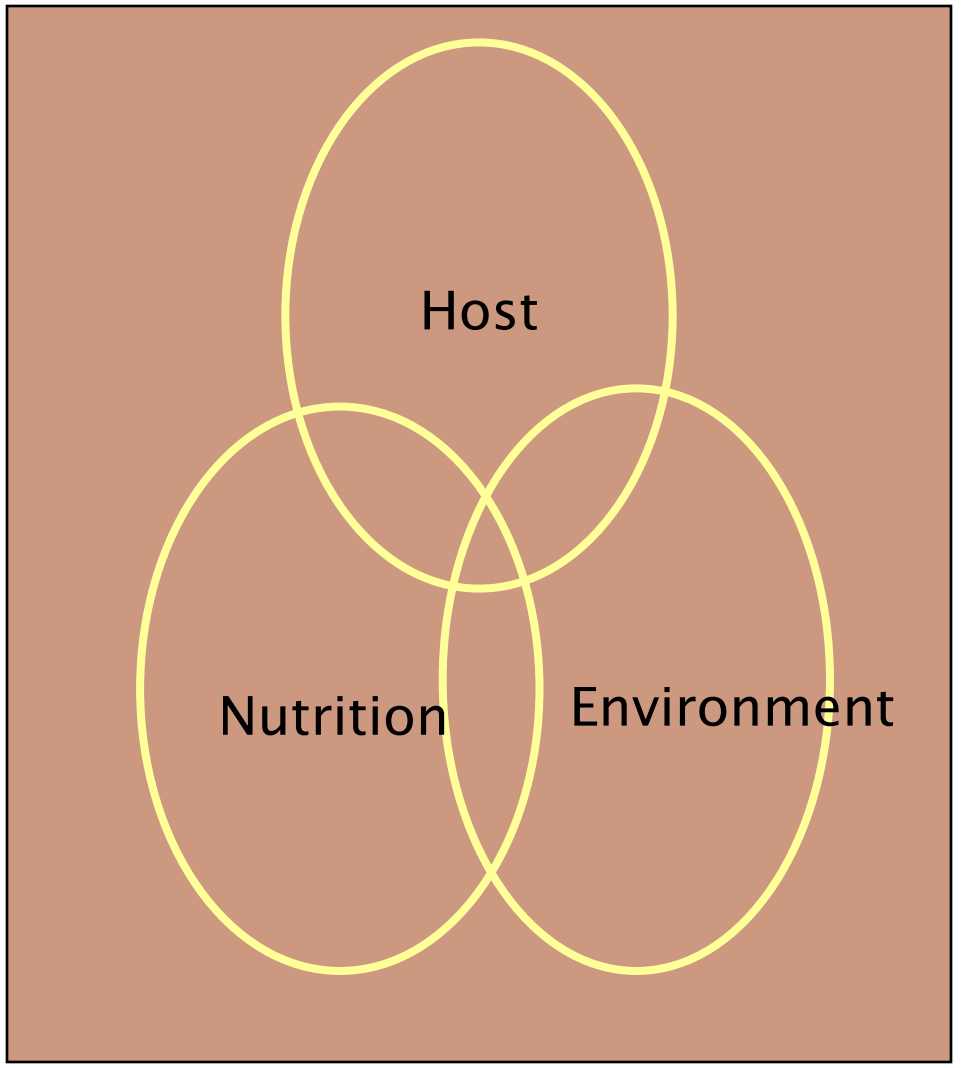
How to Ensure Quality of Survival?

Early Interactions & Modifiable Expressions

- Genes are the building blocks,
- Nutrition is the mortar &
- Environment is the architect
- that shape your destiny



The ICP model of growth, Karl Berg

Major determinants of growth during

Infancy : Nutrition, Birth Weight, Illnesses

Childhood: Nutrition, Hormones:

thyroxine & growth hormone,

Mediators of Growth- IGF

Puberty : Nutrition, Genetic factors, Sex steroids

Nutrition is the key determinant in all 3 ages

The Double Burden

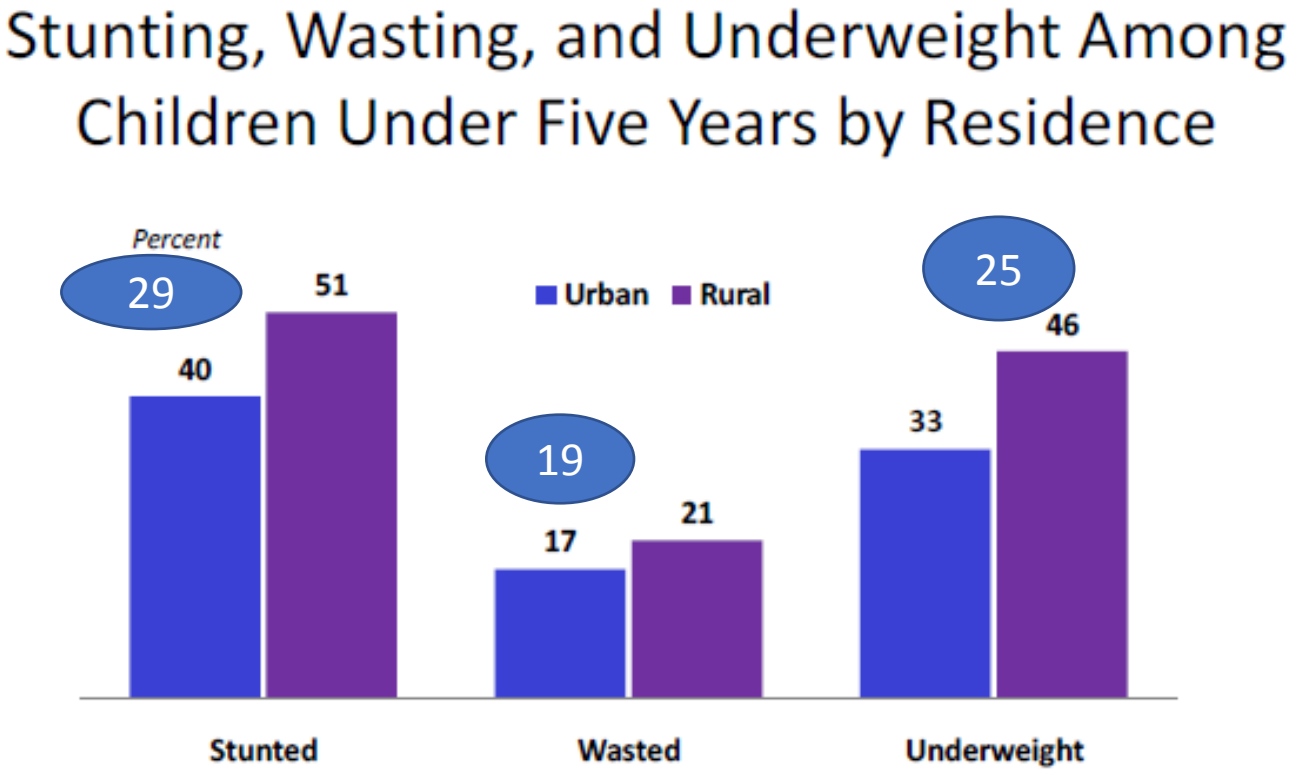
- Population: Normal weight, Underweight, Overweight
- Underweight: UW with Undernutrition, UW with Multiple Micronutrient Malnutrition
- Overweight: Obese with Metabolic syndrome, Overweight with Multiple Micronutrient Malnutrition
- Normal weight: Well nourished, Normal Weight with Multiple Micronutrient Malnutrition
- Micronutrient Malnutrition: Hidden or Overt
- Hidden- Subclinical /The Hidden Hunger (WHO)
- Overt - Micronutrient Deficiency Disorder (MDD)

The Dual Burden of Malnutrition

GOAL OF NATIONAL NUTRITION MISSION

Target topic	Present status	By 2020	Strategy with activities	Evaluation indicator
LBW	20-30	< 10		
Anemia among Mothers & Children	30-60% or more	<10%		
Child Malnutrition	22%	<10%		
Obesity	5	<5%		

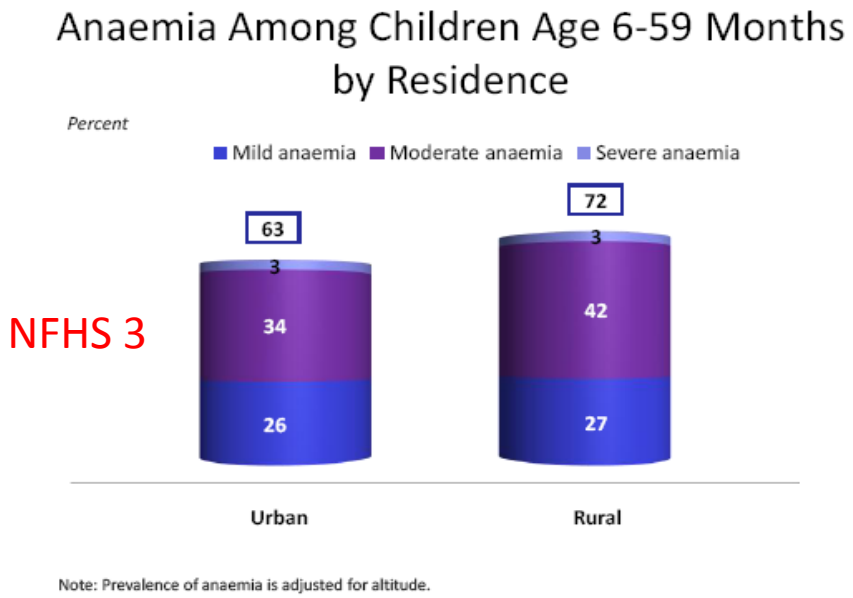
NFHS 4- Datasets, 2015-16 –Similar trends compared to NNMB 2017 (Urban) Datasets



Tackle Anemia Prevalence among Children & Mothers & Stress on Micronutrients

Anemia prevalence still high

Urban 56%



NFHS 3

NFHS 4	**55.9**	**59.4**

Prevalence of Childhood Obesity

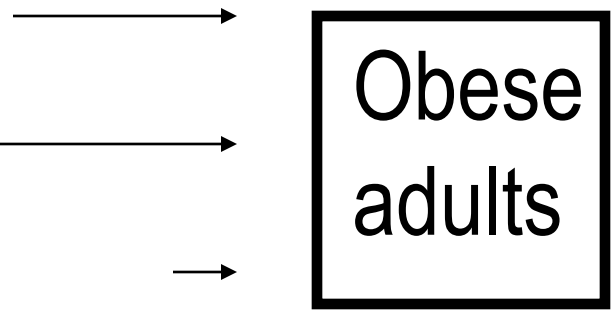
Country/City	Year	Prevalence
Global	2004	10
USA/UK	2000	20
Australia	1995	20
India/Chennai	2002	22
India/Delhi	2004	16
India/Delhi	2006	29

Misra *et al.*, *2006*

Bottle feeding, Junk food, SoFaS, The Gadgets, & The sedentary Lifestyle
Junk -HFSS (High in Fat, Sugar & Salt) &
SoFaS (Solid Fats (Transfat)& Added Sugars)

Do obese children grow into obese adults?

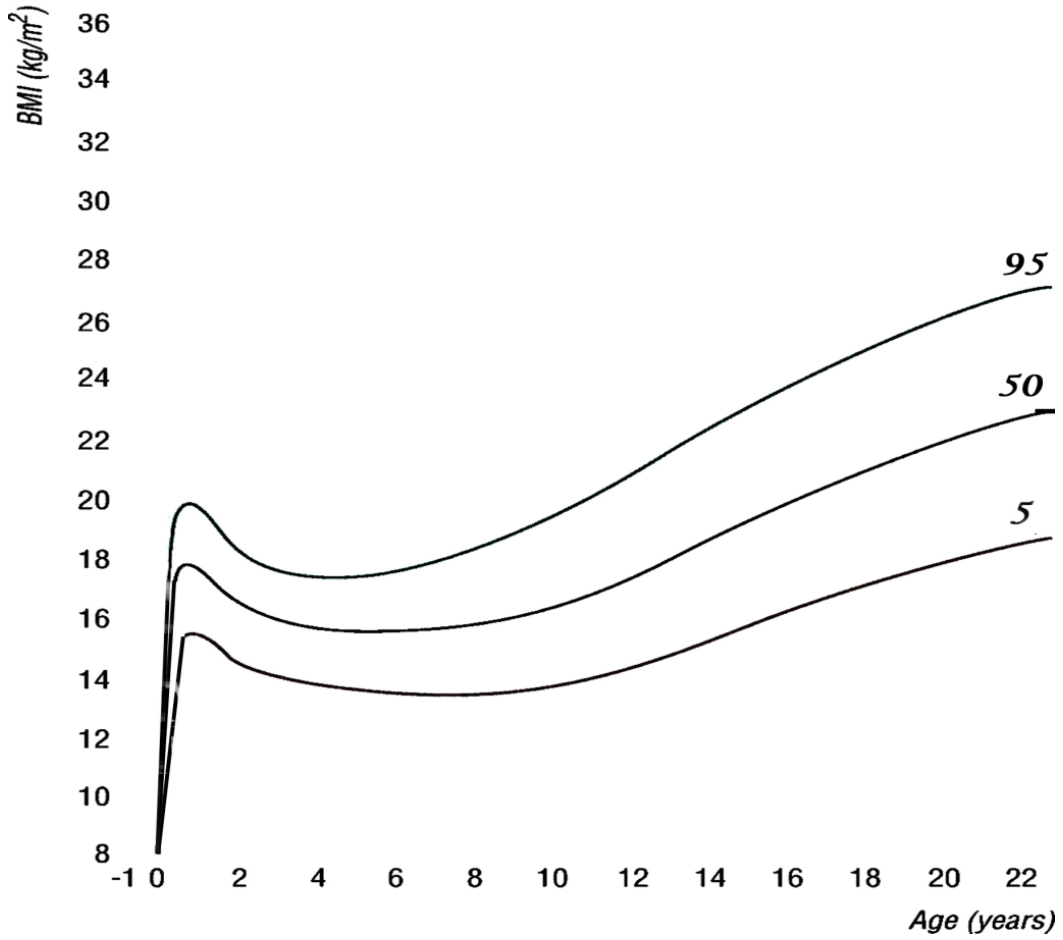
- ‘Tracking’ occurs throughout life
- 10-20% obese infants
- 40% obese children
- 60-80% obese adolescents



Tracking of BMI & W/H Ratio to predict NCDs

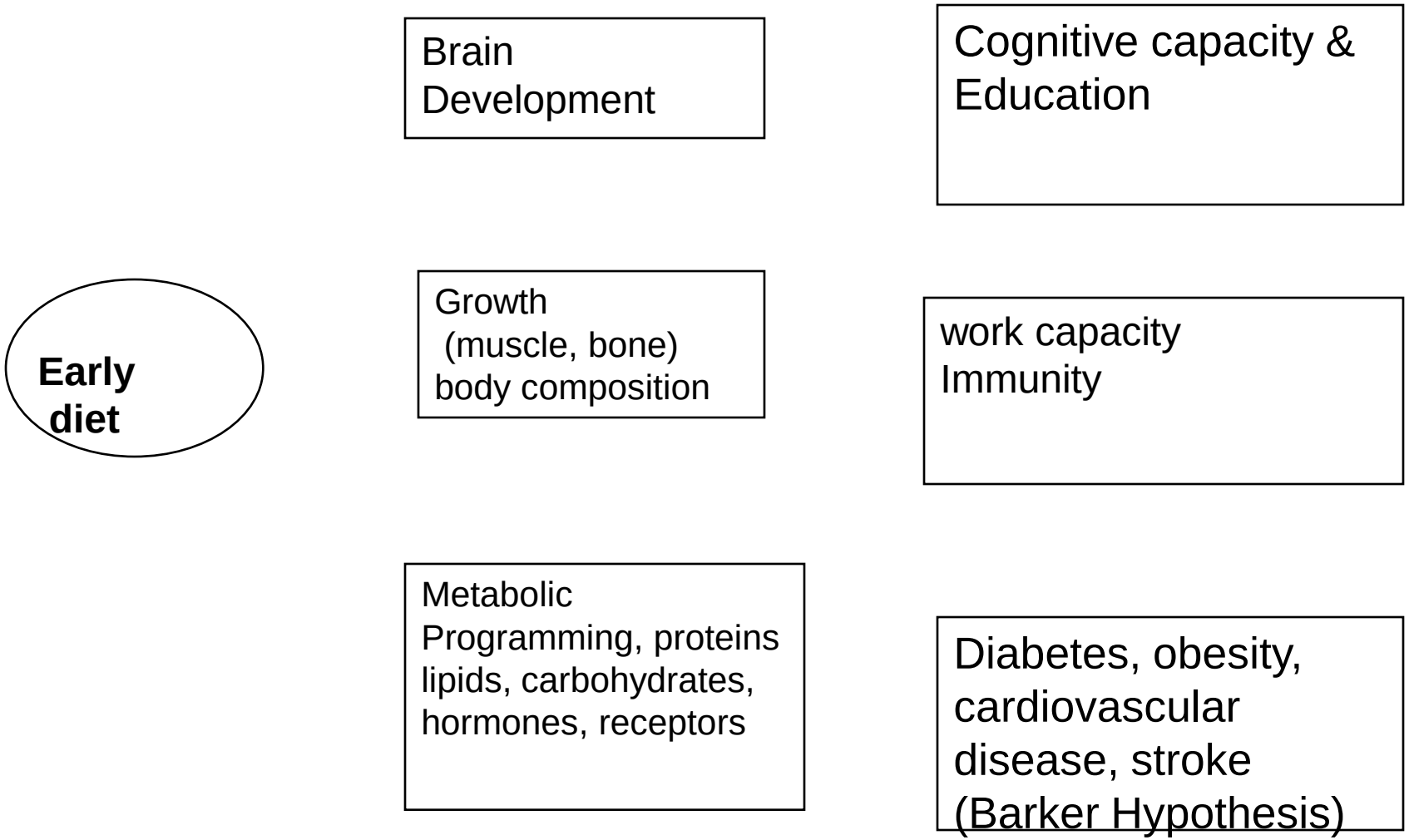
Fat cells accumulate in 1st 6-12 mo. & size increases thereafter

Number remain constant in adulthood



NB -13, 1 yr. -17, Preschool -15 → Adult- 18.5, -23-27 Asians Vs. Caucasians 25-30

Interaction between early nutrition & outcome: Early Nutrition Programming

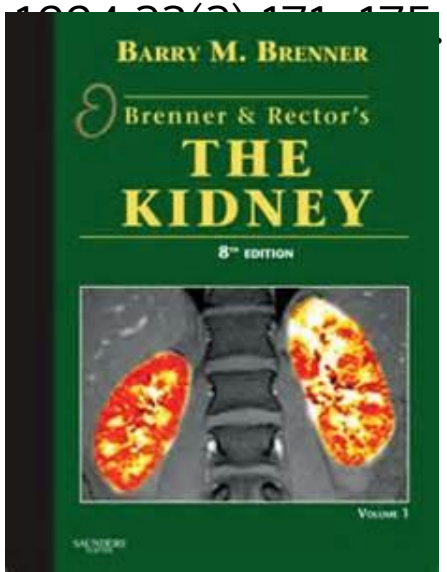


The Barker Hypothesis (1990)

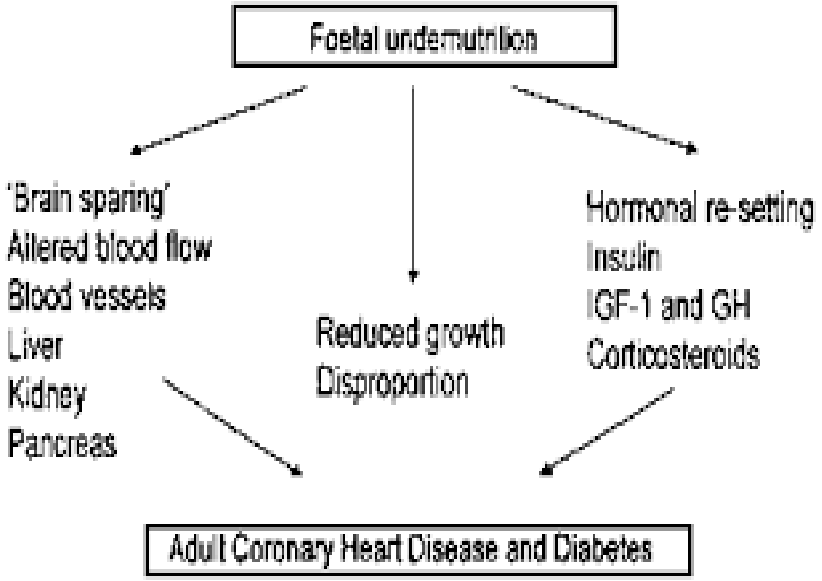
- The roots of adulthood Diseases are laid during fetal period (1990)
- LBW Babies develop adulthood diseases early

- The Brenner Hypothesis (1994)

Brenner BM, Chertow GM. Congenital oligonephropathy and the etiology of adult hypertension and progressive renal injury. *The American Journal of Kidney Diseases*. [PubMed]



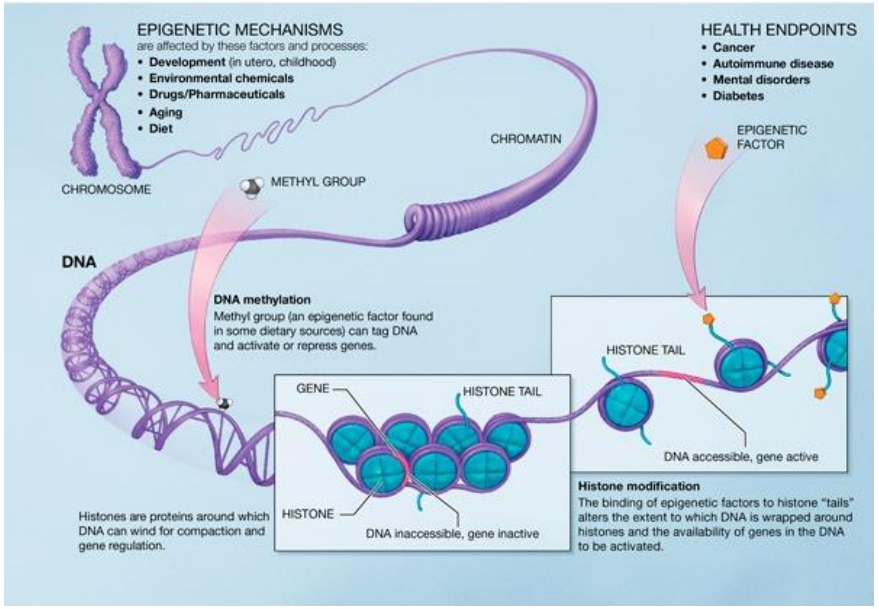
The Thrifty Phenotype, Barker Hypothesis & Early Nutrition Programming

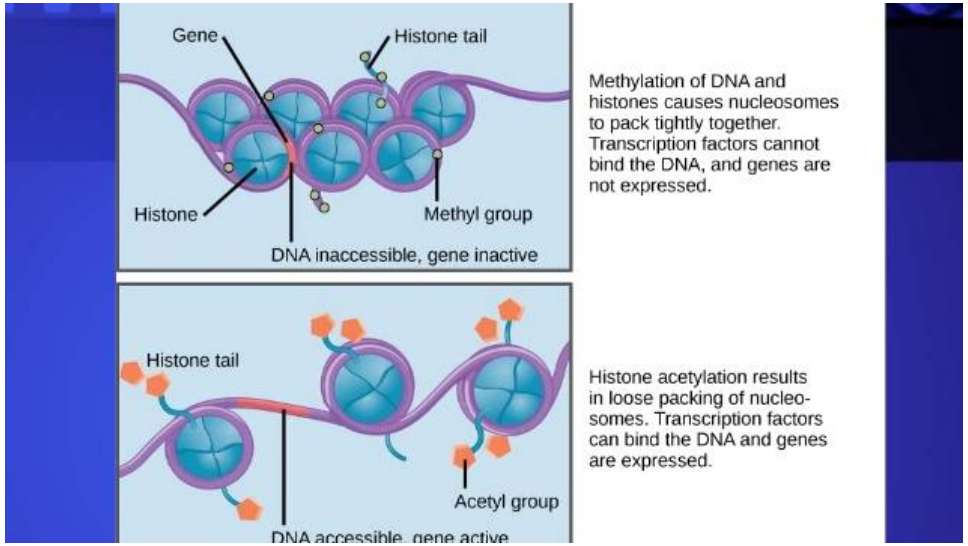


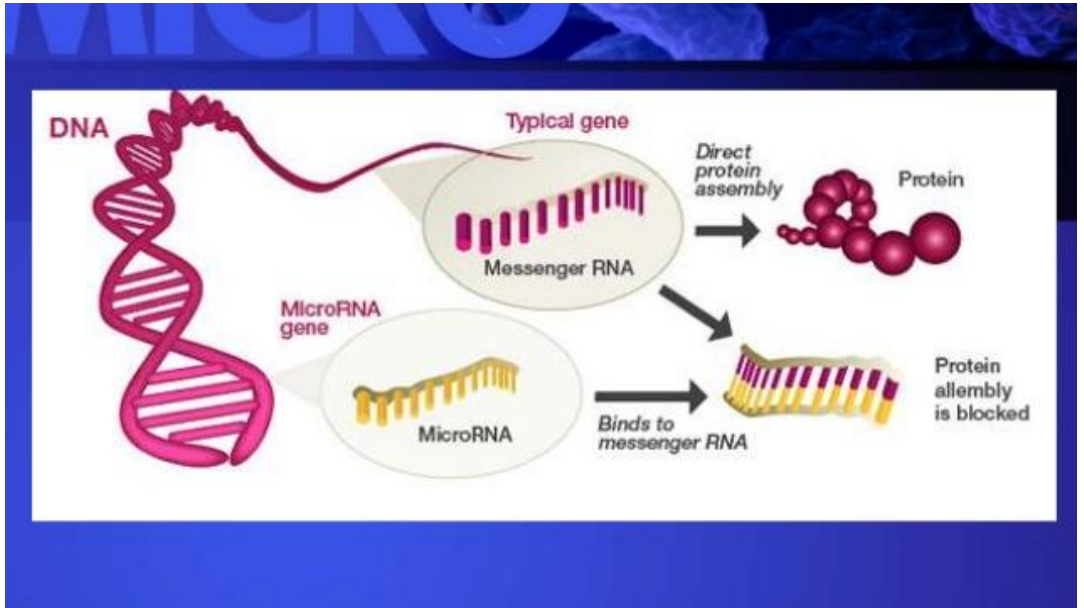
- Permanent structural changes- vascular aging and vascular remodeling, secondary to high cortisol
- Epigenetic programming of gene expression & gene modulation
- Accelerated cellular ageing & apoptosis

Know the power of Epigenetics & Transgenerational Effects by gene modulation- in 1-60 + generations

Methylation →“Silences” Genes & Histone Modification “Activates Genes”





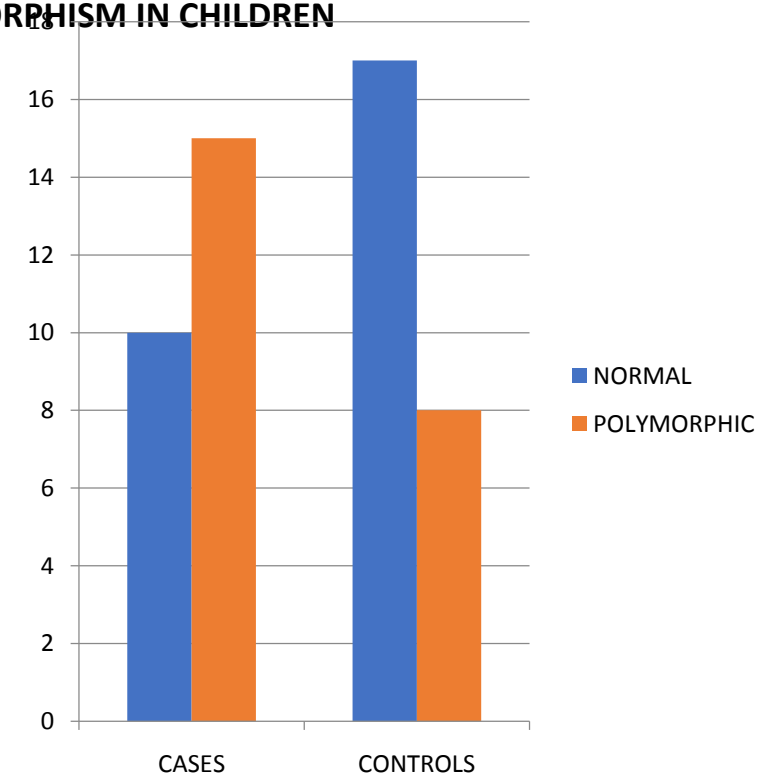


K E Elizabeth, S L Praveen, N R Preethi, V T Jissa, M R Pillai. Folate, vitamin B12, homocysteine and polymorphisms in folate metabolizing genes in children with congenital heart disease and their mothers, Nature-EJCN European Journal of Clinical Nutrition, (6 September 2017) | doi:10.1038/ejcn.2017.135

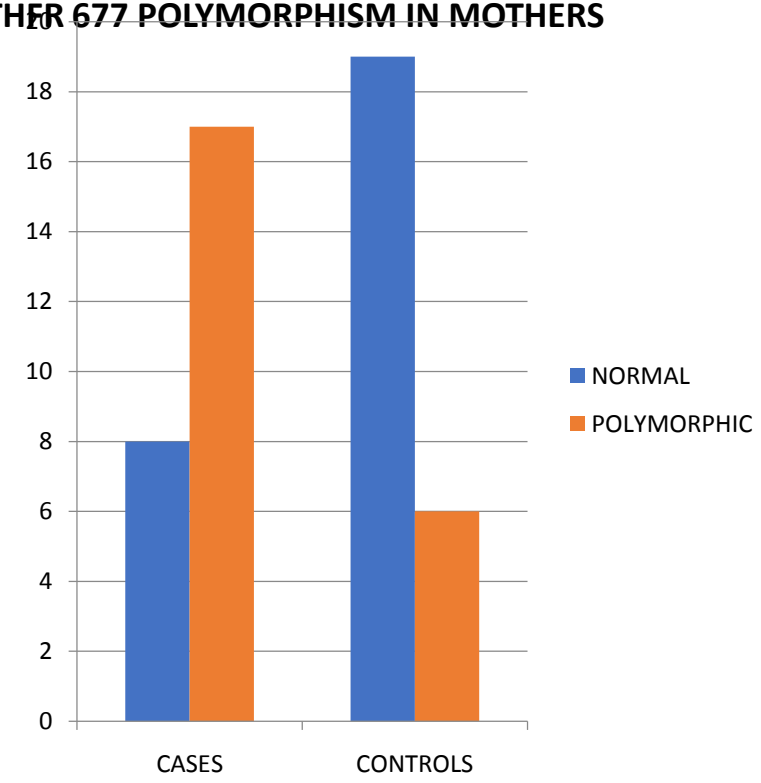
(Funding- Kerala State Science & Technology)

CHD & Folate Related Polymorphism- could have been addressed by folate supplementation for primary prevention

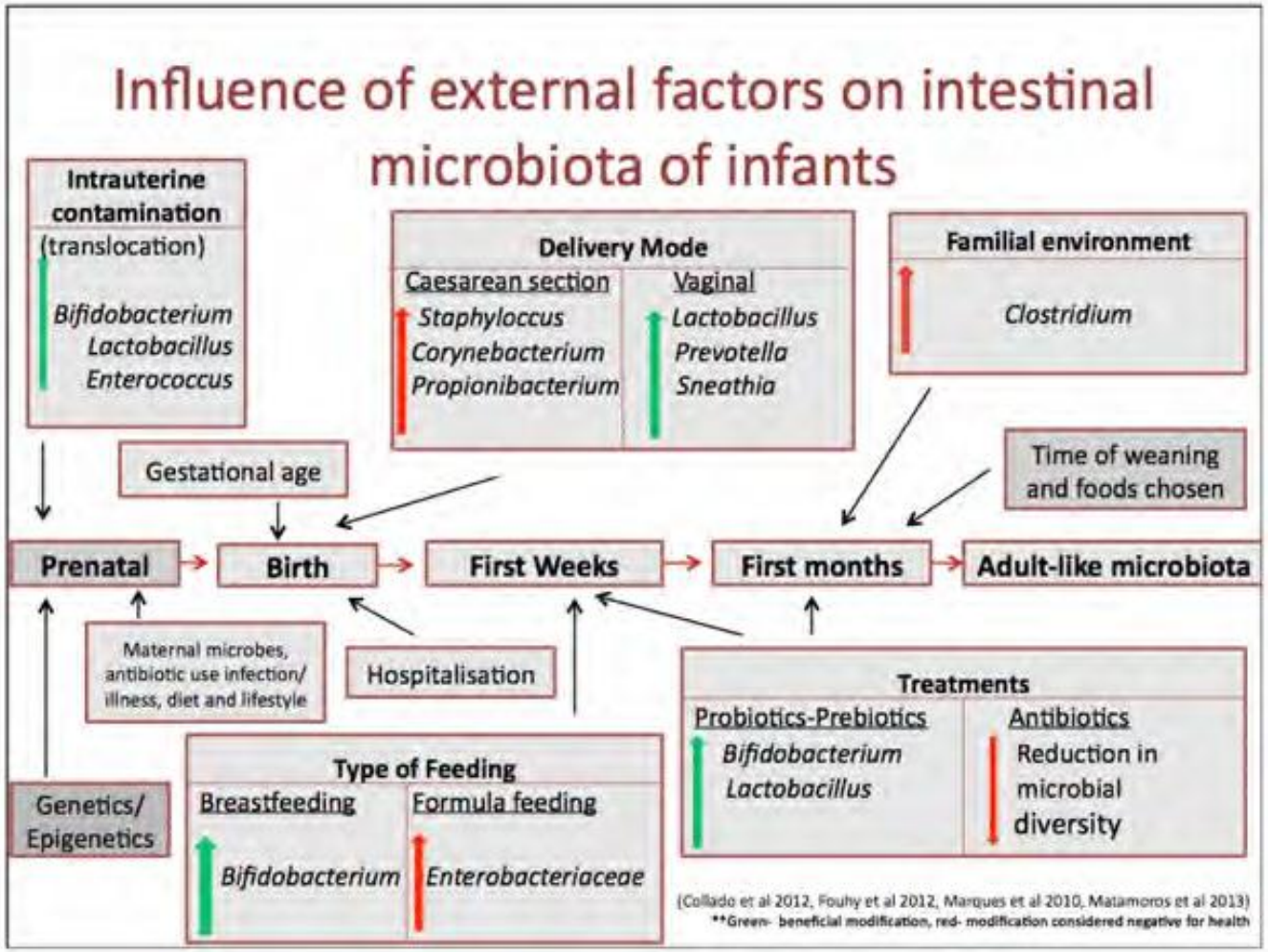
MTHFR 677 POLYMORPHISM IN CHILDREN

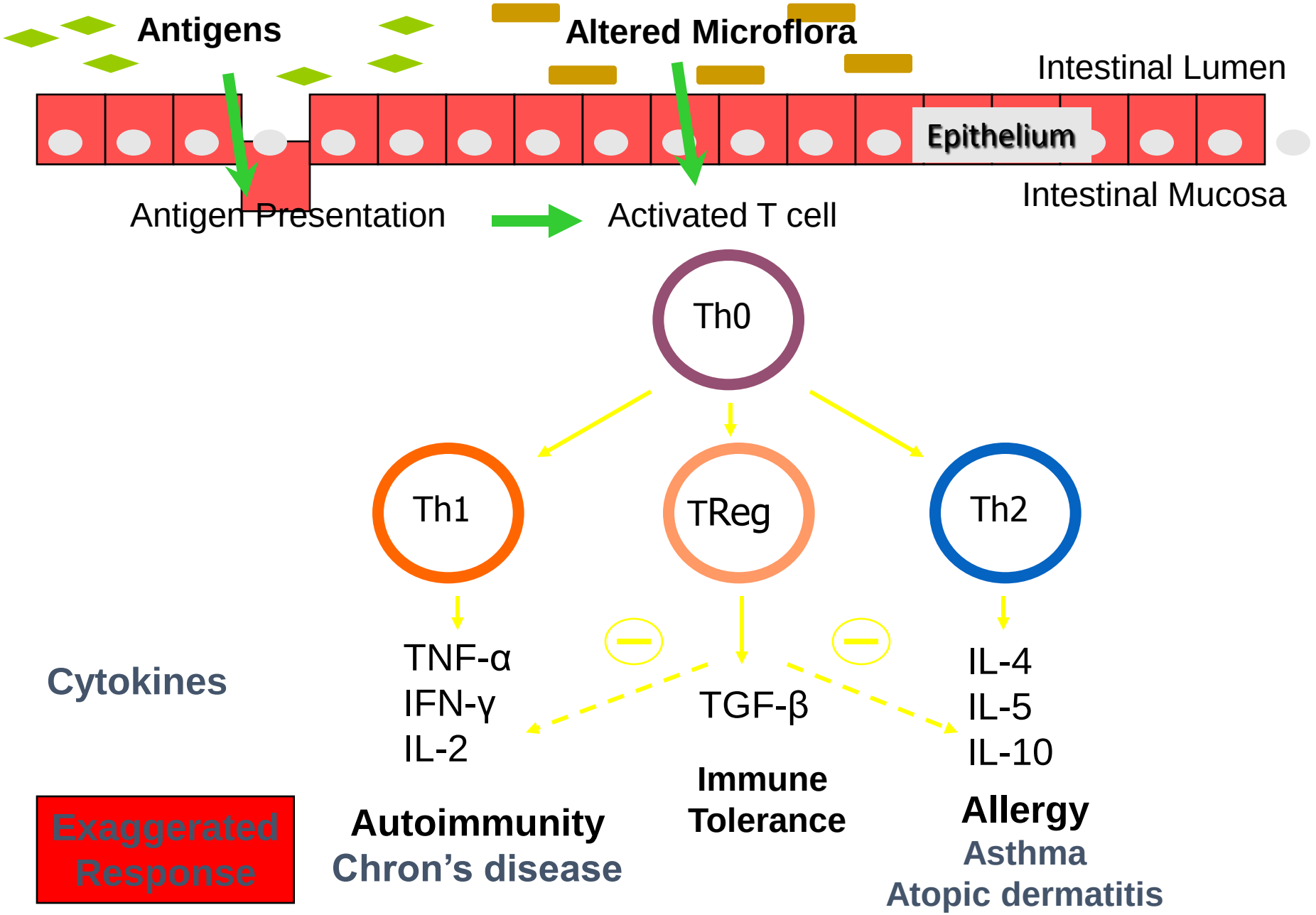


MTHFR 677 POLYMORPHISM IN MOTHERS



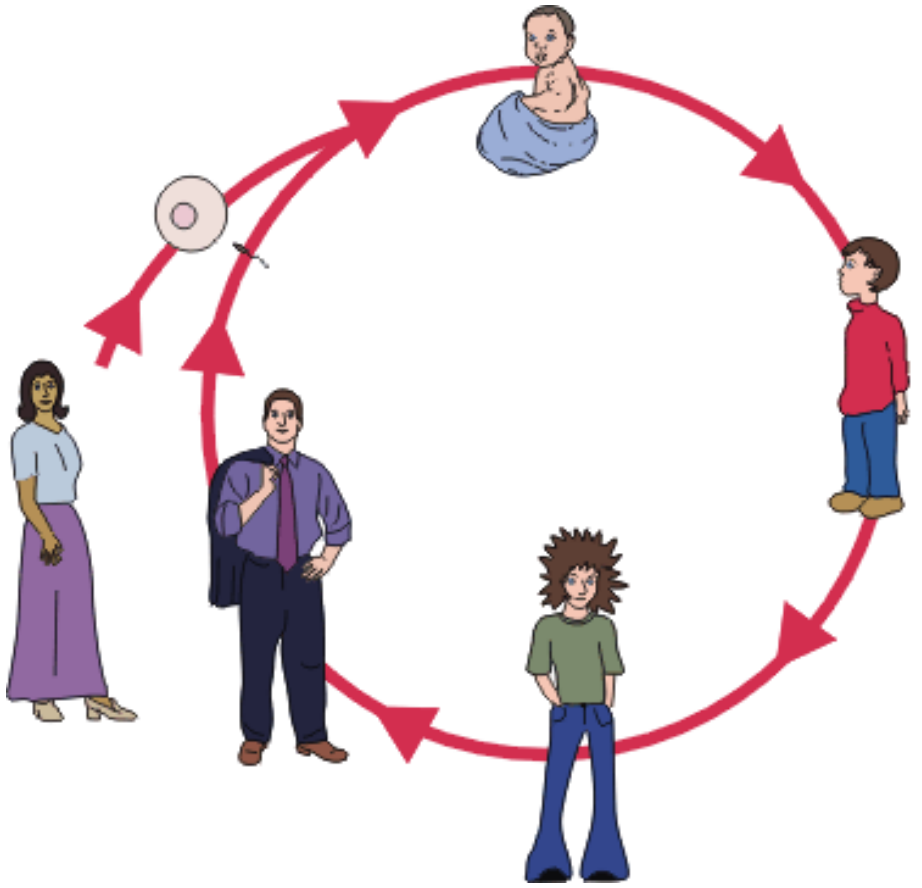
MICROBIOTA


Influence of external factors on intestinal microbiota of infants
Intrauterine contamination
(translocation)
Bifidobacterium
Lactobacillus
Enterococcus
Delivery Mode
Caesarean section
Staphyloccus
Corynebacterium
Propionibacterium
Vaginal
Lactobacillus
Prevotella
Sneathia
Familial environment
Clostridium
Gestational age
Time of weaning and foods chosen
Prenatal
Birth
First Weeks
First months
Adult-like microbiota
Maternal microbes, antibiotic use infection/ illness, diet and lifestyle
Hospitalisation
Treatments
Probiotics-Prebiotics
Bifidobacterium
Lactobacillus
Antibiotics
Reduction in microbial diversity
Genetics/ Epigenetics
Type of Feeding
Breastfeeding
Bifidobacterium
Formula feeding
Enterobacteriaceae
(Collado et al 2012, Fouhy et al 2012, Marques et al 2010, Matamoros et al 2013)
**Green- beneficial modification, red- modification considered negative for health


Antigens
Altered Microflora
Intestinal Lumen
Epithelium
Intestinal Mucosa
Antigen Presentation
Activated T cell
Th0
Th1
TReg
Th2
Cytokines
TNF-α
IFN-γ
IL-2
TGF-β
IL-4
IL-5
IL-10
Exaggerated Response
Autoimmunity
Chron's disease
Immune Tolerance
Allergy
Asthma
Atopic dermatitis

Primordial prevention & IYCF **Life Cycle Approach**

1st 1000 days concept: – 9 mo (270) to + 24 mo (730 days)

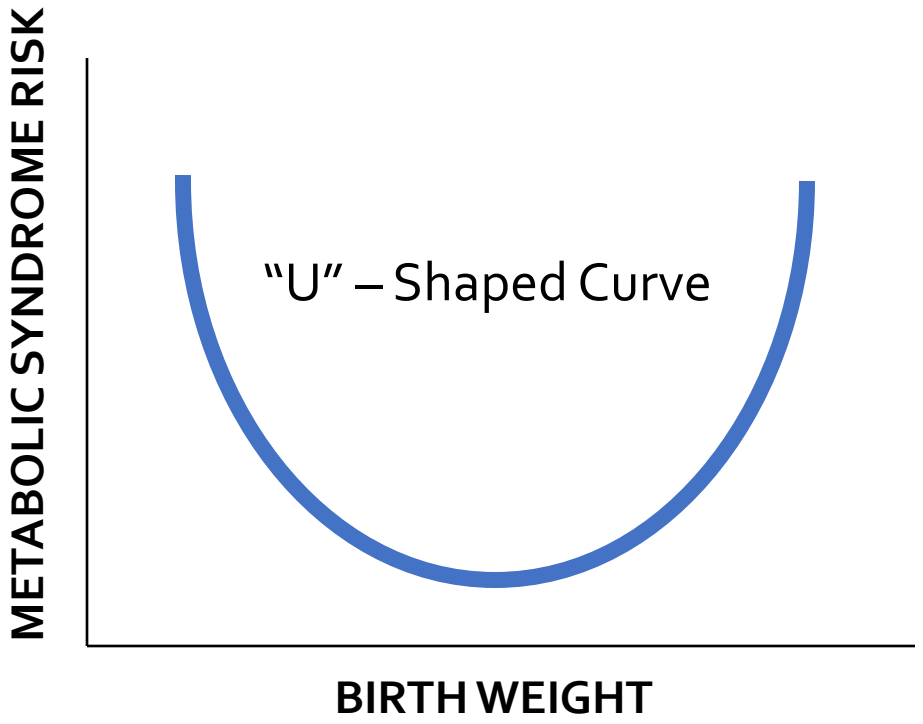


IYCF-Nutrition in the 1st 1000 days of life (-9 to +24 months)

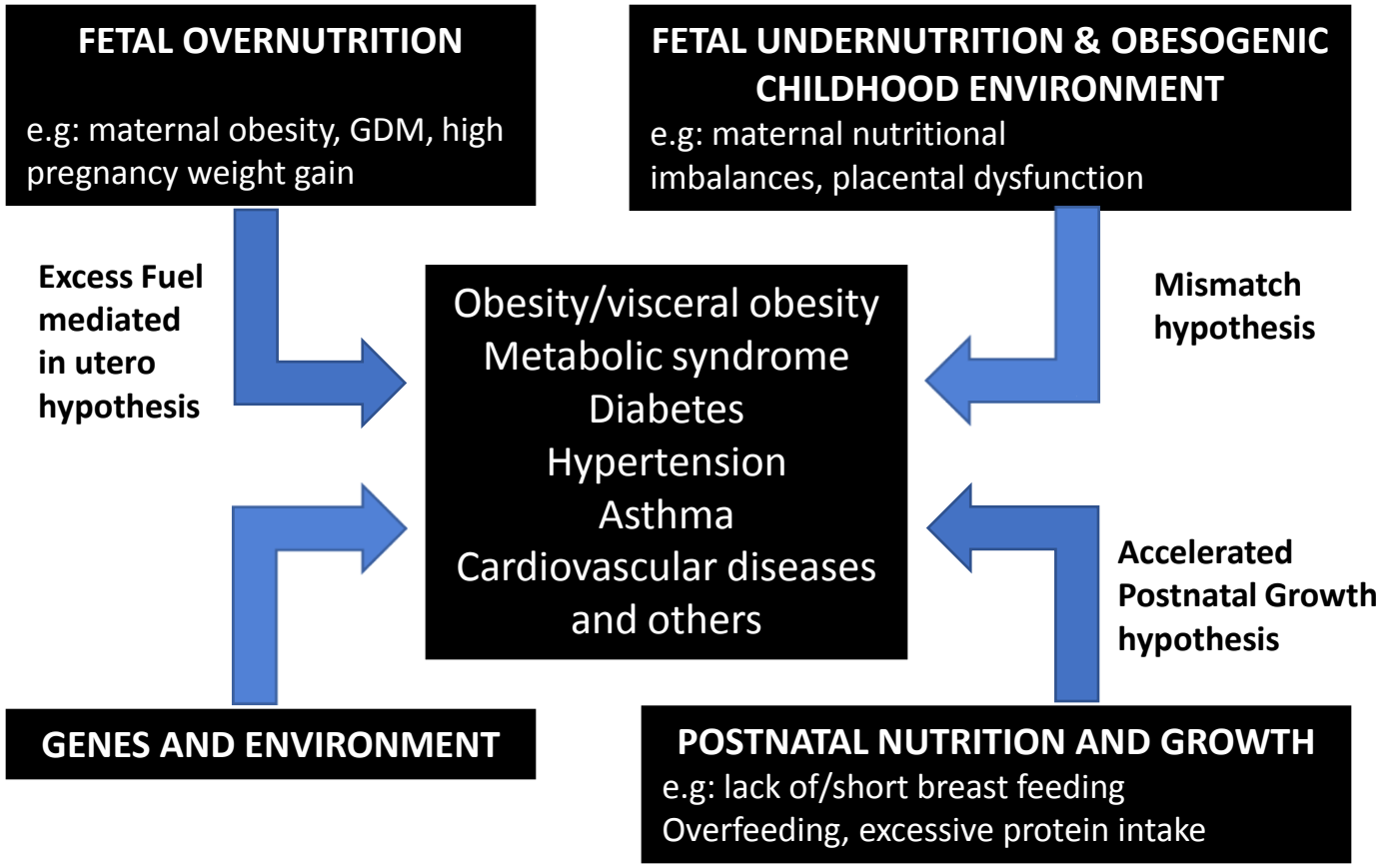
- In utero- 270 days (-9 mo.)- reflected as the birth weight
- 1st 24 months- 730 days (+ 24 mo.)-
- period when body growth becomes 20%,
- height becomes 50%
- brain growth and myelination becomes 80%
- paves the foundation of health, immunity and future diseases

Birth Weight: Implications for Future Generations- Normal BW-The greatest wealth of a baby

Ensure Normal Birth weight- Implement Adolescent & Prenatal Nutrition



EARLY NUTRITION PROGRAMMING IN LONG-TERM HEALTH



Predictive Postnatal Adaptive Response

FETAL NUTRITION ENVIRONMENT	POSTNATAL DIET ENVIRONMENT	ADULT HEALTH

Adequate Nutrition → Adequate Nutrition → HEALTHY

Adequate Nutrition → Poor Nutrition → MALNOURISHED

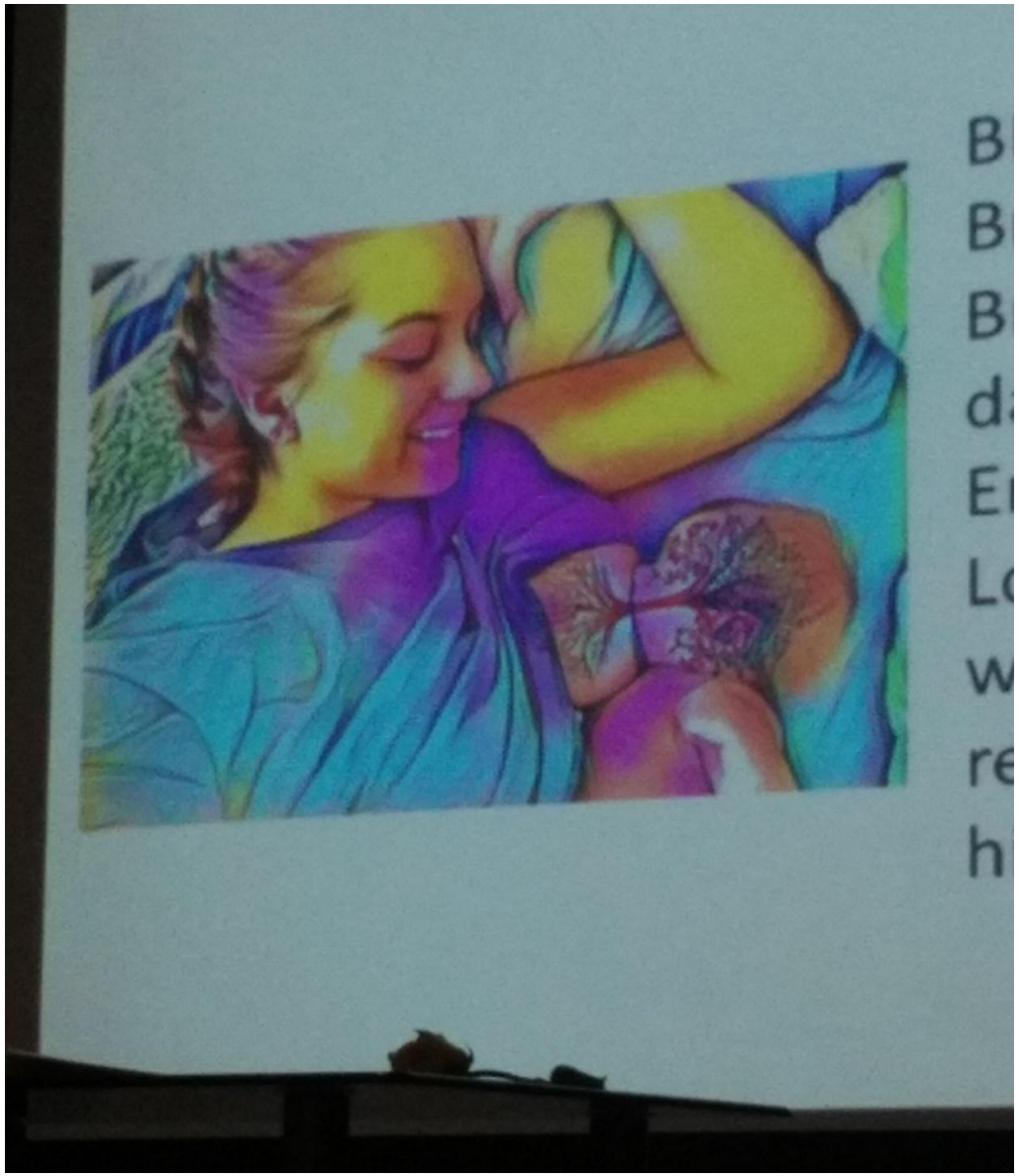
Poor Nutrition → Excess Nutrition → METABOLIC SYNDROME

Poor Nutrition → Poor Nutrition → MALNOURISHED

Recommended Weight Gain based on Pre-Pregnancy BMI

BMI $\frac{\text{Weight (kg)}}{\text{Height (m}^2\text{)}}$	Weight Gain (kg)	Weight Gain (lbs)
Underweight BMI < 18.5	12.7-18.2	28-40
Normal Weight BMI 19-24.9	11.4-15.9	25-35
Overweight BMI 25-29.9	6.8-11.4	15-25
Obese BMI > 30.0	6.8	<15

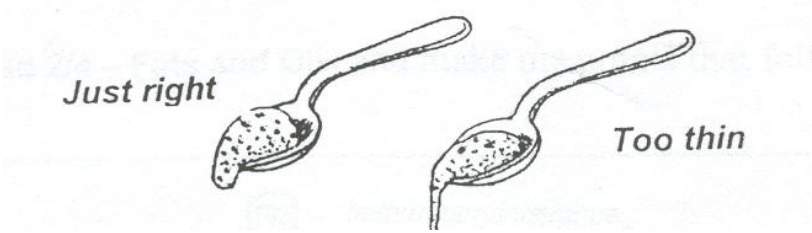
Institute of Medicine. Weight Gain During Pregnancy. National Academy Press. 1999.



Capitalize on Healthy eating: Initiate breastfeeding soon after birth & Record 1st feed in every baby- The first gift

- The Strength & warmth of
- Breastfeeding →
- better Body Growth,
  Brain Growth,
  Emotional wellbeing &
  Immunity

Ensure Responsive Complementary feeding & Anticipatory Nutrition Guidance (ANG) in a media free zone, media free time with comfortable Seating



Can we use TV viewing be used to assist eating?

- Mindless eating
- Not listening to cues
- TV decides eating

  <u>Dinner Table</u>

- Family Bonding & Family Time
- Table Manners
- Try new food

ENSURE Breakfast for all- the Brain's Food

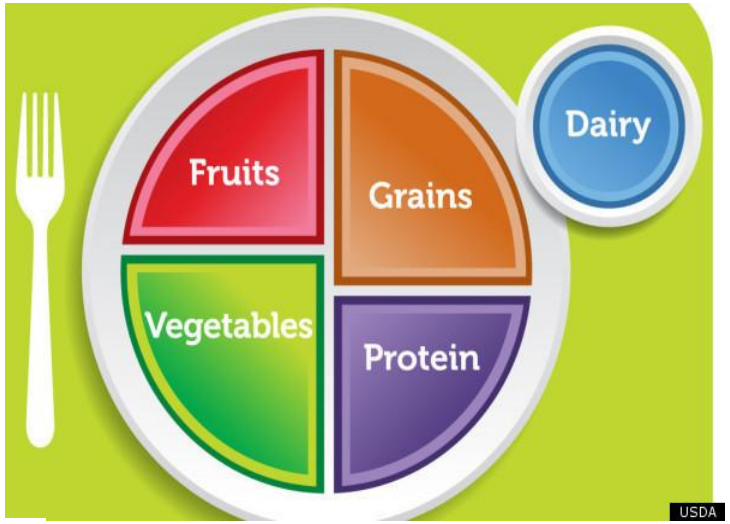
Good Breakfast like King

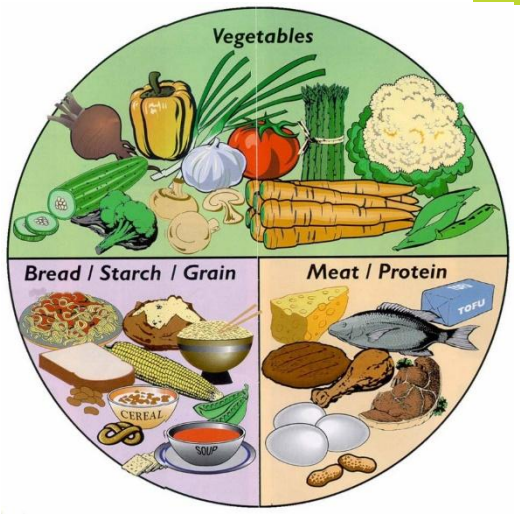
Adequate Lunch like Prince

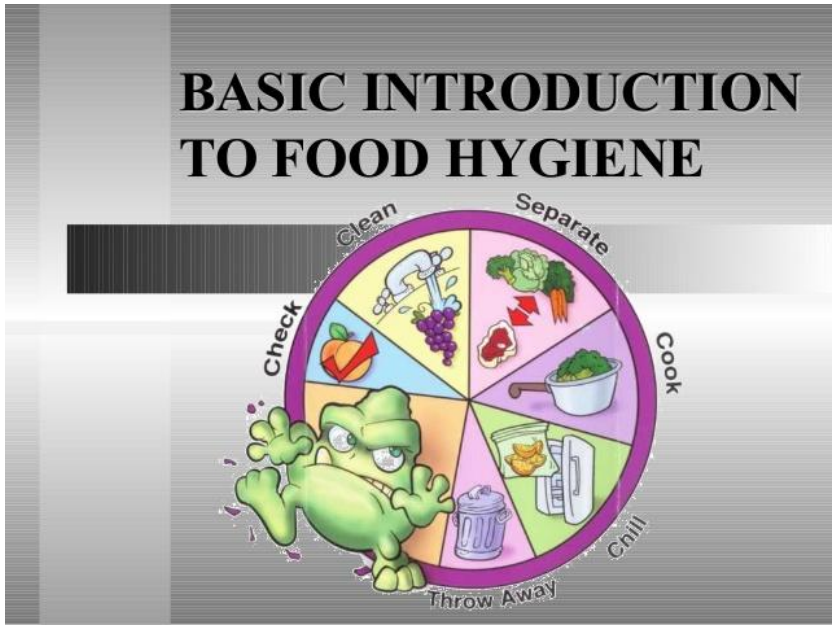
Small evening snack

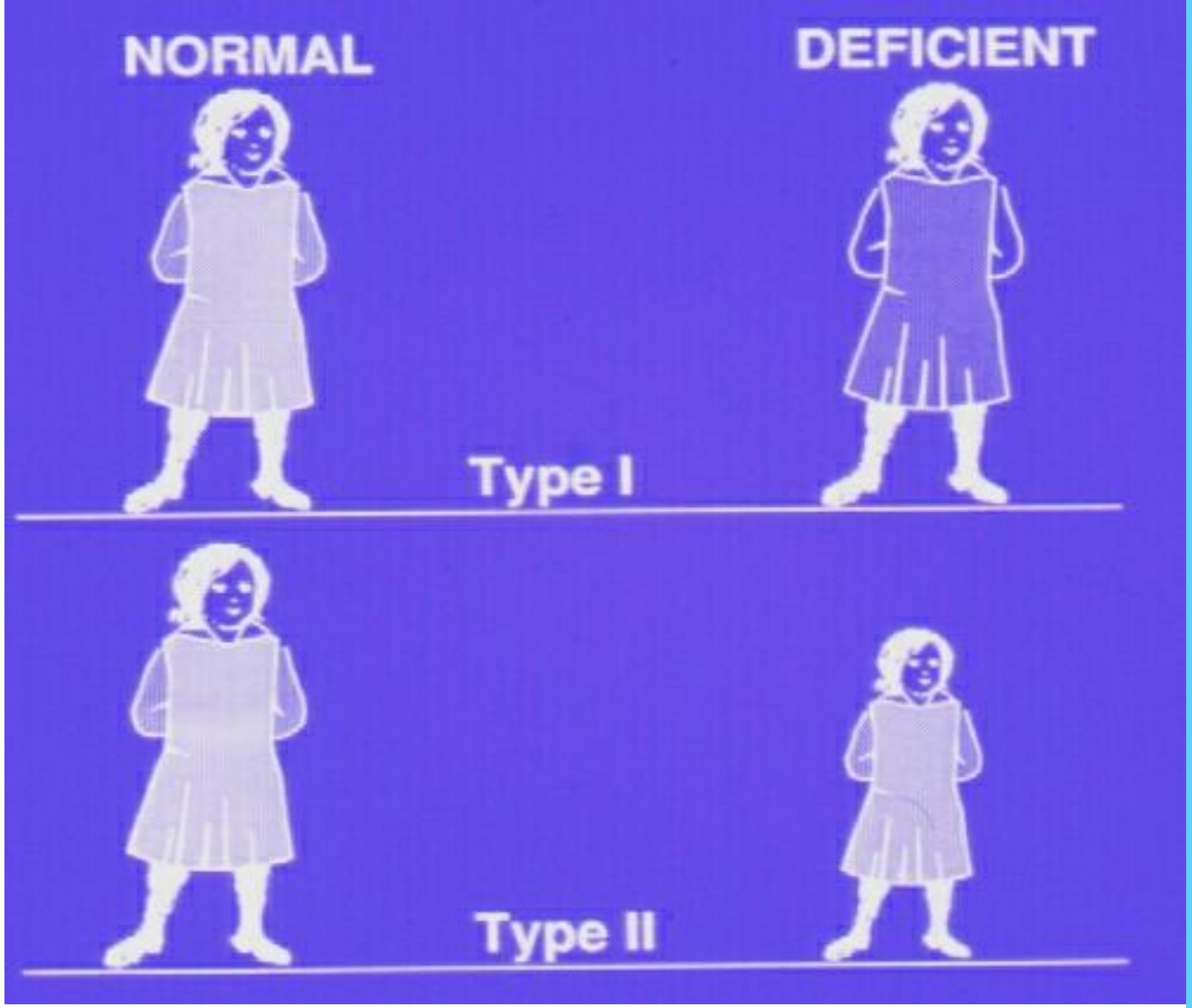
Frugal dinner like Pauper

Popularize Rainbow Revolution for addressing the Micronutrient Gap &
Promote the Plate Method for Healthy eating with 7 colors (GYOR, B, P, W)
Know Type 1 Type 2 Nutrients









What is the difference ??

What is your interpretation ??

KNOW TYPE 1 & Type 2 nutrients

Type 1

- iron
- iodine
- copper
- calcium
- selenium
- thiamin
- riboflavin
- pyridoxine
- niacin
- folate
- cobalamin
- vitamin A, D, E, K

Type 2

- nitrogen
- essential amino acids
- potassium
- magnesium
- phosphorus
- sulphur
- zinc
- sodium
- chloride

Ensure Enough Fiber, Antioxidants and Water for optimum Health & Growth

Two small fruits 200g = 4 g Fibre

One large Fruit 200gm = 4 g Fibre

One tuber 100g = 4 g Fibre

50 gm GLV = 4 g Fibre

3 year old (3 + 5 = 8 g)

Concern about Iron deficiency, affects stamina & learning ability
National Iron Plus Initiative-NIPI

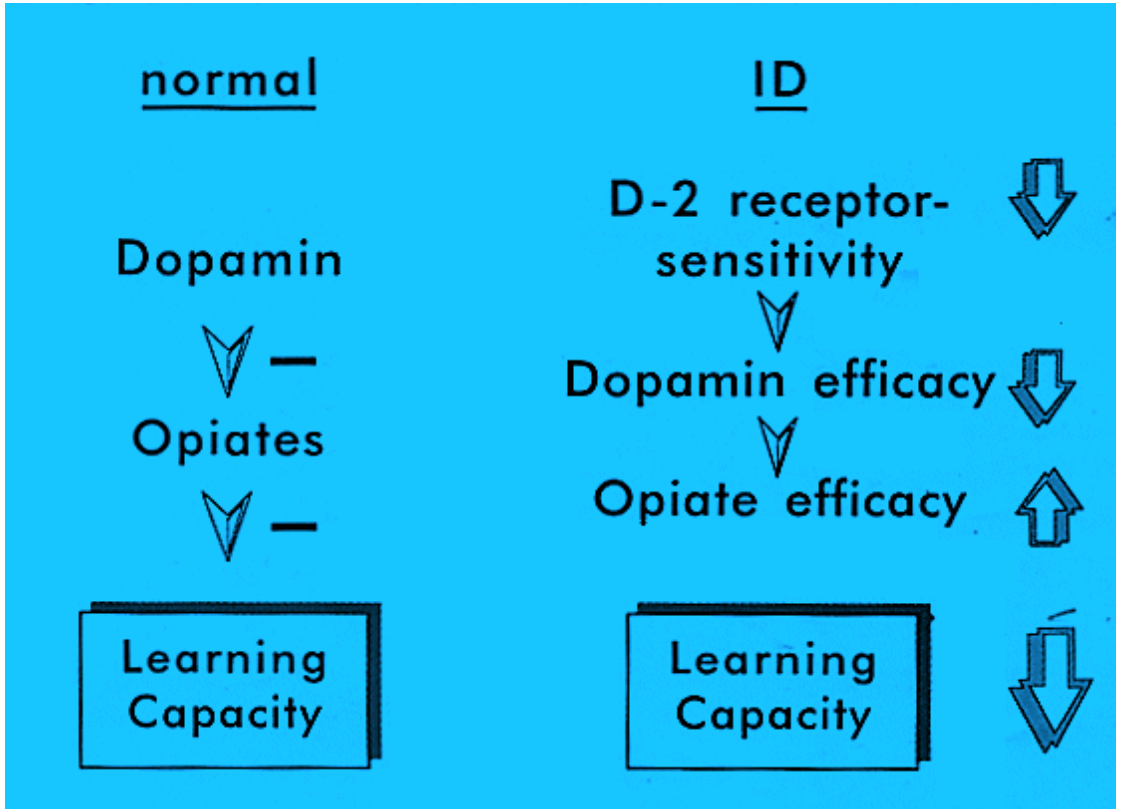
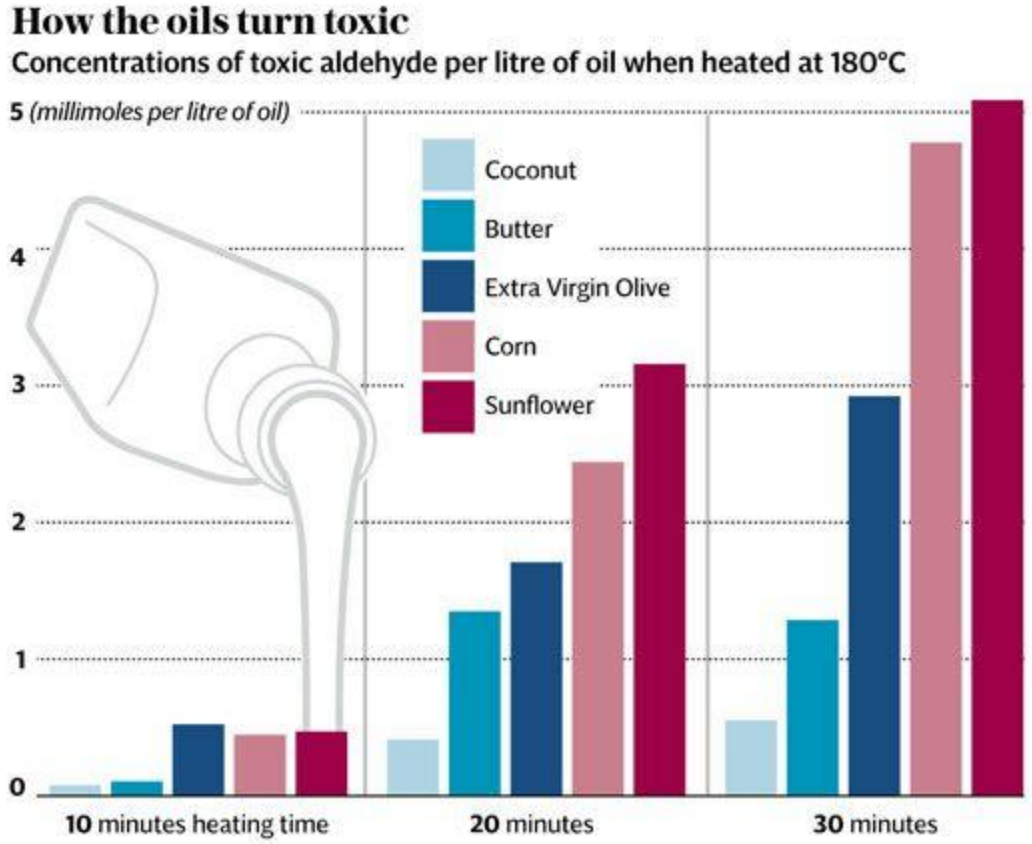


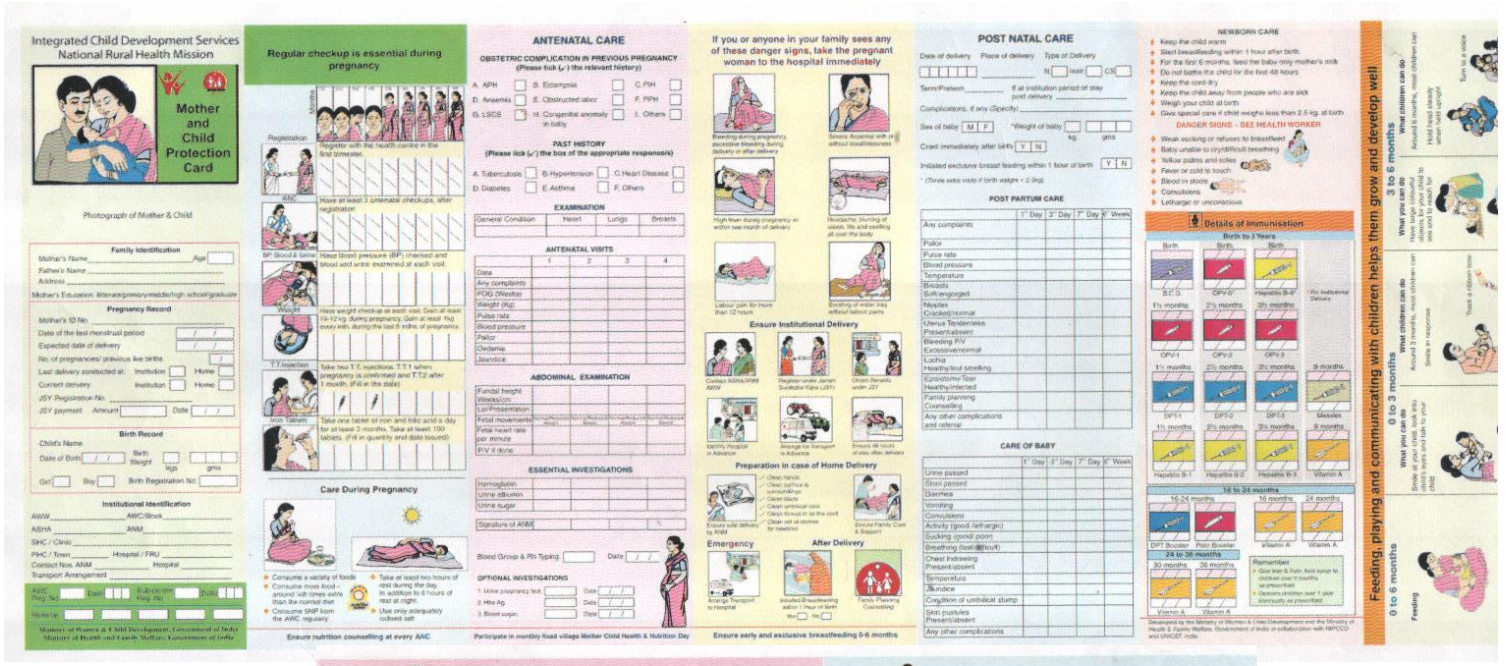
Table 4: Prophylactic dose and regime for Iron Folic Acid supplementation

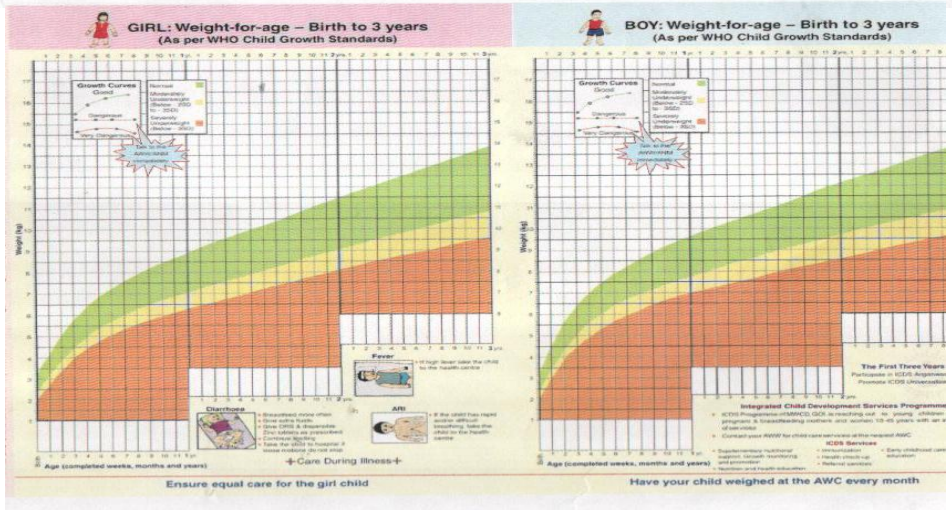
Age group	Dose and regime
Children 6–59 months of age	Biweekly, 1 ml Iron and Folic Acid syrup Each ml of Iron and Folic Acid syrup containing 20 mg elemental Iron + 100 mcg of Folic Acid Bottle (50ml) to have an 'auto-dispenser' and information leaflet as per MoHFW guidelines in the mono-carton (*See Note 1*)
Children 5–9 years of age	Weekly, 1 Iron and Folic Acid tablet Each tablet containing 45 mg elemental Iron + 400 mcg Folic Acid, sugar-coated, pink colour
School-going adolescent girls and boys, 10–19 years of age Out-of-school adolescent girls, 10–19 years of age	Weekly, 1 Iron and Folic Acid tablet Each tablet containing 60 mg elemental iron + 500 mcg Folic Acid, sugar-coated, blue colour (*See Note 2*)
Women of reproductive age (non-pregnant, non-lactating) 20–49 years	Weekly, 1 Iron and Folic Acid tablet Each tablet containing 60 mg elemental Iron + 500 mcg Folic Acid, sugar-coated, red colour (*See Note 2*)
Pregnant women and lactating mothers (of 0–6 months child)	Daily, 1 Iron and Folic Acid tablet starting from the fourth month of pregnancy (that is from the second trimester), continued throughout pregnancy (minimum 180 days during pregnancy) and to be continued for 180 days, post-partum Each tablet containing 60 mg elemental Iron + 500 mcg Folic Acid, sugar-coated, red colour

Create Oil awareness- Unsaturated: Monounsaturated: Polyunsaturated
Ratio: 1:1:1 (10% each→ 30% energy)
Least harm at Room Temp. Use in Moderation & in rotation



Evaluate by the MCP Card- Follow the ABCDEFG approach
(Ensure 1Kg weight gain by 6 weeks immunization, another I Kg at 2nd dose, near doubling at 3rd dose, tripling at MR dose, 10 Kg at 1 yr. & quadrupling by 2 yrs. of age)





The ABCDEFG APPROACH- ELIZ MODIFIED IMPACT (IAP Malnutrition Proactive Assessment – A Comprehensive Tool)

Ref: Elizabeth KE NEP-The Crusade against Malnutrition. Indian Pediatr., March, 2016

A- Anthropometric measurements - Assess Nutritional Status (WfA, HfA, WfH, MUAC, BMI)

B- **Biochemical & Lab asessment**.

C-Clinical assessment of malnutrition-undernutrition, overweight/obesity & micronutrient malnutrition

D-**Dietary evaluation** including IYCF & current diet

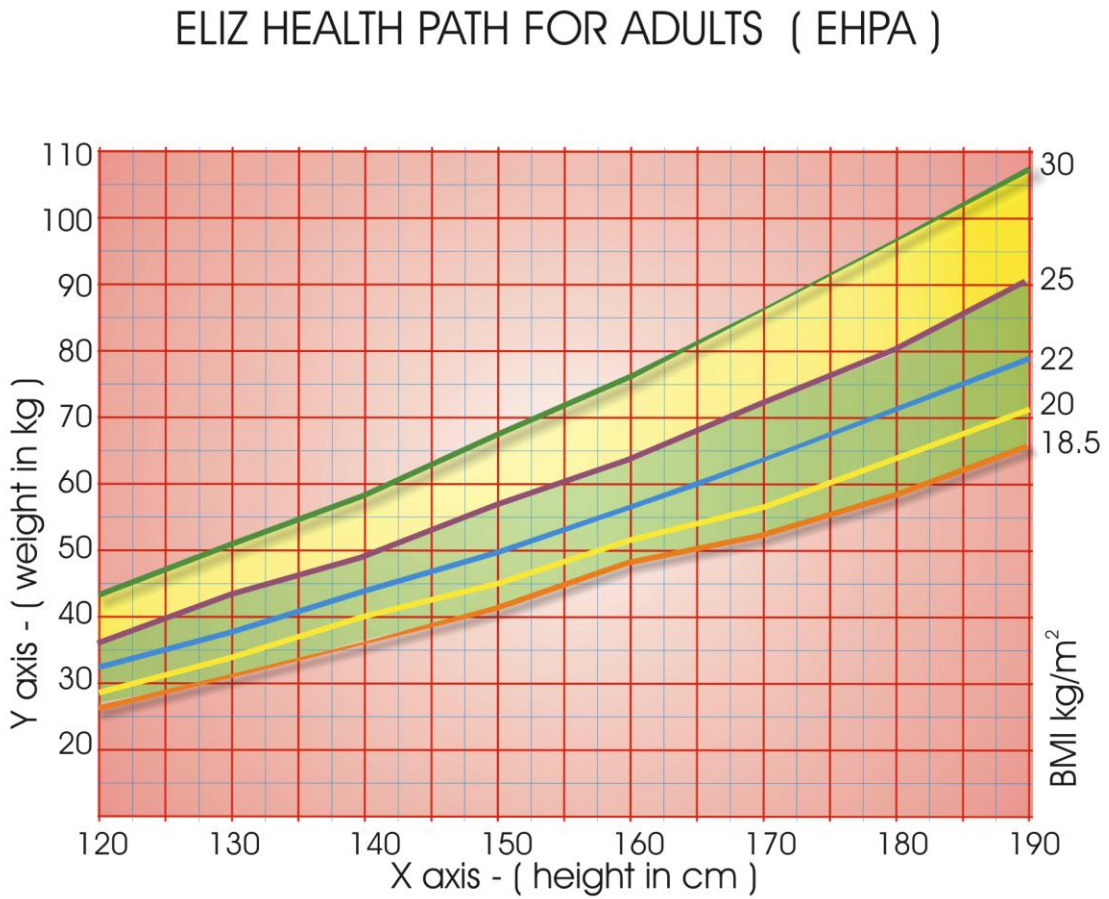
E-**Ecologic/Environmental & Epidemiological evaluation-** Stress on SES, Child abuse/neglect

F-Functional assessment- Developmental Milestones , Morphological, Radiological, , Special sense organs

G- Growth Monitoring to ensure Normal Growth Trajectory & prevent FTT & Obesity

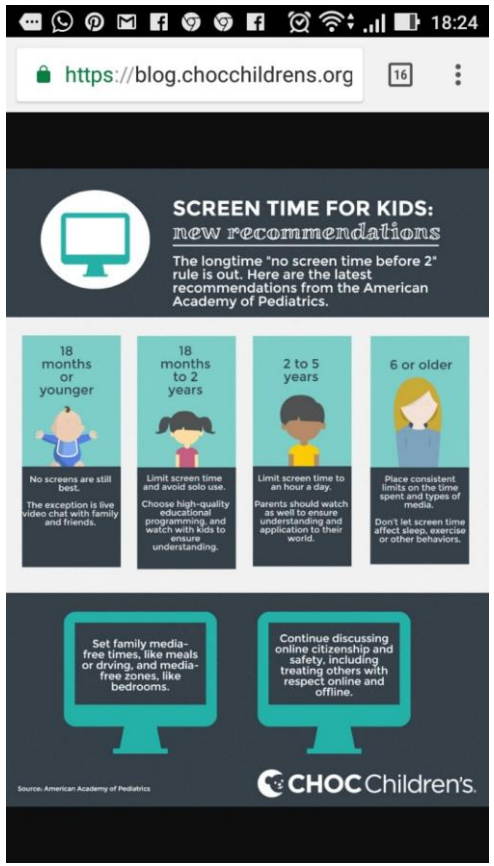
Quality of Life

Elizabeth K.E, Manu Muraleedharan.
Three in One Weight, Height & Body Mass Index (BMI) Charts for Children and Adults,
Journal of Tropical Pediatrics, Oxford University Press, London, 2003, 9: 224 – 227



Tackle Overweight & Obesity by promoting Healthy Eating, reduce Junk food- HFSS (High in Fat, Sugar & Salt) and SoFAS (Solid Fats – (Transfat)& Added Sugars), ensure Exercise & adequate Sleep and reduce screen time
Remember- 108- 1 hour Exercise, 0 Junk Food & 8 Hours sleep (Achieve 80%)

Revised AAP Screen Time



Exercise for All

Catch them Young,
Better Catch them before they hatch out!

Thank You