FoodHealth co. | NIQ

2025

The Health of America's Grocery Carts

How we shop, how (un)healthy we eat — and how to fix it.

Letter from the CEO

Few places reveal the truth about America's health like its grocery carts.

Grocery receipts offer a precise record of what actually enters American kitchens. Together with NielsenIQ, we linked 361,000 itemized receipts and a year of Point-of-Sale data to the FoodHealth Score to build the clearest view yet of the nation's grocery health.

The average U.S. Household FoodHealth Score is **48.9/100** — almost **50 percent below** the level associated with long-term health. But the data also shows where the momentum is: In most categories, the healthiest products are also the ones with the fastest-growing sales.

What follows is, we hope, a spark that ignites real, measurable change. The data tells us that people want to change[1], but the problem is larger than any individual can tackle alone. By understanding what is (the truth about what's in our baskets) and what should be (how our baskets should look to improve our health), we can begin to chart a path forward.

– **Sam Citro Alexander**
Founder & CEO, FoodHealth Company

We'll publish this report annually with NielsenIQ. The full dataset, and a synthesized version of it, are available via FoodHealth Intel.
Book a demo.

Inside America’s Carts

If you read nothing else, read this.

THE AMERICAN CART IS OFF COURSE.

The average household FoodHealth Score is 48.9/100 - almost 50% below the level associated with long-term health.

SNAP IS CLOSING HEALTH EQUITY GAPS.

Adjusted for income, SNAP participants buy food that’s as healthy — and often healthier — than non-SNAP households.

HEALTH HAS SALES MOMENTUM.

The healthiest products are gaining share in 6 out of 10 categories, with sales growing 13.5% year-over-year faster than their peers.

SMALL SWAPS, MASSIVE IMPACT.

If every household replaced just three unhealthy items with healthier choices each week, the national FoodHealth Score would jump +19 points.

In This Report

01

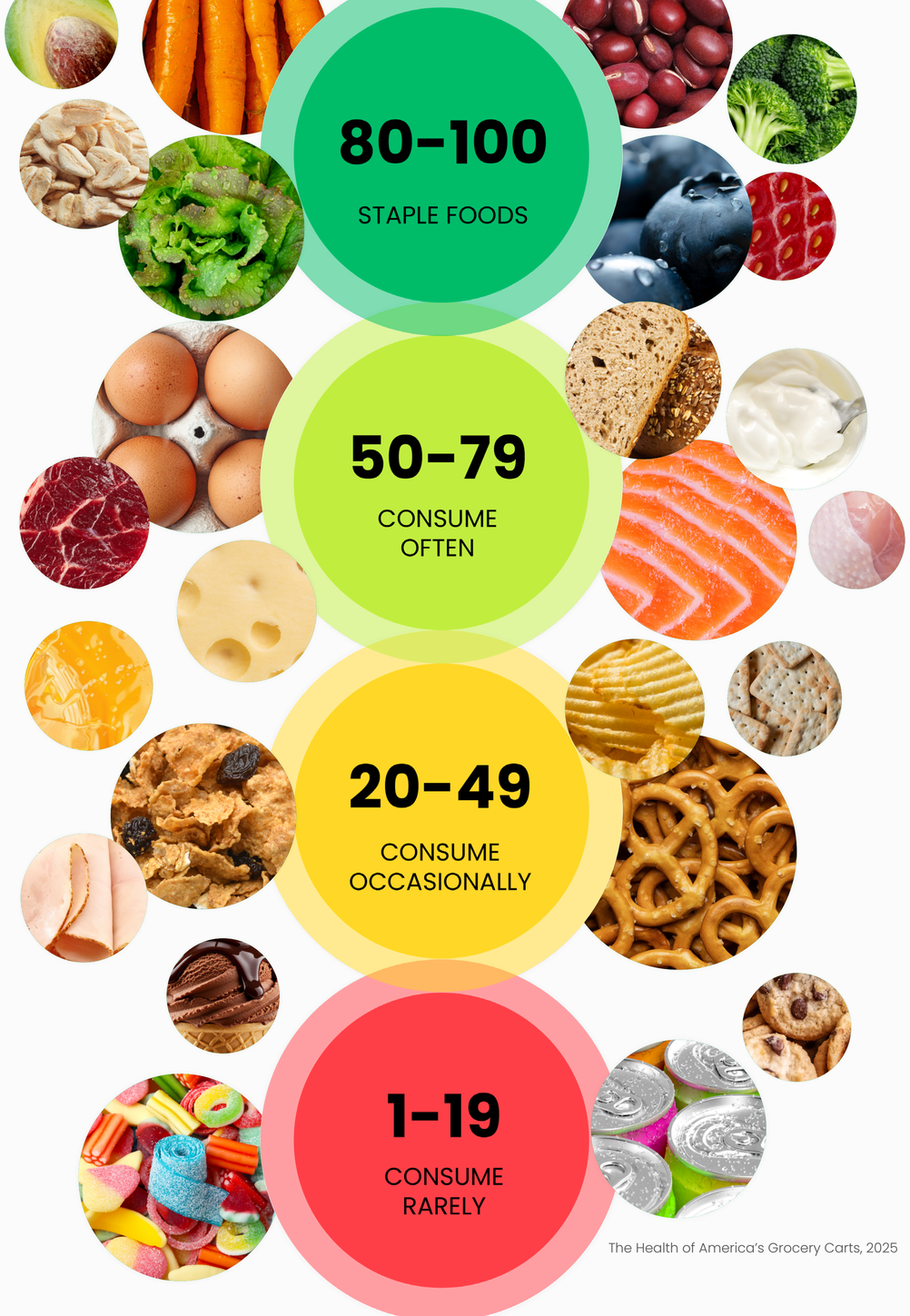
U.S. Household FoodHealth

What does the average American household actually buy - and how do choices shift across income, education, and life stages? This chapter answers that question, mapping how structural forces and daily realities shape the quality of what ends up in our carts. From income gradients to the school-age dip in food quality, we reveal where the biggest gaps exist and why.

The FoodHealth Score

is a 1–100 scoring system that enables consumers, retailers, manufacturers, and policymakers to compare the 'healthiness' of individual foods across the spectrum. Each product–from a box of cereal to a head of lettuce–receives a score, based on its nutrient density and ingredient quality. The score reflects how closely household food choices align with dietary patterns proven to lower chronic disease risk [7-35]. A score of 50 marks the midpoint – foods above it trend healthier; below it less so.

Each product receives both a numeric score (1–100) and a category color (red, yellow, light green, dark green) for ease of interpretation across consumer, retail and policy settings. The methodology draws from the Mediterranean diet (the most clinically validated for disease prevention) [7-35] and the 2020-2025 Dietary Guidelines for Americans, combining a per-calorie nutrient comparison with an ingredient quality assessment.



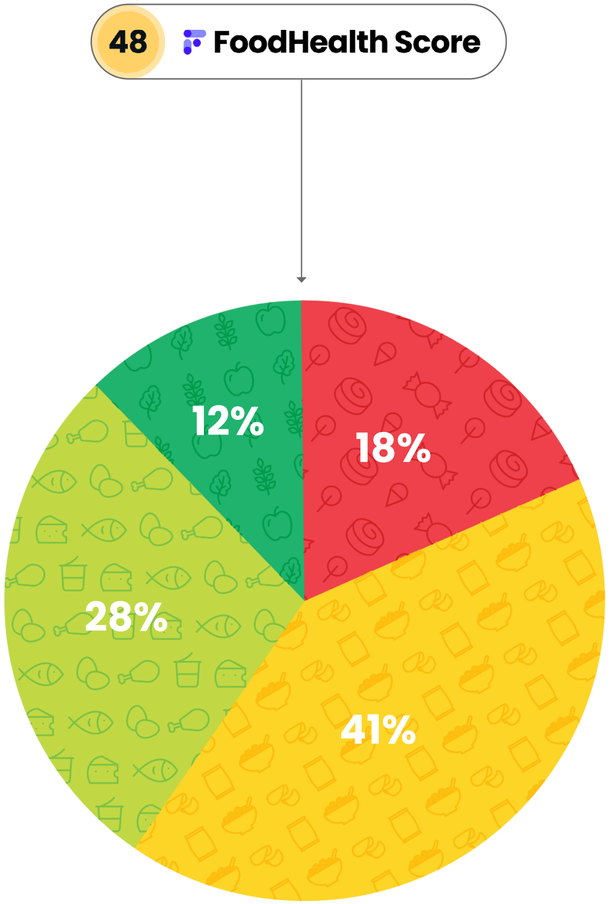
What should the FoodHealth Score of a healthy household look like?

If we anchor “healthy” to Mediterranean diet principles and U.S. Dietary Guidelines, while minimizing reliance on ultra-processed or “junk” foods, the answer is **~88**. For this study, registered dietitians modeled grocery carts for a week’s worth of Mediterranean eating patterns — across cultural variations from traditional European to Vietnamese or Mexican interpretations — and found that the Aggregate FoodHealth Score consistently landed in the 87-89 range. At this level, a household cart is dominated by foods in both the dark and light-green quadrants, with only occasional yellow and almost no red.

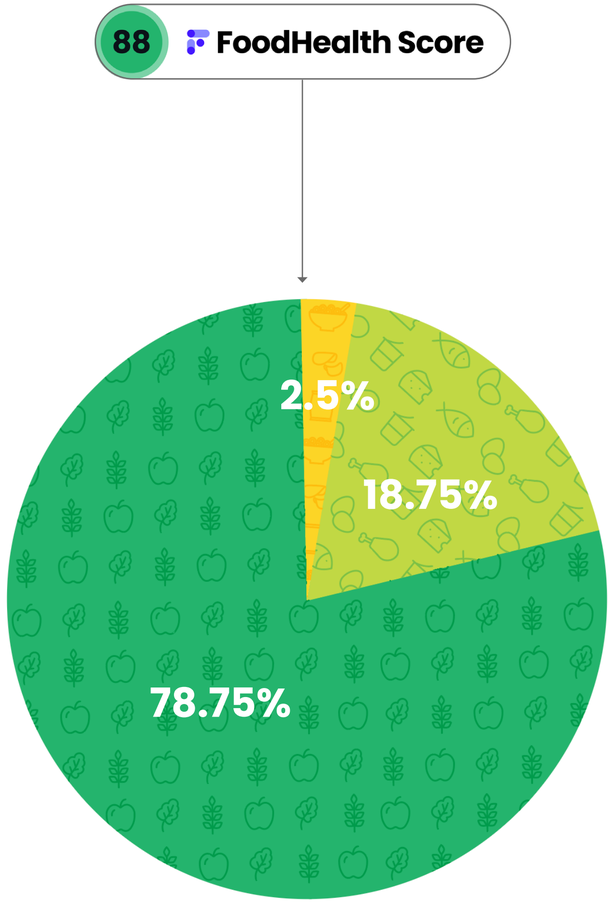
So, where are we today?

The national household average sits just **under 50**. Using two independent NielsenIQ datasets — four weeks of receipt data (48.9 FoodHealth Score) and twelve months of sales data (47.6 FoodHealth Score) — we see remarkable consistency. Together they reveal the same truth: America’s carts are nearly **40 points below** the level associated with long-term health. At this level, household carts are dominated by red & yellow foods (accounting for ~60% of the items in a cart) and only ~12% of items purchased are in the dark green.

AVERAGE AMERICAN CART



IDEAL HEALTHY CART



Source: FoodHealth Co FoodHealth Score, FoodHealth Co Health-focused Cart, NielsenIQ Point-of-Sale data

At first glance, the national distribution of household scores is perfectly normal. Most Americans cluster between 45 and 55, with tails on either end.

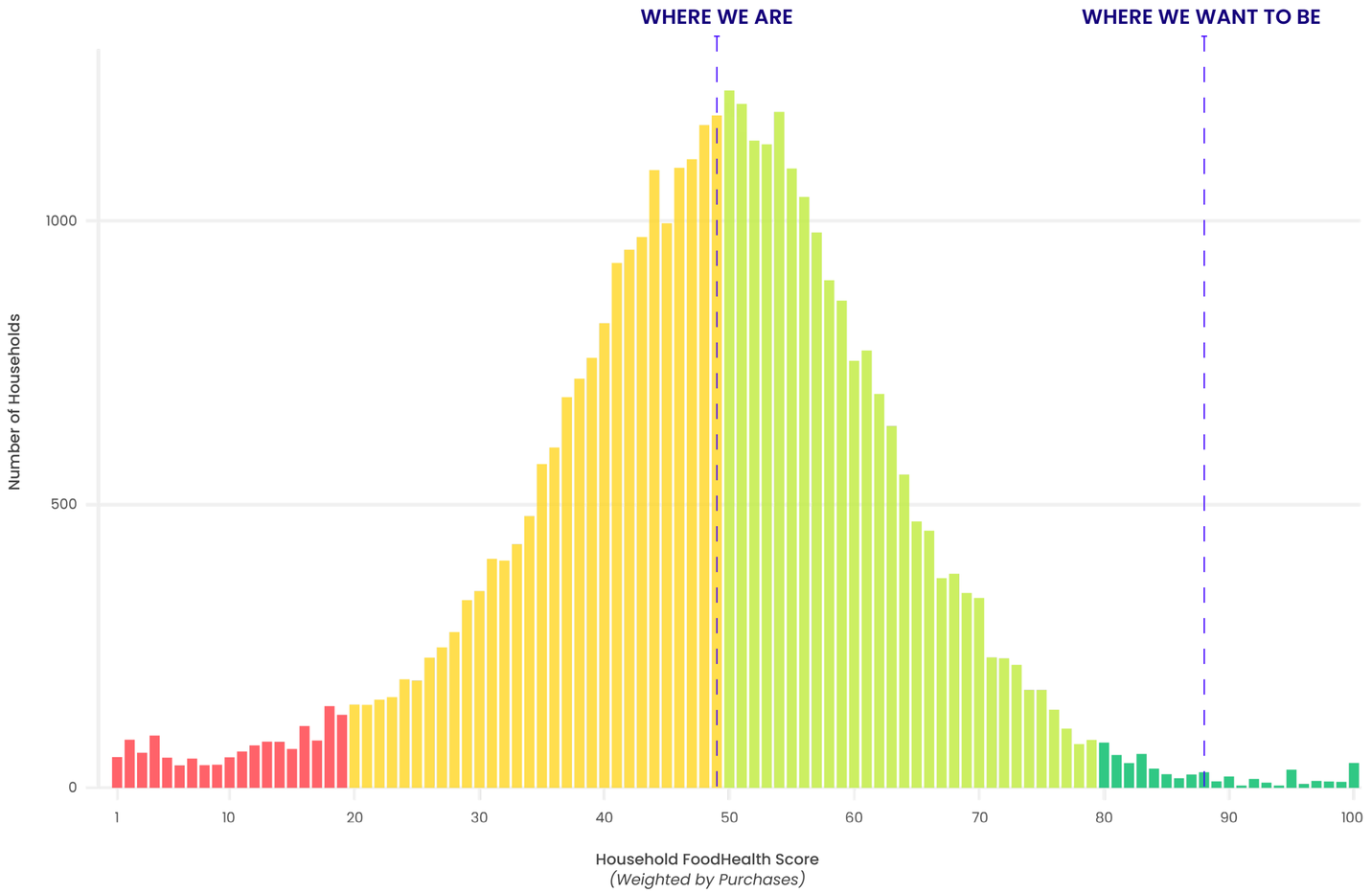
That's exactly what someone observing our country for the first time would statistically expect.

But in that normal distribution lies the problem. 45 - 55 is the Standard American Diet zone (165). Eating the Standard American Diet is, unfortunately, not healthy. In middle range lie the salted and sweetened foods that have given rise to the prevalence of diabetes, heart disease, and obesity in our country. We need to shift the curve right.

If the median shifts right by 30–40 points - from the high-40s toward the high-70s and 80s - we've realigned everyday shopping with patterns associated with lower chronic disease risk. For instance, in a large-scale study of over 90,000 nurses, women who swapped just one daily serving of red meat for nuts, legumes, or whole grains were 13–19% less likely to die from cardiovascular disease over the next two decades.

Making that shift will be a challenge, yes, but the good news is, we don't need to do it all at once. Progress comes from thousands of small upgrades inside that middle band. It's about incremental change over time, with the score being the mile marker along the way (and read more about the impact of small changes on page 26).

Distribution of U.S. Household FoodHealth Scores



Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score

Ask in FoodHealth Intel

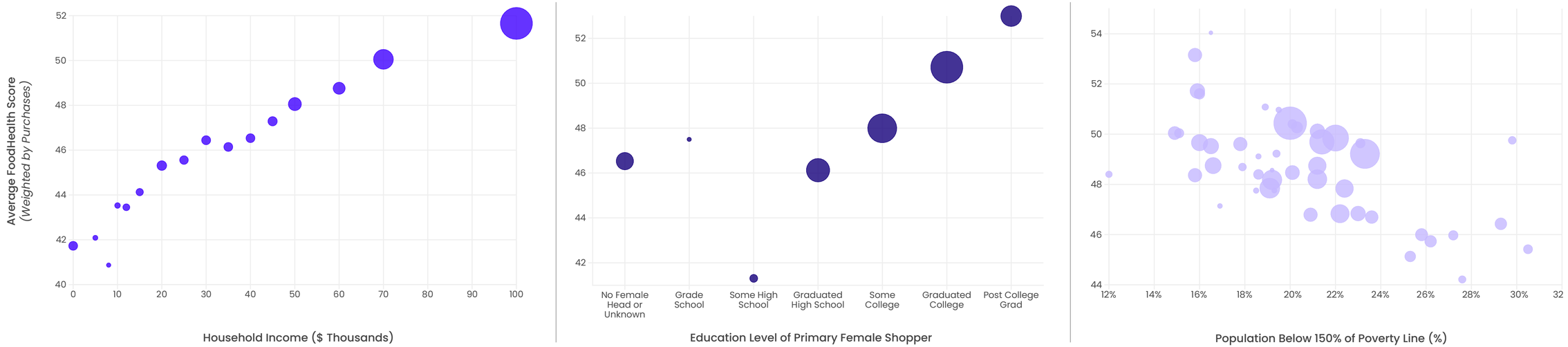
"Which 25 SKUs appear most often in carts scoring 45–55?"

Explore the dataset behind this page.

Book a demo today.

Not all households face the same barriers to healthier carts. When we examine the underlying drivers, three structural patterns emerge.

How income, education, and poverty influence FoodHealth Scores



Source: NielsenIQ Household Sample (weighted FoodHealth Scores, adjusted for household purchases); CDC Social Determinants of Health dataset (state-level poverty).

Direct Correlation: Household Income & FoodHealth Score

FoodHealth Scores rise steadily with income. The trend is near-linear: higher earning households consistently assemble higher-scoring carts.

Direct Correlation: Education & FoodHealth Score

Education of the primary shopper (in our dataset this is defined as the "female head of household") shows a parallel story. Primary shoppers with "some high school" education average a FoodHealth Score of **41.3**, compared with **53.0** for post-college graduates.

Indirect Correlation: Poverty Rates & FoodHealth Score

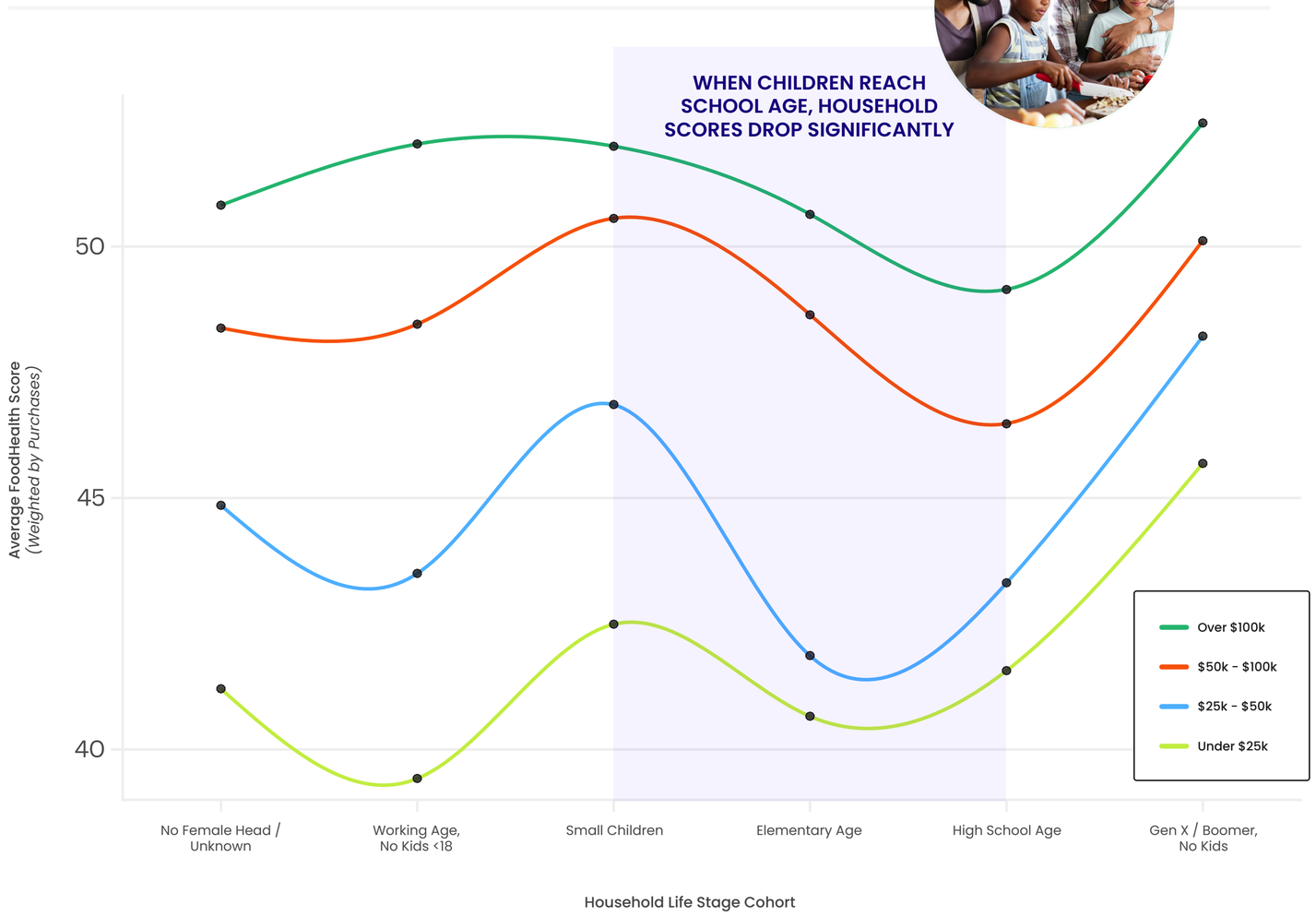
Regions with higher poverty rates post lower FoodHealth Scores. Still, there are exceptions: New Hampshire and New Mexico stand out as outliers, with higher FoodHealth Scores despite higher poverty levels in those states.

Beyond income, education, or geography, life stage introduces the sharpest non-economic break in cart health: scores fall when children enter elementary school.

Research suggests that time, convenience, and marketing pressures weigh heavily on families with kids - creating a universal nutritional trade-off [166]. The "school-aged family cart" is systematically less healthy than the life stages that precede it ("familes with young children") and follow it ("empty nesters").

In the cohort of families with school-aged children, snack foods surge: salty snacks rise 14%, candy climbs 20%, and both categories shift toward lower-scoring options. Even where spending holds steady, quality quietly erodes — not because parents change, but because the marketplace does. Juice, for instance, averages a FoodHealth Score of 56 in households with small children and drops nearly ten points once kids enter school — a reflection of the sugary, heavily marketed products that dominate this stage. Products that purport to be healthy, but their nutrition data holds the truth. Cereal tells a similar story: the share of wallet barely moves, yet average scores fall by 3 points as bright packaging and kid-focused claims crowd out higher-quality options. In short, family carts don't just change in size — they change in composition, shaped less by household choice than by commercial design.

How families' FoodHealth Scores change by life stage



Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score

Ask in FoodHealth Intel

"Which high FoodHealth Score kids' products are gaining share among families with young children?"

Explore the dataset behind this page.

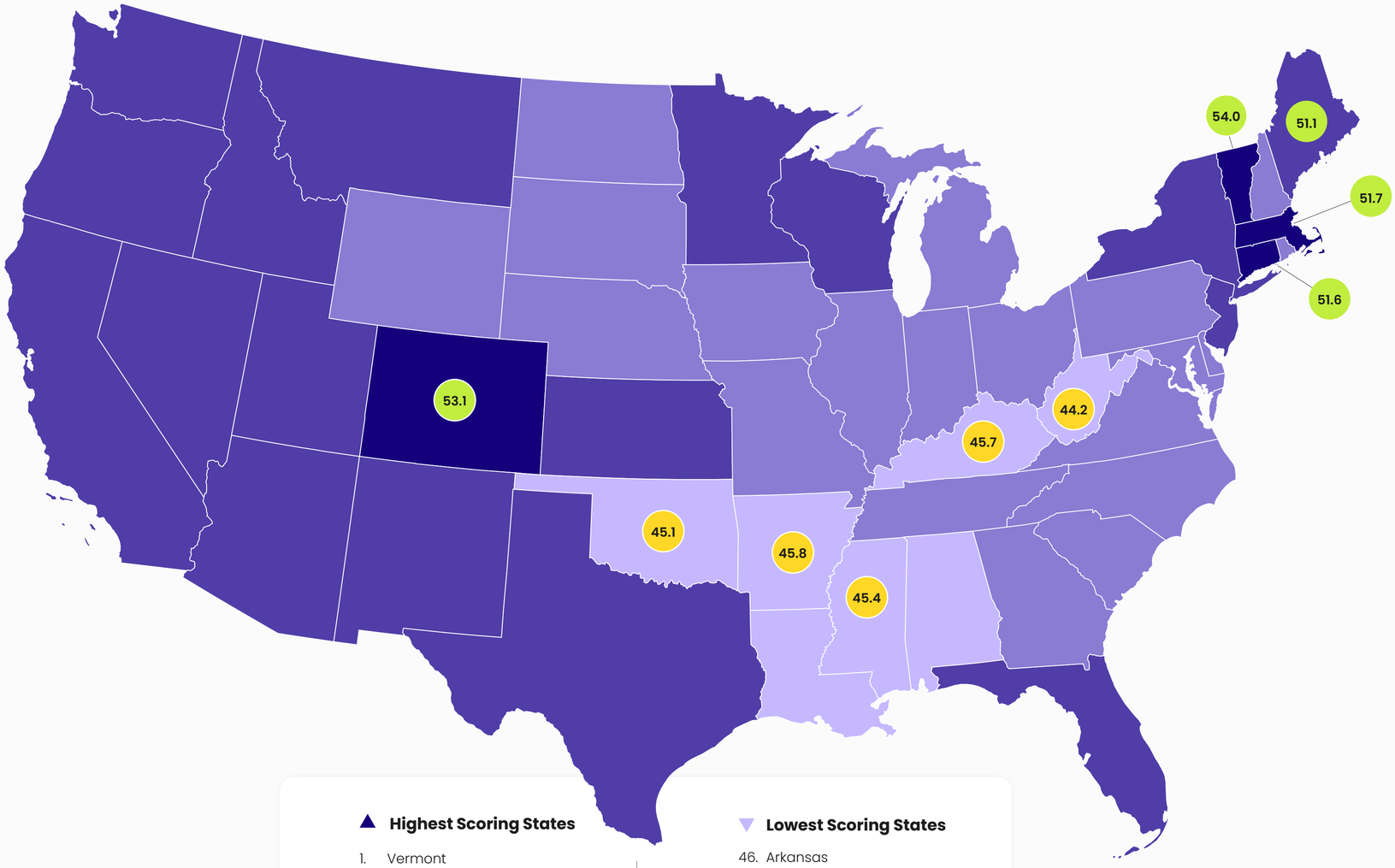
Book a demo today.

When we map FoodHealth Scores across the country, a clear regional story comes into view.

Shoppers in the the **South** and **Southeast** regions consistently purchase the least healthy baskets, dominated by yellow- and red-category foods. The **Midwest** follows closely, with carts that reflect similar dietary patterns and fewer green items overall.

By contrast, the **West and Northeast** lead the nation. These regions buy more nutrient-dense foods, showing a stronger tilt toward light and dark green choices. And within that, Vermont and Colorado stand out as top performers, earning the highest FoodHealth Scores in the country.

This variation underscores how place shapes the food environment. The choices available, promoted, and normalized at the regional level, not surprisingly, influence what ends up in household carts.



▲ Highest Scoring States

1. Vermont
2. Colorado
3. Massachusetts
4. Connecticut
5. Maine

▼ Lowest Scoring States

46. Arkansas
47. Kentucky
48. Mississippi
49. Oklahoma
50. West Virginia

Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score

Ask in FoodHealth Intel

"Show me the 10th, 50th & 90th percentile Household FoodHealth Scores of each state."

Explore the dataset behind this page.

Book a demo today.

02

What’s in a Cart?

When we translate national averages into the tangible contents of a shopping cart, the story becomes personal. This section breaks down what Americans are actually buying - by color tier, category, and score - showing the difference between the average cart and the “green cart” that aligns with long-term health. It’s a side-by-side look at the choices driving our national FoodHealth Score: the items that boost it, the ones that drag it down, and the small shifts that could add up to real change. Two carts, same cost, radically different outcomes.

America's average cart mirrors the Standard American Diet. The "green cart" shows how we could successfully change.

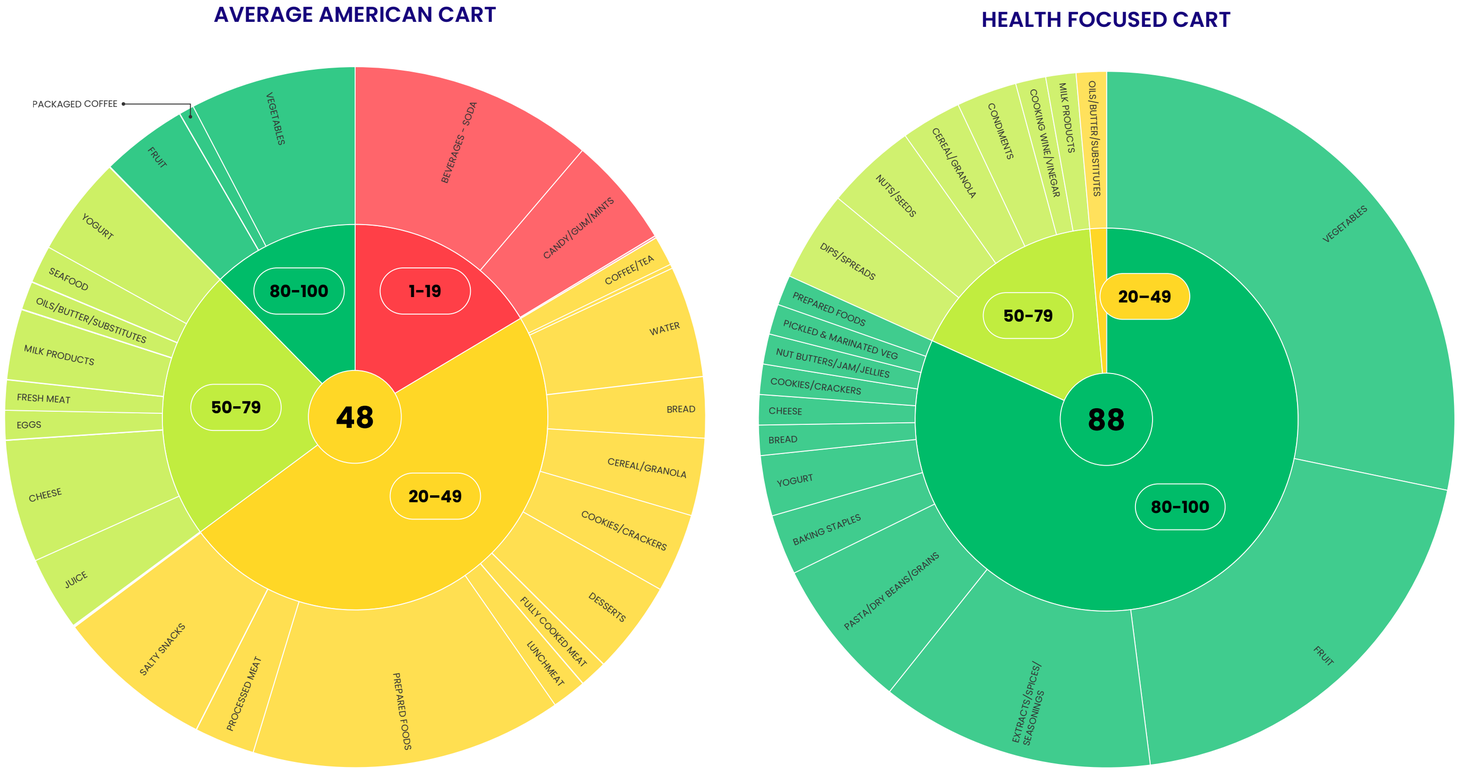
When we break down the average U.S. shopping cart by FoodHealth Score quartile, the picture is familiar: most dollars flow into the yellow and light-green zones, where convenience foods, snacks, and sweetened beverages dominate.

By contrast, the "green cart" - modeled on Mediterranean diet principles - looks entirely different. It channels spending toward fresh produce, whole grains, beans, seafood, and unsweetened beverages. The proportion of dark-green items rises sharply, lifting the household FoodHealth Score by roughly +40 points.

The two carts, both built to feed a 2-person household for a week, cost nearly the same; what differs is what fills them. The "green cart" swaps ready-made entrées and sodas for ingredients that build meals from whole foods. It's not about buying more - it's about buying better. And that's where consumer education matters. One 2023 literature review showed that knowledge, self-efficacy and confidence in food preparation were all factors that help fuel a healthier diet [167].

FoodHealth Score and food category cart breakdown

Sized by number of units purchased (total household volume). Color represents FoodHealth Score quartile.



Source: NielsenIQ Household Sample, FoodHealth Co Health-focused Cart, FoodHealth Co FoodHealth Score

When we zoom out from individual household carts to the nation's total food purchases, the micro story becomes the macro story.

The weighted average FoodHealth Score for all foods sold in the past 12 months is 47.6, confirming that the health quality of America's food supply mirrors that of its grocery carts.

More than 60% of all dollars spent go toward foods in the red (consume rarely) or yellow (consume occasionally) zones. In other words, over half of what we buy every year falls into categories that are meant to be eaten only on occasion.

A handful of familiar categories drive this imbalance. Soda, candy, and salty snacks together account for roughly 14% of national sales - a staggering share of low-scoring calories. But they're not alone. Prepared foods, processed meats, juice, and even breakfast staples like cereal and granola also contribute heavily to the nation's non-green spend.

Where America's grocery dollars go

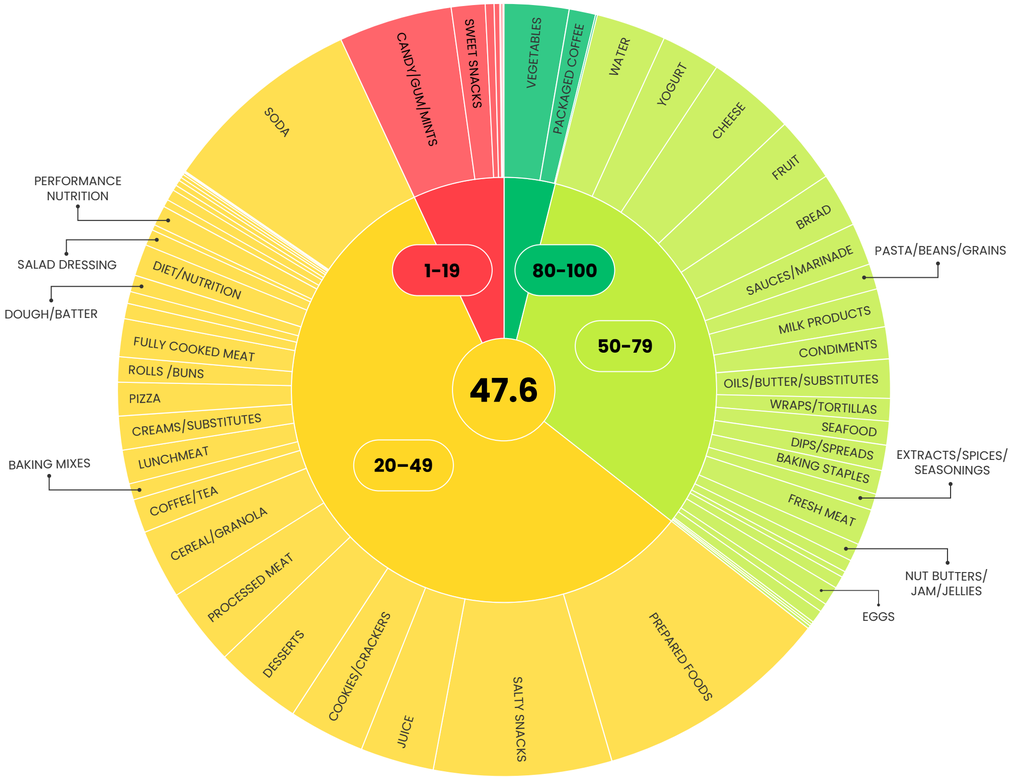
Sized by total dollars spent (past 12 months). Color represents FoodHealth Score quartile.

47.6

AVERAGE FOODHEALTH SCORE OVER THE LAST 12 MONTHS

60%
of foods

IN YELLOW AND RED ZONES



Source: FoodHealth Co FoodHealth Score, NielsenIQ Point-of-Sale data

Ask in FoodHealth Intel

"In which low-scoring (yellow/red) categories are new product entrants scoring meaningfully higher than the category average - and are those better products gaining share?"

Explore the dataset behind this page.

Book a demo today.

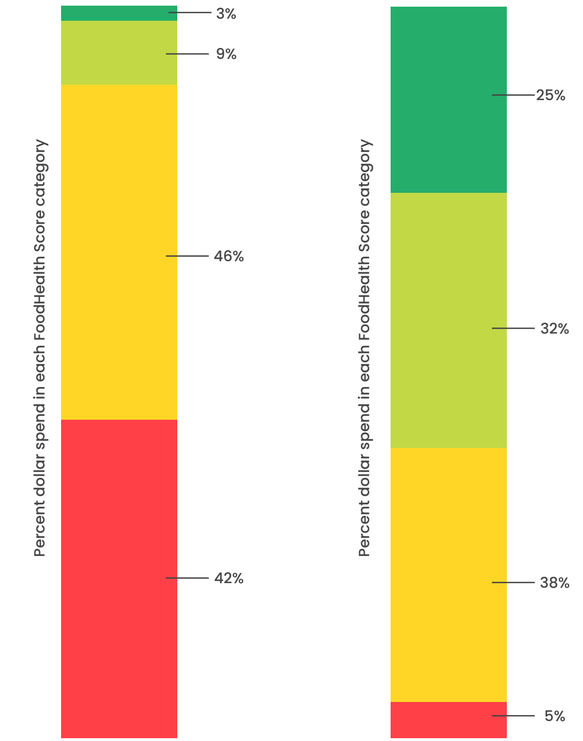
What separates America's healthiest and unhealthiest grocery carts?

At a 30,000-foot view, America's healthiest and unhealthiest grocery carts look quite similar. They tend to have the same number of items. They have a similar blend of food and beverages. They have the same percentage breakdown of proteins, grains, dairy, and vegetables. But the minute you dig into the product level, stark differences in healthfulness emerge.

The bottom 10% of carts average a **FoodHealth Score of 21** — right on the cusp of the red category.

The top 10% average **72 FoodHealth Score** — solidly light green, trending toward long-term health.

U.S. least and most healthful carts



BOTTOM 10% OF CARTS
Average FoodHealth Score = 21
On the verge of the red zone

TOP 10% OF CARTS
Average FoodHealth Score = 72
Trending toward long-term health

Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score

KEY INSIGHTS

Divergence Begins in the Beverage Aisle
- The single largest gap between top and bottom carts is in beverages.
- On average, beverages alone account for nearly **one-third of the total score gap** between the top and bottom declines.

Protein Quality, Not Quantity, Drives the Divide
- Both groups buy similar volumes of protein, but *what* they buy differs sharply.
- The difference in the "protein category" FoodHealth Score is more than **+25 points**, making it one of the biggest contributors to the health delta.

Snacking Defines the Bottom Cart
- Salty snacks, candy, and desserts make up **~15–20% of total** spend in the lowest decile but **under 5%** in the top.

Vegetables and Fruit: The Great Gap
- Produce accounts for **4× more share** in the healthiest carts than in the lowest ones.

Prepared Foods Tell a Story of Time and Trade-offs
- Low-score carts rely on **frozen entrées, pizza, and pre-made sides**; high-score carts still buy convenience items, but they're meal components—**frozen vegetables, soups, pre-cooked grains**, etc.
- This pattern reinforces that the healthiest households aren't cooking *everything* from scratch — they're just selecting better building blocks.

From Grains: A Tale of Two Loaves—Show this in the cart:
- The average FHS for grain-based items jumps from the 20s to the 60s between the two groups— driven by a shift from white bread, refined pasta, and sweetened cereal to whole grains, oats, and unsweetened granolas.

SNAP Works Better Than We Think

It's often assumed that families receiving SNAP benefits make less healthy choices. Our data shows the opposite.

Across the country, **SNAP and non-SNAP households have nearly identical FoodHealth Scores** (SNAP: **49.9** | Non-SNAP: **48.8**).

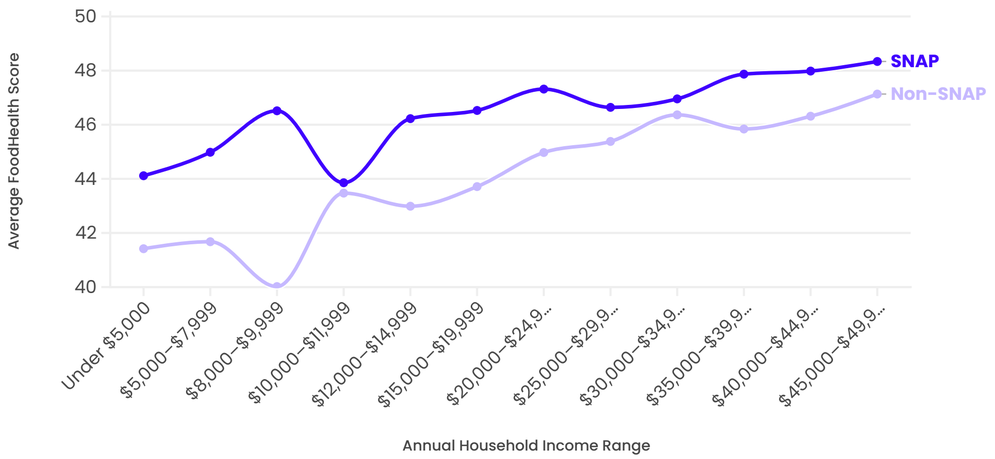
And when we normalize for income, the pattern strengthens.

Among households earning under $30K per year, SNAP participants score 3-10% higher — a sign that structured benefits and consistent access can actually improve food quality where it's needed most.

SNAP isn't just a food program. It's one of America's most effective health equity tools.

Average FoodHealth Score by Household Income (SNAP vs Non-SNAP)

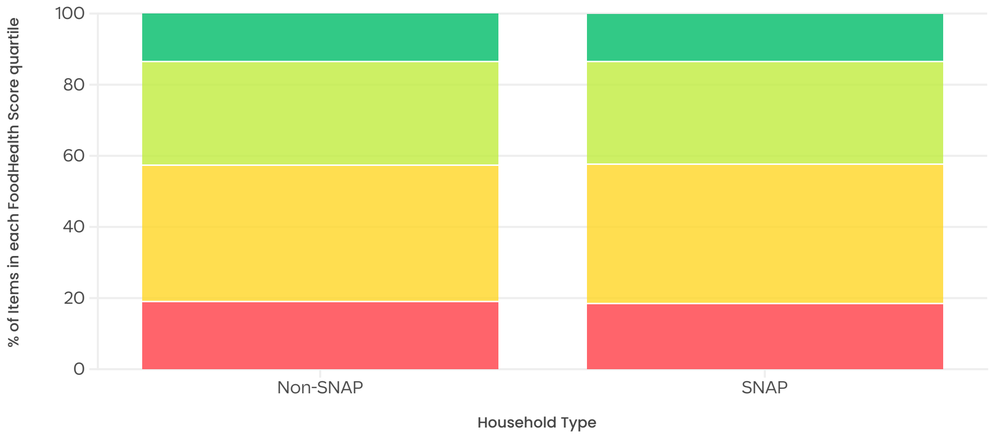
SNAP participants show a nutrition "lift" at lower income levels



Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score

Cart Composition by FoodHealth Score (SNAP vs Non-SNAP)

Distribution of items across FoodHealth Score quartiles



Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score

Ask in FoodHealth Intel

"What % of SNAP household spend goes to soda & candy? How does that differ from non-participants' household spend?"

Explore the dataset behind this page.

Book a demo today.

SNAP's health impact depends on where you live.

When we zoom in on lower-income households (<$30K Household Income), the national story splinters.

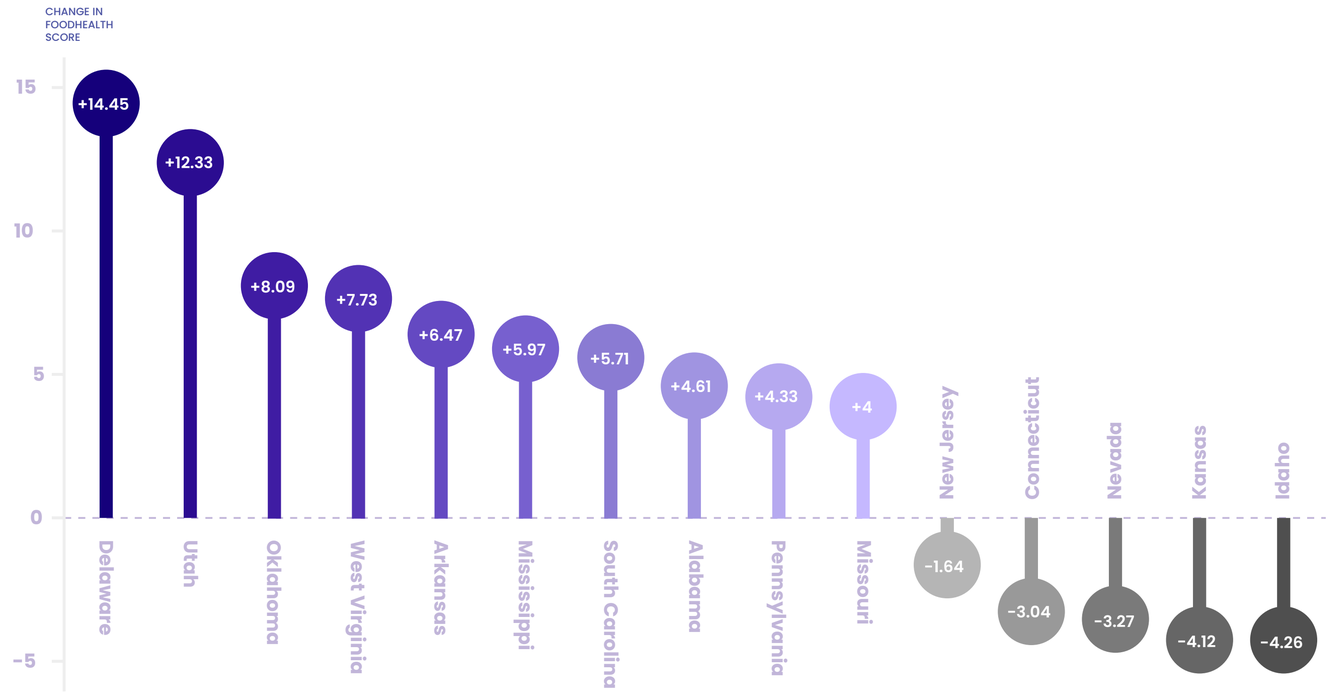
In some states — **Delaware, Utah, and Oklahoma** — SNAP participants' carts score 8–14 points higher than their non-SNAP participating peers.

In others — **Kansas, Idaho, and Connecticut** — we see the opposite trend.

These gaps likely reflect local realities: program design, food access, retailer participation, and state-level policy.

The takeaway? SNAP's impact isn't fixed - it's engineered. States proving it works should set the playbook for the rest.

SNAP households' Foodhealth Scores compared to non-SNAP, by state



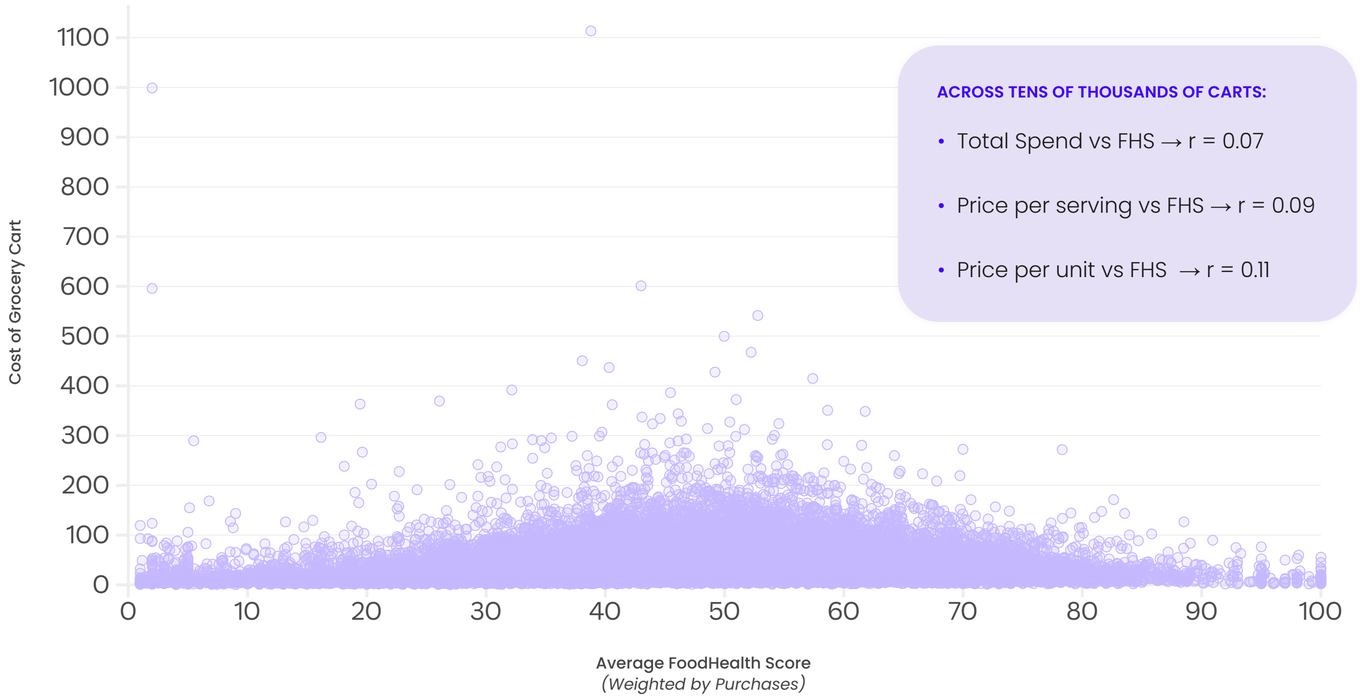
Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score

The loudest argument against the feasibility of healthy eating — especially in food assistance debates — is price.

"Healthy costs more." Price is cited as the #1 barrier to healthy eating [169] time and time again.

But when we ran the numbers, we found almost no relationship between what households spend and how healthy their carts are.

FoodHealth Score of grocery cart relative to spend



Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score

Statistically negligible.

You can build a healthy cart at almost any price point… but not at any retail location.

While the cost of healthier food items in ~30% of categories is the same or lower than unhealthy items, the healthier items are just harder to find. Healthy food is (on average) 20% less available than unhealthy food.

And when we look at staple categories? Those numbers can be much worse (Healthy Fresh, Frozen & Canned Low Sodium Fruits & Vegetables, for example, are ~35% less available than their less healthy counterparts).

04

Does Health Sell?

The business of better-for-you is no longer niche. It’s measurable - and it’s evolving rapidly.

Across most categories, sales of the top-scoring (aka healthiest) items are growing faster than those on the shelf around them — sometimes exponentially faster — yet they still represent a sliver of total sales. Consumers are signaling where they want the food system to go; innovation just hasn’t caught up.

The FoodHealth Company x NielsenIQ sales measurement dataset gives us a front-row seat to that shift. It doesn’t just show what’s selling — it shows why it’s selling, and where the next billion-dollar opportunities are hiding.

Health isn’t a niche anymore. It’s the direction the market is already headed, and the brands that follow it early will lead the next era of growth.

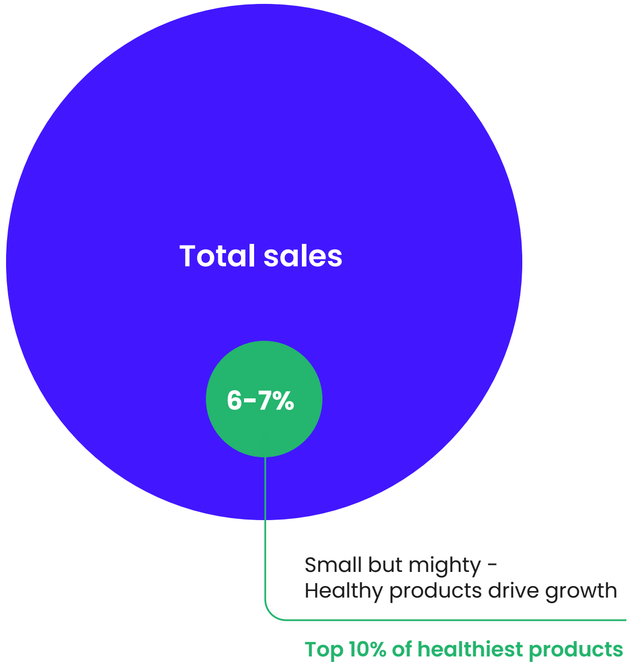
Health Is Winning at the Shelf.

In **6/10 categories** — from soda to sour cream — **the healthiest 10% of products** (by FoodHealth Score) are gaining share faster than the rest of the shelf.

Yet the products driving that growth are a tiny fraction of what's on shelf: just 6–7% of items, growing 14% faster than their categories (on average).

Healthier products may still be the minority on shelves, but they're the majority of the momentum. This trend cuts across every aisle and signals where both consumers and capital are flowing next.

Healthy products drive growth in stagnant categories



Categories Where Health Drives Growth

Top 10% FHS items ≥5% market share and outpacing the category

EXAMPLES:

- **Fruit Snacks:** 5% share, ~100% YoY growth
- **Soda:** 5% share, +33% YoY growth
- **Yogurt:** 21% share, +24% YoY growth

Velocity = YoY dollar growth.

Source: FoodHealth Co FoodHealth Score, NielsenIQ Point-of-Sale data

Ask in FoodHealth Intel

"Surface categories where the healthiest SKUs are growing >2× the category."

Explore the dataset behind this page.

Book a demo today.

Fruit Snacks is a $1.7B aisle built around the idea of “fruit.” In reality, it’s one of the least healthy corners of the store – an average FoodHealth Score of 17.6, deep in the red.

But inside that aisle, a revolution is happening.

The healthiest items (just 2.5% of the market) are growing nearly 70% year-over-year.

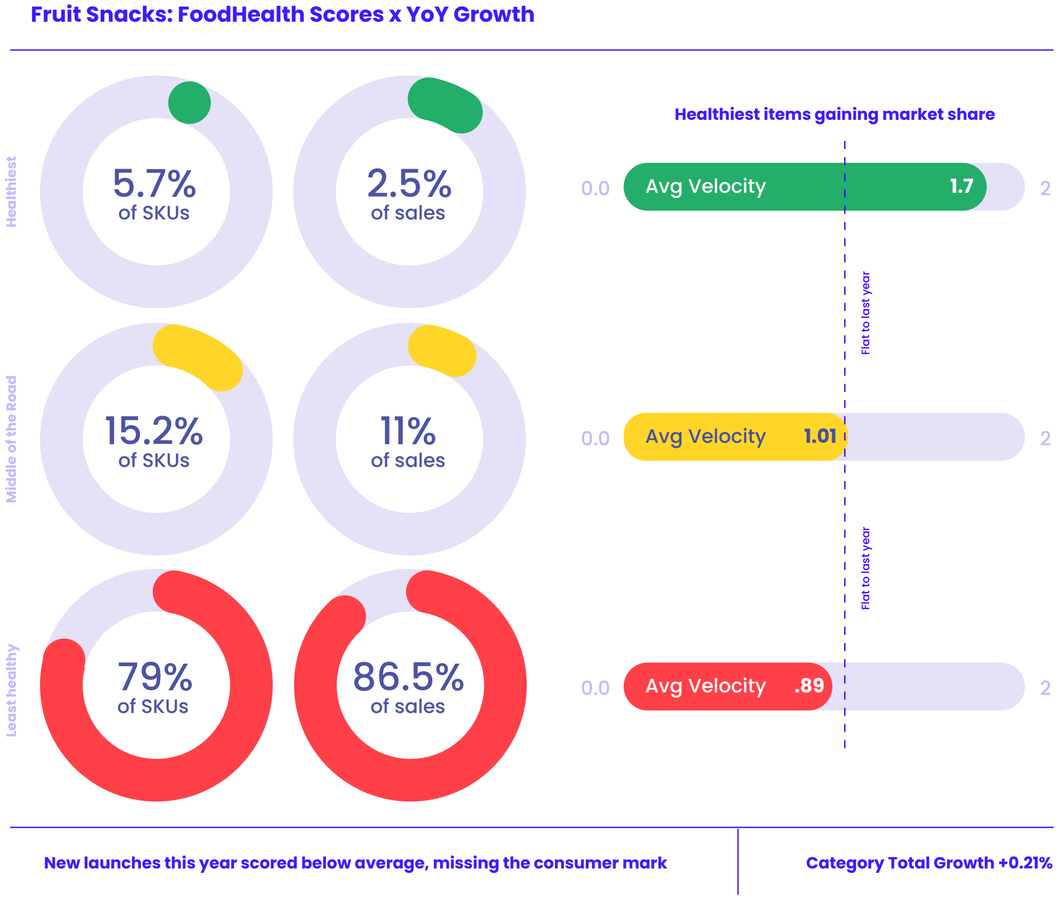
The rest of the category? **Flat.**

The demand signal is loud. The supply response is lagging.

Last year’s new product launches actually scored below the category average (14.4 vs. 17.6), proving that many brands are still launching candy in disguise while the few that reformulated with real fruit and less sugar are quietly taking share.

Fruit Snacks isn’t an anomaly. **It’s a blueprint.** The same pattern is emerging across dozens of categories.

The question is: where else is it happening first?



Source: FoodHealth Co FoodHealth Score, NielsenIQ Point-of-Sale data

Ask in FoodHealth Intel

“Where are healthy new entrants winning in unhealthy categories?”

Explore the dataset behind this page.

Book a demo today.

We tracked every new product launch to see if innovation is actually making the food supply healthier.

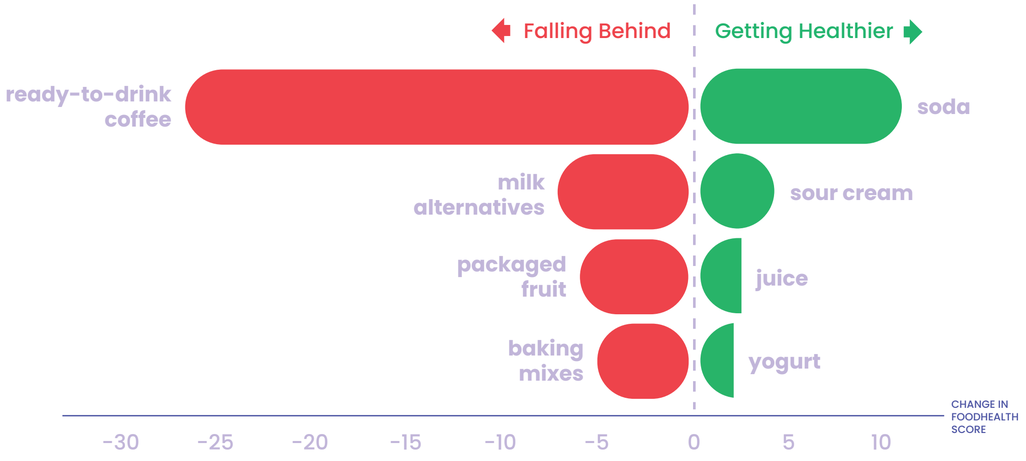
Some categories are getting it right.
Others are moving backwards.

This isn't just a nutritional problem - it's a business one.

In Milk Alternatives, for example, sales of the healthiest products are growing +14% year-over-year, while the category as a whole is down nearly -4%. Brands chasing flavor or price over nutrition are missing the signal the market is already sending.

This data underscores a broader truth: the next decade of growth won't come from inventing new categories. It'll come from improving the ones we already have.

FoodHealth Scores of new product launches (relative to category average)



Source: FoodHealth Co FoodHealth Score, NielsenIQ Point-of-Sale data

Ask in FoodHealth Intel

"What is the FoodHealth Score trend for new product launches in my category?"

Explore the dataset behind this page.

Book a demo today.

05

Shopping Our Way to Better Health

What fills our carts eventually shows up in our medical charts. This final section connects the dots between household FoodHealth Scores and population outcomes, from obesity and diabetes rates to projected improvements if every home made just three weekly swaps.

It also lays out a framework for national action - how policy, business, and personal behavior can work together to move America’s score from 48 toward 88. The goal is to show the path forward. Because when the business of food aligns with the business of health, everyone wins.

When we map state-level FoodHealth Scores with population health data, a consistent pattern emerges: States that buy healthier food have healthier people.

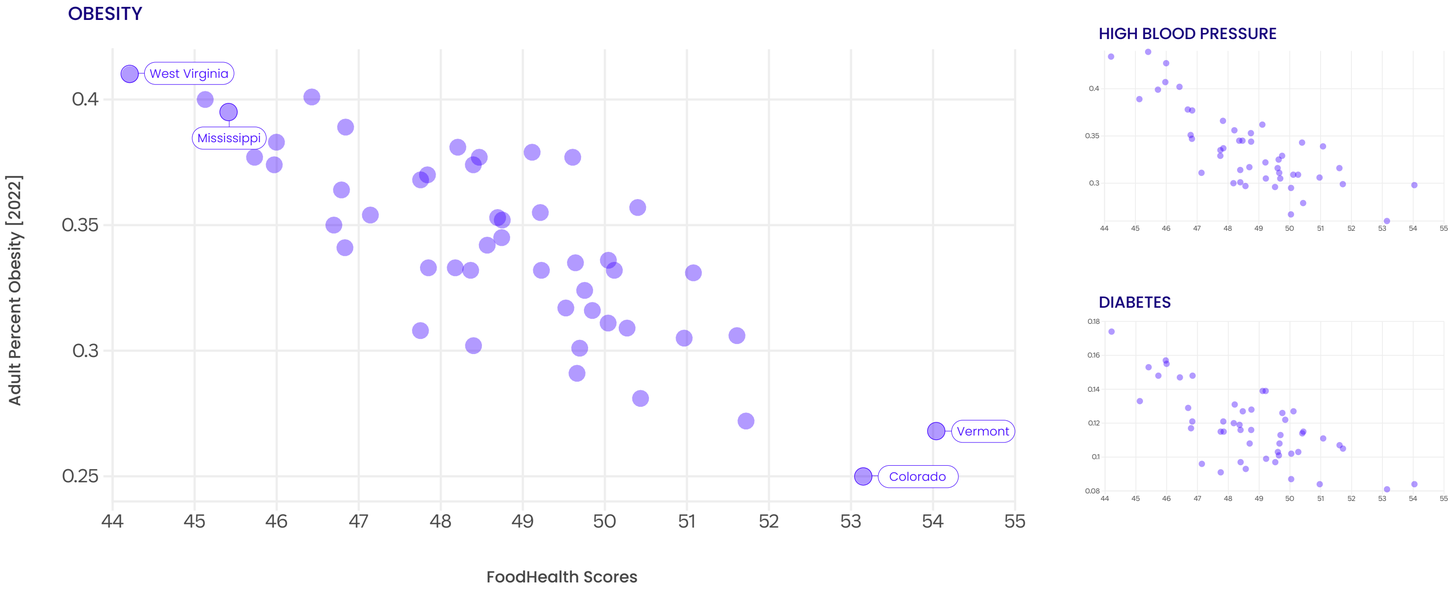
But before we go further, two important caveats. First, this is correlation, not causation — these data don't prove that healthier carts cause better health. Second, they're not perfectly aligned in time: FoodHealth Score data reflects 2025, while state health data from the CDC reflects 2022. What the FoodHealth Score offers is an early public-health signal: The foods in our carts today shape the health outcomes we might see years from now.

The relationship is striking. Across all 50 states, higher FoodHealth Scores are strongly associated with lower rates of obesity, hypertension, and diabetes - three of the nation's most pressing chronic diseases [178].

The correlation coefficient (r) quantifies the strength and direction of these relationships on a scale from –1 to +1, where –1 indicates a perfect inverse relationship and 0 indicates no relationship. In this analysis, all correlations are negative, meaning that as a state's FoodHealth Score rises, rates of chronic disease fall. The relationships are also strong in magnitude - particularly for obesity (r = –0.80), high blood pressure (–0.79), and diabetes (–0.72). We see moderate, but still meaningful, associations for heart disease mortality (–0.63) and prevalence of two or more chronic conditions (–0.60).

State FoodHealth Scores vs Chronic Disease Rates

Correlation, not causation. FHS 2025 (leading) vs CDC 2022 (lagging)



Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score, CDC

Correlation between FoodHealth Score and Chronic Disease is very high.

CORRELATION COEFFICENTS ARE:

- Obesity (adults): r = –0.80
- High blood pressure: r = –0.79
- Diabetes: r = –0.72
- Heart disease mortality: r = –0.63
- ≥2 chronic conditions: r = –0.60

At the top of the ranking, Vermont, Colorado, and Massachusetts combine strong FoodHealth Scores (50+) with better population health metrics. At the bottom, West Virginia, Oklahoma, and Mississippi fall in both food quality and population health.

What we're seeing isn't a coincidence - it's a reflection. The foods that fill our carts eventually fill our medical charts.

To test whether this pattern holds beyond geography, we ran the same comparison at the individual level using national health data.

In an independent analysis of **NHANES (2005–2018, n ≈ 26,900 adults)**, every 10-point rise in a person's aggregated FoodHealth Score was linked to measurable improvements across key health metrics [163].

All movements are in clinically favorable directions. Taken together, these data show that the FoodHealth Score is not just intuitive - it's predictive. Higher-scoring carts consistently align with better biometric outcomes.

As before, these findings are **observational, not causal**. But they point to a powerful and intuitive truth: when people buy & eat better, they tend to live better.

Health Metric	Change per +10 FHS	Direction
Total Cholesterol / HDL Ratio	−0.05	**Better**
HDL Cholesterol	+1.03 mg/dL	**Better**
Systolic BP	−0.55 mmHg	**Better**
Diastolic BP	−0.48 mmHg	**Better**
HbA1c	−0.01%	**Better**
BMI	−0.76 kg/m²	**Better**

MOVING IN CLINICALLY FAVORABLE DIRECTIONS

Source: CDC NHANES, FoodHealth Co FoodHealth Score

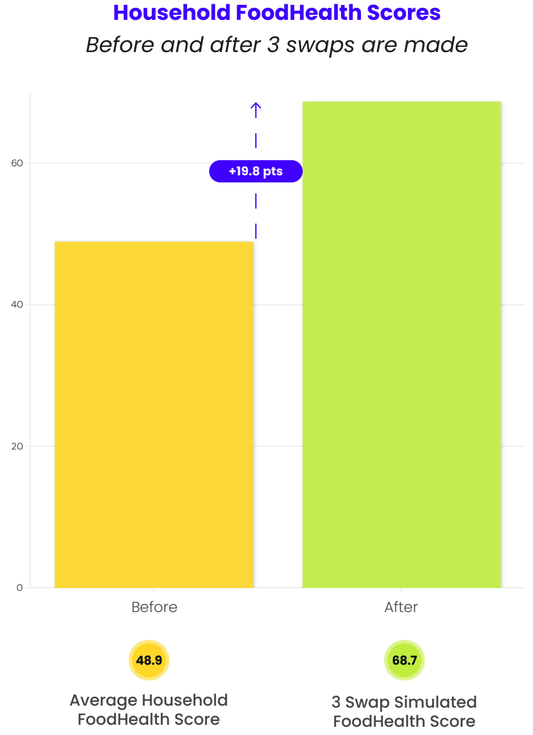
What if improving the nation's FoodHealth Score didn't require a full overhaul - just a single weekly change?

To test that, we modeled a simple intervention: For each household, replace three low-FHS, high-frequency items (i.e. soda) with a same-aisle, higher-FHS peer. Think of it as trading a soda for a sparkling water, a sugary cereal for whole oats, or white bread for whole grain.

The results were striking. Three simple swaps per trip raised the average household FoodHealth Score by +19.8 points, demonstrating the power that high frequency items can have on your cart. And, in line with our data on cost, these swaps had a negligible effect on the total cost of a weekly shop (less than a 0.7% increase). Scaled nationally, that shift would raise America's FoodHealth Score from 48.9 to 68.7 — closing ~50% of the gap toward the "healthy household" benchmark of 88.

These results suggest that meaningful change doesn't require a total diet revolution — just better defaults. If every household makes three small swaps, the collective impact could be enormous.

*Simulated using 2025 NielsenIQ household dataset; one-for-one swap by category, matched for serving size and brand availability.



Source: NielsenIQ Household Sample, FoodHealth Co FoodHealth Score

Ask in FoodHealth Intel

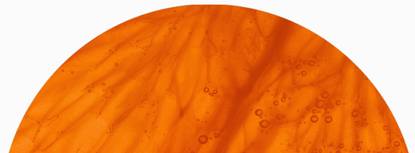
"Rank the top five categories where a simple swap delivers the largest health return."

Explore the dataset behind this page.

Book a demo today.

Improving the nation's FoodHealth Score isn't about blame - it's about alignment.

We can raise America's score only if everyone plays a part: policymakers, retailers, manufacturers, and the people who fill their carts each week.



Our Recommended National Actions

1. **Track the National FoodHealth Score Year Over Year**
   We measure what matters. We'd like to offer the FoodHealth Score as a national metric — tracked alongside economic and health indicators — to gauge progress toward a healthier food system.

2. **Make Nutrition Scores Visible Where People Shop**
   Transparency drives behavior. Whether it's the FoodHealth Score or another validated system, people need to see how healthy their choices are — on shelf, online, and in their carts — so they can make simple, informed swaps.

3. **Incentivize Healthier Purchases**
   Behavior follows incentives. Grocers can reward healthier shopping through loyalty programs. Government can continue to align federal food programs toward healthier options and require digital nutrition tools wherever those programs are accepted. Health plans can integrate food metrics and continuous shopping support into food-as-medicine programs.

4. **Encourage Food Brands to Make Better Food**
   The supply must evolve with the demand. We recommend subsidies or tax incentives for food reformulation — rewarding manufacturers that improve the FoodHealth Score of their portfolios. Reformulating for nutrition should be as financially attractive as reformulating for shelf life.

We’re not just tracking the health of America’s food system — we’re helping to change it.

Consumers are already trying to shop their way to better health. It’s the system that hasn’t caught up. Across most categories, the top-scoring items are growing faster than the shelf around them — sometimes much faster — yet they still make up only a small fraction of total sales.

At the FoodHealth Company, our job isn’t just to measure the health of America’s food supply - it’s to help improve it. And, accountability is part of who we are. That’s why we’re committing to two actions designed to accelerate the shift we see in this data:

1. Annual Reporting & Data For Food Industry
Together with NielsenIQ, we’ll publish The Health of America’s Grocery Carts every year, tracking national progress and giving brands, retailers, and researchers the same visibility we shared today. The detailed dataset is available to purchase for partners who want to dig deeper - to identify the next growth category, the next reformulation opportunity, the next signal of change.

2. We’ll Support People Making Healthier Choices
This year, we’ll release a free tool that lets every shopper see the FoodHealth Scores in their own carts - and make smarter, more affordable swaps in real time. Because the same intelligence that drives better shelves can drive better choices at home.

Public good and private enterprise aren’t opposites; they’re partners in scale. The innovations that transformed our world — from lightbulbs to flight to the internet — began as business pursuits that served the public good. The same can be true for food.

Ask in FoodHealth Intel

Explore the dataset behind this page.
Book a demo today.

Know Your FoodHealth Score

Download, shop, swap.
Join the waitlist today.

The business of food can become an engine for health. Our commitment is to build that bridge between commerce and wellbeing, **to make healthier choices easier for everyone.**

05

Methodology & Acknowledgements

Each chart in this report is powered by a data pipeline connecting the items in Americans' shopping carts to what those choices reveal about their health. The NielsenIQ point-of-sale and household receipt data, the FoodHealth Score algorithm, and billions of transactions are combined into a single, nationally representative measure of grocery health. You'll also find the validation work that ensures the score aligns with real-world health outcomes, and acknowledgements for all of the research we've cited.

About FoodHealth Co.

FoodHealth Co. is a nutrition intelligence company redefining how we understand food and its impact on the body. Through its clinical research-backed FoodHealth Score, the company provides data tools that help consumers make better choices, retailers curate smarter shelves, and brands formulate products with health in mind. With real-world integrations into major grocery chains, FoodHealth Co. believes that the future of health is food. Formerly known as bitewell, the company is headquartered in San Francisco.

For more information, please visit foodhealth.co

About NielsenIQ

NielsenIQ (NIQ) is a leading consumer intelligence company, delivering the most complete understanding of consumer buying behavior and revealing new pathways to growth. NIQ combined with GfK in 2023, bringing together two industry leaders with unparalleled global reach. Our global reach spans over 90 countries covering approximately 85% of the world's population and more than $7.2 trillion in global consumer spend. With a holistic retail read and the most comprehensive consumer insights—delivered with advanced analytics through state-of-the-art platforms—NIQ delivers the Full View™.

For more information, please visit www.niq.com

Summary

This report collects and analyzes a sample of grocery carts and sales data, provided by NielsenIQ, to understand the health quality of food items (individually) and purchase patterns (at a household level) across the US.

Data Set

We combined multiple datasets to create a unified analytical view at both the **national UPC** and **state-demographic** levels:

- NielsenIQ Point-of-Sale (POS) data provided retail sales information, including dollars, units, and net weight, at the UPC level covering 210 billion transactions over the 12 month period from August 9th 2024 to August 9th 2025.
- NielsenIQ Household Sample data captured household-level purchasing behavior for 70,000 US households during a 4-week period from July 27th 2025 to August 23rd 2025, enabling demographic weighting and representativeness across U.S. households.
- FoodHealth Score (FHS) data provided nutritional quality metrics for each UPC.
- Centers for Disease Control and Prevention (CDC) data contributed state-level public health indicators (e.g. obesity, diabetes prevalence).
- U.S. Census Bureau data supplied demographic distributions by state (e.g. income, SNAP participation, household composition).
- CDC NHANES survey data linking 2 days of individual consumption data to health metrics, including cholesterol, HbA1c and others.

Two weighting strategies were applied depending on data source:

- NielsenIQ Sales Data: Measures were weighted to reflect national household representation, using Census-aligned sampling weights derived from NIQ's panel..
- NielsenIQ Receipt Data: Measures were unweighted, as they represent a full-census view of retail sales rather than a sample.

Analysis Method

The FoodHealth Company ran all UPC barcodes from the NIQ datasets through its FoodHealth Score algorithm. Only foods that have a complete nutrition facts panel, ingredient list & item weight were scored.

Once individual food items were scored and analyzed, the FoodHealth Company's Aggregate Score Methodology was applied in order to map purchasing patterns of individual households and analyze the population at large.

The FoodHealth Company's Aggregate Score Methodology evaluates the nutritional quality of a shopping cart in its entirety by combining the FoodHealth Score of each item with the adjusted weight of the items purchased. This methodology reduces bias of heavy weight outliers, ensures meaningful contributions from all items, uses widely available data and aligns Household FoodHealth Scores with consumption patterns. According to Appelhans et al. (2017), "Objectively documented household food purchases yield an unbiased and reasonably accurate estimate of overall diet quality as measured through 24-h diet recalls" [2-6].

This analysis allowed for comparisons across:

- UPC-level distributions: Nutritional quality and sales volume across individual products and brands.
- State-level profiles: Relationship between average FHS and CDC-reported health outcomes.
- Demographic segments: Variation in FHS across income, SNAP participation, and household composition strata.

The upshot: This study illustrates the health of America's food supply at two levels: the **population as a whole** and the **individual household**.

Limitations

While the analysis provides a comprehensive linkage between retail purchases, nutritional quality, and public health indicators, several limitations should be noted when interpreting the results.

Data Coverage, Constraints & Completeness

Not all UPCs in the NielsenIQ datasets could be matched to a corresponding FHS record or associated with complete net weight and serving information. This introduces partial coverage across categories, particularly for niche or limited-distribution products.

Both POS and Sample datasets are restricted to the **lower 48 U.S. states**, excluding Alaska and Hawaii from the analysis. We further removed households from the weighted sample analyses with complete item coverage under 80% to ensure participating households had adequate data coverage.

NIQ Sample Data Constraints, Bias and Representativeness

The NielsenIQ Household Sample panel is known to **overrepresent lower-income and older households**, which may skew weighted measures even after calibration to Census-based targets. Household purchases are self-reported via receipt submission.

The Sample data reflect a **28-day period**, providing a snapshot rather than a full-year view of purchasing behavior. As a result, the analysis may not capture seasonal or episodic consumption patterns.

Sampling weights were calibrated at the **household ID (HHID)** level. While this improves alignment with demographic targets, it may not fully adjust for differences in trip frequency or within-household heterogeneity in purchase behavior.

NIQ Point-of-Sale (POS) Data Constraints, Bias and Representativeness

The NielsenIQ POS data reflects in-store purchases only. Similar to the Sample dataset, POS data are limited to the lower 48 states. POS data are aggregated at the store or product level and do not include demographic or household characteristics.

The FoodHealth Score is a 1–100 scoring system that enables consumers, retailers, manufacturers, and policymakers to compare the 'healthiness' of individual foods across the spectrum. Each product–from a box of cereal to a head of lettuce–receives a score, based on its nutrient density and ingredient quality. The score reflects how closely household food choices align with dietary patterns proven to lower chronic disease risk [7-35]. A score of 50 marks the midpoint – foods above it trend healthier; below it less so.

Each product receives both a numeric score (1–100) and a category color (red, yellow, light green, dark green) for ease of interpretation across consumer, retail and policy settings. The methodology draws from the Mediterranean diet (the most clinically validated for disease prevention) [7-35] and the 2020-2025 Dietary Guidelines for Americans, combining a per-calorie nutrient comparison with an ingredient quality assessment.

85% of surveyed shoppers said the Score improved their decisions.

Evidence Base

The Score rests on a comprehensive review of nutrition science, including:

- Epidemiological and interventional research on diet-related chronic disease prevention and management [7-35]
- Dietary patterns consistently linked to long-term health (i.e. Mediterranean, whole foods, plant forward) [7-35]
- Recommendations from organizations specializing in nutrition and disease management (i.e the Academy of Nutrition and Dietetics, AHA, Whole Grains Council, IARC,etc)
- Nutrient intake recommendations (i.e. U.S. DGA, WHO, EFSA, FAO) [36-45]
- Ingredient quality frameworks, including processing and additives [46-150]
- Existing scoring systems (i.e. Healthy Eating Index, NutriScore, NOVA, Food Compass) [151-162]

This ensures the methodology reflects consensus science and global standards.

Standardization of Nutrition Data

Foods vary widely in serving size and energy density. The FoodHealth Score standardizes nutrients per calorie to allow fair comparison. To prevent distortions, special rules apply where calorie-standardization isn't appropriate (e.g., zero-calorie foods evaluated per serving).

Calculation Framework

Nutrient Density Score (NDS)

Balances beneficial nutrients (unsaturated fats, fiber, protein, potassium) against those to limit (saturated/trans fats, sodium, added sugars, cholesterol). Impacts are scaled to intake recommendations and expressed per calorie or via nutrient ratios [36-45].

Ingredient Quality Measure (IQm)

Captures ingredient type and preparation beyond nutrient values. Foods are scored with "boosters" (whole grains, healthy oils, omega-3s, probiotics) and "detractors" (refined grains, artificial additives, deep frying). Each booster and detractor carries a weighted value based on the strength of evidence linking it to health outcomes [46-150].

Composite Scoring & Color Categories

Products receive both a numeric score and a color code:
Colors drive broad swaps (e.g., red - green); numbers guide finer decisions within a category.

- Dark Green (80–100): staple foods (ie: fruits, vegetables, whole grains)
- Light Green (50–79): consume often (ie: seafood, lean protein, yogurt)
- Yellow (20–49): consume occasionally (ie: processed meat, some snacks)
- Red (1–19): consume rarely (ie: candy, cookies)

Validation

The Score has been applied to hundreds of thousands of foods (single-ingredient foods, packaged foods and beverages, and mixed meals) and validated across dimensions:

- Face Validity: Classifies foods in line with consumer and expert expectations — vegetables, fruits and whole grains score high; sugar- or sodium-dense foods score low.
- Predictive Validity: Among a nationally representative sample of ~26,917 U.S. adults, a 10-point higher aggregate FoodHealth Score was statistically associated with better biomarkers (cholesterol, blood pressure, HbA1c, BMI, waist-to-hip ratio) [163].
- Behavioral Validity: In an online grocery survey (n=1,000), 27% swapped to a higher-scoring product even at higher cost. 85% said the score improved decisions; 80% would use it regularly [164].
- Benchmarking: Aligned with indices like Healthy Eating Index, NutriScore, and FDA "Healthy," ensuring fairness and interpretability across contexts.

CITATIONS

1. NIQ Homescan Panel. Total US; Generational cohort demographics; NIQ Product Insight powered by Label Insight; $ share index; 52 weeks ending January 27, 2024.

2. Appelhans, B.M., French, S.A., Tangney, C.C., Powell, L.M., & Wang, Y. (2017). To what extent do food purchases reflect shoppers' diet quality and nutrient intake? The International Journal of Behavioral Nutrition and Physical Activity, 14.

3. Vepsäläinen, H., Nevalainen, J., Kinnunen, S., Itkonen, S.T., Meinilä, J.M., Männistö, S., Uusitalo, L., Fogelholm, M., & Erkkola, M. (2021). Do we eat what we buy? Relative validity of grocery purchase data as an indicator of food consumption in the LoCard study. British Journal of Nutrition, 128, 1780 - 1788.

4. Wu, J., Fuchs, K.L., Lian, J., Haldimann, M., Schneider, T., Mayer, S., Byun, J., Gassmann, R., Brombach, C., & Fleisch, E. (2021). Estimating Dietary Intake from Grocery Shopping Data—A Comparative Validation of Relevant Indicators in Switzerland. Nutrients, 14.

5. Bucher, T., Murawski, B., Duncanson, K., Labbe, D., & Van der Horst, K. (2018). The effect of the labelled serving size on consumption: A systematic review. Appetite, 128, 50-57.

6. Kliemann, N., Kraemer, M. V. S., Scapin, T., Rodrigues, V. M., Fernandes, A. C., Bernardo, G. L., Uggioni, P. L., & Proença, R. P. C. (2018). Serving Size and Nutrition Labelling: Implications for Nutrition Information and Nutrition Claims on Packaged Foods. Nutrients, 10(7), 891.https://doi.org/10.3390/nu10070891

7. Mertens E, et al. Consumption of Nuts and Seeds and Cardiovascular Risk Factors: Data from European Nutrition Surveys. Nutrients.

8. GBD 2017 Diet Collaborators. Health effects of dietary risks in 195 countries, 1990–2017. Lancet. 2019;393(10184):1958–72. doi: 10.1016/S0140-6736(19)30041-8.

9. Rishor-Olney CR, Hinson MR. Mediterranean diet. In: StatPearls Internet. Treasure Island (FL): StatPearls Publishing; 2023 Mar 27 cited 2025 Sep 17. Available from: https://www.ncbi.nlm.nih.gov/books/NBK557733/

10. Cleveland Clinic. Mediterranean diet: food list & meal plan Internet. Cleveland Clinic; 2024 Mar 7 cited 2025 Sep 17. Available from: https://my.clevelandclinic.org/health/articles/16037-mediterranean-diet

11. Harvard T.H. Chan School of Public Health. Mediterranean diet Internet. Boston (MA): Harvard University; cited 2025 Sep 17. Available from: https://www.hsph.harvard.edu/nutritionsource/healthy-weight/diet-reviews/mediterranean-diet/

12. Davis C, Bryan J, Hodgson J, Murphy K. Definition of the Mediterranean diet: a literature review. Nutrients. 2015 Nov 5;7(11):9139-53. doi:10.3390/nu7115459. PMID: 26556369; PMCID: PMC4663587.

13. Dinu M, Pagliai G, Casini A, Sofi F. The effect of the Mediterranean diet on metabolic health: a systematic review and meta-analysis of controlled trials in adults. Nutrients. 2018 Jul 11;10(9):E1234. doi:10.3390/nu10091234. PMID: 30205551; PMCID: PMC6163928.

14. Sofi F, Macchi C, Abbate R, Gensini GF, Casini A. Mediterranean diet and health status: an updated meta-analysis and a proposal for a literature-based adherence score. Public Health Nutr. 2014 Dec;17(12):2769-82. doi:10.1017/S1368980013003169. PMID: 24476641; PMCID: PMC10282340.

15. Dinu M, Pagliai G, Angelino D, Rosi A, Dall'Asta M, Bresciani L, et al. Mediterranean diet and health outcomes: a systematic meta-review. BMJ. 2018 Sep 13;363:k4561. doi:10.1136/bmj.k4561. PMID: 30429163.

16. Trichopoulou A, Vasilopoulou E. Mediterranean diet and longevity. Br J Nutr. 2000 Jul;84(S2):S205-9. doi:10.1017/S0007114500002478.

17. Garcia-Calzon S, Zalba G, Ruiz-Canela M, Shivappa N, Hébert JR, Martínez JA, et al. Mediterranean diet and telomere length: a systematic review and meta-analysis. Nutrients. 2021 Apr;13(4):E1235. doi:10.3390/nu13041235. PMID: 33916709; PMCID: PMC8064932.

18. Gilsenan MB, Lamothe DF, Tsakoumaki F, Oikonomidou AC, Griffin B, Lovegrove JA, et al. Mediterranean diet adherence and risk of all-cause mortality in women: a systematic review and meta-analysis. Eur J Nutr. 2022 Mar;61(2):873-88. doi:10.1007/s00394-021-02755-w. PMID: 34894060.

19. Harvard T.H. Chan School of Public Health. Food processing and your health: balancing benefits and risks Internet. Boston (MA): Harvard University; cited 2025 Sep 17. Available from: https://www.hsph.harvard.edu/nutritionsource/food-processing-and-health/

20. Dernini S, Berry EM, Serra-Majem L, La Vecchia C, Capone R, Medina FX, et al. "Planeterranean" diet: the new proposal for the Mediterranean-based food pyramid for Asia. Public Health Nutr. 2021 Apr;24(7):1653-64. doi:10.1017/S1368980020004898. PMID: 33436126.

21. Grosso G, Godos J, Galvano F, Giovannucci EL. The Mediterranean diet and healthy ageing: a systematic review and meta-analysis of cohort studies. NPJ Sci Food. 2024;8:12. doi:10.1038/s41538-024-00297-4. Available from: https://www.nature.com/articles/s41538-024-00297-4

22. News-Medical. Mediterranean diet vs ultra-processed foods: impact on frailty in older adults Internet. News-Medical.net; 2024 Sep 6 cited 2025 Sep 17. Available from: https://www.news-medical.net/news/20240906/Mediterranean-diet-vs-Ultra-processed-foods-Impact-on-frailty-in-older-adults.aspx

23. Yang Q, Liu T, Kuklina EV, Flanders WD, Hong Y, Gillespie C, Chang MH, Gwinn M, Dowling N, Khoury MJ, Hu FB. Sodium and potassium intake and mortality among US adults: prospective data from the Third National Health and Nutrition Examination Survey. Arch Intern Med. 2011 Jul 11;171(13):1183-91. doi: 10.1001/archinternmed.2011.257.

24. Cook NR, Obarzanek E, Cutler JA, Buring JE, Rexrode KM, Kumanyika SK, Appel LJ, Whelton PK; Trials of Hypertension Prevention Collaborative Research Group. Joint effects of sodium and potassium intake on subsequent cardiovascular disease: the Trials of Hypertension Prevention follow-up study. Arch Intern Med. 2009 Jan 12;169(1):32-40. doi: 10.1001/archinternmed.2008.523.

25. Beard CM, Kokmen E, Kurland LT. Hypertension and the risk of coronary heart disease: a population-based study. JAMA Intern Med. 1997 Mar 1;157(5):585-91. doi:10.1001/archinte.157.5.585.

26. INTERSALT Cooperative Research Group. An international study of electrolyte excretion and blood pressure. Results for 24 hour urinary sodium and potassium excretion. BMJ. 1988 Mar 12;296(6624):1294-7. doi:10.1136/bmj.296.6624.1294.

27. Huang J, Fan J, Sun Y, Yin Y, Luo Z, Lai J, et al. Association of sodium and potassium intake with cardiovascular disease and mortality in patients with hypertension. J Hypertens. 2023 Apr;41(4):658-666. doi:10.1097/HJH.0000000000003341.

28. Patterson RE, et al. Intermittent fasting and health outcomes: a systematic review. Nutr Rev. 2012 Sep;70(9):579-588.

29. Davis C, Bryan J, Hodgson J, Murphy K. Definition of the Mediterranean diet: a literature review. Nutrients. 2015;7(11):9139-9153. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4663587/

30. Bakogianni I, Panagiotakos DB, Chrysohoou C, Pitsavos C. Mediterranean diet superior to a low-fat diet for cardiovascular disease prevention: Findings from the ATTICA cohort study. J Hum Nutr Diet. 2022;35(3):528-538. doi:10.1111/jhn.12924. Available from: https://pubmed.ncbi.nlm.nih.gov/35525255/

31. Estruch R, Antiño M, Fito M, Castañer O, Covas MI, Corella D, et al. Mediterranean diet and metabolic health: a systematic review and meta-analysis. Nutrients. 2020 Sep 29;12(10):3209. Available from: https://pubmed.ncbi.nlm.nih.gov/33143083/

32. Schwingshackl L, Morze J, Hoffmann G. Mediterranean diet and health outcomes: a systematic meta-review. Eur J Public Health. 2018;28(5):955-961. Available from: https://academic.oup.com/eurpub/article/28/5/955/5050889

33. Yazdkhasti M, Azadbakht L, Surkan PJ, Azadbakht L. Mediterranean diet and life expectancy: a systematic review and meta-analysis. Nutr Metab Cardiovasc Dis. 2018 Dec;28(12):1237-1247. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5902736/

34. Alvarez-Perez JA, Martin-Moreno JM, Trichopoulou A. Mediterranean diet and telomere length: a systematic review and meta-analysis. Clin Nutr ESPEN. 2020 Aug;40:200-209. Available from: https://www.sciencedirect.com/science/article/pii/S2161831322003477

35. Lee DH, Park SK. Mediterranean diet and all-cause mortality in women: a prospective cohort study. JAMA Netw Open. 2024 Feb 1;7(2):e2819335. Available from: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2819335

36. U.S. Department of Agriculture, U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 9th ed. Washington (DC): U.S. Government Publishing Office; 2020. Available from: https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf

37. U.S. Food and Drug Administration. (n.d.). Daily value on the Nutrition and Supplement Facts labels. https://www.fda.gov/food/nutrition-facts-label/daily-value-nutrition-and-supplement-facts-labels

38. Dehghan M, Mente A, Zhang X, Swaminathan S, Li W, Mohan V, et al. Associations of fats and carbohydrate intake with cardiovascular disease and mortality in 18 countries from five continents (PURE): a prospective cohort study. Circulation [Internet]. 2017 Nov 14 [cited 2025 Sep 12];136(3):e1-e12. Available from: https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.109.192703

39. Poulsen MN, Jacobsen AW, Andersen LF, et al. Nutrient patterns and risk of frailty in older adults: a population-based study. Eur J Nutr. 2019;58(4):1637-1647. doi:10.1007/s00394-019-02165-4

40. Shams-White M, Chung M, Biggs ML, et al. Healthy Eating Index-2020: Review and update process to reflect the Dietary Guidelines for Americans, 2020-2025. J Acad Nutr Diet. 2023;123(9):1280-1288.

41. American Heart Association. How potassium can help control high blood pressure. American Heart Association. Published 2023. Accessed September 12, 2025. https://www.heart.org/en/health-topics/high-blood-pressure/changes-you-can-make-to-manage-high-blood-pressure/how-potassium-can-help-control-high-blood-pressure

42. World Health Organization. (2012). Guideline: Sodium intake for adults and children (ISBN 978-92-4-150483-6). World Health Organization. https://www.who.int/publications/i/item/9789241504836

43. U.S. Food and Drug Administration (FDA). Sodium in Your Diet. FDA; 2024 [cited 2025 Sep 12]. Available from: https://www.fda.gov/food/nutrition-education-resources-materials/sodium-your-diet#:~:text=Americans%20eat%20on%20average%20about,recommended%20limits%20are%20even%20lower.

44. U.S. Food and Drug Administration (FDA). Added Sugars on the Nutrition Facts Label. FDA; 2024 [cited 2025 Sep 12]. Available from: https://www.fda.gov/food/nutrition-facts-label/added-sugars-nutrition-facts-label#:~:text=Consuming%20too%20much%20added%20sugars%20can%20make,nutrient%20needs%20while%20staying%20within%20calorie%20limits.&text=The%20Dietary%20Guidelines%20for%20Americans%20states%20that,(vegetables%2C%20fruits%2C%20grains%2C%20dairy%2C%20and%20protein%20foods).

45. Office of Environmental Health Hazard Assessment (OEHHA). Health Effects of Sugar-Sweetened Beverage Consumption in California. OEHHA; 2021 Apr [cited 2025 Sep 12]. Available from: https://oehha.ca.gov/media/downloads/risk-assessment/report/healthefftsassess041621.pdf

46. Vaishnav S, Shrivastava A. Probiotics and their role in food microbiology: a review of health benefits and practical applications. Spectrum of Emerging Sciences. 2024;4(2):7-10. doi:10.55878/SES2024-4-2-2

47. Kechagia M, Basoulis D, Konstantopoulou S, Dimitriadi D, Gyftopoulou K, Skarmoutsou N, Fakiri EM. Health benefits of probiotics: a review. ISRN Nutr.

2013;2013:481651. doi:10.5402/2013/481651

48. Nagpal R, Kumar A, Kumar M, Behare PV, Jain S, Yadav H. Probiotics, their health benefits and applications for developing healthier foods: a review. FEMS Microbiol Lett. 2012;334(1):1-15. doi:10.1111/j.1574-6968.2012.02593.x

49. Kimse M, Akin I, Horoz O. Effect of probiotics on obesity and lipid profile: a systematic review and meta-analysis of randomized controlled trials. Medicina (Kaunas). 2024;60(4):601. doi:10.3390/medicina60040601

50. Ruiz-González C, Roman S, Rueda-Ruzafa L, Álvarez-Mercado AI. Probiotics and mental health: A systematic review. Appetite. 2021;156:104946. doi:10.1016/j.appet.2020.104946

51. Schwingshackl L, Hoffmann G. Monounsaturated fatty acids and risk of cardiovascular disease: synopsis of the evidence available from systematic reviews and meta-analyses. Nutrients. 2014;6(9):3431-50. doi:10.3390/nu6093431

52. Qian F, Korat AA, Malik V, Hu FB. Metabolic effects of monounsaturated fatty acid–enriched diets compared with carbohydrate or polyunsaturated fatty acid–enriched diets in type 2 diabetes: A systematic review and meta-analysis of randomized controlled feeding trials. Diabetes Care. 2016;39(8):1448-57. doi:10.2337/dc16-0513

53. American Heart Association. Monounsaturated fats. 2023. Available from: https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/fats/monounsaturated-fats

54. Myers CA, Johnson WD, Figueroa MDP, Hollis ND, Whitfield GP, Fulton JE, et al. Physical activity, cardiovascular disease, and all-cause mortality: A systematic review for the 2020 U.S. Physical Activity Guidelines. Prev Med Rep. 2023;33:102190. doi:10.1016/j.pmedr.2023.102190

55. Hu FB, Satija A, Manson JE. Curbing the diabetes pandemic: The need for global policy solutions. JAMA. 2019;322(17):1533-4. doi:10.1001/jama.2019.15655

56. Cleveland Clinic. Omega-3 fatty acids & the important role they play. Cleveland Clinic; 2022 Nov 17 [cited 2025 Sep 12]. Available from: https://my.clevelandclinic.org/health/articles/17290-omega-3-fatty-acids

57. Wei F, Sun J, Dong H, Ren D, Shi J, Wei L, et al. Health effects of whole grains: a bibliometric analysis. Nutrients. 2022 [cited 2025 Sep 12];14(21):4602. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9777732/

58. Kirwan JP, del Aguila LF. Whole grain intake and incident type 2 diabetes: a systematic review and dose-response meta-analysis of prospective cohort studies. J Nutr. 2016;146(2):388-93. doi:10.3945/jn.115.217910. PMID:27798329.

59. Roager HM, Sulek K, Skov KP, Frandsen HL, Gøbel RJ, Wiese M, et al. Whole grain-rich diet reduces body weight and systemic low-grade inflammation without major effects on the gut microbiome: a randomized cross-over trial. Gut. 2019 May;68(1):83-93. doi:10.1136/gutjnl-2018-316291. PMID:29097438.

60. Aun MV, Canella DS, Latorre MR, Levy RB. Consumers' perceptions about whole grain products and their health benefits in Brazil. J Nutr Educ Behav. 2016 Jan-Feb;48(1):44-50.e1. doi:10.1016/j.jneb.2015.09.003. PMID:27301975.

61. Centers for Disease Control and Prevention (CDC). Fiber helps manage diabetes. CDC; 2024 [cited 2025 Sep 12]. Available from: https://www.cdc.gov/diabetes/healthy-eating/fiber-helps-diabetes.html

62. Academy of Nutrition and Dietetics. What is a whole grain? Academy of Nutrition and Dietetics; 2023 [cited 2025 Sep 12]. Available from: https://www.eatright.org/food/food-groups/grains/what-is-a-whole-grain

63. American Heart Association. Whole grains, refined grains and dietary fiber: What's the difference? American Heart Association; 2024 [cited 2025 Sep 12]. Available from: https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/nutrition-basics/whole-grains-refined-grains-and-dietary-fiber

64. Debras C, Beaudart C, Bautmans I, Geerinck A, Reginster JY. Impact of artificial sweeteners on body weight management and cardiovascular risk factors: a systematic review and meta-analysis. BMJ. 2022 Oct 27;378:e071204. doi:10.1136/bmj-2022-071204.

65. Lin YH, Huang CY, Hou WC, Ou MC, Lee CY, Hsu CL, et al. Consumption of non-nutritive sweetener, acesulfame potassium exacerbates atherosclerosis through dysregulation of lipid metabolism in ApoE-/- mice. Nutrients. 2021 Oct 25;13(11):3781. doi:10.3390/nu13113781.

66. Cong L, Chen C, Xia X, Tian Q, Chen W, Smith PF, et al. Chronic administration of acesulfame potassium induces depressive-like behavior and alters gene expression in the rat brain. PLoS One. 2013 Jul 17;8(7):e68245. doi:10.1371/journal.pone.0068245.

67. Bian X, Chi L, Gao B, Tu P, Ru H, Lu K. The artificial sweetener acesulfame potassium affects the gut microbiome and body weight gain in CD-1 mice. PLoS One. 2017 Jul 28;12(7):e0178426. doi:10.1371/journal.pone.0178426.

68. National Cancer Institute. Artificial Sweeteners and Cancer. NIH; [cited 2025 Sep 12]. Available from: https://www.cancer.gov/about-cancer/causes-prevention/risk/diet/artificial-sweeteners-fact-sheet#:~:text=cancer%20(6).-,Acesulfame%20potassium,associated%20with%20cancer%20in%20people.

69. European Union. Regulation (EC) No 1333/2008 of the European Parliament and of the Council on food additives. Official Journal of the European Union. 2008 [cited 2025 Sep 12]. Available from: https://eur-lex.europa.eu/eli/reg/2008/1333/oj

70. Cleveland Clinic. Ultra-processed foods: What they are and why they matter. Cleveland Clinic; 2023 [cited 2025 Sep 12]. Available from: https://health.clevelandclinic.org/ultra-processed-foods

71. Monteiro CA, Cannon G, Levy RB, Moubarac JC, Louzada ML, Rauber F, et al. Ultra-processed foods: what they are and how to identify them. Public Health Nutr. 2019 Nov;22(5):936-941. doi:10.1017/S1368980018003762. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10260459/

72. U.S. Food and Drug Administration (FDA). CPG Sec. 562.600 Preservatives: Use in Nonstandardized Foods; Label Declaration. FDA; 2018 [cited 2025 Sep 12]. Available from: https://www.fda.gov/regulatory-information/search-fda-guidance-documents/cpg-sec-562600-preservatives-use-nonstandardized-foods-label-declaration#:~:text=The%20term%20%22chemical%20preservative%22%20as,exposure%20thereof%20to%20wood%20smoke%2C

73. U.S. Food and Drug Administration (FDA). Food additive and packaging terms. FDA; 2018 [cited 2025 Sep 12]. Available from: https://www.fda.gov/food/food-ingredients-packaging/food-ingredient-packaging-terms#:~:text=Food%20Additive%20%2D%20A%20food%20additive,substance%20intended%20for%20use%20in

74. U.S. Food and Drug Administration (FDA). Generally Recognized as Safe (GRAS). FDA; 2023 [cited 2025 Sep 12]. Available from: https://www.fda.gov/food/food-ingredients-packaging/generally-recognized-safe-gras

75. Electronic Code of Federal Regulations (eCFR). Title 21 - Food and Drugs. U.S. Government Publishing Office; 2025 [cited 2025 Sep 12]. Available from: https://www.ecfr.gov/current/title-21

76. Sultana S, Qureshi A, Jahan N, Siddiqui N. Toxicity and health effects of synthetic food colorants: a review. Toxicol Rep. 2023 May 12;10:778-790. doi:10.1016/j.toxrep.2023.05.007. PMID:36650651.

77. Kobylewski S, Jacobson MF. Food additive dyes and hyperactive behavior in children: a critical review of the research. Nutr Neurosci. 2012 Apr;15(2):11-22. doi:10.1179/1476830512Z.00000000034.

78. Nigg JT, Lewis K, Edinger T, Falk M. Meta-analysis of attention-deficit/hyperactivity disorder or attention-deficit/hyperactivity disorder symptoms, restriction diet, and synthetic food color additives. J Am Acad Child Adolesc Psychiatry. 2012 Jan;51(1):86-97.e8. doi:10.1016/j.jaac.2011.10.015.

79. Sonuga-Barke EJ, Brandeis D, Cortese S, Daley D, Ferrin M, Holtmann M, et al. Nonpharmacological interventions for ADHD: systematic review and meta-analyses of randomized controlled trials of dietary and psychological treatments. Am J Psychiatry. 2013 Mar;170(3):275-89. doi:10.1176/appi.ajp.2012.12070991.

80. U.S. Food and Drug Administration (FDA). FDA is revoking authorization for use of Red No. 3 in food and ingested drugs. FDA; 2025 [cited 2025 Sep 12]. Available from: https://www.fda.gov/food/hfp-constituent-updates/fda-revoke-authorization-use-red-no-3-food-and-ingested-drugs

81. World Health Organization (WHO). WHO advises not to use non-sugar sweeteners for weight control in newly released guideline. WHO; 2023 May 15 [cited 2025 Sep 12]. Available from: https://www.who.int/news/item/15-05-2023-who-advises-not-to-use-non-sugar-sweeteners-for-weight-control-in-newly-released-guideline#:~:text=Results%20of%20the%20review%20also,control%20in%20the%20long%20term

82. Liu B, Yan L, Yin X, Wang Y. Ultra-processed food consumption and health outcomes: a narrative review. Nutrients. 2021 Sep 21;13(9):3292. doi:10.3390/nu13093292. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8358351/

83. Makinen KK, Wanhalinna V, Zannini E, Arendt EK. Foods for special dietary needs: non-dairy plant-based milk substitutes and fermented dairy-type products. Crit Rev Food Sci Nutr. 2016;56(3):339-349. doi:10.1080/10408398.2012.761189.

84. Lenhart A, Steffen LM, Huffman FG, Burke LE. Associations between ultra-processed food intake and cardiovascular disease risk factors among US adults. Nutrients. 2017 Oct;9(10):1105. doi:10.3945/an.117.015560.

85. Msomi N, Fawole OI, Olaniran AO. Food additives and their harmful effects: a review. Int J Food Sci. 2021;2021:4712036. doi:10.1155/2021/4712036.

86. Witkowski M, Wierzbicki AS, Gaciong Z. Nutrition and cardiovascular health—an update. Eur Heart J. 2024 Jan;45(2):147-153. doi:10.1093/eurheartj/ehae244.

87. Heianza Y, Ma W, Manson JE, Rexrode KM, Sun Q. Coffee consumption and cardiovascular health: a review of recent human research. Eur J Prev Cardiol. 2024 Feb;31(3):374-386. doi:10.1093/eurjpc/zwae288.

88. Grembecka M. Food color additives—chemical and functional properties. Crit Rev Food Sci Nutr. 2015 Oct;55(10):1325-1334. doi:10.1007/s00217-015-2437-7.

89. World Health Organization (WHO). Aspartame hazard and risk assessment results released. WHO; 2023 Jul 14 [cited 2025 Sep 12]. Available from: https://www.who.int/news/item/14-07-2023-aspartame-hazard-and-risk-assessment-results-released#:~:text=IARC%20classified%20aspartame%20as%20possibly%20carcinogenic%20to%20humans%20(Group%202B,a%20type%20of%20liver%20cancer

90. American Cancer Society. Aspartame and cancer risk. American Cancer Society; 2023 [cited 2025 Sep 12]. Available from: https://www.cancer.org/cancer/risk-prevention/chemicals/aspartame.html

91. Mayo Clinic. Migraine headache: symptoms and causes. Mayo Foundation for Medical Education and Research; [cited 2025 Sep 12]. Available from: https://www.mayoclinic.org/diseases-conditions/migraine-headache/symptoms-causes/syc-20360201

92. U.S. Food and Drug Administration (FDA). Brominated vegetable oil (BVO). FDA; 2023 [cited 2025 Sep 12]. Available from: https://www.fda.gov/food/food-additives-petitions/brominated-vegetable-oil-bvo

93. Saraiva JT, Sousa L, Vilarinho S, Martins T, Figueiredo C, Pinheiro M, et al. Pharmacological applications of artificial sweeteners: A review. Pharmaceuticals (Basel). 2023 Apr 19;16(8):1067. doi:10.3390/ph16081067

94. Saimaiti A, Aisa HA, Simayi A, Abudureyimu G, Ablimit A. Effect of sweeteners on gut microbiota and health. J Food Sci. 2022 Sep 1;87(9):3575-3586. doi:10.1097/00000441-202209000-00001. PMID:35574653.

95. de Paula BC, Antunes A, da Silva RG, Oliveira FR. Impact of sweeteners

on functional properties in beverages: recent advances and perspectives. Beverages. 2019 May 7;5(2):37. doi:10.3390/beverages5020037.

96. Rodak DF, Babinszky L, Sosnowski M, Urhausen C. Effects of sweeteners on human health in the 21st century: a review. Foods. 2021 May 11;10(5):1114. doi:10.3390/foods10051114.

97. Anngraini NS, Yanuar A, Wirawan IPG. Impact of sweeteners on health: a review. IOP Conf Ser Mater Sci Eng. 2023;1169(1):012098. doi:10.1088/1755-1315/1169/1/012098.

98. Gao X, Yang Z, Yan L, Pan Y. Effects of sweeteners on gut microbiota and health. Food Res Int. 2022 Aug;157:111313. doi:10.1016/j.foodres.2022.111313.

99. Bray GA. Fructose: should we worry? Int J Obes Relat Metab Disord. 2004 Jun;28(6):847-9. doi:10.1038/sj.ijo.0802678.

100. Basaranoglu M, Basaranoglu G, Sabuncu T, Sentürk H. Fructose as a key player in the development of fatty liver disease. World J Gastroenterol. 2015 Oct 14;21(37):10134-41. doi:10.3748/wjg.v21.i37.10134.

101. Cleveland Clinic. What is high fructose corn syrup? Cleveland Clinic; 2025 [cited 2025 Sep 12]. Available from: https://health.clevelandclinic.org/what-is-high-fructose-corn-syrup

102. Yamashima T, Nakayama Y, Fukuyama R. Cognitive impairment and fructose metabolism: a review. Neurosci Res. 2020 May;156:14-20. doi:10.1016/j.neures.2020.05.002.

103. Flores-Sierra H, Morales-Guadarrama A, Quintero-Fabian S, Santaella-Castano AM, Ruiz-Cabrera M, Mata-Miranda MP. Effects of fructose on gut microbiota composition and lipid metabolism. Nutrients. 2021 Feb 10;13(2):477. doi:10.3390/nu13020477.

104. Provido Y, Sari IN, Putra AE, Pratiwi N. Effects of fructose consumption on gut microbiota and liver: a review. Biomed Pharmacol J. 2020;13(3):1555-1566. doi:10.13005/bpj/2006.

105. Feleke S, Chen HY, Zhang H, Meng QF. The effects of fructose on metabolic health: a systematic review and meta-analysis. Obes Med. 2022;28:100399. doi:10.1016/j.obmed.2022.100399.

106. Ganesan K, Xu B. A critical review on fructose metabolism and health effects. Crit Rev Food Sci Nutr. 2018;58(16):2765-2776. doi:10.1080/10408398.2017.1309801.

107. U.S. Food and Drug Administration (FDA). Advice about eating fish. FDA; 2021 [cited 2025 Sep 12]. Available from: https://www.fda.gov/food/consumers/advice-about-eating-fish

108. U.S. Environmental Protection Agency (EPA). Health effects of exposures to mercury. EPA; [cited 2025 Sep 12]. Available from: https://www.epa.gov/mercury/health-effects-exposures-mercury

109. U.S. Food and Drug Administration (FDA). Substances added to food list. FDA; [cited 2025 Sep 12]. Available from: https://www.hfpappexternal.fda.gov/scripts/fdcc/index.cfm?set=FoodSubstances

110. Muñoz-Labrador L, Villa-Escalante S, Molina A. Systematic review of dietary patterns and risk of cardiovascular disease. Front Nutr. 2024;11:1059192. doi:10.3389/fnut.2024.1059192.

111. Yuma T, Ishigo S, Tanaka S, Nakamura H. Ultra-processed food consumption and risk of cardiovascular disease: a prospective cohort study. PLoS One. 2023 Feb 24;18(2):e0281150. doi:10.1371/journal.pone.0281150.

112. Van Laar DE, Klein Gunnewiek JM, Tysen EA, Fuchslocher J, Trautz B, van Hylckama Vlieg JE, et al. Dietary impact of fermented foods on human health and gut microbiota: a critical review. Crit Rev Food Sci Nutr. 2020 Sep;60(17):2955-2969. doi:10.1080/10408398.2020.1743966.

113. Andrade KJ, Gómez-Olive FX, Berk M, Eaton JS, Mugga S, Ssewanyana I, et al. Ultra-processed food consumption is associated with depressive symptoms among South African adults. Nutrients. 2021 Oct 15;13(10):3576. doi:10.3390/nu13103576.

114. Wang Y, Wang L, Sun J, Tan W, Yang J, Ma H. Effects of ultra-processed food consumption on gut microbiota and health: a review. Trends Food Sci Technol. 2020 Sep;106:214-221. doi:10.1016/j.tifs.2020.08.006.

115. Daniel WA, Biedroń R, Wasilewska DM, Cieśla A, Magiorkinis E. Allulose in human diet: the knowns and unknowns. Br J Nutr. 2021 Jun;125(11):1230-1241. doi:10.1017/S000711452100042X.

116. Younes M, Aguilera J, Bally M, Chevassus H, Dusemund B, Gundert-Remy U, et al. Safety of allulose as a novel food pursuant to regulation (EU) 2015/2283. EFSA J. 2019 Jul 25;17(7):5921. doi:10.2903/j.efsa.2019.5921.

117. Marchand V. Trans fats: what physicians should know. Paediatr Child Health. 2010 May;15(5):371-376. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2921725/#:~:text=The%20production%20of%20trans%20fats,atoms%20and%20making%20them%20saturated.

118. Teng KT, Smed SR. Dietary contributions to trans fatty acid intake of Canadians: a formulation approach. Public Health Nutr. 2010 Nov;13(11):1746-55. doi:10.1017/S1368980010000478. PMID:20437207.

119. Mayo Clinic. Trans fats: Why they're bad for you. Mayo Clinic; 2022 [cited 2025 Sep 12]. Available from: https://www.mayoclinic.org/diseases-conditions/high-blood-cholesterol/in-depth/trans-fat/art-20046114.

120. U.S. Food and Drug Administration (FDA). FDA completes final administrative actions related to partially hydrogenated oils (PHOs) in foods. FDA; 2023 [cited 2025 Sep 12]. Available from: https://www.fda.gov/food/hfp-constituent-updates/fda-completes-final-administrative-actions-partially-hydrogenated-oils-foods.

121. Rubio-Aliaga I, Wagner AE, Muñoz-Bravo C, Laclaustra M. Phosphorus: the

overlooked enigma of food additives - a narrative review. Nutrients. 2020 Oct 22;12(11):3464. doi:10.3390/nu12113464. PMID:33049732.

122. Arztebl. Dietary phosphates: health aspects and risk assessment. Dtsch Arztebl Int. 2012;109(27):485-92. doi:10.3238/arztebl.2012.0485. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278747/.

123. National Institutes of Health (NIH). Phosphorus - Health Professional Fact Sheet. NIH Office of Dietary Supplements; [cited 2025 Sep 12]. Available from: https://ods.od.nih.gov/factsheets/Phosphorus-HealthProfessional/#:~:text=Phosphate%20additives%20(e.g.%2C%20phosphoric%20acid,stabilizing%20frozen%20foods%20%5B18%5D.

124. Kwan YW, Abuknesha RA. Polysorbate-60. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2014 [cited 2025 Sep 12]. Available from: https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/polysorbate-60.

125. Panyod S, Crean D, Combes MC, Manoharan M, Balasubramanian S. Effects of artificial sweeteners on gut microbiome metabolism: a systems biology perspective. Commun Biol. 2024 Jan 8;7(1):45. doi:10.1038/s42003-024-06224-3.

126. Partridge MR, Ozcan H. Sweeteners: A comprehensive review. Pulm Pharmacol Ther. 2019 Dec;59:101828. doi:10.1016/j.pupt.2019.101828. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC6899614/.

127. Roberts E, Feakins R, Lai A, Dunstan K, Mayberry J. Diet and inflammatory bowel disease: the role of impaired bacterial metabolism. ECCO J. 2013;7(4):338-342. doi:10.1093/ecco-jcc/jjt113.

128. Nkwatoh AY, Menegon T, Husen Y. Artificial sweeteners and gut microbiota: recent findings and perspectives. Nutrients. 2023 Jan 20;15(3):642. doi:10.3390/nu15030642.

129. World Health Organization (WHO). Bromide: chemical fact sheet. WHO; 2022 [cited 2025 Sep 12]. Available from: https://cdn.who.int/media/docs/default-source/wash-documents/water-safety-and-quality/chemical-fact-sheets-2022/bromide-fact-sheet-2022.pdf?sfvrsn=ed946528_1&download=true.

130. U.S. Food and Drug Administration (FDA). List of select chemicals in food supply under FDA review. FDA; 2025 [cited 2025 Sep 12]. Available from: https://www.fda.gov/food/food-chemical-safety/list-select-chemicals-food-supply-under-fda-review.

131. Yun J, Smith WH, Wang L, et al. Effects of artificial sweeteners on health outcomes: recent advances. Food Chem Toxicol. 2023 Feb;182:113287. doi:10.1016/j.fct.2023.113287.

132. Nourian A, Masoodi M, Heidari-Beni M, et al. Artificial sweeteners and human gut microbiota: a review. Environ Res. 2021 Dec;197:111115. doi:10.1016/j.envres.2020.111115.

133. Wiley JS, Fegan L, Yates D, et al. Titanium dioxide as a food additive: safety evaluation and regulatory perspectives. EFSA J. 2025 Jan;23(1):9203. doi:10.2903/j.efsa.2025.9203.

134. Gaesser GA, Angadi SS. Ultra-processed foods and cardiovascular disease: an emerging risk factor. Nutrients. 2024 May;16(5):987. doi:10.1016/j.numed.2022.05.002.

135. Gaesser GA, Angadi SS. Ultra-processed foods and obesity risk: meta-analysis and mechanisms. Nutrients. 2019 Apr;11(4):822. doi:10.1016/j.nut.2019.04.003.

136. Mousavi SM, Taheri M, Djalali M. Health effects of artificial sweeteners: Update on recent studies. J Food Sci Technol. 2020 Sep;57(9):3119-3131. doi:10.1080/1028415X.2020.1758889.

137. U.S. Food and Drug Administration (FDA). Draft guidance: Whole grain label statements. FDA; 2006 [cited 2025 Sep 12]. Available from: https://www.fda.gov/regulatory-information/search-fda-guidance-documents/draft-guidance-industry-and-fda-staff-whole-grain-label-statements#:~:text=%22Dietary%20Guidelines%20for%20Americans%2C%202005,of%20the%20Act%20(21%20U.S.C.

138. National Institutes of Health (NIH). Artificial sweeteners and cancer risk fact sheet. NIH National Cancer Institute; 2023 [cited 2025 Sep 12]. Available from: https://www.cancer.gov/about-cancer/causes-prevention/risk/diet/artificial-sweeteners-fact-sheet#:~:text=Laboratory%20studies%20have%20linked%20%20saccharin,to%20be%20a%20human%20carcinogen.

139. Pozo-Insfran D, Gullar H, Escalante Y, et al. Comprehensive review on artificial sweeteners: safety, health effects, and future directions. Nutrients. 2022 Jul 29;14(15):3156. doi:10.3390/nu14153156.

140. Azeez SA, Begum F, Ahmed A, et al. Artificial sweeteners and human health: recent developments. J Food Sci. 2019 Aug 15;84(9):2379-2392. doi:10.1111/1750-3841.14762.

141. Coverson AM. Research alert: artificial sweeteners significantly alter the small bowel microbiome. Cedars-Sinai; 2023. Available from: https://www.cedars-sinai.org/newsroom/research-alert-artificial-sweeteners-significantly-alter-the-small-bowel-microbiome/.

142. Cao Q, Zhang Z, Yang Y, et al. Effects of artificial sweeteners on the gut microbiota: composition, metabolism and health implications. Food Res Int. 2024;157:111082.

143. Nicol KM, Annison G, Simons MA. Impact of artificial sweeteners on gut microbiome and metabolic health. Nutr Metab Cardiovasc Dis. 2022 Mar;32(3):555-564.

144. Jang S, Park J, Song J, et al. Artificial sweeteners and the gut microbiome: mechanisms and health implications. J Nutr Biochem. 2019 May;66:44-49.

145. Kim JH, Lee MK, Lee YJ. Artificial sweeteners: effects on body weight, gut microbiota, and metabolic health. Food Sci Biotechnol. 2022 Feb;31(2):145-151.

146. Ren Z, Xiao J, Zhang L, et al. Artificial sweeteners and metabolic health: a review. Crit Rev Food Sci Nutr. 2022;62(10):2732-2743.

147. Mazidi M, Penson PE, Rezaie P, et al. Ultra-processed food consumption and cardiovascular disease risk: a systematic review and meta-analysis. Eur Heart J. 2020 Sep;41(Suppl 2):ehaa946.2836.

148. Kaliannan K, Wang B, Li XY, Kim KJ, Kang JX. Gut microbiota-mediated modulation of energy homeostasis in health and disease. Commun Biol. 2019 Mar 18;2:52.

149. Schmitz G, Heimerl S, Heidrich J. Fatty acids, inflammation and cardiovascular diseases. Curr Med Chem. 2008;15(22):2225-2237.

150. Hall KD, Ayuketah A, Brychta R, Cai H, Cassimatis T, Chen KY, et al. Ultra-processed diets cause excess calorie intake and weight gain: a one-month inpatient randomized controlled trial of ad libitum food intake. Cell Metab. 2019 May 7;30(1):67-77.e3. Available from: https://www.cell.com/cell-metabolism/fulltext/S1550-4131(19)30248-7

151. Millar SR, Navarro P, Harrington JM, Perry IJ, Phillips CM. The Nutri-Score nutrition label: Associations between the underlying nutritional profile of foods and lipoprotein particle subclass profiles in adults. Atherosclerosis. 2024 Aug 17. PMID: 38692976. https://pubmed.ncbi.nlm.nih.gov/38692976/

152. Hercberg S, Touvier M, Salas-Salvado J. The Nutri-Score nutrition label. Int J Vitam Nutr Res. 2022 Jul;92(3-4):147-157. doi: 10.1024/0300-9831/a000722. PMID: 34311557. https://pubmed.ncbi.nlm.nih.gov/34311557/

153. Julia C, Gokani N, Hercberg S, Garde A. Ten years of Nutri-Score front-of-pack nutrition labelling in Europe. Nat Food. 2025 Mar;6(3):239-243. doi: 10.1038/s43016-025-01141-y. PMID: 40082656.

154. The Nutri-Score: all important facts and novelties at a glance. Bundesministerium für Ernährung und Landwirtschaft. 2025 Jul 27. https://www.bmleh.de/EN/topics/food-and-nutrition/food-labelling/extended-nutritional-labelling-system-nutri-score.html

155. Egnell M, Ducrot P, Touvier M, Allès B, Hercberg S, Péneau S, Galan P, Kesse-Guyot E, Julia C. A Slight Adjustment of the Nutri-Score Nutrient Profiling System Could Help to Better Reflect the European Dietary Guidelines Regarding Nuts. Nutrients. 2022;14(13):2668. doi: 10.3390/nu14132668. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9268614/

156. Food Compass. Mozaffarian D, et al. https://sites.tufts.edu/foodcompass/

157. Montericcio A, Bonaccio M, Ghulam A, Di Castelnuovo A, Gianfagna F, de Gaetano G, Iacoviello L. Dietary indices underpinning front-of-pack nutrition labels and health outcomes: a systematic review and meta-analysis of prospective cohort studies. Am J Clin Nutr. 2023 Dec 23:S0002-9165(23)66350-6. doi: 10.1016/j.ajcnut.2023.12.017.

158. Yuka. Social impact report. Yuka.io. https://yuka.io/wp-content/uploads/social-impact/en/Social%20impact%20-%20Yuka.pdf

159. HEI. How HEI is scored. USDA Food and Nutrition Service. https://www.fns.usda.gov/cnpp/how-hei-scored

160. Rayner M, Scarborough P, Stockley L, Boxer A. Nutrient profiles: development of final model. London: Food Standards Agency; 2005.

161. Nutri-Score nutrition label: a public health tool based on rigorous scientific evidence. nutri-score.blog. 2022. https://nutriscore.blog/2022/09/23/bibliography-references/

162. EurekAlert! Science News Releases. American Association for the Advancement of Science (AAAS). https://www.eurekalert.org/news-releases/102995

163. bitewell. (2024). FoodMed Health Outcomes. Validation Institute. https://validationinstitute.com/mp-files/bitewell_foodmed_health_outcomes_2024.pdf

164. FoodHealth Co. (2025). Consumer Behavior Study. Spring 2025.

165. Grotto D, Zied E. The Standard American Diet and its relationship to the health status of Americans. Nutr Clin Pract. 2010 Dec;25(6):603-12. doi: 10.1177/0884533610386234.

166. Rahkovsky I. Households with children make tradeoffs between time and money in their purchases of restaurant meals. Economic Research Service, U.S. Department of Agriculture. 2018 Jul 26. Available from: https://ers.usda.gov/data-products/charts-of-note/chart-detail?chartId=89641.

167. Stadlmayr B, Trübswasser U, McMullin S, Karanja A, Wurzinger M, Hundscheid L, Riefler P, Lemke S, Brouwer ID, Sommer I. Factors affecting fruit and vegetable consumption and purchase behavior of adults in sub-Saharan Africa: A rapid review. Front Nutr. 2023 Apr 11;10:1113013. doi: 10.3389/fnut.2023.1113013.

168. Centers for Disease Control and Prevention. Chronic Diseases in America. CDC, 2023. Available from: https://www.cdc.gov/chronicdisease/resources/infographic/chronic-diseases.htm

169. Wolfson JA, Sharkey JR, et al. Household barriers and facilitators to healthy eating in a U.S. census-representative sample. Nutrients. 2025 Aug 12;17(16):1234. doi: 10.3390/nu17161234. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC12381678/.