

The Role of Nutritional Sciences in Global One Health

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2026-05-07



Land Acknowledgement

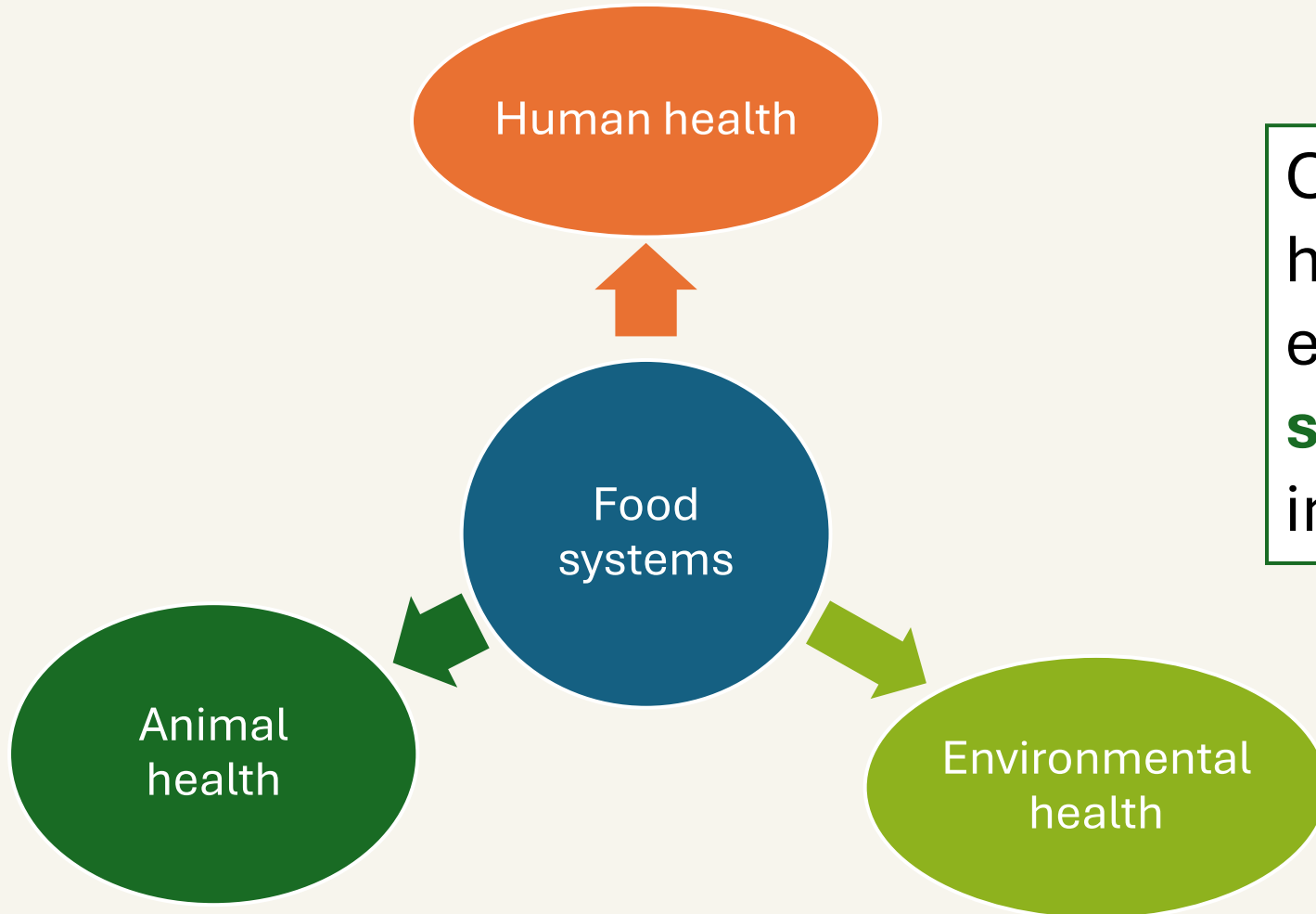
I would like to begin by acknowledging that I live and work on unceded Indigenous territory and to recognize the enduring stewardship of the Kanien'kehá:ka People. Their knowledge systems and practices—grounded in relationships between land, water, animals, and human health—prefigure what we now call One Health. I offer this acknowledgment with humility and as a reminder that advancing One Health today requires listening to and supporting Indigenous leadership and stewardship.

I declare that I have no conflicts of interest and that I do not receive funding from private companies for research or consulting.



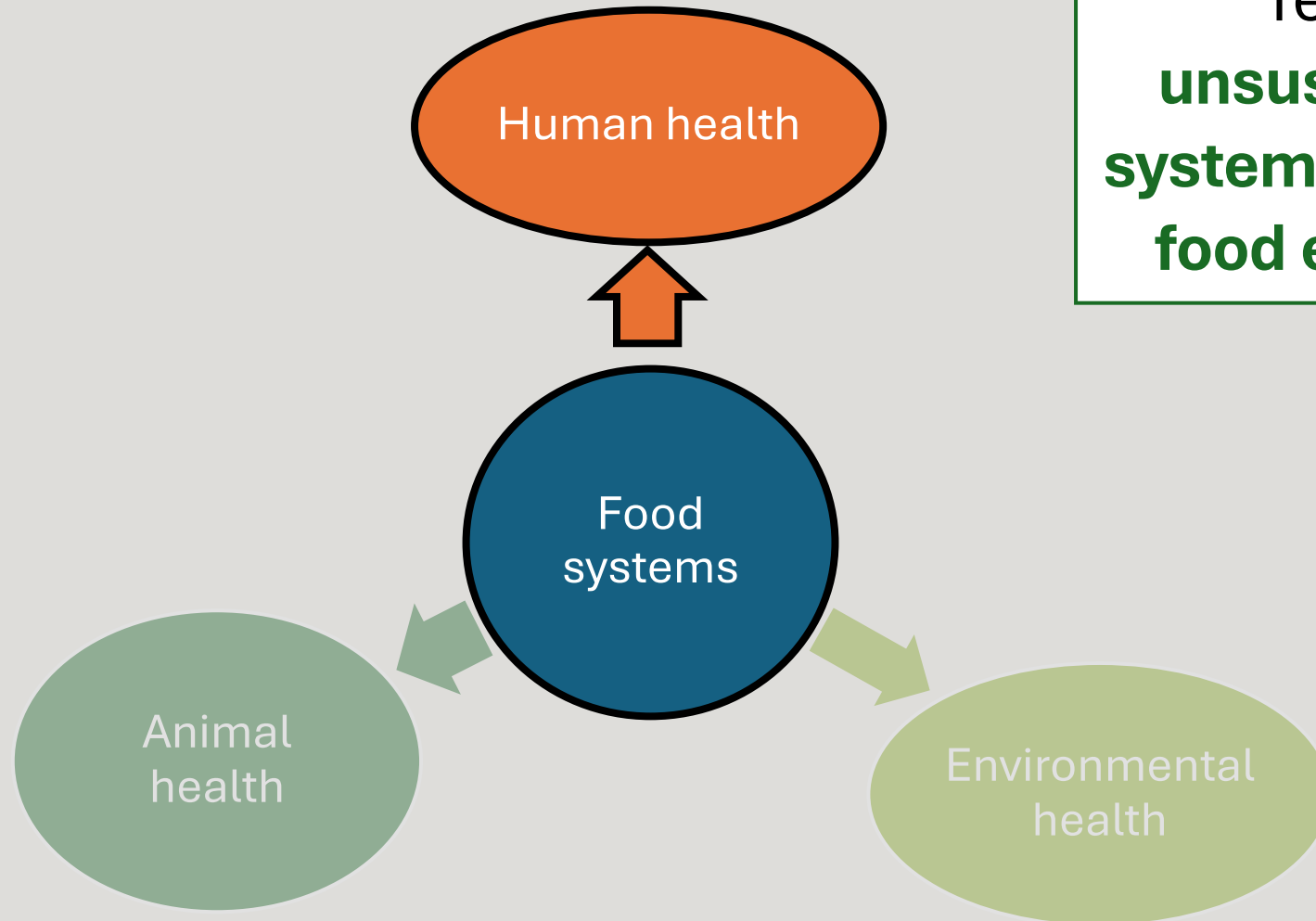
If One Health is about the interdependence between human, animal, and ecosystem health, what is the system where these three domains interact most intensely every day?

Food systems: the operational core of One Health



One Health links human health, animal health, and ecosystems, but **food systems** are where these interactions occur daily.

Food systems: the operational core of One Health



Nutrition and health issues are primarily a reflection of **unsustainable food systems** and **unhealthy food environments**.

In 2025, obesity overtakes underweight

A historic flip in child malnutrition

In 2025, more children aged 5 to 19 worldwide are living with obesity than are underweight — for the first time in history.

14% of children (ages 5–19, global)

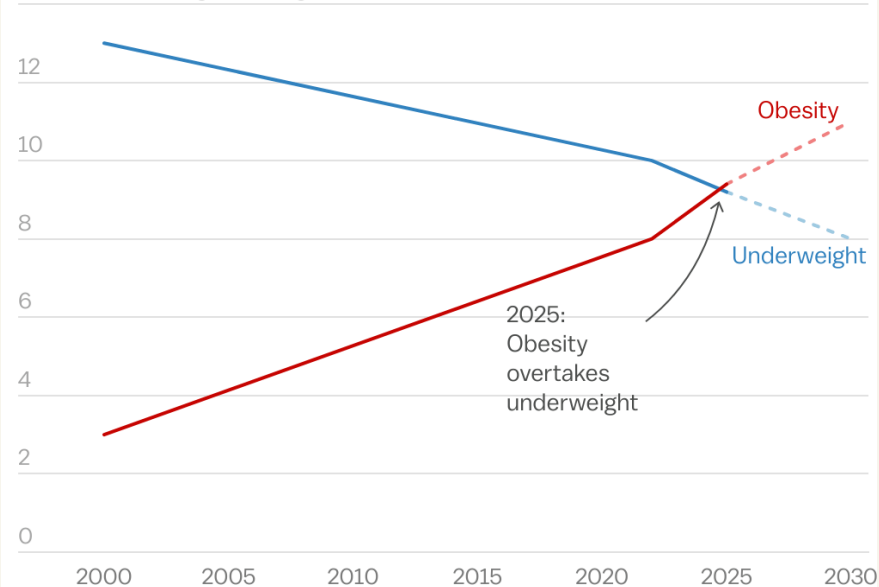


Chart: Pratik Pawar/Vox • Source: UNICEF

Vox

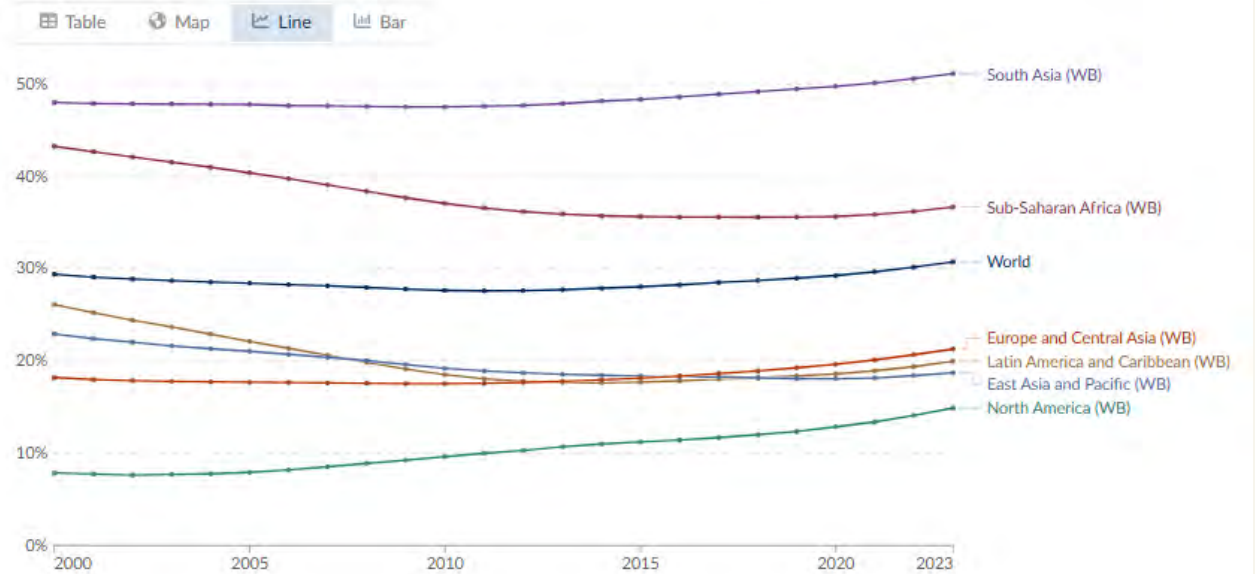
([UNICEF, 2025](#) ; [Pawar, 2025](#))

After years of decline, anemia is on the rise again

Share of women of reproductive age who have anemia

Share of women of reproductive age (aged 15–49) with anemia. Anemia is a condition that develops when your blood lacks enough healthy red blood cells or hemoglobin.

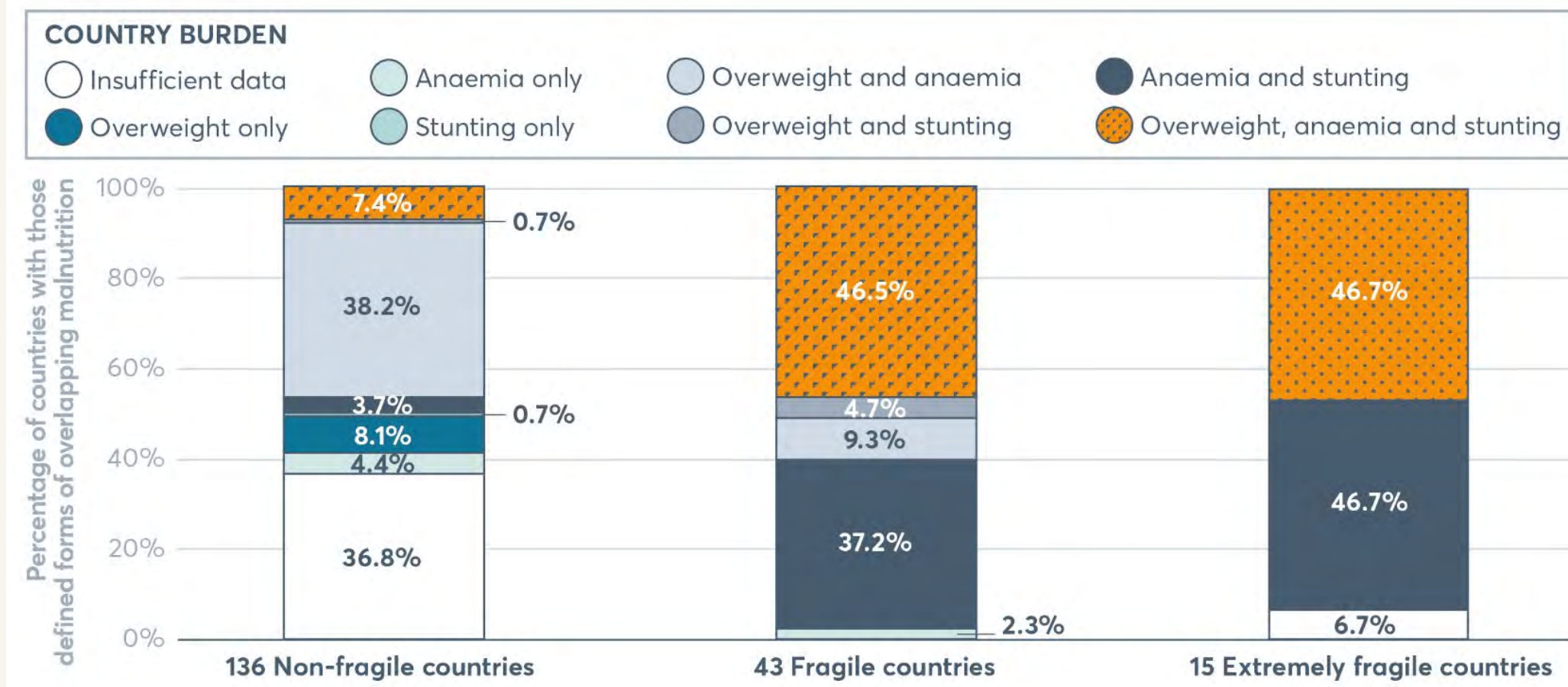
Our World
in Data



([Our World in Data, 2025](#))

*Are conventional food systems
delivering on their promise?*

In the most vulnerable countries, multiple burdens increasingly coexist



Malnutrition in all its forms is particularly prevalent in upper-middle-income countries.

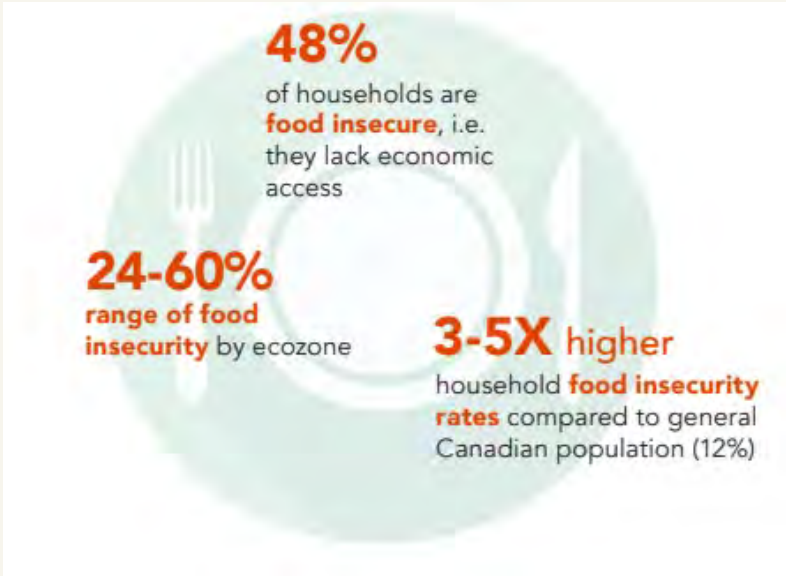
Rising food insecurity and unequal population burden

In 2021 : **5.8 million** people lived in a food-insecure household



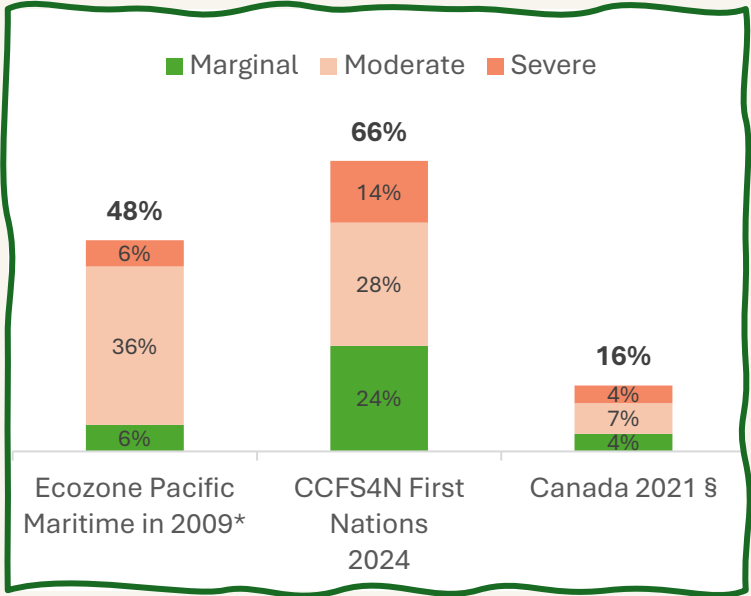
In 2022, **6.9 million** people lived in a food-insecure household

[PROOF study](#)
(Li T., et al., 2023)



Obesity X2
Diabetes X3

Figure from the [FNFNES](#) report.
Data from the FNFNES study.
(Batal et al., 2021)



Prevalence of household food insecurity in three First Nations communities, compared to the Canadian population and the Ecozone level.
Unpublished Data from the CCFS4N study.

First Nations

Women

Immigrants and refugees

Rural populations

Agricultural workers

Low-income households

Single-parent households

Non-communicable diseases are on the rise...
yet infectious diseases persist

- Infectious diseases remain a major cause of death.
- In 2023, 14% died from infectious diseases.

Total disease burden by cause, World

Total disease burden measured as Disability-Adjusted Life Years (DALYs) per year. DALYs measure the total burden of disease – both from years of life lost due to premature death and years lived with a disability. One DALY equals one lost year of healthy life.

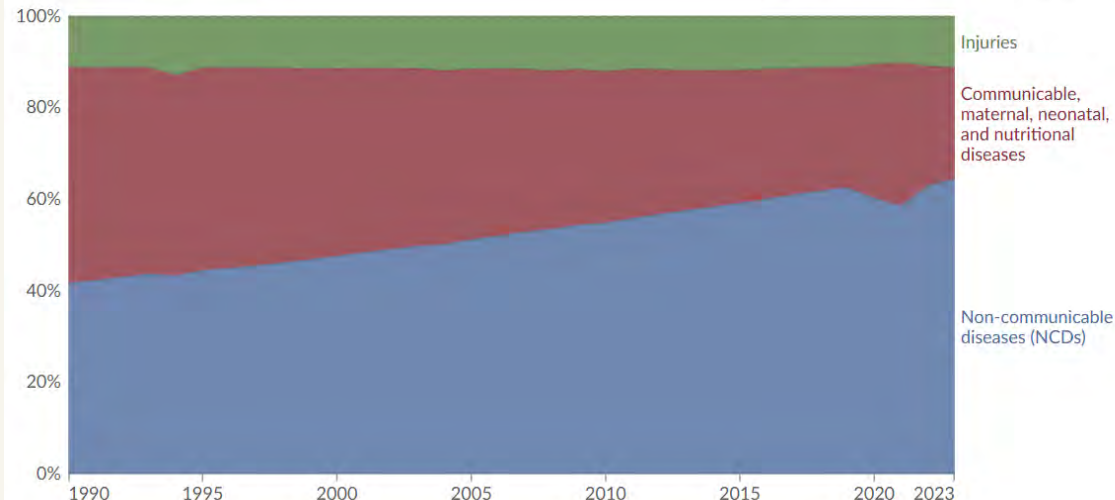
Our World in Data

Table

Area

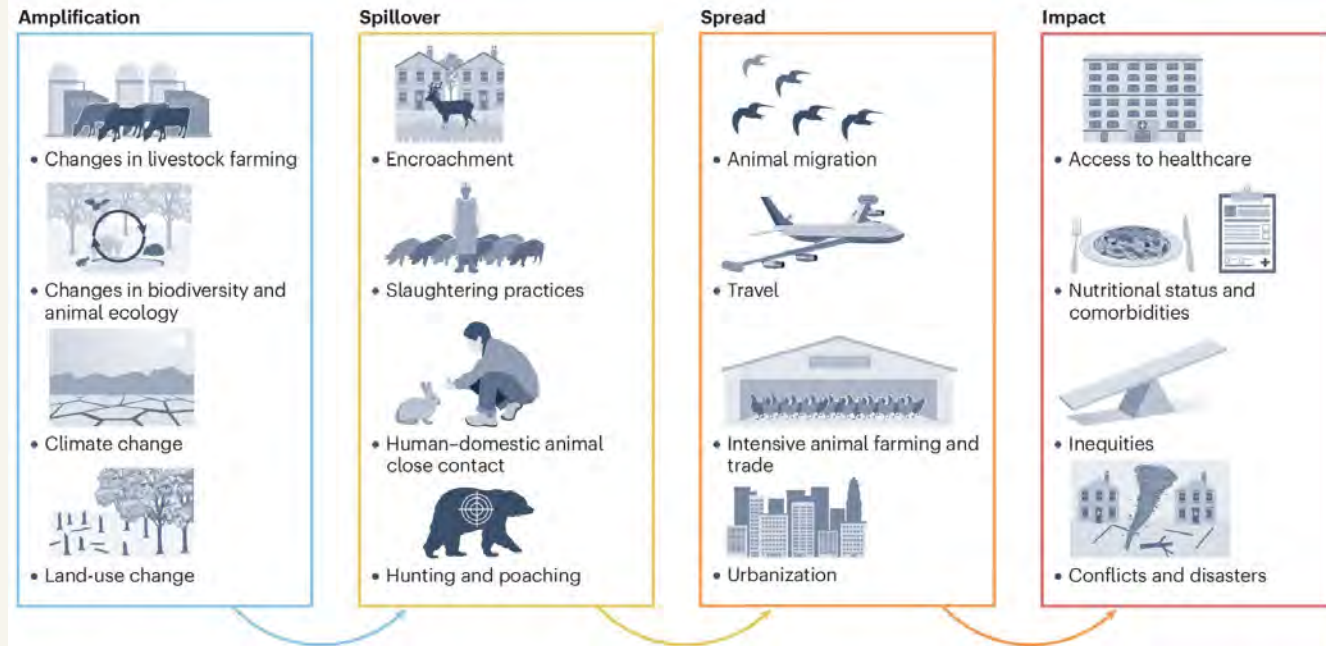
Edit countries and regions

Settings



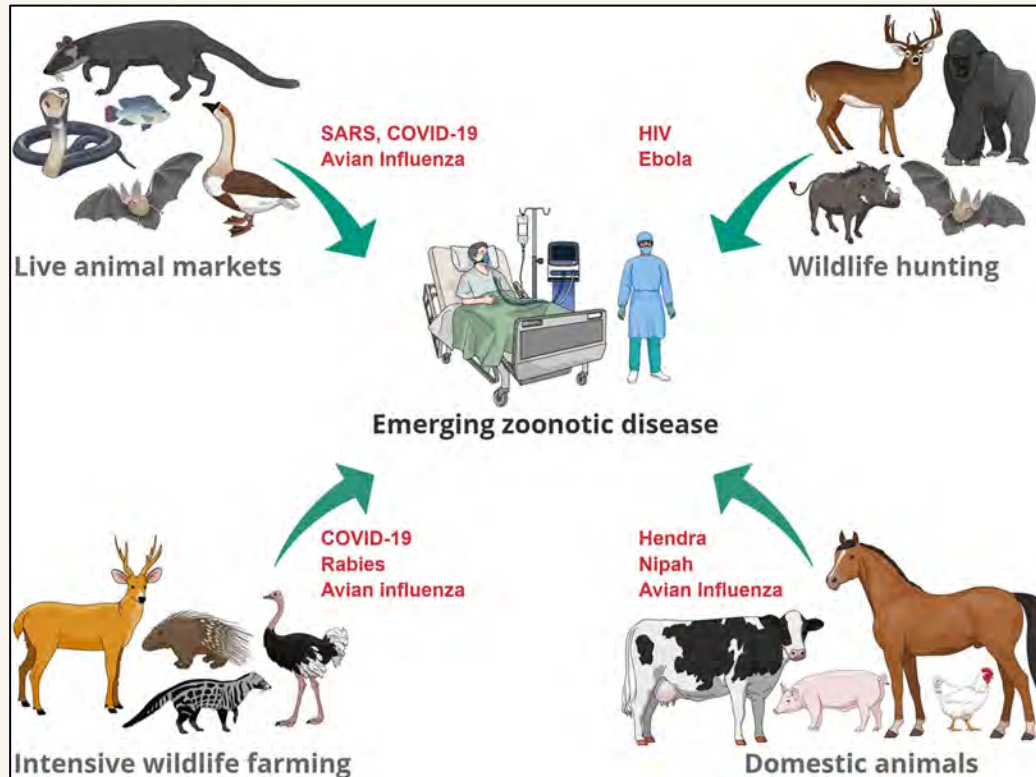
(Our World in Data 2022)

Fig. 1: Viral emergence and its key drivers.



Sikkema & Koopmans 2026

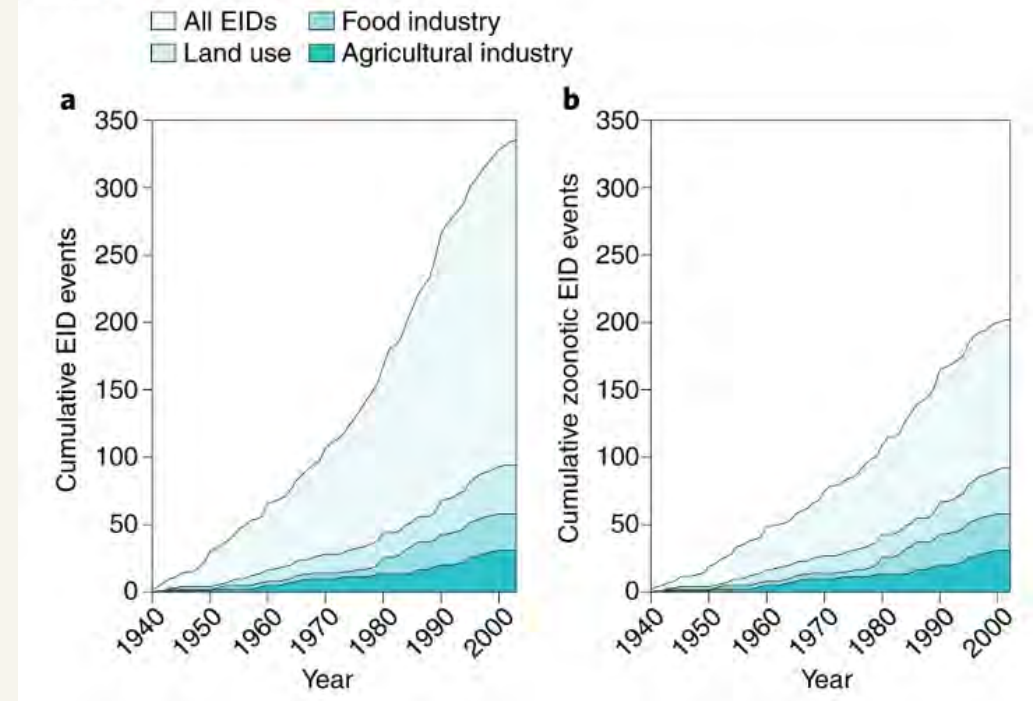
More than 60% of known infectious diseases are **zoonotic** in origin



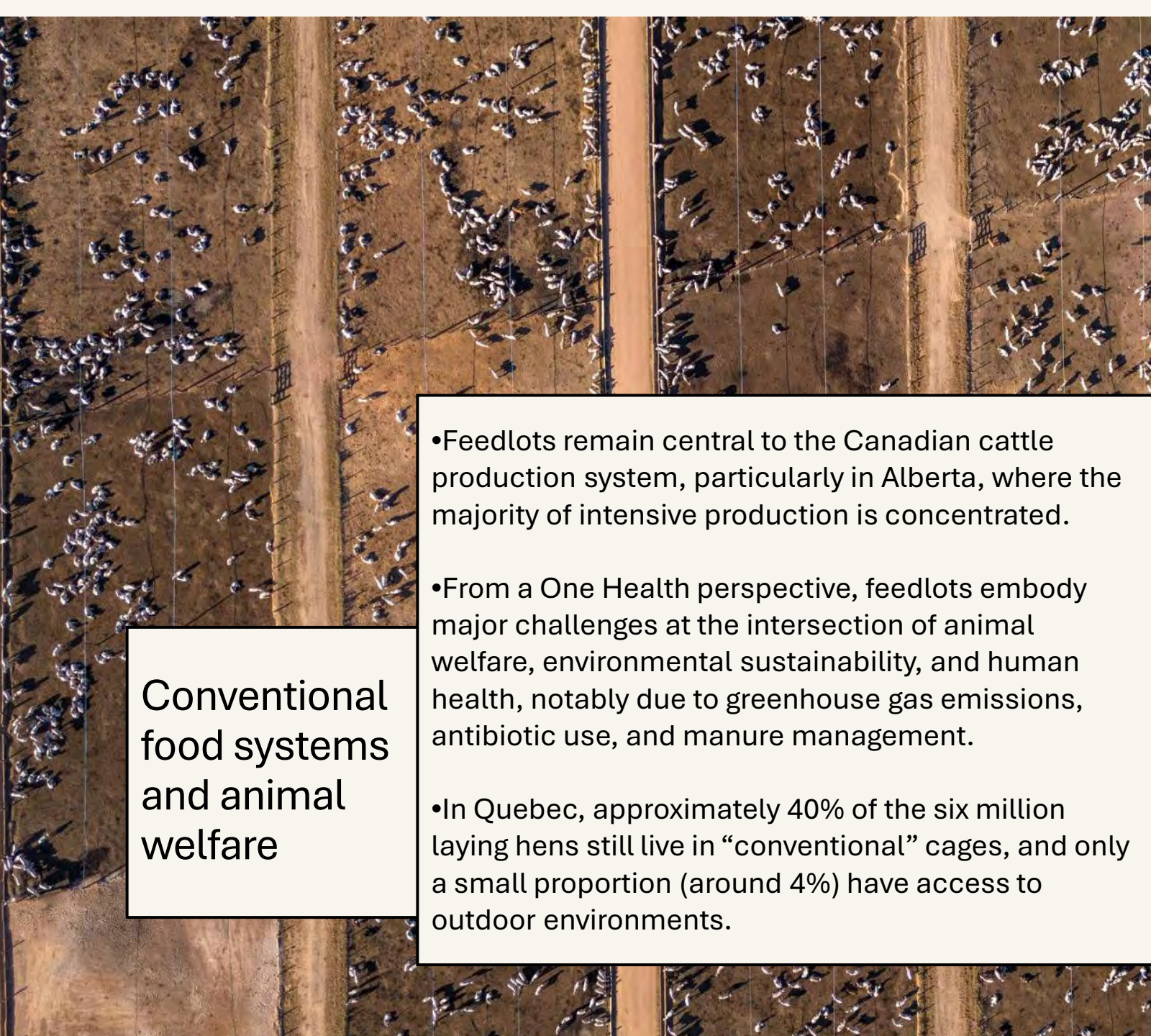
Examples of zoonotic diseases that have (re-)emerged at the animal-human interface.

Figure from [Magouras et al. \(2020\)](#)

Fig. 5: Effects of agricultural drivers on emerging infectious diseases (EIDs) and zoonotic EIDs of humans since 1940.



- Agricultural drivers were associated with 25% and nearly 50% of zoonotic diseases that emerged in humans.
- Numerous transmission pathways exist and are exacerbated by conventional intensive livestock and agricultural systems.



Conventional food systems and animal welfare

- Feedlots remain central to the Canadian cattle production system, particularly in Alberta, where the majority of intensive production is concentrated.
- From a One Health perspective, feedlots embody major challenges at the intersection of animal welfare, environmental sustainability, and human health, notably due to greenhouse gas emissions, antibiotic use, and manure management.
- In Quebec, approximately 40% of the six million laying hens still live in “conventional” cages, and only a small proportion (around 4%) have access to outdoor environments.



Our conventional food system feeds only 30% of the world's population... Yet the consequences of such a system **affect the health of the entire environment**

- Conventional agriculture uses 75% of agricultural land, water, and energy resources.
- Our food system is responsible of 1/3 of global anthropogenic GHG emissions (8 to 10% from food waste).
- Globally, 13% of food is lost between harvest and retail and 19% is wasted in households, in the food service and in retail

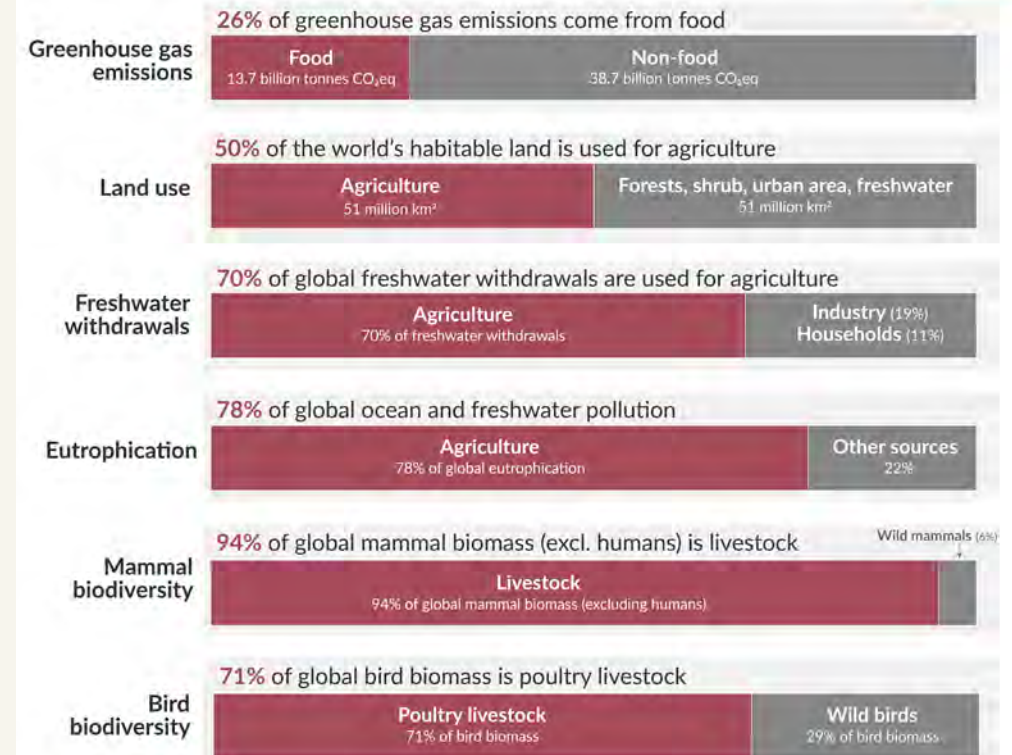


Environmental impacts: The Amazon rainforest is being decimated for vegetable oil production



The environmental impacts of food and agriculture

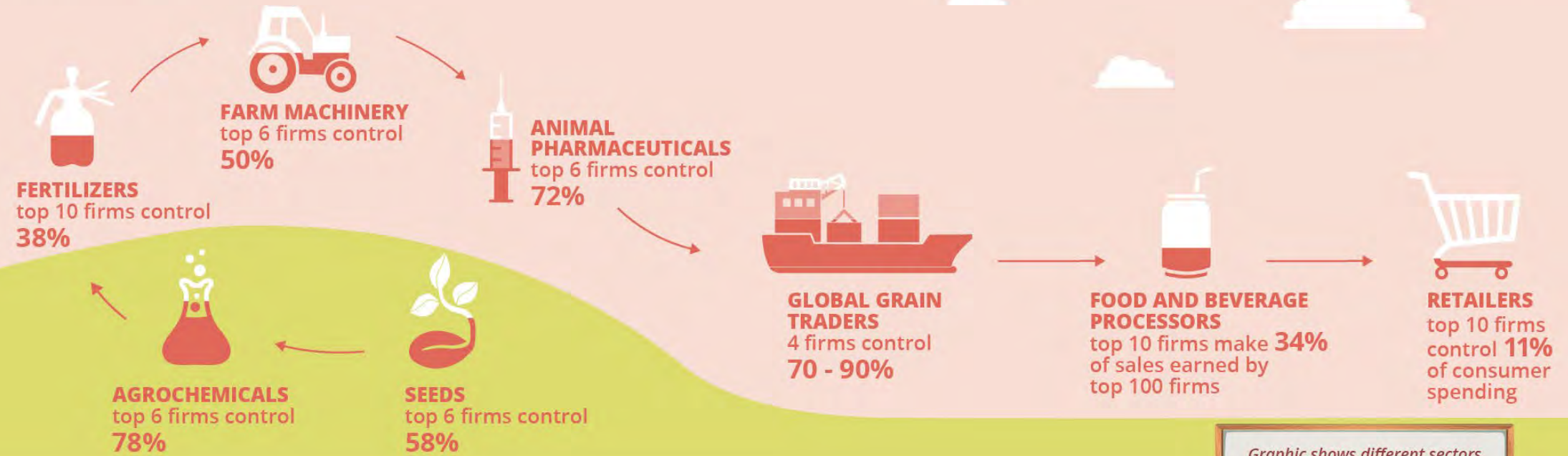
Our World in Data



Data sources: Poore & Nemecek (2018); UN FAO; UN AQUASTAT; Bar-On et al. (2018)
OurWorldinData.org - Research and data to make progress against the world's largest problems.

Licensed under CC-BY by the author Hannah Ritchie
Data published November 2020

Corporate concentration in the agri-food supply chain



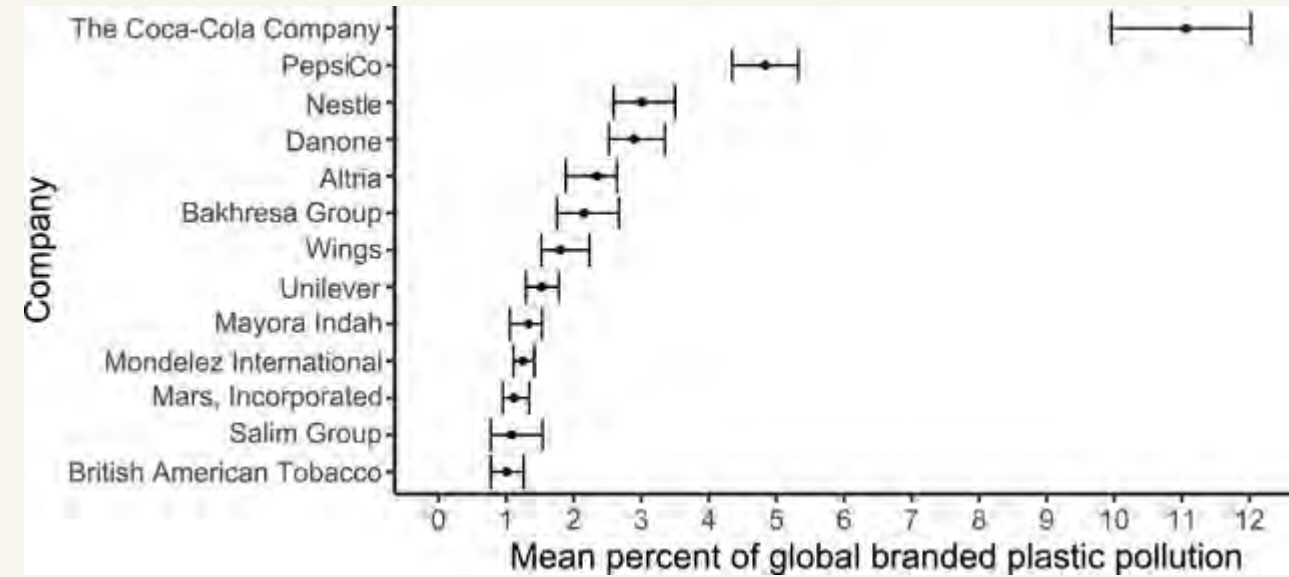
Graphic shows different sectors of the agri-food chain and the percentage of the world market that the top firms control

Source: ETC Group, 2022. Food Barons 2022.

The example of Ultra-processed foods



(Break Free From Plastic, 2023)



(Cowger et al. 2024)

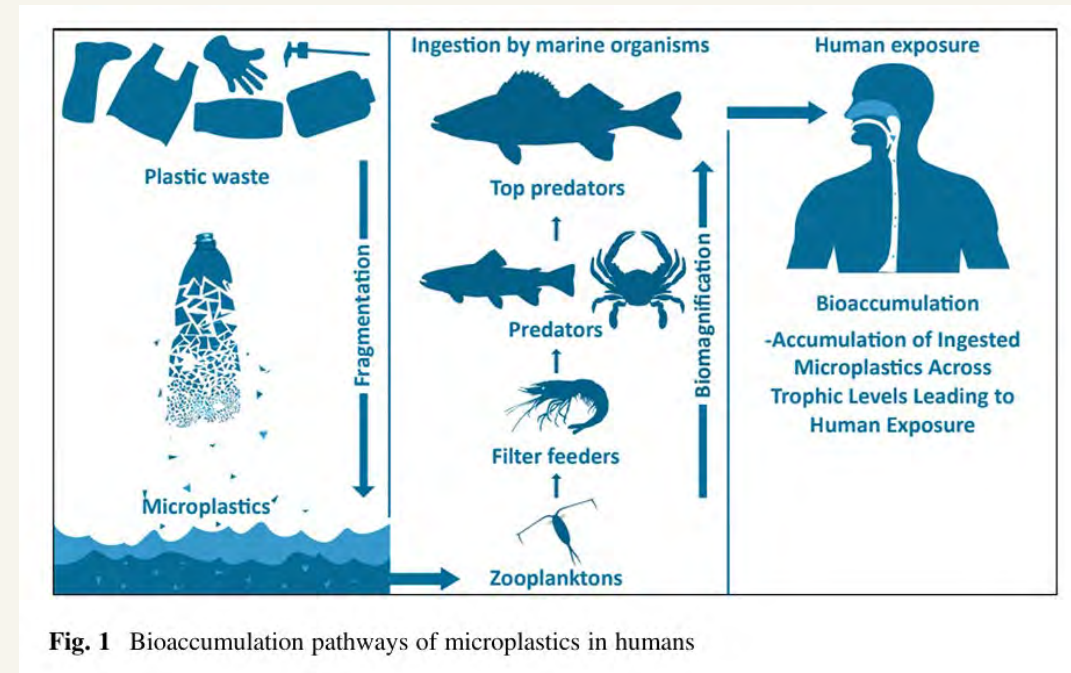


Fig. 1 Bioaccumulation pathways of microplastics in humans

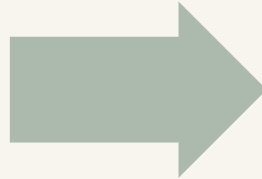
(Joseph et al. 2026)

How can we shift the paradigm?

Rethinking food systems

Current paradigm:

- Productivism
- Industrialization
- Capitalism
- Growth
- Individual responsibility and nutrient-focused nutrition



Paradigm that must emerge:

- Health
- Food sovereignty
- Sustainability
- Equity
- Social justice
- **One Health**

Solutions based in the heart of food
systems and nutritional sciences

Near salmon
extirpation by the
1990s

- Overfishing, damming projects on the Columbia River, poor water management strategies, and environmental disruptions dramatically decreased the salmon populations in the Columbia River system and its Okanagan sub-basin.
- Salmon fishery was disrupted impacting traditional diets, physical and social well-being.

*Sockeye Salmon
Reintroduction to
Skaha Lake*

- Okanagan Nation Alliance and members of the communities
- Reclaim food sovereignty
- Yearly fish fry releases, restoring natural habitats and migratory pathways, and controlling water levels
- Sylix-led initiative that includes cultural activities

Fish harvesting
increased

- Improved fishing techniques, intake promotion of reintroduced salmon
- Cultural food security, improved well-being, sense of belonging to their community

- Importance of traditional foods not only for human health but also for the environment.
- This multidisciplinary project incorporates the **One Health approach** into its design.
- This has nutritional, environmental, and cultural impacts through the restoration of a key traditional food.

Revalorisation of Indigenous traditional food systems: Reintroduction of Okanagan Sockeye Salmon



Agroecology

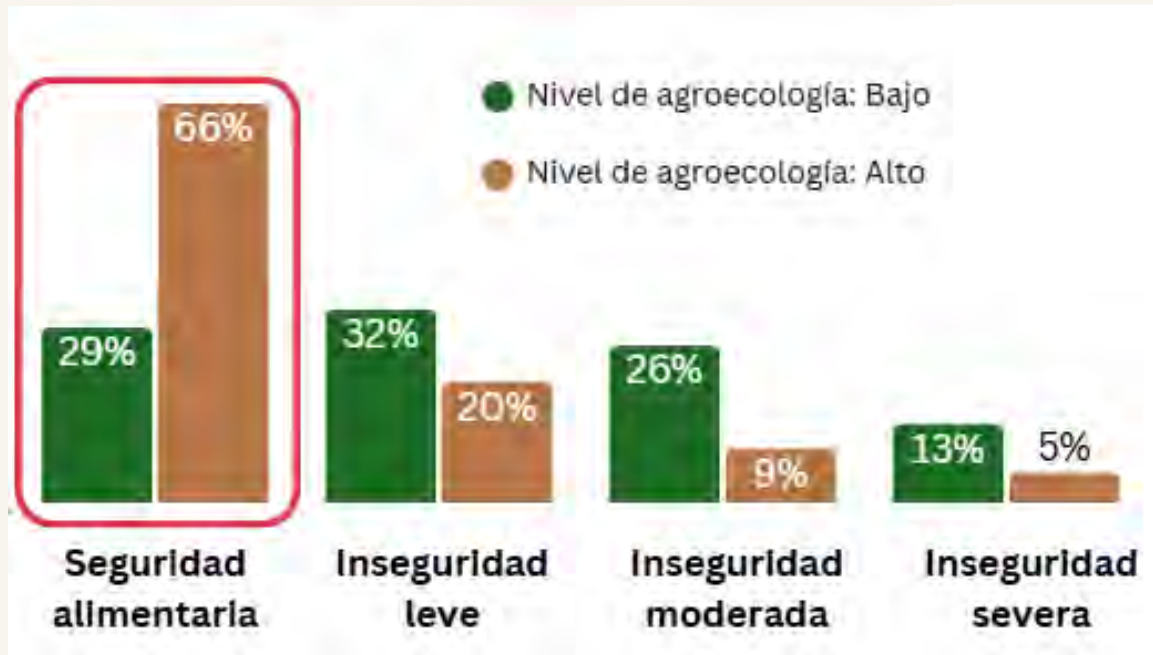


«Rather than tweaking the practices of unsustainable agricultural systems, agroecology seeks to transform food and agricultural systems, addressing the root causes of problems in an integrated way and providing holistic and long-term solutions. This includes an explicit focus on social and economic dimensions of food systems. **Agroecology places a strong focus on the rights of women, youth and indigenous peoples.**»

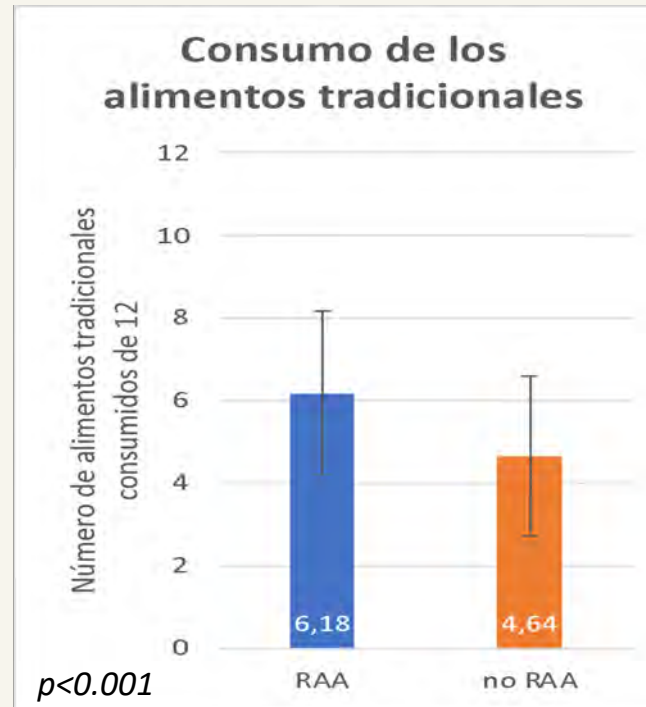
(FAO, 2018)

Agroecology is associated with...

- Improved dietary diversity
- Higher traditional food consumption
- Better food security

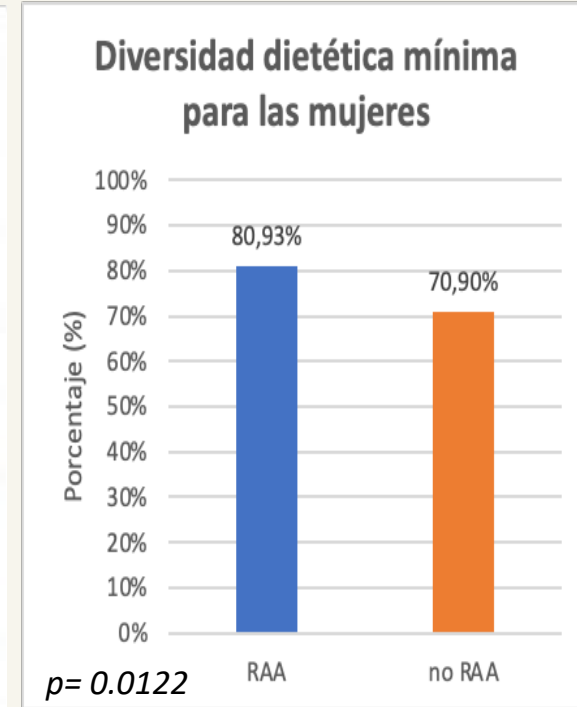


Food insecurity prevalence according to agroecology levels.
Unpublished data from the study Utz K'aslemaal (2025)



Consumption of traditional foods among female farmers in AFNs vs. female farmers in the control group.

Unpublished data from the EKOMER study



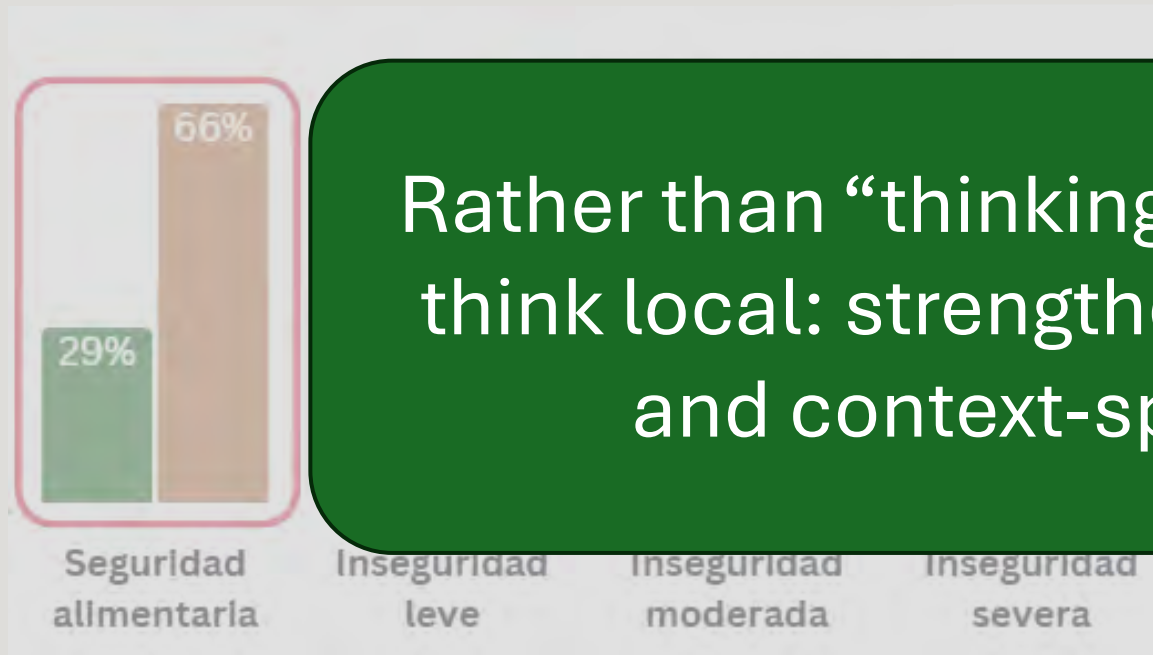
Percentage of female farmers with a score of at least 5 on the MDD-W (Minimum Dietary Diversity among Women) scale.

Unpublished data from the EKOMER study

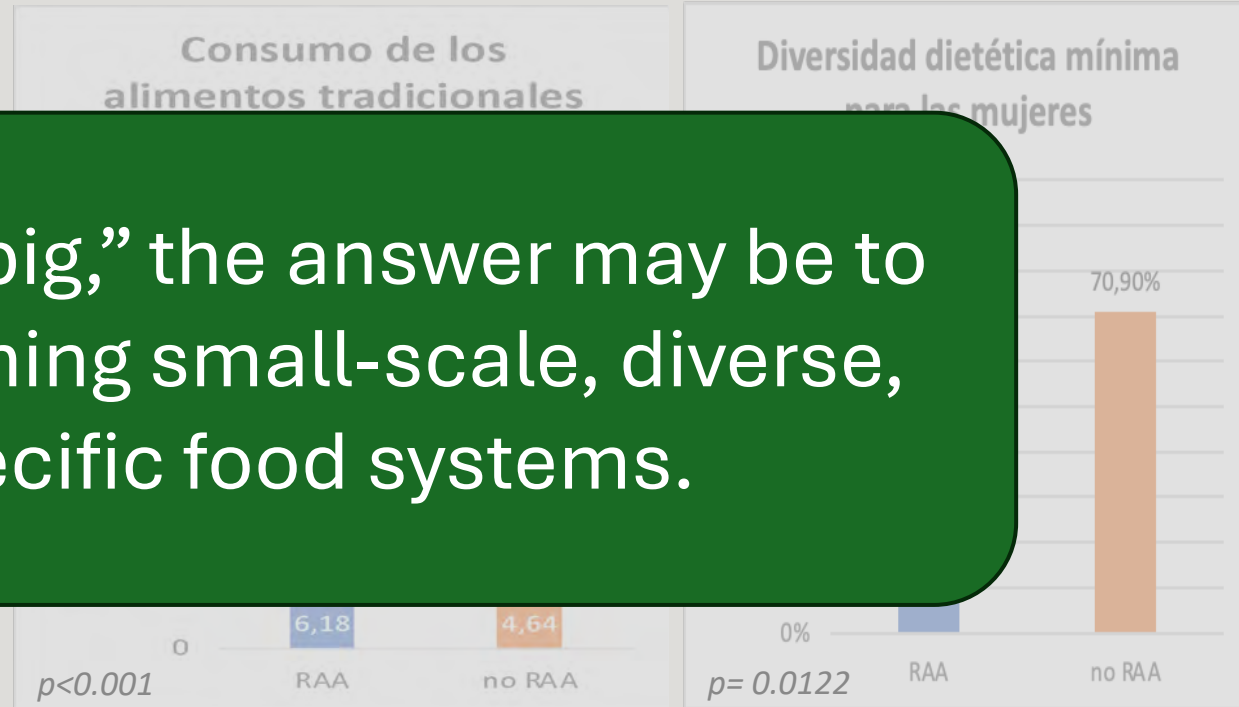
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Rather than “thinking big,” the answer may be to think local: strengthening small-scale, diverse, and context-specific food systems.



Food insecurity prevalence according to agroecology levels.
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Percentage of female farmers with a score of at least 5 on the MDD-W (Minimum Dietary Diversity among Women) scale.
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Food systems and nutritional sciences constitute a uniquely integrative lens for understanding and advancing One Health

- Food systems are the primary interface linking human, animal, and ecosystem health.
- Nutritional sciences provide essential tools to **measure** and **guide transformations of these systems**.
- Integrating animal health, animal welfare, antimicrobial resistance, and diet-related disease is essential to operationalizing One Health.



Figure 8: The food system

At the heart of food systems are interdependent relationships between humans, other animals, plants, and the wider environment. The One Health approach is crucial for addressing the health and sustainability challenges that arise in connection with contemporary food systems, and for advancing equitable, sustainable, and healthy food systems.

MOOC on Sustainable Food Systems

Available in three languages!



French



English



Spanish





Laboratoire de
Malek Batal
Lab

CANADA RESEARCH CHAIR IN
NUTRITION AND HEALTH
INEQUALITIES

WELCOME

We recognize that the Chair is located on lands
that are part of the unceded traditional territory of
the Kanien'keha:Ka (Mohawks). We are taking
steps to revealing and redressing



Faculté de médecine
Département de nutrition
Université
de Montréal

CHAIRE DE RECHERCHE DU
CANADA SUR LES INÉGALITÉS
EN NUTRITION ET SANTÉ

BIENVENUE

Nous reconnaissons que la Chaire se trouve sur
des terres qui font partie du territoire traditionnel
non cédé des Kanien'keha:Ka (Mohawks). Nous
prenons des mesures pour contribuer à

Thank you!

<https://www.ciens-malekbatal.com/>



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