MODULE

Acute and Chronic Malnutrition in Children

For the Ethiopian Health Center Team

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UNIT ONE

INTRODUCTION

1.1 Purpose of the Module

The lack of appropriate and relevant teaching material is one of the bottlenecks that hinder training of effective, competent task oriented professionals who are well versed with the knowledge, attitude and skill that would enable them to solve the problems of the community. Preparation of such a teaching material is an important milestone in an effort towards achieving these long-term goals.

Therefore, this module is prepared to facilitate the process of equipping trainees with adequate knowledge, attitude and skill through interactive teaching mainly focused on acute and chronic malnutrition.

The preparation of this module has considered the current guideline on the management of severe acute malnutrition, guideline on infant and young child feeding, the essential nutrition actions approach and guideline on micronutrient deficiency prevention and control of the Federal Democratic Republic of Ethiopia Ministry of health.

This module can be used in the basic training of health center teams in the training institutions and training of health center teams who are already in the service sectors, health extension workers and care givers. However, it was not meant to replace standard text Books or reference materials.


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UNIT TWO

CORE MODULES

2.1 Pre-and Post Test

2.1.1 Pre and Post Test for the Health Center Team (From the Core Module)

Directions: Choose the letter of the choice with the right answer.

1. Which age groups of children are more predisposed to severe acute malnutrition (kwashiorkor)?
   a) Under one year
   b) All under five
   c) Children 2-3 years old
   d) Children 4-5 years
   e) None

2. What are the different risk factors involved for the development malnutrition in children?
   a) Low socioeconomic conditions
   b) Ignorance of parents about the importance of child nutrition
   c) Infections like measles, Pertusis, diarrhea
   d) Child abuse (Neglect)
   e) All of the above

3. How ceb)

4. List the different forms of acute and chronic malnutrition?
    a) .....
    b) .....
    c) .....
    d) .....
    e) .....

5. Why is weaning time usually the period for the malnutrition to set in?
    a) Ceasing or reduction of breast-feeding
    b) Improper weaning practices like introduction of supplementary foods abruptly
    c) Use of bottle-feeding with diluted and dirty formula predisposing the child to infection

9. What is the danger of administration of high protein and energy in the first phase of the management of a case of severe acute malnutrition?

.....

10. What are the basic causes malnutrition?

a) Drought
b) Social inequality
c) War
d) All of the above
e) None

11. Which of the following is a false statement?

a) Malnutrition is associated with diarrhea
b) Immunization can prevent malnutrition
c) Marasmus is one of the problems of our society
d) Malnutrition is non-preventable communicable disease
e) A and D

12. What sanitary measures should be taken to prevent malnutrition?

a) Provision of safe and adequate food
b) Sources of water should be protected
c) Personal and environmental hygiene should be maintained
d) All of the above
e) None of the above

13. In the clinical work up of severe acute malnutrition, what laboratory investigations can be done in a routine laboratory setup?

a) Hemoglobin determination
b) Stained red blood cell morphology assessment
c) Serum albumin determination
d) Differential leukocyte count
e) All of the above

14. What is the importance of hemoglobin determination in the assessment of sere acute malnutrition?
    a) To diagnose anemia
    b) To diagnose polycythemia
    c) To assess the presence of abnormal red blood cell morphology
    d) None of the above

15. What is the importance of studying stained red cell morphology in the assessment of severe acute malnutrition?
    a) To assess nutritional anemia
    b) It enables the classification of anemia
    c) To diagnose iron deficiency anemia
    d) All of the above

16 What is the importance of serum albumin determination in the assessment of severe acute energy malnutrition?
    a) To diagnose hypo-albunemia
    b) To assess protein malabsorbtion
    c) To diagnose hyper-albuminemia
    d) A and B

17. What is the importance of differential leukocyte count (particularly lymphocyte count) in the assessment of severe acute malnutrition?
    a) To diagnose the presence of infections
    b) To determine the relative lymphocyte count as an indicator of viral infection in protein energy malnutrition
    c) To see the presence of atypical lymphocytes
    d) All of the above

18. What pathogens contribute indirectly to the development of malnutrition?
    a) Viruses
    b) Bacteria
    c) Parasites
    d) All of the above


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25 Mention all the essential nutrition actions approach components


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7 What will be your approach to the mother to prevent the recurrence of the situation?

11 Which of the following is correct?

a) The limiting factor for a catch-up growth of a child with protein energy malnutrition is protein

b) Small frequent feeds are advisable for children with severe acute mal nutrition because of the alteration of the GI-histology as due to the pathology and due to the fact that they have small stomach

c) Administration of other micro-nutrients like zinc, magnesium and potassium in the stabilization and rehabilitation phase is equally

Important


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4. Write seven rules, which can largely improve nutritional status in the community.
    a) .....
    b) .....
    c) .....
    d) .....
    e) .....
    f) .....
    g) .....

2.1.2.3 Pre and Post Test for Medical Laboratory Technicians

Direction: Circle on any of the following choices that you think are the best answer

1 What laboratory investigations can be carried out to determine severe acute malnutrition?
    a) Hemoglobin determination
    b) Stained red blood cell morphology assessment
    c) Serum albumin determination
    d) Differential leukocyte count
    e) All of the above

2 What are the sources for blood samples for hematological tests to assess nutritional anemia?
    a) Capillaries
    b) Venous
    c) Arteries
    d) A and B

3. What are the morphologic classifications of anemia in stained thin blood film examination in the assessment of severe acute malnutrition
    a) Normocytic normochromic
    b) Microcytic hypocromic
    c) Macrocytic normocromic
    d) All of the above

4. What is the normal differential range of lymphocytes in the age groups of 1-4 years?

   a) 38-45%

   b) 25-35%

   c) 44-55%

   d) 50-60%

5 What is the approximate albumin normal range in g/l?

   a) 30-45

   b) 25-35

   c) 20

   d) 30

6 By what percentage is the level of albumin lowered in infants and when individuals are lying down?

   a) 10%
   b) 20%
   c) 30%
   d) 40%

1.2.1.4 Pre and Post Test on PEM for the Sanitarians

Direction: Circle on any of the following choices, which you think, is the best answer.

1. Which of the following are risk factors for the development of malnutrition
   a) Poverty
   b) Infection
   c) Lack of knowledge on food sanitation
   d) All could be the possible risk factors

2. How is diarrhea associated with the malnutrition?
   a) During infection there will be increased loss of nutrients due to diarrhea
   b) Their causative agents are the same
   c) Both are health problems to children under five years of age
   d) None

3. Which of the following **acute infection** has a very close relationship with malnutrition?
   a) Whooping cough
   b) Leprosy
   c) Malaria
   d) All


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2.1.2.5 Pretest for Health EXTENSION Workers (HEW)


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2.4 Case Study: Learning Activity Health Professionals in Jiren – a Rural Community

Almaz lives in a rural village of Jiren community. She has many children of which several have died, but more are still alive. Her children were always weak, unhealthy, full of parasites, and irritable. They were not playful like most kids in the neighborhood. Almaz is a believer in God and therefore accepts every thing as natural.

August 19, 2000 was the first time when a health center team (a nurse, a sanitarian, a laboratory technician and a health officer) from the Jimma health center came to their village to do a **"health walk**". Together with the village elders, the team walked all round the village and observed the environmental sanitation conditions, housing condition, water supplies sanitation facilities, and the health of children. In their preliminary assessment they registered many things that needed to be corrected in order to improve the health condition of the villagers. Some of the health and sanitation problems observed were:

1 Feces of adults and children in many places; some of the excreta contained ascaris worms.
2 Wastes such as rubbish, and dung, etc were scattered all over the place.
3 No clean water supply in the village.
4 No single latrine in the whole village was seen.
5 The eyes of most children were unwashed, infested with flies and covered with discharge.
6 Many children seen were not playful, & happy, but weak looking, with big bellies, thin, and gray or cooper hair.
7 All the houses, except for a few scattered dwellings were thatched with a single room.
8 Almost all dwellings were used as barn & the houses were in general crowded.
9 Children were playing in highly commentated environment.

Having made all these observations and discussions with the elders, the health center team (the health officer, the nurse, the laboratory technician and the sanitarian) reached a consensus that, although almost all people in our country are leading the same life, this village, in particular, seems even more deprived of all the necessary health promotion mechanisms. The population is not that poor, but they have been isolated, uninformed and unexposed to health care services and mostly illiterate.

The team discussed their observations and agreed to start an intervention program together with the people. They agreed that the intervention programs should start from the basics and build up later.

The most important ones were: -

- Basic hygiene education.
- Teach basic and proper child nutrition.
- Protect the water source.
- Give basic technical help for all to have access to latrines.

The next day, when the car which brought the health center staff arrived and parked under a tree, children were running around to tell their mothers about the guests arrival. Ladies were calling each other to come to the meeting. On the way, they were asking each other what the meeting would really be about. They speculated about many things.

At the meeting place, children were crying, people were moving here and there, and the team was unloading things such as kerosene stoves, some bottles containing oil, some flour and chopping board from the car.

After everyone sat down and the supplies were unloaded, the health officer clapped his hand for silence. All except some children were quiet. The nurse, the health officer and the lab technician were dressed in white gowns; the sanitarian is dressed in neat Khaki trousers and a local cap for the sun.

Once they were quite and relaxed, the health officer began to explain to them what they do in the health centers and the team will be having in the village in the future.

The sanitarian then told them how disease is transmitted from one person to another. He then pointed out the sanitation problems in the villages and explained that when children play in those areas; they contaminate themselves and their families. He also discussed how diseases are transmitted through water or flies. He told them these things in a simplified way, showing them some posters, which he brought with him.

The health officer and the public health nurse reinforced what the sanitarian hve just said by asking them simple questions such as, how many of you've children that pass ascaris worms with their stools? Almost every mother raised her hand. Again they asked; how many of you have children that have had diarrhea in the last four days including today? Again many mothers raised their hands.

Then, they stopped asking and started to tell them about children's health, cleanliness and nutrition. They added that in order for children to grow, they have to be kept clean, fed properly (nutritious food as often as five or more times a day), teach them good habit of

hand washing and always monitor their growth, mood, and illness especially from parasitic disease as much as possible. Children should eat, and drink clean water or milk

If the children are not getting the necessary nutrients, such as body builders (proteins) energy foods (carbohydrates and fats) and protective nutrients (vitamins and minerals) they: -

- Grow slowly
- Be weak, unhappy, not playful
- Look like an old person
- Have elastic skin
- Have no resistance to disease
- Have frequent attack of diarrhea
- Have slow mental development
- Eventually may die

She started showing them pictures of a child with different kinds of nutritional deficiencies. She pointed to the pictures of Marasmus, Kwashiorkor and Marasmic-kwashiorkor and asked the mothers if they have seen a child such as the one in the picture before. One mother pointed to her own child and asked whether it is the same? The nurse told her it was the same. Getting a living example the nurse started to tell them about abouhe n1 Tfa5l

2.5 Definition

Severe acute malnutrition (SAM) is a diagnosis that includes several overlapping syndromes. The scientific basis for SAM was questioned in the early 20th century and different terms were introduced to describe it and there were different views as to its etiology. Controversies raged since 1930 and in 1935 cicely William's introduced the Ghanaian diagnosis Kwashiorkor (a disease of child disposed from breast by birth of the next one).

The term kwashiorkor -remained constant in spite of the criticisms because it doesn't describe the cause. Over the next 20 years around 50 different alternative names have been given to the same syndrome.

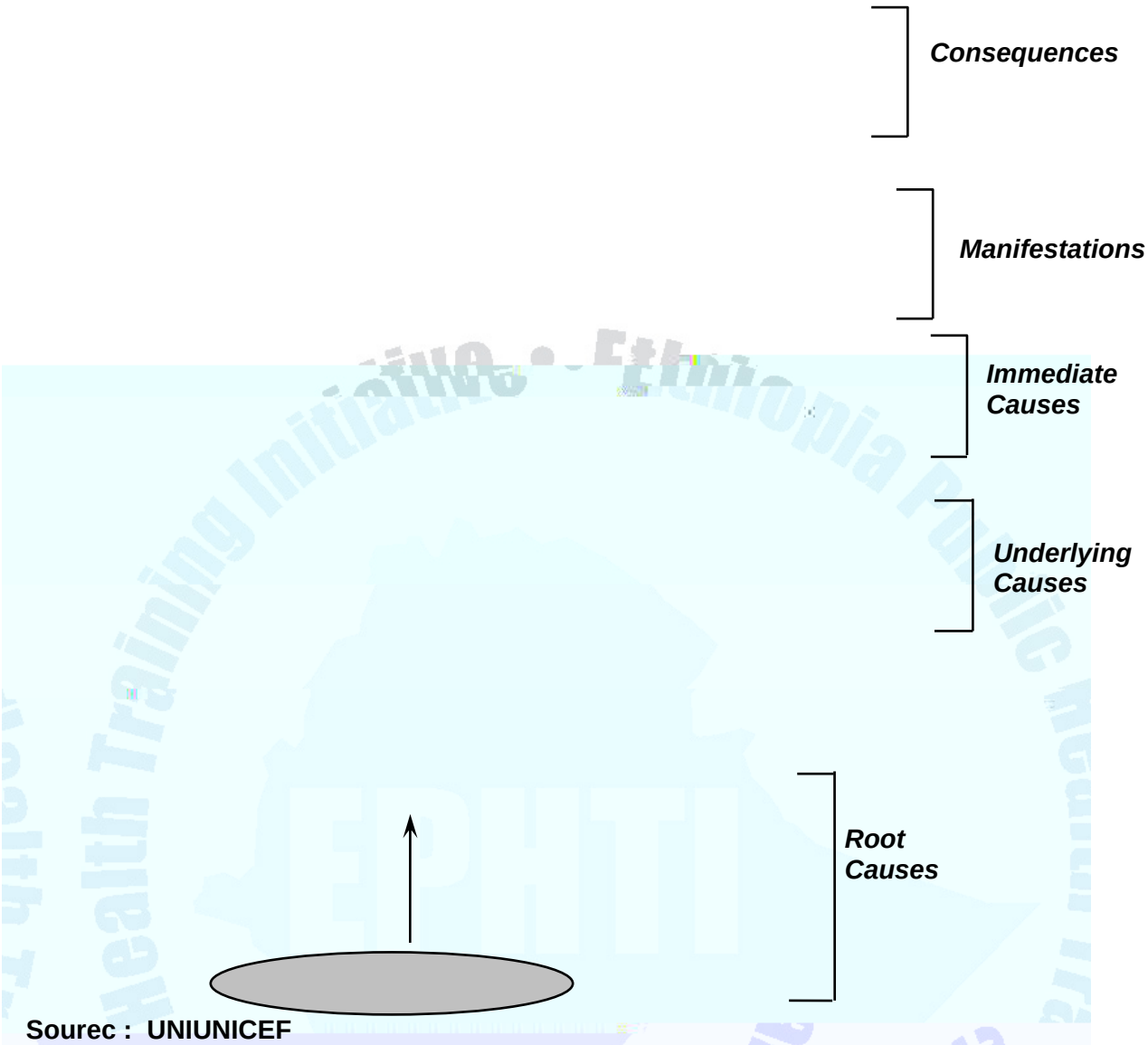
In 1959, Jelliffe, proposed the term protein calorie malnutrition (PCM) to include all syndromes relating to inadequate feeding. This has been largely replaced by protein-energy malnutrition (PEM) or malnutrition. Recently, according to the free radical theory of Professor Michael Golden on the cause of sever acute malnutrition; the syndrome is a multi-deficiency state involving the deficiency of protein, energy and other micronutrients. Protein energy malnutrition is therefore a misnomer and no more used in the nomenclature of this syndrome. Therefore, there is a general consensus that the term severe acute malnutrition (SAM) be used instead of protein energy malnutrition.

2.6 Epidemiology

Stunting and wasting are the major nutritional problems of the third world countries. Its prevalence ranges from 20-40% in Africa and Southeast Asia. In Ethiopia, according to CSA rural nutrition survey in 1992, the highest prevalence of stunting was recorded in South Gondar (74.5%) and the lowest prevalence in South Omo (49.2). Whereas the highest prevalence of wasting was recorded in Tigray (14.2%), and the lowest in Bale (4.4%). Concerning the prevalence of underweight, the highest (59.9%) was recorded in Tigray and the lowest in Bale (29.2%). Generally, the prevalence of moderate and severe forms of stunting and underweight in Ethiopia showed an increasing trend over a decade according to the report on rural nutrition survey in 1992 (see Figure 1). According to DHS the national prevalence 51% of fewer than five children in Ethiopia are stunted and 11% and 47% are wasted and underweight, respectively. In Ethiopia, 70% of children are sub-optimally breastfed.

Sever acute malnutrition is mostly common in children under five years of age. Marasmus is common in children less than 12 months of age and kwashiorkor is prevalent in children less than 5 years, commonly in the age groups of 2-3 years.

Many studies show that malnutrition is associated with different factors like improper weaning practice (early abrupt weaning with dilute and dirty formula), infections (diarrhea, measles, tuberculosis, pertusis, etc.), harmful traditional practices (age bias in feeding, sex bias in feeding, food prejudices- omission from family diet), and child neglect, sub-optima breast-feeding and complementary feeding Practices. These factors do operate in the Ethiopian context. In Ethiopia, there is a cyclic occurrence of malnutrition in most rural agrarian communities following the turn of the seasons. The winter (rainy) season is therefore called the hunger (lean) season and that of the summer (dry) season is the harvest season. This seasonality of energy and protein intake is reflected in the variations in the prevalence of PEM in those two seasons.



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At the level of the individual child one or more of the following factors may operate:-

× **Lack of knowledge** -People do not understand the nutritional nature of their Child's health problem

× **Poverty** - lack of means to obtain and provide food to their child (as in the case of war)

× **Famine and vulnerability-** destitution, being orphan (Example orphan vulnerable children due to HIV/AIDS)

× **Infections** - there is a reciprocal relationship between malnutrition and infection. During infection, the requirement for nutrients increases, there will be increased loss of nutrients due to diarrhea; genesis of fever and other acute phase reactants is at the expense of nutrients.

× **Emotional deprivation**- In orphan children and in children whose parents are negligent in giving care to their children, due to different reasons, children will lose appetite for feeding and hence end up in state of malnutrition CulturTf faEmotional dept.081 are 7.4/C2 Tf 0.001Di chilbias

2.7.3. Pathogenesis

Marasmus and Kwashiorkor in their extreme forms have basically different pathogenesis. The initiation of the pathogenesis of both problems can be traced back to the time of weaning. Kwashiorkor develops following the additional demand levied on the body's already marginalized nitrogen balance due to infection of a child that is on monotonous starchy family diet. As a result of fragile nitr

2.8 Clinical Features

The severest clinical forms acute malnutrition are Marasmus, kwashiorkor and features of both called Marasmic- kwashiorkor. The following symptoms and signs clinically characterize them-

Marasmus

Marasmic children have retarded growth with specific clinical manifestations including:- Wasting of subcutaneous fat and muscles (flabby muscles), Wizened monkey (old man face), Increased appetite, sunken eye balls, mood change

(always irritable) and mild skin and hair changes.

Kwashiorkor

Children with the **kwashiorkor syndrome** may have the following clinical manifestations; - Growth failure, wasting of muscles and preservation of subcutaneous fat, edema (pitting clith fETor s1( )Tj102.06a 72 36 4gro98i0 Tref12 703 Tm( )TjTT4iorkor

In children with marasmus or kwashiorkor, there are usually deficiencies of micronutrients like: - riboflavin, vitamin A, Iron and Vitamin D. Therefore, it is advisable to have high index of suspicion and look for the signs and symptoms of deficiencies of these nutrients.

2.9 Diagnosis

The diagnosis of severe acute malnutrition rests mainly on meticulous clinical examination for the symptoms and signs of the syndrome plus anthropometric assessments using different methods. Additionally one may need laboratory investigation for the assessment of complications and other health problems associated with malnutrition. Nutritional epidemiologic considerations also contribute to the diagnosis of malnutrition. Nutritional survey and nutritional surveillance can be used to detect the early warning signs of increased acute malnutrition (wasting) timely and design preventive and emergency intervention measures. In addition community diagnosis of the level of chronic malnutrition (Stunting) can be determined using nutritional surveys in order to avail information for food security planning.

The clinical symptoms and signs are presented in section 2.8. The anthropometric assessments can be done using the following methods:

I. Gomez classification (weight-for-age)

Percentage (%) Of NCHS Reference	Level of malnutrition
90-109	Normal
75-89	Mild (Grade I)
60-74	Moderate (Grade II)
< 60	Severe (Grade III)

The disadvantages of this classification are: - The cut off point 90% may be too high as many well-nourished children are below this value, edema is ignored and yet it contributes to weight and age is difficult to know in developing countries (agrarian society).

II. Well-come classification (weight-for-age)

Percentage (%)	Level of malnutrition	
NCHS Reference	Edema	No edema
60-79%	Kwashiorkor	Under-weight
< 60%	Marasmic- kwashiorkor	Marasmus

Shortcoming of this method is that it does not differentiate acute from chronic malnutrition**.**

III. Waterlow-classification (Height-for-age and weight-for-height)

Index	% of NCHS reference	Level of Malnutrition	
Height For Age	90-94% 85-89% < 85%	Mild Moderate Severe	Stunting (Chronic malnutrition)
Weight for Height	80-89% 70-79% <70%	Mild Moderate Severe	Wasting (Acute Malnutrition)

If prepackaged F75 is not available it can be prepared locally using one of the following recipes

Table 2. Preparation of F75 from locally available foods for Phase 1

Type of milk	***Milk (g)***	***Eggs (g)***	***Sugar (g)***	***Oil (g)***	***Cereal Powder (g)***	***Water (ml)***

Table 4. Transition Phase: amounts of F100 to give

Class of weight (Kg)	8 feeds per day Ml for each feed	6 feeds per day	5 feeds per day
Less than 3 kg	F100 full strength should not be given -Only F100 diluted should be given (see p.18)		
3.0to 3.4 kg	60 ml per feed	75ml per feed	

200kcal/kg/day and 5kcal/kg/day, respectively. The following table summarizes the different treatment s and criteria for transition from one phase to the other.

Different phases of dietary management of children with severe acute malnutrition (adults > 6m)

Table 5. Management of the different phases

Phase	Criteria for moving to the next phase or the previous phase	Management
Phase 1	Child with gross edema (+++) should wait in phase 1atleast until their edema is reduced (++) The following are criteria to move to transition phase: - Return of appetites - Beginning of loss of edema	- No iron - F75 = 100 kcal/kg/day - A single dose of Vitamin A-100,00 (for 6-12months) and

What to give: The choice of ingredients will very with local circumstances. There are many advantages in using milk as the basic ingredient, since milk can be modified very effectively and easily, by adding sugar and vegetable oil, to produce a high-energy formula.

Table 6. Preparation of F100 from locally available foods for transition phase and Phase 2

Type of milk	Milk (g)	Eggs (g)	Sugar (g)	Oil (g)	Water (ml)
DSM	80	0	50	60	Up to 1000
DWM	110	0	50	30	Up t0 1000
Fresh cow milk	900	0	50	25	Up to 1000
Fresh goat milk	900	0	50	30	Up t0 1000
Whole eggs	0	220	90	35	Up to 1000
Egg yolks	0	170	90	10	Up t0 1000

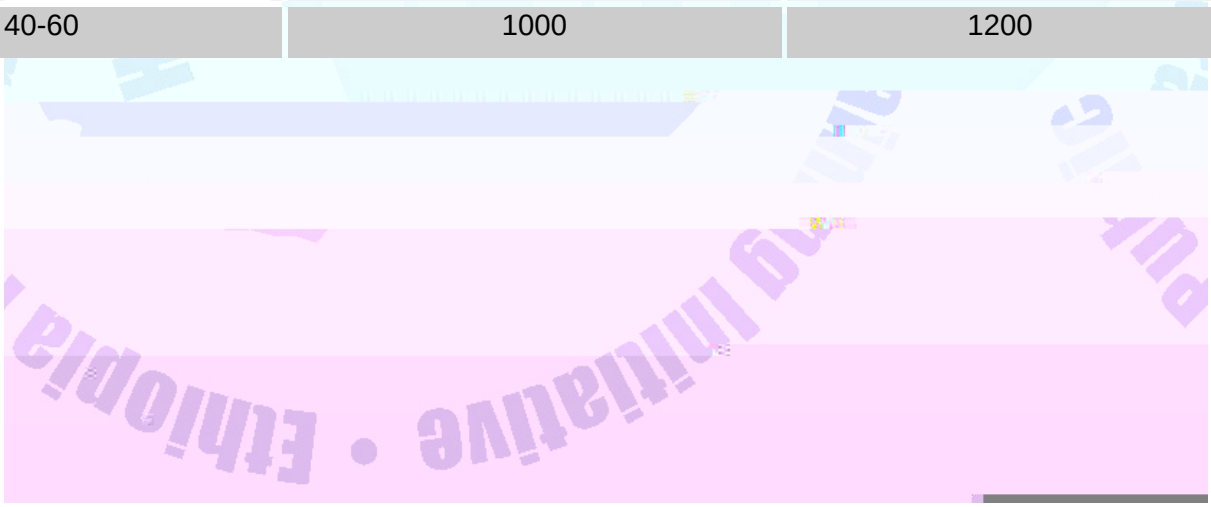
Considerable flexibility exists in the ingredients that can be used, provided the target requirements are met. Where milk is a not available, high-fat legume, nuts and oilseeds (such as groundnuts, Soya, sesame seeds) provide both energy and protein in a relatively compact form.

How much to give:

The greater the intake of energy and protein intakes the faster the growth. Hence one should give the high-energy and protein formula of at least 180 ml/kg/day (6 feeds at 30 ml/kg/feed). This amount will provide **180 kcal/kg/day and 5-gram** protein/kg/day.

Table 7. Phase 2 amount of F100 to give

Class of weight (Kg)	Ml per feed 6 feeds per 24 h	Ml per feed 5 feeds per 24 h
Less than 3 kg	Full strength F 100 is NOT used at this weight	
3.0to 3.4 kg	100 ml per feed	75ml per feed
3.5-3.9	120	150
4.0-4.9	150	180
5.0-5.9	180	200
6.0-6.9	210	250
7.0-7.9	240	300
8.0-8.9	270	330
9.0-9.9	300	360
10.0 -11.9	350	420
12.0 -14.9	450	520
15.5 -19.9	550	650
20.0 -24.9	650	780
25.0 -29.9	750	900
	850	1000
40-60	1000	1200



- Failure to regain weight more than 5 g/kg/d

Secondary

- Failure to gain wt more than 5g/kg/d for 3 successive days = during phase 2

Usual causes of failure to respond

- **Problems with the treatment facility**
  - Poor environment for malnourished children
  - Insufficient or poorly trained staff
  - Inaccurate weighing machines
  - Food prepared or given incorrectly
- **Problems with individual children**
  - Insufficient food given
  - Food taken by siblings or care taker
  - Vitamin or mineral deficiency
  - Malabsorption
  - Rumination
  - Infection, especially:
    - Diarrhea, pneumonia, tuberculosis, urinary tract infection, otitis media,

Discharge

1. Anthropometric Criteria
    - WL (W/H) ≥ 85% for & consecutive weights & or no edema for 10 days
    - MNAC ≥ 12.5 cm

      Ą In case of emergency situation where there is adequate supplementary feeding program
    - W/L > 80% (Length < 85 cm) or
    - W/H = 80% (Length = 85 cm) for 2 consecutive
    - No edema for 10 days
    - MUAC ≥ 12 cm
2. Counseling & health education
3. Immunization is up to date

Follow up after discharge

The child should be enrolled in a supplementary feeding program and given nutritional support for another 4 months. For the first 2 months they attend every 2 weeks and then once per month for further two months if the progress is satisfactory

B. MANAGEMENT FOR INFANTS BELOW 6 MONTHS (OR LESS THAN 3 KG)

1. MANAGEMENT FOR INFANTS BELOW 6 MONTHS (OR LESS THAN 3 KG) WITH A FEMALE CARE TKATER

Admission criteria

- ç Infant too week or feeble to suck effectively
- ç Infant not gaining weight at home
- ç If the infant is anthropocentrically malnourished: Weight for length < 70% or presence of bilateral edema

Phase 1 –transition phase- phase2

The aim is to stimulate breastfeeding and t supplement the child until breast milk is sufficient to allow the child to grow properly. Breast milk is stimulated by the supplemental suckling (SS) technique; it is important to put the child on breast as often as possible.

- ç Breastfeed every 2-3 hours (8-12 times in 24 hours) on demand or on cues day and night with proper positioning and attachment
- ç About one hour after a normal breastfeed give maintenance amounts of F100 diluted using the supplementary suckling technique

ç

- The supplementation is not increased during the stay in the center. If the child is growing with the same quantity of milk, it means the quantity of breast milk is increasing
- If after some days, the child does not finish all the supplemental food, but continues to gain weight, it means that the breast milk is increasing and the child has enough.
- When the baby is gaining weight at 20 g/day
    - Decrease the F100 diluted to half of the maintenance intake
    -

Routine Medicine:

- Vitamin A: 50,000 IU at admission only
- Folic acid 2.5 mg (1 tablet) in one single dose
- Iron (ferrous sulphate): when the child sucks well and starts to and start to grow (after infection is controlled)
- Amoxycillin 20mg/kg 3 times a day plus gentamycin (not chloramphenicol)

Care for the mother

- Assess her nutritional status (BMI)
- Counsel her about the aim of the treatment and what is expected of her
- She should drink at least 2 litters of F100 per day
- She must eat enough – about 2500Kcal/day
- Give her vitamin A 200, 000 IU if her baby is less than 2 months
- Shorten her stays in the NRU as far as possible
- Iron supplementation should be given to the mother and she should use iodized salt in her diet

Discharge criteria

Discharge the infant when

- It is clear that he/she is gaining weight on breast milk alone
- There is no medical problem
- The mother has been adequately supplemented with vitamins and minerals

N.B. there is no anthropometric criteria for discharge of a fully breast-fed infant who is gaining weight.

Follow up

The mother must be included in the supplementary feeding program (SFC) and receive food to improve the quantity and quality of breast milk.

2. MANAGEMENT FOR INFANTS BELOW 6 MONTHS (OR LESS THAN 3 KG) WITHOUT ANY PROSPECT OF BEING BREASTFED

Criteria for admission: Weight for length < 70% or presence of bilateral edema

NB. There are no standards for infants below 49 Cm and the increments to judge nutritional status requires precise scales that are not generally available. The NRU is not appropriate

for treating premature low birth weight non-breast fed infants below 49 cm in length. These infants should be referred to a nursery and given infant formula.

Phase 1- Transition Phase- Phase 2

When there is no prospect of being given breast milk then severely malnourished < 6 months infants should be treated according to the standard protocol with the following modifications

Table 9. Phases of treatment for < 6 months non-breastfed

Phase	Dietary management
Phase 1	ç Wasted marasmic infants < 6months can be given F100 diluted in phase 1 ç Edematous infants < 6 months should always be given F75 during Phase 1(see table 10)
Transition Phase	During transition phase, only F100 diluted should be used with the same volume as phase 1. These small infants should not be treated with full strength F1oo.
Phase 2	During Phase 2, twice the volume of F100 diluted that has been given during phase 1 should be offered to infants (See table 11)

Table 10. Amounts of F100 diluted to give for infants not breast-fed in Phase 1

Class of weight (kg)	Ml of F100 per feed in phase 2 (8feeds/day) Diluted F100
= 1.5 kg	30 ml per feed
1.6 to 1.8 kg	35 ml
1.9 – 2.1	40
2.2 – 2.4	45
2.5 – 2.7	50
2.8 – 2.9	55
3.0 – 3.4	60
3.5 – 3.9	65
4. 0 – 4.4	70

Table 11. Amount of F100 diluted to give for infants not br

Where to Rehabilitate

1. In Hospital:

In many hospitals, treatment of severe acute malnutrition is unsatisfactory due to cross infection and frequent relapses. Moreover, it is expensive and does not give a chance for parental education:

Therefore, not all children with severe acute malnutrition should not be admitted to hospitals merely for the purpose of feeding. Admission of children to a hospital be targeted to those children with severe acute malnutrition plus other admission criteria (see Satellite module for health officers section 2.10).

2. Home treatment programs alternative to conventional approach

As experienced in Bangladesh, even severe cases have been successfully rehabilitated at home. **But, this was successful only after one week** of medical care to treat infections and other complications. This method was also proved **to be the most cost-effective**, and parents prefer the method, even though no food supplements were provided.

Treatment of children with SAM at home may be successful depending on the presence of the following:

- Reasonable home circumstance
- A Willing caretaker
- Regular home visits from a monitor
- Close cooperation with NRU
- Appropriately selected children may pass directly to phase 2
- For phase & the child is fed a special dry diet ready to use therapeutic food (RUTF) that is nutritional equivalent to f100 but can safely be given to the mother at home (plumpy nut)

Table 12. Home management of a case of SAM

Phase	Criteria for progress to the next phase	Management

2. Day-care Nutrition Rehabilitation Centers (DCNRCs):-

Typically, these centers provide treatment for uncomplicated cases of acute malnutrition. According to Bengoa's original concept, childreAa wayhat chldrec

2.11.1 Dietary Diversification and Nutrition Education

This approach focuses on educating mothers/care givers on the importance of having a balanced diet through diversification of food. It also aims at the production foodstuffs at the backyard garden and intensification of horticultural activities. The nutrition education should focus on:

- Cultural malpractice and beliefs in child feeding and weaning process, weaning foods, exposure of children to sun light, time of weaning and food prejudices
- Intra household mal-distribution of food (age and sex bias)

Fig.4: Mother breast-feeding her child

- Effects of emotional deprivation and neglect on nutritional status of children and proper child treatment practices
- Importance of breast feeding
- Hygiene (personal hygiene, food hygiene, environmental hygiene)
- Importance of immunization
- Importance of growing fruits and vegetables in the backyard garden and consumption by the household members regardless of their age and sex.

Importance taking their children to health institutions for **growth monitoring**

- Monitoring of the growth of children is very importantTf0t0.273 Tp .Csling frast(ses262n ts6( )]TJ/C2_

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- **Food subsidy-** This involves subsidizing of either producers or consumers of food by the government. Structural adjustment policies interfere with the materialization of this approach.
- **Income generating projects-** This method operates in some regions of Ethiopia and involves development of income generating projects in the community to make them generate fund for buying food. It includes organizing the community and using their potentials in the running of the project. The projects could be weaving, pottery, Bee keeping, etc. This approach needs a good feasibility study on how the income generated is used, the sustainability of the programme, etc.

3. Appropriate sick child feeding
4. Maternal nutrition during pregnancy and lactation
5. Prevention of vitamin A deficiency
6. Prevention of Iodine deficiency disorders
7. Prevention of Iron deficiency anemia

These seven essential actions could be addressed during the six critical contacts of infants, mothers and young children with the health service units, which include:

1. Pregnancy during antenatal care contact
2. Delivery
3. Postal natal care and family planning
4. Immunization
5. Growth monitoring and promotion & well baby clinic visit
6. Sick child visit

However essential nutrition action approach contacts can further be extended beyond the regular contacts of women and children with the health service units. It could be delivered integrated with: school health programs, national immunization days, EPI + programs, IMCI and other child survival programs and reproductive health services. The same essential action should be considered during emergency situations.

Preparation Nutritious Food from Locally Available Food Staffs

Balanced diet can be prepared by mixing different locally available foodstuffs. For Example the requirements for protein, energy and other micronutrients of children by preparing a diversified diet as following: -

1. ***Quadri mix****---staple+ animal protein + plant protein + leafy vegetable*
2. ***Triple Mix****---Staple +animal protein + plant protein or leafy vegetables*
3. ***Double mix****--- staple + animal protein or plant protein or leafy vegetable*

Parents / caregivers need to be instructed how to modify the protein, energy and other nutrient contents of the locally available foodstuffs used in **complementary feeding** of children after 6 months (See Dietary modifications, in part 2.11.2).

Nutritional Surveys

Community based nutritional surveys including anthropocentric measurements and dietary consumption surveys need to be carried out among under five children in order to early detect the occurrence of nutritional problems in the community. Nutrition surveillance

activities should carefully monitor the occurrence of acute malnutrition and trends of the chronic one to avail information for proper planning.

2.12 Learning Activities (Case Study) Continued

Based on the story of health workers in Jiren community, different points of discussion have been incorporated in the respective satellite modules. Therefore, the students are advised to refer to the questions in satellite modules for each professional category and discuss them in the class under the coordination of their facilitator.

UNIT THREE

SATELLITE MODULES

3.1 SATELLITE MODULE FOR HEALTH OFFICERS

3.1.1 INTRODUCTION

3.1.1.1. Purpose and Use of the Module

The ultimate purpose of this training module is to produce Competent Health Officers who can effectively manage and provide care for cases of severe acute malnutrition both in clinical and community settings.

3.1.1.2 Direction for Using the Satellite Module

This satellite module can be used in the basic training of Health Center team particularly health officers who are either already in the service or in the training programs. In order to make maximum use of the satellite module, the health officer should follow the following directions

- Evaluate your self by doing the pre-test pertinent to your category under section 2.1.2.1 before going through the satellite module and evaluate your self by referring to the answer keys given in the unit 7 section 7.1.1
- Check or read the core module very thoroughly
- Read the case study and try to answer questions pertinent to it
- Use listed references and suggested reading materials to supplement your understanding of the problem.
- For total and comprehensive understanding of the causes, etiology, pathogenesis, Epidemiology and prevention of acute and chronic malnutrition, the health officer students are advised to refer to the core module.
- After going through this module evaluate yourself by doing post-test and comparing your score with the key given in unit 7 section 7.2.1

3.1.2. SATELLITE MODULE FOR HEALTH OFFICER

3.1.2.1. Pre and Post Test for the Satellite Module of Health Officers

See the pre- and post-tests for the health officers in the core module under unit 2, section 2.1.2.1

3.1.2.2 Significance and Brief Description of the Problem

See the part under unit 2 section 2.2 in the core module

3.1.2.3 Learning Objectives

For effective management a case of acute and chronic malnutrition (ACM), the health officer student will be able to do the following at the end of the training

1. Demonstrate the process of assessing a child with ACM
2. Identify and describe the clinical manifestations/complications in a child with ACM
3. List the diagnostic methods and procedures for a case with ACM
4. Describe the principles and methods of treatment of ACM
5. List the indications for admission of a case of ACM for inpatient management
6. Identify and manage or refer timely when needed, a case of ACM
7. Demonstrate the appropriate management of case of ACM
8. Describe proper follow up of a case of ACM

Case Study: Learning Activity

Read the story of health professionals in Jiren again in the core module very thoroughly so that you will be able to answer questions pertaining to it in section 2.12 of this module.

3.1.2.5 Definition

Refer to the core module unit 2 sections 2.5

3.1.2.6 Epidemiology

Refer to the core module unit 2 sections 2.6

3.1.2.7 Causes, Etiology and Pathogenesis

Refer to unit 2 section 2.7 of the core module

3.1.2.8 Clinical features (Symptoms and Signs)

The clinical features of SAM depend of its type. The severest clinical types include: Marasmus, kwashiorkor and features of both called marasmic- kwashiorkor. The following clinical symptoms and signs characterize them:

Kwashiorkor

- Growth failure
- Wasting of muscles and preservation of subcutaneous fat
- Edema (pitting type)
- Fatty liver (hepatomegaly)
- Psychomotor retardation (difficulty of walking)
- Moon face due to hanging cheeks as a result of edema and preserved subcutaneous fat.
- Anorexia
- Apathetic, miserable and have poor interest in the surrounding
- Skin changes
- Desquamation, De-pigmentation, Hypo-pigmentation, Flaky paint dermatosis especially on pressure areas, Hyper pigmentation (mosaic or cracked skin) especially on the head

Hair changes

- De-pigmentation, straightening of hair and presence of different color bands of the hair indicating periods of malnourishment and well nourishment (flag sign)
- Persistent lanugo hair, Long eye lashes, Gray and easily pluckable hair
- Straightening of hair at the bottom and curling on the top giving an impression of a forest (Forest sign)

Marasmus

- Growth retardation
- Wasting of subcutaneous fat and muscles (flabby muscles)
- Weight is more effected than Height
- Wizened monkey (old man face)
- Sunken eye balls
- Increased appetite
- Mood change (always irritable)
- Mild skin and hair changes

Acute and chronic complications of malnutrition

Acute

- Electrolyte imbalance
- Diarrhea, dehydration and shock
- Hypoglycemia
- Hypothermia
- Sepsis

Chronic

- Insult to the brain development leading to Low school performance and impaired IQ (Severe stunting is associated with reduction in IQ by 5-10 points.
- Stunting and ending up in short adult

With low fitness for physical activity and this s perpetuated through intergenerational cycle of malnutrition

3.1.2.9 Diagnosis of Acute and Chronic malnutrition

The clinical work up of cases of PEM mainly focuses on four factors, which do contribute to accurate diagnosis and management. These are:-

1. **Detailed history--**pertinent to

The ten steps in the management of a child with severe acute malnutrition developed by Ashworth and Feachem are depicted in the following table.

Steps of Management	Duration over which the interventions be started and continued
	Day 1-2

Small frequent feeds are ideal as they reduce the risks of diarrhea, vomiting, hypoglycemia and hypothermia. Refer to the core module section 2.10 for the to give additional Potassium 4mmol/kg/d, Magnesium 2mmol/kg/d, and Zinc 2mg preparation of the maintenance formula. It is important /kg/d), Copper 0.2mg/kg/d and a multivitamin preparation and folic acid.

2. Phase 2

Refer to the core module section 2.10

Inpatient Management of PEM: -

In many hospitals and health centers, treatment of SAM as inpatient is unsatisfactory and relapses are frequent. Attention needs to be given to: -

a) Reducing mortality through: rehydration, treatment of infection, and small frequent feeds.
b) Reducing length of stay: through administration of high-energy feeds in the rehabilitation phase.
d) Reducing relapses through: parental education, follow up, improvement of family resources.
e) Not all children with severe acute malnutrition are admitted to hospitals merely for the purpose of feeding. Admission of children to a hospital is targeted to those children with SAM plus other conditions stipulated below. A child with severe acute malnutrition (weight for height < 60%) and the following conditions should be admitted to a hospital or health center for inpatient management. For details, see 7.3

3.1.2.11 Prevention of Protein Energy Malnutrition (Options for Intervention)

Parental education on child feeding practice, importance of bringing their under five children to the nearby health institutions every month in the first 1 year, every 2 months in the second year 3 month then after for **growth monitoring and follow up**, the importance of immunization and personal, food and environmental hygiene are critically important in averting the occurrence and recurrence of protein energy mal nutrition. For further details refer to the core module unit 2, section 2.11.

3.1.2.12 Learning Activities (Case Study) Continued

Refer to story of health professionals in the core module and discuss on the following questions in the class. The instructor can assist you.

1. What pertinent history do you ask parents of children in the Jiren community?

2. What pertinent physical signs would you look for?
3. What laboratory investigations would you order in order?
4. What other assessments do you carry out in order to determine the type of malnutrition? What is your diagnosis from the story?
5. What other causes do you consider for the differential diagnosis?
6. What complications do you expect from malnutrition of such kind?
7. What are the risk factors for the development of malnutrition?
8. How would you manage the problem of Almaz?
9. What are the preventive measures for malnutrition?

3.1.2.13 Post Test

See the pre and posttest in the core module pertaining to health officers unit 2 section 2.1.2.1

3.1.2.14 Role and Task Analysis

Refer to unit 4 of the core module for the tasks expected of you.

3.1.2.15 Glossary and Abbreviations

Refer to unit 5 of the core module

3.1.2.16 References

Refer to unit 6 of the core module

3.1.2.17 Annexes

Refer to unit 7 of the core module for answer keys and other materials

3.2 SATELLITE MODULE FOR PUBLIC HEALTH NURSES

3.2.1. INTRODUCTION

3.2.1.1. Purpose and Use of the Module

TFfr a betterunderstt(Ling)f this anursesoar andvisd2.o- follow
The purpose of this satellite module is to equip students (trainees) with knowledge and skills required2.o- Td()5(lLt(Lot22ae)effectively casesof tseve)6(a ancue moalnutrition. Th5(e ipublic)]TJ0.0001 programsT.2.1.12 Dredction ffr Usingaul

5) Stay with the child during the meal or make sure a loved person is there. The child will eat and assimilate food better if a caring person soothes anxiety and loneliness away.

6) Encourage the child to eat the most nutritious foods first before they become too full to complete the meal.

7) Let the child eat with other children if possible. They will enjoy meal times more, accept more food and eat for longer periods.

3.2.2.10.2 Responsibilities of Public Health Nurse in Managing severe acute malnutrition (SAM)

The nursing management of PEM consists of providing nutrition rich in the essential nutrients to correct the dietary insufficiency and to promote normal growth and development. The digestive capacity of malnourished child is poor. As a result oral feedings are given in small frequent amounts, limited in proteins and carbohydrates especially fats that are hard to digest.

In addition, the nurse is responsible for:

1. Maintaining the child's body temperature within a normal range.
2. Providing periods of rest and appropriate activity.
3. Providing stimulation
4. Recording intake, out put and daily weight
5. Turning position in bed frequently.
6. Preventing bedsore and infection by keeping the skin clean and dts s.

- Return for follow up visit after 30 days or earlier if there is feeding problem.

3.2.2.11 Prevention and Interventions

The public health nurses should advise the mothers/care givers of malnourished children to come for regular check up (growth monitoring) and vaccination to prevent the occurrence and recurrence of mal nutrition. They should be advised about proper child feeding practices. During the follow up visit, if the recommended changes in child's feeding are helping, encourage the mother to continue accordingly, but if the child is continuing to loss weight and no change in feeding seems likely, discuss with the other team members mainly the health officers for further management.

3.2.2.11.1 Education to Improve Nutrition

This involves teaching all sections of the community, especially fathers and mothers, to make the best use of the foods available (including breast-feeding), to make use of available primary health care services, and to grow local foods in their own gardens.

3.2.2.11.2 Practical Nursing for Improving Nutrition

There are seven rules, which, if kept, can largely improve nutritional status in the community.

1) Identify the local sources of foodstuffs
2) Recognize the causes of improper feeding in the community
3) Explain the effects of improper feeding on different age groups.
4) Teach nutritional values of local foodstuffs.
5) Demonstrate how to cook balanced meals using locally available foodstuffs
6) Teach food hygiene in the home
7) Evaluate what the community members have learnt about improved nutrition

3.2.2.11.3 Practical Nursing for Infant Feeding

There are five rules that can largely prevent malnutrition in educating mothers or other caregivers in-group or individually

1. Breast-feed at least until 1-2 years
2. Start thick porridge, paste or gruel at 4 months and continued breast-feeding
3. Use all available animal food sources
4. Use vegetable (cereals & legumes) mixture.
5. Give children four good meals a day

3.3 SATELLITE MODULE FOR MEDICAL LABORATORY TECHNICIANS

3.3.1. INTRODUCTION

3.3.1.1 Purpose of the Module

This module helps laboratory technicians to participate in the team management of protein energy malnutrition, with a particular emphasis on the laboratory investigations of malnutrition, associated infections and other complications.

3.3.1.2. Direction for Using the Satellite Module

Therefore, for a better understanding of this module the laboratory technicians are advised to follow the following directions.

- Do the pretest in your profession in unit 2, section 2.1.2.3 of the core module
- Read the core module thoroughly
- Use listed references and suggested reading materials to substantiate your understanding of the problem
- Evaluate yourself by doing the post test and referring to the keys given in unit 7 section 7.1.2.3

3.3.2.1. Pretest

Refer to the pre and post test in the core module unit 2 section 2.1.2.3

3.3.2.2. Significance and Brief Description of the Problem

See the core module unit 2 section 2.2.

3.3.2.3. Learning Objectives

After completion of this module students will able to:

- Describe how to collect, handle and label blood specimens
- Describe routine concept of laboratory diagnosis of malnutrition
- Describe and demonstrate the laboratory procedures for hemoglobin determination using Sahli-Hellige method
- Describe and demonstrate how to prepare and stain thin blood film for red blood cell morphology

- Demonstrate how to assess stained thin blood films including elements of the blood films other than red cell morphology (e.g. haemoparasites)
- Classify anemia based on red blood cell morphology and measured hemoglobin

3.3.2.4. Learning Activities: Case Study

Read the story of health professionals in Jiren the core module very thoroughly so that you will be able to answer questions pertaining to it in section 2.12 of this module.

3.3.2.5. Definition

Refer to the core module unit 2 sections 2.5.

3.3.2.6 Epidemiology

Refer to the core module unit 2 sections 2.6.

3.3.2.7 Cause, Etiology and Pathogenesis

Refer to the core module unit 2 sections 2.7.

3.3.2.8 Clinical Features

Refer to the core module unit 2 sections 2.8.

3.3.2.9 Diagnosis

3.3.2.9.1 Blood Collection

The proper collection and reliable processing of blood specimens is a vital part of the laboratory diagnostic process in hemoglobin determination. This helps to assess the morphology of red blood cells in thin blood film and to know the level and type of anemia in

should wear disposable rubber gloves. The operator is also strongly advised to cover any cuts, abrasions or skin breaks on the hand with adhesive tape and wear gloves. Care must be taken when handling especially, syringes and needles as needle-stick injuries are the most commonly encountered accidents. Do not recap used needles by hand. Should a needle-stick injury occur, immediately remove gloves and vigorously squeeze the wound while flushing the bleeding with running tap water and then thoroughly scrub the wound with cotton balls soaked in 0.1% hypochlorite solution.

Used disposable syringes and needles and other sharp items such as lancets must be placed in puncture-resistant container for subsequent decontamination or disposal. Blood sources for hematological tests are:

- Capillary/peripheral blood
- Venous blood

3.3.2.9.3 Blood Collection

3.3.2.9.3.1 Capillary/Peripheral Blood or Micro Blood Samples

This is frequently used when only small quantities of blood are inquired, e.g., for Hemoglobin quantitation, and for blood smear preparation. It can be collected from palmar surface of the tip of the ring or middle finger or free margin of the ear lobe in adults and plantar surface of the big toe or the heel in infants and small children.

Notes: -

- Edematous, congested and cyanotic sites should not be punctured.
- Cold sites should not be punctured as samples collected from cold sites give falsely high results of hemoglobin and cell counts. Site should be massaged until it is warm and pink.

Materials:

- Gauze pads or cotton,
- 70% alcohol,
- Sterile disposable lancet

Technique:

Rub the site vigorously with a gauze pad or cotton moistened with 70% alcohol to remove dirt and epithelial debris and to increase blood circulation in the area. If the heel is to be punctured, it should first be warmed by immersion in warm water or applying a hot towel

compress. Otherwise values significantly higher than those in venous blood may be obtained.

After the skin has dried, make a puncture 2-3mm deep with a sterile lancet. A rapid and firm puncture should be made with control of the depth. A deep puncture is no more painful than a superficial one and makes repeated punctures unnecessary. The first drop of blood, which contains tissue juices, should be wiped away. The site should not be squeeze or pressed to get blood since this dilutes it with fluid from the tissues. Rather, a freely flowing blood should be taken or a moderate pressure some distance above the puncture site is allowable.

Stop the blood flow by applying slight pressure with a gauze pad or cotton at the site.

3.3.2.9.3.2 Venous Blood Collection

It is used when larger quantity of blood is required. E.g. serum albumin. It can be collected from forearm, wrist or ankle. In infants and children, veni-puncture presents special problems

3. Prepare the arm by swabbing the ante-cubital fossa with a gauze pad or cotton moistened with 70% alcohol. Allow it to dry in the air or use a dry pad or cotton. The area should not be touched once cleaned.
4. Apply a tourniquet at a point about 6-8cm above the bend of the elbow making a loop in such a way that a gentle tug on the protruding end will release it. It should be just tight enough to reduce venous blood flow in the area and enlarge the veins and make them prominent and palpable. The patient should also be instructed to grasp and open his/her fist to aid in the build up of pressure in the area of the puncture. Alternatively, gently tapping the antecubital fossa or applying a warm towel compress can visualize the veins.
5. Grasp the back of the patient's arm at the elbow and anchor the selected vein by drawing the skin slightly taut over the vein.
6. Using the assembled syringe and needle, enter the skin first and then the vein. To insert the needle properly into the vein, the index finger is placed along side the hub of the needle with the bevel facing up. The needle should be pointing in the same direction as the vein. The point of the needle is then advanced 0.5-1.0cm into the subcutaneous tissue (at an angle of 45^0) and is pushed forward at a lesser angle to pierce the vein wall. If the needle is properly in the vein, blood will begin to enter the syringe spontaneously. If not, the piston is gently withdrawn at a rate equal to the flow of blood. The tourniquet should be released the moment blood starts entering the syringe/vacuum tube since some hemo-concentration will develop after one minute of venous stasis.
7. Apply a ball of cotton to the puncture site and gently withdraw the needle. Instruct the patient to press on the cotton.
8. With the syringe and needle system, first cover the needle with its cap, remove it from the nozzle of the syringe and gently expel the blood into a tube without anticoagulant and Stopper the tube. Label the tubes with patient's name, hospital number and other information required by the hospital.
9. Rei-nspect the veni-puncture site to ascertain that the bleeding has stopped. Do not let the patient go until the bleeding stops

3.3.2.9.4. Estimation of hemoglobin by the Acid Hematin Method of Sahli-Hellige

Principle: -

Hemoglobin in a sample of blood is converted to a brown colored acid hematin by treatment with 0.1 N HCl and after allowing the diluted sample to stand for 5 minute to ensure

complete conversion to acid hematin it is diluted with distilled water until its color match as with the color of an artificial standard (tinted glass).

Materials:-

Sahli Hemoglobinometer

1 Sahli pipettes that measures 20µl (0.02ml)
2. Stirring glass rod
3. Absorbent cotton
4. 0.1N HCl
5. Dropping pipette

Technique:

Fill the graduated Sahli tube to the 20 mark of the red graduation/or 39% mark of the yellow grad with 0.1 N HCl using the dropper provided. Take a well-mixed venous blood or capillary blood from a freely flowing skin puncture to the “20” mark of the Sahli pipette. Wipe the outside of the pipette with a piece of cotton. Check that the blood is still on the mark. Blow the blood from the

3.3.2.9.5 Preparation, Staining and Examination of Peripheral Blood Film

3.3.2.9.5.1 Preparation of Thin Blood Film

Examination of the blood film is an important part of the hematological evaluation and the validity or reliability of the information obtained from blood film evaluation, the differential leukocyte count in particular depends heavily on well-made and well-stained films.

If not made from skin puncture, films should be prepared within 1 hour of blood collection into EDTA. Adequate mixing is necessary prior to film preparation if the blood has been standing for any appreciable period of time.

A thin blood films can be prepared on glass slides or cover glasses. The latter has the single most important advantage of more even distribution of leucocytes.

Preparation of blood films on glass slides has the following advantages:

- Slides are not easily broken
- Slides are easier to label
- When large numbers of films are to be dealt with, slides will be found much easier to handle.

Technique: The Two-Slide or Wedge Method

A small drop of blood is placed in the centerline of a slide about 1-2cm from one end. Another slide, the spreading slide placed in front of the drop of blood at an angle of 30^0 to the slide and then is moved back to make contact with the drop. The drop will spread out quickly along the line of contact of the spreader with the slide. Once the blood has spread completely, the spreader is moved forward smoothly and with a moderate speed. The drop should be of such size that the film is 3-4cm in length (approx. $3/4^{th}$ of the length of the slide). It is essential that the slide used as a spreader have a smooth edge and should be narrower in breadth than the slide on which the film is prepared so that the edges of the film can be readily examined. It can be prepared in the laboratory by breaking off 2mm from both corners so that its breadth is 4mm less than the total slide breadth. If the edges of the spreader are rough, films with ragged tails will result and gross qualitative irregularity in the distribution of cells will be the rule. The bigger leucocytes (neutrophils and monocytes) will accumulate in the margins and tail while lymphocytes will predominate in the body of the film. The ideal thickness of the film is such that there is some overlap of the red cells through out much of the film's length and separation and lack of distortion towards the tail of the film.

Thickness and length of the film are affected by speed of spreading and the angle at which the spreader slide is held. The faster the film is spread the thicker and shorter it will be. The bigger the angle of spreading the thicker will be the film. Once the slide is dry, the name of the patient and date or a reference number is written on the head of the film using a lead pencil or graphite. If these are not available, writing can be done by scratching with the edge of a slide. A paper label should be affixed to the slide after staining.

3.3.2.9.5.2. Staining of Thin Blood film with Romanowsky Dyes

Modern Romanowsky stains are common (e.g., Wright's) containing an acidic component (eosin B) and a basic component (ethylene blue).

Wright's Stain

It is purchased as a solution ready to use or as a powder 1gm of which is carefully dissolved in 600ml of methyl alcohol and then filtered before use.

Staining Method

1. Place the air-dried smear film side up on a staining rack (two parallel glasses rods kept 5cm apart).
2. Cover the smear with undiluted stain and leave for 1 minute. The methyl alcohol fixes the smear. When it is planned to use an aqueous or diluted stain, the air dried smear must first be fixed by flooding for 3-5 minutes with absolute methanol. if films are left unfixed for a day or more, it will be found that the background of dried plasma stains pale blue and this is impossible to remove Without spoiling the staining of the blood cells.
3. Dilute with distilled water (approximately equal volume) until a metallic scum appears. Mix by blowing. Allow this diluted stain to act for 3-5 minutes.
4. Without disturbing the slide, flood with distilled water and wash until the thinner parts of the film are pinkish red.
5. Place the slide on end to dry.

Appearance of cells and cell components in Romanowsky-Stained blood films

Films stained with Wright's stain are pinkish in color when viewed with the naked eye. Microscopically,

- Red cells - pink with a central pale area
- Nuclei of leukocytes - blue to purple
- Cytoplasmic neutrophilic granules - tan
- Eosinophilic granules - red orange each distinctly discernible

- Basophilic granules - dark blue
- Cytoplasm of monocytes - faint blue gray
- Platelets - violet granules
- Malaria parasites - sky blue cytoplasm and red purple chromatin

3.3.2.9.5.3 Examination of Stained Thin Blood Films

Examination of stained thin blood film helps for Morphologic classification of anemia and is considered to be the most appropriate and practical way for the correct appraisal of red cell morphology.

1. Normocytic Normochromic Anemia

There is normal sized RBC with normal hemoglobinization. Mean cell volume (MCV), Mean cell hemoglobin (MCH) and Mean cell hemoglobin concentration (MCHC) are normal. This is caused by increased red cell loss, blood loss, blood loss anemia, and hemolytic anemia

3.3.2.9.6.1 Methods of Counting

Various systems of performing the differential count have been advocated. The problem is to overcome the differences in distribution of the various classes of white cells, which are probably always present to a small extent even in well-made films.

The lateral strip (“crenellation”) pattern of differential counting is the most routinely used pattern and in this method the field of view is moved from side to side across the width of the slide in the counting area just behind the featheredge where the cells are separated from one another and are free from artifacts. Multiple manual registers or electronic counters are used for the count.

N.B: The following elements of the blood film must be observed while performing the differential count.

-

3.3.2.9.7 Measurement of Serum or Plasma Albumin

Serum or plasma albumin levels are mainly measured to investigate liver diseases, protein energy malnutrition, and disorders of water balance, nephrotic syndrome, and protein-losing gastrointestinal diseases.

Method

The bromocresol (BCG) binding method is recommended as a manual colorimetric technique for measuring serum or plasma albumin.

Principle of the BCG Albumin Method

Bromocresol green is an indicator, which is yellow between pH 3.5-4.2. When it binds to albumin the color of the indicator changes form yellow to blue-green. The absorbance of the color produced is measured in a colorimeter using an orange filter or in a spectrophotometer at 632 nm wavelengths. Turbidity in the solutions is avoided by the addition of Brij-35.

***Albumin + BCG PH4.2 -- Ą Albumin-BCG complex* Reagent**

1. Bromocresol green (BCG), when stored at 2-8^0 C the BCG reagent is stable for several months. It should be allowed to warm to room temperature (20-28^{0}C) before use.
2. Albumin standard, 30 g/l

Technique:

Specimen: The method requires 20µl (0.02 ml) of patient's serum or plasma.
The blood must be collected with the minimum of venous stasis and haemolysis should be avoided.

1. Take four or more tubes (depending on the number of tests) and label as follows.
   B - Reagent blank
   S - Standard, 30 g/l
   1.2 etc. - Patients' Tests
2. Pipette 4 ml of BCG reagent (Warmed to room temperature) into each tube.
3. Add to each tube as follows;

Tube	
B	20µl (0.02 ml) distilled water
S	20µl standard, 30 g/l
1, 2, etc	20µl patient's serum or plasma

Note: If a patient's sample appears turbid, prepare a serum blank by mixing 20 of patient's Serum or plasma in 4 ml of succinate buffer


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Summary of Albumin Method

1. Pipette into tubes as follows:

	Blank	Standard	Test 1,2, etc
Bromocresol green (BCG) reagent	4ml	4ml	4ml
Distilled water	20µl	-	-
Standard, 30g/l	-	20µl	-
Patient's serum or plasma	-	-	20µl

1. Mix well but avoid frothing
2. Read absorbance immediately

   Colorimeter: Orange filter. E.g. Ilford No.607

   Spectrophotometer: 632

   Zero instrument with blank solution in tube B
3. Calculate the results as follows:

$$\text{Albumin g/l} = \frac{\text{Absorbance of test}}{\text{Absorbance of 30g/l standard}} \times 30$$

4. Report patient's result in g/l

3.3.2.10 Case Management

Refer to the core module unit 2 sections 2.10.

3.3.2.11 Prevention and Intervention

Refer to the core module unit 2 sections 2.11**.**

3.3.2.12. Learning Activities (Case Study) Continued

Refer to story of health professionals in the core module and discuss on the following questions in the class. The instructor can assist you.

- How is blood specimen collected, stained and examined for blood morphology examination?
- What could be the etiology of protein energy malnutrition?
- What laboratory investigations could be done at the health station or health center level?
- What materials are required to carry out the investigations?
- What should be reported in the laboratory request form in the determination of hematological tests for the assessment of protein energy malnutrition?

3.3.2.13. Roles and Task Analysis

Refer to the core module unit 4.

3.3.2.14. Glossary and abbreviations

Refer to the core module unit 5.

3.3.2.15. Bibliography

Refer to the core module unit 6.

3.3.2.16. Annexes

Refer to the core module unit 7.

3.4 SATELLITE MODULE FOR SANITARIAN

3.4.1.INTRODUCTION

The role of the sanitarian in the prevention of mannutritin is mostly on awareness creation, environmental sanitation improvement and behavior change in nutritional improvement and hygiene practices.

3.4.1.1. Purpose and use of the Module

The main purpose of this module is equip sanitarians with adequate knowledge and skill for the prevention and management of cases of malnutrition together with the other team members.

3.4.1.2. Directions for using the Module

For a better understanding of this module, the sanitarians are advised to follow the following directions.

- Do the pretest pertinent to your field in unit 2 section 2.1.2.4 of the core module. The sanitarians should also read the core module thoroughly at first and when referred in this module.
- The sanitarians could be successful in using this module if he works with other team members and inter-sectoraly with other development workers (agriculture extension agents, health extension workers, development workers, home economists etc.)
- Since malnutrition and diarrhea are directly associated the sanitarians should use the module on diarrhea (core, satellite) in conjunction with this module.
- Read the story of health workers in Jiren community and try to address the question relevant to you.
- Evaluate yourself by doing posttests and comparing your score by referring to the key given unit 7 section 7.1.2.4.

3.4.2.1. Pretest and Post Test:

Please refer to section 2.1.2.1 in the core module

3.4.2.2. Significance and Brief Description of the Problem:

Please refer to section 2.2 in the core module.

3.4.2.3. Learning Objectives

The objective of this module is to equip the sanitarian with the appropriate knowledge, attitude and skills required to effectively prevent acute and chronic malnutrition conduct

health and nutrition education to targets for sustainable behavioral change. Therefore, at the end of this module, the sanitarians will be able to: -

1) Describe the prevention methods protein energy malnutrition
2) Identify appropriate methods and the primary targets for nutrition and health education program in the prevention of malnutrition
3) Describe why personal hygiene, nutrition education and environmental sanitation practice prevents those risk factors which are associated with malnutrition
4) Describe the whole mechanism of different factors that are associated with the problem of malnutrition

3.4.2.4 Learning Activities: Case Study

Read the story of health workers in Jiren community so that you will be able to discuss question in section 2.12 of this module.

3.4.2.5 Definition

Please refer to the core module unit 2 sections 2.5

- **Water protection** at the source and use at home, please refer to the module on diarrhoeal disease for the sanitarian, section 2.8 no.2
- **Food hygiene**, please refer to the module on diarrhoeal disease section 2.8
- **Domestic and environmental sanitation**, please refer to the module on diarrhoeal disease for the sanitarian section 2.8 No. 5

2. Nutrition Education

Nutrition education should be given to the target group (mothers and caregivers) on the importance of:

1) Feeding balanced diet through the use of locally available food resources
2) Proper and hygienic preparation and storage of food.
3) Proper preparing and feeding of unadulterated and uncontaminated fresh food

3. Health's and Hygiene Education

It has to be understood that one of the problems for the spread of malnutrition in children is lack of knowledge or information on simple preventive measures such as proper food preparation, storage and cleanliness. Hygiene or health education program should therefore be planned to help community members understand the importance of hygienic practices in weaning food preparation, in the prevention of diarrhoeal and helminthic infections and general health promotion. To be successful in hygiene /health education program we should focus on the following facts.

- Health/Hygiene education should be targeted
- Health/Hygiene education should be simple (short and to the point facts has to be given to the targets)
- Health/ hygiene education program should be Convincing (target should be able to get the point and demonstrate it)
- Health/ Hygiene education program should be programmed to be given at appropriate time, place, and condition.

In addition, preparation for health/hygiene education should start from the behavior analysis. Behavior is culture bound and hence each culture will have to be analyzed critically so that proper strategy could be formulated to change or modify existing behavior.

3.4.3.1. Behavioral Analysis:

This means understanding what the current or existing behaviors of people in the communities are with regard to:

- Type of food prepared for children
- The care or practices of food hygiene during preparation and storage
- Having latrine or latrine use
-

3.5.2.3. Learning Objectives

At the end of completing these modules the Health extension workers (HEW) will be able to

manmade and natural calamities, social unrest (war), poor food production, uncontrolled population growth and poor marketing, storage and distribution systems.

3.5.2.8 Clinical Features

state of severe malnutrition and those who fail to improve in their nutritional status in the subsequent measurements (follow up) be referred to the next health institution for better management. For further details refer to the core module unit 2, section 2.10.

3.5.2.11 Prevention & Intervention

Give nutrition education to mothers or care givers on: -

Proper child feeding practices like:

- Exclusive breast feeding during the first 6 months
- Optimal complementary feeding at six months with continuation of breast feeding for the first 24 months or more
- Avoidance of bottle feeding and use of cup instead
- Using iodized salt for preparation of complementary and consumption of the same by the family
- Importance of increasing the frequency breast feeding and giving other complementary foods and fluid during sickness continued feeding during diarrheal attack

Introduction of complementary foods of children gradually and step by step with liquid

3.5.2.12 Learning Activities (Case Study)

Continued:

Read story of health workers in Jiren community to the class (make them read) and discuss the following questions.

1) What should parents of children in the Jiren community do to prevent malnutrition?
2) If parents of these children come to see you first what do you do to address their problem?
3) What other factors contribute to development of malnutrition?
4) What do you think are the preventive measures of malnutrition?

UNIT:4 ROLE AND TASK ANALYSIS

See unit four of the core module for the expected role and tasks of PHW/CHW

UNIT: 5 GLOSSARY AND ABBREVIATIONS

See unit five of the core module

UNIT: 6 BIBLIOGRAPHY

Se unit six of the core module

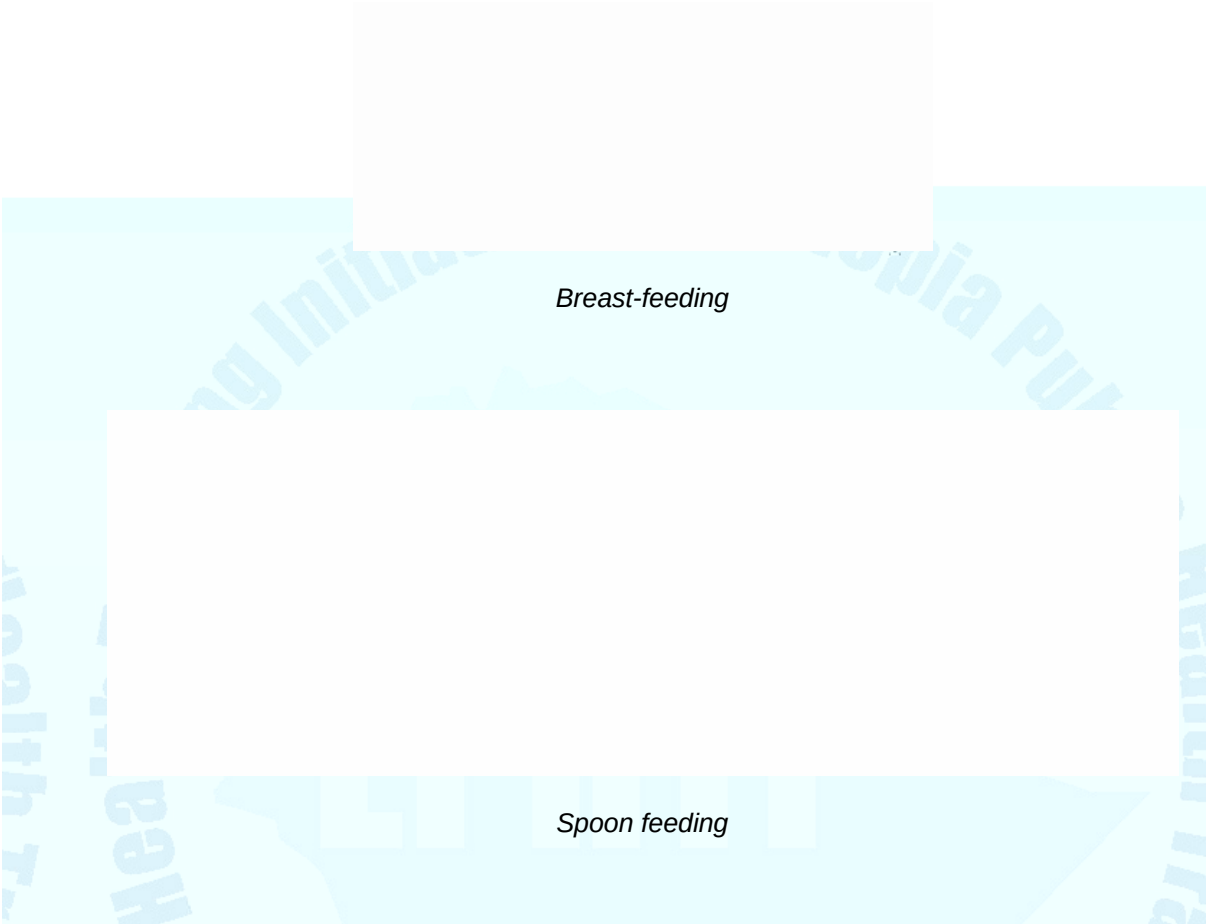
UNIT: 7 ANNEXES

See unit seven of the core module

3.6 TAKE HOME MESSAGE FOR THE MOTHER / CAREGIVER

Severe acute (Malnutrition): is a general poor state of health of children that arises from poor (improper) child feeding practices such as early abrupt weaning, bottle feeding, poor food hygiene, avoidance of breast feeding and poor nutritional quality of the weaning foods. The mothers or caregive

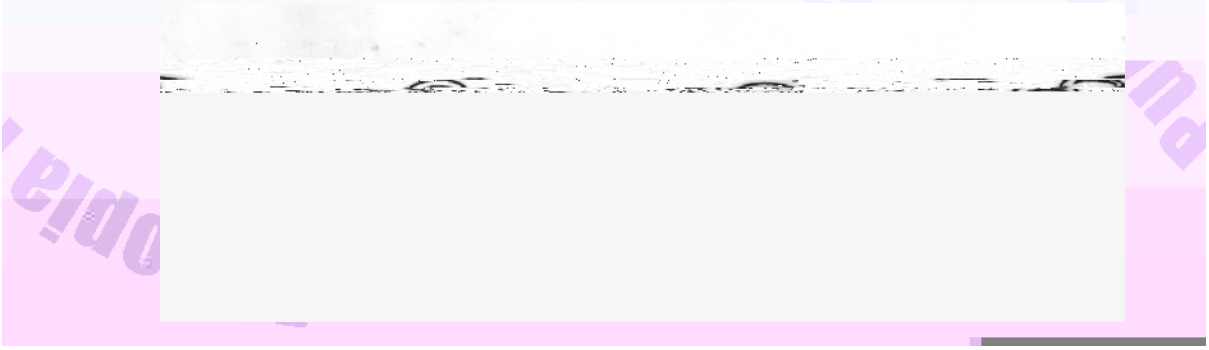
Figure 9. Proper child feeding practices (breast-feeding and using spoon than bottles



Breast-feeding

Spoon feeding

Figure 10. Sources of vitamins and minerals for good health



UNIT FOUR

TASK AND ROLE ANALYSIS

Table 4.1 Knowledge Objective And Essential Tasks Of The Health Center Team (Health Officer, Public Health Nurse, Medical Laboratory Technician and Sanitarians)

	Learning objective (expected out Come)	HO	PHN	EH	MLT	Activity
Knowledge	Define and describe types of acute & chronic malnutrition(ACM)	Define and describe types of ACM.	Define and describe types of ACM	Define and describe types of ACM.	Define & describe types of ACM	Define & Characterize types of ACM
	List causes and risk factor of ACM	List different causes of and their association with the different risk factors.	List different causes of ACM & their association with the different risk factors	List different causes of ACM their association with the different risk factors.	List different causes of ACM	List the different causes of ACM & associated risk factors.
	Describe the Magnitude and contribution of ACM to over all childhood health problems locally & nationally	Pin point the prevalence of malnutrition and its contribution to mortality & morbidity in children locally and nationally	Pin point prevalence of malnutrition on & its contribution to mortality & Morbidity in children locally and nationally.	Pin point prevalence of malnutrition and its contribution to mortality and Morbidity in children locally & nationally.	Pinpoint the prevalence of malnutrition and its condition to morbidity and mortality in children locally and nationally	* Explain the burden of malnutrition morbidity & mortality in children * Describe the commonest Causes of PEM

owledge Objective and Essential Tasks of The Health Center Team (Health Officer, Public Health Nurse, edical Laboratory Technician and Sanitarians)

Objective d Outcome)	HO	PHN
Knowl		

Table 4.3. Attitude Objective and Essential Tasks of The Health Center Team (Health Officer, Public Health Nurse, Medical Laboratory Technician and Sanitarians)

	Learning Objective (Expected out come)	HO	PHN	EH	MLY	Activities
Attitude	-Believe in the importance of breast feeding and weaning practices in reducing mortality due to protein energy malnutrition.	-Instruct HEW (community health workers) mothers and care gives in reducing mortality due to protein energy malnutrition	-Instruct HEW (Community health Workers) mothers, & care gives in reducing mortality due to protein energy malnutrition	-Instruct HEW (community health workers) mothers and care givers in reducing mortality due to protein energy malnutrition	-Instruct HEW (Community health workers Mothers & caregivers. In Reducing mortality due to malnutrition	Advise HEW, mothers and care givers for the utility of feeding high energy and protein diet in facilitating recovery from malnutrition.
	-Believe in promoting proper Feeding of infants (children) with case of protein energy malnutrition	-Advocate continued feeding of a child required less malnutrition.	-Advocate continued feeding of a Child regardless of m Malnutrition.	Advocate continued		

Table. 4.4 Practice Objective And Essential Tasks of the Health Center Team (Health Officer, Public Health Nurse, Medical Laboratory Technician and Sanitarians)

	Learning Objective (Expected out come)	HO	PHN	EH	MLY	Activities
Practice						

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Table 4.6 Attitude Objectives and Essential Tasks of Community Health Extension Workers (HEW)

	Learning Objective (Expected out come)	CHW	Care giver	Activity
Attitude	-Promote utilization of health service facilities for the treatment of malnutrition	-Advice care givers to bring a child with malnutrition to the health service units to Consult health worker	- Advice friends and families to	

Table 4.7. Practice Objective and Essential Tasks of Health Extension Workers (HEW)

	Learning Objective (Expected out come)	CHW	Care giver	Activities
Practice	Demonstrate preparation of feeding formula for the treatment of malnutrition and its proper use.	Demonstrate preparation of feeding formulas their administration to the case of malnutrition for caretakers.	Demonstrate properly how and what to prepare and administer to a child With Malnutrition.	Show materials and ingredients to be used in the preparation of Feeding formulas
	Identify a case of malnutrition and demonstrate its appropriate management	Identify complications of malnutrition and its degrees and advise the caregiver to feed the patient properly.	Identify signs of symptoms of malnutrition and its complications and decide whether there is a need for admission or referral	Identify sings and symptoms of malnutrition and administer proper feeding practices (see the core module).
	Demonstrate proper communication to mothers or care givers pertaining to malnutrition.	Display Effective Communication skill with Mothers or care givers on Treatment and prevention of malnutrition	-------	Identify ways of educating Mothers/ care gives about malnutrition

***Gomez Classification:* -** A classification of malnourished children by comparing their weight with the weight of reference child of the same age.

***Hypoglycemia:* -**

Stunting: **-** A state of chronic malnutrition characterized by normal weight for height (>80%) & low height for age (<80%) according to Waterlow classification

Wasting: - Is a state of acute malnutrition characterized by normal height for age (>80%) & low (< 80%) weight for height according to water low classification.

Water Low Classification**: -** Classification of malnourished children that uses two indices: weight for height and height for age for detection of acute and chronic states of malnutrition in the community.

Weaning: - Administration of food (solid or liquid including formula or cows milk) in addition to breast milk or without breast milk.

Welcome Classification**:** - Classification of malnourished children based on their weight, age & presence of edema. This classification is used to distinguish the clinical form of PEM.

UNIT SIX

BIBILIOGRAPHY

Ashworth, A et al. Ten steps to recovery (report), Child health dialogue, second and third quarter, 1996.

Brown. L.V, et al. Evaluation of the impact of weaning food messages on infant feeding practices and child growth in rural Bangladesh. Am.J.Clin.Nutr. 1992. 56: 994-1003.

Cohen, R., et al, Effects of Age of introduction of complimentary foods on infant breast milk intake, total energy intake, and growth: a randomized intervention study in

Central Statistics Authority. The transitional government of Ethiopia. Report on the national Rural Nutrition Survey, Core module, March, 1992.

Dewey, K.G., et al, Growth Pattern of breast fed infants in affluent (United States) and poor (Peru) communities, implications for timing of complimentary feeding, A.M.J.Clin.Nutr. 1992; 56: 1012-1018.

Ethiopian Public Health Association, Food and Nutrition Strategy and Policy issue,

Honduras. The lancet, 1994; 344: 288-293.

Husaini, M.A., et al., Developmental effect of short term supplementary feeding

in nutritionally at risk Indonesian infants. Am.J.Clin.Nutr, 1991: 54: 799-804

Latham, M.C., Human nutrition in the Developing World, Rome: F.A.O; 1997.

Latham, M.C., Human nutrition in tropical Africa. Second edition, F.A.O, Rome; 1979

Lofti, M., Weaning foods-new uses of traditional methods. SCN news No.6 Addis Ababa, Nov. 1997

Lorri,W, and Svanberg, U., Lower Prevalence of diarrhea in Young Children fed lactic Acid fermented cereal gruels, food and nutrition bulletin, 1994: 15 (1): 57-63

Mahan LK, ***Stump SE.*** Kruse's food, Nutrition and diet therapy, 9th ed., USA: Saunders, 1996.

MOH. *Guideline for the management of severe acute malnutrition for Ethiopia****. MOH, May , 2004***

MOH. *Infant and young child feeding strategy for Ethiopia, MOH, 2004****.***

MOH. *Guideline for control and prevention of macronutrient deficiency in Ethiopia****. MOH, 2004.***

Rahway, M.I., Protein Energy Malnutrition (PEM), Merck manual, 16th. Edition 1992.

Tshikuka, J.G., et al**.** The relationship of childhood protein energy, malnutrition and parasite infections in an urban African setting. Trop. Med. Int. Health. 1997; 2 (4): 374- 382

Walker, A.**,** The contribution of Weaning Foods to Protein-Energy malnutrition. Nutrition research reviews, 1990; 3: 25-47.

Walker, S.P., et al*,* Nutritional supplementation, psychosocial stimulation, and growth of stunted children: the Jamaican study. Am. J.Clin.Nutr. 1991, 54: 642-648.

Waterlow, J.C. et al, Protein Energy malnutrition, Edmund bury press, London, 1992.

Weaver, L.T., Feeding the weanling in the developing world: problem and solution. International journal of food sciences and nutrition, 1994; 45: 127-134.

MOH, Ethiopia. Guideline for the management of Severe acute malnutrition. MOH, Ethiopia, May 2004.

MOH, Ethiopia. Ifant and yong child feeding strategy . MOH, Ethiopia, May 2004

MOH, Ethiopia. National Guideline for control and Porevention of Micronutrient deficiency. MOH, Ethiopia, May 2004

WHO, BASICS, UNICEF*. Nutrition essentials: a guideline for health managers, WHO, 1999.*

UNIT SEVEN

ANNEXES

7.1 Answer Keys

7.1.1 Keys for the Core Module (all categories)

Q.No.1. **C**

Q.No.2. **E**

Q.No.3. **E**

Q.No.4. **A Marasmus**

a. Kwashiorkor

b. Marasmic –kwashiorkor

c. Underweight

d. Stunting and wasting

Q.No.5. **D**

Q.No.6. **Kwashiorkor**

a. Pitting edema

b. Gray and easily pluckable hair

c. Miserable and apathetic

d. Loss of muscle & preservation of subcutaneous fat

Marasmus

A. Loss of both subcutaneous fat and muscle (skin and bone appearance)

B. Irritability and moodiness

C. Wizened monkey faces (old man appearance)

D. Absence of edema

Q.No.7.

Q.No.9. **Because it causes fluid overload and death from heart failure (a condition called recovery syndrome)**

Q.No.10. **D**

Q.No.11. **D**

Q.No.12. **D**

Q.No.13. **E**

Q.No.14. **A**

Q.No.15. **D**

Q.No.16. **D**

Q.No.17. **D**

Q.No.18. **D**

Q.No.19. **D**

Q.No.20. **C**

Q.No.21. **B**

Q.No.22. **False**

Q.No.23. Exclusive breast feeding for the first 6 months and optimal complementary feeding after 6 months with the continuation of breast feeding up to 24 months or beyond

Q.No.24. **A, B, C, D**

Q.No.25. 1. Eclusive breast-feeding for the first 6 months
2. Optimal complementary feeding at 6 months with the Continuation of breast-feeding at 6 months
3. Sick child feeding (during illness and for 2 weeks after illness)
4. Maternal nutrition
5. Control and prevention of vitamin A deficiency (VAD)
6. Control and prevention of vitamin Iron deficiency (IDA)
7. Control and prevention of vitamin Iodine deficiency disorders (IDD)

7.1.2. KEYS FOR SATELLITE MODULES (SPECIFIC PROFESSIONAL CATEGORIES)

7.1.2.1. HEALTH OFFICERS

Q.No. 1. A to E

Q.No. 2. B to E

Q.No. 3. A to D

Q.No. 4. A to D

Q.No. 5. C

Q.No. 6. A, B, D and E

Q.No. 7. A to E

Q.No. 8 A to E

Q.No. 9. A and B

Q.No. 10. A, B, C and D

Q.No. 11. B, C, D and E

Q.No. 12. A and B

Q.No. 13. B

Q.No. 14. A to D

Q.No. 15. D

Q.No. 16. D

7.1.2.2. PUBLIC HEALTH NURSE

Q.NO. 1 **A. Coordinate client care when discharged home**
B. Teach them how to follow the feeding program.
C. Provide the necessary supplies and equipment

Q.NO. 2 . **D**

Q.NO. 3 **A. Provide iron rich foods, after the first 7days**

B. Prevent non compliance by giving appropriate and adequate information

C. Offer the child favorite food.

D. Avoid bottle feeding

E. Return to clinic after a month or so.

Q. NO. 4. **A. Identify the local sources of foods stuffs.**

B. Recognize the cause of improper feeding in a given community.

C. Provide information regarding the effect of improper feeding.

D. Teach nutritional values of local foodstuffs.

E. Support the information with appropriate demonstrations.

F. Teach the food hygiene at home.

G. Evaluate the feeding programme.

7.1.2.3. MEDICAL LABORATORY TECHNOLOGY

Q.No. 1**.** **E**

Q.No. 2. **D**

Q.No. 3. **D**

Q.No. 4**.** **C**

Q.No. 5**.** **A**

Q.No. 6. **A**

7.1.2.4. SANITARIANS

Q.No. 1**.** **A**

Q.No. 2. A

Q.No. 3. B

Q.No. 4. **D**

Q.No. 5**.** **D**

Q.No. 6**.** **D**

Q.No. 7. **D**

Q.No. 8. **D**

7.1.2.4. PRIMARY HEALTH WORKER (PHW)/COMMUNITY HEALTH WORKER (CHW)

Q.No.1. **C**

Q.No.2.

7.3. Admission and discharge criteria for severely malnourished patients

Class of Age	Admission criteria	Discharge criteria
< 6 months old	- The infant is too weak or feeble to suckle effectively (any weight-for-length). - Or the mother does not have enough milk to feed her child. - And the infant is not gaining weight at home, malnourished (weight-for length < 70%)	- It is clear than he/she is gaining weight on breast milk alone for 5 consecutive days after the supplemented sucking technique has been used. - And there is no medical problem - And the mother has been adequately supplemented with vitamins and minerals, so that she has accumulated body stores of he type 1 nutrients
6 months to 18 years old	- Weight/Length < 70% (for length< 85 cm) and Weight/Height < 70% (for height>=85 cm), - Or presence of bilateral edema - Or MUAC < 100 mm (only for children of more than 75 cm height)	-

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