NUTRITION · STUDY GUIDE

Exam 7 Study Guide

This guide covers the two applied chapters. Chapter 13 is a toolkit: how to assess a person's nutrition, how to read a label, how to plan a day with the right reference value, and how to tell strong evidence from noise. Chapter 14 widens the lens to households, countries and the planet: food security, malnutrition, the food system and the programs that change it. Work one chapter at a time and finish each with its ten self-test items.

WHAT THIS GUIDE COVERS

- Chapter 13 · screening versus assessment, the ABCD domains, deficiency signs, recalls, records and FFQs, underreporting and doubly labeled water, Nutrition Facts, %DV and the 5/20 rule, claims, planning with the DRIs, and evaluating evidence and red flags.
- Chapter 14 · food security and its four dimensions, the US continuum, health effects, stunting and wasting, the first 1,000 days, hidden hunger, food loss and waste, processing, food environments, environmental footprints, and food assistance and fortification.

CHAPTER 13

Assessment and Diet Planning

Read it in full: **Chapter 13 in the textbook**. Practice it in the lab: **Read the Label** and **Build a Day**.

What to know

Screening is a fast, sensitive filter for everyone in a setting, with a few questions about weight change, appetite and ability to eat. Its only job is to flag who needs a closer look. **Assessment** is that closer look: a multi-source evaluation. No single measure settles anything, because each one is ambiguous alone.

The four domains are **ABCD**. Anthropometric: height, weight, BMI, waist, mid-upper arm circumference, skinfolds and, in children, the growth trajectory. BMI is a population screen that cannot tell muscle from fat. Biochemical: serum 25-hydroxyvitamin D for vitamin D status,

ferritin for iron stores (hemoglobin falls only later), and methylmalonic acid and homocysteine as earlier B12 markers. Albumin and prealbumin reflect inflammation, not protein intake. Clinical: the physical exam, history and medications; signs come late and overlap. Dietary: the intake history plus meal patterns, cooking setup, food security, budget, swallowing, allergies, medicines and cultural practice.

Classic deficiency signs: perifollicular hemorrhage and bleeding gums (vitamin C), night blindness and Bitot spots (vitamin A), neuropathy, heart failure or Wernicke encephalopathy (thiamin), dermatitis, diarrhea and dementia (niacin), pallor and spoon nails (iron), goiter (iodine), bowed legs or bone pain (vitamin D), and anemia with nerve damage (B12). They cluster in restricted diets, malabsorption, bariatric surgery, alcohol use disorder and food insecurity.

The **24-hour recall** uses a multiple-pass interview and is retrospective, so it does not change eating, but one day is not a usual diet; several nonconsecutive days, including a weekend day, are needed. The **food record** is written as you eat for 3 to 7 days; its problem is reactivity, because recording changes eating. The **food frequency questionnaire** covers the past month or year with 100 to 150 foods; it ranks people in big studies but is poor at absolute amounts.

Self-reported energy is systematically low. Against **doubly labeled water**, weight-stable adults commonly underreport by about 10 to 30%, more for foods that carry social judgment. Urinary nitrogen, sodium and potassium are recovery biomarkers too. This is measurement error from memory and portion estimation, not dishonesty, and because it is directional it does not shrink with a bigger sample. Food composition databases add more uncertainty. React to a food record with neutral curiosity, not judgment.

On a **Nutrition Facts** panel, every number scales to the serving size, which reflects what people customarily eat, not advice. The 2016 update enlarged calories, added an Added Sugars line, swapped required vitamins A and C for vitamin D and potassium, and kept calcium and iron. %DV is anchored to a 2,000 kcal reference. The **5/20 rule**: 5% DV or less is low, 20% or more is high. "Good source" means 10 to 19% DV; "excellent source" or "high in" means 20% or more; "low sodium" means 140 mg or less per serving.

Ingredients are listed by weight, most first. Sweeteners can be split across many names, so read the Added Sugars line too. Nine major allergens must be declared, with sesame added January 1, 2023. Nutrient content claims are arithmetic. Health claims need authorization, and qualified ones must state their weak evidence. Structure/function claims need no premarket authorization; the FDA disclaimer is required on supplements only. Supplements are regulated as food, not drugs.

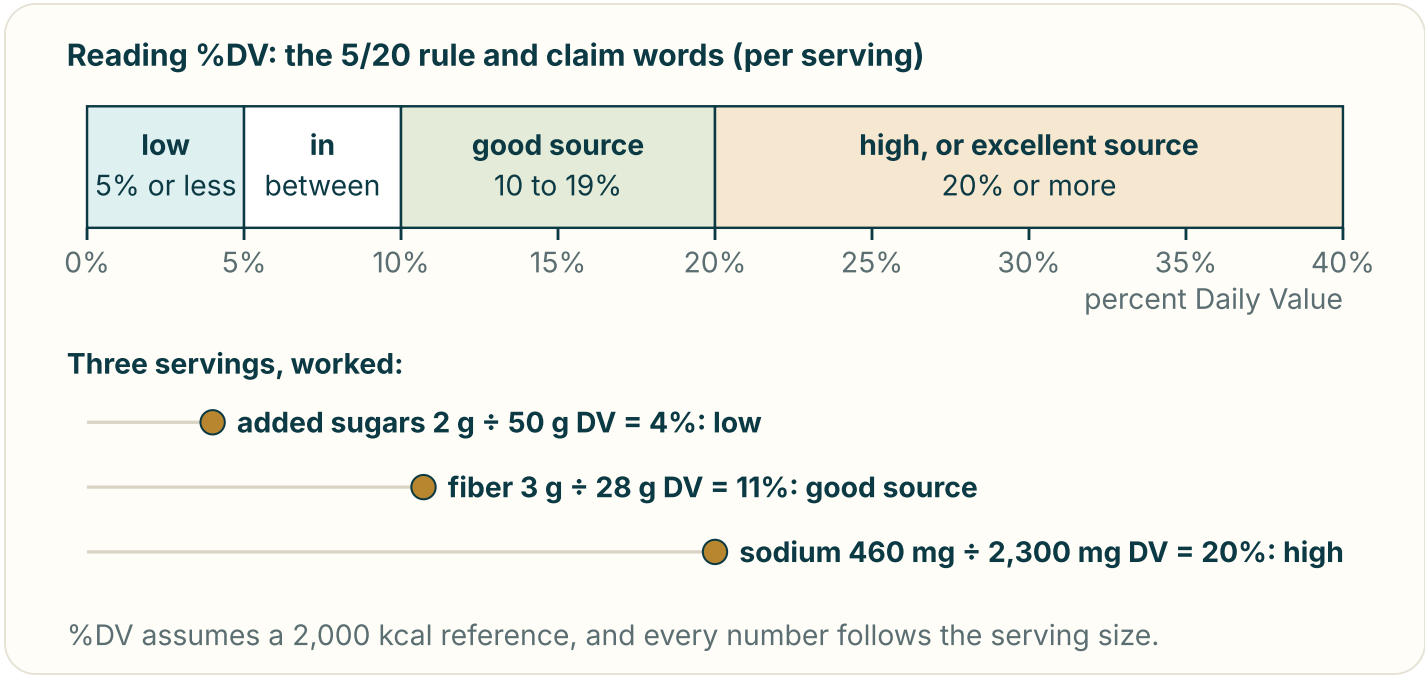
Use the right DRI. RDA for an individual goal, EAR for groups, AI where data are thin, UL as a ceiling, AMDR for macronutrient ranges and EER for energy. Adult AMDRs: carbohydrate 45 to 65%, fat 20 to 35%, protein 10 to 35%. The carbohydrate RDA floor is 130 g. Fiber AI is 14 g per 1,000 kcal. Priority nutrients that shift: iron, calcium, vitamin D, folate, B12, vitamin C (plus 35 mg for smoking), vitamin A, sodium and water.

Plan in two passes. First, draft a day from food groups, because that is how nutrients travel. Then check: energy with 4 4 9, the shortfall nutrients (fiber, calcium, iron, vitamin D, potassium), the ceilings (sodium, added sugars, supplement ULs) and, most of all, feasibility: cost, time, equipment, culture, preference and appetite. Adequacy is reached over days, not every meal.

Judge a claim by design first. Mechanism and animal work suggest; cohorts are informative but confounded; randomized trials break confounding; systematic reviews pool trials. Nutrition limits trials (no blinding to broccoli, long outcomes, no placebo diet), so strong conclusions often come from convergence. Then ask about absolute effect size, hard versus surrogate endpoints, confidence intervals, funding and realistic dose. "Nutritionist" is often unregulated; RD and RDN are protected credentials. Red flags: unspecified detox, cure-alls, uncited "clinically proven," testimonials, "natural," proprietary blends, sellers making claims, conspiracy talk and "clean" versus "toxic" foods. Single-nutrient extrapolation has failed, as with beta-carotene in smokers.

LOCK THESE IN

- Screening flags; assessment answers. Never conclude from one ABCD domain.
- Albumin and prealbumin track inflammation, not protein intake.
- Recall: memory error. Record: reactivity. FFQ: ranks, does not quantify.
- Energy underreporting is about 10 to 30% against doubly labeled water, and it is error, not lying.
- Every label number follows the serving size. %DV assumes 2,000 kcal. 5% low, 20% high.
- DVs: sodium 2,300 mg, fiber 28 g, added sugars 50 g, potassium 4,700 mg, vitamin D 20 µg, iron 18 mg, calcium 1,300 mg.
- RDA for a person, EAR for a group, UL is a ceiling. Check fiber, calcium, iron, vitamin D, potassium.
- Ask "compared to what?" and look for absolute risk, hard endpoints and conflicts of interest.



5% low, 20% high. Divide the amount per serving by the Daily Value to get %DV, then read it against the scale.

Daily Values on the label (adults and children 4+)

Nutrient	Daily Value	Reading note
Total fat	78 g	Saturated and trans broken out
Saturated fat	20 g	Guidelines: under 10% of calories
Sodium	2,300 mg	Most comes from packaged and restaurant food
Total carbohydrate	275 g	Includes fiber and sugars
Dietary fiber	28 g	Most people fall short
Added sugars	50 g	Excludes sugars naturally in fruit and dairy
Protein	50 g	%DV optional unless a claim is made
Vitamin D	20 µg (800 IU)	Required since the 2016 format
Calcium	1,300 mg	Shown in mg and %DV
Iron	18 mg	Pegged to women 19 to 50, so it understates coverage for men
Potassium	4,700 mg	Required; a shortfall nutrient

Label and claim rules

Rule	Meaning
5/20	5% DV or less is low; 20% DV or more is high
Good source	10 to 19% DV per serving
Excellent source or high in	20% DV or more per serving
Low sodium	140 mg or less per serving
Ingredient order	Descending by weight
Allergens	Milk, eggs, fish, crustacean shellfish, tree nuts, peanuts, wheat, soybeans, sesame
Structure/function claim	No premarket authorization; FDA disclaimer required on supplements only

Worked examples

WORKED EXAMPLE 1 · SCALING A LABEL TO WHAT YOU EAT

A bag of snack mix lists a serving of 2/3 cup, 2.5 servings per bag, 230 kcal and 160 mg sodium per serving. Mateo eats the whole bag. Find his energy and sodium, and the sodium %DV.

STEP 1 · SCALE ENERGY

230 × 2.5 = **575 kcal**.

STEP 2 · SCALE SODIUM

160 × 2.5 = **400 mg**.

STEP 3 · %DV PER SERVING

160 ÷ 2,300 = 7% DV, which is between low and high.

STEP 4 · %DV FOR THE BAG

400 ÷ 2,300 = **17% DV**, close to high.

THE HABIT

Read the serving size first. Every number below it is per serving, not per package. Packages near 2 to 3 servings often show a dual column for this reason.

WORKED EXAMPLE 2 · THE IRON %DV TRAP

A cereal serving has 4 mg of iron, and the label shows 22% DV. What share of the RDA does it give a man of 40 and a woman of 30?

STEP 1 · CHECK THE %DV

4 ÷ 18 = 22%. The DV of 18 mg is pegged to women 19 to 50.

STEP 2 · THE WOMAN

Her RDA is 18 mg, so 22% is accurate for her.

STEP 3 · THE MAN

His RDA is 8 mg, so 4 ÷ 8 = **50%** of his need.

THE LESSON

%DV is one reference for everyone 4 and older. It can under- or overstate coverage for a specific person.

WORKED EXAMPLE 3 · AMDRS INTO GRAMS FOR A 2,000 KCAL PLAN

Turn the adult AMDRs into gram ranges for a 2,000 kcal day, and check the carbohydrate floor.

STEP 1 · CARBOHYDRATE

45%: 900 kcal ÷ 4 = 225 g. 65%: 1,300 kcal ÷ 4 = 325 g. So **225 to 325 g**.

STEP 2 · FAT

20%: 400 kcal ÷ 9 = 44 g. 35%: 700 kcal ÷ 9 = 78 g. So **44 to 78 g**.

STEP 3 · PROTEIN

10%: 200 kcal ÷ 4 = 50 g. 35%: 700 kcal ÷ 4 = 175 g. So **50 to 175 g**.

STEP 4 · THE FLOOR

The low end of 225 g clears the 130 g RDA. Fiber at 14 g per 1,000 kcal is 28 g, which matches the label DV.

WORKED EXAMPLE 4 · HOW BIG IS THE UNDERREPORT?

A weight-stable adult reports eating 1,600 kcal a day. Doubly labeled water measures their total energy expenditure at 2,200 kcal a day. How large is the gap?

STEP 1 · FIND THE GAP

2,200 − 1,600 = 600 kcal.

STEP 2 · AS A SHARE

600 ÷ 2,200 = 0.27, so about **27% underreported**.

STEP 3 · WHY EXPENDITURE IS THE TRUTH

In a weight-stable person, intake must roughly equal expenditure, so measured TEE is the best estimate of true intake.

READ IT FAIRLY

27% sits inside the usual 10 to 30% range. It reflects memory and portion error, not dishonesty, and it does not average out in a larger sample.

TRAPS PEOPLE FALL INTO

- **Diagnosing from one measure.** A low weight, one lab or one sign is ambiguous. Triangulate across ABCD.
- **Using albumin as a protein marker.** It falls with inflammation and illness regardless of intake.
- **Treating one recall as usual intake.** Day-to-day variation is large; repeat on nonconsecutive days.
- **Calling underreporting lying.** It is systematic measurement error that does not shrink with sample size.
- **Treating serving size as advice.** It reflects customary amounts and is a reporting unit.
- **Assuming a structure/function claim was approved.** It needs no premarket authorization.
- **Using the EAR to judge one person.** The EAR is for groups. The RDA or AI is the individual goal.
- **Trusting a claim with no comparison.** Ask what it was compared with, in whom, and how big the absolute change was.

Chapter 13 self-test · ten items

1. What is the main purpose of nutrition screening?

A. To replace lab tests with a questionnaire
B. To set an individual's calorie prescription
C. To diagnose a specific nutrient deficiency
D. To flag quickly who needs a full assessment

D. To flag quickly who needs a full assessment Screening is a fast, sensitive filter. Assessment is the detailed, multi-source evaluation of those flagged.

2. A hospital patient has low albumin. What does current guidance say it mainly reflects?

A. Recent low protein intake
B. Low iron stores in the liver
C. Inflammation and illness burden
D. Dehydration from poor fluid intake

C. Inflammation and illness burden Albumin and prealbumin fall with inflammation, injury and illness regardless of intake.

3. Which intake method is most affected by reactivity?

A. A 24-hour recall
B. A 5-day food record
C. Doubly labeled water
D. A frequency questionnaire

B. A 5-day food record Writing food down as you eat changes what you eat. Recalls are retrospective, so they do not change behavior.

4. Why does a larger study sample not fix energy underreporting?

A. The error runs one way, so it does not cancel out
B. Doubly labeled water cannot be used in groups
C. Bigger studies report their energy in kJ instead
D. Large studies always switch to using the FFQ

A. The error runs one way, so it does not cancel out Directional error does not average out. Only calibration and recovery biomarkers correct it.

5. A serving has 6% DV for fiber. By the 5/20 rule, how should it be read?

A. High in dietary fiber
B. An excellent source
C. Neither low nor high
D. Low in dietary fiber

C. Neither low nor high 5% or less is low and 20% or more is high. 6% sits between them. "Good source" starts at 10%.

6. A soup can say "low sodium" only if a serving has at most how much sodium?

A. 140 mg
B. 1,500 mg
C. 230 mg
D. 480 mg

A. 140 mg The regulated "low sodium" claim means 140 mg or less per serving.

7. A cereal box says "supports immune health." What does that kind of claim require?

A. FDA approval from strong evidence
B. No premarket authorization at all
C. A randomized trial on the cereal
D. A qualified evidence disclaimer

B. No premarket authorization at all It is a structure/function claim. On a conventional food it needs no premarket authorization and no disclaimer.

8. A dietitian is planning menus for a whole group home. Which value is the right tool for the group?

A. The RDA
B. The UL
C. The DV
D. The EAR

D. The EAR The EAR is used to assess and plan for groups. The RDA is the goal for one person, and the UL is a ceiling.

9. Which is the strongest single question to ask of a headline that says a food "cuts risk by 40%"?

A. Was the food grown on an organic farm?
B. What was the absolute risk before and after?
C. Was the study published in any journal?
D. Did the lead author hold a doctorate?

B. What was the absolute risk before and after? A relative change means little without the baseline. A 40% cut of a tiny risk is still tiny.

10. High-dose beta-carotene supplements in smokers led to what result?

A. More lung cancer in the supplemented groups
B. Fewer heart attacks but more strokes
C. Less lung cancer, as cohorts had predicted
D. No change in any outcome measured

A. More lung cancer in the supplemented groups Two large trials found more lung cancer. A nutrient pulled from its food at high dose is a different intervention.

Food Security and Sustainability

Read it in full: **Chapter 14 in the textbook**. Practice it in the lab: **The Food Security Spectrum** and **The Footprint of a Meal**.

What to know

Food security means all people, at all times, have physical, social and economic access to enough safe, nutritious food that meets their needs and preferences (1996 World Food Summit). Its four dimensions are **availability** (does food exist nearby), **access** (can this household get it: money, transport, distance, time), **utilization** (can the body use it: safety, clean water, cooking, health) and **stability** (do the other three hold over time). A household can fail on any one.

Food insecurity is a continuum, not hunger alone. The US household module (18 items with children, 10 without) sorts households into **high**, **marginal** (worry but normal diet), **low** (reduced quality and variety, little or no cut in amount) and **very low** food security (meals cut or skipped). The last two count as food insecure. About one in eight US households is food insecure in a given year, about one in twenty at very low. Globally about 2.3 billion people face moderate or severe food insecurity (FIES), and about 700 to 800 million are chronically undernourished.

Food insecurity is linked to iron deficiency, illness, school difficulty and anxiety in children, and to diabetes, hypertension, depression and poor disease control in adults. It is about income, time and access. Its link to higher body weight in some groups follows from cost per calorie, scarcity cycles, stress and missing cooking resources, not character. The two-question **Hunger Vital Sign** flags it in about fifteen seconds.

Malnutrition means any deficiency, excess or imbalance: undernutrition, micronutrient deficiency and diet-related chronic disease. Many places carry a **double burden**, sometimes in one household. Using WHO growth standards: **stunting** is height-for-age below −2 SD (chronic), **wasting** is weight-for-height below −2 SD (acute, highest near-term death risk), and **underweight** is weight-for-age below −2 SD (mixed). Severe acute malnutrition is weight-for-height below −3, MUAC below 115 mm, or bilateral pitting edema. About 150 million children are stunted and about 45 million wasted.

The **first 1,000 days**, from conception to age two, build the brain, immune system and linear growth; deficits there are only partly recoverable. Marasmus is severe wasting without edema. Kwashiorkor has edema, a fatty liver and skin and hair changes, and its cause is unsettled. Refeeding syndrome can drive phosphate, potassium and magnesium into cells dangerously, so treatment is supervised. Ready-to-use therapeutic food is built on fat because fat gives 9 kcal/g: a 92 g sachet gives about 500 kcal with no water.

Hidden hunger means enough calories but too few micronutrients. The big five are iron (anemia), vitamin A (night blindness, xerophthalmia, higher infection deaths), iodine (goiter; in pregnancy, irreversible brain harm), zinc (growth faltering, poor immunity, prolonged diarrhea) and folate (megaloblastic anemia, neural tube defects). Beriberi followed polished rice; pellagra followed untreated maize diets, prevented by nixtamalization.

A food system runs from inputs through production, storage, processing, distribution, retail and consumption to waste. About 13% of food is lost between harvest and retail, mostly to storage and cold-chain gaps in lower-income settings, and about 19% is wasted at retail, food service and home, mostly in higher-income settings: close to a third in all. "Processed" covers opposites: freezing, canning, pasteurizing and fortifying help, while refining strips fiber, magnesium, vitamin E and B vitamins. Frozen produce often matches or beats fresh for vitamin C and folate. Ultra-processed food links to disease are strong observationally, but the mechanism is preliminary.

Low-access areas (food deserts; some prefer "food apartheid" to stress policy history) and cheaper calories from energy-dense food make diet predictable from income and place. WHO estimates about 600 million foodborne illnesses and 420,000 deaths a year, which is the utilization dimension made concrete.

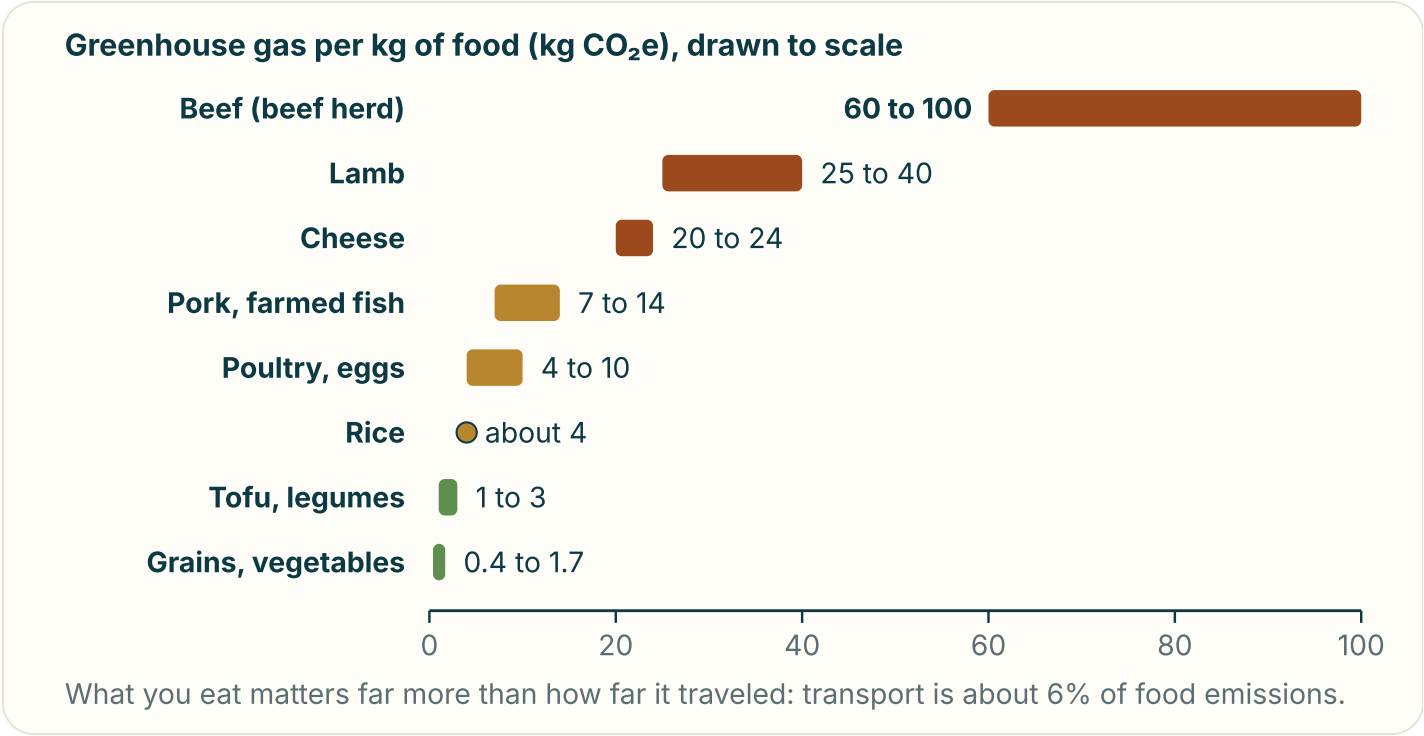
Food systems use about half of habitable land and about 70% of freshwater withdrawals, and make roughly a quarter to a third of greenhouse gas emissions. Life-cycle data put beef near 60 to 100 kg CO_2e per kg, lamb 25 to 40, cheese 20 to 24, pork and farmed fish 7 to 14, poultry and eggs 4 to 10, tofu and legumes 1 to 3, and most grains and vegetables 0.4 to 1.7 (rice about 4). **Food type** matters far more than food miles; transport is about 6% of food emissions, with air-freighted perishables the exception. Regenerative grazing as a full offset is preliminary. The EAT-

Lancet planetary health diet is a global model, not a personal prescription. Sustainability is about ratios and less waste, not forbidden foods.

Income is the main lever. **SNAP** reaches about 40 million people a month, and food insecurity tracks its benefit levels. **WIC** serves pregnancy, infants and children under five, with strong (mostly observational) evidence for birth outcomes and diet quality. School meals, especially with universal eligibility, raise participation. Food banks fill gaps but cannot replace income. Produce prescriptions are promising but preliminary. **Fortification** works without behavior change: iodized salt cut goiter, folic acid cut neural tube defects about 25 to 35%, vitamin D in milk made rickets rare, and enriched flour ended endemic pellagra and beriberi. Biofortification is best shown for orange-fleshed sweet potato and vitamin A. Effective programs change the environment rather than lecturing the person.

LOCK THESE IN

- Four dimensions: availability, access, utilization, stability.
- High and marginal count as secure; low and very low count as insecure.
- About 1 in 8 US households food insecure; about 2.3 billion people globally.
- Stunting = height-for-age below −2 SD (chronic). Wasting = weight-for-height below −2 SD (acute).
- SAM: weight-for-height below −3, MUAC below 115 mm, or bilateral pitting edema.
- Big five hidden hunger: iron, vitamin A, iodine, zinc, folate.
- About 13% lost before retail plus about 19% wasted after, close to a third. Transport is about 6% of food emissions.
- Income programs and fortification beat education alone because they change the environment.



Food type beats food miles. Ruminant meat and cheese sit far above plant proteins, grains and vegetables on the same scale.

Food security and malnutrition measures

Measure	Definition	What it tells you
High food security	No reported problems	Food secure
Marginal food security	Anxiety, but normal diet and amount	Food secure
Low food security	Reduced quality and variety	Food insecure
Very low food security	Meals cut or skipped for lack of money	Food insecure
Stunting	Height-for-age below −2 SD	Chronic deprivation
Wasting	Weight-for-height below −2 SD	Acute; highest near-term mortality
Underweight	Weight-for-age below −2 SD	Mixed; cannot separate the two
Severe acute malnutrition	WHZ below −3, MUAC below 115 mm, or bilateral pitting edema	Medical emergency

Hidden hunger: key micronutrients (adults 19 to 50)

Nutrient	RDA	Pregnancy	Deficiency
Iron	8 mg men; 18 mg women	27 mg	Microcytic anemia; fatigue
Vitamin A	900 µg RAE men; 700 women	770 µg RAE	Night blindness, xerophthalmia
Iodine	150 µg	220 µg	Goiter; fetal brain harm
Zinc	11 mg men; 8 mg women	11 mg	Growth faltering, poor immunity
Folate	400 µg DFE	600 µg DFE	Megaloblastic anemia; neural tube defects

Approximate footprints (kg CO_2e per kg of food)

Food	Footprint	Note
Beef (beef herd)	About 60 to 100	Methane and land conversion
Lamb	About 25 to 40	Also a ruminant
Cheese	About 20 to 24	About 10 kg milk per kg
Pork, farmed fish	About 7 to 14	Feed drives most of it
Poultry, eggs	About 4 to 10	Eggs at the low end
Tofu, legumes	About 1 to 3	Fix their own nitrogen
Grains, roots, most vegetables	About 0.4 to 1.7	Rice about 4; air-freighted produce higher

Worked examples

WORKED EXAMPLE 1 · CLASSIFYING CHILDREN BY Z-SCORE

Three children aged 2 are measured. Kwame: height-for-age −2.4, weight-for-height −0.8. Lila: height-for-age −1.1, weight-for-height −2.3. Sami: weight-for-height −3.2. Classify each.

STEP 1 · KWAME

Height-for-age below −2 means **stunted**. Weight-for-height −0.8 is not wasted. This is chronic deprivation.

STEP 2 · LILA

Weight-for-height below −2 means **wasted**, an acute problem with high near-term risk. Her height is not stunted.

STEP 3 · SAMI

Weight-for-height below −3 is **severe acute malnutrition**, a medical emergency. A MUAC below 115 mm or bilateral pitting edema would also qualify.

WHY BOTH MEASURES

Underweight (weight-for-age) mixes these pictures, which is why stunting and wasting have largely replaced it.

WORKED EXAMPLE 2 · WHERE A HARVEST GOES

Use the chapter's shares to follow 1,000 kg of food grown: about 13% lost before retail and about 19% wasted at retail, food service and home.

STEP 1 · LOST BEFORE RETAIL

1,000 × 0.13 = 130 kg.

STEP 2 · WASTED AFTER

1,000 × 0.19 = 190 kg.

STEP 3 · EATEN

1,000 − 130 − 190 = **680 kg**, so about 32% never gets eaten.

WHERE TO ACT

The loss before retail is mostly storage and cold chain in lower-income settings. The waste after is mostly households in higher-income settings. Wasted food carries every upstream cost with it.

WORKED EXAMPLE 3 · FOOD TYPE VERSUS FOOD MILES

A recipe uses 0.5 kg of beef. Compare its footprint with 0.5 kg of tofu, using about 80 kg CO_2e per kg for beef and about 2 for tofu.

STEP 1 · BEEF

0.5 × 80 = **40 kg CO_2e**.

STEP 2 · TOFU

0.5 × 2 = **1 kg CO_2e**.

STEP 3 · COMPARE

40 ÷ 1 = 40 times larger for the beef.

TRANSPORT

Transport is about 6% of food emissions, so shipping the tofu by sea barely changes the result. What the food is matters far more than how far it traveled.

WORKED EXAMPLE 4 · WHY THERAPEUTIC FOOD IS BUILT ON FAT

A sachet of ready-to-use therapeutic food delivers about 500 kcal in 92 g. How many grams would 500 kcal take as pure carbohydrate, and as pure fat?

STEP 1 · ENERGY DENSITY

500 ÷ 92 = 5.4 kcal per gram of sachet.

STEP 2 · AS CARBOHYDRATE

500 ÷ 4 = **125 g**, more than the whole sachet weighs.

STEP 3 · AS FAT

500 ÷ 9 = **56 g**.

WHY IT MATTERS

Fat packs energy into a small, shelf-stable paste that needs no water, which matters where water may be unsafe.

TRAPS PEOPLE FALL INTO

- **Equating food insecurity with hunger.** It is a continuum; low food security can involve no cut in amount.
- **Blaming people for food insecurity.** It is about income, time and access. Higher weight in some groups reflects cost and stress, not character.
- **Using underweight to tell acute from chronic.** Stunting shows chronic deprivation; wasting shows acute risk.
- **Calling kwashiorkor simply protein deficiency.** That is a teaching shortcut; the mechanism is unsettled.
- **Judging a meal by food miles.** Transport is about 6% of food emissions. Food type dominates.
- **Calling all processing harmful.** Freezing, canning, pasteurizing and fortifying protect nutrition and safety.
- **Expecting food banks to end food insecurity.** They fill gaps. Income programs move the numbers.
- **Assuming more fortification is always better.** Mandatory, voluntary and supplements can stack past a UL.

Chapter 14 self-test · ten items

1. A household has food on local shelves but no money until payday. Which dimension of food security fails?

A. Stability over time
B. Food utilization
C. Access to food
D. Food availability

C. Access to food Food exists nearby, but the household cannot obtain it. Money, transport, distance and time all belong to access.

2. A family eats cheaper, less varied food but does not cut how much they eat. Which category fits?

A. Marginal food security
B. Very low food security
C. High food security
D. Low food security

D. Low food security Reduced quality and variety with little or no cut in amount is low food security. Very low means meals are cut or skipped.

3. Roughly what share of US households report food insecurity in a typical year?

A. About one in twenty
B. About one in eight
C. About one in fifty
D. About one in three

B. About one in eight About one in eight households is food insecure; about one in twenty reaches very low food security.

4. A child's height-for-age is −2.6 SD and weight-for-height is normal. What does this show?

A. Stunting, from chronic deprivation
B. Normal growth for a child this age
C. Wasting, from a recent acute loss
D. Severe acute malnutrition (SAM)

A. Stunting, from chronic deprivation Low height-for-age below −2 SD is stunting, the marker of long-run deprivation.

5. Which finding alone is enough to classify severe acute malnutrition in a young child?

A. A MUAC of 130 mm
B. Weight-for-age of −1.5
C. Height-for-age of −2.1
D. Bilateral pitting edema

D. Bilateral pitting edema Bilateral pitting edema qualifies on its own. A MUAC below 115 mm or weight-for-height below −3 also qualifies.

6. Why is the period from conception to age two singled out?

A. It is when food insecurity is easiest to measure
B. Deficits there are only partly recoverable later
C. Growth stops at two, so later food matters less
D. Children need no iron before their second year

B. Deficits there are only partly recoverable later The brain, immune system and linear growth are laid down in the first 1,000 days.

7. Which deficiency in pregnancy causes irreversible harm to the child's brain and is prevented by salt iodization?

A. Thiamin
B. Vitamin A
C. Iodine
D. Zinc

C. Iodine Iodine deficiency in pregnancy causes congenital hypothyroidism and lasting neurodevelopmental harm. Iodized salt sharply reduced it.

8. A shopper picks local beef over sea-shipped lentils to cut emissions. What does the chapter say?

A. Food type outweighs miles; lentils win by far
B. Beef and lentils have about equal footprints
C. Local food always has the smaller footprint
D. Sea freight makes up most food emissions

A. Food type outweighs miles; lentils win by far Transport is about 6% of food emissions. Ruminant beef is roughly 60 to 100 kg CO_2e per kg; legumes about 1 to 3.

9. Which program evidence does the chapter rate as strong for birth outcomes and diet quality?

A. Nutrition lectures
B. Produce prescriptions
C. Food bank pantries
D. WIC food packages

D. WIC food packages WIC has among the strongest evidence of any nutrition program, though most of it is observational.

10. Why have fortification programs been so effective?

A. They work without anyone changing habits
B. They depend on people reading labels closely
C. They raise every nutrient above its UL safely
D. They replace the need for any food assistance

A. They work without anyone changing habits Fortification changes what is already in the food supply, so no one has to remember, change or pay extra.

ONE PAGE

Cram sheet

Everything from chapters 13 and 14 in one place. Cover the right column and see if you can rebuild each row.

Assessment and planning

Item	Value or rule	Note
ABCD	Anthropometric, biochemical, clinical, dietary	Triangulate; one domain never decides
Markers	Ferritin for iron stores; 25-hydroxyvitamin D; MMA for B12	Albumin tracks inflammation
Intake methods	Recall (memory); record (reactivity); FFQ (ranks)	Repeat recalls on nonconsecutive days
Underreporting	About 10 to 30% vs doubly labeled water	Error, not dishonesty
5/20 rule	5% DV low; 20% DV high	Good source 10 to 19%
Key DVs	Sodium 2,300 mg; fiber 28 g; added sugars 50 g; potassium 4,700 mg	Iron 18 mg; calcium 1,300 mg; vitamin D 20 µg
AMDRs, adults	Carb 45 to 65%; fat 20 to 35%; protein 10 to 35%	Carbohydrate floor 130 g
DRI use	RDA person; EAR group; AI thin data; UL ceiling	EER for energy
Shortfalls to check	Fiber, calcium, iron, vitamin D, potassium	Then sodium, added sugars, ULs, feasibility

Food security and sustainability

Item	Value or rule	Note
Four dimensions	Availability, access, utilization, stability	Fail on any one
US continuum	High, marginal (secure); low, very low (insecure)	About 1 in 8 insecure
Global	About 2.3 billion insecure; 700 to 800 million undernourished	FIES scale
Child growth	Stunting HAZ below −2; wasting WHZ below −2	SAM: WHZ below −3, MUAC below 115 mm, or edema
Children affected	About 150 million stunted; 45 million wasted	First 1,000 days
Loss and waste	About 13% before retail; 19% after	Close to a third
Footprints	Beef 60 to 100; legumes 1 to 3 kg CO_2e/kg	Transport about 6%
Programs	SNAP about 40 million a month; WIC; school meals	Food banks fill gaps
Fortification	Iodized salt; folic acid (NTDs down 25 to 35%); vitamin D milk; enriched flour	No behavior change needed

Rules that are not equations

Topic	The rule
Claims	Nutrient content (arithmetic); health (authorized); structure/function (not authorized).
Evidence	Design first; then absolute effect, hard endpoints, funding, realistic dose.
Red flags	Detox, cure-alls, uncited "clinically proven," testimonials, proprietary blends, "clean" vs "toxic".
Screening	Hunger Vital Sign: two questions about food running out.
Processing	Freezing and fortifying help; refining strips nutrients.
Framing	Food insecurity is about income, time and access; no good or bad foods.

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