Dietary diversity- How can it boost nutrition in children

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Will be discussed under following headlines

- Pregnant women nutrition its evidences and food diversity
- Lactating women nutrition its evidences and food diversity
- Optimal nutrition of infant below 6 months and its evidences including preterm nutrition
- Nutrition of children below 5 years

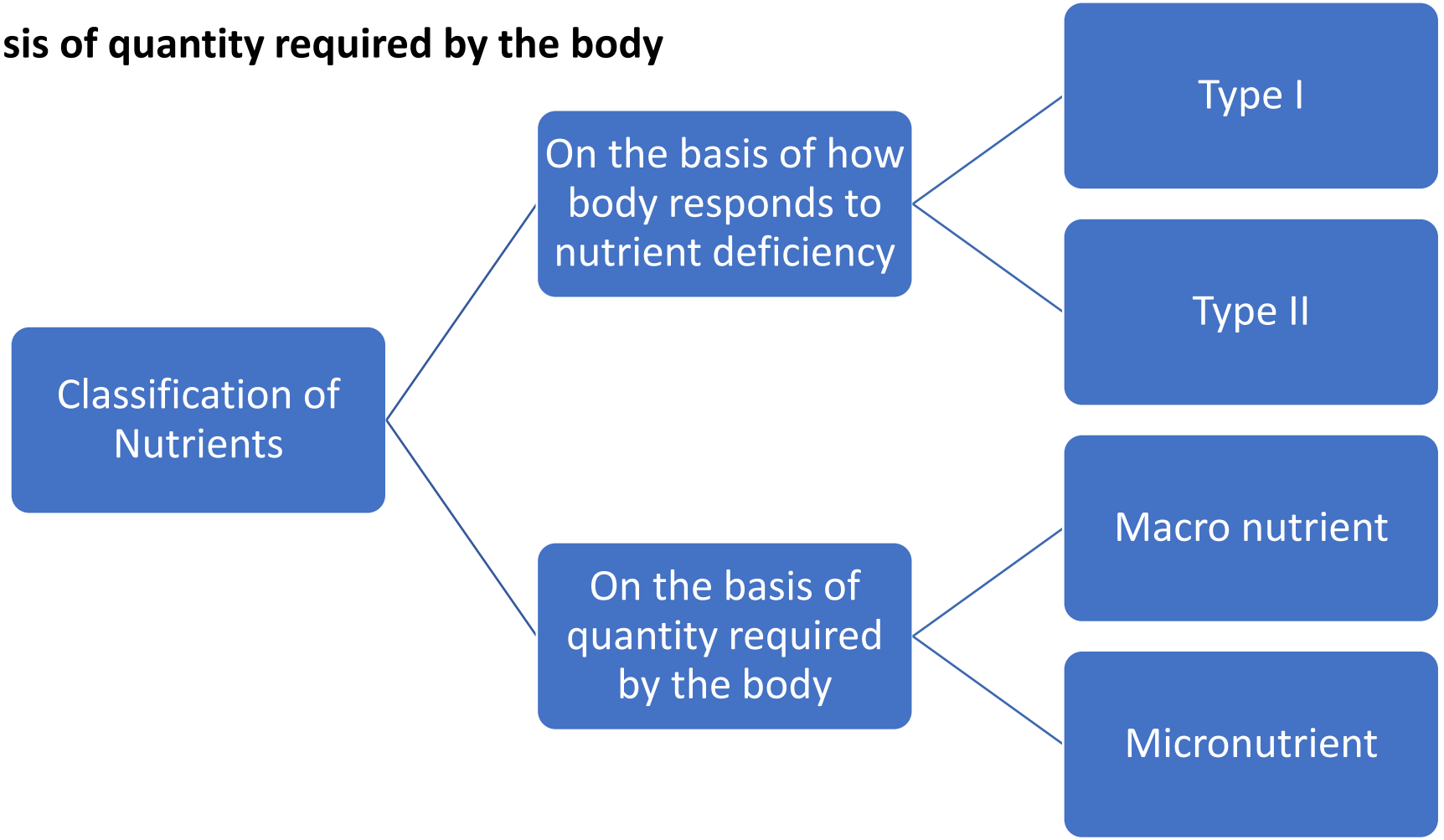
DIETARY GOALS

1. Maintenance of a state of positive health and optimal performance in populations at large by maintaining ideal body weight.
2. Ensuring adequate nutritional status for pregnant women and lactating mothers.
3. Improvement of birth weights and promotion of growth of infants, children and adolescents to achieve their full genetic potential.
4. Achievement of adequacy in all nutrients and prevention of deficiency diseases.

Nutrients can be divided into different types based on the way in which they are classified. There are two major ways in which nutrients can be classified. They are:

1.On the basis of how the body responds to a nutrient deficiency

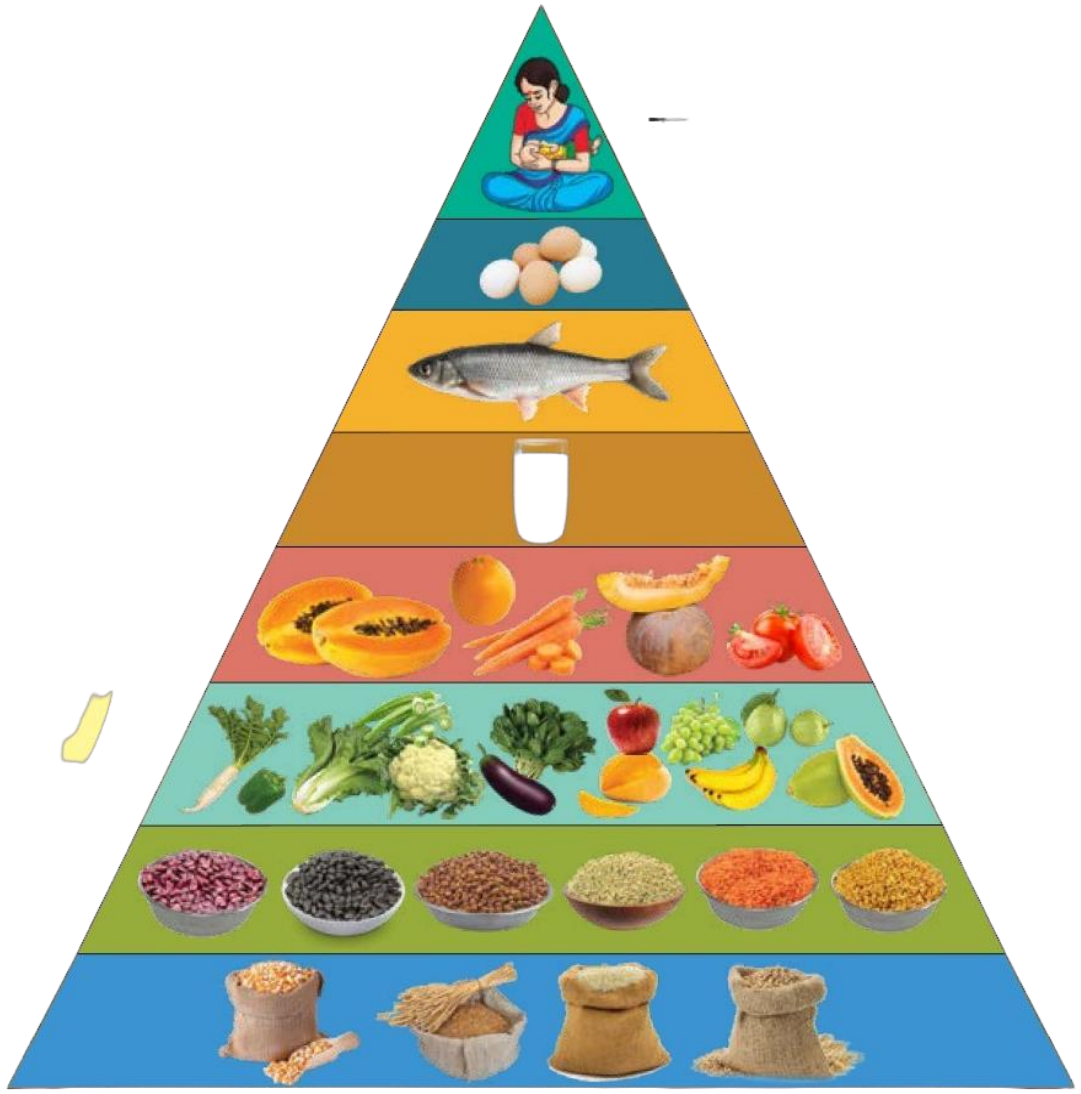
2.On the basis of quantity required by the body



Dietary Diversity:

Dietary diversity is defined as the number of different food groups or foods consumed over a given references period.

It is a qualitative measure of food consumption that **reflects household access to a variety of foods and** is also a proxy for nutrient adequacy of the diet of individuals.



Minimum Dietary Diversity for Women

MDD-W is a dichotomous indicator of whether or not women 15 to 49 years of age have consumed at least five out of ten defined food groups the previous day or night.

The ten food groups for Women:

1. Grains, white roots and tubers, and plantains
2. Eggs
3. Pulses (beans, peas and lentils)
4. Dark green leafy vegetables
5. Nuts and seeds
6. Other vitamin A-rich fruits and vegetables
7. Milk and milk products
8. Other vegetables
9. Meat, poultry and fish
10. Other fruits

(women who have consumed at least 5 of the 10 possible food groups over a 24-hour period are classified as having minimally adequate diet diversity**)**

Pregnant women nutrition -its evidences and food diversity

- Nutrition is a key modifiable factor that affects birth outcomes and has long-term effects on the health of offspring.
- Undernutrition and overnutrition can be associated with adverse pregnancy outcomes.
- The developmental model for the origins of disease (ie, Barker Hypothesis) hypothesizes that the fetal environment causes epigenetic modifications that impact gene expression and there by influence development of disease in children and adults.

Potential pregnant women need attention regarding nutrition counselling includes :-

- Use of supplements
- Food avoidances/special diets/skipping meals
- Eating disorders
- Lack of resources for adequate nutrition
- Low intake of nutrient-dense foods (fruits and vegetables)
- High intake of added sugars and fats (fried foods, processed foods, desserts)
- Overweight or obesity
- Medical history of bariatric surgery or other conditions that cause malabsorption
- Substance misuse

The incidence of pregnancy complications is higher at the upper and lower extremes of weight gain.

- Recommendations for weight gain during singleton pregnancy are :-

-Maternal BMI <18.5 kg/m^2 **(underweight)** – weight gain12.5 to 18.0 kg

-Maternal BMI 18.5 to 24.9 kg/m^2 (**normal weight**) – weight gain 11.5 to 16.0 kg

-Maternal BMI 25.0 to 29.9 kg/m^2 **(overweight)** – weight gain 7.0 to 11.5 kg

-Maternal BMI ≥30.0 kg/m^2 (**obese**) – weight gain 5 to 9.0 kg

Daily Requirement of Macro and Micronutrients

- **The daily multiple calories, macronutrients, micronutrient supplements should contain key vitamins/minerals**

CALORIES-

- Key nutritional factor in determining birth weight
- Increase daily caloric intake by 340 to 450 additional kcal per day in 2^{nd} and 3^{rd} trimester respectively

MACRONUTRIENTS-

- **PROTEIN**-Fetal/pregnancy unit consumes 1 kg of protein during pregnency
- Intake of pregnant women-1.1g/kg/day
- Use of protein powder or high protein beverages should be discouraged.

CARBOHYDRATES-

- Increase to 175 g/day, up from 130 in non pregnant women
- Highly processed food should be minimized.
- **Fiber intake**-28g/day along with adequate fluid intake to prevent constipation
- **FAT**-Trans fatty acid have adverse effect on fetal growth and development by interfering with essential fatty acid metabolism.
- TFA should be minimized or avoided .

MICRONUTRIENTS

IRON

- Fetal/placental development
- Expand the maternal red cell mass
- Most bioavailable form is heme iron which is found in meat, poultry and fish
- Absorption of non heme iron is enhanced by vit c rich foods or muscle tissue and inhibited by dairy products, coffee/tea/cocoa.
- Women with iron deficiency anemia (<11g/dl Hb in first or 3rd trimester) should receive an additional iron supplement (30 to 120 mg per day) until the anemia corrected.

CALCIUM

- FETAL SKELETAL DEVELOPMENT requires about 30 gm of ca during pregnancy
- RDA-1000 mg/day
- Calcium supplementation do not reduce the preterm birth or low birth weight

VIT D

- RDA-600IU for all reproductive age women, including during pregnancy or lactation
- Above RDA do not reduce adverse pregnancy outcome(preeclampsia or stillbirth).

FOLIC ACID

- 0.4 to 0.8 mg one month before and for the first two to three months after conception
- Reduce the risk of child with a neural tube defect.
- 0.6 mg per day thereafter to meet the growth needs of the fetus and placenta
- 4mg per day for women known to be at increased risk for NTD(HISTORY OF PREVIOUSLY AFFECTED INFANT,MATERNAL USE OF ANTICOVULSANT).

Zinc

- Essential for normal growth
- Increases birth weight
- Does not improve any pregnancy outcome except 14% reduction in preterm births.
- Women at risk for severe zinc deficiency are-

  active inflammatory bowel disease

  acrodermatitis enteropathica , pica

IODINE

- WHO—250 mcg during pregnancy and lactation.
- Thyroid association recommends that women who are planning pregnancy, lactating or pregnant supplement their diet with oral multivitamin that contains 150 mcg of iodine in form of potassium iodide.

VIT A

- Non pregnant -700mcg/day
- Pregnant women-770 mcg/day
- In developing countries deficiency is concerned as it is associated with maternal xeropthalmia, night blindness, anemia and infections
- In endemic area a weekly supplement less than 25000 IU appears to have some maternal and fetal/neonatal health benefits.

ADVERSE EFFECTS FROM EXCESSIVE SUPPLEMENTATION AND DIETRY INTAKE

VIT A
CAN BE TERATOGENIC
Avoid liver consumption during pregnancy as it is rich in Vit A

IODINE
Can cause fetal goiter

VIT D
Safe upper limit-4000 iu daily(100mcg)

VIT E

Self reported abdominal pain and premature rupture of membrane at term. women should take a supplement of 0.4 to 0.8 mg per day. Higher doses (4 mg per day) are recommended for women known to be at increased risk for offspring with neural tube defects.

- Excessive intake of vitamin A (greater than 10,000 international units per day) and/or iodine can have harmful fetal effects.

Lactating women nutrition

- Early feeding and nutrition are of importance in the origin of adult diseases such as type 2 diabetes, hypertension, obesity, and the metabolic syndrome
- The American Academy of Pediatrics (AAP) and World Health Organization(WHO) have declared breastfeeding and the administration of human milk to be the normative practice for infant feeding and nutrition.
- Maternal milk production is dependent upon mobilization of maternal stores and dietary consumption.

BODY WEIGHT

- Changes in maternal body composition vary during breastfeeding. Typically, there is a mild gradual weight loss during the first six months postpartum, with preservation of lean body mass.
- Infant demand is the major factor in determining milk volume.
- Maternal factors associated with decreased milk volume include maternal stress, anxiety, fatigue, illness, maternal insulin resistance, hormonal oral contraceptives, and smoking.
- Lactation requires additional energy and nutrients in the maternal diet including protein, vitamins A and E, and several other vitamins and minerals
- Mild to moderate variations in maternal diet, energy balance and aerobic exercise don't affect milk production
- 15% decrease in milk production when calories intake < 1500 /day .

MILK VOLUME

- 750 to 800 ml per day
- Can exceed 2000 ml per day in hyper-lactation or nursing twins or triplets
- Low on the first 2 days, increased markedly on day 3
- Addition of milk substitutes or solid food reduces infant demand and decrease milk production

Calcium and Vitamin D supplementation

- The recommended intake for calcium and vitamin D by lactating women are the same as for nonlactating women.
- This is because maternal bone mineral content, which typically declines during lactation then rebounds after weaning, is not affected by the mother's intake of these nutrients.
- Breastfeeding does not increase the risk of low bone density, osteoporosis or fracture in long term.
- Breast milk is low in vitamin D and supplementation to the infant is required to prevent rickets.
- Rarely used strategy is supplementation of high dose of vit D to lactating mother - can lead to toxic level in milk

Other Fat-soluble Vitamins to mother and baby

- **VIT K** is low in breastmilk
  - routine administration of vit k to neonate to prevent vit k deficiency & bleeding.

- **VIT A**
- Supplementation no longer recommended for lactating women, neonate and infant up to 6 months of age.
- High dose of vit A in infant and children 6m to 59 month where vit A deficiency is public health problem.

Components of Optimal IYCF

Initial Breastfeeding

Early initiation of breastfeeding; immediately after birth, preferably within one hour

Exclusive Breastfeeding

Exclusive breastfeeding for the first six months of life (No other foods or fluids, not even water)

Complementary Feeding

Timely introduction of complementary food (maintaining adequate diet and dietary diversity) beyond six months along with continued breastfeeding

Active feeding of children during and after illness

Breastfeeding- Healthy Bodies, Healthy Brains

Breastfeeding alone can

- Reduce Under-5 mortality by 13%
- Prevent 39, 00, 000 episodes of diarrhea
- Prevents 34, 36, 560 episodes of pneumonia
- Improves IQ in children by 3 points
- Prevents 4, 915 deaths due to breast cancer
- Reduce obesity by 26%
- Reduce type-2 diabetes by 35%
- Add Rs. 4, 300 crores to the economy

➢ **Lancet 2013:** initiation within the *first 24 hours* associated with 45% reduction in all-cause neo-natal mortality. ***(LANCET/BPNI)***

Source: Lancet/BPNI

Diet for Pre-mature (weighing less than 2000 g.) Children

(***Babies who were born early (before 37 weeks) or at a low birth weight (less than 5 pounds, 8 ounces) need special nutrition to help them catch up on growth. Breast-fed babies may get a fortifier added to the milk***)

- Protein and mineral content of human milk is insufficient to meet the needs of the growing preterm infant.
- Fortification of Human Milk is indicated in order to supply the nutrients required and support the rapid rate of growth and bone mineralization in the preterm infant.

1. Human Milk Fortifier (24 kcal/oz) is indicated for all breast milk fed infants weighing less than 1500 gm & added till 40 wks post menstrual age (PMA) or attains 2 Kg
2. Human Milk Fortifier (24 kcal/oz) should be initiated when the infant is tolerating breast milk feeds of > 100 ml/kg/day.
3. Lactodex HMF -25ml EBM with 1 gm sachet.

Feeding of Children beyond 6 months (Complementary feeding)

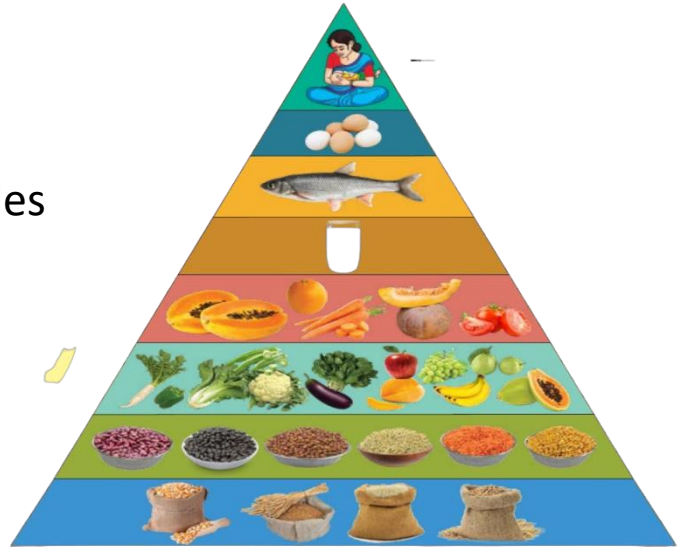
- The process of giving an infant other foods and liquids along with breast milk or non-human milk as breast milk alone is no longer sufficient to meet the nutritional requirements.
- These foods should complement rather than replace breastmilk.

Minimum Dietary Diversity for Children (6 Months To 5 Years)

MDD-C is a dichotomous indicator of whether or not children 6 months to 5 years of age have consumed at least five out of Eight defined food groups the previous day or night.

The ten food groups for Children:

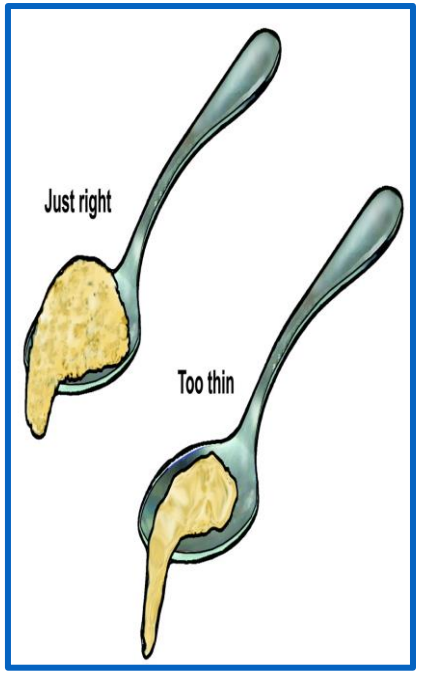
1. Breastmilk
2. Grains, white roots and tubers, and plantains
3. Pulses (beans, peas and lentils)
4. Milk and milk products
5. Eggs
6. Meat and fish
7. Other vitamin A-rich fruits and vegetables
8. Other fruits and vegetables



Appropriate Complementary Feeding

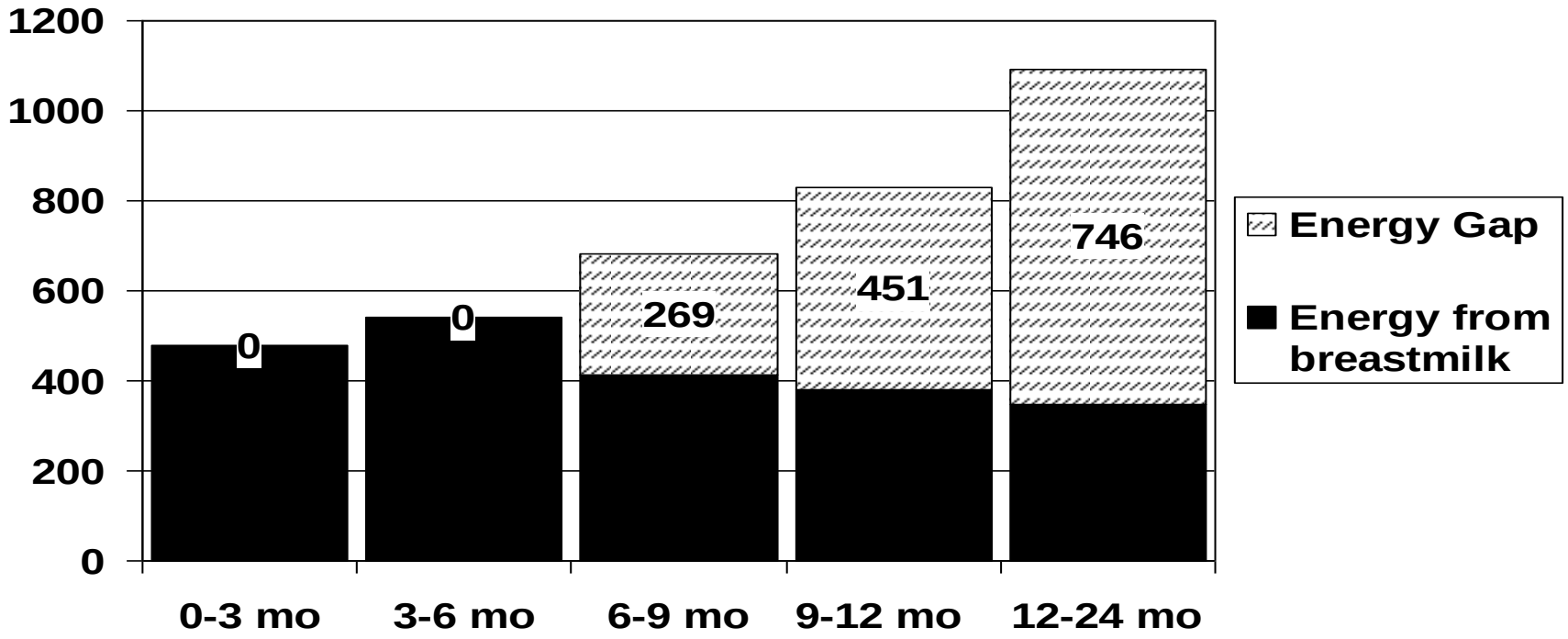
- Timely: Introduced when need for energy and nutrients exceeds that provided by BF
- Adequate: Should provide sufficient energy, protein, micronutrients
- Properly Fed: Active feeding method and proper frequency according to age
- Safe: Should be hygienically prepared, stored and fed

- Right consistency
- Soft
- Easy to digest
- Inexpensive
- Locally available
- Culturally acceptable
- Easily prepared at home



Age of Introduction

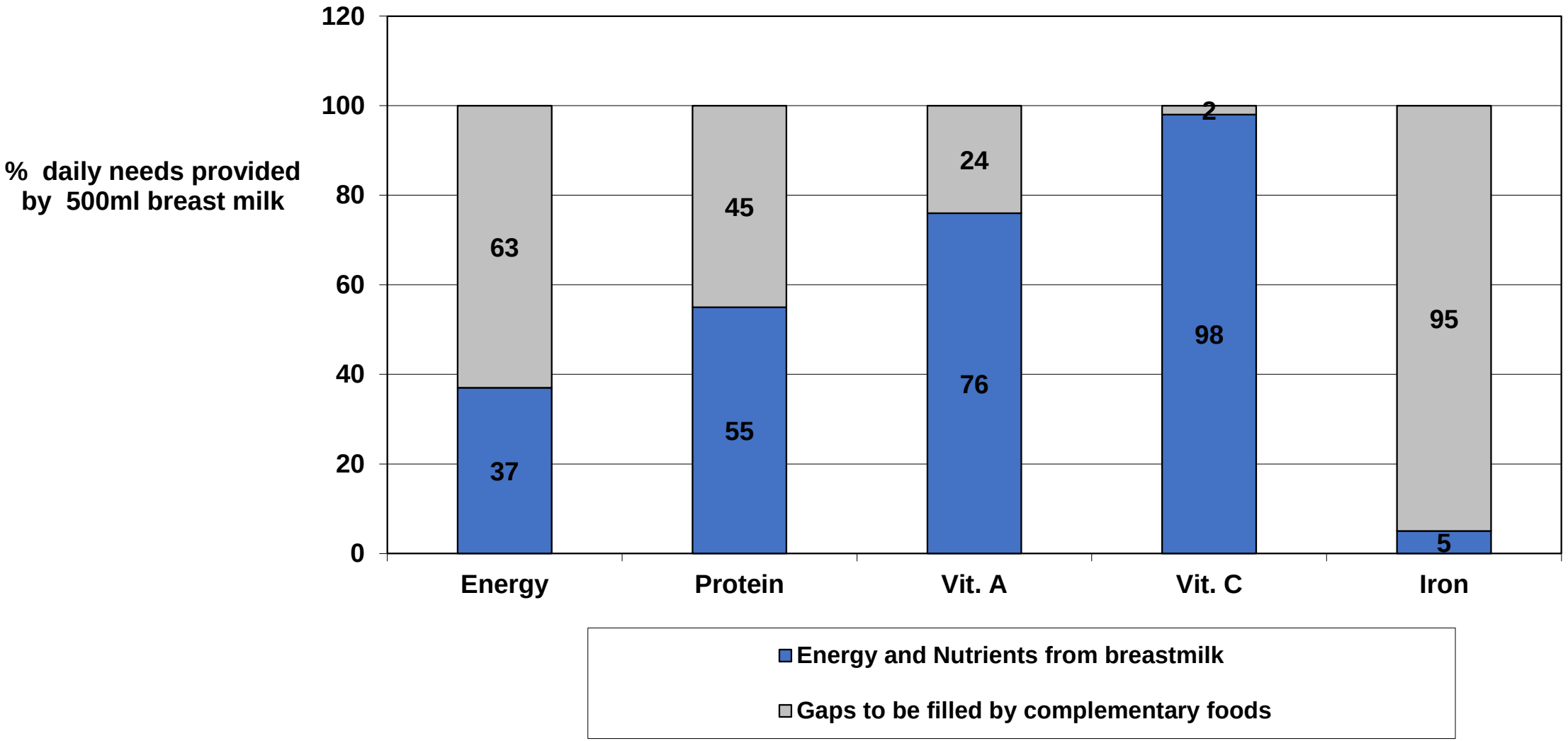
Energy Needs



Excl. Breastfeeding

Comp. feeding & continued BF

Importance of continued breastfeeding for 2 years and beyond



Amounts of foods to offer

Age	Texture	Frequency	Amount of each meal
6 months	Soft porridge, well mashed vegetable, meat fruit	2 times per day plus frequent breastfeeds	2-3 tablespoonfuls
7-8 months	Mashed foods	3 times per day plus frequent breastfeeds	Increasing gradually to more than 3/4 of katori (150ml)
9-11 months	Finely chopped or mashed foods, and foods that baby can pick up	3 meals plus 1 snack between meals plus breastfeeds	a full katori (200ml)
12-24 months	Family foods, chopped or mashed if necessary	3 meals plus 2 snacks between meals plus breastfeeds	more than katori (250ml)

Ensure Adequacy

- Growth Monitoring: Measure weight and length periodically and interpret by plotting in growth curves.
- Investigate causes of poor growth: Dietary history; evaluate for any illness.
- Counsel mother/caregivers on growth, feeding and caring practices

Community-based management of severe acute malnutrition in children

Severe acute malnutrition is defined by a very low weight for height (below -3z scores of the median WHO growth standards), by visible severe wasting, or by the presence of nutritional oedema.

- Recent studies suggest that severe acute malnutrition in children above 6 months of age who have no medical complications can be managed at the community level using specially formulated ready-to-use therapeutic foods.

- The community-based approach involves timely detection of severe acute malnutrition in the community.

- Provision of treatment for those without medical complications with ready-to-use therapeutic foods or other nutrient-dense foods at home.

Important messages about Complementary Feeding

POINTS TO PONDER

- Breast-milk alone is not enough for infants after 6 months of age.
- Complementary foods should be given after 6 months of age, in addition to breast-feeding.
- Do not delay complementary feeding.
- Feed low-cost home-made complementary foods.
- Feed complementary food on demand 3-4 times a day.
- Provide fruits and well cooked vegetables.
- Observe hygienic practices while preparing and feeding the complementary food.
- Read nutrition label on baby foods carefully.

WHAT SHOULD BE DONE IF BREAST-MILK IS NOT ADEQUATE?

- If breast-feeding fails, the infant needs to be fed animal milk or commercial infant formula.
- Milk should be boiled before being fed to the baby.
- To start with, milk may be diluted with an equal volume of water.
- Full strength milk may be started from 4 weeks of age.
- Infants fed animal milk should receive supplements of iron and vitamin C.
- About 120-180 ml of milk should be fed with one teaspoon of sugar per feed, 6-8 times over the day.
- While reconstituting the infant formula, the instructions given on the label should be strictly followed.
- The feeds should be prepared and given using a sterile cup, spoon, bottles and nipples taking utmost care.
- Overfeeding should be avoided in artificially-fed infants to prevent obesity.
- Low-cost home-made complementary foods should be preferred.

10 guiding principle for successful Complementary feeding

Exclusive breastfeeding for 6 months & starting of CF at start of 7 months.

Continue BF ,frequent on demand until 2 years of age and beyond

Responsive Feeding

Safe preparation and storage of CF

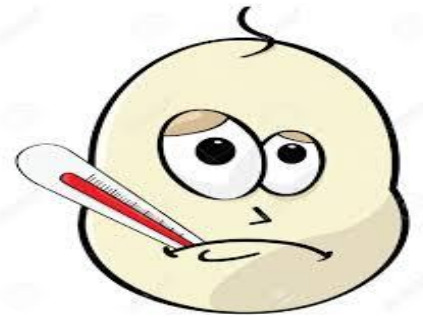
Amount of CF needed

Food Consistency

Meal Frequency and energy Density

Nutrient Content of Complementary Feeding

Use of Vitamins-Minerals Supplements or Fortified Products for Infants and mothers



Feeding During and after Illness


THANK YOU
WELLS FARGO
THE WALK TO CURE DIABETES
JDRF 2005
We're on Track For a Cure