



Functional foods and Non-communicable diseases

Table of contents

1. [Introduction](#)
2. [Non-communicable diseases](#)
3. [Role of functional foods in addressing non-communicable diseases](#)
4. [What are Functional foods](#)
5. [Probiotics](#)
6. [Phytochemical rich Foods](#)
7. [The future of functional foods](#)
8. [Related Resources](#)

Introduction

Non-communicable diseases in developing countries are a major public health and socio-economic problem. They are the major challenge to development in the 21st century. According to World Health Organization (WHO) fact sheets, lifestyle diseases like cardiovascular diseases, diabetes, obesity, cancer, osteoporosis, respiratory diseases and gastro-intestinal diseases account for 59 percent of the 56.5 million deaths annually and 45.9 percent of the global burden of disease. During the last decades, knowledge of the dietary influence on health and well being has highly increased and often related to specific food components. Consumer interest in healthy eating is shifting towards the potential health benefits of specific foods and food ingredients. Moreover, scientific evidence supports the idea that some of these might have positive effects on our health and well-being, beyond the provision of basic nutritional requirements. The rise of functional foods has occurred at the convergence of several critical factors, such as: awareness of personal health deterioration, led by busy lifestyles with poor choices of convenience foods and insufficient exercise; increased incidence of self-medication; increased level of information from health authorities and media on nutrition and the link between diet and health; scientific developments in nutrition research; and a crowded and competitive food market, characterized by pressurized margins.

Non-communicable diseases

Non-communicable diseases (NCDs) include cardiovascular diseases such as heart attacks and strokes, diabetes, obesity and cancer, which are significant problems both globally and regionally. Communicable diseases are no longer the only threat: Because of changes in diet and lifestyle as well as rapid population ageing in developing countries, major NCDs – such as circulatory system diseases, cancers, diabetes, major psychiatric disorders, and chronic respiratory diseases – are now quickly adding to the worldwide burden of disease. NCDs are interconnected: not only sharing many of the same risk factors but also acting as risk factors for each other. Overweight and obesity significantly increase the risk for cardiovascular disease, many cancers and diabetes. Diabetes increases the risk for cardiovascular disease. The main cause for the growing problems of NCDs is changing lifestyles, associated with globalization and urbanization. The main modifiable behavioural risk factors for NCDs are diet, physical inactivity, alcohol and tobacco use. It is because of these behavioural risk factors that NCDs are often termed 'lifestyle diseases' although this is a rather misleading term because it implies that the behaviours are solely determined by individual choices. In reality, these behaviours are enormously determined by the environments related to tobacco, alcohol, the food supply systems, transport and the built environment. These behaviours are, in turn, linked with the intermediate (biological) risk factors: overweight, high blood pressure, high blood lipids and blood glucose. Reducing the burden of NCDs will require a reduction in the intermediate and modifiable risk factors. However, it is very difficult for individuals to make healthy choices over a lifetime when the underlying environments continue to promote the unhealthy choices.

Role of functional foods in addressing non-communicable diseases

The emergence of dietary compounds with health benefits offers an excellent opportunity to improve public health and thus, this category of compounds has received much attention in recent years from the scientific community, consumers and food manufacturers. The list of dietary active compounds (vitamins, probiotics, bioactive peptides, antioxidants...) is endless, and scientific evidence to support the concept of health promoting food ingredients is growing steadily.

The following factors have been associated with lower risks of NCDs:

- High intakes of fresh fruits and vegetables
- Frequent intake of fish
- Diets which are rich in whole grains, legumes, fresh fruits and vegetables and fish, and low in refined grains, processed meats, sweets, desserts, sweetened drinks.

What are Functional foods

What are functional foods

The Food and Nutrition Board of the National Academy of Sciences has suggested that a functional food is “any modified food or food ingredient that may provide a health benefit beyond the traditional nutrients it contains.” Others state that a functional food is any food promoted or consumed for a specific health effect, regardless of whether the food has been modified in some fashion. Foods qualify as functional foods because they contain non-essential substances with potential health benefits. A considerable array of food has been described as “functional” in one or more respects, including calcium-fortified orange juice, whole grains, fruits and vegetables, soyabeans, omega-3 fatty acids, phytosterols and cocoa. While there is increased awareness of the links between diet and disease such as certain fats and CVD, calcium and osteoporosis, fibre and gastrointestinal (GI) health, it is important, for a functional food, to identify the specific food constituents that could promote health and well-being as well as the exact conditions where they can have this beneficial effect.

Practical examples of a functional food

- A natural food such as fruit or grain which may or may not be modified by plant breeding or other technologies (e.g. lycopene-enhanced tomatoes, vitamin E-enriched vegetable oils, vitamin A- enriched rice)
- A food to which a component has been added (e.g. a spread with added phytosterols)
- A food from which a component has been removed or reduced (e.g. a yogurt with reduced fat)
- A food in which one, or several components, have been modified, replaced or enhanced to improve its health properties (e.g. a juice drink with enhanced antioxidant content, a yogurt with added prebiotic or probiotic).

Probiotics

The most recent definition says that probiotics are live microorganisms administered in amounts that positively affect the health of the host. The health advantages of probiotics may include resistance to pathogenic microorganisms, gut and systemic immunity, as well as colonocyte nutrition from the lumen. Probiotic products present an opportunity for dairy companies to present their products as part of a healthy diet, not by removing fat but by adding health promoting ingredients – live microorganisms (probiotics), or substrates for them like oligosaccharides (prebiotics). Probiotics represent one of the largest functional food markets. Most of the available products are some form of dairy, such as milk, ice cream, yogurt, cheese, and frozen desserts, despite the continuously growth of the nondairy sector, with products like soy-based drinks, fruit-based foods, and other cereal-based products. Among the nondairy probiotic products, those made with soy stand out because of the

nondairy probiotic products, those made with soy stand out because of the inherently health benefits of soy, linked to the presence of isoflavones, and the beneficial changes in bacterial populations in the gastrointestinal tract, caused by the presence of probiotic microorganisms. Both nondairy (in general) and soy-based probiotic products represent a huge growth potential for the food industry, and may be widely explored through the development of new ingredients, processes, and products.

Phytochemical rich Foods

In recent decades, a considerable number of epidemiological studies suggest that the high consumption of “fruit and vegetables” as a collective term, or in some studies, of specific vegetables, is associated with low morbidity and mortality from CVDs and certain cancers. Compounds found in fruit and vegetables, such as polyphenols in fruit, isoflavones in the legume soy and β -carotene in vegetables, have been considered to be the responsible active compounds. However, several intervention studies have shown that ingestion of some of these isolated compounds, in tablet or capsule form, cannot confer similar health benefits to those observed with the intact food from which they come. Studies of intact foods on health outcomes, like those with whole grains on CVDs and diabetes support these findings. This understanding should stimulate a more food ingredient and recipe approach than the isolated phytonutrient approach to Functional Foods.

Phytochemicals and their possible roles in health ([Wahlqvist et al, 1998](#))

Phytochemicals	Some important food Sources	Possible roles in health
Carotenoids	Orange pigmented and green leafy vegetables, e.g. carrots, tomatoes, spinach	Antioxidant
		Antimutagen
		Anticarcinogen
		Immuno-enhancement
		Antioxidant

Flavonoids, isoflavonoids and saponins	Green and yellow leafy vegetables, e.g. parsley, celery, soy bean and soy Products	Anticarcinogen Estrogenic Immuno-modulating
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Polyphenols	Cranberries, raspberries, Blackberries, Rosemary, oregano, thyme	Antioxidant
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Catechins	Green & black tea	Antioxidant Anticarcinogen Anticariogen Protective against cardiovascular disease
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Isothicyanates and indoles	Cruciferous vegetables, e.g. broccoli, cabbage	Antimutagen
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Allyl thiosulfinates	Garlic, onions, leeks	Anticarcinogen Antibacterial
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Limonene	Citrus fruits, caraway seeds	Anticarcinogenic against mammary tumours
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Phytoestersols	Pumpkin seeds	Reduce symptoms of prostate enlargement
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Curcumin	Turmeric	Anti-inflammatory
Salicylates	Grapes, dates, cherries, oranges, apricots, gherkins, mushrooms, capsicums, zucchini	Protective against macrovascular disease
Non-digestible Carbohydrates	Artichoke, chicory root, maize, garlic, oats	Stimulate growth of microbial flora




The future of functional foods

In the future, plant and animal breeding, with or without genetic modification, should be able to create nutritive factor-enhanced foods with equivalence to and superior over traditional foods from various communities. As the more detailed chemistry of food unfolds, nutritionists, industrial food technologists and regulatory authorities will face new challenges, with exciting opportunities for the use of biologically active components from animals (zoochemicals), such as heme iron from muscle or caseopeptides from milk, or components from fungi (mycochemicals). These challenges include:

1. Recognition of favourable health outcomes, which may be attributable to composite and/or cumulative effects of phyto-, zoo- and mycochemicals.
2. Risk analysis of these food components in traditional food patterns, new cuisines, new Functional Foods – the “nutritional safety” domain of food safety.
3. The cost-effectiveness of food choice, which is based on a greater food component emphasis.
4. The ecological impact of shifting the food supply in new directions.

In reality, these challenges are shared by many cognate disciplines, and require the participation of those who can cross the disciplinary boundaries. They present new imperatives for training and career development, for health care systems, for economic development and for sustainable food production. Thus, more innovative methods in the application of functional foods in the everyday diet of people will have to be developed in order to reduce the incidence of non-communicable diseases as well as treat them in the natural way.

Related Resources

1. [Designer Foods - Their role in preventing lifestyle disorders](#) 
2. [Non-communicable diseases](#) 
3. [Functional foods](#) 
4. [Probiotics](#) 

Source: <https://data.vikaspedia.in/short/lc?k=3S4zoUaAOQpGGuWuZA-tjw>

