

Rendre un repas compréhensible

Des quantités lisibles,
des explications utiles.

**Comprendre un affichage
ne valide pas son interprétation.**

Compréhension, utilité et incertitude dans les retours sur un repas : revue critique
ciblée et contrat de présentation proposé.

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Synthèse en français · dossier scientifique en anglais

Propulsé par MedLab

L'essentiel

Ce que cette recherche permet de retenir

01 Des questions concrètes en premier

Portions saisies, quantités estimées et aliments contributeurs offrent un point de départ. La hiérarchie exacte reste une hypothèse d'interface à tester. [1-7]

02 La limite près de la donnée concernée

Donnée absente, zéro et saisie incomplète doivent être distingués. Une valeur partielle n'efface pas les autres valeurs connues ; formulation et visibilité restent à évaluer. [D1-D4]

03 Graphiques et explications à comparer

Des résultats indirects soutiennent certains usages de l'interactivité, sans établir la meilleure disposition mobile ni un bénéfice universel du graphique de macros. [5 ; dossier 9-15]

04 L'apport de l'IA reste à démontrer

Aucune étude retrouvée ne démontre pour cette tâche un gain de compréhension de l'IA sur une explication locale adéquate. Préférence d'experts et compréhension objective des utilisateurs sont distinctes. [10 ; dossier 16-20]

Portée et méthode

Revue critique ciblée, non exhaustive. Certaines sources ne sont accessibles que partiellement. La recherche documentaire et les conclusions n'ont pas été actualisées pour cette édition. Les propositions du dossier ne constituent ni une validation clinique de Nutrikom ni une recommandation personnelle.

Parcourir le rapport

Le dossier scientifique conserve sa pagination de référence : 01 à 22.
Les renvois internes désignent cette pagination, affichée en pied de page.

01-03	Question, critères et méthode
04-08	Études et portée des résultats
09-16	Présentation, graphiques et incertitude
17-20	Évaluation et cas proposés
21-22	Bibliographie et décisions

Édition publique

Cette édition ajoute une synthèse française et une navigation au dossier v1.0. La présentation est harmonisée ; les mentions d'outils et d'opérations internes sont retirées. Les données, références, niveaux d'accès aux sources et réserves scientifiques sont conservés. Les propositions décrivent l'état de la recherche à la date du dossier.

Understanding and usefulness of single-meal feedback

Make the meal understandable before evaluating it

Question ID: UX01

Date: 11 October 2026 | **Version:** 1.0

Population: generally healthy adults using a self-administered nutrition app.

Object: one entered meal, with estimated composition and explicit data coverage.

Disposition: **ADOPT FOR DESIGN, subject to comprehension testing.** Start with amounts for the entered portion, recognizable foods, and a short scope statement. Add one grounded explanation of food contributions; add a second explanation only when it resolves a likely misunderstanding. Keep reference comparisons optional and explicitly generic. Defer the experimental consumer score, following IDX01.

Decision	Reason and evidence status
Retain descriptive feedback	Estimated amounts and their food contributors answer concrete questions. Their proposed hierarchy is a UX hypothesis, informed by adjacent digital studies and indirect label-comprehension research. [1-7]
Show uncertainty where it belongs	Mark the affected value, preserve other known information, and distinguish missing composition from zero and incomplete intake. This follows the prior contracts; exact wording and salience need testing. [D1-D4]
Investigate explanations and graphics	Digital interactivity can help selected arithmetic tasks. Evidence does not establish the best mobile meal layout, a universal benefit of a macro chart, or an optimal number of sentences. [5]
Investigate AI only as an increment	No retrieved study establishes that AI wording improves this task over an adequate local explanation. Expert preference for AI answers is not consumer comprehension. [10]
Defer evaluative meal scores	Understanding a score does not validate its construct. Do not introduce a replacement score or imply adequacy, safety, medical assessment or personal physiological response. [D5]

Main evidence gap: the closest meal-feedback trial measured food choices, while meal-recommender studies mainly measured use, reported understanding and acceptance. Objective comprehension evidence is stronger for packaged-food labels, which is indirect for this application. This is a targeted critical review, not an exhaustive systematic review or an executed usability study.

Scope and the meaning of success

The unit of interpretation is the foods and portions entered for one meal. A correct calculation is not proof of accurate intake; a comprehensible display is not proof of personal nutritional adequacy. This review carries forward the previous boundaries without re-evaluating collection methods, reference tables or physiology. [D1-D5]

Prior boundary	UX consequence
DAY01: meal, day and usual diet differ	Use “this entered meal”. Do not turn one meal into an assessment of the person, the day or habitual intake.
REC01: coverage has distinct meanings	Keep user-confirmed intake coverage, nutrient-data coverage and sampling representativeness separate. Reviewing a record does not complete its composition data.
REF01: a reference is not a personal target	Name the framework and denominator. Do not use a generic adult label reference as an individual requirement, adequacy threshold or amount to consume next.
MEAL01: composition is not response	Do not infer a personal glucose rise, insulin response, fullness duration or digestion time. Meal labels and clock time remain neutral context.
IDX01: current score is experimental	Defer consumer total and timing ratings; investigate/revise density and food-characteristics components. Useful composition explanations do not rehabilitate an unvalidated score.

Four outcomes that must remain separate

Outcome	Example and interpretation
Objective comprehension	The user correctly identifies what an amount describes and what cannot be concluded. Requires an answer key, not a rating of clarity.
Appropriate decision	The user edits a mistaken portion, checks an unmatched food, or declines an unsupported inference. A food choice is “correct” only against a stated, defensible task criterion.
Satisfaction and engagement	Liking, repeat use, clicks, perceived usefulness and intention to follow advice. These can coexist with misunderstanding.
Perceived authority and confidence	Belief that the app is scientific or personally accurate. High confidence in an incorrect adequacy or health inference is a failure, not a success.

Healthy adults are the intended audience, not a claim that all research samples were healthy or representative. Patient samples, workplace cohorts, motivated volunteers and expert raters are identified below. Paediatric, pregnancy, therapeutic-diet and disease-management claims require their own eligibility and validation.

Reproducible search and appraisal

Search date: 11 October 2026. No lower date limit; English-language searches, with original human studies prioritized. Scholarly discovery was followed by primary publisher, PubMed, author-manuscript and institutional records. Search-engine results were not treated as a substitute for a study’s methods.

Route	Queries and follow-up
Scholarly keyword searches	digital nutrition app single meal feedback visualization comprehension human study meal dietary feedback explanations app user comprehension randomized personalized visual
Web discovery	nutrition app meal feedback visualization comprehension user study digital meal nutrition feedback understanding randomized trial visualization
Focused searches	“single meal” “feedback” nutrition “comprehension” “nutrition” “visualization” “comprehension” Szymanski “meal” “feedback” “app” “randomized” understanding
Exact-title verification	Effects of a Novel Applet-Based Personalized Dietary Intervention; Beyond Static Labels; Objective Understanding of Front-of-Package Nutrition Labels; Patient Understanding of Food Labels; Evaluation of AI-generated versus registered dietitian-authored nutrition responses; both uncertainty papers in the bibliography.
Original institutional source	W3C WCAG 2.2, pinned Recommendation of 12 December 2024. Prior Nutrikom contracts were retrieved separately as design dependencies, not external validation studies.

Bibliographic records for Liu, De Croon, Hauptmann and Rabbi were consulted before use. Publisher publication dates supersede preprint metadata.

Selection and extraction

Include digital feedback tied to actual meals first; then meal selection/recommendation systems; then indirect label, whole-diet and uncertainty experiments. Extract population, comparator, outcome type, numerical result when relevant, access level and threats to transfer. Exclude software-only demonstrations as evidence of comprehension, marketing claims, reviews as substitutes for primary results, and disease-response studies outside this UX question.

Access codes: **F** = primary full text read, including an author/publisher PDF mirror; **A** = primary abstract/record only; **S** = original standard. Several PMC/publisher pages returned bot checks or access errors; mirrors or indexed primary records were used where identified. No new pooled estimate, formal risk-of-bias score, exhaustive screening count or claim that unlocated studies do not exist is made.

Evidence matrix: feedback around an actual meal

Directness is not study quality. A randomized trial can address the wrong outcome for UX01; a usability study can identify a design problem without demonstrating a causal comprehension benefit.

Study / population / comparator	Measured findings	Limit and use for UX01
Liu et al. 2024 [1] F Closest direct meal feedback. Shanghai workplace; 153 apparently healthy adults, 76 intervention / 77 control; four months. Applet combined pre-meal dish traffic lights and a post-meal report versus no intervention.	3413 lunch records. Animal:plant ratio slope difference -0.03/week ($P=.024$); livestock/poultry -1.80 g/week ($P=.035$). Vegetable/fruit increase +3.22 g/week did not reach $P<.05$ ($P=.055$).	Fixed canteen recipes and portions plus self-reported leftovers; not independently weighed consumption. No comprehension endpoint or isolated post-meal explanation comparison. Pandemic-related missing follow-up; constrained food environment. Supports feasibility, not a preferred display.
De Croon et al. 2025 [2] F Adjacent: meal recommendations before ordering. Iterative workplace design; final seven-week deployment: 136 users completed the initial FFQ and at least two orders. Final questionnaire $n=41$; no explanation-free randomized control.	32/41 reported understanding why dishes were recommended; 36/41 reported clear explanations, 33/41 adequate explanations. Only 22/41 said recommendations matched preferences. Ingredient details were frequently viewed.	Reported understanding, not objective interpretation accuracy. Strong selection/attrition; authors report 77% dropout using their study denominator. No attribution of change to explanations alone. Food contributors and user control are promising design hypotheses, not established comprehension effects.

What this evidence does and does not settle

The closest evidence supports investigating timely, understandable feedback within a real eating context. It does not identify a superior combination of grams, percentages, explanatory sentences, charts or scores for interpreting one self-entered meal. The bundled interventions also differ from Nutrikom in data capture and purpose. [1,2]

Therefore, do not describe the proposed UI as “clinically proven”, “validated to improve understanding” or “shown to produce healthier decisions”. The initial design is a testable synthesis of constraints and indirect evidence. Its success must be demonstrated on the intended tasks, devices, languages and data states.

Evidence matrix: related digital feedback

Study / population / comparator	Measured findings	Limit and use for UX01
Hauptmann et al. 2021 online / 2022 issue [3] F Nutralize; 34 participants, 29 women, across study waves lasting two to three months. Visual feedback, diary, recipes and recommendations; first-wave app/control comparison and later app use.	Mixed-method analysis examined logged dietary behaviour, system interaction, physical measures and perceptions. Interviews identified practical constraints, trust issues and mismatches between recommendations and preferences.	Indirect: meal features embedded in longitudinal dietary and phenotype-based feedback. Small, selected sample, multiple components and self-report. Associations between engagement and diet are not causal effects of an explanatory sentence; reported model R^2 is not percent dietary improvement.
Rabbi et al. 2015 [4] F MyBehavior pilot RCT: 17 motivated adults; personalized automated activity/food suggestions (n=9) versus professional generic suggestions (n=8), three weeks.	Personalized suggestions were rated more positively ($P < .001$). Between-group lower-calorie food difference was not significant ($P = .15$); walking difference $P = .05$.	Indirect: context-aware behaviour change over time, not interpretation of one meal. Small sample, logged food outcomes, multiple behaviours and no knowledge test. Shows why acceptance and intention cannot stand in for comprehension or dietary effects.

A useful disagreement

Actionable or personalized feedback may be liked while objective benefit remains uncertain. This is not evidence that explanation is useless. It is evidence that usefulness needs an explicit definition and an adequate comparator. Nutrikom should first test whether a contributor sentence helps a person explain the displayed meal correctly, rather than infer success from reading time or positive ratings. [2-4]

No direct support located for several precise design choices

The retrieved human studies do not establish that a macro-energy pie is better than a labelled bar, that two sentences outperform one, that hiding all unknown nutrients improves decisions, or that a single quality number is safer than amounts. Those choices remain UX hypotheses. A short, reversible prototype comparison is proportionate; inventing a new score is not.

Whole-diet dashboards can inform interaction patterns and accessibility, but their trends, goals and repeated measurements must not silently become single-meal claims. A user may understand how to reach a dashboard target while misunderstanding whether that target represents a personal need.

Evidence matrix: labels and numerical understanding

Study / directness / comparator	Objective result	Limits and implication
Wimer, Szymanski & Metoyer 2024 [5] F INDIRECT digital packaged-food labels. A/B study, 24 adults, 12 per group. Static label versus contextual hover text, serving calculator and visual encoding.	Nutrient classification: 87.9% vs 71.9% correct; numeracy: 91.5% vs 66.9% (both $P < .01$). Product comparison: 66.7% vs 55.0%, $P = .29$. No confidence intervals used here.	Small, mainly young sample; bundled features. "Unsure" classifications excluded; permissive ± 2 -serving scoring and exclusions limit precision. Does not isolate graphics or test adequacy misconceptions. Use to motivate assisted arithmetic, not a blanket comprehension claim.
Egnell et al. 2018 [6] F INDIRECT packaged foods, 12,015 adults across 12 countries. Rank three products in each of three categories without labels, then randomized to one of five front labels.	Nutri-Score showed the greatest improvement in ranking against the study criterion. Adjusted ordinal OR 3.07 (95% CI 2.75-3.43) versus reference-intake labels.	Task is product ranking, not whole-meal adequacy or individual health. Online sample, fixed categories and a predefined quality criterion. Evidence that an evaluative aid can help a bounded task; it does not validate the Nutrikom Index or show that every colour system misleads.
Rothman et al. 2006 [7] A INDIRECT US primary-care patients, $n=200$; cross-sectional 24-item label-comprehension assessment with literacy/numeracy measures.	Primary abstract reports mean 69% correct (SD 21%), with literacy/numeracy-related difficulties. Not a randomized format comparison.	Clinical rather than healthy-population sample; older US labels. A 2015 erratum was located but its text could not be retrieved. Do not treat the percentage as a current prevalence estimate or a Nutrikom benchmark. Use only as cautious corroboration of numeracy barriers.

The label studies have clearer objective tasks than most meal apps, but transfer remains limited. Label comprehension is defined against the label's rules. Correctly ranking packages or calculating a serving does not establish that someone understands the difference between a reference value, a personal need and an estimated meal amount. [5-7]

Evidence matrix: uncertainty and AI wording

Study / population / comparator	Finding	Limit and implication
van der Bles et al. 2020 [8] A INDIRECT general fact communication. Five experiments, total n=5780; verbal/numeric uncertainty and magnitudes compared, including a national sample and BBC field experiment.	Communicated uncertainty increased perceived uncertainty; trust reductions were small overall and mainly associated with verbal formulations.	Primary institutional abstract accessed; full PDF retrieval failed. Trust and perceived uncertainty, not meal-comprehension accuracy. Supports testing honest uncertainty without assuming it inevitably destroys trust.
Longman et al. 2012 [9] A INDIRECT hypothetical clinical risk. 120 first-year psychology students; point estimate versus small/large ranges, clinician versus pharmaceutical source.	Ranges reduced accurate understanding; a large range increased perceived risk relative to a point estimate, according to the abstract.	Abstract only; no numerical effect sizes extracted. Narrow sample and risk-probability task. Ranges are not automatically easier to understand; do not fabricate intake confidence intervals or claim every range helps.
Ayres, Nadery & Henfridsson 2026 [10] F INDIRECT nutrition Q&A. Eight US dietitians rated 100 paired questions, four raters per response-source arm; ChatGPT-4o versus existing dietitian forum answers.	Expert quality ratings favoured AI: 4.48 ± 0.31 vs 2.56 ± 0.76 on a five-point scale. Dietitian text was more readable: Flesch 53.5 ± 13.5 vs 46.2 ± 12.5 ; both differences $P < .001$.	No consumer comprehension/decision task; no adequate local-template comparator. Separate rater groups, retrospective forum answers and one model snapshot limit attribution/generalization. Expert-rated quality and fluent authority are not demonstrated user benefit.

These are different outcomes, not interchangeable verdicts

An uncertainty message may preserve trust yet fail to improve interpretation. AI may receive favourable expert ratings yet be harder to read. Neither finding decides Nutrikom's presentation. Test the specific explanation, denominator and data state with real users; retain the local version unless AI shows a useful increment without increasing incorrect inferences. [8-10]

No retrieved study directly compared fact-constrained AI prose with an adequate, equally informative local explanation for a single entered meal. This is a search finding, not proof that no such study exists. No personal health benefit, physiological prediction or diagnosis is inferred here.

Presentation choices: a design decision matrix

Presentation	Useful task	Risk / proposed disposition
Nutrient amounts	Find the estimated amount in the entered portion; check changes after editing.	ADOPT descriptively. Place unit and scope beside values; round consistently with input precision. More digits are not more certainty.
Reference percentages	Understand scale against a named, eligible reference.	CONDITIONAL / optional. Always show the amount and reference identity. No “remaining”, deficit, fill-to-100 goal or personal adequacy interpretation. [D3]
One or two short explanations	Explain where a nutrient comes from or clarify a denominator/limitation.	INVESTIGATE exact wording. Use a useful fact, not a generic compliment or a paraphrase of every number. No study establishes the optimal sentence count. [2,5]
Food contributors	Connect a number to recognizable foods and identify what to edit.	ADOPT FOR DESIGN, test understanding. Require per-food values on compatible bases. Qualify rankings when coverage is partial. Do not imply a food causes a health response.
Macro-energy graphic	Show proportions of energy attributed to macronutrients.	OPTIONAL / test. Text labels and a data equivalent are essential. Distinguish energy share from mass share and daily-reference %. Missing components invalidate a complete-looking 100% graphic.
Evaluative score or traffic-light grade	Rapid ranking under a defined, valid framework.	DEFER current Index and meal health grades. Indirect label results support bounded ranking tasks, not transfer of scientific validity. A familiar green band may be read as medical reassurance. [6,D5]
Optional food idea	Explore a relevant, feasible alternative or ingredient.	OPTIONAL / user-controlled. State the educational reason and conditions. Do not infer need, prescribe a gram replacement or promise prevention of a glucose spike. [D4]

Evidence versus proposal: study outcomes above are evidence. This hierarchy, default visibility and wording are proposed product decisions constrained by the prior contracts. They require comprehension testing; they are not a validated replacement nutritional assessment.

What should be immediately visible

Proposed default, not an experimentally established optimum. Use a compact vertical summary that answers: Which meal? Which portion? What is estimated? Which foods explain the main numbers? Keep editing close to the result.

Layer	Visible content / action
First view	Meal name or selected label and time, if present; “Estimated for the foods and portions entered”; concise food/portion summary and Edit action. Energy, carbohydrate, protein, fat and fibre when known, with units and local state labels.
Immediately below	One concrete contributor explanation. A second short explanation only when it clarifies a different point, such as the macro-energy denominator or partial coverage. No mandatory generic advice paragraph.
On request	All nutrients; named reference comparisons; preparation assumptions; per-food contributions; food matching, composition provenance and missing-data detail. Keep the first-level scope visible while expanding.
Separate optional action	“Explore a food idea”. Show only a relevant, supported option; “No change” and dismissal remain ordinary outcomes. Do not require an AI exchange to access the meal facts.

Illustrative local presentation

The following is a **synthetic UI fixture**, not a verified food-composition record, a runtime meal or nutritional advice. Figures exist only to show hierarchy; production figures must come from the approved calculation pipeline.

Understand this meal	Lunch · 12:30
Scope	Estimated for the foods and portions entered
Entered foods	Rice, beans and vegetables · View or edit foods and portions
Estimated amounts	Energy 600 kcal Carbohydrate 75 g · Protein 25 g · Fat 20 g · Fibre 8 g
Explanation slot	Use a supported contributor statement, for example: “{Food} contributes {amount} of the estimated {nutrient} in this meal.”
Actions	Food contributions · All nutrients · Reference comparisons Explore a food idea

Do not require every nutrient to be available before displaying this view. If fibre is unavailable, replace only that value with “No value available”, keep known amounts, and offer a concise reason on expansion. If too little is known for a useful total, show the entered foods and the specific next step instead of a fabricated summary.

The exact nutrient order, first-view density and action labels should be tested on narrow screens. A fixed “above the fold” pixel boundary is not a comprehension requirement; content must reflow under text enlargement.

English explanations: one useful fact at a time

Situation	Proposed wording	Required fact / condition
Whole meal scope	"Estimated for the foods and portions entered."	Applies to entered composition, not confirmed consumption or a complete day.
Known contribution	"{Food} contributes about {amount} of this meal's estimated {nutrient}."	Server-calculated contribution, unit and rounding; food identity and portion match.
Largest contributor	"{Food} is the largest contributor to the estimated {nutrient} in this meal."	Comparable data for all entered contributors and a ranking robust to meaningful input uncertainty. Handle ties; otherwise qualify.
Partial ranking	"Among foods with {nutrient} data, {food} contributes the most. Data for {other food} are missing."	Known per-food coverage. Do not imply the ordering would survive complete data.
Amount estimated	"The portion is estimated. Changing it will change these amounts."	Portion state is estimated, not weighed/known; avoid fabricated numerical error bounds.
Different units of comparison	"This chart shows energy shares, not the weight of the foods."	Graphic actually uses the documented energy calculation.
No suitable extra explanation	Keep amounts and food list; omit the empty explanation card.	Do not fill space with "Great balance", "Healthy choice" or invented ingredients.

Choose the second explanation deliberately

Prefer a new relation the user cannot see instantly: the main contributing food, why an estimate is partial, or what a percentage means. Avoid repeating "This meal contains carbohydrate" beside a carbohydrate value. Do not stack a physiology paragraph, a reference warning and a food suggestion onto every meal. The proposed limit of one or two explanations is a reading-load hypothesis to test.

"Most" should not be used ambiguously. If intended to mean more than half, the computed share must support that meaning. "Largest contributor" can mean less than half. If an uncertainty in portion or food matching can reverse the ranking, use the factual contribution amount or list several contributors without asserting a winner.

Use "estimated amount", "entered portion" and "food contribution" consistently. Avoid "deficit", "optimal", "clean", "bad", "guilt-free", "metabolically suitable" and "balanced" as automatic meal judgements. A reassuring tone must not create an unsupported health assessment.

Missing values without a missing-information wall

Missingness belongs to a specific food, quantity or nutrient. It should be clear at the point of interpretation and detailed on demand. A complete-looking total that silently replaces unknowns with zero is more misleading than a compact state label. [D2,D3]

State	Visible English wording	Display and calculation contract
Known zero	"0 g" or the appropriate unit.	Only a supported zero. If rounding a small value to zero, follow the documented precision rule; do not imply analytically absent.
Known but estimated	"About {amount} {unit}" where useful.	Preserve amount and provenance. The word "about" does not quantify uncertainty or repair an unreliable match.
Unknown quantity	"Amount not entered for {food}."	Keep the food visible. Exclude unsupported contributions; mark affected totals partial and offer Edit amount.
Missing composition	"No {nutrient} value available for {food}."	Food may be correctly matched and consumed. Do not call this non-consumption or nutrient absence.
Partial sum	"{amount} {unit} from foods with data" plus "Partial estimate".	Sum compatible known values only; identify exclusions. Do not call it the meal total or compare it as a complete reference percentage.
Unmatched food	"{Food} has not been matched to nutrition data."	Keep identity and entered portion; show available other-food information. No silent substitute chosen for a fluent explanation.
Unreported intake	"This describes the foods entered so far."	No claim of a complete meal/day. This differs from a known food with missing composition.
Not applicable / unavailable ratio	"Energy shares unavailable" with a short reason.	No division by zero, forced proportions or zero-quality grade; retain useful amounts.

Three separate questions

Intake coverage: Did the user confirm that all relevant foods were entered?

Nutrient-data coverage: Which foods and nutrients have usable values?

Sampling representativeness: Does this meal/day characterize other periods? A user confirmation answers only the first question; no single coverage badge answers all three.

A statement such as "Fibre values are available for 4 of 5 entered foods" is a count, not "80% accurate". Small missing ingredients can matter for some nutrients. Never convert food-count coverage into a universal reliability percentage. Avoid suppressing known calcium merely because vitamin D is missing.

Reference percentages and macro-energy graphics

Reference comparisons: explanatory, not goal completion

Follow REF01 eligibility, source/version and unit rules. This review does not select new reference values. An optional row should contain the estimated amount, named reference, reference amount and percentage together. A generic adult food-label comparison does not require a personal profile, but must not be presented as a personal energy or nutrient requirement. [D3]

Allowed English	Avoid
"{Amount} {unit}: {percent}% of the {named adult food-label reference} ({reference amount} {unit})."	"You have met {percent}% of your needs."
"Reference comparison, not your personal requirement."	"You still need {remaining}." / "Deficit: {amount}."
"This entered meal is below the named reference amount." Only with the context visible.	"Your intake is inadequate." / "No deficiency."
"Comparison unavailable: {nutrient} data are incomplete." Keep the partial known amount.	A complete-looking percent calculated from missing-as-zero input; a progress ring stopped at 100%.

Energy shares need an explicit denominator

For a compatible three-macronutrient illustration, $Q = 4 \times \text{protein(g)} + 4 \times \text{carbohydrate(g)} + 9 \times \text{fat(g)}$. Label the result **"Energy shares from carbohydrate, protein and fat"**, not "share of your daily needs". Use the established server carbohydrate definition and conversion method; do not use an incompatible total-carbohydrate field. This is a display rule, not a new nutrient-calculation specification.

In the synthetic fixture on page 9, $Q = 580 \text{ kcal}$; carbohydrate, protein and fat contribute approximately 52%, 17% and 31% of Q . The reported 600 kcal is a different denominator. Do not claim these are percentages of 600 kcal, or silently allocate the discrepancy to fibre. Other energy sources and database methods may differ. Production must reconcile or label the basis.

Sugars and saturated fat are subsets, not extra sectors to add to carbohydrate and fat. If any required macro amount is missing, do not renormalize the others into a complete-looking 100%. Keep their amounts; omit the complete-share graphic. If reported total energy is the denominator, include other/unallocated energy only when it is a defensible calculated category, not a cosmetic balancing value.

A labelled stacked bar is a candidate because it fits a narrow screen; a pie is not established as inferior here. Test both against a text-only baseline if a graphic is retained. Use descriptive colours and visible labels, no "ideal" bands or health grades.

Optional food ideas and cultural relevance

An optional food idea is useful when it answers a user's question or makes a supported food property concrete. It should not appear merely because a meal falls short of a generic daily reference. A meal need not contain every nutrient or food group in order to be an acceptable part of someone's diet. [D1,D3,D4]

Requirement	Proposed English / behaviour
Invite, do not prescribe	"Explore a food idea" or "Would you like an idea using foods you enjoy?" A dismissal is not failure or non-adherence.
Explain one relevant property	"If you would like a different texture, you could explore a whole-fruit option." Use only a curated, applicable property claim; no promise about this person's glucose or satiety.
Quantitative alternative	"Compare an alternative portion." Ask the user to select the food and amount, then recalculate with the same data rules. Do not invent a nutrient difference or prescribe a fixed gram substitution.
Unknown food or preferences	"Which food would you like to explore?" Do not guess the recipe, cultural meaning, availability, allergy safety or preferred diet.
No supported idea	Omit the suggestion. Keep the descriptive explanation useful. No compulsory replacement just to populate a card.

Cultural applicability is a design requirement, not a translation step

Studies in a Shanghai canteen, European workplaces and US label tasks do not establish transfer to every food culture or reading context. The 12-country label experiment broadens coverage for its packaged-food ranking task, not for home recipes, shared dishes or local meal conventions. [1,2,5,6]

Test recognizable local names, mixed dishes, staple foods, vegetarian and religious dietary patterns, shared-plate eating and preparation variants. Rice, bread, cassava, taro, lentils and composite dishes should not receive generic moral labels or be replaced automatically by unfamiliar products. Ask about feasibility, price, availability and preference when an alternative depends on them; do not infer culture from a name or location.

Separate "does this sound respectful and useful?" from "what does this statement actually mean?". Translation must preserve the scope and uncertainty of "estimated", "partial" and "reference", with community review and user paraphrase. Familiar foods improve task realism; unfamiliar recipes can expose whether food matching is understood. Both need deliberate inclusion.

No claim of allergy safety follows from a nutrient list or generated suggestion. When an option must satisfy a stated restriction, it needs an appropriate verified food/ingredient basis. Suppress unsupported suitability statements rather than attach a broad reassurance.

AI wording: optional and fact-constrained

Current disposition: INVESTIGATE FURTHER. Ship a useful local explanation first. The retrieved evidence does not establish incremental comprehension benefit from AI in this setting. Generative fluency may increase confidence without increasing correctness; this is a risk to measure, not a finding about all AI interfaces. [10]

Contract element	Proposed requirement
Input facts	Meal revision ID; food IDs and entered amounts; server-calculated nutrient values and states; per-food contributions; permitted comparisons; source/version IDs; approved educational statements. No inferred foods, missing values or personal diagnoses.
Eligible output	Brief title; one or two plain-language explanatory sentences; optional food idea only if eligible; fact IDs and any applicable condition. No new numerical calculations, references, scores or nutrient contributions.
Fact linkage	Every numerical or food-specific assertion maps to supplied facts. General explanations map to approved statement IDs. “Among foods with data” and other qualifiers cannot be dropped for brevity.
Rendering responsibility	Server controls figures, units, rounding, citation/source links and attribution. The model may propose text around placeholders; it cannot redefine a denominator or reference. Validate before display.
Failure and edits	Unknown fact ID, unsupported assertion, timeout, stale meal revision or incompatible language causes fallback to local text. A portion or food edit invalidates both numerical and narrative caches.
Transparency	“AI-assisted wording” in an unobtrusive details area if used. It must not read as “AI verified”, “expert diagnosis” or an additional layer of measurement accuracy.

Example of an eligible fact-linked explanation

Title: Where the fibre comes from

Sentence: “Among foods with fibre data, {food} contributes the most. The estimate does not include fibre from {unmatched food}.”

Fact IDs: meal.revision; nutrient.fibre.coverage; contribution.fibre.rank_known; food.unmatched.

Condition: a partial ranking is available and the omitted food’s identity is known.

Food idea: omitted unless an independently eligible option exists.

The same message must be available as a local template. Test AI versus that template with equivalent facts, scope and length; do not give AI richer content and then attribute any gain to its wording. Possible gains in language adaptation or relevance remain hypotheses. Actual comprehension, unsupported claims, confident errors, latency and user effort determine value.

Numeracy, accessibility and mobile reading

Reduce arithmetic, preserve meaning

Show the amount for the entered portion directly; do not make users multiply a per-100-g value mentally. Keep a transparent details view for the underlying basis. Put units next to values, use familiar nutrient names, and avoid unexplained acronyms. Rounding must not flip “below/above” interpretation or imply precision the portion does not support. Label calculation assistance is promising, but transfer to this meal task requires testing. [5,7]

Problem to prevent	Design hypothesis to test
Percentage without a denominator	Keep “of what?” in the visible label. Distinguish a macro-energy share from a food-label reference comparison; do not use the same unlabeled ring for both.
Numbers crowd out foods	Pair quantities with recognizable food names. Put the detailed nutrient list one action away; avoid a first screen of unexplained laboratory-style values.
Small screen or reading fatigue	Use a vertical hierarchy, short paragraphs and expandable detail. Keep essential scope and state labels visible, rather than hiding them in a tooltip or footer.
False certainty near a boundary	Avoid red/green changes driven by rounded differences or unsupported uncertainty assumptions. Prefer a descriptive amount and a named comparison; use ranges only if their basis is defensible and tested.
User does not want evaluation	Allow neutral amounts and explanations without a grade, target chase or compulsory suggestion. Measure whether the language creates pressure or unwarranted reassurance.

Accessibility baseline from an original standard

Use WCAG 2.2 as an implementation baseline, not proof of comprehension: do not convey information by colour alone (1.4.1); provide text/data alternatives for meaningful graphics (1.1.1); normal text contrast at least 4.5:1, large text 3:1 (1.4.3); support text resize to 200% (1.4.4) and applicable reflow at 320 CSS px width (1.4.10). Provide keyboard operation, visible focus and programmatic labels; pointer targets meet 2.5.8, including its exceptions. [11]

A chart should have a plain-text equivalent such as “Carbohydrate: {share}% of energy from the three macronutrients.” Screen readers must announce the nutrient, value, unit and partial/unknown state together. Updates should be perceivable without moving focus unexpectedly. No hover-only explanations or swipe-only access to critical qualifiers.

Automated accessibility checks and visual inspection are useful, but do not replace testing with people using assistive technology. Readability formulas can flag complexity; a low reading-grade score cannot establish understanding of nutritional concepts.

Proportionate comprehension testing: design

Proposed protocol; no participants recruited and no tests executed. The primary question is whether people correctly interpret the entered meal and avoid unsupported personal conclusions. This is a product-comprehension study, not a dietary intervention or clinical validation.

Stage	Method and decision
1. Content and task review	Nutrition/domain and UX reviewers independently check facts, denominators, missing states and answer keys. Include accessibility review. Fix misleading copy and invalid computations before exposing users.
2. Formative sessions	Iterative moderated think-aloud and teach-back sessions on mobile prototypes. Ask users to paraphrase before giving answer choices. Observe what they notice, overlook, infer and try to change; revise and repeat for unresolved problems.
3. Comparative study	Randomize users to adequate amounts-first local baseline A or A plus concise contributor/context explanation B. Keep facts, typography, editing access and data coverage equivalent. Counterbalance different meal cases; do not repeatedly teach the same answer.
4. Targeted extensions	Test a macro graphic, reference presentation or missing-data design as a separate contrast. Add AI arm C only after local B is adequate; compare like-for-like facts and length. A full factorial design is unnecessary unless a specific interaction needs estimation.
5. Transfer and realistic use	Include an unseen meal and, when feasible, a delayed interpretation task. Measure whether understanding transfers beyond the demonstration, including partial data, edits and a culturally familiar mixed dish.

Recruit for the decisions the product must support

Recruit generally healthy adults across age, nutrition familiarity, numeracy and literacy, mobile experience and educational background. Deliberately include lower-numeracy users, people who enlarge text or use screen readers, and relevant language and food-culture groups. Do not restrict all testing to nutrition professionals, app enthusiasts or highly educated employees.

Use a brief established numeracy/literacy measure where suitable and licensed, plus relevant food/app experience; avoid treating educational attainment as an adequate substitute. Accommodate access needs during consent and tasks. Report exclusions, refusals, device constraints and attrition so that apparent ease of use is not created by excluding difficult-to-serve users.

Choose sample size from the decision: formative recruitment until important patterns and priority subgroups have been explored; comparative recruitment from a prespecified precision or power calculation for the main comprehension outcome. No universal “five users”, invented effect size, sample size or pass-rate threshold is proposed.

Tasks, answer keys and outcome separation

Task prompt	What counts as correct understanding
“What do these amounts describe?”	The foods/portions entered for this meal; estimated composition, not measured absorption, a whole day or a person’s health.
“The display says 30% of an adult label reference. What does that tell you?”	A ratio to that stated reference. It does not establish 30% of this person’s needs or an obligation to consume the other 70%.
“Where does most of the displayed fibre come from?”	Identify the supported contributor or qualified known-food ranking. Do not invent a source for an unmatched recipe.
“Fibre has no value. Is there no fibre in the meal?”	No; it is unknown. Known carbohydrate or energy remains usable within its stated coverage.
“You entered two portions but ate one. What would you do?”	Edit the recorded portion and expect the amounts and explanations to update. Do not compensate by choosing a different meal label.
“Does this chart show food weight, energy shares or your daily needs?”	Identify the displayed energy denominator. The visual cannot stand in for grams or personal reference completion.
“What can the app tell from Snack at 15:00?”	Entered label and time. It cannot judge suitability or predict the person’s glucose/insulin response from these alone.
“Must you choose the food idea to correct this meal?”	No. It is optional exploration, with an explicit property or comparison, not evidence of a personal deficit.
“Can this meal prove that you have no deficiency?”	No. Recognize the boundary without concluding that all descriptive amounts are useless.

Record outcomes separately

Primary: prespecified objective scope/comparison comprehension and rate of critical misinterpretations, reported separately.

Decision tasks: correct edit/check/no-inference action under a stated scenario.

Secondary: time to answer, assistance needed, confidence calibration, recall/transfer, perceived usefulness, satisfaction and willingness to use.

Ask an open explanation before recognition questions. Include “cannot tell from this record” only where it is a genuinely correct option, and include cases where known information supports a definite answer. Otherwise the study merely teaches blanket scepticism. A confidence rating after each answer can expose persuasive but incorrect interpretations.

Do not mark a participant’s preferred cuisine, portion or optional food choice as incorrect unless the task has a clearly specified, defensible criterion. Choice preference is not the same outcome as interpreting the record correctly.

Analysis, release decisions and limitations

Requirement	Proposed analysis or gate
Prespecify the estimand	Define the main task-level outcome and participant-level summary before recruitment. Report each critical misconception separately; a high average must not conceal frequent personal-adequacy errors.
Use transparent denominators	Report correct, incorrect, unsure and non-response counts. Do not remove “unsure” to inflate comprehension. Separate task abandonment from an answered misconception; document missing outcomes and attrition.
Estimate uncertainty	Report proportions and between-condition differences with confidence intervals. Account for repeated tasks within participants and meal/item differences; use an appropriate prespecified model or clustered analysis.
Assess equity and heterogeneity	Describe subgroup results and uncertainty for numeracy, language and accessibility needs. Do not interpret an underpowered non-significant interaction as equal performance.
Code explanations reproducibly	Use a prespecified rubric, independent coding where feasible and adjudication of disagreements. Blind coders to UI condition when practical; retain examples of failure modes without identifiable data.
Separate convenience outcomes	Keep satisfaction, clicks, reading time and trust outside the primary accuracy conclusion. Faster answers with more confident errors are not a useful improvement.
Set decision criteria prospectively	Before the comparative study, agree the smallest worthwhile benefit and tolerable rate/uncertainty of critical misinterpretations from product risk and user needs. Use these in the sample-size calculation; do not invent numerical thresholds in this review.
Use failure to revise	Correct factual errors and unsupported inference in all versions. Revise or withhold a feature if it increases critical misconceptions, even if liked. AI must show useful added value over local B and meet factual/conditionality checks.

What passing would mean

A successful study would support comprehension for the tested interface, tasks, devices, languages and populations, with quantified uncertainty. It would not validate nutrient databases, user portion accuracy, the Index, personal adequacy, clinical diagnosis or long-term dietary benefit. Those are different evidence requirements.

Freeze the wording, calculation/reference versions and task fixtures used in evaluation. Re-test material changes to scope labels, denominators, warning salience or AI model/prompt behaviour. Routine layout changes need proportionate review; do not demand a new clinical trial for every reversible copy edit.

Verification cases: meaning and data coverage

Proposed fixtures and expected interpretation, not executed tests. Numerical examples are synthetic unless explicitly labelled as prior discussion inputs. They verify the contract, not biological outcomes.

Case	Expected display / interpretation
V01. Complete entered meal	Known amounts and foods appear first; scope says entered meal and estimated. No adequacy or health grade.
V02. One food has unknown fibre	Other known nutrients remain visible. Fibre shows a partial estimate or unavailable value, with the omitted food identified on expansion.
V03. Fibre known to be zero	Show the supported zero with the documented rounding basis. Never replace an unknown value with the same state.
V04. Recipe entered, no quantity	Recipe remains listed. Affected totals are partial; the action is Edit amount. No assumed “standard serving” hidden in the prose.
V05. Unmatched local mixed dish	Retain the user’s dish name. No automatic generic substitute, invented ingredient contributions or health judgement.
V06. Portion doubled	Recompute the affected amounts and contributors; invalidate old explanation. A composition ratio may stay the same without implying an equally suitable personal portion.
V07. User confirms all intake	Intake confirmation changes only its own status. Missing calcium composition stays missing; representativeness remains unassessed.
V08. Eight of ten foods have data	If showing coverage, label it a count for the named nutrient. Do not display “80% accurate” or imply equal contribution from all foods.
V09. Largest known contributor, unknown sauce	Use “among foods with data” or show amounts without ranking the full meal. A small sauce could matter; do not assume negligible contribution.
V10. Ranking changes under plausible portion edits	Avoid categorical “largest” or “most” if not robust. Show supported amounts or multiple contributors; no invented statistical confidence interval.
V11. Zero-energy entry such as water	No division by zero or 0/100 health rating. Retain meaningful known amounts; an energy-share chart is not applicable.

Cross-check each fixture through the local explanation and any optional AI path. The expected state is the same. A generative explanation must not make partial data look complete, convert an unmatched food into a familiar one, or describe an estimate as an observation.

Verification cases: comparisons and presentation

Case	Expected display / interpretation
V12. 30% of a named label reference	User can name the denominator. No “70% remaining”, personal requirement, adequacy or deficiency conclusion.
V13. Scientific comparison needs missing profile data	Keep meal amounts. Withhold only the ineligible comparison or request the specific needed context; do not assume a life stage or silently substitute frameworks.
V14. 99.6% rounded to 100%	No “target achieved” badge or status reversal driven by rounding. Details preserve calculation basis and uncertainty.
V15. 75 g C, 25 g P, 20 g F; 600 kcal reported	Three-macro Q is 580 kcal. If shown, 52/17/31% describes Q, not 600 kcal, food mass or daily need. No cosmetic allocation of the difference.
V16. Macro amount missing	Do not renormalize known macros to 100%. Show known grams and explain why the complete-share graphic is unavailable.
V17. Total sugars and saturated fat available	Do not add them as independent energy sectors on top of carbohydrate and fat. Do not relabel total sugars as added/free sugars.
V18. Prior discussion: 581 kcal, 92.2 g carbohydrate, about 63% energy; Snack at 15:00	Label as discussion inputs, not verified runtime facts. No “massive glycaemic load”, “immediate insulin spike” or “unsuitable afternoon snack”. No contributor claim without foods.
V19. Screen reader / colour-vision difference	Value, unit, scope and data state remain understandable without colour. Chart has a text equivalent and logical reading order.
V20. Small screen and enlarged text	No clipped units, hidden qualifiers or hover-only explanation. Focus, editing and expansion remain usable.
V21. Optional idea is culturally irrelevant or declined	Allow dismissal or a preference-based alternative without moral language, adherence penalty or a compulsory substitution.
V22. AI adds a new number or stale food	Reject the explanation and show local text. Validate fact IDs and meal revision; do not display unsupported attribution or nutritional advice.
V23. Fluent answer says “no deficiency”	Block the personal inference even when all displayed values are known and the wording is liked. Usability cannot authorize a medical conclusion.

These are realistic review scenarios, not test results. The study protocol should include a manageable, counterbalanced subset per participant while the software/content review covers every relevant state.

Bibliography: original human studies

Links identify primary publications. Access codes describe what was actually available for this review, not whether a paper is nominally open access. Accessed 11 October 2026. Population, comparator, findings and limitations are in the evidence matrix.

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F: open publisher full text. Motivated adult volunteers; behavioural logs and acceptability.

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Bibliography, dependencies and disposition

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S: original institutional standard. An accessibility baseline, not experimental proof of nutrition comprehension.

Prior Nutrikom contracts used as boundaries

[D1] DAY01 - Meal composition, observed day, usual intake, adequacy and deficiency.

[D2] REC01 - Dietary collection method and Nutrikom minimum data contract.

[D3] REF01 - Nutrient references and Nutrikom interpretation contract.

[D4] MEAL01 - Single-meal physiology and Nutrikom explanation contract.

[D5] IDX01 - Nutrikom Index construct and validation contract.

All v1.0, 11 October 2026; retrieved report decision/scope sections used as project dependencies. They are not independent clinical or usability validation.

Project context: <https://github.com/drYves/nutrikom-com>. UX01 proposes a future presentation contract; it does not assert current runtime behaviour, change repository code or validate the Index.

Disposition and next decision

Adopt for design: descriptive amounts and contributors, visible scope, nutrient-specific missing states, optional named comparisons, useful local explanations and accessibility requirements.

Investigate further: exact hierarchy, wording, graphic value, cultural fit and AI's incremental benefit using the proposed protocol.

Defer: consumer Index/meal health grades, adequacy or medical reassurance, and personal physiological predictions. No replacement score is proposed.