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Tips & tricks for healthy longevity: down to practice

Lara Tiranini - Rossella E. Nappi
(UNIPV-ITALY)

GLADE – VIRTUAL INSTITUTE FOR GOOD HEALTH AND WELL-BEING,
18 – 25 September, 2022

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Summary of Key Concepts

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Programming of weight and obesity across the lifecourse by the maternal metabolic exposome (1)

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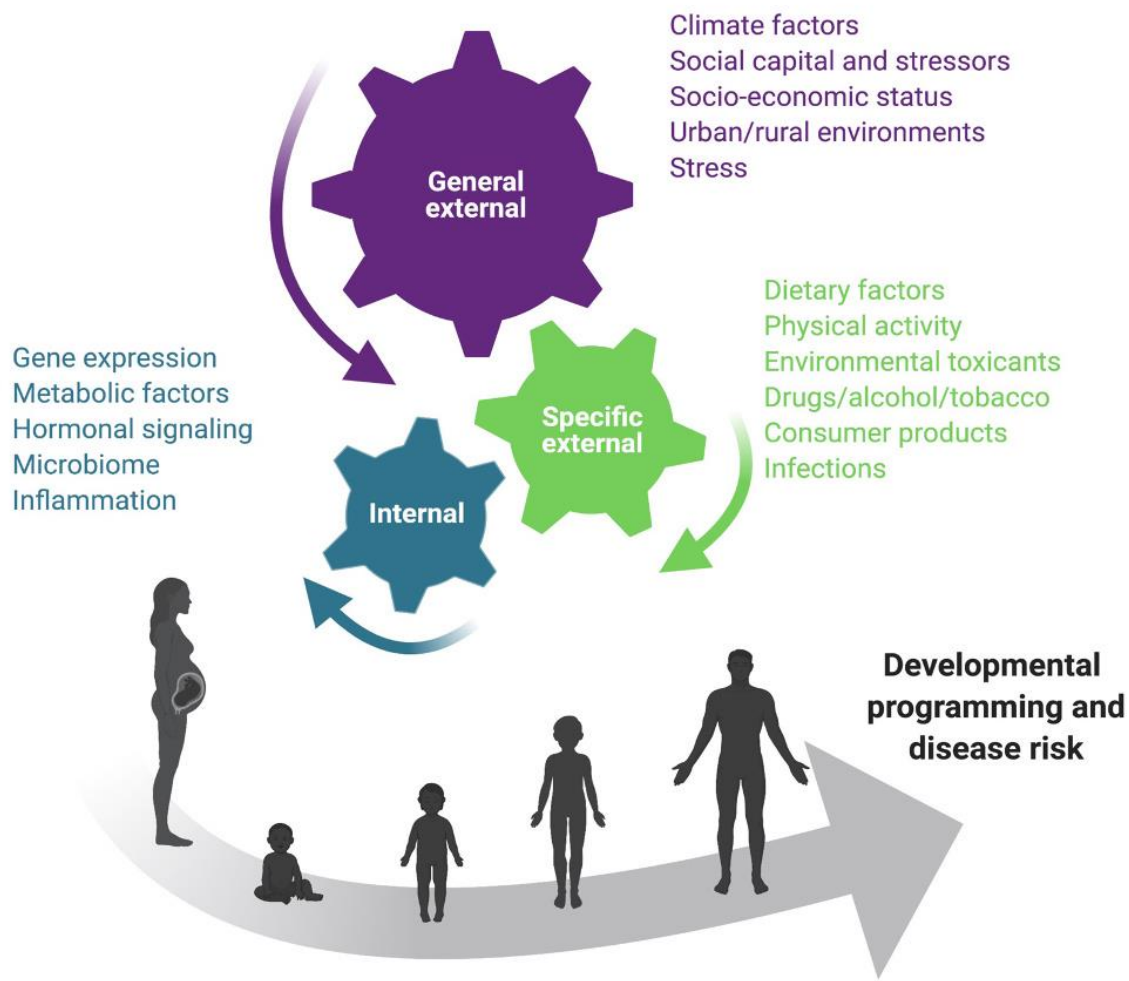
- Exposome research aims to comprehensively understand the multiple environmental exposures that influence human health.
- A lifecycle perspective, from before pregnancy, through childhood and adolescence to adulthood, should be applied when evaluating how multiple exposures experienced by an individual can influence health and disease trajectories across the lifespan.



Strain et al, 2022

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Programming of weight and obesity across the lifecourse by the maternal metabolic exposome (2)

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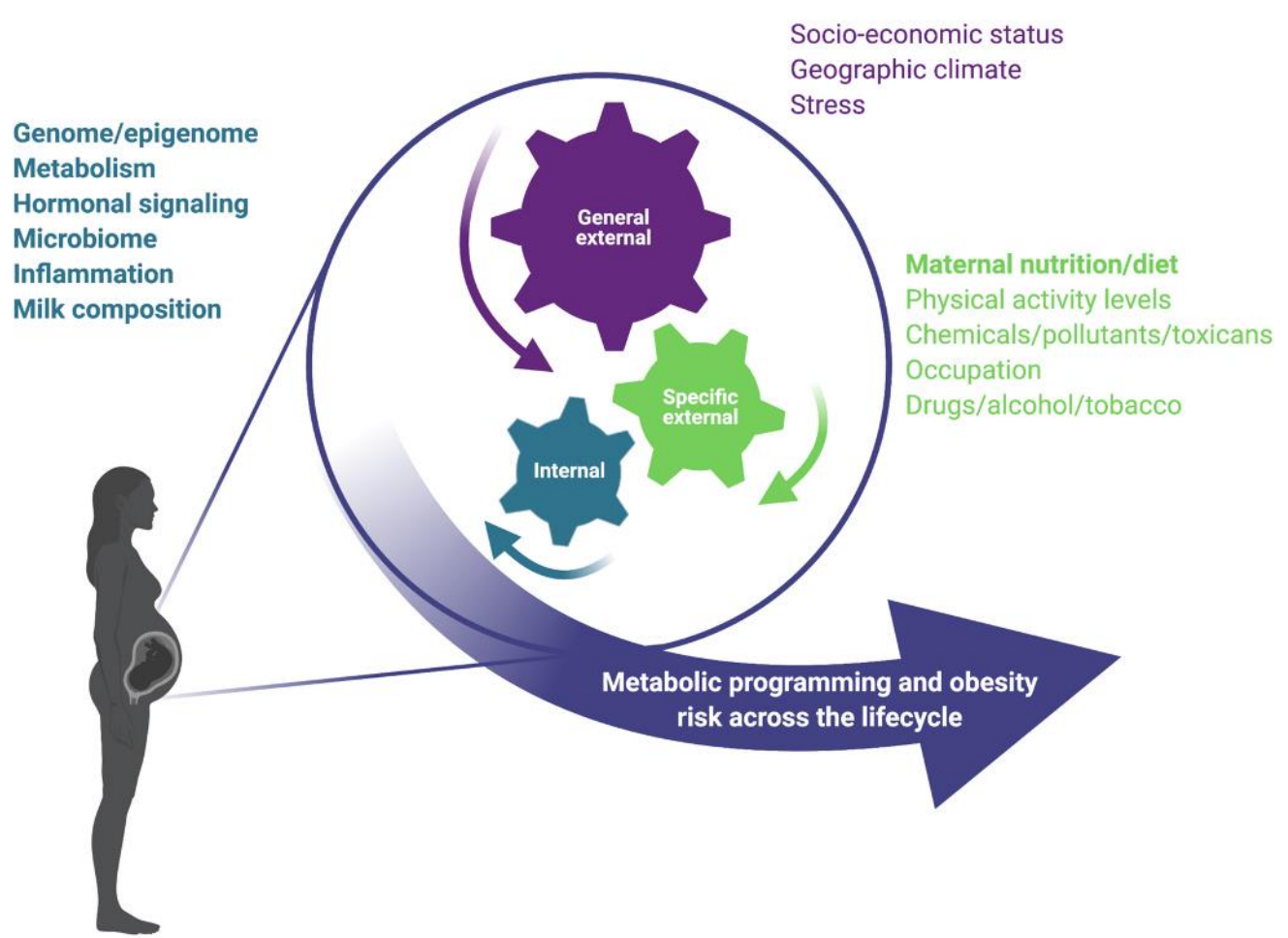
- Whilst many factors impact metabolic status, some of the most influential include those listed here.
- These metabolic exposures can shape the health of the individual and adaptations to pregnancy, and set the developmental trajectory of the gametes, embryo, fetus, and child, influencing health and risk for metabolic disease in later life, and health trajectories in subsequent generations.



Strain et al, 2022

The Intergenerational Cycle of Chronic Cardio-Metabolic Disorders

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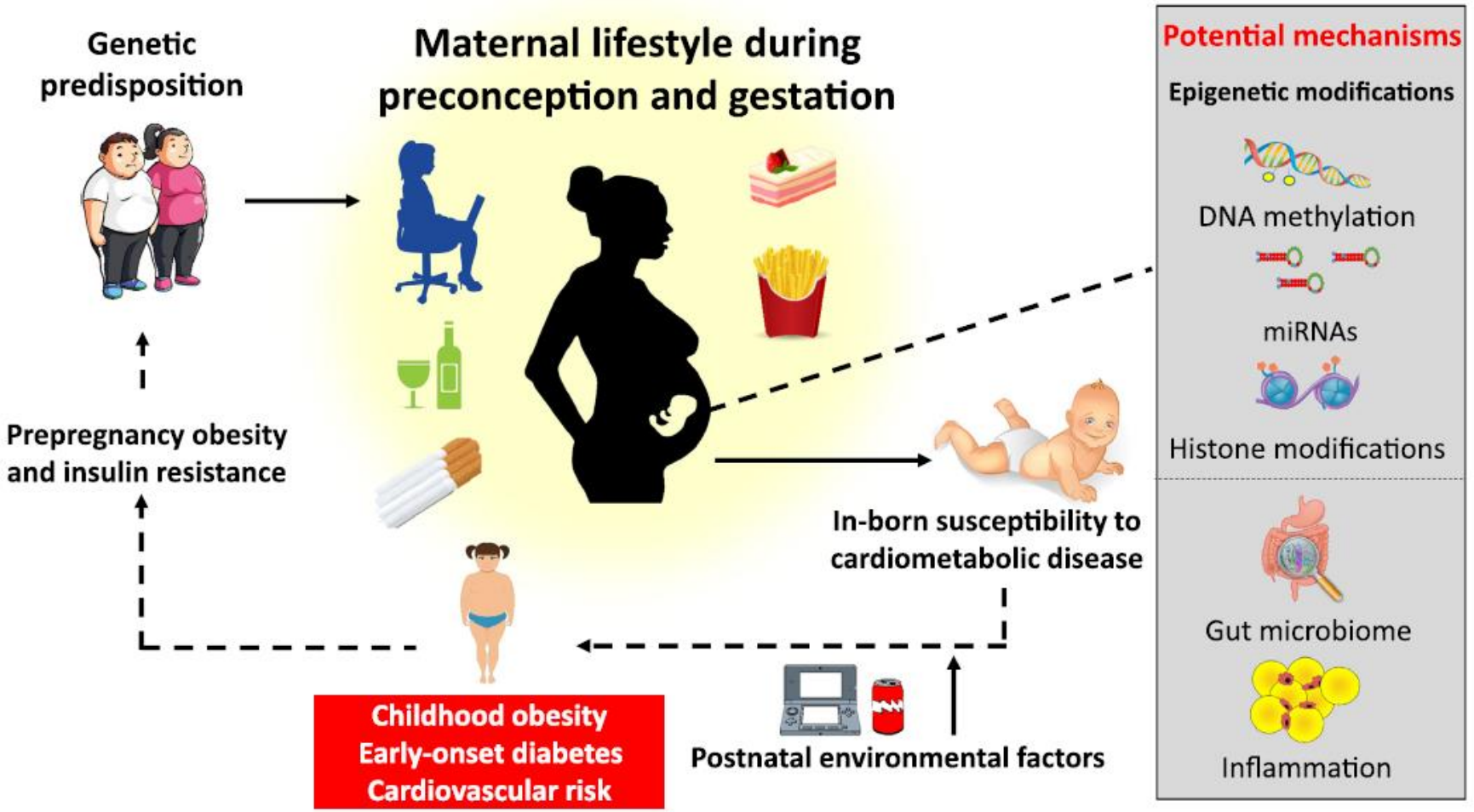
- **Poor preconception and gestational maternal lifestyle predispose both mother and baby to unfavourable pregnancy outcomes, creating an intergenerational cycle of obesity, insulin resistance, and associated disorders.**



Moholdt & Hawley, 2020

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A Time to Eat and Time for Exercise

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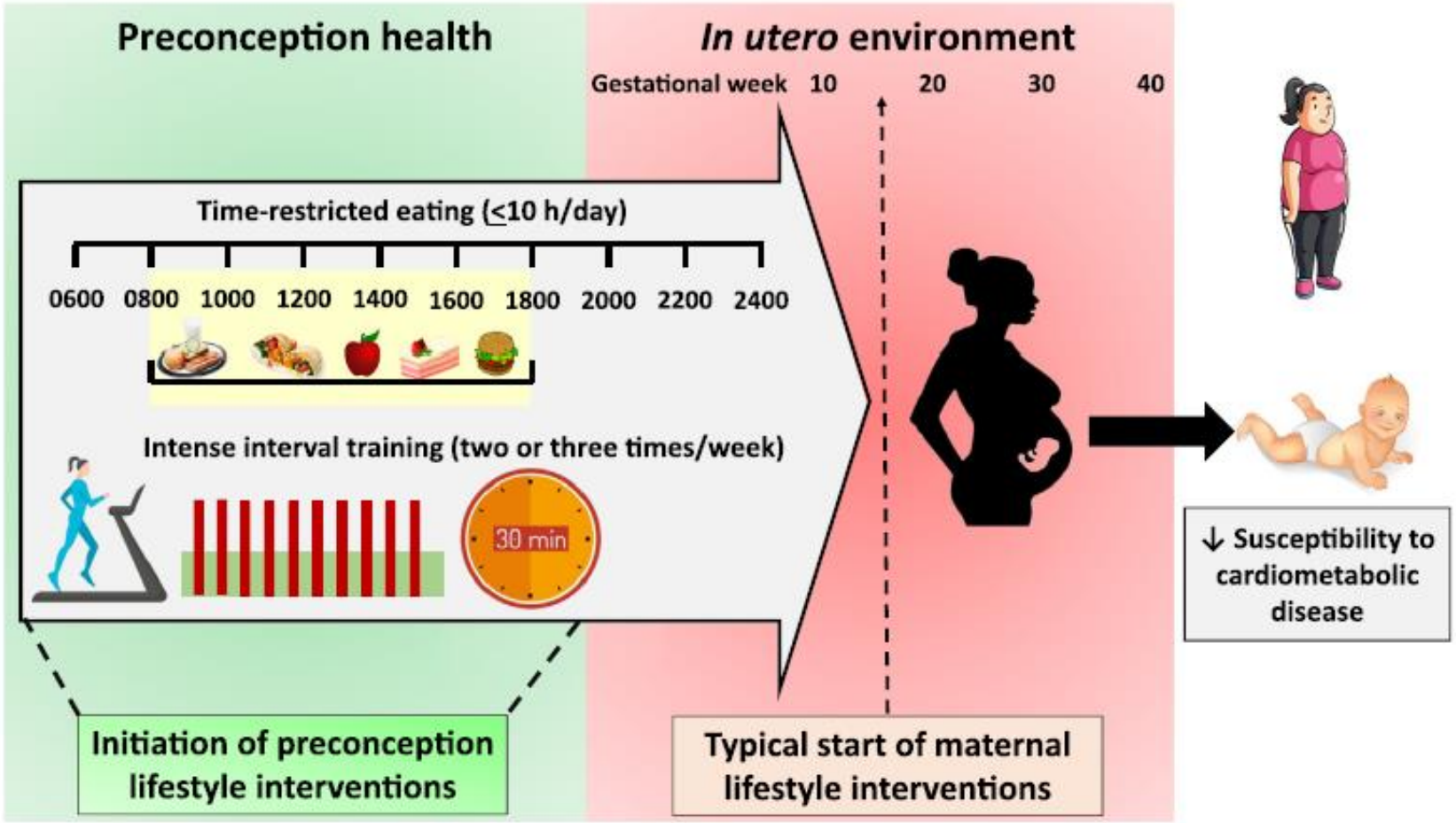
- **Novel and practical preconception and maternal lifestyle interventions could reduce the impact of maternal obesity and insulin resistance on future maternal and offspring health, thereby halting inherited and epigenetic abnormalities of metabolism.**



Moholdt & Hawley, 2020

Maternal Lifestyle Interventions: Targeting Preconception Health

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Box 1. Practical Diet–Exercise Strategies to Improve Maternal Glycaemic Control

To be commenced preconception[a] and continued throughout pregnancy, as able.

- Time-restricted eating: a daily eating 'window' of ≤10 h.
- The timing of the eating window (i.e.,the time of the first to the last eating occasion) is flexible according to personal preferences and practicalities.
- Preconception, two or three weekly sessions of high-intensity interval training (e.g.,four to ten exercise bouts lasting a minimum of 30 s and a maximum of 4–5 min separated by 1–3 min of low-to-moderate-intensity exercise) can be an alternative exercise protocol to current, prolonged exercise prescription.
- During pregnancy, two or three weekly sessions of high-intensity interval training (e.g.,six to ten exercise bouts lasting less than 60 s interspersed with 2–3min low-intensity exercise).
- A total exercise time of <60 min/week can still confer metabolic health benefits, providing exercise is of sufficient intensity (i.e.,the maximal intensity that can be sustained for the duration and number of the prescribed workbouts).

[a]We define 'preconception' as the weeks or months from a conscious intention to conceive until conception.

Moholdt & Hawley, 2020

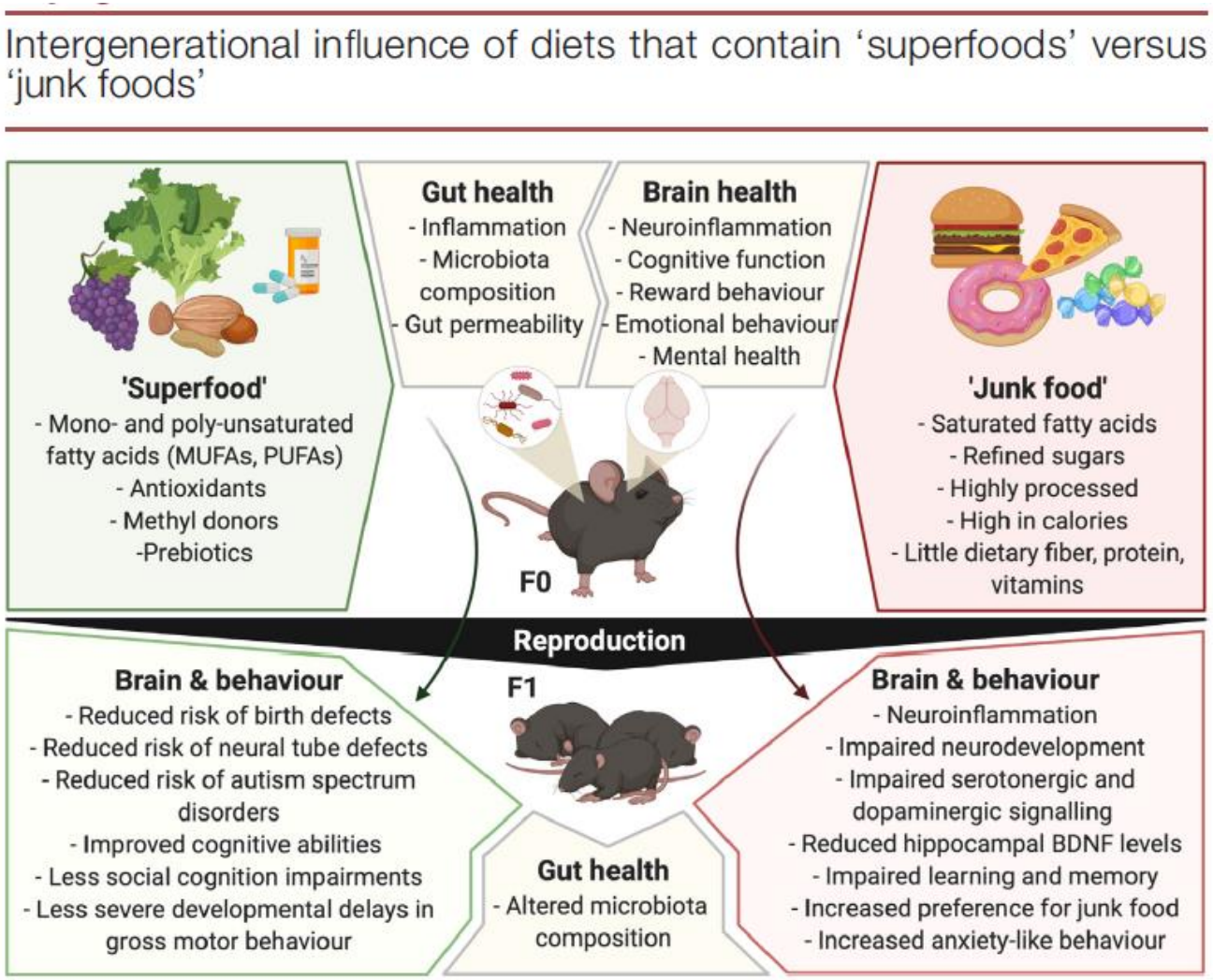
How parental diet influences offspring neurobiology and behaviour

Co-funded by the Erasmus+ Programme of the European Union

‘You are what you eat’ proposed the philosopher Ludwig Feuerbach (1848)

Parental diet and nutritional supplementation can have diverse effects on offspring development, brain function, and behaviour. Evidence indicates that a healthy diet, including dietary supplements, can reduce birth defects and cognitive impairments, while an unhealthy diet promotes neuroinflammation as well as impaired neurotransmission and cognitive abilities, potentially mediated via alterations in the gut microbiome.

Both maternal and paternal diet can influence various processes involved in conception and intrauterine and postnatal development of the offspring. Spermatogenesis is an ongoing process that begins at puberty and continues throughout the lifespan; DNA methylation is also maintained during this process, and epigenetic modifications to DNA methylation occur throughout spermatozoa development, which can be influenced by environmental factors, including nutrition. The composition of the seminal plasma is also influenced by diet, which in turn modulates the interaction of sperm and oocyte. Maternal diet can influence the foetus through the placenta and postnatally, and pup development can be altered through maternal milk composition and coprophagy.



Bodden et al, 2021

Global prevalence of anemia in pregnant women

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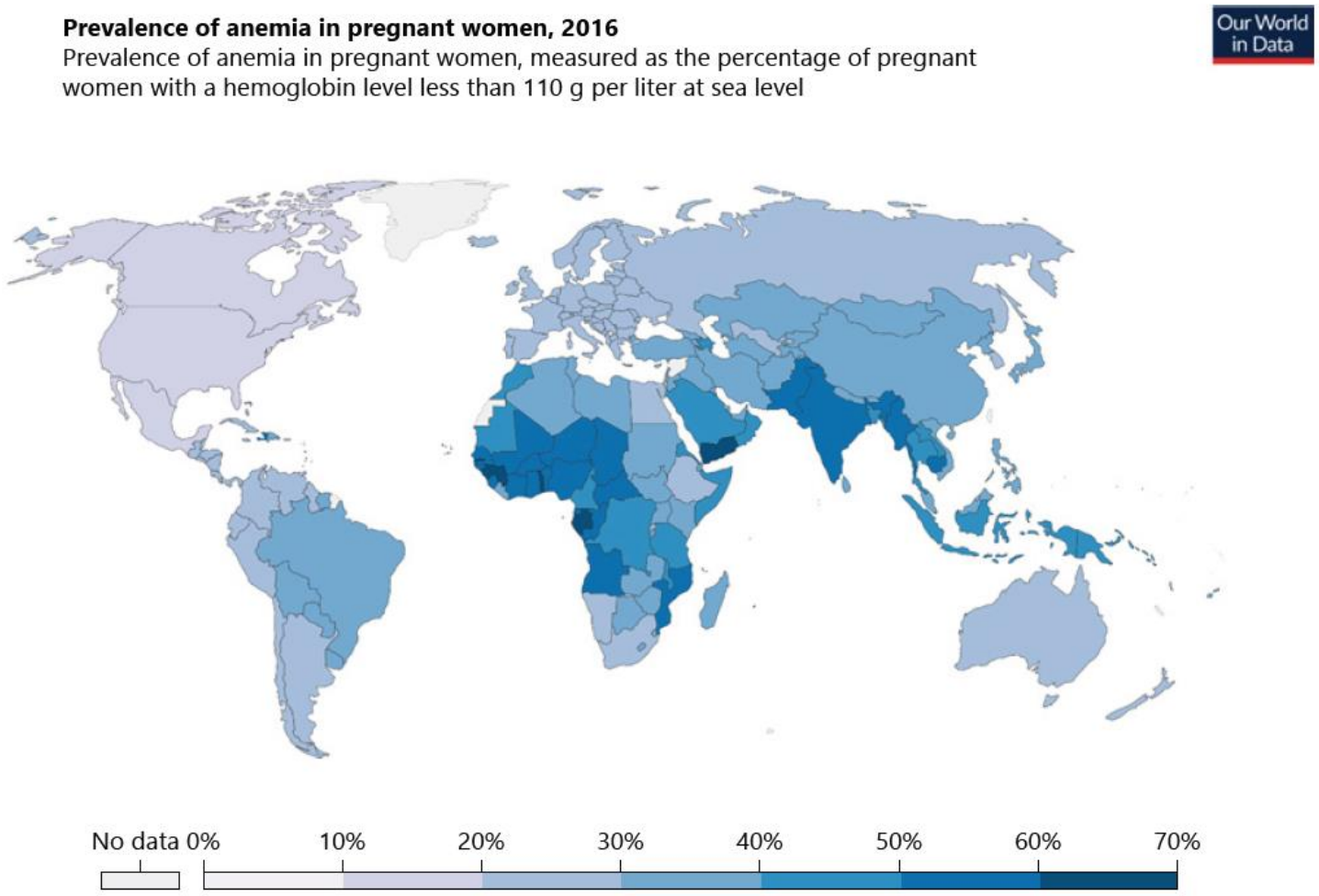
- Maternal undernutrition remains a critical public health problem.
- Globally, 29% of non pregnant women and 38% of pregnant women are anemic.



Young & Ramakrishnan, 2020

Regional estimates of micronutrient deficiencies and anemia among women of reproductive age

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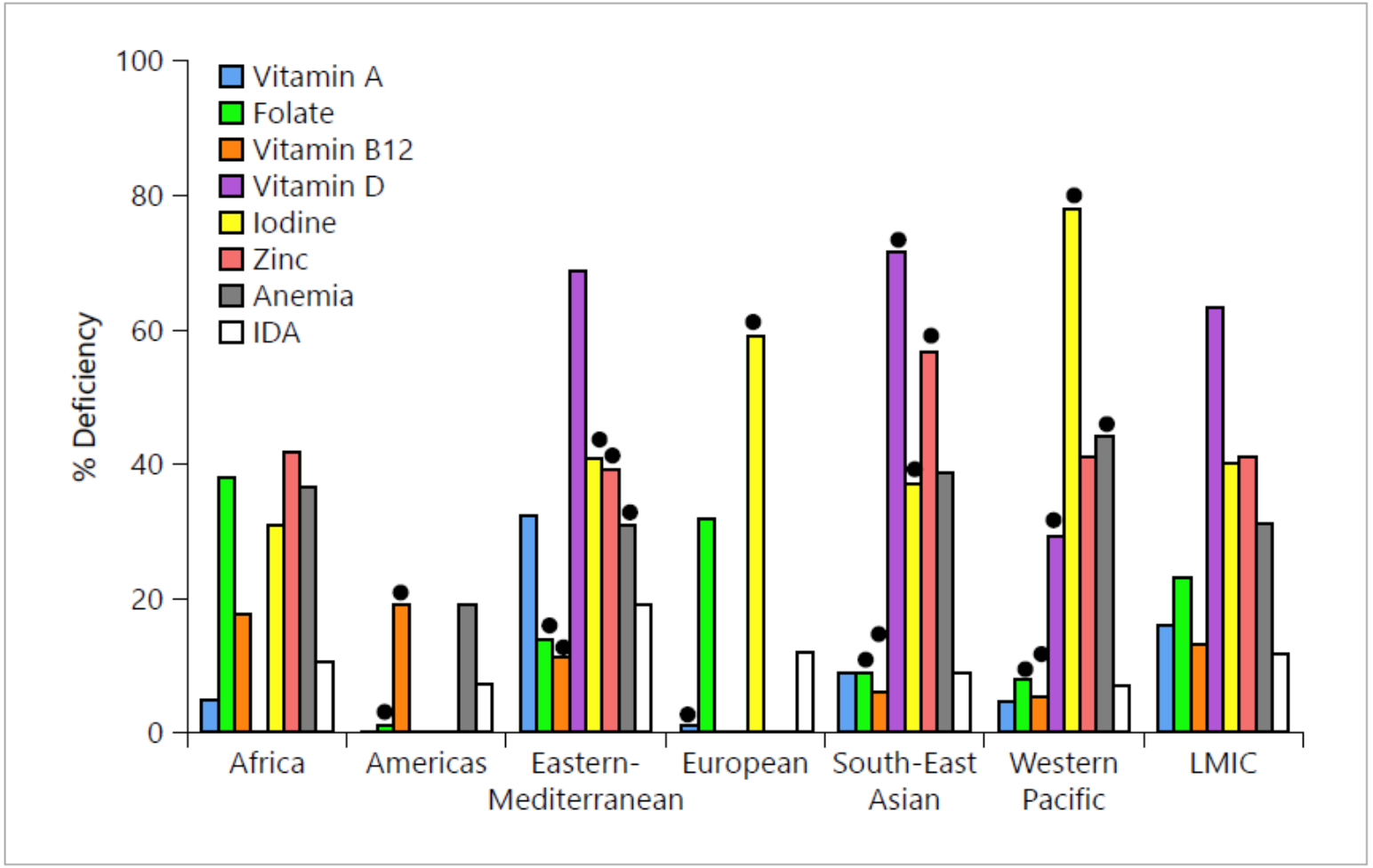
- The World Health Organization (WHO) estimates that over two billion people are at risk for micronutrient deficiencies.



Young & Ramakrishnan, 2020

Conceptual framework of the causes and consequences of maternal undernutrition

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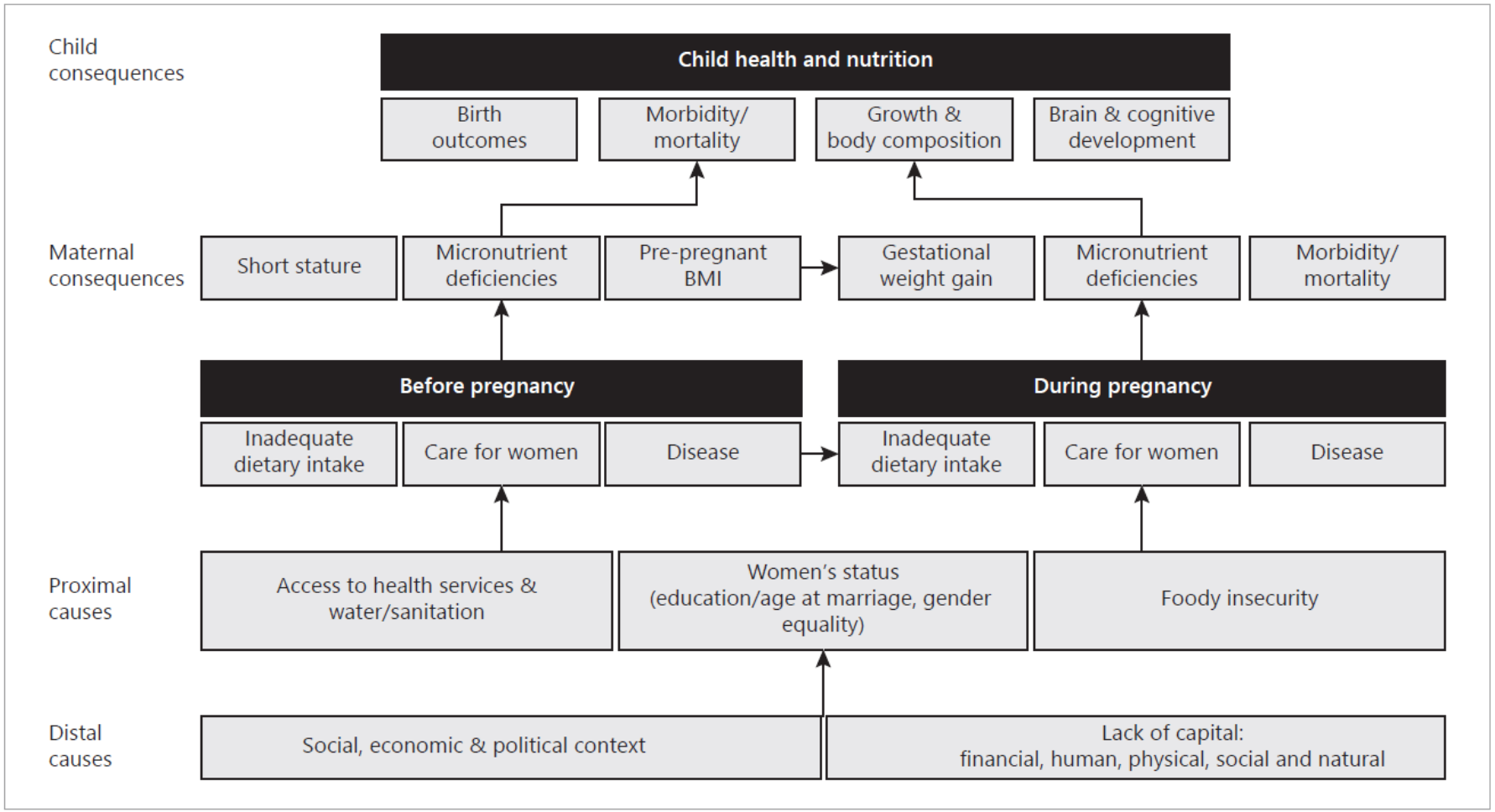

Young & Ramakrishnan, 2020

Modifiers of the effects of prenatal maternal micronutriens supplementation on birth outcomes (1)

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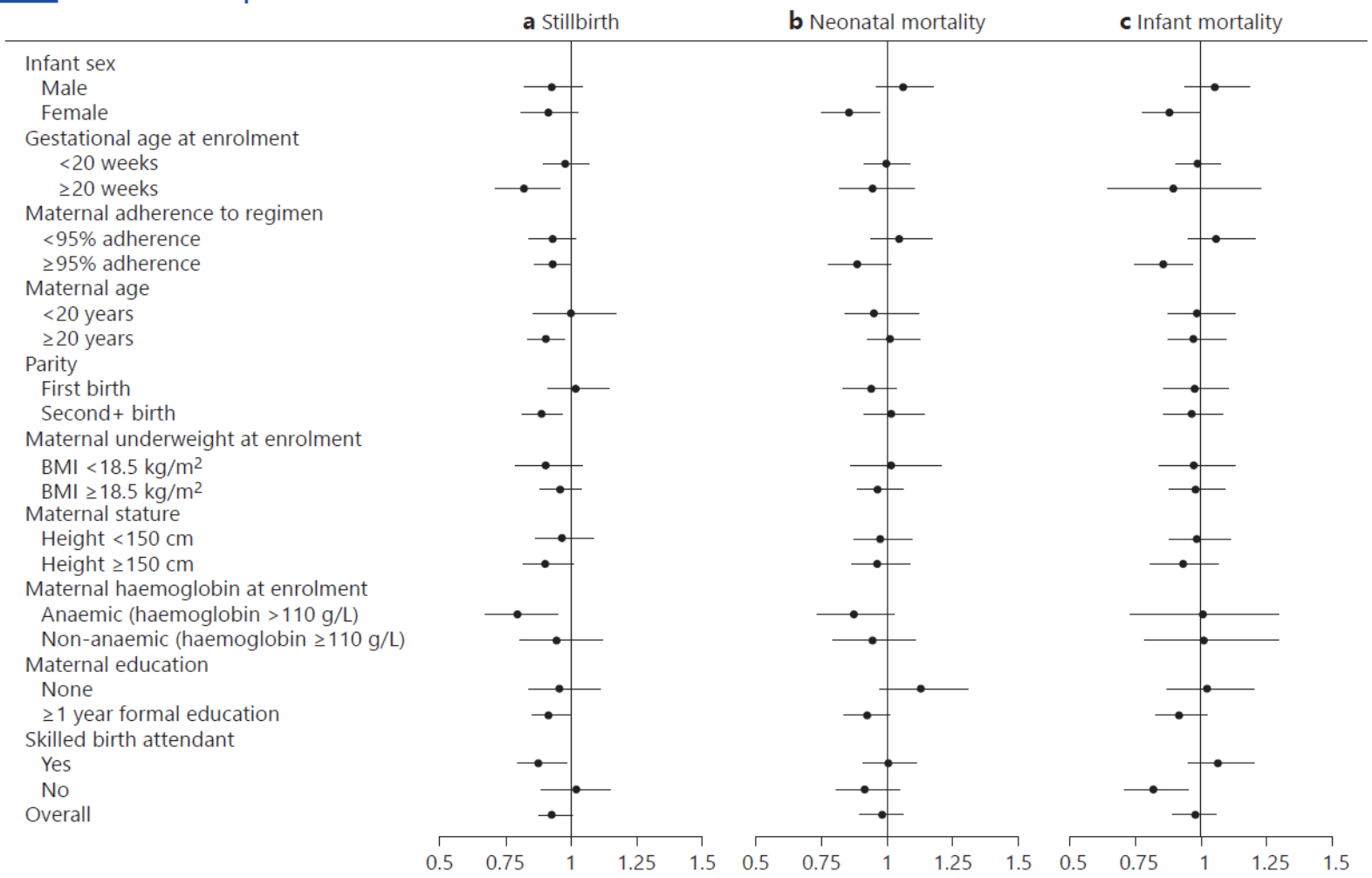

Young & Ramakrishnan, 2020

Modifiers of the effects of prenatal maternal micronutriens supplementation on birth outcomes (2)

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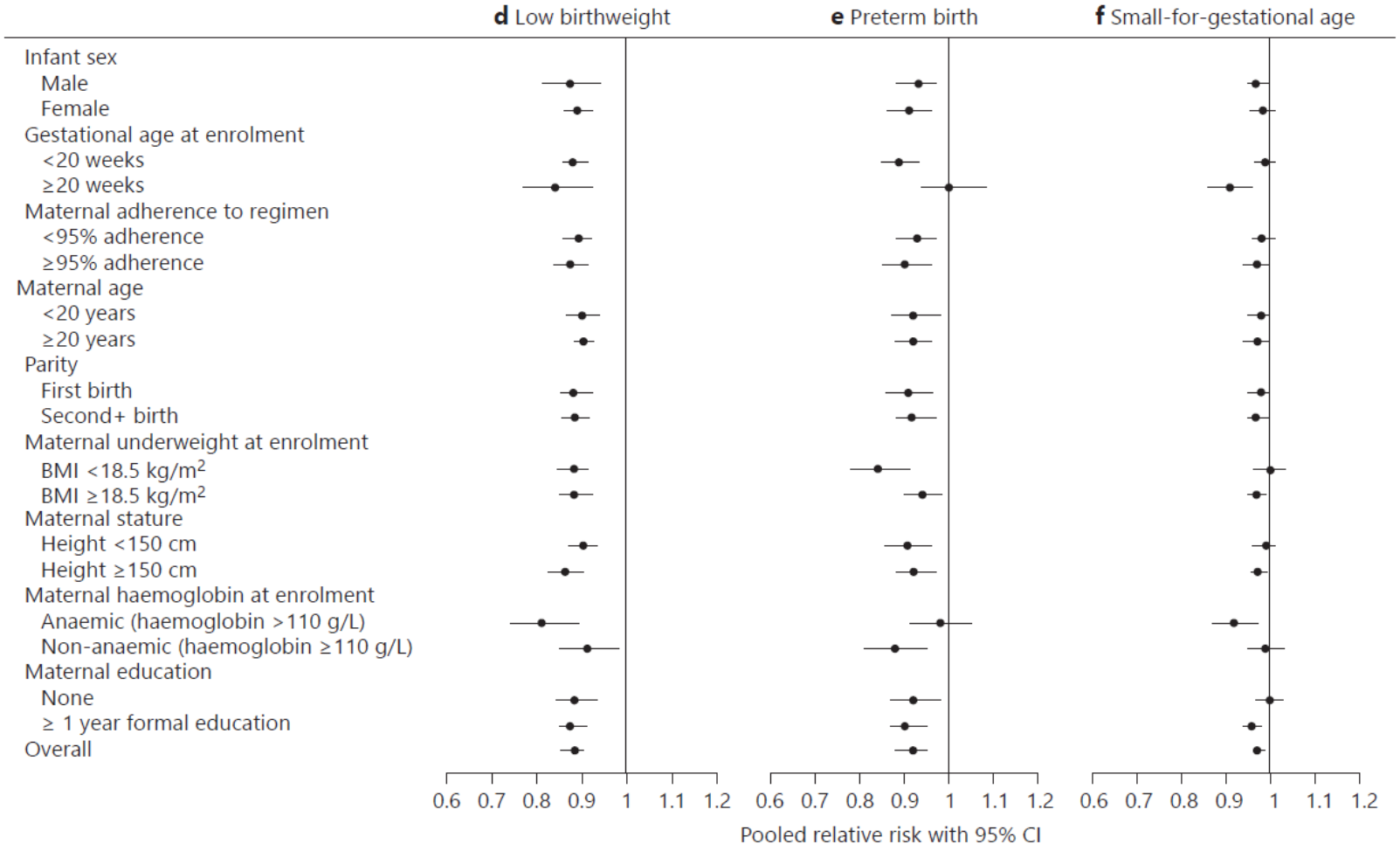

Young & Ramakrishnan, 2020

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Recommendations for pregnancy weight gain

Pre-pregnancy weight category	Pre-pregnancy Body Mass Index	Recommended weight gain (kg) *
Underweight	< 18.5	**12.5 - 18**
Normal weight	18.5 – 24.9	**11 - 16**
Overweight	25 – 29.9	**7 - 18**
Obese	≥ 30	**5 - 9**

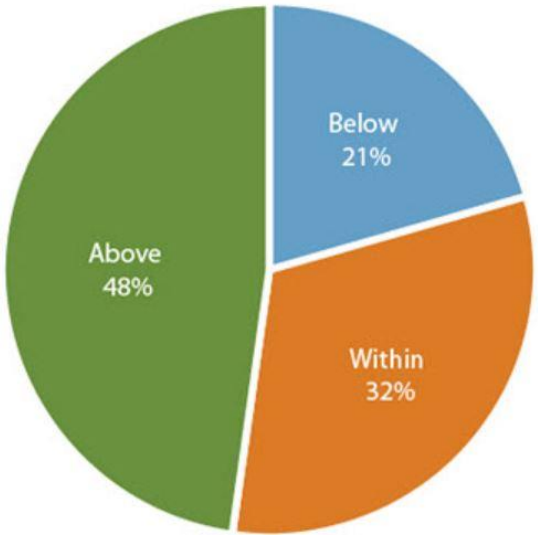
2009 Institute of Medicine (IOM) guidelines

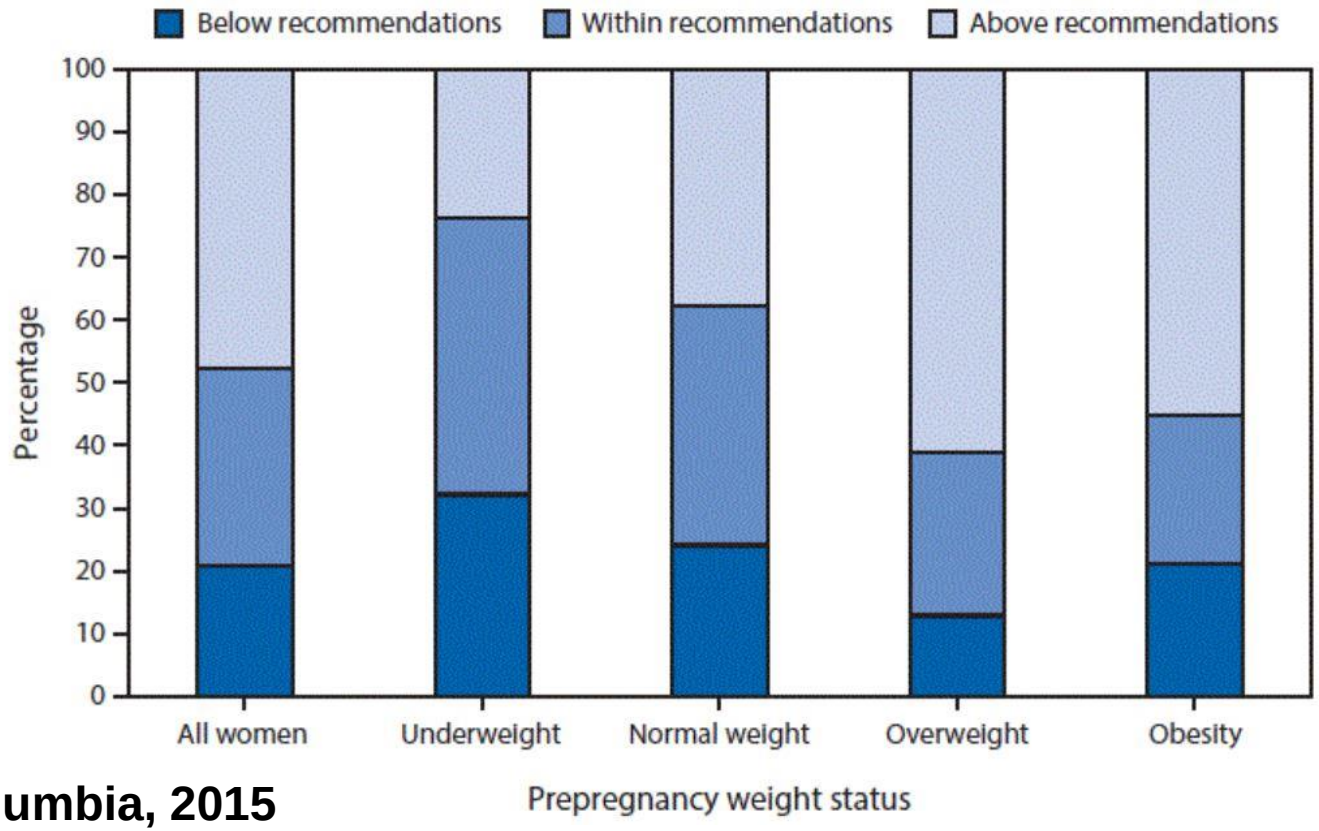
*** For singleton pregnancies**

Gestational Weight Gain Among Women with Full-Term, Singleton Births, Compared with Recommendations

Co-funded by the Erasmus+ Programme of the European Union

What percentage of women had pregnancy weight gain within recommendations?





48 States and the District of Columbia, 2015

Steps to meet pregnancy weight gain recommendations (1)

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1. Work with the **health care provider** on weight gain **goals** at the beginning and throughout pregnancy

2. **Track** the pregnancy weight gain at the beginning and regularly throughout pregnancy and make comparisons to the recommended ranges of healthy weight gain

CDC, Centers for Disease Control and Prevention

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Weight gain tracker

Write Your Weight (in pounds) Just Before You Became Pregnant ➤			
Weeks of Pregnancy	Write Today's Date	Write Today's Weight (in pounds)	Write Today's Weight Gain *(subtract your weight just before pregnancy from today's weight)*
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			

CDC, Centers for Disease Control and Prevention

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Examples for pregnant women

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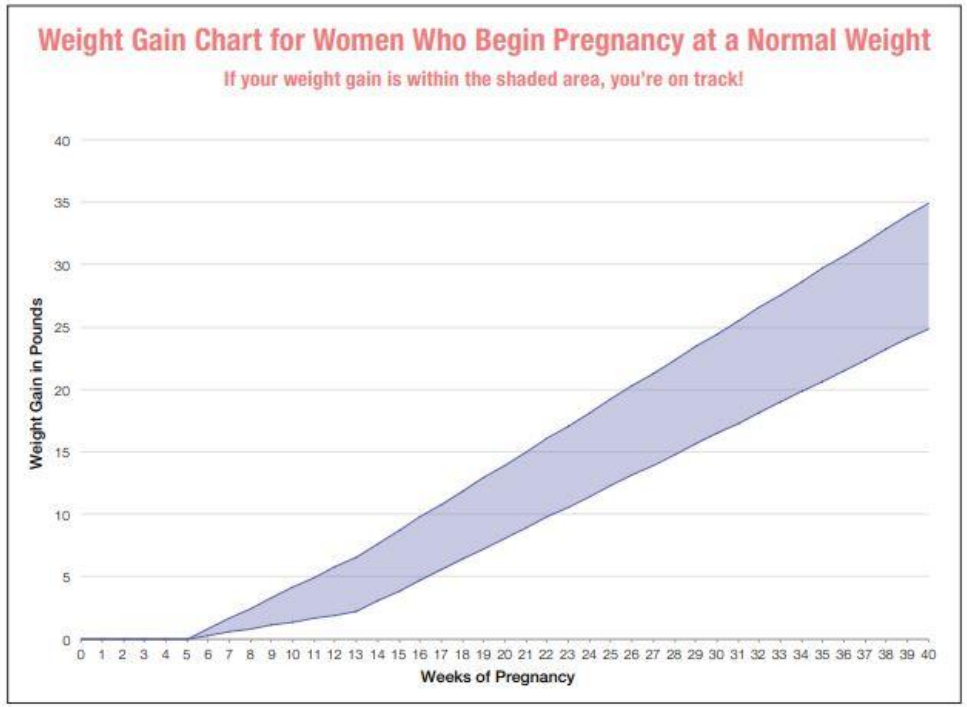
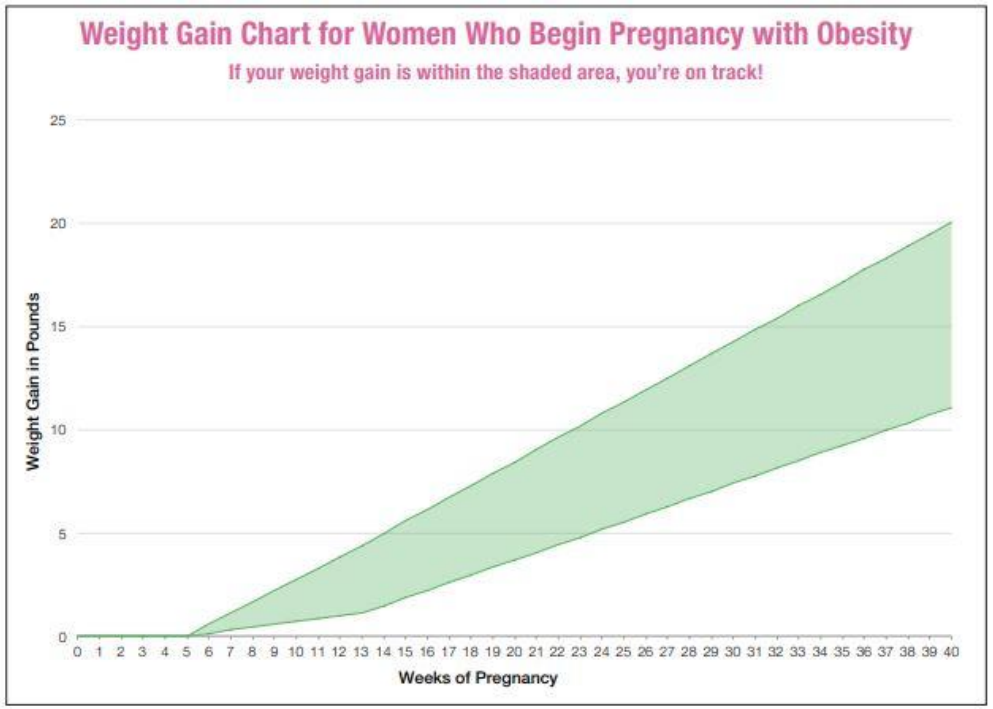
Weight gain charts





CDC, Centers for Disease Control and Prevention

Steps to meet pregnancy weight gain recommendations (2)

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3

Know the **caloric needs**

	Additional calories per day required		
Pre-pregnancy BMI	First trimester	Second trimester	Third trimester
Underweight	No extra calories required	400	400-600
Normal weight		400	400
Overweight		200-400	400
Obese		200	400

Steps to meet pregnancy weight gain recommendations (3)

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4

Eat a **balanced diet**.

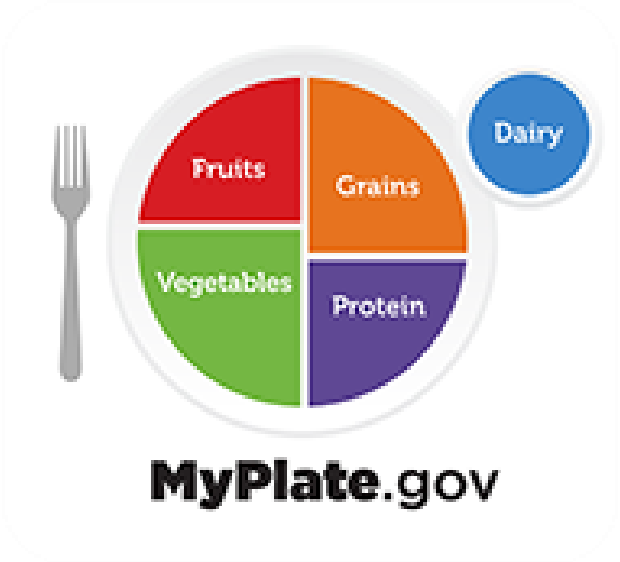
- **High** in whole grains, vegetables, fruits, low fat dairy, and lean protein.
- **Limited in** added sugars and solid fats found in foods like soft drinks, desserts, fried foods, whole milk, and fatty meats.

Self-help in pregnancy to watch weight gain

Co-funded by the Erasmus+ Programme of the European Union

Possible use of resources as **MyPlate plan** to evaluate the daily food group targets best fitting the stage of pregnancy

https://www.myplate.gov/myplate-plan



CDC, Centers for Disease Control and Prevention

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Pay attention to what you eat in pregnancy! (1)

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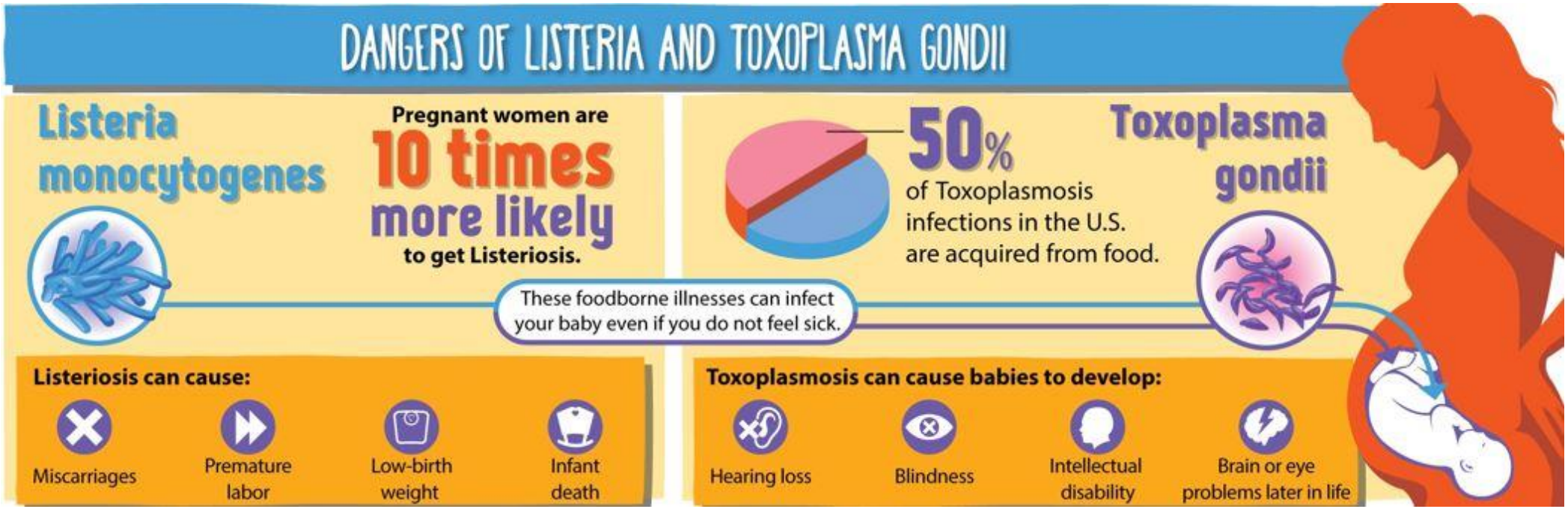
Caution with or avoid certain foods at risk to cause foodborne illnesses



Pay attention to what you eat in pregnancy! (2)

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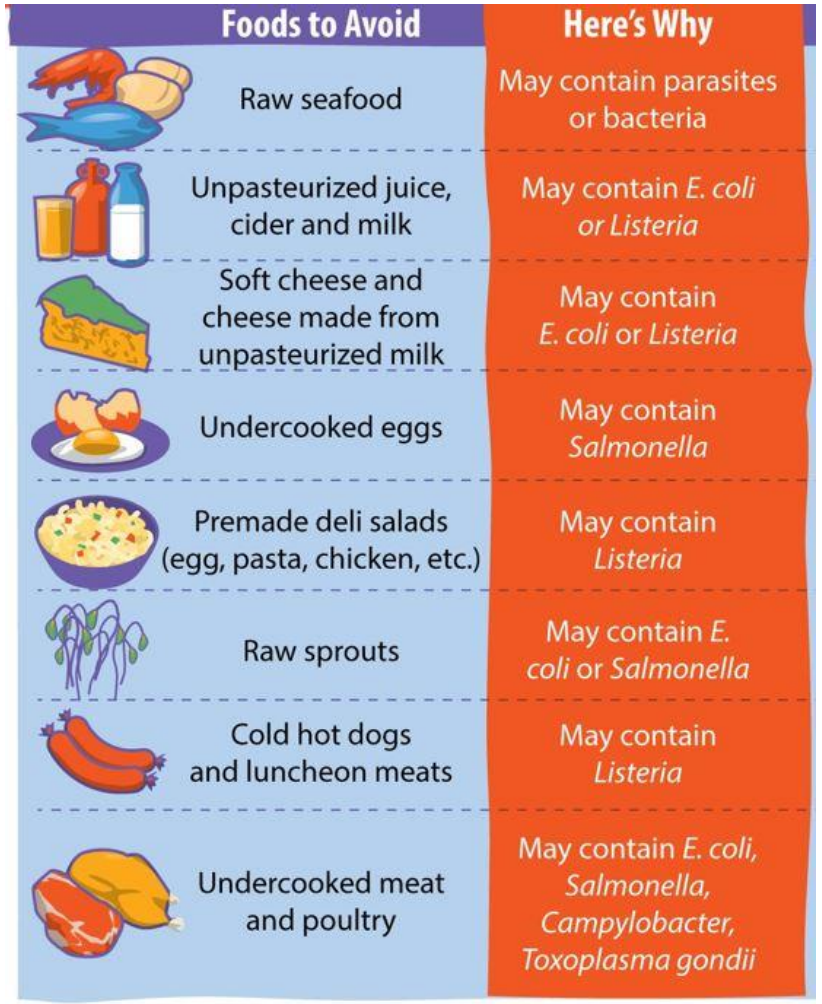
Foods to **avoid** during pregnancy:

- Deli Meat
- Raw or Smoke Salmon
- Rare Meat
- High-Mercury Fish
- Raw Eggs
- Alcohol
- Unpasteurized Milk
- Imported Soft Cheese
- Unwashed Fruits / Vegetables



Foodsafety.gov

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Steps to meet pregnancy weight gain recommendations (4)

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Physical activity is healthy and safe for most pregnant women.

Boost the mood

Sharpen the focus

Reduce stress

Improve sleep

CDC, Centers for Disease Control and Prevention

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Pay attention to how you exercise in pregnancy! (2)

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- **To avoid: contact sports, activities at risk of fall or hitting the belly, exercises lying flat on the back after the first trimester.**

Exceptional Human Longevity: an extreme phenotype

TABLE 1. Longevity Factors Associated With Geographic Clustering of Long-Lived Populations
Eating in moderation (small- or moderate-portioned "regular" meals), mostly plant-based diets, with lighter meals at the end of the day
Purposeful living (eg, life philosophy, volunteerism, "hard work" or "work ethic")
Social support systems: interactions with family/friends, laughter/humor
Exercise, especially walking, gardening
Other nutritional factors: goat's milk, red wine, herbal teas
Spirituality
Maintenance of a healthy body mass index
Other possible factors: sunshine, adequate hydration, naps

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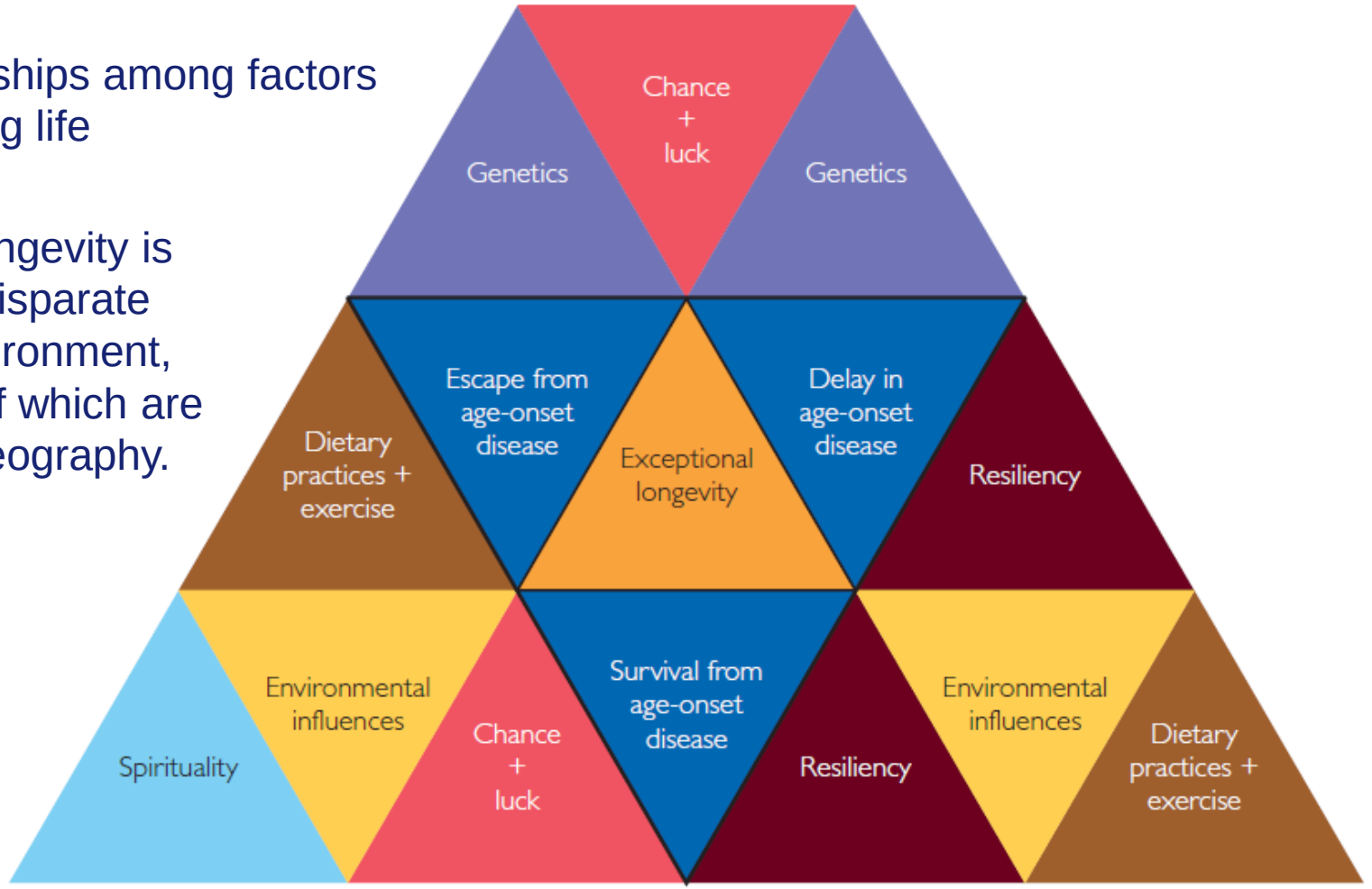
Multiple pathways to exceptional longevity

- Shown are putative relationships among factors associated with extreme long life
- The basis for exceptional longevity is multifactorial and involves disparate combinations of genes, environment, resiliency, and chance, all of which are influenced by culture and geography.



RJ Pignolo, 2018

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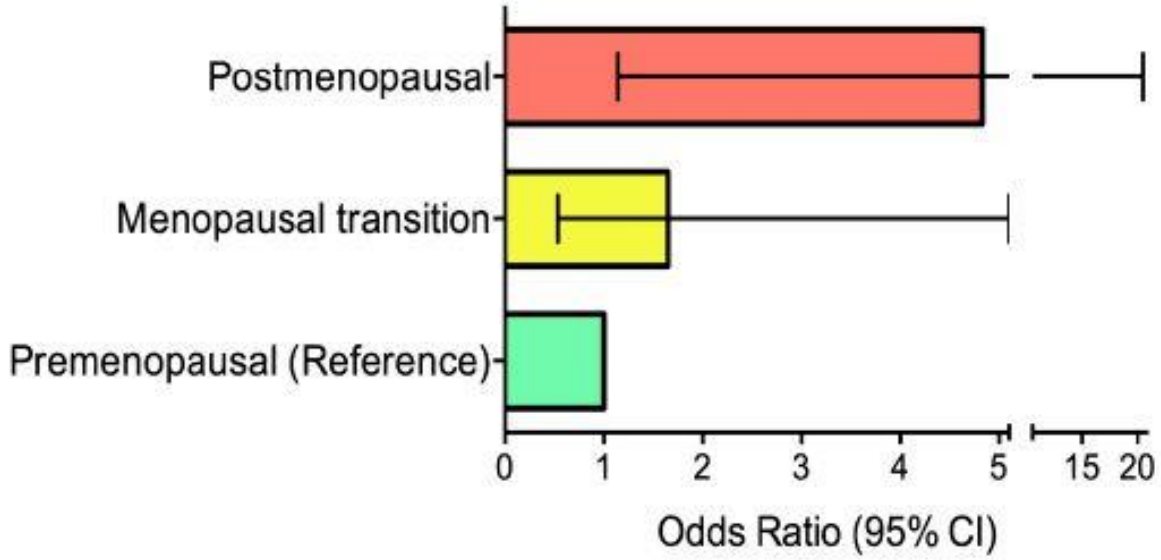
Watch your waist at menopause!

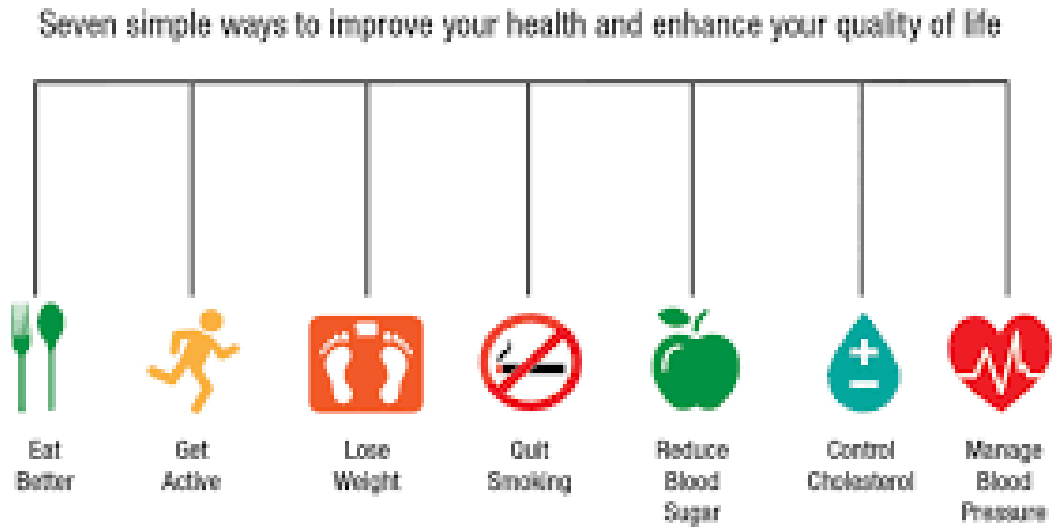


Adjusted odds ratios for **central adiposity**, defined as waist circumference ≥ 88 cm, in perimenopausal and postmenopausal women.

Silva et al, 2021

Menopause: a cardiometabolic transition

Rossella E Nappi, Peter Chedraui, Irene Lambrinoudaki, Tommaso Simoncini



www.thelancet.com/diabetes-endocrinology **Published online May 5, 2022** **https://doi.org/10.1016/S2213-8587(22)00076-6**

Panel 2: Non-hormonal management of women transitioning to menopause in the context of cardiometabolic health

Diet
- High intake of fruit, vegetables, nuts, fish, whole grains, and olive oil
- Low consumption of red and processed meat, sweet foods and beverages, and refined grains
- Alcohol intake in moderation

Exercise
- Aerobic exercise five times a week, for at least 10–15 min
- Muscle strengthening activities at least twice a week
- Older adults should aim to be as physically active as possible
- Aim to increase the duration of moderate-intensity aerobic activity to 300 min a week, or engage in 150 min of vigorous-intensity aerobic exercise, or a combination of both

Other behaviours
- Stop smoking
- Adequate sleep
- Promotion of psychological wellbeing

Lipid management
- Lifestyle changes: healthy diet, exercise, weight control
- Statin use based on risk stratification

Insulin resistance and diabetes
- Lifestyle changes: healthy diet, exercise, weight control
- Consider metformin as first-line medical treatment
- Consider GLP-1 receptor agonists and SGLT2 inhibitors as medications with additional benefits for cardiovascular disease risks and weight control
- Use thiazolidinediones with caution in patients at risk of osteoporotic fractures

Hypertension
- Set blood pressure targets based on age and comorbidity
- Customise medical treatment according to efficacy, side-effects, and compliance
- Most patients will require combination therapy to reach blood pressure targets

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Nutrition and dietary patterns to improve cardiovascular function with aging

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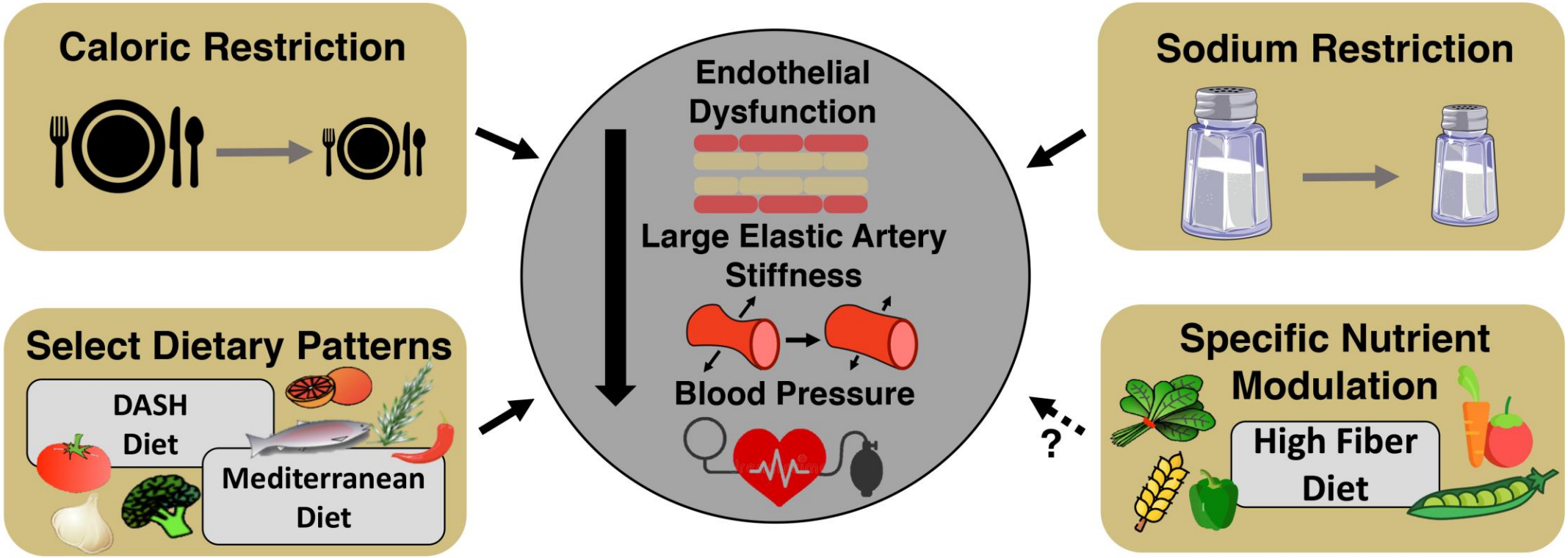

Caloric (dietary) restriction and sodium restriction increase endothelial function and lower large elastic artery stiffness and blood pressure. Specific dietary patterns, such as the Dietary Approaches to Stop Hypertension (DASH) and Mediterranean diets, have been shown to improve blood pressure, but more studies need to be conducted to assess the effects of these dietary patterns in improving overall cardiovascular function in midlife/older adults. Recent evidence points to high soluble fiber as a possible nutrient in conferring vascular benefits. Subsequently, specific nutrient modulation of high fiber diets may be an effective and safe dietary pattern to improve overall vascular function in midlife/older adults.

Clayton et al, 2022

DASH* dietary recommendations

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- Examples for a 2000-Calorie diet.

Food Group	Serving Recommendation	What Counts as One Serving	Examples To Fulfill Recommendation
Grains	6 to 8 per day	1 slice bread, ½ cup cooked rice, pasta, or cereal grain, ½ to 1¼ cup dry ready-to-eat cereal	½ cup regular oatmeal (1) + 1 slice whole wheat bread (1) + 1 hamburger bun (2) + 1 cup cooked spaghetti (2) = 6
Vegetables	4 to 5 per day	1 cup leafy greens, ½ cup raw, canned, or frozen 4 oz (½ cup) 100% juice	2 large leaves romaine lettuce (½) + 2 sliced tomato (½) + 1 cup fresh spinach (1) + ½ cup fresh carrots (1) + ½ cup fresh mushrooms (1) + ½ cup cooked corn (1) = 5
Fruits	4 to 5 per day	1 medium fresh fruit, 16 grapes, ½ cup fresh, canned, or frozen ¼ cup dried 4 oz (½ cup) 100% juice	1 medium banana (1) + ¼ cup dried cranberries (1) + ½ cup strawberries (1) + 1 cup (8 oz) apple juice (2) = 5
Fat-free or low-fat milk and milk products	2 to 3 per day	8 oz (1 cup) milk, 8 oz (1 cup) yogurt, 1½ oz cheese	1 cup lowfat milk (1) + 1 slice (¾ oz) Swiss cheese (½) + 3 Tbsp parmesan cheese (½) + 1 cup yogurt (1) = 3
Lean meats, poultry, fish	≤6 per day	1 oz cooked beef, fish, or chicken 1 egg, 2 egg whites	3 oz chicken breast (3) + 3 oz salmon (3) = 6
Nuts, seeds, legumes	4 to 5 per week	1½ oz (1/3 cup) nuts, 2 Tbsp peanut butter, ½ oz seeds, ½ cup cooked dry beans, peas, or lentils	2 Tbsp peanut butter (1) + ½ oz sunflower seeds (1) + ½ cup cooked chickpeas (1) + 1/3 cup almonds (1) = 4
Fats and oils	2 to 3 per day	1 tsp soft margarine, 1 Tbsp low-fat mayo, 2 Tbsp light salad dressing, 1 tsp vegetable oil	1 Tbsp low-fat mayo (1) + 1 Tbsp vinaigrette dressing (½) + 1 tsp extra-virgin olive oil (1) = 2½
Sweets and added sugars	≤5 per week	1 Tbsp sugar, 1 Tbsp jelly or jam, ½ cup sorbet and ices, 8 oz (1 cup) lemonade	½ cup fruit sorbet (1) = 1

*DASH Dietary Approaches to Stop Hypertension

Woolf et al, 2016

Effects of Mediterranean diet

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Mediterranean diet

Increased consumption of whole-grain cereals, nuts, fruits, pulses, olive oil

Moderate consumption of fish

Lower consumption of sweetened beverages and red meat.

Dietary antioxidants (beta-carotene, vitamins C and E, selenium, polyphenols)

- ↓ Oxidative stress and inflammation
- ↓ Inhibition of osteoblastic cell differentiation
- ↑ Protection of myocytes from ROS
- ↓ TNFα, IL-6, IL1β in visceral adipose tissue

Beta-carotene

- ↑ Bone formation
- ↑ Osteocalcin synthesis by osteoblast
- ↑ Osteoblast mineralization
- ↓ Suppression of osteoclast formation

Magnesium

- ↑ Muscle performance
- ↑ Energy metabolism
- ↑ Transmembrane transport
- ↑ Muscle contraction and relaxation

Silva et al, 2021

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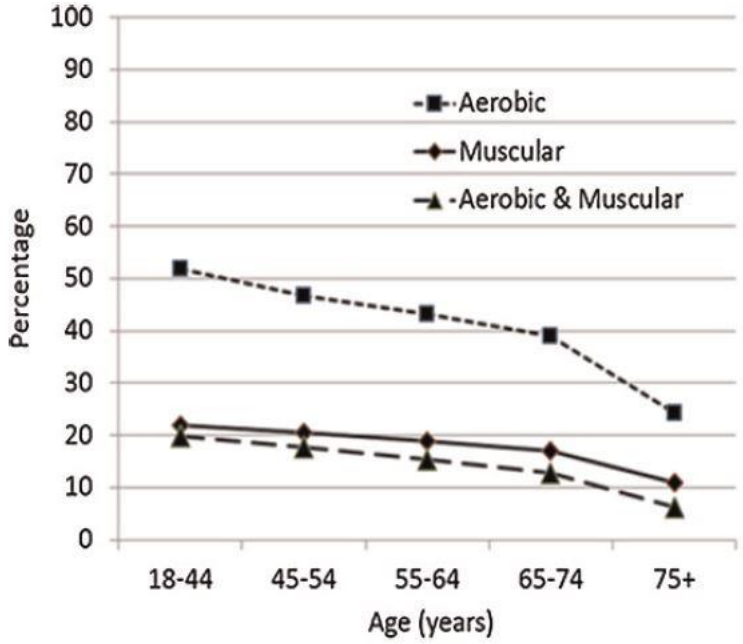
The American College of Sports Medicine (ACSM) recommendations for exercise

Physical activity involvement by women across the lifespan



Cardiorespiratory exercise	• ≥5 days/week for 30 to 60 minutes/day of moderate intensity (~150 minutes/week) or
	• ≥3 days/week for 20 to 60 minutes/day of vigorous intensity (~75 minutes/week) or
	• A combination of both
Resistance exercise	• 2 to 3 days/week train each major muscle group
	° To improve strength: 8 to 12 repetitions, 2 to 4 sets
	° To improve muscular endurance: 15 to 20 repetitions, 1 to 2 sets
	° For middle-aged and older adults just starting exercise: 10 to 15 repetitions, 1 to 4 sets
Flexibility exercise	• ≥2 to 3 days/week to improve joint range of motion
	° Greatest gains occur with daily exercise
	° 30 to 60 seconds/stretch
Neuromotor exercise training	• ≥2 to 3 days/week for ≥20 to 30 minutes/day
	° Including motor skills (*i.e.*, balance, agility, coordination, and gait), proprioceptive training, and multifaceted activities (*i.e.*, *tai chi* and yoga)

Woolf et al, 2016

Lifestyle advice for the management of menopausal symptoms and for prevention of chronic disease

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Diet	Supplementation	Physical activity	General
• ↑ mono- and polyunsaturated fats • ↑ complex carbohydrates (legumes, rice, fruits, beans, whole-grain cereals) • ↑ proteins (fish, poultry, plants, skimmed dairy products)	• Calcium and vitamin D through either diet or supplements	• Aerobic exercise ≥150 min/week (moderate intensity) or 75 min/week (vigorous intensity) • Muscle-strengthening activities ≥2 days/ week or as active as possible • Reduce sedendary behaviour as much as possible	• Lighter clothing, sleeping in cooler room, use fans • Reduce stress • Control triggers of vasomotor symtpoms (e.g. spicy foods, coffeine, smoking) • Relaxation techniques (e.g. deep breathing, guided visualization, progressive muscle relaxation)

Lambrinoudaki et al, 2022

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Thank You!

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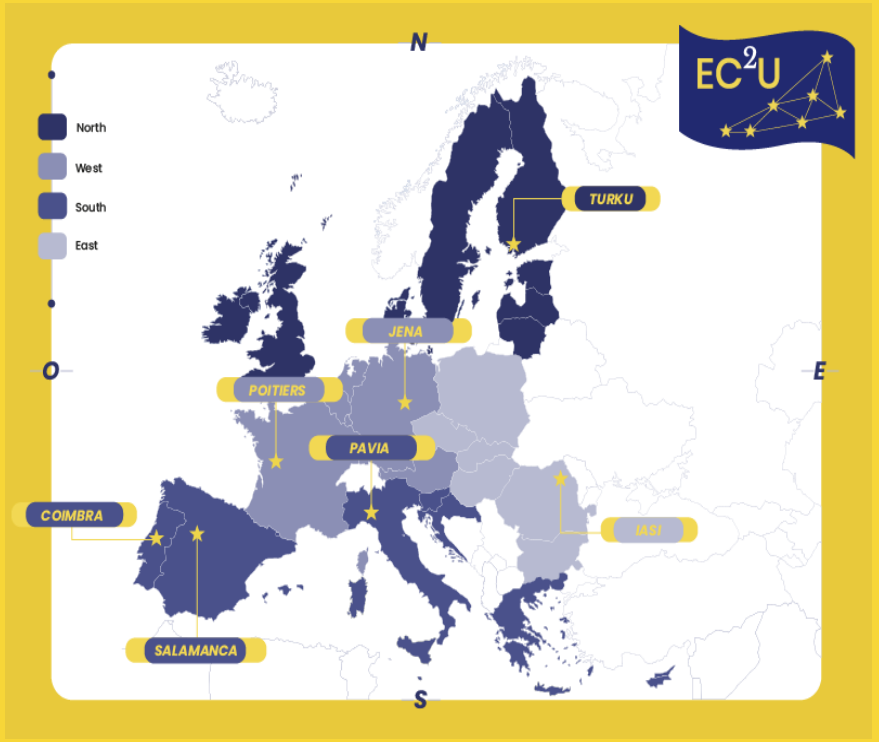

Thank you !

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