European Commission

# NUTRITION QUICK TIPS SERIES

# CLIMATE CHANGE AND NUTRITION

***What we eat impacts climate change, and climate change impacts what we eat: ensuring sustainable, resilient and healthy diets is therefore critical to improved nutrition and to adapt to and mitigate climate change.***

## Introduction

Climate change contributes to all forms of malnutrition (including undernutrition, micronutrient deficiencies and overweight) and increased susceptibility to disease, particularly for nutritionally vulnerable groups including adolescent girls, pregnant and breastfeeding women and girls, children, older people, and chronically ill, low-income households, among others[1]. As one of the key drivers of biodiversity loss in agriculture, climate change reduces the ability of global food systems to respond to shocks and stresses and to provide healthy and nutritious diets. Changes in temperature, precipitation and the frequency and severity of extreme weather events, such as extreme heat, drought, floods and storms, results in reduced crop yields and productivity, and threatens critical infrastructure needed to access food (e.g., roads, storage facilities, water and sanitation). Studies have shown that increasing $CO_2$ levels can alter the nutritional composition of food crops. Climate change also influences other underlying factors of malnutrition, such as unsustainable food systems, poor public health, risk of conflict and vulnerable livelihoods or socio-economic status, which in turn also impact the immediate determinants of nutritional status: food consumption and health. On the other hand, current food systems, driven by increasingly unsustainable dietary patterns, are both a major driver of climate change and the single largest driver of environmental degradation[2,3].

While ending hunger and malnutrition in all its forms depends on access to health, social protection and Water, Sanitation and Hygiene (WASH) systems, which are also affected by climate change, this Quick Tip focuses on climate change in relation to food systems. It is guided by the question 'How can climate-related interventions in the (agri-) food systems be designed/ adapted to maximise nutrition outcomes and to minimise climate impacts on a "planetary health diet"[4]?' WHO guidance for a healthy diet for adults includes fruit, vegetables, legumes (e.g., lentils and beans), nuts and wholegrains with limited sugar, saturated and trans fats, and salt, while the Planetary Health Diet proposed by EAT Lancet emphasises a plant-dominant diet where wholegrains, fruit, vegetables, nuts and legumes comprise a greater proportion of foods consumed, with significantly smaller proportions of meat and dairy.

Feeding a growing population a healthy and nutritious diet provided by 'nature-positive'[5] food systems requires both economic and policy-related shifts, as well as individual-level change.

1 Pörtner, H.-O., Roberts, D.C., Tignor, M. et al. (Eds). Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, IPCC, 2022, p. 51.

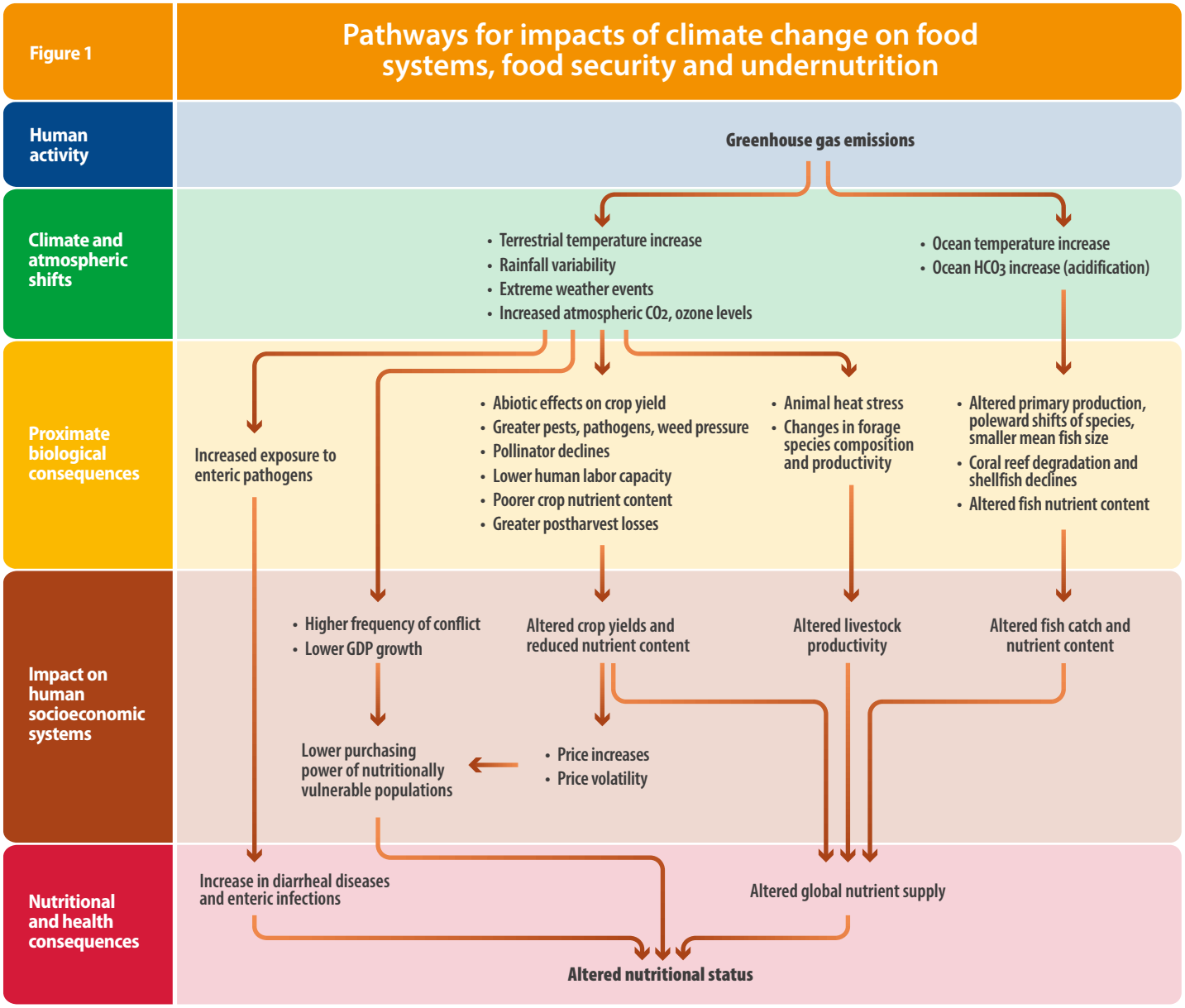
2 EAT Lancet (2019) and Springmann et al. (2018). It is also important to recognise other devastating impacts of the current food system on biodiversity loss and land-use change, depletion of freshwater resources and the large- scale pollution of aquatic and terrestrial ecosystems through excessive nitrogen and phosphorus inputs.

3 www.stockholmresilience.org/research/planetary-boundaries.html

4 The planetary health diet provides guidelines for food groups, which in combination constitute an optimal diet for human health and environmental sustainability. The Planetary Health Diet - EAT (eatforum.org)

5 https://www.weforum.org/agenda/2021/06/what-is-nature-positive-and-why-is-it-the-key-to-our-future/

## What are the effects of climate change on nutrition?




*(From Myers et al., 2017)*

There are several pathways by which climate change impacts on food systems, food security and rates of undernutrition, as presented in Figure 1. It also affects rates of overweight and obesity, as higher temperatures are associated with reduced physical activity in many parts of the world, particularly among urban populations, while food price fluctuation can reinforce dependency on highly processed foods[6]. Increased levels of carbon dioxide in the atmosphere may also reduce nutrient levels in food: experiments have demonstrated the impact of higher concentrations of $CO_2$ in reducing the content of protein in cereal grains and rice; of zinc and iron in grains and pulses; and the content of both these and other micronutrients (including phosphorus, potassium, calcium, sulphur, magnesium, copper and manganese[7]) across a broader range of food crops. Increased heat and water stress can also increase the incidence of pests and diseases during production, and of foodborne pathogens and mycotoxins during food storage, processing and transportation[8]. Changing patterns in rainfall, dry seasons and temperatures also affect agroecosystems and their capacity to produce diversified crops. Risks associated with food safety and food waste in rural communities can be especially acute, as retail infrastructure and cold storage are often basic and access to water may be restricted, resulting in inadequate food hygiene and poor nutritional outcomes.

6 An, R. et al. (2018). Global warming and obesity: A Systematic Review.

7 Myers et al 2017, Climate Change and Global Food Systems: Potential Impacts on Food Security and Undernutrition

8 Battilani et al. (2016). Aflatoxin B1 contamination in Europe increases due to Climate Change.

## What are the impacts of unsustainable diets on climate change?

Food systems have a significant impact on climate change. From changes in land use and agricultural production to packaging and waste management, food systems emissions are estimated to represent around a third of total global emissions[9]. The increased consumption of ultra-processed foods and beverages is strongly associated with substantial levels of greenhouse gas (GHG) emissions. The production of animal-based food[10], which is particularly relevant for industrialised countries accounts for 57% of global GHG emissions from food production, and demand for this is projected to increase by 70% by 2050, while demand for food in general will increase by 50%, significantly above the projected population increase. This implies that our diets will continue to contribute excessive GHG emissions while placing an increasing burden on health systems.

## What needs to change?

Mitigation strategies are urgently needed to transform our food systems, to deliver nutritious food to all within planetary boundaries (see Figure 2). There is evidence to show that demand-side measures, such as shifting towards healthier diets, reducing food loss and waste, and adopting sustainable intensification of agricultural systems as well as agroecological approaches[11], can reduce ecosystem conversion, GHG emissions and contribute to ecosystem restoration and reforestation[12]. A food systems approach that incorporates actions in these areas[13] is one essential factor for the attainment of global climate commitments, counteracting biodiversity loss, and ensuring food security and healthy diets for a growing population.

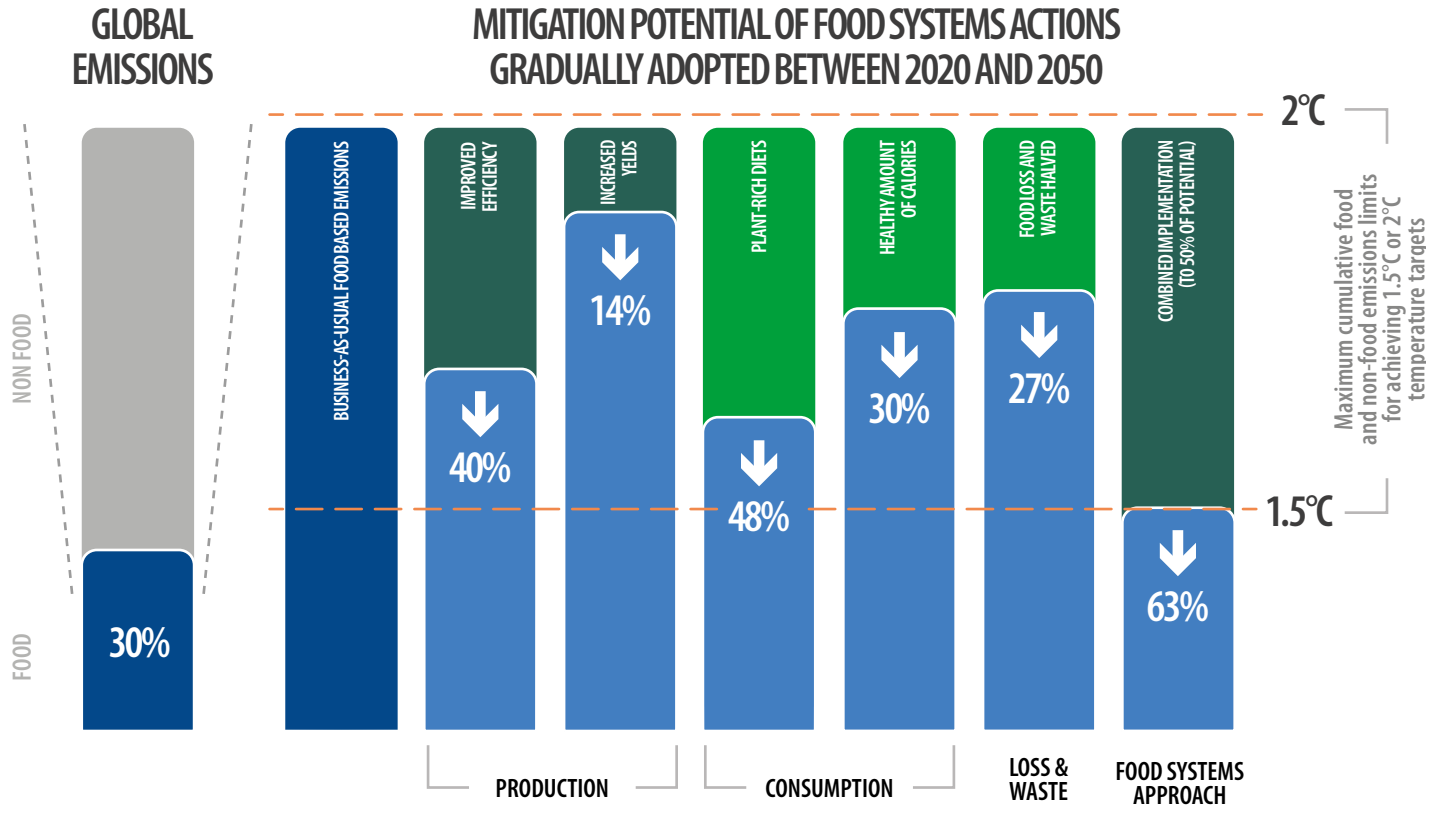



*Figure 2: Mitigation potential for food system actions. (From: World Wildlife Fund: Solving the Great Food Puzzle p.9)*

At the heart of the European Green Deal, the EU Biodiversity Strategy, EU Strategy on Adaptation to Climate Change and Farm-to-Fork Strategy lies a vision of a new and better balance between nature, food systems and biodiversity. The Farm-to-Fork Strategy supports a transition to food systems and food consumption patterns that support healthy and sustainable diets. The Adaptation Strategy seeks to step up action across the economy and society to achieve climate resilience, by making adaptation smarter, swifter and more systemic, and by increasing international action on adaptation to climate change.

9 FAO - News Article: Food systems account for more than one third of global greenhouse gas emissions.

10 Xu X. et al., 'Global greenhouse gas emissions from animal-based foods are twice those of plant-based foods', Nature Food, Vol. 2, No 9, 2021, pp. 1-9.

11 Technical note: 'Supporting the transformation of agricultural and food systems through agroecological approaches', 2021, European Union, DG INTPA, Capacity4dev.

12 Climate Change 2022: Mitigation of Climate Change IPCC. (2022). Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, et al. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926

13 Clark, M.A., Domingo, N.G., Colgan, K., Thakrar, S.K., Tilman, D. et al., Global food system emissions could preclude achieving the 1.5 and 2 C climate change targets. Science, vol. 370, No 6517, 2020, pp. 705-708.

While a substantial degree of global warming is inevitable, urgent action across food systems to mitigate climate change is needed, including shifts towards diets with a greater proportion of proteins from alternative sources including plants. It is particularly important to adopt a gender transformative approach: improved diets and nutrition for women address gender inequalities, contribute to their empowerment and are key in breaking the intergenerational cycle of malnutrition[14]. It is also essential to enhance the resilience of food systems to climate stresses and shocks.

# Strategies to include nutrition objectives within climate change interventions in the food systems/agriculture sector

## Mobilise governance structures and policy to achieve tangible nutrition outcomes

- Incorporate climate change considerations into nutrition governance mechanisms, strategies and policies, promoting greater sustainability of food production whilst boosting healthy diets and improved nutrition. Similarly, identify where nutrition can be incorporated in climate-related governance mechanisms, strategies and policies.
- Support the creation of a conducive policy environment for sustainable and nutrition-sensitive private investment in smallholder farming (including fish-farming) and processing[15] and actively promote the shift to business models that are based on diversified food production (including protein alternatives), favouring resilient and sustainable farming and consumption of nutritious diets.
- Encourage governments and private sector actors to collaborate in helping consumers to make the appropriate dietary choices through suitable marketing strategies. Identify potential conflicts of interest and support their resolution – between the private sector and national as well as international authorities and when promoting public-private partnerships[16].
- Encourage governments to promote fiscal and policy measures that support healthy and sustainable diets. This includes for example: taxes on sugar-sweetened beverages and other unhealthy foods, and subsidies for healthy foods targeting people of low socioeconomic status[17]; policies regulating the marketing of unhealthy items and brands, particularly to children; monitoring and enforcement of advertising regulations; incentivising food/beverage industries to reformulate and produce healthier products; labelling strategies to assist consumers to identify healthier food products.
- Ensure that nutrition-related indicators are integrated into climate change policy and programming[18]. Such indicators are needed to capture countries' national efforts and international commitments, e.g. the targets of their Nationally Determined Contributions (NDCs) that embody efforts by each country to reduce its emissions and adapt to the impacts of climate change.

## Promote sustainable healthy diets

- Include nutrition in research, to provide greater insights into the interactions between climate change and nutrition. Topics could include, for example: the impacts of global warming on foods from land and sea; shifts in land and water use and GHG emissions due to diet changes; how diversification of local food systems addresses agricultural resilience and nutritional diversity; less-polluting means of production of micronutrient-rich foods to meet the nutritional needs of poor communities[19]. Research is also needed into adapted and indigenous nutritious crops (available in sufficient quantities) for the benefit of all.
- Accelerate innovation in alternative proteins (such as seaweed, microalgae, edible insects or plant-based protein[20]) and their introduction to the market.
- Advance large-scale food fortification and promote crop diversification by re-introducing underutilised (indigenous) crop varieties that are micronutrient dense, to improve the diets of vulnerable populations[21].
- Realise the full potential of sustainable, aquatic foods – such as fish, shellfish, aquatic plants, and algae sustainably captured or cultivated in freshwater or marine ecosystems[22].

14 For more information see Quick Tip on Nutrition, Gender Equality and Women's Empowerment, 2022, on the EU's Capacity4dev web platform.

15 E.g. EU-Africa: Global Gateway Investment Package - Sustainable Food Systems.

16 Management of Conflicts of Interests in Public-Private Partnerships (video), a workshop from the Coalition of Action for Healthy Diets from Sustainable Food Systems for Children and All.

17 Implementing fiscal and pricing policies to promote healthy diets: a review of contextual factors, World Health Organization, 2021.

18 For more information on indicators and result chains see: Nutrition Results and Indicators webpage on Capacity4dev (europa.eu).

19 Haddad, L. et al., 'A new global research agenda for food', Nature, Vol. 540, 2016, pp. 30-32.

20 'Alternative proteins top the bill for the latest FAO–International Sustainable Bioeconomy Working Group webinar', news story on website of Food and Agriculture Organization of the United Nations, 9 May 2022.

21 Food Fortification Advisory Services | 2fas

22 Aquatic/Blue Food Coalition, Pacific Community (spc.int) or Blue Aquatic Food Action Coalition Information.pdf (edf.org).

## Foster resilience

- Design interventions that tackle water scarcity, ensuring safe drinking water and improved sanitation, to ensure adequate food hygiene and food safety at the household level and reduce the prevalence of water-related diseases.
- Improve early warning systems for (climate-related) natural hazards, including biological hazards (pests, locusts etc.), to facilitate the dissemination of timely and accurate data/analysis at field level to smallholder farmers.
- Promote the provision, availability and accessibility of services including climate-related information/data to enhance disaster and climate risk management, including disaster/climate insurance and finance interventions.
- Promote clean cooking, using cleaner fuels and energy-efficient modern stoves, to limit impacts on the environment and family health, and reduce the workload of those responsible for daily food preparation[23].
- Support the transition towards agroecological, diversified, sustainable agroecosystems at farm level to maximise local production of nutritious food.

## Support sustainable and healthy consumption

- Boost the capacity of those responsible for daily food choices and food preparation, as this can transform consumption patterns, which drive food systems.
- Encourage consumption of diverse and locally produced foods.
- Promote behaviour-change linked to food preferences and choices which are unsustainable and/or unhealthy (e.g., ultra-processed foods or overconsumption of animal products in certain contexts), and offer nutritious alternatives (especially, but not limited to, plant-based options). Entry points are e.g. agricultural/health/food and nutrition policy design, school/hospital meal programmes and increasing the ratio of plant-rich to meat-based dishes on restaurant menus.
- Develop and help enforce national food-based dietary guidelines[24] that define context-specific sustainable healthy diets by considering the social, cultural, economic, ecological and environmental circumstances.
- Support smallholders and assist them with equitable access to markets to increase their incomes and in turn enable communities to consume more nutrients from the foods they buy[25].

## Further information and support

- Nutrition and climate change. Current state of play: Scoping review, Emergency Nutrition Network.
- The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission report, The Lancet, February 2019.
- The State of Food Security and Nutrition in the World 2022, FAO.
- The FAO brief Climate Action and Nutrition Pathways to Impact provides options to address climate change and malnutrition through agrifood systems, water systems, social protection, and health.
- Food Fortification Advisory Service (from 2023 no longer updated).
- Quick tips: Integrating climate change and the environment in the agriculture and food systems, European Union INTPA - NEAR Environment and Climate Change Mainstreaming Facility, 2020.
- Initiative on Climate Action and Nutrition (I-CAN), WHO.
- Accelerating Action and Opening Opportunities – 2023 I-CAN baseline assessment of nutrition and climate change.
- For more information on the link between climate change and agriculture and biodiversity, see:
  - Climate Change, biodiversity and nutrition nexus: Evidence and emerging policy and programming opportunities, FAO, 2021;
  - The State of the World's Biodiversity for Food and Agriculture, FAO, 2019;
  - Climate Change and Land, IPCC, 2019.
- The global climate crisis is a child nutrition crisis, UNICEF, 2023.

23 The Value of Clean Cooking, Clean Cooking Alliance.

24 e.g. based on Sustainable healthy diets. Guiding principles, Food and Agriculture Organization of the United Nations (fao.org) and World Health Organization (WHO), 2019.

25 On a larger scale, as climate change shifts growing seasons and territories, evidence shows that providing equitable access to global food trade will be more important than ever in helping to improve people's access to nutrients in some poor countries.

## Case studies of EU-funded projects showing how nutrition and climate elements have been considered in the design of agriculture/food security projects

- *Projects that work for improved nutrition: case studies from EU-funded projects*, European Commission, Directorate-General for International Partnerships, Publications Office of the European Union, 2021.

- Waibuta, U., *Pro-Resilient Fiji – Strengthening climate resilience of communities for food and nutrition security.* Apia. FAO, 2019.

- 'Integral approach to build resilience in communities vulnerable to food insecurity and climatic shocks, especially droughts, in Guatemala (PRO RESILIENCE)'. European Commission, Directorate-General for International Partnerships, *Action plan on nutrition: seventh progress report April 2021-March 2022*, Publications Office of the European Union, 2022.

The new policy marker on nutrition of the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) was approved by the OECD-DAC for official development assistance reporting in 2019 with the support of the European Commission and EU Member States. According to this marker, 'a project should be identified as nutrition related when it is intended to address the immediate or underlying determinants of malnutrition'. An OECD-DAC Nutrition Policy Marker Handbook is available.

The EU is a global leader in promoting gender equality as a key political objective of its external action and common foreign policy, aimed at accelerating progress towards the UN Sustainable Development Goals. By 2025, 85% of new EU actions should contribute to achieving the objective of gender equality and women's empowerment, with more actions including it as a main objective. Please refer to the Quick Tips: Nutrition, gender equality and women's empowerment.

*For further information contact INTPA F3 Nutrition and One Health Sector by email: intpa-f3@ec.europa.eu*

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