Prevention of NCDs: Moving From Nutrition to Food Systems On The SDG Pathway

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NCDs

A Global Threat To Health And Sustainable Development

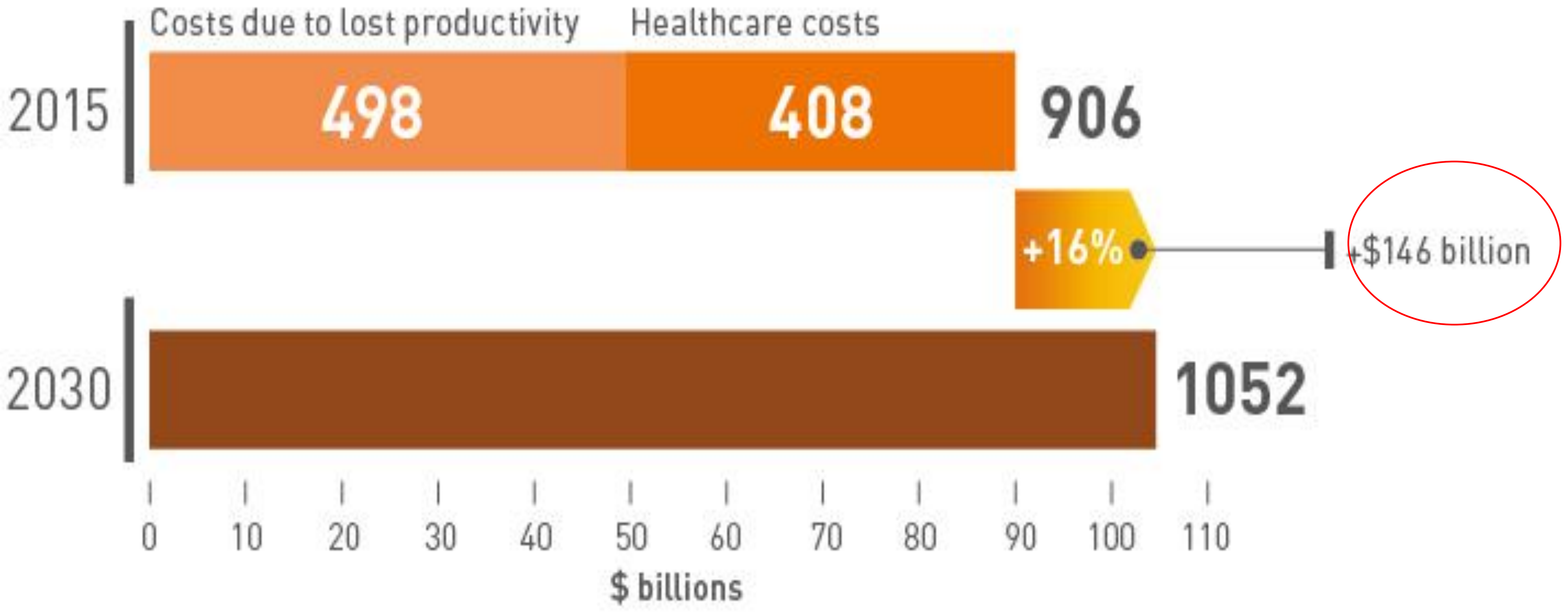
- 40.5 Million Deaths In 2016
- 71% Of Global Deaths
- 78% Of NCD Deaths In LMICs
- High Proportion Of LMIC Deaths In Middle Age
- Global Economic Cost Of NCDs & Mental Illness

  = 47 Trillion Dollars (2011-2030)
- NCDs Cause Poverty, Lost Productivity, High Healthcare Costs

- **Between 2010 & 2025, deaths from 4 main NCDs will rise from 28.3 million to 38.8 million; of the 10.5 Million Additional Deaths, 9.5 Million will be in LMICs.**

Kontis et al, Lancet; 2014

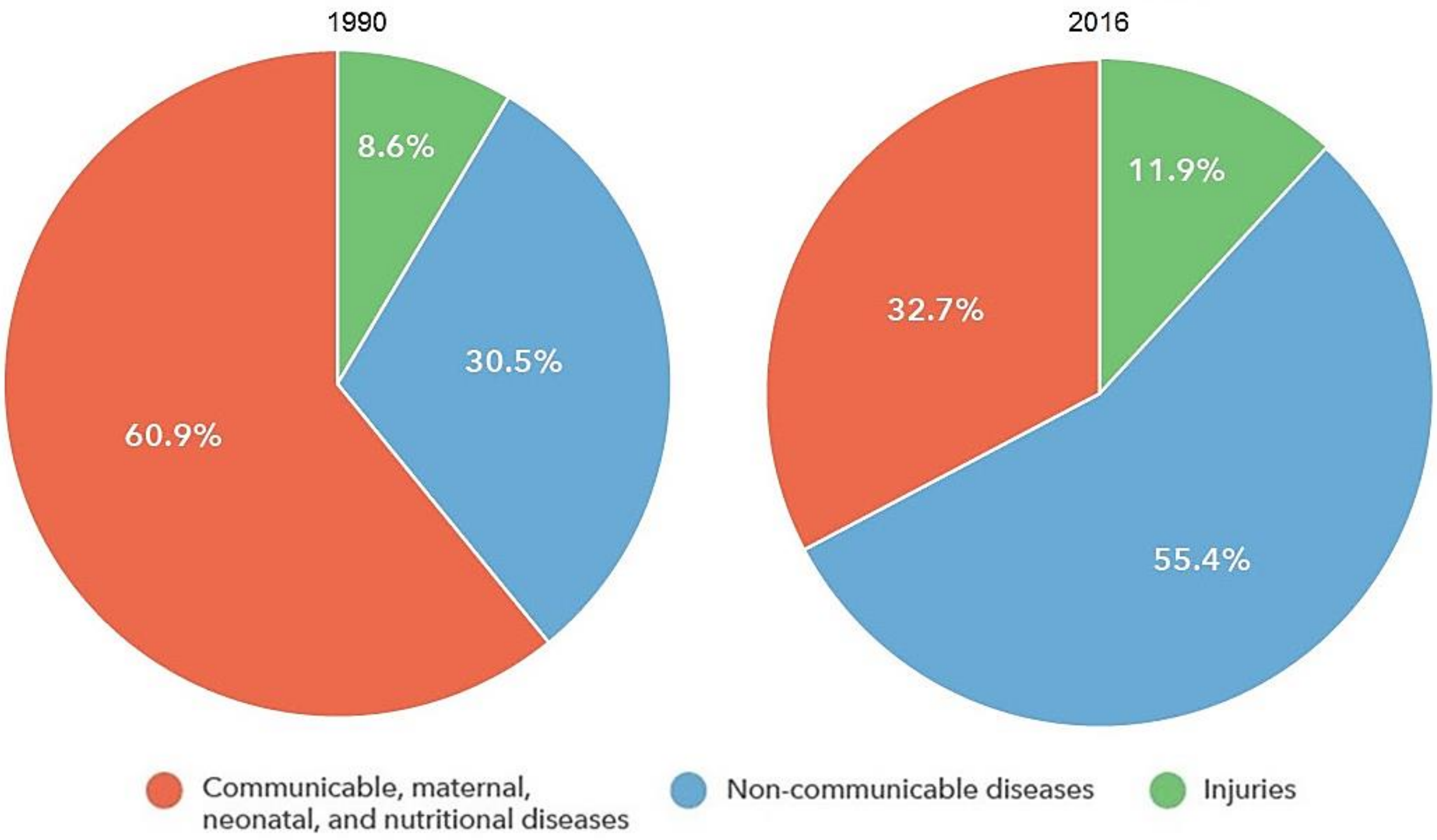
Global Costs of Cardiovascular Diseases



NCDs, including CVD, **accelerate poverty** – and conversely, **reducing** the burden of NCDs supports development

Shift in Causes of Disease Burden in India

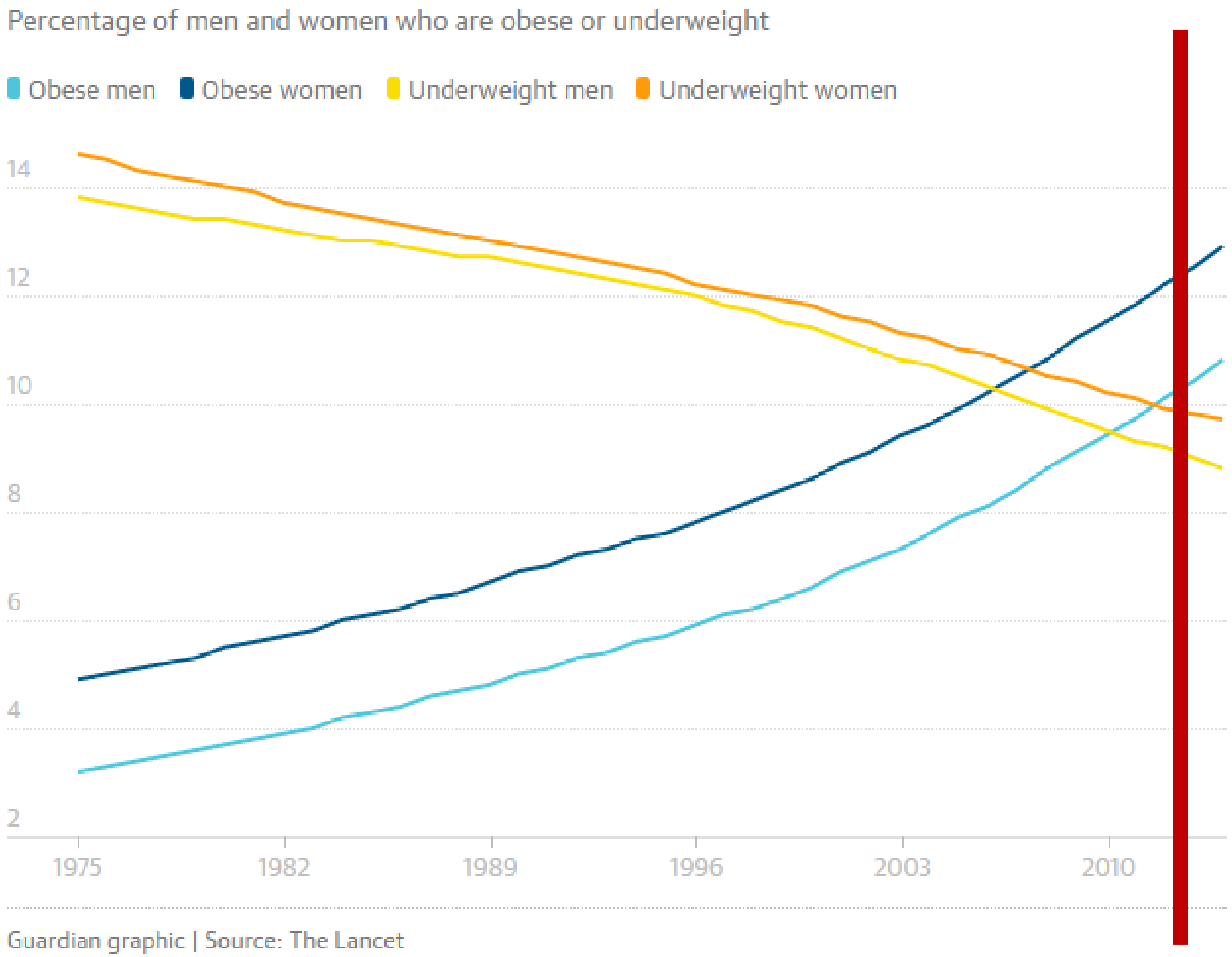
Contribution of major disease groups to disease burden (DALYs)



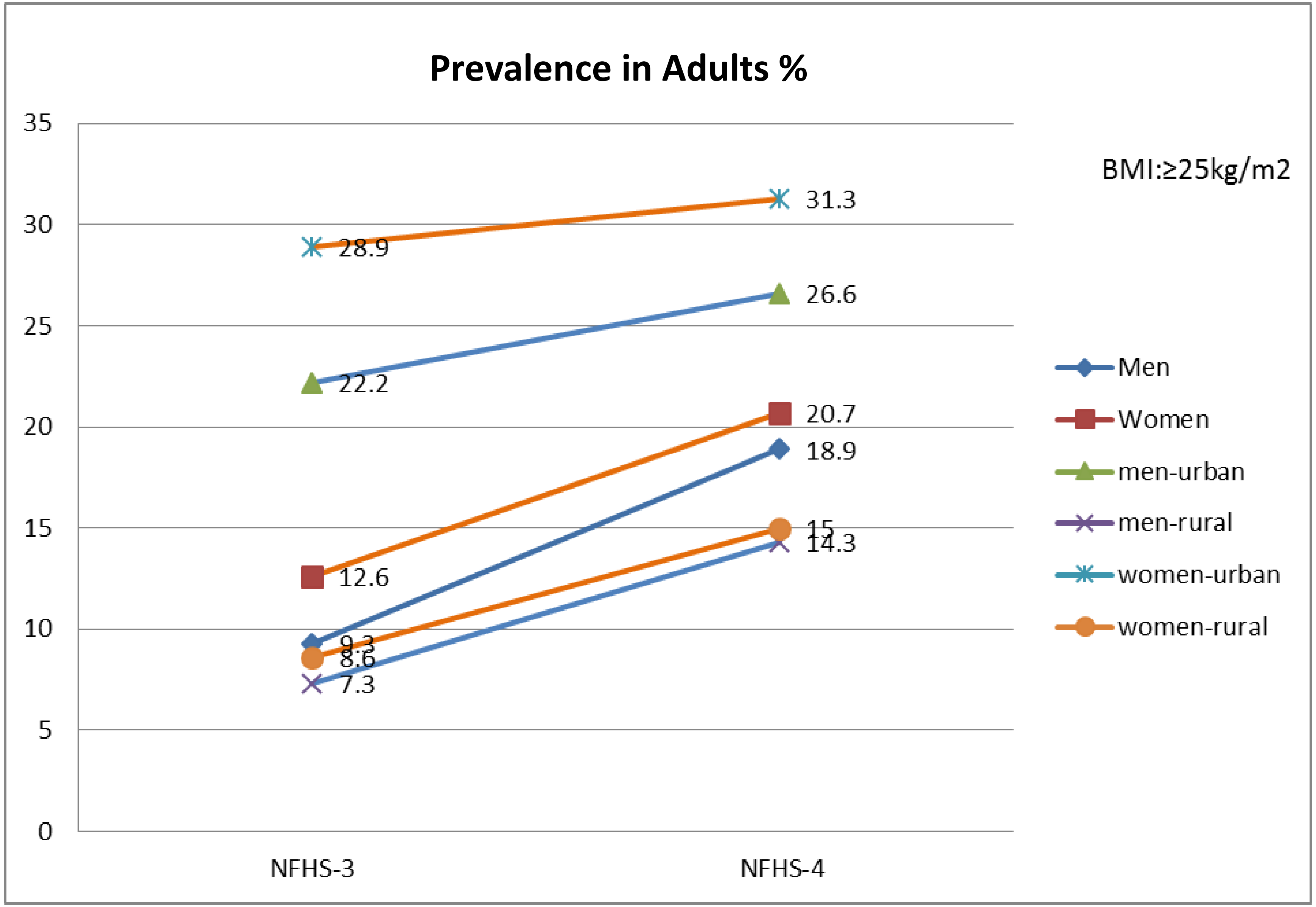
NCDs caused 63% deaths
CVD is the leading NCD: 27% deaths

The World Just Crossed A Critical Threshold

First, adult obesity has now officially overtaken (adult) underweight globally.



‘Obesity’ Trends in India 2005-6 to 2015-16

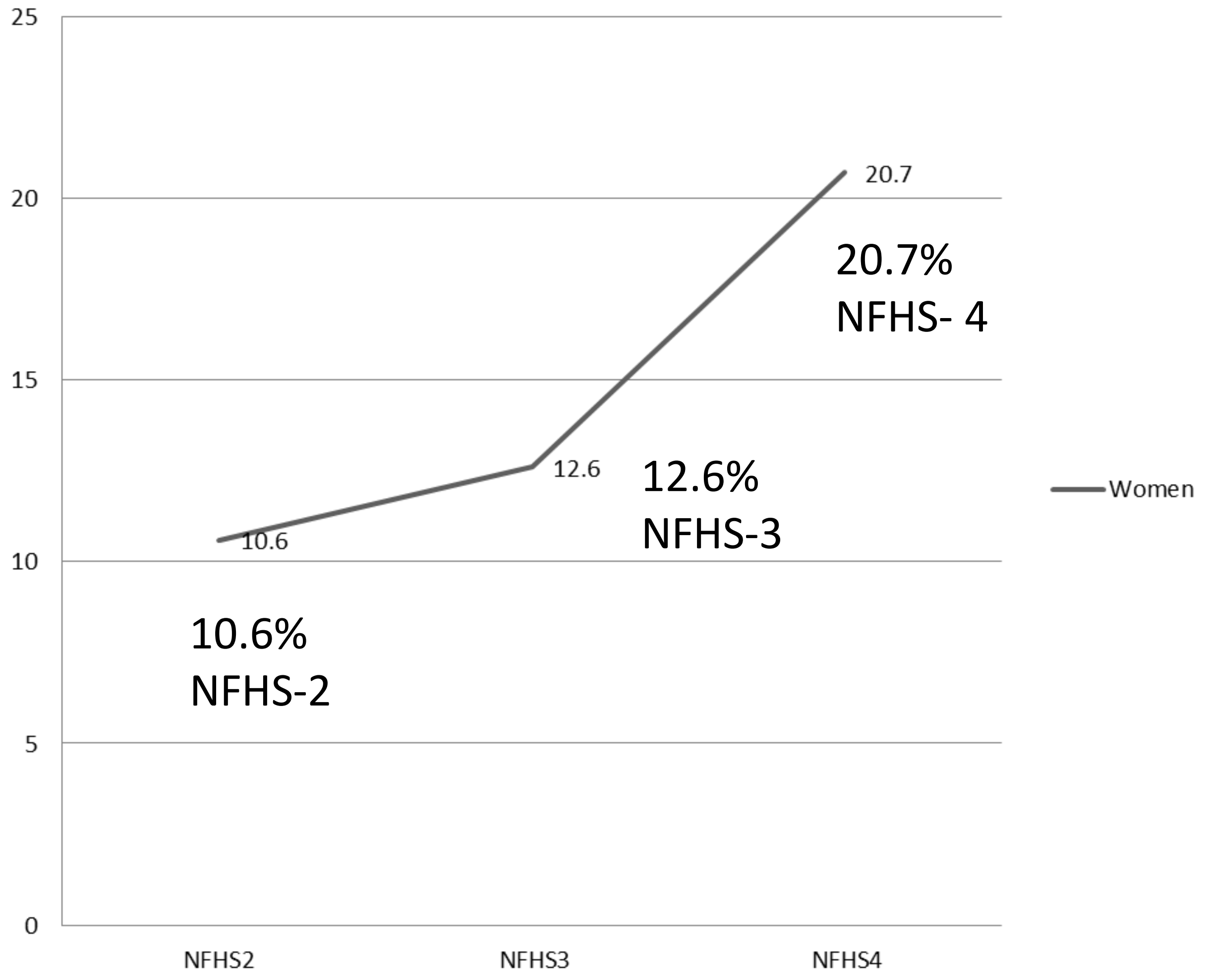


‘Obesity’ includes overweight (BMI≥25)

data analysed from the NFHS

http://rchiips.org/NFHS/about.shtml

Steep Rise In Prevalence On ‘Obesity’ 1998-99- 2005-2006-2015-17- Women



data analysed from the NFHS
http://rchiips.org/NFHS/about.shtml

NFHS-2 : 1998-1999
NFHS-3 : 2005-6
NFHS–4- 2015-16

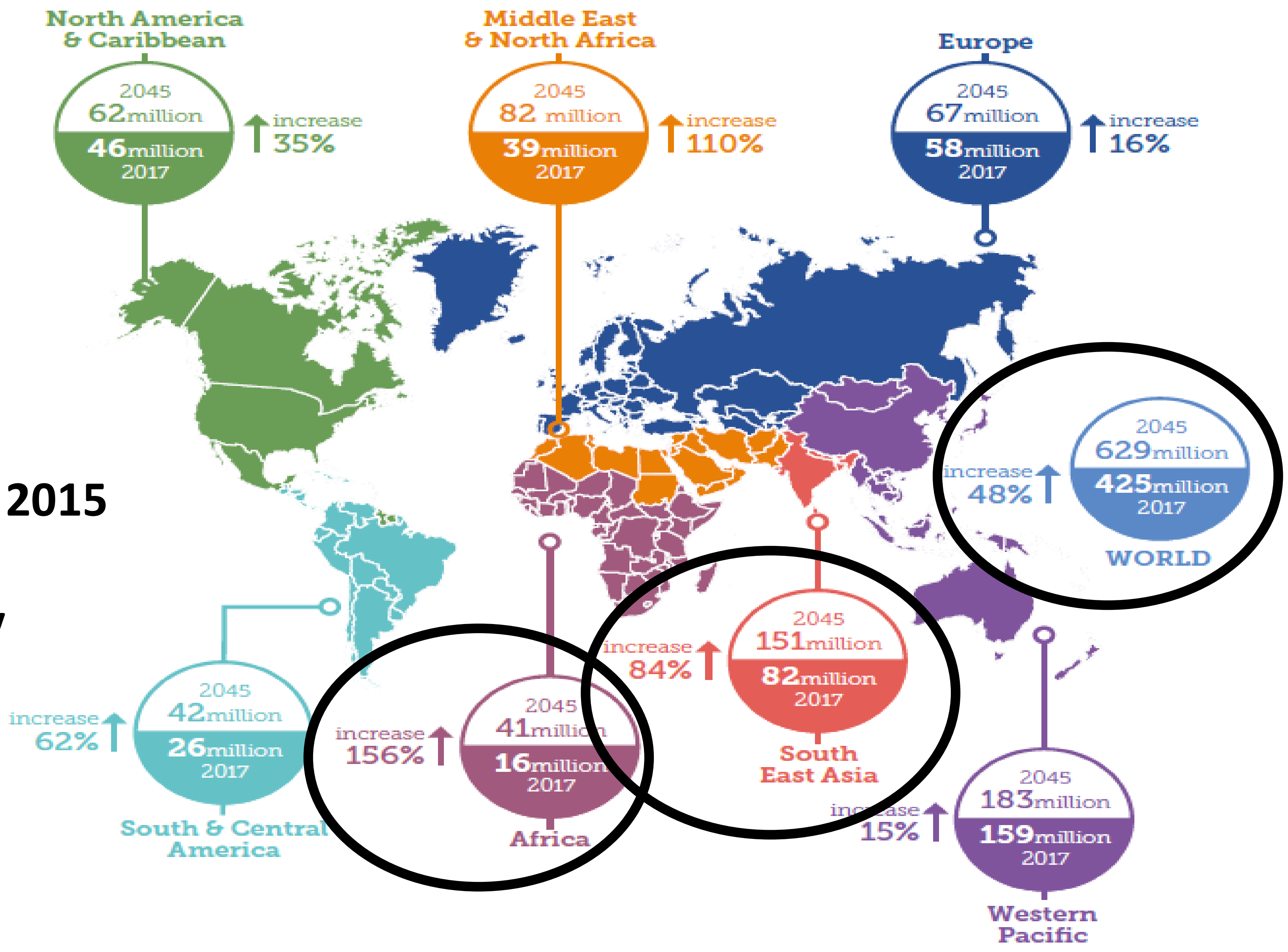
‘Obesity’ includes overweight

Adults With With Diabetes, 2017 And 2045

- 2000 = 151 million
  2017 = 425 million
  2045 = 629 million

- US$54 billion more spent
on treatment globally than in 2015

- Diabetics 2-3x more likely
to develop CVD



Source: IDF Diabetes Atlas 2017

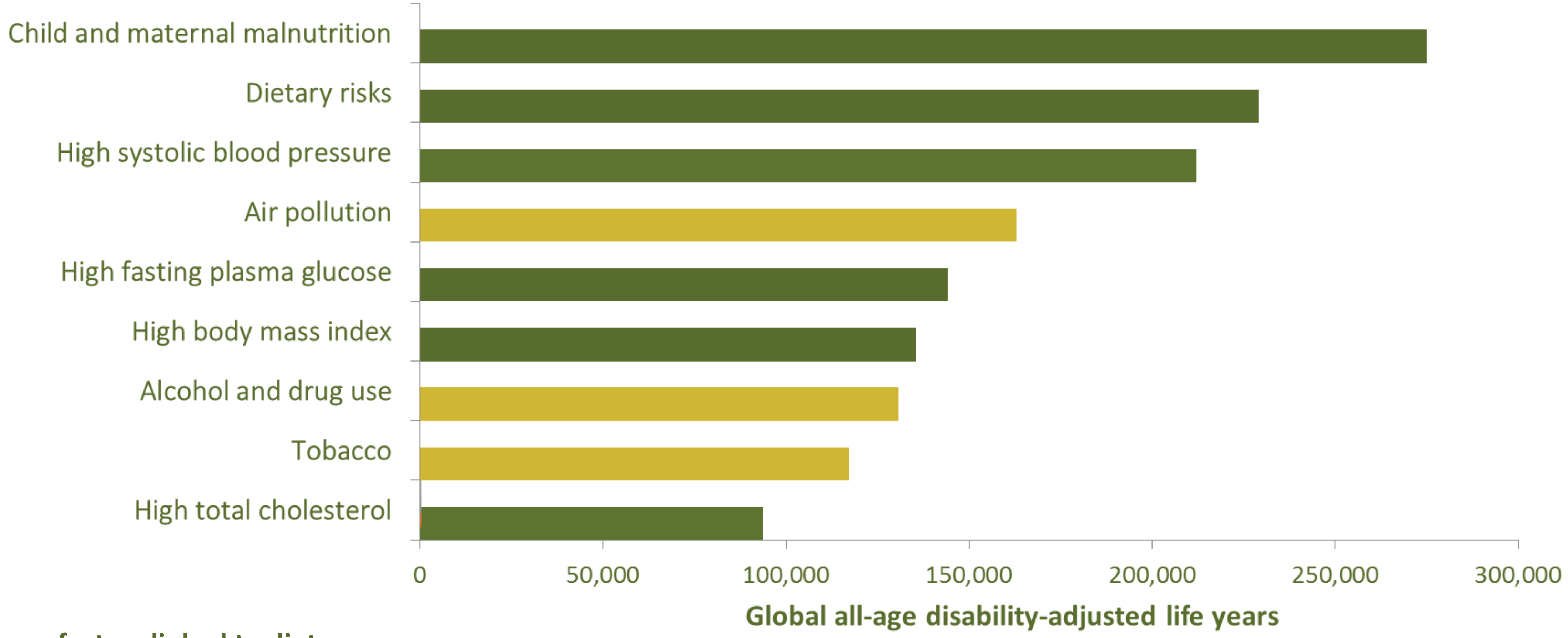
MDGs to SDGs

Higher Investment in Health

Focus Areas
- CDs
- MCH

Focus Areas
- UHC
- NCDs
- CDs
- MCH

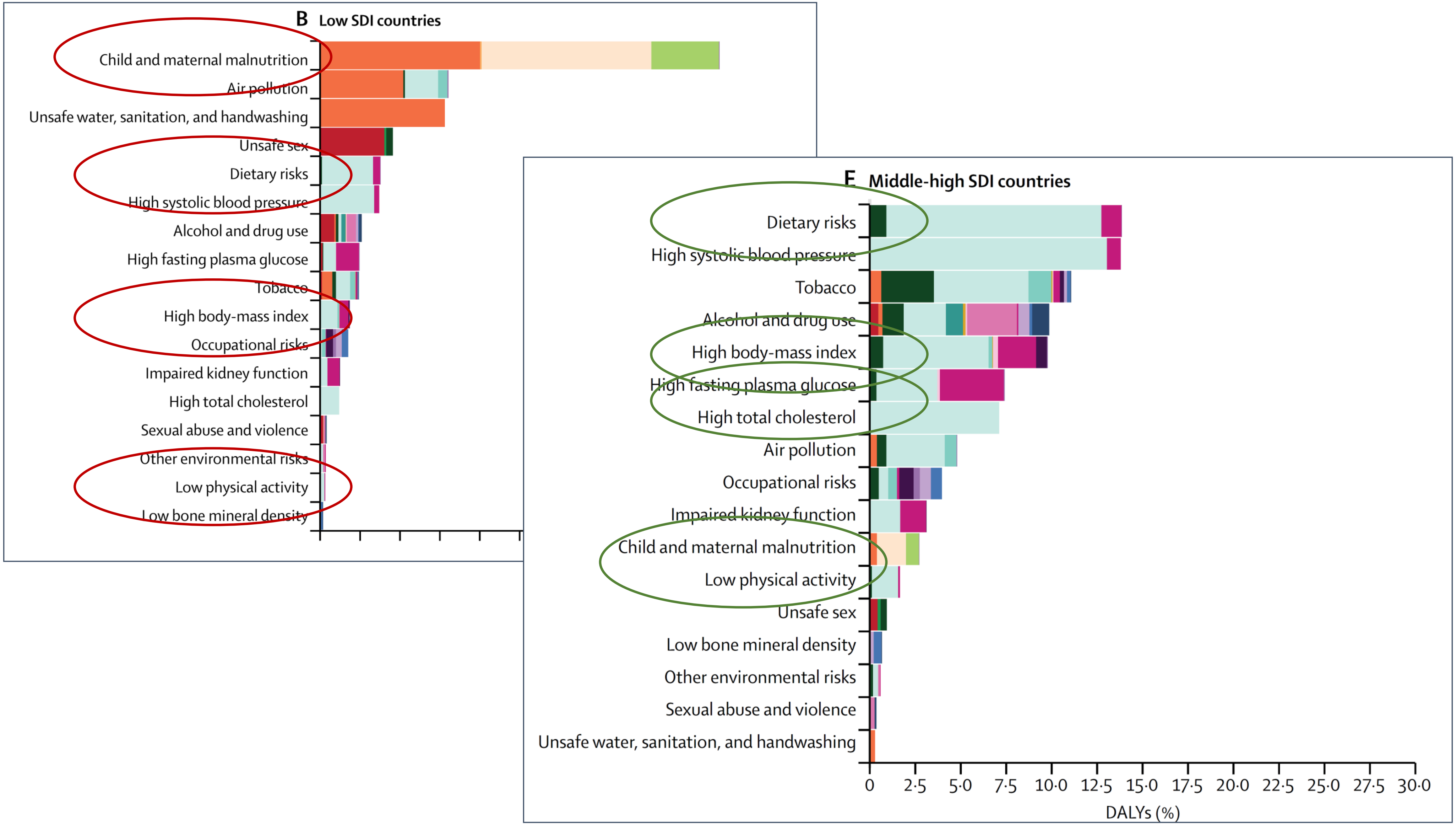
Diet Related Factors Now Account For **Six Of The Top Nine** Contributors To The Global Burden Of Disease



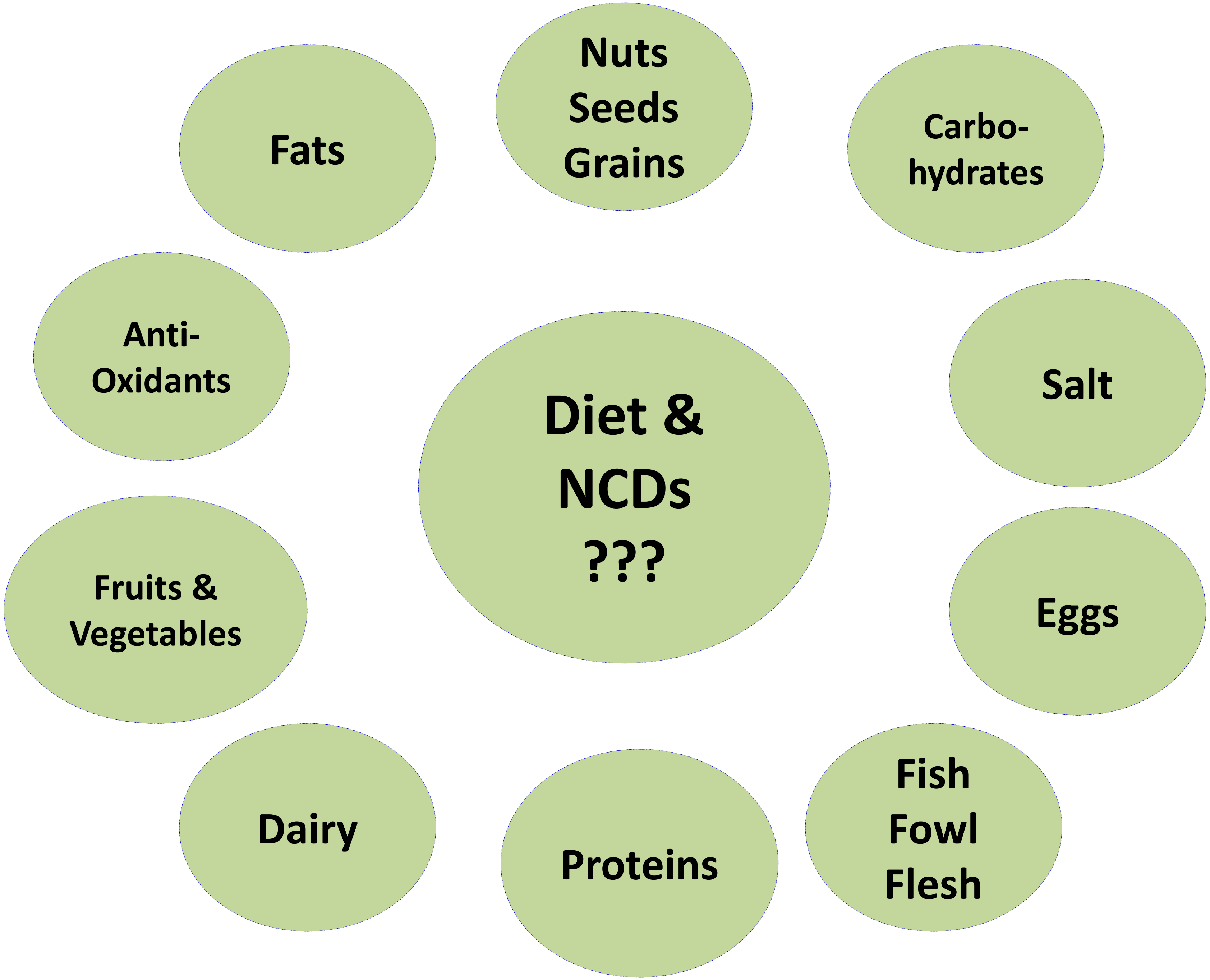
Disease factors linked to diet

Disease factors not linked to diet

Abajobir, Amanuel Alemu et al (2017).
The Lancet, Vol.990, 1345-1422.


B Low SDI countries
Child and maternal malnutrition
Air pollution
Unsafe water, sanitation, and handwashing
Unsafe sex
Dietary risks
High systolic blood pressure
Alcohol and drug use
High fasting plasma glucose
Tobacco
High body-mass index
Occupational risks
Impaired kidney function
High total cholesterol
Sexual abuse and violence
Other environmental risks
Low physical activity
Low bone mineral density
E Middle-high SDI countries
Dietary risks
High systolic blood pressure
Tobacco
Alcohol and drug use
High body-mass index
High fasting plasma glucose
High total cholesterol
Air pollution
Occupational risks
Impaired kidney function
Child and maternal malnutrition
Low physical activity
Unsafe sex
Low bone mineral density
Other environmental risks
Sexual abuse and violence
Unsafe water, sanitation, and handwashing
0 2·5 5·0 7·5 10·0 12·5 15·0 17·5 20·0 22·5 25·0 27·5 30·0
DALYs (%)

GBD 2017



Diet &
NCDs
???
Nuts
Seeds
Grains
Carbo-
hydrates
Salt
Eggs
Fish
Fowl
Flesh
Proteins
Dairy
Fruits &
Vegetables
Anti-
Oxidants
Fats

Search Light On Diet And NCD Connection

Specific Nutrients

→ Individual Food Items

→ Dietary Patterns

Spectrum of Science Is
Reductionist In Content But Holistic in Context!

Fats: American Heart Association Guidelines 2018

- Limit total fat <25-35% total energy
- Limit saturated fat <7% total energy
- Limit trans fat <1% total daily energy
- Remaining fat should come from sources of unsaturated fat

  e.g nuts, seeds, fatty fish, vegetable oils

Eg. 2000 cals daily intake should have <15g saturated fat, <2g trans fat ,55-77g total fat from other sources

https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/nutrition-basics/aha-diet-and-lifestyle-recommendations

Carbohydrates

- In the meta-analysis (n=432179), both low (<40%) and high CHO consumption (>70%) conferred **greater mortality risk.**

  - **50-55% energy from carbohydrate - lowest risk of mortality.**
  - Source of macronutrients imp:
    - mortality increased when carbohydrates were exchanged for animal-derived fat or protein and
    - mortality decreased when substitutions were plant-based (0·82)

Lancet Public Health. 2018 Sep;3(9):e419-e428. doi: 10.1016/S2468-2667(18)30135-X. Epub 2018 Aug 17.15

Proteins

- ✓Inverse association between protein intake & CVD
  - ✓meat protein-weight gain over 6.5 years, with 1 kg of weight increase per 125 g of meat per day.
  - ✓In the Nurses' Health Study, diets low in red meat, containing nuts, low-fat dairy, poultry, or fish, were associated with a 13% to 30% lower risk of CHD compared with diets high in meat.
- ✓Replacement of SFA/CHO by proteins : beneficial effects on CV risk factors (TG, LDL and SBP)
- ✓**Plant proteins** (nuts, beans) and Tuna rich in L-arginine improve endothelial dysfunction
- ✓Dairy proteins appear to be beneficial.

Kris-Etherton and Fleming AJ Adv Nutr 2015

Fruits And Vegetables

- Ness (1997): Systematic Review-
- 9/10 ecological studies
- 2/3 case-control studies
- 6/16 cohort studies

Protective against CHD

- 3/5 ecological studies
- 6/8 cohort studies

Protective against Stroke

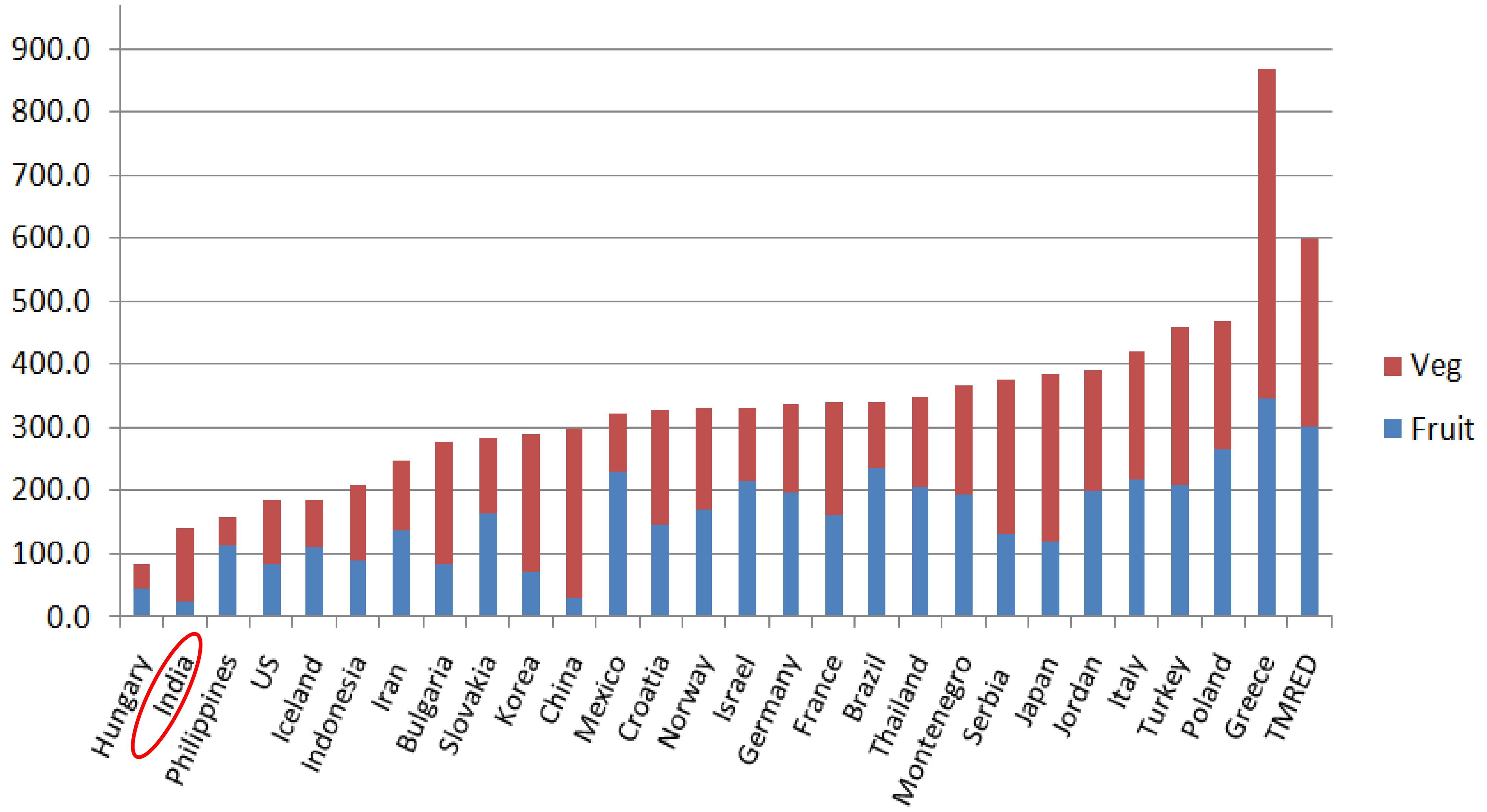
Similar findings from :

- ♦ Women's Health Study (Liu et al, 2000)
- ♦ Physicians' Health Study (Liu et al 2001)
- ♦ Finland (Kuopio; Riassen TH, 2003) : 34% less risk of CVD Death
- ♦ NHANES FOLLOW-UP (Bazzano, Am J Clin Nutr 2002)

Overall 20-30% reduction in the incidence of stroke and CHD and mortality due to stroke and CHD.

Inter Heart study : Fruits/vegetables > 5 servings: 30 % risk reduction for MI

Fruit and Vegetable Consumption (g/day)

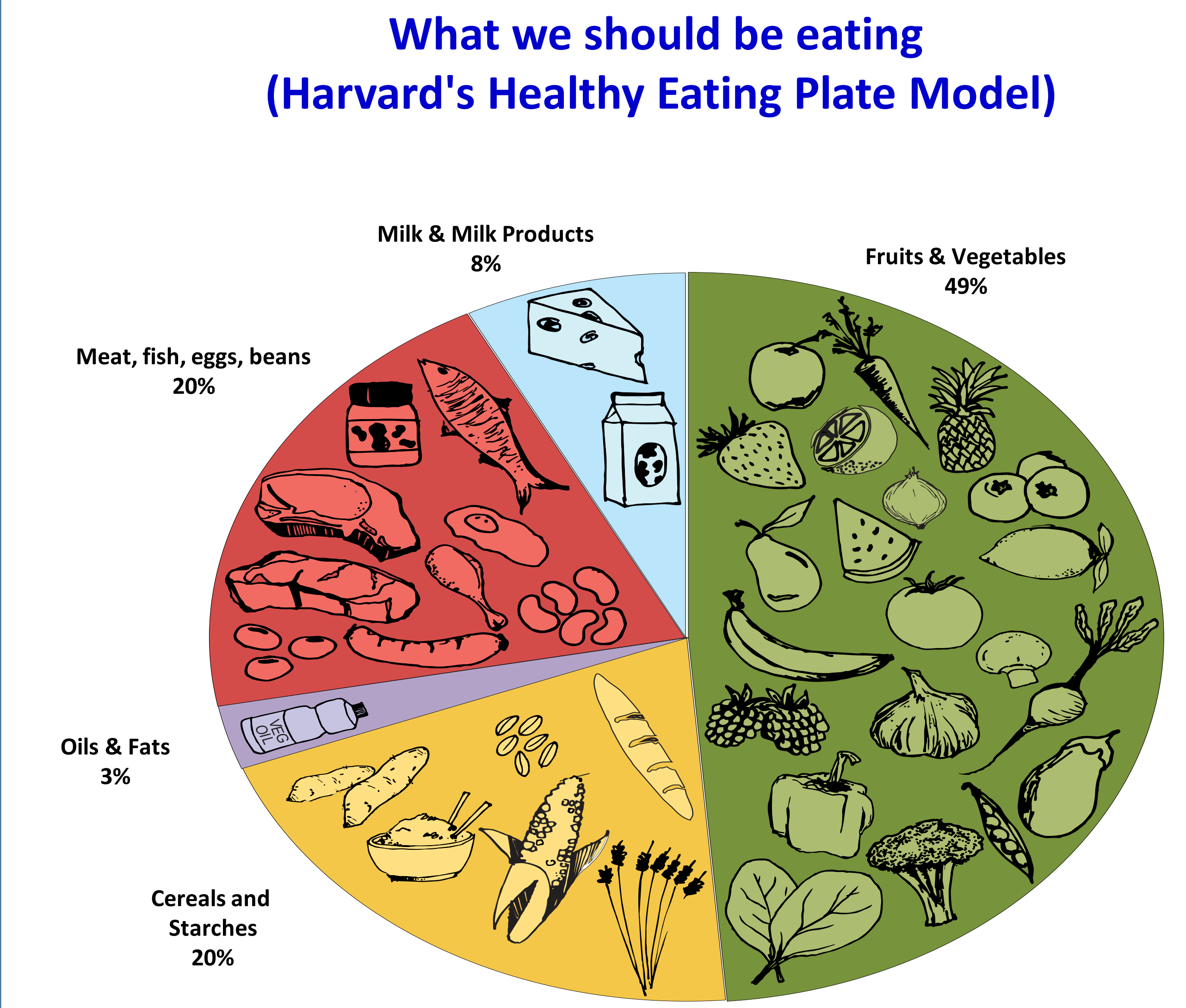


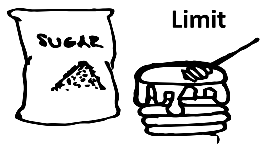
COMPOSITE "healthy" DIETS

- Mediterranean diet
- DASH diet
- Okinawa diet
- Oriental Diet
- Polymeal

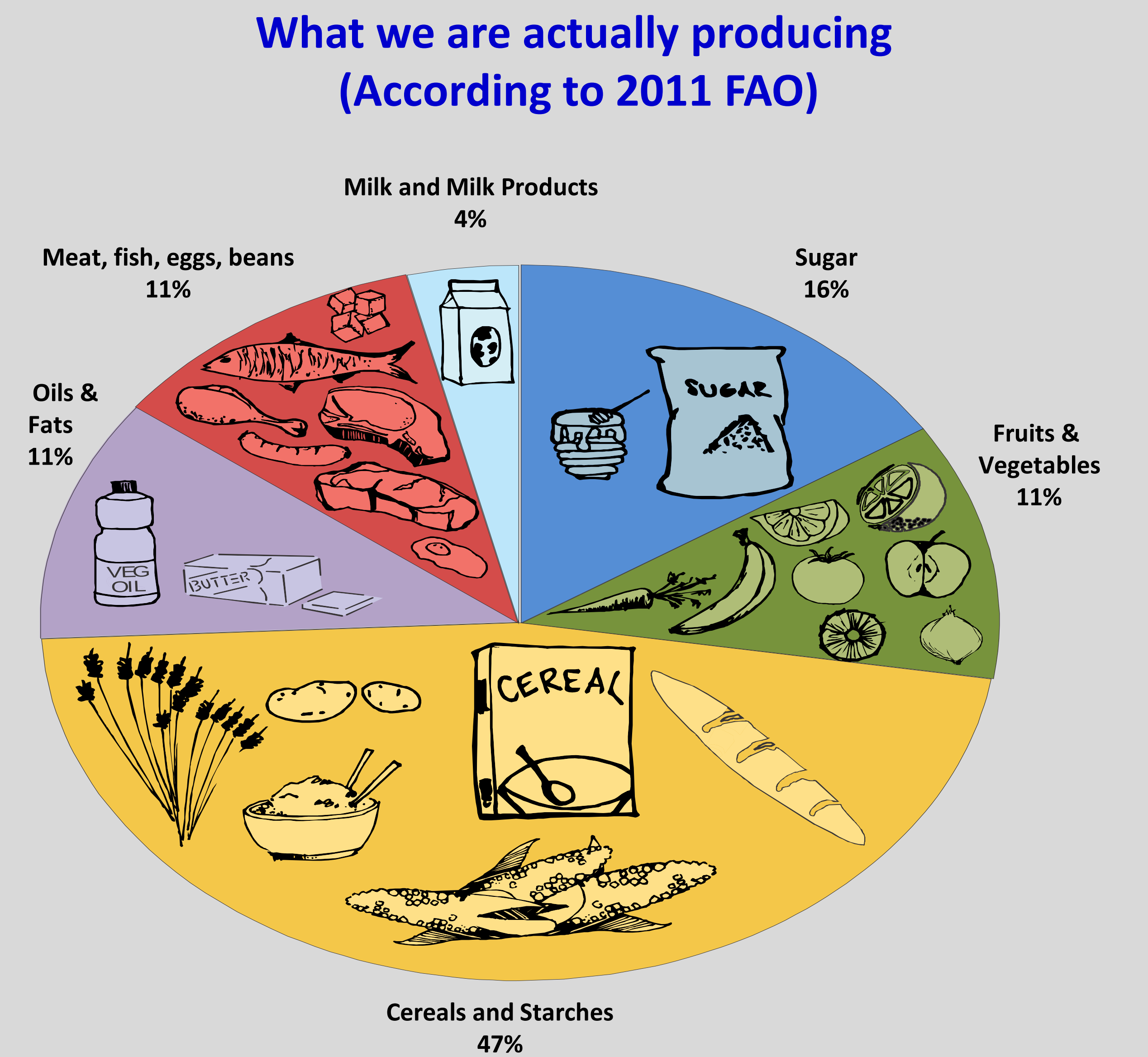
Bob devises the ultimate weight-loss system.

- **Whole natural foods than isolated fractions any day**!
- Healthy balanced portions from variety of foods and diverse food groups
- Keep your weight controlled
- Lots of PA
- Stay hydrated
- Sleep well!





WHO< 5%



Citation: KC KB, Dias GM, Veeramani A, Swanton CJ, Fraser D, Steinke D, et al. (2018) When too much isn't enough: Does current food production meet global nutritional needs? PLoS ONE 13(10): e0205683. https://doi.org/10.1371/journal.pone.0205683

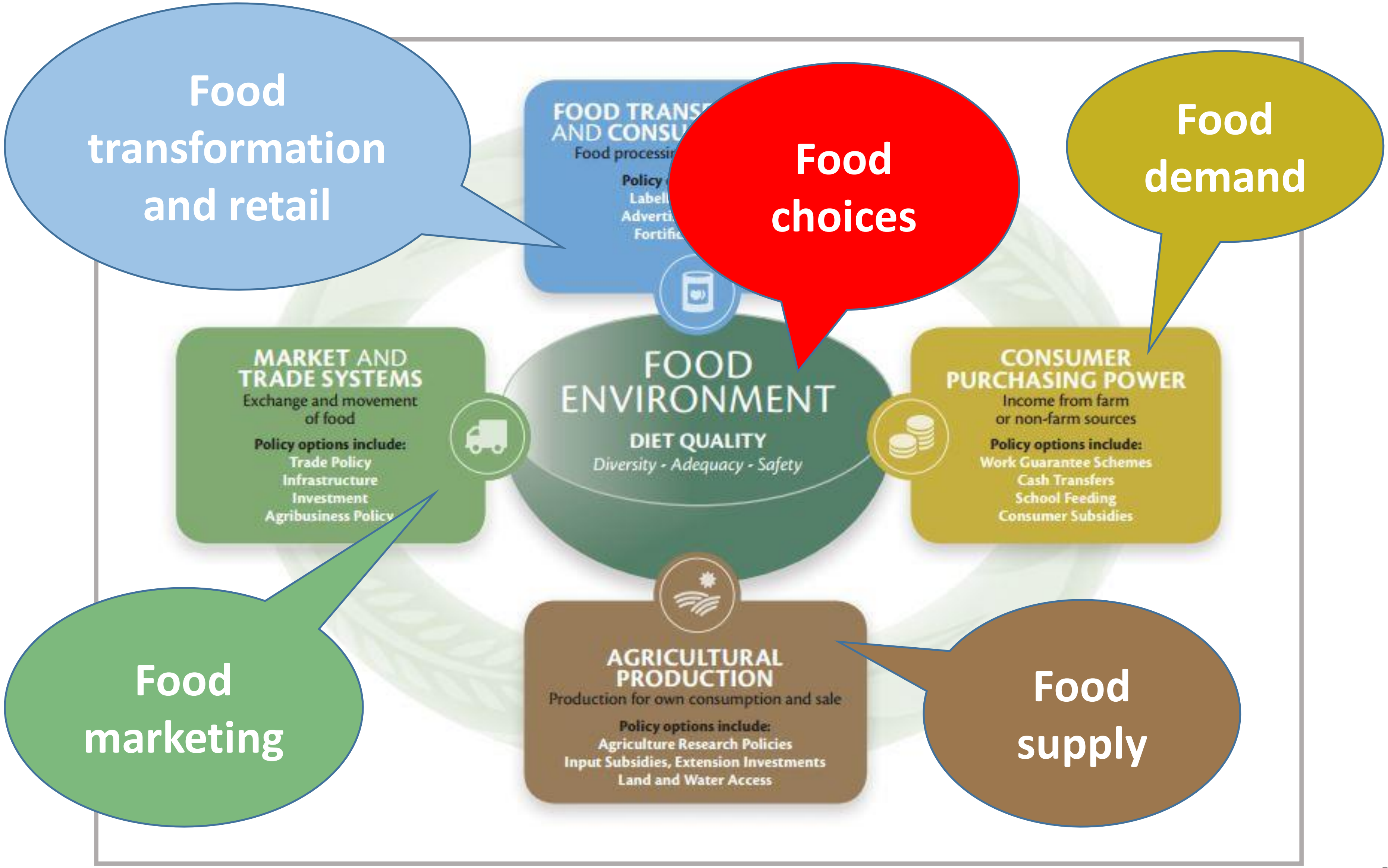
What Are Food Systems?

Food systems go well **BEYOND PRODUCTION**:
to storage, transport, trade, transformation,
provisioning, retail

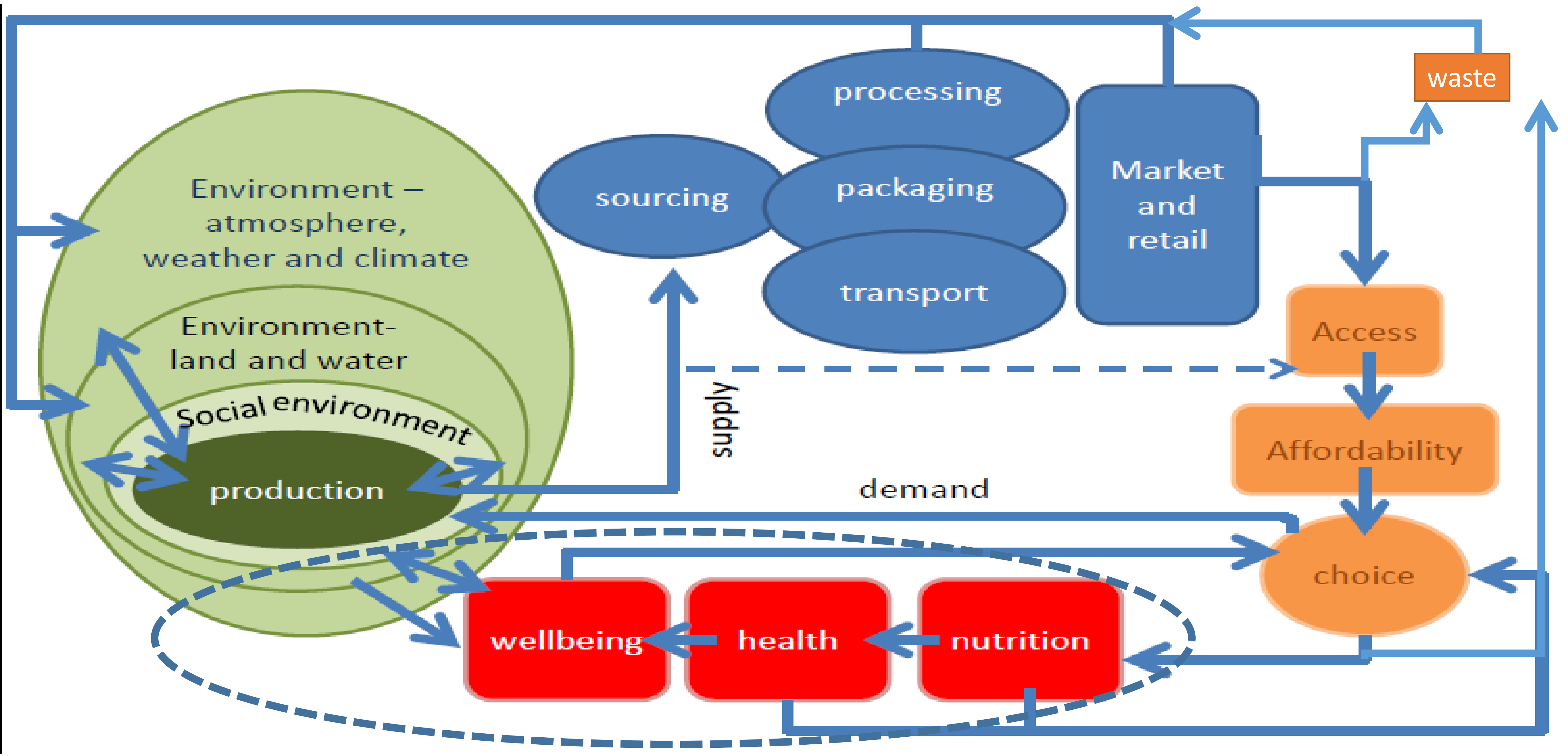
Food systems **GOVERN** the safety, nutrition
quality and affordability of food

To improve nutrition for all, we will need to make changes in what food we produce, and how it is **processed**, **transported, marketed** and **consumed**.

A Systems Perspective Can Help Guide Effective Policies For Agriculture, Food And Nutrition



The Food System: Feedbacks, Loops And Connections



Agriculture & Food Systems
Will Have To Be Re-configured To Assure

Affordable Access To Diversified Diets That

Are Calorically Adequate

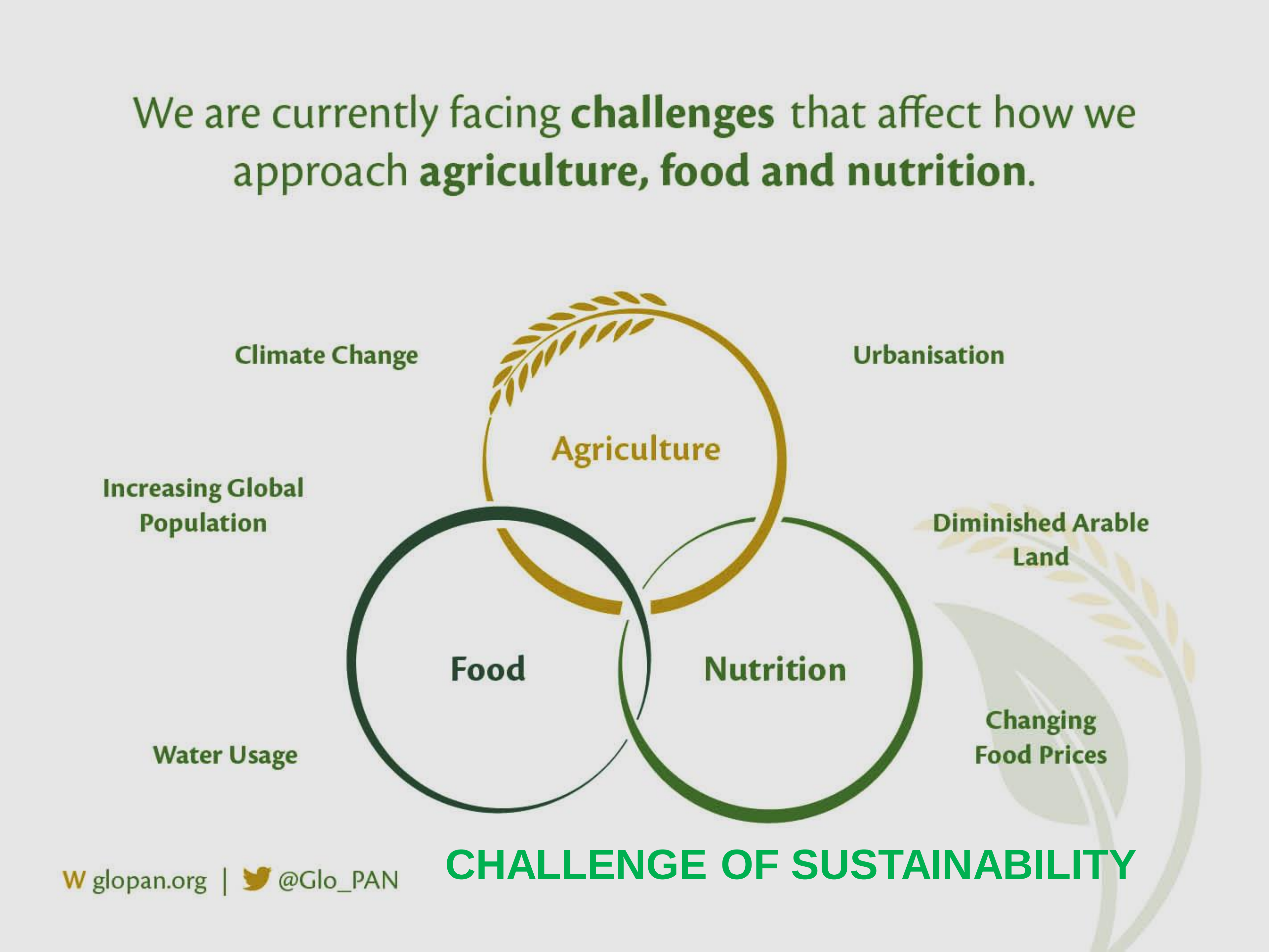
And

Nutritionally Appropriate

To Each Person At Every Stage of

His Or Her Life

In A Sustainable Manner



CHALLENGE OF SUSTAINABILITY

Climate Change Through Nutrition Lens-1

By 2100

40% of the world's land surface will likely experience altered climates

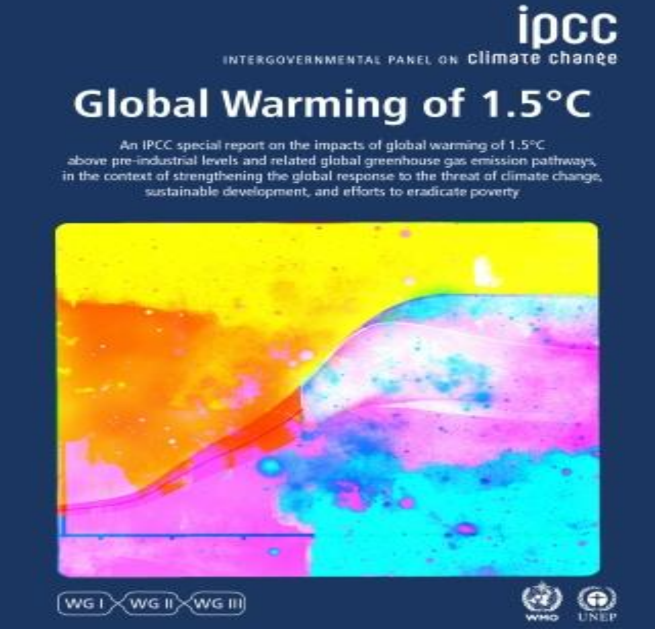
Up to 2050

- Agricultural output is projected to:
  Fall by 2% per decade (due to impact of climate change on crop and livestock production)
- Food Demand is projected to:
  Rise by 14% per decade (due to population growth, urbanisation, poverty reduction)

Climate Change Through Nutrition Lens-2

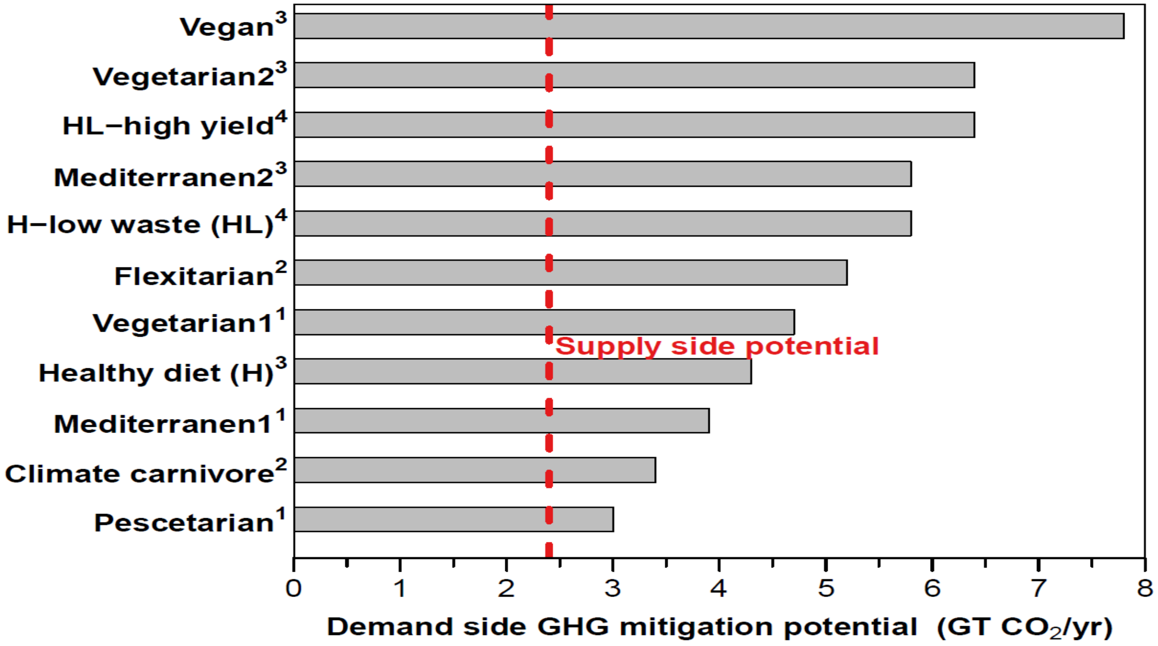
- Higher production of ***staple crops*** will not be enough to make agriculture more resilient to climate change or better able to address the world's need for improved diets
- ***Nutrient rich crops*** are more susceptible to droughts, pests, diseases and temperature fluctuations
- Higher ***CO_2*** in atmosphere may reduce nutrient content of staple crops
- **Soil degradation** also reduces nutrient quality

Implications of Paris for food systems (beyond adaptation)

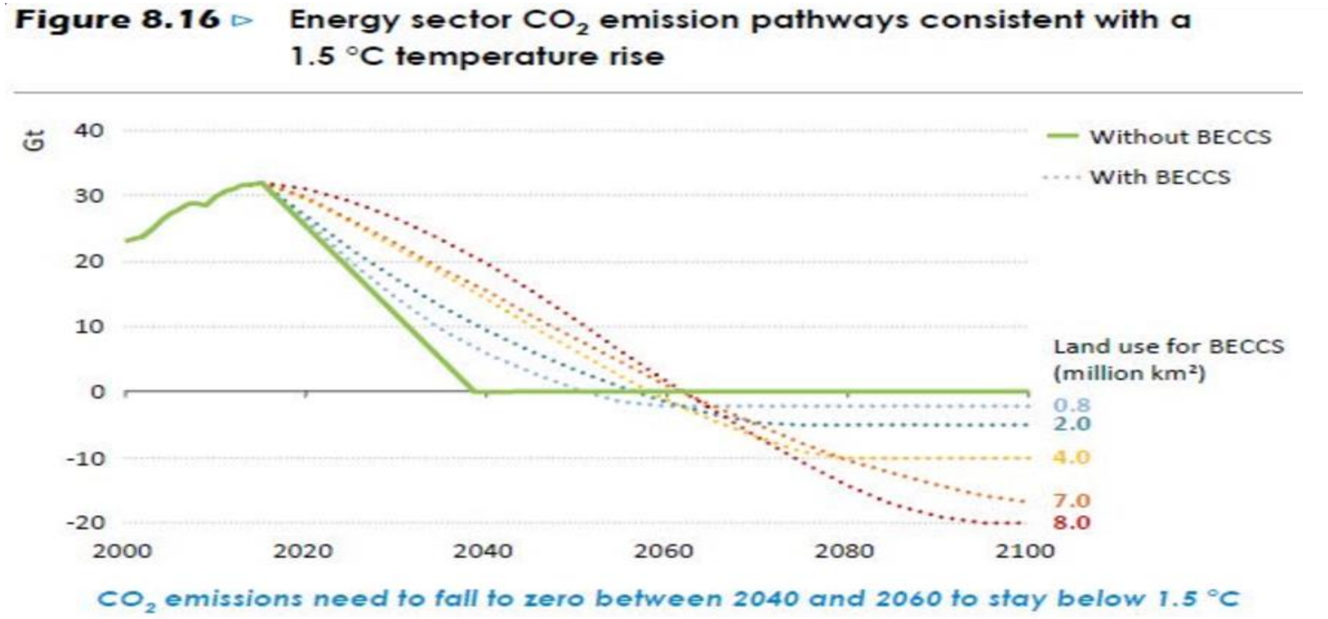


PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

Agricultural mitigation potential



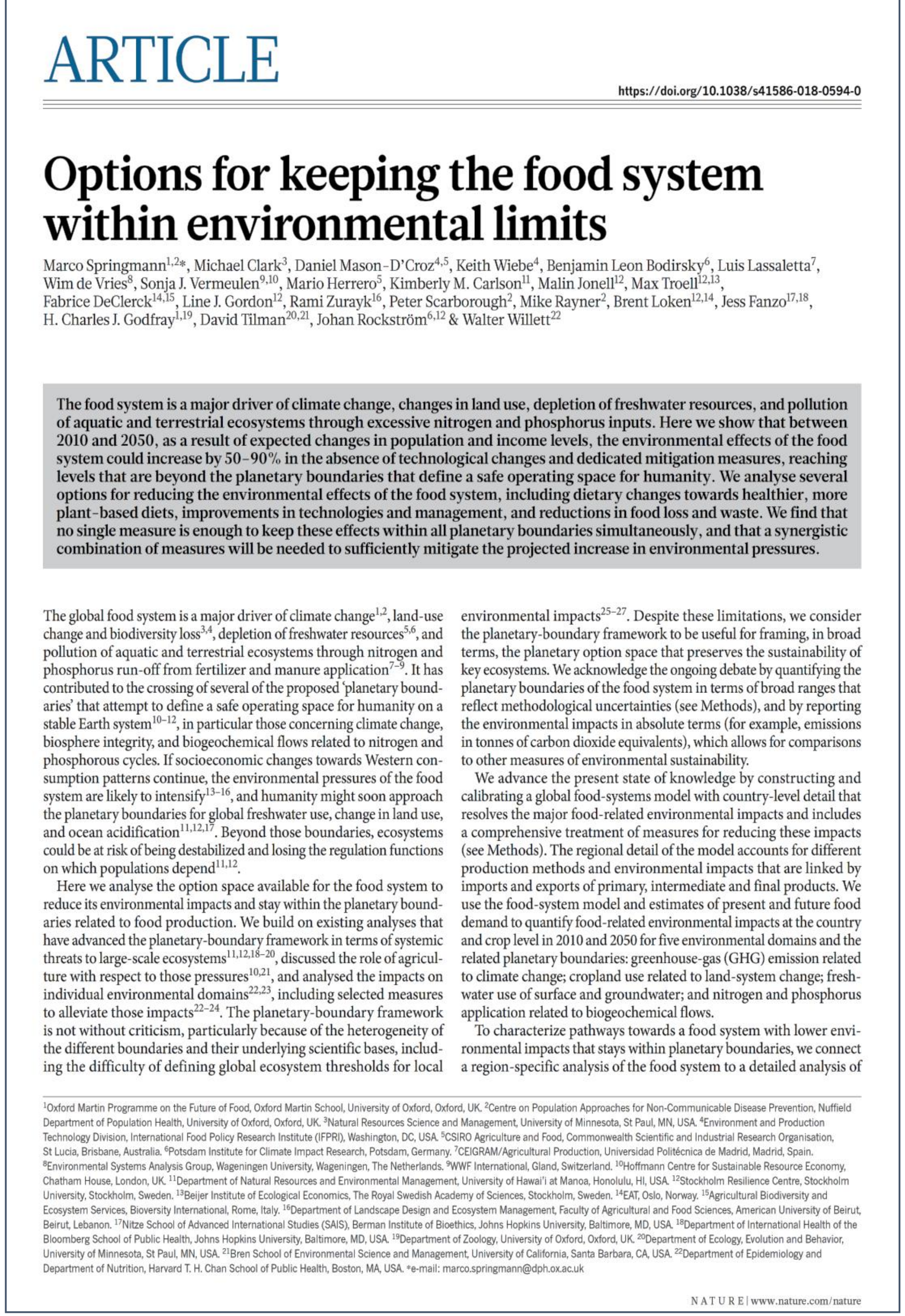
(Herrero et al 2016)



IEA/OECD WEO 2016

Invisibility Of The Problem

"no single measure is enough… a synergistic combination of measures will be needed."


ARTICLE

https://doi.org/10.1038/s41586-018-0594-0

Options for keeping the food system within environmental limits

Marco Springmann[1,2]*, Michael Clark[3], Daniel Mason-D'Croz[4,5], Keith Wiebe[4], Benjamin Leon Bodirsky[6], Luis Lassaletta[7], Wim de Vries[8], Sonja J. Vermeulen[9,10], Mario Herrero[5], Kimberly M. Carlson[11], Malin Jonell[12], Max Troell[12,13], Fabrice DeClerck[14,15], Line J. Gordon[12], Rami Zurayk[16], Peter Scarborough[2], Mike Rayner[2], Brent Loken[12,14], Jess Fanzo[17,18], H. Charles J. Godfray[1,19], David Tilman[20,21], Johan Rockström[6,12] & Walter Willett[22]

The food system is a major driver of climate change, changes in land use, depletion of freshwater resources, and pollution of aquatic and terrestrial ecosystems through excessive nitrogen and phosphorus inputs. Here we show that between 2010 and 2050, as a result of expected changes in population and income levels, the environmental effects of the food system could increase by 50–90% in the absence of technological changes and dedicated mitigation measures, reaching levels that are beyond the planetary boundaries that define a safe operating space for humanity. We analyse several options for reducing the environmental effects of the food system, including dietary changes towards healthier, more plant-based diets, improvements in technologies and management, and reductions in food loss and waste. We find that no single measure is enough to keep these effects within all planetary boundaries simultaneously, and that a synergistic combination of measures will be needed to sufficiently mitigate the projected increase in environmental pressures.

The global food system is a major driver of climate change[1,2], land-use change and biodiversity loss[3,4], depletion of freshwater resources[5,6], and pollution of aquatic and terrestrial ecosystems through nitrogen and phosphorus run-off from fertilizer and manure application[7–9]. It has contributed to the crossing of several of the proposed 'planetary boundaries' that attempt to define a safe operating space for humanity on a stable Earth system[10–12], in particular those concerning climate change, biosphere integrity, and biogeochemical flows related to nitrogen and phosphorous cycles. If socioeconomic changes towards Western consumption patterns continue, the environmental pressures of the food system are likely to intensify[13–16], and humanity might soon approach the planetary boundaries for global freshwater use, change in land use, and ocean acidification[11,12,17]. Beyond those boundaries, ecosystems could be at risk of being destabilized and losing the regulation functions on which populations depend[11,12].

Here we analyse the option space available for the food system to reduce its environmental impacts and stay within the planetary boundaries related to food production. We build on existing analyses that have advanced the planetary-boundary framework in terms of systemic threats to large-scale ecosystems[11,12,18–20], discussed the role of agriculture with respect to those pressures[10,21], and analysed the impacts on individual environmental domains[22,23], including selected measures to alleviate those impacts[22–24]. The planetary-boundary framework is not without criticism, particularly because of the heterogeneity of the different boundaries and their underlying scientific bases, including the difficulty of defining global ecosystem thresholds for local environmental impacts[25–27]. Despite these limitations, we consider the planetary-boundary framework to be useful for framing, in broad terms, the planetary option space that preserves the sustainability of key ecosystems. We acknowledge the ongoing debate by quantifying the planetary boundaries of the food system in terms of broad ranges that reflect methodological uncertainties (see Methods), and by reporting the environmental impacts in absolute terms (for example, emissions in tonnes of carbon dioxide equivalents), which allows for comparisons to other measures of environmental sustainability.

We advance the present state of knowledge by constructing and calibrating a global food-systems model with country-level detail that resolves the major food-related environmental impacts and includes a comprehensive treatment of measures for reducing these impacts (see Methods). The regional detail of the model accounts for different production methods and environmental impacts that are linked by imports and exports of primary, intermediate and final products. We use the food-system model and estimates of present and future food demand to quantify food-related environmental impacts at the country and crop level in 2010 and 2050 for five environmental domains and the related planetary boundaries: greenhouse-gas (GHG) emission related to climate change; cropland use related to land-system change; freshwater use of surface and groundwater; and nitrogen and phosphorus application related to biogeochemical flows.

To characterize pathways towards a food system with lower environmental impacts that stays within planetary boundaries, we connect a region-specific analysis of the food system to a detailed analysis of

[1]Oxford Martin Programme on the Future of Food, Oxford Martin School, University of Oxford, Oxford, UK. [2]Centre on Population Approaches for Non-Communicable Disease Prevention, Nuffield Department of Population Health, University of Oxford, Oxford, UK. [3]Natural Resources Science and Management, University of Minnesota, St Paul, MN, USA. [4]Environment and Production Technology Division, International Food Policy Research Institute (IFPRI), Washington, DC, USA. [5]CSIRO Agriculture and Food, Commonwealth Scientific and Industrial Research Organisation, St Lucia, Brisbane, Australia. [6]Potsdam Institute for Climate Impact Research, Potsdam, Germany. [7]CEIGRAM/Agricultural Production, Universidad Politécnica de Madrid, Madrid, Spain. [8]Environmental Systems Analysis Group, Wageningen University, Wageningen, The Netherlands. [9]WWF International, Gland, Switzerland. [10]Hoffmann Centre for Sustainable Resource Economy, Chatham House, London, UK. [11]Department of Natural Resources and Environmental Management, University of Hawai'i at Manoa, Honolulu, HI, USA. [12]Stockholm Resilience Centre, Stockholm University, Stockholm, Sweden. [13]Beijer Institute of Ecological Economics, The Royal Swedish Academy of Sciences, Stockholm, Sweden. [14]EAT, Oslo, Norway. [15]Agricultural Biodiversity and Ecosystem Services, Bioversity International, Rome, Italy. [16]Department of Landscape Design and Ecosystem Management, Faculty of Agricultural and Food Sciences, American University of Beirut, Beirut, Lebanon. [17]Nitze School of Advanced International Studies (SAIS), Berman Institute of Bioethics, Johns Hopkins University, Baltimore, MD, USA. [18]Department of International Health of the Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD, USA. [19]Department of Zoology, University of Oxford, Oxford, UK. [20]Department of Ecology, Evolution and Behavior, University of Minnesota, St Paul, MN, USA. [21]Bren School of Environmental Science and Management, University of California, Santa Barbara, CA, USA. [22]Department of Epidemiology and Department of Nutrition, Harvard T. H. Chan School of Public Health, Boston, MA, USA. *e-mail: marco.springmann@dph.ox.ac.uk

“Our forecast points to overall improvements through 2040 in most countries,

…but with the potential for worsening health outcomes in the absence of *deliberate policy action*.

Health and nutritional aspects of sustainable diet strategies and their association with environmental impacts: a global modelling analysis with country-level detail

Marco Springmann, Keith Wiebe, Daniel Mason-D’Croz, Timothy B Sulser, Mike Rayner, Peter Scarborough

Summary

Background Sustainable diets are intended to address the increasing health and environmental concerns related to food production and consumption. Although many candidates for sustainable diets have emerged, a consistent and joint environmental and health analysis of these diets has not been done at a regional level. Using an integrated health and environmental modelling framework for more than 150 countries, we examined three different approaches to sustainable diets motivated by environmental, food security, and public health objectives.

Methods In this global modelling analysis, we combined analyses of nutrient levels, diet-related and weight-related chronic disease mortality, and environmental impacts for more than 150 countries in three sets of diet scenarios. The first set, based on environmental objectives, replaced 25–100% of animal-source foods with plant-based foods. The second set, based on food security objectives, reduced levels of underweight, overweight, and obesity by 25–100%. The third set, based on public health objectives, consisted of four energy-balanced dietary patterns: flexitarian, pescatarian, vegetarian, and vegan. In the nutrient analysis, we calculated nutrient intake and changes in adequacy based on international recommendations and a global dataset of nutrient content and supply. In the health analysis, we estimated changes in mortality using a comparative risk assessment with nine diet and weight-related risk factors. In the environmental analysis, we combined country-specific and food group-specific footprints for greenhouse gas emissions, cropland use, freshwater use, nitrogen application, and phosphorus application to analyse the relationship between the health and environmental impacts of dietary change.

Findings Following environmental objectives by replacing animal-source foods with plant-based ones was particularly effective in high-income countries for improving nutrient levels, lowering premature mortality (reduction of up to 12% [95% CI 10–13] with complete replacement), and reducing some environmental impacts, in particular greenhouse gas emissions (reductions of up to 84%). However, it also increased freshwater use (increases of up to 16%) and had little effectiveness in countries with low or moderate consumption of animal-source foods. Following food-security objectives by reducing underweight and overweight led to similar reductions in premature mortality (reduction of up to 10% [95% CI 9–11]), and moderately improved nutrient levels. However, it led to only small reductions in environmental impacts at the global level (all impacts changed by <15%), with reduced impacts in high-income and middle-income countries, and increased resource use in low-income countries. Following public health objectives by adopting energy-balanced, low-meat dietary patterns that are in line with available evidence on healthy eating led to an adequate nutrient supply for most nutrients, and large reductions in premature mortality (reduction of 19% [95% CI 18–20] for the flexitarian diet to 22% [18–24] for the vegan diet). It also markedly reduced environmental impacts globally (reducing greenhouse gas emissions by 54–87%, nitrogen application by 23–25%, phosphorus application by 18–21%, cropland use by 8–11%, and freshwater use by 2–11%) and in most regions, except for some environmental domains (cropland use, freshwater use, and phosphorus application) in low-income countries.

Interpretation Approaches for sustainable diets are context specific and can result in concurrent reductions in environmental and health impacts globally and in most regions, particularly in high-income and middle-income countries, but they can also increase resource use in low-income countries when diets diversify. A public health strategy focused on improving energy balance and dietary changes towards predominantly plant-based diets that are in line with evidence on healthy eating is a suitable approach for sustainable diets. Updating national dietary guidelines to reflect the latest evidence on healthy eating can by itself be important for improving health and reducing environmental impacts and can complement broader and more explicit criteria of sustainability.

Funding Wellcome Trust, EAT, CGIAR, and British Heart Foundation.

Lancet Planet Health 2018; 2: e451–61

See Comment page e425

Oxford Martin Programme on the Future of Food and Centre on Population Approaches for Non-Communicable Disease Prevention, Nuffield Department of Population Health, University of Oxford, Oxford, UK (M Springmann PhD, Prof M Rayner DPhil, P Scarborough DPhil); Environment and Production Technology Division, International Food Policy Research Institute, Washington, DC, USA (K Wiebe PhD, D Mason-D’Croz MA, T B Sulser MS); and Global Food and Nutrition Security Group, Commonwealth Scientific and Industrial Research Organisation, St Lucia, QLD, Australia (D Mason-D’Croz)

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Nutrition-sensitive Food Systems Can Also Be Climate-smart

- Support **variety of food production systems** to minimize risks and enhance the supply of more diverse foods in the diet;
- Promote **efficiency**, including **waste minimization**, along the entire food value chain to meet higher food demand and enhanced resource use, while achieving **dietary diversification**
- Focus domestic **research and investments on mitigating climate-related food system shocks** and volatility, **and adapting** those systems to longer-terms stresses;
- Establish **robust social protection programmes** that stablise and enhance consumer purchasing power, thereby protecting their diets and nutrition in the face of supply shocks;
- Researchers should generate **rigorous empirical evidence on effective investments** along food value-chains that are resilient to climate changes while delivering positive dietary outcomes.

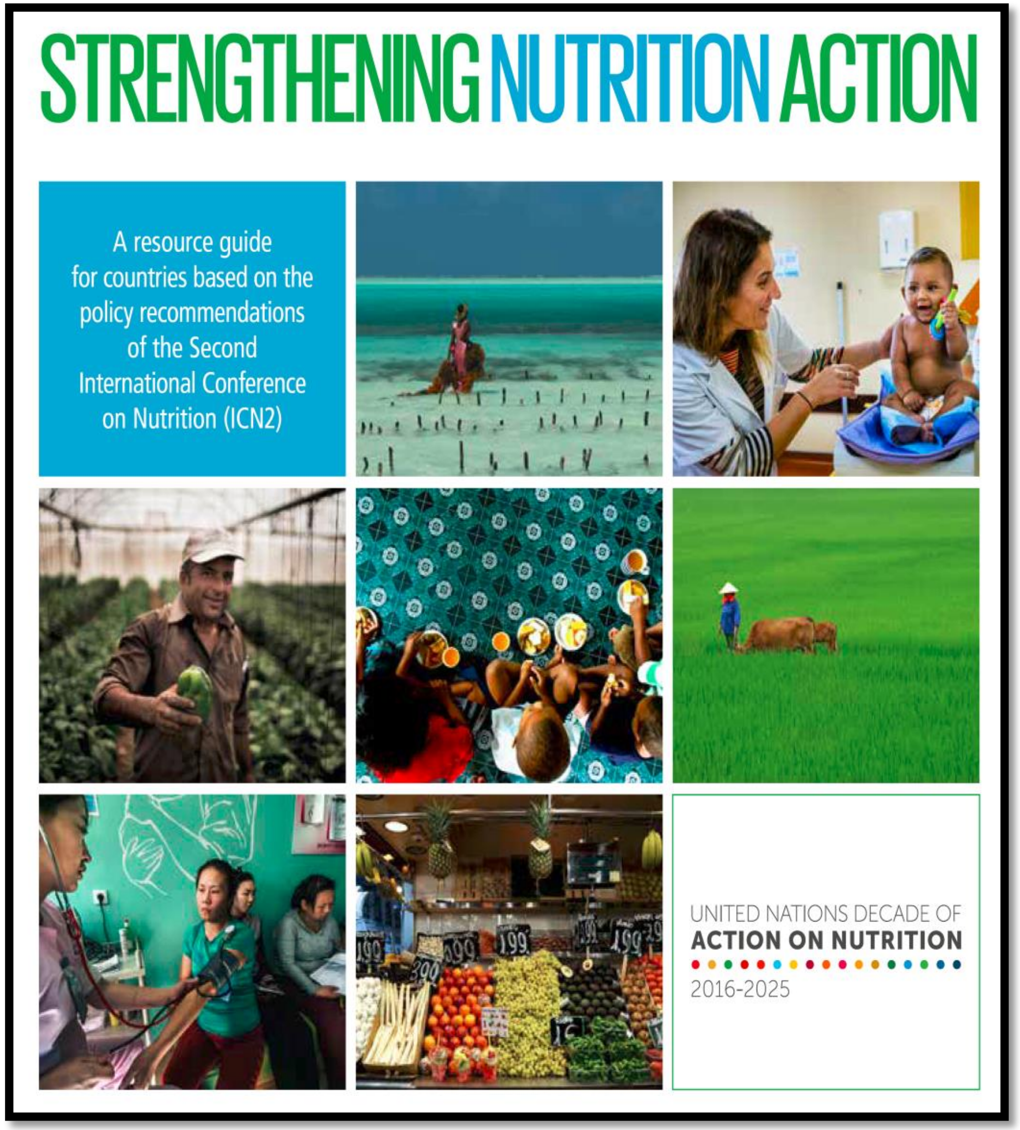
Agriculture & Food Systems

- Climate Resilient (Climate Smart), Agriculture With Crop Diversity (esp. Non-Staples + Fruits & Vegetables)
- Sustainable Fish Production
- Fibre Preserving Food Grain Processing
- Non-atherogenic & Non-diabetogeneic Processed Food Products
- Food Safety Against Carcinogens

Summing Up – What Needs To Be Done?

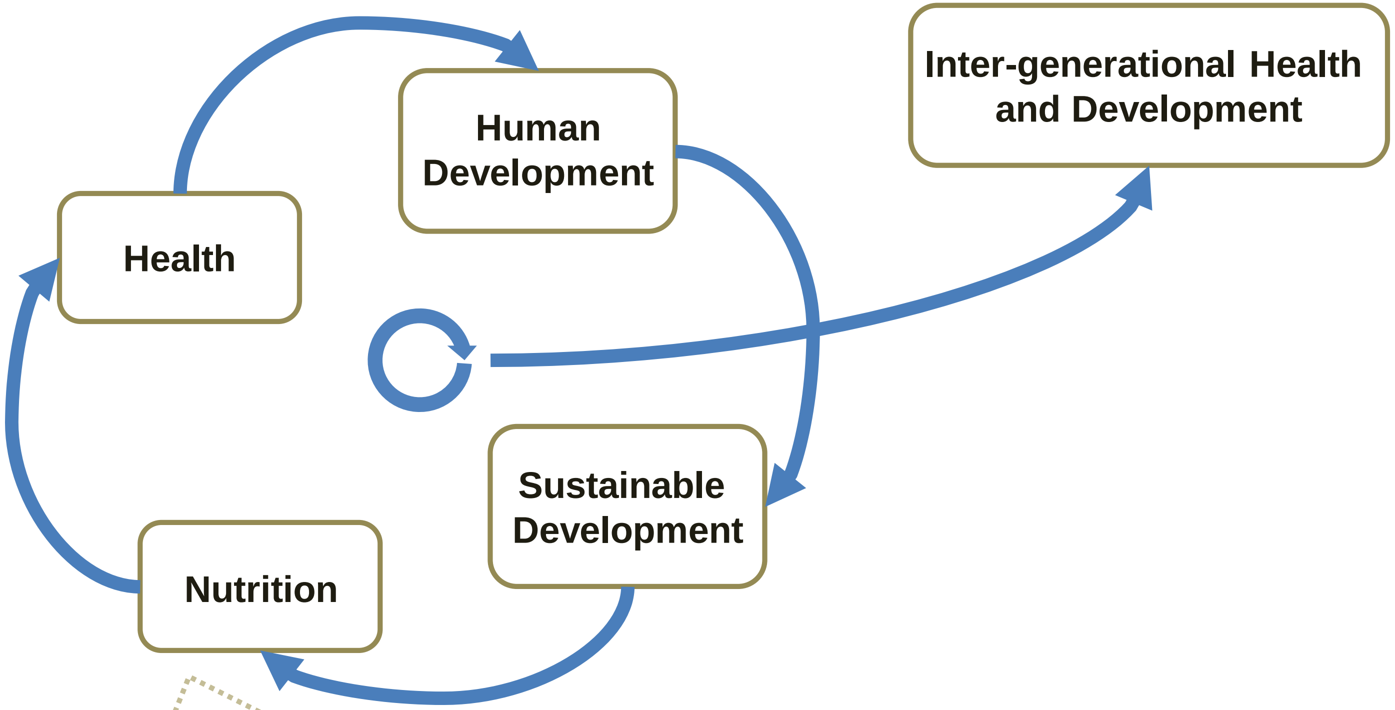
- Sustainable, resilient food systems for healthy diets.
- Aligned health systems providing universal coverage of essential nutrition actions.
- Social protection and nutrition education.
- Trade and investment for improved nutrition.
- Safe and supportive environments for nutrition at all ages.
- Strengthened governance and accountability for nutrition.

Enabling environment critical to support nutrition policy regulation vs choice...*empower the consumer but strengthen public policy for fighting against obesity, NCDs*



We Need To “Unleash The Virtuous Circle Of Nutrition And Sustainable Development”

Nutrition’s virtuous circle



But the forces that enable good nutrition status will need to be multi-sectoral

ALL OF THIS NEEDS TO BE POSITIONED IN THE CONTEXT OF

SDGs

(1/3rd Reduction In Premature Mortality Due to NCDs By 2030: SDG 3.4)

While

Utilising The Whole SDG Framework

Sustainable Development Goals

Agriculture And Food Frames Sustainable Development: Food Is Far More Than Feeding People

1 NO POVERTY
- Secure access to land
- Agricultural development

2 ZERO HUNGER
- Food production
- Calories and nutrients

3 GOOD HEALTH AND WELL-BEING
- Diets underpin health
- Agricultural pollution, AMR, zoonosis

5 GENDER EQUALITY
- Women agricultural labourers
- Women's access to land

6 CLEAN WATER AND SANITATION
- 70% freshwater used for agriculture
- Agricultural pollution of water

7 AFFORDABLE AND CLEAN ENERGY
- Land for bioenergy, solar, wind
- Water (silt-free) for hydro

8 DECENT WORK AND ECONOMIC GROWTH
- >1 billion jobs in agriculture
- Agricultural development

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
- Infrastructure drives land-use change
- Bioeconomy and biomaterials

11 SUSTAINABLE CITIES AND COMMUNITIES
- Land for urbanisation
- Urbanisation and dietary demand
- Air quality and agricultural pollution

12 RESPONSIBLE CONSUMPTION AND PRODUCTION
- Dietary choices – what is grown?
- Over-consumption, food waste

13 CLIMATE ACTION
- Agriculture and land-use ~30% GHGs
- Paris agreement: need to transform from source to sink

14 LIFE BELOW WATER
- Pollution from agricultural run-off
- Crop feed for aquaculture

15 LIFE ON LAND
- Habitat destruction/degradation
- Species loss, ecosystem services

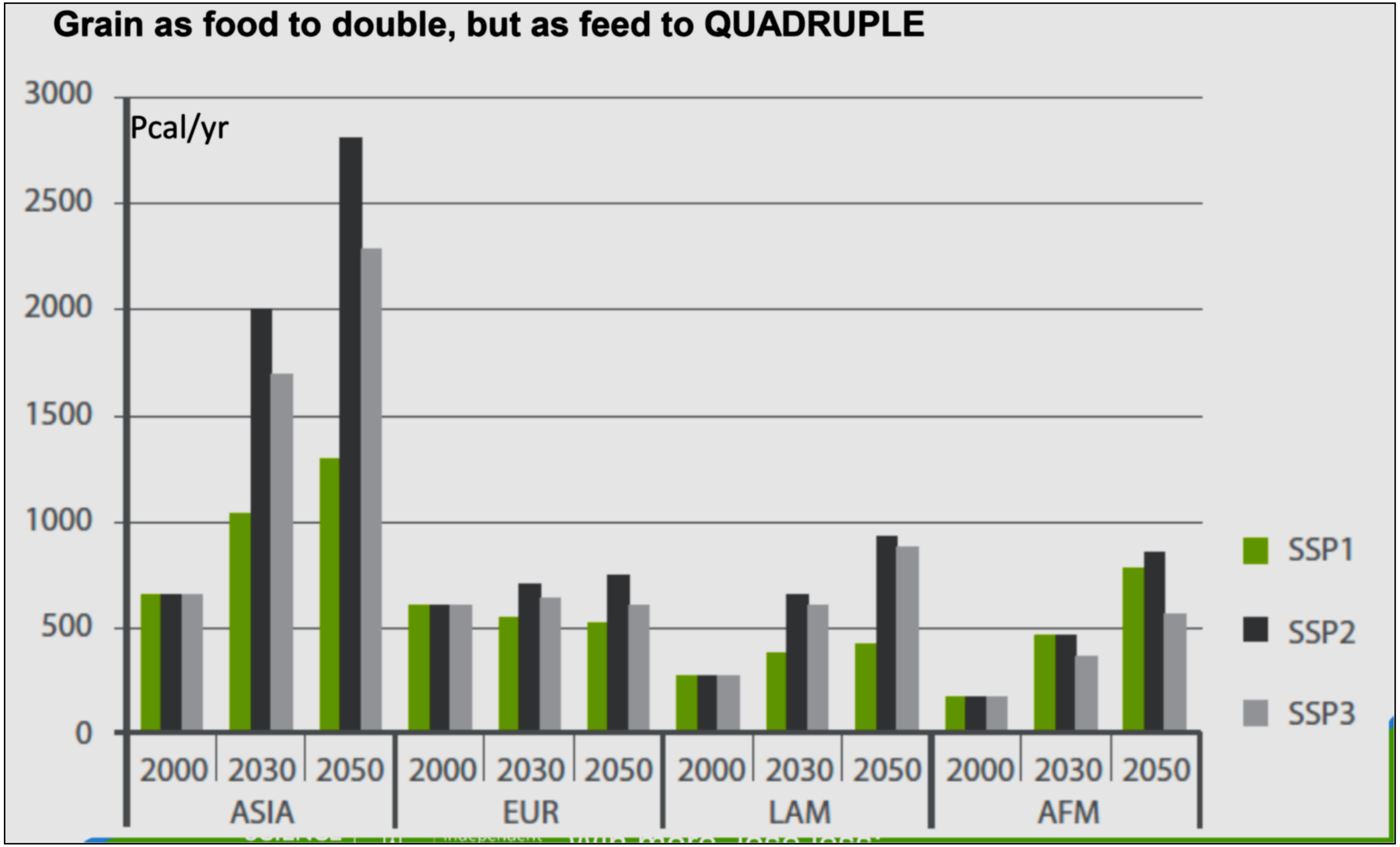
THE GLOBAL GOALS
For Sustainable Development

The global middle-class is expected to increase by 3 billion in 2030. This will increase demands for energy by 45%, water by 30%, and food by 50%.

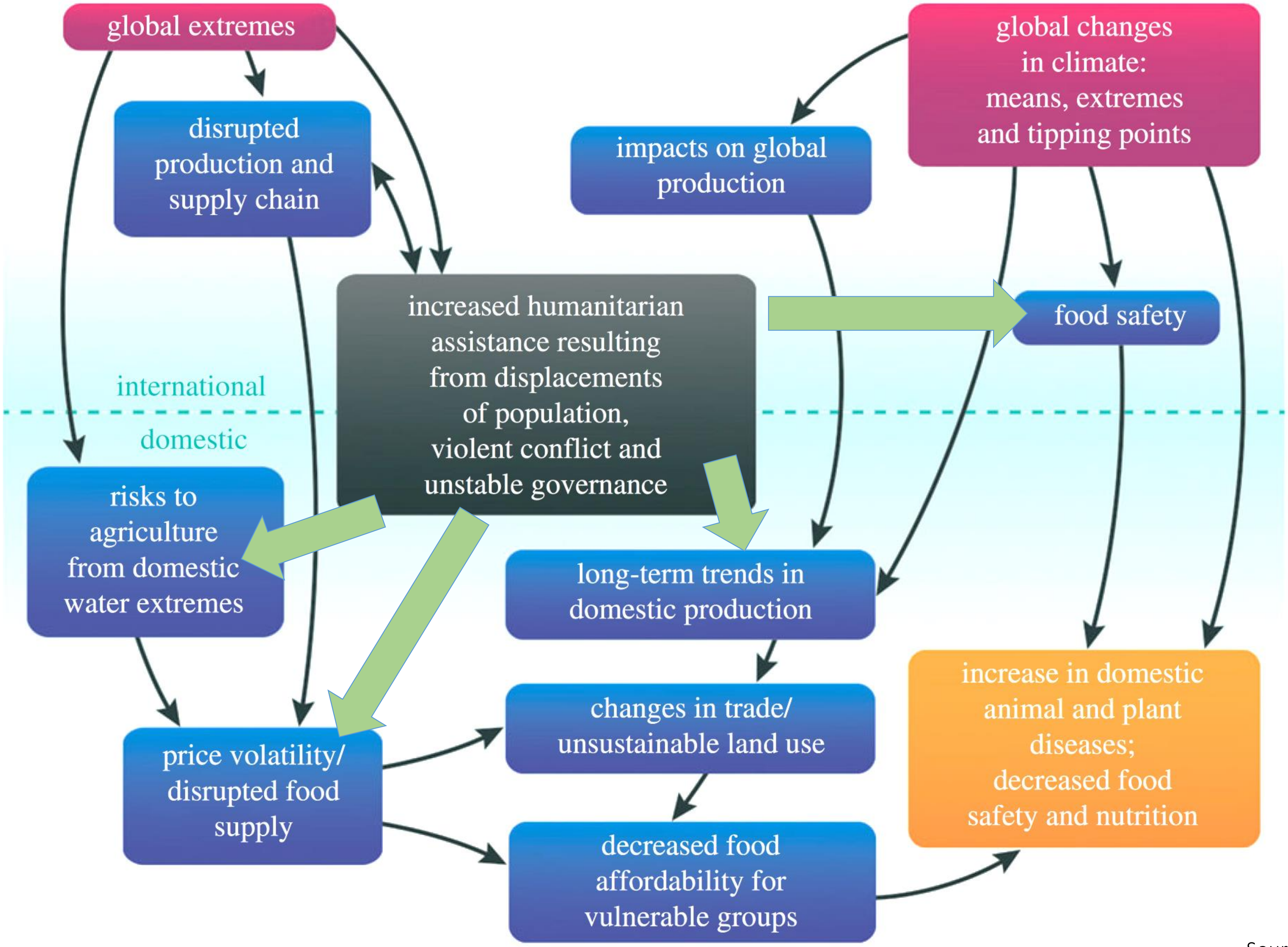
DANIDA (2014) A Shared Agenda: Denmark's Action Plan For Policy Coherence For Development.

1. Where will they live?
2. What will they choose to spend their money on?

Demand For Animal Source Feeds

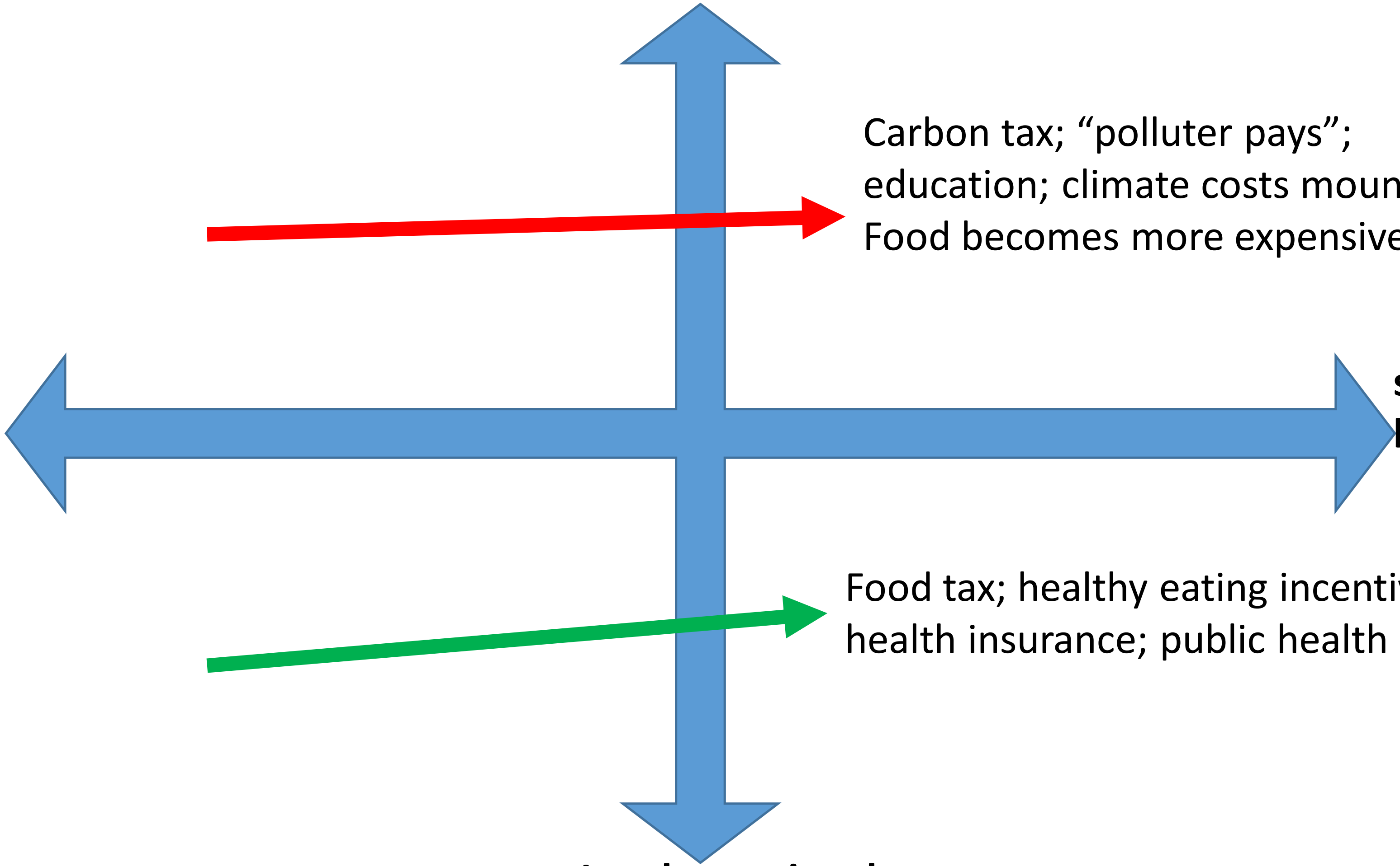


Source: Herrero et al. 2014.



Source: Challinor et al. 2018. *Phil. Trans. A*

Alternative Futures



WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

https://www.weforum.org/whitepapers/shaping-the-future-of-global-food-systems-a-scenarios-analysis

Nutrition Policy

20^{th} Century

- Focus on Technology Aided PRODUCTION
- Emphasis on Individual Behaviour Change

21^{st} Century

- Focus on both PRODUCTION and CONSUMPTION patterns which are compatible with sustainable development
- Emphasis on Systems thinking for broader societal change

CHOICE?

Conscious

- Well Informed
- Ill Informed

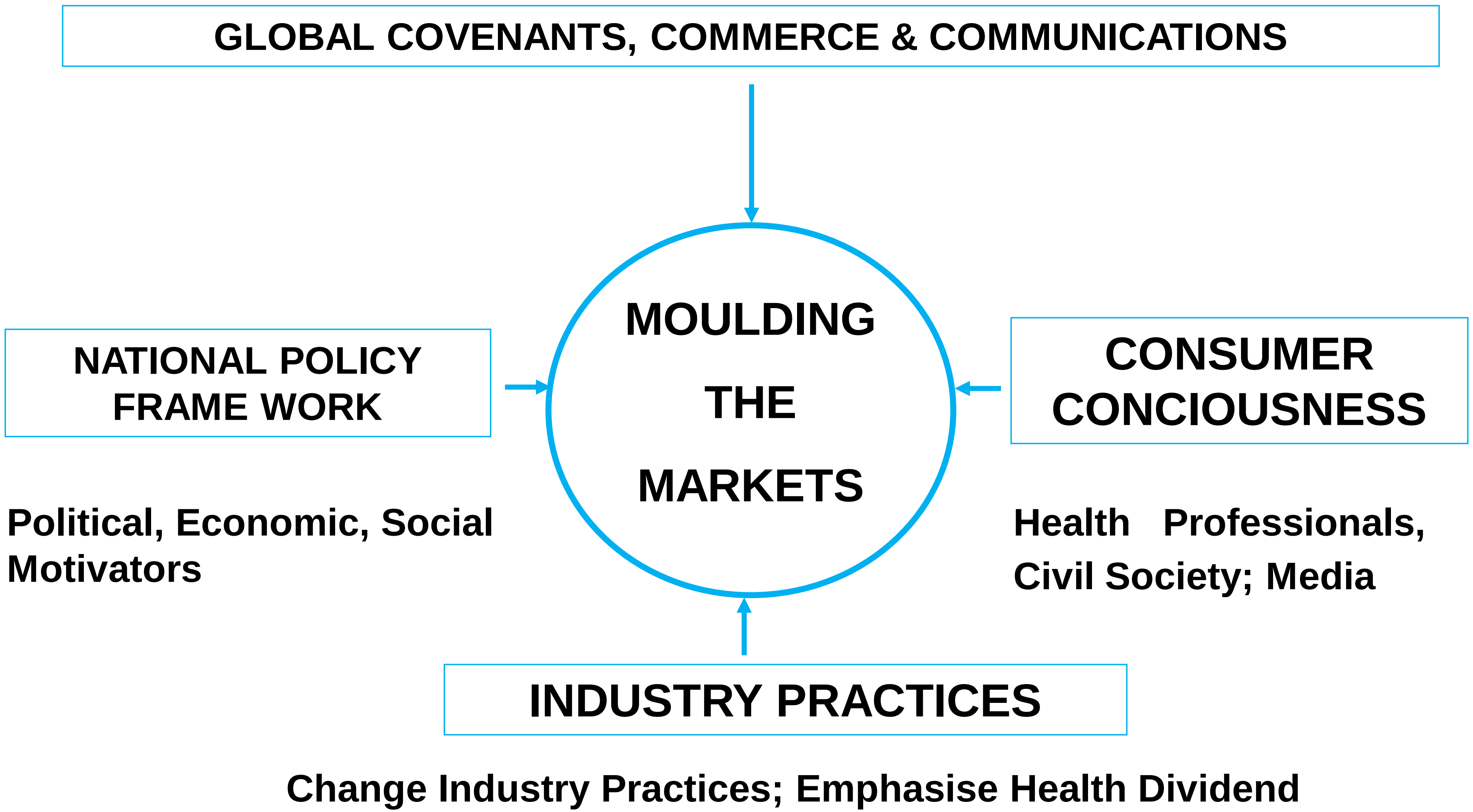
Conditioned

- Marketing and Promotion
- Cultural Factors

Compelled

- Availability
- Affordability

INTERNATIONAL AGENCIES; TRANS-NATIONAL TRADE AND MEDIA



FSSAI - HFSS Recommendations

- **Nutrient specific guidelines:** Overall moderation and a healthy balance of all nutrients are encouraged.
  - **Fats-**Fats should be largely consumed in the unsaturated form.
  - **Sugars-**A total of 10% of total energy is allowed as added sugars in our daily diet
- **Ban on foods with high FSS advertising on children's channels or during children show** is urged
- **Additional tax** on highly processed commodities and sugar sweetened beverages
- Advocating **reformulation** of commercialized products.
- Positive **nutritional labelling**
- Provide a **nutrition-sensitive and an enabling environment** to allow a consumer to make healthier choices in a sustained fashion.
- **Safe and Nutritious Food at School** is a nation-wide campaign to help school children inculcate the habit of eating safe and eating right.

Safe & Nutritious Food
A Shared Responsibility

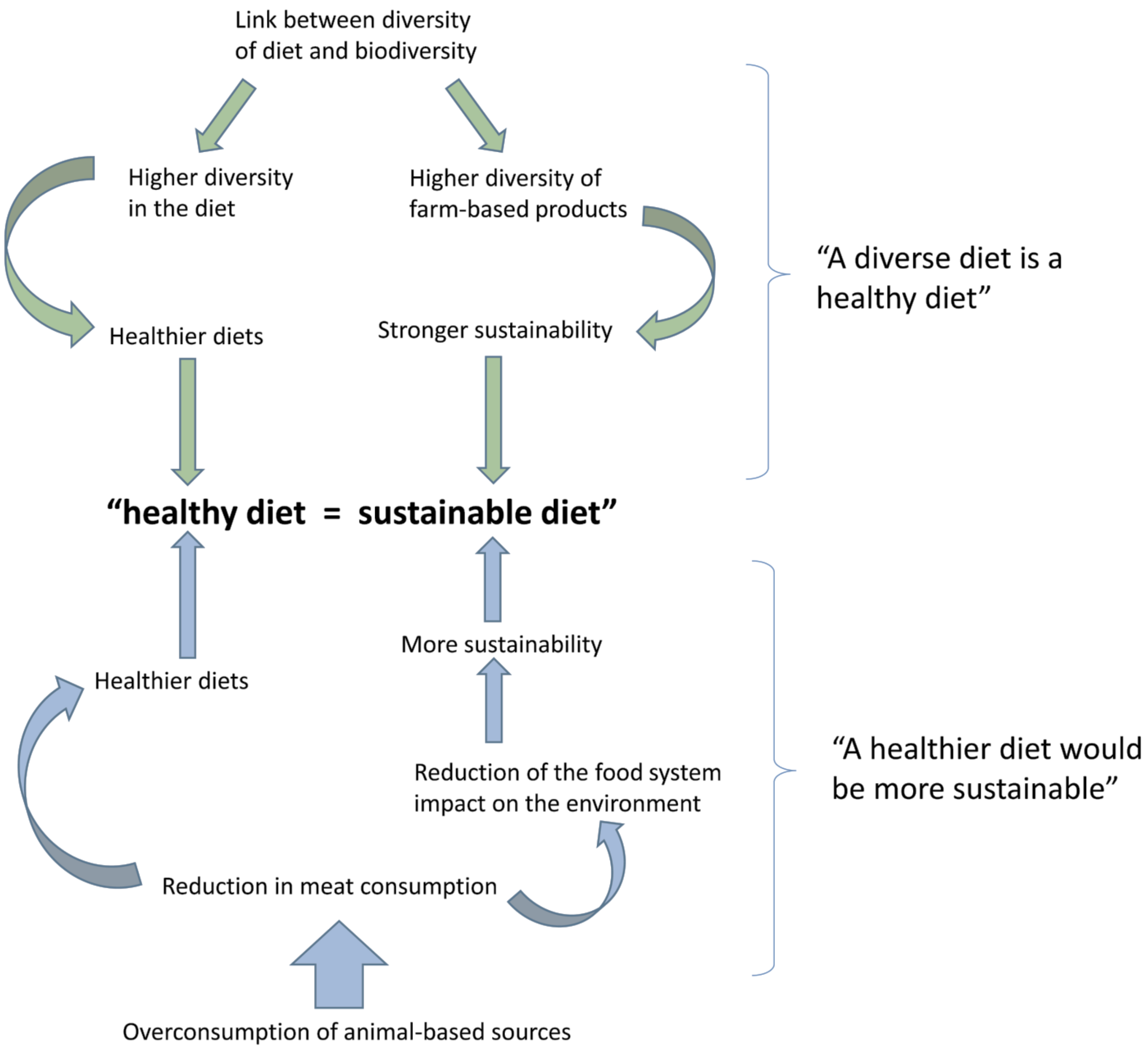
Ref: *http://snfportal.in/ (2017)*

Research: Knowledge Is Needed On

DOMAINS THAT NUTRIONISTS RELATE TO	DOMIANS THAT RELATE TO NUTRITION
FOODS	AGRICULTURE
NUTRIENTS	FOOD PROCESSING
COOKING PRACTICES	WATER
EATING PATTERNS	SANITATION
DIGESTION & ASSIMILATION	HEALTH SYSTEM
PHYSICAL ACTIVITY	EDUCATION
HORMONES	INCOME
BIOMARKERS	EQUITY
(PHYSIOLOGICAL & BIOCHEMICAL)	TRANSPORT
IMMUNITY	COMMUNICATIONS
ANTHROPMETRICS	MEDIA
PATHOLOGICAL MARKERS	TRADE
GENES	ENVIRONMENT
EPIGENETICS	POLITICAL SYSTEMS
MICROBIOME	


As food systems evolve to address the challenges of population growth, environmental change and economic instability, we should ensure that they also **improve nutrition**.

What credible win-win scenarios should WE promote?



Source: Bene et al. 2018. World Development

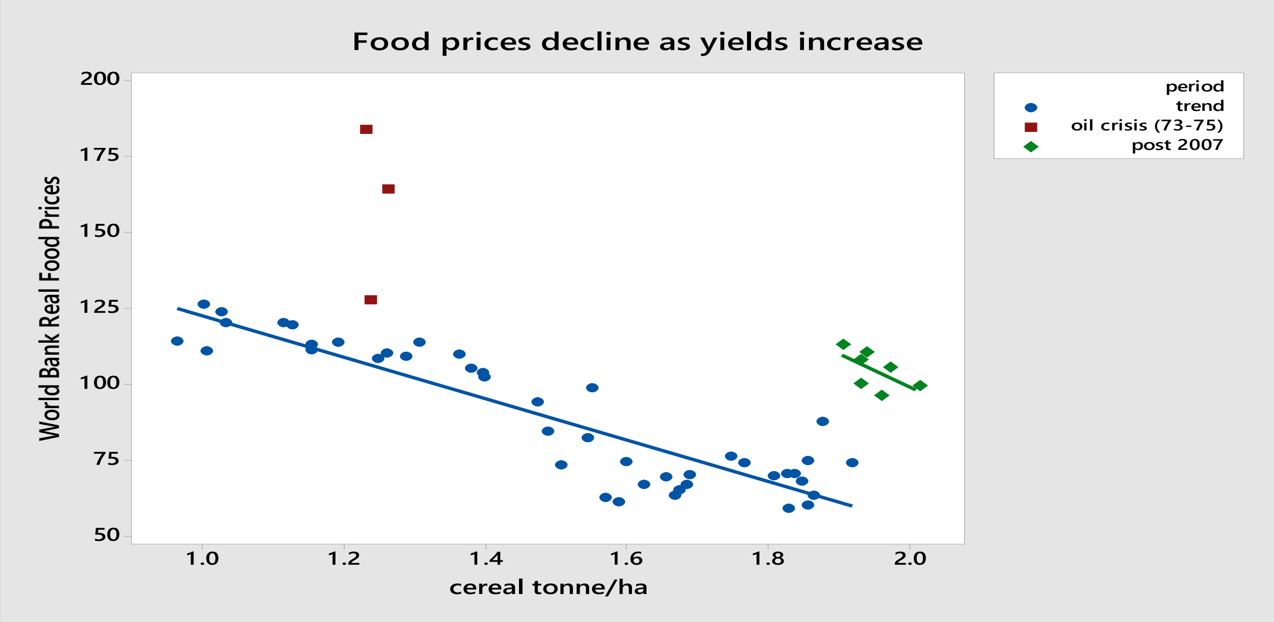
School Meals Can Be Transformational

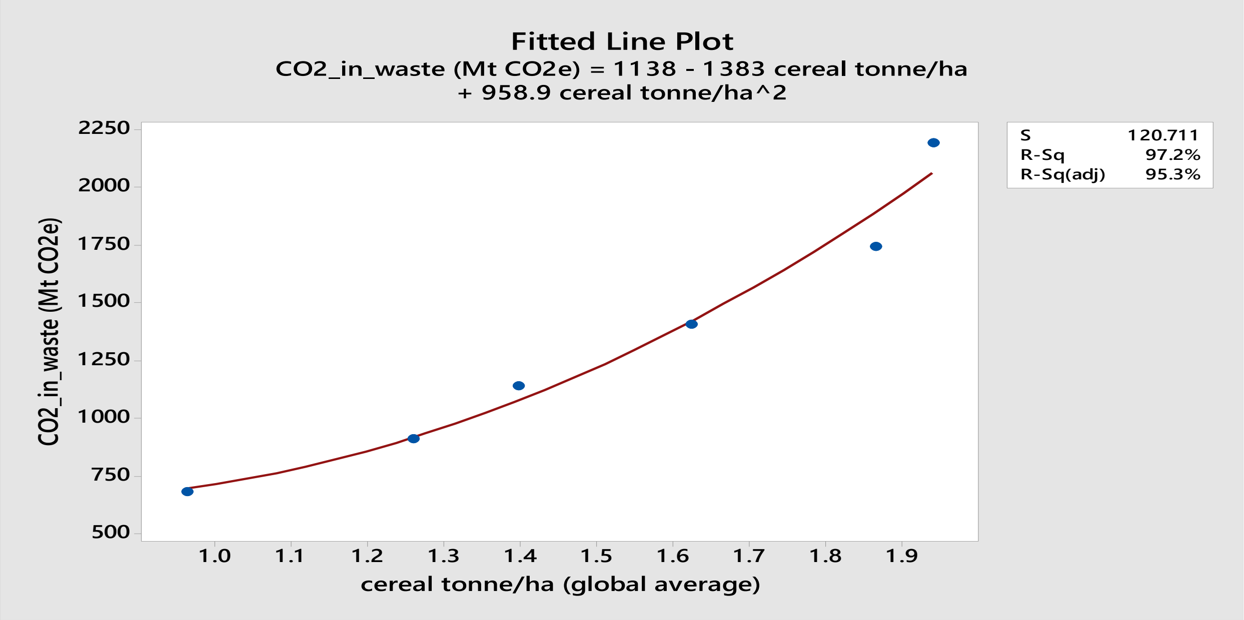
1. School meals that are consistent with national dietary guidelines and formulated with **emphasis on nutritious ingredients and food groups**
2. Policies that facilitate **local and regional procurement** and **diversification** of foods for schools
3. **Predictable national budget allocations** to support these integrated activities

4. An **effective, inter-sectoral mechanism** for managing such programmes, which includes **careful measurement and monitoring** of their efficiency and of their expected educational, nutritional and agricultural outcomes.
5. The ability to promote consumption of healthier school meals and **encourage children's lifelong healthy eating habits** through:
6. Integrated actions that link school meals with **nutrition education**, **community engagement**, **school gardening**, **trainings** and technical support to help schools achieve a healthier environment overall.

Nutrition Status
Health Status
Social Harmony
Community Engagement
Connect to Local Farming
Sports Performance
Educational Outcomes
BETTER SCHOOL MEALS

As Yields Grow, Waste Grows Faster





A half-century of production-phase greenhouse gas emissions from food loss & waste in the global food supply chain

Stephen D. Porter [a,*], David S. Reay [a], Peter Higgins [b], Elizabeth Bomberg [c]

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[c] School of Social & Political Science, University of Edinburgh, Edinburgh EH8 9LD, UK

Science of the Total Environment 571 (2016) 721–729

making food cheaper embeds waste as “economically rational behaviour”

1.3 billion metric tons, or one third, of food available for human consumption never reaches the plate or bowl

- ***Food waste:*** discarding of food downstream in the value-chain, particularly at retail and consumer levels, e.g. aesthetic quality, or spoilage

- ***Food loss:*** decrease in quantity or quality of food intended for human consumption, e.g. in agricultural production, post-harvest or during transformation

Global Food Loss And Waste Costs C. US$940 Billion / Year

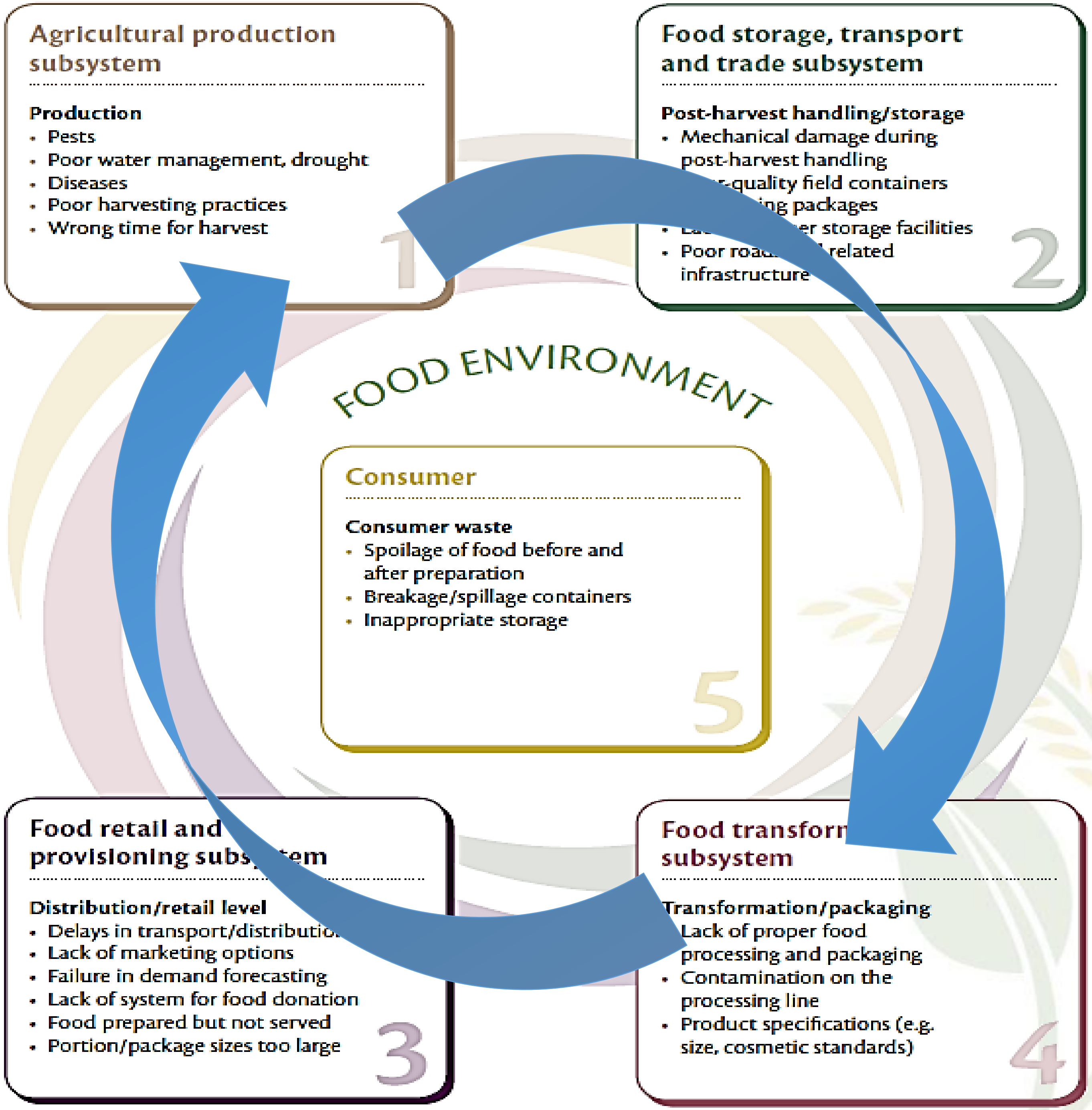
The highest economic losses occur for:

- cereals in post-harvest handling and storage;
- fruit and vegetables in transformation and packaging; and
- meat, seafood and milk, at the distribution and retail level.

"The Very Foods That Are Critical Components Of Healthy Diets Are At The Highest Risk Of Loss And Waste"

© iStock

Drivers Of Nutrient Loss And Waste



Policy Solutions Exist Throughout The Value Chain

Agricultural production	Post-harvest handling/storage	Transformation/ packaging	Distribution/ retail	Consumer level waste
During or immediately after harvesting on the farm	*After leaving the farm for handling, storage and transport*	*During industrial or domestic processing and/or packaging*	*During distribution to markets, including at the wholesale and retail markets*	*In the home or business of the consumer, including restaurants and caterers*
Improve agriculture extension services Improve harvesting techniques Improve access to infrastructure and markets	Improve storage technologies Improve handling to reduce damage Improve infrastructure (e.g. roads, electricity access)	Improve supply chain management Improve packaging to keep food fresher for longer, optimize portion size and gauge safety Reprocess or repackage food not meeting specifications	Provide guidance on food storage and preparation Make cosmetic standards more amenable to selling 'imperfect' food (e.g. with irregular shape, blemishes)	Improve access to storage facilities Address improper storage at consumption level Improve consumer cooking skills Conduct consumer education campaigns (e.g. general public, schools, restaurants)

Source: Hanson C, Mitchell P. 2017. *The Business Case for Reducing Food Loss and Waste.*

A New Global Panel Study Shows That Reducing Food Loss And Waste Would Have Substantial Nutritional Benefits

Scenario 1 ('business as usual') - food loss/waste rises 37%:

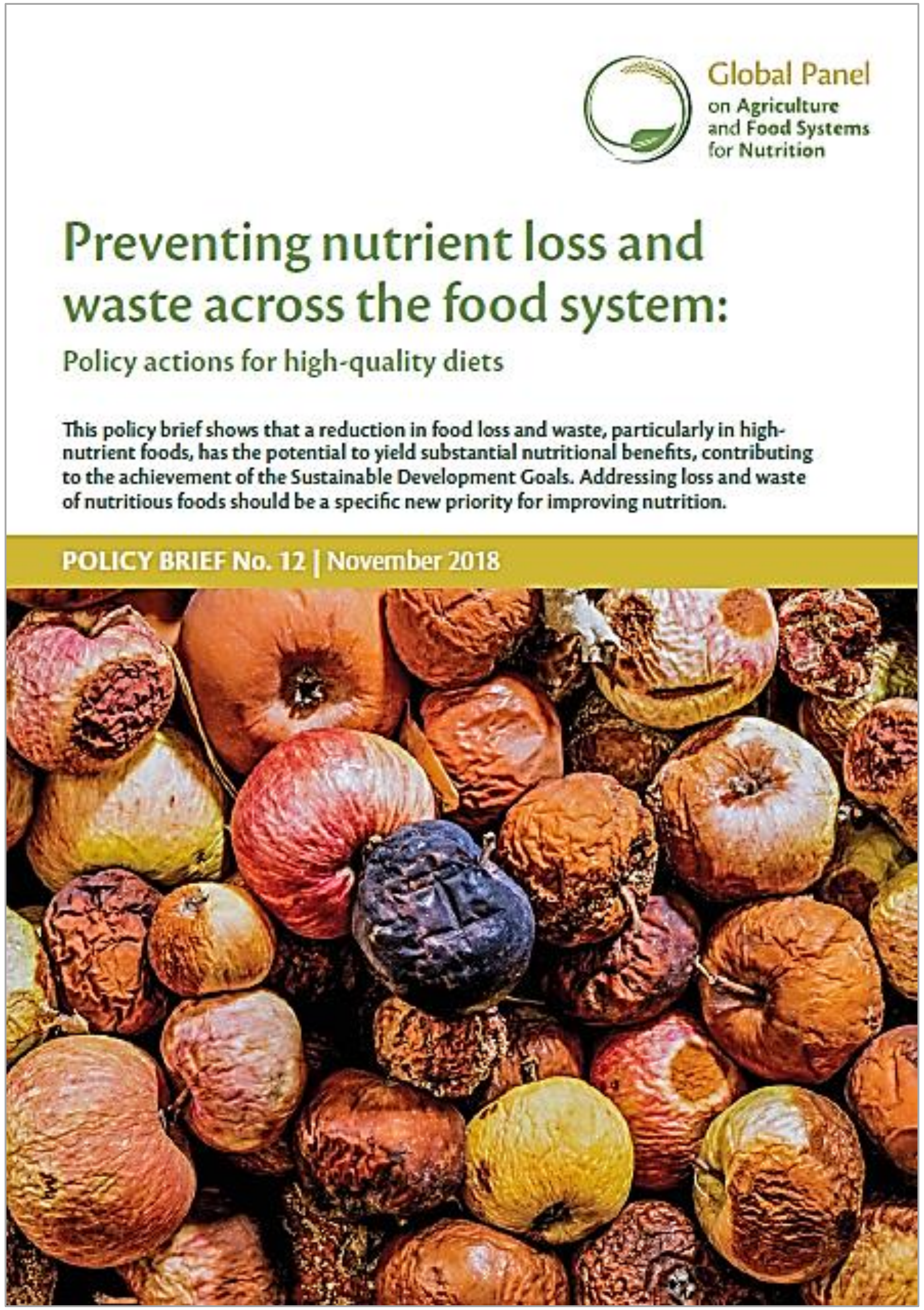
- By 2030, 25% of calories and protein produced would be 'lost' to consumers, along with 18% to 41% of vitamins and minerals.

Scenario 2 (consistent with SDG target 12.3) - food loss and waste cut by 50%

- Supply of folate, vitamin A, riboflavin, folate and calcium would significantly increase.

Priority Areas For Action

1. Make reduction of food loss and waste a global policy agenda on par with ‘producing more food’
2. Take practical steps at all points across the food system to retain nutrients produced
3. Invest in public and private infrastructure at all levels
4. Encourage innovation in technologies, system efficiencies, policies and practices
5. Improving data collection & analysis – set targets for loss reduction and report progress



"Reducing loss and waste in nutritious foods would yield substantial benefits not only for human health, but for global economies and the environment"

Download the brief:
Glopan.org/foodwaste

Science – Policy - Action

NUTRITION: THE ‘SPA’ OF HEALTH TRANSFORMATION AND SUSTAINABLE DEVELOPMENT