FREE EDITION · NOTES + 3 SAMPLE MCQS

CUET · HOME SCIENCE · CLASS XI · CODE 315

Food, Nutrition, Health and Fitness

CUET unit: Nutrition, Food Science and Dietetics (Concepts of food, nutrition, balanced diet, RDA, food groups, adolescent dietary patterns, eating disorders)

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📌 Snapshot

- Establishes the foundational definitions of food, nutrition, nutrients, health, and fitness — the bedrock vocabulary of Home Science Paper II.
- Introduces the concept of a **balanced diet** and the formula **RDA = Requirement + Margin of Safety**, distinguishing dietary requirement from RDA.
- Classifies nutrients into **macronutrients** (carbohydrates, proteins, fats, water, fibre) and **micronutrients** (vitamins, minerals — iodine, iron, calcium); covers ICMR's **five basic food groups** and the **food guide pyramid** for Indians.
- Explains adolescent dietary patterns (skipping meals, snacking, fast foods, dieting), factors influencing eating behaviour, and **eating disorders** (anorexia nervosa, bulimia) — a high-frequency CUET zone.
- Highlights energy yields: carbohydrate 4 Kcal/g, protein 4 Kcal/g, fat 9 Kcal/g — a perennial direct-recall MCQ.

📖 Detailed Notes

2.1 Core concepts

This is the first nutrition chapter of HEFS Class XI and the foundation block for the entire Class XII Public Nutrition, Clinical Nutrition, and Food Quality clusters. It is also the highest-yield CUET chapter in Unit II, built around five anchor concepts — food, nutrition, the balanced diet, health/fitness and adolescent food behaviour — and culminating in eating disorders.

- The science of food and nutrients and their action on our health is called **Nutrition**; nutrition and health are "two sides of the same coin" (NCERT §3.1, p. 28-29).
- **Food** is anything solid or liquid which when swallowed, digested and assimilated provides the body with nutrients and keeps it well; it supplies energy, enables growth/repair, protects from disease and regulates body functions (NCERT §3.1, p. 29).
- **Nutrition** is the science of foods, nutrients and other substances they contain, and of their actions within the body including ingestion, digestion, absorption, metabolism and excretion; it has physiological, social, psychological and economic dimensions (NCERT §3.1, p. 29).

- **Nutrients** are the constituents in food that must be supplied to the body in suitable amounts — carbohydrates, proteins, fats, minerals, vitamins, water and fibre; classified as macronutrients and micronutrients based on quantity required (NCERT §3.1, p. 29).
- Macronutrients (required in large amounts) = carbohydrates, proteins, fats, water, fibre/roughage. Micronutrients (required in small amounts) = vitamins and minerals (iodine, iron, calcium) (NCERT Fig. 1, p. 30).
- A **balanced diet** includes a variety of foods in adequate amounts and correct proportions to meet the day's requirements of all essential nutrients; it provides a **safety margin/reserve** for short durations of deprivation (NCERT §3.2, p. 29).
- **Recommended Dietary Allowances (RDAs) = Requirements + Margin of Safety**; if a balanced diet meets the RDA, the safety margin is already included (NCERT §3.2, p. 29).
- A balanced diet (i) includes a variety of foods, (ii) meets RDA, (iii) includes nutrients in correct proportions, (iv) provides a safety margin, (v) promotes/preserves good health, (vi) maintains acceptable body weight for height (NCERT §3.2, pp. 29-31).
- **Health** (WHO, 1948) is the state of complete physical, emotional and social well-being, not merely the absence of disease or infirmity (NCERT §3.3, p. 31).
- **Mental health** is a state of emotional and psychological well-being in which an individual is able to use her/his cognitive and emotional capabilities, function in society, and meet the ordinary demands of everyday life (NCERT §3.3, p. 31).
- **Physical fitness** is the body's ability to function efficiently and effectively in work and leisure, to be healthy, resist diseases and meet emergency situations; five categories — aerobic fitness, muscular strength, muscular endurance, flexibility, body composition (NCERT §3.3, p. 31).
- The **five basic food groups (ICMR)** for India: (1) Cereals, grains and products, (2) Pulses and legumes, (3) Milk and meat products, (4) Fruits and vegetables, (5) Fats and sugars (NCERT §3.4, p. 32).
- Energy yield: carbohydrate releases **4 Kcal**/g, protein **4 Kcal**/g, fat **9 Kcal**/g (NCERT §3.4 box, p. 35).
- Guideline: cereals should not supply more than **75 per cent** of total Kcal/Calories; include at least one serving of milk for calcium (NCERT §3.4 guidelines, p. 35).
- The **Food Guide Pyramid** for Indians: broad base of cereals/bread/rice/chapaties (6-11 servings), vegetables and fruits (3-5 servings), meat/poultry/nuts/pulses/milk/yogurt (2-3 servings), and fats/oils/sugars at the tiny apex (use very little) (NCERT §3.4 Fig. 2, p. 36).
- Vegetarians can replace meat with legumes, seeds, nuts, tofu and (where used) eggs; soy "milk" fortified with calcium, vitamin D and vitamin B12 can replace cow's milk (NCERT §3.5, p. 37).

- Adolescents typically obtain less vitamin A, thiamine, iron and calcium than recommended, and ingest more fat, sugar, protein and sodium than optimal (NCERT §3.6, p. 37).
- Common adolescent eating idiosyncrasies: skipping meals (especially breakfast — common in girls due to pursuit of thinness), snacking, fast foods (high in fat, sodium, "empty calories", low in calcium/riboflavin/vitamin A/folic acid/fibre), and dieting (NCERT §3.6, pp. 38-39).
- If obesity in adolescence is not checked, **80 per cent** will stay overweight as adults — risk of diabetes, high blood pressure, high cholesterol, sleep apnea (NCERT §3.6, p. 39).
- Modifying behaviour: limit TV to 1-2 hours/day, eat three balanced meals + two nutritious snacks, drink 4-6 glasses of water, exercise 20-30 minutes 3-4 times a week (NCERT §3.7, p. 40).
- Anaemia: **56%** of adolescent girls vs **30%** of adolescent boys are anaemic (NFHS-3, 2005-06); India's high prevalence is due to poverty, inadequate diet, repetitive pregnancy/lactation, poor health services (NCERT §3.7 box, p. 41).
- Factors influencing eating behaviour: external (family, parenting, peers, social-cultural, mass media, fast foods, food fads, nutrition knowledge) and internal (physiological needs, body image, personal values, food preferences, psychosocial development, health) (NCERT §3.8 Fig. 3, p. 42).
- **Anorexia nervosa** — disorder tied to body image distortion; person feels pressured to be "ideally" thin, low self-esteem, insists she is fat though undernourished (NCERT §3.9, pp. 43-44).
- **Bulimia** — begins in late adolescence/early adulthood; bingeing (overeating) followed by purging via vomiting or laxatives; about **5-10%** of all eating disorders occur in males (NCERT §3.9, p. 44).
- Consequences of anorexia/bulimia: convulsions, renal failure, irregular heartbeats, dental erosion; in girls anorexia can delay menstruation, permanently minimise stature and cause osteoporosis (NCERT §3.9, p. 44).

Keep several points at fingertips for CUET. Nutrition versus food (p. 29): food is a tangible substance — solid or liquid — that, when swallowed, digested and assimilated, provides nutrients and enables life. Nutrition is the science studying the entire chain — ingestion, digestion, absorption, metabolism, transport, utilisation and excretion — and is interdisciplinary, drawing on physiology, biochemistry, sociology, psychology and economics. This scientific framing matters because Class XII's clinical and public nutrition build on it rather than on a culinary or domestic-skills framing.

In the macronutrient/micronutrient classification (NCERT Fig. 1, p. 30), water and fibre sit on the macronutrient side along with carbohydrates, proteins and fats — a placement that contradicts the older school-level habit of treating water as a 'non-nutrient'. CUET items frequently exploit this. The micronutrients in the diagram are explicitly listed as vitamins and three minerals named by ICMR for their public-health

importance in India: iodine, iron and calcium. These three correspond to India's three major micronutrient deficiency diseases — iodine deficiency disorders (IDD), iron deficiency anaemia (IDA) and calcium-related osteomalacia/rickets — and are the focus of the National Iodine Deficiency Disorders Control Programme, the Anaemia Mukt Bharat strategy, and ICDS supplementation.

A balanced diet (p. 29) has six attributes — variety, adequacy (meets RDA), correct proportion, in-built safety margin, health promotion, and maintenance of acceptable weight-for-height. The 'variety' attribute is the conceptual basis of the five-food-group system and the food pyramid. The 'safety margin' attribute is operationalised as the RDA formula: RDA = Requirement + Margin of Safety. The requirement is the minimum quantity of a nutrient that prevents deficiency disease; the margin covers individual variation, processing losses and physiological stress (pregnancy, lactation, growth). The ICMR-NIN releases periodic RDA tables for Indians, the most recent being the 2020 revision used by Anganwadi and school meal programmes.

The WHO definition of health (1948), unchanged for over seven decades, is 'a state of complete physical, emotional and social well-being and not merely the absence of disease or infirmity' (p. 31). This carries three implications: health is positive, not merely the negative absence of disease; it is multi-dimensional, requiring physical, mental and social well-being together; and it is socially produced, since social conditions (poverty, sanitation, education) affect all three dimensions. Mental health is defined as the capacity to use cognitive and emotional capabilities to meet ordinary demands, and physical fitness is task-related — the ability to function efficiently in work and leisure. Five components of physical fitness are identified — aerobic fitness (cardio-respiratory endurance), muscular strength, muscular endurance, flexibility, and body composition. These five components anchor any fitness-related CUET MCQ.

The ICMR five food groups (p. 32) are: Cereals/grains and products; Pulses and legumes; Milk and meat products; Fruits and vegetables; Fats and sugars. Their nutrient profiles: cereals provide energy, protein and invisible fat; pulses provide energy and protein (especially important for vegetarian Indians); milk/meat provide protein, fat and vitamins; fruits/vegetables provide vitamins, minerals and dietary fibre; fats and sugars provide concentrated energy. The Food Guide Pyramid (Fig. 2, p. 36) translates the five groups into daily serving recommendations — 6–11 servings of cereals, 3–5 of fruits and vegetables, 2–3 of body-builders, and very little of fats/oils/sugars. A widely tested guideline is that cereals should not supply more than 75 per cent of total Kcal — a check on the cereal-heavy Indian diet that contributes to micronutrient deficiencies.

The energy yields are catechism: carbohydrate 4 Kcal/g, protein 4 Kcal/g, fat 9 Kcal/g (NCERT box p. 35). Alcohol (7 Kcal/g) is not but is sometimes added as a distractor. Vegetarian Indians can replace meat with legumes, nuts, seeds, tofu and (where culturally accepted) eggs; soy 'milk' fortified with calcium, vitamin D and vitamin B12 can replace cow's milk for the lactose-intolerant or vegan (NCERT §3.5, p. 37). This reflects dietary diversity within Indian culinary culture.

Adolescent food behaviour (§3.6, pp. 37–39) shows several modern problems. Adolescents typically under-consume vitamin A, thiamine, iron and calcium and over-consume fat, sugar, protein and sodium — exactly the pattern observed in National Nutrition Monitoring Bureau (NNMB) surveys. Four idiosyncrasies dominate: skipping meals (girls skipping breakfast in pursuit of thinness — which slows metabolism and impairs concentration), constant snacking on energy-dense foods, fast foods (high in fat, sodium and 'empty calories' but low in calcium, riboflavin, vitamin A, folic acid and fibre), and dieting (often unsupervised and nutritionally unsound). If adolescent obesity is not checked, about 80 per cent of overweight adolescents stay overweight as adults — with elevated risk of type 2 diabetes, hypertension, dyslipidaemia and obstructive sleep apnoea. NCERT-recommended modifications are practical: limit television to 1–2 hours a day, eat three balanced meals plus two nutritious snacks, drink 4–6 glasses of water, and exercise 20–30 minutes 3–4 times a week.

Anaemia is highlighted as India's most prevalent nutritional deficiency, with the NFHS-3 (2005-06) figures of 56 per cent of adolescent girls and 30 per cent of adolescent boys cited (NCERT box p. 41). The causes listed are poverty, inadequate diet, repetitive pregnancy and lactation, and poor health services — the standard public-health framing. CUET candidates should remember that subsequent NFHS-4 and NFHS-5 rounds have shown persistence of anaemia, but the NCERT-cited NFHS-3 figure is the testable one for this chapter.

Factors influencing eating behaviour (Fig. 3, p. 42) are arranged as external (family, parenting, peers, social-cultural, mass media, fast foods, food fads, nutrition knowledge) and internal (physiological needs, body image, personal values, food preferences, psychosocial development, health), which together shape lifestyle and ultimately individual food behaviour. The figure is a standard match-the-following source.

Two named eating disorders round out the topic. Anorexia nervosa is the disorder of body-image distortion: the person feels socially pressured to be 'ideally' thin, has low self-esteem, and continues to insist she is fat even when severely undernourished (pp. 43–44). Bulimia begins in late adolescence/early adulthood and is characterised by bingeing — rapid eating of large food quantities — followed by purging via self-induced vomiting or laxative abuse. Approximately 5–10 per cent of all eating disorders occur in males. Consequences of these disorders include convulsions, renal failure, cardiac arrhythmias and dental erosion (from gastric acid in bulimia); in adolescent girls, anorexia can delay menarche, permanently stunt stature and produce premature osteoporosis. These are medically serious conditions, not merely matters of vanity.

2.2 Definitions to memorise

Term	Definition	Page
Food	Anything solid or liquid which when swallowed, digested and assimilated provides the body with nutrients and keeps it well	29
Nutrition		29

Term	Definition	Page
	Science of foods, nutrients and their actions within the body including ingestion, digestion, absorption, metabolism and excretion	
Nutrients	Constituents in food that must be supplied to the body in suitable amounts — carbohydrates, proteins, fats, minerals, vitamins, water, fibre	29
Balanced diet	A diet including a variety of foods in adequate amounts and correct proportions to supply all essential nutrients which promote and preserve good health	29, 45
RDA	Allowances of nutrients which cover the needs of practically all healthy individuals; RDA = Requirement + Margin of safety	29, 45
Health (WHO)	State of complete physical, emotional and social well-being, not merely the absence of diseases or infirmity (1948)	31
Mental health	State of emotional and psychological well-being enabling use of cognitive/emotional capabilities to function in society	31
Physical fitness	Body's ability to function efficiently and effectively in work and leisure, to be healthy, resist diseases and meet emergency situations	31
Anorexia nervosa	Eating disorder tied to body image distortion; obsession with being thin despite normal/low weight	43-44
Bulimia	Eating disorder characterised by bingeing followed by purging via vomiting or laxatives	44
Lactation	The period when the mother nurses her infant	45
Macronutrient	Nutrient required in large amounts — carbohydrate, protein, fat, water, fibre	30
Micronutrient	Nutrient required in small amounts — vitamins and minerals (iodine, iron, calcium)	30
Requirement	Minimum quantity of a nutrient that prevents deficiency disease	29
Margin of safety	Additional allowance over requirement to cover individual variation	29
Food group	A set of foods sharing similar nutrient profiles — ICMR uses five for India	32
Food guide pyramid	Visual representation of daily servings recommended from each food group	36
Empty calories	Calories from foods low in essential nutrients (e.g., sugar, refined oils)	38
Anaemia	Reduced haemoglobin in blood — 56% of adolescent girls, 30% of boys (NFHS-3)	41
Aerobic fitness	Cardio-respiratory endurance — a component of physical fitness	31

Term	Definition	Page
Body composition	Proportion of fat to lean body mass — a component of physical fitness	31
Binge eating	Rapid consumption of large food quantities — feature of bulimia	44
Purging	Self-induced vomiting or laxative abuse — feature of bulimia	44
Body image	Subjective picture of one's own body — central to anorexia	43
Invisible fat	Fat naturally present in foods (e.g., cereals, pulses) not added during cooking	33

2.3 Diagrams / processes to remember

- **Figure 1: Basic Nutrients in Our Food** — splits nutrients into macronutrients (carbohydrates, proteins, fats, water, fibre/roughage) and micronutrients (vitamins, minerals — iodine, iron, calcium) (p. 30).
- **Figure 2: Food Guide Pyramid** for Indians — apex (use very little) fats/oils/sugars; body-building (2-3 servings) meat/poultry/nuts/pulses/milk/yogurt; protection (3-5 servings) vegetables/fruits; broad base (6-11 servings) cereals, bread, rice, chapaties (p. 36).
- **Figure 3: Factors Affecting Food Behaviour of Adolescents** — external factors (family, parenting, peers, mass media, fast foods, food fads, nutrition knowledge) and internal factors (physiological needs, body image, personal values, food preferences, psychosocial development, health) → lifestyle → individual food behaviour (p. 42).
- **Five Food Groups Table** — cereals (energy, protein, invisible fat); pulses (energy, protein); milk/meat (protein, fat, vitamins); fruits/vegetables (vitamins, minerals); fats and sugars (energy) (pp. 33-34).

The Food Guide Pyramid is the single most testable diagram. Visualise it as a triangle with four horizontal bands. The wide base contains cereals, bread, rice and chapaties with the inscription '6–11 servings'. The next band up is fruits and vegetables with '3–5 servings'. The third band contains body-building foods — meat, poultry, fish, eggs, dry beans, nuts, milk, yogurt, cheese — with '2–3 servings'. The narrow apex contains fats, oils and sweets labelled 'use very little' (Fig. 2, p. 36). The pyramid is constructed so that the visual area allotted to each band roughly matches its proportion in the daily diet.

The Factors Affecting Food Behaviour figure (Fig. 3, p. 42) is a two-column flowchart: 'External Factors' on the left (family/parenting, peers, social-cultural environment, mass media, fast foods, food fads, nutrition knowledge), 'Internal Factors' on the right (physiological needs, body image, personal values, food preferences, psychosocial development, health), both feeding into 'Lifestyle' and then 'Individual Food Behaviour'.

2.5 Key data / processes table (Indian context)

Item	Value / fact	Source
Energy yield of carbohydrate	4 Kcal/g	NCERT p. 35
Energy yield of protein	4 Kcal/g	NCERT p. 35
Energy yield of fat	9 Kcal/g	NCERT p. 35
RDA formula	RDA = Requirement + Margin of Safety	NCERT p. 29
Maximum share of cereals in total Kcal	75 per cent	NCERT p. 35
Number of ICMR food groups for India	Five	NCERT p. 32
ICMR food groups	Cereals; Pulses; Milk & meat; Fruits & vegetables; Fats & sugars	NCERT p. 32
Cereals/bread/rice/chapati servings (pyramid base)	6–11 servings/day	NCERT p. 36
Fruits and vegetables servings	3–5 servings/day	NCERT p. 36
Body-builders servings	2–3 servings/day	NCERT p. 36
Fats/oils/sugars servings	Use very little	NCERT p. 36
Anaemia prevalence in adolescent girls (NFHS-3, 2005-06)	56 per cent	NCERT p. 41
Anaemia prevalence in adolescent boys (NFHS-3)	30 per cent	NCERT p. 41
Obese adolescents staying obese as adults	~80 per cent	NCERT p. 39
Eating disorders occurring in males	5–10 per cent	NCERT p. 44
TV-time recommendation	1–2 hours/day	NCERT p. 40
Water intake recommendation	4–6 glasses/day	NCERT p. 40
Exercise recommendation	20–30 minutes, 3–4 times/week	NCERT p. 40

Item	Value / fact	Source
Number of components of physical fitness	Five (aerobic, muscular strength, muscular endurance, flexibility, body composition)	NCERT p. 31
Three key micronutrients flagged for India	Iodine; Iron; Calcium	NCERT p. 30
WHO definition year	1948	NCERT p. 31

2.4 Common confusions / NTA trap points

- **Requirement vs RDA:** Requirement is the minimum nutrient amount needed; RDA = Requirement + Margin of Safety. NTA likes to swap these.
- **Macronutrient vs Micronutrient:** Water and fibre are macronutrients (large quantity), not micronutrients. Vitamins are micronutrients even though essential.
- **Energy yields:** Carbohydrate AND protein both give 4 Kcal/g, fat gives 9 Kcal/g — distractors often give 7 or 5 Kcal/g for fat.
- **Cereal cap:** NCERT says cereals should NOT supply more than **75%** of total Kcal — not 50%, not 80%.
- **Health vs Fitness:** Health = state of complete well-being (WHO); Fitness = ability to meet a physical task. Don't conflate.
- **Anorexia vs Bulimia:** Anorexia = self-starvation, body image distortion; Bulimia = binge + purge cycles. Both can occur in males (5-10% in bulimia).
- **Food groups count:** ICMR uses **five** food groups for India, not four or seven.
- **NFHS-3 anaemia figures** are 56% (girls) and 30% (boys) — don't substitute newer NFHS-4/5 figures in this chapter's MCQs.
- **Anorexia restricts intake; bulimia binges and purges** — both can co-exist but the diagnostic feature differs.
- **Five components of physical fitness** — aerobic fitness, muscular strength, muscular endurance, flexibility, body composition (not 'agility' or 'speed' — those are not).

🎯 Practice MCQs

📊 PYQ Alignment

> This chapter is a perennial CUET favourite for Home Science (315): direct recall on RDA-Requirement formula, energy yield of macronutrients (4/4/9 Kcal), ICMR's five food

groups, the WHO definition of health, and one or two MCQs on adolescent eating disorders (anorexia/bulimia) typically appear each year, with the Food Guide Pyramid serving as a popular match-the-following source.