

# UNIT II

## NUTRITION, FOOD SCIENCE AND TECHNOLOGY

Our life is centred around food. Food is more than a biological necessity. It contributes to our cultural identity, is a part of social and religious practices. Food also enables us to realise our creativity, is a symbol of hospitality, status and power, among many other things. Our food choices have far reaching effects. Food nourishes the body, promotes growth, enables it to function and builds resistance to infection. If we eat nutritious and wholesome food, our bodies can function optimally. Thus knowledge about food and nutrition is essential.

Food and Nutrition / Food Science and Nutrition is a broad domain consisting of several sciences that are distinct yet interrelated. As you know, nutrition influences our health, well being and quality of life. Are you aware that nutrition plays a significant role even before birth and that it affects the health of an individual throughout life? Have you ever thought of yourself as a biological being, that your body is made up of carefully arranged atoms, molecules, cells, tissues and organs? Every cell is regularly and continually replaced, some after a few days, some after months and some after years, although your external appearance may be relatively unchanged. For all these internal and external processes, nutrients are required and food is the source of these nutrients.

However, many people do not have the correct knowledge; some do not get adequate food, some overeat, others have wrong food choices because of various reasons, thus leading to malnutrition. In India, the proportion of undernourished persons has been high, but in recent years, prevalence of overnutrition is gradually increasing and many people are now suffering from health problems such as obesity, heart disease, hypertension, diabetes. Infectious diseases still continue to take their toll. Nutrition is the cornerstone for promotion of health as well as prevention and management of numerous disease conditions. Trained dietitians/medical nutrition therapists are required to give advice about diet and nutrition to the individual as well as the community. Trained public health nutritionists are required to tackle public nutrition and health problems at regional, national and international levels, for planning-implementing-monitoring-evaluating various strategies and programmes.

India is a major producer of fruits and vegetables, milk, etc., but almost 1/5th to 1/3rd of the produce is wasted. This calls for concerted action to prevent spoilage, preserve, process and convert foods into a variety of forms. Cost of production in India is less than in many other countries and foreign direct investment is high. Therefore, food processing industry has been termed as the 'sunrise sector' of the Indian economy. Simultaneously socio-economic and socio-cultural changes/transitions in the country have tremendously increased the demand for ready to eat and processed foods. Besides this, the increasing prevalence of disease has necessitated

development of foods for managing disease conditions. This has increased the demand for trained personnel who can undertake development, manufacture and marketing of various processed foods.

Increasing number of persons travel outside the home daily for education, work, tourism. Also those who live in institutions of various kinds such as old age homes, hospitals, orphanages, school and college hostels, prisons, ashrams need to be fed daily. Nutritious, wholesome and safe food needs to be prepared and catered. This requires expertise which can be achieved through appropriate training. With increasing tourism, interest in ethnic foods and cuisinology, there is demand for qualified persons.

However, availability of foods with varying shelf life is not enough. Safety of the foods is crucial. 'Safety culture' of any organisation is important, be it food processing/manufacturing/catering industry. Indian government therefore has introduced several legislations and standards of food safety from time to time. Ensuring that all consumers have access to safe, good quality food, will require persons trained in food quality and safety.

The five areas dealt in this Unit will acquaint you with basic concepts in each of these areas, give you insights about the professions and the knowledge and skills you need to acquire for each of these.



# CLINICAL NUTRITION AND DIETETICS

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## LEARNING OBJECTIVES

After completing this chapter, the learner will be able to:

- understand and describe the significance and scope of clinical nutrition and dietetics.
  - describe the role and function of a dietitian/clinical nutritionist/medical nutrition therapist.
  - explain the knowledge and skills required for a career in clinical nutrition and dietetics.
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## INTRODUCTION

*Nutrition* is the science of food, nutrients and other substances as well as their digestion, absorption and utilisation by the body. Nutrition is also concerned with the social, psychological and economic aspects of food and eating. It is well known that optimum nutrition is important for providing immunity and protection from infection, and to promote recovery from a variety of illnesses as well as managing chronic diseases. When nutrient intakes are inadequate, the body has difficulty in maintaining immune defences, healing wounds, utilising medications, supporting organ functions. Such persons may fall victims to additional complications. Nutrition is also important in disease states. In some diseases, nutrition plays a major role in management and treatment, and for some it

complements the medical treatment. Nutritional status and support, prior to and after illness, play an important role in prognosis, recovery and even duration of hospitalisation. Also, illness and disease can result in nutrient imbalances even in a person who previously had good nutritional status. Thus health and nutrition are intimately interlinked. Poor nutrition not only leads to health problems but can also make existing problems worse. The specialised area of nutrition which deals with nutrition during illness is '*Clinical Nutrition*'. In recent times, this field is called Medical Nutrition Therapy.

## SIGNIFICANCE

Nutritional care has gained importance worldwide, more so in recent times. Health problems/illness/disease and their treatment can affect nutritional status in a variety of ways: by impairing a person's ability to eat and/or swallow, by interfering with digestion, absorption and metabolism as well as excretion. Even if one function is initially affected, in some individuals, if the health problem intensifies, other body functions may be affected. Clinical nutrition focusses on the nutritional management of patients with established disease.

It must be borne in mind that function of any organ/tissue/system of the body can be affected due to disease, which can lead to minor and acute to major and sometimes, chronic or long lasting problems. In all these conditions, it is important to ensure that the person is adequately nourished and the person who delivers this service is a trained dietitian/medical nutrition therapist/clinical nutritionist. The professional clinical nutritionist/dietitian uses a systematic and logical approach to the nutrition care process, focussing on each person/patient's unique needs and addresses them in an individualistic and holistic manner. The patient is the primary focus of the nutritional care process.

The 20<sup>th</sup> and 21<sup>st</sup> centuries have witnessed tremendous advances in the field of medicine and pharmacology, enabling us to control many communicable and infectious diseases. However, newer diseases such as HIV/AIDS have emerged. Prevalence of non-communicable diseases such as obesity, heart disease, hypertension and diabetes is not only increasing, but these are occurring at a much younger age. In fact, India is likely to be the diabetes 'capital' of the world. Further, older persons require special attention. Thus, the proportion of population which requires nutritional care, support and diet counseling is increasing. The clinical nutritionist/medical nutrition therapist plays an important role in prevention of diseases and promotion of good health, besides recommending therapeutic diets for management of various diseases.

New scientific knowledge is being generated about physiological and metabolic disturbances in chronic and acute diseases; newer methods of

nutritional assessment are being developed and adopted, newer techniques and supplements for nourishing the patient are being used. With advances in the food and pharmaceutical industry basic research in nutrition has shed light on the role of various nutrients and other substances such as nutraceuticals, phytochemicals / bioactive substances resulting in the growth of the discipline of clinical nutrition. Researchers and scientists continue to discover the role of individual nutrients ranging from a role in gene expression, metabolic regulation and in the prevention and treatment of disease. For example, antioxidants like beta-carotene, selenium, vitamin E and vitamin C, particularly from food, appear to have a protective role.

According to the FSSAI, foods for special dietary uses or functional foods or nutraceuticals or health supplements means foods which are specially processed or formulated to satisfy particular dietary requirements which exist because of a particular physical or physiological condition or specific diseases and disorders and which are presented as such, wherein the composition of these foodstuffs must differ significantly from the composition of ordinary foods of comparable nature, if such ordinary foods exist, and may contain one or more of the following ingredients, namely:

- (i) plants or botanicals or their parts in the form of powder, concentrate or extract in water, ethyl alcohol or hydro alcoholic extract, single or in combination;
- (ii) minerals or vitamins or proteins or metals or their compounds or amino acids (in amounts not exceeding the Recommended Daily Allowance for Indians) or enzymes (within permissible limits);
- (iii) substances from animal origin;
- (iv) a dietary substance for use by human beings to supplement the diet by increasing the total dietary intakes.

*Medical foods* are those products that are specially manufactured for persons with specific needs. Such foods are regulated and can be used only with a doctor's prescription for the specific dietary management of a disease or condition.

*Phytochemicals/Bioactive compounds* are non-nutrient constituents present in foods that have physiological or biological activity and influence health.

## BASIC CONCEPTS

The dietitian/ medical nutrition therapist's role is to provide advice and translate technical information into dietary guidelines. They provide advice

to patients and if necessary, give prescriptions to healthy individuals at different stages of the life cycle, from the womb to the tomb (i.e., pregnancy, infancy and childhood up to old age) in order to help them maintain good nutritional status and remain healthy. Besides this, nutrition and diet therapy are used to improve the overall health of patients with a wide range of conditions. Examples of these conditions are diarrhea, vomiting, food allergies, anemia, fever, typhoid, tuberculosis, ulcers, hyperacidity and heart burn, epilepsy, gastrointestinal problems, AIDS, hypertension, cancer, osteoporosis, obesity, burns, metabolic disorders, including diabetes, and kidney, liver, and pancreatic disorders. Patients who are to undergo surgery also need pre and post operative nutritional intervention/support. *Clinical Nutrition and Dietetics*, therefore, is concerned with nutritional requirements of patients suffering from different diseases and prescribing the right type of diet for them. The objectives of **diet therapy** are:

- (i) promotion of recovery formulation of the diet to meet the needs of the patient taking into consideration her or his food habits.
- (ii) modification of the existing diets to ameliorate the disease condition and to keep it under control;
- (iii) correction of nutritional deficiencies; if any
- (iv) prevention of short-term and long-term complications in case of chronic diseases;
- (v) education and counselling of the patient regarding the need to adhere to the prescribed diet.

A dietitian also needs to look at the effect of illness on food acceptance and utilisation. Some of the factors that are considered include (a) nutritional stress (b) psychological stress (c) effect of illness on food acceptance and (d) acceptability of modified therapeutic diets.

Thus, *Nutritional care* during illness is an organised group of activities and consists of :

- Assessing nutritional status
- Diagnosis of nutritional problems
- Planning and prioritising nutrition intervention(s) to meet nutritional needs
- Monitoring and evaluating nutritional care outcomes and making changes if necessary.

The nutritional care process is applied to individuals or groups in any setting from healthy persons who are clients of fitness/wellness centres/programmes, pregnant women, elderly persons, persons being treated for illness in private physicians' clinics to hospitalised patients, regardless of whether they are in municipal, government, charitable or private hospitals.



A study of clinical nutrition and dietetics enables the professional to:

- Plan diets appropriately to meet the nutritional requirements at various stages of the life cycle.
- Modify diets in various disease conditions, keeping in mind the physical state, occupation, cultural, ethnic and socio-economic background, the treatment regimen and the individual's likes and dislikes.
- Plan diets for athletes/sports persons, for individuals in special situations such as nutrition in space, persons working in submarines, defence personnel, industrial workers, etc.
- Promote health and well-being of patients admitted to hospital or in outpatient clinics as well as in institutional settings.
- Manage food services in a variety of institutional settings such as old age homes, schools, orphanages etc.
- Help patients with chronic diseases such as diabetes and heart disease in management, to prevent complications and improve quality of life.
- Promote better health in the community and better efficacy of services in health care institutions/ establishments in terms of better patient care management, holistic care, and contribute to better survival and recovery.

Nutritional assessment is required to obtain information on the patient's nutritional status and nutrient needs. It involves:

- Obtaining detailed information on health, diet, personal and medication histories
- Anthropometric measurements
- Relating the information on laboratory and physical measurements with the above and the physician's diagnosis
- Interpreting all of the above to identify potential nutritional deficiencies and risk of future deficiencies.

It must be borne in mind that physicians are ultimately responsible for ensuring that all the patient's medical needs are met. Based on the doctors' diagnosis of the disease condition and the nutritional assessment done, the dietitian prescribes the diet, ensures provision of food in the hospital according to the diet restrictions and provides dietary counseling to the patient. For the implementation of the diet prescription, the physician relies on the dietitian/medical nutrition therapist. Today, the field of clinical nutrition has evolved into a practice that is increasingly incorporated into mainstream medical treatment and the dietitian forms an integral part of the medical team.



The dietitian has the primary responsibility for ensuring that the patient receives appropriate diet and optimal nutritional care, after assessing the nutritional status of the patients, analysing nutrient needs (nutritional requirements change in different illness/disease states) and developing the nutrition care plan by administering suitable regimens to patients who are hospitalised or counseling those in the outpatient department (OPD).

Both normal and therapeutic diets are planned to maintain or restore good nutrition in the individual. This is done by the medical nutrition therapist/dietitian taking into account the food pattern and frequency of intake of different types of food, diagnosis of disease and prescription given by the doctor, the health status and physical condition including ability to eat, chew, swallow, digest and absorb the food eaten, feeling of hunger, physical activity and life style, dietary and other supplements consumed, cultural/ethnic practices and religious beliefs.

Let us get acquainted with some basic terms used by clinical nutritionists and dietitians.

**Types of Diets :** Any nutritional care plan involves providing for adequate intake of all nutrients vis-à-vis the requirements based on age, sex, physiological state, occupation and health status.

- A *standard, normal or regular diet* is one that includes all groups of foods and meets the needs of healthy individuals. However, in the hospitals a regular diet would be low in fried fatty foods, sweets, spices and condiments.
- *Modified diets* are those that are adjusted to meet the medical needs of a patient, which may involve one or more of the following: (1) change in consistency and/or texture (e.g., fluid and soft diets), (2) an increase or decrease in the energy intake, (3) include greater or lesser amounts of one or more nutrients e.g., increase in protein intake in case of surgery, lower protein intake in case of kidney failure, high or low in fibre, lower fat intake, restriction in sodium intake, restriction in fluid intake, restricted intake of certain foods as these may be rich in a non-nutritive dietary constituent e.g., spinach, because spinach is rich in oxalates, and (4) change in the number of meals, or modification in intervals of feeding or special plan for patients when route of feeding is altered.

**Changes in Consistency:** Depending on the condition, patients may be advised liquid, soft or regular diet (i) *Liquid diets* are primarily fluid in consistency at room temperature. Also known as full fluid diets, these include foods which are free from fibre and are nutritionally adequate. The advantage is that the nutrients are easily absorbed if the gastrointestinal tract is functioning normally. Such a diet is advised for persons who are

unable to chew or swallow normally. For example, coconut water, fruit juice, soup, milk, buttermilk, milk shakes, etc. A variation of this is also clear liquid diet, which is even more thin in consistency, e.g., clear soups or juices (without pulp), very light tea, etc. Clear liquid diet is prescribed just after surgery. However, the limitation is that it is not easy to meet the nutritional requirements of the person completely. (ii) *Soft diets* provide semi but solid foods that are lightly seasoned, do not contain much fibrous or gas forming foods. Such diets are easy to chew and digest. Examples of foods included in soft diets are *khichdi*, sago *kheer*, etc. Foods included should minimise the risk of indigestion, abdominal distention, nausea, cramping or any other gastrointestinal problems.

There are certain modifications we make even for normal adults in the older age group. This is called *mechanical soft diet* which includes soft, mashed and pureed foods for the elderly with problems in chewing. A soft diet, on the other hand, is a therapeutic modification. It is soft in consistency and includes only simple, easily digestible food with no harsh fibre, high fat or spicy foods. Such diets are given when rest to the digestive system is recommended.

**Feeding Routes:** The best and most preferred way / route for feeding the patient is orally or by mouth. However, there are patients who may not be able to chew or swallow e.g., if the person is unconscious or if there is a problem with the esophagus. For such individuals there are two options (a) tube feeding which is introduced through the nose into the stomach or (b) intravenous feeding. In tube feeding, nutritionally complete feeds are delivered through a tube. These are preferred over intravenous feeding which is introduced through the nose into the stomach as long as the gastrointestinal tract is functional and the person is able to digest and absorb whatever is fed. Intravenous feeding means that the patient is nourished with special solutions which are given through a drip in a vein.

**Prevention of Chronic Diseases:** Besides being important for persons with disease, diet and good nutrition (as well as a healthy lifestyle) can control and delay the age of onset of chronic diseases. The foods we consume today, especially processed foods, contain many additives, are high in fat and/or sugar, often are prepared from highly refined foods and are therefore low in fibre and many other important constituents which confer health benefits. This is why we need help in making appropriate choices.

Can you identify the types of changes that have occurred in the diets of urban Indians over the past decade? It is seen that fat consumption has increased, refined sugar consumption has increased. There is a reduced intake of fibre as well as several vitamins and minerals. In non-vegetarian populations, consumption of animal protein has also increased.

What are the consequences of these dietary changes? Broadly speaking, such changes have been associated with increased incidence of chronic diseases such as obesity, cancer of the colon, diabetes, cardiovascular disease and hypertension. For example, the increase in sugar and fat consumption, along with the decrease in fibre consumption and less physical activity, play a role in causing of obesity and diabetes. It has also been found that high consumption of highly salted convenience foods, processed foods with high sodium content, decreased intake of potassium-rich fruits, vegetables, grains and legumes, possibly low calcium intakes, less physical activity as well as stress are associated with increased risk of hypertension (high blood pressure).

Clinical nutritionists can play a very important role in preventing development of such problems by providing appropriate diet counselling and guidance. They can also be appointed for guidance to various groups such as schools and colleges, etc.

## EXERCISE

1

Scientists have found connection between diet and disease. For example in a clinical study of 20,000 men, consuming fish once a week was linked to a 52 per cent reduction in the risk of sudden death from heart attack. Fish is high in omega-3 fatty acids, which are essential components of cells and can protect the heart from abnormal heart rhythm.

In another clinical study of more than 42,000 women, those who ate lots of fruits, vegetables, whole grains, low-fat dairy products, and only lean meats lived longer. High intake of fruits, vegetables, and legumes was associated with a lower risk of developing heart disease.

*What can you conclude about (a) role of the diet in disease causation? (b) role of the diet in disease prevention?*

## PREPARING FOR A CAREER

The professional clinical nutritionist or dietitian must have:

- Knowledge of physiological changes in disease conditions, changes in RDAs/nutrient requirements in illness and types of dietary modifications required, traditional and ethnic cuisines.
- Skills in assessing nutritional status of patients using clinical and biochemical criteria, diet planning customised to requirements of individual patients and specific disease conditions, recommending and administering diets to patients, communication for diet counselling, adapting to cultural milieu, food taboos and overcoming fads/myths.

It is absolutely essential to have knowledge (both theoretical and practical) of the subject areas of nutrition, food science, food composition, clinical nutrition and dietetics or the more recently used terminologies such as medical nutrition therapy or medical nutrition management. For this, the clinical nutritionist and dietitian needs to have thorough knowledge and understanding of the basic biological and physical sciences including chemistry, biology, physiology, biochemistry. Since food safety, especially in institutional settings, is critical, s/he must have knowledge of microbiology and food microbiology and safety, food quality and assurance, food laws and regulations, physics to be able to effectively use and ensure maintenance of the various equipments used in food preparation, storage and service. Knowledge of food service management including quantity food production is essential. Basic knowledge and understanding of bookkeeping and accounts, record-keeping, management, especially personnel management, are important. One of the most important aspects of the job profile of a dietitian is counselling patients. Disease changes the body and mind. It can have a major impact on both the physiological and mental/emotional condition of the body. Counselling is an art and a science. A dietitian requires knowledge of psychology, sociology, education and counselling in order to become a good diet counsellor.

Clinical nutritionists would need to have additional knowledge of epidemiology and the patterns of prevalence and incidence of nutritional disorders and diseases, skills in surveying patient populations, laboratory research using biochemical parameters, skill in conducting experimental research with patients to find out the usefulness of various diets, drugs and nutritional supplements.

## PREPARING FOR A CAREER

In order to choose any of the career options offered by Clinical Nutrition and Dietetics, you need to have passed 10+2 level followed by completion of a B.Sc. degree in Home Science or B.Sc. with a specialisation in Nutrition / Food Technology. In case you want to be a dietitian you must at least complete a Postgraduate Diploma in Dietetics with an internship to qualify to be a registered dietitian. Those who have a B.Sc. degree in Home Science, Life Sciences, Biochemistry, Microbiology or Biotechnology can enter this area at the Postgraduate Diploma level. M.Sc. in Food Science and Nutrition or Dietetics helps one to specialise in this field and are preferred in many places of employment. A dietitian, after finishing her/his university education, can go further and qualify to obtain the credential of a “Registered Dietitian”. Many countries have regulatory laws regarding this. If you choose a career focussing on teaching and research, a number of options open up in universities, colleges and research institutions. In order to qualify for teaching posts it is now essential to successfully clear

the National or State Eligibility Tests conducted by University Grants Commission (UGC). It is advisable to complete your Ph.D. too in case you want to pursue a career in academics or research.

## SCOPE

Clinical Nutrition and Dietetics offers rich scope and potential for a satisfying career as a dietitian, diet counsellor, teacher, researcher or corporate consultant. The primary career and wellness possibilities in this field include becoming a dietitian, diet counsellor or clinical nutritionist engaged in research and/or teaching. Besides this, clinical nutritionists also have career opportunities in the food industry, research and development (R&D) and production of medical foods, nutraceuticals, tube feeds, various types of nutritional support formulations or functional foods.

If you have a keen interest in improving the way in which we use food to control, prevent and treat disease conditions, clinical nutrition and dietetics is the field you should choose. Clinical Nutrition and Dietetics has a promising future. While most of us have an idea of the role of dietitians and diet counsellors, we may not be aware that there is expanding scope for research into the physiological and psychosocial changes brought about by disease conditions. The relevance of nutritional considerations in preventing, treating and curing different types of disease conditions is being increasingly accepted. Research has led to the development of drugs and nutritional supplements, rehabilitation of patients in community settings; development of dietary guidelines and nutrition education.

Further, clinical nutritionist can have a role in delineation of public policy, in designing and implementing preventive and promotive nutrition programmes to tackle nutritional deficiency disorders. You could expect jobs as a dietitian in hospitals/ clinics, wellness centre, gyms, slimming clinics with consultants, teacher / faculty in a university or college, researcher in medical research establishments and nutrition research laboratories, consultant in companies developing therapeutic foods and supplements, food service manager/ provider in hospitals etc. You can also work as a freelancer, diet consultant or dietitian running your own enterprise.

### CAREER AVENUES:

- Dietitians with consultants/physicians, in health clubs or gymnasiums
- Dietitians in hospitals including speciality departments; a key member to provide nutrition support in the healthcare team

- Freelance Dietitian.
- Dietitians in catering services for hospitals, schools, industrial canteens, etc.
- Entrepreneurs who develop and supply speciality foods for specific health purposes
- Teaching and Academics
- Research including Clinical Research
- Nutrition Marketing
- Technical Writing.

### KEY TERMS

Dietetics, clinical nutrition, dietary modification, therapeutic diets, dietitian, nutrition counselling.

### REVIEW QUESTIONS

1. What is the significance of the study of clinical nutrition and dietetics?
2. What are the types of dietary modifications that a medical nutrition therapist may make?
3. Why do we need dietary changes to prevent chronic diseases? How are they linked with lifestyle?
4. What are the roles performed by a dietitian? How does the dietitian form a team in patient care with other health care professionals?
5. How can we prepare for a career in clinical nutrition and dietetics?
6. How does illness/disease affect nutritional status of a person?

### PRACTICAL 1

**Theme:** Modification of a normal diet to soft diet for elderly person.

- Tasks:**
1. Interviewing and recording of one day's diet / food intake for an adult,
  2. Assessing the diet to determine whether it is nutritionally balanced,



3. Modifying the diet to suit the needs of an elderly person who needs a soft diet,
4. Assessing the modified diet to determine whether it is nutritionally balanced, and
5. Interacting with an elderly person to determine whether the modified diet is acceptable.

**Purpose:** This practical will enable students to understand the basic concepts of diet modification for a specific purpose and the importance of providing a well-balanced, nutritious diet, keeping in mind the age, sex and health status of the individual. It will also give them an opportunity to interview a person and recording diet intake.

### Conducting the Practical

**Note to the Teacher:** The first part of the practical (Tasks 1 and 2) is to be done with an adult person within 60 years of age and the modification of the diet (Tasks 3, 4 and 5) has to be done for an elderly person, as given on page 68.

This practical can be done individually or in pairs.

1. Each individual student/pair should interview an adult man or woman who is below 60 years of age, in your family or neighbourhood.
2. One day's diet, i.e. food intake including all liquids and beverages, are to be recorded in the format given herein. An example is given for your reference.
3. The diet should then be assessed to determine whether it is nutritionally well-balanced, using the guide given.
4. This diet should then be modified to a soft diet (easy to chew and swallow) for the following situations: **(Note to teacher: One case of the following to be assigned to each student/pair)**
  - a) An elderly man/woman who has no teeth - age > 70 years
  - b) An elderly man/woman who has no teeth and has difficulty in swallowing
  - c) An elderly man/woman who has dentures ( age about 60-65 years)
  - d) An elderly man/woman who does not have molar teeth.
5. Assess the modified diet to determine whether it is nutritionally balanced.
6. Interact with an elderly person in your family or neighbourhood.



7. The diet plan is to be shared with them, and their comments and suggestions should be recorded
8. Teacher to facilitate a class discussion about the exercise.

### Record of 24-hour dietary intake

Time of Day	Meal	Menu Item	Ingredients	Amount consumed (in household measures)	Remarks*
Early morning	Bed tea				
Morning	Breakfast				
Mid morning					
Afternoon	Lunch				
Evening					
Night	Dinner				
At bed time					

\* Note any additional ingredients added e.g., sugar to milk, ghee on chapati or rice, supplement in milk, sugar or jaggery or honey eaten with bread or chapati, etc.

### Example for recording the food intake

Time of Day	Meal	Menu Item	Ingredients	Amount consumed (household measures)	Remarks*
Example 6.30 am	Bed tea	Tea	Milk Sugar	1 mug	2 tsps sugar added
7.30 am	Breakfast	Bread with omelette  Milk	Bread Butter Egg -1 Oil Onion Coriander Milk	2 slices 1 tsp 1 omelette  1 mug	Sugar added 1 tsp Supplement added (e.g.) 1 tablespoon

**Guide for assessing diet quality and whether the diet is nutritionally balanced**

Food group	No. of servings consumed	No. of servings recommended	Difference between recommended and consumed
Cereals and Millets		Approx 10	
Pulses and Legumes		2-3	
Green leafy vegetables		½ to 1 katori cooked	
Other vegetables		2 katoris <sup>b</sup> cooked	
Roots and tubers		½ to 1 katori	
Fruits		2-3 servings <sup>A</sup>	
Milk/milk products e.g., curd		1 glass / 1 katori	
Visible fats and oils including butter, ghee etc.		6 tsps*	
Sugar and jaggery		4 tsps*	

**Note:** \* The maximum desirable intake

(a) At least one of the fruits should be a source of vitamin C

(b) including salads