

# Tailor-Made Foods: The Future of Personalised Nutrition

Harithraadevi L.

PG Scholar, Department of Post Harvest Technology, Horticultural College and Research Institute, TNAU, Periyakulam, Theni.

Corresponding Author: [harithraadevi@gmail.com](mailto:harithraadevi@gmail.com)

## Abstract

The concept of “one-size-fits-all” nutrition is increasingly outdated. Malnutrition remains a significant global health concern, driving the need for innovative nutritional solutions. The future of food is personal. Tailor-made foods, also known as personalised nutrition, are revolutionising the food industry by addressing specific health and dietary needs. With advancements in food processing technologies, these customised foods enhance nutrient bioavailability, improve health outcomes, and contribute to disease prevention. Originating from the concept of functional foods, tailor-made foods go beyond basic nutrition by incorporating bioactive components, optimising ingredient combinations, and catering to individual dietary requirements. Their development involves precise formulation, mathematical modelling, and the utilisation of bioactive compounds. As the demand for personalised nutrition grows, tailor-made foods offer a promising solution for improving global health and fostering a more sustainable food system.

## Introduction

Nutrition is the foundation of human existence. Generally, we consume nutrients from food every day to improve our health. If we become ill for any cause, we must take medication to treat the condition. Malnutrition among the children, adults, and elderly people is a major concern in the food sector, costing millions annually to health and social care systems. In recent years, there has been a growing interest in developing functional foods with specialised qualities for the aged population to improve nutrient bioaccessibility and bioavailability. Innovative food processing technology, like developing tailor-made foods, can significantly improve the health and well-being of humans. Advancements in novel food processing technologies can inform the development of nutritional interventions to avoid diseases and promote a healthy global population.

**History:** The term functional food was initially used in Japan in the mid-1980s to describe processed foods

that contain substances that enhance specific biological functions while also being healthy. The Institute of Medicine's Food and Nutrition Board (IOM/FNB, 1994) defines functional foods as “any food or food ingredient that may provide a health benefit beyond the traditional nutrients it contains.” Early in 1995, the United Kingdom's Ministry of Agriculture, Fisheries, and Food defined food function as food that contains components that provide specific medical or physiological benefits in addition to nutritional impacts. (Richardson 1996).

## Tailor-made foods – definition

Tailor-made products are designed, tailored, and meant for a particular purpose or person. Tailor-made food can be defined as food with programmable characteristics. Tailor-made foods are typically developed for specific consumer groups and have functional characteristics beyond basic nutritional properties. They are processed using appropriate technologies to preserve the required functional/biological properties.

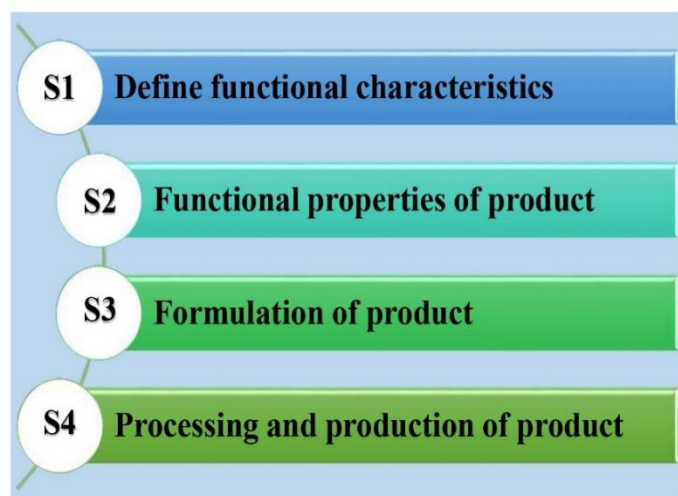
## Tailor-made foods vs. functional foods – term overlaps

In Japan, the term 'functional foods' refers to food products that contain ingredients with health benefits and are officially certified for their physiological effects on the body. Food products labelled as 'functional' offer additional health benefits beyond their nutritional content.

Tailor-made foods, characterised by programmable properties, are systems whose composition has been developed through various methods. This development involves evaluating the activity of individual components (such as bioactive components and essential oils) and utilising waste products.

## Stages in the development of tailor-made food product

According to Avramenko and Kraslawski (2008), the process of developing a new product, such as tailor-made food, involves four steps (Fig. 1).



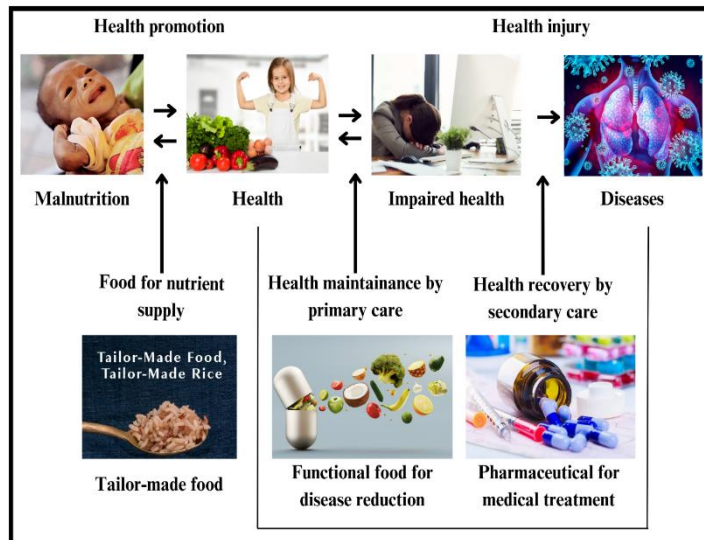
**Fig. 1. Stages in the development of a tailor-made food product**

There are four stages involved in the development of a new product (tailor-made food).

- ✚ Identify the chemical, physical, nutritional, microbiological, and functional aspects, as well as the primary constituents, of the target and reference foods.
- ✚ Creating databases for major food constituents and their impact on food system functions.
- ✚ Mathematical modelling and optimisation are used to determine suitable combinations of fundamental components.
- ✚ Selecting components to create a programmable nutritional system (tailor-made foods).

### Benefits of tailor-made foods

Tailor-made foods, also known as personalised nutrition, offer a range of potential benefits based on individual needs and preferences. Tailor-made foods can improve well-being and promote good lifespan among the elderly. The National Cholesterol Education Program Adult Treatment Panel III and the American Heart Association recommend using functional foods that contain cholesterol-lowering components, such as total dietary fibre and soluble fibre found in oats, whole grains, fruits, and vegetables. Consuming fish, omega-3 fatty acids, and plant sterols can help decrease blood cholesterol levels. Consuming more beans may be more effective than simply eating fibre-rich foods. Consuming beans and other legumes can help lower hypercholesterolaemia and CVD risk (Winham, D. M. 2009).



**Fig. 2. An approach for placing a functional food in relation to a regular diet and a medicine**

Nutraceuticals play a significant role in tailored food items. A healthy diet has gained popularity and traction in several areas as people recognise its potential to avoid diseases and improve overall health. Functional foods, a category of tailored food products, have complicated matrices due to their diverse components (e.g., proteins, lipids, carbs) and potential for nutraceuticals (Table. 1).

The development of foods with medicinal or functional benefits (e.g., low-glycaemic index fruits for diabetics), specialised diets (e.g., gluten-free wheat alternatives), enhanced nutrient content (e.g., biofortified crops like vitamin A-rich sweet potatoes), and reduced anti-nutritional compounds (e.g., low-oxalate spinach) are some examples of tailor-made foods. Gluten-free meals for people with coeliac disease or gluten sensitivity could involve substituting wheat flour with almond flour or using gluten-free grains like quinoa. Low-sodium meals for people with high blood pressure might involve using herbs and spices to flavour food instead of salt and avoiding processed foods high in sodium. Some other examples are

- Golden Rice – Genetically modified to contain higher levels of vitamin A,
- Vitamin A-rich Sweet Potatoes – Biofortified to combat vitamin A deficiency,
- Low-Oxalate Spinach – Bred to reduce kidney stone risks,
- Purple Tomatoes – Engineered for higher antioxidant content and

<ul style="list-style-type: none"> <li>Low-Glycaemic Index Bananas – Suitable for diabetic diets.</li> </ul> <p>Tailor-made food development entails evaluating individual components, including bioactive</p>	<p>elements obtained from waste materials like essential oils. The key components present in specific foods provide health benefits. (Table 2.)</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------

**Table 1. Health benefits of functional food with nutraceutical components**

Functional food	Nutraceutical components	Health benefits
<b>Dietary fibre-enriched foods</b>	Cereal products, seeds, fruits, vegetables, fermented milk drinks	Resistant to human digestion enzymes, contributing to reducing blood glucose and cholesterol levels.
<b>Foods high in polyunsaturated fats</b>	Omega-3 and omega-6 (derived from fish, various nuts and seeds, and avocados) are incorporated into oils, margarine, bread, pasta, milk drinks, and fruit juices	Enhance cognitive and cardiovascular function.
<b>Foods enriched with natural antioxidants</b>	Flavonoids and vitamins A, C, and E (derived from vegetables, fruits, red wine, tea, coffee, and cocoa) are incorporated into drinks, fruit and vegetable juices, margarine, and breakfast cereals	Limiting reactive oxygen species can lessen the risk of cancer, cardiovascular disease, and neurological illness.
<b>Foods enriched with dietary carotenoids</b>	Lutein and zeaxanthin (derived from yellow and orange vegetables, green leafy vegetables, corn, and some fruits) are incorporated or found in corn products, cereal-based functional foods, eggs, and egg products	Preventing age-related changes in eye health.
<b>Foods enriched with phytosterols</b>	Margarines, cheeses, yoghurts, salad dressings, milk drinks	Lowering cholesterol and avoiding cardiovascular problems.

**Table 2. Health components in the food**

Food	Key component	Potential health
<b>Black and green tea</b>	Catechins	Reduce carcinogenic risk.
<b>Broccoli</b>	Sulforaphane	Reduce carcinogenic risk.
<b>Fish</b>	Omega-3 fatty acid	Reduce heart related diseases.
<b>Fruits and vegetables</b>	Phytochemicals	Reduce heart diseases and reduce the risk of cancer.
<b>Garlic</b>	Sulphur compounds	Reduce heart diseases and reduce the risk of cancer.
<b>Oats</b>	Soluble fibre beta glucan	Reduce cholesterol.
<b>Purple grape juice</b>	Polyphenolic compounds	Support cardiovascular function.
<b>Soy foods</b>	Soy protein	Reduce cholesterol.
<b>Yoghurt and fermented dairy products</b>	Probiotics	Improve gastrointestinal health.

## Conclusion

The era of “one-size-fits-all” diets is fading. As our understanding of nutrition deepens and technology advances, tailor-made food solutions are poised to

revolutionise how we approach health and wellness. While challenges remain in terms of accessibility and affordability, the potential for personalised nutrition to optimise individual well-being and prevent disease is

immense. The future of food is personal, and the journey towards a truly individualised approach to eating is just beginning. Creating personalised functional foods and tailor-made foods is crucial for addressing global health concerns. The United Nations' Sustainable Development Agenda aims to achieve “zero hunger,” “good health and well-being,” and “responsible consumption and production.” Malnutrition has serious consequences and is unsustainable in the long run. As the global population ages, malnutrition becomes more prevalent and may be linked to other age-related diseases and chronic ailments. The use of novel food processing technology in developing personalised nutrition can have a significant impact not only on disease prevention but also on maintaining healthy ageing.

### References

- Alongi, M., & Anese, M. (2021). Re-thinking functional food development through a holistic approach. *Journal of functional foods*, 81, 104466.
- Avramenko, Y., & Kraslawski, A. (2008). *Case based design: Applications in process*

*engineering* (Vol. 87). Springer Science & Business Media.

- Berdejo, D., García-Gonzalo, D., Oulahal, N., Denkova-Kostova, R., Shopska, V., Kostov, G., ... & Pagan, R. (2023). Minimal Processing Technologies for Production and Preservation of Tailor-Made Foods §. *Food Technology and Biotechnology*, 61(3), 357-377.
- Fernandes, J. M., Araujo, J. F., Vieira, J. M., Pinheiro, A. C., & Vicente, A. A. (2021). Tackling older adults' malnutrition through the development of tailored food products. *Trends in Food Science & Technology*, 115, 55-73.
- Richardson, D. P. (1996). Functional foods--shades of gray: an industry perspective. *Nutrition Reviews*, 54(11), S174.
- Winham, D. M. (2009). Culturally tailored foods and cardiovascular disease prevention. *American journal of lifestyle medicine*, 3(1\_suppl), 64S-68S.

\*\*\*\*\*