EDUCATION FOR ENHANCEMENT

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INTRODUCTION

- **India - significant tribal population (8.6%) - 400 tribal groups, <5MR- 84; IMR-61; MMR-97 (Census India, 2011). The Nilgiris - tribal population (called Primary Tribal Groups, PTG) of about 26,000, spread over Coimbatore District and the adjacent states of Kerala and Karnataka.**

Nutritional Status Scenario of the Tribals

Traditional Life Style

↓

Lack of awareness

↓

Wide spread malnutrition among tribes

Prevalence of PCM & other Nutritional Deficiencies

Paniya, Kurumba, Irula > Thoda, Kota

Macronutrient malnutrition

↑ ICDS

↑ Non Government Organization

Micronutrient malnutrition

↓ VAD

↓ Conjunctival Xerosis

Koilonychia

↓ IDA

Still Birth

Low Birth Weight

Health Status of Tribals

Prevalence of Diabetes and Hypertension

Diabetes mg/dl

- RBS <140-86.8;87.6;
- RBS 140-200 -8.2; 6.9
- RBS>200 -5;5.5

Hypertension mmHg
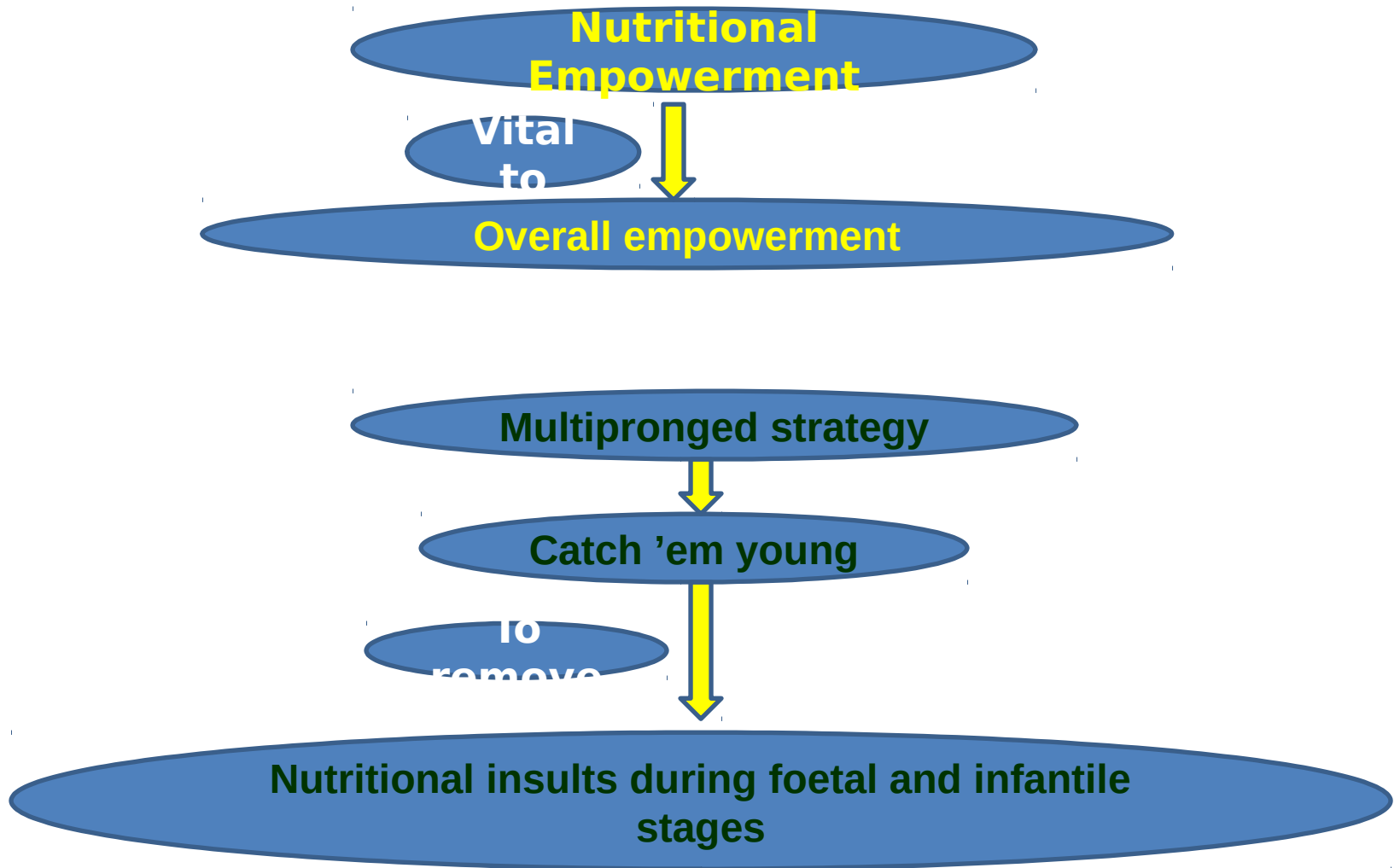
Normal -21.5; 42.5

Pre HTN-42; 30.4

Stage I HTN-21.5; 17.6

Stage 2 HTN- 15; 9.5

Nutritional Status of <5 (%)

- Normal- 26
- Grade I Malnutrition - 40
- Grade II- 28
- Grade III -6

Nutritional Empowerment

Vital to

↓

Overall empowerment

Multipronged strategy

↓

Catch 'em young

To remove

↓

Nutritional insults during foetal and infantile stages

- It is the duty of every well-meaning citizen to help improve the health of our tribal brethren. Enhancement of their nutritional status could form the very basis for the upliftment and empowerment of tribals.

OBJECTIVES

- **Assess the prevalence of Vitamin A and Iron deficiencies among tribal children in Nilgiris district**

- **Assess their Socioeconomic and Nutritional Status**

- **Impart and evaluate the impact of maternal nutrition education on KAP of mothers**

- **Develop kitchen gardens and assess their effect on KAP of mothers.**

RESEARCH DESIGN

Phase –I Screening of Tribal children for Vitamin A and Iron Deficiencies

Nilgiris District

↓

Tribal Hamlets
(N=215)

↓

Tribal Children (1-14 years)
(N= 4376)

↓

Screening for clinical symptoms of vitamin A and Iron Deficiency in 1-14 year old Tribal Children
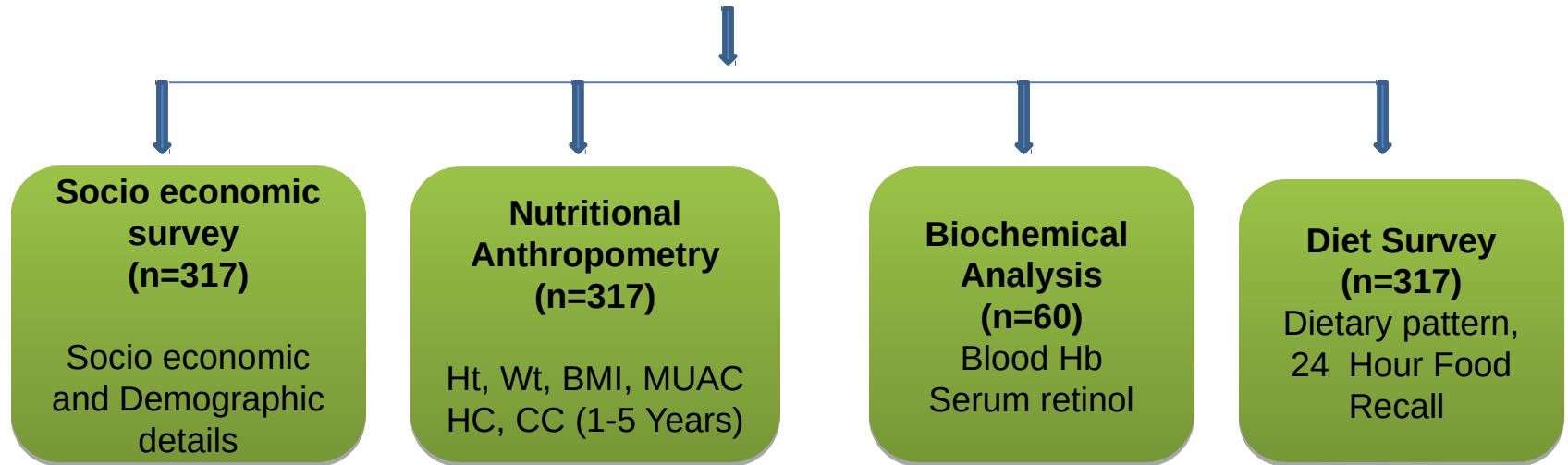
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Selection of vitamin A and Iron Deficient children (1-14 years of age) n=317
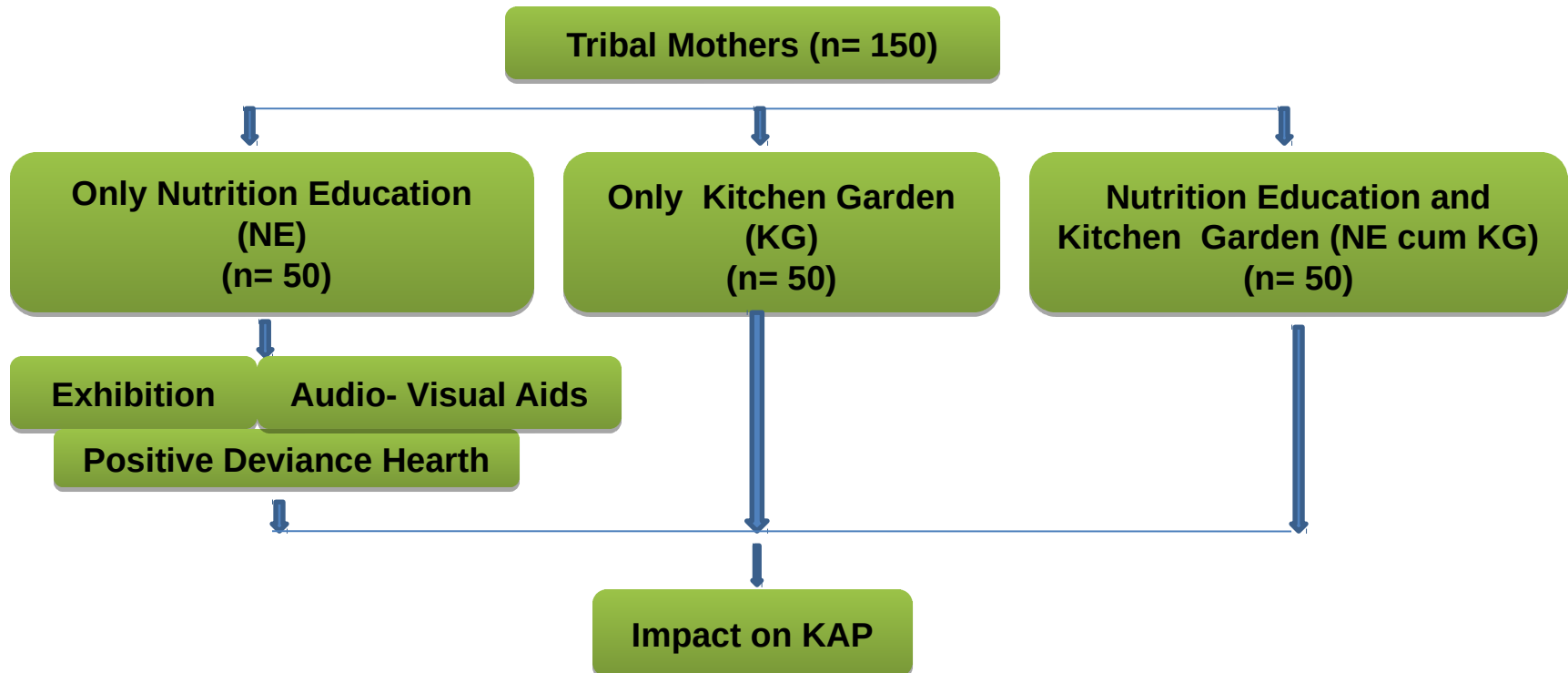
Phase- II Assessment of Socioeconomic and Nutritional Status

Assessment of Socioeconomic and Nutritional status

Socio economic survey (n=317)

Socio economic and Demographic details

Nutritional Anthropometry (n=317)

Ht, Wt, BMI, MUAC HC, CC (1-5 Years)

Biochemical Analysis (n=60)
Blood Hb
Serum retinol

Diet Survey (n=317)
Dietary pattern, 24 Hour Food Recall

Phase - III Nutrition Education and Kitchen Garden

Tribal Mothers (n= 150)

Only Nutrition Education (NE) (n= 50)

Only Kitchen Garden (KG) (n= 50)

Nutrition Education and Kitchen Garden (NE cum KG) (n= 50)

Exhibition   **Audio- Visual Aids**

Positive Deviance Hearth

Impact on KAP

Approval from the Institutional Human Ethics Committee with No. AUW/IHEC-13-14/FHP-20

Intervention

- **Audio and visual methods-Adequate Nutrition and Hydration**
- **Classroomteaching, Exhibitions, Demonstrations, folk methods, positive deviance hearth**
- **Method of preparing the soil, planting seeds and saplings, watering and protection, harvest**
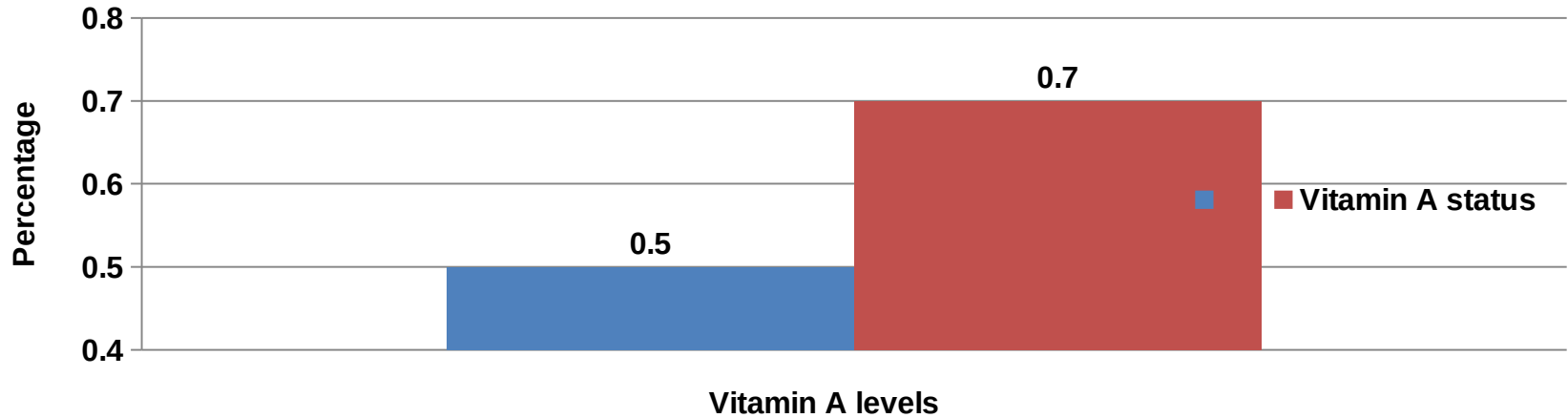
Salient Findings

RESULTS

PHASE –I PREVALENCE OF VAD AND IDA AMONG PTG CHILDREN IN NILGIRIS DISTRICT

CLINICAL SYMPTOMS OF VAD AND IDA AMONG PRIMITIVE TRIBAL

Chart values:
- Emaciation: 0.5
- Dry, brittle hair: 0.1
- Conjuctival Xerosis: 0.6
- Bitot's spot: 0.7
- Angular Stomatitis: 2.6
- Cheilosis: 2.2
- Glossitis: 1.8
- Phrynoderma: 0.6
- Gingivitis: 0.7
- Koilonychia: 0.5
- Dental caries: 3.7
- Thyroid gland Palpable: 0.1
- Dermatitis: 1.6
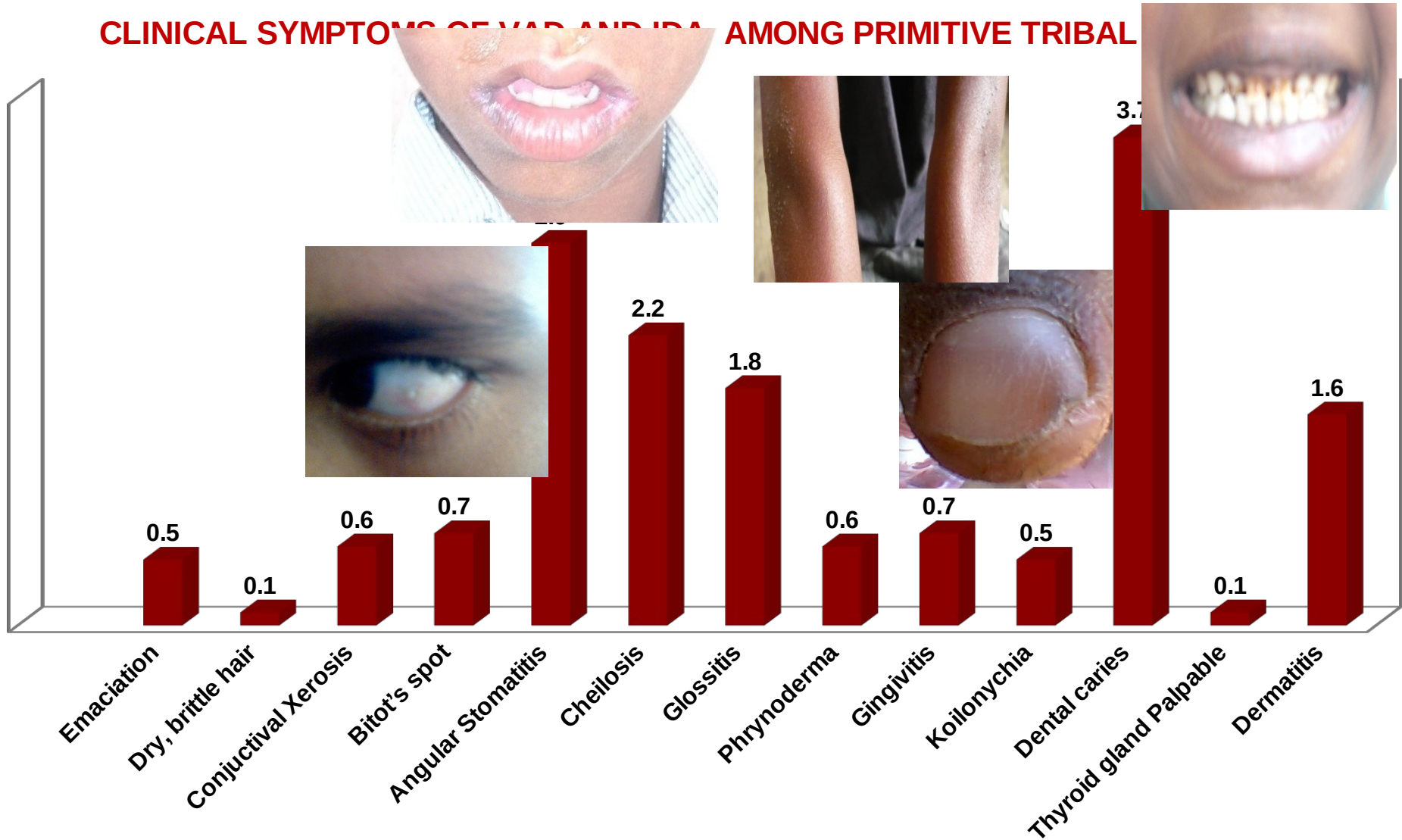
PROBLEM OF PUBLIC HEALTH SIGNIFICANCE

Vitamin A Status among PTG Children

Iron Status among PTG Children
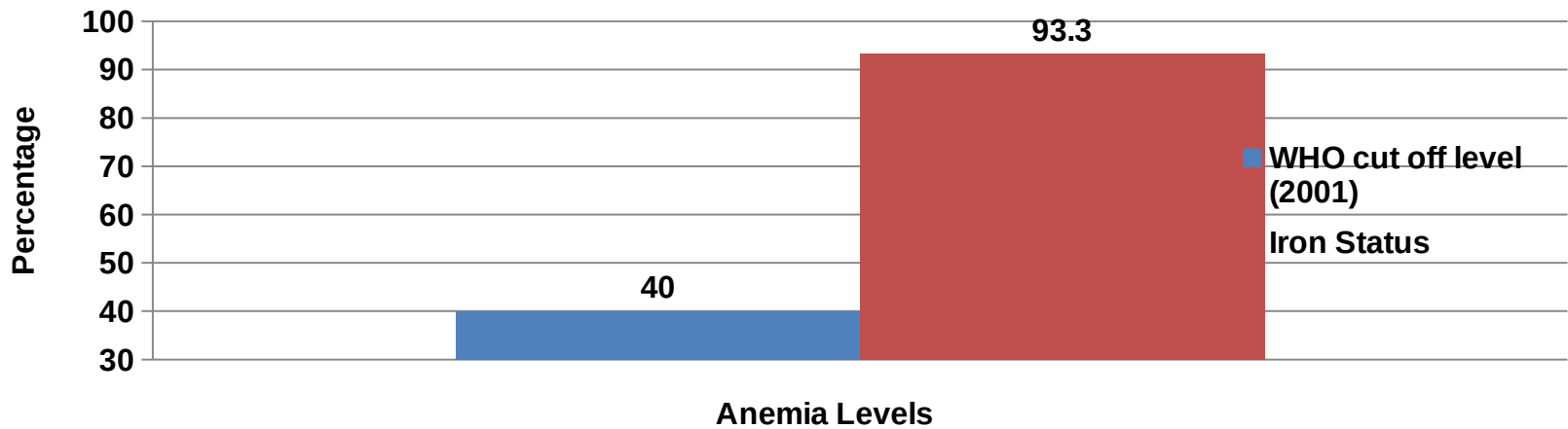
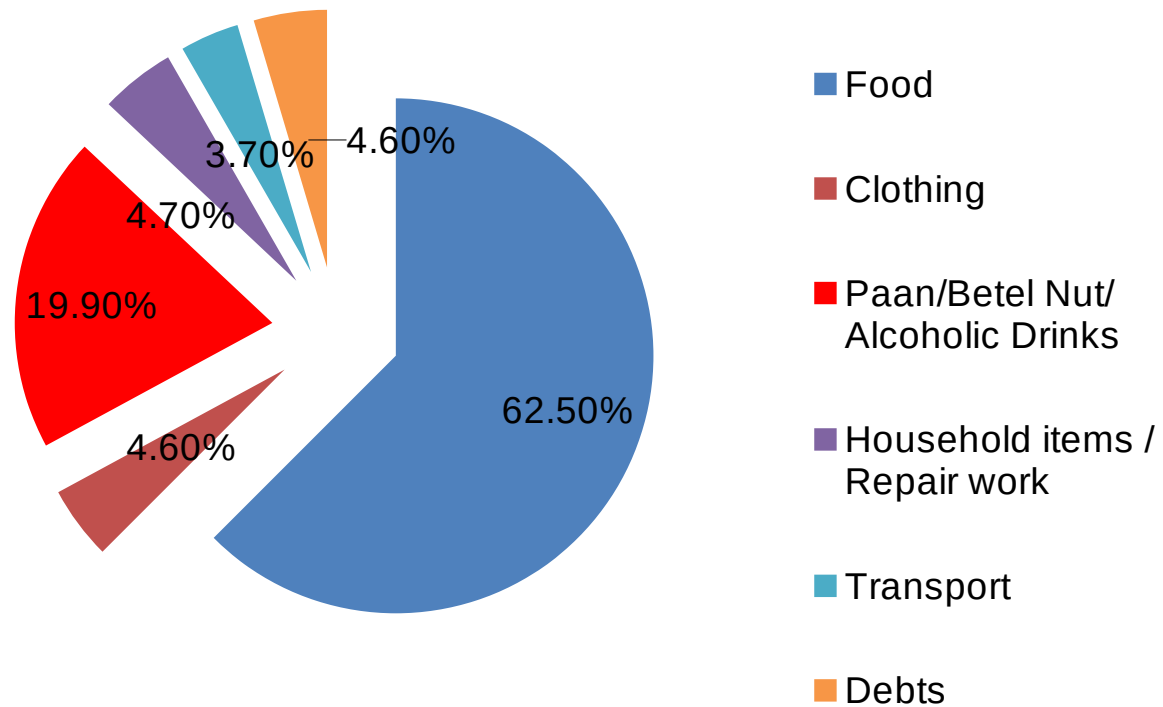# PHASE- II ASSESSMENT OF SOCIOECONOMIC AND NUTRITIONAL STATUS

TYPE OF FAMILY

joint ▪ nuclear

24.00%

76.00%
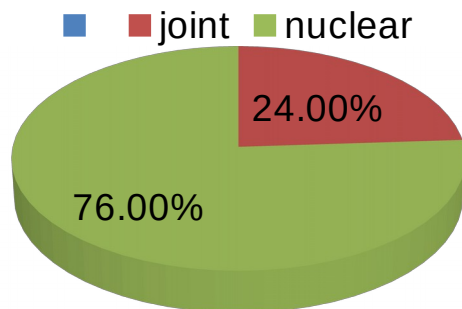
NUMBER OF CHILDREN PER HOUSEHOLD

Children (No.) vs Families (%)
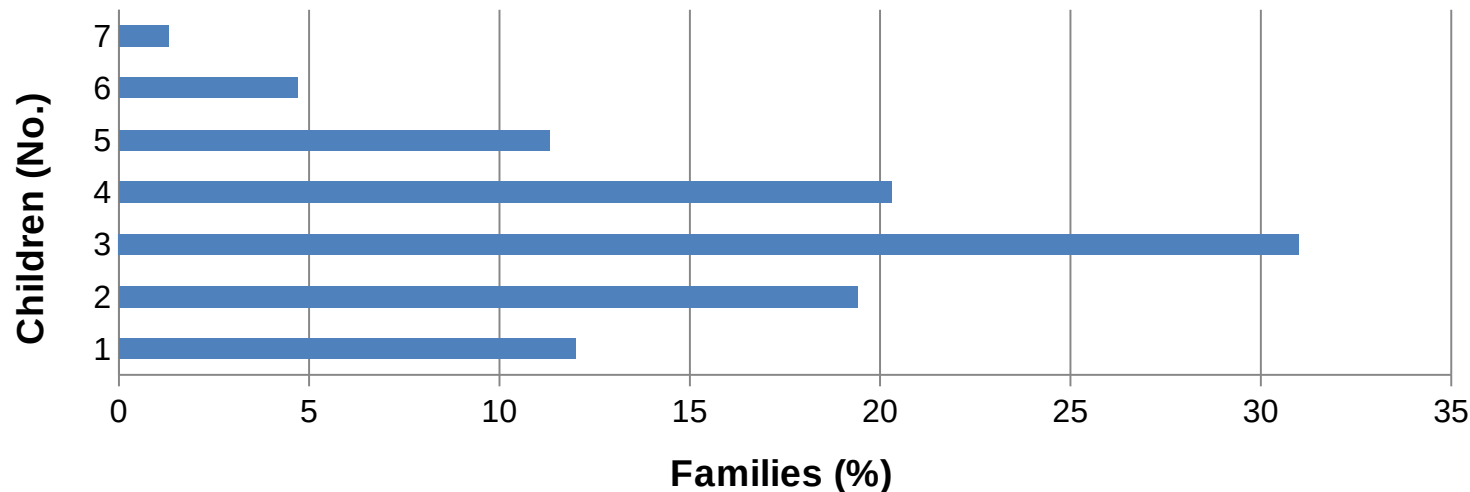
- **EWS** -99.7 per cent; **LIG** 0.3 per cent (monthly income Rs. 5001 to 10,000 HUDCO, 2010).

MONTHLY EXPENDITURE PATTERN

Legend:
- Food
- Clothing
- Paan/Betel Nut/ Alcoholic Drinks
- Household items / Repair work
- Transport
- Debts

62.50% — Food
19.90% — Paan/Betel Nut/Alcoholic Drinks
4.70% — Household items / Repair work
3.70% — Transport
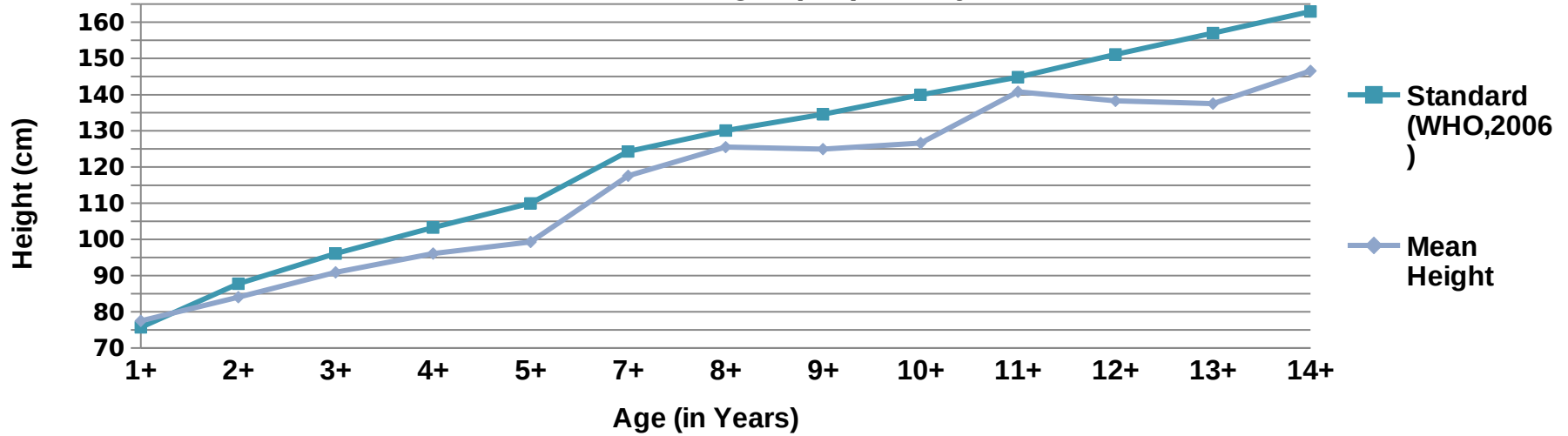4.60% — Debts
4.60% — Clothing
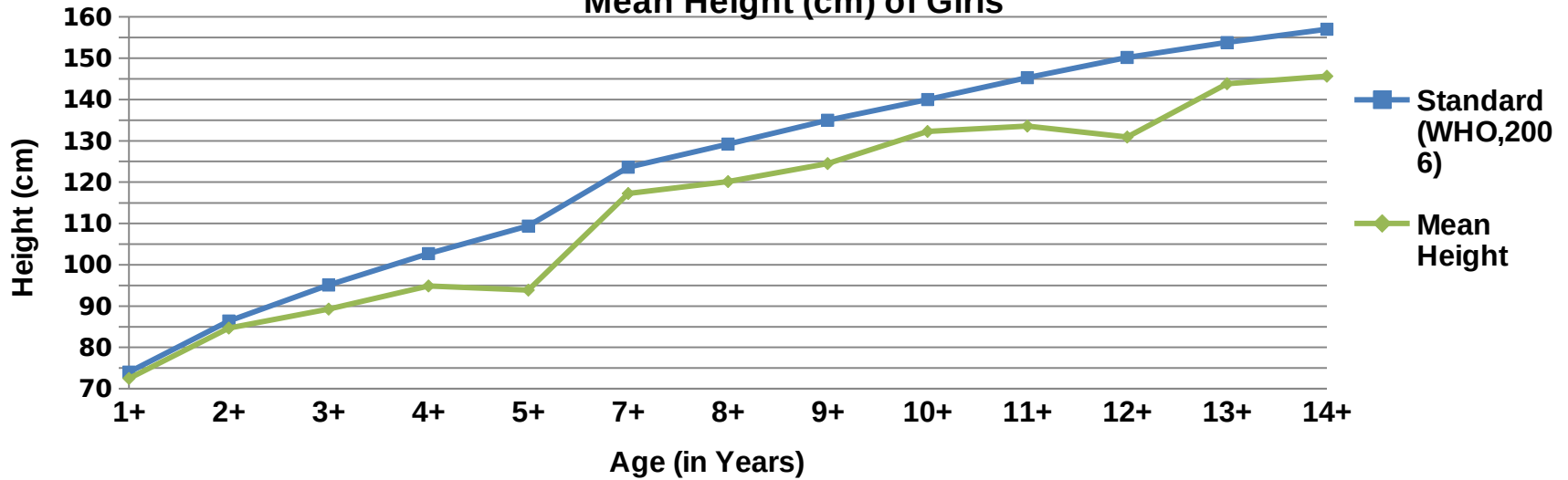
Food and Nutrient Intake

- **Adequacy (%): RDI/RDA(ICMR, 2016)**
- **Cereals- 88; Pulses- 72 ; Roots and Tubers- 67; Glv- 47; Milk and milk products-5; Fruits and Vegetables-12 ; Flesh foods- 21**
- **Protein 61; Energy- 82; Calcium 63; Iron- 37; Vitamin A-43; Thiamine -81; Riboflavin- 44; Niacin- 92; Vitamin C -77; Folic acid-32**
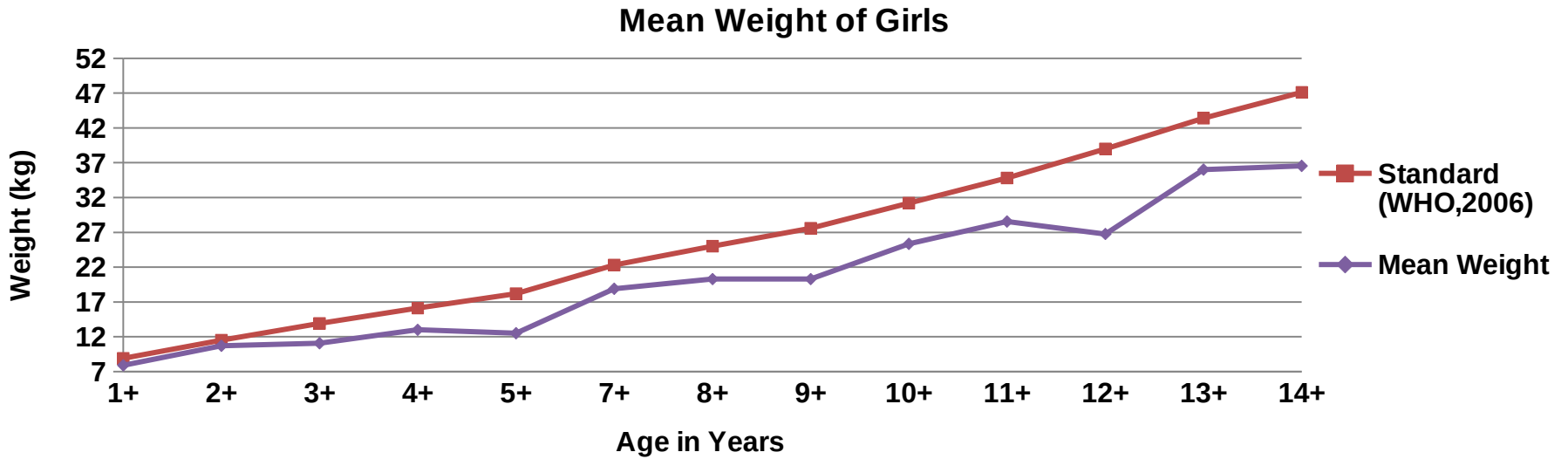
- **<NNMB Tribal Survey (2009)**
-

NUTRITIONAL ANTHROPOMETRY

Mean Height (cm) of Boys

Legend: Standard (WHO,2006), Mean Height

Y-axis: Height (cm)
X-axis: Age (in Years) — 1+, 2+, 3+, 4+, 5+, 7+, 8+, 9+, 10+, 11+, 12+, 13+, 14+

Mean Height (cm) of Girls

Legend: Standard (WHO,2006), Mean Height

Y-axis: Height (cm)
X-axis: Age (in Years) — 1+, 2+, 3+, 4+, 5+, 7+, 8+, 9+, 10+, 11+, 12+, 13+, 14+

Mean Weight of Boys

Legend:
- Standard (WHO,2006)
- Mean Weight

X-axis: Age in Years (1+, 2+, 3+, 4+, 5+, 7+, 8+, 9+, 10+, 11+, 12+, 13+, 14+)

Y-axis: Weight (kg) (8, 13, 18, 23, 28, 33, 38, 43, 48)

Mean Weight of Girls

Legend:
- Standard (WHO,2006)
- Mean Weight

X-axis: Age in Years (1+, 2+, 3+, 4+, 5+, 7+, 8+, 9+, 10+, 11+, 12+, 13+, 14+)

Y-axis: Weight (kg) (7, 12, 17, 22, 27, 32, 37, 42, 47, 52)

MEAN MUAC, CHEST CIRCUMFERENCE AND HEAD CIRCUMFERENCE (cm) OF CHILDREN

Age Group (years)	Standard Values				Mean MUAC		Mean Chest Circumference		Mean Head Circumference	
	MUAC*		CC#	HC#						
	Boys	Girls			Boys(80)	Girls(70)	Boys(80)	Girls(70)	Boys(80)	Girls(70)
1-2	13.1	12.8	50	49	13.73±0.97	13.64±0.88	44.84±1.70	44.37±1.66	45.25±1.13	45±1.61
2-3	13.3	12.9	52	50	13.81±1.11	13.94±1.08	47.89±2.61	47.64±3.27	47.28±1.32	46.27±1.67
3-4	14.0	13.7	53	50.5	14.28±1.15	13.85±0.89	49.04±3.05	48.28±2.26	47.60±1.69	46.19±1.51
4-5	14.1	13.9	55	50.8	14.05±0.95	14.24±1.11	50.47±2.48	49.65±2.69	47.51±1.91	47.29±0.82

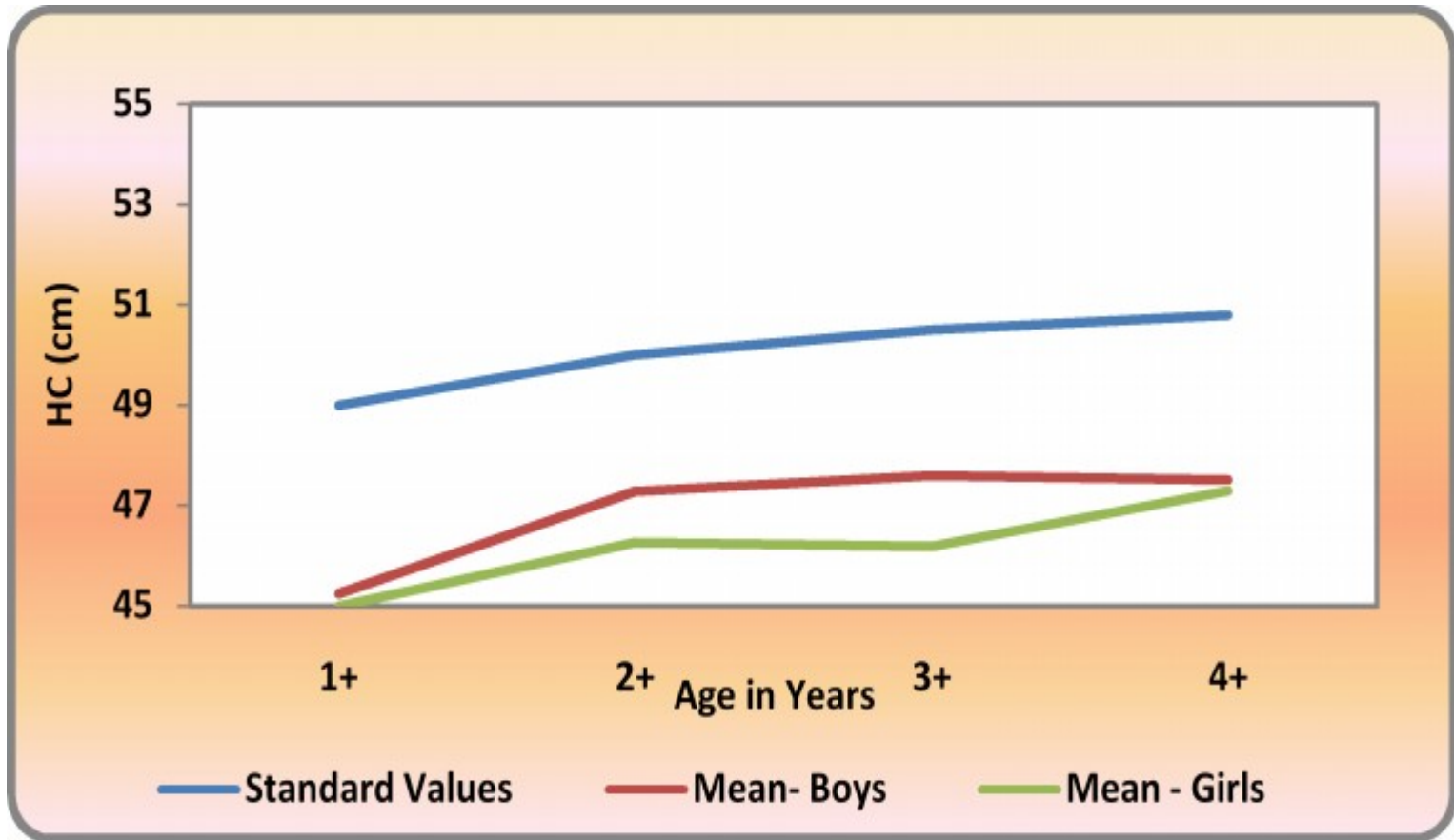*Jelliffe (1966)   #Watson and Lowrey (1962)

Mean MUAC of Children
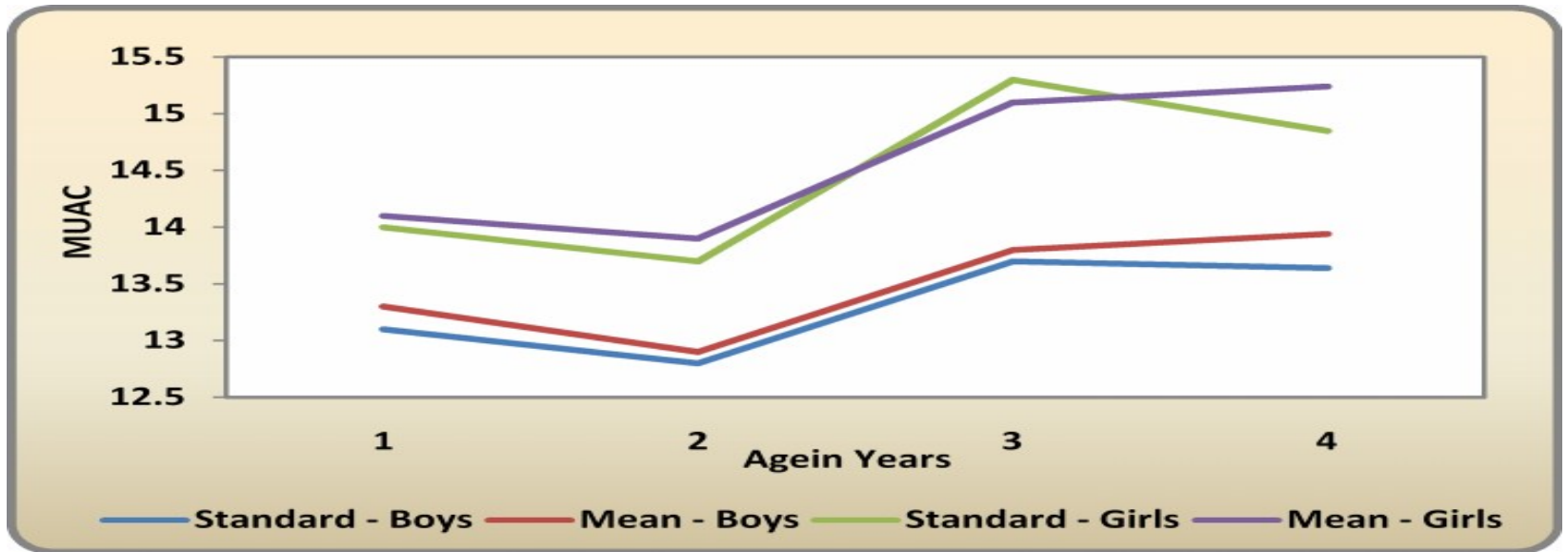
Mean Chest Circumference of Children
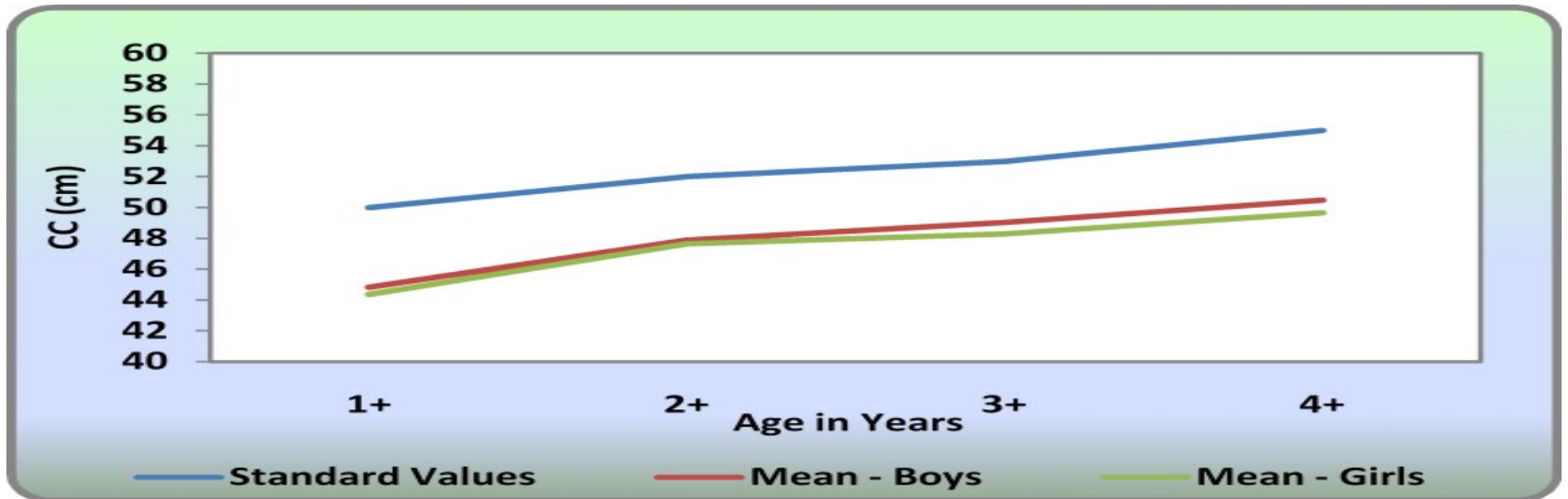
Mean Head Circumference of Children

Morbidity Pattern over three months (n=317)

Morbidity Pattern	No. of days	Scores*
Diarrhoea	4-6 days	10
Fever	For 5-9 days	10
Bronchitis	5 days	5
Cold	10 days	10
Others	Within 10 days	10
Degree of Morbidity		**II**

*Arroyave and Pineda (1974)

Correlation between Energy Intake and BMI

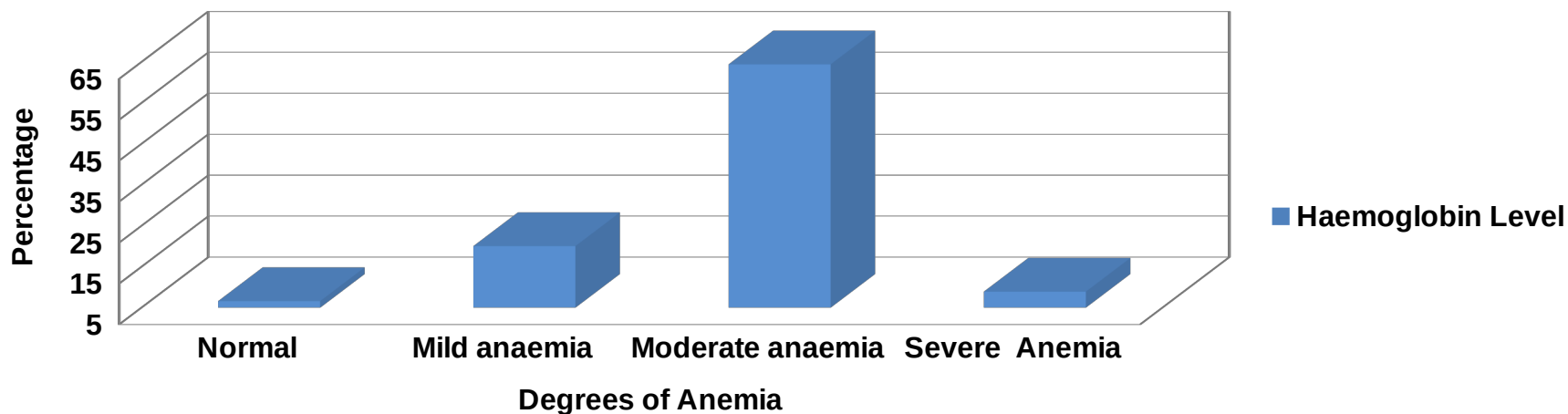| Age group (in years)	N	Energy Intake and BMI	
		Correlation coefficient of 'r'	p value
7+	8	+0.949	0.017**
8+	8	+0.556	0.1193[NS]
9+	8	+0.810	0.0235*
10+	8	+0.6927	0.0363*
11+	9	+0.7518	0.0291*
12+	9	+0.9057	0.0124**
13+	10	+0.9156	0.0146**
14+	10	+0.8964	0.0135**

Biochemical Picture

MEAN HAEMOGLOBIN (g/dl) OF CHILDREN   (N=60)

Age Group (years)	n	Standard Values* (g/dl)	Mean Haemoglobin (g/dl)	't' Value
8+	8	11.5	10.22 ± 0.5	4.491**
9+	8	11.5	9.35 ± 1.42	2.088*
10+	8	11.5	10.56 ± 0.21	2.963*
11+	8	11.5	9.27 ± 1.14	2.694*
12+	9	12	10.41 ± 0.57	4.168**
13+	9	12	10.65 ± 0.18	3.529*
14+	10	12	10.77 ± 0.31	3.748*

* WHO, 2015

Grouping of children according to degree of anemia

CORRELATION BETWEEN IRON INTAKE AND HAEMOGLOBIN

Age group (in years)	N	Iron intake vs Haemoglobin	
		Correlation coefficient of 'r'	p value
8+	8	+0.5372	0.014**
9+	8	+0.4162	0.025*
10+	8	+0.5015	0.012**
11+	8	+0.6348	0.035*
12+	9	+0.3369	0.618[NS]
13+	9	+0.4826	0.042*
14+	10	0.4165	0.025*

MEAN SERUM RETINOL (g/dl) OF CHILDREN   (N=60)

Age Group (years)	n	Standard Values# (mg/L)	Mean serum retinol (mg/L)	't' Value
8+	8	0.20-0.50	0.22 ± 0.1	3.542**
9+	8	0.20-0.50	0.21 ± 0.03	7.034**
10+	8	0.20-0.50	0.26 ± 0.1	3.036**
11+	8	0.30-0.60	0.19 ± 0.1	4.815**
12+	9	0.30-0.60	0.25 ± 0.1	5.247**
13+	9	0.30-0.60	0.27 ± 0.1	4.39**
14+	10	0.30-0.60	0.27 ± 0.1	5.133**

CORRELATION BETWEEN BETA- CAROTENE INTAKE AND SERUM RETINOL

Age group (in years)	N	Beta- carotene vs Serum Retinol	
		Correlation coefficient of 'r'	p value
8+	8	+0.8451	0.001**
9+	8	+0.9214	0.003**
10+	8	+0.9483	0.001**
11+	8	+0.8905	0.002**
12+	9	+0.9039	0.001**
13+	9	+0.8516	0.002**
14+	10	+0.9472	0.001**

Correlation between Haemoglobin and Serum Retinol level

Age Group (years)	Mean serum retinol (mg/L)	Mean Haemoglobin (g/dl)	Correlation coefficient	
			r value	p value
8+	0.22±0.10	10.22±0.5	+0.907	0.002**
9+	0.21±0.03	9.35 ±1.4	+0.937	0.001**
10+	0.26±0.10	10.56±0.7	+0.986	0.001**
11+	0.19±0.10	9.27±1.1	+0.782	0.02*
12+	0.25±0.10	10.41±1.4	+0.984	0.001**
13+	0.27±0.10	10.65±0.9	+0.826	0.003**
14+	0.27±0.10	10.77±0.8	+0.960	0.002**

PHASE -III IMPACT OF NUTRITION EDUCATION AND KITCHEN GARDEN ON KAP

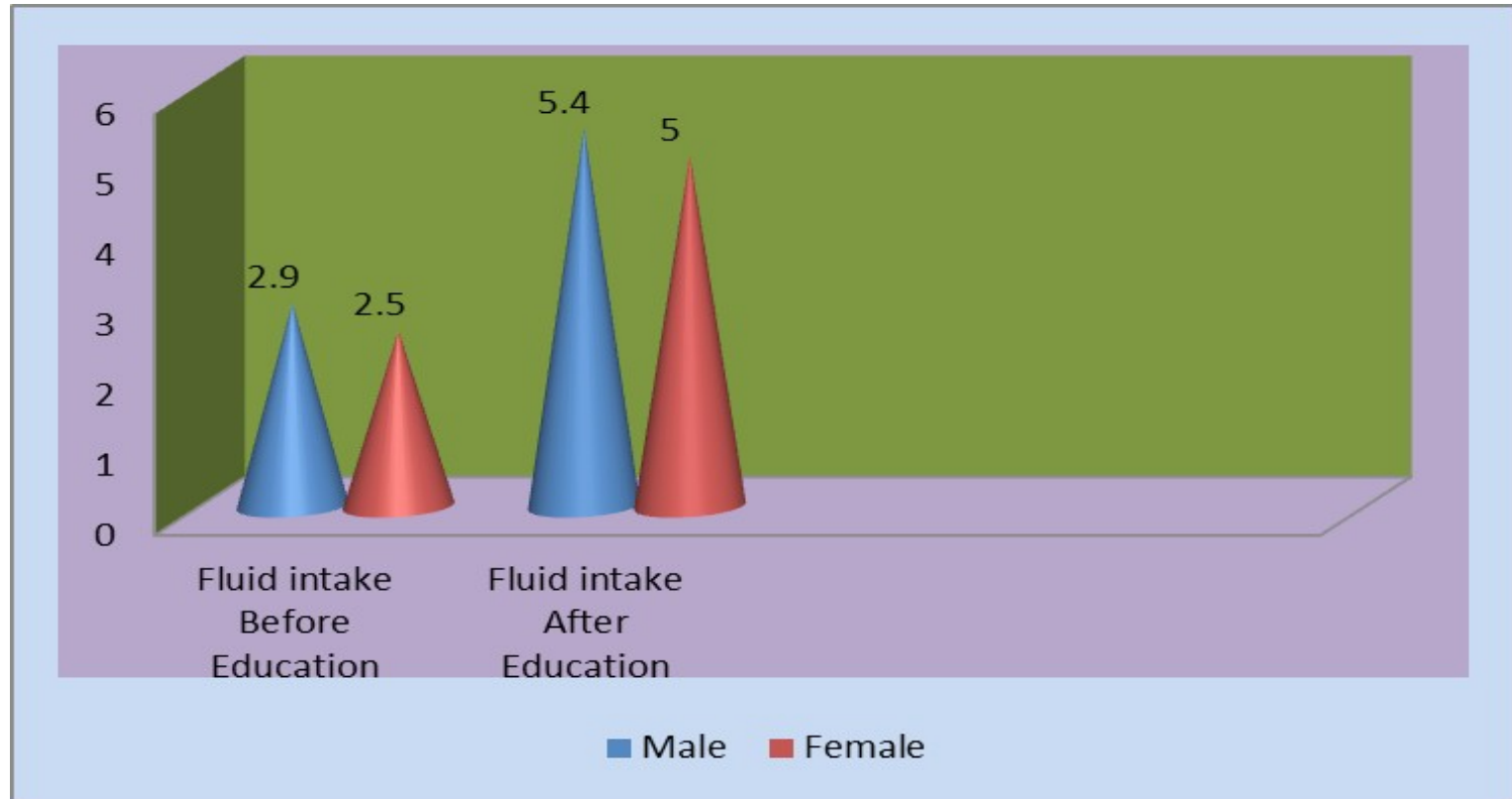KAP OF PARTICIPANTS BEFORE AND AFTER INTERVENTIONS
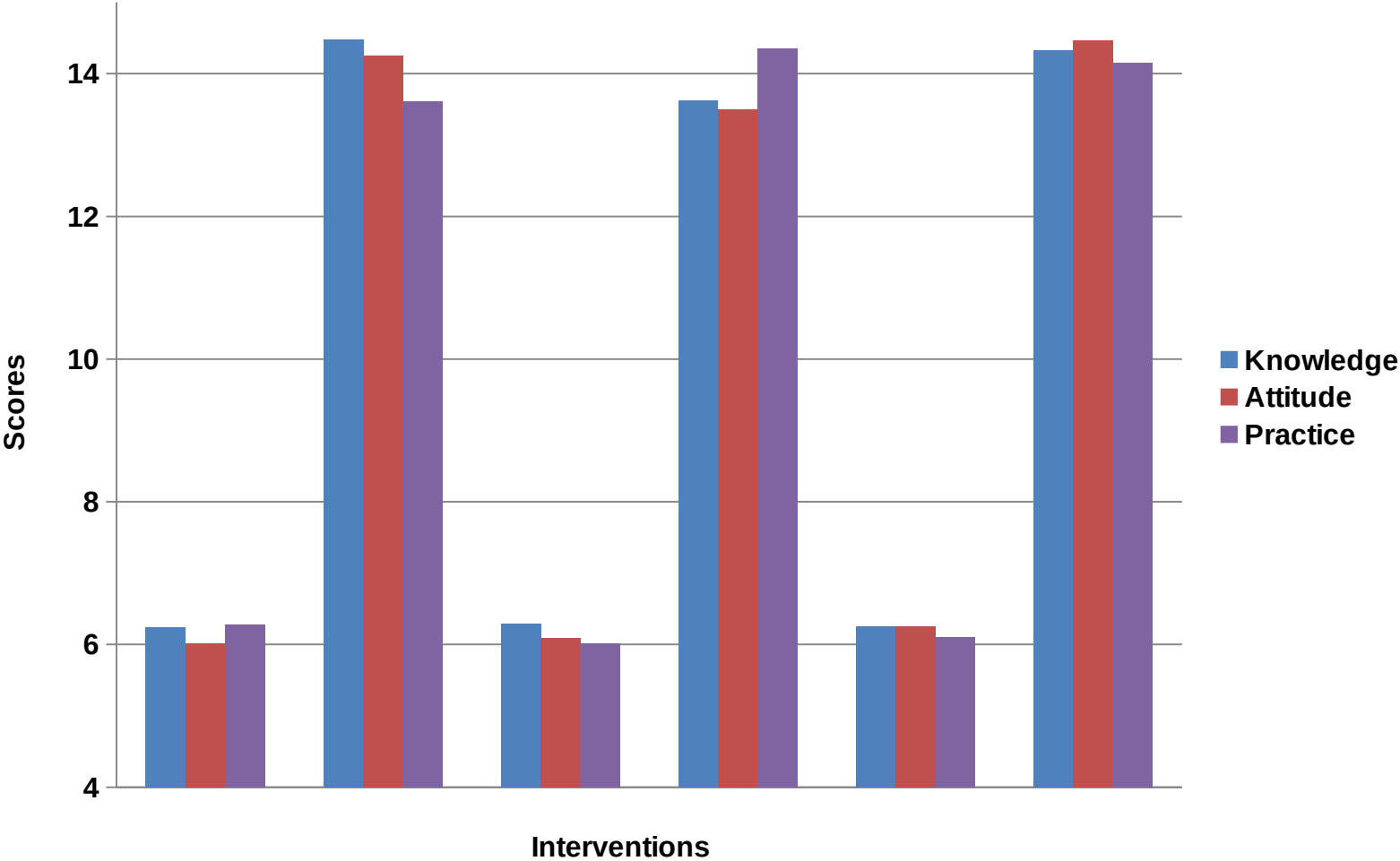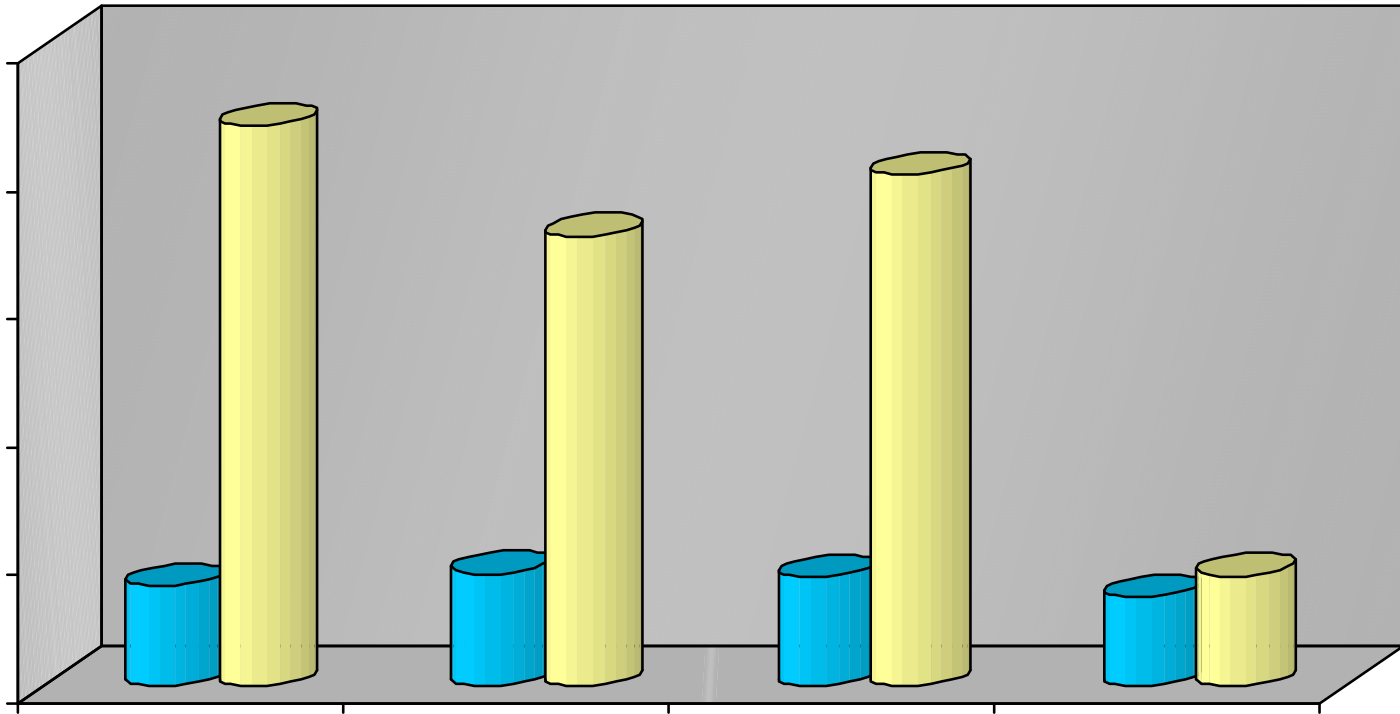
EFFECT OF NUTRITION EDUCATION ON FLUID INTAKE

CONCLUSION

- **VAD- a problem of public health significance among PTG children- 0.7%. Prevalence of Anemia - 93.3 per cent of the children.**

- **Angular stomatitis, bleeding gums, glossitis, cheilosis- observed especially among Kattunaickers and Paniyas.**

- **99 per cent of the families- EWS; 66 per cent of the monthly income -spent on food and 18.6 per cent - on alcoholic drinks, paan and betel leaves.**

- **All were non vegetarians; consumed three meals and black tea daily.**

- **Food intake pattern -dismal.**

- **Most of the foods cooked by boiling; Parboiled rice – daily; pulses and fleshy foods - not included; roots and tubers, green leafy vegetables and other vegetables - beans, brinjal, lady's finger and drumstick - only once a week; fruits and milk - very rare.**

- **Nutrition Education cum Kitchen Garden - more effective on KAP of mothers than any of them singly.**
- **Increase in number of mothers with the right nutritional concepts**
- **Increase in fluid intake of mothers**

Thank You