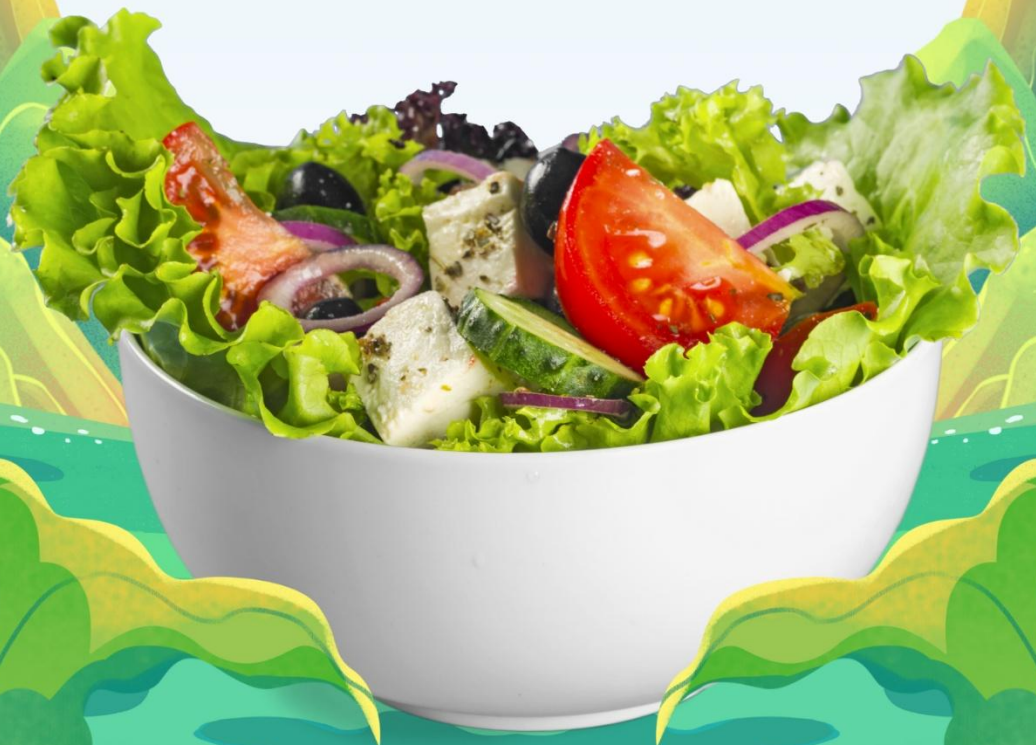
PRIYAM KUMAR

KNOW YOUR PLATE

Diet and Disease : Nutrition guide



About this book

Growing up in India, I've seen food weave through every corner of life—from the steaming idlis of the South to the ghee-laden rotis of the North, from festive laddoos to daily dal. It's more than taste; it's survival, health, and sometimes, unknowingly, harm. Over the years, I've watched my loved ones battle diabetes, relatives struggle with anaemia, and kids in villages waste away—all tied to what's on their plates. Curiosity drove me to dig deeper: Why does white rice spike sugar? How does tea sap iron? What's in our blood tests telling us? This book, *Know Your Plate: A Common Indian's Health Handbook*, is my attempt to share those answers with you—the everyday Indian wanting to live better.

This isn't a doctor's manual or a scholar's thesis. It's a labour of love—a detailed notes I've pieced together to make sense of nutrition, diseases, and health for the common man. Inside, you'll find the basics—carbs, proteins, vitamins—unpacked with Indian staples like rice and dal in mind. We'll explore harmful habits (too much chai sugar, reused oil), the 50 diseases hitting India hardest (diabetes to TB), and blood tests (Hb, glucose) that reveal what's wrong. Clinical nutrition ties it to action—how dal fights malnutrition or millets tame diabetes. It's all grounded in India's reality: 40% of kids stunted, 77 million diabetic, 50% of women anaemic (NFHS-5, IDF, WHO). My goal? To help you connect your fork to your future.

I'm no professional nutritionist—just an avid reader who's sifted through books, studies, and online sources, scribbling notes to understand this puzzle. These pages reflect my journey, but they're not expert advice. Use your own discretion with what you read here—cross-check with doctors or dietitians, especially for serious health decisions. This is a starting point, not a prescription. Take it, tweak it, and make it yours—because in India, health begins where knowledge meets the plate.

Priyam Kumar

In this Book

Chapter 1: Nutrition Basics and Relevance

- Overview of nutrition science and its medical importance.
- Macronutrients (carbs, proteins, lipids) and micronutrients (vitamins, minerals)—energy balance.
- Diet's role in health and disease—India's malnutrition (40% kids stunted) and diabetes (77 million).
- Clinical correlations (e.g., kwashiorkor, anaemia).

Chapter 2: Carbohydrates: Metabolism and Indian Diets

- Types (simple, complex), sources (rice, millets), digestion, and metabolism (glycolysis).
- Glycemic index—white rice (high GI) vs. ragi (low GI).
- Clinical relevance: Diabetes (77 million cases)—Patient's Case (e.g., "PPBS 220, rice daily?").
- Indian context: Carb-heavy diets—South (idli) vs. North (roti).

Chapter 3: Proteins: Needs and Malnutrition

- Amino acids, sources (dal, paneer), quality (biological value), and metabolism (nitrogen balance).
- PEM focus: Kwashiorkor (edema) vs. marasmus (wasting)—40% kids affected (NFHS-5).
- Patient's Case: "Child, swollen, albumin 2 g/dL?" (Kwashiorkor—protein fix).
- Indian lens: Vegetarian diets—B12, lysine risks.

Chapter 4: Lipids: Essentials and Risks

- Types (saturated, unsaturated, trans), sources (ghee, mustard oil), digestion, and lipoproteins.
- Clinical stakes: CVD (25% deaths)—trans fats (vanaspati), reused oil.
- "LDL 170, fries daily?" (Atherosclerosis—low fat fix).
- Indian context: Ghee tradition vs. urban trans-fat surge.

Chapter 5: Fat-Soluble Vitamins

- Vitamin A (vision), D (bones), E (antioxidant), K (clotting)—functions, sources, RDA.
- Deficiencies: D (70% low—rickets), A (night blindness)—Patient's Case (e.g., "Bowlegs, no sun?").
- Indian angle: Urban D scarcity, rural A gaps—fortification efforts.
- Toxicity risks and mnemonics (e.g., "A DEK").

Chapter 6: Water-Soluble Vitamins

- B-complex (B1–B12) and C—metabolism (coenzymes), sources (amla, dal), deficiencies (beriberi, scurvy).
- Indian focus: B12 (30% vegetarians low), folate (20% women)—anaemia links.
- Patient's Case: "Vegan, numb, Hb 9?" (B12—megaloblastic).
- Clinical pathways and quick fixes (e.g., amla for C).

Chapter 7: Major Minerals

- Calcium, phosphorus, magnesium, sodium, potassium, chloride—functions, RDA, sources (milk, salt).
- Clinical issues: Osteoporosis (50% women over 50), hypertension (24% men)—Na excess.
- "BP 150/90, papad daily?" (Sodium—low salt fix).
- Indian lens: Milk vs. salt-heavy diets—regional balance.

Chapter 8: Trace Elements

- Iron, zinc, iodine, selenium, copper, manganese, fluoride—roles, sources (jaggery, iodized salt).
- Deficiencies: Anaemia (50% women), goiter (Himalayas)—Patient's Case (e.g., "Pale, Hb 8?").
- Indian context: Iron gaps (tea blocks), fluorosis (Rajasthan).
- tools: Mnemonics (e.g., "Fe Zn I") and fixes (e.g., zinc for TB).

Chapter 9: Hydration and Electrolytes

- Water's role (60% body), intake/loss, dehydration (diarrhea—1.5 million kids/year).
- Electrolytes (Na, K, Cl)—balance, imbalances (hyponatremia, hypokalemia).
- Patient's Case: "Child, sunken eyes, watery stools?" (Dehydration—ORS fix).
- Indian angle: Tropics (sweat), ORS success—hydration as lifesaver.

Chapter 10: Dietary Guidelines and Special Diets

- ICMR RDA (e.g., 2,300 kcal, 50 g protein), balanced diet (roti, dal, veg).
- Special diets: Diabetic (low GI), renal (low Na), TB (high protein)—Patient's Case (e.g., "Glucose 200?").
- Indian diversity: South (rice) vs. North (wheat), vegetarianism (30%).
- Clinical tweaks and relevance (e.g., "TB, 45 kg, weak?"—3,000 kcal).

Chapter 11: Harmful Food Habits and Patterns

- Plastics (BPA—cancer), sugar (diabetes), processed (hypertension), reused oil (CVD)—risks.
- Indian habits: Chai (50 g sugar/day), street food (trans fats)—Patient's Case (e.g., "LDL 170, pakoras?").

- Other risks: Alcohol (liver), tobacco (cancer)—NFHS-5 trends (30% urban obese).
- Fixes: Steel, low Na—focus on prevention.

Chapter 12: Top 50 Diseases

- 50 conditions: Diabetes (77 million), CVD (25% deaths), anaemia (50% women), TB (2.6 million)—nutrition links.
- Signs, causes, fixes: “Pale, Hb 9?” (Anaemia—iron), “Chest pain, fries?” (CVD—low fat).
- Indian burden: Rural PEM (40% stunted), urban obesity—dual crisis.

Patient’s Case and mnemonics (e.g., “DAC”—Diabetes, Anaemia, CVD).

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- 20+ tests: CBC (Hb <12—anaemia), FBS (>126—diabetes), lipid profile (LDL >100—CVD), LFTs (albumin <3—PEM).
- Parameters, norms, nutrition ties: “Ferritin 10, pale?” (Iron lack—jaggery fix).
- Indian context: Anaemia (50%), diabetes (77 million)—labs reflect diet.
- Labs (e.g., “HbA1c 7%?”—diabetes), clinical correlations.

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- PEM (kwashiorkor, marasmus), overnutrition (obesity, diabetes)—40% stunted, 30% obese (NFHS-5).
- Disease nutrition: Cancer (enteral), TB (3,000 kcal), CKD (low Na)—Patient’s Case (e.g., “Swollen child, albumin 2?”).
- Enteral/parenteral feeds: “Post-op, no gut?” (TPN)—clinical tools.
- Indian lens: Anaemia (50%), TB (2.6 million)—nutrition as cure.

Chapter 15: Conclusion: Integrating Nutrition into Medical Practice

- Recap: Macros (carbs, proteins), micros (D, iron), habits (sugar, oil), diseases (diabetes, CVD), tests (Hb, FBS).
- Practice integration: Diagnosis (labs), treatment (diet), prevention (low Na)—India’s health (77 million diabetic).
- tips: Mnemonics (e.g., “PEM OCD”), cases (e.g., “Bowlegs, no sun?”—rickets).
- Final push: Nutrition’s power—study, apply, heal India.

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Chapter 1: Nutrition Basics and Relevance

Introduction to Nutrition Science

Nutrition is the cornerstone of medicine, bridging biochemistry, physiology, and clinical practice. It's the study of how food fuels the body, prevents disease, and heals ailments. For Indian medical students, mastering nutrition isn't just academic—it's critical for you to know, where questions test your ability to link diet to conditions like diabetes, anaemia, or rickets. This chapter lays the groundwork: what nutrients are, why they matter, and how they'll appear on your test.

Nutrition splits into two big categories: **macronutrients** (carbohydrates, proteins, lipids) and **micronutrients** (vitamins, minerals). Macros provide energy—measured in kilocalories (kcal)—while micros regulate processes like bone growth or oxygen transport. Water, often overlooked, is a nutrient too, vital for every reaction in your body. In India, where diets vary from rice-heavy South Indian meals to wheat-based North Indian rotis, understanding these basics is key to tackling both patient care and questions.

Macronutrients: The Energy Trio

1. **Carbohydrates**: Your body's primary fuel. Found in rice, chapati, and sweets like jalebi, they break down into glucose. A gram gives 4 kcal. Too little? Fatigue. Too much? Obesity or diabetes—huge in India, with over 77 million cases (IDF, 2021).
2. **Proteins**: The building blocks. Dal, paneer, and chicken supply amino acids for muscles and enzymes. Also 4 kcal/gram. Deficiency hits kids hard—think kwashiorkor, common in rural India.
3. **Lipids**: Dense energy (9 kcal/gram). Ghee, mustard oil, and nuts pack fats for membranes and hormones. Excess clogs arteries—think heart disease, rising in urban India.

Energy balance is simple: calories in vs. calories out. Eat more than you burn, you gain weight. Eat less, you lose. Expect questions like: "A patient eats 3,000 kcal daily but burns 2,500. What's the outcome?" (Answer: weight gain).

Micronutrients: The Regulators

These don't give energy but run the show:

- **Vitamins**: Organic compounds, like Vitamin D from sunlight (crucial in smoggy cities like Delhi) or B12 from curd (tricky for vegetarians).
- **Minerals**: Inorganic, like iron in spinach (fights India's anaemia epidemic) or iodine in salt (prevents goiter in the Himalayas).

Deficiencies are on top focus. Example: "A child has night blindness. Which vitamin is lacking?" (Vitamin A). Or: "A woman with fatigue has low hemoglobin. Cause?" (Iron deficiency).

Diet's Role in Health and Disease

In India, diet shapes disease patterns:

- **Undernutrition**: Protein-energy malnutrition (PEM) plagues kids—40% stunted (NFHS-5, 2021).

- **Overnutrition**: Obesity and diabetes soar with sugary chai and fried pakoras.
- **Micronutrient gaps**: Vitamin D deficiency hits 70% of Indians (urbanization, less sun), while anaemia affects 50% of women (iron-poor diets).

Do you know: "A 5-year-old has edema and low albumin. Diagnosis?" (Kwashiorkor). Or: "A diabetic patient needs a diet tweak. Suggest one." (Cut simple carbs, add millets).

Why Nutrition Matters

Nutrition pops up in:

- **Biochemistry**: Metabolic pathways (e.g., glycolysis, Vitamin B1's role).
- **Physiology**: How nutrients affect systems (e.g., calcium in muscle contraction).
- **Medicine**: Clinical cases (e.g., scurvy's bleeding gums).
- **Community Medicine**: Public health (e.g., iodized salt programs).

You'll see questions like:

- **MCQ**: "Which nutrient deficiency causes megaloblastic anaemia?" (Folate or B12).
- **Case**: "A farmer's son has bowlegs. Likely cause?" (Vitamin D deficiency).

Indian Context: Diet Diversity

India's food varies wildly:

- **South**: Rice, sambar, coconut—carb-heavy, low B12 if vegetarian.
- **North**: Roti, dal, ghee—protein-rich, but iron absorption lags (phytates in grains).
- **East**: Fish, rice—better omega-3s, iodine if coastal.
- **West**: Millets, peanuts—fiber and zinc boost.

Do you know this: "A Gujarati vegetarian has fatigue. Likely deficiency?" (B12 or iron). Know these patterns.

Key Concepts for Prep

1. **Energy**: Calories = life. Macros provide it; imbalance causes disease.
2. **Deficiencies**: Learn symptoms (e.g., Vitamin C = scurvy = bleeding gums).
3. **Excess**: Too much salt? Hypertension. Too much fat? Heart attack.
4. **Balance**: ICMR's RDA guides diets—e.g., 2,300 kcal/day for a moderately active man.

Quick Tips

- **Mnemonic**: "Carbs, Proteins, Fats = CPF = Core Power Fuel."
- **Table**: Memorize this—

Nutrient	Source	Deficiency	Excess

Carbs	Rice, millets	Fatigue	Diabetes
Protein	Dal, egg	Kwashiorkor	Rare
Fat	Ghee, oil	Rare	Atherosclerosis
Vitamin A	Carrot	Night blindness	Liver damage
Iron	Spinach	Anaemia	Hemochromatosis

- **Practice**: "A 30-year-old woman eats rice and dal daily, feels weak. Likely issue?" (Iron or B12 deficiency—check diet history).

Wrap-Up

Nutrition isn't just food—it's medicine. Master the basics here, and the next chapters will dive deeper: carbs, proteins, vitamins, and more, all with an Indian lens. Next up: Carbohydrates—how rice powers India and diabetes trips it up.

Chapter 2: Carbohydrates: Metabolism and Indian Diets

Carbohydrates are India's dietary backbone—think rice in the South, rotis in the North, or idlis at breakfast. They're the body's go-to energy source, powering everything from brain function to muscle movement. For medical, you need to know their chemistry, metabolism, and clinical relevance, especially in a country where diabetes is a growing epidemic (77 million cases, IDF 2021). This chapter covers carb basics, how they're processed, and why they matter?—think questions like: "A diabetic patient eats white rice daily. What's the risk?" Let's break it down.

What Are Carbohydrates?

Carbs are organic molecules made of carbon, hydrogen, and oxygen (ratio 1:2:1). They're classified by size:

1. **Monosaccharides**: Simple sugars—glucose (blood sugar), fructose (fruits), galactose (milk).
2. **Disaccharides**: Two sugars—sucrose (table sugar = glucose + fructose), lactose (milk = glucose + galactose).
3. **Polysaccharides**: Complex carbs—starch (rice, wheat), glycogen (stored in liver), fiber (vegetables).

In India, starch dominates: rice, chapati, and potatoes are staples. A gram of carbs yields **4 kcal**, making them efficient fuel. Do you know: "What's the primary dietary carb in India?" (Starch).

Sources in Indian Diets

Carbs vary by region:

- **South India**: Rice, idli, dosa—high starch, fermented boosts digestion.
- **North India**: Wheat (roti, paratha), millets (bajra, jowar)—complex carbs, some fiber.
- **Sweets**: Jalebi, laddoo—simple sugars (sucrose).

- **Fruits**: Mango, banana—fructose-rich.

Vegetarian diets lean on grains, so carbs often hit 60–70% of daily calories (ICMR RDA: 50–60%). Compare that to meat-heavy diets elsewhere (40–50%). Do you know Know local sources—"A Tamil Nadu patient eats rice thrice daily. Main nutrient?" (Carbs).

Digestion and Absorption

Carb breakdown starts in the mouth:

1. **Salivary Amylase**: Chops starch into maltose (disaccharide).
2. **Stomach**: Minimal action—amylase stalls in acid.
3. **Small Intestine**: Pancreatic amylase finishes starch to maltose; enzymes (maltase, sucrase, lactase) split disaccharides into glucose, fructose, galactose.
4. **Absorption**: Monosaccharides enter blood via intestinal villi—glucose spikes sugar levels fast.

In India, lactose intolerance is common (60–70% of adults lack lactase), so milk curdles into curd—less lactose, relevance: "A patient gets diarrhea from milk. Enzyme?" (Lactase).

Metabolism: From Rice to Energy

Glucose is the star—here's how it's used:

1. **Glycolysis**: In cytoplasm, glucose → pyruvate + 2 ATP (energy). must-know: Vitamin B1 (thiamine) aids this—deficiency = beriberi.
2. **Aerobic Pathway**: Pyruvate enters mitochondria → Krebs cycle → 36–38 ATP (if oxygen's plentiful).
3. **Anaerobic**: No oxygen? Pyruvate → lactate (muscle cramps).
4. **Storage**: Excess glucose → glycogen (liver, muscles) or fat (obesity risk).

Fructose and galactose? Liver converts them to glucose. **glycolysis**—10 steps, but focus on glucose → pyruvate + ATP.

Glycemic Index: Speed Matters

Not all carbs are equal. **Glycemic Index (GI)** measures how fast blood sugar rises post-meal:

- **High GI (>70)**: White rice (89), jalebi—rapid spike, diabetes risk.
- **Medium GI (56–69)**: Brown rice, millets—slower release.
- **Low GI (<55)**: Whole wheat roti, oats—steady energy.

In India, polished white rice (high GI) dominates, driving type 2 diabetes. #Question: "A patient switches from white rice to millet. Effect on blood sugar?" (Lower spike—lower GI).

Clinical Relevance: Feast or Famine

Carbs fuel life, but imbalance kills:

1. **Deficiency**: Rare—brain needs 130g/day. Low-carb diets (ketogenic) shift to fat-burning, producing ketones. #Linkage: "Ketosis sign?" (Acetone breath).

2. **Excess**: High-GI carbs → obesity, insulin resistance, diabetes. India's urban shift to refined grains and sweets is a culprit.
3. **Diabetes Mellitus**: Type 2 explodes here—carb overload + sedentary life. Symptoms: polyuria, polydipsia, polyphagia (the 3 Ps).

Case study: A 45-year-old from Chennai eats rice thrice daily, now has fasting glucose of 140 mg/dL. Diagnosis? (Pre-diabetes—normal <100, diabetes >126).

Indian Context: Carbs and Culture

Rice and wheat aren't just food—they're identity. But:

- **Malnutrition**: Rural kids get carbs but lack protein—PEM risk.
- **Diabetes**: Urban India's polished rice + sugary chai = metabolic chaos.
- **Fiber Gap**: Polished grains strip fiber—constipation, colon cancer risk rises.

Millets (jowar, ragi) are a comeback story—low GI, nutrient-rich. ICMR pushes them—#Intresting fact: "National Millet Year?" (2023).

What to Know

1. **Biochemistry**: Glycolysis (glucose → pyruvate), enzymes (amylase, maltase).
2. **Physiology**: Glucose uptake (insulin), glycogen storage.
3. **Medicine**: Diabetes (type 2), hypoglycemia (low carbs).
4. **Nutrition**: GI, RDA (130g/day minimum, 50–60% calories).