

Consumer Awareness, Perception And Knowledge About “The Concept of Functional Food” in The Urban Population of Pune City. A Cross-Sectional Analysis.

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Abstract

There is an increased burden and trend of non-communicable diseases; also termed as lifestyle diseases; in the urban population. This has become the trajectory for an increasing trend for consumption of various categories of supplements, nutraceuticals, fortified foods, foods for special purpose, functional foods as a preventive health measure. However, there is the significant gap between consumer awareness and regular consumption of these products.

The marketing gimmicks adopted by manufacturing MNC's, the aggressive advertising, tall attractive health claims, no stringent regulation and limited enforcement by legal authorities, increasing demand within consumers, estimated market growth with large profit, propaganda link of “modern “personalized” nutrition therapy” to our traditional knowledge of Ayurveda are the aspects or concepts to initiate this foundational survey activity. This can be the guideline for further empirical research.

Keeping an objective of study that; to evaluate the demographic drivers, sources of information, and perceived efficacy of functional foods among the urban population in Pune City a method of survey i.e. a descriptive cross-sectional study was conducted using a structured questionnaire (n=83). Data were analysed for frequency distribution and thematic perception.

It is observed that, there is the high awareness (75.9% respondents) noted, primarily driven by digital media (44.3%). While 81.8% respondents correctly identified the health benefits of functional foods, only 30.5% were regular consumers. This shows a significant trust deficit with 53.7% respondents viewing brand claims as exaggerated.

Conclusion: There is a robust market for functional foods as the need among the age group of 50 yrs. (+) plus population, but growth is hindered by a lack of medical endorsement and less trust about the claims and also regarding labelling accuracy.

Keywords

Functional foods, Consumer awareness, Consumer behaviour, Nutraceuticals, Urban health, Cross-sectional study, FSSAI regulation, Pune City.

1. Introduction

The term “functional food” was first coined in Japan, around year 1984. It was introduced by scientists aiming to study the relationship between nutrition, sensory satisfaction, and the modulation of physiological systems. It led to create the legislative framework for such category of food as the “[Foods for Specified Health Use](#) (FOSHU)” in 1991. It was spread, improved and amended in other parts of the world.

In India it was formally accepted very recently and just a decade ago, Food Safety and Standards Authority of India (FSSAI); the apex regulatory body responsible for Food Safety, in our country; had formulated the regulation called **Food Safety and Standards (Food or Health Supplements, Nutraceuticals, Foods for Special Dietary Uses, Foods for Special Medical Purpose, Functional Foods and Novel Food) Regulations, 2016**. These regulations were officially enforced on January 1, 2018, requiring food business operators (FBOs) to comply with specific health claim standards.

If we search down the lane for history of functional food concept; our country had the culture or heritage of traditional / ancestral knowledge. The foundation of functional foods in India lies in Ayurveda and traditional culinary practices, which embrace the concept of "*Unavaemarunthu*" (food is medicine). Items like turmeric (curcumin), ginger, garlic, Fenugreek (methi), and ghee had had been consumed for thousands of years not just for nutrition, but for disease prevention and health promotion.

Ancient Ayurveda, a 5,000-year-old traditional Indian system of medicine, considers food as *Mahabhaisajya*—the greatest of all medicines. It teaches that food is not merely calories, but a powerful, accessible, and natural medicine that nourishes the body, mind, and spirit while serving as the first line of defence against illness.

According to Ayurvedic knowledge, food is responsible for physical, temperamental, and mental states. It is considered one of the three sub-pillars of life (*Trayopastambha*), along with sleep and a balanced lifestyle.

Another trail of recent history similar to ayurvedic thought lies in Europe. "Let food be thy medicine, and let medicine be thy food." This famous quote is often attributed to Hippocrates. But, as research by Diana Cardenas in 2013 shows, this quote cannot be found anywhere in Hippocrates' writings. Diana Cardenas discovered that the quote started to emerge from 1926 onwards, and really started to get popular in the 1970s. In another text by Hippocrates, "De Alimento", there's another statement about food, which reads: "In food excellent medicine can be found, in food bad medicine can be found; good and bad are relative." With some imagination this can be read as: some foods can cure you, other foods can make you sicker; the effect can vary case by case. {Ref:- <https://www.drgoodfood.org/en/news/let-food-be-thy-medicine-hippocrates>}

All this thought process related to "functional food" concept and looking to the fact of today's alarming situation of an increased burden and trend of non-communicable diseases; also termed as lifestyle diseases; in the urban population; which has become the trajectory for an increasing trend for consumption of various categories of supplements, nutraceuticals, fortified foods, foods for special purpose, functional foods as a preventive health measure. However, there is the significant gap between consumer awareness and regular consumption of these products.

Hence it is decided to study and analyse, the basic foundational / factual situation through this survey. Functional foods, defined as foods which provides health benefits beyond basic nutrition, are at the intersection of diet and medicine. In the Indian context, these often overlap with traditional Ayurvedic practices. Despite a growing market, empirical data on why consumers choose "self-decision" over "professional advice" is scarce. This paper examines the current landscape of consumer trust and regulatory recognition.

2. Materials and Methods

- **Study Design:** Quantitative cross-sectional survey. The structured questionnaire is prepared with multiple options for each question; for the survey of Functional Food concept. The sections are designed with a thought, whether people participating in survey bares knowledge about type of functional food; brands available in market; it's use; frequency of use; suggested by whom (use by self-decision or by medical professional); for which purpose; economically affordable; any claim of ayurvedic benefits; any traditional knowledge with respect to functional food concept; quality norms and do they feel that there is any regulatory body to control quality norms; effect, affect and efficacy issues in population.
- The validated questionnaire is distributed as Google Form Format within the population and target forms to 100 participants. Out of 100; total 83 participants responded. 17 persons are found to be non-respondents.
- **Data Analysis:** The data converted to excel format is processed with descriptive statistical tools used to interpret /processed the responses across the 83 participants and analysed them using frequency distributions, covariance, linearity, standard deviation, and regression/progression trends.

3. Results and Discussion

➤ Demographic Profile of Respondents

The survey represents a diverse group of 83 respondents, with a significant majority being **male (81.9%)**.

The largest age demographic consists of individuals **above 50 years (57.8%)**, followed by the 36–50 age group (24.1%).

Professionally, more than half are **employed in private or government sectors (54.2%)**, while 30.1% are retired.

Educational levels are high, with **54.2% being postgraduates** and 34.9% graduates.

➤ Awareness and Knowledge

Awareness of the term "Functional Food" is quite high at **75.9%**.

Most respondents correctly define them as foods providing **additional health benefits beyond basic nutrition (81.8%)**.

The primary source of this information is **social media or the internet (44.3%)**, followed by friends and family (20.3%).

Among specific products, **probiotic curd/yogurt (66.3%)** and fortified cereals (57.5%) are the most recognized; followed by functional oil (43.8 %) and Green tea / Herbal Tea (42.5%).

➤ Consumption Patterns and Influences

While awareness is high, regular consumption is lower, with only **30.5% consuming functional foods regularly**, though 47.6% do so occasionally. Frequency varies, with **33.8% consuming them 2–3 times a week**.

Interestingly, the decision to use these products is largely a **self-decision (62%)**, rather than being driven by Nutritionist, medical professionals or advertisements.

➤ Health Perceptions and Benefits

The primary motivation for consumption is **general health maintenance (73.1%)** and immunity boosting (51.3%).

Most users report positive results, with **46.5% experiencing slight improvements** and 40.8% noting significant health improvements. Furthermore, **67.9% believe these foods offer Ayurvedic or traditional benefits**, and 75.3% use traditional home-based functional foods.

➤ Trust and Economic Viability

There is a split in trust regarding marketing; while 17.5% find health claims mostly true, **53.7% believe they are somewhat exaggerated**.

Despite this, 61.3% believe the products are of good quality.

Economically, the majority find them **moderately affordable (48.1%)**, though 17.3% view them as expensive. Notably, **90.1% correctly identify FSSAI** as the monitoring regulatory body.

Frequency Distribution

- **Age Group:** Majority are **More than 50 yrs (48/83)**, followed by **36-50 years (20/83)**. Very few are under 25.
- **Gender:** Strong skew toward **male (68/83)**, female (15/83).
- **Occupation:** Mostly **employed (45/83)** and **self-employed (25/83)**.
- **Education:** Predominantly **postgraduates (45/83)** and **graduates (29/83)**.
- **Awareness:** 63 respondents have heard of functional foods; 64 report consuming them; either regularly or occasionally

This shows the sample is **adult, male-dominated, educated, and professionally active**.

Covariance & Linearity

- **Education ↔ Awareness:** Higher education levels correlate positively with awareness. Covariance is **positive**; linearity suggests more education → more awareness.
- **Occupation ↔ Consumption:** Employed/self-employed respondents consume more functional foods than students/retired. Another **positive covariance**.
- **Awareness ↔ Consumption:** Strong alignment; those aware are also consumers.

Standard Deviation (Spread of Opinions)

- **Affordability:** Responses spread across “easily affordable,” “moderately affordable,” and “expensive.” Standard deviation is **high**, showing diverse opinions.
- **Effectiveness:** Majority say “moderately effective,” but some say “very effective” or “not effective.” Again, **high variance**.
- **Trust in Claims:** 43 respondents think claims are exaggerated, 18 think they’re genuine. This shows **polarization**.

Regression / Progression Analysis

- **Education → Awareness → Consumption:** Regression trend shows that higher education predicts awareness, which in turn predicts consumption.
- **Occupation → Consumption Frequency:** Employed/self-employed respondents consume more regularly (weekly or 2–3 times a week).
- **Awareness → Recommendation:** Despite awareness and consumption, only **5 respondents** said they would recommend functional foods. Regression suggests **trust issues weaken progression from awareness → advocacy**.
- **Traditional Foods → Daily Use:** 61 respondents use home-based functional foods, often daily. This progression shows **traditional practices remain strong alongside modern functional foods**.

Overall major insights are learned through the responses is categorized in 5 different attributes below

1. **Awareness is high but trust is low** – many consume but hesitate to recommend.
2. **Education is the strongest predictor** of awareness and consumption.
3. **Occupation influences frequency** – working professionals consume more regularly.
4. **Variance in affordability and effectiveness** shows market segmentation: some see value, others see cost barriers.
5. **Traditional foods remain dominant** – daily use suggests cultural continuity.

From above discussions the “Strengths” observed within survey study is highlighted as -

- **High Awareness & Literacy:** Over **75.9%** of respondents are aware of the term, and the majority are highly educated (Postgraduates/Graduates).
- **Established Regulatory Trust:** **90.1%** of respondents correctly identify **FSSAI** as the governing body, showing a clear understanding of where quality control should lie.
- **Cultural Alignment:** **67.9%** associate functional foods with **Ayurvedic/traditional benefits**, making it easier for brands to market products that bridge the gap between tradition and modern science.

There are also major “Limitations” observed and highlighted as -

- **Exaggerated Marketing Claims:** A significant **53.7%** of consumers believe brand claims are **somewhat exaggerated**. This lack of trust is a major barrier to regular adoption.
- **Low Regular Consumption:** Only **30.5%** are regular users, despite high awareness. This suggests a gap between “knowing” and “buying.”

- **Price Sensitivity:** Only 22.2% find these products "easily affordable," indicating a perceived "premium" barrier.

The major "Regulatory Enforcement Issues" emerged or classified are noted as below-

Misclassification: 16% of people believe functional foods can **replace medicines**. This is a major regulatory risk; if consumers stop medication in favour of food supplements, it could lead to legal and safety crackdowns on the entire sector.

Traditional vs. Industrial Confusion: 75.3% use home-based functional foods. The threat to the industry is that consumers may prefer unmonitored home remedies over regulated, branded products if the latter are seen as "too processed" or "dishonest."

Claim Verification: Since over half the respondents doubt brand claims, there is a **Regulatory Gap** in how strictly FSSAI enforces "label vs. truth" for health benefits.

The validated structured questionnaire, data sheets generated and separately prepared by manual data feeding, for data analysis using basic computer software is shared as Appendices here at the end of the paper. [Appendix A, B and C]

4. Conclusion and Recommendations

Functional foods hold immense potential for improving population health and can play a vital role in decreasing NCD's, a crisis of "credibility" and "trust" is faced by all stakeholders – the consumer, regulator and industry.

1. **For Regulators:** FSSAI must implement stricter verification of "health claims" to bridge the 53.7% scepticism gap.
2. **For Industry:** Brands should pivot from social media marketing to clinical validation to convert "occasional" users into "daily" consumers.
3. **For Research:** Future studies should focus on the bioavailability of nutrients in fortified foods compared to traditional home-based alternatives.

The data indicates a well-informed consumer base that views functional foods as a secondary support for health maintenance rather than a replacement for medicine. While digital media has successfully driven awareness, there is a clear scepticism toward brand claims, suggesting that consumers value transparency.

The high reliance on self-decision and traditional/home-based options reflects a preference for integrated wellness.

Overall, functional foods are perceived as a moderately effective tool for improving population health, supported by a strong recommendation rate of 80% among respondents.

Further Recommendations

There is significant potential for empirical research in the functional food sector. Future studies should move beyond basic "awareness" and focus on **consumer psychology, clinical validation, and regulatory impact**.

Here are four key recommendations for empirical research:

(A) Gap Analysis: Perception against Reality of Clinical Efficacy

- **Research Need:** Conduct double-blind, placebo-controlled trials on popular commercial functional foods (e.g., fortified cereals or probiotic yogurts) to measure actual health outcomes against marketed claims.
- **Objective:** To determine if the "slight improvement" reported by 46.5% of users is a placebo effect or a statistically significant physiological change.

(B) The "Silver Economy" & Geriatric Nutrition

With 57.8% of the survey's respondents being **above 50 years old**, there is a clear demographic focus.

- **Research Need:** Empirical studies focusing on the long-term impact of specific functional foods (e.g., functional oils or Ayurvedic tonics) on age-related issues like bone density, cognitive decline, and metabolic health.

- **Objective:** To create data-driven nutritional profiles specifically for the aging population, which is currently the most engaged consumer segment.

(C) Behavioural Economics of "Self-Decision" against Medical Advice

A significant 62% of users consume these products based on **self-decision**, while only 7% do so under medical advice.

- **Research Need:** Investigate the barriers preventing healthcare professionals (doctors/nutritionists) from recommending functional foods.
- **Objective:** To identify if the lack of medical endorsement is due to a lack of clinical data, scepticism of the food industry, or gaps in medical curriculum regarding nutrition.

(D) Regulatory Compliance & Labelling Accuracy

The data shows 90.1% of consumers look to FSSAI for quality control, yet scepticism remains high.

- **Research Need:** A comparative study between "Label Claims" and "Actual Nutrient Content" in products sold by leading brands like Amul, Nestlé, and Patanjali.
- **Objective:** To assess the effectiveness of current regulatory enforcement and propose a standardized "Health Claim Verification" framework to build consumer trust.

Limitations Of Study

- Sample size – Sample size is very less, only 83 participants responded. This shall be more / increased in hundreds / thousands. The accuracy and precision of data will increase and more true or correct outcome will be achieved.
- Area covered is very limited – Geographical area covered in Pune City is very limited and only urban. More length and breadth of the area shall be included and more number of stakeholders shall be tapped for wide spectrum. Even urban v/s rural aspect to be incorporated.
- Socio-economic group – Our survey has covered or reached up to very limited socio-economic group. All socio-economic groups from BPL to Wealthy and more social hierarchy (cast / religion wise) to be covered.
- Bias information chances – In a smaller number of sample size, bias information chances are more.
- Non-responsive or non-participatory group is 17 % population. So also, male dominance and less number of women participated in the survey due to many reasons is a point of concern. This hidden picture of the problem may misguide for the overall management of the issue.
 - ❖ Conflict of Interest – NIL
 - ❖ There is no any financial support or funding received for this study.
 - ❖ Acknowledgements –

Appendix "A" :- Structured Questionnaire

Appendix "B" :- Google Form Responses Charts

Appendix "C" :- Data Sheet converted in MS Word & MS Excel

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