NUTRISIZE HEALTH HANDBOOK, UNDERGRADUATE EDITION

How to read the evidence

Eleven real studies and guidelines, each with a question to work through. Learn to read hazard ratios, confidence intervals, trials and guidelines on actual numbers from WHO, the CDC, the FDA, the NIH and leading journals.

START HERE

Six ideas that make every study easier to read

1. Association is not cause

A cohort study follows people and compares groups. It can show that two things go together, not why. People who walk more also differ in health, income and habits.

2. Hazard ratios and relative risk

A ratio compares a group with a reference group. A hazard ratio of 0.53 means the rate of the outcome was 47% lower than in the reference group, over the follow-up period. A ratio of 1.00 means no difference.

3. Confidence intervals

The interval shows the range of values the data are compatible with. For a ratio, an interval that includes 1.00 does not rule out no effect. For a difference, an interval that includes 0 does the same.

4. Cohort versus randomised trial

In a randomised trial a chance process assigns people to groups, which balances other differences on average. That is why trials speak more strongly about cause, and why they are usually shorter and smaller.

5. Certainty of evidence

Frameworks such as GRADE rate how much confidence to place in a body of evidence (for example high, moderate, low, very low). A guideline can be a strong recommendation built on moderate-certainty evidence.

6. How was it measured?

Self-reported activity and one-day food recalls are noisy. Wrist accelerometers and weighed food are better but rarer. Always ask what the number actually measured.

A free study aid: When an assignment asks for the original source, the free Nutrisize Health nutrient pages (75 nutrients, 207 citations) and food pages cite theirs, so you can trace a number back to a paper. They are on nutrisize.health and in the mobile apps.

WORKED CASES

Eleven cases to read like a scientist

Each case gives the finding, then questions to try. The sources are listed so you can check every number.

Case 1. Steps and mortality: reading a hazard ratio

A 2025 meta-analysis found that 7,000 steps a day was linked to a hazard ratio of 0.53 (95% CI 0.46 to 0.60) for all-cause mortality, compared with 2,000 steps. The benefit levelled off around 5,000 to 7,000 steps.

Try this: What does 0.53 mean in plain words? Why does the interval not include 1.00? Why can this still not show that walking prevents death? What could explain the pattern besides walking itself?

Source: Ding D, Nguyen B, Nau T, et al. Daily steps and health outcomes in adults. Lancet Public Health 2025;10:e668-e681. doi.org/10.1016/S2468-2667(25)00164-1

What this does not show: Observational; certainty moderate for most outcomes and low or very low for some, per the authors.

Case 2. A null result is still a result: low-fat versus low-carbohydrate

In the DIETFITS trial (609 adults, 12 months), weight change was -5.3 kg on a healthy low-fat diet and -6.0 kg on a healthy low-carbohydrate diet. The difference was 0.7 kg (95% CI -0.2 to 1.6). Neither a genotype pattern nor insulin secretion predicted who did better.

> **Try this:** The interval for the difference includes 0. What does that say about whether one diet is better? Why might this surprise people who have heard strong claims for one diet?

Source: Gardner CD et al. JAMA 2018;319(7):667-679 (DIETFITS). doi.org/10.1001/jama.2018.0245

> **What this does not show:** A randomised trial with group counselling, 12-month weight outcomes, adults with BMI 28 to 40.

Case 3. Does eating within a window help? Adding time-restricted eating

In 139 adults with obesity, time-restricted eating (8:00 to 16:00) added to calorie restriction gave -8.0 kg versus -6.3 kg with calorie restriction alone at 12 months. The net difference was 1.8 kg (95% CI -4.0 to 0.4; P=0.11).

> **Try this:** Does the interval include 0? What would you conclude, and how sure would you be? What sample size might be needed to detect a difference this size?

Source: Liu D et al. N Engl J Med 2022;386(16):1495-1504. doi.org/10.1056/NEJMoa2114833

> **What this does not show:** Randomised trial; certainty not graded in the abstract.

Case 4. A J-shaped curve: lifting and mortality

Across 16 cohorts, muscle-strengthening activity was linked to 10 to 17% lower risk of death and chronic disease, with the largest gain at about 30 to 60 minutes a week. The curves for several outcomes were J-shaped.

> **Try this:** What does a J-shaped curve say about 'more is better'? Why would 30 to 60 minutes not be called an optimum?

Source: Momma H, Kawakami R, Honda T, Sawada SS. Muscle-strengthening activities are associated with lower risk and mortality in major non-communicable diseases. Br J Sports Med 2022;56(13):755-763. doi.org/10.1136/bjsports-2021-105061

> **What this does not show:** Self-reported lifting; association, not cause.

Case 5. Measuring food: what does '55% of calories' mean?

In 2021 to 2023, ultra-processed foods supplied 55.0% of calories for Americans aged 1 and over, 61.9% for ages 1 to 18 and 53.0% for adults. The data come from one 24-hour recall per person, classified with the NOVA system.

> **Try this:** What errors could creep in when people recall one day of eating? Is a share of calories the same thing as harm? What other data would you want?

Source: Williams AM, Couch CA, Emmerich SD, Ogburn DF. Ultra-processed Food Consumption in Youth and Adults: United States, August 2021-August 2023. NCHS Data Brief No. 536, 2025.
https://cdc.gov/nchs/products/databriefs/db536.htm

> **What this does not show:** A share of energy is not a measure of harm.

Case 6. Pooling evidence and rating certainty: fibre

A WHO-commissioned set of reviews pooled 185 prospective studies and 58 trials. Highest versus lowest fibre intake was linked to 15 to 30% lower all-cause and cardiovascular mortality and lower risk of several diseases, with the greatest reduction at 25 to 29 g a day. Certainty was moderate for fibre.

> **Try this:** Why does pooling many studies help? Why is 'moderate certainty' still useful for a guideline? What would raise certainty?

Source: Reynolds A et al. Carbohydrate quality and human health. Lancet 2019;393(10170):434-445.
doi.org/10.1016/S0140-6736(18)31809-9

> **What this does not show:** Largely cohort associations; certainty for glycaemic index was low to very low.

Case 7. A small randomised trial: sleep and calories

Eighty adults aged 21 to 40 with overweight, who usually slept under 6.5 hours, were asked to extend sleep by about 1.2 hours a night for two weeks. They ate about 270 fewer calories a day (95% CI -393 to -147).

> **Try this:** What are the strengths of randomising? What limits generalising (who was in the trial, how long, how intake was estimated)? Would you change your sleep because of it?

Source: Tasali E, Wroblewski K, Kahn E, Kilkus J, Schoeller DA. JAMA Intern Med 2022;182:365-374.
doi.org/10.1001/jamainternmed.2021.8098

> **What this does not show:** One centre, two weeks, specific group; no long-term weight effect shown.

Case 8. From trial to the real world: the Diabetes Prevention Program

In the NIH Diabetes Prevention Program (3,234 participants), a lifestyle programme aiming for 7% weight loss and 150 minutes of activity a week lowered diabetes risk by 58% versus placebo, and metformin by 31%. When Medicare offered the programme to 9,015 beneficiaries, average weight loss was 4.9%.

> **Try this:** Why might real-world results differ from a trial? Who volunteers for each? What does 'efficacy' mean compared with 'effectiveness'?

Source: Diabetes Prevention Program (DPP), NIDDK, reviewed August 2021. https://www.niddk.nih.gov/about-niddk/research-areas/diabetes/diabetes-prevention-program-dpp; Medicare Diabetes Prevention Program Expanded Model: Findings at a Glance (April 2018 to March 2024), CMS Innovation Center, 2025. https://www.cms.gov/priorities/innovation/data-and-reports/2025/mdpp-finalevalrpt-fg

> **What this does not show:** A randomised trial and an administrative evaluation answer different questions.

Case 9. Reading a guideline: what WHO actually says

WHO's 2020 guidelines for adults recommend 150 to 300 minutes of moderate (or 75 to 150 minutes of vigorous) activity a week, plus muscle strengthening on 2 or more days. The strengthening advice is a strong recommendation based on moderate-certainty evidence, and benefits appear below the targets.

> **Try this:** What is the difference between a recommendation and a threshold? Why do guideline panels grade both strength and certainty?

Source: Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med 2020;54:1451-1462. doi.org/10.1136/bjsports-2020-102955

> **What this does not show:** WHO also notes evidence was insufficient to set a numeric limit for sedentary time.

Case 10. Reading a Nutrition Facts label

The FDA's Daily Value for added sugars is 50 g a day on a 2,000-calorie diet. A label showing 5% Daily Value or less is low; 20% or more is high. Sodium's Daily Value is 2,300 mg and fibre's is 28 g.

> **Try this:** Bring a food label to class. Convert the percentages to grams. Which of your foods are high in sodium or added sugars? Why are Daily Values a reference, not a personal target?

Source: Added Sugars on the Nutrition Facts Label, FDA (content current March 2026). https://www.fda.gov/food/nutrition-facts-label/added-sugars-nutrition-facts-label; Daily Value on the Nutrition and Supplement Facts Labels, FDA. https://www.fda.gov/food/nutrition-facts-label/daily-value-nutrition-and-supplement-facts-labels

> **What this does not show:** Daily Values are label references on a 2,000-calorie diet.

Case 11. When bodies disagree: sodium

WHO recommends under 2,000 mg of sodium a day. The US Daily Value is 2,300 mg, and the National Academies set an adequate intake of 1,500 mg with a risk-reduction intake of 2,300 mg. The average US intake is about 3,400 mg and the global mean 4,278 mg.

> **Try this:** Each number answers a different question (population goal, label reference, risk-reduction intake). Write one sentence explaining each. Which would you quote in a report?

Source: Sodium reduction fact sheet, WHO, 11 May 2026. https://www.who.int/news-room/fact-sheets/detail/sodium-reduction; Dietary Reference Intakes for Sodium and Potassium, National Academies of Sciences, Engineering, and Medicine, 2019. https://nationalacademies.org/news/2019/03/sodium-and-potassium-dietary-reference-intake-values-updated-in-new-report; Sodium Reduction in the Food Supply, FDA, 2024. https://www.fda.gov/food/nutrition-food-labeling-and-critical-foods/sodium-reduction-food-supply

> **What this does not show:** Averages hide differences between people.

Tools for your coursework

Nutrisize Health is a free nutrition, exercise and health-numbers reference for iPhone and Android. It is not medical advice.

- 75 nutrients with plain-language summaries, functions, food sources and 207 citations
- 201 physiological parameters across 16 body systems, each with sources
- A regional units view for converting between systems, and a 4,995-food library to practise label reading

Free to use, with optional Remove Ads and premium packs. Your health data stays on your device.

Sources

1. Ding D, Nguyen B, Nau T, et al. Daily steps and health outcomes in adults. Lancet Public Health 2025;10:e668-e681. doi.org/10.1016/S2468-2667(25)00164-1
2. Gardner CD et al. JAMA 2018;319(7):667-679 (DIETFITS). doi.org/10.1001/jama.2018.0245
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10. Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med 2020;54:1451-1462. doi.org/10.1136/bjsports-2020-102955
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14. Dietary Reference Intakes for Sodium and Potassium, National Academies of Sciences, Engineering, and Medicine, 2019. https://nationalacademies.org/news/2019/03/sodium-and-potassium-dietary-reference-intake-values-updated-in-new-report
15. Sodium Reduction in the Food Supply, FDA, 2024. https://www.fda.gov/food/nutrition-food-labeling-and-critical-foods/sodium-reduction-food-supply

This handbook is a compilation, paraphrased from the cited public sources, with each figure traceable to its source; it is not a peer-reviewed publication. It provides health and wellness information for educational purposes and is not medical advice. Consult your clinician before changing your diet or exercise. Published by Nutrisize Health, a product of EqualInformation, LLC, Sunnyvale, CA, USA. October 2026.

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