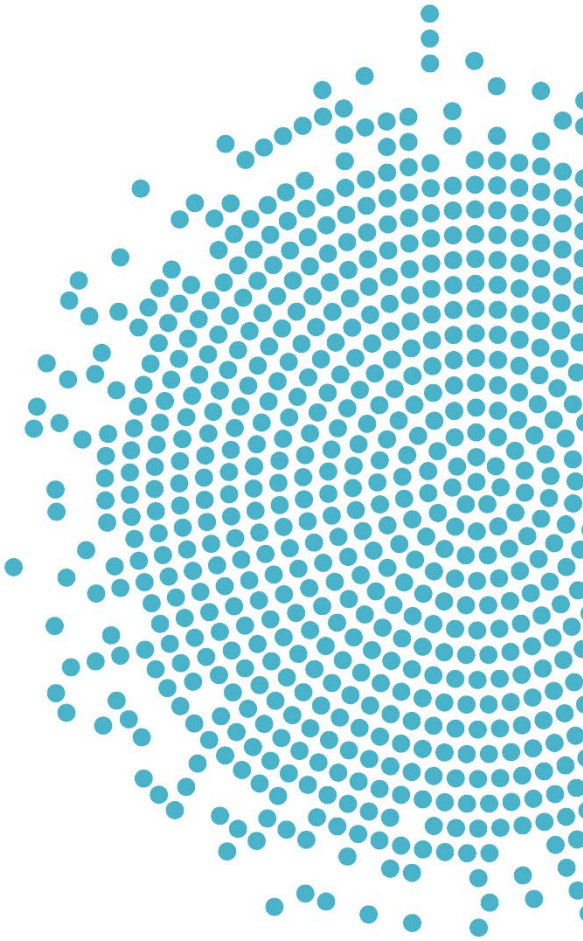
USDA
UNITED STATES DEPARTMENT OF AGRICULTURE

Dietary Patterns and Risk of Colorectal Cancer: A Systematic Review



Edward Giovannucci, MD, ScD[a,b] Teresa Fung, ScD, RD,[a,c] Cheryl A.M. Anderson, PhD, MPH, MS,[a,d] Sarah Booth, PhD,[a,e] Andrea Deierlein, PhD, MPH, MS, [a,f] Christopher Gardner, PhD, [a,g] Deanna M. Hoelscher, PhD, RDN, LD, CNS, FISBNPA,[a,h] Hollie Raynor, PhD, RD, LDN,[a,i] Fatima Cody Stanford, MD, MPH, MPA, MBA, FAAP, FACP, FAHA, FAMWA, FTOS,[a,b] Sameera Talegawkar, PhD,[a,j] Chris Taylor, PhD, RDN, LD, FAND,[a,k] Deirdre Tobias, ScD,[a,b] Emily H Callahan, MS, [l] Laural Kelly English, PhD,[l] Molly Higgins, MLIS,[m] Shue Huang, PhD, MS, [n] Nicole Reigh, PhD,[n] Gisela Butera, MEd, MLIS,[o] Nancy Terry, MLIS,[o] Julie Obbagy, PhD, RD[p]

[a] Dietary Patterns and Specific Dietary Pattern Components Across Life Stages Subcommittee, 2025 Dietary Guidelines Advisory Committee

[b] Harvard University

[c] Simmons University

[d] University of California San Diego

[e] Tufts University, Committee Chair

[f] New York University

[g] Stanford University

[h] UT Health Houston School of Public Health, Subcommittee Chair

[i] University of Tennessee Knoxville

[j] The George Washington University

[k] The Ohio State University

[l] Systematic Review Analyst, Nutrition Evidence Systematic Review (NESR) Branch; Nutrition Guidance and Analysis Division (NGAD), Center for Nutrition Policy and Promotion (CNPP), Food and Nutrition Service (FNS), U.S. Department of Agriculture (USDA)

[m] Systematic Review Librarian, NESR Branch; NGAD, CNPP, FNS, USDA

[n] Systematic Review Analyst, Panum Telecom, under contract with FNS, USDA

[o] Biomedical Librarian/Informationist, National Institutes of Health Library

[p] Branch Chief, NESR Branch; NGAD, CNPP, FNS, USDA

NESR

Suggested citation: Giovannucci E, Fung T, Anderson CAM, Booth S, Deierlein A, Gardner C, Hoelscher DM, Raynor H, Stanford FC, Talegawkar S, Taylor C, Tobias D, Callahan EH, English LK, Higgins M, Huang S, Reigh N, Butera G, Terry N, Obbagy J. Dietary Patterns and Risk of Colorectal Cancer: A Systematic Review. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review; 2025. https://doi.org/10.52570/NESR.DGAC2025.SR22

Related citations: 2025 Dietary Guidelines Advisory Committee. 2024. Scientific Report of the 2025 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Health and Human Services and Secretary of Agriculture. U.S. Department of Health and Human Services. https://doi.org/10.52570/DGAC2025

Boushey C, Ard J, Bazzano L, Heymsfield S, Mayer-Davis E, Sabaté J, Snetselaar L, Van Horn L, Schneeman B, English LK, Bates M, Callahan E, Butera G, Terry N, Obbagy J. Dietary Patterns and Breast, Colorectal, Lung, and Prostate Cancer: A Systematic Review. July 2020. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://doi.org/10.52570/NESR.DGAC2020.SR0104

2015 Dietary Guidelines Advisory Committee: Systematic Reviews of the Dietary Patterns, Foods and Nutrients, and Health Outcomes Subcommittee. February 2015. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/sites/default/files/2019-04/2015DGAC-SR-DietaryPatterns.pdf

Table of contents

Plain language summary

What is the question?
The question is: What is the relationship between dietary patterns consumed and risk of colorectal cancer? The populations of interest for this question included infants, young children, children, adolescents, adults, and older adults.

Why was this question asked?
This systematic review was conducted by the 2025 Dietary Guidelines Advisory Committee as part of the process to develop the *Dietary Guidelines for Americans, 2025-2030*.

How was this question answered?
The Committee conducted a systematic review to answer this question with support from the USDA Nutrition Evidence Systematic Review team. This review updated an existing review that was conducted by the 2020 Dietary Guidelines Advisory Committee.

What is the answer to the question?
Dietary patterns consumed by adults and older adults that are characterized by higher intakes of vegetables, fruits, legumes and nuts, and whole grains, and lower intakes of red and processed meats, refined grains, fried potatoes, saturated fat, and sugar-sweetened foods and beverages are associated with lower risk of colon and rectal cancer. Some of these dietary patterns also included fish, low-fat dairy, tea and coffee. This conclusion statement is based on evidence graded as moderate.

How up-to-date is this systematic review?
Conclusion statements from this review are based on articles published between January 2000 and January 2024.

Abstract

Background

This systematic review was conducted by the 2025 Dietary Guidelines Advisory Committee as part of the process to develop the *Dietary Guidelines for Americans, 2025-2030*. The U.S. Departments of Health and Human Services (HHS) and Agriculture (USDA) appointed the 2025 Dietary Guidelines Advisory Committee (Committee) in January 2023 to review evidence on high priority scientific questions related to diet and health. Their review forms the basis of their independent, science-based advice and recommendations to HHS and USDA, which is considered as the Departments develop the next edition of the *Dietary Guidelines*. As part of that process, the Committee conducted a systematic review with support from the USDA Nutrition Evidence Systematic Review (NESR) team to answer the following question: What is the relationship between dietary patterns consumed and risk of colorectal cancer? This review is an update to existing reviews that was conducted by the 2020 Dietary Guidelines Advisory Committee.

Methods

The Committee conducted a systematic review using the methodology of the USDA NESR team. The Committee first developed a protocol. The intervention or exposure was dietary patterns consumed by infants, young children, children, adolescents, adults, and older adults, the comparators were different dietary patterns or different levels of adherence to/consumption of the same dietary pattern, and the outcome included incident cases of breast cancer. Additional inclusion criteria were established for the following study characteristics: a) use randomized or non-randomized controlled trial, prospective or retrospective cohort, or nested case-control study designs, b) be published in English in peer-reviewed journals, c) be from countries classified as high or very high on the Human Development Index, and d) enroll participants with a range of health statuses. The review excluded studies that exclusively enrolled participants who were being treated for a disease.

NESR librarians conducted a literature search in PubMed, Embase, and Cochrane to identify articles published between January 2020 and January 2024. Two NESR analysts independently screened all electronic results and the reference lists of included articles based on the pre-determined criteria.

NESR analysts extracted data, from each included article, with a second analyst verifying accuracy of the extraction. Two NESR analysts independently conducted a formal risk of bias assessment, by study design, for each included article, then reconciled any differences in the assessment. The Committee qualitatively synthesized the evidence according to the synthesis plan, with attention given to the overarching themes or key concepts from the findings, similarities and differences between studies, and factors that may have affected the results. The Committee developed a conclusion statement by starting with the conclusion from the existing review and determining whether and what updates were needed based on the newly published evidence. After establishing the need for updating the review, the Committee then graded the strength of evidence for the conclusion statement based on its consistency, precision, risk of bias, directness and generalizability

Results

Conclusion statement and grade: Dietary patterns consumed by adults and older adults that are characterized by higher intakes of vegetables, fruits, legumes and nuts, and whole grains, and lower intakes of red and processed meats, refined grains, fried potatoes, saturated fat, and sugar-sweetened foods and beverages are associated with lower risk of colon and rectal cancer. Some of these dietary patterns also included fish, low-fat dairy, tea and coffee. This conclusion statement is based on evidence graded as moderate. (Grade: Moderate)

Summary of the evidence:

- This body of evidence includes 29 articles (27 from prospective cohort studies and 2 from nested case-control studies) published since January 2020 that met inclusion criteria for this review and were assessed as they related to the evidence included in the existing review (46 articles).
- The direction of results and size of effects were similar across studies.
- The size of study groups was small in some studies. Variation around the effect estimates ranged from narrow to wide across studies.
- Some studies were designed and conducted well.
- The populations, dietary patterns, comparators, and outcomes that were examined directly represent those of interest in this review.
- The evidence applies to the U.S. population.

Introduction

To prepare for the development of the *Dietary Guidelines for Americans, 2025-2030*, the U.S. Departments of Health and Human Services (HHS) (Appendix 1) and Agriculture (USDA) identified a proposed list of scientific questions based on relevance, importance, potential federal impact, and avoiding duplication, which were posted for public comment.[*] The Departments appointed the 2025 Dietary Guidelines Advisory Committee (Committee) in January 2023 to review evidence on the scientific questions. The Committee's review of the evidence forms the basis of the Scientific Report of the 2025 Dietary Guidelines Advisory Committee,[†] which includes independent, science-based advice and recommendations to HHS and USDA and is considered during the development of the next edition of the *Dietary Guidelines*.

The proposed scientific questions were refined and prioritized by the Committee for consideration in their review of the evidence. As part of that process, the following systematic review question was prioritized: What is the relationship between dietary patterns consumed and risk of colorectal cancer? The Committee conducted a systematic review to address this question, with support from USDA's Nutrition Evidence Systematic Review (NESR) team. This review is an update to the systematic review conducted by the 2015 and 2020 Dietary Guidelines Advisory Committees (**Table 1**), and the conclusion statements developed as part of that existing work can be found in **Appendix 2**.

Table 1. Review history

Date	Description	Citation
February 2015	Original systematic review conducted by the 2015 Dietary Guidelines Advisory Committee published in 2015	2015 Dietary Guidelines Advisory Committee: Systematic Reviews of the Dietary Patterns, Foods and Nutrients, and Health Outcomes Subcommittee. February 2015. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/sites/default/files/2019-04/2015DGAC-SR-DietaryPatterns.pdf
July 2020	Systematic review updated by the 2020 Dietary Guidelines Advisory Committee published in 2020	Boushey C, Ard J, Bazzano L, Heymsfield S, Mayer-Davis E, Sabaté J, Snetselaar L, Van Horn L, Schneeman B, English LK, Bates M, Callahan E, Butera G, Terry N, Obbagy J. Dietary Patterns and Breast, Colorectal, Lung, and Prostate Cancer: A Systematic Review. July 2020. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://doi.org/10.52570/NESR.DGAC2020.SR0104
May 2023	Systematic review protocol for the 2025 Dietary Guidelines Advisory Committee published online	Hoelscher DM, Anderson C, Booth S, Deierlein A, Fung T, Gardner C, Giovannucci E, Raynor H, Stanford FC, Talegawkar S, Taylor C, Tobias D, Obbagy J, Callahan EH, English LK, Fultz A, Raghavan R, Reigh N, Higgins M, Butera G, Terry N. Dietary Patterns and Risk of Colorectal Cancer: A Systematic Review Protocol. May 2023. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/protocols

[*] Dietary Guidelines for Americans: Learn About the Process. 2022. Available at: https://www.dietaryguidelines.gov/work-under-way/learn-about-process

[†] 2025 Dietary Guidelines Advisory Committee. 2024. Scientific Report of the 2025 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Health and Human Services and Secretary of Agriculture. U.S. Department of Health and Human Services. https://doi.org/10.52570/DGAC2025

Methods

The Committee used NESR's methodology to conduct this systematic review. NESR's methodology is described in detail in its methodology manual,[*] as well as in the Committee's Scientific Report.[†] This section presents an overview of the specific methods used to answer the systematic review question: What is the relationship between dietary patterns consumed and risk of colorectal cancer?

This systematic review is an update to an existing NESR systematic review completed as part of the 2015 and 2020 Dietary Guidelines Advisory Committee[‡§], which included evidence published from January 2000 to January 2014. The original review was updated by the 2020 Committee, which reviewed articles published from January 2014 to January 2020. Eligible studies published since January 2020 were synthesized, and the new evidence was assessed as it relates to the existing evidence, according to the methods described below and final graded conclusion statements take into consideration evidence published from January 2000 to January 2024.

Develop a protocol

A systematic review protocol is the plan for how NESR's methodology will be used to conduct a specific systematic review and is established by the Committee, *a priori*, before any evidence is reviewed. The protocol is designed to capture the most appropriate and relevant body of evidence to answer the systematic review question. Development of the protocol involves discussion of the strengths and limitations of various methodological approaches relevant to the question, which then inform subsequent steps of the systematic review process. The protocol describes all of the methods that will be used throughout the systematic review process. Additionally, the protocol includes the following components, which are tailored to each systematic review question: the analytic framework, the inclusion and exclusion criteria, and the synthesis plan. The Committee used the analytic framework and the inclusion and exclusion criteria from the existing review and made adjustments to the protocol, as needed. Differences in the inclusion and exclusion criteria between existing and updated reviews are documented in **Appendix 3**.

The protocol was posted online (https://nesr.usda.gov/protocols) for the public to view and comment on. Revisions to the systematic review protocol were made during the review process. These amendments are documented in **Table 2**.

[*] USDA Nutrition Evidence Systematic Review Branch. USDA Nutrition Evidence Systematic Review: Methodology Manual. February 2023. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/methodology-overview

[†] 2025 Dietary Guidelines Advisory Committee. 2024. Scientific Report of the 2025 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Health and Human Services and Secretary of Agriculture. U.S. Department of Health and Human Services. https://doi.org/10.52570/DGAC2025

[‡] 2015 Dietary Guidelines Advisory Committee: Systematic Reviews of the Dietary Patterns, Foods and Nutrients, and Health Outcomes Subcommittee. February 2015. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/sites/default/files/2019-04/2015DGAC-SR-DietaryPatterns.pdf

[§] Boushey C, Ard J, Bazzano L, Heymsfield S, Mayer-Davis E, Sabaté J, Snetselaar L, Van Horn L, Schneeman B, English LK, Bates M, Callahan E, Butera G, Terry N, Obbagy J. Dietary Patterns and Breast, Colorectal, Lung, and Prostate Cancer: A Systematic Review. July 2020. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://doi.org/10.52570/NESR.DGAC2020.SR0104

Table 2. Protocol revisions

Date	Protocol revision	Description
January 2024	Inclusion and exclusion criteria for publication date were updated to document that the review will include studies published through January 2024..	This revision was made to document the final publication date range covered by the literature search.
July 2023	Inclusion and exclusion criteria were added for confounders, specifying that studies must control for at least one key confounder listed in the analytic framework to be included.	This revision was made to enable focus on a stronger body of evidence. The revision was made before any evidence was synthesized.
July 2023	The inclusion and exclusion criteria for the intervention/exposure and comparator were revised to clarify that: • a study must provide a description of the foods and beverages in both the intervention/exposure and comparator groups to be included. • studies that examine consumption of and/or adherence to similar dietary patterns of which only a specific component or food source differs between groups are excluded.	These revisions were made before evidence synthesis to clarify the intent of the intervention/exposure and comparator criteria, but do not represent a change in how the criteria were applied.

Develop an analytic framework

An analytic framework visually represents the overall scope of the systematic review question and depicts the contributing elements that were examined and evaluated. It presents the core elements of each systematic review question, including the **P**opulation (i.e., those who experience the intervention/exposure and/or outcome), **I**ntervention and/or exposure (i.e., the independent variable of interest), **C**omparator (i.e., the alternative being compared to the intervention or exposure), and **O**utcome(s). Definitions for key terms are also included because they provide the basis for how concepts are operationalized throughout the review. The Committee identified key confounders based on their knowledge of nutrition and health research and experience as subject matter experts. Key confounders are participant characteristics, such as demographics, health status, and diet and lifestyle behaviors, and/or other factors related to both the intervention/exposure and the outcome of interest that may impact the relationships of interest. Key confounders were considered during review and evaluation of the evidence, particularly during the risk of bias assessment of non-randomized and observational studies.

Figure 1 is the analytic framework for the systematic review. The intervention or exposure of interest is dietary patterns consumed by infants, young children, children, adolescents, adults, and older adults. The comparators are different dietary patterns or different levels of adherence to/consumption of the same dietary pattern. The outcome includes incident cases of colorectal cancer. The key confounders may impact the relationships of interest and are sex, age, physical activity, race and/or ethnicity, socioeconomic position, anthropometry, and screening for colorectal cancer in all populations, alcohol intake and smoking in adults and older adults only. Dietary patterns are defined as the quantities, proportions, variety, or combination of different foods, drinks, and nutrients (when available) in diets, and the frequency with which they are habitually consumed.

Figure 1. Analytic framework for the systematic review question: What is the relationship between dietary patterns consumed and risk of colorectal cancer?

Population	***Intervention/ exposure***	***Comparator***	***Outcome***	***Key confounders***
Infants and young children (birth up to 24 months) Children and adolescents (2 years up to 19 years) Adults and older adults (19 years and older)	Consumption of a dietary pattern	Different dietary pattern(s) Different adherence/ consumption levels to the same dietary pattern	Incident cases of colorectal cancer (in infants; young children; children; adolescents; adults; older adults)	• Sex • Age • Physical activity • Race and/or ethnicity • Socioeconomic position • Anthropometry • Smoking (adults, older adults) • Alcohol intake (adults, older adults) • Anthropometry • Screening for colorectal cancer

Synthesis organization:

I. ***Population:*** Infants and young children; Children and adolescents; Adults; Older adults

   a. ***Outcome:*** Tumor Location

Key definitions:

Dietary patterns: the quantities, proportions, variety, or combination of different foods, drinks, and nutrients (when available) in diets, and the frequency with which they are habitually consumed.

Develop inclusion and exclusion criteria

The inclusion and exclusion criteria provide an objective, consistent, and transparent framework for determining which articles to include in the systematic review (**Table 3**). These criteria ensure that the most relevant and appropriate body of evidence is identified for the systematic review question, and that the evidence reviewed is:[*]

- Applicable to the U.S. population of interest
- Relevant to Federal public health nutrition policies and programs
- Rigorous from a scientific perspective

[*]USDA Nutrition Evidence Systematic Review Branch. USDA Nutrition Evidence Systematic Review: Methodology Manual. February 2023. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/methodology-overview

Table 3. Inclusion and exclusion criteria

Category	Inclusion Criteria	Exclusion Criteria
Study design	• Randomized controlled trials • Non-randomized controlled trials[*] • Prospective cohort studies • Retrospective cohort studies • Nested case-control studies	• Uncontrolled trials[†] • Case-control studies • Cross-sectional studies • Ecological studies • Narrative reviews • Systematic reviews • Meta-analyses • Modeling and simulation studies • Mendelian randomization studies
Publication date	• January 2000 – January 2024[‡]	• Before January 2000, after January 2024
Population: Study participants	• Human	• Non-human

Population: Life stage	• At intervention or exposure and outcome:
	  ○ *Infants and young children (birth up to 24 months)*
	  ○ *Children and adolescents (2 up to 19 years)*
	  ○ *Adults and older adults (19 years and older)*
		• At intervention or exposure:
		  ○ *N/A*
		• At outcome:
		  ○ *Individuals during pregnancy*

[*] Including quasi-experimental and controlled before-and-after studies

[†] Including uncontrolled before-and-after studies

[‡] This review update date range encompasses the original systematic review date range, which included articles published from 2000 to 2014

Category	Inclusion Criteria	Exclusion Criteria
Population: Health status	• Studies that <u>exclusively</u> enroll participants not diagnosed with a disease[*] • Studies that enroll <u>some</u> participants: o diagnosed with a disease; o with severe undernutrition, failure to thrive/underweight, stunting, or wasting; o born preterm,[†] with low birth weight,[‡] and/or small for gestational age; o pre- or post-bariatric surgery; o receiving pharmacotherapy to treat obesity; o and/or hospitalized for an illness, injury, or surgery	• Studies that <u>exclusively</u> enroll participants: o diagnosed with a disease;[§] o hospitalized for an illness, injury, or surgery[**] o with severe undernutrition, failure to thrive/underweight, stunting, or wasting; o born preterm,[†] with low birth weight,[‡] and/or small for gestational age; o pre- or post-bariatric surgery; o receiving pharmacotherapy to treat obesity; o and/or with the outcome of interest (i.e., studies that aim to treat participants who have already been diagnosed with the outcome of interest);
Intervention/ exposure	• Studies that examine consumption of and/or adherence to a dietary pattern [i.e., the quantities, proportions, variety, or combination of different foods, drinks, and nutrients (when available) in diets, and the frequency with which they are habitually consumed], including, at a minimum, a description of the foods and beverages in the pattern of each intervention/exposure and comparator group o Dietary patterns may be measured or derived using a variety of approaches, such as adherence to a priori patterns (indices/scores), data driven patterns (factor or cluster analysis), reduced rank regression, or other methods, including clinical trials • Multi-component intervention in which the isolated effect of the intervention of interest on the outcome(s) of interest is provided or can be determined despite multiple components	• Studies that do not provide a description of the dietary pattern, which at minimum, must include the foods and beverages in the pattern (i.e., studies that examine a labeled dietary pattern, but do not describe the foods and beverages consumed in each intervention/exposure and comparator group) • Multi-component intervention in which the isolated effect of the intervention of interest on the outcome(s) of interest is not provided or cannot be determined due to multiple components
Comparator	• Consumption of and/or adherence to a different dietary pattern • Different levels of consumption of and/or adherence to a dietary pattern	• Consumption of and/or adherence to a similar dietary pattern of which only a specific component or food source s differs between groups
Outcome(s)	• Incident cases of colorectal cancer	• Studies that exclusively examine cancer related mortality, prevalence, survivorship, or recurrence of cancer

[*] Studies that enroll participants who are at risk for chronic disease were included

[†] *Gestational age <37 weeks and 0/7 days*

[‡] *Birth weight <2500g*

[§] Studies that exclusively enroll participants with obesity were included

[**] Studies that exclusively enroll participants post-cesarean section were included

Category	Inclusion Criteria	Exclusion Criteria
Confounders	• Studies that control for at least one of the key confounders listed in the analytic framework	• Studies that do not control for any of the key confounders listed in the analytic framework
Study duration (not applied to pregnancy and postpartum studies)	• Intervention study length ≥12 weeks	• Intervention study length <12 weeks
Publication status	• Peer-reviewed articles published in research journals	• Non-peer-reviewed articles, unpublished data or manuscripts, pre-prints, reports, editorials, retracted articles, and conference abstracts or proceedings
Language	• Published in English	• Not published in English
Country*	• Studies conducted in countries classified as high or very high on the Human Development Index the year(s) the intervention/exposure data were collected	• Studies conducted in countries classified as medium or low on the Human Development Index the year(s) the intervention/exposure data were collected

Search for and screen studies

NESR librarians, in collaboration with NESR analysts and the Committee, used the analytic framework and inclusion and exclusion criteria to develop a comprehensive literature search strategy. The literature search strategy included selecting and searching the appropriate bibliographic databases, translating search using syntax appropriate for the databases being searched, and employing search refinements, such as search filters. For existing reviews, search strategies were updated, as appropriate, for each database. The full literature search is documented in **Appendix 4**.

The results of all electronic database searches, after removal of duplicates, were screened independently by two NESR analysts using a step-wise process by reviewing titles, abstracts, and full-texts to determine which articles meet the inclusion criteria. Manual searching was conducted to find peer-reviewed published articles not identified through the electronic database search. These articles were also screened independently by two NESR analysts at the abstract and full-text levels.

Extract data and assess the risk of bias

NESR analysts extracted all essential data from each included article to describe key characteristics of the available evidence, such as the author, publication year, cohort/trial name, study design, population life stage at intervention/exposure and outcome, intervention/exposure and outcome assessment methods, and outcomes. One NESR analyst extracted the data and a second NESR analyst reviewed the extracted data for accuracy. Each article included in the systematic review underwent a formal risk of bias assessment, with two

* The classification of countries on the Human Development Index (HDI) is based on the UN Development Program Human Development Report Office (http://hdr.undp.org/en/data) for the year the study intervention occurred or data were collected. If the study does not report the year(s) in which the intervention/exposure data were collected, the HDI classification for the year of publication is applied. Studies conducted prior to 1990 are classified based on 1990 HDI classifications. If the year is more recent than the available HDI values, then the most recent HDI classifications are used. If a country is not listed in the HDI, then the current country classification from the World Bank is used (The World Bank Country and Lending Groups, available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-country-and-lending-groups)

NESR analysts independently completing the risk of bias assessment using the tool that is appropriate for the study design.[*†‡§**]

Synthesize the evidence

The Committee described, compared, and combined the evidence from all included studies to answer the systematic review question.[††] Synthesis of the body of evidence involved identifying overarching themes or key concepts from the findings, identifying and explaining similarities and differences between studies, and determining whether certain factors impact the relationships being examined, which includes potential causes of heterogeneity across all included evidence.

Extracted data and risk of bias assessments for all included studies were tabulated to visually display results and facilitate synthesis. Eligible studies published since January 2014 were synthesized, and the new evidence was assessed as it related to the existing evidence. This allows the full body of evidence to be reflected in the updated conclusion statements and grades without a complete re-synthesis of the individual studies from the previous review. During synthesis, the Committee considered effect direction, magnitude, and statistical significance of the results reported across the articles included in the body of evidence. The evidence was synthesized qualitatively without meta-analysis of effect estimates, statistical pooling or conversion of data, or quantitative tests of heterogeneity.

The synthesis plan for this review was designed with the end-use in mind, to inform the Committee's advice to HHS and USDA regarding dietary guidance across life stages. The first level of synthesis organization was by population at intervention or exposure. When synthesizing dietary patterns evidence, focus was placed on the food and beverage components of the dietary patterns examined in the included studies (i.e., fruits, vegetables, whole grains, seafood), and not on the "label" or "name" of the pattern assigned by researchers (e.g., Mediterranean, DASH). To accomplish this, data visualizations were created to illustrate the components reflected in each dietary pattern studied. These visualizations allowed the Committee to compare and contrast the results across patterns while also identifying common foods and beverages reflected in patterns associated with beneficial, null, or adverse health outcomes.[‡‡]

---

[*] Sterne JAC, Savović J, Page MJ, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. *BMJ* 2019; 366: l4898.doi:10.1136/bmj.l4898

[†] Sterne JAC, Hernán MA, Reeves BC, et al. ROBINS-I: a tool for assessing risk of bias in non-randomized studies of interventions. BMJ 2016; 355; i4919; doi: 10.1136/bmj.i4919

[‡] Higgins JPT, Morgan RL, Rooney AA, et al. A tool to assess risk of bias in non-randomized follow-up studies of exposure effects (ROBINS-E). *Environment International* 2024 (published online Mar 24); doi: 10.1016/j.envint.2024.108602.

[§] Randomized controlled trials included in the existing review were assessed using the "Cochrane Risk-of-bias 2.0" tool (RoB 2.0) (August 2016 version)" (Higgins JPT, Sterne JAC, Savović J, Page MJ, Hróbjartsson A, Boutron I, Reeves B, Eldridge S. A revised tool for assessing risk of bias in randomized trials In: Chandler J, McKenzie J, Boutron I, Welch V (editors). Cochrane Methods. Cochrane Database of Systematic Reviews 2016, Issue 10 (Suppl 1). dx.doi.org/10.1002/14651858.CD201601.)

[**] Observational studies included in the existing review were assessed using the "Risk of Bias for Nutrition Observational Studies" tool (RoB-NObs) (Dietary Guidelines Advisory Committee. 2020. Scientific Report of the 2020 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Agriculture and the Secretary of Health and Human Services. U.S. Department of Agriculture, Agricultural Research Service, Washington, DC.

[††] USDA Nutrition Evidence Systematic Review Branch. USDA Nutrition Evidence Systematic Review: Methodology Manual. February 2023. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/methodology-overview

[‡‡] English LK, Raghavan R, Obbagy JE, et al. Dietary Patterns and Health: Insights From NESR Systematic Reviews to Inform the Dietary Guidelines for Americans. JNEB. 2024 Jan; 56(4):75-87. doi: 10.1016/j.jneb.2023.10.001

Develop a conclusion statement and grade the evidence

After the Committee synthesized the body of evidence, they drafted a conclusion statemen. A conclusion statement is one or more summary statements carefully constructed to answer the systematic review question. Each conclusion statement reflects the evidence reviewed, as outlined in the analytic framework (e.g., PICO elements) and synthesis plan, and does not take evidence from other sources into consideration. Conclusion statements do not draw implications and should not be interpreted as dietary guidance.

The Committee then developed a conclusion statement by starting with the conclusion from the existing review and determining whether updates were needed based on the newly published evidence. In doing so, the Committee determined if the existing conclusion statement and grade should be retained without any modifications or should be updated to appropriately reflect both the existing review and the newer evidence.[*]

The Committee then graded the strength of the evidence underlying each conclusion statement. They do this using NESR's predefined criteria, based on five grading elements: consistency, precision, risk of bias, directness and generalizability of the evidence. Study design and publication bias were also considered.[†]

- Consistency: Consistency considers the degree of similarity in the direction and magnitude of effect across the body of evidence. This element also considers whether differences across the results can be explained by variations in study designs and methods.
- Precision: Precision considers the degree of certainty around an effect estimate for a given outcome. This element considers measures of variability, such as the width and range of confidence intervals, the number of studies, and sample sizes, within and across studies.
- Risk of bias: Risk of bias considers the likelihood that systematic errors resulting from the design and conduct of the studies could have impacted the accuracy of the reported results across the body of evidence.
- Directness: Directness considers the extent to which studies are designed to directly examine the relationship among the interventions/exposures, comparators, and outcome(s) of primary interest in the systematic review question.
- Generalizability: Generalizability considers whether the study participants, interventions and/or exposures, comparators, and outcomes examined in the body of evidence are applicable to the U.S. population of interest for the review.

The Committee assigned a grade to each conclusion statement (i.e., strong, moderate, limited, or grade not assignable). The grade communicates the strength of the evidence supporting a specific conclusion statement to decision makers and stakeholders. A conclusion statement can receive a grade of Strong, Moderate, or Limited, and if insufficient or no evidence is available to answer a systematic review question, then no grade is assigned (i.e., Grade Not Assignable) (**Table 4**). The overall grade is not based on a predefined formula for scoring or tallying ratings of each element. Rather, each overall grade reflects the expert group's thorough consideration of all of the grading elements, as they each relate to the specific nuances of the body of evidence under review.

[*] USDA Nutrition Evidence Systematic Review Branch. USDA Nutrition Evidence Systematic Review: Methodology Manual, Chapter 8: Updating NESR Systematic Reviews. February 2023. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/methodology-overview

[†] Spill MK, English LK, Raghavan R, et al. Perspective: USDA Nutrition Evidence Systematic Review Methodology: Grading the Strength of Evidence in Nutrition- and Public Health-Related Systematic Reviews. Adv Nutr. 2022 Aug 1;13(4):982-991. doi: 10.1093/advances/nmab147

Table 4. Definitions of NESR grades

Grade	Definition
Strong	The conclusion statement is based on a strong body of evidence as assessed by consistency, precision, risk of bias, directness, and generalizability. The level of certainty in the conclusion is strong, such that if new evidence emerges, modifications to the conclusion are unlikely to be required.
Moderate	The conclusion statement is based on a moderate body of evidence as assessed by consistency, precision, risk of bias, directness, and generalizability. The level of certainty in the conclusion is moderate, such that if new evidence emerges, modifications to the conclusion may be required.
Limited	The conclusion statement is based on a limited body of evidence as assessed by consistency, precision, risk of bias, directness, and generalizability. The level of certainty in the conclusion is limited, such that if new evidence emerges, modifications to the conclusion are likely to be required.
Grade Not Assignable	A conclusion statement cannot be drawn due to either a lack of evidence, or evidence that has severe limitations related to consistency, precision, risk of bias, directness, and generalizability.

Recommend future research

The Committee identified and documented research gaps and methodological limitations throughout the systematic review process. These gaps and limitations are used to develop research recommendations that describe the research, data, and methodological advances that are needed to strengthen the body of evidence on a particular topic. Rationales for the necessity of additional or stronger research is also provided with the research recommendations.

Health equity considerations

The Committee was charged by HHS and USDA to review all scientific questions with a health equity lens to ensure that the next edition of the *Dietary Guidelines* is relevant to people with diverse racial, ethnic, socioeconomic, and cultural backgrounds. The Committee made a number of health equity considerations throughout the NESR systematic review process. The Committee's Scientific Report[*] includes a more detailed discussion of their approach to applying a health equity lens to their review of evidence, but examples of how the Committee incorporated health equity considerations into its systematic reviews and evidence scan include consideration of key confounders relevant to health equity and assessment of generalizability of the evidence.

[*] 2025 Dietary Guidelines Advisory Committee. 2024. Scientific Report of the 2025 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Health and Human Services and Secretary of Agriculture. U.S. Department of Health and Human Services. https://doi.org/10.52570/DGAC2025

Results

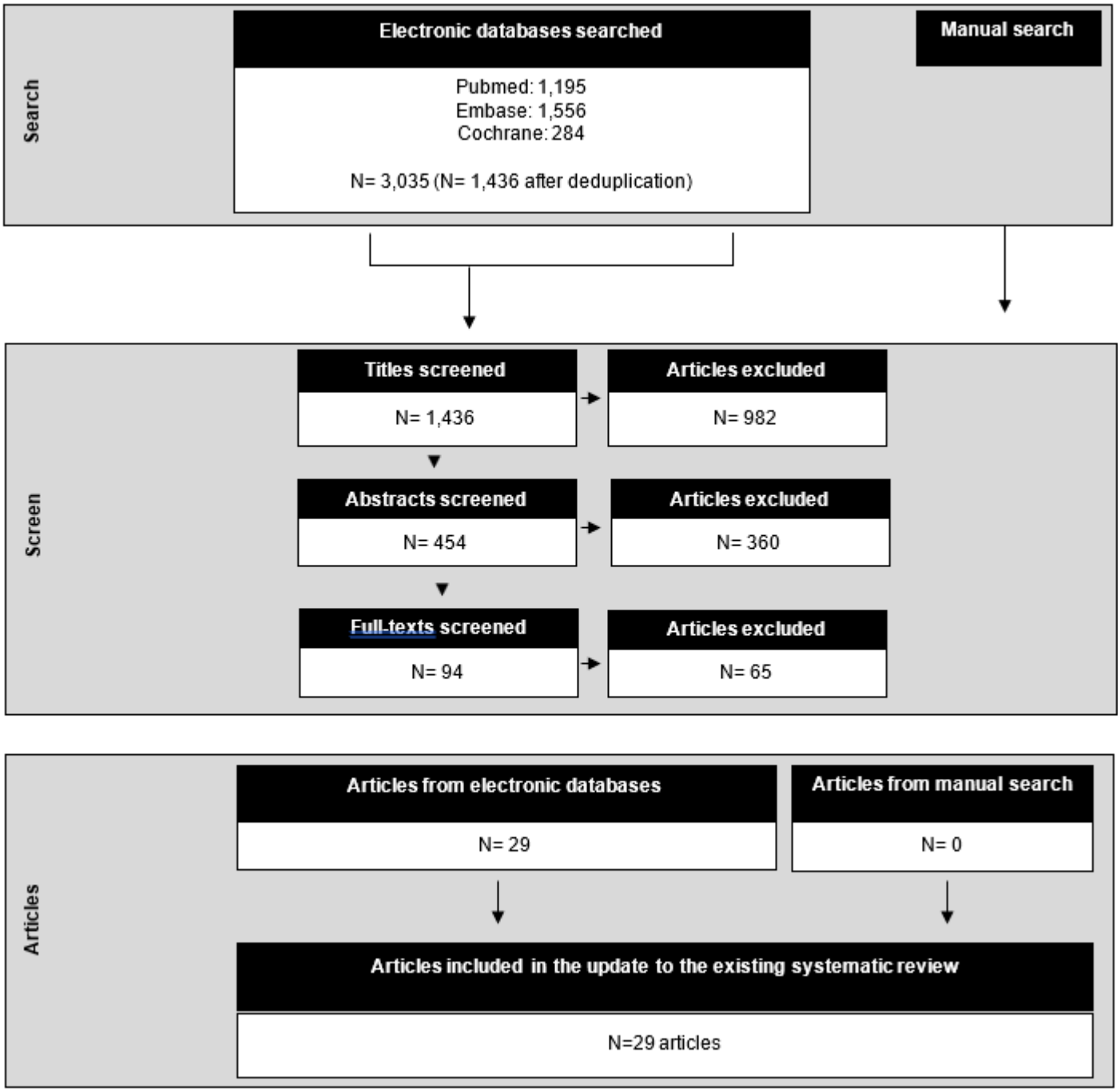
Literature search and screening results

Articles included in this systematic review were identified from literature searches conducted to identify all potentially relevant articles for the systematic review assessing the relationship between dietary patterns consumed and colorectal cancer*. The literature search (**Appendix 4**) yielded 1,436 search results after the removal of duplicates (see **Figure 2**). Dual-screening resulted in the exclusion of 982 titles, 360 abstracts, and 65 full-texts articles. Reasons for full-text exclusion are in **Appendix 5**. No additional articles were identified from the manual search. The body of evidence for colorectal cancer includes 29 articles[1-29] published since 2020. In addition, this review updates an existing review,† which developed and graded a conclusion based on 46 articles.

* Hoelscher DM, Anderson CAM, Booth S, et al. *Dietary Patterns and Risk of Colorectal Cancer: A Systematic Review*. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review; 2025. https://doi.org/10.52570/NESR.DGAC2025.SR22

† Boushey C, Ard J, Bazzano L, Heymsfield S, Mayer-Davis E, Sabaté J, Snetselaar L, Van Horn L, Schneeman B, English LK, Bates M, Callahan E, Butera G, Terry N, Obbagy J. Dietary Patterns and Breast, Colorectal, Lung, and Prostate Cancer: A Systematic Review. July 2020. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://doi.org/10.52570/NESR.DGAC2020.SR0104

Figure 2. Literature search and screen flowchart



Adults and older adults

The 2025 Dietary Guidelines Advisory Committee updated the existing systematic review by synthesizing the additional 29 articles that were published between January 2020 and January 2024 and met inclusion criteria, and assessing how this new evidence relates to the conclusion statement from the existing review.

Description of the evidence

Twenty-nine articles met inclusion criteria examining the relationship between dietary patterns consumed and risk of colorectal cancer (**Table 6**).[1-29] Twenty-seven articles analyzed data from prospective cohorts[1,3-19,21-29] and 2 articles analyzed case-cohort data .[2,6,20]

Population

Analytic sample size ranged from N=1,189[12] up to N=422,702.[18] Follow-up durations ranged between a median of 6 years up to 28 years.[24] Four articles combining data from the Nurses' Health Study and the Health Professional Follow-up Study did not report follow-up duration, but is estimated to be about 30y based on information from other articles reporting on this cohort.[1,11,12,23]

The number of cases identified across the studies varied and ranged from 197 colorectal cases from a cohort of 9,886[7] to 18,768 colorectal cases from a cohort of 112,468 participants.[9]

Articles used data collected from a total of 8 countries with 13 articles using data collected in the United States:

- Nurses' Health Study and Health Professionals Follow-up Study (HPFS)[1,11,12,23-25], n=6
- NHS II,[28] n=1
- Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial,[19,27] n=2
- Women's Health Initiative (WHI),[7,16] n=2
- Multi-Ethnic cohort,[10] n=1
- WHI-Dietary Modification trial,[9] n=1

Additional countries and cohorts were represented in the data as follows:

- United Kingdom, n=7 (UK Biobank,[6,8,13,14,18,21,22] n=7)
- Canada, n=2 (Alberta's Tomorrow Project,[26] n=1; Canadian Study of Diet, Lifestyle and Health (CSDLH),[2] n=1)
- Spain, n=2 (PREvencion con DIeta MEDiterranea (PREDIMED),[3] n=1; European Prospective Investigation into Cancer and Nutrition (EPIC)-Spain,[4] n=1)
- China, n=1 (Shanghai Women's Health Study (SWHS); Shanghai Men's Health Study (SMHS),[17] n=1)
- Denmark, n=1 (Danish Diet, Cancer and Health cohort (DCH),[29] n=1)
- France, n=1 (NutriNet-Santé,[5] n=1)
- The Netherlands, n=2 (The Netherlands Cohort Study,[20] n=1; Lifelines,[15] n=1)

Health status

Most studies reported mean BMI ≥25.0 kg/m2 of study participants,[3,4,6-10,13-18,22,24,26-29] but the full range included 23.8 kg/m2[5] up to 31.1kg/m2.[7]. Many studies also reported that >40% of the populations had

overweight or obesity.[6-9,12,13,17,18,22,26,29] Among studies that reported information on smoking (n= 19), ever smoking ranged from 24%[11] to 69%;[10] in the 6 articles that reported current smoking, there was a range from 4[21,23] to 26%.[24] Only 5 articles reported family history of cancer or colorectal cancer (family history of cancer 37%[6] and 49%[3]) and family history of colorectal cancer ranged from 5%[20] to 19%[1] in the 3 articles that reported it).

Race and/or Ethnicity

The reported race and/or ethnicity of study samples indicated homogeneity across the included articles. Nineteen articles included populations that were >77% White.[1,2,6,8,9,11-14,16,18,19,21-25,27,28] Three included articles reported that <40% of the study population was White, one of which was 100% Chinese ancestry;[17] one was 100% Black;[7] and the other reported 13-19% "African-American", 7% "Native Hawaiian", 28-30% "Japanese American"; 21-24% "Latino", with about 25-26% "White".[10] Seven of the articles did not report the race or ethnicity of their populations,[3-5,15,20,26,29] and were conducted in the following populations: Dutch,[15,20] Spanish,[3], Canadian,[26] or Danish.[29].

Socioeconomic position (SEP)

Variability in participants' SEP was demonstrated among the articles reporting such information. Nine articles did not report an indication of socioeconomic position,[1,10-12,19,23-25,28] however, 7 of those articles used data from populations of 100% health professionals.[1,11,12,23-25,28] Education was the most commonly-reported indicator of socioeconomic position, but income, socioeconomic status (e.g. Townsend index), occupation status, and/or cohabitation status were also reported. Populations with high education or employment status were represented in 10 articles,[1,2,11,12,14,16,23-25,28] low education or household income in 3 articles,[3,4,8] or mixed socioeconomic position in 14 articles represented by household income, education, occupation, or Townsend index.[5-7,9,13,15,17,18,20-22,26,27,29]

Intervention/Exposure and Comparator

Dietary patterns consumption was examined among participants whose mean ages ranged from 44 years[5] to 65.5 years[16]. The majority of articles assessed dietary intake multiple times throughout the course of study,[1-3,5-9,11-14,16,18,21-25,28] however ,12 of those only used a single measure in their analysis.[2,3,7,9,11,13,16,18,22-25] Nine articles only collected and used dietary data from a single collection at baseline.[4,10,15,17,19,20,26,27,29] Therefore, the majority of analyses were based on a single measure of dietary intake. The most common diet assessment method used was FFQ (n=21),[1-3,7,9-12,15-17,19-21,23-29] followed by 24-hour dietary recall (n=7),[5,6,8,13,14,18,22] and diet history questionnaires (n=1).[4]

Dietary pattern methods included:

- Index/Score analysis: n=25[2,3,5-13,15-25,27-29]
- Factor/Cluster: n=3[1,4,26]
- Reduced Rank Regression: n=2[14,26]

A visualization of all dietary pattern components in each dietary pattern examined in relation to outcomes of interest is available in **Appendix 6**.

Outcomes

Methods used to assess incident cases of colorectal cancer varied across the articles. Thirteen articles initially identified cases using self-report, then confirmed cases using the national death index, medical records or pathology reports, health insurance and mortality registries.[1,5,7,9,11,12,16,19,23-25,27,28] The remaining articles determined incident cases using linkages to cancer, death, or health registries, medical or hospital records, national health services[2-4,6,10,13,15,17,18,20-22,26,29], or did not report their methods.[8,14]

All but one of the included articles reported risk of overall colorectal cancer,[1-25,27-29] and many studies also reported risk of colon cancer (n=9)[2,6,8,9,11,17,20,26,29] and risk of rectal cancer (n=13).[2,4,6,8,10,11,13,17,19,20,24,28,29]

Synthesis of the evidence

Across the body of evidence, reported results supported two general directions of results, regardless of statistical significance, and with minor variation in magnitude of effect estimates. In 21 articles,[2-5,8-11,13,15-17,19,21-23,25-29] dietary patterns related to lower risk of colorectal cancer were generally characterized by higher intakes of: vegetables, fruits, legumes and nuts, whole grains, fish, unsaturated fats; and lower intakes of: red and processed meats, refined grains, sugar-sweetened foods and beverages. In 15 articles[1,4,7,9,11-14,18,22-26,28] dietary patterns related to higher risk of colorectal cancer were generally characterized by higher intakes of: red and processed meats, fried potatoes, refined grains, sugar-sweetened foods and beverages; and lower intakes of vegetables, fruit, legumes and nuts, whole grains, tea and coffee.

When synthesized together and oriented as evidence for a relationship with lower risk of colorectal cancer, the patterns shared similar direction of findings and magnitude of effect estimates in 66 comparisons from 27 articles and were generally characterized by higher intakes of vegetables, fruits, legumes and nuts, whole grains, and lower intakes of red and processed meats, refined grains, fried potatoes, saturated fat, and sugar-sweetened foods and beverages. Some of these dietary patterns also included fish, low-fat dairy, tea and coffee. While half of the dietary pattern comparisons from 12 of those articles reported results that were not statistically significant, they were consistent in direction and dietary pattern components and supported the overall findings described above.[3,4,7,11,15-17,21,22,25,26,28]

A subset of articles reported results between dietary patterns and colon cancer (n=9)[2,6,8,9,11,17,20,26,29] and rectal cancers (n=13)[2,4,6,8,10,11,13,17,19,20,24,28,29] separately. While results for these sub-categories were typically less statistically significant, less consistent in direction across quartiles, and had wider confidence intervals, results tended to be in the same direction as overall results.

Most of these dietary patterns included fish as a contributor to these dietary patterns, and while it was included as a positive component in many patterns associated with lower risk of colorectal cancer, it was also included as a positive component in many patterns that were associated with higher risk of colorectal cancer. Dairy and/or milk products were often included but considered differently across these dietary patterns, such as with total dairy and/or milk products scored as a negative component compared to specifically scoring low-fat dairy positively. Tea and/or coffee was included as a positive component in many of the comparisons of the same dietary patterns, but it was unclear how much they were contributing to the overall relationship. The methods and labels for these dietary patterns varied across the body of evidence, including a priori indices or scores as well as posteriori or hybrid methods (e.g., factor analysis and reduced rank regression) across observational studies.

Dietary patterns derived from various indices/scores were used in the majority articles, which reported similar results despite variation in the name, label, or style of dietary pattern (e.g., Mediterranean, dietary guideline-related, “Plant-based”, or other).

- Dietary Guidelines-related scores (e.g., Healthy Eating Index) were examined in 8 articles[2,3,7,9,16,17,21,25] and associated with a statistically significant lower risk of colorectal cancer in 2 articles.[2,9] While results were not statistically significant, 5 out of 8 articles reported results in a consistent direction of an inverse relationship between Dietary Guidelines-related scores and colorectal cancer. These articles generally scored the following dietary pattern components positively: vegetables (not potatoes, French fries), fruit, legumes and nuts, whole grains; and negatively: added sugars/sugar-sweetened beverages, red and processed meats.

- Country-specific dietary patterns scores were examined in 3 articles, including adherence to the Dutch Dietary Guidelines (n=2),[15,29] and to the Programme National Nutrition Santé Guidelines Score in France (n=1).[5]. Adherence to these county-specific dietary pattern scores were associated with lower risk of colorectal cancer in 2 of the 3 articles,[5,29] while the other reported a result in the same direction, however it was not statistically significant.[15]. These scores generally scored the following positively: vegetables, fruit, legumes, whole grains; and negatively: meats (all, red, and/or processed).

- Plant-based dietary patterns were assessed in 8 articles including the Plant-Based Diet Index (PDI),[10,11,13,25,28] PDI healthful (hPDI),[11,13,21-23,25,28] PDI unhealthful (uPDI)[11,13,22,23,25,28] and modifications.

    - Two of 5 analyses reported an association with a PDI or modified PDI pattern and lower risk of colorectal cancer,[10,13] while 1 other reported a non-significant result in the same direction.[25] The other 2 analyses reported no relationship between PDI or modified PDI pattern and colorectal cancer.[11,28] PDI patterns generally shared the following components: positively coded: vegetables; fruits; nuts; legumes; whole grains; vegetable oils; tea and coffee; fruit juices; sugar-sweetened beverages; refined grains; potatoes; sweets/desserts; negative: animal fats; dairy; eggs, fish/seafood; meat (poultry and red meat); miscellaneous animal-based foods.

    - Three of 8 analyses reported an association with a healthful PDI pattern and lower risk of colorectal cancer,[13,21,23] with the 5 other analyses reported a non-significant result in the same general direction.[10,11,22,25,28] Healthful PDI patterns generally shared the following components: positively coded: vegetables; fruits; nuts; legumes; whole grains; vegetable oils; tea and coffee; negative: fruit juices; sugar-sweetened beverages; refined grains; potatoes; sweets/desserts; animal fats; dairy; eggs, fish/seafood; meat (poultry and red meat); miscellaneous animal-based foods.

    - Three of 7 analyses reported an association with an unhealthful PDI pattern and higher risk of colorectal cancer,[11,13,23] while 2 others reported non-significant associations in the same direction.[22,25] Unhealthful PDI: positively coded: fruit juices; sugar-sweetened beverages; refined grains; potatoes; sweets/desserts; negative: whole grains; fruits; vegetables; nuts; legumes; vegetable oils; tea and coffee; animal fats; dairy; eggs, fish/seafood; meat (poultry and red meat); miscellaneous animal-based foods.

- Five articles assessed empirical dietary index for hyperinsulinemia (EDIH) or empirical dietary inflammatory pattern (EDIP).[9,12,21,25,28] Seven out of 8 analyses reported an association with the EDIH or EDIP pattern and higher risk of colorectal cancer.[9,12,25,28] The other analyses report no association between an EDIP pattern and colorectal cancer.[21]

    - EDIH pattern generally shared the following components positively scored: red meat; processed meat; poultry; tomatoes; french fries, fish (non-dark); low-fat dairy; eggs; high-energy beverages (cola and other carbonated beverages with sugar, fruit drinks); low-energy beverages; margarine; cream soups; negative: green leafy vegetables; whole fruit; high-fat dairy products; coffee; wine.

    - EDIP pattern generally shared the following components and is reverse coded: positively scored (anti-inflammatory): vegetables (dark yellow: carrots, or squash), vegetables (leafy green: cabbage, spinach, lettuce); fruit juice (apple, cantaloupe, orange, or other fruit juice); pizza; snacks (cracker, potato chips); tea; coffee. negatively scored (pro-inflammatory): vegetables, other: mixed, green pepper, cooked mushroom, eggplant, zucchini, or cucumber); processed meat (sausage); red meat (beef, or lamb); organ meat (beef, calf, or chicken liver), fish, canned tuna; refined grains (white bread, biscuit, white rice, pasta, or vermicelli); high- and low-energy beverages (cola with sugar, carbonated beverages with sugar, fruit punch drinks); tomatoes.

- Cancer specific dietary patterns were assessed in 4 articles including WCFR/AICR scores,[8,15,20,25] American Cancer Society Index,[15] and a colorectal cancer dietary score.[25] Two articles reported an inverse association between cancer specific dietary patterns and risk of colorectal cancer.[8,15] Two articles reported non-significant results that were generally in a similar direction.[15,25] A case-cohort analysis reported no association between WCFR/AICR score and colorectal cancer. Dietary patterns generally shared the following components positively scored: vegetables; fruit; whole grains; dietary fiber; negative: red and processed meat; sugar sweetened beverages; alcohol; sodium; energy-dense foods

- "Mediterranean" dietary pattern scores were assessed in 4 articles and no clear direction of effect was reported with risk of colorectal cancer.[4,20,21,25] Three articles reported results in an inverse direction with mediterranean dietary pattern scores and lower risk of colorectal cancer, but were not statistically significant.[4,21,25] Dietary patterns shared the following components positively scored: vegetables (not potatoes), fruit, legumes, nuts, fish, and unsaturated vegetable oils/fats; positive in moderation: alcoholic beverages; and negatively scored: red and processed meat, sugar-sweetened beverages.

- 'DASH' style scores were examined in 2 articles[17,25] in which 1 article reported a statistically significant association with a lower risk of colorectal cancer.[17] The other article was not significant, but reported consistent results in an inverse direction.[25] "DASH"-style indices that similarly scored the following components positively: vegetables (not potatoes and legumes); nuts and legumes; fruit and fruit juice; whole grains; low-fat dairy; and negatively: red and processed meat; sugar-sweetened beverages; sodium. The study that reported significant associations with colorectal cancer modified the DASH dietary pattern by removing whole grains, and sugar-sweetened beverages and included all Dairy comparted to only low-fat.[17]

- Patterns focused on ultra-processed foods using the Nova classification were reported in 2 articles with mixed results.[6,24] One article reported a positive association between a dietary pattern with higher Nova classification with higher risk of colorectal cancer,[24] while the other article reported no association.[6]

- Other index/score analyses were examined in 7 articles including the Global Diet Quality Score or Prime Diet Quality Score (healthy and unhealthy),[25,28] Lifelines Diet score,[15] Chinese Food Pagoda (CHFP),[17] Paleolithic Diet Score,[27] Dietary Risk Score,[18] and EAT-Lancet Reference Diet.[19] Out of 9 analyses, 3 reported an association between these other patterns and lower risk of colorectal cancer.[17,19,27] The remaining analyses reported no significant associations, however 5 were in a similar direction.[15,19,25,28]. Generally, these scores commonly scored the following components positively: vegetables, fruit, legumes, nuts and seeds, whole grains, fish and shellfish; poultry and game; low-fat dairy; eggs; oils (liquid). negative: meat; refined grains; sweets; sugar-sweetened beverages and juice; purchased deep fried foods; neutral (moderate): high-fat dairy; red meat. One article reported results in the opposite direction that the Dietary Risk Score was associated with a higher risk of colorectal cancer.[18] This was expected as it positively scored: red meat; processed meat; whole-milk; spread (butter, other/ margarine, and/or flora pro-active/benecol); salt added to food; negative: vegetables and fruit; cereals; total fish; water.

Dietary patterns examined by factor/cluster analysis or reduced-rank regression were examined in 4 articles. [26] Though patterns varied, dietary patterns higher in the following components (unprocessed red meat; processed meat; and high fat dairy food; refined grains; and sweets) were associated with higher risk of colorectal cancer in 3 articles [4,25,26]. Dietary patterns commonly higher in vegetables, fruits, and whole grains tended to be associated with a lower risk of colorectal cancer in 3 articles, but results were not statistically significant. The other remaining factor/cluster analysis or reduced-rank regression analyses had mixed results.[4,14,26]

Conclusion statement and grade

The 2025 Dietary Guidelines Advisory Committee updated the existing conclusion statement[*†] (**Appendix 2**) to answer the question, "What is the relationship between dietary patterns consumed and risk of colorectal cancer?" based on their review of the body of evidence on adults and older adults from an additional 29 articles that met inclusion criteria and were published between January 2020 and January 2024 (**Table 5**).

Table 5. Conclusion statement, grades for dietary patterns consumed by adults and older adults and risk of colorectal cancer

Conclusion Statement	Dietary patterns consumed by adults and older adults that are characterized by higher intakes of vegetables, fruits, legumes and nuts, and whole grains, and lower intakes of red and processed meats, refined grains, fried potatoes, saturated fat, and sugar-sweetened foods and beverages are associated with lower risk of colon and rectal cancer. Some of these dietary patterns also included fish, low-fat dairy, tea and coffee. This conclusion statement is based on evidence graded as moderate.
Grade	Moderate
Body of Evidence	29 included articles (27 PCS, 2 case-cohort studies) assessed as they relate to the evidence in the existing review[†] (46 articles)
Consistency	A few concerns with variability with the magnitude of results and minimal concerns with variability in the direction of results.
Precision	Some concerns with studies reporting wider confidence intervals across effect estimates.
Risk of bias	Some concerns with higher risk of bias, primarily due to confounding, the exposure only being measured one time, and the selection of the reported results.
Directness	A few concerns with exposure, comparators, and outcomes being examined that were directly related to the systematic review question.
Generalizability	Some concerns with generalizability to the U.S. population due to lack of diversity in race and/or ethnicity.

Assessment of the evidence

The body of evidence underlying the conclusion statement includes 29 articles published since 2020, assessed as they relate to the evidence included in the existing review.[†] Dietary patterns were assessed using various analytic approaches, including an investigator-assigned dietary intervention, index/score analysis, factor/cluster analysis, and reduced rank regression. Incident cases of colorectal cancer was determined from various methods including self-report, registry linkage, medical and hospital records, death records or indices, and insurance databases. As outlined and described below, the body of evidence was assessed for the following elements used when grading the strength of evidence. This body of evidence includes both large and small studies (with significant as well as null findings) so publication bias may be less likely.

[*] A conclusion statement is carefully constructed, based on the evidence reviewed, to answer the systematic review question. A conclusion statement does not draw implications and should not be interpreted as dietary guidance.

[†] Boushey C, Ard J, Bazzano L, Heymsfield S, Mayer-Davis E, Sabaté J, Snetselaar L, Van Horn L, Schneeman B, English LK, Bates M, Callahan E, Butera G, Terry N, Obbagy J. Dietary Patterns and Breast, Colorectal, Lung, and Prostate Cancer: A Systematic Review. July 2020. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://doi.org/10.52570/NESR.DGAC2020.SR0104

Consistency

The findings were consistent in direction and magnitude of findings when oriented towards a lower risk of colorectal cancer. Twenty-one of 29 articles reported (15 statistically significant) associations between dietary patterns and lower risk of colorectal cancer. Fifteen of 29 articles reported (11 statistically significant) associations between dietary patterns and higher risk of colorectal cancer. When synthesized together lower risk of colorectal cancer was associated with patterns characterized by higher intakes of vegetables, fruits, legumes and nuts, whole grains, and lower intakes of red and processed meats, refined grains, fried potatoes, saturated fat, and sugar-sweetened foods and beverages. Within the 16 articles that reported only non-significant results, 12 articles reported results consistent in direction and food components as the significant results. Results for subcategories of risk of colon and rectal cancer subtypes were typically less significant and had greater heterogeneity, however, results tended to be in the same direction as overall results.

Precision

There were some concerns that the width of confident intervals varied across studies, with moderate to large variances. There was a total of 29 observational studies and the majority had large analytic sample sizes with a sufficient number of colorectal cancer cases

Risk of bias

There were numerous risks of bias across domains, which may influence the reported results (**Table 7**). Many of the studies did not account for colorectal cancer screening which was identified as a key confounder a priori. Many of the articles also may be at a higher risk of exposure classification due to only assessing dietary patterns at one time point and not accounting for potential diet changes over long periods of follow-up, or measuring habitual consumption using tools that more accurately measure acute dietary intake. Additionally, because many of the studies were observational, they didn't have pre-specified analytic plans and therefore tended to be at higher risk of bias for selection of reported results.

Directness

Studies and/or analyses were designed to directly examine the relationship between dietary patterns and risk of colorectal cancer outcomes.

Generalizability

Socioeconomic positions of participants varied across included articles and were likely generalizable to the U.S. population. The United States was the most represented country among the included articles (n= 13), however, there were some concerns with the generalizability of the racial and ethnic representation. The majority of participants across articles were White with less representation from diverse racial and/or ethnic groups which led to concerns with applicability to the U.S. population. Participants across the body of evidence represented a range of health disparities based on studies that reported such information, including a majority of participants without chronic disease as well as those with overweight, obesity, and variable family history of cancer. Outcomes examined in the body of evidence, including overall risk of colorectal cancer, colon cancer, and rectal cancer are relevant to the U.S. population of interest.

Research recommendations

- Examine populations that are generalizable to the U.S. population with regards to socioeconomic position and racial and/or ethnic groups.
- Adopt methodologic approaches for defining different dietary patterns such that patterns can be consistently identified, scored and compared across studies, including clearer description of foods and food components (e.g. low-fat dairy vs. dairy, red and processed meat vs total protein).

- Establish population studies starting earlier in life to better capture dietary patterns contributing to risk of colorectal cancer risk later in life.
- Assess associations of dietary patterns by sub-types of colorectal cancer defined by location within the colon, cancer genetics and other histopathologic characteristics.
- Collect and include information on the confounding contribution of colorectal cancer screening when assessing the relationship between dietary patterns and colorectal cancer.

Table 6. Evidence examining the relationship between dietary patterns consumed by adults and older adults and risk of colorectal cancer[a]

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
Arima, 2022 [1] United States; NHS; HPFS Analytic N=134775; NHS: 87326; HPFS: 47449 **Participant characteristics:** • Health: BMI, mean kg/m2: 25.3-26.3 (HPFS), 24.9-25.9 (NHS) • Family Hx CRC: 15-19% • Smoking, pack-years mean: 9-15.2 • Postmenopausal ~73-75% (NHS) • Race and/or Ethnicity: Predominantly Non-Hispanic White • SEP: NR; 100% health professionals Selection: Excluded those who had or with: Hx of Cx; Missing DP data; Implausible TEI; Hx of colitis	**DP Age(s):** 63 to 65y, mean HPFS; 60 to 63y, mean NHS (range: 30 to 75y at baseline) **DP(s) examined:** "Western" **DP Components:** • "Western": Higher loadings (coefficients >0.30) for: Potatoes; French Fries; Refined grains; Unprocessed red meat; Processed meat; Eggs; High fat dairy food; Desserts (cake, chocolate, candy bars; cookies; brownies, pie, pastries); Sugar-sweetened beverages; Condiments (soy sauce, red chili sauce, pepper, nondairy creamer, Worcestershire sauce); Butter; Mayonnaise; Margarine; Snacks (chips, popcorn, crackers); Pizza; Creamy soups • Top 3 loadings >0.50 were Unprocessed red meat; Processed meat; and High fat dairy food • T3 vs. T1 intakes were higher in Unprocessed red meat; Processed meat; Alcohol (only HPFS); Similar in Vegetables; Fruit; Poultry [IDairy intakes NR] **DP Method(s)**: Factor/Cluster Analysis: PCA **Comparisons:** Categorical, tertiles	**Follow-Up Duration:** NR, ~ 30y **Results for Overall CRC:** "Western" DP & Incident CRC, T1, HR: 1 REF T2, HR: 0.98, 95 % CI: 0.88, 1.09 T3, HR: 1.14, 95 %CI: 1.01, 1.29 p-trend=0.01 **Summary:** Positive: "Western" DP & CRC	• **Did not account for:** Race/Ethnicity, SEP, TEI • **Diet assessment:** FFQ every 4y • **Outcome measurement**: Incident cases determined by self-report, NDI; Tumor location and Dz stage from medical records & study physician; Both colon and rectal carcinomas included based on colorectal continuum model; • n=3200 incident CRC cases; Secondary analysis by bacteria status reported in subset of n=1175 cases • **Funding:** NIH; American Association for Cancer Research (Stand Up 2 Cancer Partner); Project P Fund, The Friends of the Dana-Farber Cancer Institute, Bennett Family Fund, and the Entertainment Industry Foundation through the National Colorectal Cancer Research Alliance

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	of "Western" DP with T1, HR: 1 REF		
Arthur, 2023 [2] Canada; Canadian Study of Diet, Lifestyle and Health (CSDLH) Analytic N=5594; 573 cases, 5021 subcohort members (2225 men, 2796 women). **Participant characteristics:** • Health: BMI, mean kg/m2: 25.1 cases; 24.4 subcohort • Current smoker: 6% cases and 6% subcohort • Race and/or Ethnicity: ~97% White • SEP: Education: ~40% graduate school • Selection: Excluded those who had or with: Hx of Cx; Unusual TEI; Included primarily university alumni (small amount from Cancadian Cancer Society). Sensitivity analysis excluded first 2y FU: attenuated results but still SS.	**DP Age(s):** ~65y, mean at baseline (65.1 cases; 65.4y subcohort) **DP(s) examined:** Healthy Eating Index (HEI-2015) [Krebs-Smith 2018] **DP Components:** • HEI-2015: Positive: Total Vegetables; Greens and Beans; Total Fruit; Whole Fruit; Whole Grains; Seafood and Plant Proteins; Total Protein Foods; Dairy; PUFA+MUFA/SFA. Negative: Refined Grains; Added Sugars; SFA; Sodium **DP Method(s)**: Index/Score Analysis **Comparisons:** Categorical, quintiles of HEI with Q1, HR: 1 REF	**Follow-Up Duration:** 7 y (cases) to 13y (subcohort), median (IQRs: 4 to 16) **Results for Overall CRC:** HEI-2015 & CRC, HR (95% CI), Q1, HR: 1 as REF ♀+♂, Overall Q2, 0.75 (0.58, 0.97) Q3, 0.92 (0.72, 1.18) Q4, 0.96 (0.75, 1.23) Q5, 0.65 (0.49, 0.85) P-trend=0.056 Sex-stratified results Overall ♂Q2, 0.73 (0.51, 1.04) ♂Q3, 0.74 (0.52, 1.04) ♂Q4, 0.99 (0.71, 1.37) ♂Q5, 0.56 (0.38, 0.81) P-trend: 0.041 ♀Q2, 0.86 (0.57, 1.29) ♀Q3, 1.22 (0.82, 1.81) ♀Q4, 1.07 (0.72, 1.59) ♀Q5, 0.88 (0.58, 1.34) P-trend: 0.902 P-intx: 0.029	• **Did not account for:** Race/Ethnicity (97% White), Screening • **Diet assessment:** FFQ at baseline (verified sub-set that completed additional FFQ and 24-h recall) • **Outcome measurement**: Incident cases determined by record linkage to the Canadian Cancer Registry (CCR) and to the Ontario Cancer Registry • **Funding:** NR

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
		Summary: Inverse: HEI-2015 & overall CRC; Colon; Distal Colon; NS/Inverse: HEI & Proximal colon; Rectum Interaction with sex: HEI-2015 & overall CRC; Colon;	
Barrubés, 2020 [3] Spain; PREvencion con DIeta MEDiterranea (PREDIMED) Analytic N=7216 **Participant characteristics:** • Health: BMI, mean: 29.7; 100% high-CMR; • 83% HTN; 49% DM; Smokers: 62% never, 25% former, 14% current; 49% Family Hx of Cx; 22% Aspirin users; 3% HRT (♀) • Race and/or Ethnicity: NR (Spanish) • SEP: Education: 7% university+; 93% high school or less • Selection: Excluded those with or who had: severe Chronic Dz; malignant tumor Dz in last 5y; alcohol or drug abuse, allergy to nuts/olive oil; BMI=40+; implausible/extreme TEI; incomplete or missing FFQ at baseline Selected those at high risk of CVD.	**DP Age(s):** 67y, median (IQR: 62-72); range: 55 to 80y **DP(s) examined:** Alternative HEI (AHEI)-2010 [Chiuve, 2012] **DP Components:** • AHEI-2010: Positive: Vegetables (not potatoes); Fruit; Legumes and Nuts; Whole Grains; Long-Chain Fats (EPA + DHA); PUFA. Negative: Red and Processed Meat; Sugar Sweetened Beverages and Fruit Juice; Trans FA; Sodium. Neutral: Alcohol **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous, AHEI-2010 score	**Follow-Up Duration:** 6.0y, median **Results for Overall CRC:** AHEI-2010 & CRC, HR: 0.81, 95% CI: 0.52, 1.27; p=0.362 **Summary:** NS/Inverse: AHEI-2010 & CRC	• **Did not account for:** Race/ethnicity (Spanish); Screening • **Diet assessment:** FFQ at baseline (verified sub-set from RCT) • **Outcome measurement**: Incident cases/events defined by ICD and based on first invasive CRC, histological exam to confirm, and events from medical records and NDI (reviewed by blinded physicians/researchers) • **Funding:** Spanish Instituto de Salud Carlos III (ISCIII)/CIBEROBN (the Centro de Investigac on Biomedica en Red de Fisiopatologıa de la Obesidad y Nutricion), which are funded by FEDER/Spanish Government; Centro Nacional de Investigaciones Cardiovasculares (CNIC); Fondo de Investigaciones Sanitarias; Ministerio de Ciencia e Innovacion; Autonomous Govt. of Catalonia; Navarra Regional Govt.; Fundacion Patrimonio Comunal Olivarero, California Walnut Commission, Borges SA, and Morella Nuts
Castelló, 2022 [4] Spain; European Prospective Investigation into Cancer and Nutrition (EPIC)-Spain	**DP Age(s):** 46 to 51y (median) at entry (range: 29 to 69y) **DP(s) examined:** "Western" DP	**Follow-Up Duration:** 16.98y, median (cases, 10.5y; deaths 11.1y) **Results for Overall CRC:** Western DP & CRC, HR (95% CI)	• **Did not account for:** Race/Ethnicity, Screening • **Diet assessment:** Diet Hx questionnaire • **Outcome measurement**: Incident

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
Analytic N=40898 **Participant characteristics:** • Health: BMI, mean: ~27.4-28.2; • Smokers: 47-65% never • Race and/or Ethnicity: NR • SEP: Education: majority < secondary/high-school (30-40% none, 37-41% primary, 12-17% secondary, 8-16% univesity+) Selection: Excluded those with or who had: BMI of 60+; implausible/extreme TEI; first y of F/U; males	"Prudent" DP "Mediterranean" DP **DP Components:** • "Western" DP: high intakes of high-fat dairy products, processed meat, refined grains, sweets, caloric drinks, convenience food and sauces [e.g., crackers, snacks, egg derivatives; processed white/blue fish]; Low intakes of low-fat dairy products and whole grains; • "Prudent" DP: high intakes of low-fat dairy products, vegetables, fruits, whole grains and [veg./fruit] juices • "Mediterranean" DP: high intakes of fish, vegetables, legumes [Peas, lentils, chickpeas, beans and broad beans], boiled potatoes, fruits, olives, and vegetable oil; Low intake of [veg./fruit] juices **DP Method(s)**: Factor/Cluster Analysis: PCA **Comparisons:** Continuous (per-SD) of each DP (Western; Prudent; Med)and categorical by quartiles with Q1, HR: 1 REF	overall CRC, F/U > 1y Q2, HR: 1.30 (1.02, 1.66) Q3, HR: 1.47 (1.16, 1.87) Q4, HR: 1.51 (1.18, 1.93) p-trend=0.001 per-SD, HR: 1.15 (1.05, 1.25) overall CRC in Y1-Y10 F/U Q2, HR: 1.28 (0.85, 1.91) Q3, HR: 1.24 (0.81, 1.89) Q4, HR: 1.53 (0.99, 2.36) p-trend=0.087 per-SD, HR: 1.17 (0.99, 1.37) Prudent DP & CRC overall CRC, F/U > 1y Q2, HR: 0.84 (0.67, 1.06) Q3, HR: 0.79 (0.62, 1.00) Q4, HR: 0.83 (0.65, 1.05) p-trend=0.092 per-SD, HR: 0.92 (0.85, 1.01) overall CRC in Y1-Y10 F/U Q2, HR: 0.58 (0.39, 0.86) Q3, HR: 0.73 (0.50, 1.07) Q4, HR: 0.85 (0.57, 1.25) p-trend=0.547 per-SD, HR: 0.94 (0.81, 1.09) Mediterranean DP & CRC	cases identified by cancer and registry linkage; definined by ICD via first occurrence of primary malignant tumor of colon (Proximal of splenic flexure: cecum, ascending, transverse; Distal: descending; sigmoid) or rectum (at recto sigmoid junction or rectum); Tumors with overlapping lesions or non-specified locations were excluded from sub-type analyses; • n=568 cases CRC identified • **Funding:** Alcala de Henares and Autonomous community of Madrid; International Agency for Research on Cancer (IARC); Department of Epidemiology and Biostatistics, School of Public Health, Imperial College London; Health Research Fund (FIS)—Instituto de Salud Carlos III (ISCIII), the Regional Governments of Andalucía, Asturias, Basque Country, Murcia and Navarra, and the Catalan Institute of Oncology—ICO (Spain)

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
		overall CRC, F/U > 1y Q2, HR: 0.91 (0.71, 1.15) Q3, HR: 0.98 (0.77, 1.24) Q4, HR: 1.19 (0.94, 1.50) p-trend=0.107 per-SD, HR: 1.05 (0.96, 1.14) overall CRC in Y1-Y10 F/U Q2, HR: 0.81 (0.55, 1.18) Q3, HR: 0.69 (0.46, 1.02) Q4, HR: 0.78 (0.52, 1.16) p-trend=0.165 per-SD, HR: 0.84 (0.73, 0.98) **Summary:** Positive: "Western" DP & overall CRC (F/U >1y; NS/Positive: F/U Y1-Y10); NS/Positive: Proximal; Distal; Rectum NS/Inverse (no clear/consistent effects): "Prudent" DP & overall CRC (F/U >1y or Y1-Y10); Proximal; Distal; Rectum Inverse: Meditteranean DP & Distal CRC (♂); NS/Inverse (no clear/consistent effects):"Mediterranean" DP & overall CRC; Proximal; Rectum (F/U >1y or Y1-Y10)	
Chaltiel, 2022 [5] France; NutriNet-Santé Analytic N=75634 **Participant characteristics:** • Health: BMI, mean: 23.8	**DP Age(s):** 44y, mean (SD: 14.6) **DP(s) examined:** Programme National Nutrition Santé Guidelines Score (PNNS-GS2) **DP Components:**	**Follow-Up Duration:** 6.7y, median **Results for Overall CRC:** PNNS-GS2 & CRC, HR (95% CI) T2, HR: 1.18 (0.82, 1.69)	• **Did not account for:** Race/Ethnicity, Screening • • **Diet assessment:** 24-hr recalls, ≥3 in first 2y of F/U

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
• 24% HRT • Race and/or Ethnicity: NR • SEP: HH Income: 45% low, 27% low-mid, 28% mid, 28% high • Education: 65% university, 34% secondary, 1% primary or less • Cohabitation: 72% cohabitating; 28% living alone • Most common occupation status: 24% managerial, 20% retired (<20% each: employees, intermediate profession, unemployed, student, famer/self-employed, manual worker) Selection: Excluded those with or who: were under-reporters; missing diet/covariate data; prevalent Cx	• PNNS-GS2, Positive: Vegetables and Fruit; Fish and Seafood; Vegetable Fat. Negative: Sweetened Foods; Soda (drink water); Added Fat; Salt. Neutral: Bread, Cereals, Potatoes, and Legumes; Meat and Poultry; Fatty Fish; Eggs; Milk and Dairy Products; Alcohol **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous (per-1=pt and per-SD increment) and categorical by tertiles with T1, HR: 1 REF	T3, HR: 0.66 (0.43, 1.01) per-1-pt, HR: 0.94 (0.89, 0.99) per-SD, HR: 0.82 (0.69, 0.98) P= 0.03 **Summary:** Inverse: PNNS-GS2 & CRCx	• **Outcome measurement**: Incident cases identified by self-report then verified by physician with medical records and validated by panel and/or linkage with health insurance and mortality registries; Cx defined by ICD codes • CRCx, n=56; BCx, n=239 • **Funding:** Ministère de la Santé, Santé Publique France, Institut National de la Santé et de la Recherche Médicale (INSERM), Institut national de recherche pour l'agriculture, l'alimentation et l'environnement (INRAe), Conservatoire National des Arts et Métiers (CNAM) and Université Sorbonne Paris Nord
Chang, 2023 [6] United Kingdom; UK BIOBANK Analytic N=197426 **Participant characteristics:** • Health: BMI, OW: 41%; Ob 21%; Normal, 37%; • 4% CVD; 4% DM; 26% High-BP; Smokers: 57% never; 36% Family Hx of Cx; 37% HRT "ever" (♀) • Race and/or Ethnicity: 95% White, 0.5% Mixed; 1.4% South Asian; 1.2% Black; 1% Chinese or other • SEP: Education: 43% university/college (13% A/AS; 25% O; 10% vocational; 8% not listed) Selection: Excluded those with or who: were pregnant/unsure, implausible/extreme TEI; <1 24-hr recall; pre-existing Cx	**DP Age(s):** 58y, mean (SD: 8) (40-69y at baseline) **DP(s) examined:** UPF, Nova Classification System Group 4 [Monteiro, 2019] **DP Components:** • UPF, Nova4 (Table 1, Q4 > Q1 intakes): Higher intakes of Processed Meat; Total Fat; Total Carbohydrates; Total Sodium; Lower intakes of Vegetables; Fruit; Red Meat; Alcohol • UPF, Nova4 (Fig. 1 top sources): Carbonated drinks; Fruit-based drinks; Ready-to-eat/heat foods; Industrial-processed breads; Dairy-based drinks; Pastries, buns, cakes;	**Follow-Up Duration:** 9.8y, median **Results for Overall CRC:** Nova 4 & CRC, HR (95% CI) per-10%, HR: 1.02 (0.97, 1.06) Q2, HR: 1.03 (0.89, 1.20) Q3, HR: 1.01 (0.86, 1.18) Q4, HR: 1.05 (0.89, 1.24) p-trend=0.59 **Summary:** NS/Null: Nova 4 & CRC, Colon, Rectum	• **Did not account for:** Screening • **Diet assessment:** 24-hr recalls, web-based (1 to 6) • **Outcome measurement**: Incident cases identified by cancer and registry linkage; Cx defined by ICD codes • n= 15921 Cx cases identified (BC: n=3030; CRC: n=1670, Color n=1091, rectum n=579) • **Funding:**

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Sausage and other reconstituted meat products; Other beverages; Industrial-processed desserts; Sauces and spreads; Biscuits; Breakfast cereals; Confectionary; Packaged salty snacks; Alcoholic drinks; Sweeteners; Meat alternatives; Lower in Tea, Coffee; Fruit, Vegetables; Fruit juice; Beer and Wine; Cheese **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous (per-10% increment in UPF) and categorical by quartiles with Q1, HR: 1 REF		
Chebet, 2020 [7] United States; Women's Health Initiative, WHI Analytic N=9886 **Participant characteristics:** • Health: BMI, mean: 31.1; OW: ~60%, Ob: 24% • Smokers: 50% never • Race and/or Ethnicity: 100% Black • SEP: HH Income: 86% ≤ $74,999/y; Education: 75% college (some or degree) or higher • Selection: Excluded those with or who had: severe clinical conditions (incl. Cx); predicted short survival, males, non-Black, unknown BMI, implausible TEI; incomplete or missing data (diet, PA, SEP, smoking, F/U)	**DP Age(s):** 50 to 59y, ~40%; 60 to 69y, ~43%; 70 to 79y, ~16% **DP(s) examined:** Healthy Eating Index (HEI-2015) [Krebs-Smith 2018] **DP Components:** • HEI-2015: Positive: Total Vegetables; Greens and Beans; Total Fruit; Whole Fruit; Whole Grains; Seafood and Plant Proteins; Total Protein Foods; Dairy; PUFA+MUFA/SFA. Negative: Refined Grains; Added Sugars; SFA; Sodium **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous (per-10-pt) and categorical by tertiles with T1, HR: 1 REF	**Follow-Up Duration:** 13y, mean **Results for Overall CRC:** HEI-2015 & CRC, HR: 1.13, 95% CI: 0.94, 1.36 **Summary:** NS/Positive: HEI-2015 & CRC	• **Did not account for:** Screening • **Diet assessment:** FFQ (verified sub-set with RCT) • **Outcome measurement**: Incident cases identified by self-report, verified by physicians and/or medical records, NDI if LFU; Cx defined by ICD codes; • BC cases identified: n=500; CRC cases identified: n=197) • **Funding:** NIH: NCI, NHLBI

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
Hoang, 2023 [8] United Kingdom; UK BIOBANK Analytic N=374004 **Participant characteristics:** • Health: BMI, OW: 43%, Ob: 24% • Race and/or Ethnicity: 100% White British • SEP: HH Income: 41% Low (31K); 23% Low-Mid (31K-<52K); 22% High (52K+); 14% missing Selection: Excluded those with or who: missing genetic info, sex discordance, chromosome aneuploidy, were not White British, existing Cx	**DP Age(s):** 56.6y, mean (SD: 8) **DP(s) examined:** simplified WCRF/AICR Score (2018) - Diet Only [Choi, 2021 and Kaluza, 2020 modified Romaguera 2012] **DP Components:** • simplified WCRF/AICR-diet only, Positive: Non-starchy Vegetables, Fruit, Beans, and Whole grains; Dietary Fiber. Negative: Red and Processed Meat; Sugar-sweetened Drinks; Alcohol; Energy-Dense and "Fast" Foods (high in starch, fat, added sugar) • **DP Method(s)**: Index/Score Analysis **Comparisons:** Categorical: Low WCRF (score 0-1) vs. high WCRF (2-3) HR: 1, REF	**Follow-Up Duration:** 12.4y, median **Results for Overall CRC:** WCRF (Low (0-1) vs. high (2-3)) & Overall CRC: ♀+♂, HR: 1.12, 95% CI: 1.05, 1.19 ♂, HR: 1.18, 95% CI: 1.12, 1.31 ♀, HR: 1.02, 95% CI: 0.93, 1.12 IV-weighted WCRF & Overall CRC: ♀+♂,-2.88 to <1.09, HR: 1.14, 95% CI: 1.06, 1.23 ♀+♂, 1.09 to 13.02, HR: 1.27, 95% CI: 1.18, 1.37; p-trend<0.001 ♂, -2.88 to <1.09, HR: 1.26, 95% CI: 1.13, 1.40 ♂, 1.09 to 13.02, HR: 1.42, 95% CI: 1.28, 1.57; p-trend<0.001 ♀, -2.88 to <1.09, HR: 1.04, 95% CI: 0.93, 1.15 ♀, 1.09 to 13.02, HR: 1.11, 95% CI: 0.99, 1.24; p-trend=0.09 **Summary:** Inverse: WCRF & CRC	• **Did not account for:** SEP (not indicated in tables but indicated in methods text); Screening • **Diet assessment:** 24-hr recalls, web-based • **Outcome measurement**: NR, Cx defined by ICD codes • n=4684 cases of CRC identified • **Funding:** National Research Foundation of Korea (NRF)
Jin, 2023 [9] United States; Women's Health Initiative, Dietary Modification (WHI-DM) Trial Analytic N=112468 **Participant characteristics:** • Health: BMI, mean: 26-30; 33-35% OW; 18-40% Ob across DP quintiles • 100% postmenopausal; Smokers:	**DP Age(s):** 50 to 59y, ~40%; 60 to 69y, ~43%; 70 to 79y, ~16% **DP(s) examined:** Empirical Dietary Indices for Hyperinsulinaemia (EDIH) [Tabung, 2016] Empirical Dietary Inflammatory Pattern (EDIP) [Tabung, 2016]	**Follow-Up Duration:** 17.8y, median **Results for Overall CRC:** Overall CRC EDIH Q2, HR: 1.06(0.89,1.24) Q3, HR: 1.29(1.10,1.52) Q4, HR: 1.05(0.88,1.25)	• **Did not account for:** Screening (BC only) • • **Diet assessment:** FFQ (verified sub-set with RCT) • **Outcome measurement**: Incident cases identified by self-report, verified by physicians and/or medical records, NDI if LFU; Cx defined by ICD codes; Sub-types of BC defined

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
5-13% current; 12-14% use Aspirin/NSAIDs • Race and/or Ethnicity: ~ 77-92% "White", 4-16% "Black", 2.5-8% "Hispanic/Latino",1.3-5% "Asian/Pacific Islander", 1-2% Other, < 1% "American Indian or Alaska Native" • SEP: Education: ~28-51% ≥ 4y of college; ~46-62% high-school or less Selection: Excluded those with or who: were in the DM arm; existing Cx; implausible/missing/extreme TEI/BMI; incomplete or missing FFQ at baseline; 4y lag or lower GI Dz (e.g., Chron's); missing outcome	Healthy Eating Index (HEI-2015) [Krebs-Smith 2018] **DP Components:** • EDIH: Positive: Red meat; Processed meat; Poultry; Tomatoes; French fries, Fish (non-dark); Low-fat dairy; Eggs; High-energy beverages (cola and other carbonated beverages with sugar, fruit drinks); Low-energy beverages; Margarine; Cream soups; Negative: Green leafy vegetables; Whole fruit; High-fat dairy products; Coffee; Wine • EDIP, Positive (Anti-Inflammatory): Vegetables (dark yellow: carrots, or squash), Vegetables (leafy green: cabbage, spinach, lettuce); Fruit juice (apple, cantaloupe, orange, or other fruit juice); Pizza; Snacks (cracker, potato chips); Tea; Coffee. Negative (Pro-Inflammatory): Vegtables, other: mixed, green pepper, cooked mushroom, eggplant, zucchini, or cucumber); Processed meat (sausage); Red meat (beef, or lamb); Organ meat (beef, calf, or chicken liver), Fish, canned tuna; Refined grains (white bread, biscuit, white rice, pasta, or vermicelli); High- and low-energy beverages (cola with sugar, carbonated beverages with sugar, fruit punch drinks);	Q5, HR: 1.14(0.95,1.36) p-trend=0.21 per SD, HR: 1.05(0.99,1.11) p=0.1084 EDIP Q2, HR: 1.13(0.95,1.34) Q3, HR: 1.17(0.98,1.41) Q4, HR: 1.17(0.96,1.42) Q5, HR: 1.18(0.96,1.46) p-trend=0.1295 per SD, HR: 1.07(0.99,1.15) p=0.0891 HEI-2015 Q2, HR: 0.97(0.83,1.13) Q3, HR: 0.92(0.78,1.08) Q4, HR: 0.84(0.72,1.00) Q5, HR: 0.88(0.75,1.04) p-trend=0.0468 per SD, HR: 0.94(0.89,0.99) p=0.0271 **Summary:** Positive: EDIH per SD & CRC, Colon Cx, Proximal Colon Cx; NS/Positive: Distal CRC or Q2, Q3, Q4 Positive: EDIP per SD & CRC, Colon Cx, Proximal Colon Cx; NS/Positive: Distal CRC or Q2, Q3, Q4	by SEER • Total Cx cases identified: n=18768 • **Funding:** NCI; ACS; NIH (NHLBI)

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Tomatoes • HEI-2015: Positive: Total Vegetables; Greens and Beans; Total Fruit; Whole Fruit; Whole Grains; Seafood and Plant Proteins; Total Protein Foods; Dairy; PUFA+MUFA/SFA. Negative: Refined Grains; Added Sugars; SFA; Sodium **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous (per-SD) and categorical (quintiles, Q1, HR: 1 REF)	Inverse: HEI-2015 per SD & CRC, Colon Cx, Proximal Colon Cx; NS/Inverse: Distal CRC or Q2, Q3	
Kim, 2023 [11] United States; NHS; HPFS Analytic N=211673; NHS-I; NHS-II; HPFS **Participant characteristics:** • Health: BMI, mean: ~24.7 to 26.2 • 4-8% DM; Smokers: 50-58% never; ~18-21% current HRT; ~ 31-41% reg. NSAID/Asprin use • Race and/or Ethnicity: ~94-95% White • SEP: NR; 100% health professionals Selection: Excluded those with or who had: implausible/extreme TEI; did not respond post-baseline; Dx of Cx or IBD	**DP Age(s):** 65y, mean HPFS and NHS I; 49y, mean NHS-II (total range, 30 to 75y at baseline) **DP(s) examined:** Plant-Based Diet Index (PDI), healthful/unhealthful PDI (hPDI/uPDI) [Satija, 2016] **DP Components:** • PDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Negative: Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • hPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Negative: Fruit juices; Sugar-sweetened beverages; Refined grains;	**Follow-Up Duration:** NR, ~ 30y **Results for Overall CRC:** PDI & CRC ♀ + ♂, per-SD, HR: 0.98, 95% CI: 0.92, 1.05 ♀ NHS-I, per 10-pt, per-SD, HR: 1.03, 95% CI: 0.93, 1.14 ♀ NHS-II, per 10-pt, per-SD, HR: 0.99, 95% CI: 0.81, 1.20 ♂ HPFS, per 10-pt, per-SD, HR: 0.94, 95% CI: 0.85, 1.04 hPDI & CRC ♀ + ♂, per-SD, HR: 0.94, 95% CI: 0.89, 1.00 ♀ NHS-I, per 10-pt & CRC, HR: 0.96, 95% CI: 0.88, 1.04 ♀ NHS-II, per 10-pt & CRC, HR: 0.92, 95% CI: 0.78, 1.08	• **Did not account for:** SEP, Screening • **Diet assessment:** FFQ every 4y • **Outcome measurement**: Incident cases determined by self-report, NDI; Tumor location and Dz stage from medical records & study physician • n= 3794 CRC, n=2284 Colon Cx, n=759 Rectal Cx incident cases • **Funding:** National Research Foundation of Korea (NRF); Ministry of Science and ICT (Korean govt.); NIH

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Potatoes; Sweets/desserts; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • uPDI: Negative: Whole grains; Fruits; Vegetables; Nuts; Legumes; Vegetable oils; Tea/coffee; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods; Positive: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous, per 1-SD (1 SD =10 units for PDI, 0.83 hPDI, 0.81 SD for uPDI)	♂ HPFS, per 10-pt & CRC, HR: 0.93, 95% CI: 0.86, 1.02 uPDI & CRC ♀ + ♂ CRC, per-SD, HR: 1.07, 95% CI: 1.01, 1.13 ♀ NHS-I, per 10-pt, HR: 1.07, 95% CI: 0.99, 1.16 ♀ NHS-II, per 10-pt, HR: 1.09, 95% CI: 0.94, 1.26 ♂ HPFS, per 10-pt, HR: 1.06, 95% CI: 0.97, 1.16 **Summary:** NS/Null: PDI & CRC, Colon, or Rectal Cx NS/Null-Inverse: hPDI & CRC, Colon, or Rectal Cx Positive: uPDI & CRC; NS/Positive: Colon; Rectal	
Kim, 2022 [10] United States; Multi-Ethnic cohort Analytic N=79952 **Participant characteristics:** • Health: BMI, mean: 26.6 ♂ , 26.4 ♀ • Smokers: 69% ♂ , 44% ♀ Ever • Race and/or Ethnicity: ~ 25-26% "White", 13-19% "African-American", 7% "Native Hawaiian", 28-30% "Japanese American"; 21-24% "Latino" • SEP: NR Selection: Excluded those with or who had: invalid/incomplete data, pre-existing CRC, ethnicity other than 5	**DP Age(s):** 60y mean **DP(s) examined:** modified Plant-Based Diet Index (PDI), healthful/unhealthful PDI (hPDI/uPDI) [Kim 2022 modified Satija, 2016] **DP Components:** • mPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Fruit juices; Added sugars (SSB+Sweets); Refined grains; Potatoes; Negative: Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat)	**Follow-Up Duration:** 19.2y, mean **Results for Overall CRC:** mPDI & CRC (95% CI) Q2, ♂ HR: 0.89 (0.79, 1.01); ♀ HR: 0.98 (0.86, 1.12) Q3, ♂ HR: 0.95 (0.84, 1.07); ♀ HR: 0.99 (0.86, 1.13) Q4, ♂ HR: 0.89 (0.78, 1.01); ♀ HR: 0.88 (0.77, 1.02) Q5, ♂ HR: 0.76 (0.67, 0.87); ♀ HR: 0.99 (0.86, 1.14) ♂ p-trend<0.001; ♀ p-trend=0.53 Associations by race/ethncity were strongest in Japanese-American	• **Did not account for:** SEP, Screening • **Diet assessment:** FFQ • **Outcome measurement**: Incident cases identified via cancer registries or (deaths) via NDI; CX defined by ICD codes • CRC cases identified: n=4976 • **Funding:** National Research Foundation of Korea (NRF); Ministry of Science and ICT (Korean govt.); NCI/NIH

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
major groups specified, implausible TEI, missing covariates	• mhPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Negative: Fruit juices; Refined grains; Potatoes; Added sugars (SSB+Sweets); Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat) • muPDI: Negative: Whole grains; Fruits; Vegetables; Nuts; Legumes; Vegetable oils; Tea/coffee; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods; Positive: Fruit juices; Added sugars (SSB+Sweets); Refined grains; Potatoes **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous (per-SD) and categorical (quintiles, Q1, HR: 1 REF)	and White men and NS for African American, Native Hawaiian and Latino men; In women, NS by race/ethnicity mhPDI & CRC (95% CI) Q2, ♂ HR: 0.95 (0.84, 1.06); ♀ HR: 0.97 (0.85, 1.10) Q3, ♂ HR: 0.96 (0.85, 1.08); ♀ HR: 1.06 (0.93, 1.20) Q4, ♂ HR: 0.85 (0.75, 0.96); ♀ HR: 0.93 (0.81, 1.06) Q5, ♂ HR: 0.79 (0.69, 0.91); ♀ HR: 0.91 (0.80, 1.04) ♂ p-trend=0.0001; ♀ p-trend=0.14 muPDI & CRC (95% CI) Q2, ♂ HR: 0.93 (0.83, 1.05); ♀ HR: 0.96 (0.85, 1.09) Q3, ♂ HR: 0.97 (0.86, 1.10); ♀ HR: 0.96 (0.85, 1.09) Q4, ♂ HR: 0.96 (0.84, 1.09); ♀ HR: 0.97 (0.85, 1.11) Q5, ♂ HR: 1.08 (0.95, 1.22); ♀ HR: 1.01 (0.89, 1.15) ♂ p-trend=0.19; ♀ p-trend=0.85 **Summary:** Inverse: mPDI & overall CRC, left colon Cx, rectal Cx in ♂ (NS/null: mPDI & right colon Cx in ♂); NS/null in ♀ (all types) NS/Null: mhPDI & all types in ♂; NS/Null: mhPDI & all types in ♀	

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
		NS/Null: muPDI & overall CRC, right colon Cx, left colon Cx in ♂ (NS/positive: muPDI & rectal Cx in ♂); NS/Null: in ♀ (all types)	
Lee, 2023 [12] United States; NHS; HPFS Analytic N=1189 (full-cohort analysis); 524 (case-control) **Participant characteristics:** • Health: BMI, mean: ~25 (~34% OW; ~14% Ob) • Smokers: 43% never; ~29% current PM-HRT • Race and/or Ethnicity: ~98% White • SEP: NR; 100% health professionals Selection: Excluded those with or who: implausible/extreme TEI; excessive missing FFQ data; Dx of Cx or IBD	**DP Age(s):** 60y, mean (total range, 30 to 75y at baseline) **DP(s) examined:** Empirical Dietary Indices for Hyperinsulinaemia (EDIH) [Tabung, 2016] Empirical Dietary Inflammatory Pattern (EDIP) [Tabung, 2016] Healthy Eating Index (HEI-2015) [Krebs-Smith 2018] **DP Components:** • EDIH, Positive: Red meat; Processed meat; Poultry; Tomatoes; French fries, Fish (non-dark); Low-fat dairy; Eggs; High-energy beverages (cola and other carbonated beverages with sugar, fruit drinks); Low-energy beverages; Margarine; Cream soups; Negative: Green leafy vegetables; Whole fruit; High-fat dairy products; Coffee; Wine • EDIP, (revserse coded), Positive (Anti-Inflammatory): Vegetables (dark yellow: carrots, or squash), Vegetables (leafy green: cabbage, spinach, lettuce); Fruit juice (apple, cantaloupe, orange, or other fruit juice); Pizza; Snacks (cracker, potato chips); Tea; Coffee; Beer; Wine. Negative	**Follow-Up Duration:** NR, ~ 30y **Results for Overall CRC:** (95% CI) EDIP, case-control, per SD & CRC (95% CI), ♂ OR: 1.47 (1.03, 2.09), p=0.03; ♀ OR: 1.12 (0.94, 1.34), p=0.21 EDIP, full cohort, per SD & CRC: ♂ OR: 1.17 (1.09, 1.26), p<0.001; ♀ OR: 1.08 (1.02, 1.16), p=0.02 EDIH, case-control, per SD & CRC (95% CI), ♂ OR: 1.20 (0.89, 1.63), p=0.24; ♀ OR: 1.27 (1.07, 1.50), p=0.006 EDIH, full cohort, per SD & CRC: ♂ OR: 1.13 (1.06, 1.22), p<0.001; ♀ OR: 1.08 (1.01, 1.15), p=0.03 **Summary:** Positive: EDIP per SD in ♂ or ♀ in the full cohort or case-control ♂ & CRC; NS/Positive: case-control ♀ Positive: EDIH per SD in ♂ or ♀ in the full cohort or case-control ♀ & CRC; NS/Positive: case-control ♂	• **Did not account for:** SEP • **Diet assessment:** FFQ (verified sub-set with RCT) • **Outcome measurement**: Incident cases determined by self-report, NDI and included only confirmed cases from medical record/study physician review • n= 3794 CRC, n=2284 Colon Cx, n=759 Rectal Cx incident cases • **Funding:** NIH; Yonsei Signature Research Cluster Project; Yonsei University Research Fund

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	(Pro-Inflammatory): Vegetables, other: mixed, green pepper, cooked mushroom, eggplant, zucchini, or cucumber); Processed meat (sausage); Red meat (beef, or lamb); Organ meat (beef, calf, or chicken liver), Fish, canned tuna; Refined grains (white bread, biscuit, white rice, pasta, or vermicelli); High- and low-energy beverages (cola with sugar, carbonated beverages with sugar, fruit punch drinks); Tomatoes • HEI-2015: Positive: Total Vegetables; Greens and Beans; Total Fruit; Whole Fruit; Whole Grains; Seafood and Plant Proteins; Total Protein Foods; Dairy; PUFA+MUFA/SFA. Negative: Refined Grains; Added Sugars; SFA; Sodium **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous per-SD for EDIH and EDIP (i.e., higher scores=more inflammatory/insulinemic)		
Liu, 2023 [13] United Kingdom; UK BIOBANK Analytic N=186675 **Participant characteristics:** • Health: BMI, OW: 42%; Ob 21% • Smokers: 53-60% never • Race and/or Ethnicity: ~ 95% "White", 1.1-1.6% "Black", 1.3-1.6% "Asian", 0.6% "Mixed", 0.3%	**DP Age(s):** ~58y, mean across PDI quintiles (range 37 to 73y at baseline) **DP(s) examined:** modified Plant-Based Diet Index (PDI), healthful/unhealthful PDI (hPDI/uPDI) [Kim modified Satija, 2016 (UK BIOBANK did not include data on vegetable oils)] **DP Components:**	**Follow-Up Duration:** 9.5y, mean **Results for Overall CRC:** PDI & CRC (95% CI) Q2, HR: 0.94 (0.83, 1.06) Q3, HR: 0.92 (0.81, 1.05) Q4, HR: 0.87 (0.77, 0.99) p-trend=0.0318 per10, HR: 0.88 (0.81, 0.96)	• **Did not account for:** Screening • **Diet assessment:** 24-hr recalls, web-based • **Outcome measurement**: Incident cases identified via medical records, cancer or death registries; CX defined by ICD codes • CRC cases identified: n=2163 • **Funding:** National Key R&D Program of China; National Natural

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
"Chinese", ~0.8% Other, 0.4% Unknown • SEP: Townsend: ~-2.1 to -2.4; • Education: 43% university/college Selection: Excluded those with or who: <1 diet assessment, did not have genetic data; implausible/extreme TEI; Dx of Cx	• mPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Tea/coffee; Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Negative: Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • mhPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Tea/coffee; Negative: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • muPDI: Negative: Whole grains; Fruits; Vegetables; Nuts; Legumes; Tea/coffee; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods; Positive: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous, per 10-unit increases and Categorical, by quartiles (Q1, HR: 1 REF)	hPDI & CRC Q2, HR: 0.96 (0.85, 1.08) Q3, HR: 0.91 (0.81, 1.03) Q4, HR: 0.85 (0.75, 0.97) p-trend=0.0122 per10, HR: 0.91 (0.84, 0.99) uPDI & CRC Q2, HR: 1.18 (1.04, 1.33) Q3, HR: 1.08 (0.95, 1.22) Q4, HR: 1.14 (1.01, 1.30) p-trend=0.1542 per10, HR: 1.05 (0.97-1.13) **Summary:** Inverse: mPDI (per10; Q4)& CRC and Rectal Cx; NS/Inverse: Proximal or Distal Colon Cx Inverse: mhPDI (per10; Q4)& CRC and Rectal Cx; NS/Inverse: Proximal or Distal Colon Cx Positive: muPDI (Q2, Q4) & CRC and Distal Colon Cx; NS/Positive: Proximal Colon or Rectal Cx	Science Foundation of China, Tianjin Key Medical Discipline (Specialty) Construction Project, the Young Elite Scientists Sponsorship Program by China Association for Science and Technology; Guang dong Basic and Applied Basic Research Foundation
Maimaitiyiming, 2023 [14] United Kingdom; UK BIOBANK	**DP Age(s):** ~56y, mean across DP quartiles (40-69 y at baseline) **DP(s) examined:** "Obesity-related"	**Follow-Up Duration:** 9.4y, median **Results for Overall CRC:** DP & CRC (95% CI)	• **Did not account for:** Screening • **Diet assessment:** 24-hr recalls, web-based

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
Analytic N=114289 **Participant characteristics:** • Health: BMI, mean: 25-28.5 • 17-27% HTN, 2-7% DM; 2-6% CVD; Smokers: 49-62% never; ~33-36% current HRT • Race and/or Ethnicity: ~100% White • SEP: Townsend: ~-1.48 to -1.77; • Education: 84-94% higher/degree Selection: Excluded those with or who: <1 diet assessment; Dx of Cx; implausible/extreme TEI; withdrew	DP **DP Components:** • DP characterized by: Higher intake of beer and cider, processed meat, high-sugar beverages, red meat, and artifcial sweetener (Other positive loadings, 0.40 to 0.10: Crisps, chips, savory snacks; instant coffee; spirits/liquors; ice cream; frozen vegetable; egg and egg dishes; added sugars; breaded meat/fish; buns, cakes etc.; white bread; poultry; other breakfast cereals; PUFA margarine; boiled/baked potato; liver; legumes); Lower intake of fresh vegetables, olive oil, tea, and high fber breakfast cereals (Other negative loadings, -0.20 to 0.0: water; other milk; nuts and seeds; fruits; cereals; meat alternatives; oily fish; whole grain cereals; low-fat butter; other coffee; other fish; low-fat cheese; wine) **DP Method(s)**: RRR **Comparisons:** Categorical (quartiles, Q1, HR: 1 REF) and linear trend	linear, HR: 1.08(1.04,1.12) Q2, HR: 1.04(0.94,1.15) Q3, HR: 1.12(1.02,1.24) Q4, HR: 1.2(1.08,1.33) p=0.001 Complete-case, HR: 1.10 (1.06, 1.15); p<0.001 Similar CRC risk by age (</> 65y) **Summary:** Positive: "Obesity-related" DP & CRC	• **Outcome measurement**: Methods NR; Cx defined by ICD • CRCx, n=1218; Premenopausal BCx, n=809; postmenopausal BCx, n=1190 • **Funding:** None reported for study
Moazzen, 2022 [15] The Netherlands; Lifelines Analytic N=72695 **Participant characteristics:** • Health: BMI, mean: 26.5 • Smokers: 7.4 pk/y • Race and/or Ethnicity: NR (100% Dutch nationality)	**DP Age(s):** 51.2y, mean (SD: 8.71) **DP(s) examined:** Dutch Dietary Guidelines - 2015 [Kromhout, 2016] Lifelines Diet score (LLDS) [Vinke, 2018] American Cancer Society Index, ACS-diet only [Kabat, 2015]	**Follow-Up Duration:** 8y, mean (2y IQR) **Results for Overall CRC:** DDG & CRC (95% CI) Q2, HR: 0.84 (0.61, 1.17) Q3, HR: 0.92 (0.68, 1.25) Q4, HR: 0.90 (0.66, 1.23)	• **Did not account for:** Sex, Race/Ethnicity (Dutch), Screening • • **Diet assessment:** FFQ • **Outcome measurement**: Incident cases identified via registry • CRC cases identified: n=434 • **Funding:** NR

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
• SEP: Education: 37% low, 36% medium, 26% high Selection: Excluded those with or who: missing data/unreliable diet; Hx or Dx of Cx	WCRF/AICR Score - Diet Only [Romaguera 2012] **DP Components:** • DDG, Positive: Vegetables; Legumes; Fruit; Nuts, unsalted; Whole Grains; Fish; Liquid cooking fats, Vegetable Oils, Soft Margarine; Tea. Negative: Red and Processed Meat; Sugar-Sweetened Beverages; Alcohol • LLS, Positive: Vegetables; Fruit; Legumes and Nuts; Whole Grains; Fish; Oils and Soft Margarines; Unsweetened Dairy; Tea; Coffee (Filtered); Negative: Red and processed meats; Sugar-sweetened beverages; Butter and Hard Margarines • ACS-diet, Positive: Vegetables; Fruit; Whole Grains; Negative: Red and Processed Meat; Alcohol • WCRF/AICR-diet only, Positive: Vegetables and Fruit; Dietary Fiber. Negative: Red and Processed Meat; Sugary Drinks; Alcohol; Sodium; Energy-Dense Foods **DP Method(s)**: Index/Score Analysis **Comparisons:** Categorical for each DP by quintiles (Q1, HR: 1 REF) and linear trend	Q5, HR: 0.79 (0.57, 1.09) p-trend=0.61 LLS & CRC Q2, HR: 0.87 (0.63, 1.20) Q3, HR: 0.83 (0.60, 1.16) Q4, HR: 0.72 (0.52, 1.01) Q5, HR: 0.94 (0.68, 1.30) p-trend=0.29 ACS-diet & CRC Q2, HR: 0.91 (0.65, 1.26) Q3, HR: 0.75 (0.57, 0.99) Q4, HR: 0.65 (0.46, 0.92) Q5, HR: 0.68 (0.49, 0.93) p-trend=0.6 WCRF/AICR-diet & CRC Q2, HR: 0.98 (0.71, 1.35) Q3, HR: 0.96 (0.70, 1.31) Q4, HR: 1.01 (0.74, 1.38) Q5, HR: 0.90 (0.65, 1.26) p-trend=0.96 **Summary:** NS/Inverse: DDG & CRC NS/Inverse: LLS & CRC Inverse/NS: ACS-diet (Q2, Q3, Q4) & CRC NS/Inverse: WCRF/AICR-diet & CRC	

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
Neuhouser, 2022 [16] United States; Women Health Initiative (WHI) Analytic N=100374 **Participant characteristics:** • Health: BMI, mean: 27.6 • Smokers: 51% never; 40% current HRT • Race and/or Ethnicity: 84.5% White, non-Hispanic; 7.7% Black, non-Hispanic; 3.3% Hispanic/Latina; 2.8% Asian/Pacific Islander • SEP: Education: 42.4% ≥ college degree Selection: Excluded those with Hx of CVD	**DP Age(s):** 63.6y, mean (50 to 79 y) **DP(s) examined:** HEI-2010 **DP Components:** • HEI-2010, Positive: Total Vegetables; Greens and Beans; Total Fruit; Whole Fruit; Whole Grains; Seafood and Plant Proteins; Total Protein Foods; Dairy; Fatty Acids. Negative: Refined Grains; Added Sugars in "Empty Calories"; Solid Fats in "Empty Calories"; Sodium **DP Method(s)**: Index/Score **Comparisons:** Continuous, per 20% increment in HEI-2010 scores [Uncalibrated (Uncal), Calibrated (Cal) for biomarkers]	**Follow-Up Duration:** 22-26y ~ **Results for Overall CRC:** HEI-2010 (Uncal per 20%) & CRC, HR: 0.94, 95% CI: 0.89, 1.00 HEI-2010 (Cal per 20%) & CRC, HR: 0.90, 95% CI: 0.71, 1.14 **Summary:** NS/Inverse: HEI-2010 & CRC	• **Did not account for:** Screening • **Diet assessment:** FFQ (verified sub-set with RCT) • **Outcome measurement**: Incident cases identified via self-report then confirmed via medical records/pathology with physician review; • cases identified: n=2364 (BCx); n=2315 (CRCx) • **Funding:** NIH/NHLBI
Nguyen, 2020 [17] China; Shanghai Women's Health Study (SWHS); Shanghai Men's Health Study (SMHS) Analytic N=132606 **Participant characteristics:** • Health: BMI: OW: 24%; Ob: ~19% • 45% with 1+ HTN, DM, CVD and/or OW/Ob; Smokers: 72% never • Race and/or Ethnicity: NR (100% Chinese) • SEP: Income: 16% low, 42% low-mid, 30% upper-mid, 13% high; Education: 25% elementary or less, 31% middle, 27% high school, 17% college+ Selection: Excluded those with or who: missing/incomplete FFQ; implausible	**DP Age(s):** 60.5y, mean total (those w CRC); 51.5, mean total (those w/out CRC) (40-74 y at baseline) **DP(s) examined:** CHFP & CRC mAHEI-2010 & CRC mDASH & CRC **DP Components:** • CHFP, Positive: Vegetables; Fruits; Beans; Grains; Fish and shrimp; Dairy. Negative: Meat and poultry; Eggs; Fats and oils; Salt • mAHEI-2010: Positive: Vegetables (not potatoes, French fries); Fruit; Legumes and Nuts; Long-Chain Fats (EPA + DHA); PUFA. Negative:	**Follow-Up Duration:** 8.1y, mean for ♂; 13.4y, mean for ♀ **Results for Overall CRC:** CHFP & CRC Q2, HR: 0.88 (0.77, 1.00) Q3, HR: 0.86 (0.75, 0.98) Q4, HR: 0.84 (0.73, 0.96) p-trend=0.01 perSD, HR: 0.94 (0.90, 0.99), p=0.02 mAHEI-2010 & CRC Q2, HR: 0.92 (0.80, 1.05) Q3, HR: 0.94 (0.83, 1.08) Q4, HR: 0.91 (0.79, 1.05) p-trend=0.27	• **Did not account for:** Race/Ethnicity (100% Chinese), Screening • • **Diet assessment:** FFQ (verified sub-set with 24h recalls in parent studies) • **Outcome measurement**: Incident cases identified via registry and verified; Cx defined by ICD • CRC cases identified: n=1670 • **Funding:** NIH

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
TEI; Dx of Cx; or <2y of F/U; Excluded data from first 2y F/U	Red and Processed Meat; Sodium; Moderate: Alcohol (Removed whole grains, SSBs, trans FA) • mDASH: Positive: Vegetables (not potatoes and legumes); Nuts and Legumes; Fruit and Fruit Juice; Dairy. Negative: Red and Processed Meat; Sodium (Removed whole grains, SSBs; all Dairy v. low-fat) **DP Method(s)**: Index/Score **Comparisons:** Continuous (per-SD) and categorical (quartiles, Q1, HR: 1 REF)	perSD, HR: 0.96 (0.92, 1.01); p=0.13 mDASH & CRC Q2, HR: 0.92(0.80,1.05) Q3, HR: 0.98(0.86,1.12) Q4, HR: 0.90(0.78,1.03) p-trend=0.23 perSD, HR: 0.96(0.91,1.01); p=0.15 **Summary:** Inverse: CHFP & CRC and Rectal Cx; NS: Colon Cx NS/Inverse: mAHEI-2010 & CRC; Colon Cx; Rectal Cx NS/Inverse: mDASH & CRC; Colon Cx; Rectal Cx	
Petermann-Rocha, 2021 [18] United Kingdom; UK BIOBANK Analytic N=422702 **Participant characteristics:** • Health: BMI, mean: 26.7-28.1; 42% OW 24% Ob: • 5% DM; 29% CVD; Smokers: 42-61% never • Race and/or Ethnicity: ~95% White, 1.8% "South Asian", 1.5% "Black", 1.4% "Mixed", 0.3% "Chinese" • SEP: ~29-36% Lower; ~32-34% Mid; ~29-40% High (based on deprivation index) Selection: Excluded those with or who: missing data (diet, Cx, covariates); Dx of Cx; implausible/extreme TEI; withdrew	**DP Age(s):** ~56y, mean across DP quartiles (37-73 y at baseline) **DP(s) examined:** Dietary risk score (DRS) [Petermann-Rocha, 2021] **DP Components:** • Positive: Red Meat; Processed Meat; Whole-milk; Spread (Butter, Other/ margarine, and/or Flora pro-active/benecol); Salt added to food; Negative: Vegetables and Fruit; Cereals; Total Fish; Water. **DP Method(s)**: Index/score **Comparisons:** Continuous, DRS (higher scores ~ higher risk and lower recommendations met)	**Follow-Up Duration:** 9y, median **Results for Overall CRC:** DRS & CRC, HR: 1.05, 95% CI: 1.03, 1.07 **Summary:** Positive: DRS & CRC	• **Did not account for:** Screening, Postmenopausal hormone therapy (BC only) • • **Diet assessment:** 24-hr recalls, web-based • **Outcome measurement**: Incident cases identified via registry, national health services, information center, hospital records; CX defined by ICD codes • Total Cx, n= 42,767 (includes GI Cx, CRCx, BCx, Prostate Cx) • **Funding:** come Trust medical charity, Medical Research Council, • Department of Health, Scottish Government, and the • Northwest Regional Development Agency. It has also had

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
			• Wellcome Trust medical charity; Medical Research Council, Dept. of Health Scottish Government; Welsh Assembly Government; British Heart Foundation.
Ren, 2023 [19] United States; Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial Analytic N=98415 **Participant characteristics:** • Health: BMI NR • 32% HTN; Smokers: 48% never • 12.6 % with Family Hx CRCx • Race and/or Ethnicity: 93% White • SEP: NR Selection: Excluded those with or who: missing baseline questionnaire; invalid FFQ; missing 8+ FFQ items; Hx of Cx; withdrew; implausible/extreme TEI	**DP Age(s):** 65.5y (55 to 74y at baseline) **DP(s) examined:** EAT-Lancet Reference Diet [Vallejo, 2022; EAT-Lancet Commission, 2019] **DP Components:** • EAT-Lancet: Positive: Whole grains & all grains, ≤ 464 g/d and whole grain fiber; Vegetables, ≥ 200 - ≤ 600 g/d; Fruits, ≥ 100 - ≤ 300 g/d; All nuts, ≥ 25 g/d. Negative: Dairy foods, ≤ 500 g/d; Beef and lamb, ≤ 14 g/d; Pork, ≤ 14 g/d; Chicken and other poultry, ≤ 58 g/d; Eggs, ≤ 25 g/d; Fish, ≤ 100 g/d; Dry beans, lentils & peas, ≤ 100 g/d; Soy foods, ≤ 50 g/d; Palm oil, ≤ 6.8 g/d; Lard or tallow, ≤ 5 g/d; Butter, 0 g/d; All sweeteners, ≤ 31 g/d. Neutral: Tubers or starchy vegetables, ≤ 100 g/d; Unsaturated oils, ≥ 20 - ≤ 80 g/d **DP Method(s)**: Index/score **Comparisons:** Categorical and linear trend (quartiles, Q1, HR: 1 REF)	**Follow-Up Duration:** 8.8y, mean **Results for Overall CRC:** EAT-Lancet & CRC Q2, HR: 0.81 (0.69, 0.95) Q3, HR: 0.84 (0.70, 0.99) Q4, HR: 0.81 (0.673, 0.98) p-trend=0.034 **Summary:** Inverse: EAT-Lancet & CRC; NS/Inverse: Proximal or Distal Colon Cx or Rectal Cx	• **Did not account for:** SEP, Screening • **Diet assessment:** FFQ • **Outcome measurement**: Incident cases identified via self-report then confirmed via medical records/pathology • Cases identified: n=1054 • **Funding:** General Project of Chongqing Natural Science Foundation, Chongqing Science and Technology Commission, China; Kuanren Talents Project of the Second Affiliated Hospital of Chongqing Medical University in China
Schulpen, 2020 [20] Netherland; The Netherlands Cohort Study Analytic N=8050 in total; 4084 subcohort members; 3966 case	**DP Age(s):** 61y, mean (55-69y) **DP(s) examined:** Alternate Med Diet Score (aMED) [Fung 2005]	**Follow-Up Duration:** 20.3 y **Results for Overall CRC:** In Men aMEDr & CRC	• **Did not account for:** Race/Ethnicity, Screening • **Diet assessment:** FFQ • **Outcome measurement**: Incident cases identified via annual record linkage with the Netherlands Cancer

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
Participant characteristics: • Health: BMI, mean, kg/m2: ♂ 24.9, ♀ 25 (cases: ♂ 25.2; ♀ 25); • Smokers: former ♂ 52%, ♀ 23% (cases: ♂ 58%; 23%); • Family Hx CRC: ♂ 5%, ♀ 6% (cases, 9% , 10% • • Race and/or Ethnicity: NR (Dutch) • SEP: Higher vocational education or university, 19.3-21.0% in men; 9.5% in women Selection: Excluded those who had a history of cancer at baseline (except skin cancer), did not have complete and consistent dietary data, did not have data available on alcohol consumption and MD adherence	Alternate Med Diet Score (aMEDr)[Fung 2005] with alcohol removed WCRF/AICR [Romaguera 2012], [van den Brandt PA, 2017] **DP Components:** • aMED, Positive: Vegetables (not potatoes); Legumes; Fruit; Nuts; Whole Grains; Fish; MUFA/SFA. Negative: Red and Processed Meat. Neutral: Alcohol • aMEDr, Positive: Vegetables (not potatoes); Legumes; Fruit; Nuts; Whole Grains; Fish; MUFA/SFA. Negative: Red and Processed Meat. [aMEDr removed alcohol] • WCRF/AICR-diet only, Positive: Vegetables and Fruit; Dietary Fiber. Negative: Red and Processed Meat; Sugary Drinks; Alcohol; Sodium; Energy-Dense Foods **DP Method(s)**: Index/Score Analysis **Comparisons:** Categorical: low (0-3)(ref, HR 1), middle (4-5), and high (6-8(9)); Continuous: per two-point per SD-increment of WCRF/AICR	4-5, HR: 1.07, 95% CI: 0.92, 1.24 6-8, HR: 1.04, 95% CI: 0.85, 1.28 P for trend=0.654 Per 2 pts, HR 1.04, 95% CI: 0.95, 1.13 aMED & CRC 4-5, HR 1.04, 95% CI: 0.88, 1.21 6-8, HR 1.07, 95% CI: 0.89, 1.28 P for trend=0.5 Per 2 pts, HR 1.03, 95% CI: 0.95, 1.12 WCRF/AICR (excluding alcohol) & CRC, Per SD: HR 0.99, 95% CI: 0.93, 1.07 aMEDr & CRC, per SD: HR 1.03, 95% CI: 0.96, 1.10 WCRF/AICR with alcohol & CRC, per SD: HR 0.95, 95% CI:0.88, 1.02 aMED & CRC, per SD: HR 1.02, 95% CI: 0.96, 1.10 In women aMEDr & CRC 4-5, HR 0.86, 95% CI: 0.73, 1.00 6-8, HR 1.01, 95% CI: 0.82, 1.23 P for trend=0.941 Per 2 pts, HR 0.97, 95% CI: 0.88, 1.07 aMED & CRC 4-5, HR 0.86, 95% CI: 0.73, 1.01	Registry and the nationwide Dutch Pathology Registry; microscopically confirmed • **Funding:** Wereld Kanker Onderzoek Fonds Nederland, World Cancer Research Fund International grant program

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
		6-9, HR 0.97, 95% CI: 0.80, 1.18 P for trend=0.960 Per 2 pts, HR 0.97, 95% CI: 0.89, 1.06 WCRF/AICR (excluding alcohol) & CRC, Per SD: HR 0.99, 95% CI: 0.92, 1.07 aMEDr & CRC, per SD: HR 0.98, 95% CI: 0.91, 1.05 WCRF/AICR with alcohol & CRC, per SD: HR 1.00, 95% CI:0.92, 1.07 aMED & CRC, per SD: HR 0.97, 95% CI: 0.90, 1.05 **Summary:** NS/Null: aMED & CRC, colon, distal, proximal and rectal colon in both men and women NS/Null: aMEDr & CRC, colon, distal, proximal and rectal colon in both men and women NS/Null: WCRF/AICR diet score (including and excluding alcohol) & CRC, colon, distal, proximal and rectal colon in both men and women	
Shang, 2023 [21] United Kingdom; UK BIOBANK Analytic N=121513 **Participant characteristics:** • Health: BMI, • Smokers, current: 4-11% • Race and/or Ethnicity: 94-98% White • SEP: Education, high (≥ 13y): 39-54%	**DP Age(s):** 59y, mean (range: 30 to 75y) **DP(s) examined:** Alternate Med Diet Score (aMED) [Fung 2005] "AEDII"=Empirical dietary inflammatory pattern (EDIP) [Tabung, 2016] Alternative HEI (AHEI)-2010 [Chiuve 2012]	**Follow-Up Duration:** ~8.5 y **Results for Overall CRC:** aMED & Colon cancer Q2, HR 0.94, 95% CI: 0.75, 1.18 Q3, HR 0.80, 95% CI: 0.64, 1.01 Q4, HR 0.94, 95% CI: 0.75, 1.18 Q5, HR 0.81, 95% CI: 0.64, 1.01 P for trend=0.19	• **Did not account for:** Screening; PM HRT for BC • **Diet assessment:** FFQ • **Outcome measurement**: Incident cases identified using inpatient hospital records and mortality registers, using ICD9 or ICD10 • **Funding:** GDPH Supporting Fund for Talent Program; National Natural Science Foundation of China; Research Foundation o Medical Science and Technology of

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
• HH Income (pounds), 18K-30,999: 28-33%; 31K-51,999: 26-27%; 52K-100K: 20-25%; >100K: 5-9% Selection: Excluded individuals with no data on diet, or with only one dietary assessments, or with total energy intake in either the highest or lowest percentile, or with prevalent cancer of interest for analysis at baseline	Healthful PDI (hPDI) [Satija, 2016] **DP Components:** • aMED: Positive: Vegetables (not potatoes); Legumes; Fruit; Nuts; Whole Grains; Fish; MUFA/SFA. Negative: Red and Processed Meat. Neutral: Alcohol • EDIP ("AEDII"): Anti-inflammatory group: tea, coffee, dark yellow vegetables (carrots, or squash), leafy green vegetables (cabbage, spinach, or lettuce), snacks (cracker, or potato chips), fruit juice (apple juice, cantaloupe juice, orange juice, or other fruit juice), pizza Pro-inflammatory group: processed meat (sausage), red meat (beef, or lamb), organ meat (beef, calf, or chicken liver), other fish (canned tuna, or fish), other vegetables (mixed vegetables, green pepper, cooked mushroom, eggplant, zucchini, or cucumber), refined grains (white bread, biscuit, white rice, pasta, or vermicelli), high-energy and low energy beverages (cola with sugar, carbonated beverages with sugar, fruit punch drinks), and tomatoes • AHEI-2010: Positive: Vegetables (not potatoes, French fries); Fruit; Legumes and Nuts; Whole Grains; Long-	Per quintile increment, HR 0.96, 95% CI: 0.91, 1.01 EDIP (AEDII) & Colon cancer Q2, HR 0.82, 95% CI: 0.65, 1.04 Q3, HR 0.86, 95% CI: 0.69, 1.08 Q4, HR 0.87, 95% CI: 0.70, 1.09 Q5, HR 0.97, 95% CI: 0.78, 1.21 P for trend=0.36 Per quintile increment, HR 1.00, 95% CI: 0.95, 1.05 AHEI-2010 & Colon cancer Q2, HR 1.06, 95% CI: 0.85, 1.32 Q3, HR 1.13, 95% CI: 0.91, 1.41 Q4, HR 1.01, 95% CI: 0.81, 1.26 Q5, HR 0.83, 95% CI: 0.65, 1.05 P for trend=0.0993 Per quintile increment, HR 0.96, 95% CI: 0.91, 1.01 hPDI & Colon cancer Q2, HR 0.85, 95% CI: 0.64, 1.14 Q3, HR 0.94, 95% CI: 0.77, 1.14 Q4, HR 0.91, 95% CI: 0.74, 1.12 Q5, HR 0.72, 95% CI: 0.57, 0.91 P for trend=0.0763 Per quintile increment, HR 0.94, 95% CI: 0.89, 0.99 **Summary:** NS/Inverse: aMED & Colon cancer	Guangdong Province; National Natural Science Foundation of China; Outstanding Young Talent Trainee Program of Guangdong Provincial People's Hospital; Guangdong Provincial People's Hospital Scientific Research Funds for Leading Medical Talents and Distinguished Young Scholars in Guangdong Province; Talent Introduction Fund of Guangdong Provincial People's Hospital; High-level Talent Flexible Introduction Fund of Guangdong Provincial People's Hospital; University of Melbourne at Research Accelerator Program and the CERA Foundation; Operational Infrastructure Support from the Victorian State Government.

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Chain Fats (EPA + DHA); PUFA. Negative: Red and Processed Meat; Sugar Sweetened Beverages and Fruit Juice; Trans FA; Sodium. Neutral: Alcohol • hPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Negative: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods **DP Method(s)**: Index/Score Analysis **Comparisons:** Categorical: quintiles (Q1 ref, HR 1); Continuous: each quintile increment	NS/Null: EDIP(AEDII) & Colon cancer NS/Inverse: AHEI-2010 & Colon cancer Inverse: hPDI (Q5 vs. Q1; per quintile) & Colon Cancer	
Thompson, 2023 [22] United Kingdom; UK BIOBANK Analytic N=126394 **Participant characteristics:** • Health: BMI, OW: 42%; Ob 21% • Smokers: 53-60% never • Race and/or Ethnicity: 91% "White", 0.4% "Black", 4.6% "Asian", 2.8% "Multiple", <1% Unknown/Other • SEP: Townsend: ~-2.1 to -2.4; • Education: 43% university/college Selection: Excluded those with or who: < 2 diet assessment; missing data on diet/covariates; implausible/extreme TEI; Dx of Cx	**DP Age(s):** 56.1y, mean across PDI quintiles (range: 37-73y at baseline) **DP(s) examined:** Plant-Based Diet Index - healthful (hPDI)/unhealthful PDI (uPDI), modified [modified Satija, 2016; UK BIOBANK did not include data on vegetable oils)] **DP Components:** • mhPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Tea/coffee; Negative: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Animal fats; Dairy; Eggs,	**Follow-Up Duration:** 10.6 to 12.2y, mean **Results for Overall CRC:** hPDI & CRC (95% CI) Q2, HR: 1.01 (0.85, 1.21) Q3, HR: 0.92 (0.77, 1.11) Q4, HR: 0.87 (0.72, 1.05) p-corrected=0.22 uPDI & CRC (95% CI) Q2, HR: 1.20 (1.01, 1.42) Q3, HR: 1.19 (1.00, 1.42) Q4, HR: 1.05 (0.86, 1.27) p-corrected=0.22	• **Did not account for:** Screening • **Diet assessment:** 24-hr recalls, web-based • **Outcome measurement**: Incident cases identified via registry (information center) and/or medical records; CX defined by ICD codes • Cases identified: n=1083 postmenopausal BC; n=959 CRC • **Funding:** Wellcome Trust medical charity, Medical Research Council, Department of Health, Scottish Government, and the Northwest Regional Development Agency; Medical Research Council, Dept. of Health Scottish Government; Welsh Assembly Government; British Heart

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • muPDI: Negative: Whole grains; Fruits; Vegetables; Nuts; Legumes; Tea/coffee; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods; Positive: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous, per 10-unit increases and Categorical, by quartiles (Q1, HR: 1 REF)	**Summary:** NS/Inverse: hPDI & CRC NS/PositivE: uPDI & CRC	Foundation, Diabetes United Kingdom, the Northwest Regional Development Agency.
Wang, 2023 [25] United States; NHS; HPFS Analytic N=218181 **Participant characteristics:** • Health: BMI, mean: 24.2-26.2 (Q1 vs. Q5 across DPs) • Smoking ~7-12 pack-years • Race and/or Ethnicity: Predominantly White • SEP: NR (all health professionals) Selection: Excluded those with or who had: implausible/extreme TEI; missing data; Dx of Cx or IBD	**DP Age(s):** 65y, mean HPFS-NHS I; 49y, mean NHS-II (range: 30 to 75y at baseline) **DP(s) examined:** "Prudent" DP via PCA "Western" DP via PCA WCRF/AICR Score - Diet Only [Romaguera 2012] Colorectal cancer dietary score (CRC) [no citation] Alternative HEI (AHEI)-2010 [Chiuve 2012] Alternate Mediterranean diet score (aMED) [Fung, 2005] DASH diet score [Fu **DP Components:** • "Prudent" and "Western" DP	**Follow-Up Duration:** 24y, median **Results for Overall CRC:** adj. for BMI; pooled ♀ + ♂ between DP & overall CRC risk (95% CI); sex-specific estimates by cohort were NS WCRF-diet & overall CRC, HR: 0.91 (0.83, 1.00); p=0.06 CRC & overall CRC, HR: 0.95 (0.87, 1.05); p=0.31 Prudent & overall CRC, HR: 0.94 (0.86, 1.03); p=0.16 AHEI-2010 & overall CRC, HR: 0.99 (0.90, 1.09); p=0.83 aMED & overall CRC, HR: 0.96 (0.87, 1.06); p=0.41 DASH & overall CRC, HR: 0.87 (0.79, 0.95); p=0.004	• **Did not account for:** Race/Ethnicity ("predominantly White"), SEP (all health professionals), Screening (Hx) • **Diet assessment:** FFQ every 4y • **Outcome measurement**: Incident cases determined by self-report, NDI; Tumor location and Dz stage from medical records & study physician • n= 3428 CRC cases (1420 proximal colon; 931 distal colon; 720 rectal) • **Funding:** NIH

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	not clearly reported, but included the following components: Fruit, cruciferous vegetables, yellow vegetables, leafy vegetables, other vegetables, tomatoes, whole grains, legumes, refined grains, snacks, French fries, pizza, desserts, red meat, processed meat, low-energy beverages, sugar-sweetened beverages, fruit juice, wine, beer, liquor, water, tea, coffee, low-fat dairy, high-fat dairy, creamy soups, condiments, salad dressing, olive oil, butter, margarine, mayonnaise, garlic, potatoes, nuts, eggs, poultry meat, fish, and organ meat. • WCRF/AICR-diet only, Positive: Vegetables and Fruit; Dietary Fiber. Negative: Red and Processed Meat; Sugary Drinks; Alcohol; Sodium; Energy-Dense Foods ("UPF") • CRC, Positive: Whole grains; Dairy products; Fiber; Calcium supplements. Negative: Red meats; Processed meats; Alcoholic drinks • AHEI-2010: Positive: Vegetables (not potatoes, French fries); Fruit; Legumes and Nuts; Whole Grains; Long-Chain Fats (EPA + DHA); PUFA. Negative: Red and Processed Meat; Sugar Sweetened Beverages and	GDQS & overall CRC, HR: 0.95 (0.86, 1.04); p=0.23 hGDQS & overall CRC, HR: 0.97 (0.88, 1.06); p=0.47 uGDQS & overall CRC, HR: 0.94 (0.86, 1.02); p=0.15 PDI & overall CRC, HR: 1.03 (0.94, 1.13); p=0.52 hPDI & overall CRC, HR: 0.94 (0.85, 1.03); p=0.16 uPDI & overall CRC, HR: 1.09 (0.99, 1.19); p=0.07 Western & overall CRC, HR: 1.13 (1.03, 1.23); p=0.008 EDIH & overall CRC, HR: 1.14 (1.04, 1.24); p=0.006 EDIP & overall CRC, HR: 1.18 (1.08, 1.29); p=0.0002 **Summary:** NS/Inverse: Prudent DP & overall CRC, Proximal colon, Distal Colon, Rectal Cx NS/Inverse: AHEI-2010 & overall CRC, Proximal colon, Distal Colon, Rectal Cx NS/Inverse: aMED & overall CRC, Proximal colon, Distal Colon, Rectal Cx Inverse: DASH & overall CRC, Proximal colon, Distal Colon, Rectal Cx NS/Inverse: GDQS & overall CRC, Proximal colon, Distal Colon, Rectal Cx	

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Fruit Juice; Trans FA; Sodium; Moderate: Alcohol • aMED: Positive: Vegetables (not potatoes; Legumes; Fruit (not juices); Nuts; Whole Grains; Fish & shell fish; MUFA/SFA. Negative: Red and Processed Meat. Neutral: Alcohol • DASH: Positive: Vegetables (not potatoes and legumes); Nuts and Legumes; Fruit and Fruit Juice; Whole Grains; Low-Fat Dairy. Negative: Red and Processed Meat; Sweetened Beverages; Sodium • GDQS, Positive: Vegetables (dark green leafy); Vegetables (Cruciferous); Vegetables (Deep Orange); Vegetables (Other); Tubers (Deep Orange); Fruit (Citrus); Fruit (Deep Orange); Fruit (Other); Legumes; Nuts and Seeds; Whole Grains; Fish and Shellfish; Poultry and Game; Low-fat Dairy; Eggs; Oils (Liquid). Negative: Processed meat; Refined grains and baked goods; Sweets and ice cream; SSBs; Juice; White roots and tubers; Purchased deep fried foods; Neutral (Moderate): High-fat Dairy; Red meat • hGDQS (not clearly reported, 16 "healthy" items of GDQS): Positive: Vegetables (dark green leafy); Vegetables	NS/Inverse: hGDQS & overall CRC, Proximal colon, Distal Colon, Rectal Cx NS/Inverse: uGDQS & overall CRC, Proximal colon, Distal Colon, Rectal Cx NS/Inverse: PDI & overall CRC, Proximal colon, Distal Colon, Rectal Cx NS/Inverse: hPDI & overall CRC, Proximal colon, Distal Colon, Rectal Cx Positive/NS: uPDI & overall CRC, Proximal colon, Distal Colon, Rectal Cx Positive: Western DP & overall CRC, Proximal colon, Distal Colon, Rectal Cx Positive: EDIH & overall CRC, Proximal colon, Distal Colon, Rectal Cx Positive: EDIP & overall CRC, Proximal colon, Distal Colon, Rectal Cx	

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	(Cruciferous); Vegetables (Deep Orange); Vegetables (Other); Tubers (Deep Orange); Fruit (Citrus); Fruit (Deep Orange); Fruit (Other); Legumes; Nuts and Seeds; Whole Grains; Fish and Shellfish; Poultry and Game; Low-fat Dairy; Eggs; Oils (Liquid). • uGDQS (not clearly reported, 9 "unhealthy" items of GDQS): Negative: Processed meat; Refined grains and baked goods; Sweets and ice cream; SSBs; Juice; White roots and tubers; Purchased deep fried foods; Neutral (Moderate): High-fat Dairy; Red meat • PDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Negative: Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • hPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Negative: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Animal fats; Dairy; Eggs,		

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • uPDI: Negative: Whole grains; Fruits; Vegetables; Nuts; Legumes; Vegetable oils; Tea/coffee; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods; Positive: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts • EDIH, Positive: Red meat; Processed meat; Poultry; Tomatoes; French fries, Fish (non-dark); Low-fat dairy; Eggs; High-energy beverages (cola and other carbonated beverages with sugar, fruit drinks); Low-energy beverages; Butter/Margarine; Cream soups; Negative: Green leafy vegetables; Whole fruit; High-fat dairy products; Coffee; Wine • EDIP, (reverse coded), Positive (Anti-Inflammatory): Vegetables (dark yellow: carrots, or squash), Vegetables (leafy green: cabbage, spinach, lettuce); Fruit juice (apple, cantaloupe, orange, or other fruit juice); Pizza; Snacks (cracker, potato chips); Tea; Coffee; Beer; Wine. Negative (Pro-Inflammatory): Vegetables, other (mixed, green pepper, cooked mushroom, eggplant,		

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	zucchini, or cucumber); Processed meat (sausage); Red meat (beef, or lamb); Organ meat (beef, calf, or chicken liver), Fish, canned tuna; Refined grains (white bread, biscuit, white rice, pasta, or vermicelli); High- and low-energy beverages (cola with sugar, carbonated beverages with sugar, fruit punch drinks); Tomatoes **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous for each DP		
Wang, 2022_Healthy [23] United States; NHS; HPFS Analytic N=123773 **Participant characteristics:** • Health: BMI, mean: 25.1-26.3 (Q4-Q1, PDI) • Smoker: 4-15% current; 23-28% current HRT use • Race and/or Ethnicity: Predominantly White • SEP: NR (all health professionals) Selection: Excluded those with or who had: implausible/extreme TEI; missing birth year; Dx of Cx or colitis/IBD; missing tissue/data for molecular analyses	**DP Age(s):** 48-54y, mean (range: 30 to 75y at baseline) **DP(s) examined:** Plant-Based Diet Index (PDI) - healthful (hPDI)/unhealthful PDI (uPDI) [Satija, 2016] **DP Components:** • hPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Negative: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • uPDI: Negative: Whole grains; Fruits; Vegetables; Nuts; Legumes; Vegetable oils;	**Follow-Up Duration:** NR; ~30y **Results for Overall CRC:** hPDI & overall CRC; pooled ♀ + ♂ (95% CI) Q2, HR: 0.88 (0.79, 0.97) Q3, HR: 0.93 (0.83, 1.03) Q4, HR: 0.86 (0.77, 0.96); p=0.04 uPDI & overall CRC; pooled ♀ + ♂ (95% CI) Q2, HR: 1.07 (0.96, 1.18) Q3, HR: 1.08 (0.97, 1.2) Q4, HR: 1.16 (1.04, 1.29); p=0.005 **Summary:** Inverse: hPDI & overall CRC (NS: Q3) Positive: uPDI & overall CRC (NS: Q2, Q3)	• **Did not account for:** Race/Ethnicity ("predominantly White"), SEP (all health professionals), Screening (Hx) • **Diet assessment:** FFQ every 4y • **Outcome measurement**: Incident cases determined by self-report, NDI; Tumor location and Dz stage from medical records & study physician • n= 3077 CRC cases (1304 proximal colon; 853 distal colon; 636 rectal) • **Funding:** NIH; Cancer Research UK Grand Challenge Award

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Tea/coffee; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods; Positive: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts **DP Method(s)**: Index/Score Analysis **Comparisons:** Continuous and Categorical, by quartiles (Q1, HR: 1 REF)		
Wang, 2022_Association [24] United States; NHS; HPFS Analytic N=206248 **Participant characteristics:** • Health: BMI, mean: 24.3-25.8 • Smoker: 9-26% current; ~31% current HRT use (NHSI+II) • Race and/or Ethnicity: 89-98% White • SEP: NR (all health professionals) Selection: Excluded those with or who had: implausible/extreme TEI; Dx of Cx or colitis/IBD; missing data	**DP Age(s):** 52-55y, mean (range: 30 to 75y at baseline) **DP(s) examined:** UPF, Nova Classification System Group 4 [Monteiro, 2019] **DP Components:** • UPF, Nova4 (Fig. 1 top sources): Breads and breakfast foods 27% ♂, 25% ♀; Fats, condiments/sauces 22% ♂ or ♀; Sweet, snacks, desserts 17% ♂, 18% ♀; Beverages 13% ♂, 17% ♀; Meat, poultry or seafood based products 5% ♂, 3% ♀; Ready-to-eat or heat mixed dishes 5% ♂, 4% ♀; Yogurt and dairy based desserts 5% ♂, 4% ♀; Savory snacks 4% ♂ or ♀; Other 2% ♂, 3% ♀ **DP Method(s)**: Index/ Score Analysis	**Follow-Up Duration:** 24-28y **Results for Overall CRC:** Nova 4/UPF & overall CRC (95% CI) ♂, Q2, HR: 1.20 (1.01, 1.43) ♂, Q3, HR: 1.02 (0.85, 1.22) ♂, Q4, HR: 1.13 (0.95, 1.35) ♂, Q5, HR: 1.24 (1.04, 1.48); p-trend=0.02 ♀, Q2, HR: 0.89 (0.77, 1.03) ♀, Q3, HR: 0.94 (0.82, 1.09) ♀, Q4, HR: 0.97 (0.84, 1.12) ♀, Q5, HR: 1.01 (0.88, 1.17) ; p-trend=0.87 **Summary:** Positive: UPF/Nova4 (Q5 vs. Q1) in ♂ & overall CRC; Proximal Colon; Distal Colon; NS/Null: data in ♀; other quartiles; UPF/Nova4 & Rectum Cx in ♂ or ♀	• **Did not account for:** SEP (all health professionals), Screening (Hx) • **Diet assessment:** FFQ every 4y • **Outcome measurement**: Incident cases determined by self-report, NDI; Tumor location and Dz stage from medical records & study physician • n= 3216 CRC cases (1304 proximal colon; 853 distal colon; 636 rectal) • **Funding:** NIH/NIMHD; Tufts University

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Comparisons: Categorical and linear-trend by energy-adjusted serv/d quartiles (Q1, HR: 1 REF)		
Willemsen, 2022 [26] Canada; Alberta's Tomorrow Project Analytic N=26242 **Participant characteristics:** • Health: BMI, mean: 29.7-32.6 (66% OW/Ob, with BMI > 25) • Smokers: 33-47% never • Race and/or Ethnicity: NR("homogenous; Canadian") • SEP: Majority cohabitating/married (~72-84%) and employed FT (~35-78%); Income: ~23-46% low, 35-49% mid, 15-32% highest category Selection: Excluded those with or who: missing data/unreliable diet; Hx of Cx	**DP Age(s):** 51y, mean at baseline **DP(s) examined:** "Western" DP "Prudent" DP "Dietary fiber" DP "Vitamin D" DP "Fruits, sugar and dairy" DP **DP Components:** • "Western" DP: Grains (non-whole), vegetables, white potatoes, cheese, red and processed meats, discretionary fats, and added teaspoons of sugar. • "Prudent" DP: Vegetables, fruits, and lean meat from fish and other seafood • "Dietary fiber" DP: Grain servings, vegetables, and fruits • "Vitamin D" DP: Dairy, fish, and other seafood • "Fruits, sugar and dairy" DP: Whole grains, fruits, dairy, and teaspoons of added sugar **DP Method(s)**: RRR; Factor/Cluster Analysis: PCA **Comparisons:** Categorical and linear-trend by quartiles (Q1, HR: 1 REF)	**Follow-Up Duration:** 13.3y, mean **Results for Overall CRC:** **Summary:** NS/Null: "Western" DP & Colon Cx Inverse/NS: "Prudent" DP (Q2 only) & Colon Cx Inverse: "Dietary fiber" DP (Q3, Q4) & Colon Cx NS/Null: "Vitamin D" DP & Colon Cx NS/Null: "Fruits, sugar and dairy" DP & Colon Cx	• **Did not account for:** Race/Ethnicity, SEP, Screening, Alcohol, Postmenopausal hormone therapy • **Diet assessment:** FFQ • **Outcome measurement**: Incident cases identified via registry linkage and/or medical records • Cases identified: n= 543 (BCx); n= 199 (Colon Cx) • **Funding:** Alberta Health and the Alberta Cancer Prevention Legacy Fund, Alberta Cancer Foundation, Canadian Partnership Against Cancer, Alberta Health Services
Xiao, 2023 [27] United States; Prostate, Lung,	**DP Age(s):** 65y (SD: 6) (range: 55 to 74y at baseline)	**Follow-Up Duration:** 9.2y, mean **Results for Overall CRC:** Paleo & overall CRC	• **Did not account for:** Screening • **Diet assessment:** FFQ • **Outcome measurement**: Incident

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
Colorectal, and Ovarian (PLCO) Cancer Screening Trial Analytic N=72721 **Participant characteristics:** • Health: BMI, mean: 27 (SD: 5) • 6% Hx of DM; Smokers: 49% never • Race and/or Ethnicity: 94% White; 6% Non-White • SEP: Education: 28% high-school or less; 73% some college/degree Selection: Excluded those with or who: missing baseline questionnaire/data (BMI, PA, Smoking); invalid FFQ; missing 8+ FFQ items; Hx of Cx; implausible/extreme TEI	**DP(s) examined:** Paleolithic Diet Score [Whalen 2014] **DP Components:** • Paleo, Positive: Vegetables; Fruit and Vegetable Diversity; Fruit; Nuts; Fish; Lean Meat; Calcium (from non-dairy foods). Negative: Grains and Starches; Baked Goods; Red and Processed Meat; Dairy Foods; Alcohol; Sodium **DP Method(s)**: Index/Score Analysis **Comparisons:** Categorical and linear-trend by quartiles (Q1, HR: 1 REF)	Q2, HR: 0.88 (0.71, 1.09) Q3, HR: 0.79 (0.64, 0.97) Q4, HR: 0.76 (0.61, 0.95) p-trend=0.009, **Summary:** Inverse: Paleolithic diet score & overall CRC, proximal colon Cx; NS/Inverse: Distal CRC	cases identified via self-report, medical records a/o NDI; confirmed via medical records/pathology via physician • Cases identified: n=694 CRC (420 proximal colon; 272 distal CRC; 2 unknown site) • **Funding:** The General Project of Chongqing Natural Science Foundation, Chongqing Science and Technology Commission, China; Kuanren Talents Project of the Second Afliated Hospital of Chongqing Medical University in China
Yue, 2021 [28] United States; NHS II Analytic N=94217 **Participant characteristics:** • Health: BMI, mean: 26.4 • 4% Hx DM; Smoker: 35% ever; 39% postmenopausal • Race and/or Ethnicity: 93% White • SEP: NR (all health professionals) Selection: Excluded those with or who had: implausible/extreme TEI; Dx of Cx or colitis/IBD; missing data	**DP Age(s):** 46.7y, mean (range, 25 to 42y at baseline) **DP(s) examined:** Prime (aka Global) Diet Quality score (GDQS) [Fung, 2018] Plant-Based Diet Index (PDI) - healthful (hPDI)/unhealthful PDI (uPDI) [Satija, 2016] Empirical Dietary Indices for Hyperinsulinaemia (EDIH) [Tabung, 2016] **DP Components:** • PDQS, Positive: Vegetables (dark green leafy); Vegetables (Cruciferous); Vegetables (Deep Orange); Vegetables (Other); Tubers (Deep Orange); Fruit (Citrus); Fruit (Deep Orange); Fruit (Other); Legumes; Nuts and Seeds;	**Follow-Up Duration:** 24y (2,11,655 person-years F/U) **Results for Overall CRC:** PDQS & CRC Q2, HR: 0.81 (0.60, 1.11) Q3, HR: 0.96 (0.71, 1.30) Q4, HR: 0.80 (0.57, 1.11) p-trend=0.29 cont. 75th %-tile, HR: 0.91 (0.67, 1.24) PDI & CRC Q2, HR: 1.25 (0.91, 1.72) Q3, HR: 1.45 (1.05, 2.00) Q4, HR: 1.16 (0.81, 1.67) p-trend=0.28	• **Did not account for:** SEP, Screening • **Diet assessment:** FFQ every 4y • **Outcome measurement**: Incident cases determined by self-report, NDI; Tumor location and Dz stage from medical records & study physician • n= 332 CRC cases (proximal colon; distal colon; rectal) • **Funding:** NIH

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Whole Grains; Fish and Shellfish; Poultry and Game; Low-fat Dairy; Eggs; Oils (Liquid). Negative: Processed meat; Refined grains and baked goods; Sweets and ice cream; SSBs; Juice; White roots and tubers; Purchased deep fried foods; Neutral (Moderate): High-fat Dairy; Red meat • PDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Negative: Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • hPDI: Positive: Vegetables; Fruits; Nuts; Legumes; Whole grains; Vegetable oils; Tea/coffee; Negative: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat); Miscellaneous animal-based foods • uPDI: Negative: Whole grains; Fruits; Vegetables; Nuts; Legumes; Vegetable oils; Tea/coffee; Animal fats; Dairy; Eggs, Fish/seafood; Meat (poultry and red meat);	cont. 75th %-tile, HR: 1.14 (0.82, 1.59) hPDI & CRC Q2, HR: 0.95 (0.69, 1.30) Q3, HR: 0.95 (0.69, 1.31) Q4, HR: 0.92 (0.65, 1.28) p-trend=0.63 cont. 75th %-tile, HR: 0.91 (0.66, 1.25) uPDI & CRC Q2, HR: 0.93 (0.69, 1.26) Q3, HR: 0.86 (0.62, 1.18) Q4, HR: 0.89 (0.63, 1.24) p-trend=0.42 cont. 75th %-tile, HR: 0.91 (0.66, 1.26) EDIH & CRC Q2, HR: 1.38 (0.99, 1.92) Q3, HR: 1.46 (1.04, 2.06) Q4, HR: 1.67 (1.15, 2.44) p-trend=0.01 cont. 75th %-tile, HR: 1.41 (0.99, 2.01) **Summary:** NS/Inverse: PDQS & overall CRC; NS/Null: Proximal colon; Distal colon; Rectum; Distal colon and rectum NS/Null: PDI & overall CRC, Proximal colon; Distal colon; Rectum; Distal colon and rectum	

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Miscellaneous animal-based foods; Positive: Fruit juices; Sugar-sweetened beverages; Refined grains; Potatoes; Sweets/desserts • EDIH, Positive: Red meat; Processed meat; Poultry; Tomatoes; French fries, Fish (non-dark); Low-fat dairy; Eggs; High-energy beverages (cola and other carbonated beverages with sugar, fruit drinks); Low-energy beverages; Butter/Margarine; Cream soups; Negative: Green leafy vegetables; Whole fruit; High-fat dairy products; Coffee; Wine • **DP Method(s)**: Index/Score Analysis **Comparisons:** Categorical and linear-trend per each DP by quartiles (Q1, HR: 1 REF)	Positive: EDIH (Q3, Q4) & overall CRC; NS/Null: Proximal colon; Distal colon; Rectum; Distal colon and rectum	
Zhang, 2021[29] Denmark; Danish Diet, Cancer and Health cohort (DCH) Analytic N=55744 **Participant characteristics:** • Health: BMI: OW 42%, Ob 15% • Smokers: 35% never; HRT: 28% never, 16% current • Race and/or Ethnicity: NR (Danish) • SEP: Education: 15% none, 23% short, 40% medium, 22% high Selection: Excluded those with or who: missing relevant data (diet, background, smoking, alcohol, Cx); Dx/Hx of Cx	**DP Age(s):** 56y, median; 50-64 y at baseline **DP(s) examined:** Dutch Dietary Guidelines - 2015 [Kromhout, 2016] **DP Components:** • DDG, Positive: Vegetables; Legumes; Fruit; Nuts, unsalted; Whole Grains; Fish; Liquid cooking fats, Vegetable Oils, Soft Margarine; Tea. Negative: Red and Processed Meat; Sugar-Sweetened Beverages; Alcohol **DP Method(s)**: Index/Score Analysis	**Follow-Up Duration:** 18.9y, median **Results for Overall CRC:** DDGI & CRC Q2, HR: 0.91 (0.80, 1.04) Q3, HR: 0.80 (0.69, 0.92) Q4, HR: 0.66 (0.53, 0.84) p-trend<0.001 **Summary:** Inverse: DDGI & CRC; Colon Cx; NS: Rectal Cx	• **Did not account for:** Race/Ethnicity (Danish), Screening • **Diet assessment:** FFQ • **Outcome measurement**: Incident cases identified via linkage to cancer/death registry; CX defined by ICD codes • Cases identified: n=1879 CRC (n=1256 colon; n=623 rectal) • **Funding:** None reported

Article Information	Intervention/exposure and comparator	Results	Methodological considerations
	Comparisons: Categorical and linear trend for DDGI by quartiles (Q1, HR: 1 REF)		

[a] Abbreviations: BMI: body mass index; CRC: colorectal cancer; Cx: cancer; DP: dietary pattern; DM: diabetes mellitus; Dx: diagnosis; FFQ: food frequency questionnaire; HR: hazard ratio; HTN: hypertension; HRT: hormone replacement therapy; Hx: history of; NDI: national death index; NR: not reported; NS: not statistically significant; OB: obesity; OR: odds ratio; OW: overweight; PA: physical activity; REF: referent group; SEP: socioeconomic position; TEI: total energy intake;

Table 7. Risk of bias for observational studies examining dietary pattern consumption by adults and older adults and colorectal cancer[a]

Article	Confounding	Exposure measurement	Selection of participants	Post-exposure interventions	Missing data	Outcome measurement	Selection of the reported result	Overall risk of bias
Arima, 2022[1]	HIGH	LOW	LOW	LOW	SOME CONCERNS	LOW	SOME CONCERNS	HIGH
Arthur, 2023[2]	SOME CONCERNS	LOW	LOW	LOW	LOW	LOW	SOME CONCERNS	SOME CONCERNS
Barrubés, 2020[3]	HIGH	LOW	SOME CONCERNS	LOW	LOW	LOW	SOME CONCERNS	HIGH
Castelló, 2022[4]	SOME CONCERNS	SOME CONCERNS	LOW	LOW	LOW	LOW	SOME CONCERNS	SOME CONCERNS
Chaltiel, 2022[5]	HIGH	LOW	LOW	LOW	SOME CONCERNS	LOW	LOW	HIGH
Chang, 2023[6]	SOME CONCERNS	SOME CONCERNS	LOW	LOW	LOW	LOW	SOME CONCERNS	SOME CONCERNS
Chebet, 2020[7]	SOME CONCERNS	SOME CONCERNS	SOME CONCERNS	SOME CONCERNS	LOW	LOW	LOW	HIGH
Hoang, 2023[8]	SOME CONCERNS	LOW	LOW	LOW	LOW	SOME CONCERNS	SOME CONCERNS	HIGH
Jin, 2023[9]	LOW	SOME CONCERNS	LOW	SOME CONCERNS	LOW	LOW	SOME CONCERNS	SOME CONCERNS
Kim, 2022[10]	SOME CONCERNS	SOME CONCERNS	LOW	LOW	LOW	LOW	SOME CONCERNS	SOME CONCERNS
Kim, 2023[11]	SOME CONCERNS	SOME CONCERNS	LOW	LOW	LOW	SOME CONCERNS	SOME CONCERNS	HIGH

Article	Confounding	Exposure measurement	Selection of participants	Post-exposure interventions	Missing data	Outcome measurement	Selection of the reported result	Overall risk of bias
Lee, 2023[12]	SOME CONCERNS	LOW	LOW	LOW	SOME CONCERNS	SOME CONCERNS	SOME CONCERNS	HIGH
Liu, 2023[13]	HIGH	LOW	LOW	LOW	SOME CONCERNS	LOW	SOME CONCERNS	HIGH
Maimaitiyiming, 2023[14]	SOME CONCERNS	LOW	LOW	LOW	HIGH	SOME CONCERNS	SOME CONCERNS	HIGH
Moazzen, 2022[15]	HIGH	SOME CONCERNS	LOW	LOW	LOW	LOW	SOME CONCERNS	HIGH
Neuhouser, 2022[16]	SOME CONCERNS	SOME CONCERNS	LOW	LOW	SOME CONCERNS	SOME CONCERNS	SOME CONCERNS	HIGH
Nguyen, 2020[17]	SOME CONCERNS	SOME CONCERNS	LOW	LOW	LOW	LOW	SOME CONCERNS	SOME CONCERNS
Petermann-Rocha, 2021[18]	HIGH	SOME CONCERNS	LOW	LOW	LOW	LOW	SOME CONCERNS	HIGH
Ren, 2023[19]	HIGH	SOME CONCERNS	LOW	LOW	LOW	SOME CONCERNS	LOW	HIGH
Schulpen, 2020[20]	SOME CONCERNS	SOME CONCERNS	LOW	LOW	SOME CONCERNS	LOW	SOME CONCERNS	HIGH
Shang, 2023[21]	SOME CONCERNS	LOW	LOW	LOW	SOME CONCERNS	LOW	LOW	SOME CONCERNS
Thompson, 2023[22]	SOME CONCERNS	LOW	LOW	LOW	LOW	LOW	HIGH	HIGH
Wang, 2022[24]	SOME CONCERNS	SOME CONCERNS	LOW	LOW	SOME CONCERNS	SOME CONCERNS	SOME CONCERNS	HIGH
Wang, 2022[23]	HIGH	SOME CONCERNS	LOW	LOW	SOME CONCERNS	SOME CONCERNS	SOME CONCERNS	HIGH

Article	Confounding	Exposure measurement	Selection of participants	Post-exposure interventions	Missing data	Outcome measurement	Selection of the reported result	Overall risk of bias
Wang, 2023[25]	HIGH	SOME CONCERNS	LOW	LOW	SOME CONCERNS	SOME CONCERNS	SOME CONCERNS	HIGH
Willemsen, 2022[26]	VERY HIGH	SOME CONCERNS	LOW	LOW	SOME CONCERNS	LOW	HIGH	VERY HIGH
Xiao, 2023[27]	SOME CONCERNS	SOME CONCERNS	LOW	LOW	LOW	SOME CONCERNS	LOW	SOME CONCERNS
Yue, 2021[28]	HIGH	LOW	LOW	LOW	LOW	SOME CONCERNS	SOME CONCERNS	HIGH
Zhang, 2021[29]	HIGH	SOME CONCERNS	LOW	LOW	LOW	LOW	LOW	HIGH

[a] Possible ratings of low, some concerns, high, very high, no information, or not applicable were determined using the "Risk of Bias in Non-randomized Studies of Exposures (ROBINS-E)" tool (Higgins JPT, Morgan RL, Rooney AA, et al. A tool to assess risk of bias in non-randomized follow-up studies of exposure effects (ROBINS-E). *Environment International* 2024 (published online Mar 24); doi: 10.1016/j.envint.2024.108602.) *Low risk of bias except for concerns about uncontrolled confounding.

Acknowledgments and funding

The Committee members were involved in: establishing all aspects of the protocol, which presented the plan for how they would examine the scientific evidence, including the inclusion and exclusion criteria; reviewing all studies that met the criteria they set; deliberating on the body of evidence for each question; and writing and grading the conclusion statements. The NESR team, with assistance from Federal staff from HHS and USDA (Jean Altman, MS; Kara Beckman, PhD; Dana DeSilva, PhD, RD; Kevin Kuczynski, MS, RD; TusaRebecca Pannucci, PhD, MPH, RD; Julia Quam, MSPH, RND; Elizabeth Rahavi, RD) and Project Leadership (Eve Stoody, PhD, Janet de Jesus, MS, RD), supported the Committee by facilitating, executing, and documenting the work necessary to ensure the reviews were completed in accordance with NESR methodology. Contractor support was also provided by Panum Telecom, LLC, a wholly owned subsidiary of Aretum (Verena McClain, MSc).

The Committee and NESR staff thank staff from the National Institutes of Health (NIH) for coordinating the peer review of this systematic review, and the peer reviewers for their time and expertise.

Funding: United States Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Alexandria, VA

References of the articles included in the systematic review

1. Arima K, Zhong R, Ugai T, et al. Western-Style Diet, pks Island-Carrying Escherichia coli, and Colorectal Cancer: Analyses From Two Large Prospective Cohort Studies. *Gastroenterology*. Oct 2022;163(4):862-874. doi:10.1053/j.gastro.2022.06.054
2. Arthur RS, Kirsh VA, Rohan TE. The association of the healthy eating index with risk of colorectal cancers (overall and by subsite) among Canadians. *Cancer Epidemiol*. Dec 2023;87:102454. doi:10.1016/j.canep.2023.102454
3. Barrubes L, Babio N, Hernandez-Alonso P, et al. Association between the 2018 WCRF/AICR and the Low-Risk Lifestyle Scores with Colorectal Cancer Risk in the Predimed Study. *J Clin Med*. Apr 23 2020;9(4)doi:10.3390/jcm9041215
4. Castello A, Rodriguez-Barranco M, Fernandez de Larrea N, et al. Adherence to the Western, Prudent and Mediterranean Dietary Patterns and Colorectal Cancer Risk: Findings from the Spanish Cohort of the European Prospective Investigation into Cancer and Nutrition (EPIC-Spain). *Nutrients*. Jul 27 2022;14(15)doi:10.3390/nu14153085
5. Chaltiel D, Julia C, Chaltiel R, et al. Prospective association between adherence to the 2017 French dietary guidelines and risk of death, CVD and cancer in the NutriNet-Sante cohort. *Br J Nutr*. Feb 28 2022;127(4):619-629. doi:10.1017/S0007114521001367
6. Chang K, Gunter MJ, Rauber F, et al. Ultra-processed food consumption, cancer risk and cancer mortality: a large-scale prospective analysis within the UK Biobank. *EClinicalMedicine*. Feb 2023;56:101840. doi:10.1016/j.eclinm.2023.101840
7. Chebet JJ, Thomson CA, Kohler LN, et al. Association of Diet Quality and Physical Activity on Obesity-Related Cancer Risk and Mortality in Black Women: Results from the Women's Health Initiative. *Cancer Epidemiol Biomarkers Prev*. Mar 2020;29(3):591-598. doi:10.1158/1055-9965.EPI-19-1063
8. Hoang T, Cho S, Choi JY, Kang D, Shin A. Assessments of dietary intake and polygenic risk score in associations with colorectal cancer risk: evidence from the UK Biobank. *BMC Cancer*. Oct 18 2023;23(1):993. doi:10.1186/s12885-023-11482-1
9. Jin Q, Shi N, Lee DH, et al. Hyperinsulinemic and Pro-Inflammatory Dietary Patterns and Metabolomic Profiles Are Associated with Increased Risk of Total and Site-Specific Cancers among Postmenopausal Women. *Cancers (Basel)*. Mar 14 2023;15(6)doi:10.3390/cancers15061756
10. Kim J, Boushey CJ, Wilkens LR, Haiman CA, Le Marchand L, Park SY. Plant-based dietary patterns defined by a priori indices and colorectal cancer risk by sex and race/ethnicity: the Multiethnic Cohort Study. *BMC Med*. Nov 29 2022;20(1):430. doi:10.1186/s12916-022-02623-7
11. Kim J, Khil J, Kim H, Keum N, Zhang X, Giovannucci E. Plant-based dietary patterns and the risk of digestive system cancers in 3 large prospective cohort studies. *Eur J Epidemiol*. Jun 2023;38(6):617-627. doi:10.1007/s10654-023-01007-2
12. Lee DH, Jin Q, Shi N, et al. Dietary Inflammatory and Insulinemic Potentials, Plasma Metabolome and Risk of Colorectal Cancer. *Metabolites*. Jun 12 2023;13(6)doi:10.3390/metabo13060744
13. Liu F, Lv Y, Peng Y, et al. Plant-based dietary patterns, genetic predisposition and risk of colorectal cancer: a prospective study from the UK Biobank. *J Transl Med*. Sep 27 2023;21(1):669. doi:10.1186/s12967-023-04522-8
14. Maimaitiyiming M, Yang H, Zhou L, Zhang X, Cai Q, Wang Y. Associations between an obesity-related dietary pattern and incidence of overall and site-specific cancers: a prospective cohort study. *BMC Med*. Jul 10 2023;21(1):251. doi:10.1186/s12916-023-02955-y
15. Moazzen S, Cortes-Ibanez FO, van der Vegt B, Alizadeh BZ, de Bock GH. Diet quality indices and gastrointestinal cancer risk: results from the Lifelines study. *Eur J Nutr*. Feb 2022;61(1):317-327. doi:10.1007/s00394-021-02648-3
16. Neuhouser ML, Pettinger M, Tinker LF, et al. Associations of Biomarker-Calibrated Healthy Eating Index-2010 Scores with Chronic Disease Risk and Their Dependency on Energy Intake and Body Mass Index in Postmenopausal Women. *J Nutr*. Jan 14 2023;152(12):2808-2817. doi:10.1093/jn/nxac199

17. Nguyen S, Li H, Yu D, et al. Adherence to dietary recommendations and colorectal cancer risk: results from two prospective cohort studies. *Int J Epidemiol*. Feb 1 2020;49(1):270-280. doi:10.1093/ije/dyz118
18. Petermann-Rocha F, Ho FK, Foster H, et al. Nonlinear Associations Between Cumulative Dietary Risk Factors and Cardiovascular Diseases, Cancer, and All-Cause Mortality: A Prospective Cohort Study From UK Biobank. *Mayo Clin Proc*. Sep 2021;96(9):2418-2431. doi:10.1016/j.mayocp.2021.01.036
19. Ren X, Yu C, Peng L, et al. Compliance with the EAT-Lancet diet and risk of colorectal cancer: a prospective cohort study in 98,415 American adults. *Front Nutr*. 2023;10:1264178. doi:10.3389/fnut.2023.1264178
20. Schulpen M, van den Brandt PA. Mediterranean diet adherence and risk of colorectal cancer: the prospective Netherlands Cohort Study. *Eur J Epidemiol*. Jan 2020;35(1):25-35. doi:10.1007/s10654-019-00549-8
21. Shang X, Liu J, Zhu Z, et al. Healthy dietary patterns and the risk of individual chronic diseases in community-dwelling adults. *Nat Commun*. Oct 23 2023;14(1):6704. doi:10.1038/s41467-023-42523-9
22. Thompson AS, Tresserra-Rimbau A, Karavasiloglou N, et al. Association of Healthful Plant-based Diet Adherence With Risk of Mortality and Major Chronic Diseases Among Adults in the UK. *JAMA Netw Open*. Mar 1 2023;6(3):e234714. doi:10.1001/jamanetworkopen.2023.4714
23. Wang F, Ugai T, Haruki K, et al. Healthy and unhealthy plant-based diets in relation to the incidence of colorectal cancer overall and by molecular subtypes. *Clin Transl Med*. Aug 2022;12(8):e893. doi:10.1002/ctm2.893
24. Wang L, Du M, Wang K, et al. Association of ultra-processed food consumption with colorectal cancer risk among men and women: results from three prospective US cohort studies. *BMJ*. Aug 31 2022;378:e068921. doi:10.1136/bmj-2021-068921
25. Wang P, Song M, Eliassen AH, Wang M, Giovannucci EL. Dietary patterns and risk of colorectal cancer: a comparative analysis. *Int J Epidemiol*. Feb 8 2023;52(1):96-106. doi:10.1093/ije/dyac230
26. Willemsen RF, McNeil J, Heer E, Johnson ST, Friedenreich CM, Brenner DR. Dietary patterns with combined and site-specific cancer incidence in Alberta's Tomorrow Project cohort. *Eur J Clin Nutr*. Mar 2022;76(3):360-372. doi:10.1038/s41430-021-00958-7
27. Xiao Y, Wang Y, Gu H, et al. Adherence to the Paleolithic diet and Paleolithic-like lifestyle reduce the risk of colorectal cancer in the United States: a prospective cohort study. *J Transl Med*. Jul 19 2023;21(1):482. doi:10.1186/s12967-023-04352-8
28. Yue Y, Hur J, Cao Y, et al. Prospective evaluation of dietary and lifestyle pattern indices with risk of colorectal cancer in a cohort of younger women. *Ann Oncol*. Jun 2021;32(6):778-786. doi:10.1016/j.annonc.2021.03.200
29. Zhang J, Nyvang D, Ibsen DB, et al. Adherence to the Danish food-based dietary guidelines and risk of colorectal cancer: a cohort study. *Br J Cancer*. Dec 2021;125(12):1726-1733. doi:10.1038/s41416-021-01556-x

Appendices

Appendix 1: Abbreviations

Table A 1. List of abbreviations

Abbreviation	Full name
DP	Dietary Pattern
FFQ	Food frequency questionnaire
HDI	Human Development Index
HEI	Healthy Eating Index
HHS	United States Department of Health and Human Services
NCC	Nested case-control study
NESR	Nutrition Evidence Systematic Review
NIH	National Institutes of Health
PCS	Prospective cohort study
RCT	Randomized controlled trial
SEP	Socioeconomic position
USDA	United States Department of Agriculture

Appendix 2: Conclusion statements from the existing* systematic reviews for the research question: What is the relationship between dietary patterns consumption and risk of colorectal cancer?

Table A 2. Inclusion and exclusion criteria comparison between existing* and updated systematic reviews for the research question: What is the relationship between dietary patterns and risk of colorectal cancer?

Citation	Conclusion statement and grade
2015 Dietary Guidelines Advisory Committee: Systematic Reviews of the Dietary Patterns, Foods and Nutrients, and Health Outcomes Subcommittee. February 2015. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/sites/default/files/2019-04/2015DGAC-SR-DietaryPatterns.pdf	Moderate evidence indicates an inverse association between dietary patterns that are higher in vegetables, fruits, legumes, whole grains, lean meats and seafood, low-fat dairy and moderate alcohol; and low in red and processed meats, saturated fat and sodas and sweets relative to other dietary patterns and the risk of colon and rectal cancer. Conversely, diets that are higher in red and processed meats, French fries and potatoes, and sources of sugars (i.e., sodas, sweets and dessert foods) are associated with a greater colon and rectal cancer risk. (Grade: Moderate)
Boushey C, Ard J, Bazzano L, Heymsfield S, Mayer-Davis E, Sabaté J, Snetselaar L, Van Horn L, Schneeman B, English LK, Bates M, Callahan E, Butera G, Terry N, Obbagy J. Dietary Patterns and Breast, Colorectal, Lung, and Prostate Cancer: A Systematic Review. July 2020. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://doi.org/10.52570/NESR.DGAC2020.SR0104	Moderate evidence indicates that dietary patterns higher in vegetables, fruits, legumes, whole grains, lean meats and seafood, and low-fat dairy; and low in red and processed meats, saturated fat and sugar-sweetened beverages and sweets relative to other dietary patterns are associated with lower risk of colon and rectal cancer. Moderate evidence also indicates that dietary patterns that are higher in red and processed meats, French fries, potatoes, and sources of sugars (e.g., sugarsweetened beverages, sweets and dessert foods) are associated with a greater colon and rectal cancer risk. (Grade: Moderate).

* Boushey C, Ard J, Bazzano L, Heymsfield S, Mayer-Davis E, Sabaté J, Snetselaar L, Van Horn L, Schneeman B, English LK, Bates M, Callahan E, Butera G, Terry N, Obbagy J. Dietary Patterns and Breast, Colorectal, Lung, and Prostate Cancer: A Systematic Review. July 2020. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://doi.org/10.52570/NESR.DGAC2020.SR0104

Appendix 3: Inclusion and exclusion criteria comparison between existing* and updated systematic reviews

Table A 3. Inclusion and exclusion criteria comparison between existing* and updated systematic reviews for the research question: What is the relationship between dietary patterns and risk of colorectal cancer?

Category	Existing Review	Updated Review	Change and Rationale
Study design	Included: • Randomized controlled trials • Non-randomized controlled trials, including quasi-experimental and controlled before and after studies • Prospective cohort studies • Retrospective cohort studies • Nested case-control studies Excluded: • Uncontrolled trials† • Case-control studies • Cross-sectional studies • Narrative reviews • Systematic reviews • Meta-analyses	Included: • Randomized controlled trials • Non-randomized controlled trials • Prospective cohort studies • Retrospective cohort studies • Nested case-control studies Excluded: • Uncontrolled trials • Case-control studies • Cross-sectional studies • Ecological studies • Narrative reviews • Systematic reviews • Meta-analyses • Modeling and simulation studies • Mendelian randomization studies	No change
Publication date	Included:	Included:	No change other than to include more recent evidence

* Boushey C, Ard J, Bazzano L, Heymsfield S, Mayer-Davis E, Sabaté J, Snetselaar L, Van Horn L, Schneeman B, English LK, Bates M, Callahan E, Butera G, Terry N, Obbagy J. Dietary Patterns and Breast, Colorectal, Lung, and Prostate Cancer: A Systematic Review. July 2020. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://doi.org/10.52570/NESR.DGAC2020.SR0104

† Including uncontrolled before-and-after studies

Category	Existing Review	Updated Review	Change and Rationale
	• January 2014 – January 2020 (this date range is in addition to the original systematic review, which included articles published from January 2000 – January 2014) Excluded: • Articles published prior to January 2000 or after January 2020	• January 2000 – January 2024 (this date range is encompassing the original systematic reviews, which included articles published from January 2000 – January 2020) Excluded: • Articles published prior to January 2000 or after January 2024	
Population: Study participants	Included: • Human participants • Males • Females Excluded: • Non-human participants (e.g. animal or in vitro models)	Included: • Human Excluded: • Non-human	No change other than formatting
Population: Life stage	Included: • Age at intervention/exposure: o Children and adolescents (ages 2-18 o years) o Adults (ages 19-64 years) o Older adults (ages 65 years and older • Age at outcome: o Children and adolescents (ages 2-18 o years) o Adults (ages 19-64 years) o Older adults (ages 65 years and older) Excluded: • Age at intervention/exposure and outcome: o Infants and toddlers (birth up to 24 months) • At outcome: o Infants and toddlers (birth up to 24 months)	Included: • At intervention or exposure and outcome: o Infants and young children (birth up to 24 months) o Children and adolescents (2 up to 19 years) o Adults and older adults (19 years and older) Excluded: • At intervention or exposure and outcome: o N/A • At outcome: o Individuals during pregnancy	Infants and young children (birth up to 24 months) will be included to focus the reviews on the entire lifespan. Individuals where the outcome is diagnosed during pregnancy will be excluded due to the special nature of this life stage.
Population: Health Status	Included: • Studies that enroll participants who are healthy and/or at risk for chronic disease, including those with obesity	Included: • Studies that exclusively enroll participants not diagnosed with a disease • Studies that enroll some participants:	No change other than to clarify intent

Category	Existing Review	Updated Review	Change and Rationale
	• Studies that enroll some participants diagnosed with a disease • Studies that enroll some participants diagnosed with cancer Excluded: • Studies that exclusively enroll participants diagnosed with a disease, or hospitalized patients with illness or injury. (For this criterion, studies that exclusively enroll subjects with obesity will be included.) • Studies that exclusively enroll participants with cancer (i.e., studies that aim to treat participants who have already been diagnosed with the outcome of interest)	○ diagnosed with a disease; ○ with severe undernutrition, failure to thrive/underweight, stunting, or wasting; ○ born preterm, with low birth weight, and/or small for gestational age; ○ pre- or post-bariatric surgery; ○ receiving pharmacotherapy to treat obesity; ○ and/or with the outcome of interest Excluded: • Studies that exclusively enroll participants: ○ diagnosed with a disease; ○ hospitalized for an illness, injury, or surgery; ○ with severe undernutrition, failure to thrive/underweight, stunting, or wasting; ○ born preterm,† with low birth weight,‡ and/or small for gestational age ○ pre- or post-bariatric surgery; ○ receiving pharmacotherapy to treat obesity; ○ and/or with the outcome of interest	
Intervention/exposure	Included: • Studies that examine consumption of and/or adherence to a dietary pattern [i.e., the quantities, proportions, variety, or combination of different foods, drinks, and nutrients (when available) in diets, and the frequency with which they are habitually consumed], including, at a minimum, a description of the foods and beverages in the pattern. • Dietary patterns may be measured or derived using a variety of approaches, such as adherence to a priori patterns (indices/scores), data driven patterns (factor or cluster analysis), reduced rank regression, or other methods, including clinical trials. Excluded: • Studies that do not provide a description of the dietary pattern, which at minimum, must include the foods and beverages in the pattern (i.e., studies that examine a labeled dietary pattern, but	Included: • Studies that examine consumption of and/or adherence to a dietary pattern [i.e., the quantities, proportions, variety, or combination of different foods, drinks, and nutrients (when available) in diets, and the frequency with which they are habitually consumed], including, at a minimum, a description of the foods and beverages in the pattern of each intervention/exposure and comparator group • Dietary patterns may be measured or derived using a variety of approaches, such as adherence to a priori patterns (indices/scores), data driven patterns (factor or cluster analysis), reduced rank regression, or other methods, including clinical trials • Multi-component intervention in which the isolated effect of the dietary pattern on the outcome(s) of interest is provided or can be determined Excluded:	No change other than formatting to clarify intent of the criteria.

Category	Existing Review	Updated Review	Change and Rationale
	do not describe the foods and beverages consumed).	• Studies that do not provide a description of the dietary pattern, which at minimum, must include the foods and beverages in the pattern (i.e., studies that examine a labeled dietary pattern, but do not describe the foods and beverages consumed in each intervention/exposure and comparator group) • Multi-component intervention in which the isolated effect of the dietary pattern on the outcome(s) of interest is not analyzed or cannot be determined (e.g., due to multiple intervention components within groups)	
Comparator	Included: • Consumption of and/or adherence to a different dietary pattern • Different levels of consumption of and/or adherence to a dietary pattern Excluded: • N/A	Included: • Consumption of and/or adherence to a different dietary pattern • Different levels of consumption of and/or adherence to a dietary pattern Excluded: • Consumption of and/or adherence to a similar dietary pattern of which only a specific component or food source s differs between groups	No change other than formatting
Outcome(s)	Included • Incident cases of: o Breast cancer o Colorectal cancer o Lung cancer o Prostate cancer Excluded • Studies that exclusively examine cancer-related mortality, prevalence, survivorship, or recurrence of cancer	Included • Incident cases of colorectal cancer Excluded • Studies that exclusively examine cancer-related mortality, prevalence, survivorship, or recurrence of cancer	Specific cancer types were separated into different questions for clarity of reporting

Category	Existing Review	Updated Review	Change and Rationale
Confounders	Included • n/a Excluded • n/a	Included • Studies that control for at least one of the key confounders listed in the analytic framework Excluded • Studies that control for at least one of the key confounders listed in the analytic framework	Criteria were added to enable focus on a stronger body of evidence
Study duration	Included • N/A Excluded • N/A	Included • Intervention study length ≥12 weeks Excluded • Intervention study length <12 weeks	Study duration criteria were modified to enable focus on the strongest body of evidence
Publication status	Included • Articles that have been peer-reviewed Excluded • Articles that have not been peer-reviewed and are not published in peer-reviewed journals, including unpublished data, manuscripts, reports, abstracts, and conference proceedings	Included • Peer-reviewed articles published in research journals Excluded ○ Non-peer reviewed articles, unpublished data or manuscripts, pre-prints, reports, and conference abstracts or proceedings	No change other than formatting
Language	Included • Articles published in English Excluded • Articles published in languages other than English	Included • Published in English Excluded • Not published in English	No change other than formatting
Country*	Included	Included	No change

* The classification of countries on the Human Development Index (HDI) is based on the UN Development Program Human Development Report Office (http://hdr.undp.org/en/data) for the year the study intervention occurred or data were collected. If the study does not report the year(s) in which the intervention/exposure data were collected, the HDI classification for the year of publication is applied. Studies conducted prior to 1990 are classified based on 1990 HDI classifications. If the year is more recent than the available HDI

Category	Existing Review	Updated Review	Change and Rationale
	• Studies conducted in countries classified as high or very high on the Human Development Index the year(s) the intervention/exposure data were collected	• Studies conducted in countries classified as high or very high on the Human Development Index the year(s) the intervention/exposure data were collected	
	Excluded	Excluded	
	• Studies conducted in countries classified as medium or low on the Human Development Index the year(s) the intervention/exposure data were collected	• Studies conducted in countries classified as medium or low on the Human Development Index the year(s) the intervention/exposure data were collected	

values, then the most recent HDI classifications are used. If a country is not listed in the HDI, then the current country classification from the World Bank is used (The World Bank. World Bank country and lending groups. Available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world- country-and-lending-groups)

Appendix 4: Literature search strategy

Searches from existing reviews

The search conducted for an existing review identified articles published between January 2000 and January 2020. For the complete search documentation, refer to:

Boushey C, Ard J, Bazzano L, et al. Dietary Patterns and Breast, Colorectal, Lung, and Prostate Cancer: A Systematic Review. July 2020. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://doi.org/10.52570/NESR.DGAC2020.SR0104

Search for the current review

This search was first run on December 5, 2022, and then periodically run using NESR's continuous evidence monitoring methods.[*] It was originally run to include prostate cancer and lung cancer, before the committee finalized the protocol to focus on breast and colorectal cancers.

Database: PubMed

Provider: U.S. National Library of Medicine
Date(s) Searched: December 5, 2022 (initial search); December 5, 2022 – January 9, 2024 (continuous evidence monitoring)
Dates Covered: January 1, 2020 – January 9, 2024

[*] USDA Nutrition Evidence Systematic Review Branch. Chapter 10: Continuous Evidence Monitoring. In: *USDA Nutrition Evidence Systematic Review: Methodology Manual*. February 2023. U.S. Department of Agriculture, Food and Nutrition Service, Center for Nutrition Policy and Promotion, Nutrition Evidence Systematic Review. Available at: https://nesr.usda.gov/methodology-overview.

Table A 4. Search for PubMed

Search #	Concept	String
#1	Dietary patterns	("dietary pattern*"[tiab] OR "diet pattern*"[tiab] OR "eating pattern*"[tiab] OR "food pattern*"[tiab] OR "diet quality"[tiab] OR "dietary quality"[tiab] OR "diet variety"[tiab] OR "dietary variety"[tiab] OR "varied diet"[tiab] OR "dietary guideline*"[tiab] OR "dietary recommendation*"[tiab] OR "dietary intake*"[tiab] OR "eating style*"[tiab] OR "Diet, Mediterranean"[Mesh] OR "Mediterranean Diet*"[tiab] OR "Dietary Approaches To Stop Hypertension"[Mesh] OR "Dietary Approaches To Stop Hypertension Diet*"[tiab] OR "DASH diet*"[tiab] OR "Diet, Gluten-Free"[Mesh] OR "Gluten Free diet*"[tiab] OR "prudent diet*"[tiab] OR "Diet, Paleolithic"[Mesh] OR "Paleolithic Diet*"[tiab] OR "Diet, Vegetarian"[Mesh] OR "vegetarian diet*"[tiab] OR "vegan diet*"[tiab] OR "Diet, Healthy"[Mesh] OR "healthy diet*"[tiab] OR "plant based diet*"[tiab] OR "Diet, Western"[Mesh] OR "western diet*"[tiab] OR "Nordic Diet*"[tiab] OR "Okinawan diet*"[tiab] OR "Diet, Fat-Restricted"[Mesh] OR "Diet, High-Fat"[Mesh] OR "high-fat diet*"[tiab] OR "low fat diet*"[tiab] OR "Diet, Sodium-Restricted"[Mesh] OR "low-sodium diet*"[tiab] OR "low salt diet*"[tiab] OR (("Guideline Adherence"[Mesh] OR "guideline adherence*"[tiab])AND (diet[tiab] OR dietary[tiab] OR food[tiab] OR beverage*[tiab] OR nutrition*[tiab])) OR "diet score*"[tiab] OR "diet quality score*"[tiab] OR "diet quality index*"[tiab] OR "diet quality indices"[tiab] OR kidmed[tiab] OR "diet index*"[tiab] OR "diet indices"[tiab] OR "dietary index*"[tiab] OR "dietary indices"[tiab] OR "food score*"[tiab] OR MedDietScore[tiab] OR "healthy eating index*"[tiab] OR "healthy eating indices"[tiab])
#2	Cancer	"Breast Neoplasms"[Mesh] OR "Colorectal Neoplasms"[Mesh] OR "Prostatic Neoplasms"[Mesh] OR "Lung Neoplasms"[Mesh] OR "Intestinal Polyps"[Mesh] OR ((neoplasm*[tiab] OR cancer*[tiab] OR carcinoma*[tiab] OR malignan*[tiab] OR tumor[tiab] OR tumors[tiab] OR tumorigen*[tiab] OR tumour*[tiab]) AND (breast*[tiab] OR mammary[tiab] OR colonic*[tiab] OR colon[tiab] OR colorect*[tiab] OR rectal[tiab] OR rectum[tiab] OR prostate*[tiab] OR prostatic[tiab] OR lung*[tiab] OR pulmonary[tiab])) OR "intestinal polyp*"[tiab] OR "colonic polyp*"[tiab] OR "colorectal polyp*"[tiab] OR "colorectal lesion*"[tiab]
#3		#1 AND #2

#4	Limits	#3 NOT ("Animals"[Mesh] NOT ("Animals"[Mesh] AND "Humans"[Mesh])) NOT (editorial[ptyp] OR comment[ptyp] OR commentary[tiab] OR news[ptyp] OR letter[ptyp] OR review[ptyp] OR systematic review[ptyp] OR systematic review[ti] OR meta-analysis[ptyp] OR meta-analysis[ti] OR meta-analyses[ti] OR protocol[ti] OR protocols[ti] OR retracted publication[ptyp] OR retraction of publication[ptyp] OR retraction of publication[tiab] OR retraction notice[ti] OR “retracted publication”[ti] OR "Congress"[Publication Type] OR "Consensus Development Conference"[Publication Type] OR “conference abstract*”[tiab] OR “conference proceeding*”[tiab] OR “conference paper*”[tiab] OR "practice guideline"[ptyp] OR "practice guideline"[ti]) Language: English Publication Date: January 1, 2020 - present

Database: Embase

Provider: Elsevier
Date(s) Searched: December 5, 2022 (initial search); December 5, 2022 – January 9, 2024 (continuous evidence monitoring)
Dates Covered: January 1, 2020 – January 9, 2024

Table A 5. Search for Embase

Search #	Concept	String
#1	Dietary Patterns	'dietary pattern'/exp OR 'mediterranean diet'/exp OR 'dash diet'/exp OR 'gluten free diet'/exp OR 'paleolithic diet'/de OR 'vegetarian diet'/exp OR 'healthy diet'/exp OR 'western diet'/de OR 'low carbohydrate diet'/exp OR 'low fat diet'/de OR 'lipid diet'/exp OR 'protein restriction'/exp OR 'sodium restriction'/exp OR 'nordic diet'/de OR 'protein diet'/exp OR 'dietary pattern*':ab,ti OR 'diet pattern*':ab,ti OR 'eating pattern*':ab,ti OR 'food pattern*':ab,ti OR 'diet quality':ab,ti OR 'dietary quality':ab,ti OR 'diet variety':ab,ti OR 'dietary variety':ab,ti OR 'varied diet':ab,ti OR 'dietary guideline*':ab,ti OR 'dietary recommendation*':ab,ti OR 'dietary intake*':ab,ti OR 'eating style*':ab,ti OR 'mediterranean diet*':ab,ti OR 'dietary approaches to stop hypertension diet*':ab,ti OR 'dash diet*':ab,ti OR 'gluten free diet*':ab,ti OR 'prudent diet*':ab,ti OR 'paleolithic diet*':ab,ti OR 'vegetarian diet*':ab,ti OR 'vegan diet*':ab,ti OR 'healthy diet*':ab,ti OR 'plant based diet*':ab,ti OR 'western diet*':ab,ti OR 'nordic diet*':ab,ti OR 'okinawan diet*':ab,ti OR 'high-fat diet*':ab,ti OR 'low fat diet*':ab,ti OR 'low-sodium diet*':ab,ti OR 'low salt diet*':ab,ti OR 'diet score*':ab,ti OR 'diet quality score*':ab,ti OR 'diet quality index*':ab,ti OR 'diet quality indices':ab,ti OR kidmed:ab,ti OR 'diet index*':ab,ti OR 'diet indices':ab,ti OR 'dietary index*':ab,ti OR 'dietary indices':ab,ti OR 'food score*':ab,ti OR meddietscore:ab,ti OR 'healthy eating index*':ab,ti OR 'healthy eating indices':ab,ti OR (('guideline adherence*' NEAR/2 (diet OR dietary OR food OR beverage* OR nutrition*)):ab,ti)
#2		'Breast tumor'/exp OR 'Colorectal tumor'/exp OR 'Prostate tumor'/exp OR 'Lung tumor'/exp OR 'intestine polyp'/exp OR ((neoplasm*:ab,ti OR cancer*:ab,ti OR carcinoma*:ab,ti OR malignan*:ab,ti OR tumor:ab,ti OR tumors:ab,ti OR tumorigen*:ab,ti OR tumour*:ab,ti) AND (breast*:ab,ti OR mammary:ab,ti OR colonic*:ab,ti OR colon:ab,ti OR colorect*:ab,ti OR rectal:ab,ti OR rectum:ab,ti OR prostate*:ab,ti OR prostatic:ab,ti OR lung*:ab,ti OR pulmonary:ab,ti)) OR 'intestinal polyp*':ab,ti OR 'colonic polyp*':ab,ti OR 'colorectal polyp*':ab,ti OR 'colorectal lesion*':ab,ti
#3		#1 AND #2
#4	Limits	#3 AND ([article]/lim OR [article in press]/lim) NOT ([animals]/lim NOT ([animals]/lim AND [humans]/lim)) AND [english]/lim NOT ([conference abstract]/lim OR [conference paper]/lim OR [conference review]/lim OR [editorial]/lim OR [erratum]/lim OR [letter]/lim OR [note]/lim OR 'retraction of publication':ab,ti OR 'retraction notice':ti OR 'retracted publication':ab,ti OR [review]/lim OR [systematic review]/lim OR [meta analysis]/lim OR 'practice guideline':ti) AND [2020-2024]/py

Database: Cochrane Central Register of Controlled Trials (CENTRAL)

Provider: John Wiley & Sons
Date(s) Searched: December 5, 2022 (initial search); December 5, 2022 – January 9, 2024 (continuous evidence monitoring)
Dates Covered: January 1, 2020 – January 9, 2024

Table A 6. Search for Cochrane CENTRAL

Search #	Concept	String
#1	Dietary Patterns	[mh "Diet, Mediterranean"] OR [mh "Dietary Approaches To Stop Hypertension"] OR [mh "Diet, Gluten-Free"] OR [mh "Diet, Paleolithic"] OR [mh "Diet, Vegetarian"] OR [mh "Diet, Healthy"] OR [mh "Diet, Western"] OR [mh "Diet, Fat-Restricted"] OR [mh "Diet, High-Fat"] OR [mh "Diet, Sodium-Restricted"] OR [mh "Guideline Adherence"] OR ("dietary pattern" OR "dietary patterns" OR "diet pattern" OR "diet patterns" OR "eating pattern" OR "eating patterns" OR "food pattern" OR "food patterns" OR "diet quality" OR "dietary quality" OR "diet variety" OR "dietary variety" OR "varied diet" OR "dietary guideline" OR "dietary guidelines" OR "dietary recommendation" OR "dietary recommendations" OR "dietary intake" OR "dietary intakes" OR "eating style" OR "eating styles" OR "Mediterranean Diet" OR "Mediterranean Diets" OR "Dietary Approaches To Stop Hypertension Diet" OR "Dietary Approaches To Stop Hypertension Diets" OR "DASH diet" OR "DASH diets" OR "Gluten Free diet" OR "Gluten Free diets" OR "prudent diet" OR "prudent diets" OR "Paleolithic Diet" OR "Paleolithic Diets" OR "vegetarian diet" OR "vegetarian diets" OR "vegan diet" OR "vegan diets" OR "healthy diet" OR "healthy diets" OR "plant based diet" OR "plant based diets" OR "Western diet" OR "Western diets" OR "Nordic Diet" OR "Nordic Diets" OR "Okinawan Diet" OR "Okinawan Diets" OR "high-fat diet" OR "high-fat diets" OR "low fat diet" OR "low fat diets" OR "low-sodium diet" OR "low-sodium diets" OR "low salt diet" OR "low salt diets" OR "diet score" OR "diet scores" OR "diet quality score" OR "diet quality scores" OR "diet quality index" OR "diet quality indexes" OR "diet quality indices" OR kidmed OR "diet index" OR "diet indexes" OR "diet indices" OR "dietary index" OR "dietary indexes" OR "dietary indices" OR "food score" OR "food scores" OR MedDietScore OR "healthy eating index" OR "healthy eating indexes" OR "healthy eating indices"):ti,ab,kw OR ("guideline adherence" NEAR/2 (diet OR dietary OR food OR beverage* OR nutrition*)):ti,ab,kw
#2		[mh "Breast Neoplasms"] OR [mh "Colorectal Neoplasms"] OR [mh "Prostatic Neoplasms"] OR [mh "Lung Neoplasms"] OR [mh "Intestinal Polyps"] OR (((neoplasm* OR cancer* OR carcinoma* OR malignan* OR tumor OR tumors OR tumorigen* OR tumour*) AND (breast* OR mammary OR colonic* OR colon OR colorect* OR rectal OR rectum OR prostate* OR prostatic OR lung* OR pulmonary)) OR "intestinal polyp" OR "intestinal polyps" OR "colonic polyp" OR "colonic polyps" OR "colorectal polyp" OR "colorectal polyps" OR "colorectal lesion" OR "colorectal lesions"):ti,ab,kw
#3		#1 AND #2 In trials. Word variations searched. Year first published: 2020-2024

Appendix 5: Excluded articles

The following table lists the articles excluded after full-text screening for this systematic review question. At least one reason for exclusion is provided for each article, though this may not reflect all possible reasons. Information about articles excluded after title and abstract screening is available upon request.

Table A 4. List of Excluded articles with rationale

Number	Citation	Rationale
1	Aguilera-Buenosvinos I, Martínez-González MÁ, Zazpe I, Romanos-Nanclares A, Sánchez-Bayona R, Toledo E. Associations between overall, healthful, and unhealthful low-fat dietary patterns and breast cancer risk in a Mediterranean cohort: The SUN project. Nutrition. 2023.109:111967. doi:10.1016/j.nut.2022.111967.	Intervention/Exposure
2	Aroke, D, Folefac, E, Shi, N, et al. Inflammatory and Insulinemic Dietary Patterns: Influence on Circulating Biomarkers and Prostate Cancer Risk. Cancer Prev Res (Phila). 2020. 13:841-852. doi:10.1158/1940-6207.Capr-20-0236.	Outcome
3	Blackie K, Bobe G, Takata Y. Vegetarian diets and risk of all-cause mortality in a population-based prospective study in the United States. J Health Popul Nutr. 2023. 42(1):130. doi:10.1186/s41043-023-00460-9.	Intervention/Exposure
4	Botteri, E, Peveri, G, Berstad, P, et al. Changes in Lifestyle and Risk of Colorectal Cancer in the European Prospective Investigation Into Cancer and Nutrition. Am J Gastroenterol. 2023. 118(4):702-711. doi:10.14309/ajg.0000000000002065.	Intervention/Exposure
5	Cai, H, Sobue, T, Kitamura, T, et al. Low-carbohydrate diet and risk of cancer incidence: The Japan Public Health Center-based prospective study. Cancer Science. 2022. 113:744-755. doi:10.1111/cas.15215 .	Intervention/Exposure
6	Castelló, A, Rodríguez-Barranco, M, Lope, V, et al. High adherence to Western dietary pattern increases breast cancer risk (an EPIC-Spain study). Maturitas. 2024. 179:107868. doi:10.1016/j.maturitas.2023.107868.	Outcome
7	Castelló A, Rodríguez-Barranco M, Pérez-Gómez B, Chirlaque MD, Bonet C, Amiano P, et al. High adherence to Western dietary pattern and prostate cancer risk: findings from the EPIC-Spain cohort. BJU Int. 2023. 132(3):272-282. doi:10.1111/bju.16001.	Outcome
8	Chang, K, Millett, C, Rauber, F, et al. Ultra-processed food consumption, cancer risk, and cancer mortality: a prospective cohort study of the UK Biobank. EClinicalMedicine. 2023. 56:101840. doi:10.1016/j.eclinm.2023.101840.	Publication Status
9	Chlebowski, RT, Aragaki, AK, Anderson, GL, et al. Dietary Modification and Breast Cancer Mortality: long-Term Follow-Up of the Women's Health Initiative Randomized Trial. Journal of clinical oncology. 2020. 38:1419-1428. doi:10.1200/JCO.19.00435.	Outcome
10	Chen, SLF, Braaten, T, Borch, KB, et al. Combined lifestyle behaviors and the incidence of common cancer types in the norwegian women and cancer study (Nowac). Clinical Epidemiology. 2021. 13:721-734. doi:10.2147/CLEP.S312864 .	Intervention/Exposure

11	Debras, C, Chazelas, E, Srour, B, et al. Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols (FODMAPs) and Cancer Risk in the Prospective NutriNet-Santé Cohort. J Nutr. 2022. 152:1059-1069. doi:10.1093/jn/nxab379 .	Intervention/Exposure
12	Dela Cruz, R, Park, SY, Shvetsov, YB, et at. Diet Quality and Breast Cancer Incidence in the Multiethnic Cohort. Eur J Clin Nutr. 2020. 74:1743-1747. doi:10.1038/s41430-020-0627-2.	Outcome
13	Fraser, GE, Cosgrove, CM, Mashchak, AD, et al. Lower rates of cancer and all-cause mortality in an Adventist cohort compared with a US Census population. Cancer. 2020. 126:1102-1111. doi:10.1002/cncr.32571 .	Intervention/Exposure
14	Fu, BC, Tabung, FK, Pernar, CH, et al. Insulinemic and Inflammatory Dietary Patterns and Risk of Prostate Cancer. Eur Urol. 2021. 79:405-412. doi:10.1016/j.eururo.2020.12.030 .	Outcome
15	Gardeazabal, I, Romanos-Nanclares, A, Martínez-González, MÁ, et al. Mediterranean dietary pattern is associated with lower incidence of premenopausal breast cancer in the Seguimiento Universidad de Navarra (SUN) Project. Public Health Nutr. 2020. 23:3148-3159. doi:10.1017/s1368980019003835.	Outcome
16	Huang MC, Huang TT, Feng HC, Chen IC, Chang CI, Wang TN, et al. Lifestyle Factors and Energy Intakes with Risks of Breast Cancer among Pre- and Post- Menopausal Women in Taiwan. Nutrients. 2023. 15(18):3900. doi: 10.3390/nu15183900.	Study Design
17	Jacobs, I, Taljaard-Krugell, C, Wicks, M, et al. Dietary Patterns and Breast Cancer Risk in Black Urban South African Women: The SABC Study. Nutrients. 2021. 13(11):4106. doi:10.3390/nu13114106.	Study Design
18	Kliemann N, Rauber F, Bertazzi Levy R, Viallon V, Vamos EP, Cordova R, et al. Food processing and cancer risk in Europe: results from the prospective EPIC cohort study. Lancet Planet Health. 2023. 7(3):e219-e232. doi:10.1016/S2542-5196(23)00021-9.	Intervention/Exposure
19	Kresovich, JK, Park, Y-MM, Keller, JA, et al. Healthy eating patterns and epigenetic measures of biological age. Am J Clin Nutr. 2022. 115(1):171-179. doi:10.1093/ajcn/nqab307.	Study Design; Outcome
20	Lan, T, Park, Y, Colditz, GA, et al. Adolescent dietary patterns in relation to later prostate cancer risk and mortality in the NIH-AARP Diet and Health Study. Br J Cancer. 2023. 128(1):57-62. doi:10.1038/s41416-022-02035-7.	Outcome
21	Leach, HJ, Baxter, BA, Beale, MN, et al. Feasibility of Beans/Bran Enriching Nutritional Eating For Intestinal Health & Cancer Including Activity for Longevity: A Pilot Trial to Improve Healthy Lifestyles among Individuals at High Risk for Colorectal Cancer. Integr Cancer Ther. 2020. 19:1534735420967101. doi:10.1177/1534735420967101 .	Outcome
22	Lécuyer, L, Dalle, C, Lefevre-Arbogast, S, et al. Diet-Related Metabolomic Signature of Long-Term Breast Cancer Risk Using Penalized Regression: An Exploratory Study in the SU.VI.MAX Cohort. Cancer Epidemiol Biomarkers Prev. 2020. 29:396-405. doi:10.1158/1055-9965.Epi-19-0900 .	Study Design; Intervention/Exposure
23	Loeb, S, Fu, BC, Bauer, SR, et al. Association of plant-based diet index with prostate cancer risk. Am J Clin Nutr. 2022. 115:662-670. doi:10.1093/ajcn/nqab365 .	Outcome

24	Long, M, Wang, W, Sun, Q. A high-fat diet: an unexpected role in preventing the metastatic seeding of colorectal cancer. Signal Transduct Target Ther. 2020. 5(1):257. 2020. doi:10.1038/s41392-020-00386-2.	Study Design
25	Lopez-Pentecost, M, Crane, TE, Garcia, DO, et al. Role of dietary patterns and acculturation in cancer risk and mortality among postmenopausal Hispanic women: results from the Women's Health Initiative (WHI). Journal of Public Health (Germany). 2022. 30:811-822. doi:10.1007/s10389-020-01342-8 .	Outcome
26	Männistö, S, Harald, K, Härkänen, T, et al. Association between overall diet quality and postmenopausal breast cancer risk in five Finnish cohort studies. Sci Rep. 2021. 11:16718. doi:10.1038/s41598-021-95773-2.	Outcome
27	Myneni, AA, Giovino, GA, Millen, AE, et al. Indices of Diet Quality and Risk of Lung Cancer in the Women's Health Initiative Observational Study. J Nutr. 2021. 151:1618-1627. doi:10.1093/jn/nxab033 .	Outcome
28	Nepal, S, Aslani, Z, Shi, N, et al. Associations of Dietary Patterns with Colorectal Adenomas in the Prostate, Lung, Colorectal, and Ovarian Cancer Cohort. Cancer Epidemiol Biomarkers Prev. 2023. 32(9):1260-1264. doi:10.1158/1055-9965.EPI-23-0143.	Outcome
29	Nguyen, LH, Cao, Y, Hur, J, et al. The Sulfur Microbial Diet Is Associated With Increased Risk of Early-Onset Colorectal Cancer Precursors. Gastroenterology. 2021. 161:1423-1432.e4. doi:10.1053/j.gastro.2021.07.008 .	Outcome
30	O'Hearn, M, Erndt-Marino, J, Gerber, S, et al. Validation of Food Compass with a healthy diet, cardiometabolic health, and mortality among U.S. adults, 1999–2018. Nat Commun. 2022. 13(1):7066. doi:10.1038/s41467-022-34195-8.	Study Design
31	Pan, K, Aragaki, AK, Neuhouser, ML, et al. Low-fat dietary pattern and breast cancer mortality by metabolic syndrome components: a secondary analysis of the Women's Health Initiative (WHI) randomised trial. Br J Cancer. 2021. 125:372-379. doi:10.1038/s41416-021-01379-w .	Outcome
32	Park, SY, Boushey, CJ, Shvetsov, YB, et al. Diet Quality and Risk of Lung Cancer in the Multiethnic Cohort Study. Nutrients. 2021. 13. doi:10.3390/nu13051614 .	Outcome
33	Park, YM, Shivappa, N, Petimar, J, et al. Dietary inflammatory potential, oxidative balance score, and risk of breast cancer: Findings from the Sister Study. Int J Cancer. 2021. 149:615-626. doi:10.1002/ijc.33581 .	Intervention/Exposure; Outcome
34	Peila, R, Arthur, RS, Dannenberg, AJ, Rohan, TE. Association of a Healthy Lifestyle Index with Risk of Breast Cancer among Women with Normal Body Mass Index in the UK Biobank. Cancer Epidemiol Biomarkers Prev. 2022. 31:554-560. doi:10.1158/1055-9965.Epi-21-0765.	Outcome
35	Peila, R, Chlebowski, R, Manson, JA, et al. Low-fat dietary modification and risk of ductal carcinoma in situ of the breast in the women's health initiative dietary modification trial. Cancer Epidemiology Biomarkers and Prevention. 2021. 30:1753-1756. doi:10.1158/1055-9965.EPI-21-0404 .	Outcome

36	Peila, R, Lane, DS, Shadyab, AH, et al. Healthy lifestyle index and the risk of ductal carcinoma in situ of the breast in the Women's Health Initiative. Int J Cancer. 2022. 151:526-538. doi:10.1002/ijc.34034.	Intervention/Exposure;
37	Plym, A, Zhang, Y, Stopsack, KH, et al. A Healthy Lifestyle in Men at Increased Genetic Risk for Prostate Cancer. Eur Urol. 2022. doi:10.1016/j.eururo.2022.05.008.	Outcome
38	Rassy, N, Van Straaten, A, Carette, C, et al. Association of Healthy Lifestyle Factors and Obesity-Related Diseases in Adults in the UK. JAMA Network Open. 2023. 6:E2314741.	Intervention/Exposure
39	Romanos-Nanclares, A, Tabung, FK, Willett, WC, et al. Insulinemic potential of diet and risk of total and subtypes of breast cancer among US females. Am J Clin Nutr. 2022. doi:10.1093/ajcn/nqac284.	Intervention/Exposure
40	Romanos-Nanclares, A, Toledo, E, Sánchez-Bayona, R, Sánchez-Quesada, C, Martínez-González, MÁ, Gea, A. Healthful and unhealthful provegetarian food patterns and the incidence of breast cancer: Results from a Mediterranean cohort. Nutrition. 2020. 79-80:110884. doi:10.1016/j.nut.2020.110884.	Outcome
41	Romanos-Nanclares, A, Willett, WC, Rosner, BA, et al. Healthful and Unhealthful Plant-Based Diets and Risk of Breast Cancer in U.S. Women: Results from the Nurses' Health Studies. Cancer Epidemiol Biomarkers Prev. 2021. 30:1921-1931. doi:10.1158/1055-9965.Epi-21-0352.	Outcome
42	Sciacca S, Lo Giudice A, Asmundo MG, Cimino S, Morgia G, Alshatwi AA, et al. Adherence to Healthy or Unhealthy Pro-Vegetarian Plant-Based Diets Have Different Impact on Prostate Cancer Severity: Preliminary Findings. Nutr Cancer. 2024. 76(1):98-105. doi:10.1080/01635581.2023.2279240.	Outcome
43	Shah, S, Mahamat-Saleh, Y, Ait-Hadad, W, et al. Long-term adherence to healthful and unhealthful plant-based diets and breast cancer risk overall and by hormone receptor and histologic subtypes among postmenopausal females. Am J Clin Nutr. 2023. 117(3):467-476. doi:10.1016/j.ajcnut.2022.11.019.	Study Design; Outcome
44	Shah S, Mahamat-Saleh Y, Hajji-Louati M, et al. Palaeolithic diet score and risk of breast cancer among postmenopausal women overall and by hormone receptor and histologic subtypes. Eur J Clin Nutr. 2023. 77(5):596-602. doi:10.1038/s41430-023-01267-x	Outcome
45	Shin, WK, Lee, HW, Shin, A, et al. Multi-Grain Rice Diet Decreases Risk of Breast Cancer in Korean Women: Results from the Health Examinees Study. Nutrients. 2020. 12(8)doi:10.3390/nu12082273.	Outcome
46	Shin, S, Saito, E, Sawada, N, et al. Dietary patterns and colorectal cancer risk in middle-aged adults: A large population-based prospective cohort study. Clin Nutr. 2018. 37(3):1019-1026. doi:10.1016/j.clnu.2017.04.015.	Outcome
47	Shin, S, Saito, E, Sawada, N, et al. Dietary patterns and prostate cancer risk in Japanese: the Japan Public Health Center-based Prospective Study (JPHC Study). Cancer Causes Control. 2018. 29(6):589-600. doi:10.1007/s10552-018-1030-3.	Publication Date Outcome
48	Sieri, S, Agnoli, C, Pala, V, et al. Dietary Intakes of Animal and Plant Proteins and Risk of Colorectal Cancer: The EPIC-Italy Cohort. Cancers (Basel). 2022. 14. doi:10.3390/cancers14122917 .	Intervention/Exposure
49	Thordardottir, GS, Einarsdottir, K, Thordardottir, M, et al. Dietary patterns in adolescence and risk of colorectal cancer: a population-based study. Cancer Causes Control. 2022. 33:205-211. doi:10.1007/s10552-021-01524-z .	Intervention/Exposure; Age: Intervention/Exposure

50	Ugai, T, Liu, L, Tabung, FK, et al. Prognostic role of inflammatory diets in colorectal cancer overall and in strata of tumor-infiltrating lymphocyte levels. Clin Transl Med. 2022. 12(11):e1114. doi:10.1002/ctm2.1114.	Health Status
51	van den Brandt PA. The association of a combined healthy lifestyle with the risk of postmenopausal breast cancer subtypes in the Netherlands Cohort Study. *Eur J Epidemiol*. Jun 2023;38(6):629-641. doi:10.1007/s10654-023-01005-4.	Outcome
52	Vitellius, C, Bertrais, S, Antier, J, et al. Evaluation of a risk score based on dietary and lifestyle factors to target a population at risk in colorectal cancer screening. Digestive and Liver Disease. 2021. 53:900-907. doi:10.1016/j.dld.2021.03.008 .	Study Design; Intervention/Exposure
53	Wang, Q, Hashemian, M, Sepanlou, SG, et al. Dietary quality using four dietary indices and lung cancer risk: the Golestan Cohort Study (GCS). Cancer Causes Control. 2021. 32:493-503. doi:10.1007/s10552-021-01400-w.	Outcome
54	Wang, W, Fung, TT, Wang, M, et al. Association of the Insulinemic Potential of Diet and Lifestyle With Risk of Digestive System Cancers in Men and Women. JNCI Cancer Spectr. 2018. 2(4):pky080. doi:10.1093/jncics/pky080	Intervention/Exposure
55	Wang, Y, Nguyen, LH, Mehta, RS, et al. Association Between the Sulfur Microbial Diet and Risk of Colorectal Cancer. JAMA Netw Open. 2021. 4(11):e2134308. doi:10.1001/jamanetworkopen.2021.34308.	Intervention/Exposure
56	Watling, CZ, Schmidt, JA, Dunneram, Y, et al. Risk of cancer in regular and low meat-eaters, fish-eaters, and vegetarians: a prospective analysis of UK Biobank participants. BMC Med. 2022. 20:73. doi:10.1186/s12916-022-02256-w .	Intervention/Exposure
57	Wei, X, Zhu, C, Ji, M, et al. Diet and Risk of Incident Lung Cancer: A Large Prospective Cohort Study in UK Biobank. Am J Clin Nutr. 2021. 114:2043-2051. doi:10.1093/ajcn/nqab298 .	Outcome
58	Xiao Y, He H, Xiang L, Gu H, Xu Z, Luo H, et al. Association between sulfur microbial diet and the risk of colorectal cancer precursors in older adults. Front Nutr. 2023. 10:1167372. doi:10.3389/fnut.2023.1167372.	Outcome
59	Yiannakou I, Singer MR, Moore LL. Indices of Mediterranean diet adherence and breast cancer risk in a community-based cohort. *Front Nutr*. 2023;10:1148075. doi:10.3389/fnut.2023.1148075	Outcome
60	Yu YC, Paragomi P, Jin A, Wang R, Schoen RE, Koh WP, et al. Low-Carbohydrate Diet Score and the Risk of Colorectal Cancer: Findings from the Singapore Chinese Health Study. Cancer Epi Biom Prev. 2023. 32(6):802-808.doi:10.1158/1055-9965.EPI-22-0683	Intervention/Exposure
61	Zhang, J, Yu, H, Huang, T, et al. Importance of ideal cardiovascular health metrics in the risk of colorectal cancer among people aged 50 years or older: a UK Biobank cohort study. BMJ Open. 2022. 12:e059642. doi:10.1136/bmjopen-2021-059642 .	Comparator
62	Zhang, Y, Zhong, G, Zhu, M, et al. Association Between Diabetes Risk Reduction Diet and Lung Cancer Risk in 98,159 Participants: Results From a Prospective Study. Front Oncol. 2022. 12:855101. doi:10.3389/fonc.2022.855101 .	Outcome
63	Zhang, YB, Pan, XF, Lu, Q, et al. Associations of combined healthy lifestyles with cancer morbidity and mortality among individuals with diabetes: results from five cohort studies in the USA, the UK and China. Diabetologia. 2022. doi:10.1007/s00125-022-05754-x .	Intervention/Exposure; Health Status

64	Zhang, Z, Tabung, FK, Jin, Q, et al. Diet-Driven Inflammation and Insulinemia and Risk of Interval Breast Cancer. Nutr Cancer. 2022. 74:3179-3193. doi:10.1080/01635581.2022.2063350 .	Outcome
65	Zhu P, Zhang Y, Chen Q, et al. The interaction of diet, alcohol, genetic predisposition, and the risk of breast cancer: a cohort study from the UK Biobank. *Eur J Nutr*. Mar 2024;63(2):343-356. doi:10.1007/s00394-023-03269-8	Outcome

Appendix 6: Dietary pattern visualization

The Committee's synthesis was facilitated by data visualization tables that presented the dietary pattern components in each of the dietary patterns examined in the body of evidence. During evidence synthesis, these tables were used in conjunction with other materials to compare and contrast the components between and within the dietary patterns studied along with the direction, magnitude, and statistical significance of reported results. Detailed information about the body of evidence, including study and population characteristics, a full description of each dietary pattern, reported results for all relevant outcomes, key confounders accounted for, study limitations, and funding sources, are summarized in the evidence tables of this report (**Table 6**). Each column represents the most commonly reported foods/food groups or nutrients across dietary patterns in this body of evidence. One additional column, "Other", captured a variety of other components less frequently reported across dietary patterns that did not fit into one of the preceding columns or categories, such as fast food, ready-to-eat dishes, pizza, and chocolate. Multiple symbols in each cell mean that the dietary pattern included multiple components from that column/category. Empty cells mean that the dietary pattern did not describe a component within that column/category.

Table A 7. Visualization of dietary pattern components organized by first-author last name alphabetically across evidence examining the relationship between dietary patterns consumed and risk of colorectal cancer[*†]

Article; Approach: Dietary pattern[‡]	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Arima, 2022; PCA: 'Western'		▲ ♀ ▲ FF								▲			▲P ▲ R, NP		▲			▲	▲	▲		▲	▲	◄ ♂	▲ snack foods			▲ ▲ ▲

[*] ▲ Positively-scored component, reflecting higher intake within the food category as part of the pattern; ▼ Negatively-scored component, reflecting lower intake within the food category as part of the pattern; ◄ Neutral component, reflecting moderate (in contrast to higher or lower) intake within the food category as part of the pattern

[†] Abbreviations: AP, animal foods/products; C, coffee only; ch, cheese; D, dairy/products; F, fish; fer, fermented; FF, fried potato or French fries; Fr, Fruit component; FrV, fruits and vegetables; FS, fish and seafood; G, grains/products; HF, high-fiber; LN, legumes and nuts; M, meat/products; Med, Mediterranean; NP, not processed; NS, not sweetened; oo, olive oil; P, processed; pro, protein (total/foods); RP, red and processed; SB, sugar-sweetened beverage; T, tea only; tom, tomatoes; UF: SF, ratio of unsaturated relative to saturated fat; UP, ultra-processed; V, vegetable component; VO; vegetable oil; W:R, ratio of white-to-red meat; X, component was excluded from dietary pattern; y, yogurt

[‡] Dietary approaches included methods such as a priori index/score analysis, a posteriori principal component analysis (PCA), and reduced rank regression (RRR). The dietary pattern is abbreviated in this table due to limited space but described in more detail in **Table 6** of the main document.

Article; Approach: Dietary pattern*	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Arthur, 2023; a priori: HEI-2015	▲ ▲ L	V		V, pro	▲ ▲			▲		▼	▲ pro	pro	▲ pro	pro		▲	D	D	▼	SB	▲ UF: SF		▼		▼			
Barrubés, 2020; a priori: aHEI-2010	▲	X		▲	▲		LN	▲					▼ RP						▼		▲ ▲	▼ Tr		◄	▼			
Castelló, 2022; PCA: 'Med'	▲	▲	Fr	▲	▲ ▲	▼ FrV	▲	▲			▲										▲ VO							
Castelló, 2022; PCA: 'Prudent'	▲				▲	▲ FrV		▲									▲											
Castelló, 2022; PCA: 'Western'								▼		▲	▲		▲P	▲	F		▼	▲	▲	▲					F			F
Chaltiel, 2022; a priori: PNNS-GS2	▲	G		G	V				◄		◄	▲ FS	◄	◄	◄	◄	D	D	▼	▼	▲	▼ AF		◄	▼ salt			
Chang, 2023; a priori: UPF, Nova4	▼												▼ R	▲ P								▲		▼	▲			▲
Chebet, 2020; a priori: HEI-2015	▲ ▲ L	V		V	▲ ▲			▲		▼	▲ pro	pro	▲ pro	pro		▲	D	D	▼	SB	▲ UF: SF		▼		▼			

Article; Approach: Dietary pattern*	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Hoang, 2023; a priori: WCRF, AICR	▲			V	V			V					▼ RP						▼					▼			▲	▼
Jin, 2023; a priori: EDIH	▼	▲ FF	▲ tom		▼						▲		▲R ▲P	▲	▲		▲	▼	▲			▲		▼ w		▼C		▲
Jin, 2023; a priori: HEI-2015	▲ ▲ L	V		V	▲ ▲			▲		▼	▲ pro	pro	▲ pro	pro		▲	D	D	▼	SB	▲ UF: SF		▼		▼			
Jin, 2023; a priori: rEDIP	▼ ▼ ▼		▲ tom			▼				▲	▲		▲P ▲R ▲						▲						▼ snack foods	▼T ▼C		▼
Kim, 2022; a priori: mhPDI	▲	▼		▲	▲	▼	▲	▲		▼	▼	FS	▼	M	▼	▼	D	D	▼	SB	▲ VO		▼			▲		▼ AP
Kim, 2022; a priori: mPDI	▲	▲		▲	▲	▲	▲	▲		▲	▼	FS	▼	M	▼	▼	D	D	▲	SB	▲ VO		▼			▲		▼ AP
Kim, 2022; a priori: muPDI	▼	▲		▼	▼	▲	▼	▼		▲	▼	FS	▼	M	▼	▼	D	D	AS	▲	▼ VO		▼			▼		▼ AP
Kim, 2023; a priori: hPDI	▲	▼		▲	▲	▼	▲	▲		▼	▼	FS	▼	M	▼	▼	D	D	▼	▼	▲ VO		▼			▲		▼ AP
Kim, 2023; a priori: PDI	▲	▲		▲	▲	▲	▲	▲		▲	▼	FS	▼	M	▼	▼	D	D	▲	▲	▲ VO		▼			▲		▼ AP
Kim, 2023; a priori: uPDI	▼	▲		▼	▼	▲	▼	▼		▲	▼	FS	▼	M	▼	▼	D	D	▲	▲	▼ VO		▼			▼		▼ AP

Article; Approach: Dietary pattern*	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Lee, 2023; a priori: EDIH	▼	▲ FF	▲ tom		▼						▲		▲R ▲P	▲	▲		▲	▼	▲			▲		▼ w		▼C		▲
Lee, 2023; a priori: rEDIP	▼ ▼ ▼		▲ tom			▼				▲	▲		▲P ▲R ▲						▲					▼b ▼ w	▼ snack foods	▼T ▼C		▼
Liu, 2023; a priori: mhPDI	▲	▼		▲	▲	▼	▲	▲		▼	▼	FS	▼	M	▼	▼	D	D	▼	▼			▼			▲		▼ AP
Liu, 2023; a priori: mPDI	▲	▲		▲	▲	▲	▲	▲		▲	▼	FS	▼	M	▼	▼	D	D	▲	▲			▼			▲		▼ AP
Liu, 2023; a priori: muPDI	▼	▲		▼	▼	▲	▼	▼		▲	▼	FS	▼ FS	FS	▼	▼	D	D	▲	▲			▼			▼		▼ AP
Maimaitiyiming, 2023; RRR: 'Obesity-related'	▼	▲	▲	▲		▼		▼ HF	▲	▲			▲R P	▲	▲				▲	▲	▼ OO	▲		▲ fer	▲ snack foods	▼T		▲
Moazzen, 2022; a priori: ACS	▲				▲			▲					▼ P▼ R▼											▼				
Moazzen, 2022; a priori: DDG	▲			▲	▲		▲	▲		▼	▲		▼R ▼P						▼		▲		▼	▼	▼	▲T		
Moazzen, 2022; a priori: LLS	▲			▲	▲		LN	▲			▲		▼ RP			▲ NS	D, NS	D, NS	▼		▲		▼			▲		

Article; Approach: Dietary pattern*	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Moazzen, 2022; a priori: WCRF, AICR	▲			V									▼ RP						▼					▼	▼		▲	▼
Neuhouser, 2022; a priori: HEI-2010	▲ ▲ L	V		V	▲ ▲			▲		▼	▲ pro	pro	▲ pro	pro		▲	D	D	▼	SB	▲		▼		▼			
Nguyen, 2020; a priori: CHFP	▲			▲	▲				▲		▲	FS	▼	M	▼	▲	D	D				▼			▼ salt			
Nguyen, 2020; a priori: mAHEI-2010	▲	X		▲	▲		LN						▼ RP								▲ ▲			◄	▼			
Nguyen, 2020; a priori: mDASH	▲	X		▲	▲	Fr	LN	X					▼ RP			▲	D	D	X						▼			
Petermann-Rocha, 2021; a priori: DRS	▼				V				▼		▼		▲R ▲P					▲					▲		▲ salt			▼
Ren, 2023; a priori: EAT-Lancet	▲	◄		▲	▲		▲	▲	G	G	◄		▼	▼	◄	◄			AS	▼	▲	◄	▼					
Schulpen, 2020; a priori: aMED	▲	X		▲	▲		▲	▲			▲		▼ RP								▲ UF: SF		UF: SF	◄				
Schulpen, 2020; a priori: aMEDr	▲	X		▲	▲		▲	▲			▲		▼ RP								▲ UF: SF		UF: SF	X				

Article; Approach: Dietary pattern*	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Schulpen, 2020; a priori: WCRF, AICR	▲			V									▼ RP						▼					▼	▼		▲	▼
Shang, 2023; a priori: aHEI-2010	▲	X		▲	▲		LN	▲					▼ RP						▼		▲ ▲	▼ Tr		◄	▼			
Shang, 2023; a priori: aMED	▲	X		▲	▲		▲	▲			▲		▼ RP								▲ UF: SF		UF: SF	◄				
Shang, 2023; a priori: hPDI	▲	▼		▲	▲	▼	▲	▲		▼	▼	FS	▼	M	▼	▼	D	D	▼	▼	▲ VO		▼			▲		▼ AP
Shang, 2023; a priori: rEDIP	▲ ▲		▼ ▼ tom			▲				▼	▼		▼P ▼R ▼						▼					▲ b▲ w	▲ snack foods	▲T ▲C		▲
Thompson, 2023; a priori: mhPDI	▲	▼		▲	▲	▼	▲	▲		▼	▼	FS	▼	M	▼	▼	D	D	▼	▼	▲ VO		▼			▲		▼ AP
Thompson, 2023; a priori: muPDI	▼	▲		▼	▼	▲	▼	▼		▲	▼	FS	▼	M	▼	▼	D	D	▲	▲	▼ VO		▼			▼		▼ AP
Wang, 2022_A; a priori: UPF, Nova4									▲		M	M	▲	M		▲ y, AS			▲	▲		▲			▲ snack foods			▲

Article; Approach: Dietary pattern*	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Wang, 2022_H; a priori: hPDI	▲	▼		▲	▲	▼	▲	▲		▼	▼	FS	▼	M	▼	▼	D	D	▼	▼	▲ VO		▼			▲		▼ AP
Wang, 2022_H; a priori: uPDI	▼	▲		▼	▼	▲	▼	▼		▲	▼	FS	▼	M	▼	▼	D	D	▲	▲	▼ VO		▼			▼		▼ AP
Wang, 2023; a priori: aHEI-2010	▲	X		▲	▲		LN	▲					▼ RP						▼		▲ ▲	▼ Tr		◄	▼			
Wang, 2023; a priori: aMED	▲	X		▲	▲	X	▲	▲			▲	FS	▼ RP								▲ UF: SF		UF: SF	◄				
Wang, 2023; a priori: CRC								▲					▼ P ▼ R			▲	D	D						▼			▲	
Wang, 2023; a priori: DASH	▲	X		▲	▲	Fr	LN	▲					▼ RP				▲		▼						▼			
Wang, 2023; a priori: EDIH	▼	▲ FF	▲ tom		▼						▲		▲R ▲P	▲	▲		▲	▼	▲			▲		▼ w		▼C		▲
Wang, 2023; a priori: GDQS	▲ ▲	▼	▲ ▲	▲	▲ ▲	SB	LN	▲		▼	▲	FS	◄ R	▲	▲		▲	◄	▼	▼	▲ VO							▼ ▼
Wang, 2023; a priori: hGDQS	▲ ▲		▲ ▲	▲	▲ ▲		LN	▲			▲	FS		▲	▲		▲				▲ VO							
Wang, 2023; a priori: hPDI	▲	▼		▲	▲	▼	▲	▲		▼	▼	FS	▼	M	▼	▼	D	D	▼	▼	▲ VO		▼			▲		▼ AP

Article; Approach: Dietary pattern*	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Wang, 2023; a priori: PDI	▲	▲		▲	▲	▲	▲	▲		▲	▼	FS	▼	M	▼	▼	D	D	▲	▲	▲ VO		▼			▲		▼ AP
Wang, 2023; a priori: rEDIP	▼ ▼ ▼		▲ tom			▼				▲	▲		▲ P ▲ R ▲ Organ						▲					▼b ▼ w	▼ snack foods	▼ T ▼C		▼
Wang, 2023; a priori: uGDQS		▼				SB				▼			◄ R					◄	▼	▼								▼ ▼
Wang, 2023; a priori: uPDI	▼	▲		▼	▼	▲	▼	▼		▲	▼	FS	▼	M	▼	▼	D	D	▲	▲	▼ VO		▼			▼		▼ AP
Wang, 2023; a priori: WCRF, AICR	▲				V								▼ RP						▼					▼	▼		▲	▼
Wang, 2023; PCA: 'Prudent'	▲	▲ FF	▲ tom	▲	▲	▲	▲	▲	▲	▲	▲	FS	▲ RP	▲	▲		▲	▲	▲	▲	▲ oo	▲	▲	▲		▲		▲
Wang, 2023; PCA: 'Western'								▼		▲	▲		▲P	▲	F		▼	▲	▲	▲					F			F
Willemsen, 2022; RRR; PCA: 'Dietary fiber'	▲				▲				▲																			

Article; Approach: Dietary pattern*	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Willemsen, 2022; RRR; PCA: 'Fruits, sugar, dairy'					▲			▲								▲	D	D	▲	SB								
Willemsen, 2022; RRR; PCA: 'Prudent'	▲				▲						▲	FS		▲														
Willemsen, 2022; RRR; PCA: 'Vitamin D'											▲	FS				▲	D	D										
Willemsen, 2022; RRR; PCA: 'Western'	▲	▲								▲			▲R P			▲ ch			▲	SB		▲						
Xiao, 2023; a priori: 'Paleo'	▲ ▲			V	▲		▲		▼	▼	▲		▼ RP	▲		▼								▼	▼			▲
Yue, 2021; a priori: EDIH	▼	▲ FF	▲ tom		▼						▲		▲R ▲P	▲	▲		▲	▼	▲			▲		▼ w		▼C		▲
Yue, 2021; a priori: hPDI	▲	▼		▲	▲	▼	▲	▲		▼	▼	FS	▼	M	▼	▼	D	D	▼	▼	▲ VO		▼			▲		▼ AP
Yue, 2021; a priori: PDI	▲	▲		▲	▲	▲	▲	▲		▲	▼	FS	▼	M	▼	▼	D	D	▲	▲	▲ VO		▼			▲		▼ AP
Yue, 2021; a priori: PDQS	▲ ▲ ▲	▼	▲ ▲	▲	▲ ▲ ▲	SB	LN	▲		▼	▲	FS	◀ R	▲	▲		▲	▼	▼	▼	▲ VO							▼ ▼

Article; Approach: Dietary pattern*	Vegetables	Potato	Other Vegetables	Legumes	Fruit	Fruit Juice	Nuts, Seeds	Grains: Whole	Grains	Grains: Refined	Fish	Seafood, shellfish	Meats (Red Processed)	Lean Ms (Poultry)	Eggs	Dairy	Dairy: Low, non-fat	Dairy: Whole, high fat	Sugary Beverages	Sugary foods	Fat: Unsaturated	Fat: Other	Fat: Saturated	Alcohol	Sodium	Tea and Coffee	Fiber	Other
Yue, 2021; a priori: uPDI	▼	▲		▼	▼	▲	▼	▼		▲	▼	FS	▼	M	▼	▼	D	D	▲	▲	▼ VO		▼			▼		▼ AP
Zhang, 2021; a priori: DDG	▲			▲	▲		▲	▲		▼	▲		▼ R ▼ P						▼		▲		▼	▼	▼	▲ T		