2023

Nordic Nutrition

Recommendations

INTEGRATING ENVIRONMENTAL ASPECTS

Rune Blomhoff
Professor and Project Leader
Nordic Nutrition Recommendations

Nordic Nutrition Recommendations (NNR)

- Nordic collaboration initiated in 1975
- Editions in 1980, 1989, 1996, 2004, 2012, 2023
- Use of NNR in Nordic and Baltic countries:

- nutrient recommendations
- dietary guidelines
- keyhole, nutrient declaration
- fortification, supplements

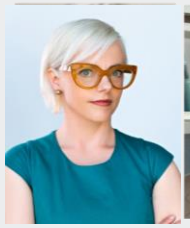
- health professionals, tube feeding, parenteral nutrition
- national surveillance
- food industry, science and education.

Nordic Nutrition Recommendations 2023

- Commissioned by Nordic Council of Ministers
- Science advice to all countries in Nordic region (Denmark, Finland, Iceland, Norway, Sweden, Estonia, Latvia, Lithuania)
- NNR2023 milestones
  - Update nutrient recommendations (DRVs)
  - Update framework for food-based dietary guideline (FBDGs)
  - Integrate environmental effects of food consumption
- NNR2023 project (2016-2023)
  - Independent NNR2023 committee (15 scientist appointed by Nordic health authorities)
  - 231 international multidisciplinary scientists
  - Improved methodologies to set DRVs and FBDGs
  - Critically assessed > 200.000 original high-quality studies according to predefined methods
  - Published 80 background papers in Food & Nutrition Research (open access)
  - Main report published June 2023 (NCM website)

Organization of NNR2023 project

Scientific Advisory Group


Amanda MacFarlane, Health Canada


Joseph Lau, co-director of Evidence-based Practice Center, Brown Univ. US


Susan Fairweather-Tait, Univ. of East Anglia, UK


Giota Mitrou, WCRF, UK


Dominique Turck (EFSA), Univ. of Lille


Joao Breda, "WHO Reg. office for Europe", Copenhagen, DK


Wulf Becker, Uppsala Univ. Sweden

Steering Committee

- Henriette Øien, The Norwegian Directorate of Health, Oslo, **Norway (Chair)**
- Satu Männistö, National Institute for Health and Welfare, Helsinki, **Finland**
- Hólmfríður Þorgeirsdóttir, Directorate of Health, Reykjavík, **Iceland**
- Ulla-Kaisa Koivisto Hursti, National Food Agency, Uppsala, **Sweden**
- Anne Pøhl Enevoldsen, Danish Veterinary and Food Administration, Glostrup, **Denmark**

The NNR2023 Committee

- Rune Blomhoff, University of Oslo/Oslo University Hospital, **Norway** (Chair)
- Anne Høyer, The Norwegian Directorate of Health, **Norway** (Project secretary)
- Ellen Trolle, Technical University Denmark, Kgs. Lyngby, **Denmark**
- Rikke Andersen, Technical University Denmark, Kgs. Lyngby, **Denmark**
- Ursula Schwab, University of Eastern Finland, Kuopio, **Finland**
- Maijaliisa Erkkola, University of Helsinki, Helsinki, **Finland**
- Inga Þórsdóttir University of Iceland, Reykjavík, **Iceland**
- Þórhallur Ingi Þórhallsson, University of Iceland, Reykjavík, **Iceland**
- Helle Margrete Meltzer, Norwegian Institute of Public Health, Oslo, **Norway**
- Jacob Juel Christensen, University of Oslo, **Norway**
- Hanna Eneroth, The National Food Agency, Uppsala, **Sweden**
- Eva Warensjö Lemming, The National Food Agency, Uppsala, **Sweden**
- Tagli Pitsi, National Institute for Health Development, Tallinn, **Estonia** (Observer)
- Lasma Pikele, The Minsitry of Health of the Republic of Latvia/Inese Siksna, Institute of Food Safety, Animal Health and Environment, Riga, **Latvia** (Observer)
- Almantas Kranauskas, Ministry of Health, Vilnius, **Lithuania** (Observer)
- Bjørg Mikkelsen, Food Department at Faroese Food and Veterinary Authority, **Faroe Islands** (Observer)

- 231 multidisciplinary scientists (methodology, statistics, nutritional topics) selected based on open call in 8 countries, direct invitation, scientific competence, balance between fields of expertise and countries.
- In addition, large number of experts through public consultation

Systematic Review Centre


Agneta Åkesson, Karolinska Institutet, (head)

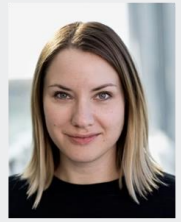

Christel Lamberg-Allardt, Univ. Helsinki,.


Erik Arnesen, Univ. Oslo, Norway


Fredrik Söderberg Karolinska Institutet


Birna ThorisdottirUniv. Iceland

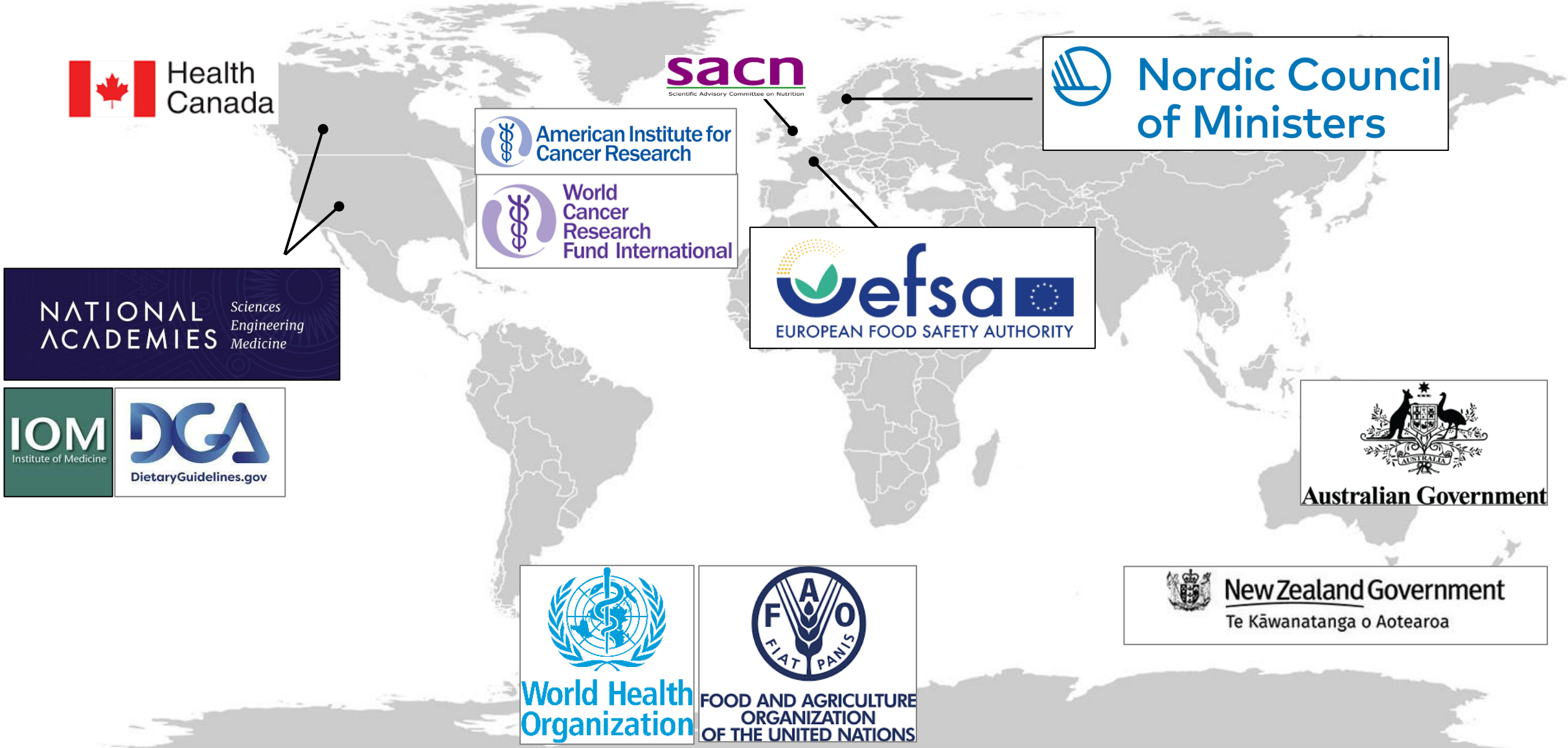

Alfons Ramel, Univ. Iceland


Linnea Bärebring, Univ. Gothenburg,

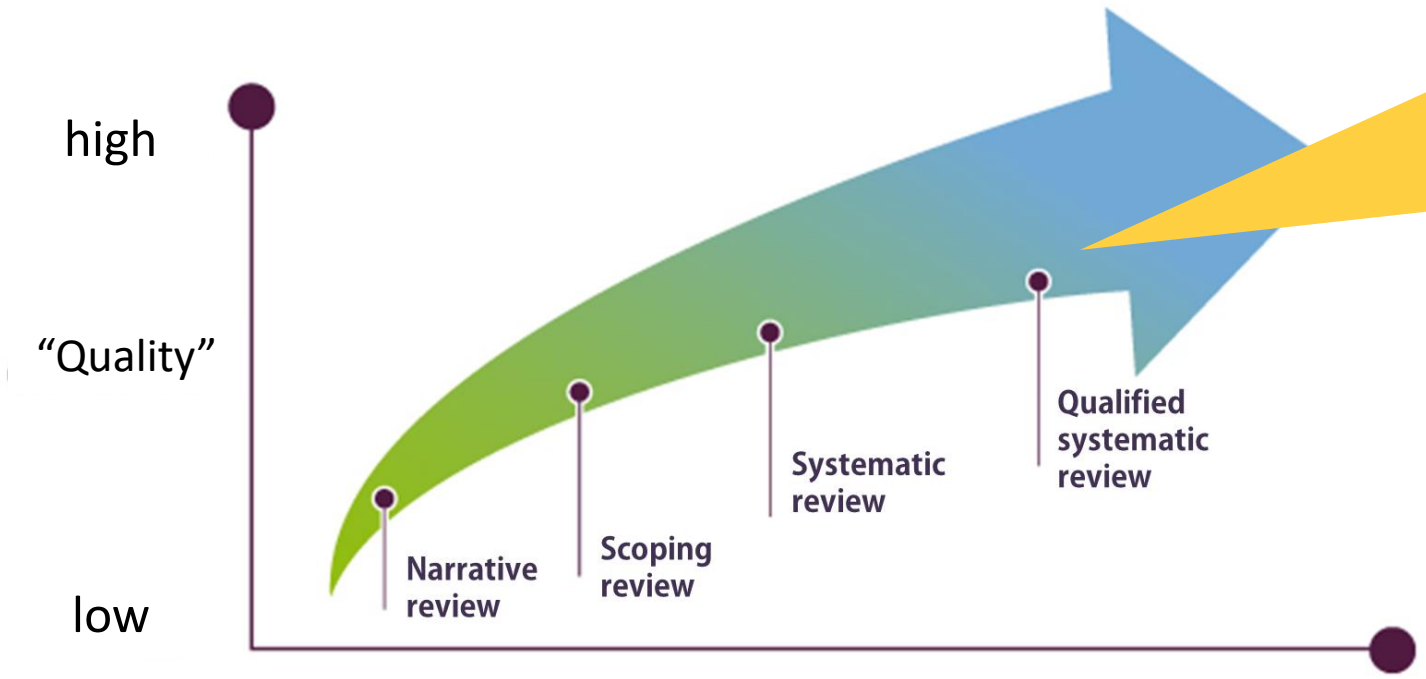

Bright Nwaru, Univ. Gothenburg,


Jutta Dierkes, Univ. Bergen,

Harmonized and improved scientific methodologies for assessment of health effects of nutrients and foods



Qualified SRs
Main evidence basis for NNR2023



qSR from health authorities

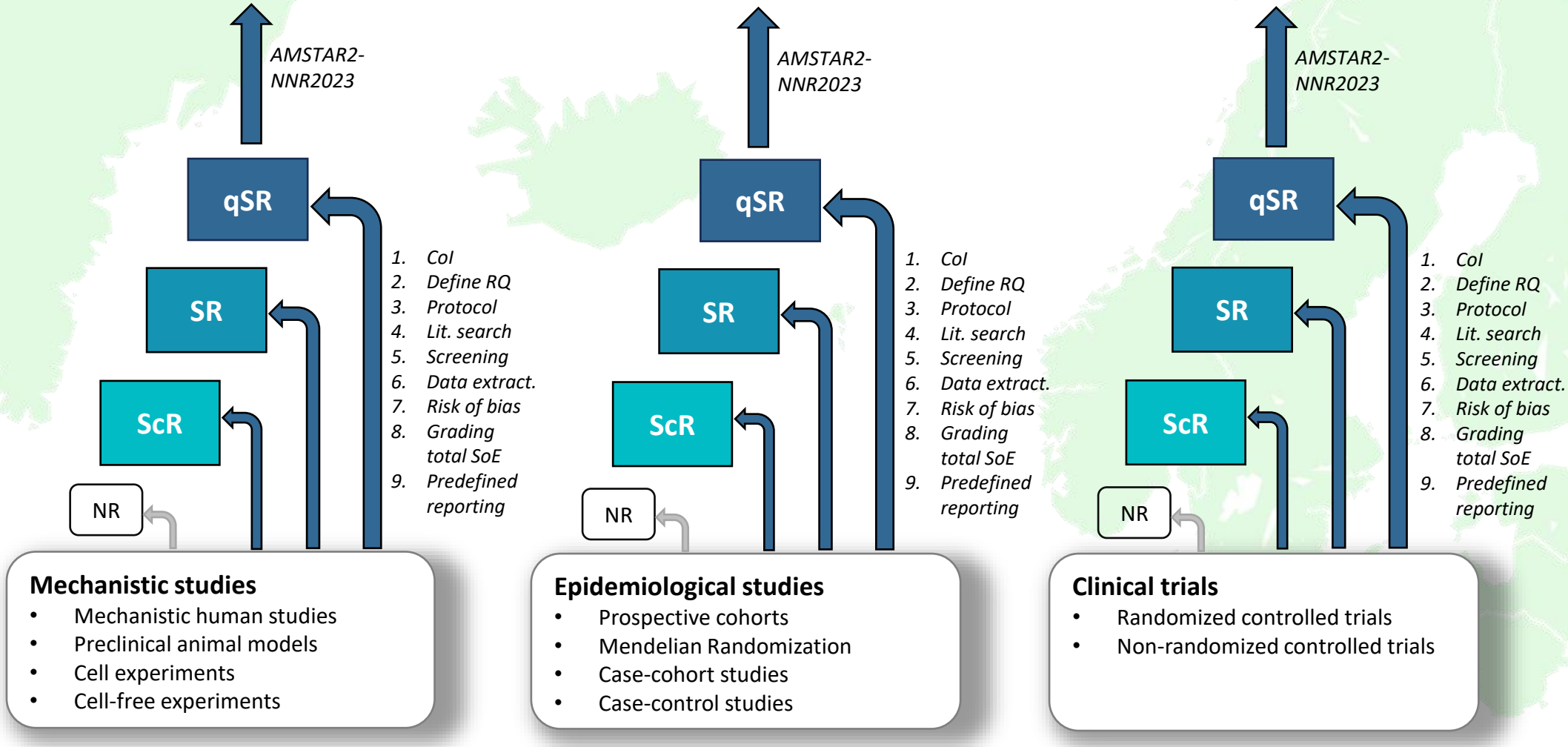
- NASEM
- NNR
- EFSA
- DGA
- WHO
- SACN
- Australian/New Zealand

- Novel definition of qSR
- Developed handbook for developing qSRs
- Developed *de novo* qSRs
- Developed novel inclusion and exclusion criteria for qSRs
- Identified about 100 qSRs from other health authorities

qSR criteria

1. *CoI*
2. *Define research question*
3. *Predefined protocol*
4. *Literature search*
5. *Screening and selecting*
6. *Data extraction*
7. *Risk of bias*
8. *Grading total strength of evidence*
9. *Predefined reporting*

NNR2023: umbrella review of qSRs of mechanistic-, epidemiological- and clinical studies



Milestone 1: Update DRVs of 36 nutrients

Dietary Reference Values (DRVs)

- Reference values for energy intake
- Reference intake ranges of macronutrients
- Average Requirement (AR)
- Recommended Intake (RI)
- Upper intake level (UL)

1. Fluid and water balance
2. Energy
3. Fat and fatty acids
4. Carbohydrates
5. Dietary fibre
6. Protein
7. Alcohol
8. Vitamin A
9. Vitamin D
10. Vitamin E
11. Vitamin K
12. Thiamin
13. Riboflavin
14. Niacin
15. Vitamin B6
16. Folate
17. Vitamin B12
18. Biotin

19. Pantothenic acid
20. Vitamin C
21. Calcium
22. Phosphorus
23. Magnesium
24. Sodium and salt
25. Potassium
26. Iron
27. Zinc
28. Iodine
29. Selenium
30. Copper
31. Chromium
32. Manganese
33. Molybdenum
34. Fluoride
35. Choline
36. Phytochemicals/antioxidants

Milestone 2: Framework for FBDGs based on health

Food groups, meal- and dietary patterns

- Breastfeeding
- Complementary feeding
- Beverages
- Cereals
- Vegetables, fruits, and berries
- Potatoes
- Fruit juices
- Pulses/legumes
- Nuts and seeds
- Fish and seafood
- Red meat
- White meat
- Milk and dairy products
- Eggs
- Fats and oils
- Sweets
- Alcohol
- Dietary patterns
- Meal patterns
- Ultra-processed foods

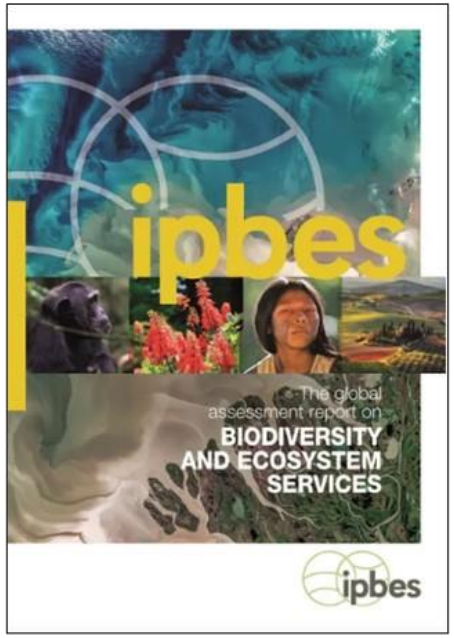
Quantitative FBDGs

- if evidence categorized as "Strong evidence" according to predefined criteria, and a dose-response curve
- or, if food group is key for nutritional adequacy

Qualitative FBDGs

- if evidence is categorized as "Strong evidence", but no high-quality dose-response curve

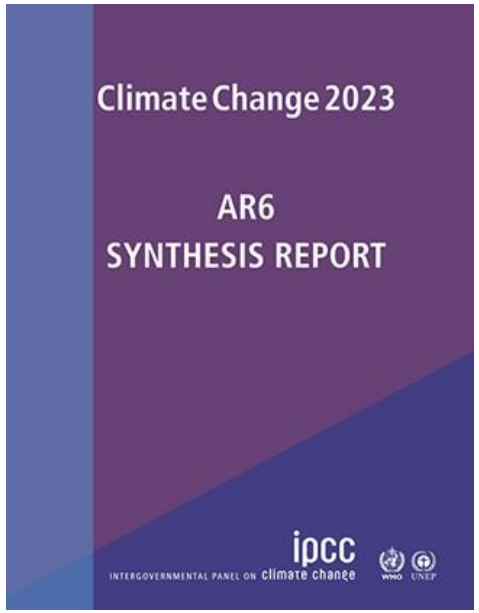
Milestone 3: Assessed environmental effects of food consumption



The Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES)
Global Assessment Report on Biodiversity and Ecosystem Services (2019)

Declarations from the Nordic Council of Ministers:
Action plan 2021-2024
Biodiversity (03.05.22)
Sustainable food systems (24.06.21)
Global climate agenda (30.04.20)
Nordic carbon neutrality (25.01.19)

Evidence synthesis on environmentally sustainable food consumption



The Intergovernmental Panel on Climate Change (IPCC)

Five NNR background papers on sustainability

Healthy and environment-friendly dietary guidelines for Nordic and Baltic countries

"A shift to a more plant-based dietary pattern"

- **A predominantly** plant-based diet high in vegetables, fruits, berries, pulses, potatoes and whole grains
- **Ample** intake of fish and nuts
- **Moderate intake** of low-fat dairy products
- **Limited intake** of red meat and poultry
- **Minimal intake** of processed meat, alcohol, and processed foods containing high amounts of fats, salt and sugar

Healthy and environment-friendly dietary guidelines for Nordic and Baltic countries

1. **Cereals**: Increased intake of whole grains supported both by effects on health outcomes and environmental footprint.
2. **Vegetables, fruits and berries**: Increased intake supported both by effects on health outcomes and environmental footprint.
3. **Potatoes**: Higher consumption is recommended, mainly due to environmental aspects.
4. **Pulses**: Higher consumption is recommended, mainly due to environmental aspects and nutrient contribution.
5. **Nuts**: Increased intake supported both by effects on health outcomes and environmental footprint.
6. **Fish**: Increased intake from sustainably managed stocks supported both by effects on health outcomes and environmental footprint.
7. **Red meat**: Reduced intake supported both by effects on health outcomes and environmental footprint.
8. **White meat (poultry):** Preferentially lower intake due to environmental impact.
9. **Milk and dairy**: Moderate intake of low-fat milk recommended mainly due to nutrient adequacies, high intakes not compatible with low environmental impact.
10. **Fats and oils**: Moderate intake recommended mainly due to nutrient adequacies and low environmental impact.
11. **Sweets:** Reduced intake supported both by effects on health outcomes and environmental footprint.
12. **Alcohol:** Reduced intake supported both by effects on health outcomes and environmental footprint.

What is based on: health vs. environment?

Increased consumption

Cereals
90
grams/day of whole grains

Vegetables, fruits and berries
500-800
grams/day of a variety of vegetables, fruits, and berries

Nuts
20-30
grams/day

Pulses
Significant part of regular diet

Fish
300-450
grams/ week of fish from sustainably managed stocks

Potatoes
Significant part of regular diet

Based on health, supported by environment

Environment

What is based on: health vs. environment?

Moderate consumption

Milk and dairy

350-500

ml/day of low fat dairy (health). Preferentially lower dependent on nutrients in overall diet (environment).

Based on health, supported by environment

What is based on: health vs. environment?

Reduced consumption

Sweets
A limited consumption

Red meat
< 350
grams/week (health). Considerably lower (environment)

Alcohol
No safe lower limit

Processed foods with high amounts of fat, salt, sugar
A limited consumption

Processed meat
As low as possible

White meat (poultry)
Preferentially reduced

Based on health, supported by environment

Environment

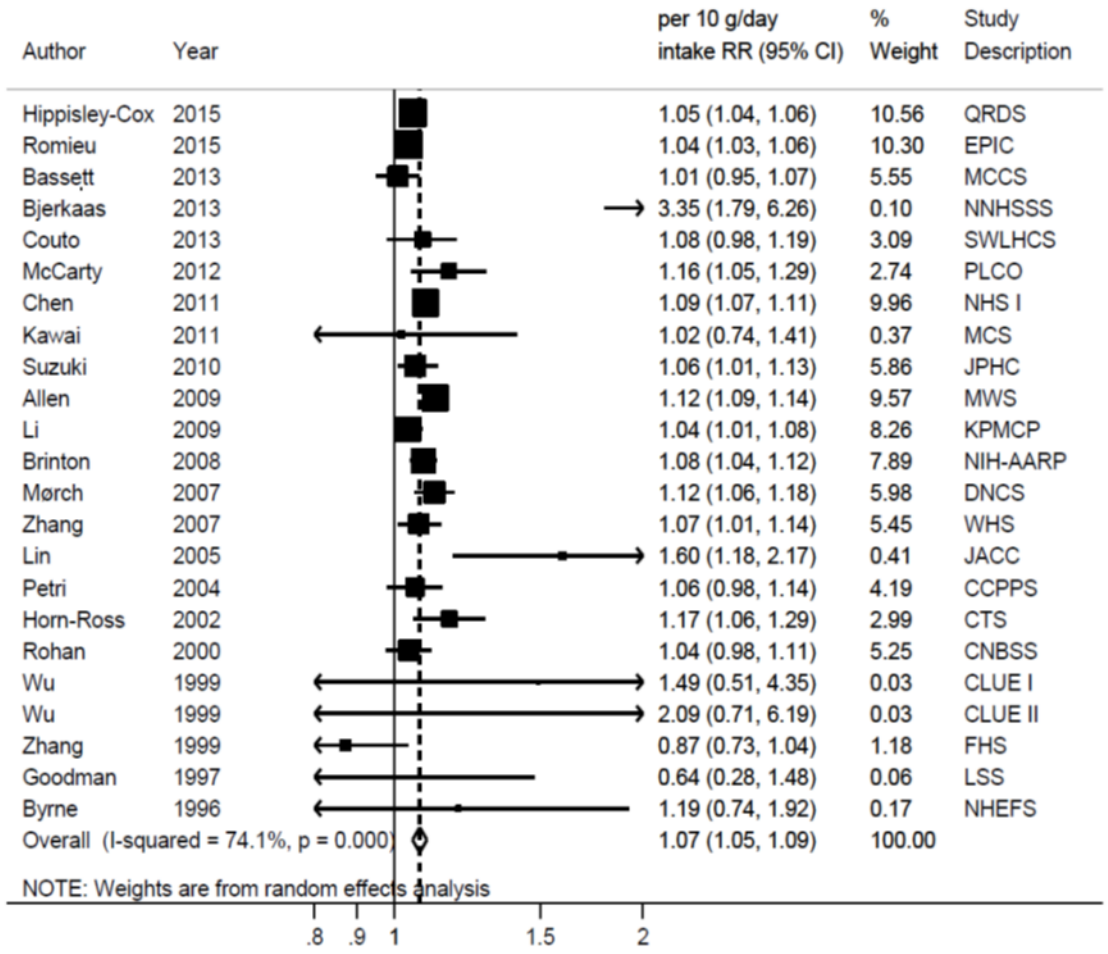
qSRs on alcohol

1. WCRF/AICR. Alcoholic drinks and the risk of cancer, 2018
   - **Strong evidence** that consuming alcoholic drinks increase risk of cancers in mouth, pharynx and larynx, esophagus, liver, stomach, colorectal, and breast (pre- and postmenopausal)
2. Mayer-Davis et al. Alcohol Consumption and All-Cause Mortality: A Systematic Review, 2020 Dietary Guidelines Advisory Committee, USDA, 2020
   - **Moderate evidence** indicates that higher average alcohol consumption is associated with an increased risk of all-cause mortality compared with lower average alcohol consumption. (Grade: Moderate)
3. Canada's Guidance on Alcohol and Health: Final Report. Canadian Centre on Substance Use and Addiction, CCSA, 2023
   - Overwhelming evidence confirms less consumption means less risk of harm from alcohol.
   - Even small amounts is damaging to everyone.
4. Boushey et al. Dietary Patterns and Risk of Cardiovascular Disease: A Systematic Review. Dietary Guidelines Advisory Committee, USDA, 2020
   - CVD: Moderate consumption of alcohol can be components of a beneficial dietary pattern in most studies.
   - Inclusion of moderate alcohol intake within an overall dietary pattern may still be acceptable but not necessarily recommended, particularly with regards to prevention of co-morbid conditions that may be worsened with alcohol intake

WCRF/AICR. Alcoholic drinks and the risk of cancer, 2018

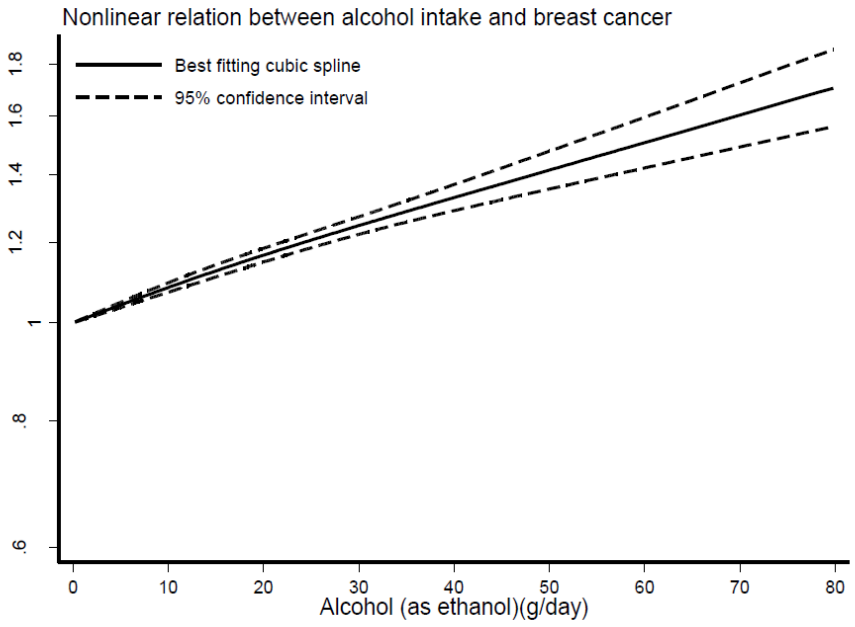
- Alcohol is a group 1 carcinogen
- **Strong evidence** that consuming alcoholic drinks increase risk of cancers in mouth, pharynx and larynx, esophagus, liver, stomach, colorectal, and breast (pre- and postmenopausal)

Figure 319 Relative risk of breast cancer incidence for 10g/day increase of alcohol (as ethanol) intake. Studies identified in the CUP



WCRF/AICR. Alcoholic drinks and the risk of cancer, 2018

Figure 327 Nonlinear dose-response meta-analysis of alcohol (as ethanol) and breast cancer



Total breast cancer

Alcohol (as ethanol) (g/day)	RR (95%CI)
0	1.00
2.5	1.02 (1.02-1.02)
5.1	1.04 (1.04-1.05)
10	1.08 (1.07-1.10)
15	1.13 (1.11-1.14)
22	1.18 (1.16-1.20)
31.2	1.26 (1.23-1.28)
43.8	1.36 (1.31-1.41)
55	1.46 (1.39-1.54)

Postmenopausal breast cancer

Alcohol (as ethanol) (g/day)	RR (95%CI)
0	1.00
2.5	1.03 (1.02-1.04)
7	1.09 (1.07-1.11)
12.5	1.15 (1.12-1.18)
15	1.18 (1.15-1.21)
25	1.28 (1.25-1.30)
35.1	1.37 (1.34-1.41)
42.5	1.45 (1.39-1.51)
57.6	1.61 (1.49-1.74)

"No safe lower limit for alcohol consumption has been established".

- One alcohol unit = 10-12 g/d

Main health effects of alcohol.

- Alcohol is a toxic substance for several organs
- Acute and chronic alcohol-induced damage contributes significantly to morbidity and mortality
- Moderate consumption has been associated with a lower risk of myocardial infarction and type 2 diabetes in observational studies. Mendelian randomization analyses do not fully support these findings.
- For several cancers, there is **convincing evidence** that alcohol consumption increases the risk, and it is not possible to set any 'safe limit' of intake. This is especially true for breast cancer, where even moderate intake has been shown to increase the risk.

Thelle DS, Grønbæk M. Alcohol – a scoping review for Nordic Nutrition Recommendations 2023. Food Nutr Res. 2024

NNR2023: Science advice

Based on health outcomes:

- Alcohol is not an essential nutrient, and from a nutritional point of view, energy contribution from high intake of alcoholic beverages affects diet quality negatively.
- Since no threshold for safe level of alcohol consumption has been established, the NNR2023 recommends avoiding alcohol intake.
- If alcohol is consumed, the intake should be very low.
- For children, adolescents and pregnant women abstinence from alcohol is advised.

NNR2023: Science advice

Based on environmental impacts:

- Contributes to negative environmental impact.
- Climate impact associated with energy and fuel used in manufacturing, transportation and post-use (e.g. 3 % of dietary climate impact in Sweden)
- The crops used for alcohol production may be associated with reducing biodiversity.

Overall recommendation:

- No safe lower limit for alcohol consumption has been established.
- For children, adolescents and pregnant women abstinence from alcohol is advised.

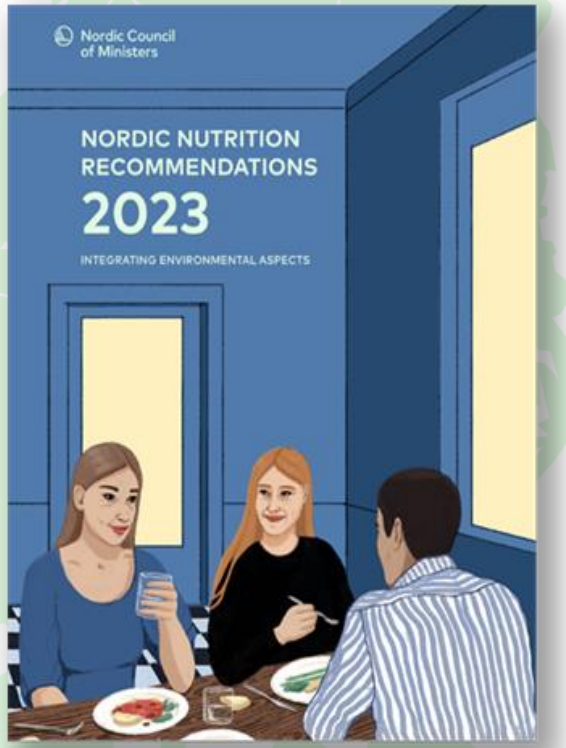
Status – NNR2023

Nordic and Baltic counties

- Food- and health authorities in all 8 countries have accepted to use NNR2023 as scientific basis for national guidelines
  - Exception: Norwegian government will only implement health-based dietary guidelines.

Other countries and authorities

- Strong support from WHO, UN, FAO and leading health authorities
- Numerous additional countries will use NNR2023 as scientific basis for national guidelines
- Major health authorities in the world will implement NNR methodology (qSR etc)



Integration of local context in country-specific dietary guidelines

1. **Health effects of food consumption: universal**
2. **Environmental impact of food consumption: global and local context**
3. Country specific public health challenges: local context
4. National food production, -availability, -culture: local context
5. National sociocultural and socioeconomic aspects: local context

Ref:

- FAO (2023). https://www.fao.org/nutrition/ education/food-based-dietary-guidelines
- Sustainable healthy diets: guiding principles, WHO/FAO (2019)

Thank you.

Rune Blomhoff
Professor and Project Leader
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