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Suraksha Sharma
Research Scholar, Himachal Pradesh University Business School, Himachal Pradesh, India

Dr. Pawan Garga
Professor, Himachal Pradesh University Business School, Himachal Pradesh, India

Corresponding Author:
Suraksha Sharma
Research Scholar, Himachal Pradesh University Business School, Himachal Pradesh, India

Consumers' willingness to pay for functional food: A systematic literature review

Suraksha Sharma and Pawan Garga

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Abstract

Functional foods are gaining popularity due to increase in life style diseases and health conscious consumers. A key question for both industry and researchers is whether consumers are willing to pay a price premium for these functional foods, and what factors influence this willingness. Understanding consumer willingness to pay (WTP) a premium is crucial for producers to price products appropriately and for policymakers aiming to encourage healthier diets through market mechanisms. This study provides a systematic literature review (SLR) of research on consumer WTP for functional foods, gathering evidence across product categories and regions, identifying the factors that influence WTP, examining the methodologies used in these studies and highlighting research gaps.

Keywords: Consumer willingness to pay, functional food, consumer behaviour

1. Introduction

The global functional foods industry has undergone remarkable expansion in the last twenty years, propelled by heightened consumer awareness of the connection between diet and health. The worldwide functional food market was valued at approximately \$183.6 billion in 2025 and is projected to reach \$211.7 billion by 2030, demonstrating a CAGR of 2.89% (Mordor Intelligence, 2025). Functional foods are characterised as foods containing bioactive chemicals that offer health advantages beyond fundamental nutritional needs, potentially decreasing illness risk or enhancing optimal health (Bigliardi & Galati, 2013). This category includes naturally functional foods like oats and blueberries, along with processed meals enhanced with helpful components such as probiotics, omega-3 fatty acids, plant sterols, and an array of vitamins and minerals.

The commercial viability of functional foods is mostly contingent upon customer acceptance and their readiness to pay elevated prices for purported health advantages. Comprehending customer willingness to pay (WTP) is essential for food manufacturers, retailers, and regulators in formulating effective marketing tactics, pricing policies, and regulatory frameworks. Willingness to Pay (WTP) denotes the highest price a consumer is prepared to pay for a product or service, indicating their perceived value and utility gained from consumption.

Prior research has demonstrated considerable variability in consumer willingness to pay for functional foods, shaped by factors like individual demographics, psychographics, product-specific attributes, and cultural contexts. The literature is fragmented across several product categories, methodological approaches, and geographic regions, requiring a thorough synthesis to discern patterns and gaps in existing information.

2. Research Methodology

A systematic search was conducted in Scopus covering the period 2000-2025. Keywords included "functional food" OR "fortified food" OR "enriched food" OR "enriched product" AND "willingness to pay" OR "WTP" OR "willingness to pay premium" OR "premium price" OR "consumer behaviour" OR "consumer buying behaviour" OR "consumer buying behaviour". Empirical studies on WTP for functional foods; published in journals; English language; focus on consumer behaviour. Studies of clinical trials without market data, non-English papers, review papers and conference abstracts. Initial search result showed 538 articles After removing duplicates and applying inclusion criteria 165 articles were left and after full-text screening 30 articles were included in the final review.

3. Willingness to pay for functional food

This section includes willingness to pay for functional food across different product categories, geographical variation, key factors influencing willingness to pay for functional food and methodological approaches used in various studies under review.

3.1 WTP Across Product Categories

The literature consistently shows a positive WTP for functional foods in many contexts, though the magnitude varies widely. In a Canada-wide survey of 1,008 shoppers, a majority were willing to purchase and pay a premium for foods with added health properties, especially when the functional ingredient was in plant-based products (West *et al.*, 2002) ^[29]. By contrast, some contexts show only modest premiums for example, an experimental study in Uzbekistan (Zaikin & McCluskey, 2013) ^[30] found on average only a WTP for apples coated with antioxidants. These findings indicate generally positive consumer valuation of functional benefits, but with substantial heterogeneity by product and setting.

Dairy and Beverage Products: Dairy foods (yogurts, milk) and beverages with added probiotics, antioxidants, or vitamins are among the most studied. Consumers often show significant WTP for these enhancements. Italian consumers in a stated-choice experiment were willing to pay an extra €0.38 per jar for a catechin-enriched yogurt, higher than the premium for a probiotic yogurt (+€0.21) (Moro *et al.*, 2015) ^[18]. In Germany, a choice experiment with 1,309 consumers found that omega-3 enriched dairy products were highly valued across all segments (Bechtold & Abdulai, 2014) ^[4]. Similarly, in Canada, functional “cancer-fighting” dairy products have been considered a viable value-added strategy given positive consumer response. However, awareness matters: when a nutrient is relatively unknown, baseline interest can be low. For example, Canadian consumers were not familiar with carnosine (an anti-aging peptide) in pork, and showed higher WTP for added carnosine only when it was communicated via familiar formats like nutrition labels (Arenna *et al.*, 2018) ^[3].

Functional Meats and Staple Foods: WTP for functional meat products tends to be mixed. A survey in Canada found consumers were unsure about functional meat, preferring “natural” meats, and one study noted consumers feel more positive about functional yogurt than about functional meat products. Similarly, a study of Italian athletes showed a segmented but generally positive WTP for a high-protein functional bread, with some athlete clusters willing to pay more for protein-enriched bread to meet their nutrition needs. For staple foods like rice and flour, evidence from developing regions shows promise when marketing is appropriate. In Bangladesh, framing fortified rice with aspirational messaging significantly increased the share of consumers willing to pay at least the cost of fortification (by +19 percentage points). Even low-income rural consumers demonstrated a viable WTP for fortified foods in a field experiment, Bangladeshi households paid on average 18 BDT (US \$0.22) extra for nutrient-fortified yogurt (Shokti+), a substantial premium given the base price of 10 BDT. This suggests functional staples can succeed if priced accessibly and well-promoted (Agnew *et al.*, 2020) ^[1].

Produce and Functional Ingredients: When functional

components are added to fruits or cereals, WTP depends on consumer perceptions of naturalness and technology. In Botswana, adding vitamin/mineral fortification to cereal foods was received favorably overall, though detailed results indicate some attribute trade-offs (Mabaya *et al.*, 2010) ^[15]. A study in Uzbekistan found that consumers were actually unwilling to pay a premium for imported antioxidant-enhanced apples in fact, on average they demanded about a 6% price discount for the functional apples relative to normal ones. Only about one-third of surveyed Uzbeks would buy the coated apples at regular price, though providing information on antioxidant health benefits did significantly improve acceptance (Zaikin & McCluskey, 2013) ^[30]. This underscores that in some markets (especially developing or technology-wary populations), functional foods might face initial resistance or require lower pricing to gain traction.

3.2 Geographic and Cultural Differences

The willingness to pay for functional foods varies across regions, reflecting cultural dietary habits and market maturity. European and North American consumers generally show positive WTP for a range of functional products (dairy, cereals, beverages), though the level of premium differs. For instance, German, Italian, and UK studies repeatedly find a willingness to pay more for added fiber, whole grains, or probiotics in foods. In contrast, evidence from some emerging economies is more mixed. In Eastern Europe, a survey in Croatia found consumers in coastal regions reported higher willingness to pay for functional foods than those in inland regions, potentially due to differences in health awareness or trust in labels. In Asia, Chinese consumers appear highly aware of functional foods (over 80% express interest in buying them), and show strong WTP for credible health claims on foods. Meanwhile, African consumers (e.g. Botswana) also value fortification, but their WTP may hinge on factors like price sensitivity and trust. Overall, across diverse geographies the evidence indicates many consumers are willing to pay a premium for functional attributes, but the degree of WTP and the conditions for acceptance (e.g. needing information or certain quality assurances) differ notably. Products perceived as more “natural” carriers of health (grains, dairy, fruits) generally garner higher premiums than those seen as heavily engineered or against local food norms (e.g. biofortified meats or highly novel ingredients).

3.3 Key Factors Influencing Consumer WTP for Functional Foods

Multiple interrelated factors determine how much extra consumers will pay for functional food benefits. These factors can be broadly grouped into consumer-related factors (demographics, attitudes, knowledge, health needs) and product-related factors (type of functional attribute, perceived effectiveness, sensory qualities, and information available).

- **Health Benefit Credibility and Information:** Perhaps the strongest driver of WTP is whether consumers believe the functional claim and perceive a real health benefit. Studies show a positive belief-attitude-WTP linkage: the more consumers believe in the health-protective effect of a functional food, the more positive their attitude and the more they are willing to pay. Providing explicit health information has a consistently

positive effect on willingness to pay. For example, adding a specific health claim (e.g. “reduces risk of heart disease”) to a functional yogurt significantly increased Italian consumers’ WTP for it. In France, informing consumers that a yogurt drink could lower cholesterol led to a significant rise in WTP, even among those without cholesterol problems. Conversely, when information is lacking or the benefit is unclear, consumers assign lower value

- **Sensory Attributes and Taste:** Taste remains a critical factor in food choice, and consumers often struggle with the health taste trade off. Many consumers are skeptical that healthier foods can taste as good. Indeed, “taste” was ranked as the most important attribute when Croatians choose functional foods, tied with “price-quality ratio”. If a functional product is perceived to compromise on taste, WTP can diminish. However, there is evidence that some consumers are willing to sacrifice a degree of taste for health benefits.
- **Consumer Attitudes, Trust, and Food Technology Neophobia:** Underlying attitudes toward nutrition and technology heavily influence WTP. Consumers with positive health orientations or who strongly believe “food is medicine” are more receptive to functional foods. By contrast, food technology neophobia distrust or fear of new food technologies can dampen WTP. For example, a survey in Italy found that individuals who scored high on food tech neophobia were less inclined to intend purchasing functional foods; those with greater knowledge and lower neophobia had higher stated WTP. Consumers who prefer “natural” or organic foods may be wary of bioengineered functional foods. The apple study by (Markosyan *et al.*, 2006) ^[17] showed organic-minded shoppers were significantly less willing to pay for a high-tech antioxidant coating on fruit. If consumers doubt the validity of a health claim or the certification, they will not pay extra. Research in Croatia revealed a general lack of confidence in functional product labels, especially inland, which likely suppressed WTP in that segment.
- **Demographics and Lifestyle:** Socio-demographic factors often moderate willingness to pay for functional foods. Older adults tend to value health attributes more and thus pay higher premiums. For instance, an auction study reported that older participants bid significantly higher for functional snacks than younger ones. Seniors may also have more immediate health concerns that functional foods address (e.g. heart health), increasing their WTP. In contrast, studies find younger consumers are sometimes less willing to pay for added health benefits, possibly due to fewer health issues or budget constraints. Individuals with specific health conditions or risk factors often place higher value on functional foods that address those needs. For example, a person with high cholesterol might pay more for sterol-fortified yogurt. In one auction, participants on special diets or with kids had higher WTP for functional yogurt. On the other hand, those who perceive themselves as already healthy might be less inclined to pay extra for additional benefits.

3.4 Methodological Approaches

Researchers have employed a range of methods to elicit and analyze willingness to pay for functional foods, each with

its advantages and limitations. The evidence base includes Experimental Auctions and Actual Payment Mechanisms: A number of studies used non-hypothetical auction methods to reveal WTP through real economic commitments. For example, (Hellyer *et al.*, 2012) ^[10] conducted an experimental auction for bread products in the UK to test how added fiber and health information affected bids. Participants bid actual money for functional vs. regular bread, providing a real WTP measure. Similarly, Vecchio *et al.* (2016) ^[28] ran a Vickrey sealed-bid auction (fifth-price) with Italian consumers to elicit WTP for conventional, organic, and functional yogurts. Auction designs (second-price, BDM mechanism, etc.) are popular to mitigate hypothetical bias: consumers know they might really have to buy the product with their bid, yielding more realistic valuation. For instance, (Marette *et al.*, 2010) ^[16] used both the BDM (Becker-DeGroot-Marschak) auction and a choice mechanism to price a cholesterol-lowering yogurt drink in France. They found the two methods gave similar results after the first round, and by having repeated auction rounds with feedback, they improved valuation accuracy. Experimental auctions are often accompanied by sensory testing when relevant e.g. Papoutsis *et al.* combined hedonic taste tests with Vickrey auctions for functional snacks, to see how blind tasting vs. informed tasting affected WTP. Overall, auction approaches are valuable for capturing real economic behavior; however, they typically use smaller, convenience samples (e.g. 100-200 participants in a lab or central location).

- **Discrete Choice Experiments (DCEs) and Conjoint Analysis:** Many recent studies adopt stated-choice modeling to estimate marginal WTP for specific attributes (e.g. a nutrient content claim, a health claim, price levels). In a choice experiment, respondents are shown product profiles or scenarios and choose their preferred option, allowing researchers to infer WTP for the functional attribute from trade-offs. For example, random parameter logit models were used to analyze choices in Italy for functional yogurt attributes, in Germany for functional dairy product attributes, and in Canada for enhanced-carnosine pork labels. (Chowdhury *et al.*, 2022) ^[8] used a framed field choice experiment in rural Bangladesh to test how marketing messages affected WTP for fortified rice. These experiments often include information treatments as part of the design. Ahn *et al.* (2016) ^[2] conducted a choice experiment for red ginseng in two rounds before and after providing an informational primer to isolate the effect of objective information on preferences. Likewise, Zaikin & McCluskey (2013) ^[30] incorporated versions of their survey in Uzbekistan with and without a paragraph explaining antioxidant benefits, then compared WTP in a double-bounded dichotomous choice CV (contingent valuation) model. The DCE method provides flexibility to simulate market-like choices and derive WTP for individual attributes rather than the whole product. It is well-suited to functional foods because one can estimate, for instance, how much value consumers attach to a “high fiber” claim or an “omega-3” enrichment in monetary terms.
- **Contingent Valuation Surveys:** Especially in earlier studies, traditional contingent valuation (CV) surveys were used, asking consumers directly their willingness to pay a certain premium for a functional benefit. Gale

West *et al.* (2002) ^[29] implemented a nationwide telephone CV survey in Canada that included stated choice questions trading off price and functional properties. They derived distributions of WTP for different hypothetical functional foods (e.g. cereal bars, meats) by asking if respondents would purchase at various price points. Markosyan *et al.* (2009) ^[17] similarly used in-person surveys with CV questions (yes/no to buy antioxidant apples at a given premium) in two U.S. cities. While CV is straightforward, it is prone to hypothetical bias many newer studies therefore favor choice experiments or real auctions to cross-validate findings. Indeed, comparisons (like Marette's test of BDM vs choice) help ensure the method itself isn't driving results.

- **Combination with Attitudinal Measures:** An important methodological trend is integrating psychometric or attitudinal data with WTP estimation to capture preference heterogeneity. Some researchers include additional surveys on consumer attitudes, then use techniques like latent class models or cluster analysis. For example, Bechtold & Abdulai (2014) ^[4] asked German consumers a battery of attitudinal statements about functional foods, then used a class choice latent model linking class membership to those attitudes. This uncovered distinct segments such as "functional food skeptics" versus "advocates," with corresponding differences in WTP (skeptics had negative WTP for functional attributes, advocates positive). Moro *et al.* (2015) ^[18] collected demographic and lifestyle variables (age, income, health status, etc.) and showed how WTP for a catechin yogurt differed across subgroups, relating higher premiums to groups like older or more health-conscious consumers. Reitano *et al.* (2024) ^[23] took a cluster analysis approach after an experimental auction for protein bread, they performed cluster analysis on participants' food value priorities (using best-worst scaling data) to identify segments with different preference structures and WTP levels. These mixed-method approaches provide richer insight by revealing why certain people pay more or less.
- **Sensory and Qualitative Components:** Given the importance of taste and perception, some WTP studies incorporate means-end chain (MEC) interviews, focus groups, or sensory tests before the quantitative elicitation. Bitzios *et al.* (2011) ^[6] first used laddering interviews to identify key attributes consumers associate with bread (like taste, health, convenience) and built those into a subsequent choice experiment design. On the sensory side, as mentioned, Papoutsis *et al.* had both blind and informed tasting sessions built into their lab experiment. Marette *et al.* had participants taste a functional vs plain yogurt and rate liking before stating WTP, to factor in actual product experience. These designs acknowledge that functional foods do not exist in a vacuum of attributes real consumption experience and personal associations can alter willingness to pay.

4. Discussion and Future Directions

Despite a substantial body of work, there remain important gaps in the literature on consumer WTP for functional foods. Much of the existing evidence comes from Europe, North America, and a few Asian countries. Large emerging

markets (e.g. other parts of Asia, Africa, Latin America) remain less studied, as do subpopulations within countries. For instance, Germany is one of Europe's biggest functional food markets, yet "only a few studies" have focused on German consumers specifically. Similarly, China's booming functional food sector still has research voids one 2021 study explicitly noted it was the first to examine Chinese consumer valuations for functional meat products. Future research should broaden to diverse cultural contexts, including low-income and rural populations, to see how WTP varies and to identify unique barriers (e.g. cultural definitions of health, trust in fortification programs, etc.). More research is needed on how different communication and labeling approaches influence WTP. Studies like Chowdhury *et al.* (2022) ^[8] highlighted that evidence on using aspirational marketing messages for functional foods was "thin and inconclusive" before their work. They began to address this by linking a functional staple to a familiar aspirational product, and such creative marketing warrants further exploration. Likewise, the comparative effectiveness of label formats (e.g. a bold front-of-pack health claim vs. an infographic vs. inclusion in the nutrition panel) on consumer valuation could be investigated more systematically. Arenna *et al.*'s finding that consumers respond better to functional info in the Nutrition Facts panel than to standalone claims raises questions about consumer trust future studies could examine label design and regulatory endorsement (e.g. a "functional" logo or certification) as moderators of WTP. There is a need for longitudinal or panel studies observing actual buying patterns of functional foods, or field experiments in retail environments

5. Conclusion

This systematic literature review shows that people in many places are prepared to pay more for functional meals, but the amount of the extra cost depends on the type of product, where it is sold, and the person. When functional benefits are clearly stated and seen as genuine, dairy products, drinks, and staple meals often have a higher WTP. Taste, sensory quality, and how "natural" a product is all still important considerations in keeping customers' interest. Consumer acceptability and willingness to pay (WTP) are highly affected by trust in health claims that are backed up by credible labelling and government approval. People who are more health-conscious, have special dietary needs, or are older likely to pay more. On the other hand, younger people who are more price-sensitive may need lower prices or extra incentives to buy. Discrete choice experiments, experimental auctions, and contingent valuation surveys have been the most common ways to estimate WTP. Mixed-method approaches, on the other hand, give us more information about what drives pricing. Studies repeatedly show that giving people clear, precise health information raises WTP, especially when the information is connected to health advantages that people can relate to. The results show that for businesses and governments to be successful in marketing functional foods, they need to do more than simply come up with new products. They also need to teach consumers about the products, create trust, and be aware of cultural differences. In the end, raising awareness, making sure people are happy with the flavour, and making sure people think the foods are real will be important for keeping people wanting to pay for functional foods.

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