THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

155/1

FOOD AND HUMAN NUTRITION 1

(For Both School and Private Candidates)

Time : 3 Hours **ANSWERS** **Year: 2003**

Instructions

1. This paper consists of sections A and B.
2. Answer all questions in section A and **three (3)** question from section B.
3. Non-programmable calculators may be used.
4. Communication devices and any unauthorised materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) Distinguish between complete proteins and incomplete proteins.
(b) Give four examples of each.
(c) State three effects of protein deficiency in human nutrition.

(a) Complete proteins are those that contain all the essential amino acids in the right proportions needed by the human body. They are mainly found in animal sources such as meat, eggs, and dairy products. Incomplete proteins, on the other hand, lack one or more essential amino acids and are mostly found in plant sources like cereals and legumes.

(b) Examples of complete proteins include eggs, milk, beef, and fish. These foods provide all essential amino acids and support proper body growth and repair.

Examples of incomplete proteins include maize, beans, groundnuts, and rice. These must often be combined to form complementary proteins that provide all essential amino acids.

(c) One effect of protein deficiency is kwashiorkor, a disease characterized by edema, stunted growth, and a swollen abdomen.

Another effect is marasmus, which involves severe wasting of body tissues due to inadequate protein and energy intake.

Protein deficiency also weakens the immune system, making individuals more susceptible to infections and slow recovery.

2. (a) Define basal metabolic rate (BMR).
(b) Mention four factors that influence BMR.
(c) Explain three reasons why BMR decreases with age.

(a) Basal metabolic rate is the minimum amount of energy the body requires at rest to carry out vital functions such as breathing, circulation, and maintaining body temperature.

(b) Age is a factor that influences BMR, as younger people have higher metabolic rates than older individuals.

Sex also plays a role, since males generally have higher BMR than females due to greater muscle mass.

Body size and composition influence BMR because people with more lean muscle mass burn more energy at rest.

Hormonal activity affects BMR, for example, thyroxine from the thyroid gland increases the metabolic rate.

(c) With age, muscle mass decreases while fat mass increases, leading to reduced energy requirements and lower BMR.

Hormonal changes such as reduced thyroid activity also slow down metabolic processes in older people.

Physical activity levels decline with age, further lowering energy expenditure and reducing BMR.

3. (a) Explain the functions of calcium in the human body.
(b) Describe the effects of calcium deficiency.
(c) Give three rich dietary sources of calcium.

(a) Calcium is important for building and maintaining strong bones and teeth, providing structural support to the skeleton.

It plays a role in blood clotting by enabling the conversion of prothrombin to thrombin, preventing excessive bleeding.

Calcium is essential for muscle contraction and relaxation, which are necessary for movement and normal heart function.

It also supports nerve transmission by helping in the release of neurotransmitters.

(b) Calcium deficiency causes rickets in children, characterized by soft and deformed bones.

In adults, deficiency leads to osteoporosis, a condition where bones become brittle and fracture easily.

Lack of calcium can also cause poor blood clotting and muscle cramps due to impaired nerve and muscle functions.

(c) Rich dietary sources of calcium include milk and dairy products such as cheese and yogurt.

Green leafy vegetables such as kale and spinach also provide significant amounts of calcium.

Fish with edible bones, such as sardines, are excellent sources of calcium.

4. (a) Differentiate between food spoilage and food poisoning.
(b) State four causes of food spoilage.
(c) Give three preventive measures against food poisoning.

(a) Food spoilage is the deterioration of food quality due to microbial activity, chemical reactions, or physical changes, making it undesirable but not always harmful. Food poisoning, on the other hand, occurs when contaminated food containing harmful microorganisms or toxins is consumed, causing illness.

(b) Microbial growth, such as bacteria and fungi, causes decomposition and bad odor in food.

Chemical reactions like oxidation lead to rancidity in fats and oils.

Enzymatic activity in fruits and vegetables causes browning and softening.

Physical factors such as moisture absorption or mechanical damage also contribute to spoilage.

(c) Washing hands thoroughly before handling food helps prevent contamination and food poisoning.

Proper cooking of food ensures harmful microorganisms are destroyed before consumption.

Refrigeration slows microbial growth and keeps food safe for longer periods.

5. Discuss the advantages and disadvantages of genetically modified foods in human nutrition.

One advantage of genetically modified foods is improved nutritional content, such as rice enriched with vitamin A to reduce deficiencies.

They can also provide higher yields, helping to combat food shortages and improve food security.

Genetically modified crops are resistant to pests and diseases, reducing losses and the need for chemical pesticides.

However, one disadvantage is the potential risk of unknown health effects, as long-term safety has not been fully established.

They may also reduce biodiversity by replacing traditional crop varieties with uniform genetically engineered ones.

Another disadvantage is that genetically modified seeds are often patented, limiting farmers' control and increasing dependency on seed companies.

6. Explain six factors that influence consumer food choices in Tanzania.

Cultural practices influence food choices because traditions and beliefs determine what is acceptable to eat.

Economic status is another factor, as people with higher income can afford diverse and nutritious diets, while low-income families rely on cheaper staples.

Availability of food affects choice, since people consume what is locally grown and easily accessible.

Health concerns influence choices, with individuals selecting foods that meet their dietary needs, such as low-fat diets for heart patients.

Education and awareness shape food preferences, as people with better nutrition knowledge make healthier choices.

Marketing and advertisement also influence consumers by creating demand for specific food products.

7. Analyse the effects of fast foods on the health of urban populations.

Fast foods often contain high amounts of fats, sugars, and salt, leading to obesity when consumed frequently.

They increase the risk of non-communicable diseases such as hypertension, diabetes, and heart diseases due to unhealthy nutrient composition.

Fast foods may replace traditional balanced meals, leading to nutrient deficiencies in essential vitamins and minerals.

Their convenience encourages sedentary lifestyles, since people rely on quick meals instead of preparing healthier home-cooked foods.

High consumption of fast foods can also increase healthcare costs due to diet-related illnesses in urban populations.

8. Describe eight methods used in food preservation.

Refrigeration slows down microbial activity by keeping food at low temperatures.

Freezing preserves food by turning water into ice, preventing microbial growth and enzymatic reactions.

Canning seals food in airtight containers and applies heat to kill microorganisms.

Drying removes moisture, preventing microbial growth and extending shelf life.

Salting draws out moisture and inhibits microbial activity, commonly used for fish and meat.

Smoking both preserves and flavors food by exposing it to smoke, which contains antimicrobial compounds.

Fermentation uses beneficial microorganisms to produce acids or alcohol that inhibit spoilage.

Pasteurization involves heating liquids like milk to destroy harmful microbes without altering taste significantly.

9. Examine the challenges facing food security in Sub-Saharan Africa.

Climate change is a major challenge, causing frequent droughts and floods that reduce crop yields.

Poor infrastructure, such as inadequate storage and transport, leads to post-harvest losses and reduced availability of food.

High population growth increases demand for food, outpacing supply in many regions.

Political instability and conflicts displace farmers and disrupt food production systems.

Dependence on rain-fed agriculture makes food production vulnerable to unpredictable weather patterns.

Limited access to agricultural inputs like fertilizers and improved seeds also hinders productivity.

10. Discuss the importance of balanced diet in promoting human health.

A balanced diet provides all essential nutrients in the right proportions, ensuring proper growth and development.

It strengthens the immune system, enabling the body to fight infections effectively.

A balanced diet prevents malnutrition-related diseases such as kwashiorkor, marasmus, and rickets.

It provides sufficient energy for daily activities and enhances mental and physical performance.

Balanced nutrition reduces the risk of lifestyle diseases such as diabetes, hypertension, and cardiovascular problems.

It also promotes quick recovery and repair of body tissues during illness or after injury.