

Lec.1. Introduction to Nutrition Assessment

Why studying nutrition assessment?

- 1- To determine the nutritional status of individual or population groups as influenced by the intake and utilization of nutrients.
- 2- To determine human body needs for nutritive and protective substances and the reflection of these in physical, physiological, and biochemical characteristics, functional capability, and health status.
- 3- To determine and recognise the forms of malnutrition.
- 4- To recognise the signs and symptoms of malnutrition.
- 5- To understand the difference between nutritional screening and nutritional assessment.
- 6- To understand the difference methods for nutritional assessment.
- 7- To know the benefits and limitations of different methods and tools for nutritional assessment.
- 8- Is essential for identification of potential critical nutrients (population groups at risk of deficiency); formulation of recommendations for nutrient intake; development of effective public health nutrition (PHN) program for nutrition-related diseases prevention; and monitoring the efficiency of such interventions
- 9- Evaluate an individual's reported dietary intake, compared to recommendations.
- 10- The nutritional assessment is done to obtain information about the prevalence and geographic distribution of nutritional disorders within a community or a specified population group.
- 11- It can also be used to identify high-risk groups and to assess the role of different epidemiological factors in nutritional deficiencies. Such nutritional assessment has a significant role in policy-making and nutritional recommendations, deciding fund allocations desired in the surveyed area to program managers, and evaluating the effectiveness of implemented corrective measures.
- 12- Identification of optimal nutritional status.
- 13- To develop health care programs that meet the community needs which are defined by the assessment.

Nutritional assessment methods that can be applied in four forms of nutritional assessment system: **surveys, surveillance, screening, or interventions.**

Nutrition Surveys are usually national [cross-sectional studies](#) that are performed to assess the nutritional status of a selected population, identify the group at risk of chronic malnutrition, evaluate existing nutritional problems, and inform evidence-based nutrition policies. Another application of nutrition surveys is to evaluate the efficacy of an intervention using data from baseline and final assessments.

Nutritional surveillance—*Public health surveillance is the continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice.* Data in nutritional surveillance studies are collected, analyzed, and evaluated in a standardized manner during a longer period of time. They can be used for the identification of possible nutritive risk factors of malnutrition of a whole population or specific vulnerable group. Formulation, evaluation, and monitoring of the nutrition intervention programs and policies are main objectives of nutrition surveillance.

Nutrition screening is used to identify malnourished individuals. It can be carried out on the whole population, on specific subpopulations at risk or on selected individuals. During nutritional screening, simple, cheap, and rapid measurement methods are used.

Nutrition interventions are carried out on population subgroups at risk, which are identified during nutrition surveys or screening. Supplementation and fortification are some examples of nutrition interventions. Providers require efficient monitoring and evaluation to prove the efficiency and soundness of these interventions.

Nutritional Screening and Nutritional Assessment Tools

Nutrition screening is defined as “the process of identifying patients, clients, or groups who may have a nutrition diagnosis and benefit from nutritional assessment and intervention by a registered dietitian.” If nutritional screening identifies a person at nutritional risk, a more thorough assessment of the individual’s nutritional status can be performed. Nutritional screening can be done by any member of the health-care team such as a dietitian, dietetic technician, dietary manager, nurse, or physician.

Nutritional screening tools are designed to quickly evaluate nutritional risk in individuals. Nutritional assessment tools are used to identify the presence of malnutrition in individuals . It is important that the RDN use validated screening and assessment tools to ensure that the results are correct for the population being evaluated .

Nutritional screening tools should be quick, easy-to-use tools that can be completed by any member of a healthcare team with minimal nutrition expertise (e.g., diet technicians, nurses, and physician assistants). Furthermore, screening tools should be validated to ensure that they accurately identify nutritional risks for the population and setting for which they are intended. Screening forms have use in both community and clinical settings.

In community settings, for example, forms can be used to identify risk for chronic diseases such as diabetes, heart disease, and high blood pressure in adults. These are typically used at community events such as health fairs and workplace wellness fairs. When the results identify individuals at risk for

a chronic disease, they are often referred to their primary care physicians for extensive evaluation to determine whether a chronic disease is present.

Screening forms are also offered to the elderly living in the community setting or assisted living to identify risks for malnutrition, osteoporosis, and other chronic diseases. The criteria on the screening form varies by facility; key criteria that are commonly shown below:

- 1- Height and weight
- 2- History of weight gain or loss (intentional or unintentional)
- 3- Changes in appetite
- 4- Lifestyle habits (tobacco use, physical activity, alcohol consumption)
- 5- Digestive disorders (constipation, diarrhea, nausea, vomiting)
- 6- Laboratory measures (blood, urine, or both)
- 7- Family history, previous medical history, or both

In the clinical and long-term care setting, screening forms are designed to identify risks of malnutrition (undernutrition), determine the need for more-in-depth nutritional assessment, and ultimately offer an early detection of malnutrition so that nutrition support is provided in a timely manner. In the United States, an estimated 30% to 50% of adult hospital patients are malnourished. Few patients, however receive the formal diagnosis of malnutrition at discharge, and only an estimated 3.2% of discharged patients are diagnosed with malnutrition. It has been well documented that patients who enter the hospital malnourished and are not given nutrition support have increased morbidity and mortality, decreased function and quality of life, and

increased length of hospital stays. This leads to increased healthcare costs expenses that can cost hospitals millions of dollars.

It is critical for clinical, long-term care, and community facilities to use validated screening tools to identify patients for malnutrition risk or use validated screening tools to diagnose patients with malnutrition—and sometimes both. Using a validated screening tool ensures that the individual who is identified at risk for malnutrition is indeed malnourished (high sensitivity), and the individual who is not identified at risk for malnutrition is likely to be well nourished (high specificity).

The Academy has identified several validated nutritional screening tools that have been researched for their ability to help identify malnutrition risk in individuals in community and clinical settings.¹⁹ These tools largely use the same screening parameters to determine scores and risk levels. Commonly used risk-assessment parameters include recent weight loss, recent poor intake or appetite, and body mass index (BMI). **TABLE 1 .3** summarizes the most commonly used validated screening tools available and a description of their target populations when screening for malnutrition risk.

TABLE 1.3 Commonly used nutrition screening tools

Nutrition Screening Tool	Patient Population	Risk-Screening Parameters	Measures for Malnutrition Risk
Malnutrition screening tool	Acute-care hospitalized adults, oncology patients	<ul style="list-style-type: none"> ■ Recent weight loss ■ Recent poor intake 	<ul style="list-style-type: none"> ■ Score 0–1 for recent intake ■ Score 0–4 for recent weight loss ■ Total score: ≥ 2 = at risk for malnutrition
Mini Nutritional Assessment (MNA): Short Form	Subacute and ambulatory elderly patients	<ul style="list-style-type: none"> ■ Recent intake ■ Recent weight loss ■ Mobility ■ Recent acute disease or psychological stress ■ Neuropsychological problems ■ BMI 	<ul style="list-style-type: none"> ■ Score 0–3 for each parameter ■ Total score: < 11 = at risk for malnutrition
Malnutrition Universal Screening Tool (MUST)	Acute-care medical adults, medical surgical hospitalized adult patients	<ul style="list-style-type: none"> ■ BMI ■ Weight loss (%) ■ Acute disease 	<ul style="list-style-type: none"> ■ Score 0–3 for each parameter ■ Total score: > 2 = high risk 1 = medium risk
Nutrition Risk Screening (NRS 2002)	Medical-surgical hospitalized, acute-care hospitalized patients	<ul style="list-style-type: none"> ■ Recent weight loss (%) ■ BMI ■ Severity of disease ■ Elderly (> 70 years of age) ■ Food intake or eating problems, skipping meals 	<ul style="list-style-type: none"> ■ Score 0–3 for each parameter ■ Total score: > 3 = start nutrition support

Data from The Academy of Nutrition and Dietetics. *The Nutrition Care Manual*. <https://www.nutritioncaremanual.org/>. Accessed January 15, 2017.

Relationship Between Nutrition and Health

In the past 30 years, researchers have focused on determining the precise nature of the relationship between nutritional status and health outcomes. Good nutrition is critical for the well-being of any society and to each individual within that society. The variety, quality, quantity, cost, and accessibility of food and the patterns of food consumption can profoundly affect health.

Nutritional imbalances are a severe public-health problem that has been associated with a significant increase in the risk of mortality and morbidity. Hunger, nutrient deficiency, and starvation were common, and infectious diseases were the leading causes of death.

An individual's nutritional status is influenced by factors such as consuming food in sufficient amounts, selecting the right foods to promote adequate nutrient intake, and the individual's eating pattern. A sedentary lifestyle and a poor-quality eating pattern have been identified as risk factors for the development of chronic diseases such as hypertension, cardiovascular disease, diabetes mellitus (DM), stroke, and cancer. Adverse outcomes such as disability, poor quality of life, and high rates of low-birthweight babies occur as a result of poor eating patterns and malnutrition in both developed and underdeveloped countries. Identifying the impact of poor eating patterns on chronic diseases and assessing the nutritional status of individuals, families, and communities are important tasks in promoting population health.

In the United States, approximately 50% of the adult population suffers from one or more avoidable chronic disease. More than two-thirds of adults and approximately one-thirds of children and youth are overweight or obese. These extreme rates of overweight, obesity, and chronic disease have been a public-health concern for more than two decades and contribute not only to increased health risks but also to associated high medical costs. In 2012, the total estimated cost of diagnosed diabetes was \$245 billion, including \$176 billion in direct medical costs and \$69 billion in decreased productivity.

1- Nutrient Deficiency Diseases: A Historical Perspective

Good health and quality of life are desired by all individuals living in a society. Access to safe drinking water, nutritious food, and quality medical care are essential to the well-being of any person. Undernutrition and hunger are prevalent in underdeveloped as well as developed countries. An estimated 870 million adults and children worldwide have inadequate food intakes. Chronic undernutrition leads to the onset of deficiency diseases, and physical signs of such diseases emerge when the intake of essential nutrients is inadequate and prolonged.

Keen observations by physicians in the early 1700s identified that in some instances the cause of human illness was related to the absence of certain foods; they proposed that those foods contained specific compounds whose absence led to the signs and symptoms of disease. One of the earliest known discoveries of the curative effects of foods with deficiency diseases was by Scottish physician James Lind in the mid-1700s. British sailors taking long voyages were developing **scurvy** and becoming severely ill or dying on the

voyage. Observational research has progressed over time to the current dietary guidelines.

2- Leading Causes of Death and Chronic Diseases

The interest in modifying diet to prevent chronic disease in Americans began when deficiency diseases and infectious diseases were eradicated. In addition, the implementation of government-mandated enrichment and fortification of food staples and the use of vaccinations to reduce deaths from infectious diseases also contributed to increased awareness of the American diet.

TABLE 1 .1 ranks the 10 leading causes of death in the United States today. Four of the ten—heart disease, cancer, stroke, and diabetes mellitus are linked to diet and either can be prevented or have their onsets delayed by implementing healthy eating practices and making positive lifestyle choices.

Nutritionists today are challenged to find the optimal food pattern and nutrient profile that will optimize the quality of life and prevent chronic disease for their clients. Conducting nutritional assessment in the community setting is important when identifying early risks for chronic disease. Novel approaches such as evaluating the genetic profile of individuals to identify genetic determinates that lead to chronic disease are being researched as a potential added “tool” that registered dietitian nutritionists (RDNs) can use along with traditional assessment measures. Understanding genomics in relationship to nutritional management of complex diseases is in its infancy, so routine genetic testing to provide dietary advice is not ready for practical application. The prospect for using nutritional genomics in the future,

however, is exciting. It has the potential to offer RDNs and healthcare professionals the tools to create “genetically” personalized diet plans that are specific to any individual’s genetic makeup.

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TABLE 1.1 Leading causes of death in the United States			
Rank	Disease	Contributing Risk Factors	Number of Deaths Annually
1	Heart disease	Increasing age, family history, smoking, poor-quality diet, obesity, hypertension, increased cholesterol, stress, physical inactivity	614,348
2	Cancer	Increased age, smoking, excessive consumption of alcohol, excessive exposure to sun, obesity, family history, presence of some chronic conditions such as ulcerative colitis	591,699
3	Chronic lower-respiratory diseases	Exposure to tobacco smoke, chemicals, dust and burning fuel; advanced age and genetics	147,101
4	Accidents (unintentional injuries)	Motor-vehicle accidents most common; contributing factors include inexperience, teenage drivers, distractions	136,053
5	Stroke (cerebrovascular diseases)	Hypertension, tobacco use, diabetes, increased cholesterol, obesity, inactivity, coronary disease, excessive alcohol intake	133,103
6	Alzheimer’s disease	Conditions that damage the heart and blood vessels such as diabetes, high cholesterol, and hypertension	93,541
7	Diabetes	Family history, dietary factors such as low vitamin D consumption, increased weight, obesity, inactivity, race, hypertension, increased cholesterol, polycystic ovarian syndrome, gestational diabetes, increased age	76,488
8	Influenza and pneumonia	Chronic disease, smoking, being immunocompromised	55,227
9	Nephritis, nephrotic syndrome, and nephrosis	Medical conditions that cause kidney injury such as diabetes, side effects of certain medications such as nonsteroidal anti-inflammatory drugs, infections such as HIV and malaria	48,146
10	Intentional self-harm (suicide)	Depression, previous self-harm	42,773

Modified from Health United States. Table 19 (data are for 2014). 2015. www.cdc.gov. Accessed January 24, 2017.

3- History of Diagnosing Malnutrition in the Clinical Setting

Identifying malnutrition and offering nutrition support to malnourished patients is relatively new in the clinical setting. Many screening tools have used albumin as the primary indicator to identify malnutrition in patients. It is well documented, however, that albumin is a poor diagnostic indicator for malnutrition given the fact that it fluctuates in the presence of inflammation that could be induced by external factors such as trauma, surgery, or inflammatory diseases. The American Society for Parenteral and Enteral Nutrition (ASPEN) and the European Society for Clinical Nutrition and Metabolism has created an etiology-based approach to diagnose adult malnutrition in the clinical setting. This approach identifies malnutrition in the context of acute illness, chronic diseases, and starvation-related malnutrition. This approach has been widely adopted by clinical dietitians across the United States. Clinical trials are currently underway to validate this approach to assessing and diagnosing malnutrition in the hospital setting.

Malnutrition occurs when food intake does not match the body's needs. A malnourished person can have either undernutrition or overnutrition caused by incorrect amount of nutrient intake.

- **Acute malnutrition** is caused by decreased food consumption and/or illness, resulting in wasting.
- **Chronic malnutrition** is caused by prolonged or repeated episodes of undernutrition, resulting in stunting.
- **Overnutrition** is the result of consuming more nutrients than the body needs for healthy growth and development.

- **Undernutrition:** is the result of insufficient food intake for healthy growth and development, and repeated infectious diseases, which includes being underweight for one's age, too short for one's age (stunted), dangerously thin for one's height (wasted), and deficient in vitamins and minerals (micronutrient malnutrition).
- **Wasting:** One of two forms of acute malnutrition, it is a condition in which children fail to achieve sufficient weight, given their height. For example, low mid-upper arm circumference or low weight-for-height .
- Wasting may be the consequence of starvation or severe disease and can also be due to chronic conditions or a combination of both.
- **Stunting:** A condition in which children fail to gain sufficient height, given their age. Stunting is often associated with long-term factors such as chronic undernutrition and frequent illness. It is recognized as one of the key indicators of child undernutrition. **Stunting** is defined by low height-for-age.

Nutrition Assessment

Nutritional assessment is defined by the American Society for Parenteral and Enteral Nutrition as “a comprehensive approach to diagnosing nutrition problems that uses a combination of the following: medical, nutrition, and medication histories; physical examination; anthropometric measurement; and laboratory data. Nutritional assessment is the first step to identify nutrition-related problems that arise from nutrient deficiency and lead to chronic disease or result in malnutrition .

“**Nutrition Assessment**” is the first step of the Nutrition Care Process. Its purpose is to obtain adequate information in order to identify nutrition-related

problems. It is initiated by referral and/or screening of individuals or groups for nutritional risk factors. Nutrition assessment is a systematic process of obtaining, verifying, and interpreting data in order to make decisions about the nature and cause of nutrition-related problems. The specific types of data gathered in the assessment will vary depending on a) practice settings, b) individual/groups' present health status, c) how data are related to outcomes to be measured, d) recommended practices such as ADA's Evidence Based Guides for Practice and e) whether it is an initial assessment or a reassessment. Nutrition assessment requires making comparisons between the information obtained and reliable standards (ideal goals).

Nutritional assessment is defined by the Academy as “identifying and evaluating data needed to make decisions about a nutrition-related problem/diagnosis.” In essence, the difference between nutritional screening and nutritional assessment is that a screen identifies the “risk” for a nutrition problem or malnutrition, while the assessment “identifies the presence of or diagnosis” of a nutrition problem or malnutrition. Once identified, the practitioner creates an intervention to resolve the nutrition problem. Validated nutritional assessment tools have been designed to allow RDNs and other healthcare professionals who are trained to use the tool to quickly and cost-effectively diagnose malnutrition in the acute care setting. The **subjective global assessment (SGA)** form initially started as a screening tool that has evolved as a validated diagnostic tool for malnutrition. When administered by a trained professional, it is recognized as a validated method to diagnose malnutrition and predict postoperative complications, longer length of stay in postoperative patients and patients in the intensive care unit, readmission to the intensive care unit, and mortality.

Nutrition assessment is an on-going, dynamic process that involves not only initial data collection, but also continual reassessment and analysis of patient/client/group needs. Assessment provides the foundation for the nutrition diagnosis at the next step of the Nutrition Care Process.

1- History of Nutrition Assessment

Prior to the recognition of dietetics as a health care profession, nurses were responsible for nutrition services, which typically involved ensuring that foods served met the requirements determined by physician diet orders. As patient care became more complex, nurses were no longer able to manage all aspects of patient care. Allied health professions including dietetics, occupational therapy, and physical therapy took on patient care responsibilities that busy nurses no longer had time to complete. Registered dietitians (RDs) assumed responsibility for food and nutrition services, which continued to focus on provision of special diets ordered for medical and surgical conditions.

Evidence supporting the importance of nutrition assessment to dietetics practice was provided in the mid-1970s when a series of articles focused on the discovery that many hospitalized patients suffered from malnutrition. The best known of these publications has been since cited by thousands of other publications, which is an indication of the interest that health care providers have in the role of nutrition status in health outcomes.

Clinical dietetics became much more visible as clinical RDs took the responsibility of assessing nutrition status of hospitalized patients. The recorded role of the RD in nutrition assessment of hospitalized patients is

first seen in diet manuals and guidelines published in the late 1970s and early 1980s.

Nutrition assessment gradually moved more fully into the mainstream of dietetics practice but the methodologies for doing assessment have been as varied as the skills and the knowledge of the individual RD until the development of the nutrition assessment portion of the NCP.

2- Importance of Nutritional Assessment

The use of nutritional assessment to identify diet-related disease has increased in importance in recent years because of our greater knowledge of the relationship between nutrition and health and our expanded ability to alter the nutritional state.

Evidence related to the role of diet in maternal and child health indicates that well-nourished mothers produce healthier children. Sufficient intake of energy and nutrients, including appropriate body weight before pregnancy and adequate weight gain during pregnancy, improves infant birth weight and reduces infant **morbidity** and **mortality**. Consequently, nutritional assessment has become an integral part of maternity care at the beginning of pregnancy and periodically throughout pregnancy and lactation. Nutrition also can have a profound influence on health, affecting growth and development of infants, children, and adolescents; immunity against disease; morbidity and mortality from illness or surgery; and risk of such diseases as cancer, coronary heart disease, and diabetes.

Interventions to alter a person's nutritional state can take many forms. In certain situations, nutrient mixes can be delivered into the stomach or small

intestine through feeding tubes (**enteral nutrition**) or administered directly into veins (**parenteral nutrition**) to improve nutritional status. Thus, nutritional assessment is important in identifying persons at nutritional risk, in determining what type of nutrition intervention, if any, may be appropriate to alter nutritional status, and in monitoring the effects of nutrition intervention.

Nutrition Monitoring

Nutrition monitoring is defined as “those activities necessary to provide timely information about the contributions of food and nutrient consumption and nutritional status to the health of the U.S. population.” As previously discussed, this definition of the term *nutrition monitoring* is different from when it is used within the context of the nutrition care process. A milestone in nutrition monitoring in the United States was passage of the National Nutrition Monitoring and Related Research Act of 1990. Key provisions of the act were development of a 10-year comprehensive plan for coordinating the activities of more than 20 different federal agencies involved in nutrition monitoring and assurance of the collaboration and coordination of nutrition monitoring at federal, state, and local levels. This included all data collection and analysis activities associated with health and nutrition status measurements, food composition measurements, dietary knowledge, attitude assessment, and surveillance of the food supply. Considerable nutritional assessment expertise is required for conducting such surveys as the National Health and Nutrition Examination Survey and the Behavioral Risk Factor Surveillance System.