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DAIRY TECHNOLOGY

Speaker – Prof. Renée Blaauw

PhD (Nutritional Sciences) is a Professor in Therapeutic Nutrition at the Division of Human Nutrition, Stellenbosch University, South Africa.

She is a registered dietitian with the Health Professions Council of South Africa. She is a Past Chairperson of the Professional Board for Dietetics in South Africa, a Past President of SASPEN and an honorary member of both SASPEN and ADSA. She is currently serving as the Scientific Secretary of SASPEN.

Her main research interests include Nutrition support of critically ill patients; Nutritional management of gastro-intestinal diseases and Hospital malnutrition. To this effect she is a member of the GLIM (Global Leadership Initiative on Malnutrition) working group and endeavours to contribute to the evidence-base regarding adult hospital malnutrition in South Africa.

She is actively involved in teaching and training in dietetics, with a passion for mentoring. She strives to fulfil her educational philosophy "***To stimulate, create interest and empower others to help themselves*".**

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forward together
sonke siya phambili
saam vorentoe

Not all fats are the same

Special reference to dairy and Cardiovascular disease

Renée Blaauw

SADT WC Meeting 28 September 2023

Disclaimer

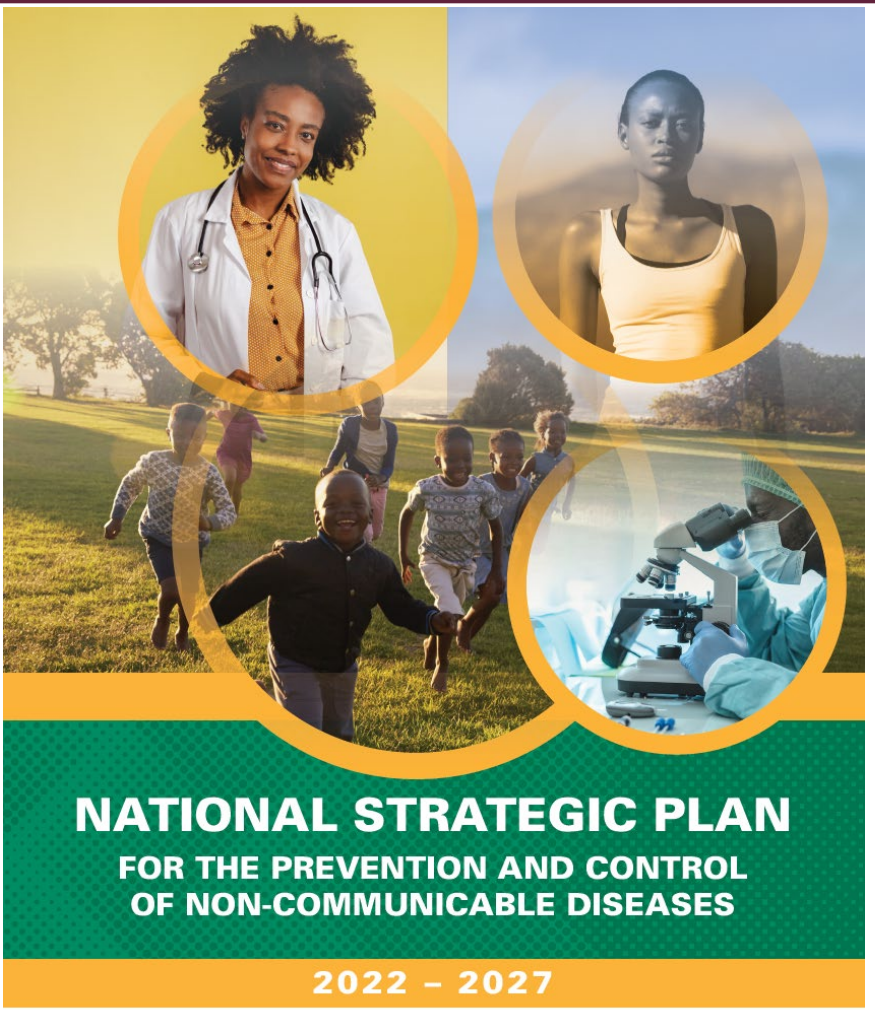
- I serve on the Technical Advisory Committee for the Consumer Education project of Milk SA

- I declare no conflict of interest which might have interfered with the scientific validity of this presentation

Discussion points

- Prevalence of NCD and cardiometabolic risk factors
- Consensus dietary recommendations
  - Dietary patterns
- Investigate some evidence
- Making sense of it all
- Concluding remarks

Non-communicable disease burden in SA



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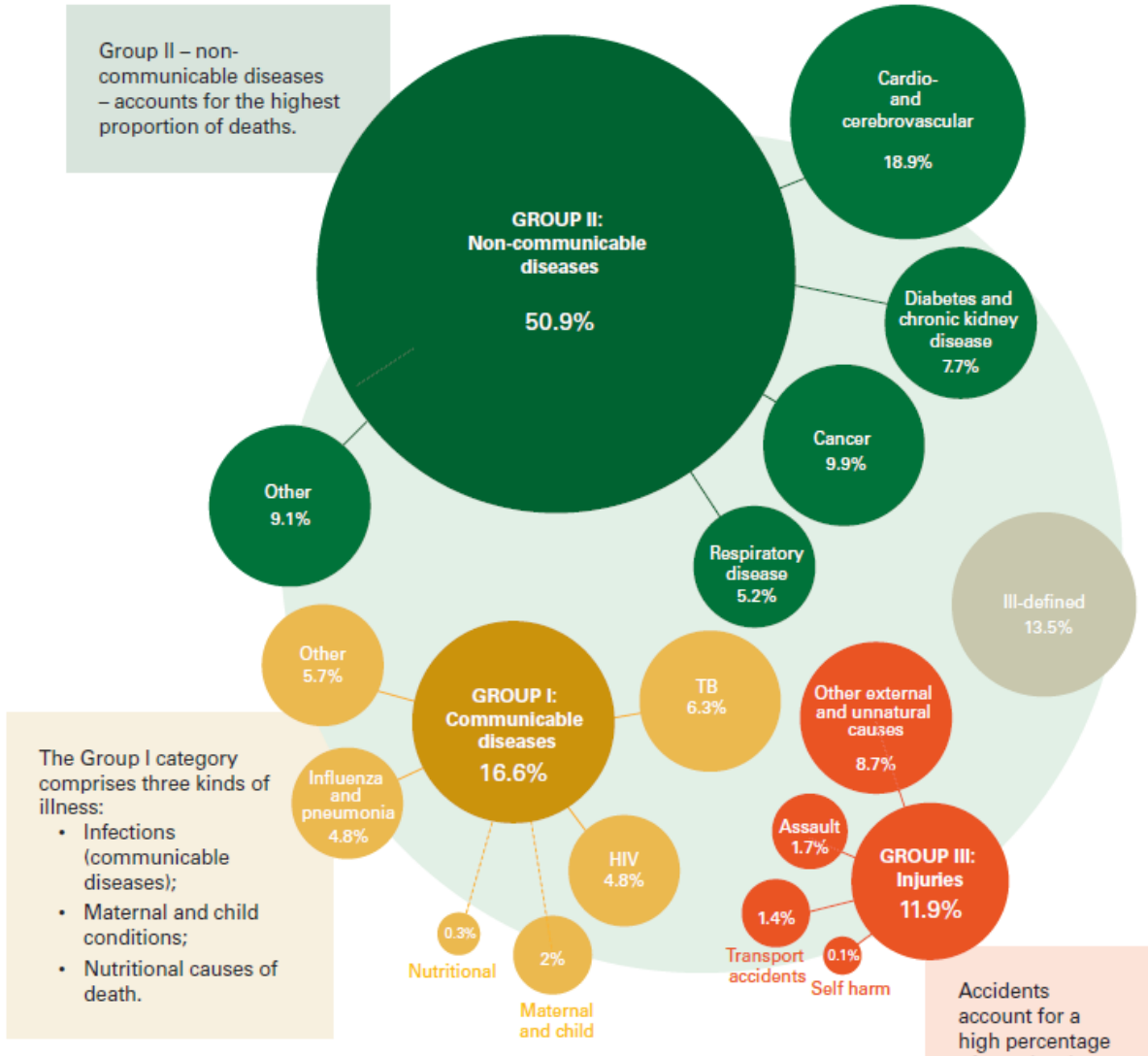
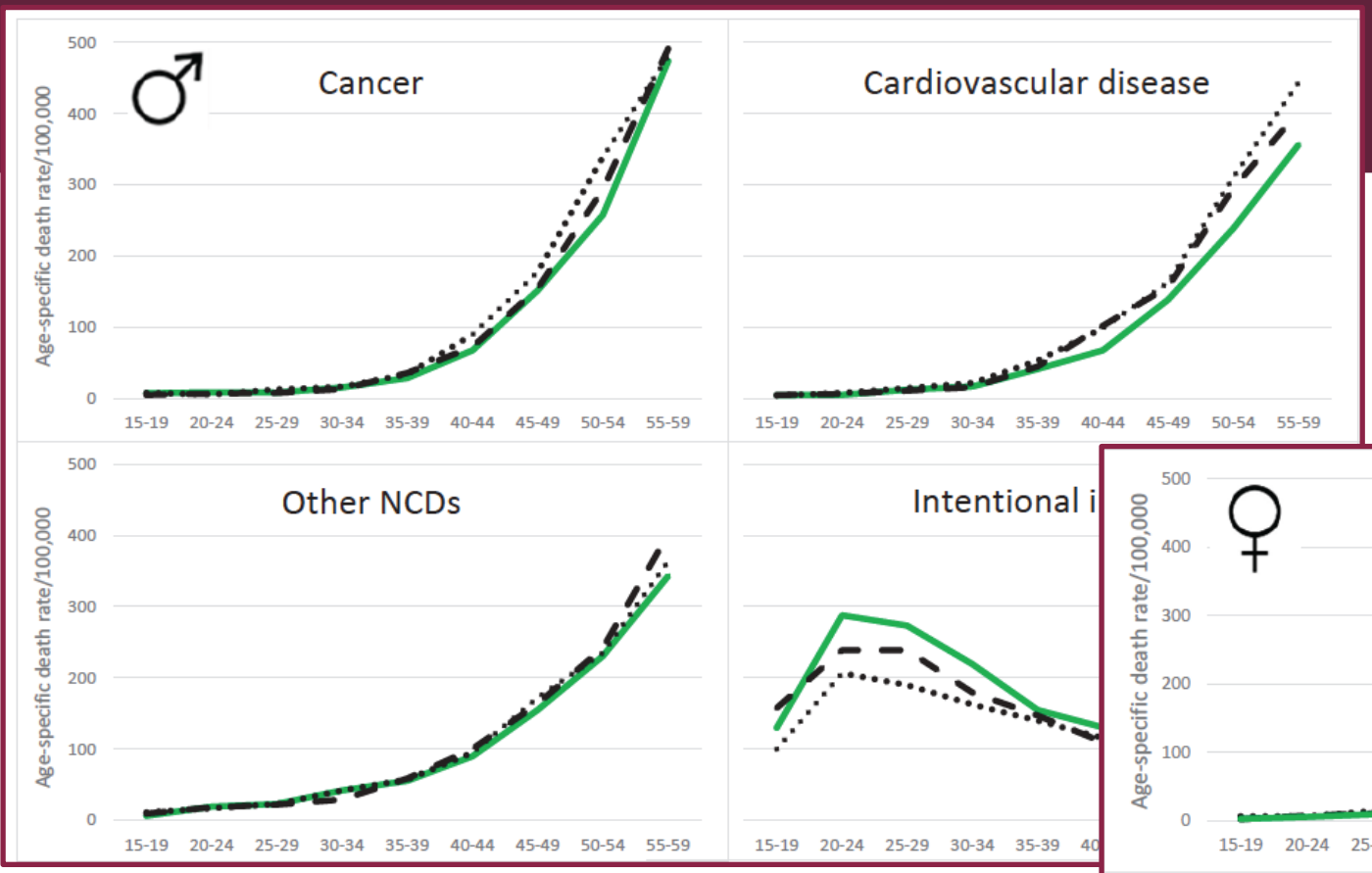
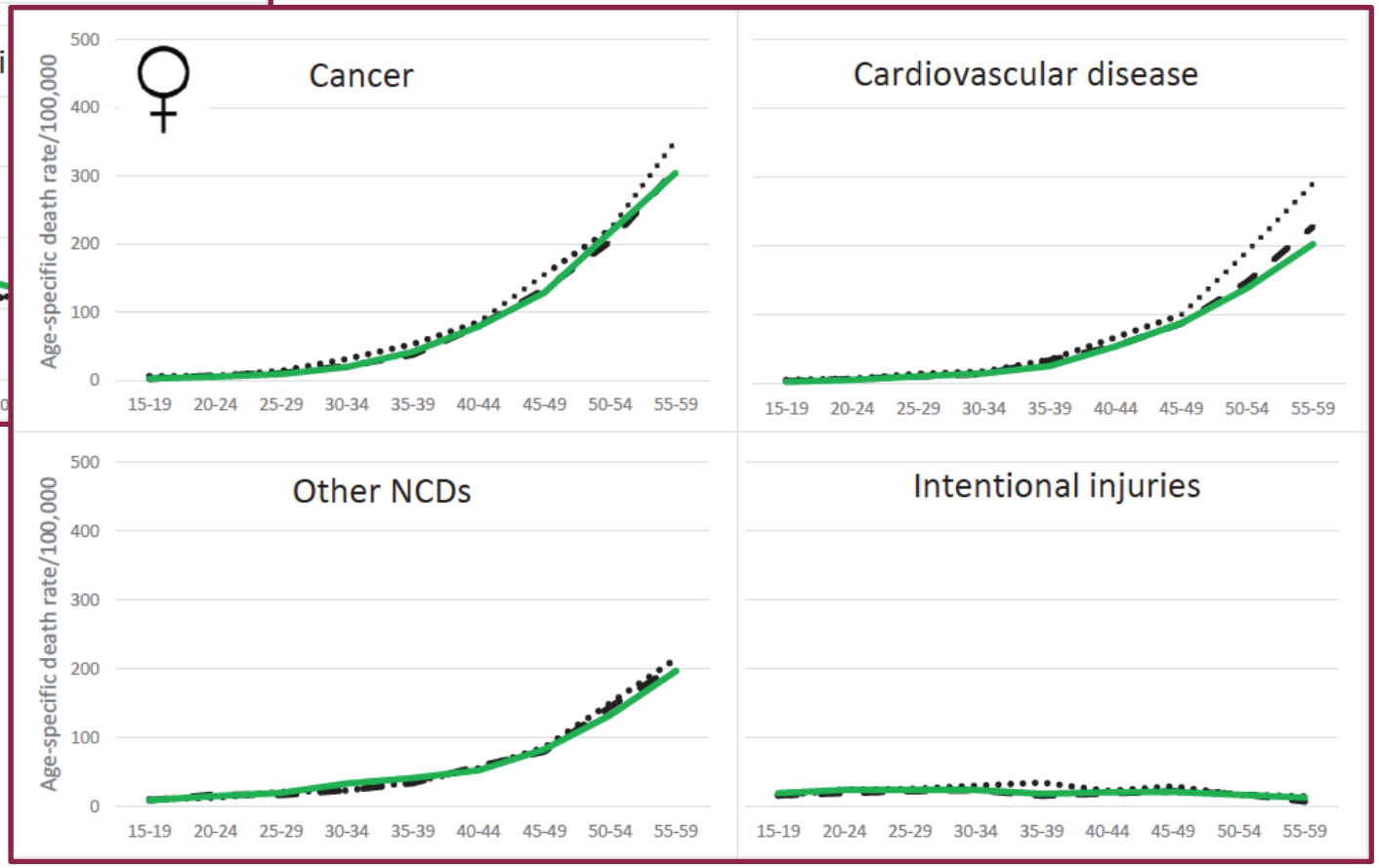
2030 NDP



NCD burden





[2009; 2013; 2016]

WCP Burden of Disease Report 2019

Cardiometabolic risk factors

Dyslipidemia

- Raised LDL-cholesterol
- Decreased HDL-cholesterol
- Raised TG

Clinical features

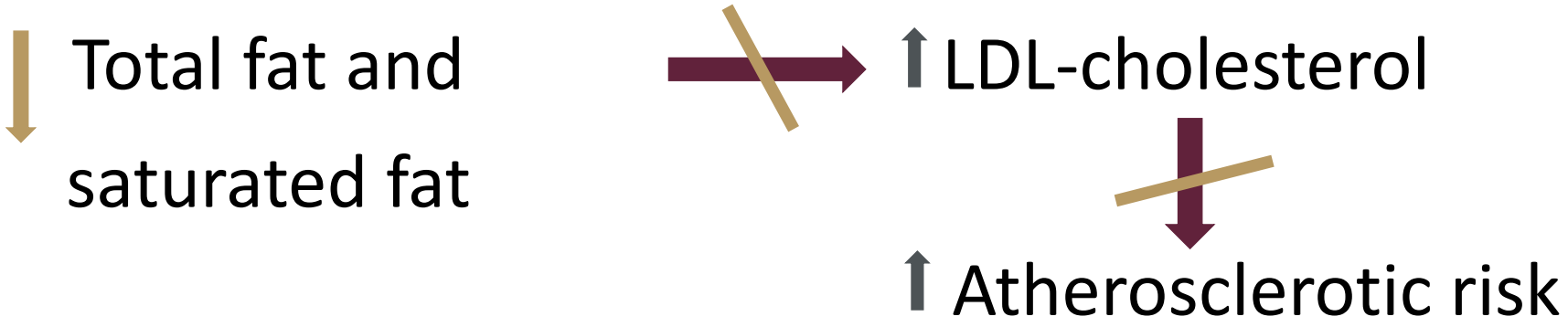
- Insulin resistance
- Subclinical inflammation
- Hypertension
- Vascular dysfunction
- Impaired coagulation

Lifestyle-related

- Obesity
- Inactivity
- Smoking
- Alcohol
- Unhealthy diet

Drouin-Chartier et al, 2016; Fung et al, 2008; Fekete et al, 2013; Markey et al, 2014

Current dietary guidelines



- **International Dietary Guidelines**
  - Control dietary fat intake
  - Intake of SFA's should be < 10% of total energy intake

Healthy dietary patterns

Giosue et al, 2022; Markey et al, 2014; Sacks et al, 2017

Healthy dietary pattern

Contains higher intakes of fruit, vegetables, whole grains, low-fat or non-fat dairy, seafood, nuts and legumes. Moderate intake of alcohol and a lower intake of red and processed meat and low in sugar and sugar-sweetened foods and beverages, as well as refined grains.

Benjamin et al 2017

Healthy dietary pattern

Contains higher intakes of fruit, vegetables, whole grains, **low-fat or non-fat dairy**, seafood, nuts and legumes. Moderate intake of alcohol and a lower intake of red and processed meat and low in sugar and sugar-sweetened foods and beverages, as well as refined grains.

Benjamin et al 2017

SA Dyslipidaemia Guidelines

South African dyslipidaemia guideline consensus statement: 2018 update

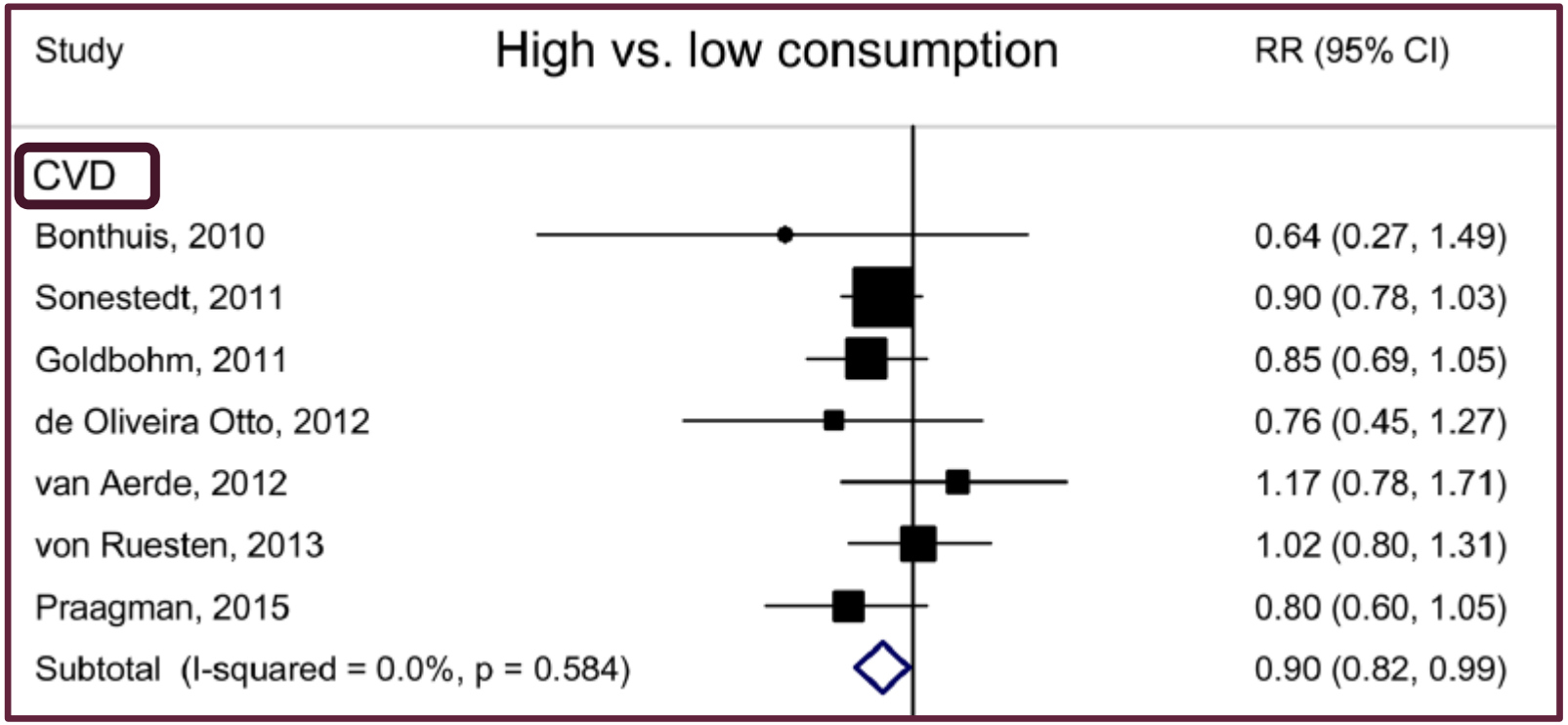
A healthy diet is one of moderation that is nutrient dense, and which emphasises adequate intake of fruits, vegetables, whole grains, legumes and nuts, and limits consumption of refined grains, processed foods, added sugar and sodium, and saturated and trans fats.

What is the evidence regards to dairy intake and CVD?

Cheese consumption and risk for CVD

- Assessing effect of cheese consumption on risk for CVD, CHD and stroke
  - 15 studies included
  - Mean study duration 10 years
- Relative Risk for high versus low cheese consumption
  - RR=0.90 for CVD
  - RR=0.86 for CHD
  - RR=0.90 for stroke

Protective effect



Chen et al, 2017

High intake = 30g or 1 serving per day

Total dairy intake and CVD risk

J Cardiovasc Thorac Res, 2017, 9 (1), 1-11
doi: 10.15171/jcvtr.2017.01
http://journals.tbzmed.ac.ir/jcvtr

TUOMS Publishing Group

Review Article

The effect of dairy consumption on the prevention of cardiovascular diseases: A meta-analysis of prospective studies

Fatemeh Gholami[1], Malihe Khoramdad[2], Nader Esmailnasab[3*], Ghobad Moradi[3], Bijan Nouri[3], Saeid Safiri[4], Yousef Alimohamadi[5,6]

- Meta-analysis on 27 prospective cohort studies, published until 2014

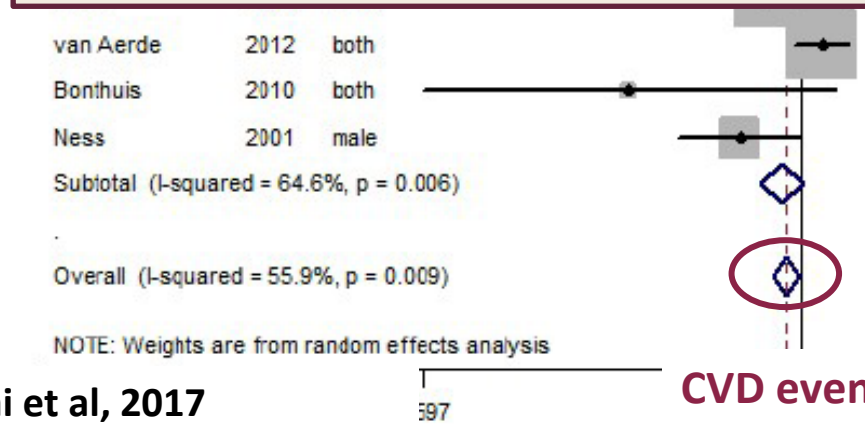
AIM: To determine relationship between total dairy intake and Cardiovascular disease

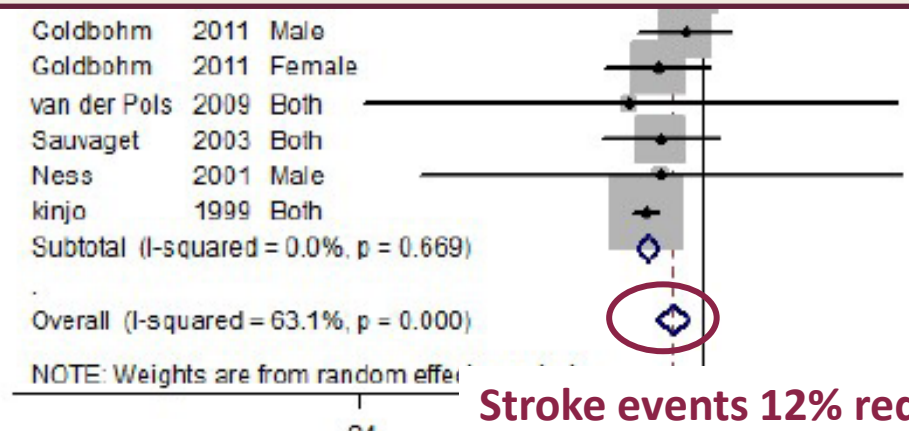
Gholami et al, 2017

Total dairy intake and CVD risk

Conclusion:

- Inverse association between total dairy intake and CVD and Stroke
- Protective role of dairy shown





Gholami et al, 2017

CVD events 10% reduction

Stroke events 12% reduction

nutrients

Nutrients **2022**, *14*, 831. https://doi.org/10.3390/nu14040831

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Review

Consumption of Dairy Foods and Cardiovascular Disease: A Systematic Review

Annalisa Giosuè [1,†], Ilaria Calabrese [1,†], Marilena Vitale [1], Gabriele Riccardi [1] and Olga Vaccaro [2,*]

- Included data published until April 2021
- 37 prospective cohort studies or RCT's included

Total dairy

200g / 200ml	Meta-Analysis	Neutral Relation	Inverse Relation (% Risk Reduction)	Positive Relation (% Risk Increase)
CHD incidence	Soedamah-Muthu 2011 [23]	✓		
	Qin 2015 [21]	✓		
	Alexander 2016 [22]	✓ (high vs. low intake)	✓ (−14% per > 3 s/d)	
	Guo 2017 [19]	✓		
	Soedamah-Muthu 2018 [24]	✓		
	Bechthold 2019 [25]	✓		
CHD mortality	Mazidi 2019 [26]	✓		
FULL-FAT DAIRY				
All-cause mortality	Guo 2017 [19]	✓		
CVD incidence	Guo 2017 [19]	✓		
CHD incidence	Soedamah-Muthu 2011 [23]	✓		
	Qin 2015 [21]	✓		
	Alexander 2016 [22]	✓		
	Guo 2017 [19]	✓		
CHD mortality	Mazidi 2019 [26]	✓		
LOW-FAT DAIRY				
All-cause mortality	Guo 2017 [19]	✓		
CVD incidence	Guo 2017 [19]	✓		
CHD incidence	Soedamah-Muthu 2011 [23]	✓		
	Qin 2015 [21]	✓		
	Alexander 2016 [22]		✓ (−10% high vs. low intake)	
	Guo 2017 [19]	✓		

Giosue et al. Nutrients 2022

Yoghurt

YOGURT 200g		Neutral Relation	Inverse Relation (% Risk Reduction)	Positive Relation (% Risk Increase)
All-cause mortality	Guo 2017 [19]	✓		
	Gao 2020 [32]	✓ high vs. low intake	✓ (−5% per 200 g/d)	
CVD incidence	Alexander 2016 [22]	✓		
	Guo 2017 [19]	✓		
	Wu 2017 [33]	✓ high vs. low intake	✓ (−8% per ≥ 200 g/d)	
	Zhang 2020 [29]		✓ (−22% high vs. low intake)	
CVD mortality	Gao 2020 [32]	✓ high vs. low intake	✓ (−8% per 200 g/d)	
CHD incidence	Qin 2015 [21]	✓		
	Alexander 2016 [22]	✓		
	Wu 2017 [33]	✓		
	Guo 2017 [19]	✓		
	Jakobsen 2021 [28]	✓		

Giosue et al. Nutrients 2022

Cheese

CHEESE		Neutral Relation	Inverse Relation (% Risk Reduction)	Positive Relation (% Risk Increase)
All-cause mortality	O'Sullivan 2013 [17]			
	Guo 2017 [19]	✓		
	Tong 2017 [30]	✓		
CVD incidence	Alexander 2016 [22]	✓		
	Chen 2017 [31]	✓ per 50 g/d	✓ (−10% high vs. low intake)	
	Guo 2017 [19]		✓ (−2% per 10 g/d)	
	Zhang 2020 [29]		✓ (−13% high vs. low intake)	
CVD mortality	O'Sullivan 2013 [17]	✓		
CHD incidence	Qin 2015 [21]		✓ (−16% high vs. low intake)	
	Alexander 2016 [22]		✓ (−14% per 50 g/d)	
	Chen 2017 [31]		(−10% per 50 g/d)	
	Guo 2017 [19]	✓		
	Jakobsen 2021 [28]		✓ (−4% per 20 g/d)	

Giosue et al. Nutrients 2022

Making sense of it all

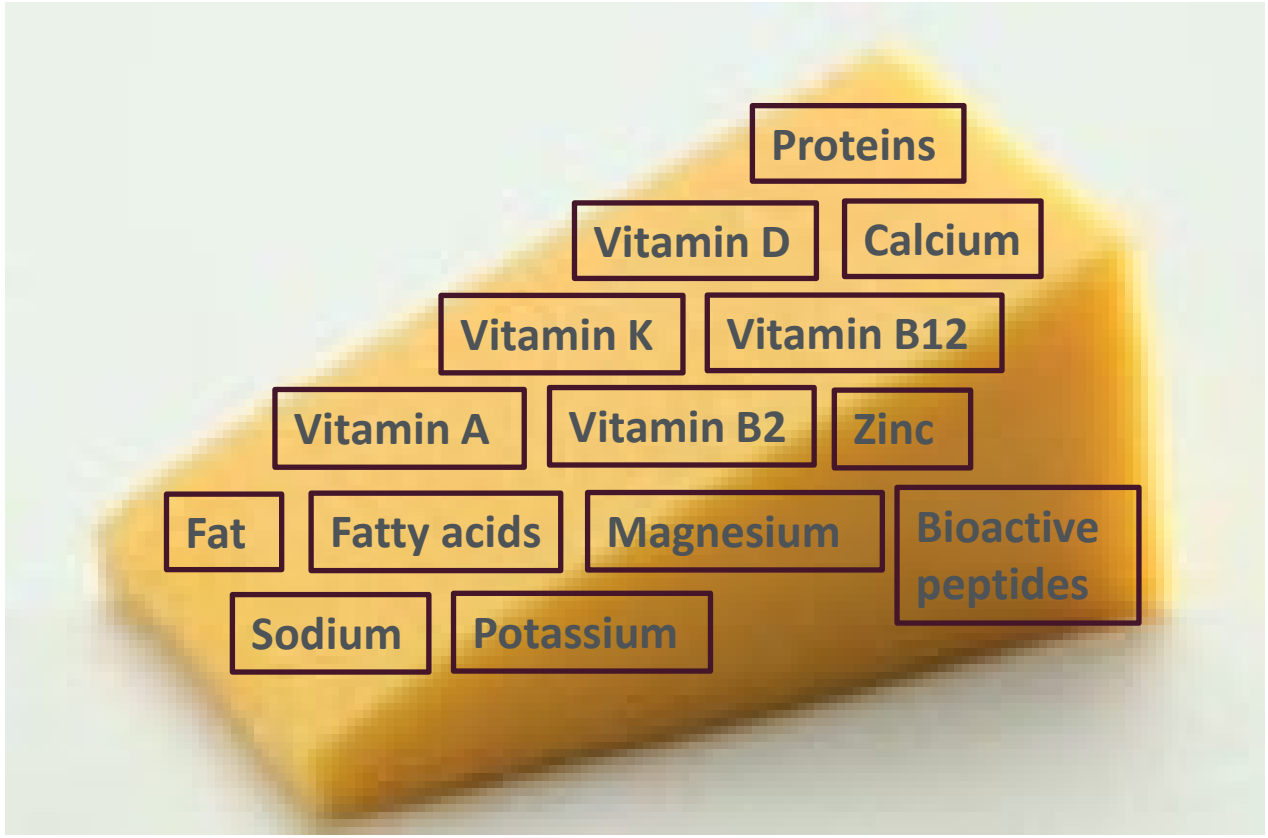
1. Food matrix
2. Changes in particle size
3. Composition of replacement food
4. Role of inflammation
5. Fermentation
6. Dose-response effect

Cheese nutrient matrix

Astrup *et al.*, 2020; Dehghan *et al.*, 2018; Lordan *et al.*, 2018; Gil and Ortega, 2019

Cheese nutrient matrix

- Dyslipidemia
- Insulin resistance
- Subclinical inflammation
- Vascular dysfunction
- Impaired coagulation

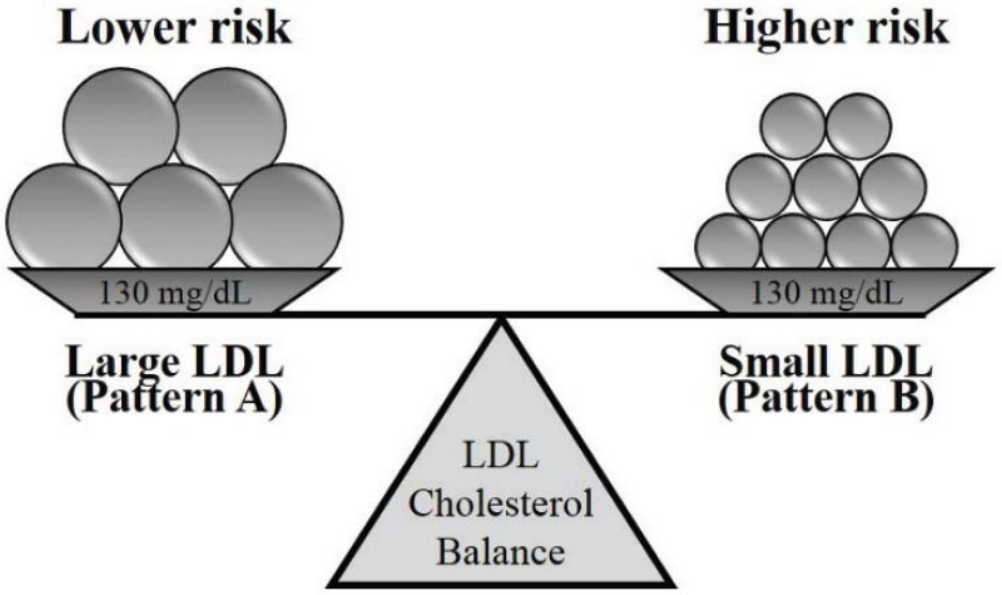


- Obesity
- Hypertension
- Inactivity
- Smoking
- Alcohol
- Unhealthy diet

Astrup *et al.*, 2020; Dehghan *et al.*, 2018; Lordan *et al.*, 2018; Gil and Ortega, 2019

Particle size

- Although intake of SFA in dairy products leads to an increase in LDL-cholesterol, it does not increase the amount of small, dense particles, but rather the formation of larger LDL particles.
- Larger LDL particles are less atherogenic and thus less strongly linked to CVD due to
  - higher affinity for LDL receptors
  - decreased susceptibility to oxidation

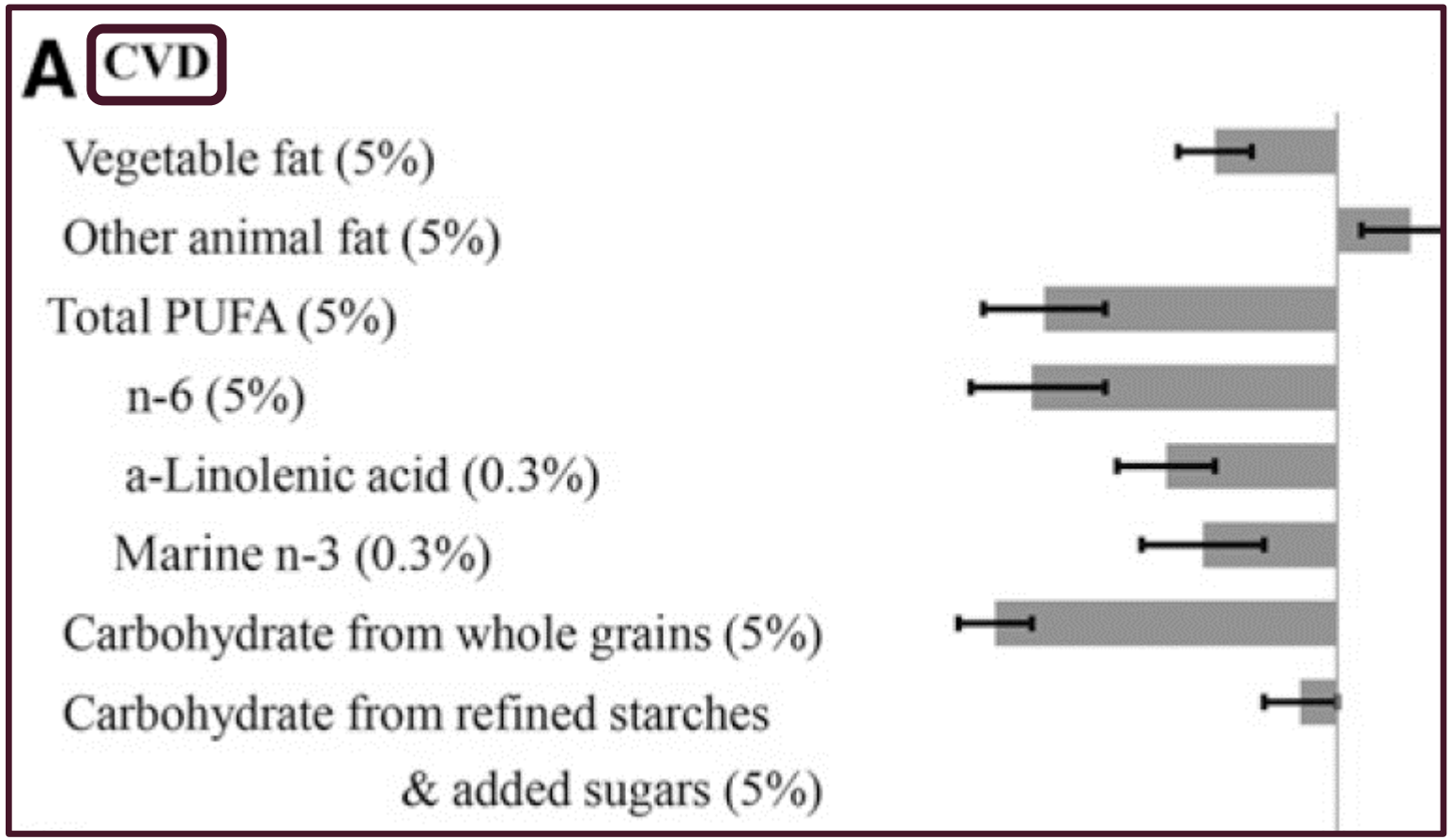


Fontecha *et al.*, 2019; Astrup *et al.*, 2020; Feeney, Lamichhane and Sheehan, 2021; Daoud et al, 2014

Composition of replacement food

Replacing 5% energy from dairy fat with equivalent energy from other sources:

- Vegetable fat
  - 10% reduced risk
- PUFA
  - 24% reduced risk
- CHO, whole grain
  - 28% reduced risk
- Other animal fat
  - 6% increased risk



Chen et al, 2016

Effect on inflammation

- The presence of low-grade inflammation are linked to the development of CVD, MS, T2DM
- Long-chain SFA [palmitic (C16:0) and stearic (C18:0) acid] found in dairy products, have pro-inflammatory effects.
- However, intake of dairy
  - leads to lower levels of CRP, TNFα, Il6 and IL13
  - a neutral or anti-inflammatory effect on inflammation

- A recent systematic review assessed 16 studies conducted in healthy individuals and those with MS and Type 2 DM to determine the effect of dairy intake on inflammatory markers:
  - No pro-inflammatory effect associated with the consumption of milk or dairy products
  - Long-term dairy intake showed a weak anti-inflammatory effect

Lordan et al., 2018; Silva et al., 2021; Bhupathi et al., 2020; Giosuè et al., 2022; Ulven et al., 2019; Gil and Ortega, 2019

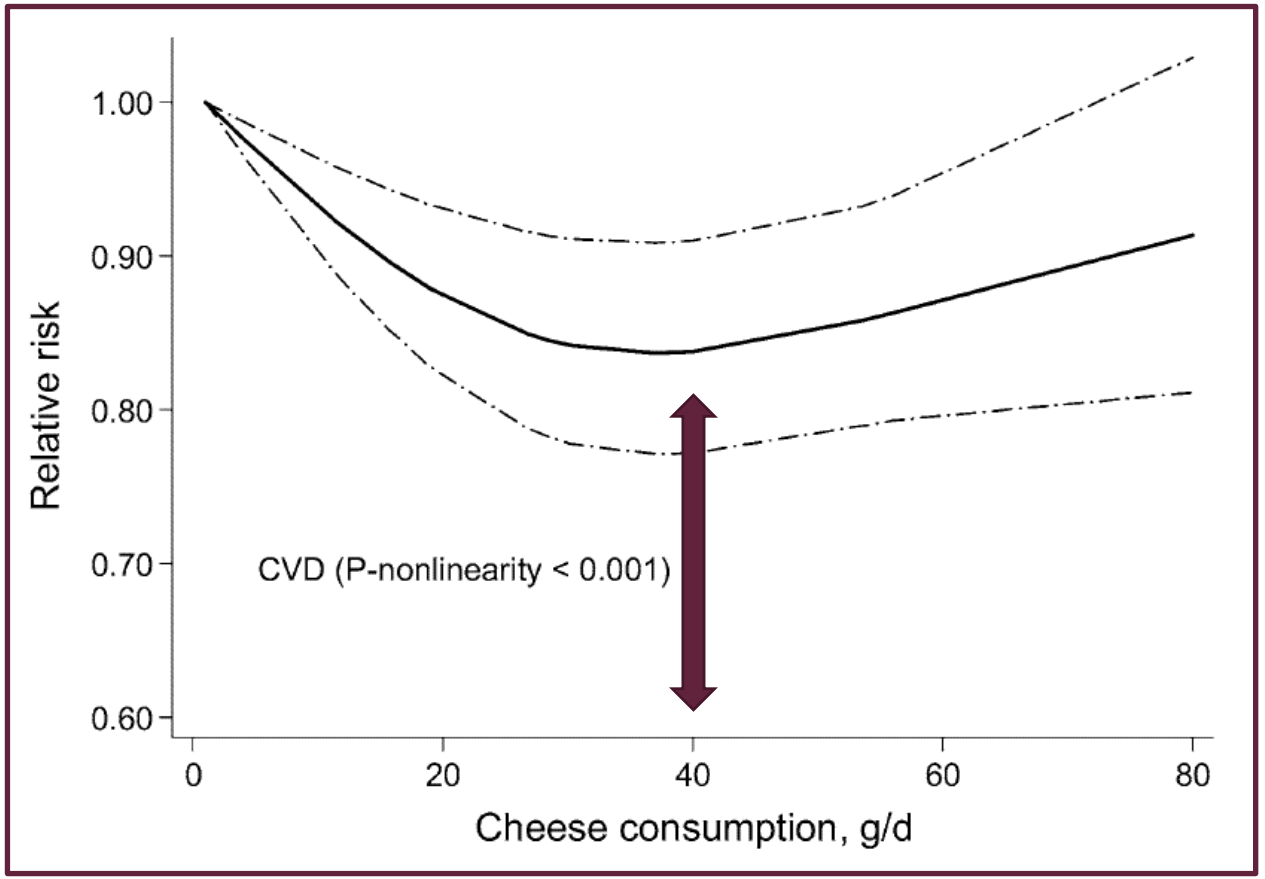
Role of fermentation and fermented foods

- Fermentation assists with reducing inflammation
  - Platelet-activating factor (PAF) is a pro-inflammatory phospholipid and dairy contains PAF inhibitors. As the level of fermentation increases, the PAF inhibitor activity increases.
- Unique nutrient matrix in fermented foods, as they also contain other nutrients with beneficial properties
- Bacterial fermentation results in the production of SCFA, especially butyrate:
  - improve gut health
  - regulate cholesterol metabolism
  - appetite regulation
  - anti-inflammatory properties

Lordan et al., 2018; Zhang *et al.*, 2020 ; Bhupathi et al., 2020; Feeney et al, 2021; Fontecha *et al.*, 2019.

Dose-response effect

- **Non-linear inverse** association between **cheese** consumption and risk for CVD
  - largest risk reductions at consumption of approximately 40 g/d



Chen et al, 2017

Dose-response

nutrients

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Review

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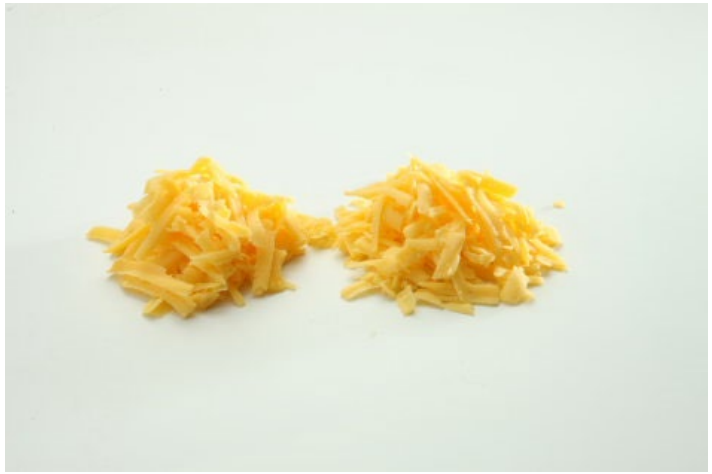
Annalisa Giosuè [1,†], Ilaria Calabrese [1,†], Marilena Vitale [1], Gabriele Riccardi [1] and Olga Vaccaro [2,*]

Portion size	Risk reduction
10 g per day	2%
20 g per day	4%
50 g per day	10-14%

Giosue et al. Nutrients 2022

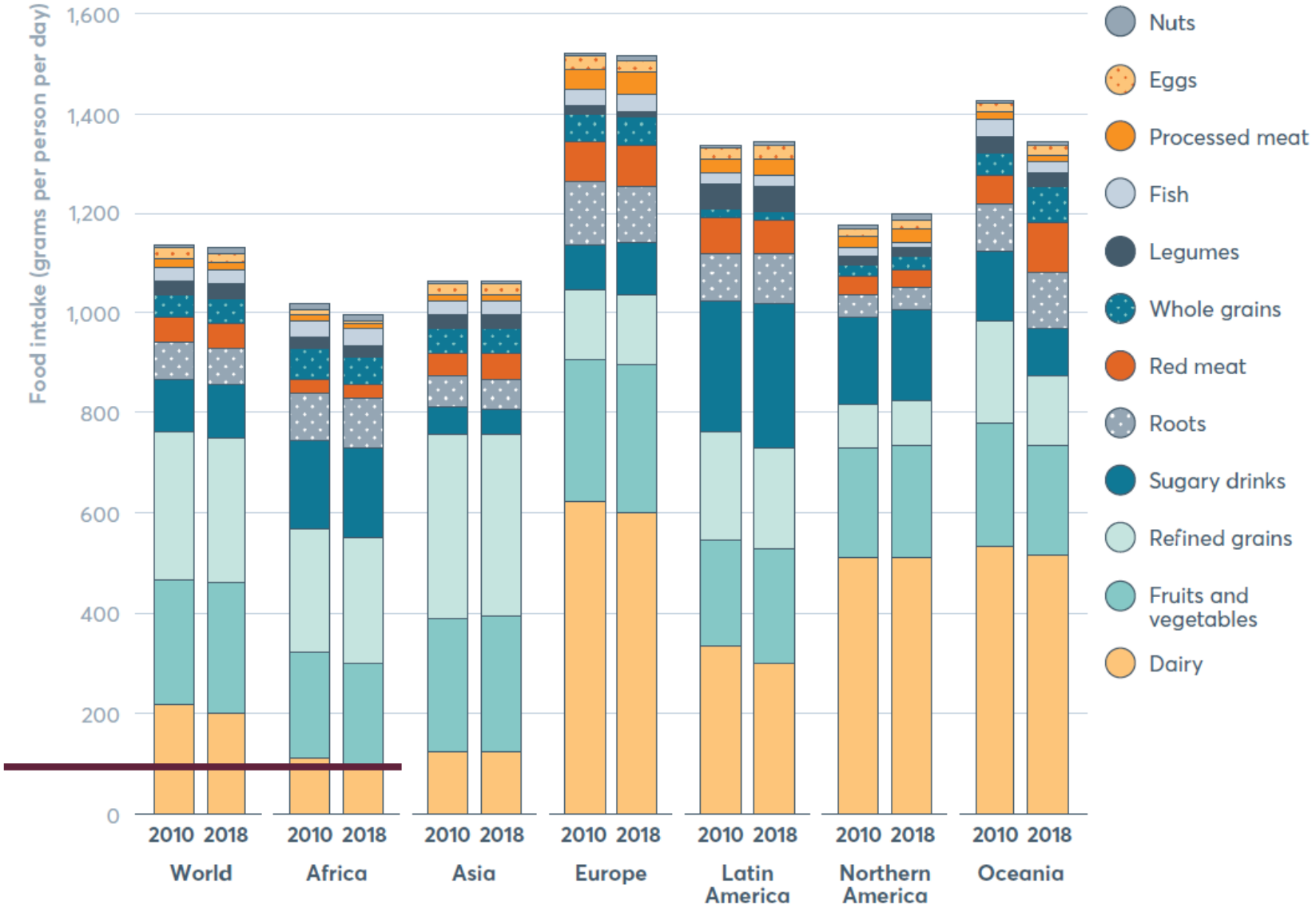
Dose-response

- For **healthy individuals with a normal serum cholesterol** level:
  - Total dairy intake (full-fat or low-fat products): up to 200g per day
  - Milk intake: up to 200ml per day
  - Yoghurt intake: up to 200g per day
  - Cheese consumption: up to 50g per day



Giosue et al. Nutrients 2022

Food intake globally



2021 Global Nutrition Report

Conclusion

nutrients

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Review

Consumption of Dairy Foods and Cardiovascular Disease: A Systematic Review

Annalisa Giosuè [1,†], Ilaria Calabrese [1,†], Marilena Vitale [1], Gabriele Riccardi [1] and Olga Vaccaro [2,*]

5. Conclusions

This study highlights the complexity of the relationship between different dairy foods and cardiovascular diseases as well as their risk factors. Altogether, the results indicate that the association of dairy intake with cardiovascular risk is largely driven by the food type (i.e., cheese, yogurt, milk). These findings may inform dietary recommendations for CVD prevention by allowing healthy people with normal plasma cholesterol levels a more liberal consumption of up to 200 g/day of total dairy foods (including milk, cheese, and yogurt), irrespective of being full or low fat. Within this amount of consumption, fermented dairy should be preferred (i.e., one generous serving/day of yogurt or three small servings/week of cheese).

Giosue et al. Nutrients 2022

Conclusion

- Intake of dairy products provides different results
  - Fat content and dairy source
  - Food matrix – synergistic effect of nutrients

- Total dairy intake as risk factor for CVD
  - Protective to neutral effects
  - No harmful effects
  - Focus on low-fat guidelines not evidence-based, as there is no proof that regular / high-fat dairy intake within recommended intake levels is harmful in low-risk individuals

Thank You

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