

Nutrition Scenario in India and Effect of Climate change on the Nutritional status of vulnerable population



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OF NUTRITION

NCDC-CLIMATE CHANGE

HEALTH AND NUTRITION

HEALTH

“... is a state of complete physical, mental, and social well being and not merely absence of disease or infirmity”

- - - WHO

NUTRITION

“ ... is a process of ingestion of food, digestion, absorption, assimilation, and utilization of various nutrients”

SIGNIFICANCE OF NUTRITION

- Normal growth, development and various physiological functions
- Epidemiological data reveals strong association between undernutrition and morbidity & mortality.
- Chronic degenerative disorders such as coronary heart disease, hypertension, Type 2 diabetes, certain types of cancers, etc. are related to diet and nutritional status

SIGNIFICANCE OF NUTRITION (Contd.)

- Consumption of foods rich in dietary fiber, antioxidants is associated with reduced risk of certain types of cancer.
- Obesity and overweight is also associated with increased risk of developing cancer of the breast, colon, endometrium, gallbladder, esophagus, pancreas, kidney, etc.
- Undernutrition in early Childhood is associated with chronic degenerative disorders in later life – **David Barker's hypothesis**

What is Malnutrition?

MALNUTRITION

“ is a pathological state that results from ingestion of one or more nutrients, either in excess or deficient quantities over a period of time.”

Who are vulnerable for nutrition?

- **Infants and Young Children (<5 years)**
- **Adolescent Girls**
- **Pregnant & Lactating Women**
- **Elderly**
- **Socio-economically deprived Groups**
 - **Schedule Castes**
 - **Schedule Tribes**
 - **Urban Slum communities**

**HEALTH AND NUTRITION
CHALLENGES
IN
INDIA**

Triple Burden of Diseases

1. Protein energy malnutrition (PEM)

- Clinical forms of PEM (Kwashiorkor and Marasmus)
- Sub-clinical forms of PEM (underweight/stunting/wasting)
- Low birth weight (LBW)
- Chronic energy deficiency (CED)

2. Micronutrient deficiencies (MND)

- Vitamin A deficiency (VAD)
- Iron deficiency anemia (IDA)
- Iodine deficiency disorders (IDD)
- Zinc deficiency disorders

3. Diet related chronic non-communicable diseases (NCDs)

- Overweight and obesity
- Insulin resistance
- Type 2 Diabetes
- Cardiovascular diseases (CVD),
- Some GIT Cancers etc.

PROTEIN ENERGY MALNUTRITION

underfeeding and consequent malnutrition can have devastating effects on the health growth of children. This is particularly so in the case of pre-school children (under 5 years of age)



Kwashiorkor

SEVERE PROTEIN-CALORIE MALNUTRITION CAN LEAD TO TWO TYPES OF NUTRITIONAL DISORDERS.

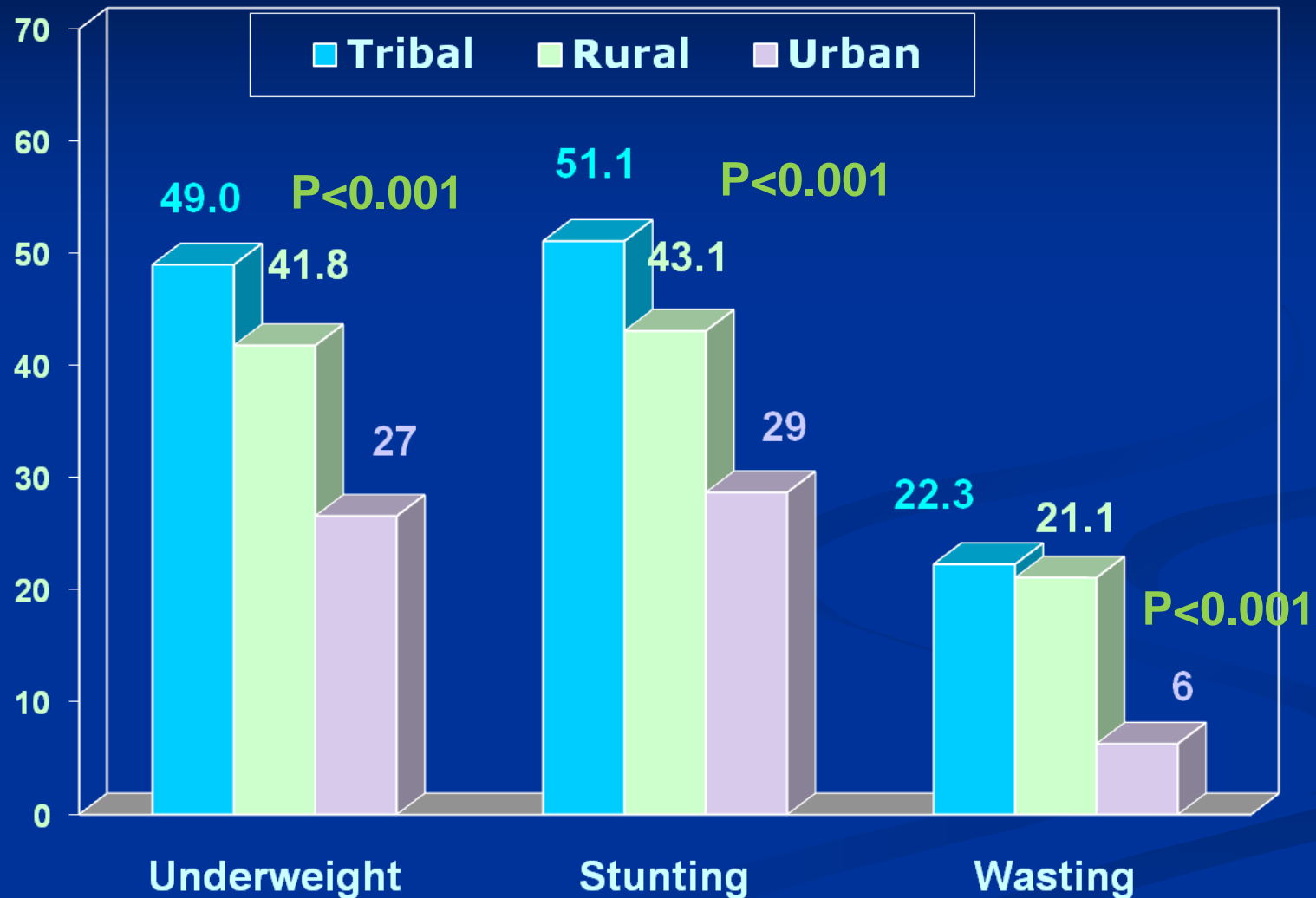
- *LACK OF TIMELY MEDICAL ATTENTION AND DIETARY CORRECTION OFTEN LEAD TO DEATH*
- *MILD OR MODERATE DEGREES OF MALNUTRITION IN CHILDREN MAY NOT BE SO EASILY DIAGNOSED. SUCH CHILDREN SHOW GROWTH RETARDATION TO VARYING DEGREES.*



Marasmus

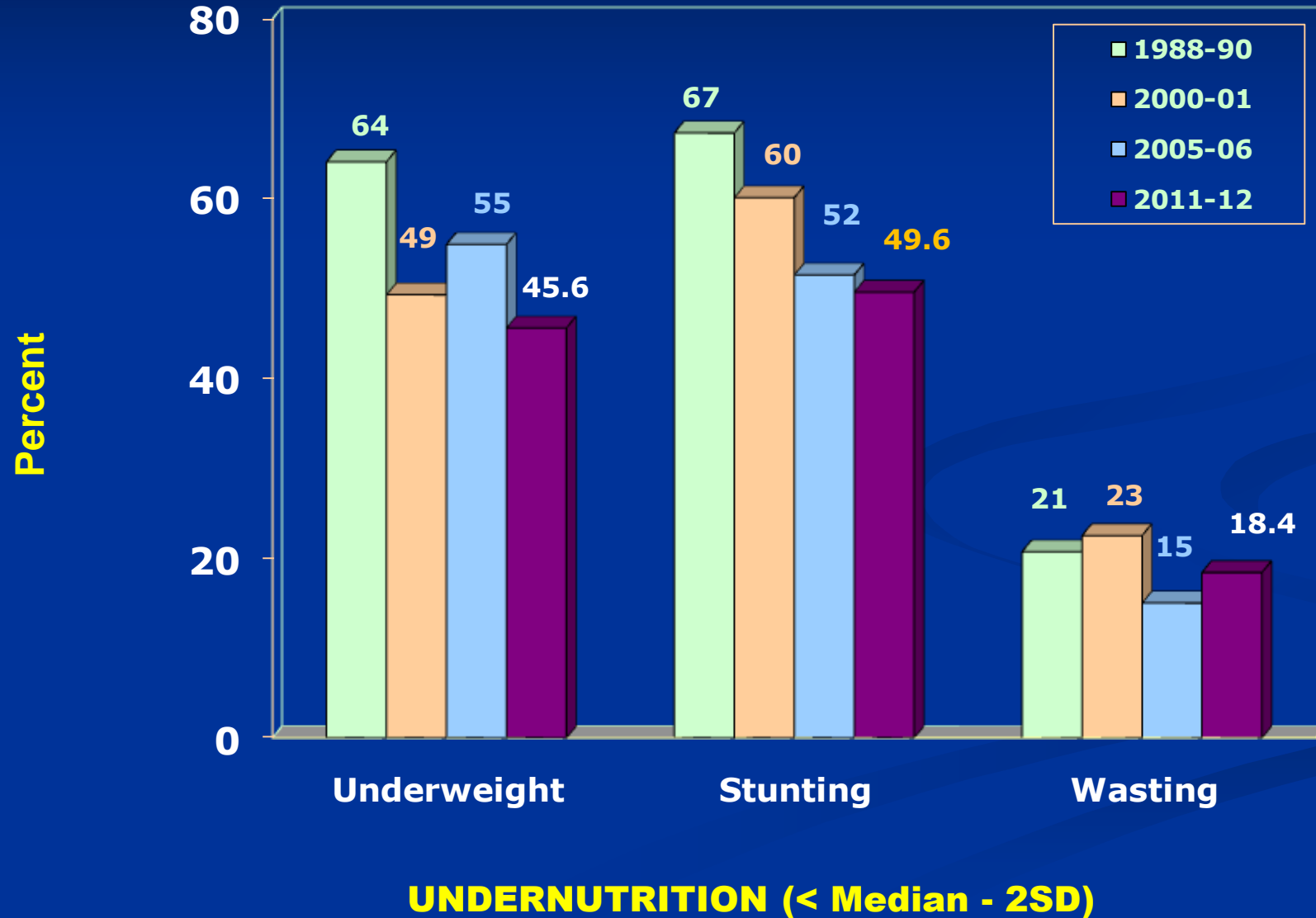
Feeding adequate amounts of diets based on low cost, locally available food stuffs such as cereals, pulses and groundnuts can help prevent ill-effects of under feeding.

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



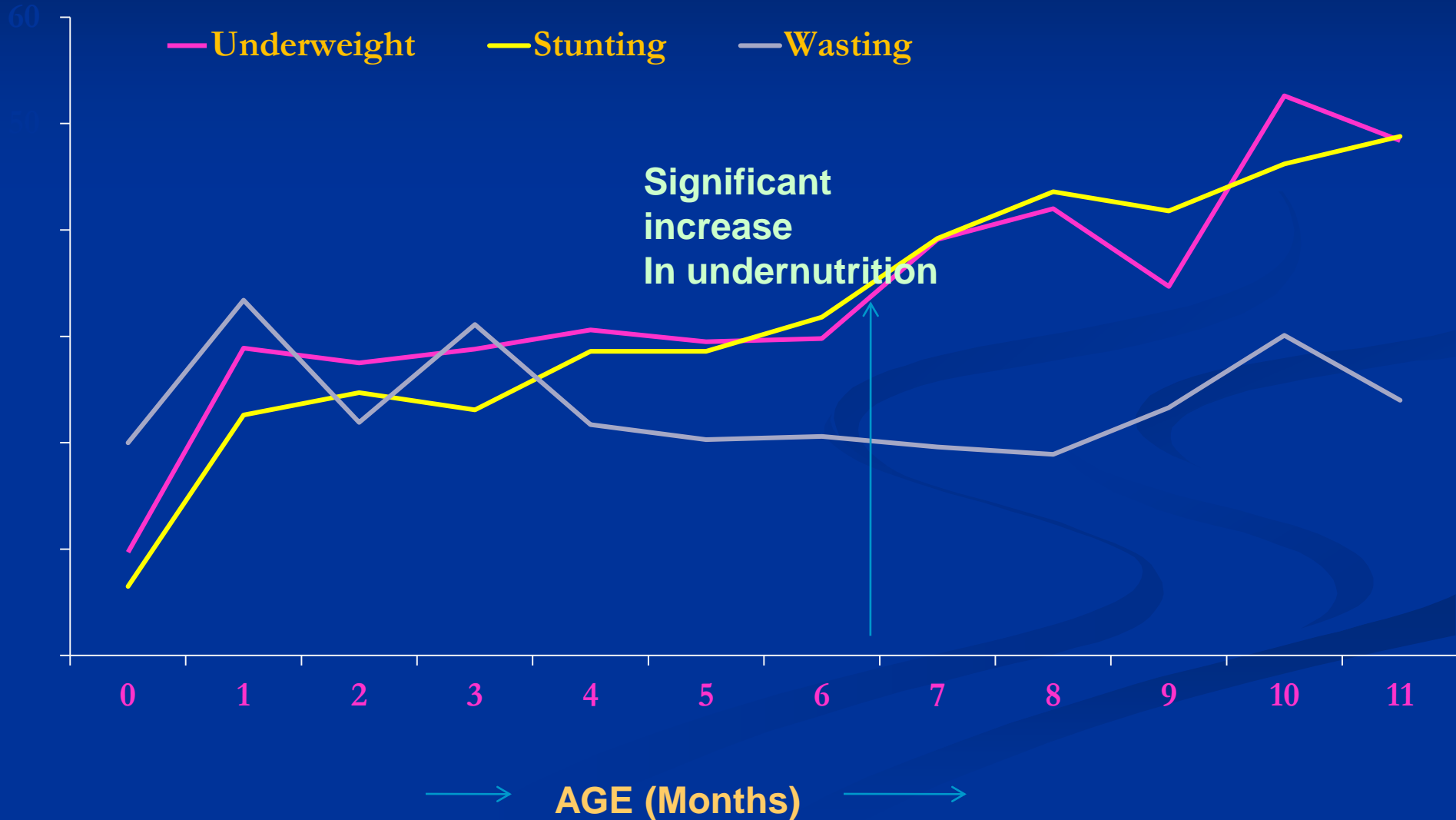
NNMB SURVEYS: Tribal 2008-09, Rural 2011-12 and Urban 2013-15 (Preliminary data)

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

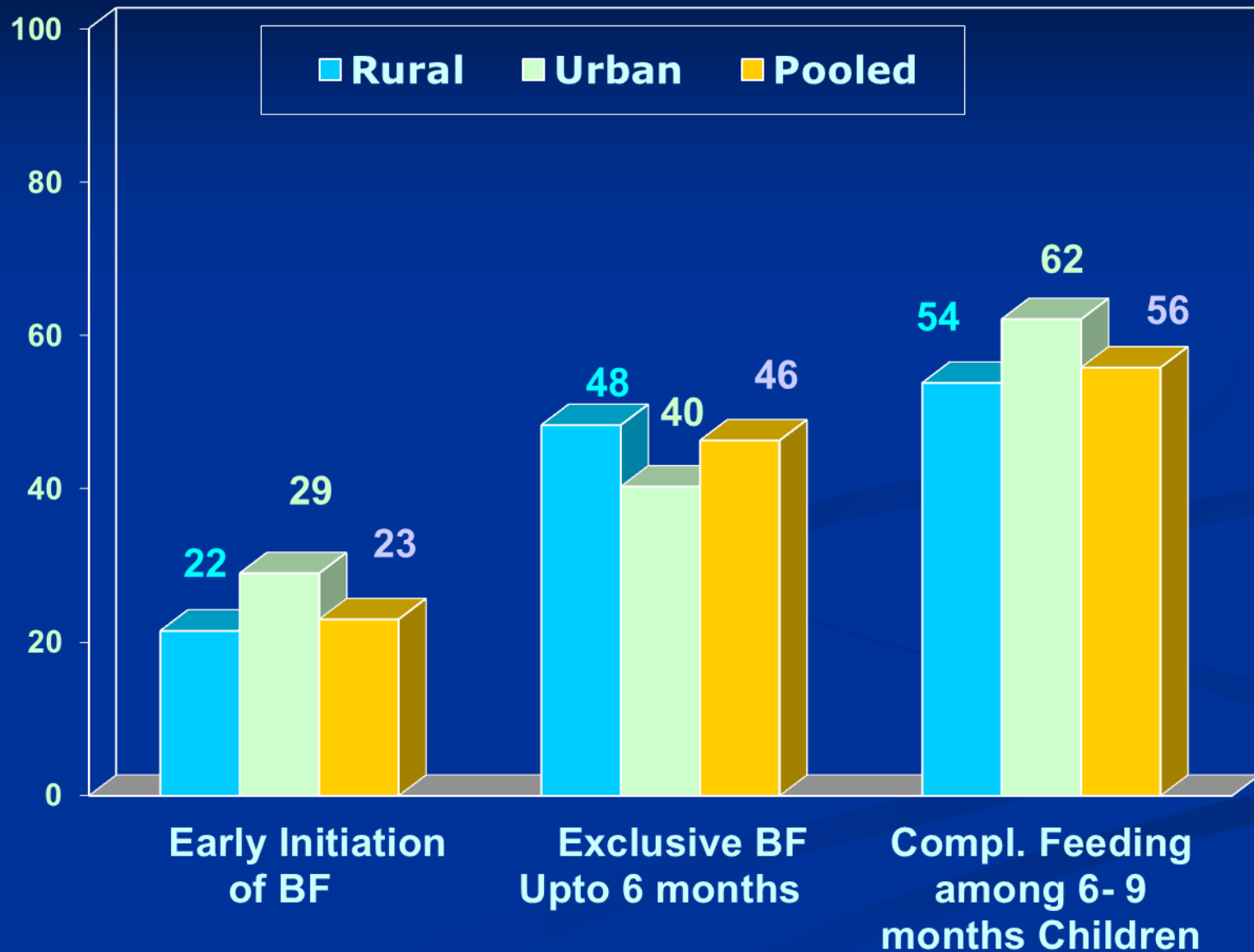


PREVALNCE (%) OF UNDERNUTRITION AMONG INFANTS BY AGE (MONTHS): NNMB SURVEYS

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



INFANT AND YOUNG CHILD FEEDING PRACTICES (NFHS 3)



Nutritional Deficiencies



Iron Deficiency

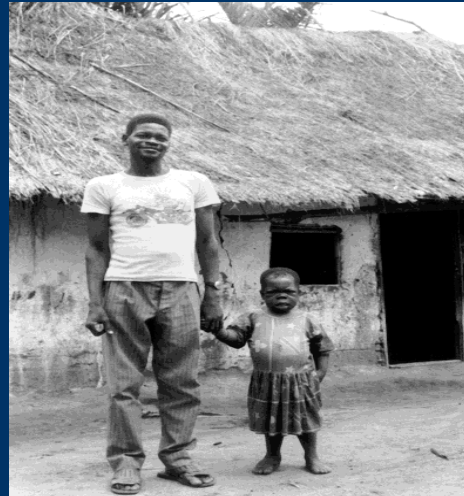
The Ugly Face of “Hidden Hunger”



Folic Acid
Deficiency



Vitamin A Deficiency



Iodine Deficiency

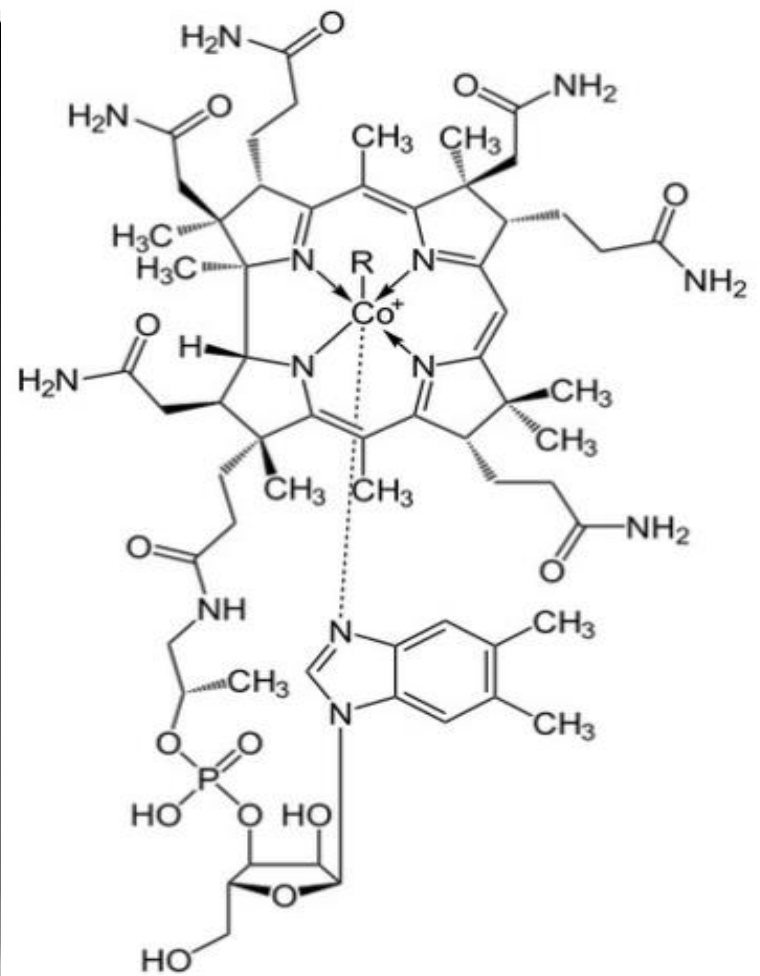


Zinc Deficiency



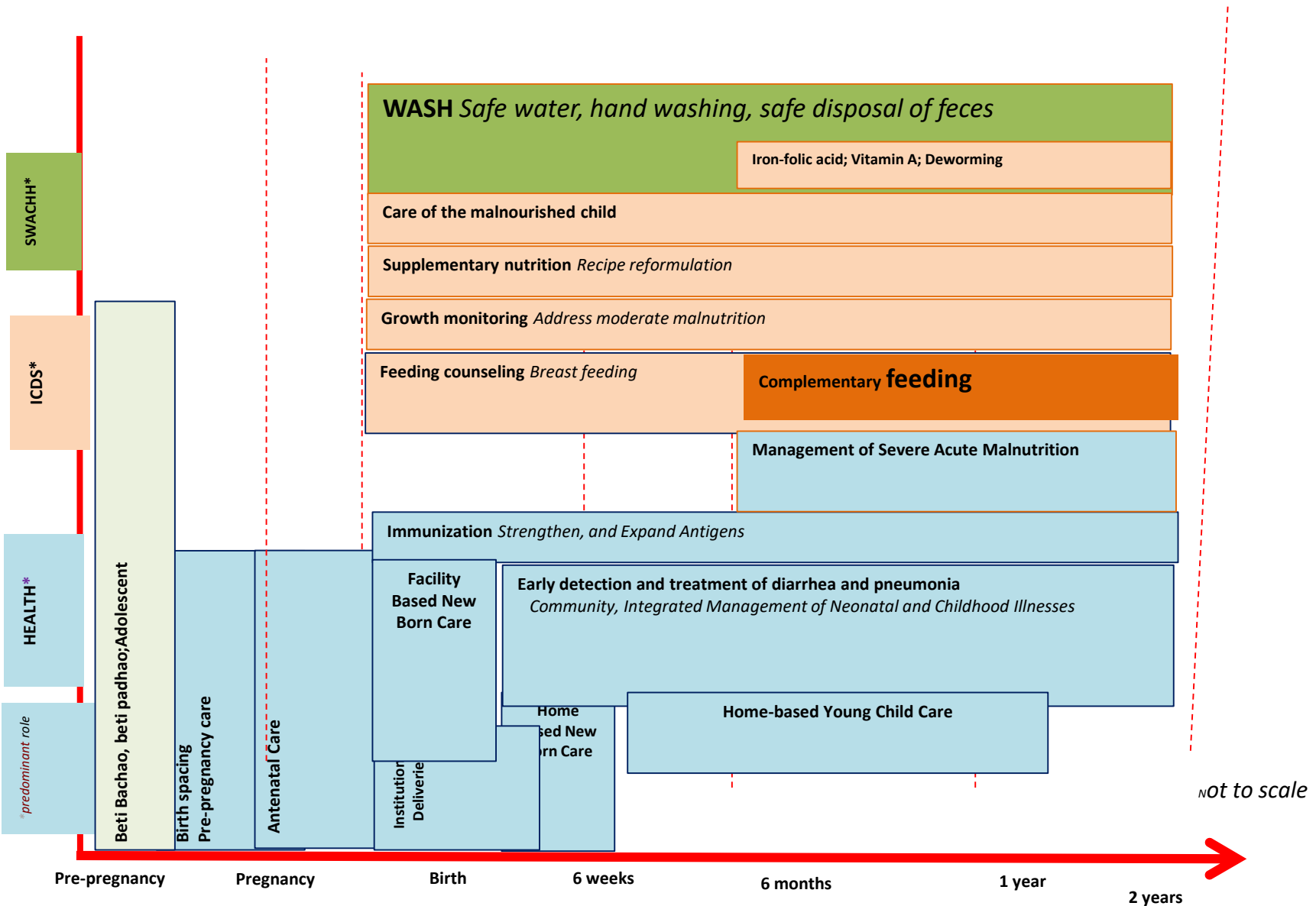
12

vitamin



NIN and 4 partner Institutes carried out B12 study during 2017-19 was conducted in 8 states of India: Prevalence was about 25%

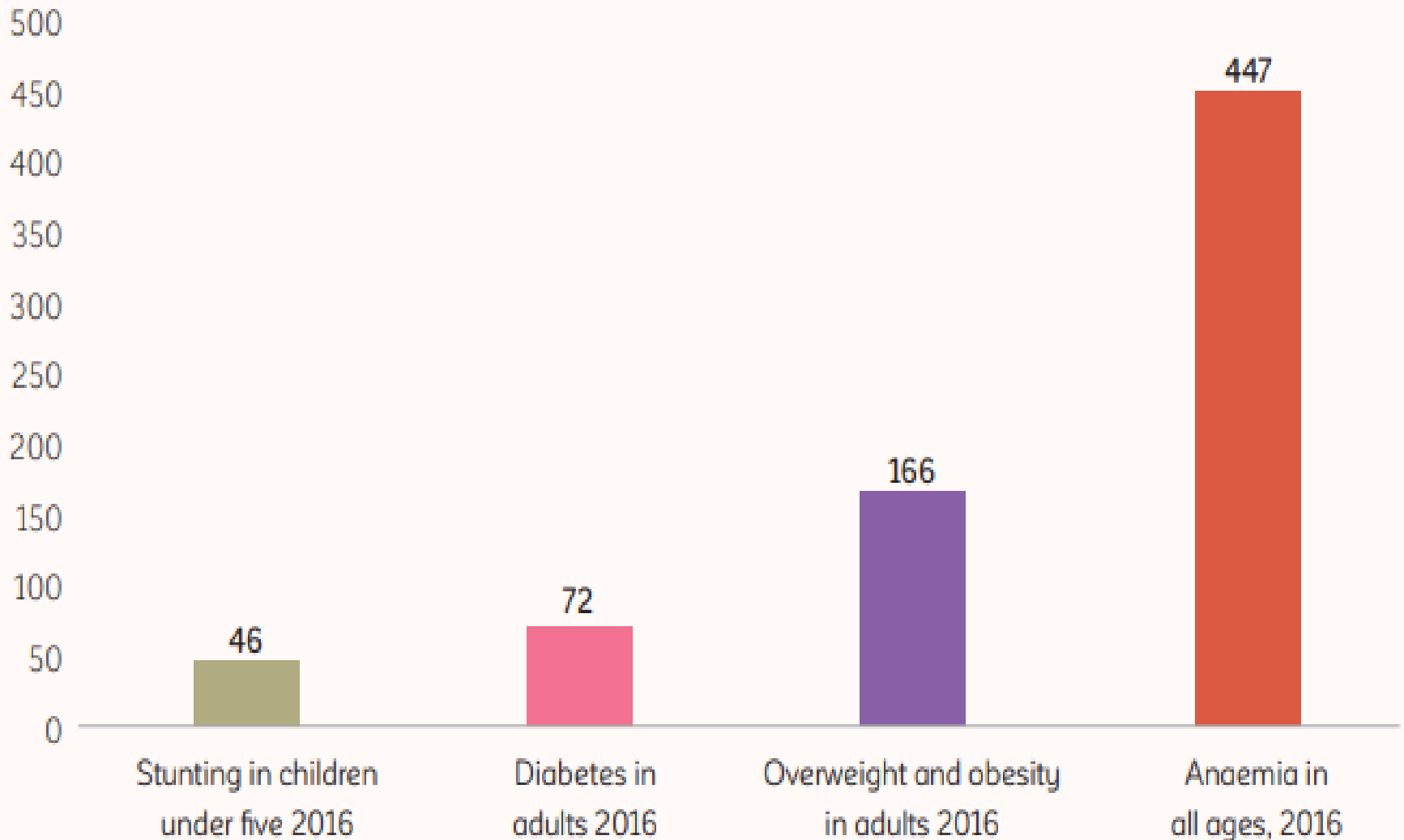
Interventions for the first 1000 days



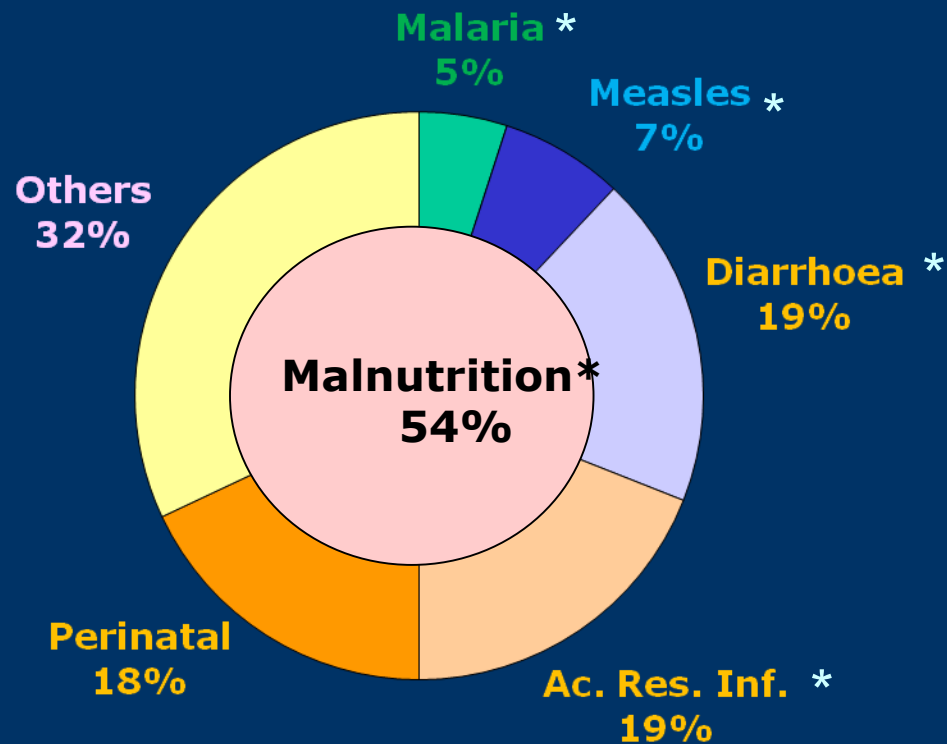
Courtesy: Vinod Paul, NitiAyog Member

Current burden of malnutrition among children and adults in India (presented in millions)

Millions



CAUSES OF DEATHS AMONG <5 YEAR CHILDREN IN DEVELOPING COUNTRIES



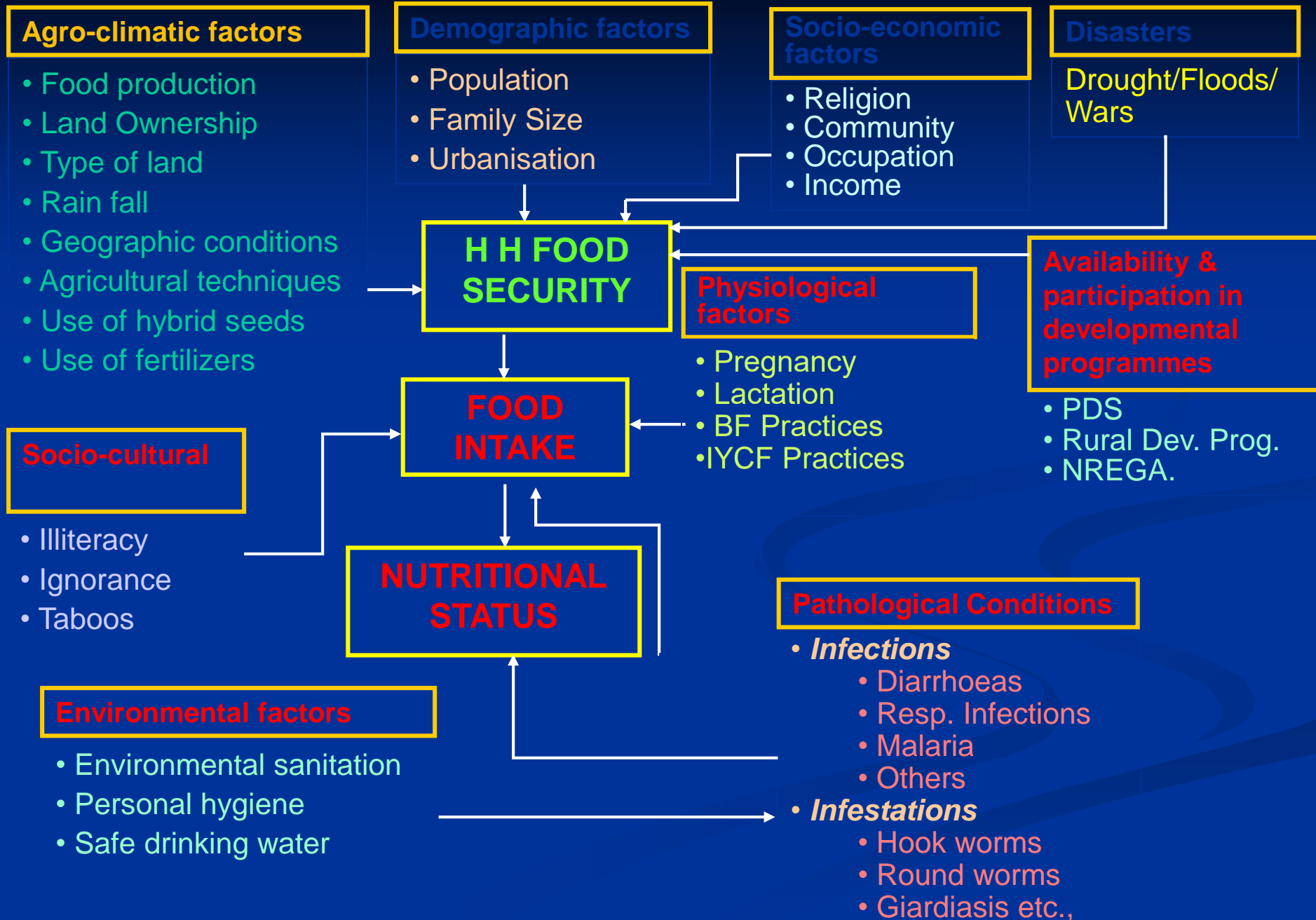
Source: Murray & Lopez, 1996; Pelletier et al, 1993

The Relationship between Health & Nutrition

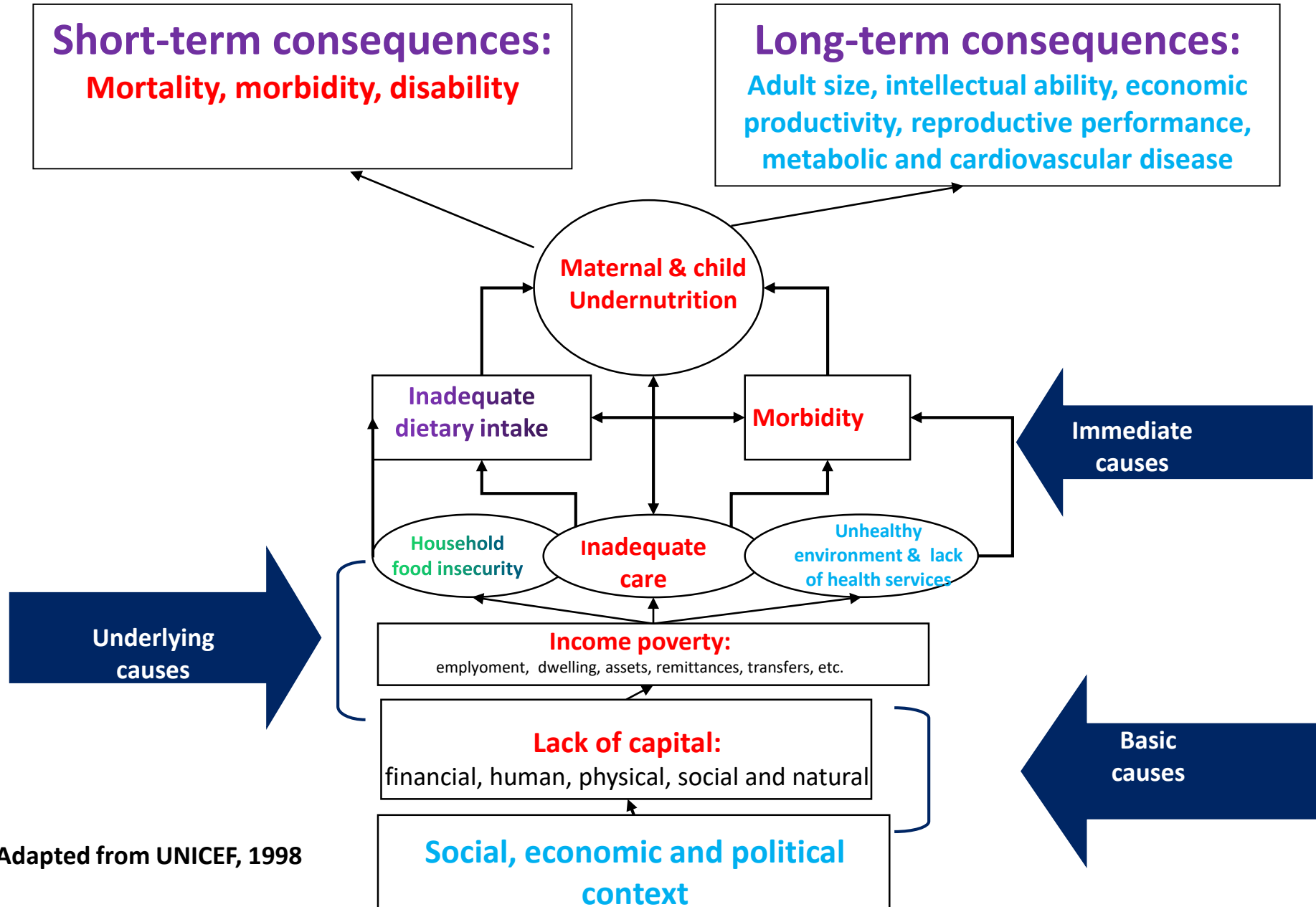


- Good nutrition is the key to leading a healthy lifestyle.
- Eating a balanced diet is an important part of good health. Nutrition plays a major role in promoting good health.
- Diets full of fruits and vegetables, whole grains, nuts, and lean meats have proven health benefits like lowering blood pressure, improving glucose control in diabetics, weight loss, improving arthritis, and reducing the risk of some of cancers and cardiovascular events etc.

DETERMINANTS OF NUTRITIONAL STATUS



Conceptual frame work for Mother & Child Undernutrition (LANCET SERIES)

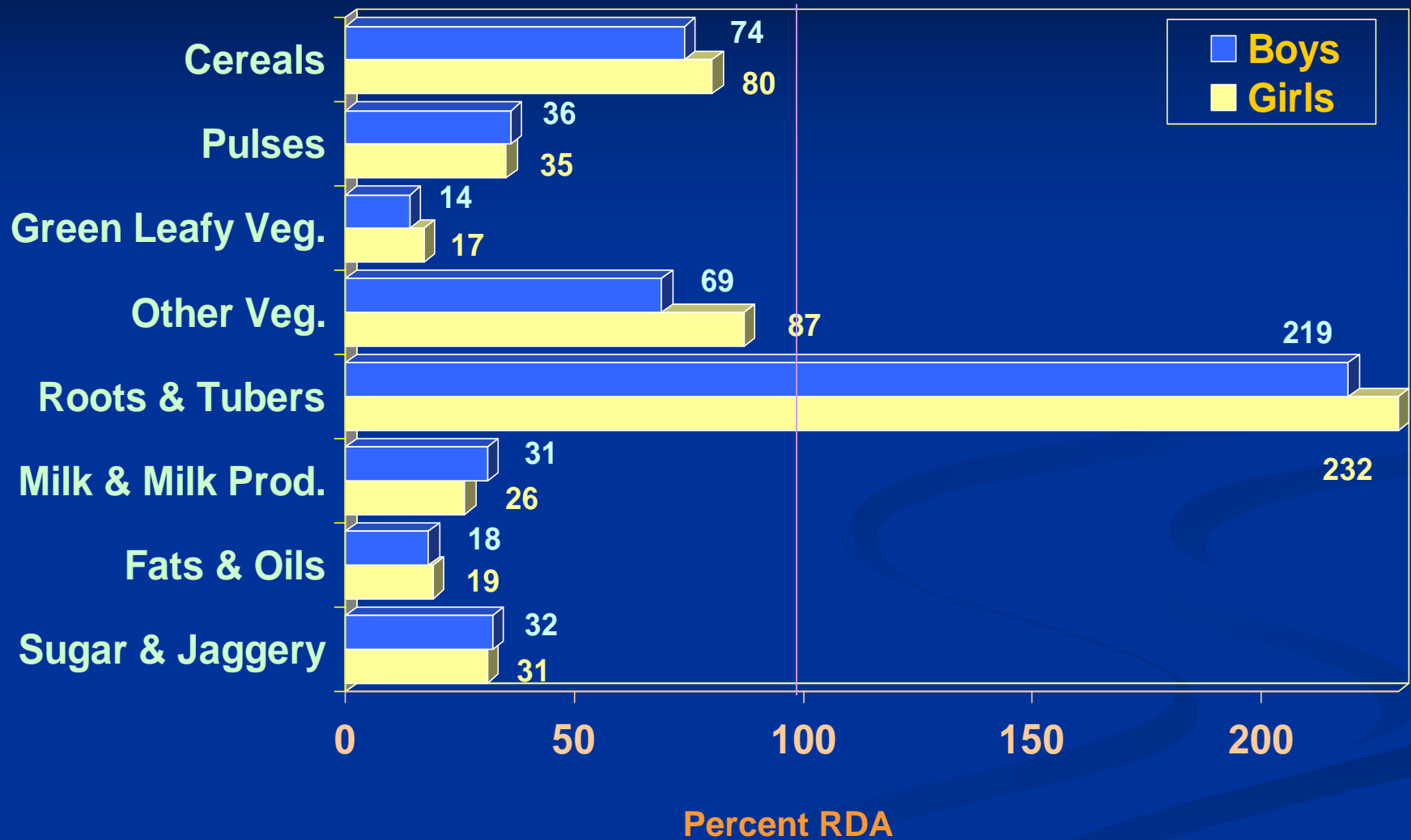


Adapted from UNICEF, 1998

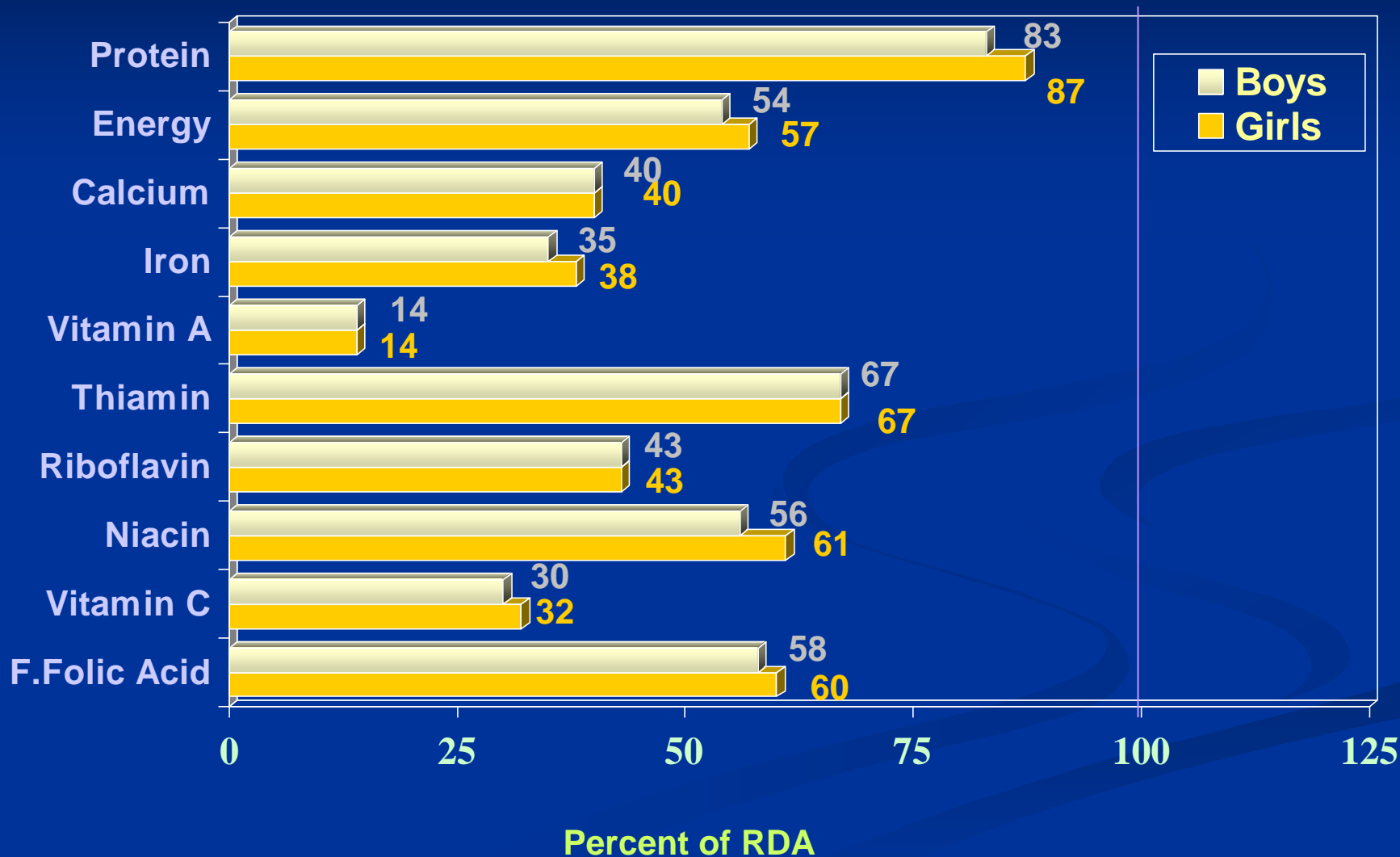
*Regardless of who
the Father of a disease is,
Surely its Mother is
IMPROPER DIET*

Old Chinese Proverb

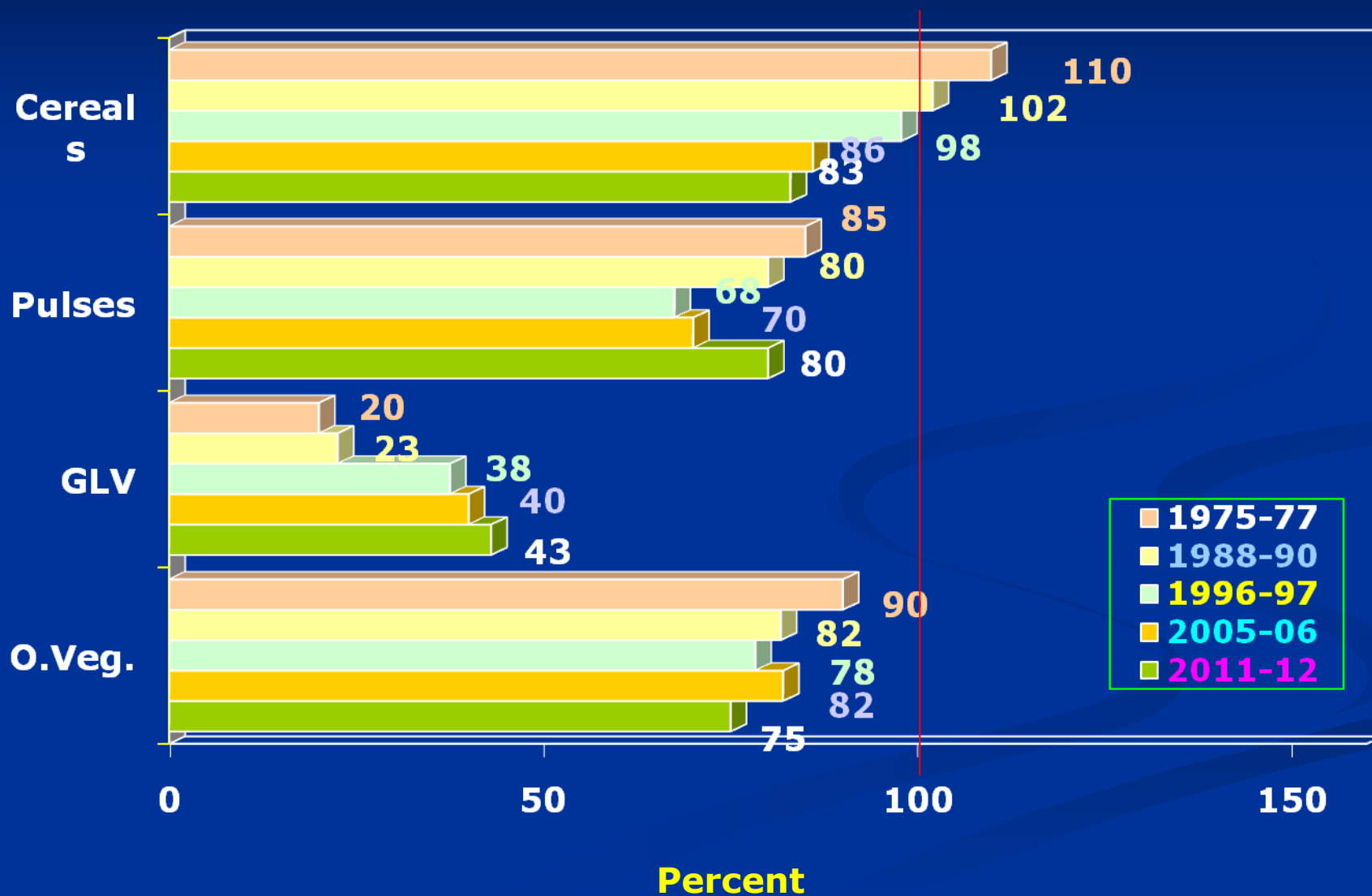
Average Daily Food Intake (% RDA) among 1-3 Year Children : By Gender



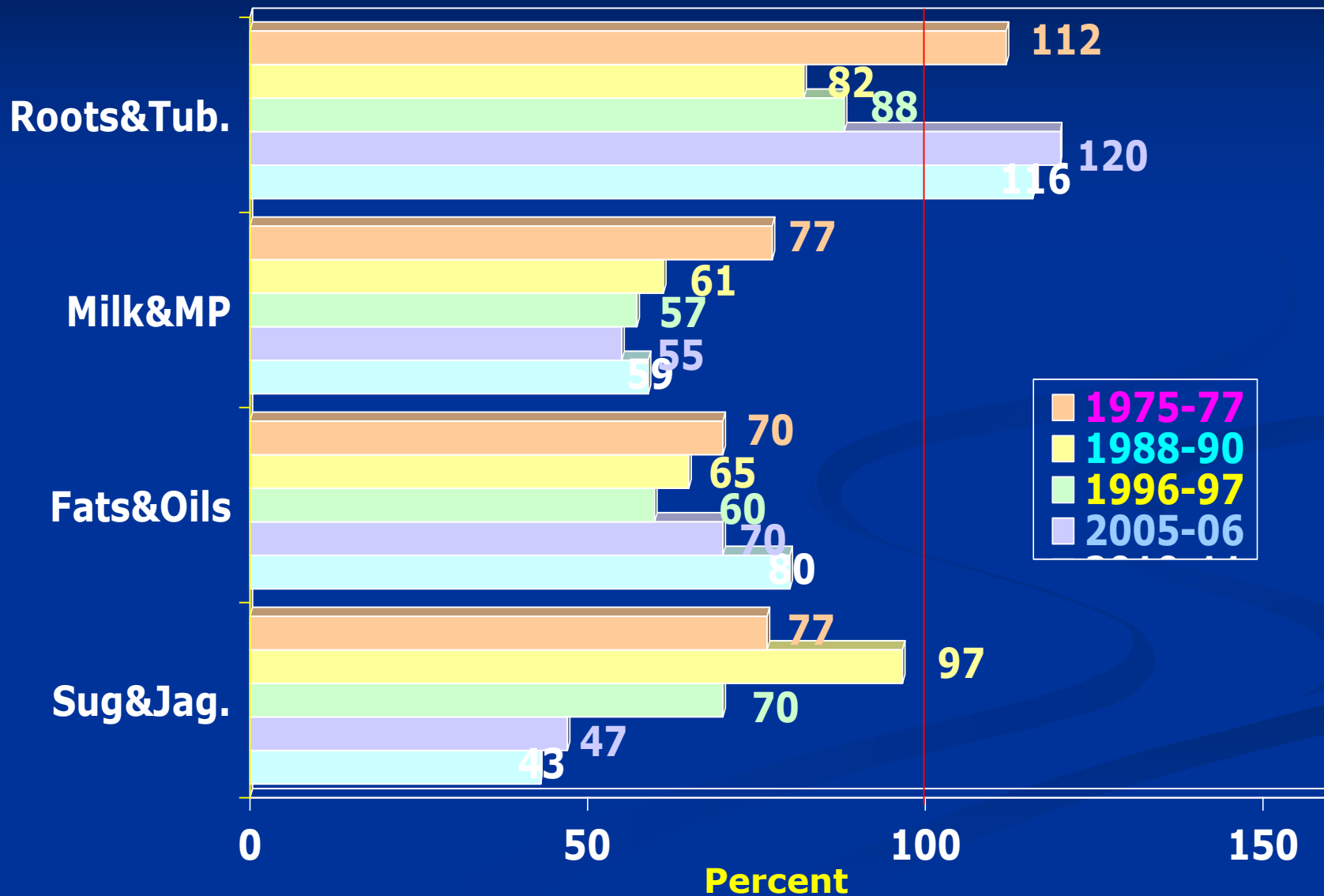
Median Intake of Nutrients (as % RDA) Among 1-3 year children : By gender



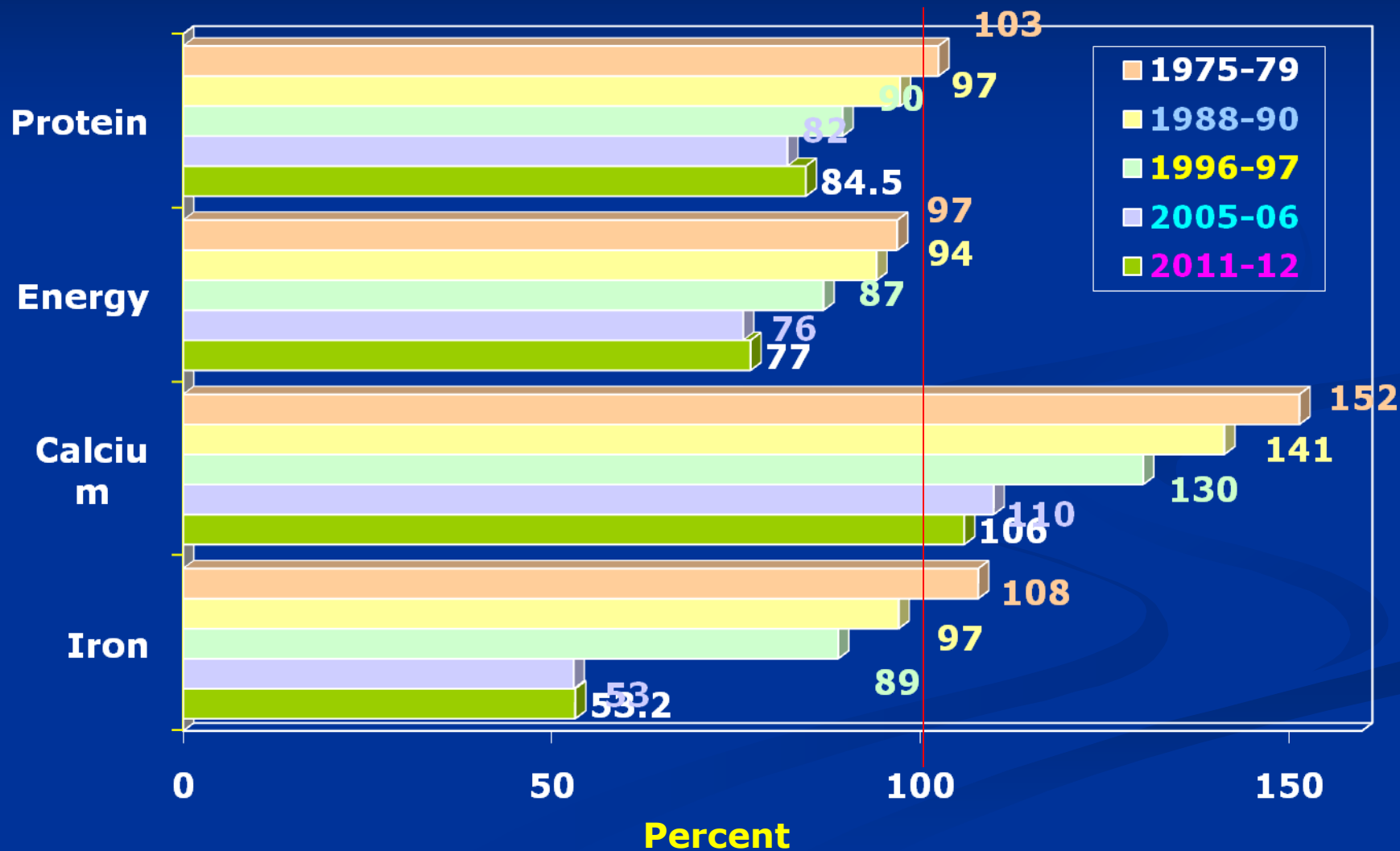
Average Intake of Foodstuffs (per CU/day) as % of RDI by Period of Survey



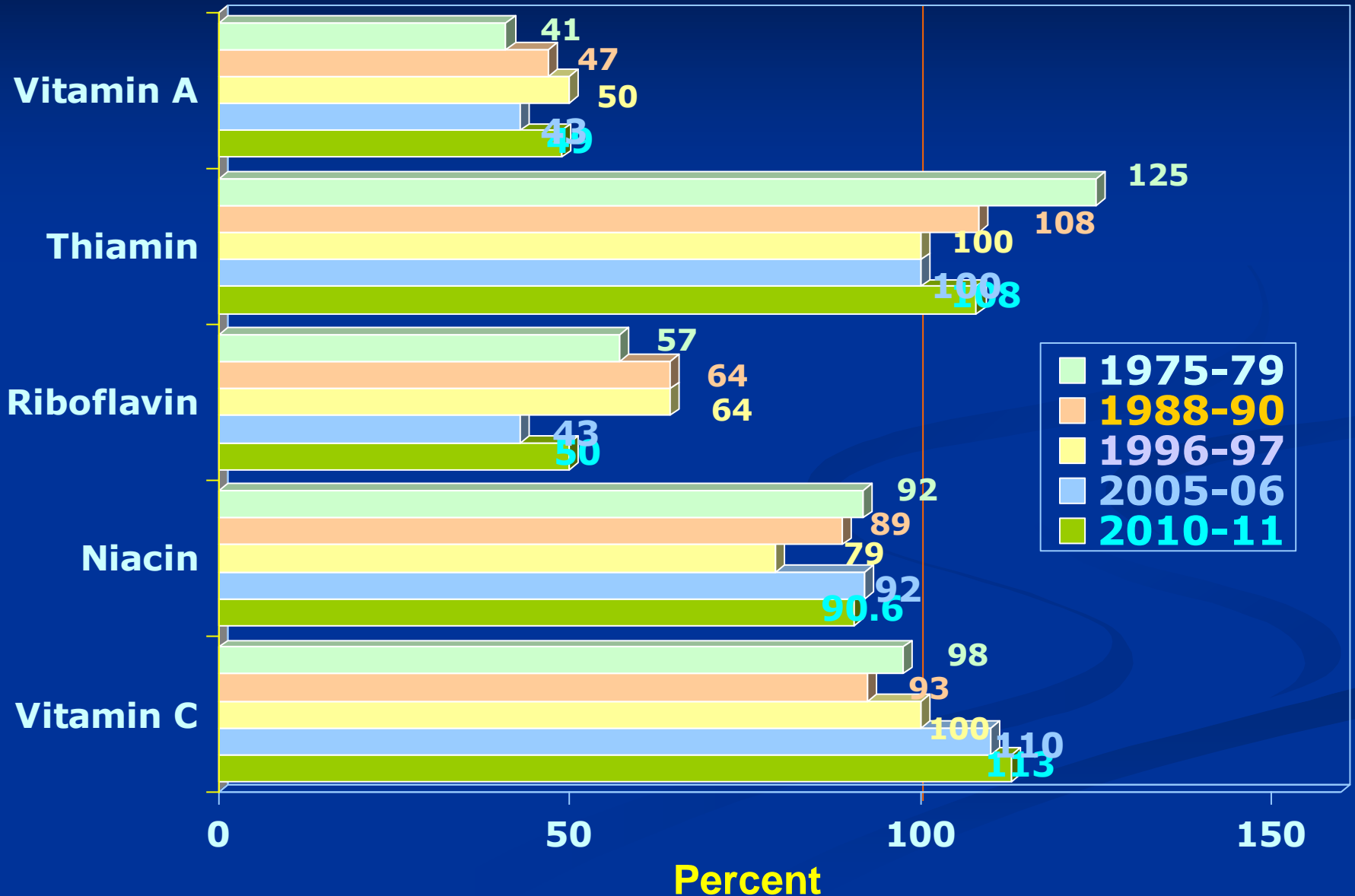
Average Intake of Foodstuffs (per CU/day) as % of RDI by Period of Survey (contd.)



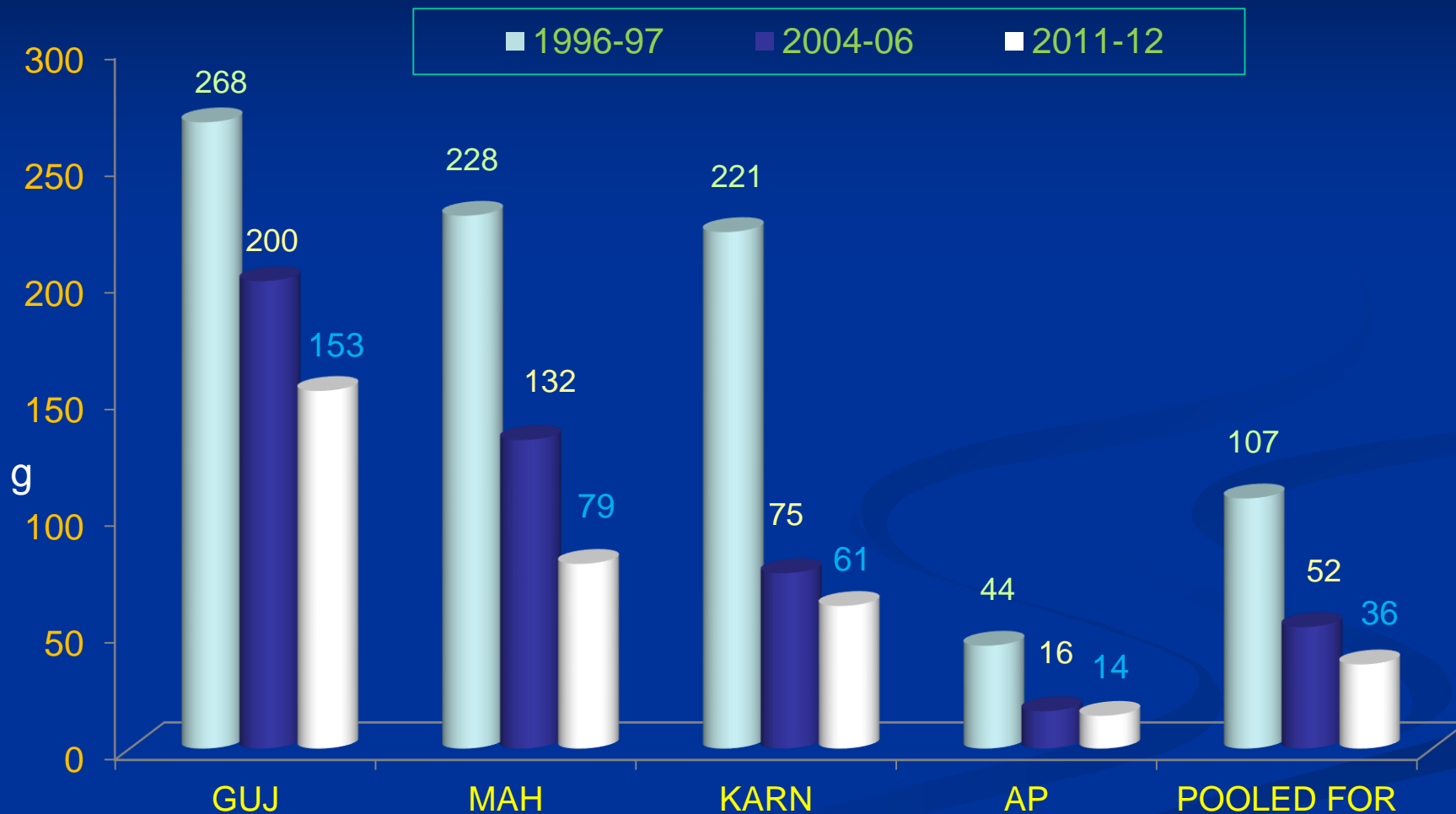
Average Intake of Nutrients (per CU/day) as % of RDI by Period of Survey



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



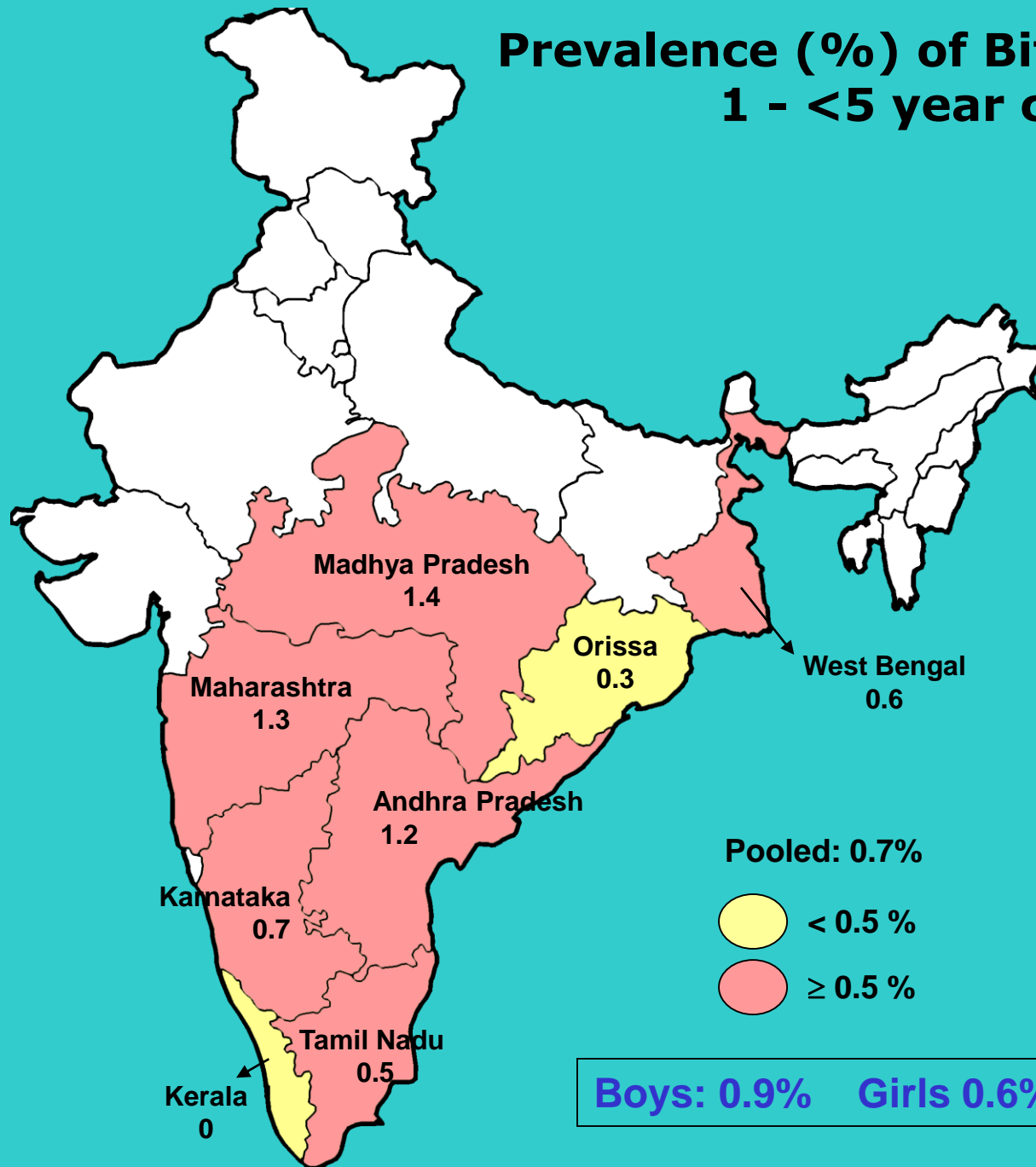
TIME TRENDS IN THE CONSUMPTION OF MILLETS (g/CU/day) AMONG RURAL POPULATION



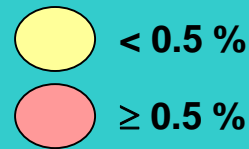
There was a significant reduction observed in consumption of millets among rural and tribal population in India, while it was increased in urban population over a period of two decades— NNMB Surveys

MICRO-NUTRIENT DEFICIENCIES

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



Pooled: 0.7%



Boys: 0.9% Girls 0.6%

MANIFESTATIONS OF VITAMIN 'A' DEFICIENCY

OCCULAR

MILD

- Night blindness
- Conjunctival xerosis
- Bitot spots

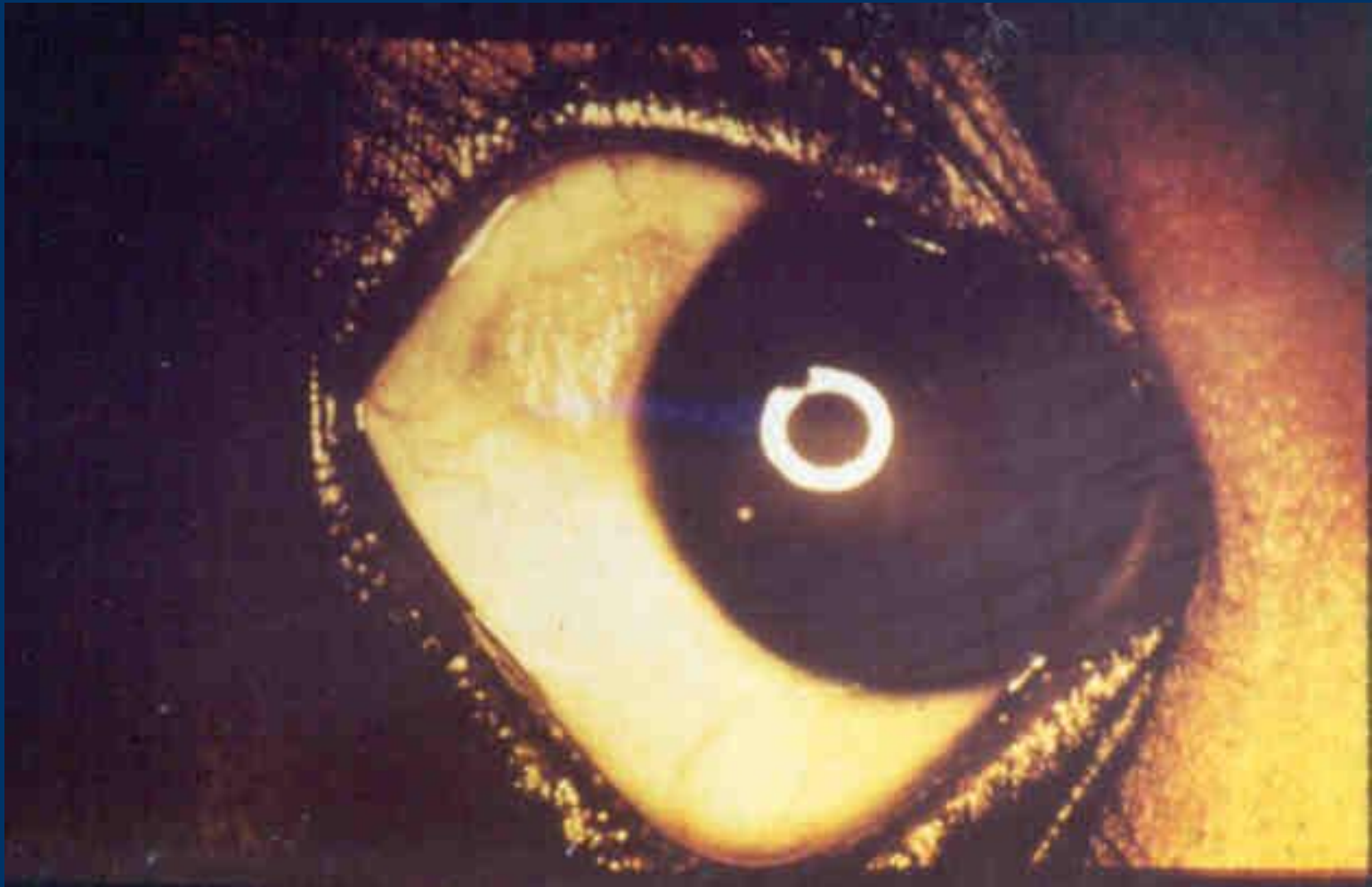
OTHERS

- Morbidity
- Mortality
- Growth retardation

SEVERE

- Corneal Xerosis
 - Corneal ulcer
 - Keratomalasia
-
-

BITOT SPOTS - 1



MAGNITUDE

- **Conjunctival signs** : **5-10% among 1-5 yrs**
- **Corneal lesions** : **< 1%**
- **Blindness** : **1/4th of the total blind**

COMPLICATIONS

- **Irreversible blindness**
- **Higher mortality in severe vitamin A deficiency (50-60% of X3b)**
- **Increased susceptibility to diarrhoea and respiratory infections**

SOLUTIONS

- **Simple – Feasible solutions available**
- **Not high technology**
- **Not expensive**

**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
<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

IRON DEFICIENCY ANAEMIA

a major nutritional problem



ANAEMIA IS MOST COMMON AMONG PREGNANT WOMEN AND LACTATING MOTHERS



Causes

- Low iron, folate intake in pregnant, lactation
- Blood loss
- Hookworm infestation
- Increased needs in pregnancy lactation

consequences

- Fatigue
- Low work efficiency, productivity
- Maternal deaths
- Pregnancy wastage
- Premature delivery
- Low birth weight babies

ANAEMIA ASSESSMENT IS MADE THROUGH



Standard method in clinic



Filter paper method in the field

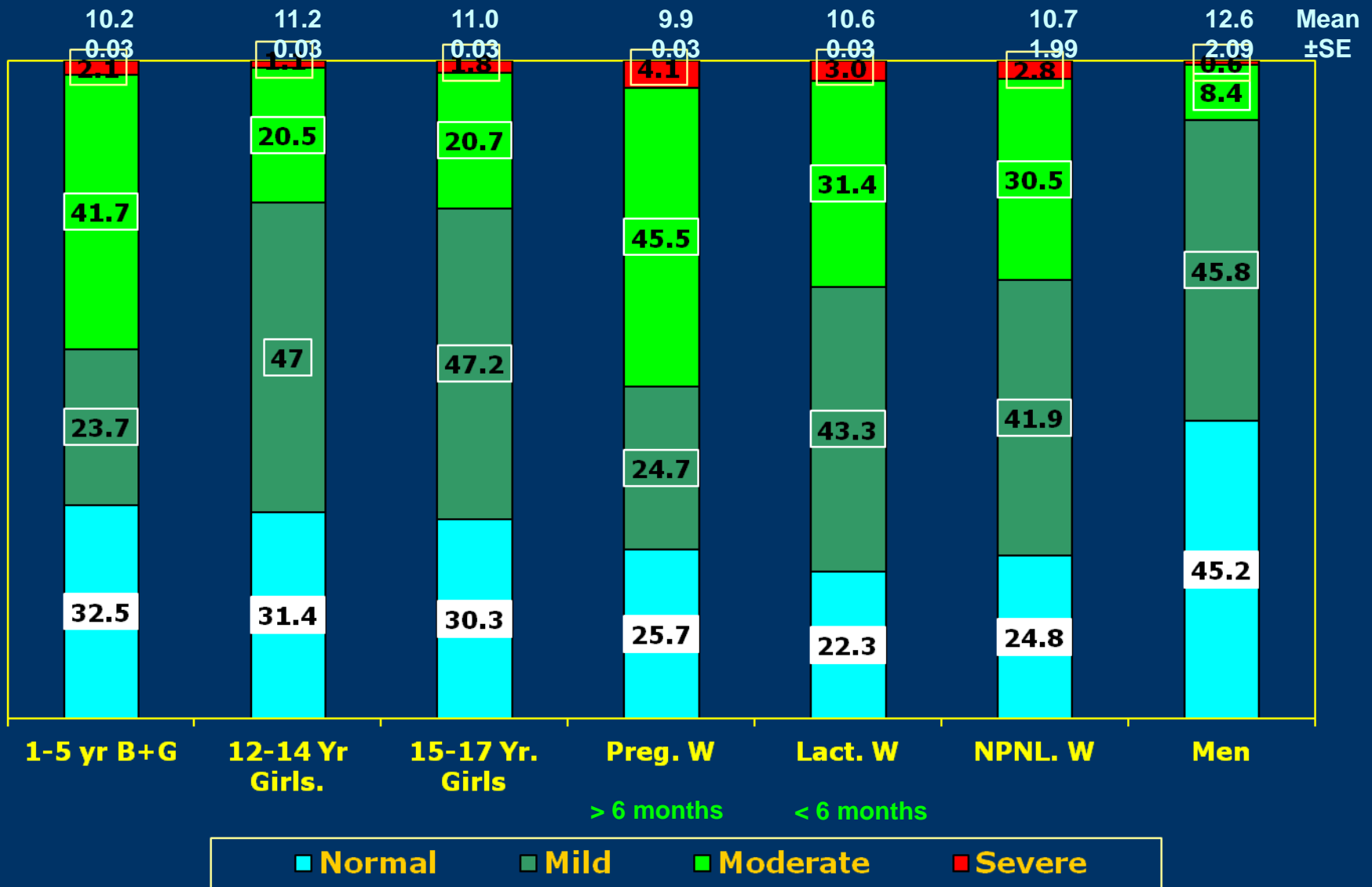
Folifer tablet distribution

Definition of Anemia

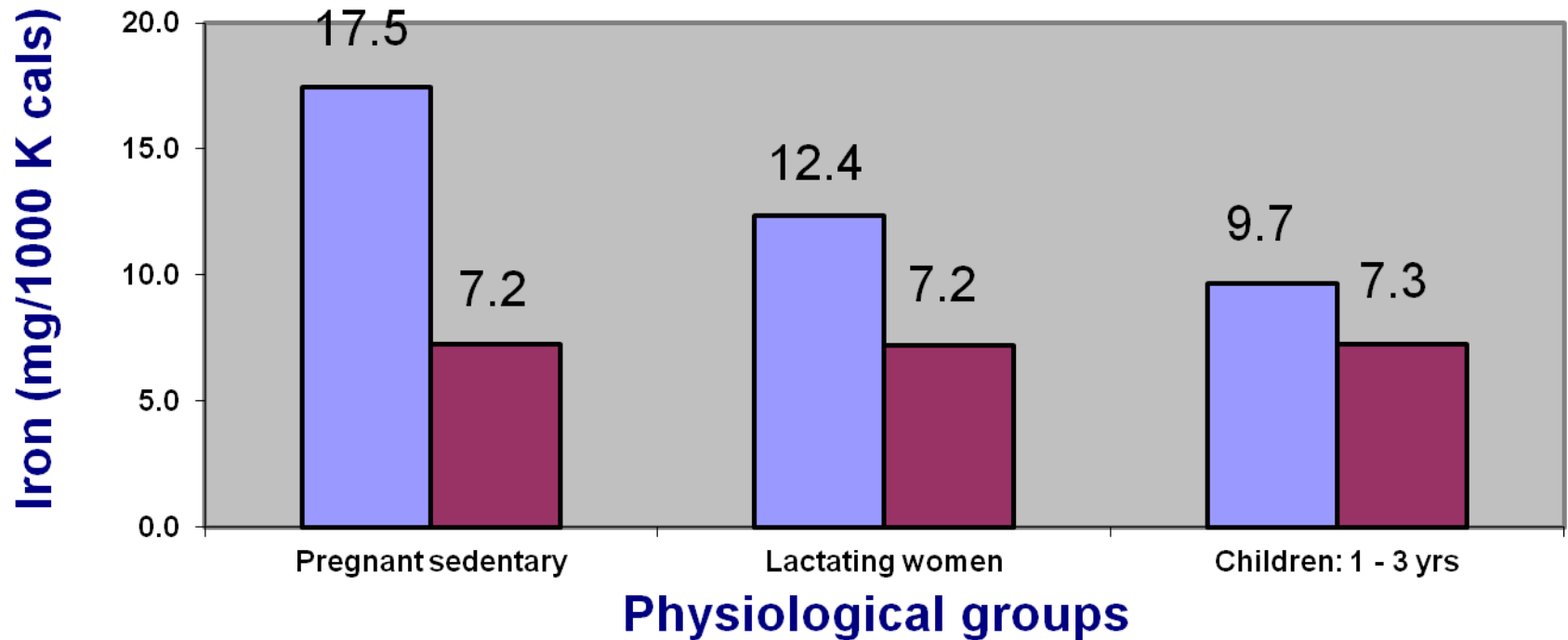
AGE / PHYSIOLOGICAL GROUP	Gender	Hb (g/dl)
6 months – 6 Years	Boys & Girls	<11
6 – 14 Years	Boys & Girls	<12
≥ 14 Years	Men	<13
	Women	<12
Pregnant Women		<11

WHO, Nutritional Anemia - TRS No. 405, Geneva 1968.

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



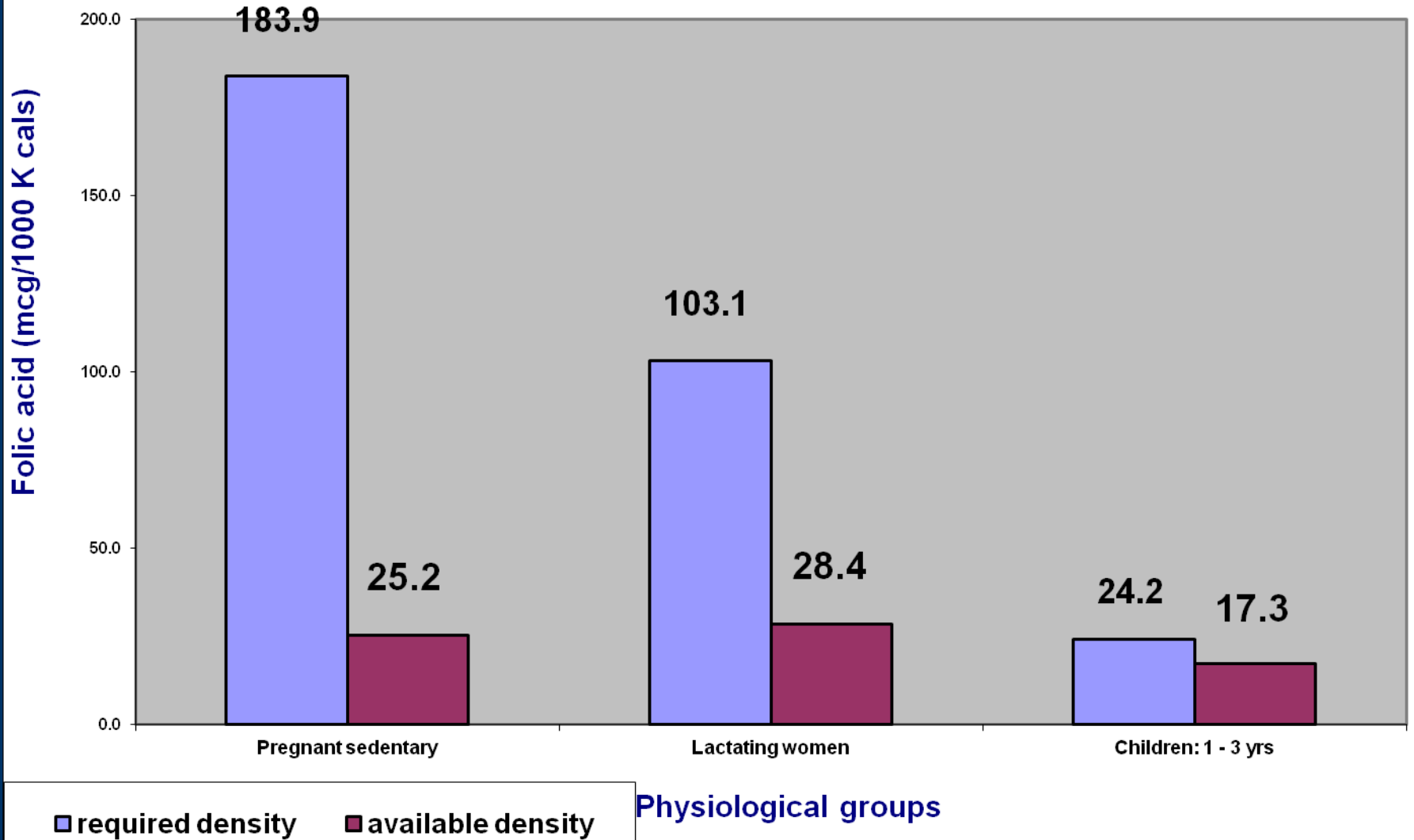
IRON DENSITY TO MEET RDA



■ required iron density ■ available iron density

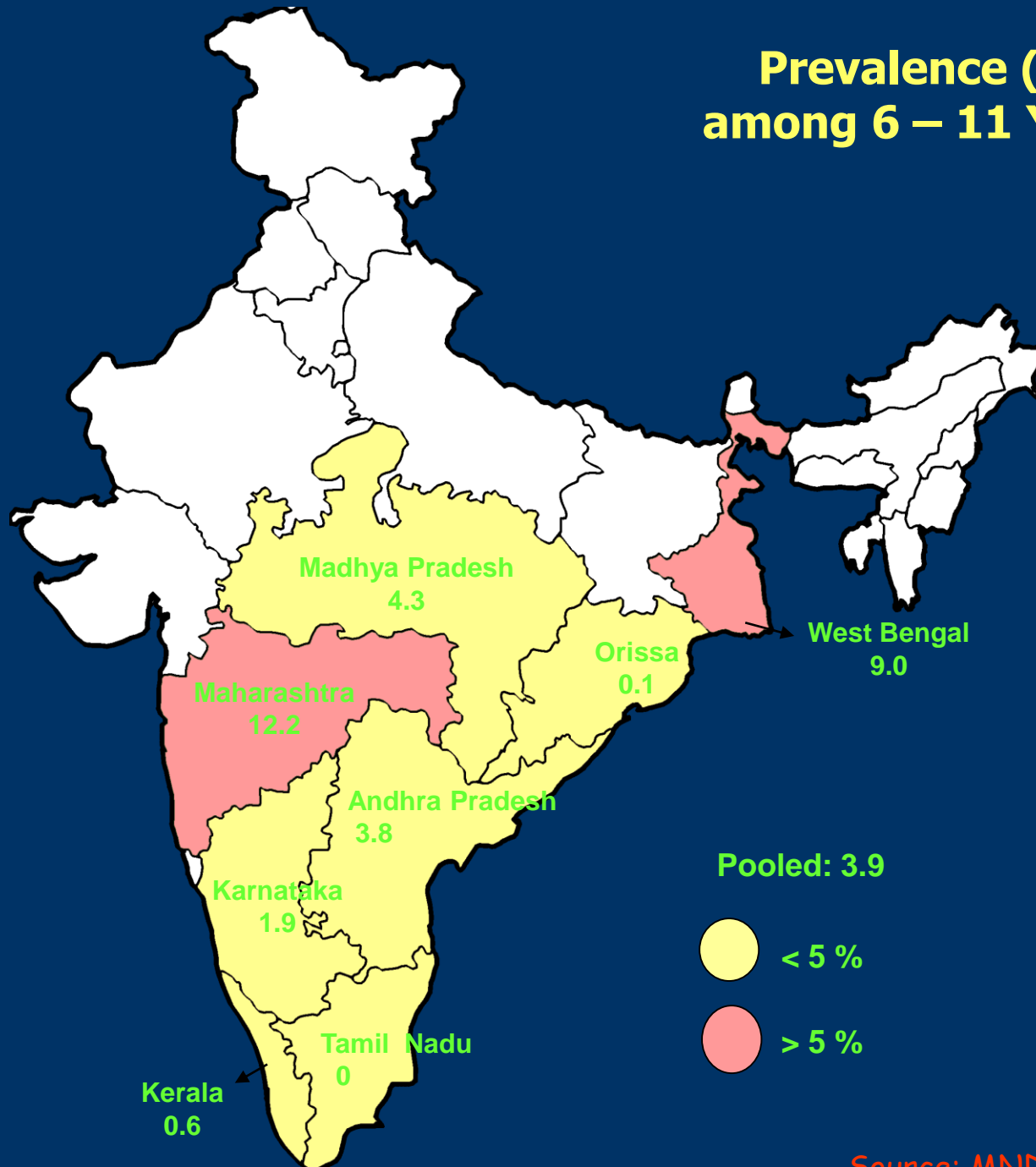
Computed from NNMB data, rural survey, 2001

FOLIC ACID DENSITY TO MEET RDA



Computed from NNMB data, rural survey, 2001

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



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

Dist- ri- cts	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

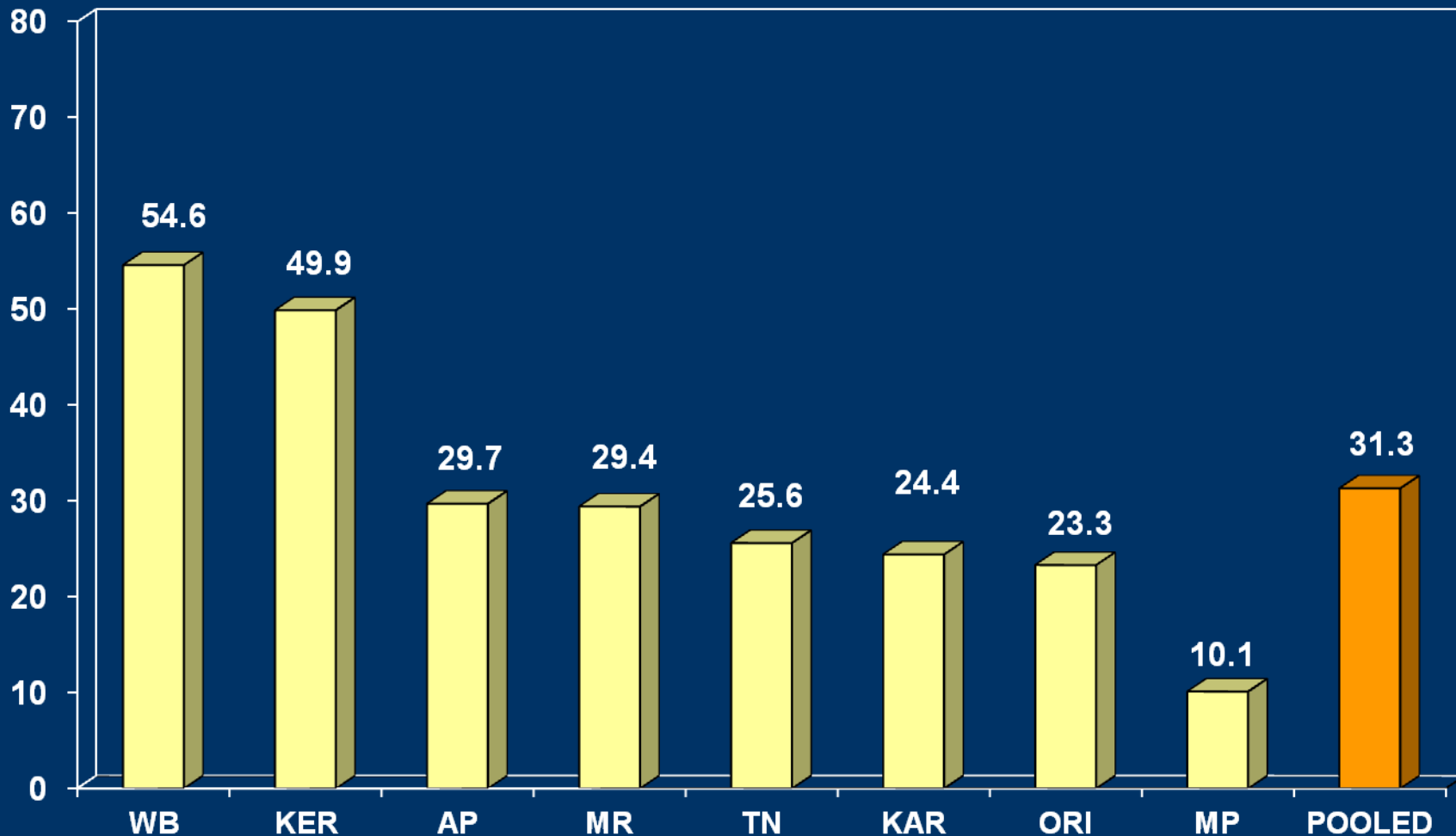
Myxodematous cretin



Neuro cretin

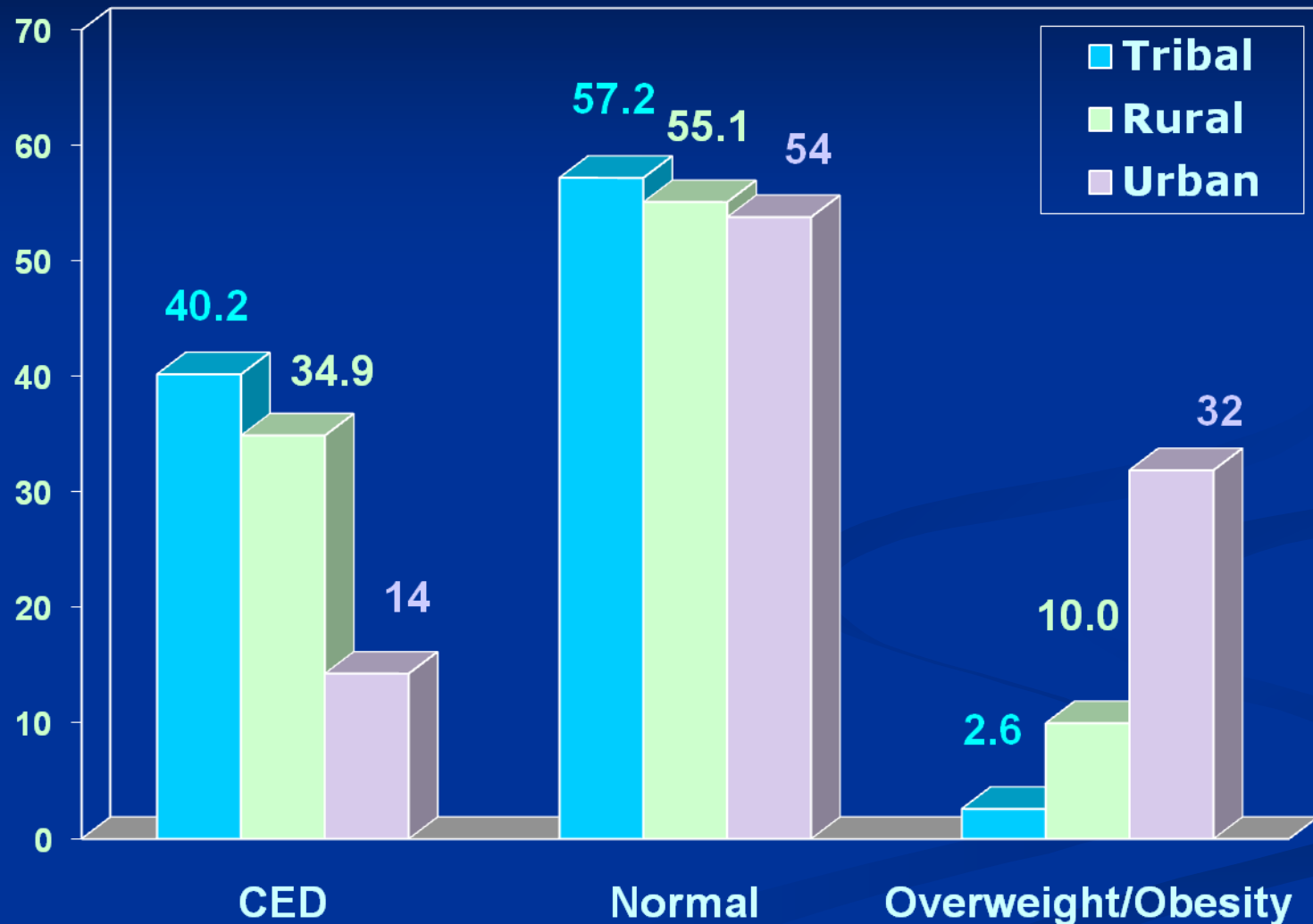


Percent of Households consuming salt having adequate Amount (≥ 15 ppm) of Iodine



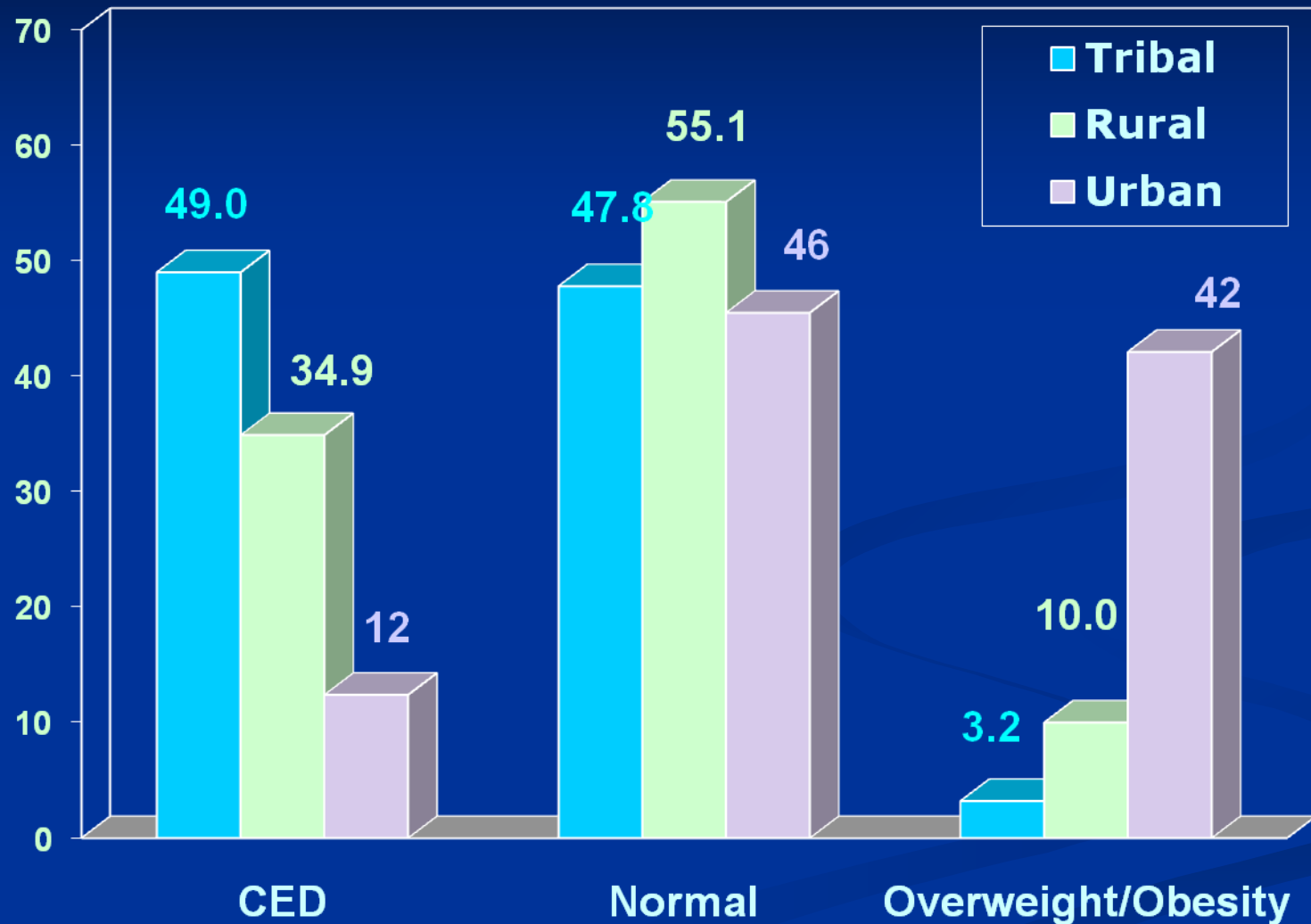
* By spot test

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



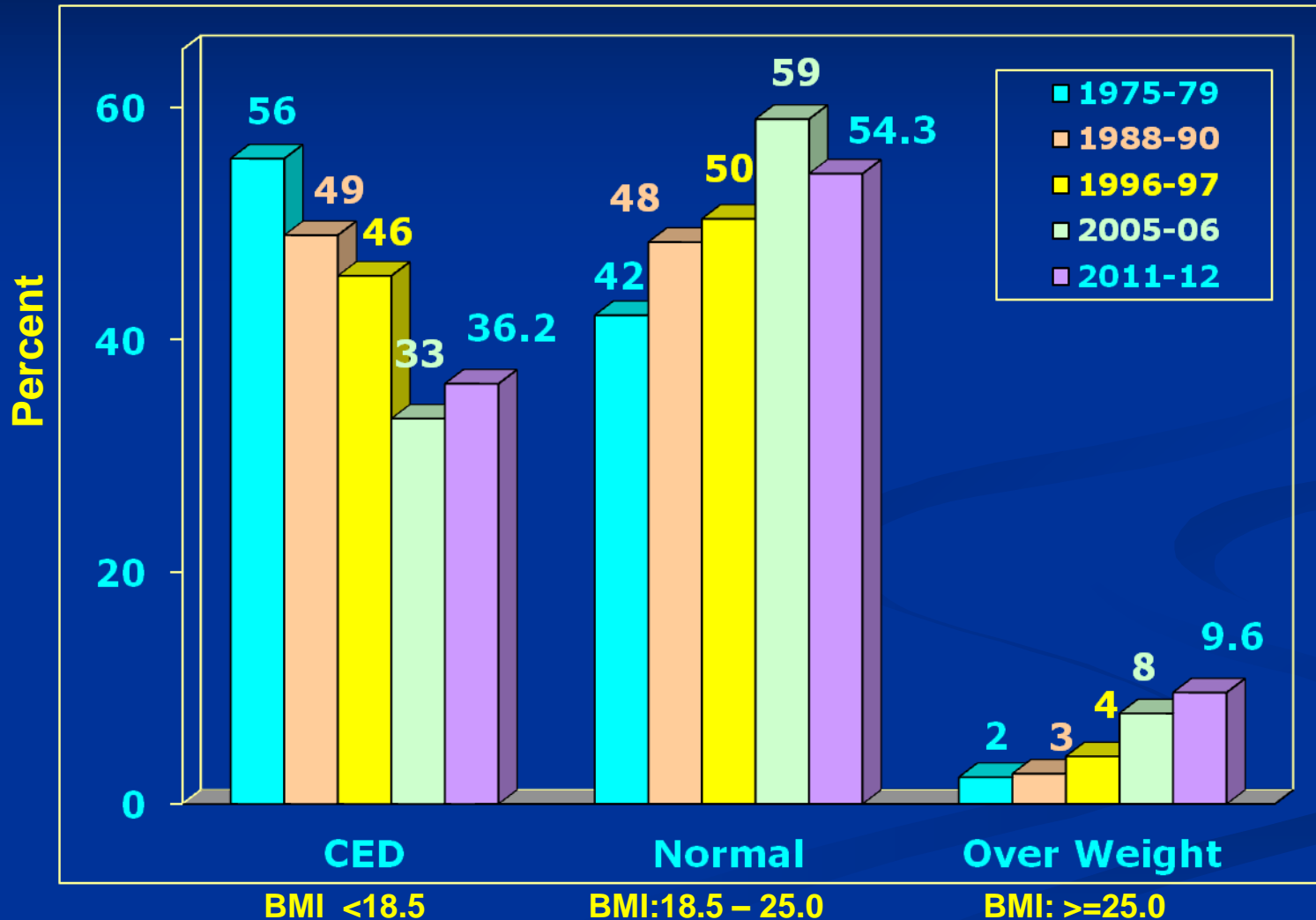
NNMB SURVEYS: Tribal 2008-09, Rural 2011-12 and Urban 2013-15
(Preliminary data)

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

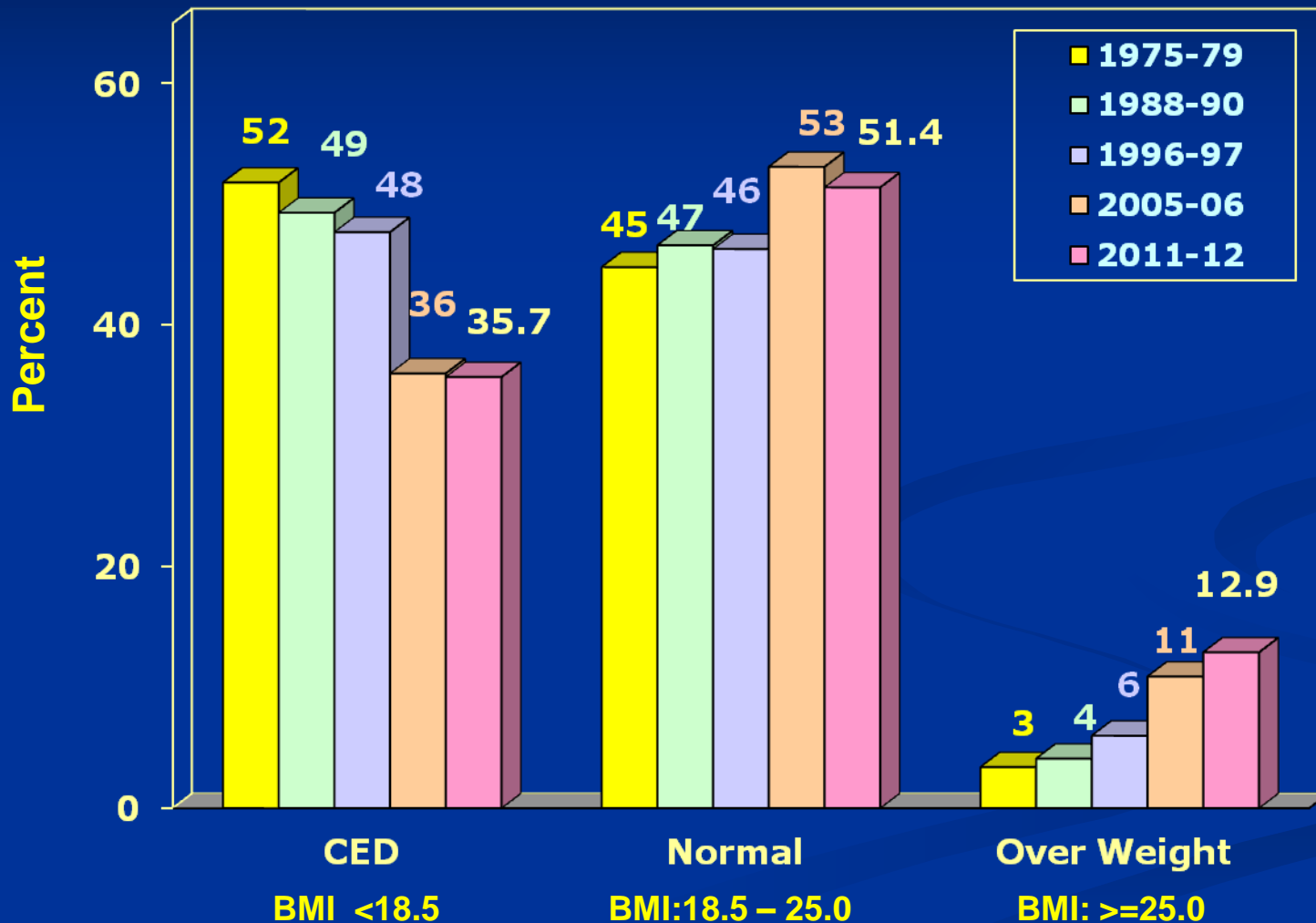


NNMB SURVEYS: Tribal 2008-09, Rural 2011-12 and Urban 2013-15 (Preliminary data)

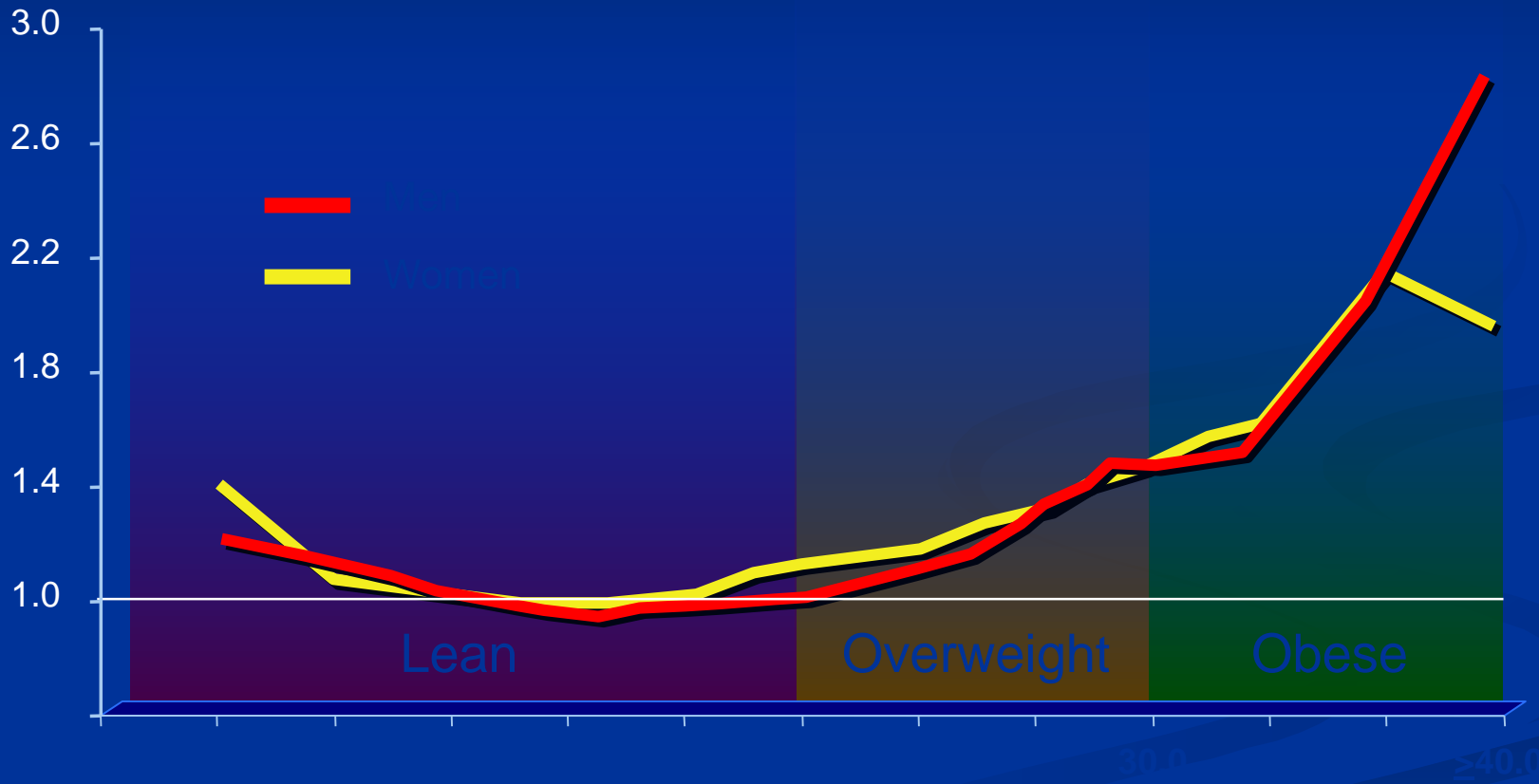
Distribution (%) of Adult Men according to BMI Grades by Period of Survey



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



Relationship Between BMI and Cardiovascular Disease Mortality



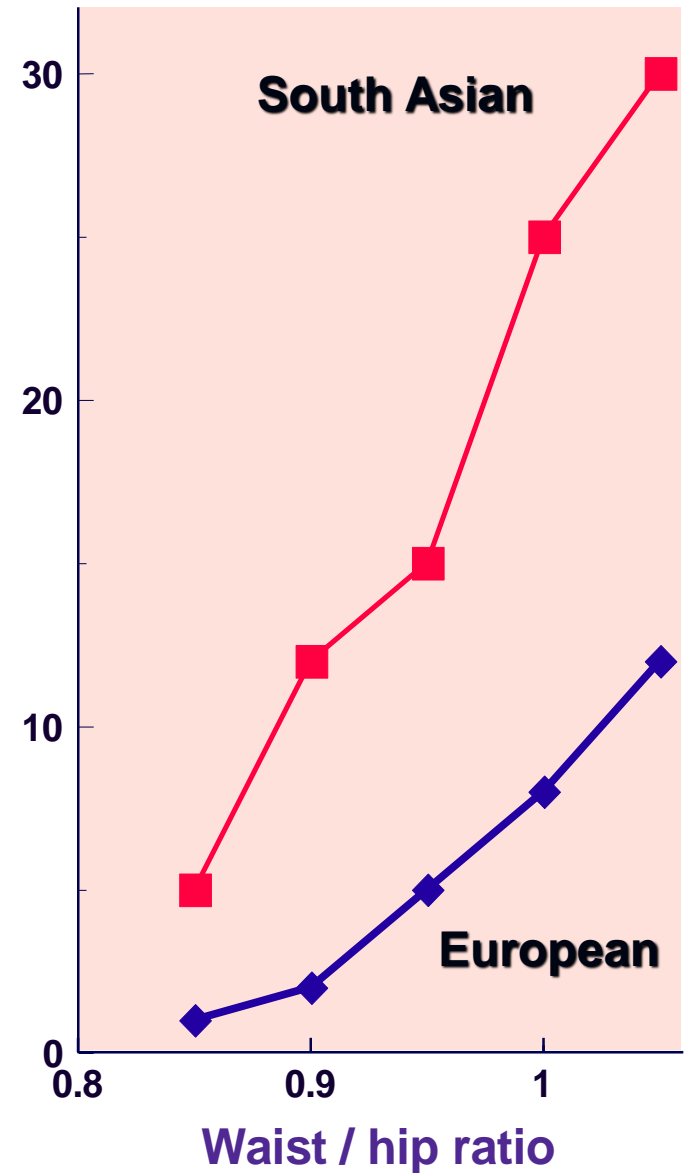
Source: Calle et al. *N Engl J Med* 1999;341:1097.

Central obesity and insulin resistance: South Asian susceptibility

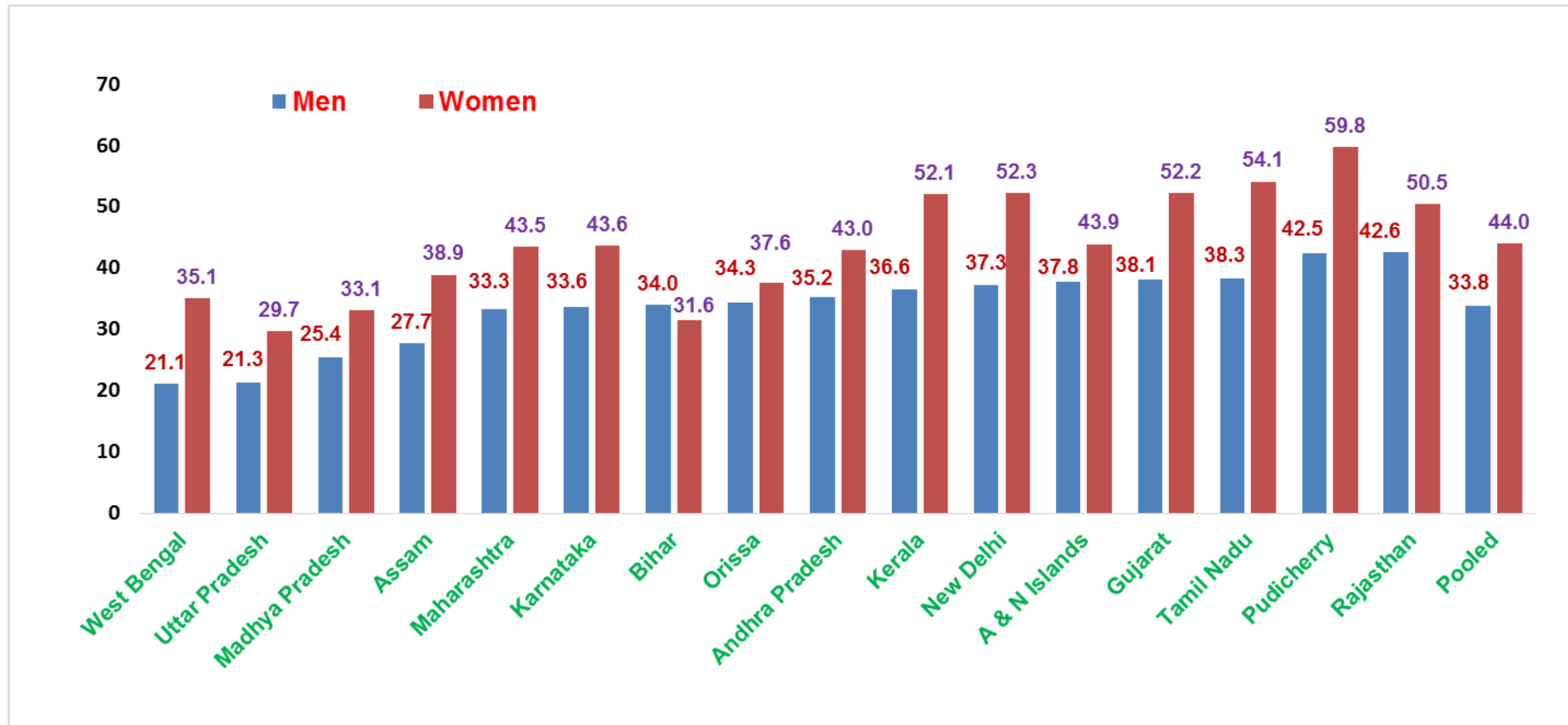


McKeigue et al. Lancet, 1991, 337: 382

Diabetes prevalence (%)



Prevalence (%) of overweight and obesity (BMI ≥ 25 and above) by 16 NNMB States and Gender (N: Men: 39,415; Women: 54,436)



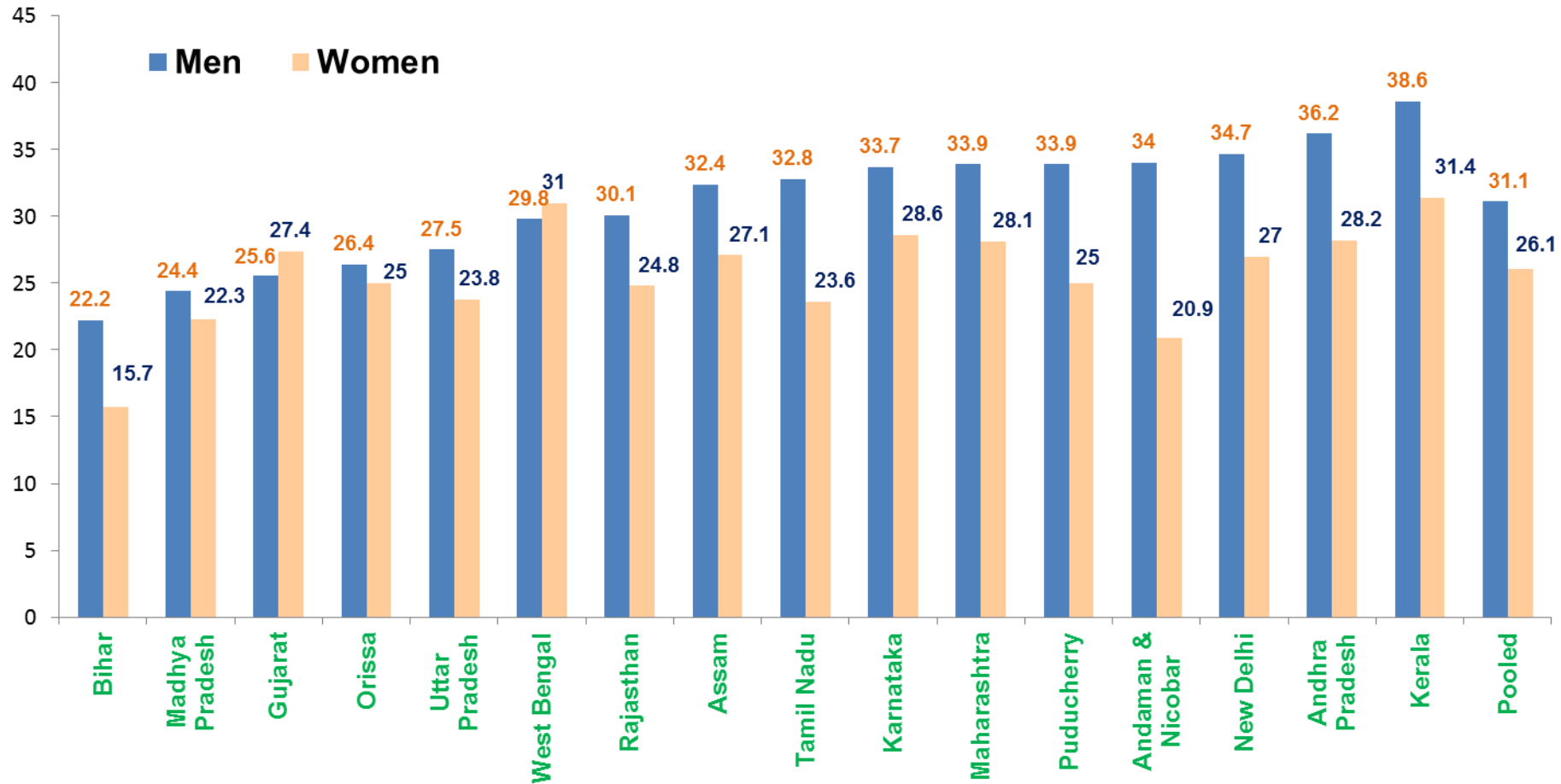
Consequences of Overweight/obesity



- ☞ **Diabetes**
- ☞ **Stroke**
- ☞ **Heart Disease / Hypertension**
- ☞ **Gall Bladder Disease**
- ☞ **Osteoarthritis**
- ☞ **Sleep Apnoea**
- ☞ **Cancers**
 - **Breast/Colon**

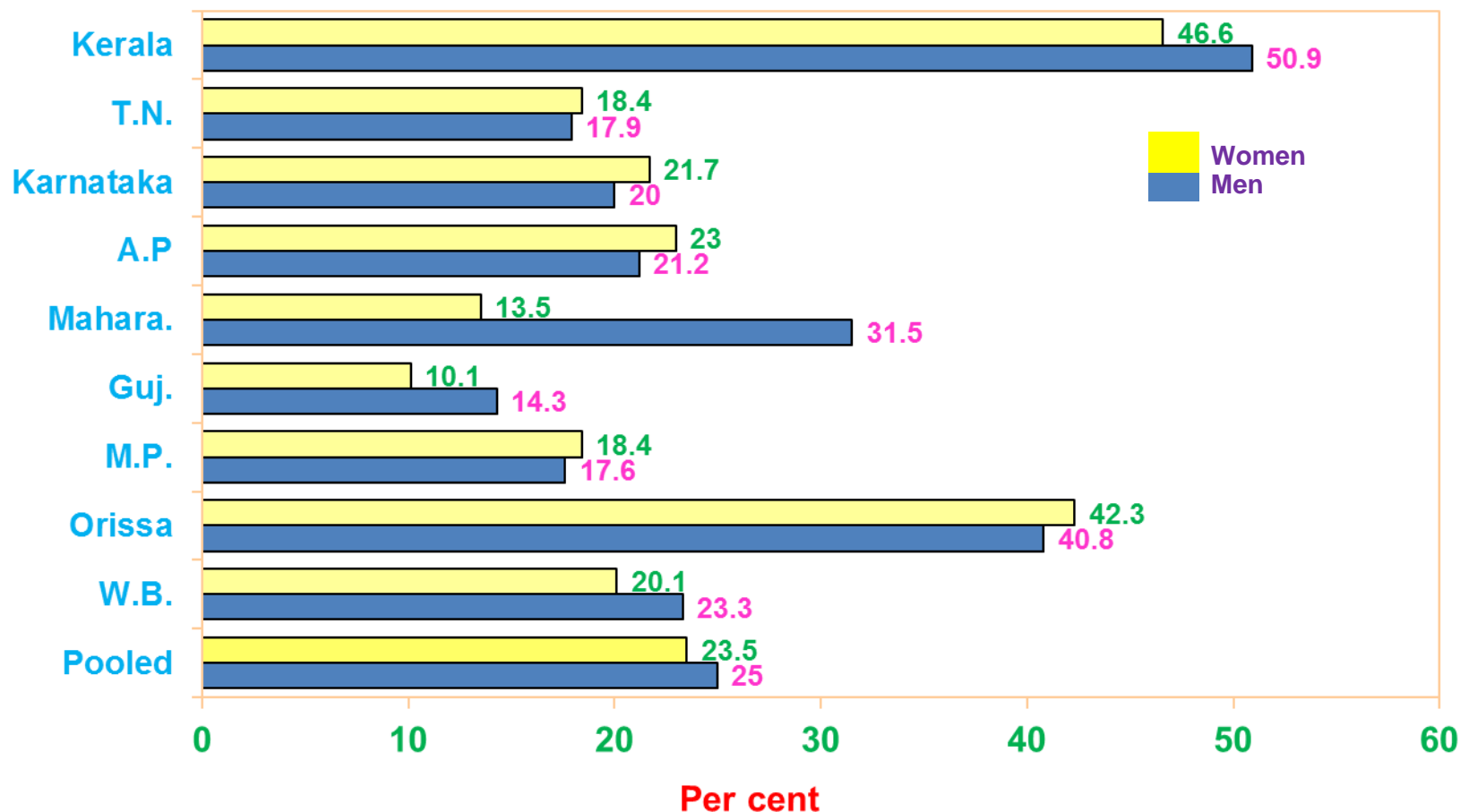


Prevalence (%) of hypertension* among urban men and women ≥ 18 years by gender and states (N: Men: 39,415; Women: 54,436)



* Age adjusted prevalence of hypertension by states

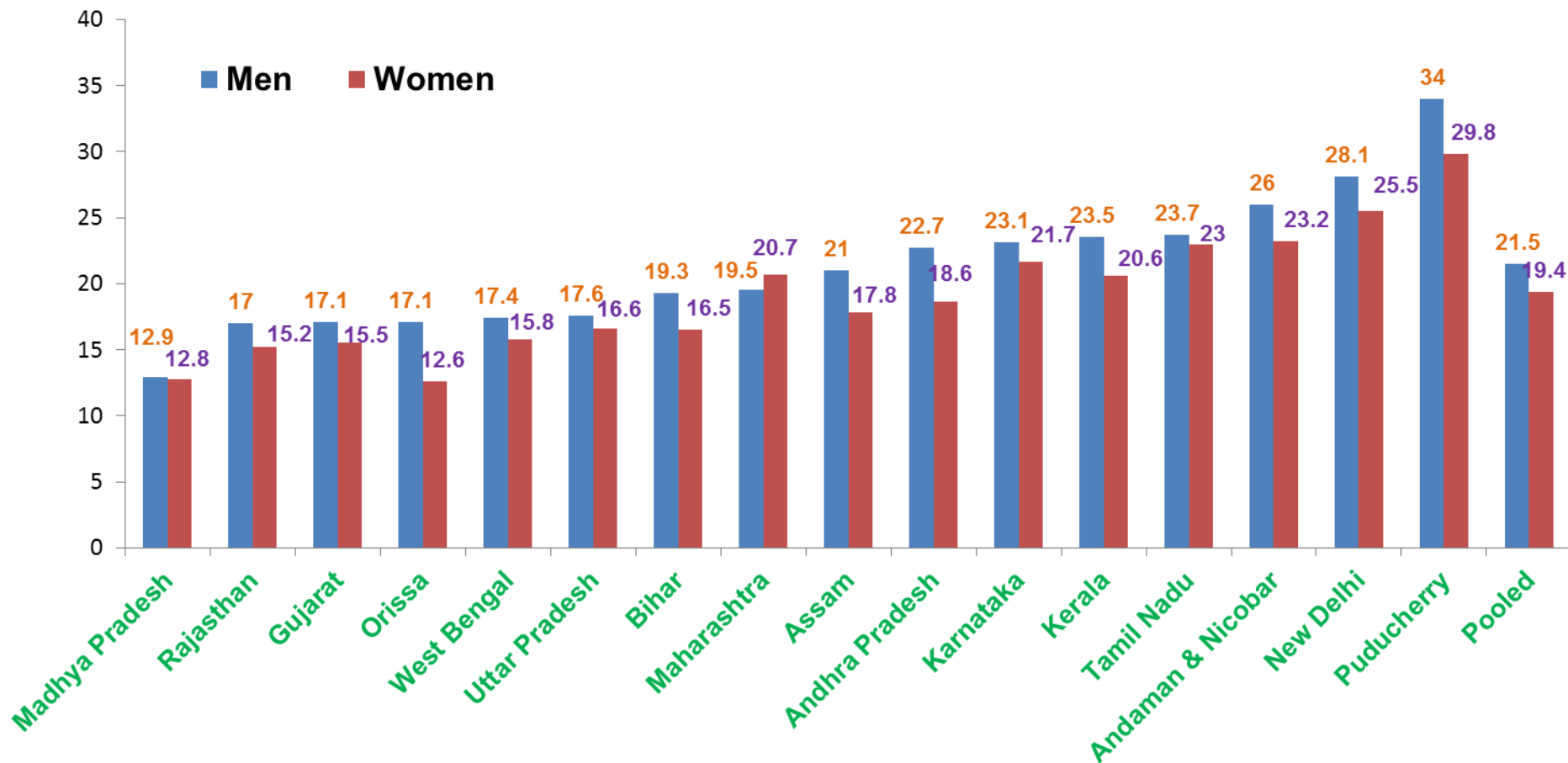
Prevalence (%) of hypertension* among Rural men and women ≥18 years by gender and states (N: Men: 21,918; Women: 27,041)



* Population standardized and age adjusted all states pooled prevalence (%) of hypertension among men and women was 24.1% and 22.6 %, respectively

* Age adjusted prevalence of hypertension by states

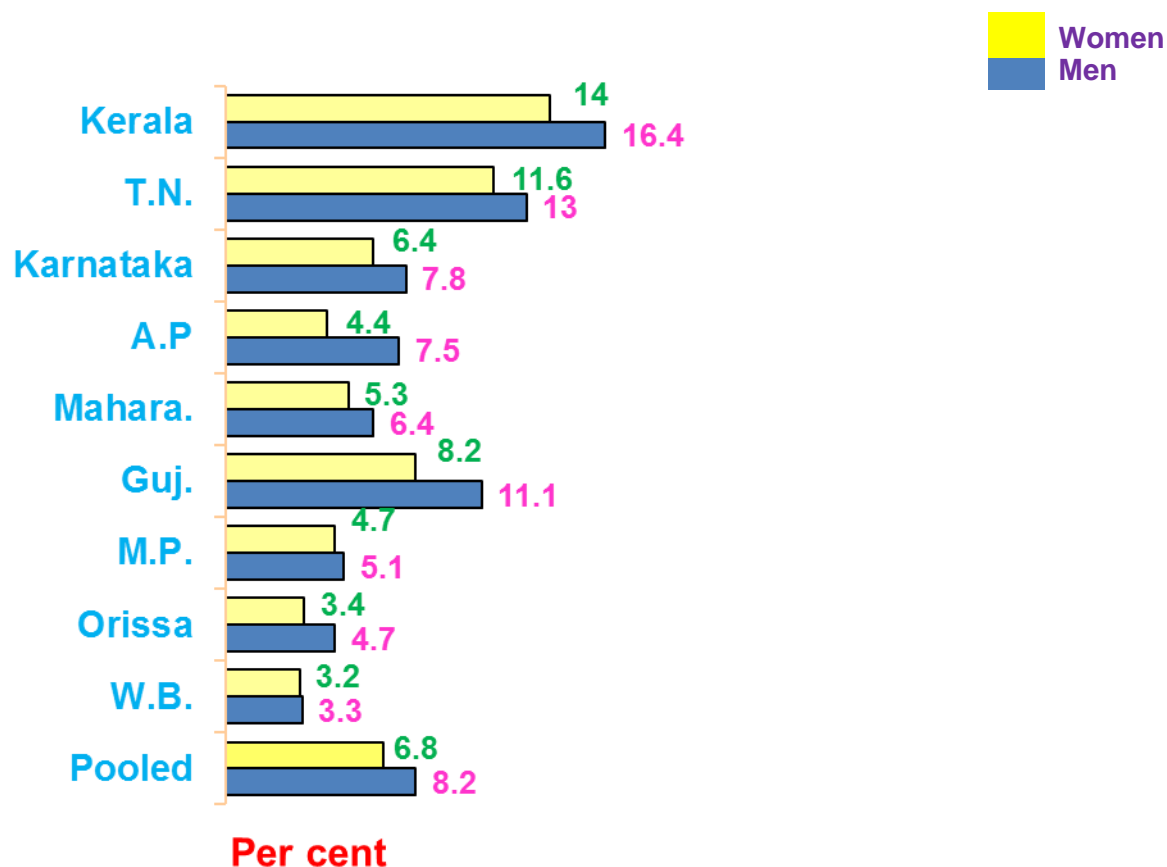
Prevalence (%) of diabetes (FBG \geq 126mg/dL) among urban men and women \geq 18 years and above by 16 NNMB states and gender (N: Men: 18,130; Women: 22,672)



* Age adjusted prevalence of hypertension by states

Prevalence (%) of diabetes among Rural men and women ≥18 years by 10 NNMB states and gender

(N: Men: 14,312; Women: 18,519)



Population standardized and age adjusted all states pooled prevalence (%) of hypertension among men and women was 5.9% and 6.8%, respectively

**Impact of Drought due to Climate change and
Nutritional status of population**

- Rajasthan



Drought 2001-2006

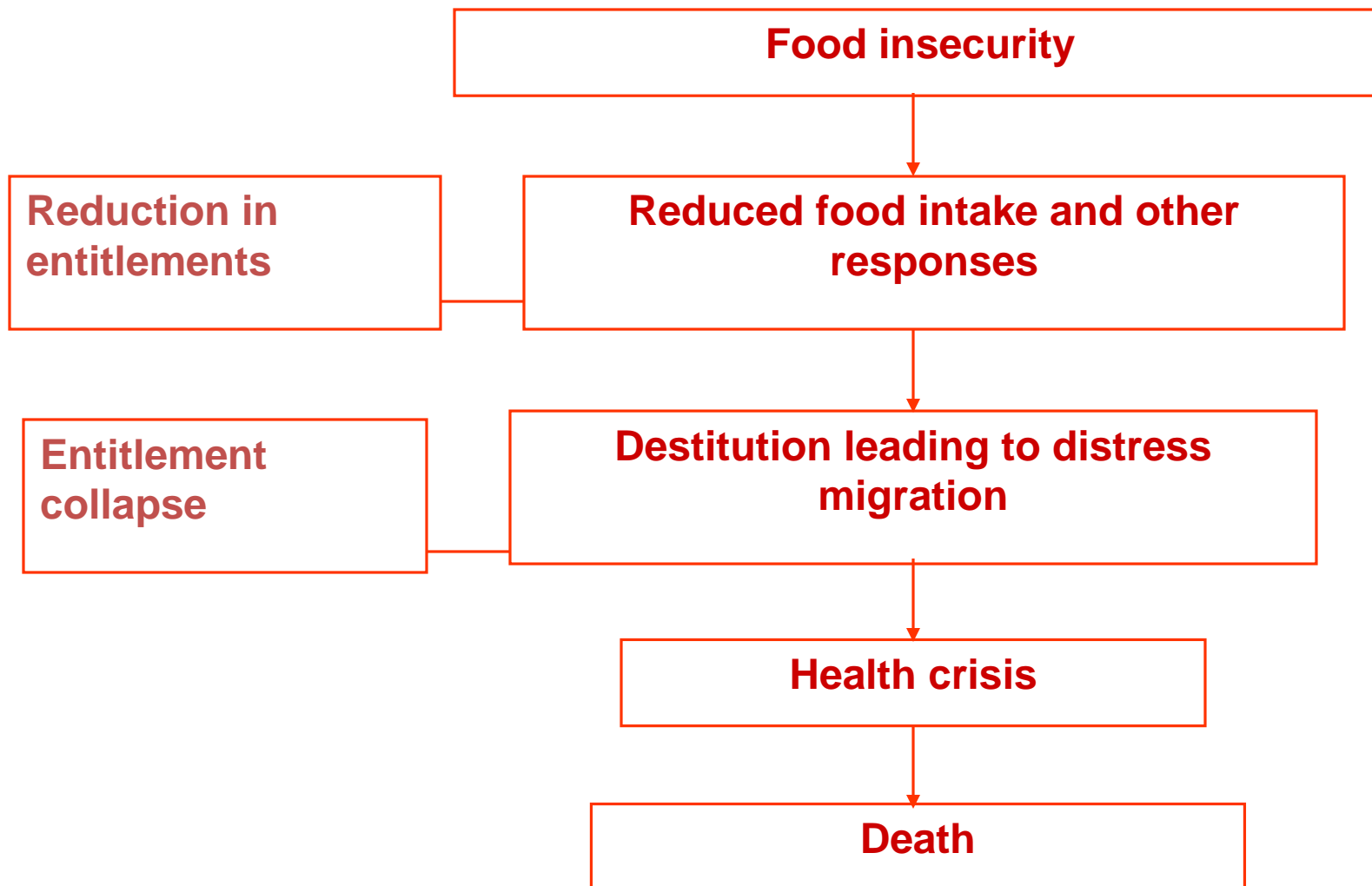


DROUGHT DUE TO CLIMATE CHANGE

Drought is a condition of moisture deficit (due to deficit rainfall) sufficient to have an adverse effect on vegetation, animals, and man over a sizeable area.

- ❖ The monsoon related calamities such as drought and floods disturb pattern of life of agrarian population in India.**
- ❖ Recurrent droughts result in primary scarcity of food, fodder and drinking water, in addition to health hazards associated with poor environmental hygiene and sanitation.**

Drought–Nutrition: A conceptual framework



At household level **food security is defined as access to food that is adequate in terms of quality, quantity, safety and cultural acceptability for all household members.**

A household achieves nutrition security when it has secure access to food coupled with a sanitary environment, adequate health services and knowledgeable care to ensure a healthy life for all household members.

Food security is of supreme importance in improving the nutritional status of people who suffer from persistent hunger and undernutrition and many who are at risk of the same situation.

In rural areas household food security is most often determined by food availability and prices, which are commonly related agricultural production and income determined by both on farm and off farm employment opportunities.

- **National Nutrition Monitoring Bureau (NNMB) surveys have shown that even normal circumstances, within the rural groups including the Scheduled Castes and Scheduled Tribal population, landless labourers, small and marginal farmers consume nutritionally inferior diets.**
- **During the earlier episodes of drought, average calorie consumption in affected areas of Andhra Pradesh, Bihar and Maharashtra was observed to be ranging from 1100 – 1400 Kcal per day – a level barely sufficient to meet the basic bodily needs.**

Per cent of families consumed < 500 Kcal per capita per day(Starvation diet)

Andhra Pradesh (1967) 26.1%

Bihar (1969) 8.2%

Maharashtra (1974) 3.8%

Prevalence of clinical signs of nutritional deficiency(0-5 Yrs Children)

Clinical signs	Andhra Pradesh	Bihar	Maharashtra
Marasmus	6.0	10.6	2.4
kwashiorkor	2.0	0.8	1.6
Conj.Xerosis	4.2	3.3	30.0
Bitot spots	3.0	4.5	4.0

The State Rajasthan experienced drought conditions in the beginning of new millennium continuously for 2-3 years.

At the request of Ministry of Agriculture,GOI and ICMR,the present survey was carried out with an objective to assess the nutritional status of the community in drought affected areas of Rajasthan.













Table –3

AVERAGE HOUSEHOLD CONSUMPTION (g/CU/day) OF FOODSTUFFS

Food Group	Mean intake			RDI (ICMR,1981)
	Drought 2003	Drought 2000	Rajasthan DWCD 1998	
n	299	200		
Cereals & Millets	357	489	483	460
Pulses & Legumes	5	23	29	40
Green Leafy Vegetables	0	2	24	40
Roots & Tubers	73	54	79	50
Other Vegetables	17	12	45	60
Milk & Milk Products	77	150	198	150
Fats & Edible Oils	14	13	22	20
Sugar & Jaggery	22	21	25	30

Table – 4**AVERAGE HOUSEHOLD INTAKE (CU/ day) OF NUTRIENTS**

Nutrients	Mean intake			RDI
	Drought 2003	Drought 2000	Rajasthan DWCD 1998	
n	299	200		
Protein (g)	61	71	76	60
Total Fat (g)	27	36	46	40
Energy (Kcal)	1827	2163	2386	2425
Calcium (mg)	441	517	734	400
Iron (mg)	24	33	30	28
Vitamin A (µg)	127	213	400	600
Thiamin (mg)	2.1	2.3	2.6	1.2
Riboflavin (mg)	1.0	1.3	1.2	1.4
Niacin (mg)	18	18	21	16
Vitamin C (mg)	14	18	46	40
Free Folic Acid (µg)	63	46	-	100



Table – 5

PREVALENCE (%) OF NUTRITIONAL DEFICIENCY SIGNS AMONG 1-5 YEARS CHILDREN

Clinical signs*	(%)
NAD	95.7
Emaciation	1.4
Marasmus	0.3
Conjunctival xerosis (XIA)	1.3
Bitot Spots (XIB)	1.3
Angular stomatitis	0.3

n = 1035

* Multiple responses

Table – 8**DISTRIBUTION (%) OF HOUSEHOLDS ACCORDING TO CURRENT HH
FOOD SECURITY STATUS DURING PREVIOUS 3 MONTHS AS
PERCEIVED BY HEAD OF THE HH**

Food group	No Change	Less than normal			
		25%	50%	75%	100%
Cereals & Millets	63.1	33.4	3.5	0	0
Pulses	46.1	31.9	20.8	1.2	0
Vegetables	43.0	29.5	16.0	11.3	0.2
Roots & Tubers	54.6	44.1	1.3	0	0
Milk & Milk products	49.6	32.6	15.8	1.2	0.8
Fats & Oils	54.7	38.8	4.5	2.0	0

n = 601

Table – 9

**DISTRIBUTION (%) OF HOUSEHOLD ACCORDING TO COPING STRATEGIES
ADOPTED DURING CURRENT DROUGHT***

Coping strategies	Per cent
Use of food stocks/ savings	22.8
Consumption of low cost food items	10.1
Borrow cash/ food	47.9
Obtained Govt./ NGO's assistance	28.3
Reduce food consumption	24.5
Migration	6.3
Selling HH assets	3.3
others	53.5

n = 601

*Multiple responses

Thank You

Prevention

Is

Better



than cure



THANK YOU FOR PATIENT HEARING