How Much Red Meat is Good for Us?

The Importance of Transparent Evidence-Based Health Metrics

Alice V. Stanton
Professor, Royal College of Surgeons in Ireland
&
Director Human Health, Devenish Nutrition

RCSI UNIVERSITY OF MEDICINE AND HEALTH SCIENCES

DEVENISH™ Beyond Nutrition

Disclosures

Non-remunerated member of;

- The Irish 2030 Agri-Food Strategy Committee,
- Horizon Europe's Cancer Mission Assembly,
- The Irish Climate and Health Coalition,
- The Council on High Blood Pressure of the Irish Heart Foundation,
- The World Action against Salt, Sugar, and Health (WASSH).

Part-time employee and owner of stock of Devenish Nutrition.

Omnivore.

WHO Definition of Healthy Diet

A healthy diet helps to protect against;

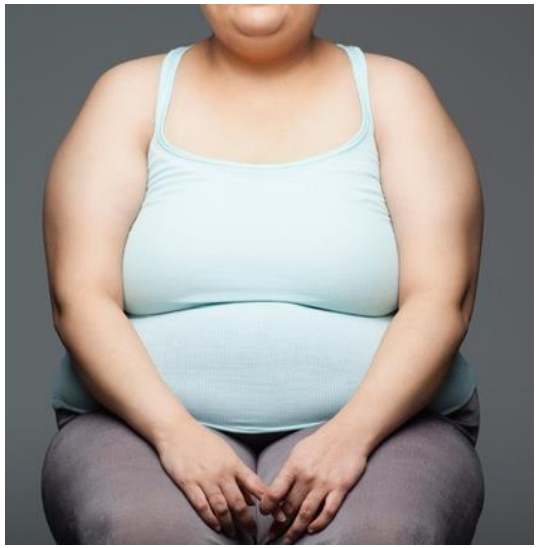
Malnutrition in all its forms,

as well as

Non-communicable diseases (NCDs),

such as diabetes, heart disease, stroke and cancer.

Current ~~Double~~ Triple Health Burden of Malnutrition.



1.9 billion are
Overweight or **Obese**

850 million are
Chronically Undernourished

2 billion suffer from
Hidden Hunger

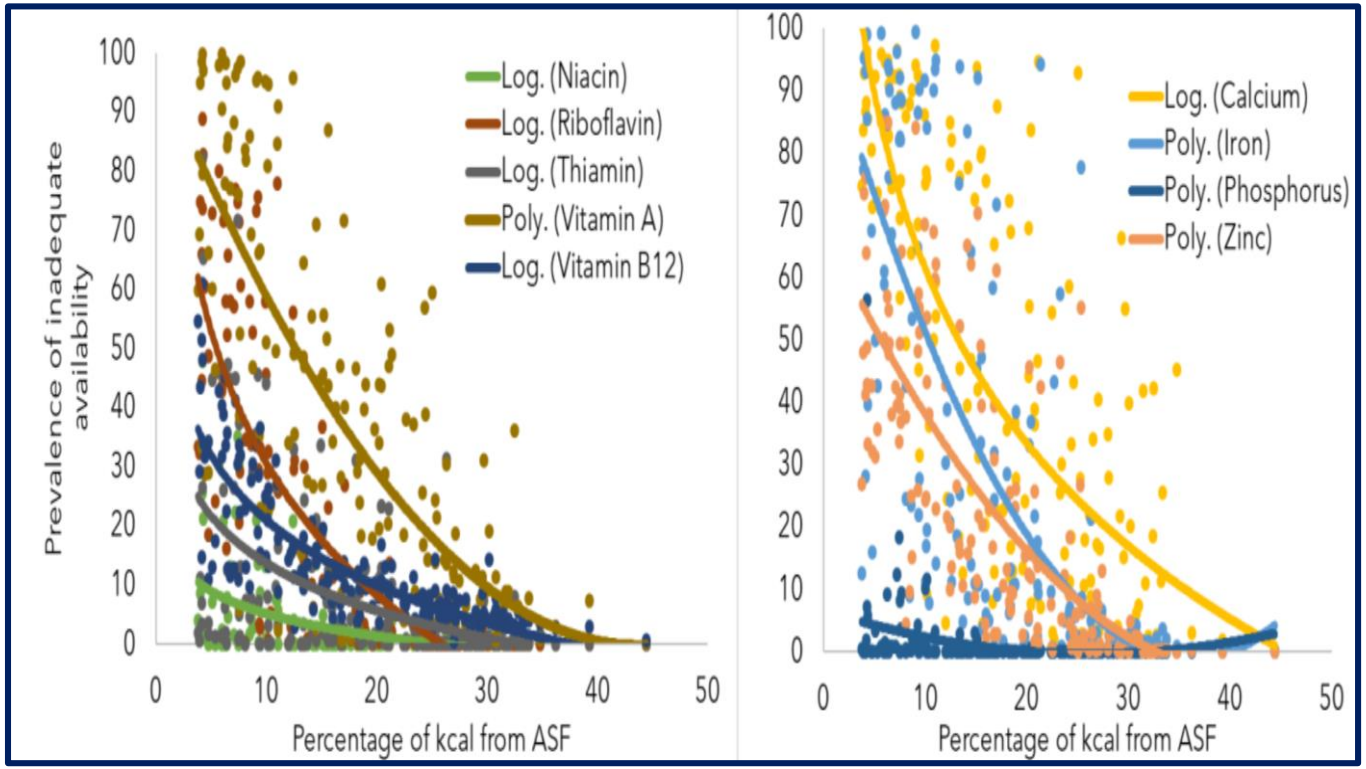
Sources: FAO, 2015 | WHO, 2017 | WHO, 2012

Animal-Source Foods Top Sources of Commonly Lacking Nutrients

	2+ nutrients	Iron	Zinc	Vitamin A	Calcium	Folate	Vitamin B_{12}
Liver	Very high	Very high	Very high	Very high	Low	Very high	Very high
Spleen	Very high	Very high	Very high	Low	Low	Low	Very high
Small dried fish	Very high	Very high	Very high	Very high	Very high	Low	Very high
Dark leafy greens	Very high	High	Low	Very high	Very high	Very high	Low
Bivalves	Very high	Very high	Very high	Very high	Very high	Moderate	Very high
Kidney	Very high	Very high	Very high	High	Low	High	Very high
Heart	Very high	Very high	Very high	Low	Low	Moderate	Very high
Crustaceans	Very high	Moderate	Very high	Low	Moderate	Low	Very high
Goat	Very high	Very high	Very high	Low	Low	Low	Very high
Beef	Very high	High	Very high	Low	Low	Low	Very high
Eggs	Very high	Moderate	Very high	Very high	Low	Very high	Very high
Cow milk	Very high	Low	High	Very high	Very high	Low	Very high
Canned fish w/ bones	Very high	Moderate	Very high	Low	Very high	Low	Very high
Lamb/mutton	Very high	High	Very high	Low	Low	Low	Very high
Cheese	Very high	Low	Very high	Very high	Very high	Low	Very high
Goat milk	High	Low	Moderate	High	Very high	Low	Low
Pork	High	Low	Very high	Low	Low	Low	Very high
Yoghurt	Moderate	Low	Low	Low	Very high	Low	Very high
Fresh fish	Moderate	Low	Moderate	Low	Low	Low	Very high
Pulses	Moderate	Moderate	Moderate	Low	Low	Very high	Low
Teff	Moderate	Very high	Moderate	Low	Low	High	Low
Vit A-rich fruit/veg	Low	Low	Low	Very high	Low	High	Low
Other vegetables	Low	Low	Low	Low	Low	Low	Low
Quinoa	Low	Moderate	Moderate	Low	Low	Very high	Low
Canned fish w/o bones	Low	Low	Moderate	Low	Low	Low	Very high
Seeds	Low	Low	High	Low	High	High	Low
Fonio	Low	Moderate	Moderate	Low	Low	Moderate	Low
Chicken	Low	Low	High	Low	Low	Low	High
Other fruits	Low	Low	Low	Low	Low	High	Low
Millet	Low	Moderate	Moderate	Low	Low	Moderate	Low
Unrefined grain prod	Low	Low	Moderate	Low	Low	Moderate	Low
Sorghum	Low	Moderate	Low	Low	Low	Low	Low
Roots/tubers/plantains	Low	Low	Low	Low	Low	Low	Low
Whole grains	Low	Low	Moderate	Low	Low	Low	Low
Nuts	Low	Low	Low	Low	Low	Low	Low
Refined grain products	Low	Low	Low	Low	Low	Low	Low
Refined grains	Low	Low	Moderate	Low	Low	Low	Low

Beal T & Ortenzi F. Priority micronutrient density in foods. Frontiers in Nutrition 2022

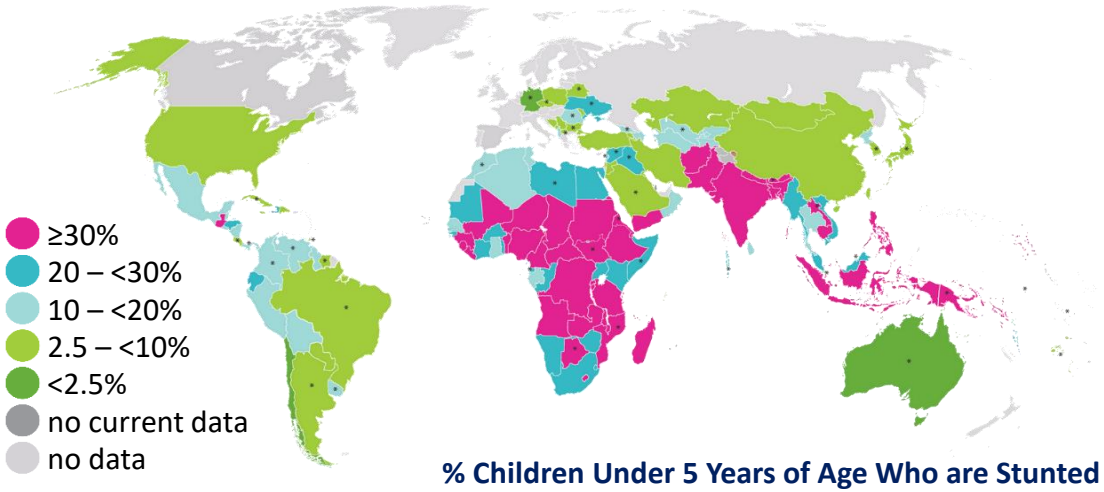
Average National Diets Low in Animal-source Foods Do Not Meet Needs for Essential Micronutrients



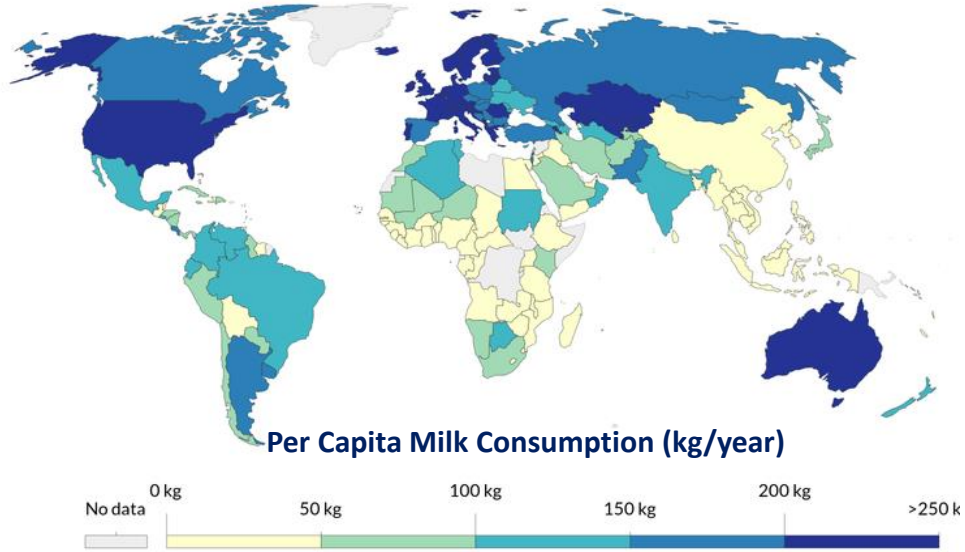
Nordhagen S, Beal T & Haddad L. The role of animal-source foods in healthy, sustainable, and equitable food systems. GAIN Discussion Paper 2020

Inverse Relationship between Childhood Stunting & Annual Meat, Milk & Seafood Consumption

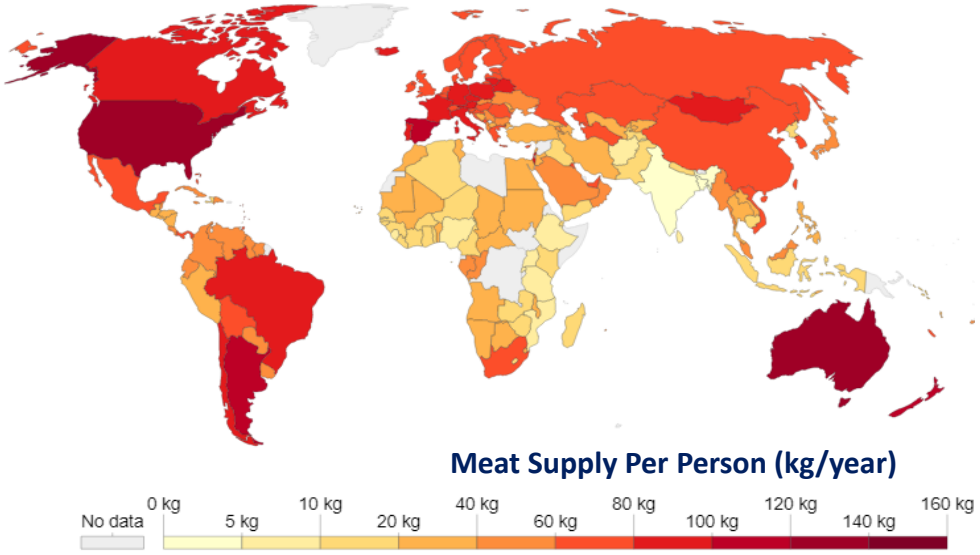
UNICEF, WHO, World Bank Joint Child Malnutrition dataset, March 2019 edition
UN Food and Agriculture Organization (FAO) 2017



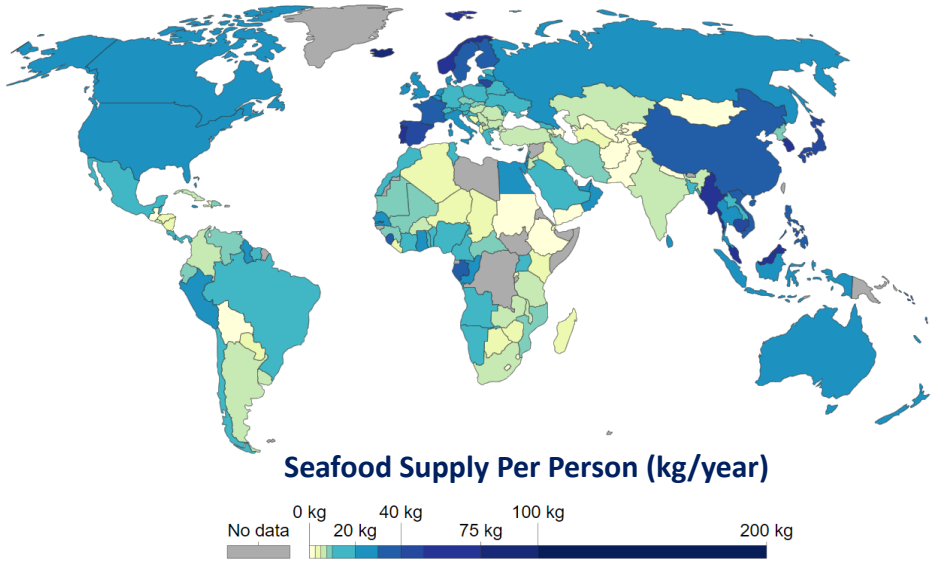
% Children Under 5 Years of Age Who are Stunted



Per Capita Milk Consumption (kg/year)



Meat Supply Per Person (kg/year)



Seafood Supply Per Person (kg/year)

Consumption of too little animal-source foods not optimal for longevity

International Journal of General Medicine

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Total Meat Intake is Associated with Life Expectancy: A Cross-Sectional Data Analysis of 175 Contemporary Populations

Wenpeng You[1,2], Renata Henneberg[1], Arthur Saniotis[1,3], Yanfei Ge[4,5], Maciej Henneberg[1,6]

24-Feb-2022

THE GERONTOLOGICAL SOCIETY OF AMERICA®

Journals of Gerontology: Medical Sciences
cite as: *J Gerontol A Biol Sci Med Sci*, 2022, Vol. XX, No. XX, 1–7
https://doi.org/10.1093/gerona/glab334
Advance Access publication November 27, 2021

OXFORD

Research Report

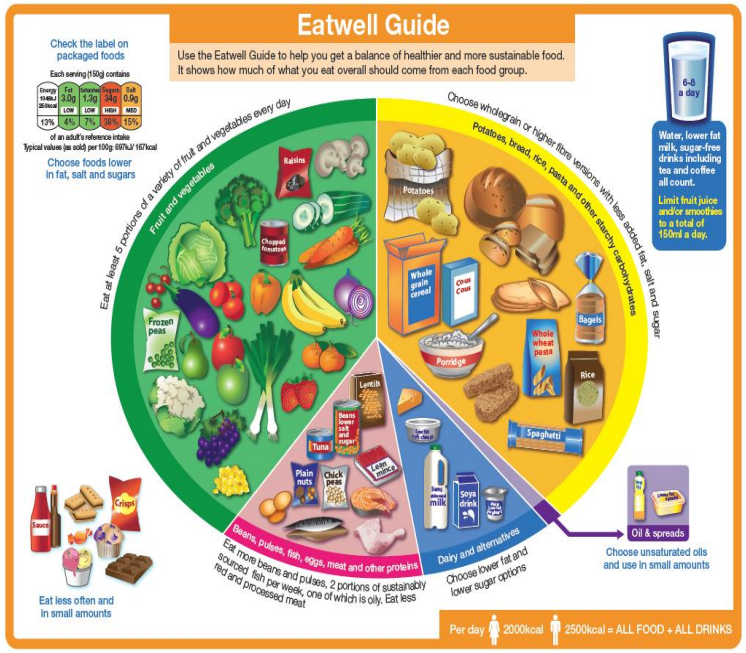
Animal Protein Intake Is Inversely Associated With Mortality in Older Adults: The InCHIANTI Study

Tomás Meroño, PhD,[1,2,•] Raúl Zamora-Ros, PhD,[1,3,*] Nicole Hidalgo-Liberona, PhD,[1,2,•] Montserrat Rabassa, PhD,[1] Stefania Bandinelli, MD,[4] Luigi Ferrucci, MD, PhD,[5,•] Massimiliano Fedecostante, MD,[6] Antonio Cherubini, MD, PhD,[6,†,•] and Cristina Andres-Lacueva, PhD[1,2,†]

Climate Change Poses Potentially Catastrophic Threats to Human Health

The EAT-Lancet Commission Reference Diet Recommended;

- Doubling Intakes of Fruits, Vegetables, Legumes, Nuts & Seeds,
- Halving Meat & Dairy Intakes



Willett W et al. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. Lancet January 2019.

BUT

- Predicted annual saving of 11 million NCD deaths
  - due to changed intakes of calories, salt, fruits, vegetables, whole grains & nuts,
  - not due to reduced red meat intake.
- Halving dairy would increase cancer and cardiovascular deaths
- Nutritional deficiencies caused by the halving of meat and dairy not considered
- Impact of ultra-processed nature of plant-based alternative foods not considered

Currently Available Plant-Based Meat & Dairy Alternatives are Ultra-Processed Foods, High in Added Sugars, Salt & Multiple Cosmetic Additives

Same Protein Content as Steak
but **5 times the Salt**

Jackfruit & Mushroom Products Typically Have
Even More Sugar & Salt, Multiple Additives, &
<20% of the Protein

Unsweetened Almond Milk
Twice the Salt
1/8 the Protein, & ¼ the Zinc

"The mimicking of animal foods using isolated plant proteins, fats, vitamins & minerals likely underestimates the true nutritional complexity of whole foods"

"Novel plant-based meat (and dairy) alternatives should arguably be treated as alternatives in terms of sensory experience, but not as true replacements in terms of nutrition"

Van Vliet S et al. Plant-Based Meats, Human Health & Climate Change. Frontiers in Sustainable Food Systems 2020.

Further Recent Publications Recommending Dramatic Reductions and/or Exclusion of Animal-Sourced Foods From the Human Diet

Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019

GBD 2019 Risk Factors Collaborators*

ARTICLES

https://doi.org/10.1038/s43016-021-00343-4

nature food

Check for updates

Small targeted dietary changes can yield substantial gains for human health and the environment

Katerina S. Stylianou[1]✉, Victor L. Fulgoni III[2] and Olivier Jolliet[1]✉

The 2020 report of The *Lancet* Countdown on health and climate change: responding to converging crises

Nick Watts, Markus Amann, Nigel Arnell, Sonja Ayeb-Karlsson, Jessica Beagley, Kristine Belesova, Maxwell Boykoff, Peter Byass, Wenjia Cai, Diarmid Campbell-Lendrum, Stuart Capstick, Jonathan Chambers, Samantha Coleman, Carole Dalin, Meaghan Daly, Niheer Dasandi, Shouro Dasgupta, Michael Davies, Claudia Di Napoli, Paula Dominguez-Salas, Paul Drummond, Robert Dubrow, Kristie L Ebi, Matthew Eckelman, Paul Ekins, Luis E Escobar, Lucien Georgeson, Su Golder, Delia Grace, Hilary Graham, Paul Haggar, Ian Hamilton, Stella Hartinger, Jeremy Hess, Shih-Che Hsu, Nick Hughes, Slava Jankin Mikhaylov, Marcia P Jimenez, Ilan Kelman, Harry Kennard, Gregor Kiesewetter, Patrick L Kinney, Tord Kjellstrom, Dominic Kniveton, Pete Lampard, Bruno Lemke, Yang Liu, Zhao Liu, Melissa Lott, Rachel Lowe, Jaime Martinez-Urtaza, Mark Maslin, Lucy McAllister, Alice McGushin, Celia McMichael, James Milner, Maziar Moradi-Lakeh, Karyn Morrissey, Simon Munzert, Kris A Murray, Tara Neville, Maria Nilsson, Maquins Odhiambo Sewe, Tadj Oreszczyn, Matthias Otto, Fereidoon Owfi, Olivia Pearman, David Pencheon, Ruth Quinn, Mahnaz Rabbaniha, Elizabeth Robinson, Joacim Rocklöv, Marina Romanello, Jan C Semenza, Jodi Sherman, Liuhua Shi, Marco Springmann, Meisam Tabatabaei, Jonathon Taylor, Joaquin Triñanes, Joy Shumake-Guillemot, Bryan Vu, Paul Wilkinson, Matthew Winning, Peng Gong, Hugh Montgomery*, Anthony Costello**

Global, regional, and national burden of stroke and its risk factors, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019

Lancet Neurol 2021; 20: 795–820

GBD 2019 Stroke Collaborators*

PLOS MEDICINE

RESEARCH ARTICLE

Estimating impact of food choices on life expectancy: A modeling study

Lars T. Fadnes[1,2]*, Jan-Magnus Økland[1,3], Øystein A. Haaland[1,3☯], Kjell Arne Johansson[1,2,3☯]

1 Department of Global Public Health and Primary Care, University of Bergen, Norway, 2 Bergen Addiction Research, Department of Addiction Medicine, Haukeland University Hospital, Bergen, Norway, 3 Bergen Center for Ethics and Priority Setting, University of Bergen, Norway

BMJ Global Health

Global red and processed meat trade and non-communicable diseases

Min Gon Chung[1,2] Yingjie Li[1,3] Jianguo Liu[1]

Further Recent P… …Recommending Dramatic Reductions and/or Exc… …d Foods From the Human Diet

Each single serving of Frankfurter sandwich results in 35 minutes of life lost

Global burden of 87 risk factors in 2… territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019

GBD 2019 Risk Factors Collaborators*

oa OPEN ACCESS

ARTICLES

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Changing from a typical Western diet to a diet which totally excludes these foods increases life expectancy by 3 years for women and by 4 years for men.

…795–820

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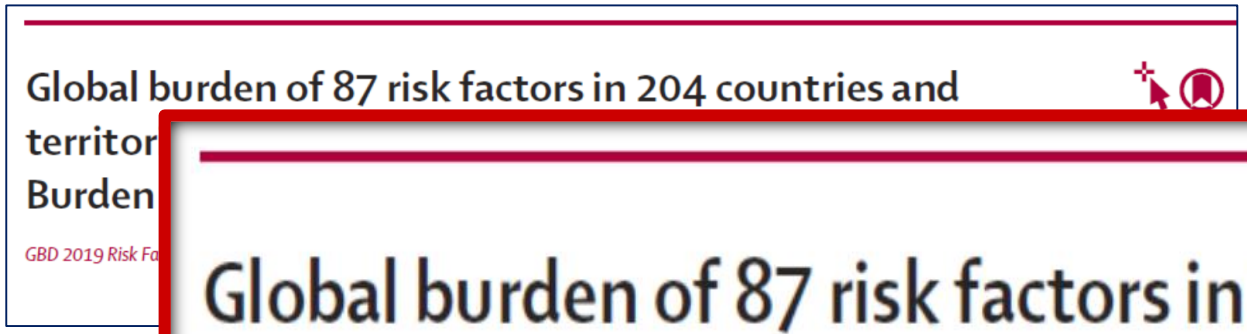
…heat trade …ommunicable diseases

Min Gon Chung[1,2] Yingjie Li[1,3] Jianguo Liu[1]

Further Recent Publications Recommending Dramatic Reductions and/or Exclusion of Animal-Sourced Foods From the Human Diet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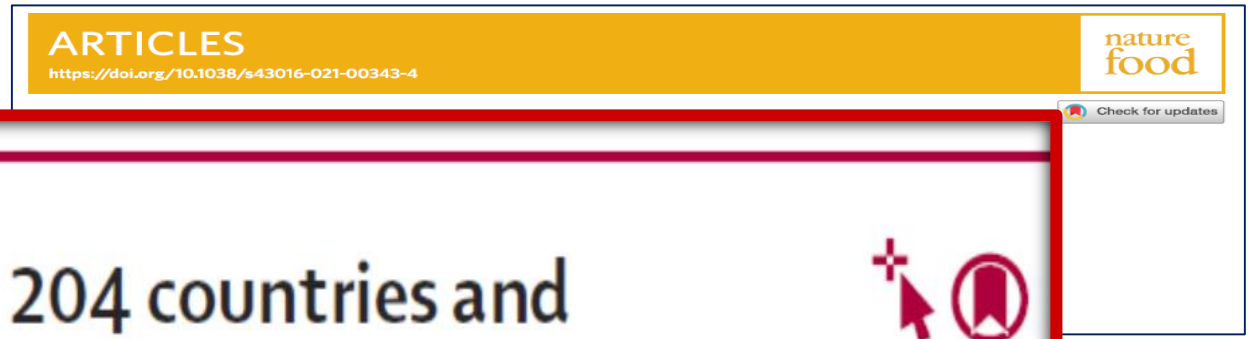
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nature food
Check for updates

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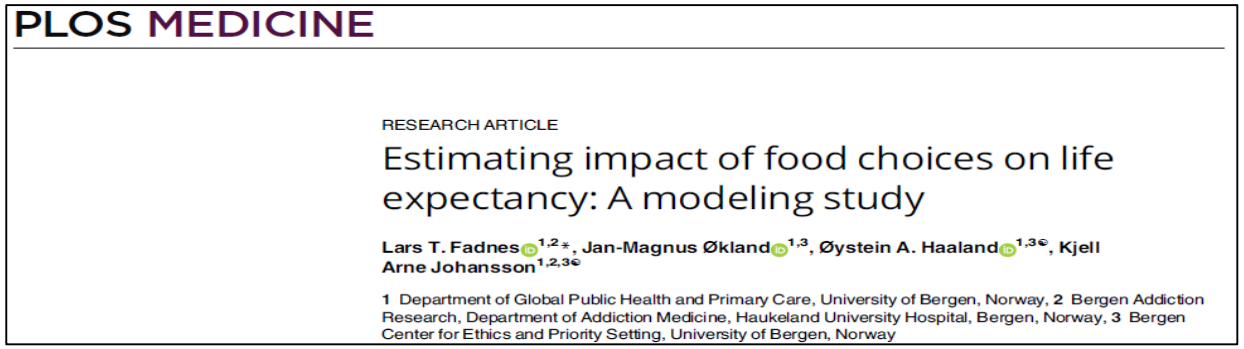
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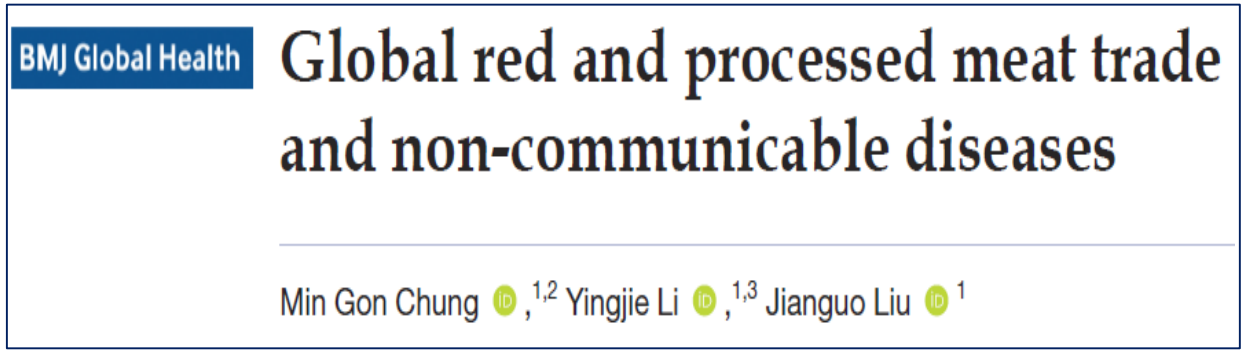
BMJ Global Health
Global red and processed meat trade and non-communicable diseases
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Global Burden of Disease (GBD) Data and Analyses are Quoted and Influence Policies of;

- **Food and Agriculture Organization** of the **United Nations**
- **World Health Organization**.
- **European Commission** - Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system.
- The **National Food Strategy** (England, but collaboration with Scotland, Wales & N. Ireland).
- Willett W et al. Food in the Anthropocene: the **EAT–Lancet Commission** on healthy diets from sustainable food systems. Lancet January 2019.

GBD studies are led by the Institute for
Health Metrics and Evaluation, University of Washington, Seattle,
who recently described the GBD studies as

“THE DE-FACTO SOURCE FOR GLOBAL HEALTH ACCOUNTING”.

Dietary Risks and Deaths

GBD 2017 Analysis *Versus* *GBD* 2019 Analysis

Christopher JL Murray & GBD 2017 Diet Collaborators. Lancet 2019I
Institute for Health Metrics and Evaluation (2018) GBD Compare. Seattle, WA: IHME, University of Washington. http://vizhub.healthdata.org/gbd-compare.

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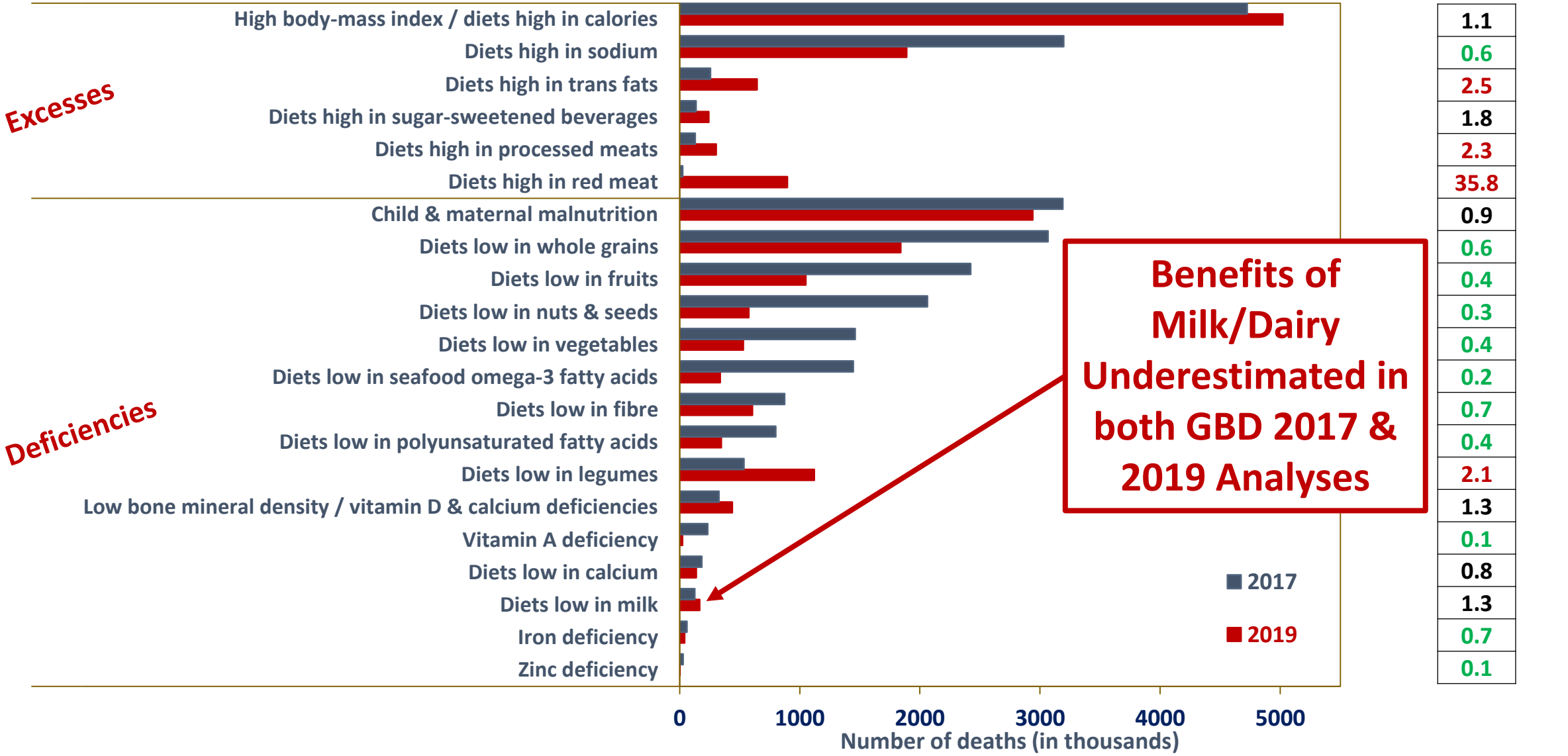
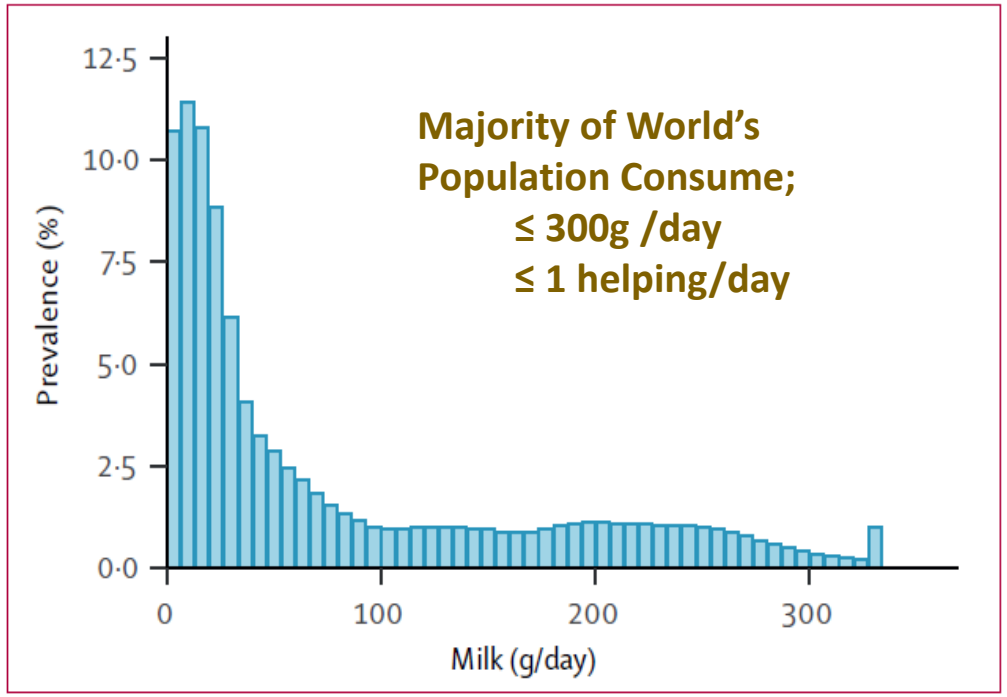
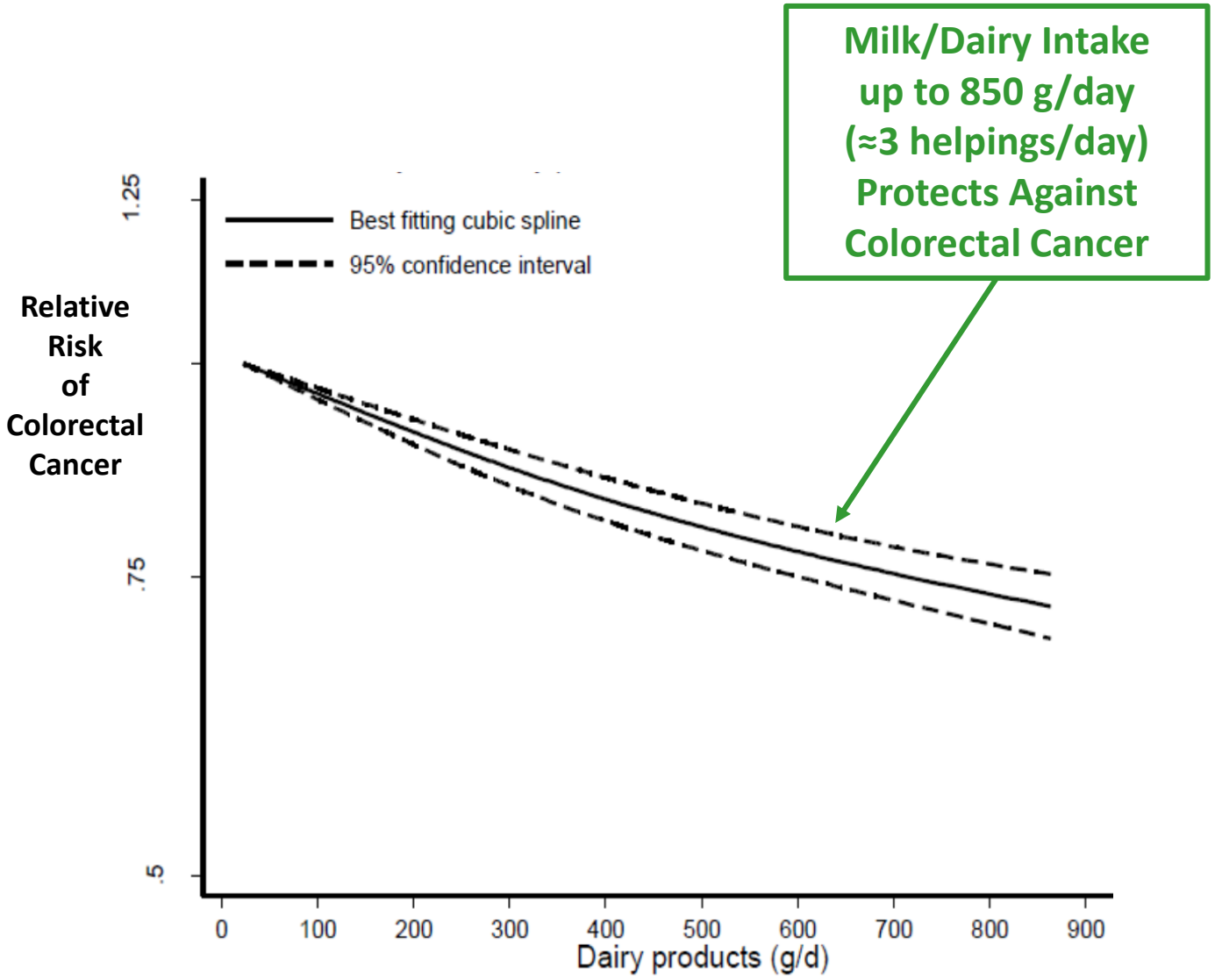


Milk & Dairy Consumption & Relationship with Colorectal Cancer

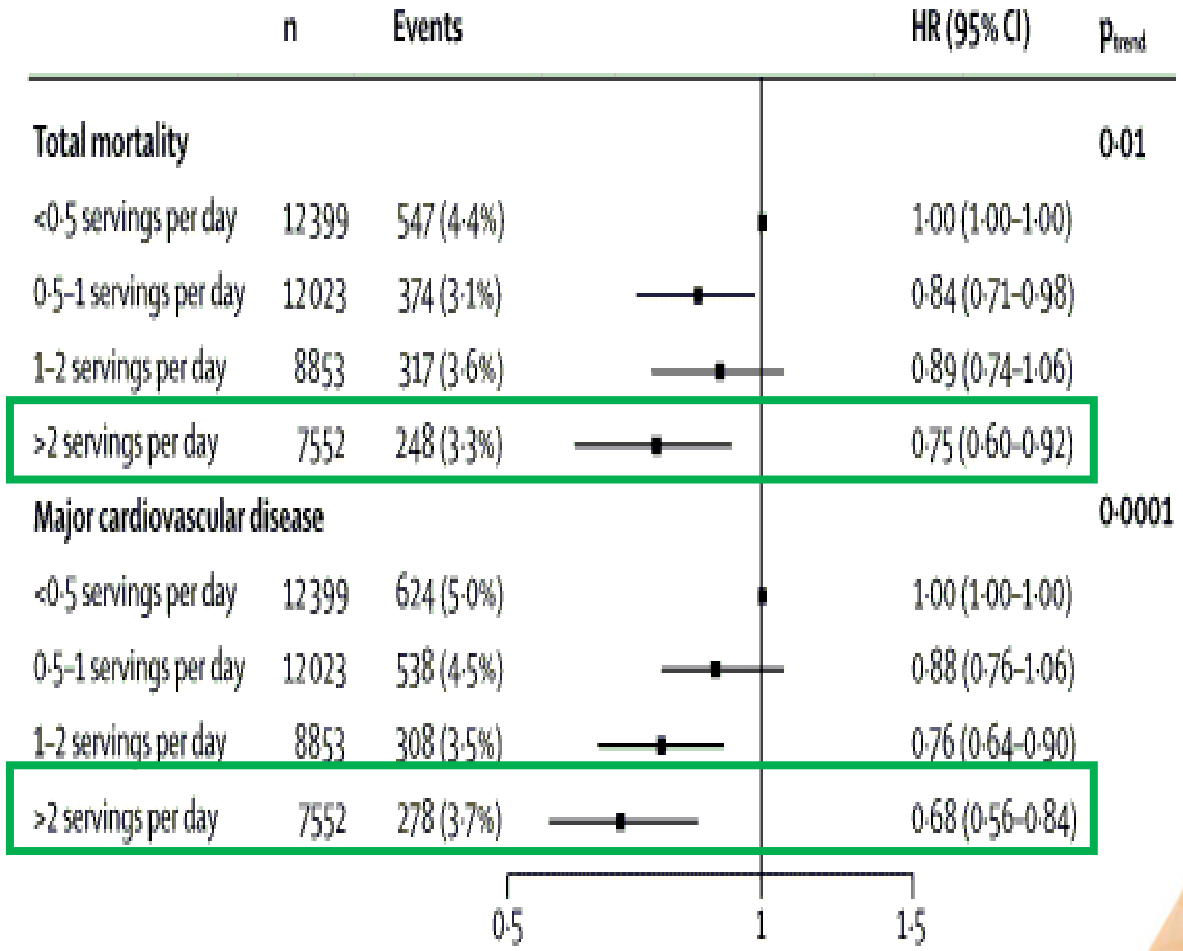


GBD 2019 Estimation of Milk Consumption



World Cancer Research Fund/ American Institute for Cancer Research. Diet, Nutrition, Physical Activity & Cancer: a Global Perspective. Continuous Update Project Expert Report 2018.

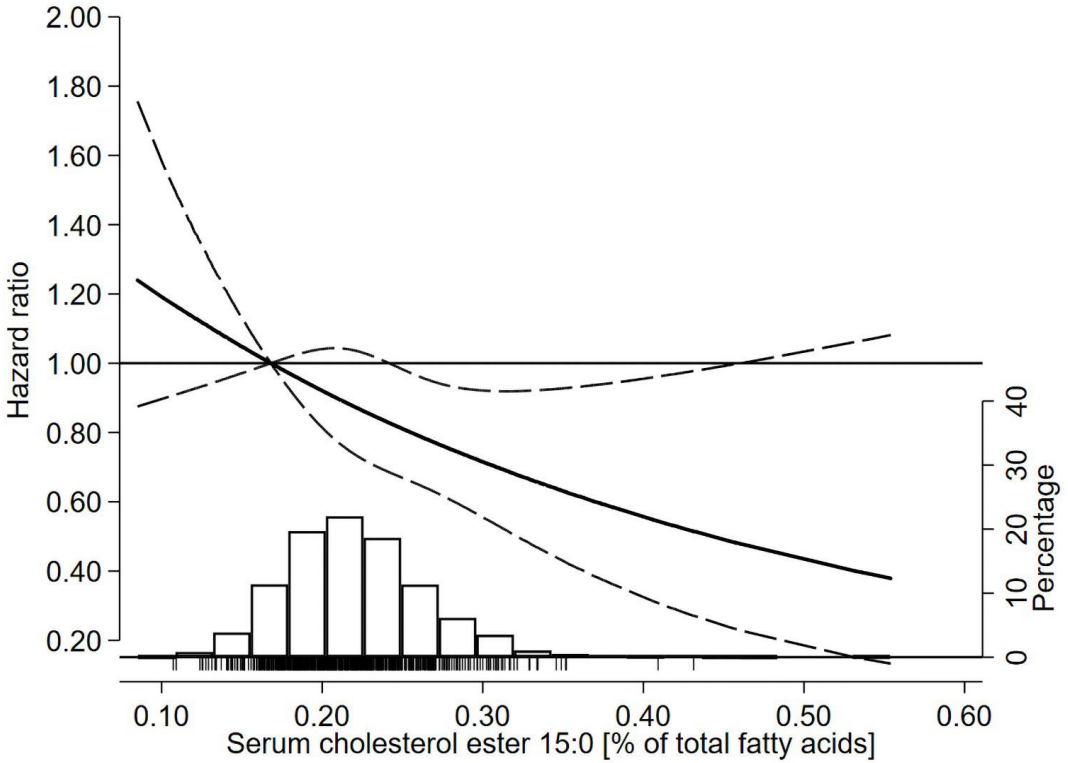
At Least 2 Full-Fat Dairy Servings/Day 32% Less Cardiovascular Events & 25% Less Mortality



Dehghan M et al. Association of dairy intake with cardiovascular disease and mortality in 21 countries from five continents (PURE): a prospective cohort study. Lancet 2018

CVD Risk Lowest with Highest Levels of Serum Pentadecanoic Acid

(Biomarker of Dairy Fat Intake)



Trieu K et al. Biomarkers of dairy fat intake, incident cardiovascular disease, and all cause mortality: A cohort study, systematic review, and meta-analysis. PLoS Med 2021; 18(9): e1003763.

Dietary Risks and Deaths

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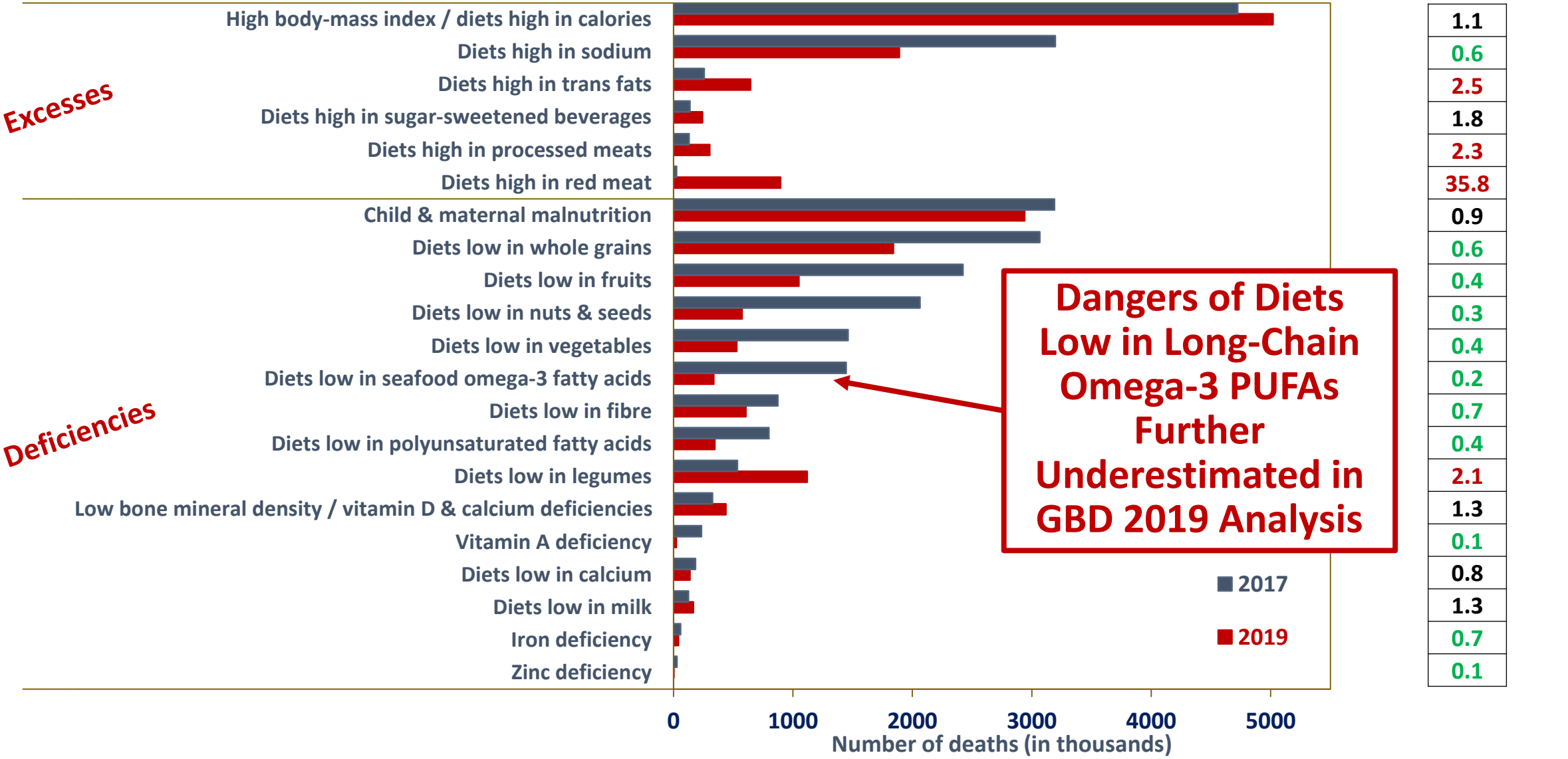
Institute for Health Metrics and Evaluation (2018) GBD Compare. Seattle, WA: IHME, University of Washington. http://vizhub.healthdata.org/gbd-compare.

Christopher JL Murray et al. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019 Lancet 2020



2019/2017 Ratio of deaths
1.1
0.6
2.5
1.8
2.3
35.8
0.9
0.6
0.4
0.3
0.4
0.2
0.7
0.4
2.1
1.3
0.1
0.8
1.3
0.7
0.1

Consumption of Long-chain Omega-3-Polyunsaturated Fatty Acids (EPA & DHA) Associated with Improved Human Health

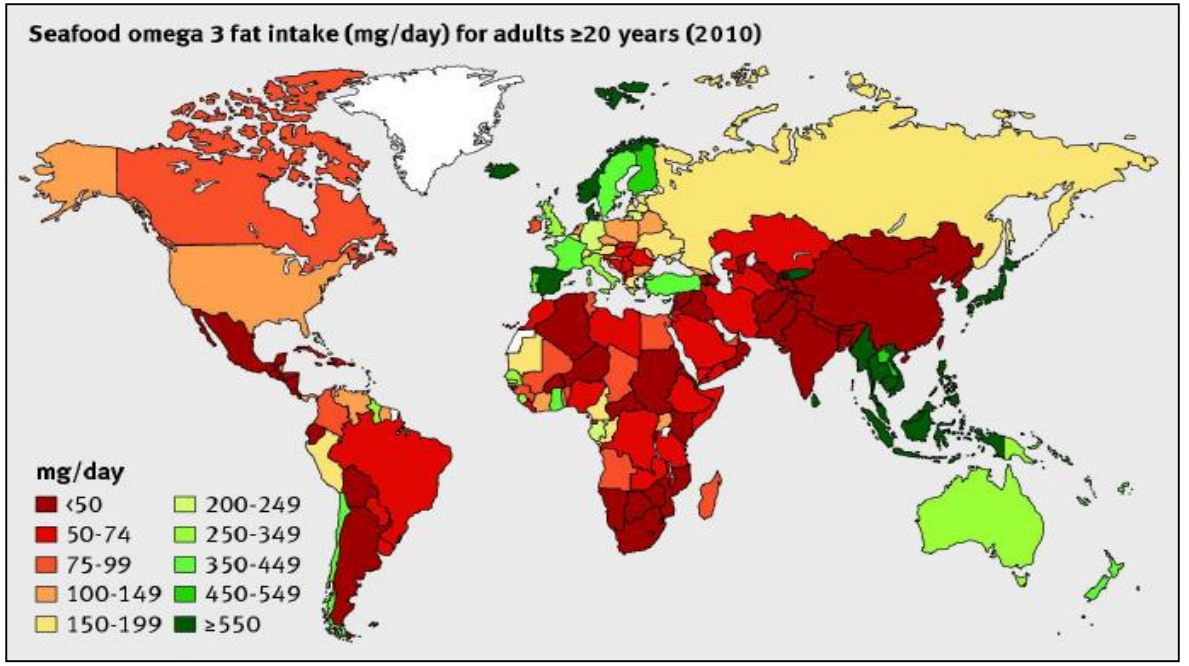
During Infancy & Childhood, Omega-3-PUFAs are Important for;

- Brain development & cognitive function
- Vision
- Muscle & joint health

In Later Life They Protect Against

- Alzheimer's disease
- Depression &
- Psychosis
- Heart attacks
- Strokes
- Cancer

Only 20% of world's populations consume the recommended intake of EPA + DHA (≥ 250 mg/day)



Reasons for this world-wide deficiency

- Insufficient global wild fish stocks.
- Levels of omega-3-PUFAs in farmed salmon & trout have more than halved over the past 20 years.
- Many (particularly children) do not like oily fish.

Dietary Risks and Deaths

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Institute for Health Metrics and Evaluation (2018) GBD Compare. Seattle, WA: IHME, University of Washington. http://vizhub.healthdata.org/gbd-compare.

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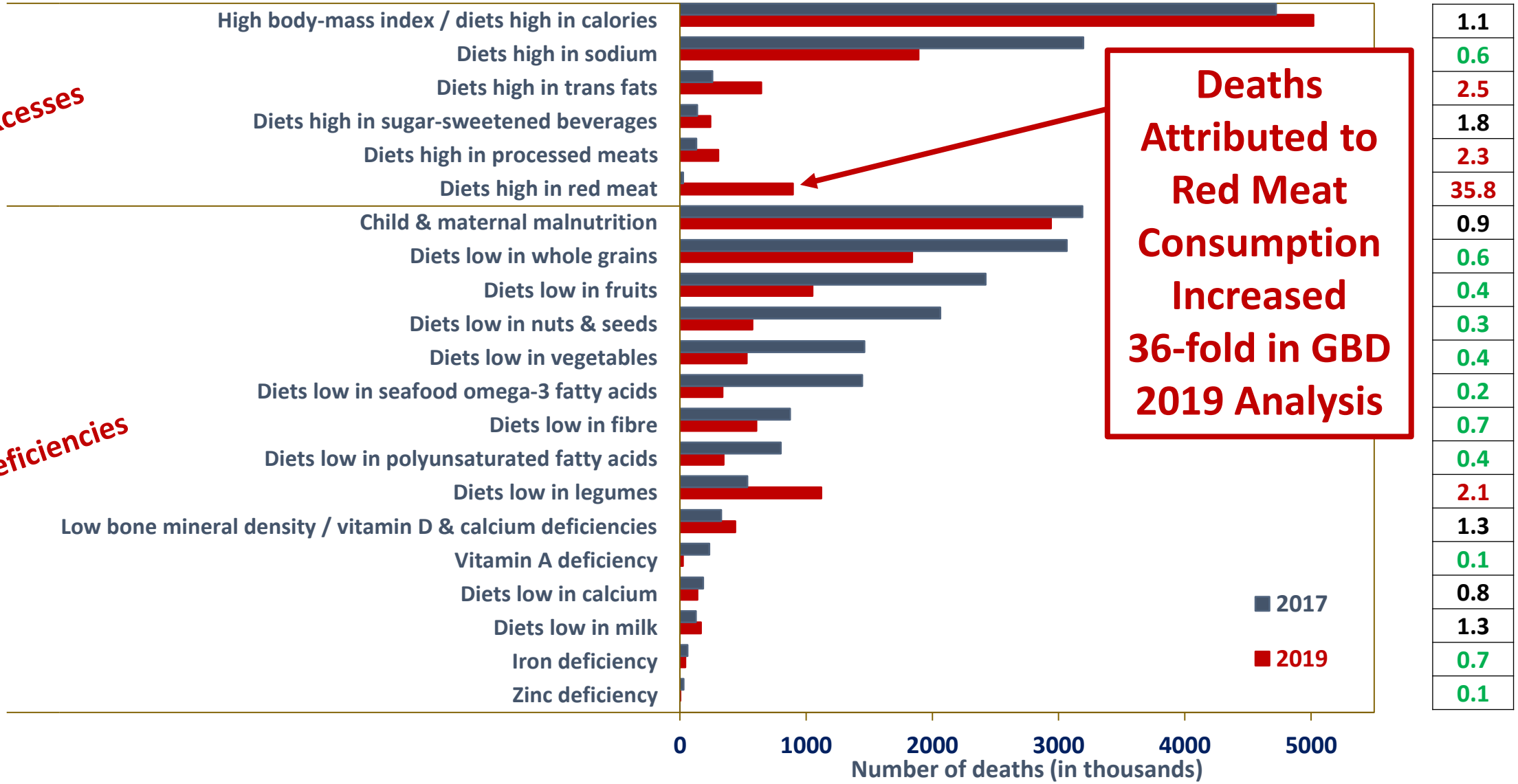
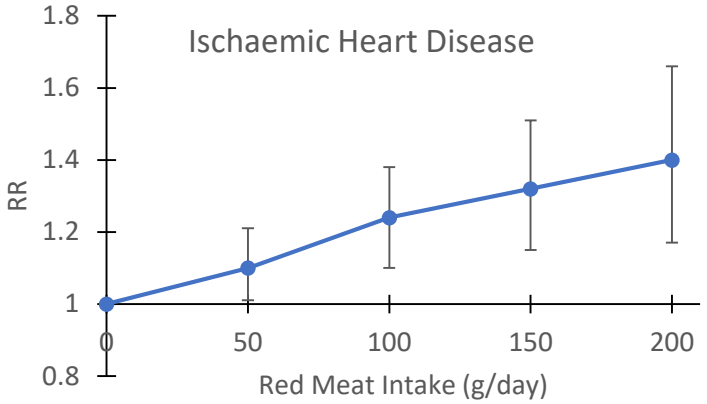
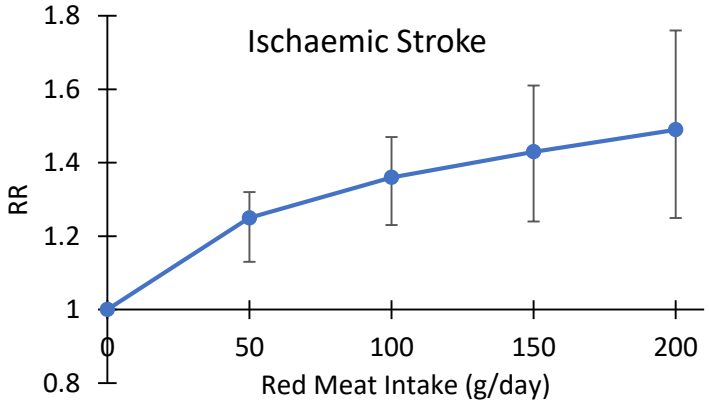


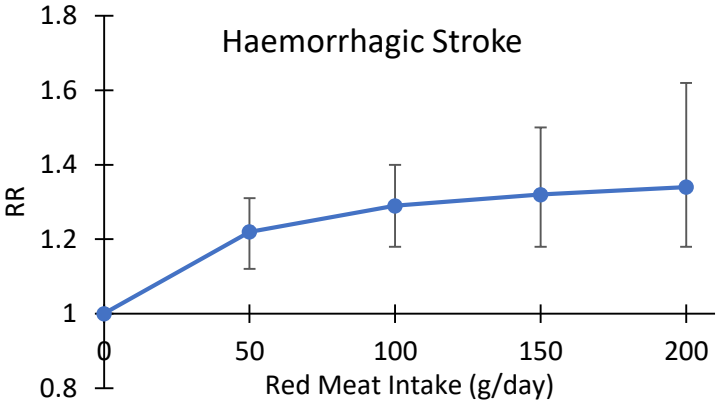
Global Burden of Disease Study 2019

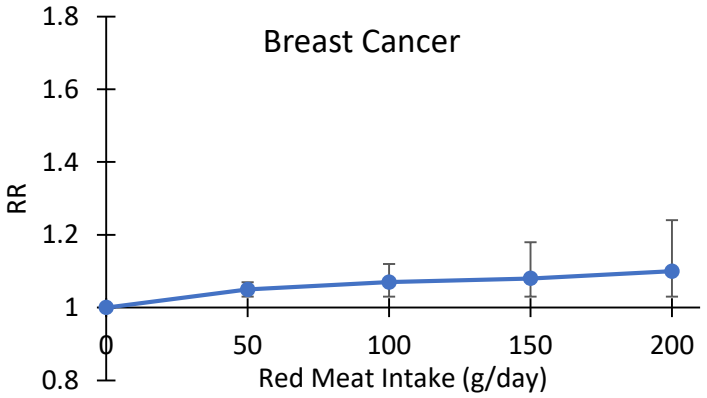
New systematic reviews and meta-regressions

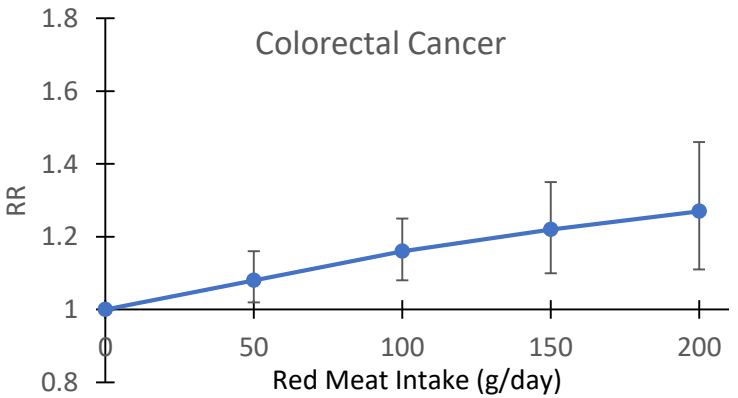
"Sufficient evidence supporting the causal relationship of red meat intake with ischaemic heart disease, breast cancer, ischaemic and haemorrhagic stroke, and added these outcomes to previously found relationships with diabetes mellitus and colon cancer."

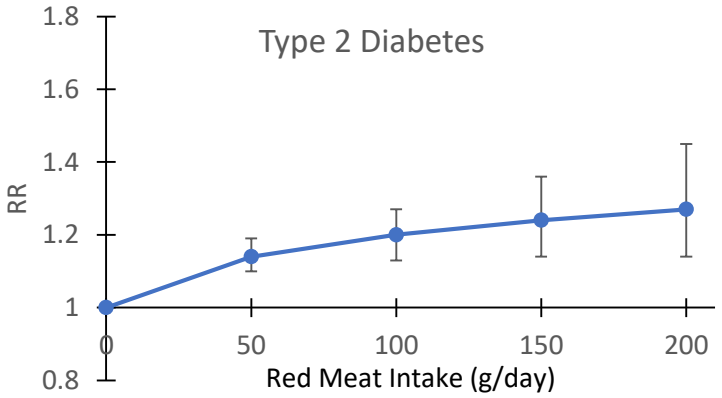










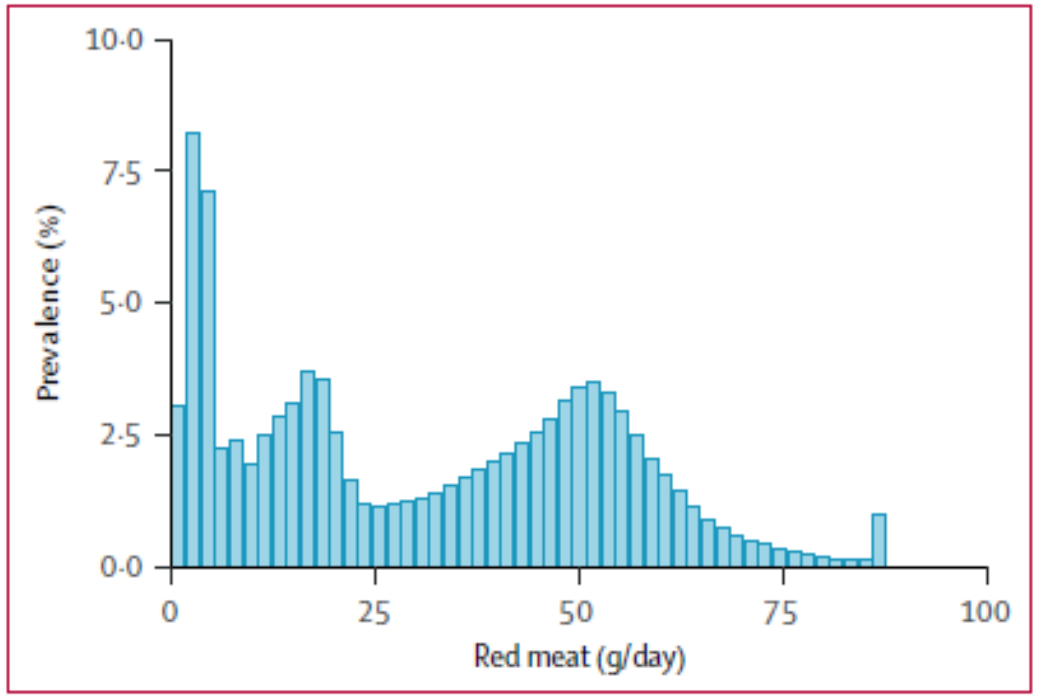


Global Burden of Disease Study 2019

More empirical standardised methods for selecting the theoretical minimum risk exposure level (TMREL)

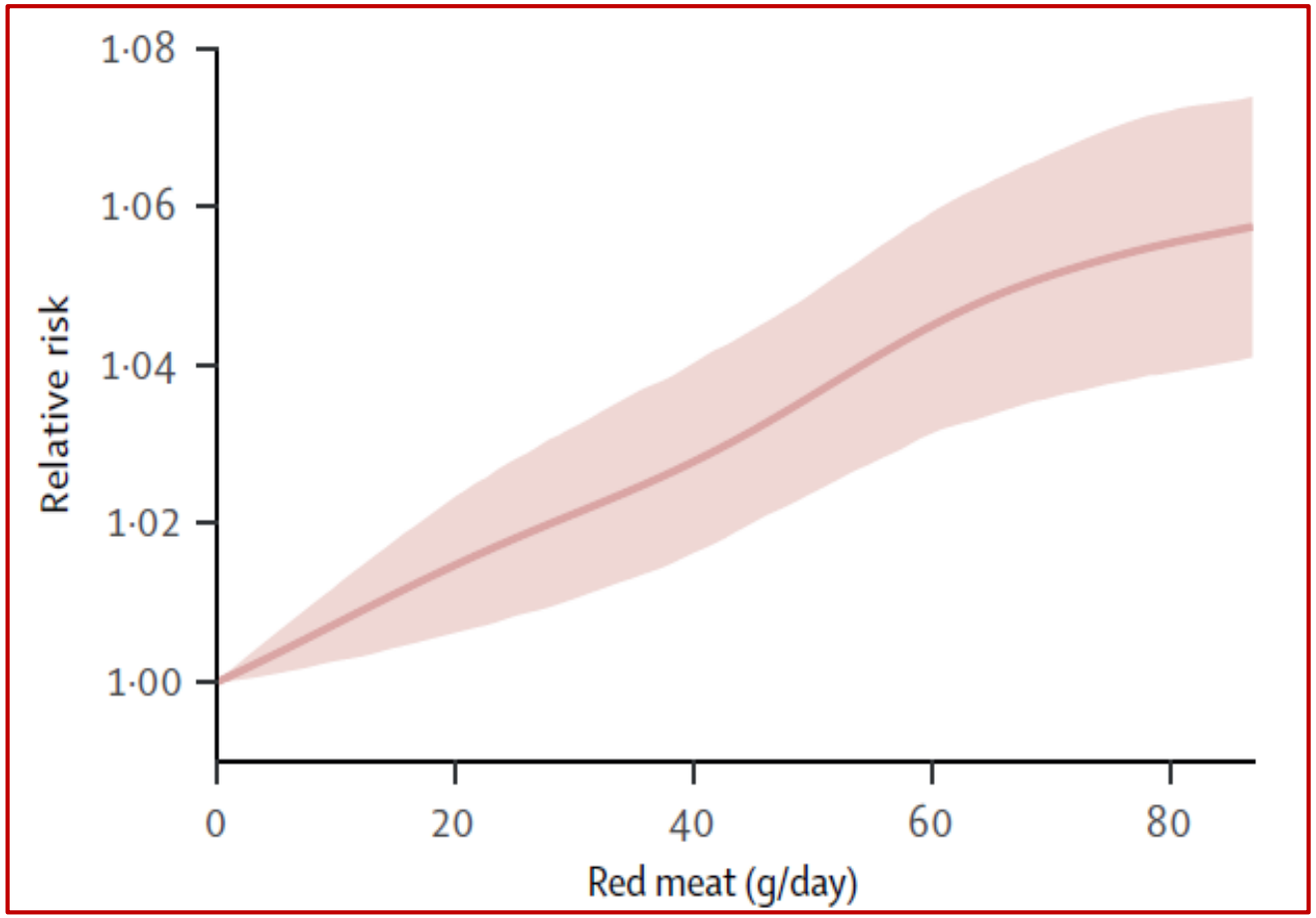
"Red meat TMREL changed from 22·5g/day to 0 g/day."

Estimation of Red Meat Consumption



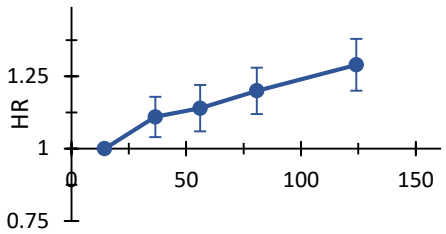
Huge Majority of World's Population Consume;
≤ 75g /day
≤ 500 g / week or
≤ 4 portions/week

Red Meat Consumption & All-Cause Mortality Risk

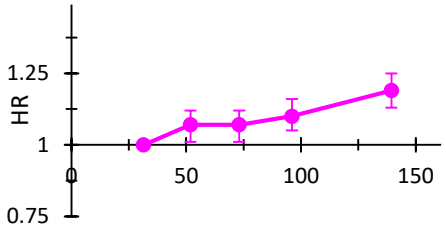


Relative Risk for All-Cause Mortality from Large Published Cohort Studies

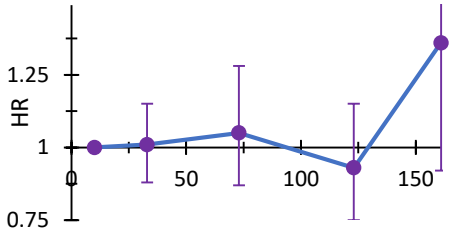
Health Professional Follow-up Study (HPHS)
8,926 male deaths
Pan A et al. Arch Intern Med 2012.



Nurses' Health Study (NHS)
15,000 female deaths
Pan A et al. Arch Intern Med 2012.

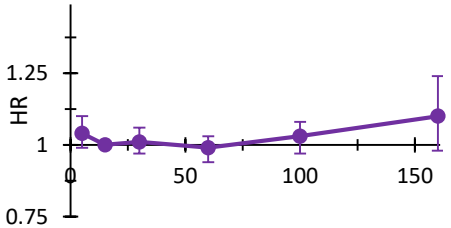


National Health and Nutrition Examination Survey III. NHANES III
3683 male and female deaths
Kappeler R et al. Eur J Clin Nutr 2013.

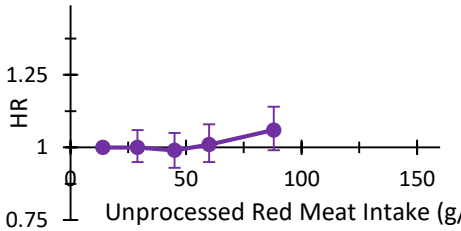


North American Studies

European Prospective Investigation into Cancer & Nutrition (EPIC)
26,344 male and female deaths
Rohrmann S et al. BMC Medicine 2013.

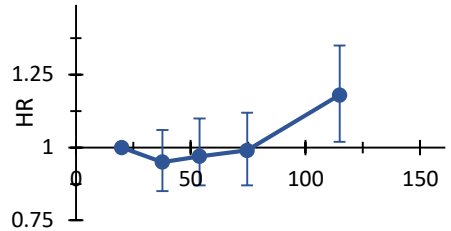


Cohort of Swedish Men (COSM) & Swedish Mammography Cohort (SMC)
17,909 male and female deaths
Bellavia A et al. Am J Clin Nutr 2016.

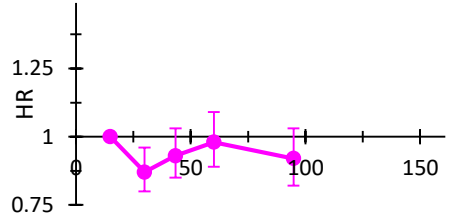


European Studies

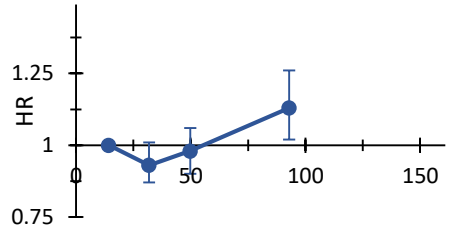
Shanghai Men's Health Study (SMHS)
2,733 male deaths
Takata Y et al. PLoS ONE 2013.



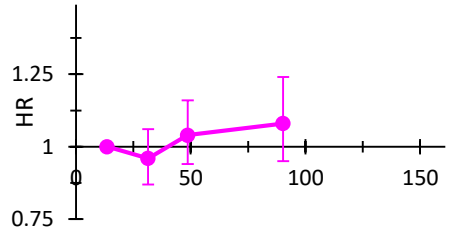
Shanghai Women's Health Study (SWHS)
4,210 female deaths
Takata Y et al. PLoS ONE 2013.



Japan Public Health Center-based Prospective Study (JPHC)
6,266 male deaths
Saito E et al. PLoS ONE 2020.

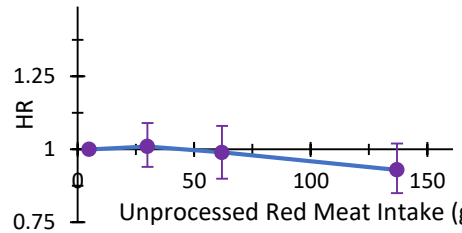


Japan Public Health Center-based Prospective Study (JPHC)
3,620 female deaths
Saito E et al. PLoS ONE 2020.



Asian Studies

Prospective Urban Rural Epidemiology Study (PURE)
7,789 deaths
Iqbal R et al. Am J Clin Nutr 2021.



Global Study

THE LANCET

CORRESPONDENCE | VOLUME 399, ISSUE 10332, E23-E26, APRIL 02, 2022

36-fold higher estimate of deaths attributable to red meat intake in GBD 2019: is this reliable?

Alice V Stanton, Frédéric Leroy, Christopher Elliott, Neil Mann, Patrick Wall, Stefaan De Smet

Published: February 25, 2022DOI:https://doi.org/10.1016/S0140-6736(22)00311-7

Key Questions

- **Where are the peer-reviewed publications of their updated or new systematic reviews**, which;
  - Address the 27 item PRISMA Statement and the 20 item GATHER Statement checklists?
  - Provide the evidence for the changing of the red meat TMREL from 22.5g/day to 0g/day?
- Have the **additional deaths and illnesses, from iron deficiency anaemia, elderly fragility, child and maternal malnutrition,** that would result from imposition of a red meat TMREL of zero been included in the GBD 2019 estimates?

THE LANCET

CORRESPONDENCE | VOLUME 399, ISSUE 10332, E27-E28, APRIL 02, 2022

36-fold higher estimate of deaths attributable to red meat intake in GBD 2019: is this reliable? – Author's reply

Christopher J L Murray on behalf of the GBD Risk Factors Collaborators

Published: March 21, 2022DOI:https://doi.org/10.1016/S0140-6736(22)00518-9

Admission of Errors

- **"Clear protective relationship between red meat intake and haemorrhagic stroke"**
- ***"No evidence supporting a relationship between red meat consumption & sub-arachnoid haemorrhage."***
- **"The strength of evidence regarding the relationship between red meat and various outcomes - including ischaemic heart disease - is relatively weak."**
- ***"Setting of the red meat TMREL to zero in the GBD 2019 analysis is not correct."***
- **"Estimates of attributable deaths for red meat will be reduced in all future GBD analyses."**

Immediate correction of all errors of fact is mandatory according to Lancet's guidelines, Committee on Publication Ethics (COPE) & International Committee of Medical Journal Editors (ICMJE).

Key Questions Unanswered

- **GBD Collaborators unable/unwilling to provide peer-reviewed published evidence to substantiate their new systematic reviews - *Professor Murray has since confirmed that GBD 2019 is not PRISMA compliant.***
- **GBD Collaborators do not intend to include the totality of nutritional effects of red meat in their analyses**

THE LANCET

CORRESPONDENCE| VOLUME 400, ISSUE 10350, P427-428, AUGUST 06, 2022

Troubling assumptions behind GBD 2019 on the health risks of red meat

Vanessa L Z Gordon-Dseagu, Martin J Wiseman, Kate Allen, Judy Buttriss, Christine Williams

Published: August 06, 2022 DOI:https://doi.org/10.1016/S0140-6736(22)01283-1

Key Comments

"We support Stanton and colleagues' call for **further clarification, justification, or reconsideration of the theoretical minimum risk exposure level of zero for unprocessed red meat** selected by GBD in their latest estimates."

"The **increase in the estimated burden appears implausible**, and the **lack of transparency undermines the authority** of the GBD estimates."

"**Neither WCRF nor other international organisations recommend complete avoidance of meat**"

"The absence of an explicit rationale for the assumptions is **troublesome**, **unsupported by the evidence**, and **unrealistic**.

Academy of Nutrition Sciences Blog: www.academynutritionsciences.org.uk/news/data-transparency-is-critically-important-the-academy-joins-forces-with-the-world-cancer-research-fund

World Cancer Research Fund Blog: https://www.wcrf.org/how-do-we-know-what-cancer-prevention-information-to-trust/

Considerable Media & Scientific Interest

Irish Farmers Journal

Leading scientists challenge findings that red meat is harmful

Farming Independent

Scientists challenge data linking red meat to health risks

THE GROCER MEAT

Growing concerns over widely-used Global Burden of Disease meat data

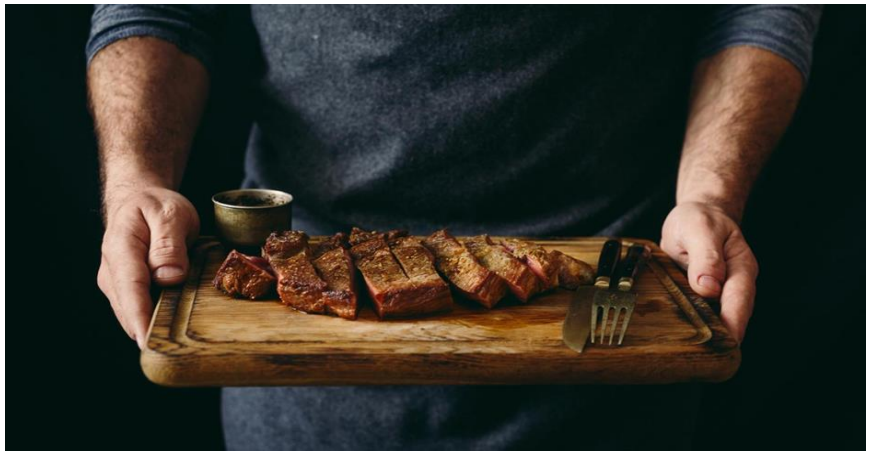
By Kevin White 4 March 2022

agriland.ie

IFA contacts international bodies on red meat data concerns

The Sunday Times

Valerie Flynn August 28th 2022



'Serious errors' in research linking deaths to red meat'

Scientists claim a study ignored nutritional benefits and have called on The Lancet to correct or retract the findings

The **World Cancer Research Fund** and the **Academy of Nutrition Sciences** have expressed their support for RCSI, UCD and QUB scientists who uncovered the serious errors in the Global Burden of Disease (GBD) study.

SOCIAL MEDIA	1,782
• Tweets	1,235
• Facebook	547

Gordon H. Guyatt

@GuyattGH

Latest estimates of deaths from #redmeat by Global Burden Disease Study 36 times greater than 2017. Red meat may not kill at all, but something seriously wrong in estimate.

Calls for evidence remain unanswered even in latest author's response – big problem

nature medicine

ARTICLES

https://doi.org/10.1038/s41591-022-01968-z

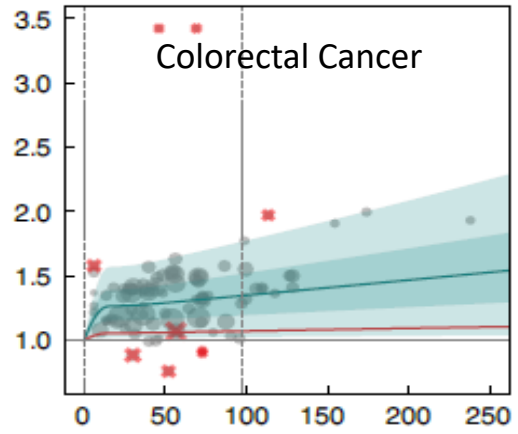
Check for updates

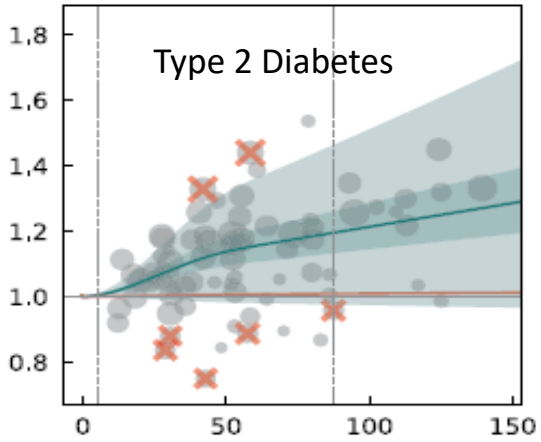
OPEN

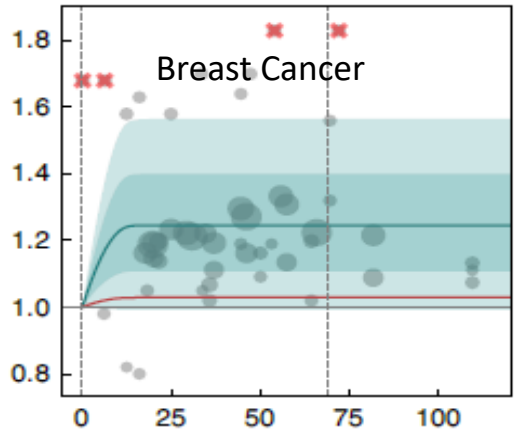
Health effects associated with consumption of unprocessed red meat: a Burden of Proof study

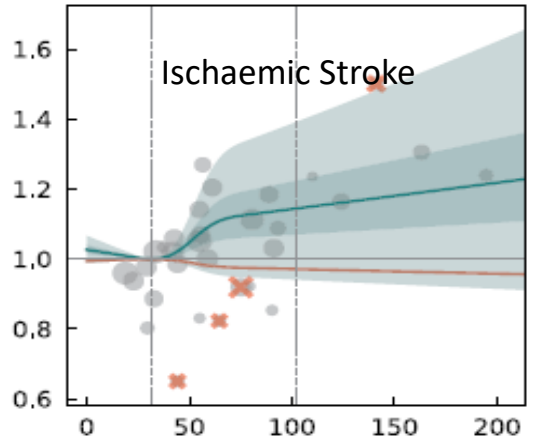
Haley Lescinsky[1], Ashkan Afshin[1,2], Charlie Ashbaugh[1], Catherine Bisignano[1], Michael Brauer[1,2,3], Giannina Ferrara[1], Simon I. Hay[1,2], Jiawei He[1,2], Vincent Iannucci[1], Laurie B. Marczak[1], Susan A. McLaughlin[1], Erin C. Mullany[1], Marie C. Parent[1], Audrey L. Serfes[1], Reed J. D. Sorensen[1], Aleksandr Y. Aravkin[1,2,4], Peng Zheng[1,2] and Christopher J. L. Murray[1,2]

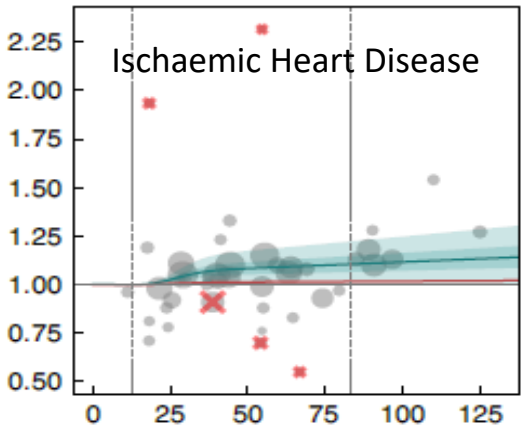
- Weak evidence of association between unprocessed red meat consumption and colorectal cancer, breast cancer, type 2 diabetes and ischaemic heart disease.
- No evidence of an association between unprocessed red meat and ischaemic stroke or haemorrhagic stroke.
- 95% uncertainty interval for minimum risk is very wide: from 0–200 g/day.
- Evidence that eating unprocessed red meat is associated with increased risk of disease is weak - insufficient to make stronger or more conclusive recommendations.
- More rigorous, well-powered research is needed to better understand and quantify the relationship between consumption of unprocessed red meat and chronic disease.

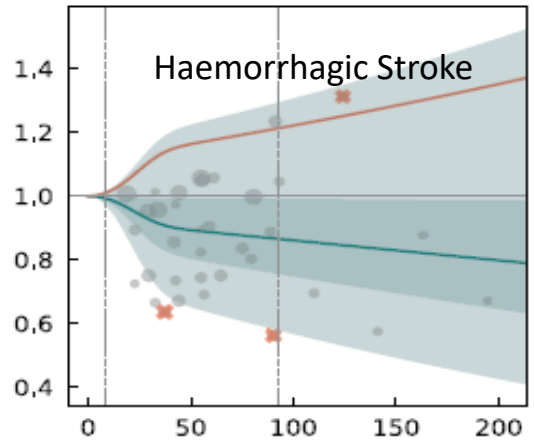












nature medicine

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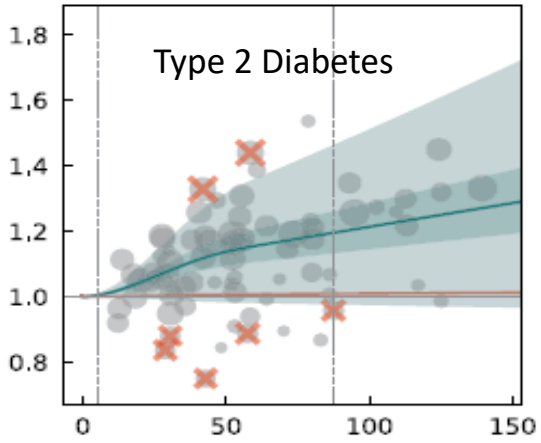
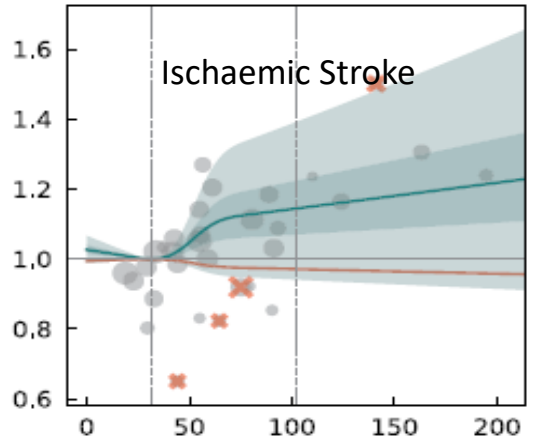
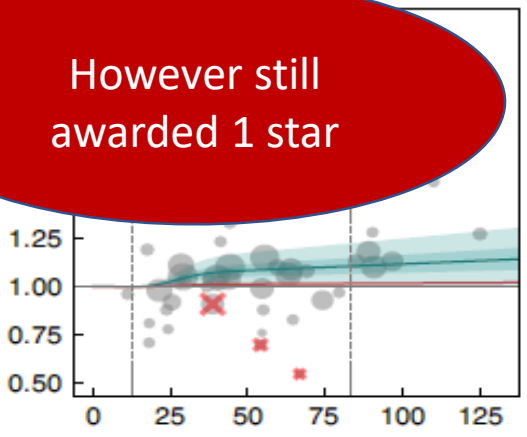
- More rigorous, well-powered research is needed to better understand and quantify the relationship between consumption of unprocessed red meat and chronic disease.

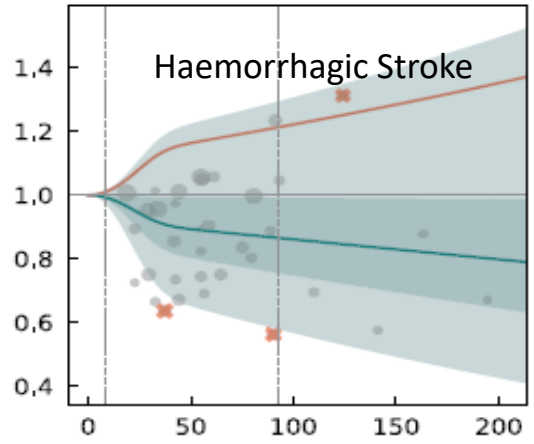
Relationship with breast cancer , type 2 diabetes, and ischaemic heart disease not statistically significant but still awarded 2 stars





However still awarded 1 star





nature medicine

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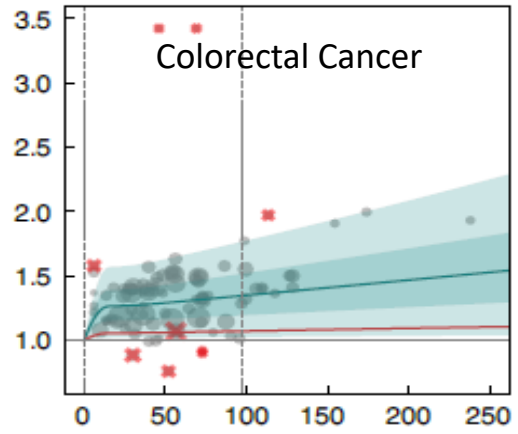
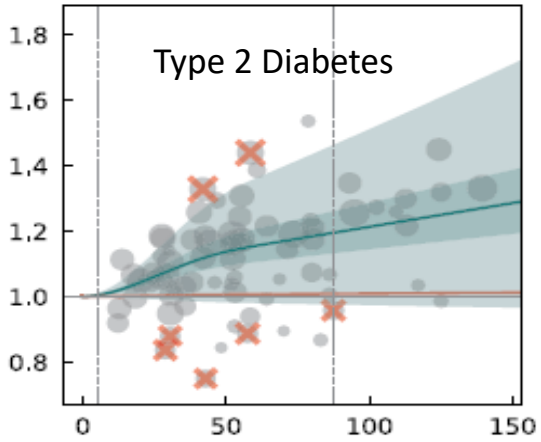
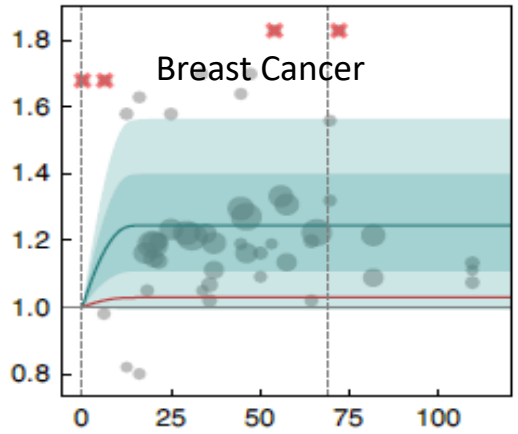
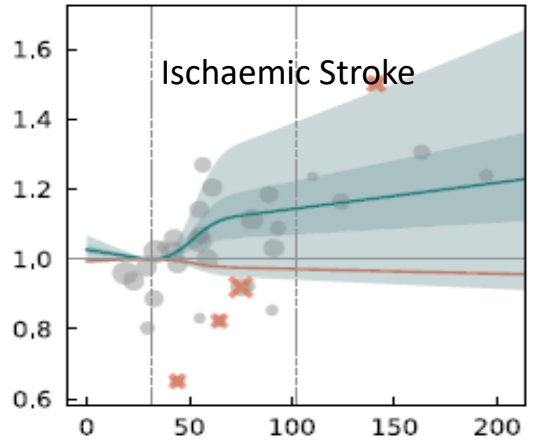
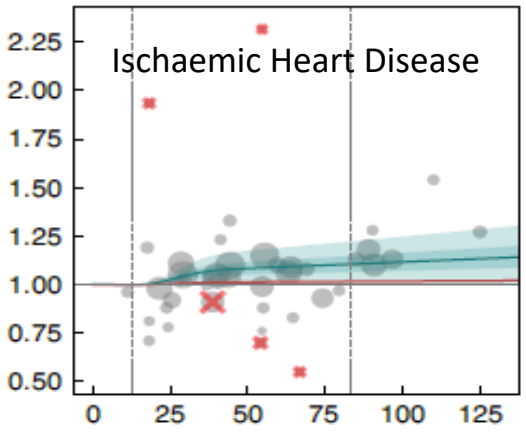
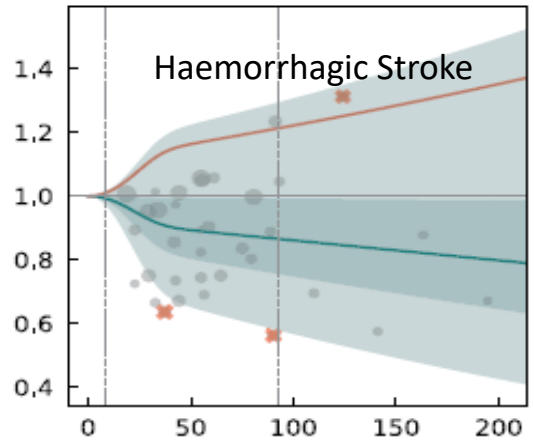












The Journal of Nutrition
Nutritional Epidemiology

Biomarker-Calibrated Red and Combined Red and Processed Meat Intakes with Chronic Disease Risk in a Cohort of Postmenopausal Women

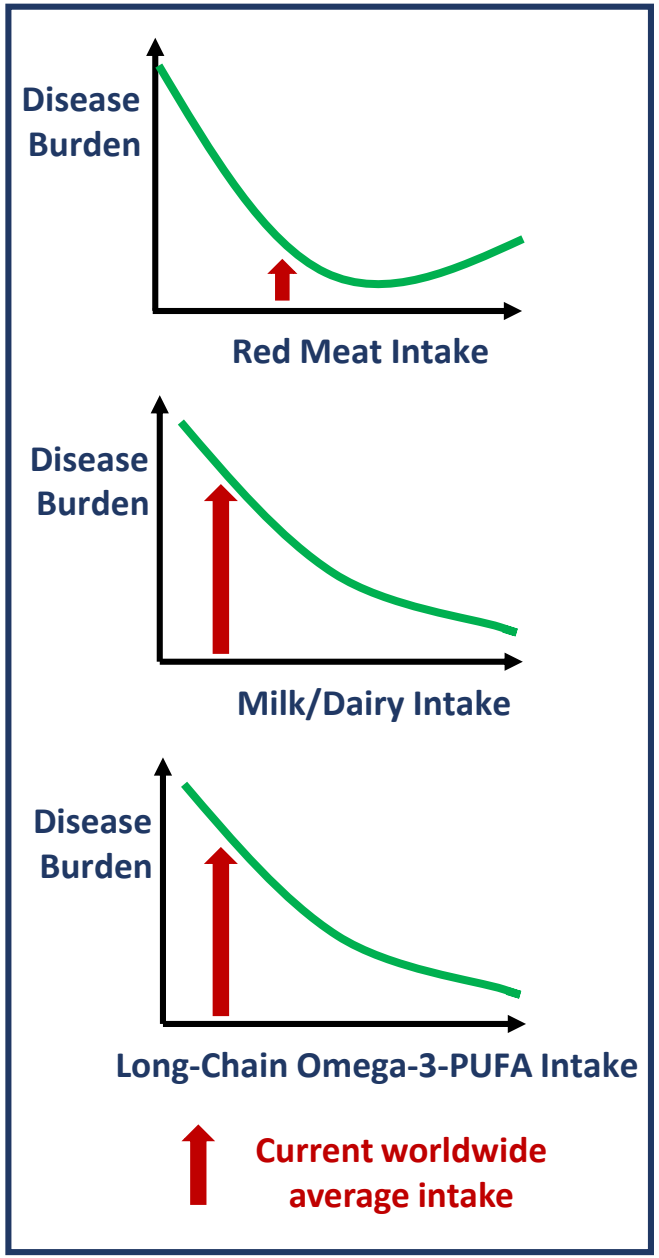
Cheng Zheng,[1] Mary Pettinger,[2] GA Nagana Gowda,[3] Johanna W Lampe,[2,4] Daniel Raftery,[3] Lesley F Tinker,[2] Ying Huang,[2,4] Sandi L Navarro,[2] Diane M O'Brien,[5] Linda Snetselaar,[6] Simin Liu,[7] Robert B Wallace,[6] Marian L Neuhouser,[2,4] and Ross L Prentice[2,4]

[1]Department of Biostatistics, University of Nebraska Medical Center, Omaha, NE, USA; [2]Division of Public Health Sciences, Fred Hutchinson Cancer Research Center, Seattle, WA, USA; [3]Department of Anesthesiology and Pain Medicine, University of Washington, Seattle, WA, USA; [4]School of Public Health, University of Washington, Seattle, WA, USA; [5]Institute for Arctic Biology, University of Alaska, Fairbanks, AK, USA; [6]College of Public Health, University of Iowa, Iowa City, IA, USA; and [7]Department of Epidemiology, School of Public Health, Brown University, Providence, RI, USA

Conclusions: A relatively high-meat dietary pattern is associated with somewhat higher chronic disease risks. These elevations appear to be largely attributable to the dietary pattern, rather than to consumption of red or processed meat per se. *J Nutr* 2022;152:1711–1720.

Key Take Home Messages

- Animal-source foods (dairy, meat, fish and eggs) are nutrient rich foods.
- The relationship between red meat and disease burden is mirror J-shaped.
  - When eaten as part of a balanced diet, red meat provides considerable protection against nutritional deficiencies
  - Low certainty evidence that relatively small deleterious effects possibly occur with consumption in excess of 500g weekly.
- The majority of the world's population are not eating enough dairy nor omega-3-PUFA rich foods.
- Replacing animal sourced foods with plant-based ultra-processed foods, so as solve greenhouse gas emissions, is very likely to harm human health - women, children, the elderly and those of low income will be particularly adversely impacted.
- Policy-makers should be extremely wary of global health estimates that;
  - Are not rigorously and transparently evidence-based.
  - Ignore the protections against nutritional deficiencies afforded by animal-source foods.



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