

# TRENDS IN THE NUTRITIONAL STATUS OF RURAL COMMUNITIES IN INDIA

- *AN OVERVIEW*

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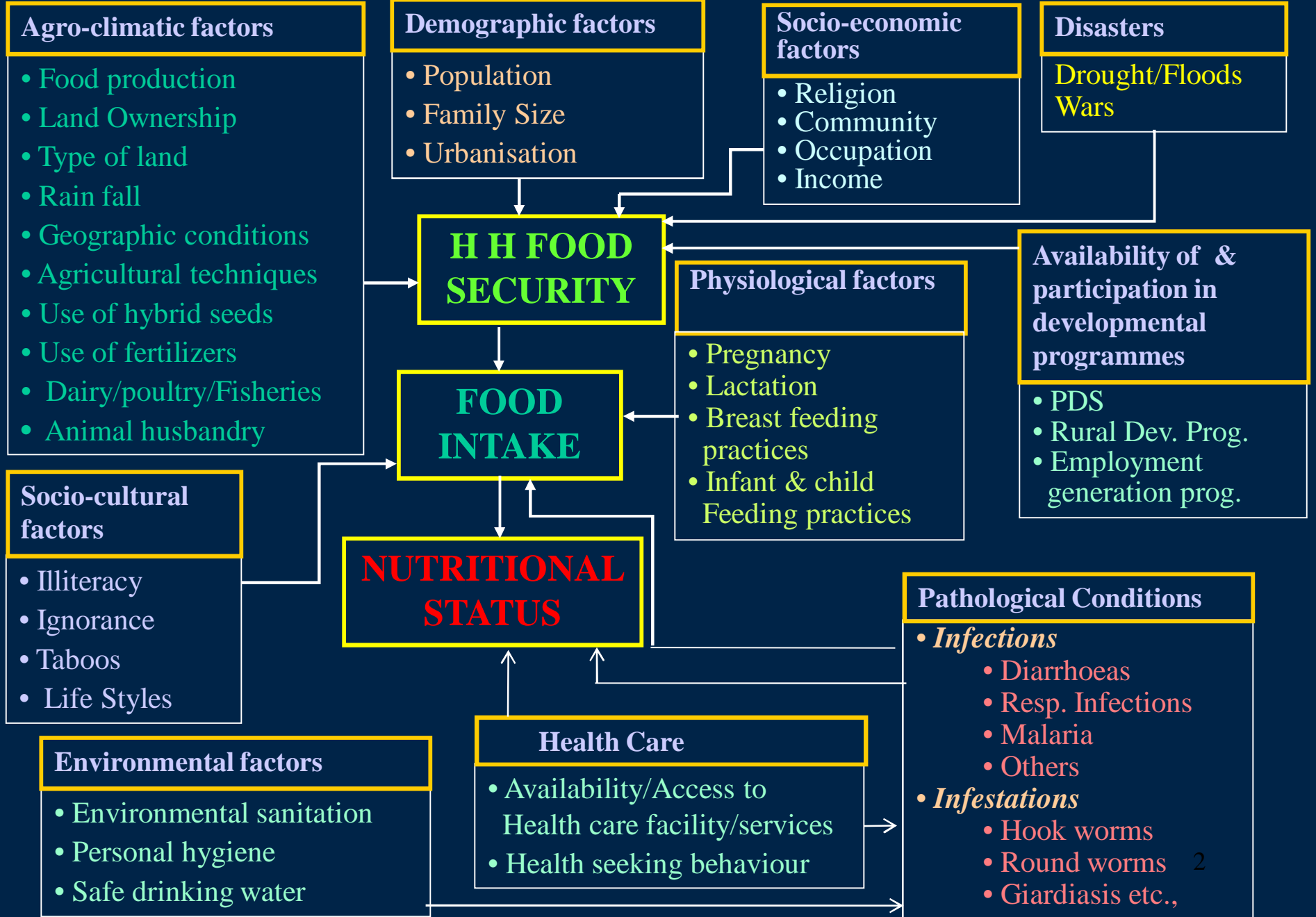
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# DETERMINANTS OF NUTRITIONAL STATUS



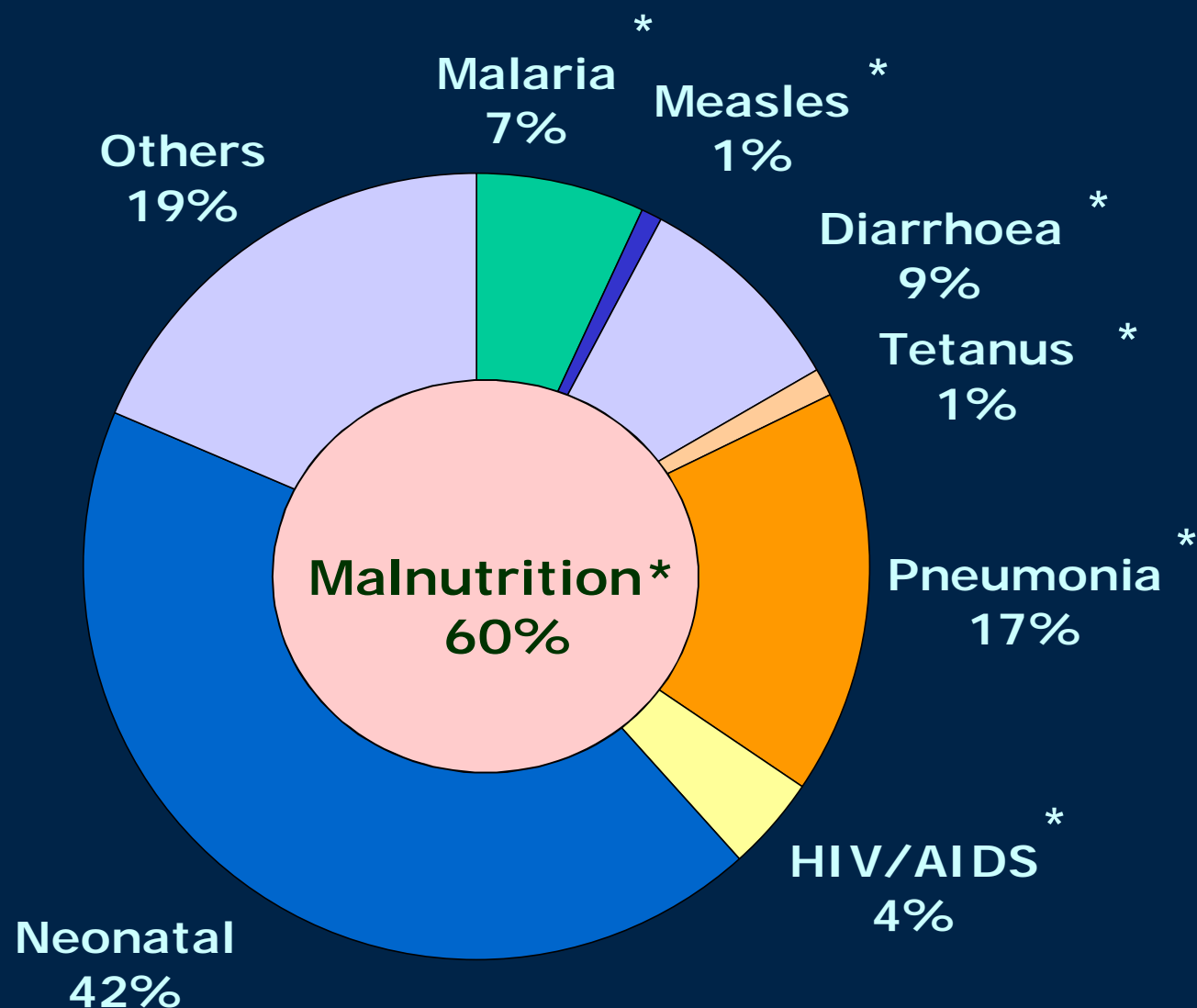
# NUTRITIONALLY VULNERABLE GROUPS

- Infants and Young Children (<5 years)
- Adolescent Girls
- Pregnant & Lactating Women
- Elderly
- Socio-economically deprived Groups
  - Schedule Castes
  - Schedule Tribes
  - Communities in Urban Slum and Chronically drought prone rural areas

## - Certain Vital Statistics

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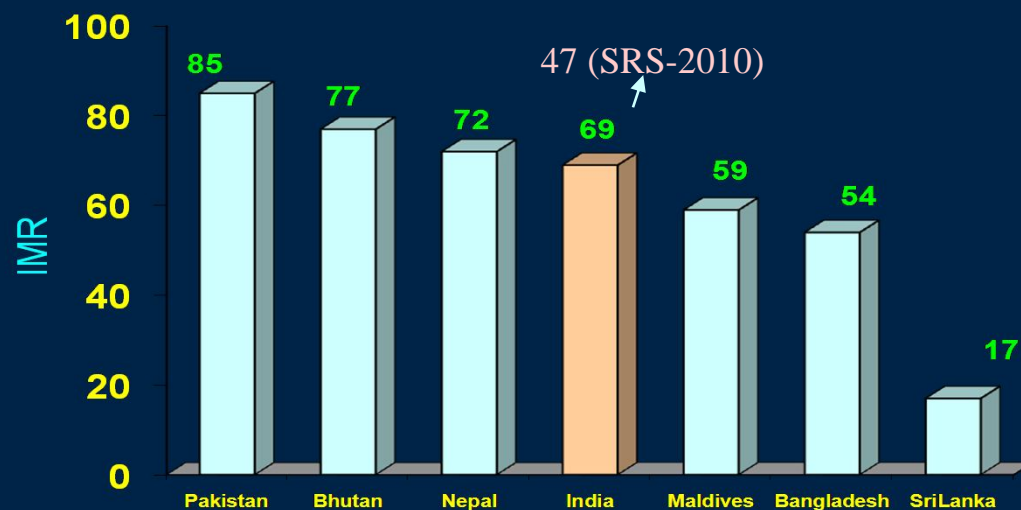
## CAUSES OF DEATHS AMONG <5 YEAR CHILDREN IN DEVELOPING COUNTRIES



\* Approximately 70% of all childhood deaths are associated with one or more of these five conditions

Source: UNICEF, 2010

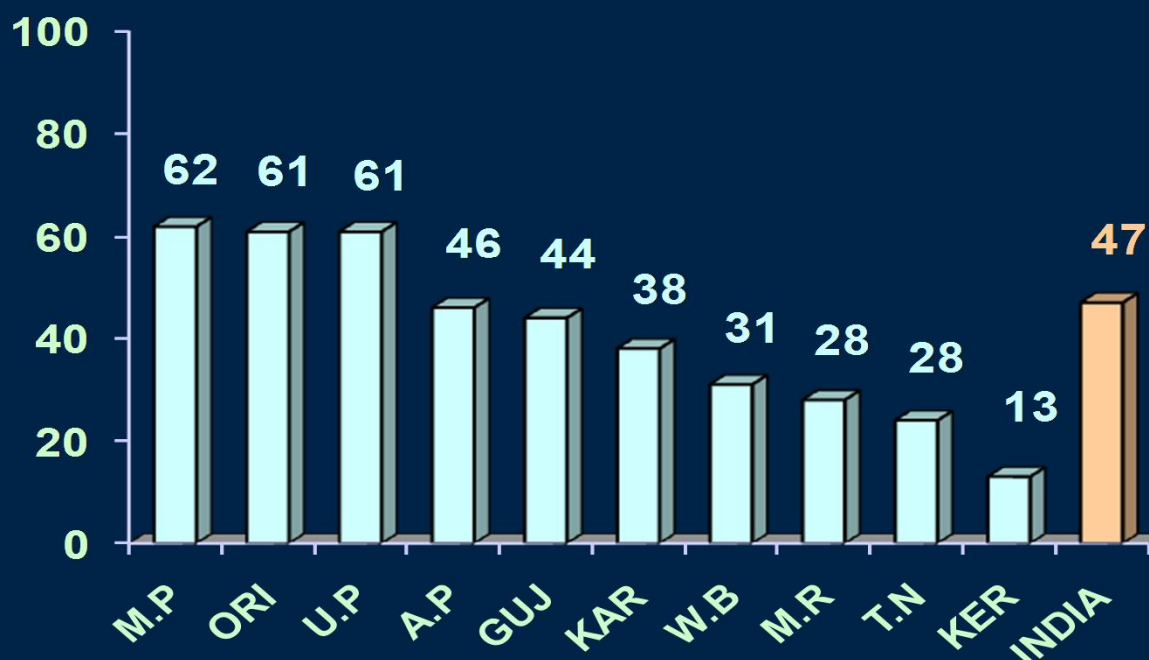
## Infant Mortality Rate (Per 1000 Live Births) in India and South-east Asian Countries



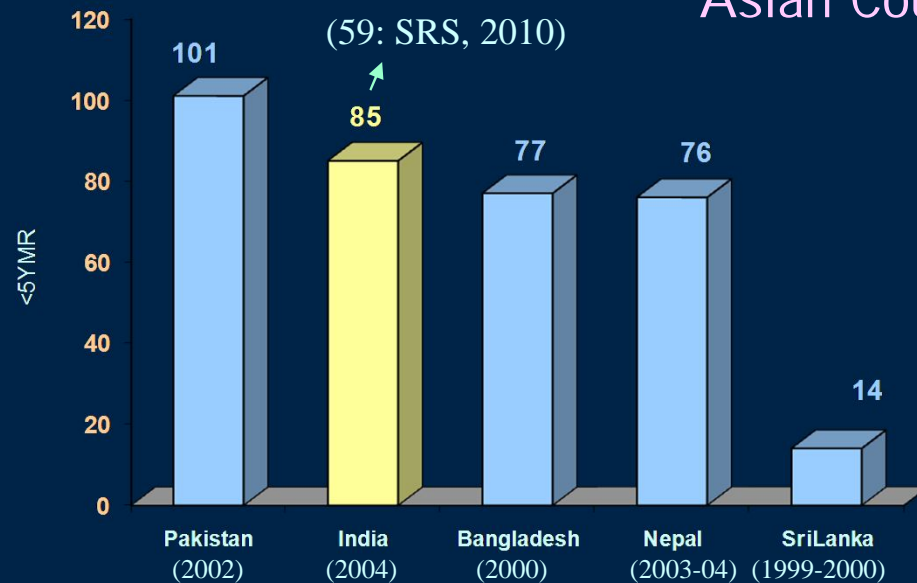
South-east Asian Countries

Source : WHO/SEARO 2000

India  
(NNMB States)  
Source: SRS, India - 2010



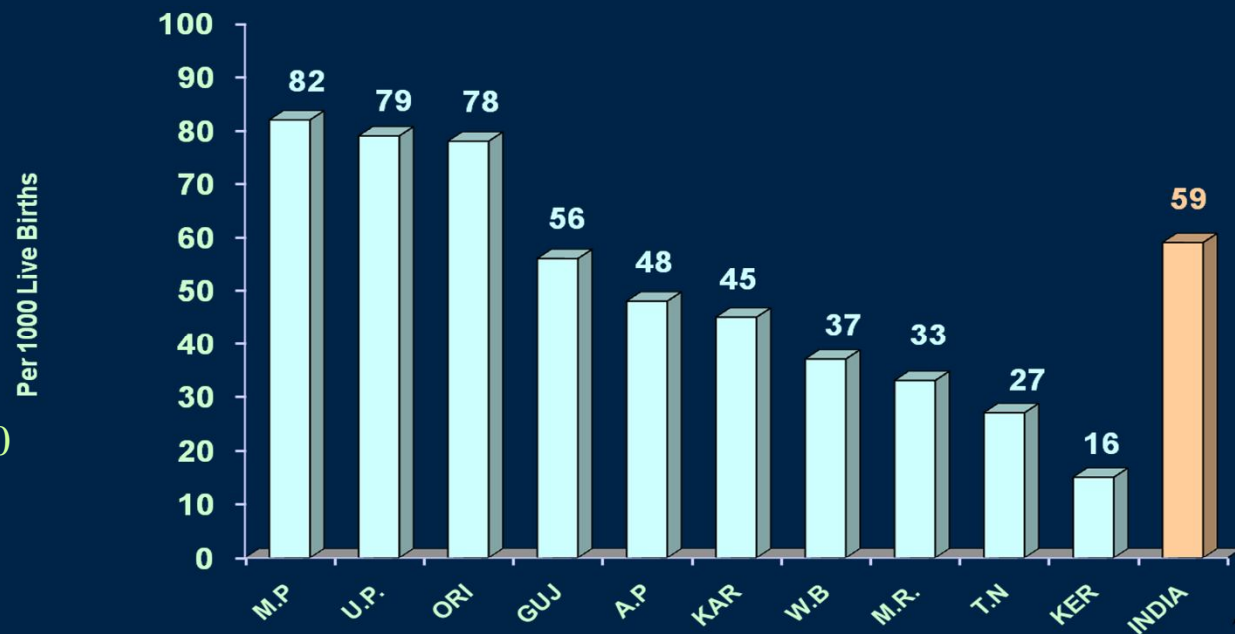
## Under-five Mortality Rate (Per 1000 Live Births) in South-east Asian Countries & India



South-east Asian Countries

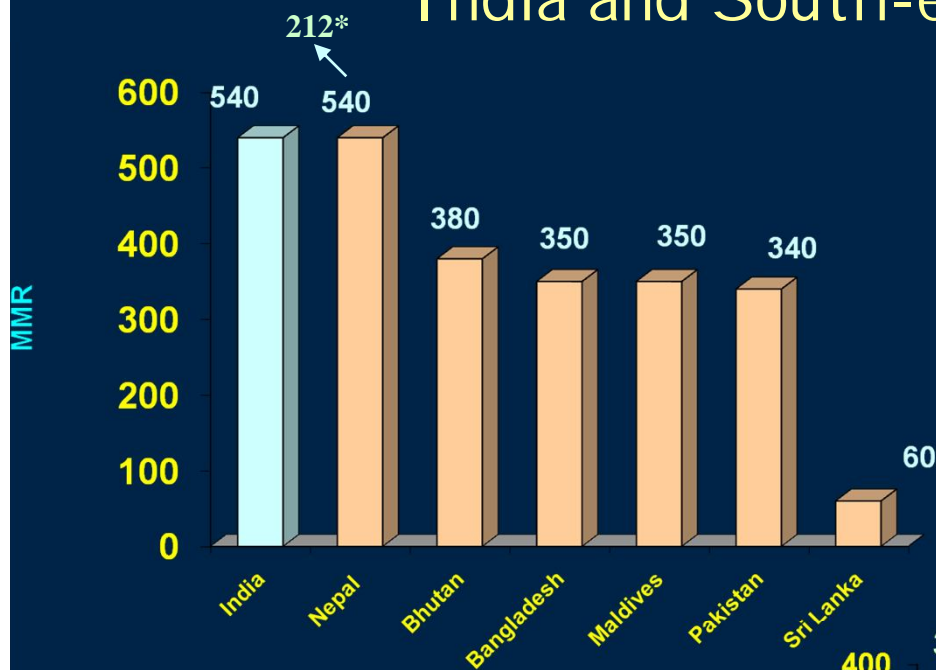
Source : World Development Report 2007

India  
(NNMB States)  
Source: SRS, India - 2010



\* Source: SRS, 2010

# Maternal Mortality Ratio (Per 100,000 Live Births) in India and South-east Asian Countries

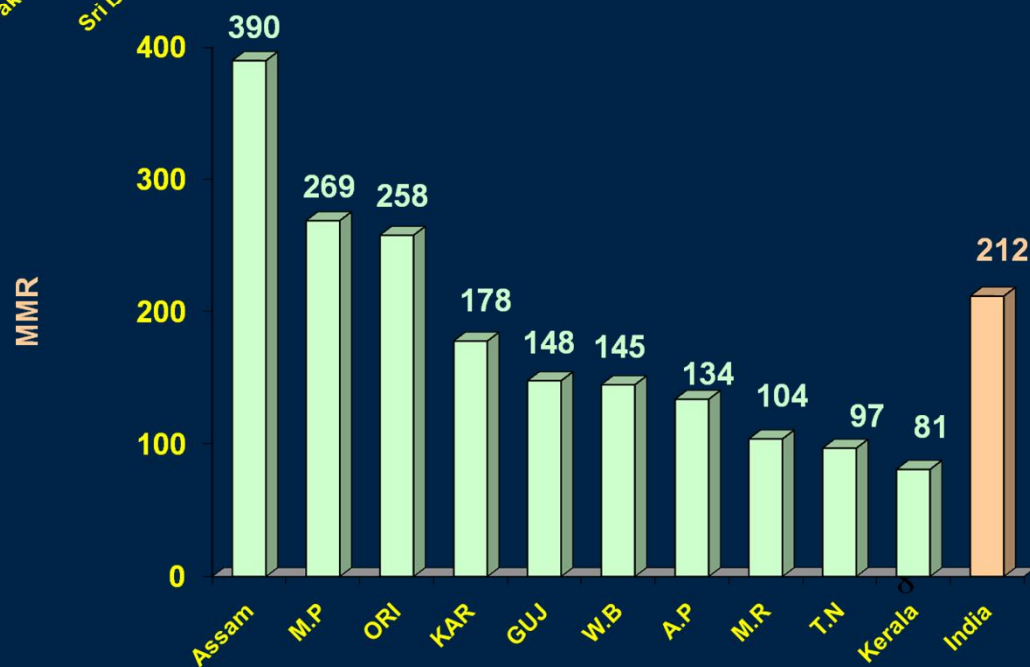


South-east Asian Countries

Source : WHO/SEARO 2000

India  
(NNMB States)

Registrar General of India,  
(2007-09, SRS-2011 )

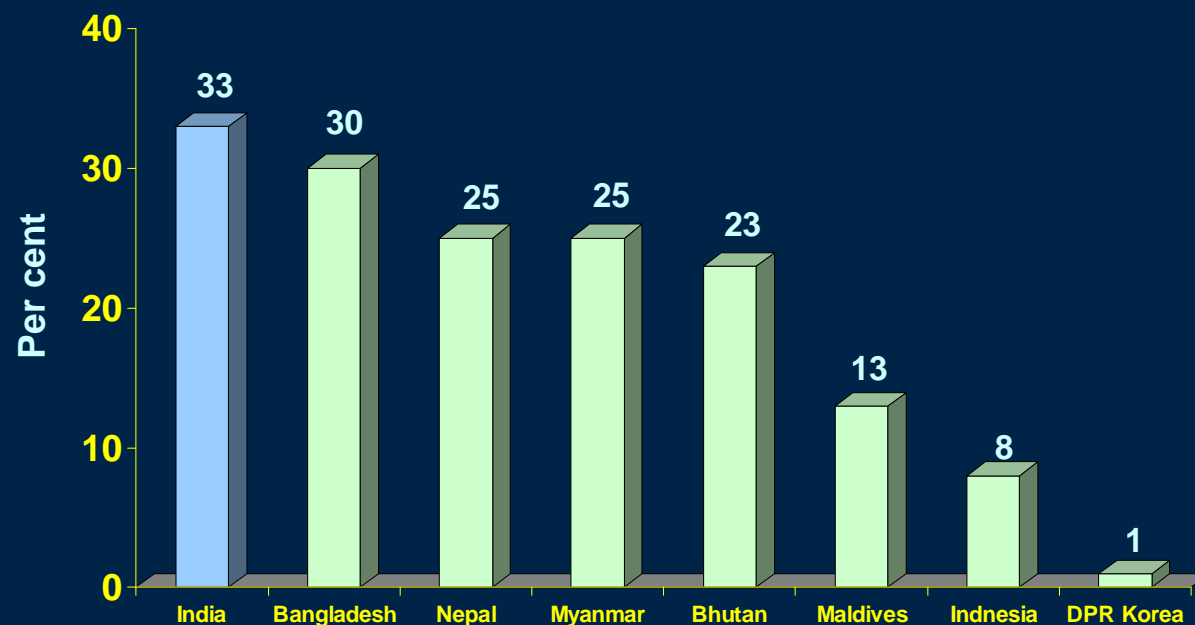




# Prevalence of Low Birth Weight

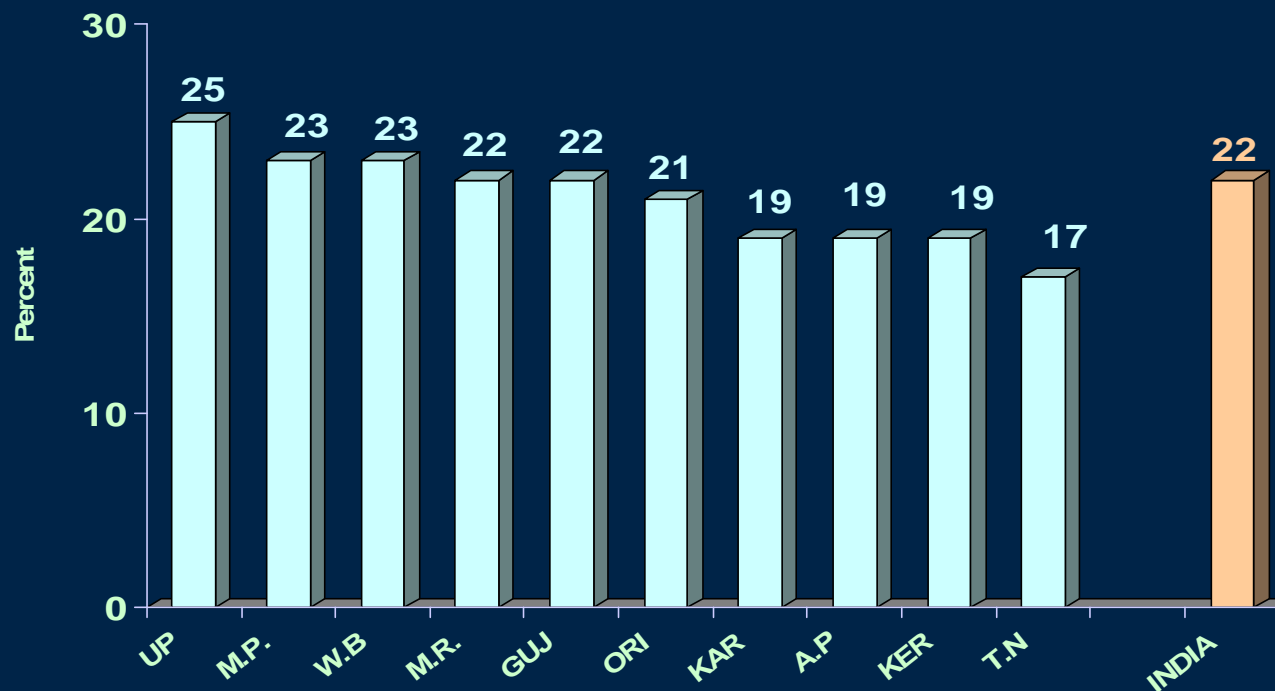
South-east Asian Countries

Source : WHO/SEARO 2000

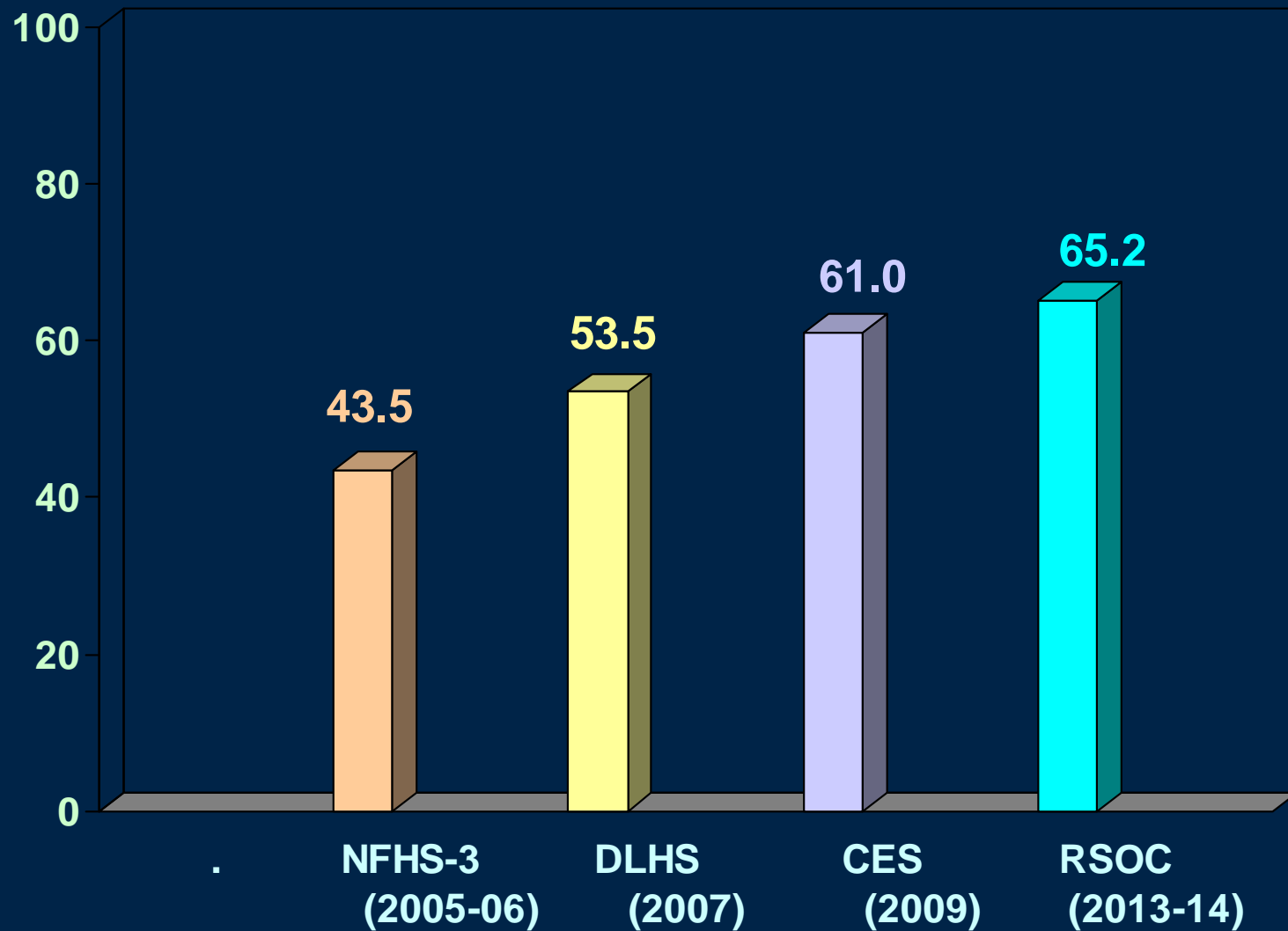


India  
(NNMB States)

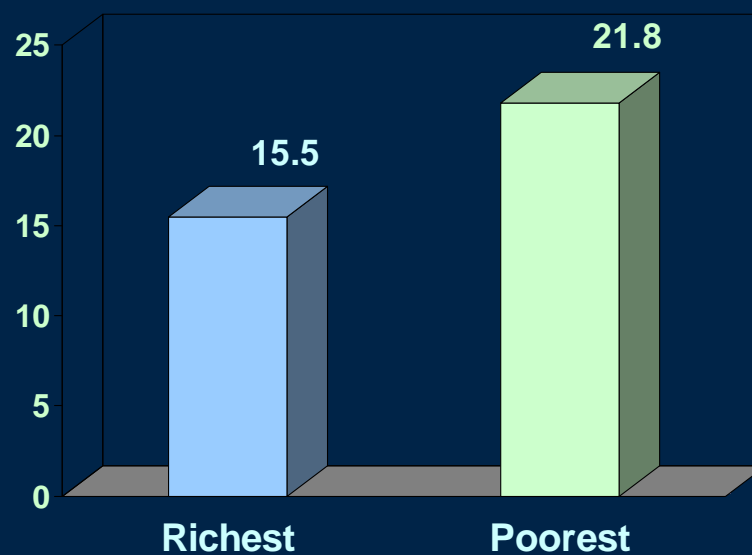
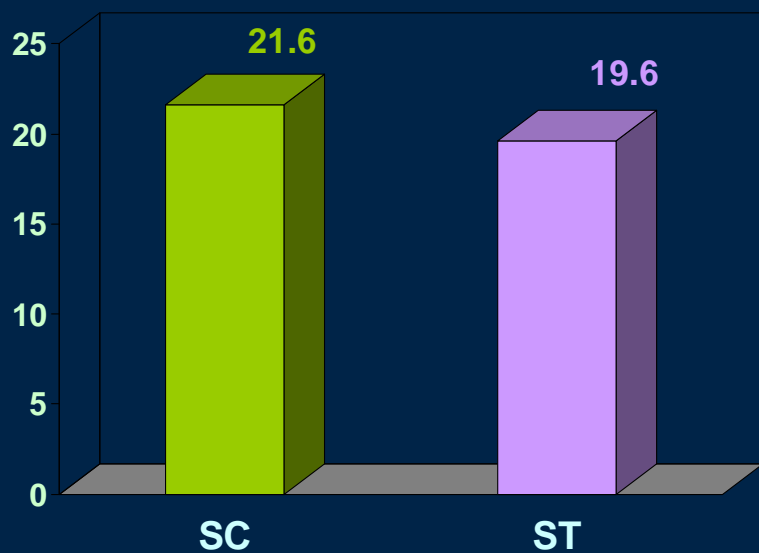
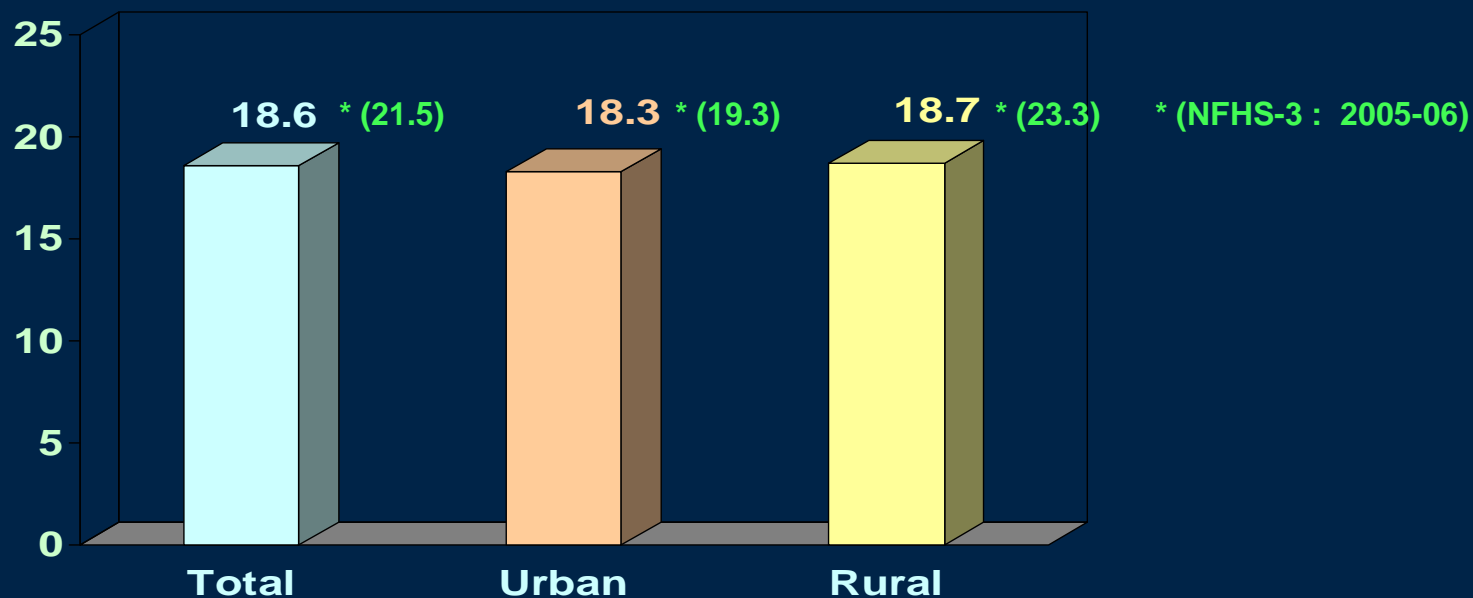
\* Source: NFHS3, 2005-06



# PERCENT CHILDREN (12-23 MONTHS) COMPLETELY IMMUNIZED



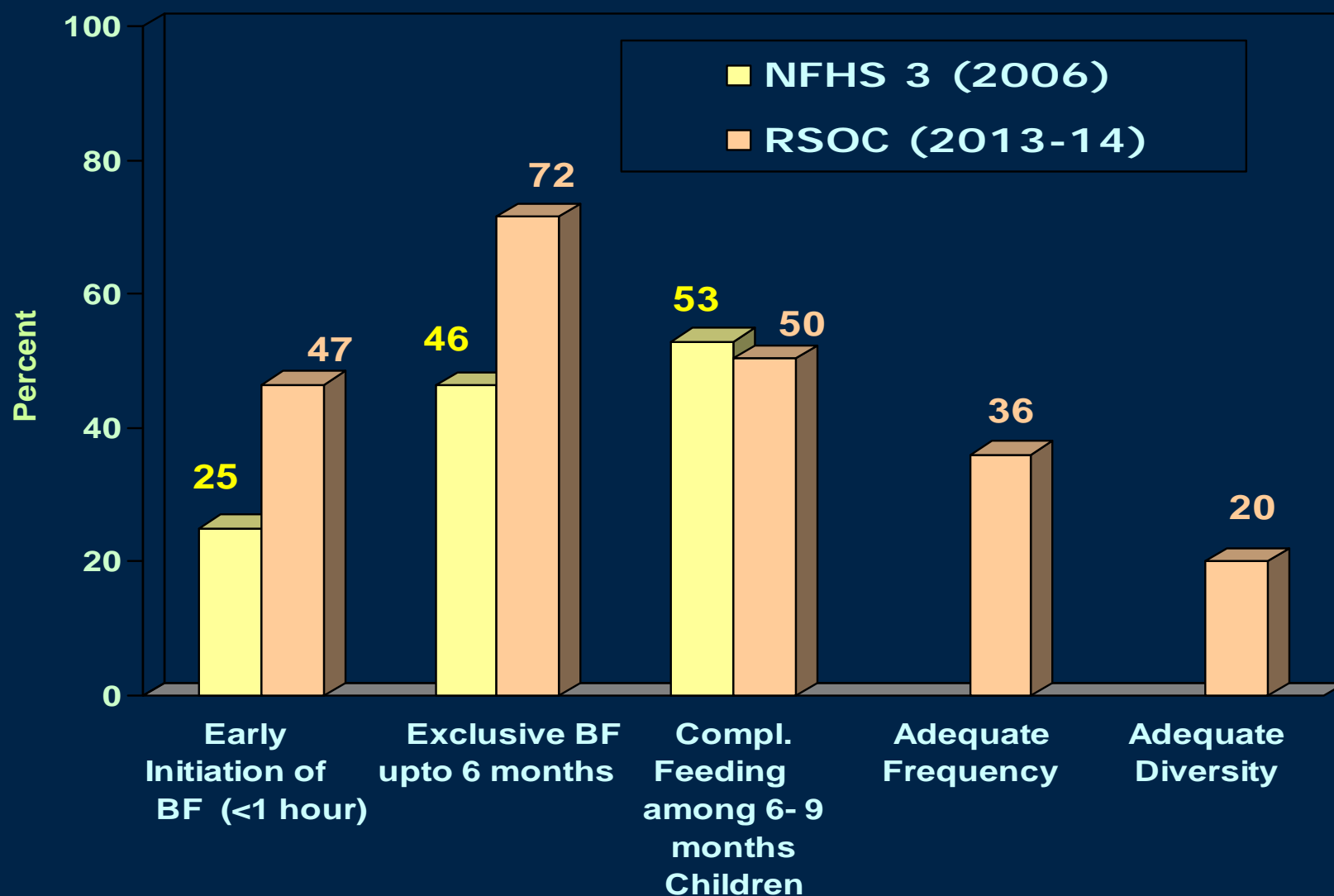
# Prevalence (%) of Low Birth weight (<2.5 kg) : RSOC 2013-14



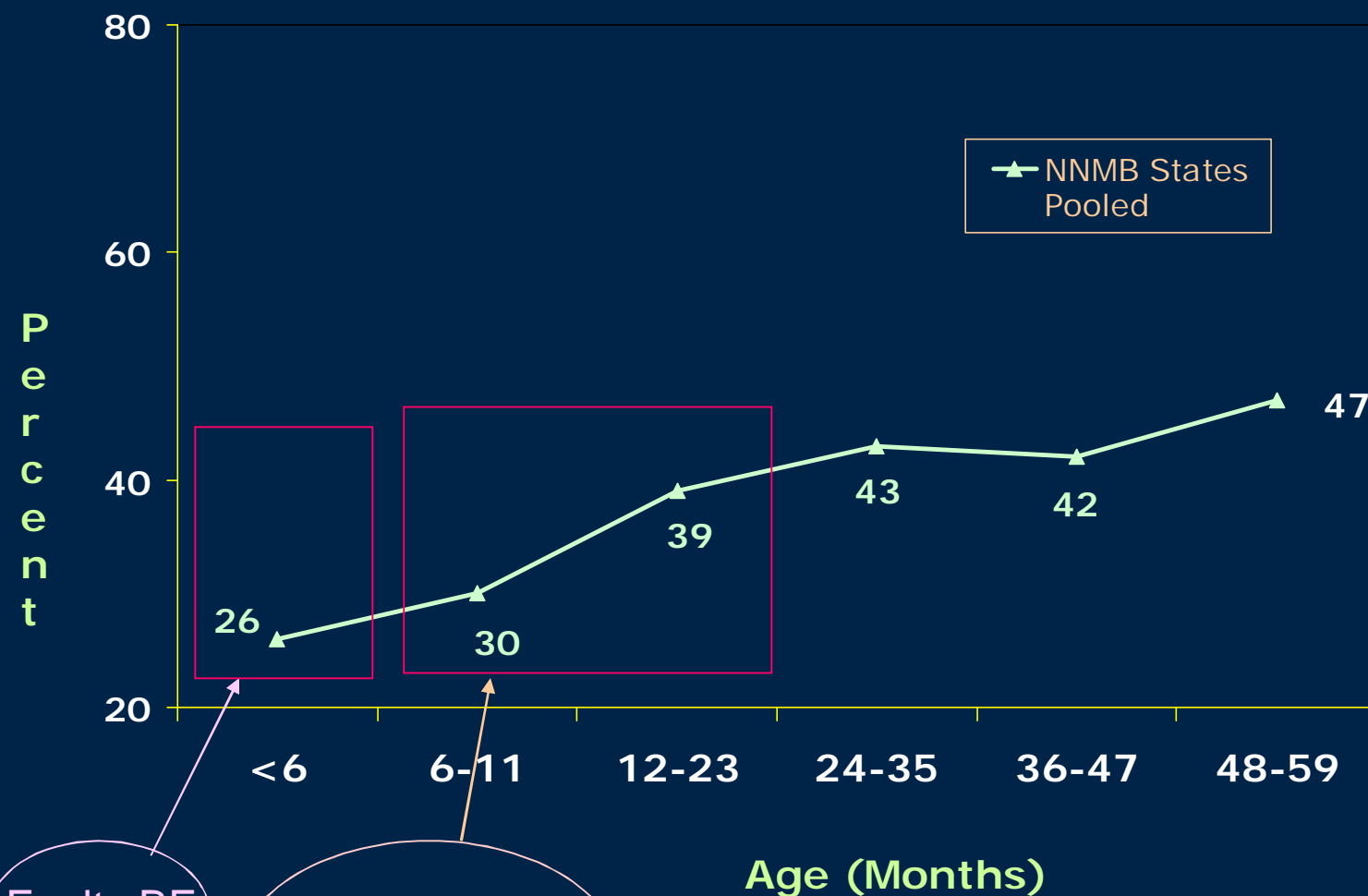
## - Infant and Young Child Feeding Practices

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# Infant and Young Child Feeding Practices in India



# Prevalence of Underweight among 6-59 months children according to age\* ( by SD classification) using WHO Child Growth Standards



Faulty BF

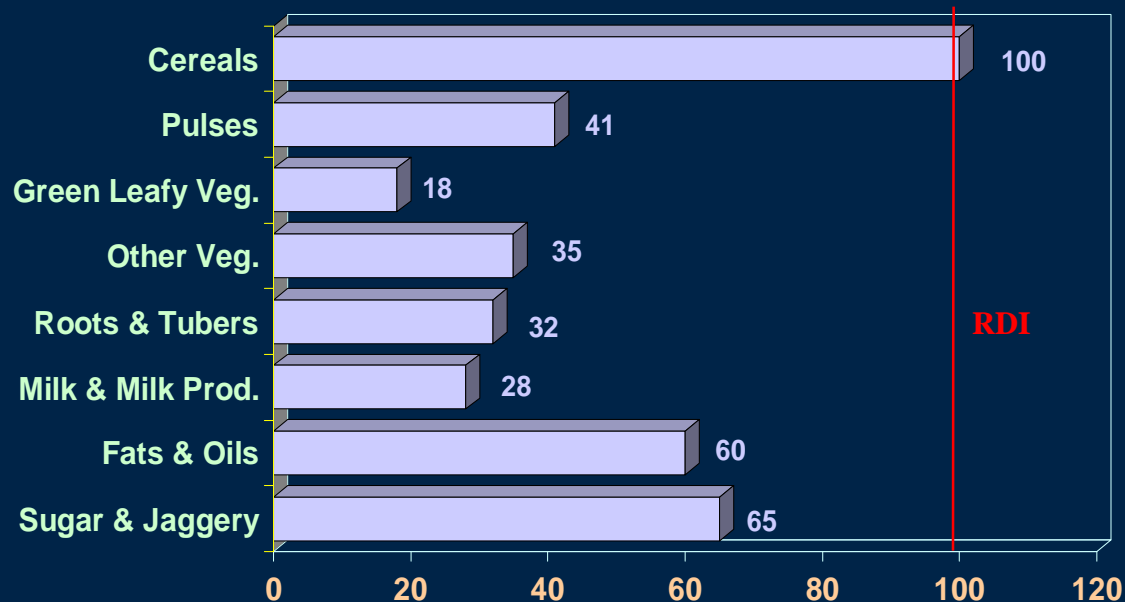
Faulty  
Complementary  
feeding

States Pooled

# *Food & Nutrient Intakes*

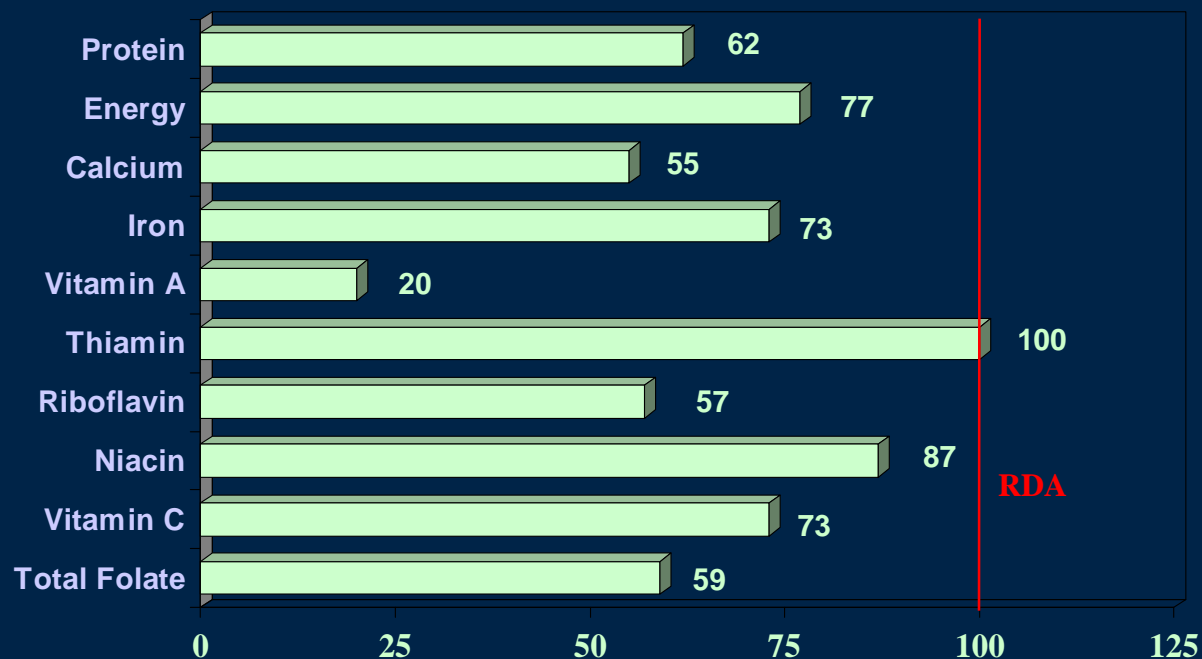
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## Average Intake of Foods & Nutrients among Rural Households: Per CU/Day as % Recommended (ICMR-2010)



Mean intakes as % RDI,  
(Dietary Guidelines for Indians, 2011)

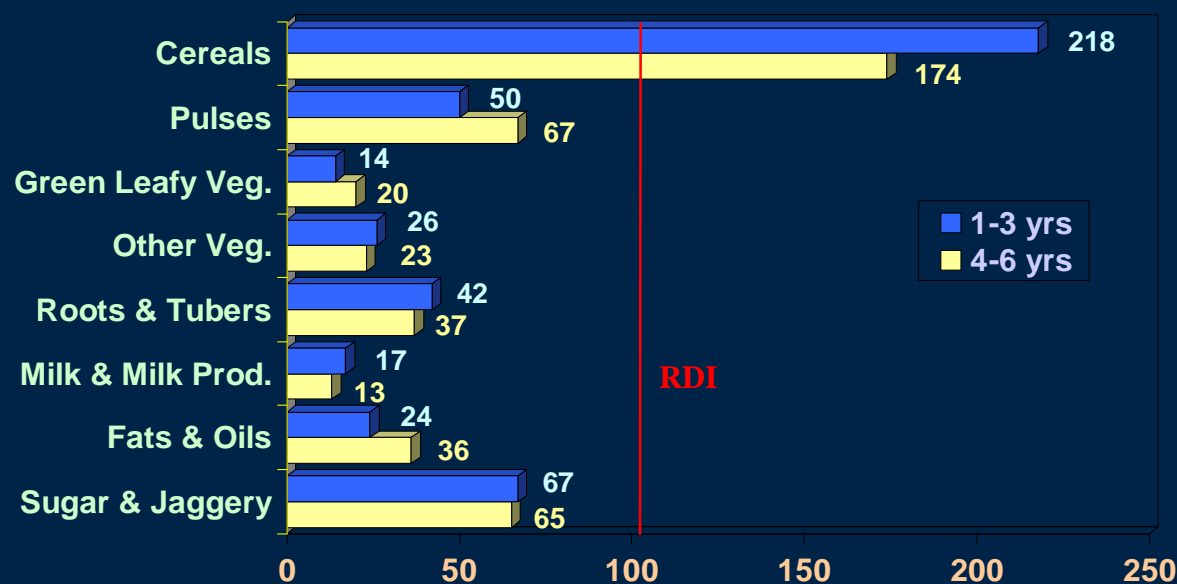
### Median Intakes as % RDA for Indians (ICMR – 2010)



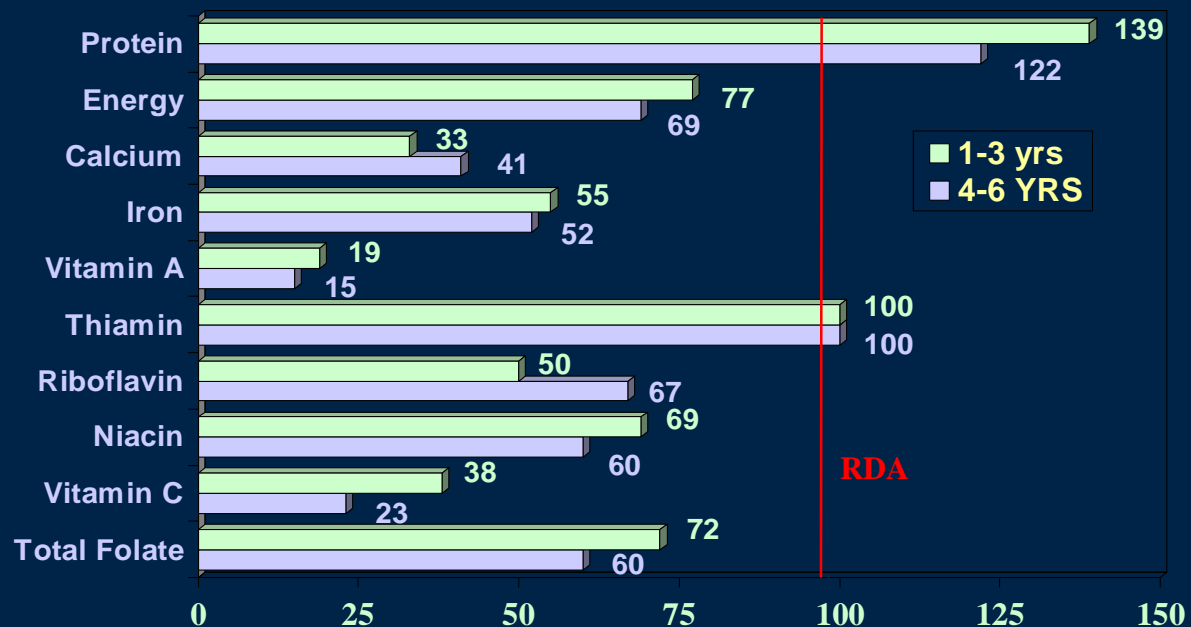
Source: NNMB, Tech Rep 26, 2012



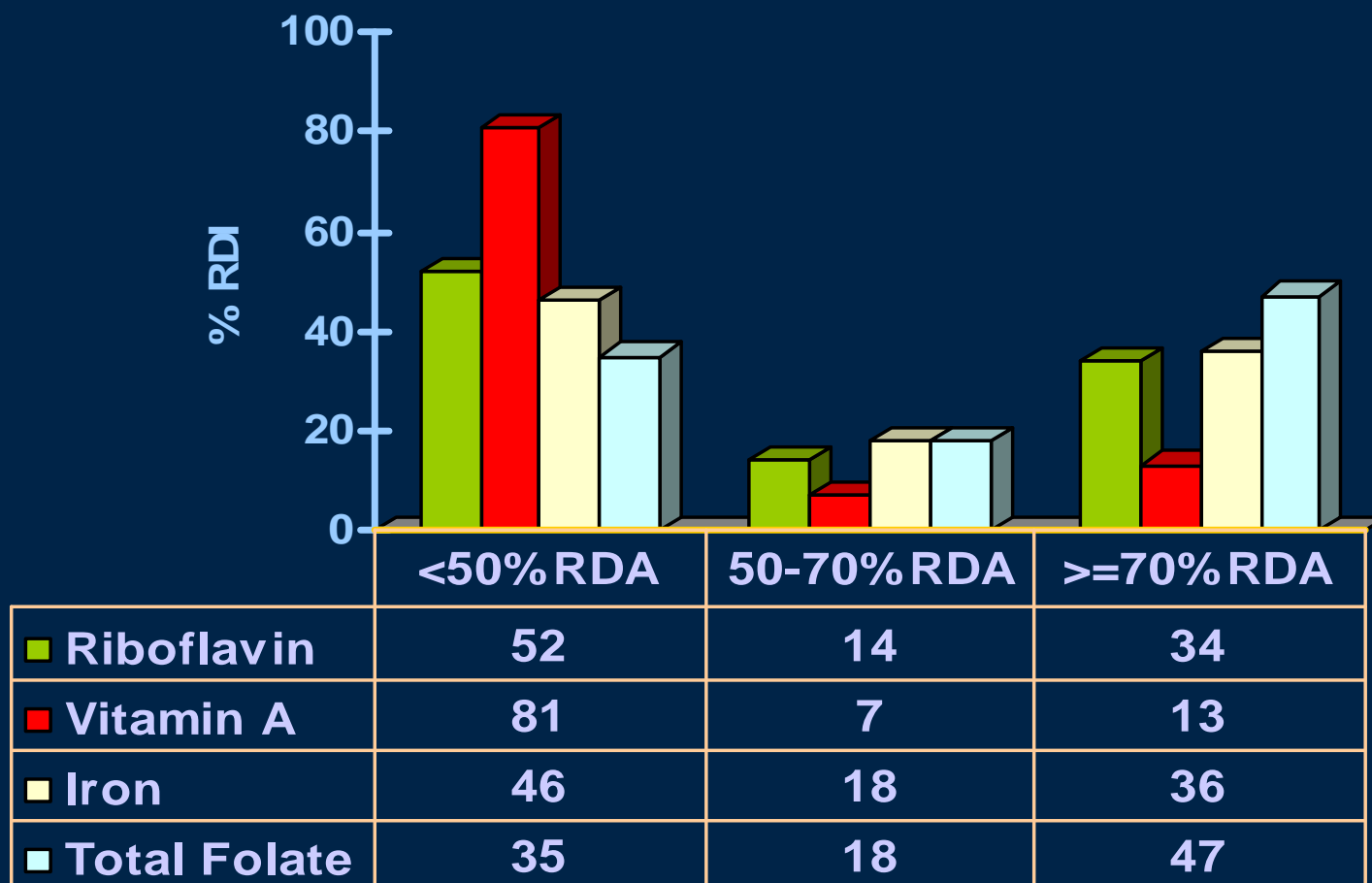
## Average Daily Foods & Nutrients Intake among 1-6 Yr Children : By Age Group (As % RDI : Balanced Diets – 2011)



## Median Intakes as % RDA for Indians (ICMR – 2010)

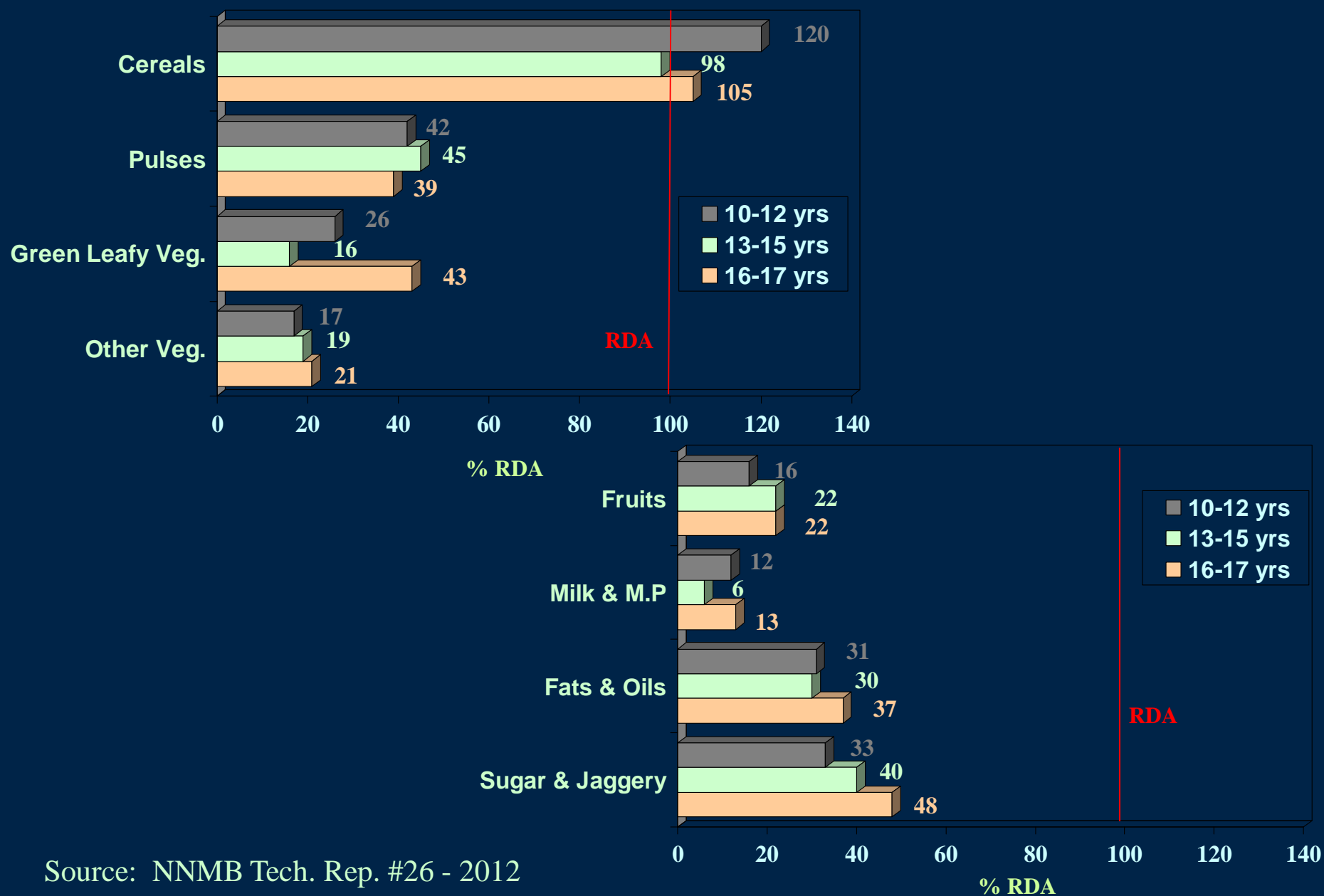


## Percent Distribution of 1-6 yr Children According to Daily Median Intake of Micronutrients

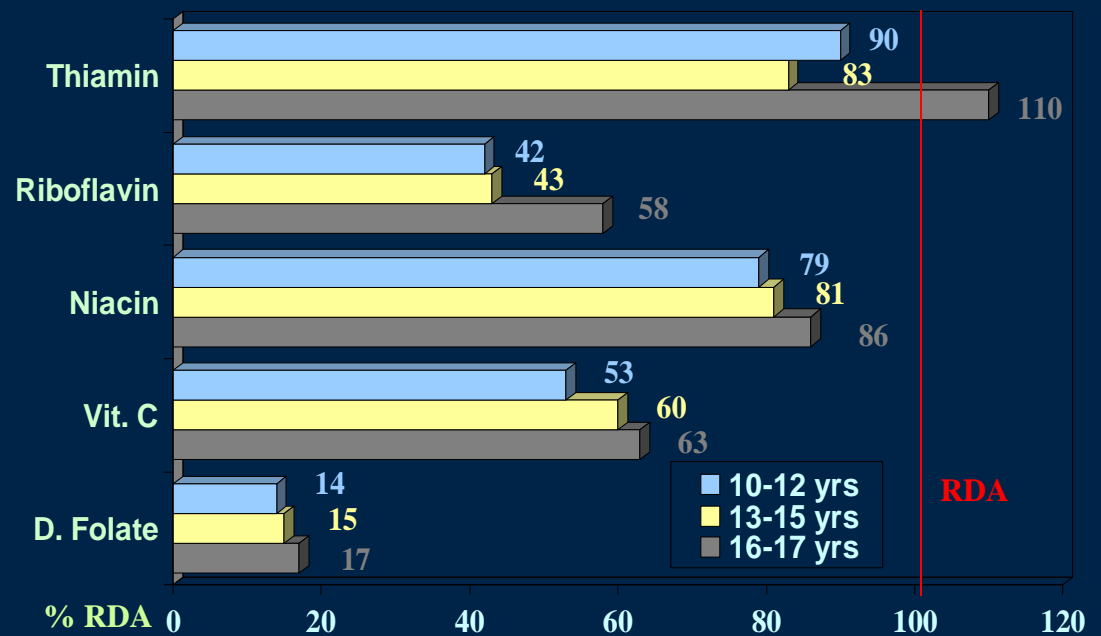
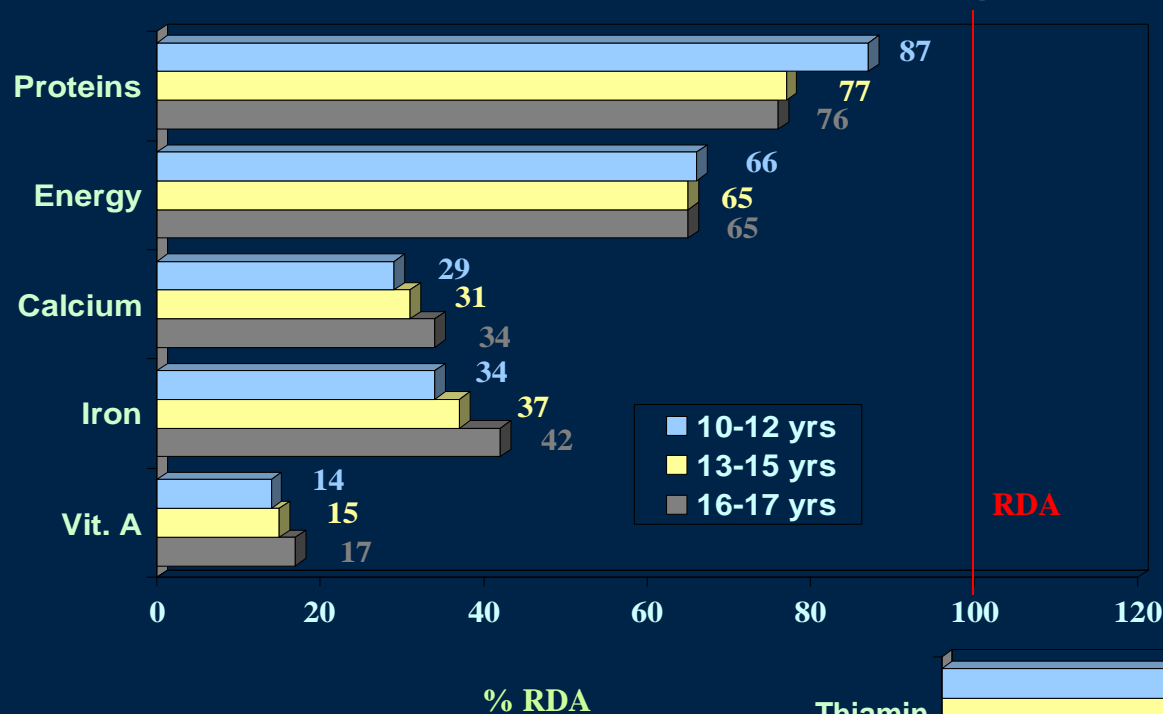


Source: NNMB, Tech Rep 26, 2012

## Average intake of Food stuffs (as % of RDI) Among Adolescent Girls: By Age Group

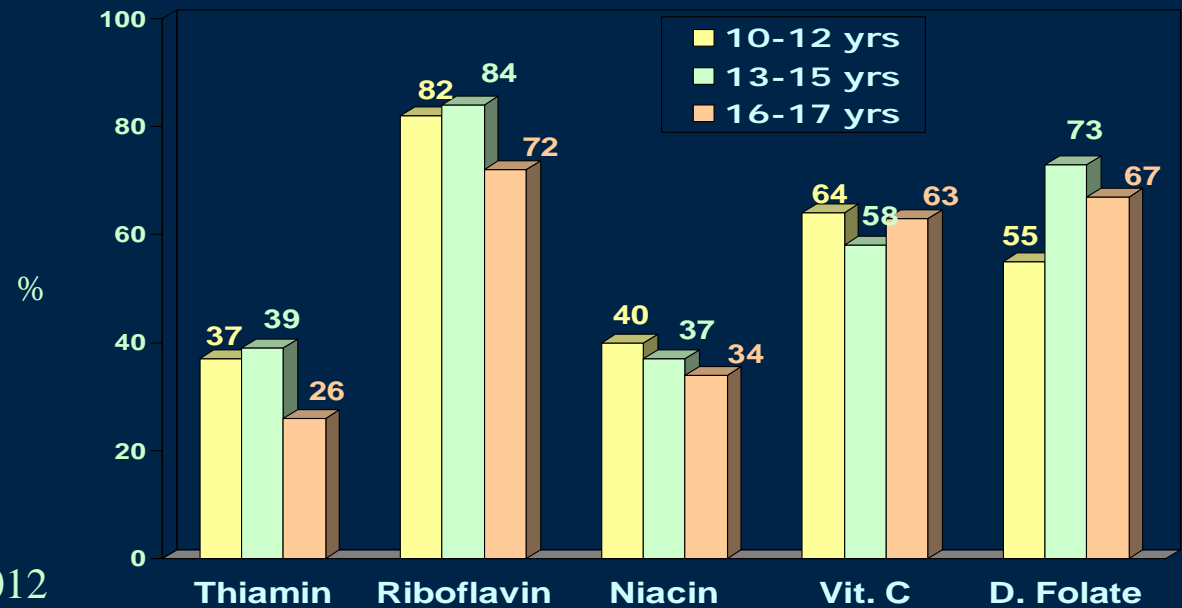
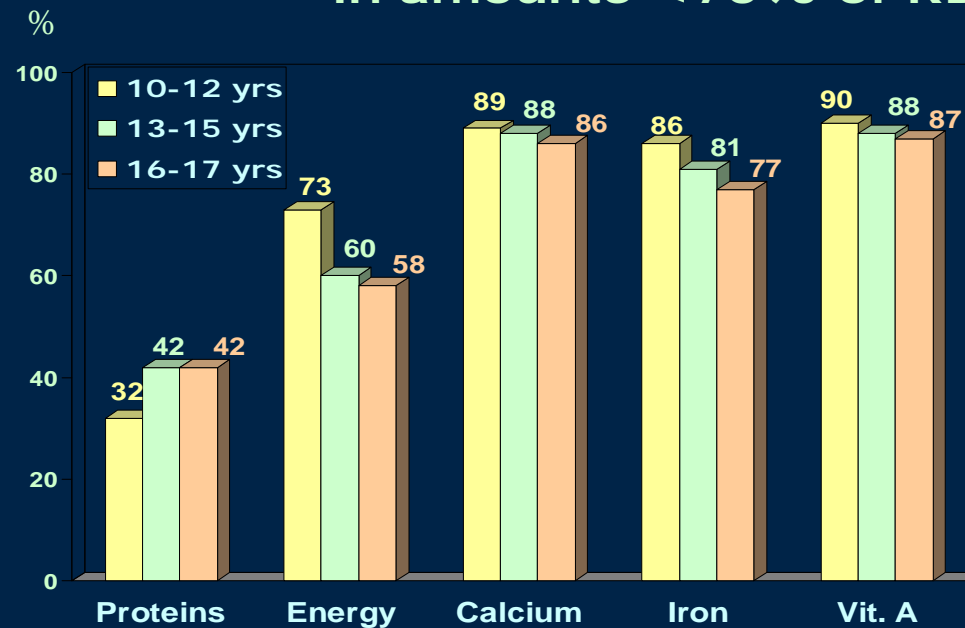


## Median intake of Nutrients (as % of RDA) Among Adolescent Girls: By Age Group



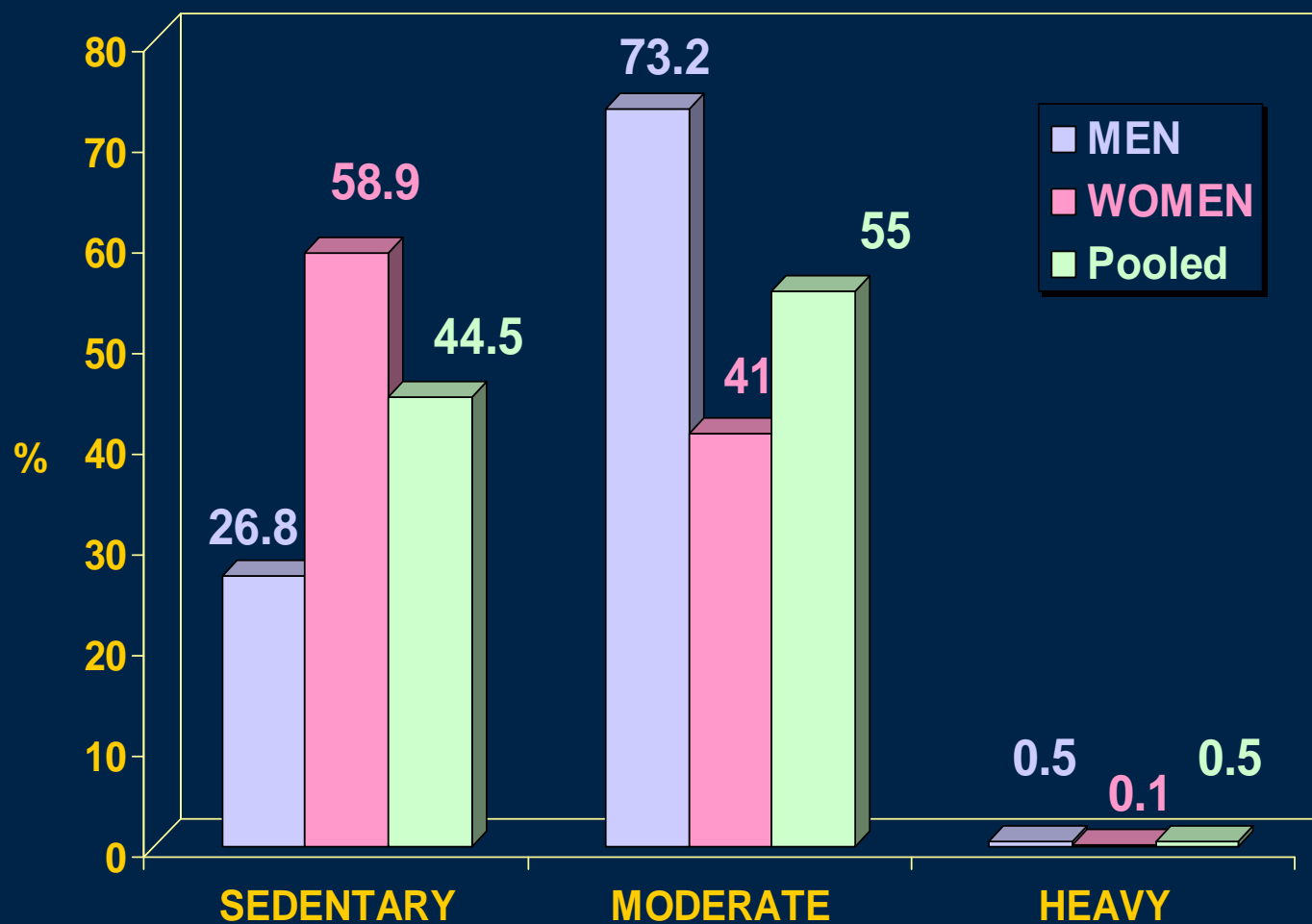
Source: NNMB Tech. Rep. #26 - 2012

## Proportion (%) of Adolescent Girls with intake of Nutrients in amounts <70% of RDA – By Age Group

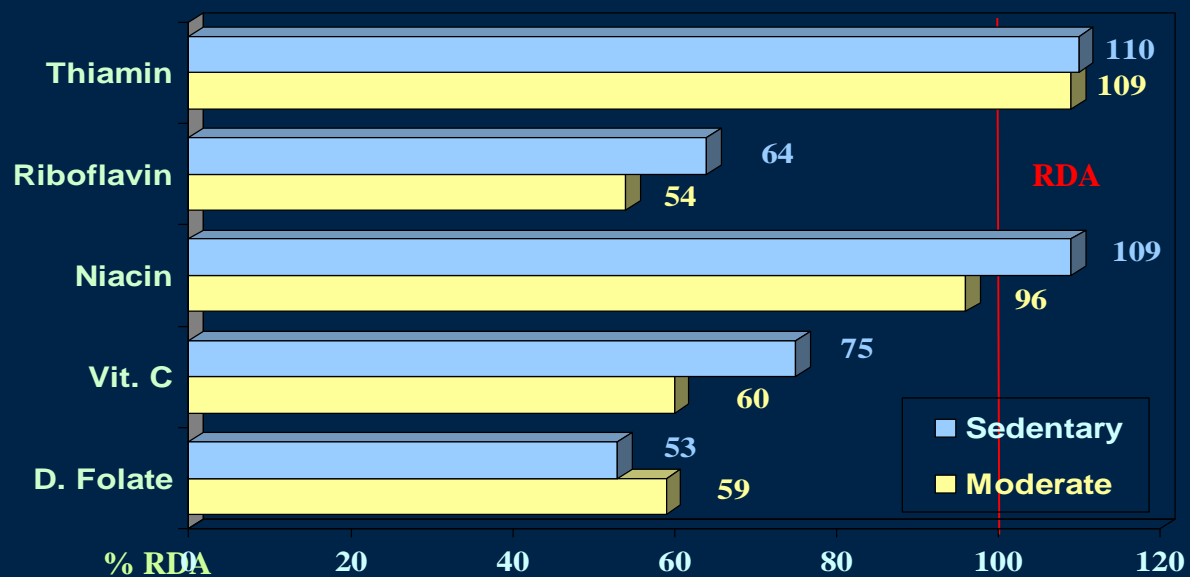
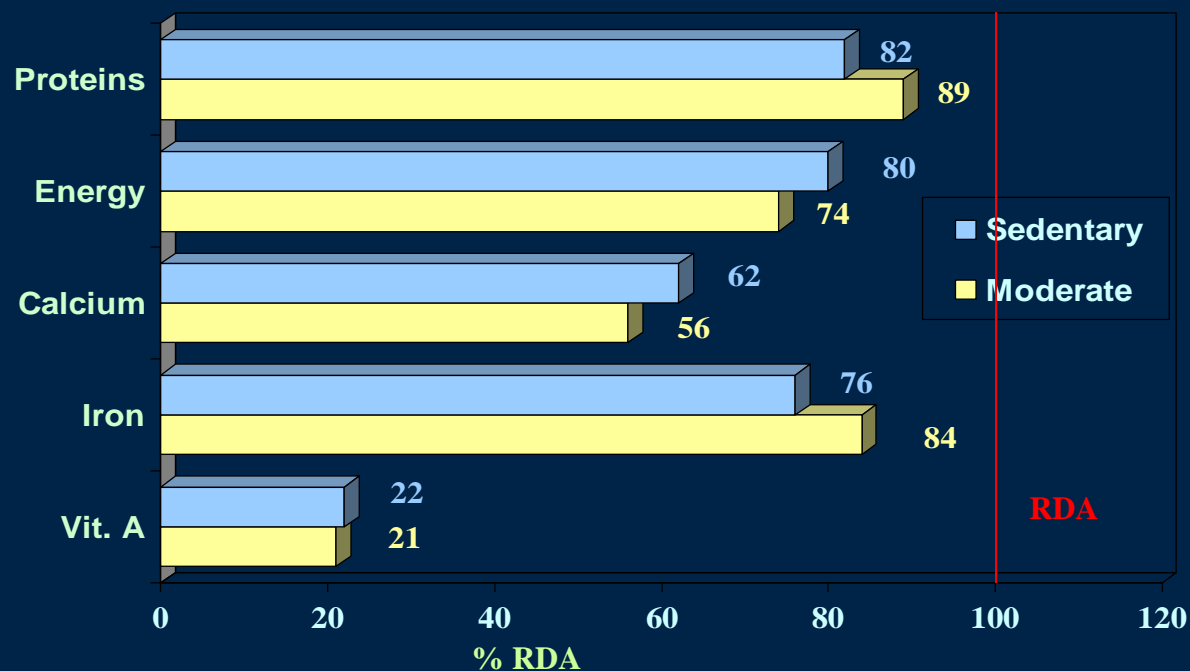


Source: NNMB Tech. Rep. #26 - 2012

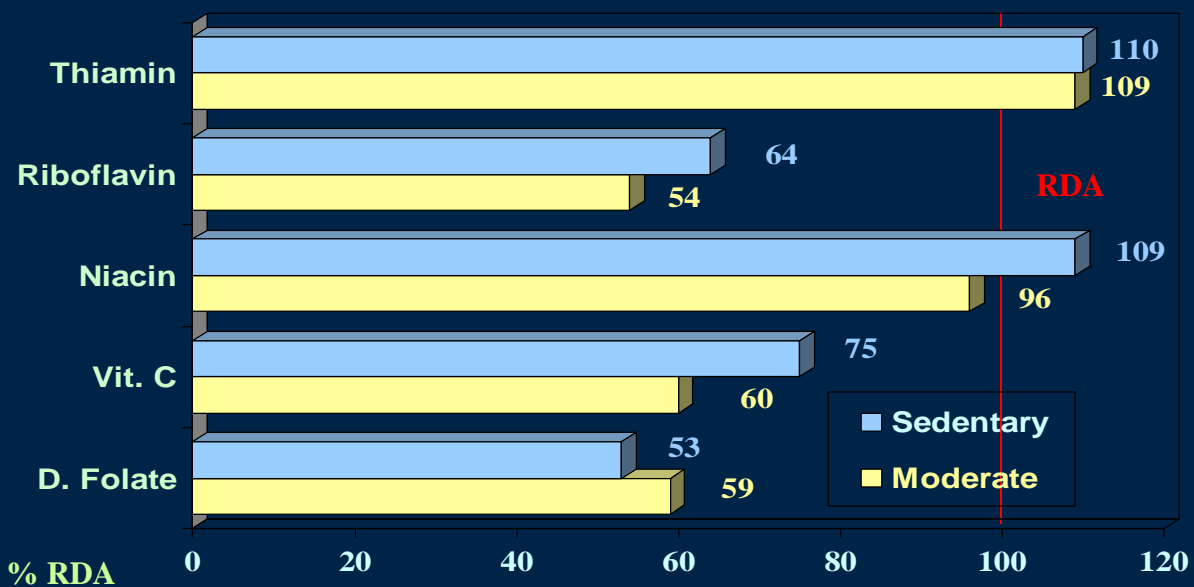
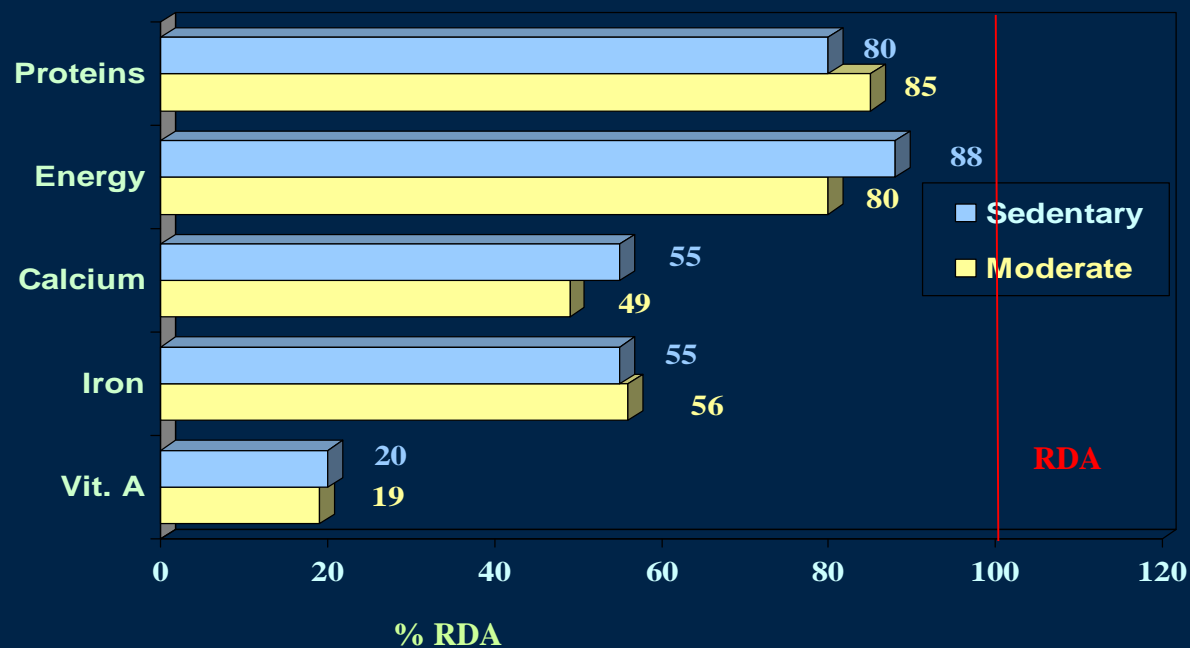
## Distribution (%) of Adult Men & Women according to Physical Activity



## Median intake of Nutrients (as % of RDA) Among ADULT MEN : By Physical Activity Level

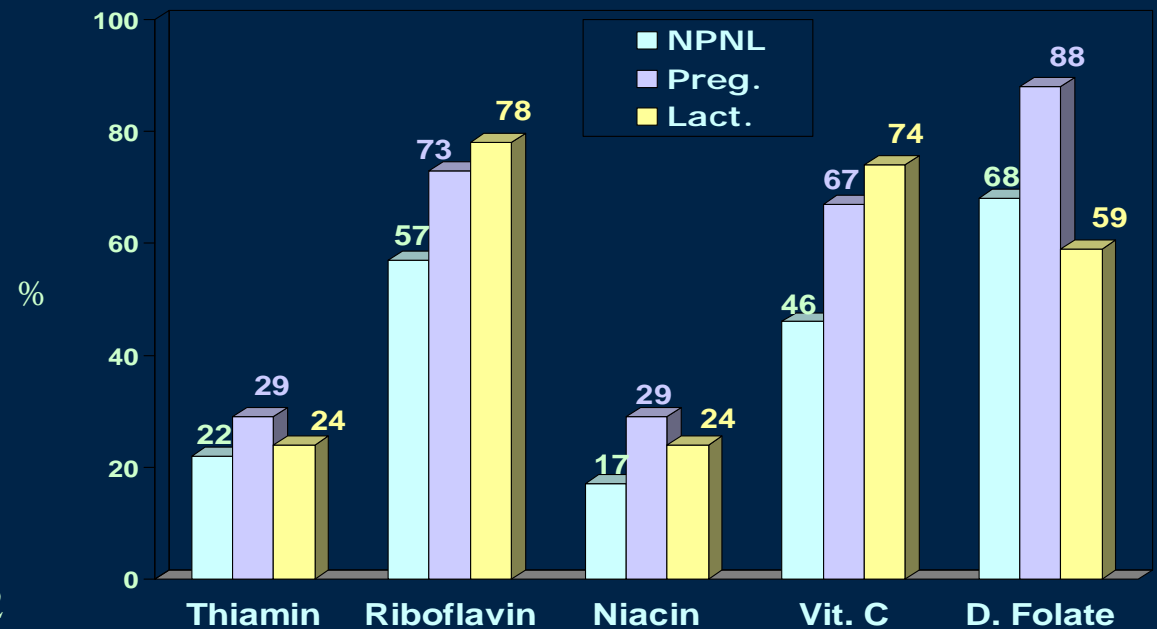
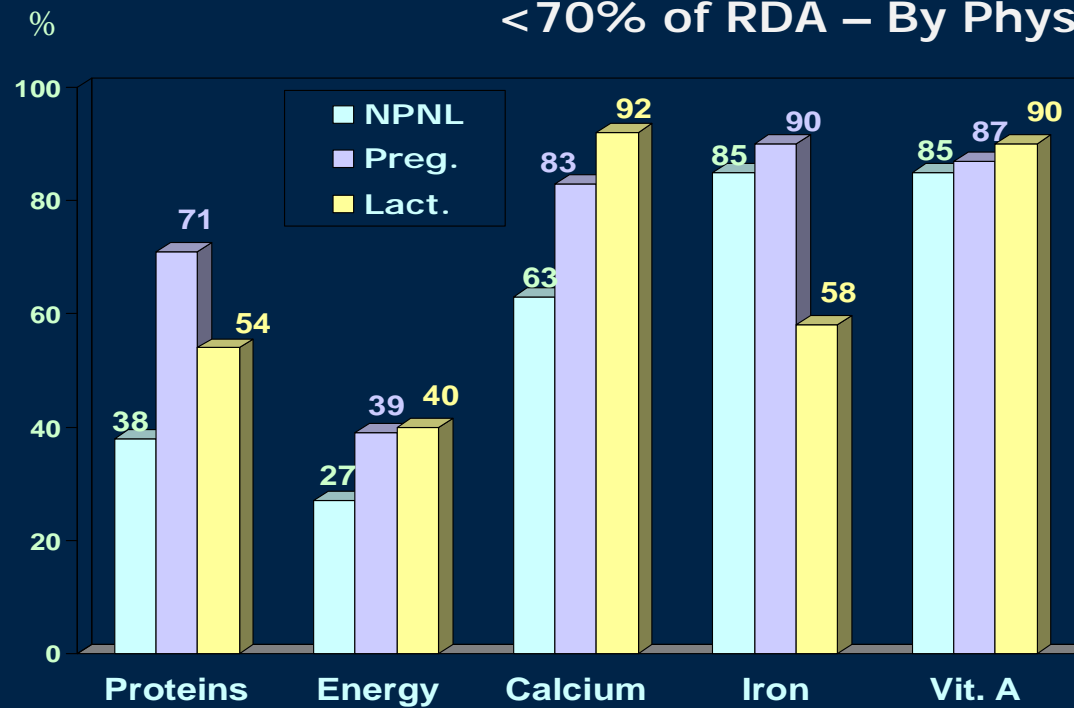


## Median intake of Nutrients (as % of RDA) Among ADULT WOMEN : By Physical Activity Level



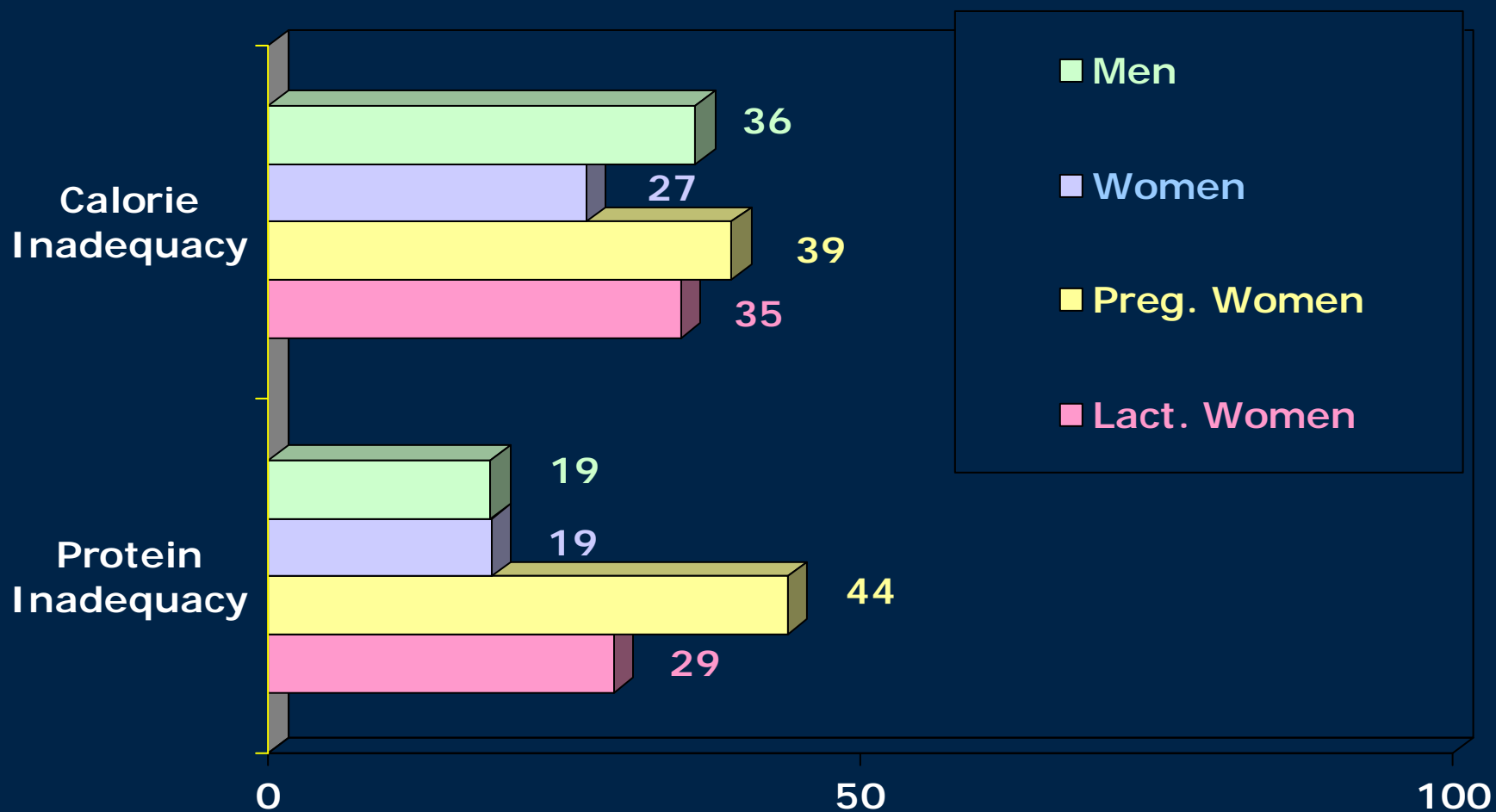


## Proportion (%) of Adult Women with intake of Nutrients in amounts <70% of RDA – By Physiological Status



Source: NNMB Tech. Rep. #26 - 2012

## Distribution (%) of Sedentary Adult Men & Women with Protein Calorie Inadequacy



States Pooled

Percent

Source: NNMB, Tech Rep 26, 2012

# *Food & Nutrient Intakes*

## *-- Time Trends*

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## Average Household Intake of foodstuffs (g/per CU/day): Time trends – States\* Pooled

STATES	Period of Survey				RDI (Dietary Guidelines: 2011)
	1975-79	1988-90	1996-97	2011-12	
<b>Cereals &amp; Millets</b>	<b>505</b>	<b>469</b>	<b>450</b>	<b>368 ↓</b>	375
<b>Pulses &amp; Legumes</b>	<b>34</b>	<b>32</b>	<b>27</b>	<b>33</b>	75
<b>Green Leafy Veg.</b>	<b>8</b>	<b>9</b>	<b>15</b>	<b>16</b>	100
<b>Other Veg.</b>	<b>54</b>	<b>49</b>	<b>47</b>	<b>48</b>	200
<b>Roots &amp; Tubers</b>	<b>56</b>	<b>41</b>	<b>44</b>	<b>50</b>	200
<b>Milk &amp; Milk Prod.</b>	<b>116</b>	<b>92</b>	<b>86</b>	<b>95 ↓</b>	300
<b>Fats &amp; Oils</b>	<b>14</b>	<b>13</b>	<b>12</b>	<b>16</b>	25
<b>Sugar &amp; Jaggery</b>	<b>23</b>	<b>29</b>	<b>21</b>	<b>14 ↓</b>	20

\*KER, TN, KAR, AP, MR, GUJ, ORI (7 States)

## Median Household Intake of Nutrients (per CU/day): Time trends – States\* Pooled

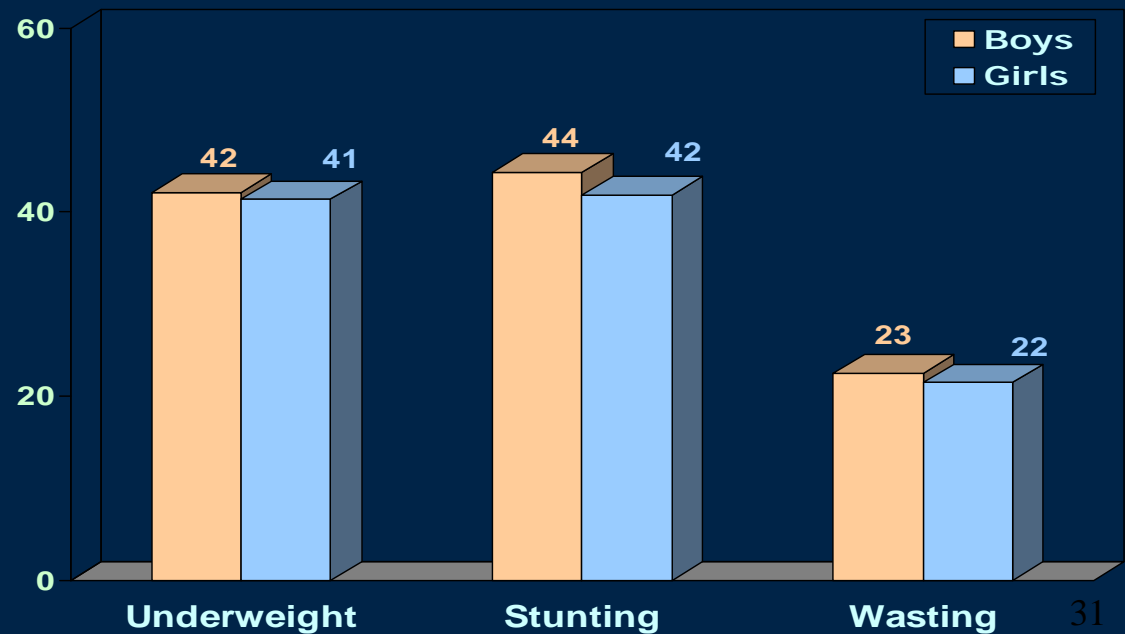
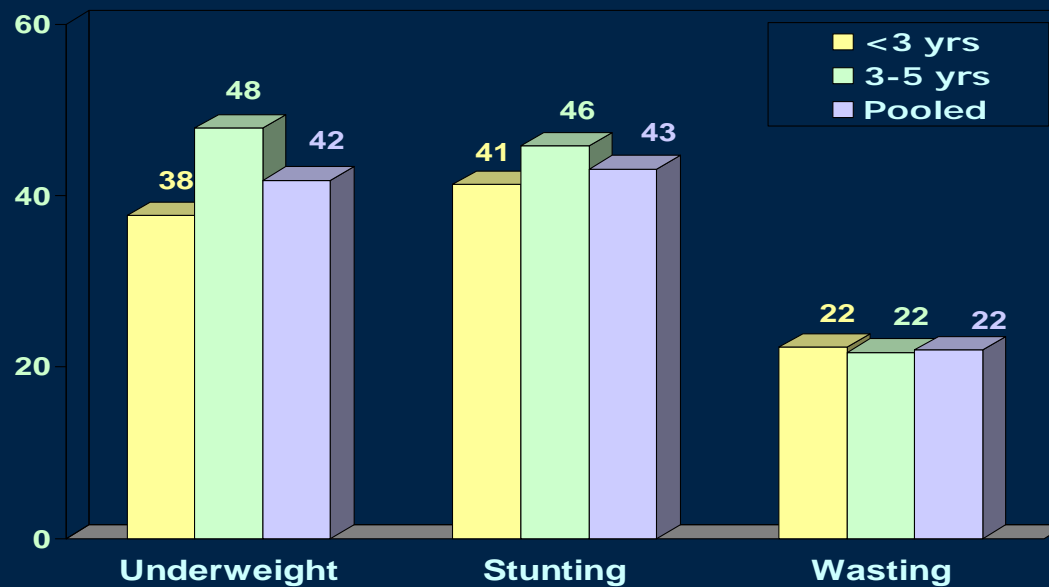
STATES	Period of Survey				RDA (2011)
	1975-79	1988-90	1996-97	2011-12	
Proteins (g)	61.5	58.4	53.7	49.0 ↓	60
Energy (Kcal)	2349	2283	2108	1852 ↓	2320
Calcium (mg)	606	565	521	433 ↓	600
Iron (mg)	17.2	15.5	14.2	13.4 ↓	25
Vitamin A (µg)	246	282	300	296	600
Thiamin (mg)	1.46	1.33	1.20	1.20 ↓	1.20
Riboflavin (mg)	0.81	0.87	0.90	0.80	1.40
Niacin (mg)	14.7	14.2	12.7	13.7	16
Vitamin C (mg)	39	37	40	46	40
Dietary Folate (µg)	-	-	153	127 ↓	200

# NUTRITIONAL STATUS

## - Anthropometry

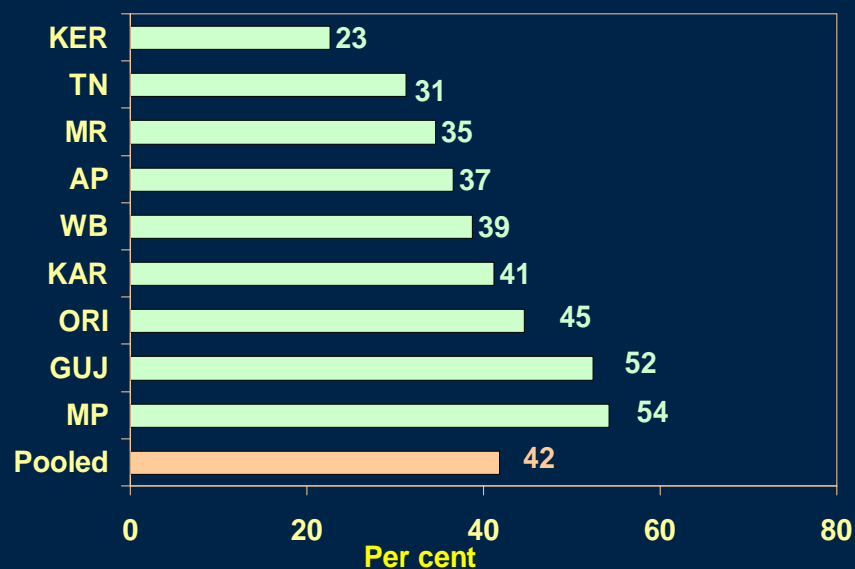
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## Prevalence (%) of Undernutrition Among 0-5 yr Children According to SD Classification (<Median - 2SD) : By Age Group & Gender

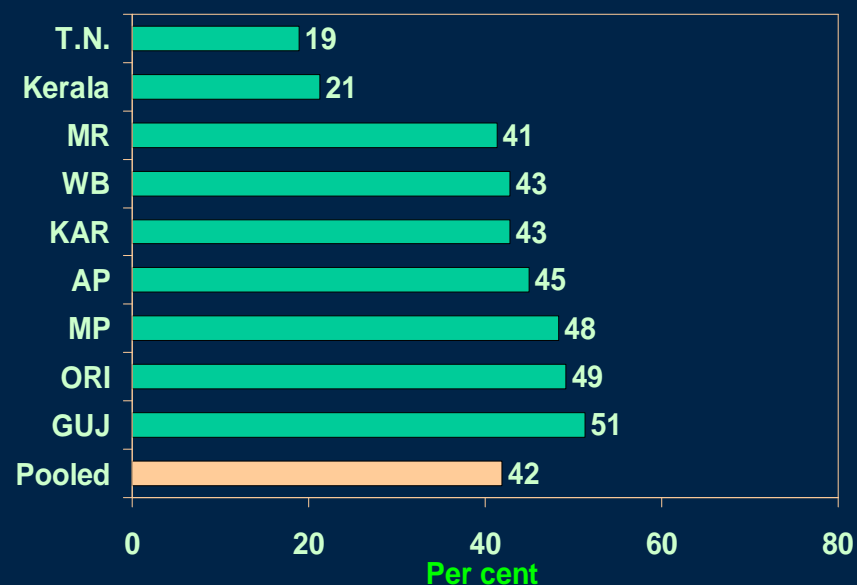


## Prevalence (%) of Undernutrition among <5 yr Children – By State \*

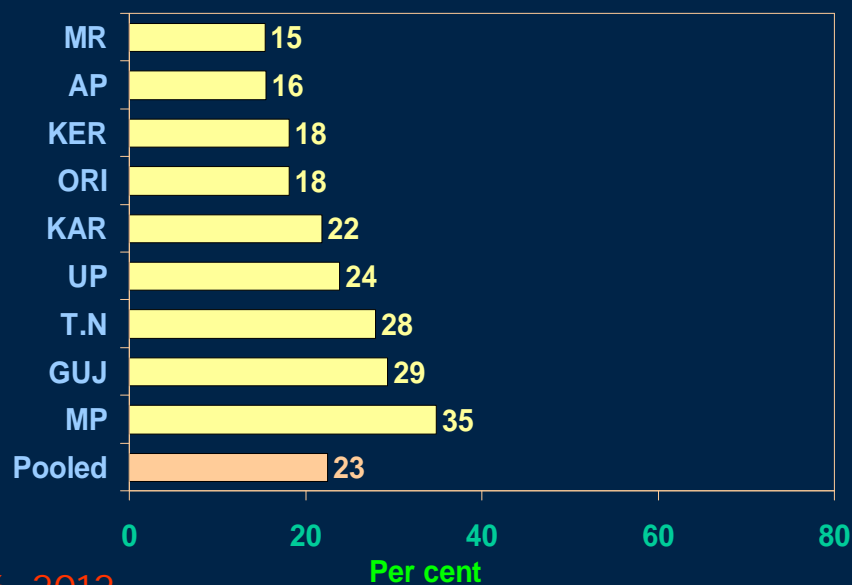
### UNDERWEIGHT



### STUNTING



### WASTING

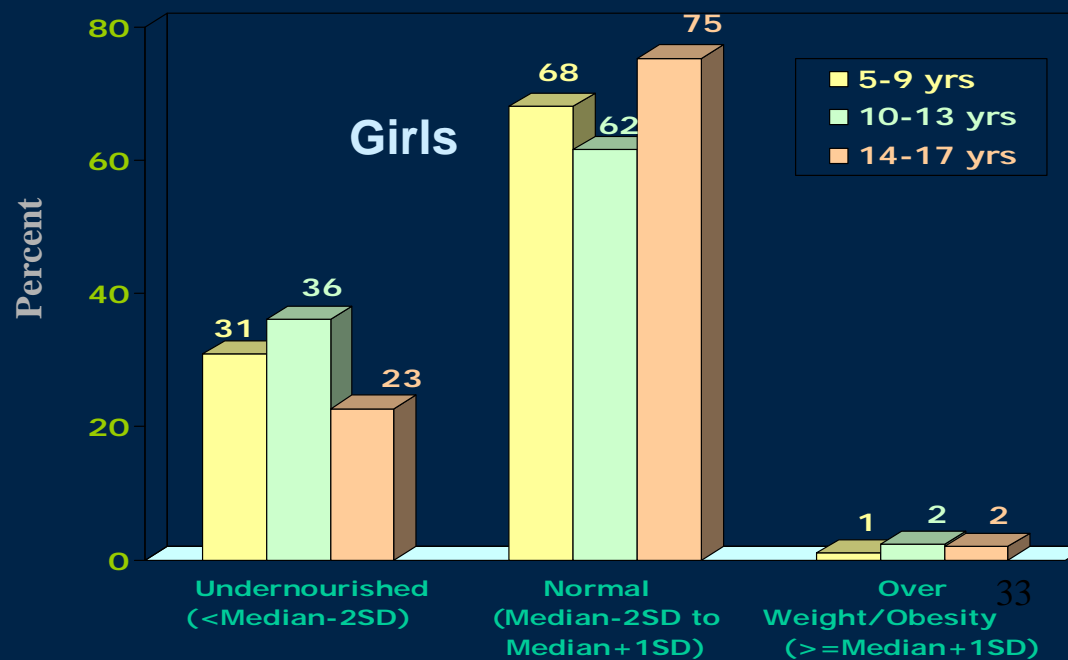
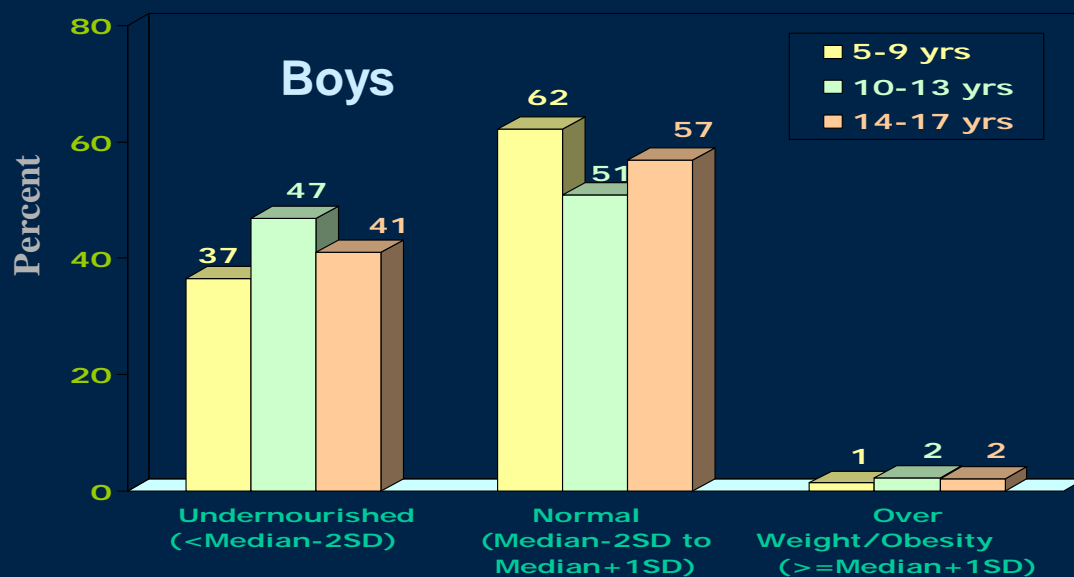


\* Using WHO Child Growth Standards

States Pooled



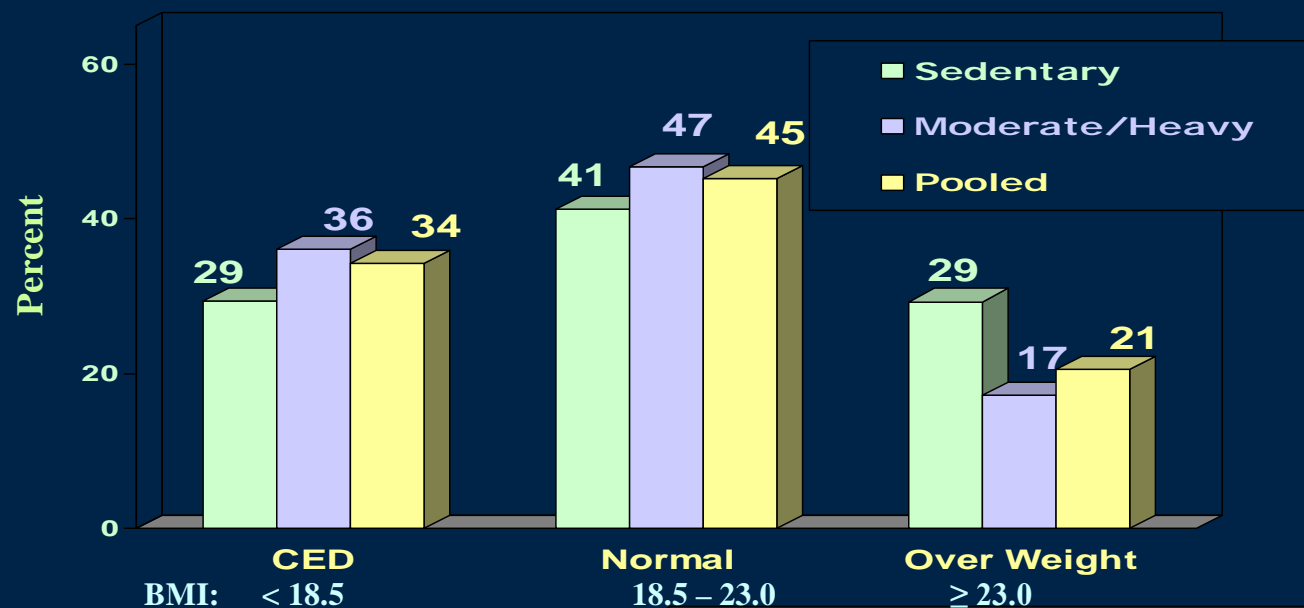
# Distribution (%) of Adolescent Boys & Girls according to Age/sex specific BMI



States Pooled

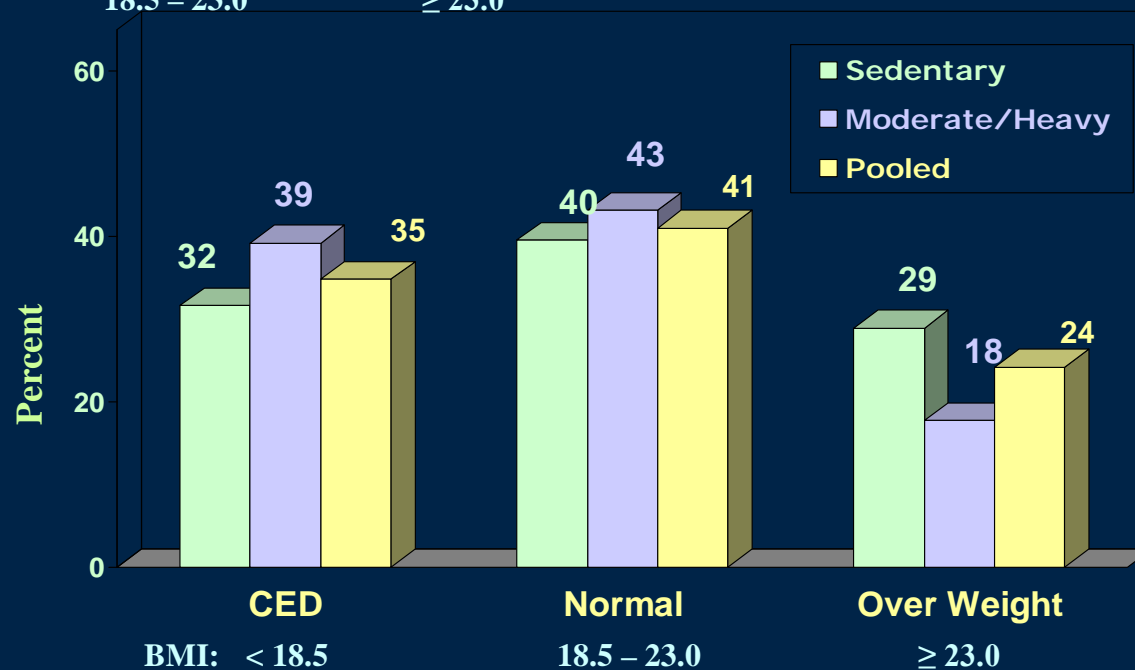
Source: NNMB, Tech Rep 26, 2012

# Distribution (%) of Adult Men & Women According to Body Mass Index (BMI Grades - Asian Cut-off Levels): By Physical Activity



## Adult Women

$\chi^2: p (<0.001)$

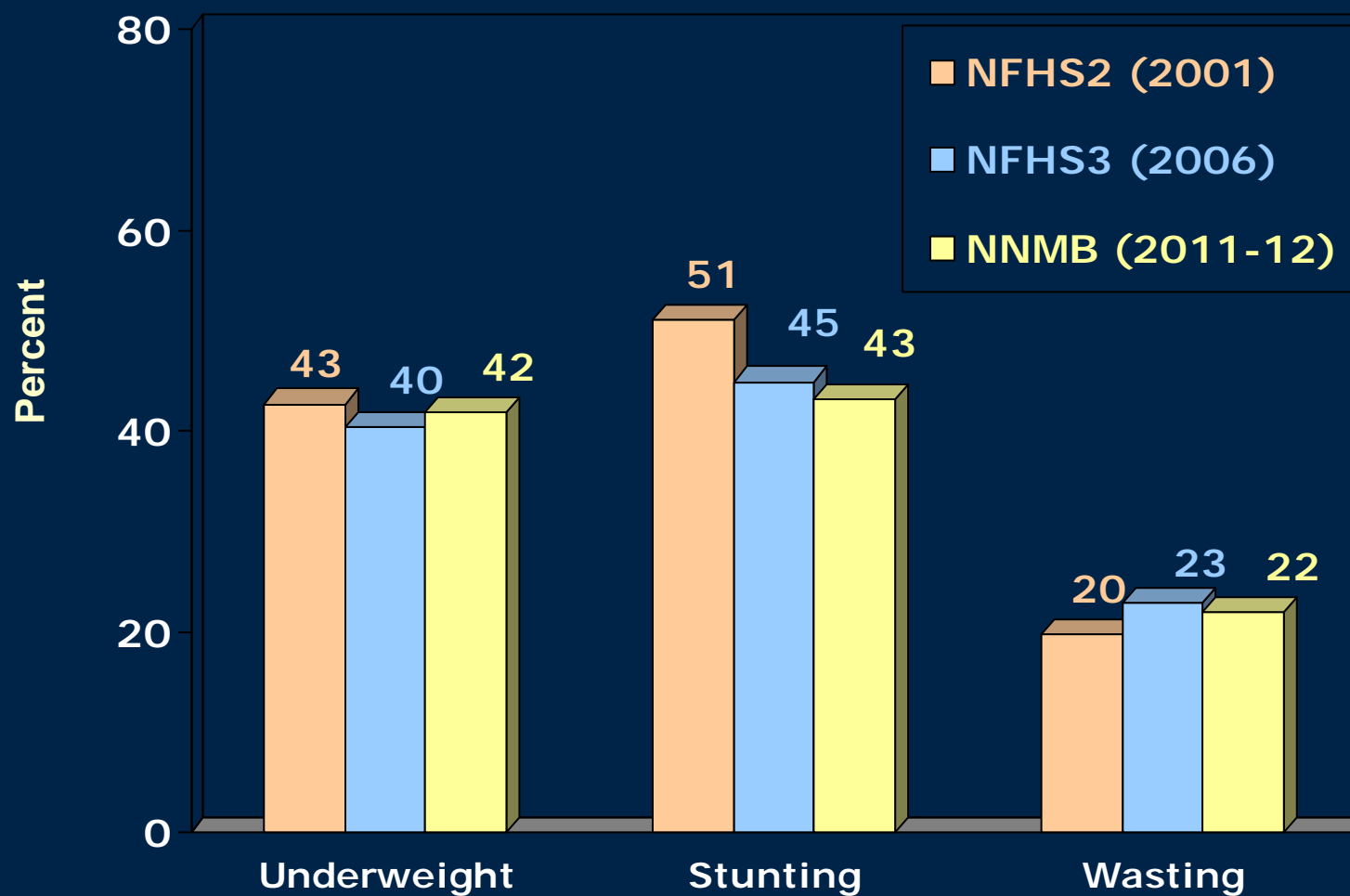


# NUTRITIONAL STATUS

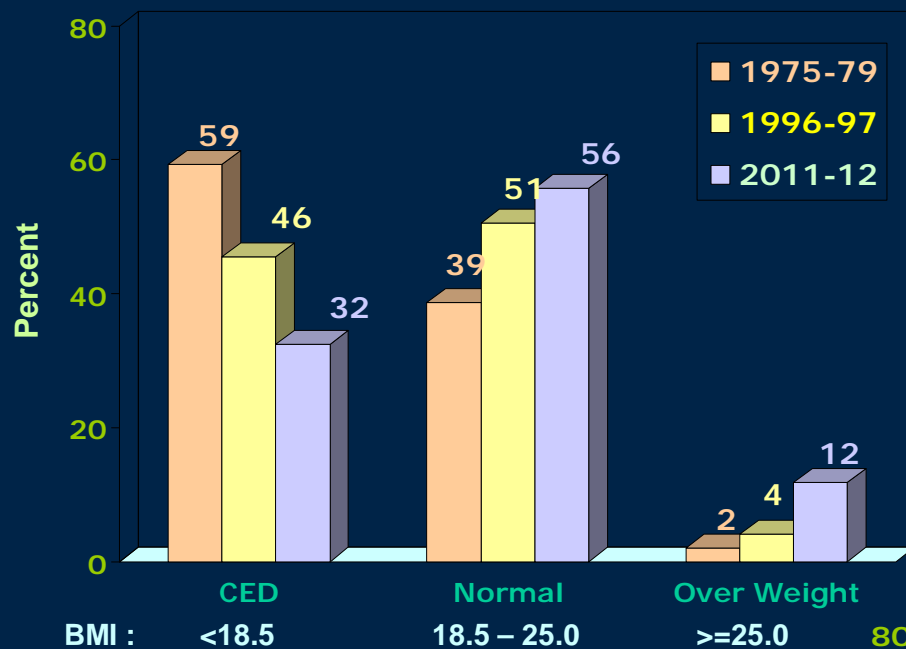
## - Time Trends

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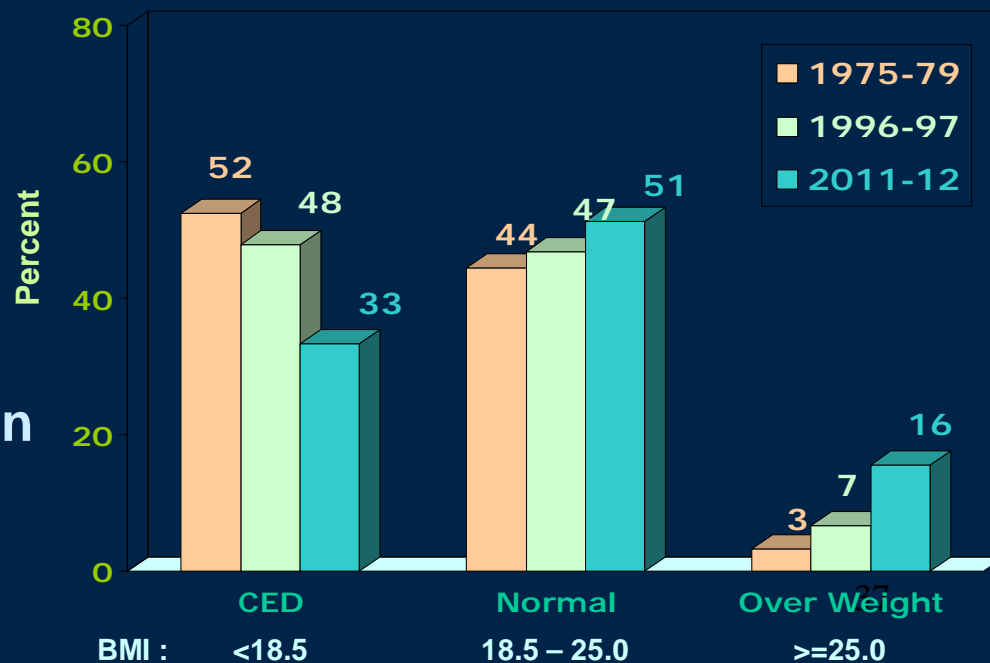
## Distribution (%) of <5 Children by Undernutrition and Period of Survey (Using WHO / MGRS Values)



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



## Adult Women



States Pooled

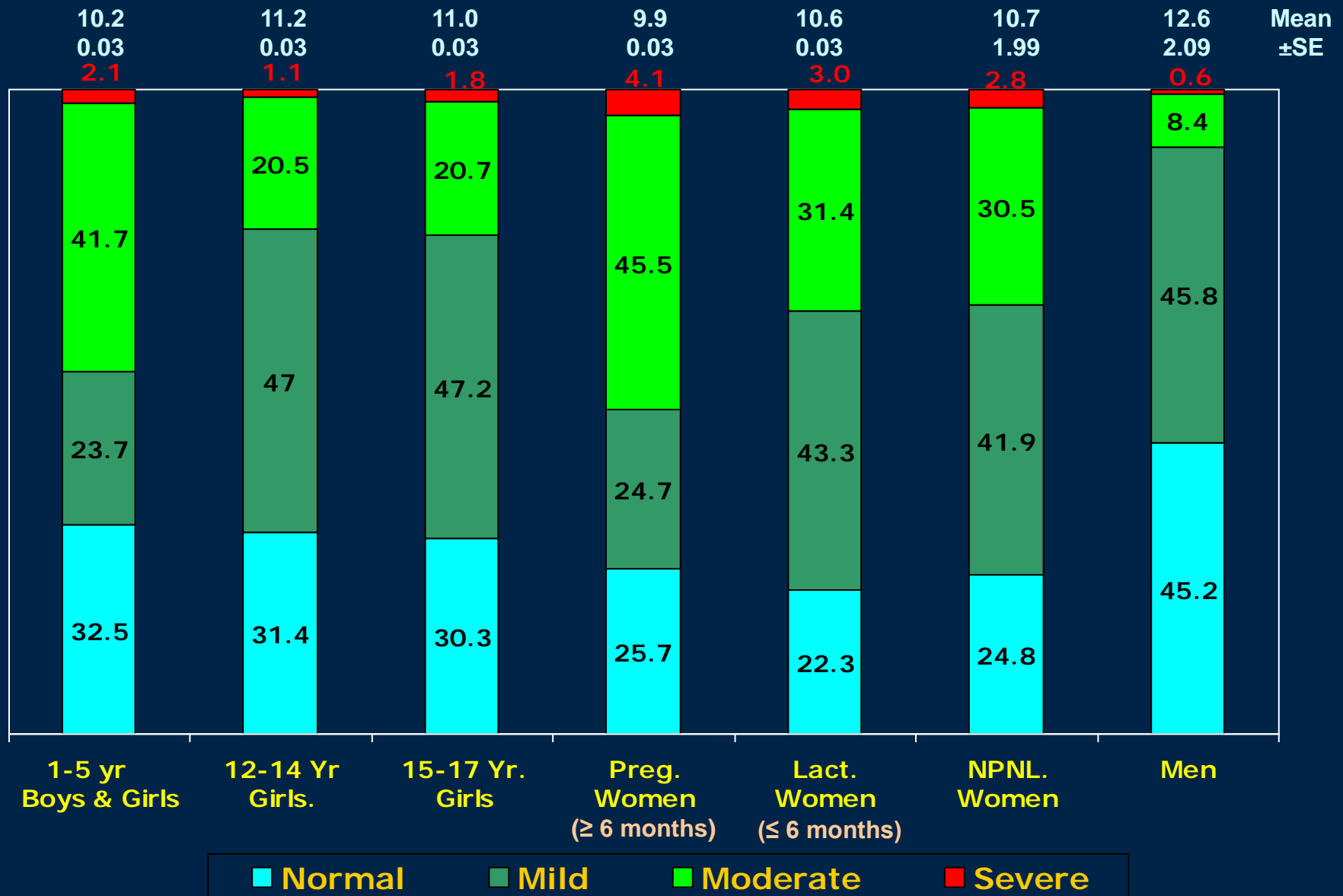
## ***Micronutrient Deficiency Disorders of Public Health significance:***

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- Iron Deficiency Anaemia (IDA)***
- Vitamin 'A' Deficiency (VAD) and***
- Iodine Deficiency Disorders (IDD)***
- Vitamin D Deficiency***

# *Iron Deficiency Anaemia (IDA)*

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



Source: MND-NNMB, Tech Rep 22, 2003



# STRATEGIES FOR CONTROL & PREVENTION OF IDA/VAD

## Short Term Strategies:

### IDA:

Distribution of 'FOLIFER' (Iron & Folic Acid Tabs.) to Vulnerable groups viz.,

- Pregnant Women
- Lactating Women (< 6 months)
- FP Acceptors
- 1 to 5 Year Children

@ 1 Tab.  
Adult/Child  
per day  
for 100 days

## Distribution (%) of Beneficiaries according to Receipt of IFA tablets

Particulars	Per cent		
	Pregnant (2053)	Lactating (2213)	Children (2178)
Received IFA tablets	62.2	12.3	3.8
No. of tablets received			
10 – 29	2.3	1.5	0.4
30 – 59	17.1	5.6	1.2
60 – 89	12.8	1.4	0.3
≥ 90	29.9	3.8	1.8

Figures in ( ) indicate numbers

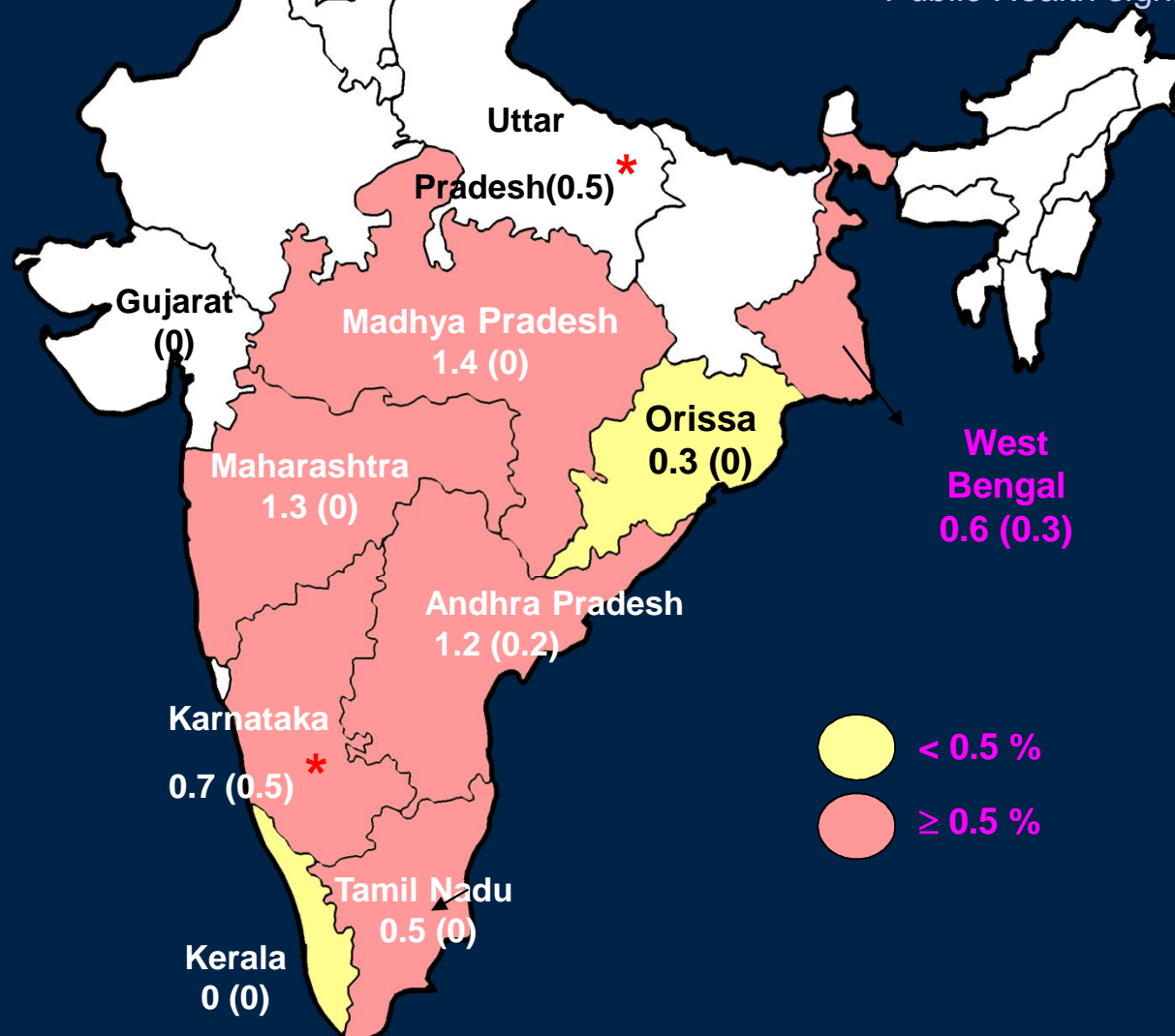
Source: NNMB-MND Survey : 8 States, 2003

# *Vitamin A Deficiency (VAD)*

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## Trends in the Prevalence (%) of Bitot spots Among Rural Preschool children: NNMB-2003 & (2012)

WHO cut-off level of 0.5% prevalence denotes Public Health significance



Source:

NNMB - MND Surveys in Rural India: 2003 & NNMB Regular Survey-2012

States Pooled:  
NNMB-2003: 0.8  
NNMB-2012: (0.2)



# STRATEGIES FOR CONTROL & PREVENTION OF IDA/VAD

## Short Term Strategies (Contd.):

### VAD:

Distribution of 'Massive Dose Vitamin A to 9-60 months children, once in 6 months:

- First dose of 100 thousand IU at 9 months along with Measles Immunization
- Second dose 200 thousand IU at 18 months along with DPT/Polio Booster
- 3<sup>rd</sup> dose onwards 200 thousand IU every 6 months

**Distribution (%) of 1- 5 Yr. Children with Blood Vit. A Levels of  
< 20 µG/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 µg/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
Pooled	61.8	86.3	55.4	30.3	25.1

Source: NNMB - MND Surveys in Rural India: 2003

**Distribution (%) of 1- 5 Yr. Children according to Coverage for  
Receipt of Massive Dose Vit. A during the year 2011-12: By State**

<b>STATES</b>	<b>Receipt of Massive Dose Vitamin A</b>		
	<b>Received</b>	<b>No. of Doses</b>	
		<b>One</b>	<b>Two</b>
<b>Kerala</b>	<b>81.1</b>	<b>49.3</b>	<b>31.8</b>
<b>Tamil Nadu</b>	<b>66.0</b>	<b>30.2</b>	<b>35.8</b>
<b>Karnataka</b>	<b>94.4</b>	<b>40.6</b>	<b>53.8</b>
<b>Andhra Pradesh</b>	<b>90.6</b>	<b>36.2</b>	<b>54.4</b>
<b>Maharashtra</b>	<b>94.4</b>	<b>38.6</b>	<b>55.8</b>
<b>Gujarat</b>	<b>91.9</b>	<b>35.2</b>	<b>56.7</b>
<b>Madhya Pradesh</b>	<b>95.6</b>	<b>45.1</b>	<b>50.5</b>
<b>Orissa</b>	<b>93.1</b>	<b>39.5</b>	<b>53.6</b>
<b>West Bengal</b>	<b>89.8</b>	<b>32.5</b>	<b>57.3</b>
<b>Uttar Pradesh</b>	<b>57.8</b>	<b>26.7</b>	<b>31.1</b>
<b><i>Pooled</i></b>	<b><i>85.0</i></b>	<b><i>36.5</i></b>	<b><i>48.5</i></b>

Source: NNMB, Tech Rep 26, 2012 <sup>47</sup>

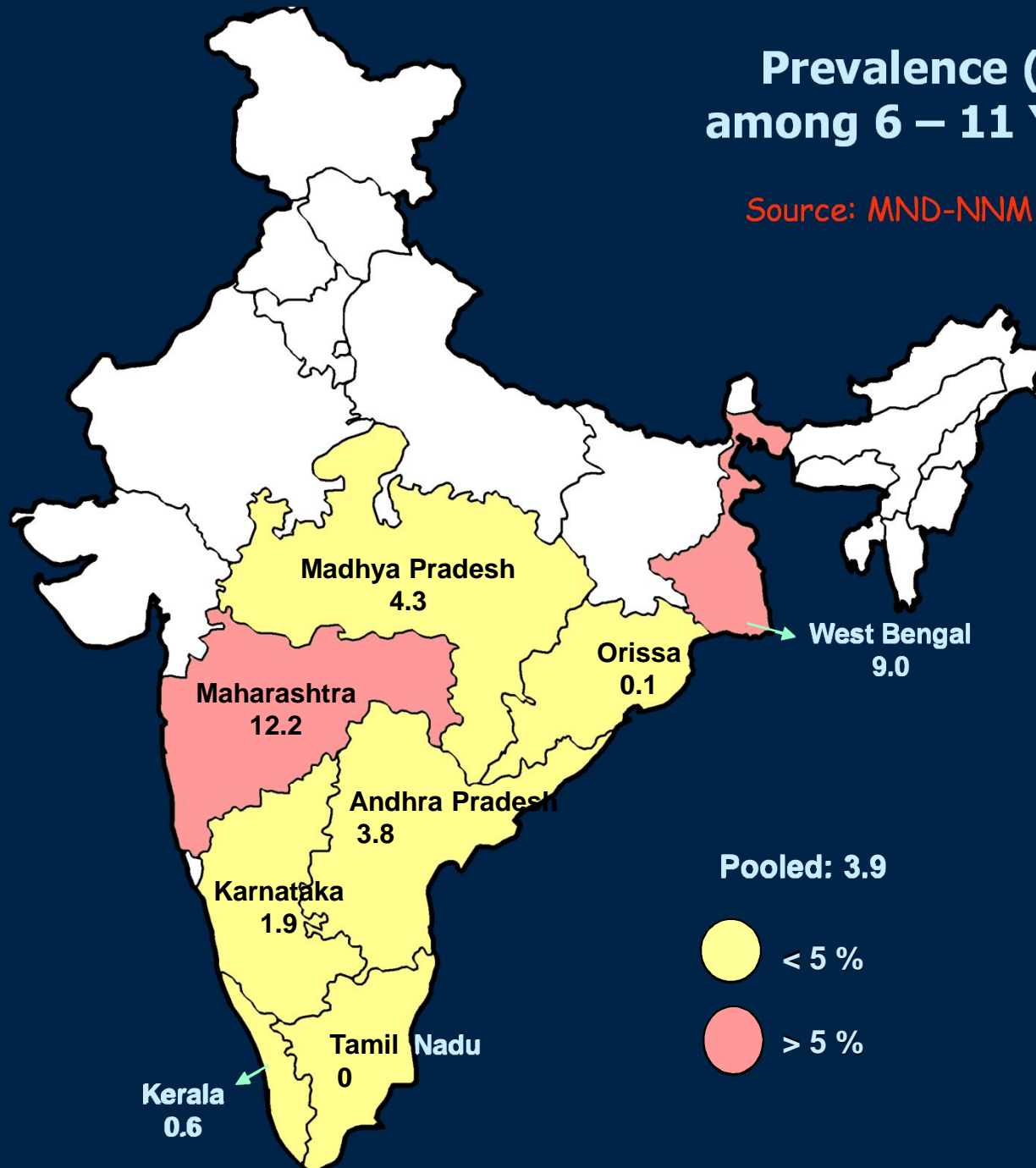
# *Iodine Deficiency Disorders (IDD)*

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

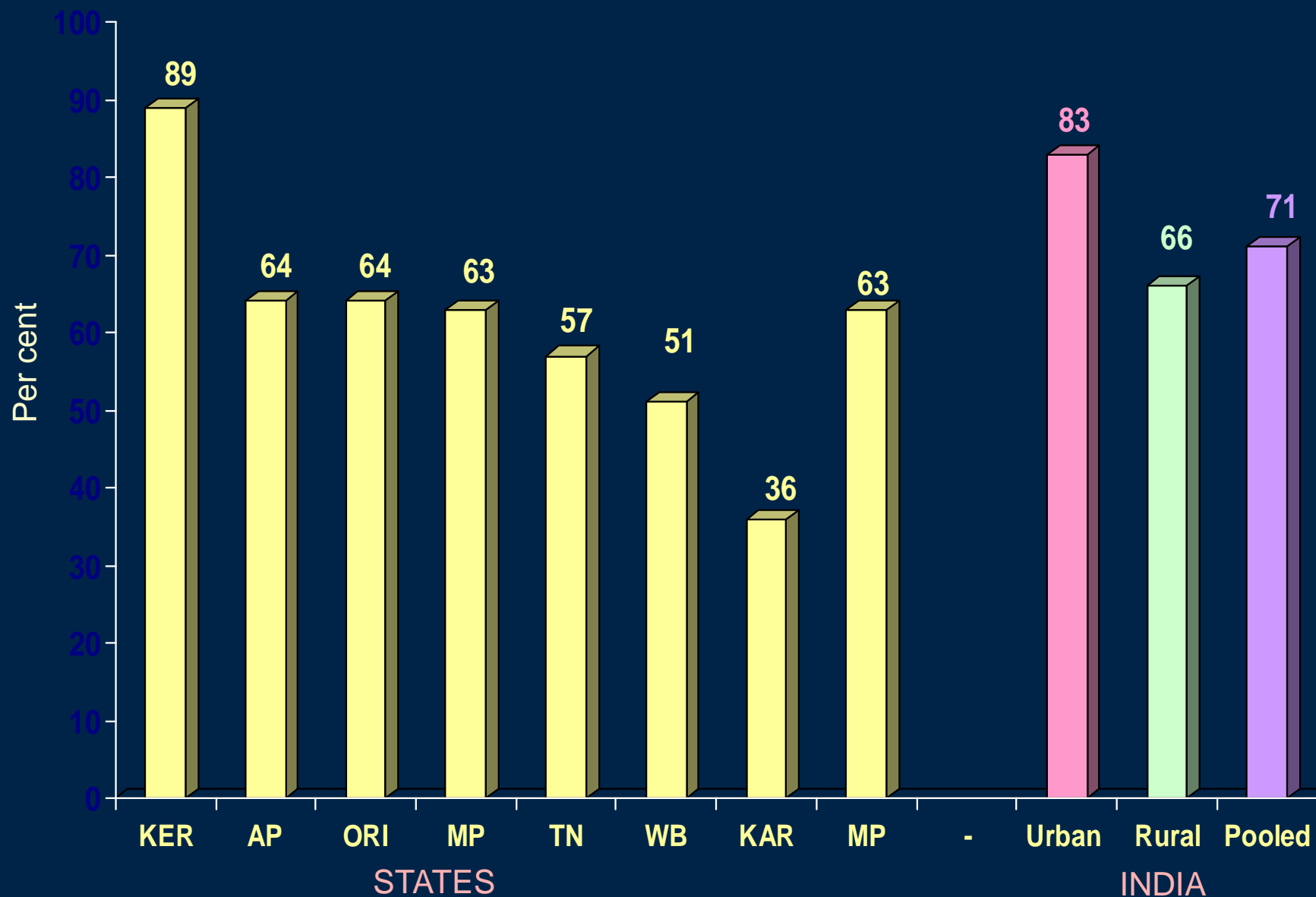
Source: MND-NNMB, Tech Rep 22, 2003



## Prevalence of Total Goitre (%) in Select Districts (8Dist. /Region) of Different Regions of the Country

Dist- ricts	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

Percent of HHs consuming adequately Iodised ( $\geq 15$  ppm) Salt  
*Coverage Evaluation Survey: UNICEF - MoH&FW (GoI) 2009*



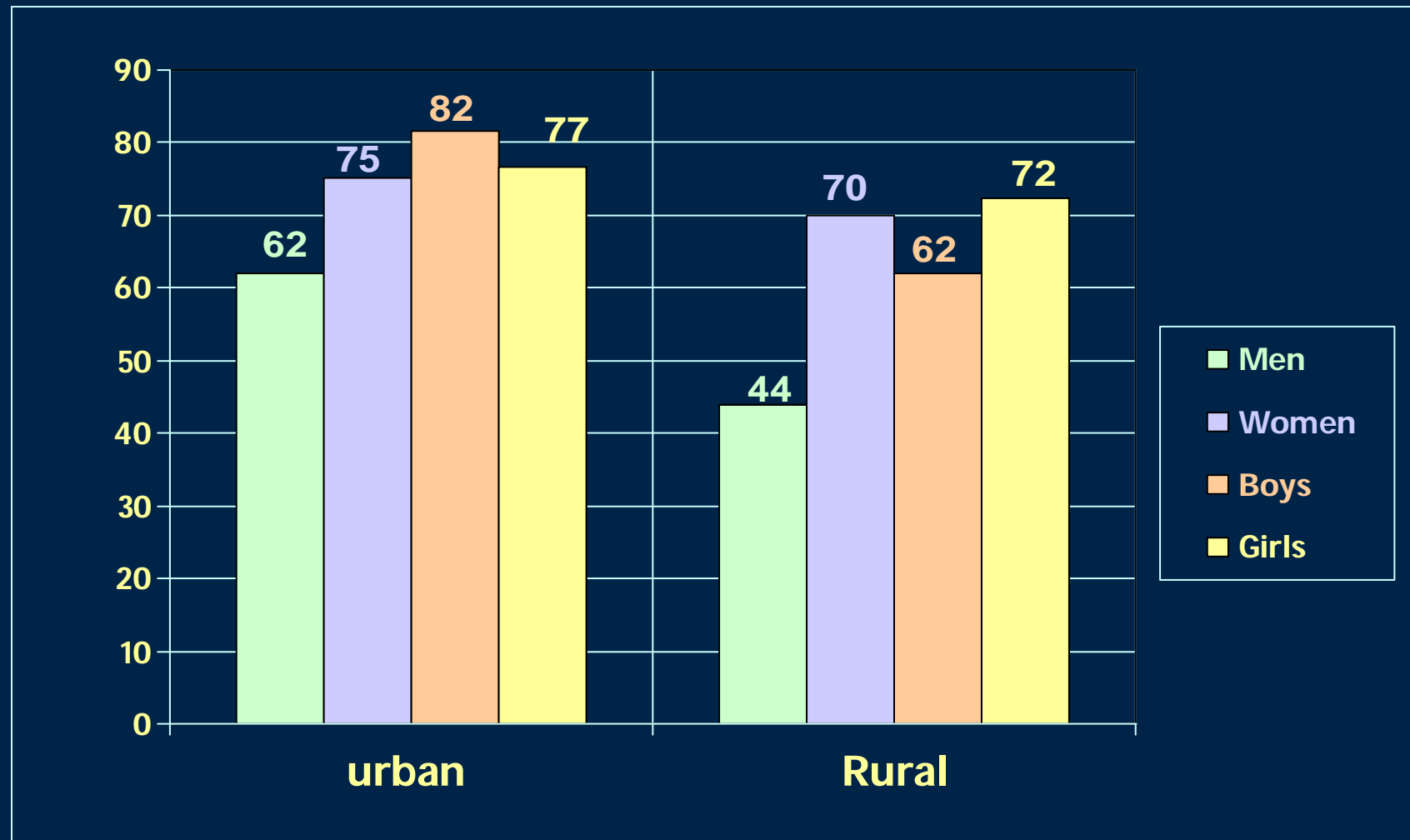
# *Vitamin - D Deficiency*

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## Prevalence of VDD - Indian studies

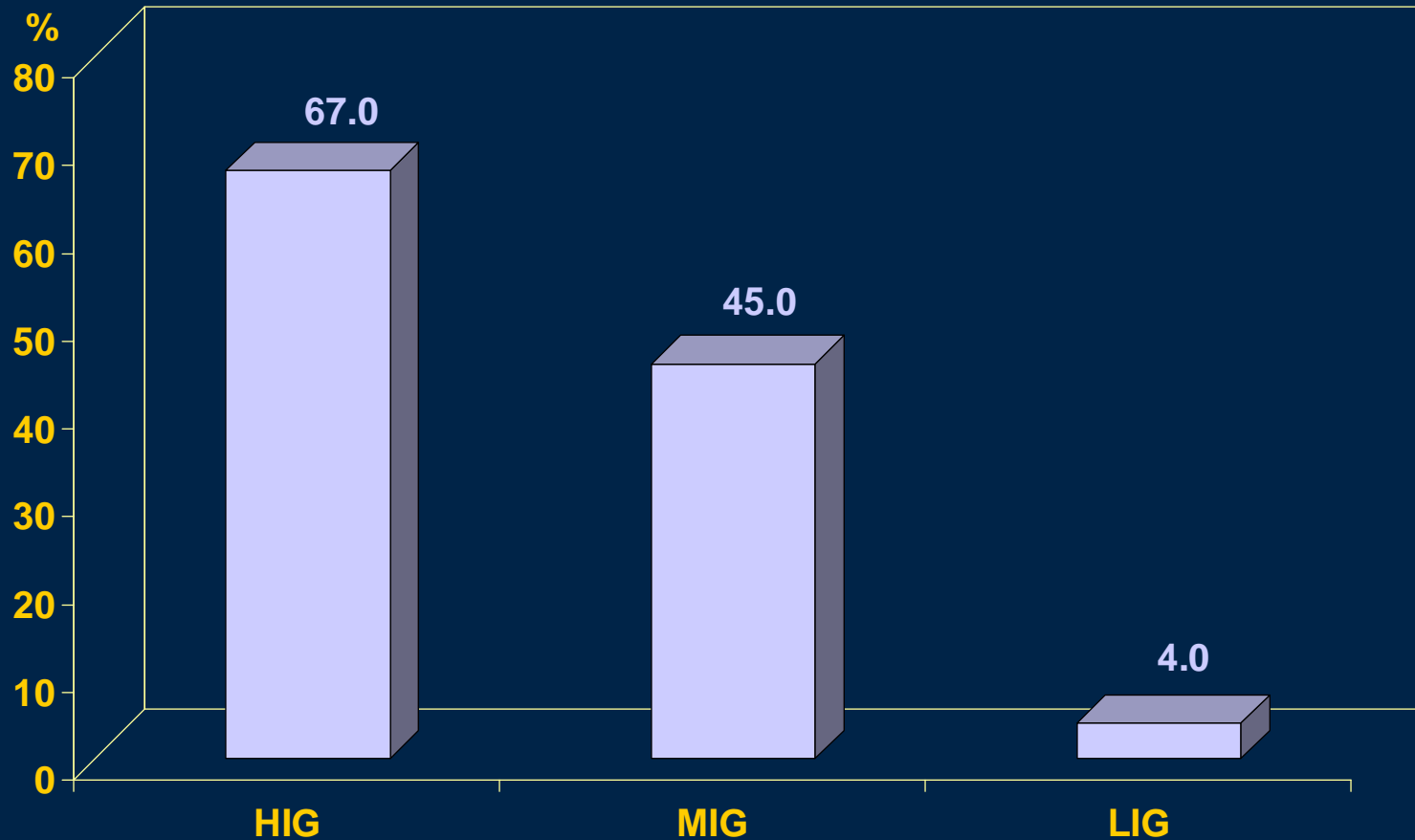
Studies	Cut off point	Prevalence %
Delhi, Madhava Rao, Goswami, Adults-2006	< 20 ng/ml	94.3%
Seema Puri et al Adolescent girls	< 20 ng/ml	90.8%
Pregnancy, Term NIN study, 2008	< 20 ng/ml	51.8%
Cord blood, NIN, 2008	< 20 ng/ml	91%
Alok sachan et al pregnancy	< 10 ng/ml	42.5%
Harinarayan et al Tirupati, children	< 20 ng/ml	75%

# Prevalence of VDD in Tirupati, South India



Harinarayan et al, IJMR,2008

# Prevalence of vitamin D deficiency (< 50 nmol/l) among Urban adult women ( $\geq 30$ yrs) by income Category (ICMR task force study- Hyderabad arm: 2008)



# Overweight, Obesity, Hypertension & Diabetes Mellitus

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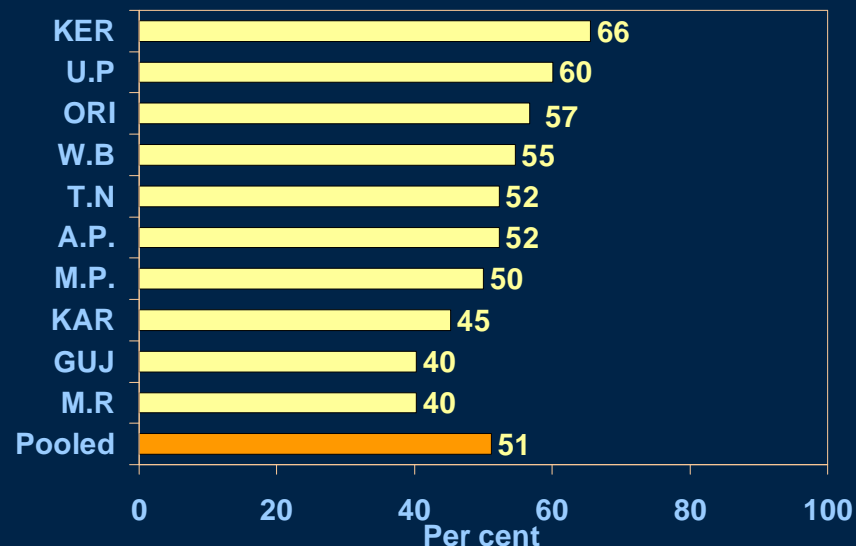


## Prevalence (%) of Obesity according to BMI/WHR/WC and HTN among ADULT MEN – By State

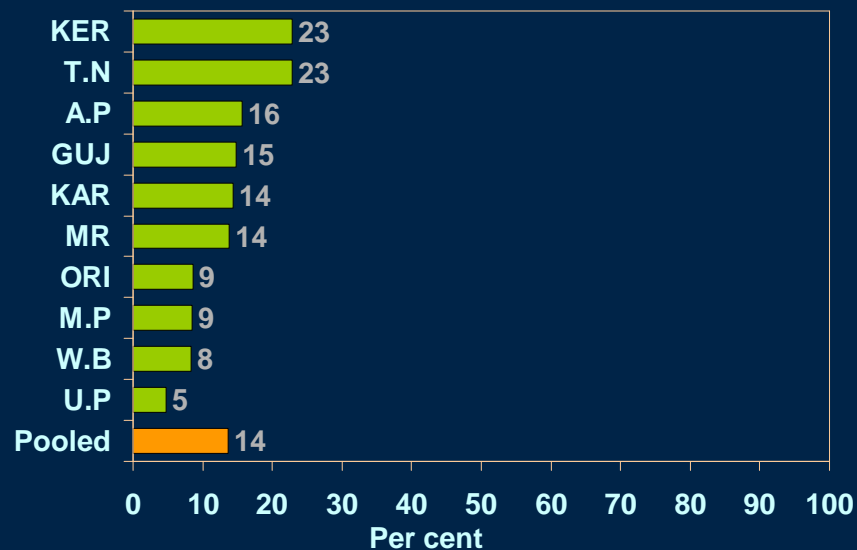
**BMI ( $\geq 23.0$ )**



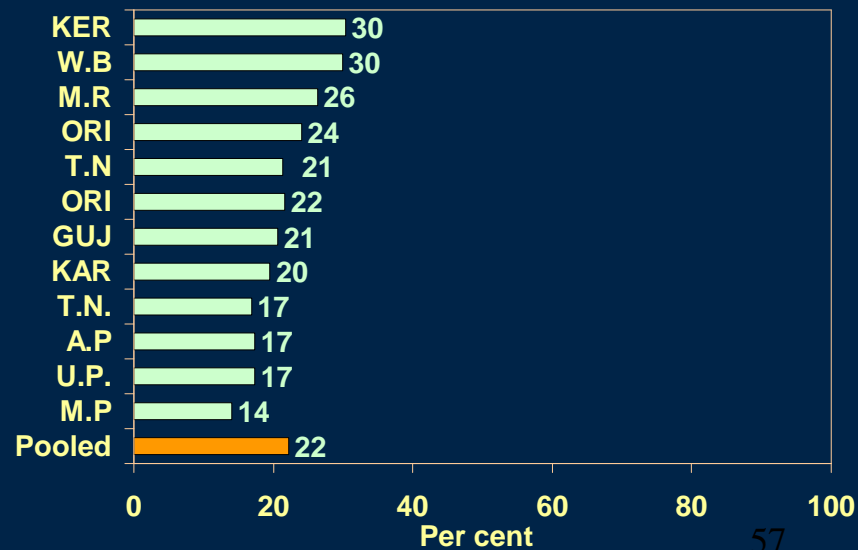
**WHR ( $\geq 0.90$ )**



**WC ( $\geq 90$  cm)**

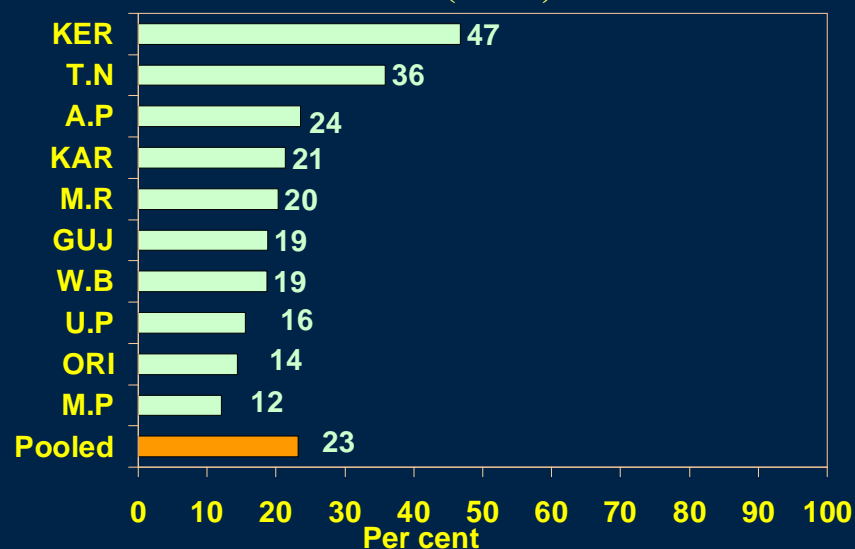


**HTN (SBP  $\geq 140$  and/or DBP  $\geq 90$  mm Hg)**



## Prevalence (%) of Obesity according to BMI/WHR/WC and HTN among ADULT WOMEN – By State

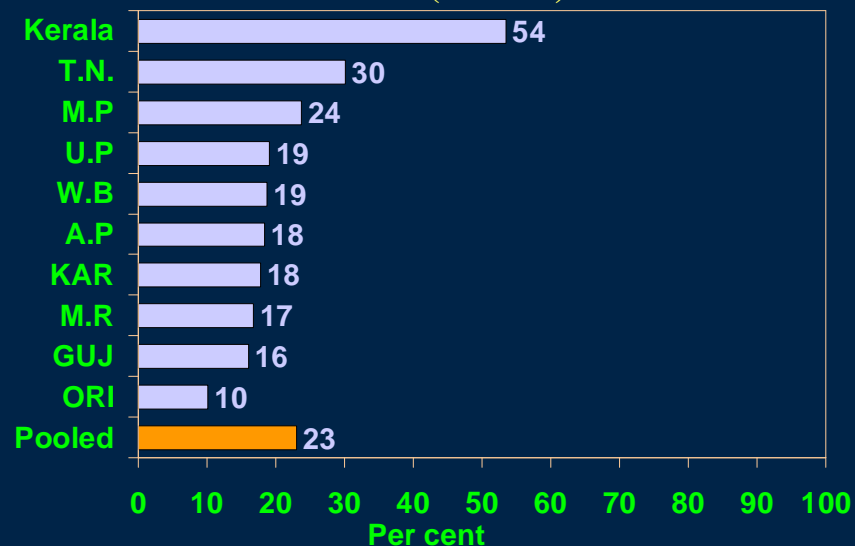
**BMI ( $\geq 23.0$ )**



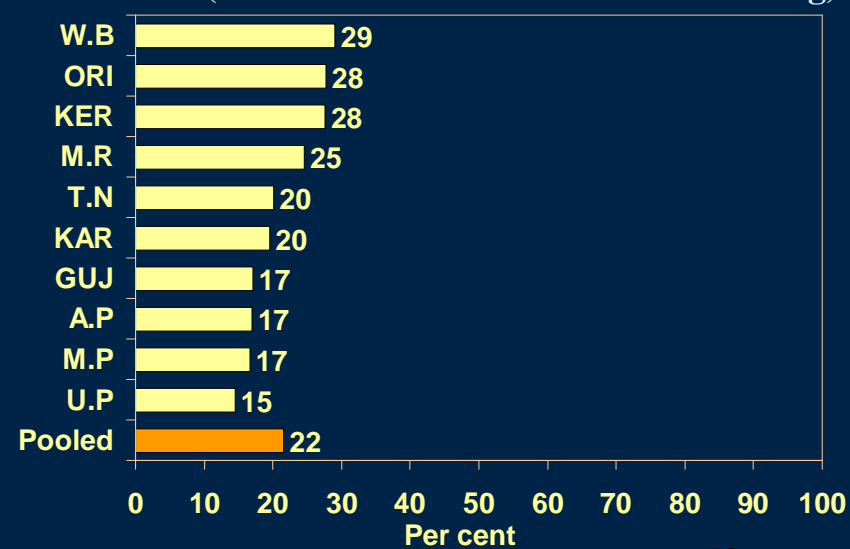
**WHR ( $\geq 0.80$ )**



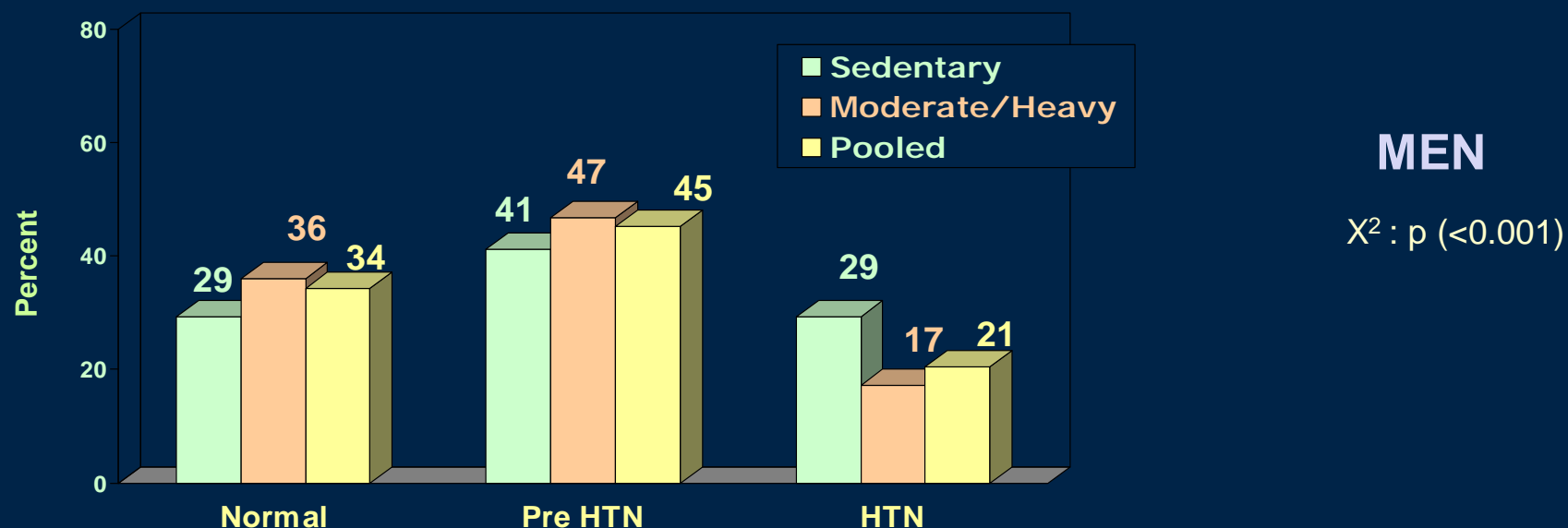
**WC ( $\geq 80$  cm)**



**HTN (SBP  $\geq 140$  and/or DBP  $\geq 90$  mm Hg)**

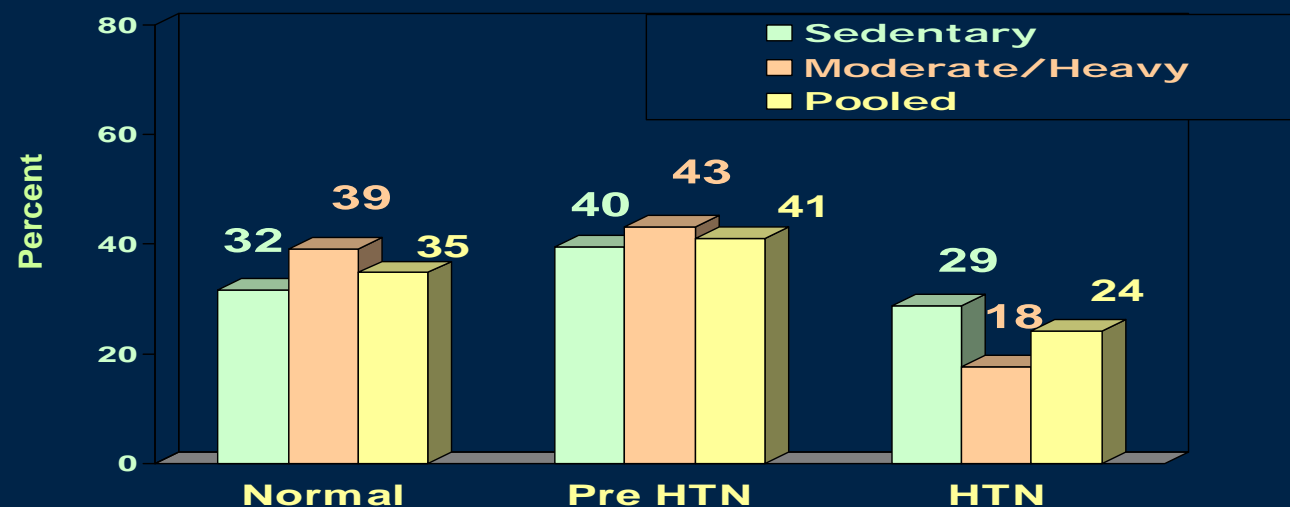


# Prevalence (%) of Hypertension (JNC-VII) Among Rural Adult Men & Women : By Physical Activity Level



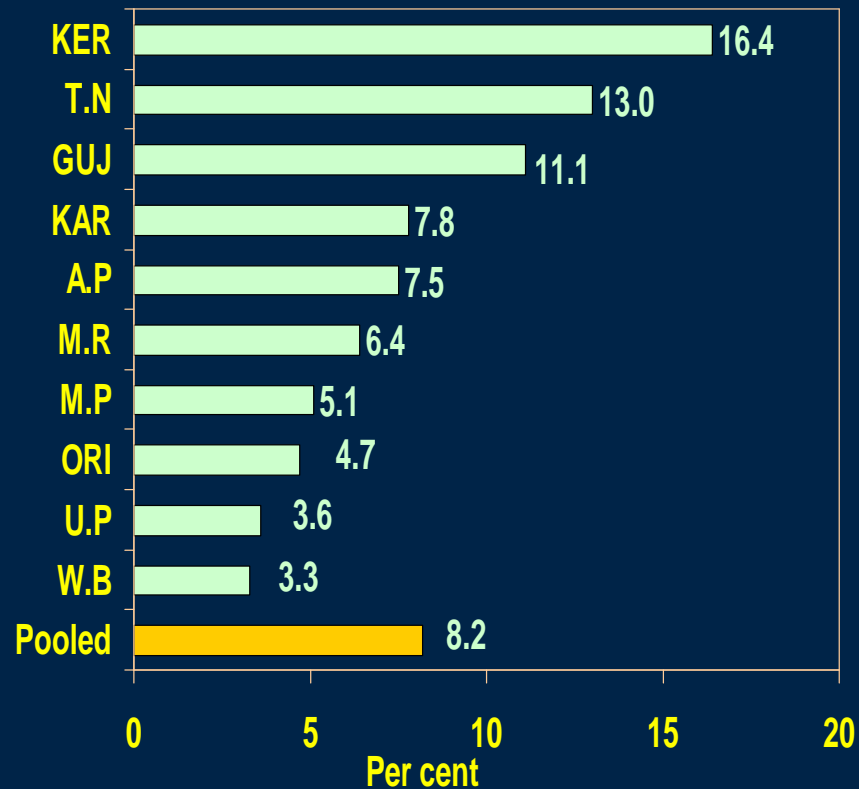
## WOMEN

$\chi^2 : p (<0.001)$

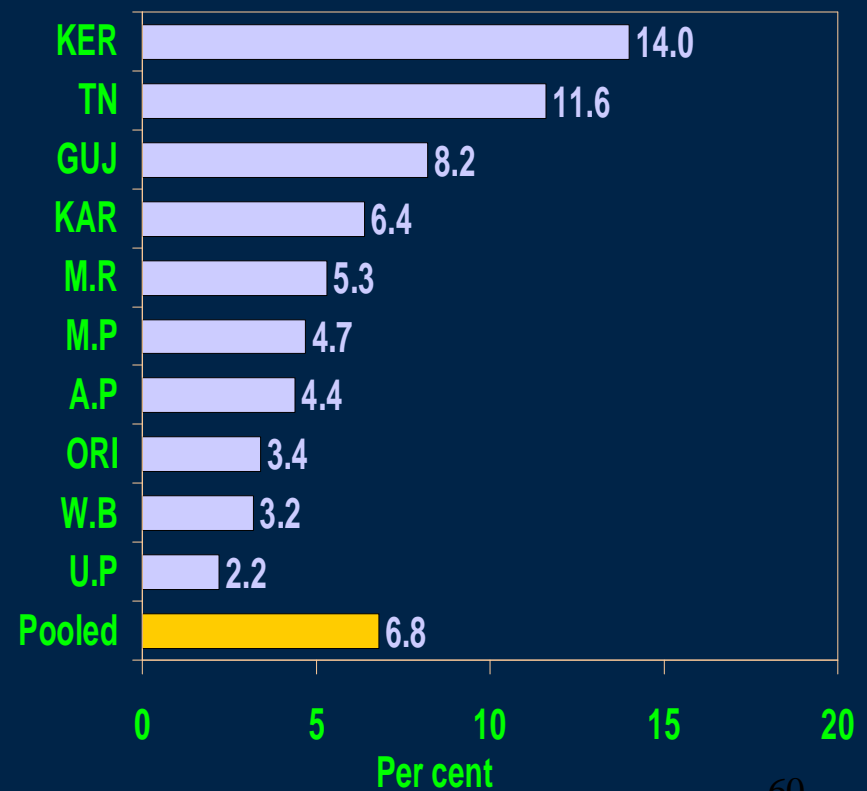


## Prevalence (%) of Diabetes Mellitus – By State (Fasting Blood Glucose $\geq$ 126mg/dL)

### ADULT MEN

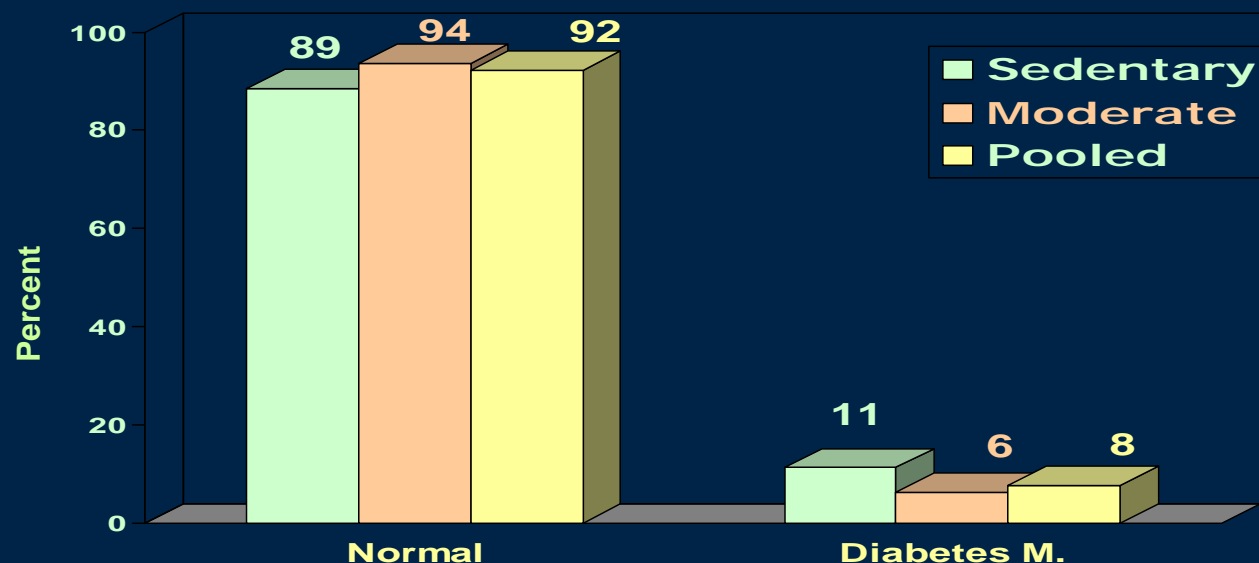


### ADULT WOMEN



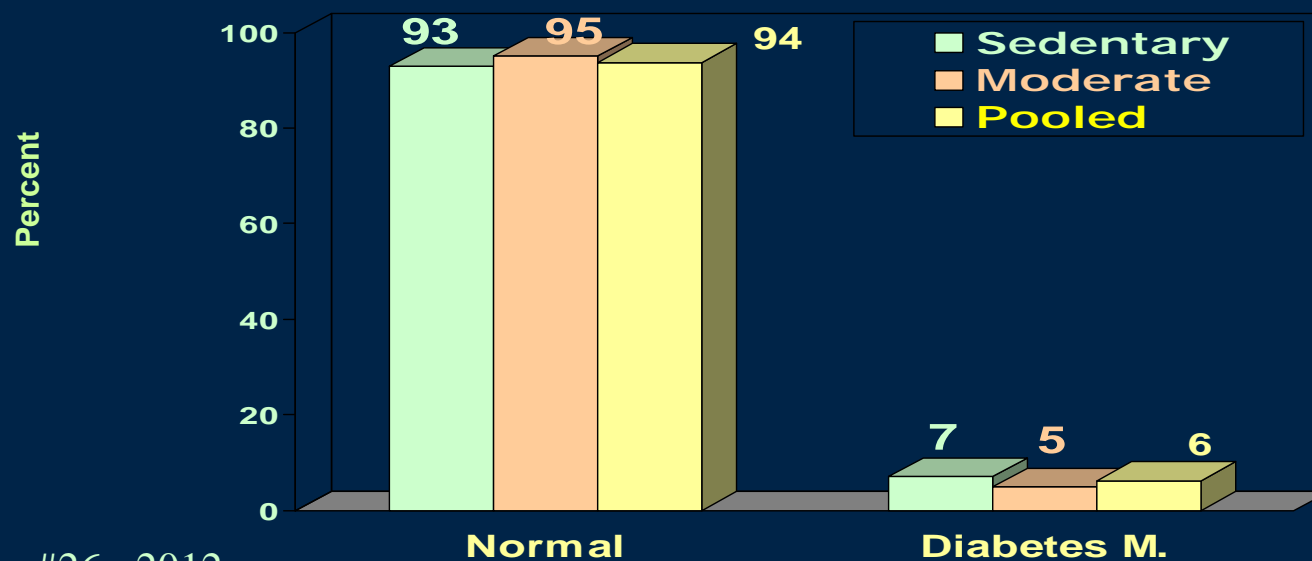
Source: NNMB, Tech Rep 26, 2012

# Prevalence (%) of Diabetes Mellitus Among Rural Adult Men & Women : By Physical Activity Level



## WOMEN

$\chi^2: p (<0.001)$



# *Strategies for Control & Prevention*

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## SHORT TERM

- Strengthening supplementary feeding Programmes (eg. ICDS), in terms of :
  - Quantity and quality of Supplement
  - Regularity
  - Coverage of target population and monitoring
- National Programme for Control & Prevention of I DA:
  - Distribution of I FA Tablets to target population,
- National Programme for prevention of Nutritional Blindness:
  - Massive dose Vitamin A Supplementation,

## Long Term Strategies

- Health & Nutrition Education
- Dietary Diversification – B. C. Commn.
- Development of Kitchen Gardens
- Agro-biodiversity, Bio-fortification,
- GM Foods
- Environmental Sanitation & Personal Hygiene
- Provision of Safe Drinking water
- Immunization
- Prompt treatment of Infections
- Income generating activities
- Improvement in HH food Security
- Promotion of Healthy Life style Practices
- . . . Population Control



# Medium Term Strategies

## Fortification of Foods with micronutrients

- Milk (Vit. A & Vit. D)
- Salt (Iodine, Iron)
- Cooking oils (Vit. A & Vit. D)
- Wheat Flour (Iron, Vit. A, Folic Acid)
- Rice (Iron, Ultra Rice [PATH])
- Supplementary foods under ICDS/MDM
- Ready to eat convenience foods

# Advantages & Disadvantages of Various Strategies

STRATEGY	ADVANTAGES	LIMITATIONS
<b>Short Term</b> (Nutrient Supplementation)	Immediate Benefit Very Effective, if properly implemented.	Expensive, Needs Manpower, Inadequate/Irregular Supplies, Inadequate/Irregular Coverage, Non-compliance, Not Sustainable.
<b>Long Term</b> (Nutrition Education/ Dietary Diversification)	Desirable, Sustainable, No cost involved.	Difficult to achieve, Time consuming.
<b>Medium Term</b> (Food Fortification)	Easy, Cost effective, Good compliance, Sustainable, Easy to Regulate.	Risk due to several foods being fortified

**Thank you**