

GAIN'S DEFINITION OF NUTRITIOUS AND SAFE FOODS



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ABOUT GAIN

The Global Alliance for Improved Nutrition (GAIN) is a Swiss-based foundation launched at the UN in 2002 to tackle the human suffering caused by malnutrition. Working with governments, businesses and civil society, we aim to transform food systems so that they deliver more nutritious food for all people, especially the most vulnerable.

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GAIN BRIEFING PAPER SERIES

GAIN Briefing Notes provide essential information in a succinct, accessible form to support informed decision-making by stakeholders in the food system to improve the consumption of nutritious, safe food for all people, especially the most vulnerable.

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SUMMARY

GAIN's mission and strategy revolve around the core concept of "nutritious and safe foods". In addition, there is a growing consensus that foods should be produced sustainably—i.e., that one should take into account the environmental impact associated with the production of these foods. Regularly achieving alignment and consistency across its programmes in the understanding and implementation of these concepts is of crucial importance to GAIN. This briefing paper aims to share the definition GAIN uses of 'nutritious and safe foods,' present environmental impact levers for sustainable production, and provide relevant examples for guidance. This definition may be useful for others, either as the end point or starting point of an organisation's journey to define nutritious and safe foods. GAIN defines a "nutritious" food as a food that in the context where it is consumed, and for the individual who consumes it, provides beneficial nutrients and minimises potentially harmful elements. We have categorised nutritious foods into four different types: 1) high inherent nutritional value; 2) enhanced nutritional value; 3) some nutritional value; and 4) source of added nutrients.

GAIN defines a "safe" food as a food that does not contain a contaminant or other attribute that increases the probability of poor health outcomes, in the context where it is consumed and for the individual who consumes it. Foodborne hazards can be biological, chemical, or physical in nature, and food contamination can occur at any stage along the supply chain. We have articulated key food safety considerations and risk-reduction measures to improve safety along the value chain by food group.

GAIN is also increasingly seeking to promote sustainably produced foods and has identified ten environmental impact levers. Nutritious and safe foods have the potential to be produced sustainably, depending on practices adopted and their suitability to the local context. We are committed to assessing and balancing the emerging synergies and trade-offs between nutrition, food safety, and sustainable production.

KEY MESSAGES

- Regularly achieving internal consistency and providing guidance on the concept of "nutritious and safe foods" is crucial to the achievement of GAIN's mission and strategic objectives.
- A "nutritious" food is a food that provides beneficial nutrients and minimises potentially harmful elements. A "safe" food is a food that does not contain a contaminant or other attribute that increases the probability of poor nutrition and health outcomes.
- Considering contextual and individual characteristics is essential when defining "nutritious and safe foods."
- Nutritious and safe foods have the potential to be produced sustainably when adopting appropriate, fit-for-context production practices.
- Decision-making around nutritious and safe foods across GAIN's programmes is guided by the definition and examples provided here.

BACKGROUND AND OBJECTIVE

GAIN's mission is to advance nutrition outcomes by improving the consumption of nutritious and safe foods for all people, especially the most vulnerable to malnutrition. Although our primary focus remains on nutrition and food safety, the organisation is increasingly seeking to promote nutritious and safe foods that are sustainably produced, in alignment with the Sustainable Development Goals.

Diets worldwide are shaped by food systems, which influence the demand, availability, affordability, convenience, and desirability of foods. GAIN aims to contribute to transforming food systems through three interlinked strategic objectives: 1) to improve the demand for nutritious and safe foods; 2) to increase the availability and affordability of nutritious and safe foods; 3) to strengthen the enabling environment to improve the consumption of nutritious and safe foods (1). Therefore, regularly achieving alignment and consistency across our programmes in the definition and use of the concept of "nutritious and safe foods" is crucial to our mission and strategy.

The purpose of this briefing paper, therefore, is to share the definition we use of "nutritious and safe foods (NSF)," present environmental impact levers of sustainable production, and provide relevant examples for guidance. This definition may be useful for others, either as the end point or starting point of one's own organisation's journey to define nutritious and safe foods.

DEFINITION OF NUTRITIOUS AND SAFE FOODS AND RELATED GUIDANCE

NUTRITIOUS FOODS

In alignment with the definition of the United Nations Food and Agriculture Organization (FAO) (2) and with the Committee on World Food Security Voluntary Guidelines (3), GAIN defines a "nutritious" food as a food that, in the context where it is consumed and for the individual who consumes it, provides beneficial nutrients (e.g., vitamins, major and trace minerals, unrefined complex carbohydrates, protein, unsaturated fats, essential amino acids, essential fatty acids, and dietary fibre) and minimises potentially harmful elements (e.g., trans-fats, excess quantities of saturated fats, free sugars, and sodium) [Error! Bookmark not defined.](#)

When categorising foods as more or less nutritious (6,7), the contextual and target group qualification is essential because different population groups, in different contexts, have different nutritional requirements depending on a series of factors, such as age, gender, level of activity, life stage (e.g., pregnancy and lactation), genetics, health, and nutritional status (8). This is especially true for groups with increased nutritional needs (e.g., infants and young children, adolescents, women of reproductive age, pregnant and lactating women) (9), which can make a given food highly nutritious to them while being less so for others. For example, a one-year-old infant needs very energy-dense foods, while these might not be ideal for an adult or adolescent at risk of overweight/obesity.

To further illustrate the concept of a nutritious food for programmatic purposes, we have grouped nutritious foods into four broad types (Table 1). Aligned with our mission, these

categories are considered in programmatic work with special emphasis given to the most nutritious foods possible for a given context and population group.

Table 1. Types of nutritious foods^{a,b}

Type	Description	Examples of food groups (non-exhaustive list)
High inherent nutritional value	Naturally contains micronutrients, dietary fibre, unrefined complex carbohydrates, high quality protein and/or essential fats in significant quantities. No major potentially harmful elements ^c when consumed in recommended quantities by a given group.	Fruits and vegetables; whole grains; legumes; nuts and seeds; unsweetened dairy products; eggs; fish; minimally processed meat
Enhanced nutritional value	Foods with some inherent nutritional value that are made more nutritious through the addition of nutrients (i.e. fortification) in significant quantities or changes to the processing procedures. No major potentially harmful elements ^c when consumed in recommended quantities by a given group.	Fortified staple grains/flours; mitigating loss of germ and dietary fibre in grain products
Some inherent nutritional value	Foods with some inherent nutritional value for which potentially harmful elements ^c have been minimized when consumed in recommended quantities by a given group.	Low sugar dairy products; low sodium processed meat; low sugar fortified biscuits
Source of added nutrients	Condiments or supplements which enhance the nutritional value of foods or diets to which they are added.	Iodized salt; fortified cooking oils; micronutrient powders; protein- or lipid-based supplements
<p>^a GAIN will not work on breast milk substitutes, highly sugar-sweetened beverages of no nutritional value (e.g., soda), alcoholic beverages, tobacco, sweeteners, hydrogenated oils, and ultra-processed meat/poultry/fish/dairy products (10).</p> <p>^b A series of definitions, standards, and criteria related to terms used in this table are available in the annex.</p> <p>^c Some exceptions related to quantities of fats may apply, such as for malnourished people and groups with higher nutritional needs.</p>		

In addition to the nutrient composition of foods, consideration should also be given to the nature, extent, and purpose of processing. Indeed, a growing body of emerging literature shows that ultra-processed foods (UPFs) (10) can be associated with increased risk of overweight and obesity and several diet-related non-communicable diseases (NCDs) (11–15) (Box 1).

BOX 1. FOOD PROCESSING AND ITS IMPLICATIONS

- Processing plays a crucial role in improving food safety, enhancing nutritional value (e.g., fortification), increasing convenience (with positive implications on female labour participation and empowerment), and reducing food loss and waste.
- On the other hand, UPFs have been associated with increased risk of overweight and obesity and several diet-related NCDs. Indeed, most UPFs are very energy-dense and high in salt, sugars, and fats, and often lead to overconsumption due to their hyper-palatability (11–15).
- While recognising the positive implications of processing, GAIN highlights the importance of increasing consumption of unprocessed and minimally processed foods (10), as they provide not only essential nutrients but also a variety of non-essential compounds with potential beneficial effects on human health (6,14,16–18).

SAFE FOODS

In alignment with the definition of food safety of the FAO and World Health Organization (WHO) (16), GAIN defines a “safe” food as a food that does not contain a contaminant or other attribute that increases the probability of poor health outcomes, in the context where it

is consumed and for the individual who consumes it. Certain population groups have increased vulnerability to food safety hazards, including infants, young children, pregnant women, the elderly, and those with a compromised immune system due to an underlying illness (17). Foods that are generally regarded as 'safe' by this definition could still be unsafe for those with food intolerances or allergies.

Foodborne hazards include biological (pathogens and parasites), chemical including radiological (both natural, e.g., mycotoxins, and synthetic, e.g., misused food additives and residues of agrochemicals), and physical hazards (e.g., glass, plastic, or metal fragments) (16,18). Food contamination can occur at any stage along the supply chain, from production to consumption. In practice, a safe food is that in which biological, chemical, and physical attributes that could cause adverse nutrition and health outcomes (19–21) do not exceed internationally agreed thresholds, as established by the Codex Alimentarius (22), which we use as a reference when appropriate (e.g., in the absence of national standards in a given country).

Table 2 summarises, by food group, key safety considerations and identified risk reduction measures when seeking to ensure food safety along the value chain (Table 2).

Table 2. Safety considerations and risk reduction measures by food groups

Food group	Level of risk ^a	Food safety considerations	Examples of risk reduction measures
Grains and their products	Low-Medium	Grains can be contaminated with a range of mycotoxins (e.g., aflatoxin, fumonisin, deoxynivalenol) produced by fungi, which can accumulate both before and after harvest. Grains can accumulate heavy metals (e.g., lead, arsenic, cadmium) from soil or irrigation water. Whole grains may be contaminated with foreign matter of inorganic (e.g., stones) and organic origins (e.g., soil, pests) and with bacterial pathogens (e.g., <i>Salmonella</i>).	Pre-harvest management and disease control practices, use clean irrigation water, avoid contaminated soil, sorting, proper storage conditions, limit storage time
Roots and tubers and their products	Low-Medium (variable)	Roots and tubers often contain naturally occurring toxins , such as solanine in potatoes and other nightshades and cyanogenic compounds in cassava.	Soak and cook before consumption, store in the dark, limit storage time
Groundnuts and tree nuts and their products	Low-Medium	Groundnuts and tree nuts can accumulate high levels of aflatoxin, a potent mycotoxin . These commodities may be contaminated with foreign matter and bacterial pathogens (e.g., <i>Salmonella</i>). They may also accumulate heavy metals from soil or irrigation water. Some tree nuts may contain high levels of naturally-occurring toxins like tannins and cyanides.	Pre-harvest management and disease-control practices, use clean irrigation water, avoid contaminated soil, sorting, proper storage conditions, limit storage time
Pulses and their products	Low	Pulses may be contaminated with foreign matter of inorganic and organic origins. These commodities may also accumulate heavy metals from the soil or irrigation water.	Pre-harvest management and disease-control practices, use clean irrigation water, avoid contaminated soil, sorting
Fruits and vegetables and their products	Medium-High	Fresh fruits and vegetables can be contaminated by several bacterial, viral, protozoan, and helminth pathogens , such as <i>E. coli</i> and <i>Salmonella</i> , <i>Hepatitis A virus</i> , <i>Cyclospora</i> , which are often associated with unclean water or fecal matter. Preserved fruits and vegetables (especially canned) can be contaminated with botulinum toxin , produced by <i>Clostridium botulinum</i> bacteria. Fruits and vegetables may also be contaminated with pesticide residues .	Pre-harvest practices, washing, cooking, refrigeration, freezing, avoid cross-contamination, irradiation, limit storage time, fermentation and preservation
Milk and dairy products	Medium-High	Raw milk and dairy products can be contaminated by several bacterial pathogens also found in cattle, e.g., <i>pathogenic E. coli</i> and <i>Salmonella</i> . Processed dairy products can be contaminated by <i>Listeria monocytogenes</i> , which can grow at refrigeration temperatures. Milk can also contain residues of veterinary drugs .	Boiling, pasteurisation, refrigeration, freezing, avoid cross-contamination, limit storage time

Food group	Level of risk ^a	Food safety considerations	Examples of risk reduction measures
Eggs and their products	Medium-High	Eggs can be contaminated with bacterial pathogens (particularly <i>Salmonella</i>) and lipid-soluble environmental contaminants (e.g., dioxins).	Pre-harvest hygiene, cooking, avoid cracked eggs, refrigeration, limit storage time
Fish and shellfish and their products	High	Fish and shellfish can bioaccumulate environmental contaminants (e.g., mercury and ciguatoxin). A number of bacterial pathogens are also prevalent in raw fish and shellfish, such as <i>Vibrio</i> , <i>Salmonella</i> and <i>Listeria</i> ; as well as helminths such as roundworms (e.g., <i>Phocanema/cod worm</i>) and tapeworms (e.g., <i>Diphyllobothrium</i>). Some fish produce toxins (e.g., tetrodotoxin in pufferfish).	Cooking, buy live from reputable sources, refrigeration, freezing, avoid cross-contamination, avoid products with pungent odors, drying, smoking
Meat and its products	High	Raw meat (including poultry) can contain bacterial pathogens such as <i>E. coli</i> , <i>Salmonella</i> , and <i>Campylobacter</i> . Meat can also contain parasites , such as <i>Taenia spp.</i> (tapeworms) and <i>Trichinella spp.</i> (roundworms).	Cooking, refrigeration, freezing, avoid cross-contamination, drying, smoking
Fats and oils	Low	Oxidation of fatty acids in oil results in ketones, alcohols, and aldehydes that can be toxic at high concentrations. Animal fats may harbour bacterial pathogens found in meat.	Avoid prolonged heating, avoid multiple fryings, avoid sunlight, hygiene, heat treatment, avoid cross-contamination
Spices and condiments	Low-Medium	Spices (e.g., chilis) can be contaminated with aflatoxin, a potent mycotoxin ; bacterial pathogens (e.g., <i>Salmonella</i>); and inorganic and organic foreign matter (e.g., hair, insects, stones, etc.).	Drying, sorting, proper packaging and handling, irradiation, proper storage conditions
Foods or supplements for particular nutritional uses	Variable	Complementary foods for infants and young children made from maize or groundnuts may be contaminated with aflatoxin and other mycotoxins .	Exclusive and continued breastfeeding, avoid maize and groundnuts in complementary foods, source safe ingredients

^aAll food groups have the potential to be high-risk in certain situations. However, some are more likely than others to be high risk.

CONSIDERATIONS FOR SUSTAINABLE PRODUCTION

In this briefing paper, the term *production* is used to encompass the whole production chain from farm level (raw ingredients) to processing and packaging of the finished product. GAIN's Environmental Guidelines present the following environmental impact levers of sustainable production for consideration in programme decision-making: 1) strategy, governance, and risk management; 2) environmental regulation compliance; 3) supplier/partner environmental maturity; 4) energy; 5) emissions; 6) biodiversity and land use; 7) soil; 8) materials; 9) water and effluents; and 10) waste.

While acknowledging the importance of this concept, we recognise that there is no one-size-fits-all model for how to sustainably produce a given food commodity. Nutritious and safe foods have the potential of being produced sustainably depending on methods and practices adopted, as well as contextual characteristics. As an example, while intensive production of animal-source foods like meat, fish, eggs, and dairy, as well as intensive crop monocultures for human consumption (23,24), can have significant negative impacts on the environment, there are many opportunities for more regenerative and sustainable production of livestock and crops, particularly when methods are appropriate for the local context and ecological environment (24–28). The level of processing also has implications for the ability to produce foods sustainably, with UPFs of both animal and plant origin generally being associated with more negative environmental consequences (22,29–32).

While GAIN's priority is promoting nutritious and safe foods, the organisation is committed to assessing and balancing any synergies and trade-offs between nutrition, food safety, and sustainable production, in alignment with the FAO-WHO recommendation to quantify and address such trade-offs (23).

CONCLUSIONS

Categorising the nutritional value and level of food safety risk of foods is very complex, as both depend on multiple inherent and external factors, and there are often ambiguities and inconsistencies across different definitions, standards, and criteria for classification (7). To address such complexity, keep up-to-date with emerging evidence, and regularly facilitate the operationalisation of the nutritious and safe foods definition, GAIN has an Nutritious and Safe Food Definition working group that has developed several tools for programmatic guidance. This set of tools are dynamic: regularly updated, adapted, and added to as needed.

In conclusion, this briefing paper has shared the definition GAIN uses of nutritious and safe food, presented environmental impact levers of sustainable production, and provided relevant examples for guidance. The definition presented here helps inform decision-making processes across GAIN's programmes, towards the achievement of our mission and strategy to advance nutrition outcomes by improving the consumption of nutritious and safe foods for all people.

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ANNEX

Table 3: *Definitions, standards, and criteria in relation to terms used in Table 1 on 'Types of nutritious foods'*

Term/expression	Definitions, standards, and criteria	Source
Unprocessed foods	Edible parts of plants (fruits, seeds, leaves, stems, roots, tubers) or of animals (muscle, offals, eggs, milk), and also fungi, algae, and water, after separation from nature.	NOVA classification system, used in FAO and WHO documents (10)
Minimally processed foods	Unprocessed foods that have been submitted to processing (e.g., cleaning, removal of inedible fractions, portioning, refrigeration, freezing, pasteurisation, fermenting, pre-cooking, drying, skimming, bottling, canning, and packaging) that does not substantially alter nutritional properties of the original food. ^a	NOVA classification system (10)
Processed foods	Products obtained by adding salt, oil, and/or sugar to unprocessed or minimally processed foods, through preservation methods such as canning, bottling, or non-alcoholic fermentation. Processed foods may also contain additives to prolong product duration, preserve original properties, and/or prevent microorganism proliferation. ^a	NOVA classification system (10)
Ultra-processed foods (UPFs)	Formulations of ingredients resulting from a series of (often sophisticated) industrial processes, including fractioning of whole foods into substances, chemical modifications of these compounds, and assembly of unmodified and modified food substances. UPFs frequently involve the use of industrial techniques such as extrusion, moulding and pre-frying, 'cosmetic additives' to increase product palatability, and sophisticated packaging. Sugar, oils and fats, and salt are often used in combination, as well as substances of no or rare culinary use (i.e., high fructose corn syrup, hydrogenated or interesterified oils, protein isolates), cosmetic additives (i.e., flavours, flavour enhancers, colours, emulsifiers, sweeteners, thickeners, anti-foaming, bulking, carbonating, foaming, gelling, and glazing agents) and additives to prolong product duration, preserve original properties, and/or prevent microorganism proliferation. ^a	NOVA classification system (10)
Low (saturated) fat	The ' <u>low fat</u> ' nutrient content claim can be attributed to foods that have no more than 3 g of fats per 100 g (solids) or 1.5 g per 100 ml (liquids). The ' <u>low saturated fat</u> ' claim can be attributed to foods in which the sum of saturated fats and trans-fats (if present) does not exceed 1.5 g per 100 g (solids) or 0.75 g per 100 ml (liquids) and does not provide more than 10% of energy.	Codex Alimentarius (33)
Trans-fat	The <u>maximum limit for trans-fat</u> (other than trans-fat naturally occurring in fat of animal origin) in food which is intended for the final consumer and supply to retail is 2 g per 100 g of fat.	European Commission ^b (34)
(Very) Low sodium	The ' <u>low sodium</u> ' or ' <u>very low sodium</u> ' nutrient content claims can be attributed to foods that have no more than 0.12 g sodium per 100 g or 0.04 g per 100 g, respectively.	Codex Alimentarius (33)
Low sugar	The ' <u>low sugar</u> ' claim can be attributed to foods that have no more than 5 g of sugar per 100 g (solids) or 1.5 g per 100 ml (liquids).	European Commission ^b (34)
Source of/High protein	Foods can be claimed to be a ' <u>source of protein</u> ' if they provide at least 10% of the Nutrient Reference Value (NRV) for protein per 100 g (solids) or 5% of the NRV per 100 ml (liquids) or 5% of the NRV per 100 kcal or 10% of the NRV per serving. Foods can be claimed to be ' <u>high protein</u> ' if they contain two times the values for the 'source of protein' claim.	Codex Alimentarius (35)
Source of/High vitamins and minerals	Foods can be claimed to be a ' <u>source of vitamins and minerals</u> ' if they provide at least 15% of the NRVs per 100 g (solids) or 7.5% of the NRVs per 100 ml (liquids) or 5% of the NRVs per 100 kcal or 15% of the NRVs per serving. They can be claimed to be ' <u>high in vitamins and minerals</u> ' if they contain two times the values for the 'source of vitamins and minerals' claim.	Codex Alimentarius (35)
Source of/High dietary fibre	Foods can be claimed to be a ' <u>source of dietary fibre</u> ' if they contain at least 3 g of dietary fibre per 100 g or 1.5 g per 100 kcal or 10 % of the daily reference value per serving. They can be claimed to be ' <u>high dietary fibre</u> ' if they contain two times the values for the 'source of dietary fibre' claim.	Codex Alimentarius (35)
High (poly or mono) unsaturated fat	The ' <u>high unsaturated fat</u> ' claim can be attributed to foods in which at least 70% of the fatty acids present in the product derive from unsaturated fat and in which unsaturated fat provides at least 20% of energy of the product.	European Commission ^b (34)

Term/expression	Definitions, standards, and criteria	Source
	The ' <u>high polyunsaturated fat</u> ' claim can be attributed to foods in which at least 45% of the fatty acids present in the product derive from polyunsaturated fat and in which polyunsaturated fat provides at least 20% of energy of the product. The ' <u>high monounsaturated fat</u> ' claim can be attributed to foods in which at least 45% of the fatty acids present in the product derive from monounsaturated fat and in which monounsaturated fat provides at least 20% of energy of the product.	
Source of/High omega-3	Foods can be claimed to be a ' <u>source of omega-3 fatty acids</u> ' if they provide at least 0.3 g of alpha-linolenic acid per 100 g and per 100 kcal, or at least 40 mg of the sum of eicosapentaenoic acid and docosahexaenoic acid per 100 g and per 100 kcal. They can be claimed to be ' <u>high omega-3 fatty acids</u> ' if they if they contain two times the values for the 'source of omega-3 fatty acids' claim.	European Commission ^b (34)
Enhanced nutritional value	Foods with enhanced nutritional value can be obtained through the addition of nutrients (i.e., fortification) <u>in significant quantities</u> . National and regional authorities are responsible for determining significant amounts for the addition of essential nutrients to foods and may want to consider the criteria for the 'source of' nutrient content claim as a reference point.	Codex Alimentarius (36)
<p>^aSummary of the complete definition which is available in (10).</p> <p>^bEuropean Commission regulations have been used as reference points in case of absence of Codex Alimentarius standards/criteria for a given nutrient. European Commission standards were selected due to their comprehensiveness (standards/criteria for all nutrients of interest were available) and level of precision.</p>		