

#### WHERE CLASSICAL WISDOM MEETS INTELLIGENT LEARNING

#### 2. Functions of food

Food extends far beyond "fuel." Its multiple roles can be grouped into **physiological**, **psychological**, and **socio-cultural/economic** domains. Understanding these layers helps dietitians craft practical advice that optimises health while respecting culture and individual preference.

# $\mathbf{1}\cdot\mathbf{Physiological}$ (Biological) Functions

Sub-function	Core Processes Enabled	Key Nutrients/Food Groups	Illustrative Outcomes
Energy-yielding ("fuel")	Oxidative phosphorylation → ATP for basal metabolism, locomotion, thermogenesis	Carbohydrates, fats, and (to a lesser extent) proteins	Ability to perform work, maintain body temperature
Body-building & Maintenance	Cellular proliferation, tissue repair, hormone & enzyme synthesis, skeletal integrity	High-quality proteins, essential amino acids, minerals (Ca, P, Zn), water	Growth in children, wound healing, muscle hypertrophy
Regulatory & Metabolic Control	Cofactor activity, osmotic balance, neuromuscular excitability	Vitamins (B-complex, A, D, K, C), electrolytes (Na+, K+, Cl-), trace minerals (I, Cr, Se)	Stable blood pressure, nerve impulse transmission, enzyme activation
Protective/Antioxidant & Immune Support	Neutralisation of reactive oxygen species, synthesis of immunoglobulins & cytokines	Vitamins A, C, E, selenium, flavonoids, carotenoids, omega-3 FA	Lower infection risk, reduced oxidative DNA damage
Hydration & Solvent	Medium for biochemical reactions, nutrient transport, thermoregulation	Water, watery foods (soups, fruits)	Adequate plasma volume, sweat evaporation, toxin excretion
Satiety & Gastro-intestinal Health	Delayed gastric emptying, microbiota modulation	Dietary fibre (soluble & insoluble), resistant starch, pre-/probiotics	Appetite control, improved bowel regularity, SCFA production
Detoxification & Excretion	Phase I-II liver enzymes, bile formation, renal clearance	Sulphur amino acids, polyphenols, adequate fluids, cruciferous veg	Biotransformation of xenobiotics, cholesterol elimination

#### **Functions Of Food - Summary Matrix**

Function Category	Key Nutrients Involved	Typical Food Examples	Primary Outcome
Energy-yielding (Fuel)	Carbohydrates, Fats, Protein	Rice, Wheat, Oils, Ghee, Sugar	ATP production for work & basal metabolism
Body-building & Maintenance	Proteins, Minerals (Ca, P, Zn), Water	Milk, Pulses, Meat, Egg, Soy	Growth, muscle & tissue repair, enzyme synthesis
Regulatory & Metabolic Control	Vitamins, Minerals, Water, Electrolytes	Fruits, Vegetables, Salt, Water	Homeostasis of metabolism, nerve & muscle function
Protective/Antioxidant & Immune Support	Vitamins A, C, E; Selenium, Phytochemicals	Berries, Citrus, Nuts, Turmeric	Reduced oxidative stress, enhanced immunity
Sensory & Psychological	Flavour compounds, Tryptophan, Theobromine	Chocolate, Coffee, Spices, Herbs	Pleasure, satiety, mood modulation
Social & Cultural	Staple crops, Traditional dishes, Communal meals	Chapati, Thali, Festival sweets	Cultural identity, social bonding
Medicinal & Prophylactic	Fibres, Prebiotics, Bioactive phytochemicals	Garlic, Green tea, Yogurt, Millets	Disease prevention (e.g., fibre & CVD risk)
Regulatory & Metabolic Control Protective/Antioxidant & Immune Support Sensory & Psychological Social & Cultural	Vitamins, Minerals, Water, Electrolytes Vitamins A, C, E; Selenium, Phytochemicals Flavour compounds, Tryptophan, Theobromine Staple crops, Traditional dishes, Communal meals Fibres, Prebiotics, Bioactive phytochemicals	Fruits, Vegetables, Salt, Water Berries, Citrus, Nuts, Turmeric Chocolate, Coffee, Spices, Herbs Chapati, Thali, Festival sweets Garlic, Green tea, Yogurt, Millets	Homeostasis of metabolism, nerve & muscle function Reduced oxidative stress, enhanced immunity Pleasure, satiety, mood modulation Cultural identity, social bonding Disease prevention (e.g., fibre & CVD risk)

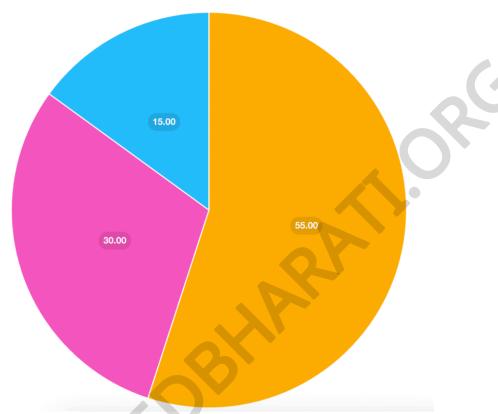
"Functions of Food - Summary Matrix" - scrollable table above categorises each major function with nutrient drivers and typical food examples.

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### **Typical Energy Contribution of Macronutrients**

Typical Energy Contribution Of Macronutrients (Indian Dietary Guidelines, 2024)





• **Pie chart** – visualises *recommended energy split* (55 % carbohydrates, 30 % fats, 15 % protein) for a standard adult diet, highlighting the proportional nature of fuel nutrients.

# 2 · Psychological & Sensory Functions

- 1. **Sensory Pleasure** Aroma, flavour, colour, and texture stimulate salivation, gastric juice secretion, and positive emotional states (e.g., dopamine release from palatable foods like chocolate).
- 2. **Satiety Signalling** Proteins and certain fatty acids trigger cholecystokinin and GLP-1, reducing subsequent intake.
- 3. **Mood Modulation** Tryptophan (serotonin precursor) in milk or bananas aids calmness; caffeine and theobromine provide alertness.
- 4. Comfort & Coping Familiar foods alleviate stress ("emotional eating") and reinforce a sense of security.

### 3 · Socio-Cultural, Economic & Environmental Functions

- Cultural Identity & Ritual Festive sweets at Diwali, communal breaking of the fast (Iftar) in Ramadan, or sacramental bread in Christian liturgy.
- Social Cohesion Shared meals strengthen family and community bonds; "breaking bread" signifies trust.
- **Economic Driver** Agriculture, food processing, and hospitality sectors form a large share of national GDP and employment.

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- Communication & Status Choice of ingredients or dining venue can signal hospitality, wealth, or affiliation.
- Environmental Stewardship Food choices (local vs. imported, plant-forward diets) influence carbon footprint and biodiversity.

## 4 · Medicinal & Prophylactic Functions

Bloactive Component	Mechanism	nealth Outcome
β-glucan in oats	Viscous fibre → reduced intestinal cholesterol absorption	↓ LDL cholesterol
Curcumin in turmeric	NF-κB inhibition, antioxidant	Anti-inflammatory, potential anticancer
Isoflavones in soy	Phyto-oestrogenic action	Alleviates menopausal symptoms
Prebiotic fructans in chicory	Fermentation → ↑ bifidobacteria	Improved gut health & immunity

In Ayurveda this aligns with the concept of *Ahar chikitsa*—food as the **first medicine**, prescribing specific *Pathya* (wholesome) and *Apathya* (unwholesome) diets for conditions such as *Prameha* (type 2 diabetes).

## 5 · Integrated Perspective

Food's roles overlap: a bowl of curd rice simultaneously delivers fuel (carbohydrate), body-building (protein), regulatory (Ca, B-vitamins), probiotic protection, sensory comfort, and cultural resonance in South India. Effective dietetics therefore balances **quantity** (meeting energy and nutrient goals) with **quality** (minimising ultra-processed items) and **context** (culture, sustainability).

#### **Self-Check & Application**

- 1. **Explain** how the same food—e.g., fish curry—meets energy, body-building, and psychological functions simultaneously.
- 2. **Analyse** why fibre-rich millets are promoted both for physiological regulation and socio-economic sustainability in semi-arid regions.
- 3. **Design** a one-day menu for an office worker that harnesses at least five distinct food functions discussed.

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