Cooking fats and oils and heart health

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This position statement for health professionals outlines the Heart Foundation's recommendations on choosing cooking fats and oils for heart health. It is based on meta-analyses, systematic reviews and/or international guidelines published since 2016 to ensure recommendations are based on the most recent peer-reviewed scientific evidence.

Cooking fats and oils are defined as fats and oils that are added to food during cooking and meal preparation at home. They include vegetable oils as well as animal fats such as butter, tallow and lard.

Choosing and using healthy fats and oils is one aspect of a heart-healthy way of eating. The food choices and ways of eating that support heart health are outlined in the Heart Foundation's position papers on healthy eating, which are available in the Health Professionals section of the Heart Foundation website.

Recommendations on the use of heart-healthy cooking fats and oils

Statement 1: There are many aspects to a heart-healthy dietary pattern, and one aspect is the type of fats and oils eaten. The healthiest fats are in or from foods such as oily fish, nuts, seeds, avocado, olives and vegetables.

Statement 2: For cardiovascular disease, olive oil is the most researched cooking oil and is associated with improved cardiovascular outcomes.

Statement 3: For blood lipids, a wider range of oils have been studied. Replacing butter or beef fat with cooking oils such as sunflower oil, canola oil or corn oil can have a beneficial effect on LDL cholesterol and blood lipids, which are important risk factors for long-term heart health.

Statement 4: There is a lack of evidence from human studies that cooking oils high in polyunsaturated fats have any effect – either beneficial or adverse – on C-reactive protein (a marker of inflammation) when eaten in typical amounts.

Statement 5: The Heart Foundation recommends that health professionals advise people who wish to reduce cardiovascular risk and/or reduce LDL cholesterol to

- Start with a heart-healthy dietary pattern that includes some fats from foods such as oily fish, unsalted nuts, seeds and avocado.
- When using fats or oils in cooking or food preparation, use oils such as sunflower, canola or olive oil instead of animal fats such as butter.
- Choose cooking fats and oils higher in polyunsaturated or monounsaturated fatty acids and lower in saturated fatty acids (less than 10% of total energy intake) to help reduce LDL cholesterol levels.

For recommendations on spreads, please refer to the Frequently Asked Questions in Appendix 1, which contains answers to common questions the Heart Foundation is asked.

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Methods for this review

How cooking fats and oils are defined in this position statement

The scope of this position statement is cooking fats and oils commonly used in home cooking and food preparation in New Zealand and does not include oils used for deep-frying at home or commercially.

This position statement does not include whole foods that are high in fats and oils like avocado, and it does not include highly processed foods that have fats and oils added. Spreads are not included as they contain a mix of types and amounts of oils that are brand specific, making the evidence difficult to assess in relation to specific oils.

The cooking fats and oils that are within scope include:

- oils higher in polyunsaturated fatty acids (often called seed or vegetable oils): safflower oil, sunflower oil, hempseed oil, flaxseed oil, corn oil, soybean oil. Fish oil is excluded as it is not typically used as a cooking oil.
- oils higher in monounsaturated fatty acids: canola (rapeseed) oil, olive oil, rice bran oil and peanut oil
- tropical oils that act like an animal fat:* coconut oil (palm oil is not included as it is not typically used in home cooking)
- animal fats higher in saturated fatty acids: lard, beef fat and butter.

How the scientific evidence was identified and assessed

To inform this position statement on cooking fats and oils, scientific evidence published since the Heart Foundation's position statement on polyunsaturated fats in 2016 was considered. This review was based on the following.

1/ Network meta-analyses or systematic reviews and meta-analyses of prospective cohort studies that showed the association between individual or total cooking oil intake and cardiovascular or coronary heart disease morbidity and mortality in humans, preferably using GRADE (Grading of Recommendations Assessment, Development and Evaluation) methodology. If a GRADE assessment was not available, this was undertaken.[1]

2/ Network meta-analyses of randomised controlled trials in humans that investigated the effect of either high versus low intake or a dose-response relationship of cooking oils on blood lipids or inflammation, preferably using GRADE methodology. If a GRADE assessment was not available, this was undertaken.[1] The effect on LDL cholesterol was the primary outcome for blood lipids, and the effect on C-reactive protein was the primary outcome for inflammation.

* See the Heart Foundation's Coconut and the Heart position statement. Coconut and palm oil contain medium-chain triglycerides that behave similarly to saturated fat.

3/ The ROBIS (Risk of Bias in Systematic Reviews) tool was used to identify the most robust (low risk of bias and high quality) systematic reviews for inclusion in this position statement.

The use of network meta-analysis was preferred as this methodology[2] enables direct comparison of cooking fats and oils across different studies.[2]

Use of the GRADE methodology ensured a rigorous approach to assessment of the quality of evidence (Table 1). GRADE assessments are reported in Appendix 2.

Table 1: GRADE categorisation of the certainty of evidence[1]

Certainty	**What it means**
Very low	The true effect is probably markedly different from the estimated effect
Low	The true effect might be markedly different from the estimated effect
Moderate	The authors believe that the true effect is probably close to the estimated effect
High	The authors have a lot of confidence that the true effect is similar to the estimated effect

Certainty of evidence is lower when:

- there is a risk of bias in the study design or conduct; or
- there is unexplained variability between study results; or
- the evidence does not directly address the research question, for example having a different population group, comparisons or outcomes; or
- the results are imprecise because of small sample sizes, wide confidence intervals, or inconsistent effect estimates.[3]

The challenges and complexities of researching long-term food and nutrient intakes against long-term health outcomes make it difficult to reach a high certainty of evidence, which usually requires randomised controlled trial data.[4]

Background on fats and fatty acids

This background section covers the impact of fatty acid types on cardiovascular outcomes. Individual fatty acids are not within the scope of this review, however they provide context for the cooking fats and oils recommendations in this position statement.

Types of fatty acids in cooking fats and oils

The fat in cooking oils is made up of three types of fatty acids with different chemical structures: saturated fatty acids, polyunsaturated fatty acids (mostly omega-6 and/or omega-3 fatty acids), and monounsaturated fatty acids. The fat in foods or cooking oils contains a mix of these fatty acids but the relative proportions differ. The proportion of the different fatty acids can affect the risk of cardiovascular disease and risk factors such as dyslipidaemia.[5]

Trans-fatty acids are a particular type of fat that are manufactured or can occur naturally in very small amounts in fats from ruminant animals. Manufactured trans-fatty acids are created through the partial hydrogenation of unsaturated fatty acids in vegetable and fish oils. Changes in food manufacturing processes have reduced the amount of trans-fatty acids in the food supply. However, there may still be some trans-fatty acids in foods like vegetable shortening, some spreads, crackers and biscuits, packaged snacks, fried foods and baked goods.[6] Frying oils at very high temperatures also creates small amounts of trans fats.[5]

Plant-based oils vary in the amounts of different fatty acids but in general are higher in monounsaturated and polyunsaturated fats (Table 2). The exception is coconut oil and palm oil, which are tropical oils that are higher in saturated fatty acids.

As noted earlier, polyunsaturated fatty acids are found in proportionally higher amounts in safflower, sunflower, hempseed, flaxseed, corn, soybean and fish oils. Monounsaturated fatty acids are found in proportionally higher amounts in olive oil, canola oil and peanut oil.

Table 2: Fatty acid composition of some common cooking fats and oils in New Zealand

	% Palmitic acid 16:0 (SFA)	% Stearic acid 18:0 (SFA)	% Palmitoleic 16:1 (MUFA)	% Oleic acid 18:1 (MUFA)	% Linoleic 18:2 (omega-6 PUFA)	% Alpha-linolenic 18:3 (omega-3 PUFA)
Beef fat	28	13	7	43	2	1
Butter	28	16	1	26	1	2
Canola oil	5	1	2	56	24	10
Coconut oil	9	2	-	7	2	-
Olive oil	12	2	1	72	11	1
Safflower oil	8	3	0	13	76	0
Soybean oil	10	4	0	25	52	7
Sunflower oil	6	6	0	33	53	0

Source: Mann J, Truswell S. Essentials of Human Nutrition. 6th ed. Oxford University Press, New York, 2023.
Abbreviations: SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids

Common dietary sources of fats in New Zealand include butter and spreads (9% of total fat); fats or oils added to potatoes, kumara and taro (6% of total fat); fats or oils added to bread-based dishes (6% of total fat); poultry (6% of total fat); and milk and beef/veal at 5% total fat each.[7]

The last data available on New Zealanders' dietary intake showed that, in 2008, the average total fat intake was within the acceptable range at the time.[8] However, the types of fat eaten did not meet guidelines. The World Health Organization recommends 6–11% energy from polyunsaturated fats, and less than 10% energy from saturated fats.[5,9] Typically, New Zealanders ate more saturated fats than recommended (15% of total energy) and less polyunsaturated fats than recommended (5% of total energy).[7] The majority of New Zealanders (88.6%) used unsaturated fats for cooking.[10]

Types of fatty acids and heart disease outcomes

The type of fatty acids in cooking fats and oils can affect heart disease outcomes directly or indirectly through risk factors such as blood lipids (cholesterol and triglycerides).

Blood lipids

For LDL cholesterol, the World Health Organization has found there is moderate to high certainty of evidence that:[5]

- reducing saturated fatty acid intake reduces LDL cholesterol
- consuming less than 10% of daily energy from saturated fatty acids reduces LDL cholesterol
- replacing saturated fatty acids with unsaturated fatty acids lowers LDL cholesterol.

Cardiovascular outcomes

For cardiovascular and heart disease outcomes, there is a moderate certainty of evidence that a low compared to high intake of saturated fatty acids reduces risk of cardiovascular disease by 17% (95% CI: 2% to 30% lower), based on data from 11 randomised controlled trials.[5]

There was moderate certainty of evidence that replacing saturated fatty acids with monounsaturated fatty acids from plants is associated with a 10% reduced risk of cardiovascular disease (95% CI: 4% to 16% lower) based on three observational studies.[5]

There was low certainty of evidence that replacing saturated fatty acids with polyunsaturated fatty acids is associated with 11% lower risk of coronary heart disease (95% CI: 2% to 19% lower) based on 17 observational studies.[5]

There was low certainty of evidence that an intake of less than 1% of total energy from trans-fatty acids, compared to a higher intake, is associated with:

- a 12% reduced risk of coronary heart disease (95% CI: 4% to 20% lower) based on four observational studies (n=67,739); and
- a 17% reduced risk of cardiovascular disease (95% CI: 7% to 25% lower) based on two observational studies (n=126,233).[5]

Findings on cooking fats and oils

The effect of different cooking fats and oils on cardiovascular disease mortality and morbidity

There is an incomplete body of evidence on the effects of different cooking fats and oils on cardiovascular disease mortality and morbidity. The majority of research assesses associations at the nutrient (fatty acid) level rather than at the food level.[11] Olive oil, however, is well studied and one network meta-analysis was available.

Olive oil is high in monounsaturated fatty acids and can be high in bioactive compounds such as polyphenols.[12,13] Olive oil is one of the components of a Mediterranean dietary pattern associated with reduced risk of cardiovascular disease, along with fruit, vegetables and legumes.[14 15 16] †

There were no recent systematic reviews or meta-analyses for other cooking fats and oils and cardiovascular outcomes, except for butter. It is important to note that other types of cooking oils may be as good or better than olive oil but are not as well researched. Oils with similar fatty acid profiles are expected to have a similar effect on cardiovascular disease mortality and morbidity.

Olive oil and risk of cardiovascular disease mortality and morbidity

There was low certainty of evidence from a meta-analysis of eight prospective cohorts that the risk of cardiovascular disease is 15% lower in the highest versus lowest consumers of olive oil (95% CI: 7% to 23% lower). Each 5g/day increase in olive oil intake was associated with a 4% (95% CI: 1% to 7% lower) lower risk of cardiovascular disease up to 20g/day (~1 tablespoon), in five cohorts.[17]

Replacing butter with olive oil and risk of cardiovascular disease

There was moderate certainty of evidence from three prospective cohorts that replacing 5g/day butter with the same amount of olive oil was associated with a 4% lower risk of total cardiovascular disease (95% CI: 2% to 5% lower).[18] There were no meta-analyses available on the substitution effect of other oils.

Summary

Olive oil and butter are the only cooking fats and oils with a recent systematic review and meta-analysis assessing their effect on cardiovascular outcomes. There is low to moderate certainty of evidence that increasing or higher olive oil intake and replacing butter with olive oil are associated with reduced risk of cardiovascular disease.

The effect of different cooking fats and oils on blood lipids

The blood lipids typically used to assess cardiovascular risk are total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides. LDL cholesterol is a causal risk factor for cardiovascular disease, and reductions in LDL cholesterol are prioritised when comparing effects on different blood lipids. New Zealand's cardiovascular disease risk assessment and management guidelines

† For more information, see the Heart Foundation's position statement on dietary patterns.

only set a blood lipid treatment target for LDL cholesterol.[19] Therefore, LDL cholesterol is the primary outcome for blood lipids in this position statement.

Network meta-analysis methodology has allowed comparison of data from various randomised controlled trials on different cooking fats and oils. It addresses the question of which cooking fats and oils are likely to give the greatest improvements in blood lipids.[20]

LDL cholesterol (primary outcome)

The World Health Organization has defined a minimally important difference[‡] in LDL cholesterol as >0.13 mmol/L. Each 0.26 mmol/L increase in LDL cholesterol has been associated with a 14% increased risk of atherosclerosis in adults without conventional cardiovascular risk factors.[21]

The certainty of evidence for LDL cholesterol was graded as low or moderate for most comparisons.[20] Replacing 10% of dietary energy from butter with 10% of energy from oils led to a statistically significant mean reduction in LDL cholesterol ranging between 0.23 mmol/L for coconut oil to –0.42 mmol/L for safflower oil. Replacing butter with safflower oil, sunflower oil, canola oil, flaxseed oil or corn oil reduced LDL cholesterol the most.[20]

Total cholesterol

The World Health Organization has defined a minimally important difference in total cholesterol as >0.26 mmol/L.[21]

The certainty of evidence for total cholesterol was graded as moderate for most of the comparisons.[20] For every 10% of energy from butter that was replaced with an equivalent amount of oil, total cholesterol reduced between –0.49 mmol/L to –0.18 mmol/L.

The oils that had the most beneficial effect on total cholesterol when replacing butter were safflower, sunflower, canola, corn, soybean and olive oil.[20] The mean difference for these oils were greater than the minimally important difference.

Triglycerides

The World Health Organization definition of a minimally important difference in triglycerides is >0.09 mmol/L.[21]

The certainty of evidence for triglycerides was graded as moderate or high for most comparisons.[20]

There was a small but statistically significant reduction in triglycerides for sunflower oil (–0.04 mmol/L), soybean oil and palm oil (–0.06 mmol/L) when these oils replaced 10% of energy from butter.[20]

HDL cholesterol

The World Health Organization has defined a minimally important difference in HDL cholesterol as >0.08 mmol/L.[21]

The certainty of evidence for HDL cholesterol was graded as moderate for most comparisons.[20] When compared to other fats and oils, sunflower oil and olive oil most consistently improved

[‡] Minimally important differences were based on a 5% change from the upper range of the normal value.[21]

(increased) HDL cholesterol by a small amount (0.03 to 0.04 mmol/L).[20] When compared to butter, only coconut oil had a statistically significant effect on HDL cholesterol, increasing it by 0.04 mmol/L (95% CI: 0.01 to 0.08 mmol/L).

Probability of cooking fats and oils having the most beneficial effect on blood lipids

The network meta-analysis data was used to rank the probability of different cooking fats and oils having a beneficial effect on blood lipids.[20–22]

For the primary outcome of LDL cholesterol, the commonly consumed cooking oils with the highest probability of a beneficial effect were canola oil, followed by sunflower oil and corn oil. Safflower oil was ranked highest but is not commonly consumed in New Zealand.

Rice bran oil was not included in the above reviews, but it is a commonly used oil in New Zealand. The most recent meta-analysis of 11 randomised controlled trials with a low risk of bias (n=572) reported the mean difference in LDL cholesterol from consumption of rice bran oil was a reduction of 0.39 mmol/L (95% CI: –0.64 to –0.15 mmol/L).[23] [§]

Summary

The network meta-analysis by Schwingshackl et al compares effects of different fats and oils on blood lipids, based on randomised controlled trial data. When oils replace butter, LDL cholesterol is reduced by a meaningful amount.[20] The level of effect varies by oil, but cooking oils higher in polyunsaturated and monounsaturated fatty acids were the most beneficial (this does not include the tropical oils).

The effect of cooking oils on markers of inflammation

Inflammation is included in this position statement as it is a topic of public interest in relation to polyunsaturated fatty acid intake.

Acute inflammation is the body's normal response to harmful microbes, tissue damage or metabolic stress. Inflammation can serve a useful purpose by priming the body's defences, protecting against further damage and starting the recovery process. However, some observational studies have linked chronic and excessive inflammation with higher risk of heart disease.[24]

C-reactive protein is a marker of inflammation, and persistently raised levels of high-sensitivity C-reactive protein are now treated as an additional modifier of cardiovascular risk by the European Society of Cardiologists.[25] However, it is not currently part of a standard cardiovascular disease risk assessment in New Zealand[26] as it is not considered to be a causal risk factor for cardiovascular disease.[27] Well established risk factors such as blood lipids and blood pressure should be prioritised.

Some longer-chain polyunsaturated fatty acids have a biological pathway in the body where they could be converted into anti-inflammatory or pro-inflammatory compounds. Evidence from human studies does not support an adverse effect of polyunsaturated fats on inflammation when consumed in typical amounts. Studies that have suggested a possible relationship have often used very large amounts of polyunsaturated fats in animals or in the lab.[28–31]

[§] A conversion factor of 38.67 was used to convert between mg/dL and mmol/L.

Cooking oils and C-reactive protein

An umbrella review of systematic reviews and meta-analyses found no effect of olive oil, canola oil and flaxseed oil consumption on C-reactive protein. However, the strength of evidence was low or very low and the ROBIS assessment found a risk of bias, so the data cannot be relied on.[32]

Summary

Available evidence does not suggest that cooking oils have either an adverse or a beneficial effect on C-reactive protein, a commonly used marker of inflammation.

Summary

Olive oil is the most well studied oil in relation to its effect on cardiovascular outcomes. There is low to moderate certainty of evidence that a higher olive oil intake is associated with reduced risk of cardiovascular disease, as is replacing butter with olive oil.

A network meta-analysis by Schwingshackl et al compared effects of different fats and oils on blood lipids, based on randomised controlled trial data. When cooking oils replaced butter, LDL cholesterol was reduced by a meaningful amount.[20] The level of effect varied by oil, with canola oil having the most beneficial effect of the oils commonly consumed in New Zealand.

There is no robust evidence available in humans to suggest cooking oils have either an adverse or beneficial effect on C-reactive protein, a commonly used marker of inflammation.

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Appendix 1: Frequently asked questions

How do I choose a good spread?

A good place to start when choosing a spread is to look for one that contains the healthier oils identified in this position statement, such as sunflower oil, canola oil or olive oil. Although spreads were not part of this review, heart health benefits are likely to be achieved when butter is replaced with spreads that are based on healthier oils.

Why do I need to store oil in a cool, dark cupboard?

Storing cooking oils in a cool dark cupboard reduces the chance that they will be oxidised by light or heat which may reduce the content of antioxidants provided by these oils.

There is conflicting information about seed oils and inflammation

Lab-based studies (in vitro or in animals) have shown there is a biological pathway where omega-6 polyunsaturated fats in seed oils could be converted into inflammatory compounds. However, studies in humans don't support these results. The body tightly regulates the conversion process and there is no evidence in humans that consuming omega-6 polyunsaturated fats leads to chronic inflammation.

Olive oil is too expensive, what can I use instead?

Canola oil is high in monounsaturated fats, like olive oil. If you are looking for an oil high in monounsaturated fats, canola is a good alternative to olive oil that is more affordable. It has the added benefit of containing alpha-linolenic acid, a plant-based omega-3. To improve blood lipid levels, oils such as sunflower, flaxseed oil or corn oil are also good options.

Is coconut oil a good oil to use?

Coconut oil may be better than butter but is not as good as other cooking oils.[33] Evidence shows that oils such as sunflower or canola oil will have a more beneficial effect on blood lipids.

I know palm oil isn't good for the environment, but what about my heart?

Palm oil is a tropical oil that has a similar composition to coconut oil. It is used extensively in processed foods but not as commonly in home food preparation. It has a similar effect to coconut oil on LDL cholesterol when compared to butter (mean difference –0.25 mmol/L (95% CI: –0.36 to –0.13).[20] The Heart Foundation recommends use of other oils instead of coconut oil or palm oil.

Does cooking at high temperature change the type of oil that is recommended?

High-temperature cooking such as frying can damage a cooking oil. The damage to oils tends to occur when the oil releases smoke – the smoke point. If you like to cook things at high temperatures, then try to use heart-healthy oils that have a higher smoke point. This is often oils higher in monounsaturated fatty acids, like sunflower oil. If a cooking oil has darkened or developed unpleasant off-flavours (rancidity), don't eat it or cook with it.

What does cold-pressed mean?

Cooking oils are extracted from plant materials such as seeds (rapeseed/canola, sunflower seed, safflower seed), nuts (almond, walnut), legumes (peanut, soybean), fruit (olive, palm) and grains

(corn). Oils can be either cold-pressed or extracted with the use of solvents. Cold pressing extracts less oil than using solvents, so the oils tend to be more expensive. However, they also tend to have more flavour, aroma, nutrients and fewer free fatty acids that results in a more stable oil.

If oil is extracted using solvent, it is often hexane that is used. Hexane is highly volatile so only a very minute amount remains in the oil after processing – on average 0.8ppm. This amount is far less than what humans are exposed to through other routes such as petrol fumes. The maximum permitted hexane residue in food is 20ppm.

Are seed oils heart-healthy?

Seed oils are a good source of polyunsaturated fats. When they replace saturated fats in the diet, polyunsaturated fats have been shown to reduce LDL cholesterol, making them a heart-healthy choice. The healthiest sources of polyunsaturated fats in our diet are whole foods like nuts, seeds and oily fish. When using fats or oils in cooking or food preparation, seed oils are a good choice instead of solid animal fats such as butter. Avoid getting fats and oils from highly processed foods such as snack foods and fast food.

Is lite olive oil a healthier choice than normal olive oil?

No, lite oil is not a healthier choice than other olive oils. Lite refers to colour and taste, so choose whichever style oil you prefer the taste of. There is no difference in energy or fat content between lite and standard olive oils.

How do I know what type of oil is in vegetable, salad or cooking oil?

Vegetable, salad or cooking oil is often a blend of oils. It is always best to try and determine the type of oils the product contains, so that you can use the oil for the correct purposes. Often the types of oils are labelled in the ingredients list on the back of the bottle. If the oils are not indicated, then you can go to the company website or contact the manufacturer to find out this information.

Which are the best local cooking oils?

For a good-quality local oil, start with New Zealand-grown olive oil, canola (rapeseed) oil or high-oleic sunflower oil. The source of the oil can be found on the food label. New Zealand and Australian oils are likely to be fresher. In the case of olive oil, testing by Callaghan Innovation has found New Zealand olive oil has more polyphenols and monounsaturated fats than imported European olive oils.[34]

What should I do to look after the cooking oil I use?

Avoid stockpiling oil. Keep an eye on the ‘use by’ date and ideally use within 12 months.

Oils prefer cool, dark places. Where possible choose oil in a dark glass bottle or tin and store it away from direct light.

Avoid overheating oil when cooking. When an oil is overheated it produces unwanted chemicals. An oil’s smoke point is the point at which the oil starts burning and smoking, which signals that damage to the oil has started.

Avoid reusing heated oils. As the oil darkens it develops off-flavours and becomes rancid.

Appendix 2: Assessment of meta-analyses using GRADE methodology

Certainty of outcomes

GRADE has four levels of evidence described in the table below.

Certainty	What it means
Very low ⨁◯◯◯	The true effect is probably markedly different from the estimated effect
Low ⨁⨁◯◯	The true effect might be markedly different from the estimated effect
Moderate ⨁⨁⨁◯	The authors believe that the true effect is probably close to the estimated effect
High ⨁⨁⨁⨁	The authors have a lot of confidence that the true effect is similar to the estimated effect

Importance of outcomes

Each outcome is assessed as either CRITICAL or IMPORTANT. The Heart Foundation ranks the primary outcomes of overall cardiovascular disease risk as a CRITICAL outcome from prospective cohort studies, and blood lipids as a CRITICAL outcome from randomised controlled trials. Secondary outcomes for this position statement, including inflammation, are assessed as IMPORTANT outcomes.

GRADE table for meta-analyses where a GRADE assessment had not been undertaken

Certainty assessment							Total no. of people	Effect			
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative risk (RR) (95% CI)	Absolute risk (95% CI)	Certainty	Importance
CARDIOVASCULAR DISEASE											
Higher versus lower olive oil intake and risk of cardiovascular disease[17]											
8	Non-randomised studies	Not serious	Not serious	Not serious	Not serious	None	14033/261016 (5.4%)	**RR 0.85** (0.77 to 0.93)	**8 fewer cardiovascular events per 1,000** (from 12 fewer to 4 fewer)	⨁⨁◯◯ Low	CRITICAL

References

1. World Health Organization. *WHO Handbook for Guideline Development*. (World Health Organization, Geneva, 2014).
2. Reynolds, A. N. *et al. Saturated Fat and Trans-Fat Intakes and Their Replacement with Other Macronutrients: A Systematic Review and Meta-Analysis of Prospective Observational Studies*. https://ourarchive.otago.ac.nz/esploro/outputs/book/Saturated-fat-and-trans-fat-intakes-and/9926545673001891 (2022).
3. NHMRC. Guidelines for Guidelines: assessing certainty of evidence. https://www.nhmrc.gov.au/guidelinesforguidelines/develop/assessing-certainty-evidence.
4. De Souza, R. J. *et al. Polyunsaturated Fatty Acids Intake and Risk of All-Cause Mortality, Cardiovascular Disease, Breast Cancer, Mental Health, and Type 2 Diabetes A Systematic Review and Meta-Analysis of Prospective Cohort Studies*. (World Health Organization, Geneva, 2022).
5. World Health Organization. *Saturated Fatty Acid and Trans-Fatty Acid Intake for Adults and Children: WHO Guideline*. (2023).
6. New Zealand Food Safety. How do trans-fatty acids affect your health? https://www.mpi.govt.nz/food-safety-home/safe-eat/how-do-trans-fatty-acids-affect-your-health/.
7. University of Otago and Ministry of Health. *A Focus on Nutrition: Key Findings of the 2008/09 New Zealand Adult Nutrition Survey*. http://www.health.govt.nz/system/files/documents/publications/a-focus-on-nutrition-v2.pdf (2011) doi:ISBN 978-0-478-37348-6.
8. NHMRC. Nutrient Reference Values for Australia and New Zealand. https://www.eatforhealth.gov.au/nutrient-reference-values/nutrients/fats-total-fat-fatty-acids (2005).
9. Food and Agriculture Organization of the United Nations; & World Health Organization; *Fats and Fatty Acids in Human Nutrition: Report of an Expert Consultation*. https://books.google.pt/books?id=77QtKQEACAAJ (2010).
10. Ministry of Health. *Adults' Dietary Habits – Findings from the 2018/19 and 2019/20 New Zealand Health Survey*. (2022).
11. Rosqvist, F. & Niinistö, S. Fats and oils - a scoping review for Nordic Nutrition Recommendations 2023. *Food Nutr. Res.* **68**, (2024).
12. Schwingshackl, L. *et al.* Impact of different types of olive oil on cardiovascular risk factors: A systematic review and network meta-analysis. *Nutr. Metab. Cardiovasc. Dis.* **29**, 1030–1039 (2019).
13. Tsartsou, E., Proutsos, N., Castanas, E. & Kampa, M. Network Meta-Analysis of Metabolic Effects of Olive-Oil in Humans Shows the Importance of Olive Oil Consumption With Moderate Polyphenol Levels as Part of the Mediterranean Diet. *Front. Nutr.* **6**, 6 (2019).
14. Grosso, G. *et al.* A comprehensive meta-analysis on evidence of Mediterranean diet and cardiovascular disease: Are individual components equal? *Crit. Rev. Food Sci. Nutr.* **57**, 3218–3232 (2017).
15. Esmaeilinezhad, Z., Torbahn, G. & Johnston, B. C. Medical Nutrition Therapy (MNT) Evidence Update: Comparative Effectiveness of Dietary Programs for Reducing Mortality and Cardiovascular Events in Adults with Increased Cardiovascular Disease Risk. *Adv. Nutr.* **16**, 100399 (2025).
16. Doundoulakis, I. *et al.* Effects of dietary interventions on cardiovascular outcomes: a network meta-analysis. *Nutr. Rev.* **82**, 715–725 (2024).
17. Xia, M., Zhong, Y., Peng, Y. & Qian, C. Olive oil consumption and risk of cardiovascular disease and all-cause mortality: A meta-analysis of prospective cohort studies. *Front. Nutr.* **9**, 1041203 (2022).
18. Neuenschwander, M. *et al.* Substitution of animal-based with plant-based foods on cardiometabolic health and all-cause mortality: a systematic review and meta-analysis of prospective studies. *BMC Med.* **21**, 404 (2023).
19. Ministry of Health. *Cardiovascular Disease Risk Assessment and Management for Primary Care*. (2018).
20. Schwingshackl, L. *et al.* Effects of oils and solid fats on blood lipids: a systematic review and network meta-analysis. *J. Lipid Res.* **59**, 1771–1782 (2018).
21. World Health Organization. *A Rapid Overview of Systematic Reviews on the Effects of Coconut Oil Intake Compared with Intake of Other Vegetable Oils on Mortality and Cardiovascular Health in Children and Adults*. https://iris.who.int/handle/10665/376275 (2024).

22. World Health Organization. *A Rapid Overview of Systematic Reviews on the Effects of Palm Oil Intake Compared with Intake of Other Vegetable Oils on Mortality and Cardiovascular Health in Children and Adults*. (2024).
23. Park, S.-Y., Kim, Y., Park, M. J. & Kim, J. Y. Rice Bran Consumption Improves Lipid Profiles: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Nutrients* **17**, (2024).
24. Calder, P. C. *et al.* Inflammatory disease processes and interactions with nutrition. *Br. J. Nutr.* **101 Suppl**, S1–S45 (2009).
25. Mach, F. *et al.* 2025 Focused Update of the 2019 ESC/EAS Guidelines for the management of dyslipidaemias. *Eur. Heart J.* **46**, 4359–4378 (2025).
26. European Society of Cardiology. 2025 Focused Update of the 2019 ESC / EAS Guidelines for the management of dyslipidaemias: official slide set. https://www.escardio.org/static-file/Escardio/Guidelines/Products/Slide sets/2025/2025 official slides_Dyslipidaemias.pdf (2025) doi:10.1093/eurheartj/ehaf190.
27. Eiriksdottir, G. *et al.* Association between C reactive protein and coronary heart disease: mendelian randomisation analysis based on individual participant data. *BMJ* **342**, 425 (2011).
28. Johnson, G. H. & Fritsche, K. Effect of dietary linoleic acid on markers of inflammation in healthy persons: a systematic review of randomized controlled trials. *J. Acad. Nutr. Diet.* **112**, (2012).
29. Rett, B. S. & Whelan, J. Increasing dietary linoleic acid does not increase tissue arachidonic acid content in adults consuming Western-type diets: a systematic review. *Nutr. Metab. (Lond).* **8**, 36 (2011).
30. Petersen, K. S. *et al.* Perspective on the health effects of unsaturated fatty acids and commonly consumed plant oils high in unsaturated fat. *Br. J. Nutr.* **132**, (2024).
31. Su, H., Liu, R., Chang, M., Huang, J. & Wang, X. Dietary linoleic acid intake and blood inflammatory markers: A systematic review and meta-analysis of randomized controlled trials. *Food Funct.* **8**, 3091–3103 (2017).
32. Voon, P. T. *et al.* Health Effects of Various Edible Vegetable Oil: An Umbrella Review. *Adv. Nutr.* **15**, 100276 (2024).
33. Duarte, A. C. *et al.* The effects of coconut oil on the cardiometabolic profile: a systematic review and meta-analysis of randomized clinical trials. *Lipids Health Dis.* **21**, 83 (2022).
34. Lagutin, K; Lewis, A; Austin, T. New Zealand extra virgin olive oil stands out in recent market surveillance. *NZ Food Magazine* **June/July**, 28–29 (2025).