6.9	50.2	8.6	37.8	23.7	41.8	16.2	41.1	7.2
7	52.3	20.6	25.9	5.0	21.6	21.8	22.0	9.2	21.0	12.8
8	24.5	19.3	25.9	6.5	30.3	39.6	13.7	9.9	44.4	11.2

The following Nutrition methods used in all NNMB surveys

The commonly used ABCDE nutrition assessment methods are as follows:

- **Anthropometric measurements**
- **Bio-chemical estimations**
- **Clinical examination**
- **Dietary intake methods**
- **Energy balances and Biophysical measurements**

Anthropometrics Measurements

- **Height (Cm)**
- **Weight (Kg)**
- **Head, chest, mid upper arm (MUAC), waist and hip circumferences,**
- **Measure of fat fold thickness at multiple sites (triceps, biceps, sub-scapular and supra-iliac sites).**

Age Assessment

Accurate age assessment is very essential to compare the measurements with age standards/reference values, especially in case of < 5 year children.

Age assessment is very difficult in rural and tribal areas, illiteracy is high.

The following methods will be useful:

- ❖ **Birth certificate**
- ❖ **Delivery notes**
- ❖ **Horoscopy**
- ❖ **Immunization cards**
- ❖ **Local events calendar**

Local events calendar (Example)

Month	Events/ Festivals	2009	2010	2011	2012	2013	2014
Margasira	Bhogi	13 Jan	13 Jan	13 Jan	14 Jan	13 Jan	13 Jan
	Sankranti	14 Jan	14 Jan	14 Jan	15 Jan	14 Jan	14 Jan
	Kanuma	15Jan	15 Jan	15Jan	16 Jan	15 Jan	15 Jan
Pushya	Republic Day	26 Jan	26 Jan	26 Jan	26 Jan	26 Jan	26 Jan
	Gandhi Vardhanti	30 Jan	30 Jan	30 Jan	30 Jan	30 Jan	30 Jan
Magha	Maha Sivaratri	23 Feb	12 Feb	2 Mar	20 Feb	10 Mar	27 Feb
	Holi	10 Mar	1 Mar	20 Mar	7 Mar	27 Mar	17 Mar
Palgun	Ugadi	27 Mar	16 Mar	4 Apr	23 Mar	11 Apr	31 Mar
	Sri Rama Navami	4 Apr	24 Mar	12 Apr	1 Apr	19 Apr	8 Apr
	Good Friday	10 Apr	2 Apr	22 Apr	6 Apr	29 Mar	18 Apr
	Ambedkar Jayanti	14 Apr	14 Apr	14 Apr	14 Apr	14 Apr	14 Apr
	May Day	1 May	1 May	1 May	1 May	1 May	1 May
Chaitra	Buddha Purnima	9 May	27 May	17 May	6 May	25 May	14 May
	Mrigasira Karthe	8 Jun	8 Jun	8 Jun	7 Jun	8 Jun	8 Jun
Jeshta	Ramzan	21 Sep	11 Sept	31 Aug	20 Aug	9 Aug	29 July
	Bakrid	28 Nov	17 Nov	7 Nov	27 Oct	16 Oct	6 Oct
Ashad	Raksha Bandhan	05 Aug	24 Aug	13 Aug	2 Aug	20 Aug	10 Aug

Local events calendar (Example)

Month	Events/ Festivals	2009	2010	2011	2012	2013	2014
	Varalaxmi Vratm	31 Jul	20 Aug	12 Aug	27 Jul	16 Aug	08 Aug
	Krishnastami	14 Aug	2 Sept	23 Aug	10 Aug	28 Aug	18 Aug
Sravan	Vinayaka Chavithi	23 Aug	11 Sept	1 Sept	19 Sept	9 Sept	29 Aug
	Moharam	01Jan & 28 Dec	17 Dec	6 Dec	25 Nov	14 Nov	4 Nov
Badra	Gandhi Jayanthi	2 Oct	2 Oct	2 Oct	2 Oct	2 Oct	2 Oct
	Durgastami	26 Sep	15 Oct	4 Oct	22 Oct	12 Oct	2 Oct
	Maharnavami	27 Sep	16 Oct	5 Oct	23 Oct	13 Oct	3 Oct
	Vijayadasami	28 Sep	17 Oct	6 Oct	24 Oct	13 Oct	3 Oct
Ashiyuja	Naraka Chaturthi	17 Oct	5 Nov	26 Oct	12 Nov	2 Nov	22 Oct
	Deepavali	17 Oct	5 Nov	26 Oct	13 Nov	3 Nov	23 Oct
	Naga Chaviti	21 Oct	9 Nov	30 Oct	17 Nov	7 Nov	27 Oct
Kartika	Nehru Birthday	14 Nov	14 Nov	14 Nov	14 Nov	14Nov	14 Nov
	Christmas	25 Dec	25 Dec	25 Dec	25 Dec	25 Dec	25 Dec

Procurement of Equipment

1. Measurement of Weight

- Spring and beam balances are available
- Children: Salter balance, TANSI, SECA (electronic)
- Adults : Sattilan, SECA mechanical, SECA electronic

2. Measurement of Height/Length

- Height: Adults and Children ≥ 2 years
A 4 piece Anthropometric rods are available
(0 to 200 Cm)
- Stadiometers are also available

2. Length: Infanto-meter

- <2 years children (up to 100 Cm)
- If length is measured with infantometer for >2 year child, 0.7Cm is deducted to convert length to height.

Equipment required (Contd.)

Measurement of MUAC : Fiber reinforced non-elastic tape is used.

Fat Fold Thickness : Holtain, Harpendens, UNA calipers,

Body Fat % : Bioelectric impedance
Under water measurement
Dual Energy X-Ray Absortiomerty
Anthropometry (FTT at multiple sites)

Equipment required (Contd.)

Measurement of MUAC : Fiber reinforced non-elastic tape is used.

Fat Fold Thickness : Harpenden skinfold calipers

- It is the gold standard caliper for skinfold measurement.
- It is capable of measuring accurately up to 0.5 mm skinfold thickness.
- They are a very well made sturdy instrument, commonly used by professionals and in scientific research,
- one of the most expensive skinfold calipers , the Cost is ~\$500.



Holtain skinfold caliper

- This instrument was developed in close collaboration with the London University - Institute of Child Health.
- It provides a measuring range: 0 mm to 48 mm, with 0.2 mm graduation,
- A constant pressure of 10 gms/sq. mm.
- Cost ~\$500.



Using Standards and References values

References:

- Harvard Reference values
- NCHS Reference values
- ICMR Reference values

Standards:

- WHO new child growth standards 2008

Harvard Growth References (1960-70)

- In 1966, WHO simplified the Harvard growth references by introducing the combined sexes.
- Reference data from caucasian children in Boston children's hospital (1930-56)

Hospital based

Longitudinal study

Small sample size

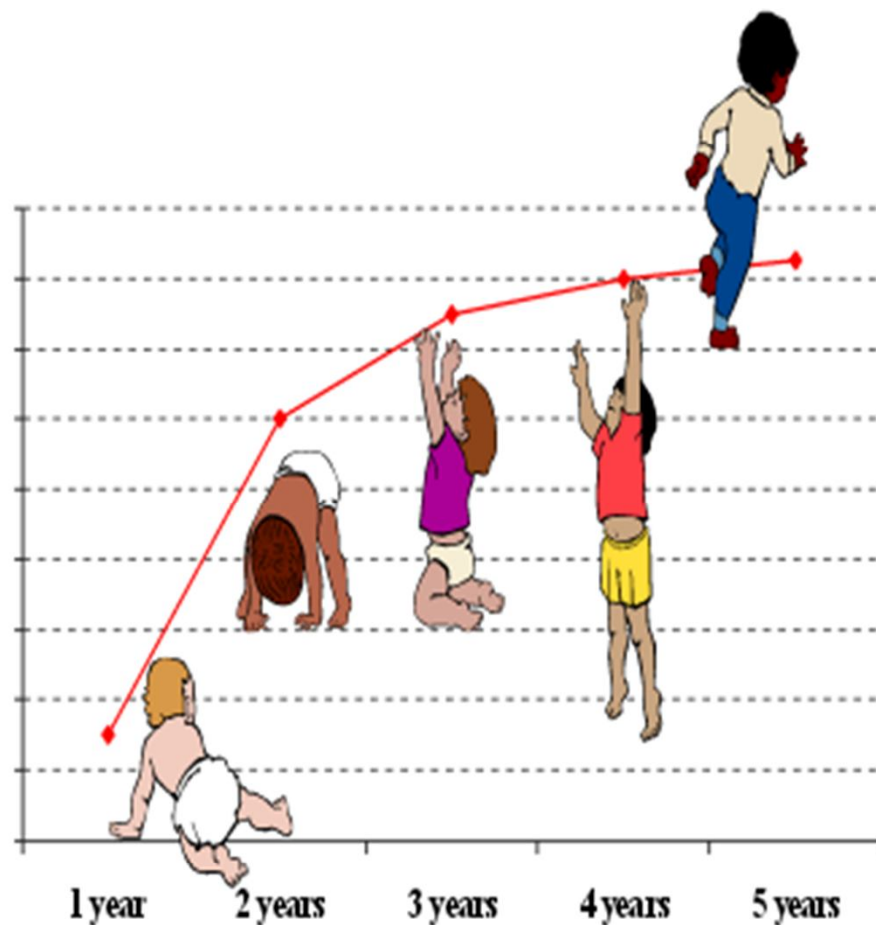
Top milk fed babies

- Still served the purpose of creating an awareness and need for monitoring & growth assessment
- Used in Indian growth charts & for classification of malnutrition since mid 1970s (50th centile taken as 100%)

CDC/NCHS growth charts

- NCHS growth charts based on growth of American children developed in 1977
- Adopted by WHO for international use
- CDC 2000 growth charts a revised version of earlier NCHS charts
- Revision of previous existing 14 charts with introduction of 2 new BMI charts
- No new primary data collected
- Used national studies conducted at various times & places and improved statistical tools

WHO Child Growth Standards



**A growth
chart for
the 21st
century**



World Health
Organization

New WHO growth standards

- The international growth standards established by the WHO in April 2008 directly confront the notion that ethnicity is a major factor in how children grow.
- The new standards demonstrate that children born in different regions of the world, when given an optimum nutrition, good environment and health care, have the potential to grow and develop within the same range of height and weight for age.

WHO Child Growth Standards



The new standards will play a key role in the prevention and early recognition of childhood obesity

Why should we adopt new WHO charts?

The new Child Growth Standards is a crucial development in improving infant and young child nutrition globally.

Unlike the old growth charts, the new standards

- describe how children "should grow,"
- establish breastfeeding as the biological "norm,"
- provide international standards for all healthy children, as human milk supports not only healthy growth, but also optimal cognitive development and long-term health.

WHO Multicentre Growth Reference Study (MGRS)



WHO Growth Reference Study

Prescriptive Approach

- Optimal Nutrition

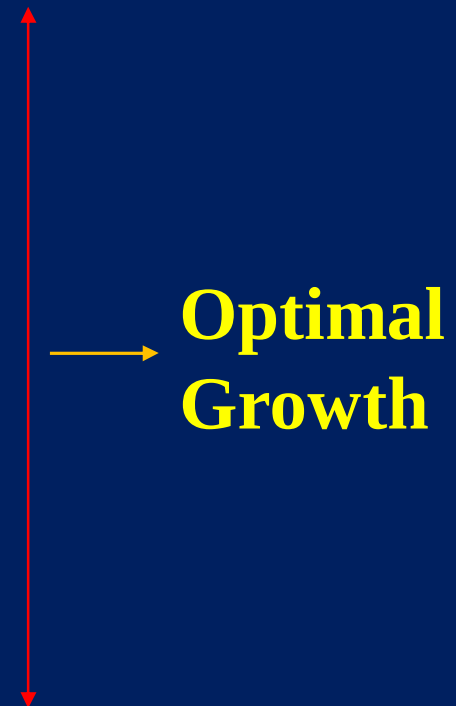
- Breastfed infants
- Appropriate complementary feeding

- Optimal Environment

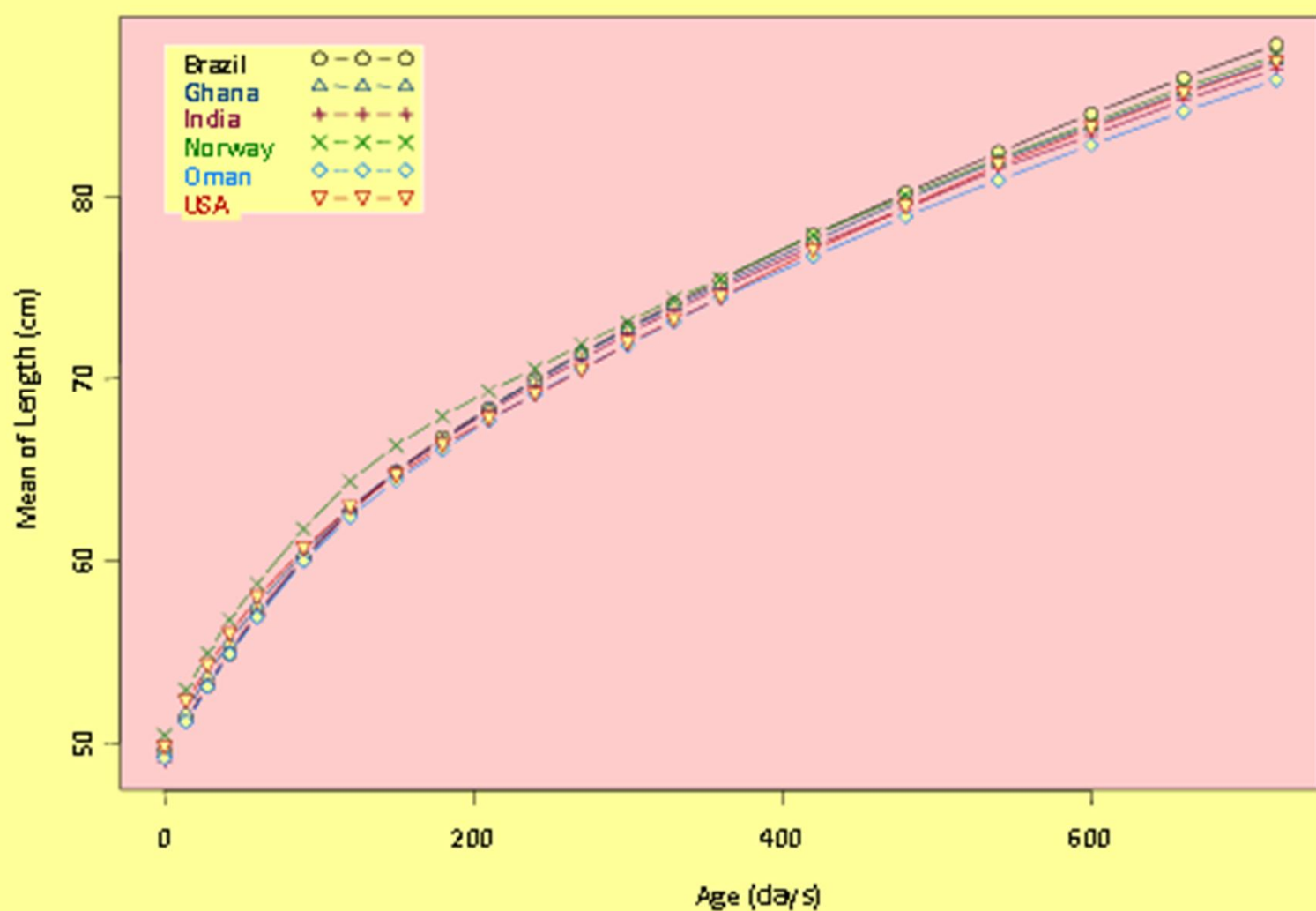
- No microbiological contamination
- No smoking

- Optimal Health Care

- Immunization
- Immediate health care availability



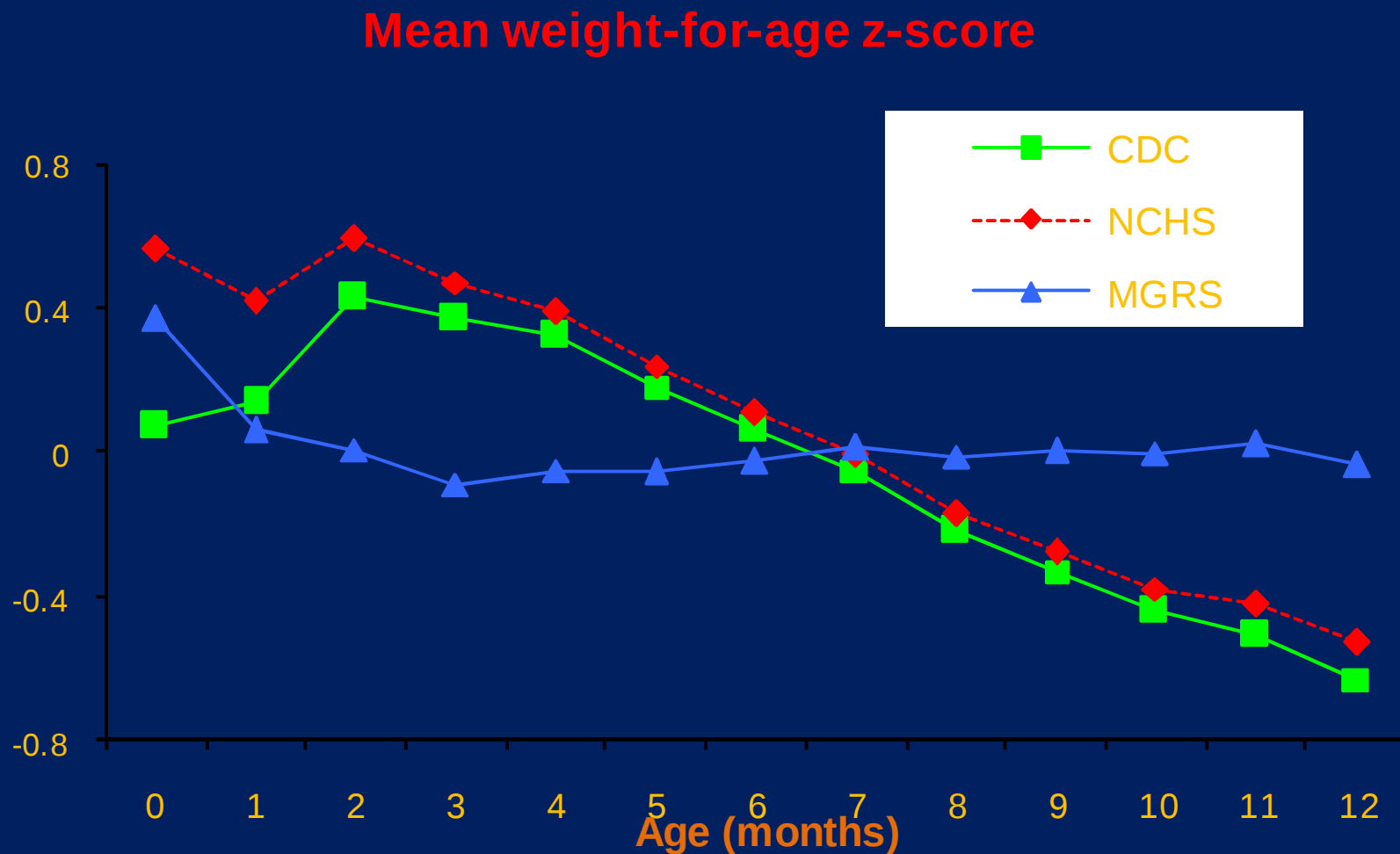
Mean length from birth to 24 months for the six MGRS sites



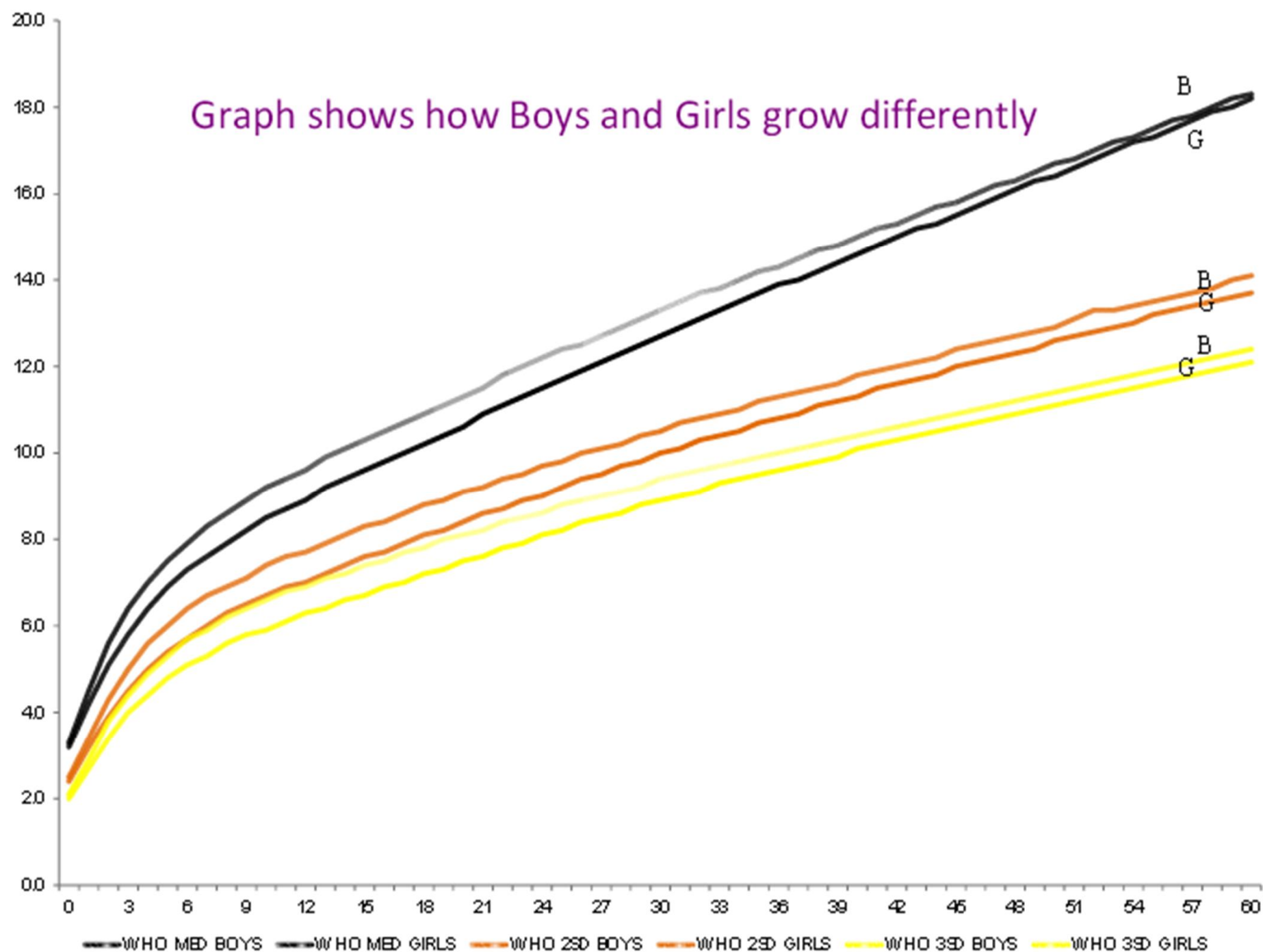
WHO Child Growth Standards

- **Attained growth**
 - **Weight-for-age**
 - **Length/height-for-age**
 - **Weight-for-length/height**
 - **Body mass index-for-age**
 - **Mid-upper arm circumference-for-age**
 - **Triceps skin-fold-for-age**
 - **Sub-scapular skin-fold-for- age**
 - **Head circumference-for-age**
- **Growth velocity**
 - **Weight**
 - **Length/height**
 - **Head circumference**
 - **Arm circumference**

Mean weight-for-age z-scores of healthy breastfed infants relative to the NCHS, CDC and WHO curves



Graph shows how Boys and Girls grow differently



What is Growth Monitoring

- Regular monthly recording of weight of the children and plotting it on the growth chart which enables us to see the changes in the weight and to give advice to mother about the growth of child

Purpose:

To take the action against

- Inadequate growth in a child
- No growth in a child
- Weight loss in a child
- To restore health & proper growth

Z- Score or standard deviation score

The deviation of the value for an individual from the median value of the reference population, divided by the standard Deviation for the reference population

$$\text{Z- Score} = \frac{(\text{Observed value}) - (\text{Median reference value})}{\text{Standard deviation of reference population}}$$

Advantage:- Allows mean and SD calculation for a group of Z score in population based studies.

Percent of median values

Ratio of a measured value in the individual, for instance weight , to the median value of the reference data for the same age or height, expressed as a percentage.

- Main disadvantage-
lack of exact correspondence with a fixed point of distribution across age and weight status.

Eg. Depending on the child's age, 80% of the median weight for age might be above or below -2Z score

- Cut off points for percent of median are different for the different anthropometric indices.

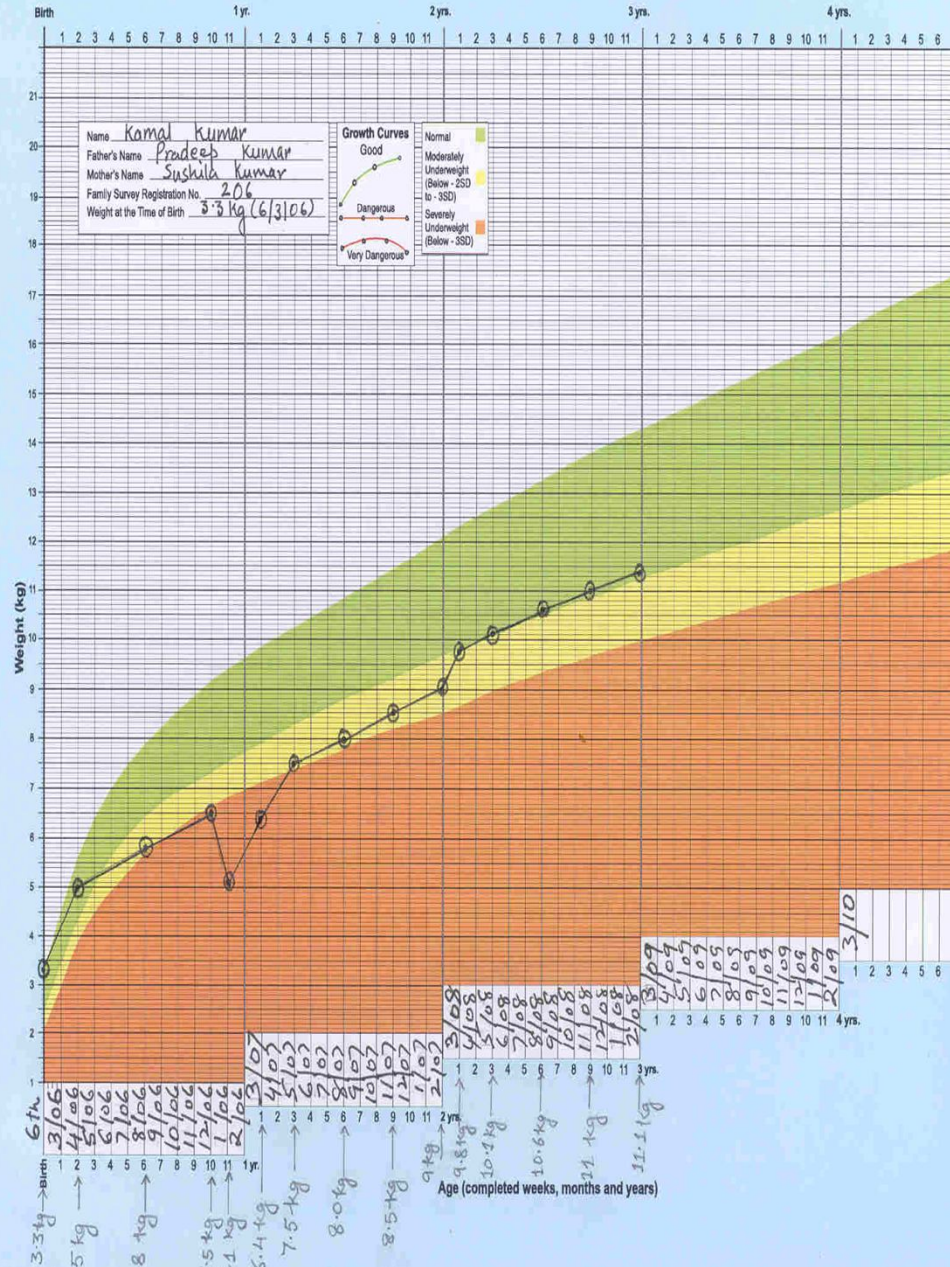
SD Classification

The WHO recommends use of SD Classification to categorize children in to various grades of nutritional status and it enable us to compare Indian Children internationally.

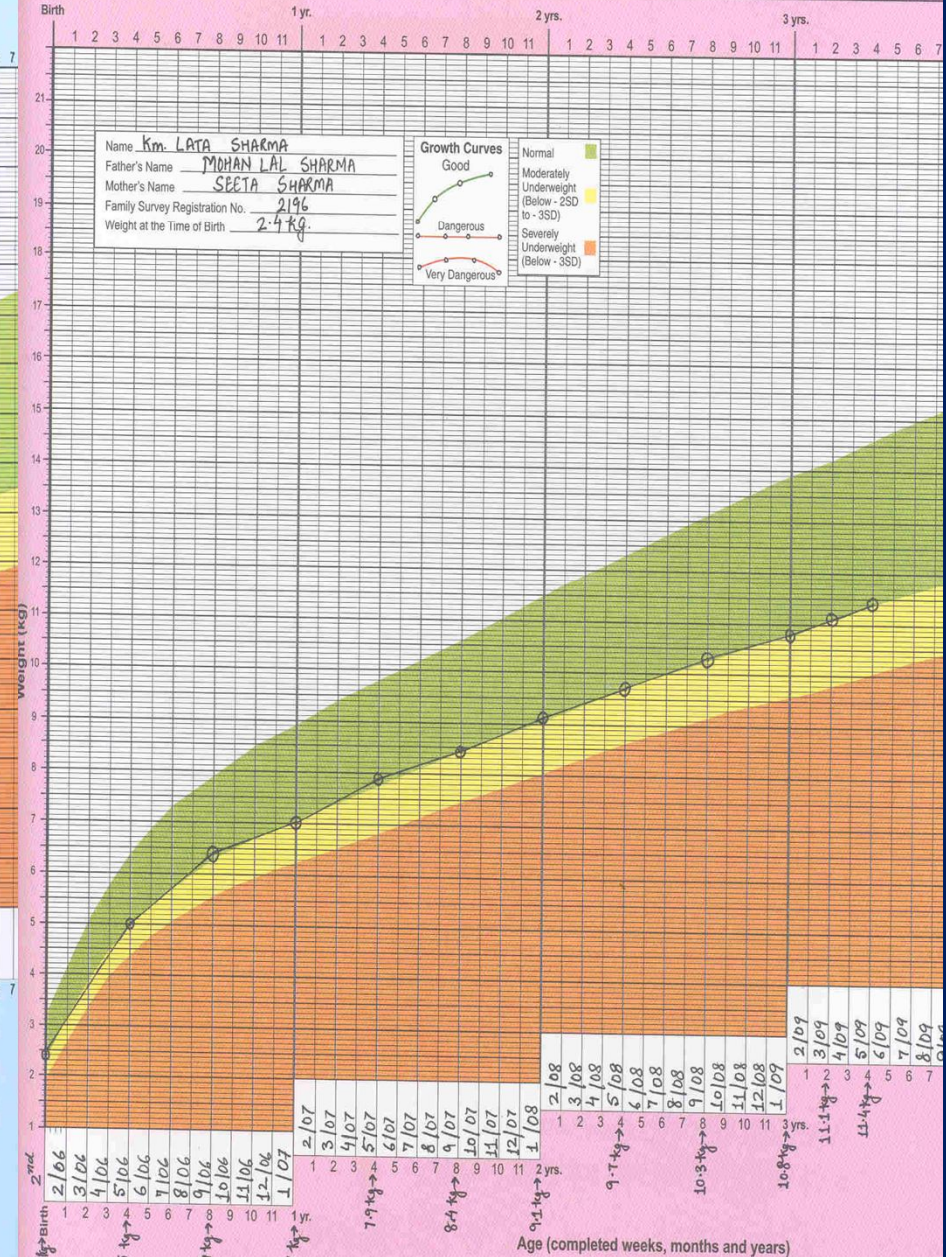
SD Classification	Weight/Age	Height/Age	Wt/Ht
$\geq$ Median	Normal	Normal	Normal
Median – 1SD to Med.			
$<$ Median – 2SD to 1SD			
$<$ Median – 3SD to 2SD	Mod. underweight	Moderate Stunting	Moderate wasting
$<$ Median – 3SD	Severe underweight	Severe stunting	Severe wasting



BOY : Weight-for-age – Birth to 5 years (As Per New WHO Child Growth Standards)



GIRL : Weight-for-age – Birth to 5 years (As Per New WHO Child Growth Standards)



Limitations of Anthropometry

- ❖ Inter-observers errors in measurement
- ❖ Limited nutritional diagnosis
- ❖ Problems with reference standards, i.e. local versus international standards.
- ❖ Arbitrary statistical cut-off levels for what considered as abnormal values.



Clinical Examination

Examination of nutritional deficiency signs (Frank clinical signs)

Hair sparse

Hair easily pluckable

Oedema

Marasmus

Conjunctival Xerosis

Corneal xerosis

Corneal scar

Angular stomatitis

Glossitis

Koilonychia

Knock knees/Bow legs

Dental Fluorosis

Thyroid gland visible

Hair discolored

Moon face

Emaciation

Night blindness

Bitot spots

Keratomalacia

Photophobia

Cheilosis

Phrynoderma

Gums spongy bleeding

Dental caries

Thyroid gland palpable

Others (Specify:)

Types of Diet Surveys

- ❖ **Family diet survey**
- ❖ **24 hour recall method**
- ❖ **Institutional diet surveys**
- ❖ **Duplicate samples**
- ❖ **Food balance sheets**
- ❖ **Food frequency, etc**

Weighment diet survey (Family diet Survey)

- The method implies weighment of edible portion of raw foods.

Key points to be remembered

- All the raw food-stuffs must be weighed, before they are cooked (breakfast, lunch, evening snacks & tea and dinner)
- Left overs and plate wastage must be taken care
- The purpose of the survey needs to be made clear to the respondent
- Prior confirmed co-operation from the family essential
- Avoid fast and feast days
- Duration of the survey may be one, three or 7 consecutive days.

Weighment diet survey (Family diet Survey) (Contd.)

- Requires two visits - one early in the morning and another in the evening to weigh raw foods prior to cooking
- The dietary intake is expressed in terms of consumption units (C.U)/day
- Demographic particulars of all the individuals in a house-hold are needed
- Information on no. of guests/absentees/pet animals partaking the food needed
- The investigator needs to be quite diligent and patient to judge any over/under estimation

Weighment diet survey (Family diet Survey) (Contd.)

Merits:

- This method is accurate among all the methods
- It gives definite dietary consumption pattern

Demerits:

- It is a time consuming procedure
- The accuracy of the data depends on the co-operation of the house-wife
- It does not give the actual intake of an individual in the family

24 Hrs Recall Method (OR) Oral Questionnaire (OR) Individual Diet Survey

- Individual dietary intake can be assessed by this method

The following key points to be remembered:

- Types of preparations for the previous day are noted
- The mother is asked to give the total raw amounts used for each preparation and weighed
- The total amount of each cooked food item is assessed with the help of a set of standard cups (volumes known)
- Out of the total cooked food, the actual amount consumed by each individual is assessed again with the help of standard cups

24 Hrs Recall Method (OR) Oral Questionnaire (OR) Individual Diet Survey

Conversion factor for the intake of each food item (raw) of an individual is derived by:

Raw quantity of food item in each preparation

Total quantity of cooked food item

X Intake of cooked food

Institutional level Diet Survey

(Hostels, Hospitals, Industrial Canteens, Jails and Orphanages)

Usually two methods are employed

- Inventory method
- Weighment method

Inventory method:

Food stock registers are verified for a week.

The average intake/caput/day= (stocks at the beginning of week
stocks at the end of week) / Total number of inmates partaking x 7
days. Derive for every food item. Estimate nutrients.

Merits : Less time consuming

Demerits : It is only an estimate . No direct assessment involved.

Weighment method:

All the raw and cooked foods items and individual plate servings are weighed and nutrients are derived.

Duplicate samples

The individual is required to save (in separate plate) a duplicate sample & the same to be sent to the laboratory for nutrient analysis.

It is most accurate method of diet survey.

Dietary Score:

The consumption of a particular food by an individual is estimated by frequency method and scores to be given to the different foods differently according to the % of content of the nutrient.

Eg: Vitamin A = GLV-3, egg=2, Milk=1

Recording Method

It involves the maintenance of dietary records of weighed quantities of foods consumed by an individual

No. of days of survey.

It is applicable with only literate people.

FOOD CONSUMPTION TABLE

- The analysis of the foods made at the National Institute of Nutrition and other national laboratories
- University College of Science & Technology, Calcutta
- Haffkine Institute ,Mumbai
- Central food Tech. Research Institute, Mysore
- State Food & Drug Lab
- Ambala Cantonment
- Nutrition Laboratory. Patna, Bihar
- The nutrients were calculated based only on the edible portion of the food stuffs

**Coefficient for computing calorie requirement
of different groups**

Group	Cu-Units
Adult male (sedentary worker)	1.0
Adult male (moderate worker)	1.2
Adult male (heavy worker)	1.6
Adult female (sedentary worker)	0.8
Adult female (moderate worker)	0.9
Adult female (heavy worker)	1.2
Adolescents — 12 to 21 yerars	1.0
Children — 9 to 12 years	0.8
Children — 7 to 9 years	0.7
Children — 5 to 7 years	0.6
Children — 3 to 5 years	0.5
Children — 1 to 3 years	0.4

SCHEDULE FOR HOUSEHOLD MEMBERS PARTICULARS.

Col. No.	Sl. No.	Name of the family member	Relation To Head	Sex	Age*		Marital Status	Physiological status	Educational Status	Major Occupation	Type of activity	C.U.	Annual Income (Rs.)	Remarks
					Years	Months								
28-47	01	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
48-67	02	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
68-87	03	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
88-107	04	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
108-127	05	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
128-147	06	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
148-167	07	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
168-187	08	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
188-207	09	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
208-227	10	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
228-247	11	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
248-267	12	.....	☐	☐			☐	☐	☐	☐	☐	☐		.....
268-269	Family Size :						270-272 Total Consumption Units :							

Income Sub-total A : Rs.

* record the age upto nearest month for <5 years children

Note: For coding keys, see end of the schedule

KEY FOR THE CODES USED

Coding Keys:

<i>RELATIONSHIP</i>	<i>MARITAL STATUS</i>	<i>PHYSIOLOGICAL STATUS</i>	<i>MAJOR OCCUPATION</i>	<i>TYPE OF ACTIVITY</i>
0. Self / Head of HH	1. Married	1. Non Preg. Non Lact.(NPNL)	0. Land less Agri. Labourer	1. Sedentary:
1. Wife	2. Unmarried	2. Pregnant	1. Other Labourer	Landlord, Service, Business, Housewife,
2. Son/Daughter	3. Widowed/Divorced	3. Lactating	2. Owner cultivator	Postman, Teacher ,etc.,
3. Father/Mother		4. Breast Fed	3. Landlord	2. Moderate:
4. Son/Daughter-in-law	<i>EDUCATIONAL STATUS</i>	5. Breast Fed + Compl. Feeds	4. Tenant cultivator	Agri.Labourer., Other Labourer,
5. Father/Mother-in-law	1. Illiterate	6. Weaned	5. Artisans (Goldsmith, Tailor, Carpenter, Pot maker, etc)	Owner/Tenant cultivator, Artisans, Mason,
6. Grand son / Grand daughter	2. Read & Write	9. Not Applicable	6. Service	Servant maid, Tailor, Rikshaw-puller. etc.,
7. Brother/Sister	3. 1-4 Standard		7. Business	3. Heavy:
8. Nephew/Niece	4. 5-8 Standard		8. Others (specify)	Blacksmith, Stone Cutter, Gangman, Wood
9. Others	5. 9-12 Standard		9. Not applicable	Cutter, Mine worker, etc.
	6. College			
<i>SEX</i>	9. Not Applicable			
1. Male				
2. Female				

NATIONAL NUTRITION MONITORING BUREAU
National Institute of Nutrition, ICMR
HYDERABAD-500 007



INDIVIDUAL DIETARY FOOD INTAKE

Schedule No : State: District :

Taluk/Block : Village: Sl.No. of Household :

Date of Survey : Name of the Head of the Household:

Name of the individual														
Sl.No. (as per HH Schedule)														
Age (years & months)														
Sex (Male:1 Female:2)														
Physiological status Code														
Activity status Code														
Consumption Units														
Meal pattern	Type of preparation	Food stuff	Raw amount (g)	Total cooked quantity	Individual intake									Left over

Cup Volumes: C1: 1400 C2: 1035 C3: 750 C4: 520 C5: 350 C6: 235 C7: 200 C8: 140 C9: 105 C10: 82 C11: 65 C12: 30

Name of the Investigator : Signature :

Errors in Measurement

Inter individual variation

(Variation between two individual's measurements)

Intra-individual variation

(Variation between two measurements taken by same individual)

Acceptable limits:

Height

-variation <0.2Cm)

Weight

-variation < 100g)

MUAC

-variation < 0.2 Cm)

FFT

-variation < 0.5mm)

WC

-Variation <1CM)

Types of errors

Instrumental errors

Recording errors

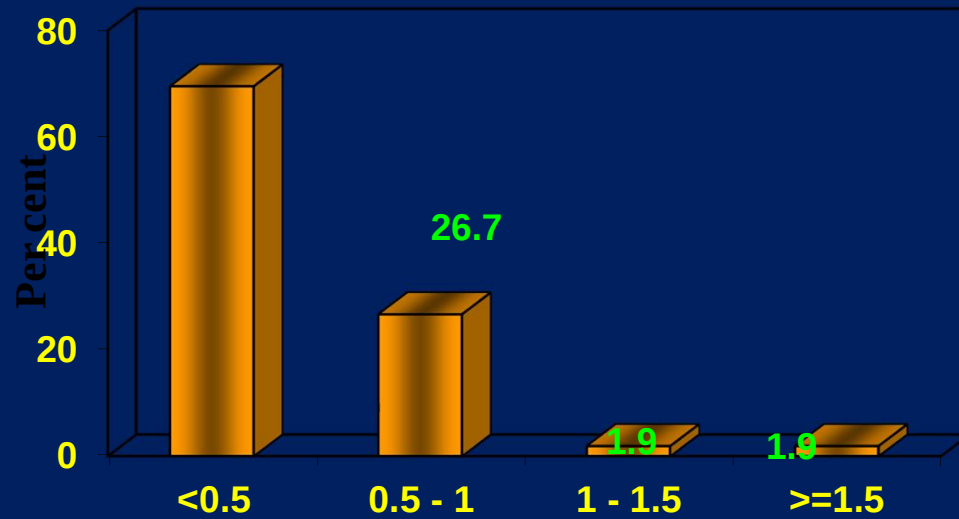
Reading errors

Random errors

Non-random errors

BIOCHEMICAL INVESTIGATIONS

Intra-observer variation in Hb
69.5



Difference in Hb (g/dl)

Example for acceptable variation in estimation of hemoglobin

About 96% of the samples were within the range of less than one gram.

Validity and Reliability

Validity is an expression of the degree to which a test is capable of measuring what it is intended to measure.

A study is valid if its results corresponding to the truth, there should be no systematic error and the random error should be as small as possible.

