



A QUALITATIVE EXPLORATION OF CONSUMER ACCEPTANCE OF FORTIFIED EDIBLE OILS IN INDIA: INSIGHTS FROM FOCUS GROUP DISCUSSIONS

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Abstract

Purpose – This study examines how urban, educated Indian consumers perceive fortified edible oil, enriched with vitamins A and D under FSSAI's 2016 regulations, given how limited consumer adoption remains outside institutional distribution channels.

Design/methodology/approach – Seven online focus groups were held with 32 participants across nine Indian states, with recruitment continuing until thematic saturation. Data were analysed through an abductive, hybrid thematic approach informed by the Theory of Planned Behavior, Value-Attitude-Behavior model and Health Belief Model, while remaining open to inductive codes.

Findings – Eight themes emerged. Most participants had never come across the term "fortified," despite unknowingly buying fortified products. Health consciousness pulled consumers toward less-processed oils rather than fortified ones, and trust in fortification claims was low; purchase decisions were gendered, and price mattered less than trust and taste. Digital trust was layered, with doctors and influencers trusted more than packaging or e-commerce claims. Because the sample was digitally recruited, educated, and higher income, generalisability is limited, and the gendered pattern, observed between rather than within groups, needs confirmatory testing.

Originality/value – This paper offers India-specific insight into consumer acceptance of fortified edible oil, extending TPB, VAB and HBM with naturalness orientation, institutional trust, household gatekeeping and layered digital trust. Findings suggest marketers should prioritise clinically substantiated claims and doctor- or influencer-led channels and recognise household gatekeeping, while nutrition campaigns may need to build regulatory-concept literacy separately from brand advertising.

Keywords: Fortified oil, consumer acceptance, focus groups, Theory of Planned Behavior, India

1. Introduction

This study looks specifically at the classical, micronutrient-based fortification of edible oil: the addition of vitamins A and D to packaged cooking oil under FSSAI's Food Safety and Standards (Fortification of Foods) Regulations, 2016 (FSSAI, 2016). It excludes two related categories sometimes grouped under "fortified foods": functional foods, which deliver benefits through bioactive compounds or probiotics, and biofortified crops, bred for higher nutrient content at the point of cultivation. Fortified edible oil examined here, refers only to the micronutrient enrichment of a consumed oil. This distinction is maintained consistently throughout the remainder of the paper.

Functional fortified foods (FFFs) have emerged as a distinct sub-type in the last decade, reflecting increased consumer awareness of the diet–health link. Fortified foods are functional foods (FFs) enriched with essential vitamins and minerals to prevent nutritional deficiency, whereas FFs more broadly deliver health benefits through bioactive compounds, probiotics, and antioxidants (Vignesh et al., 2024; Jendyose, 2024). Fortification improves the nutrient profile of commonly consumed staples (oils and fats, salt, sugar, milk, and cereal flours), the primary vehicles for classical fortification in developing countries (Mannar & Gallego, 2002; Chadare et al., 2019). India's trajectory follows a similar path: Vanaspati was fortified with vitamin A from 1953 (Dary & Mora, 2002), salt iodisation began in the 1960s (Pandav et al., 2013), and, after comparatively slow uptake (Sirohi et al., 2018), the FSS Regulations 2011 and subsequent FSS (Fortification of Foods) Regulations 2016 mandated fortification of maida, atta, rice, salt, milk, oil, and vanaspati (Press Information Bureau, 2018). All leading Indian oil marketers now voluntarily carry at least one fortified brand, in a category that is large, mature, and price driven: retail value was INR 2,155 billion in 2021, projected to reach INR 3,688 billion by 2026 despite (Mintel, 2022), and remains fragmented even among large suppliers. The opportunity for fortified oil is therefore large but under-realized: growth is constrained less by policy than by distribution channels and consumer trust (Mintel, 2022).

The next section reviews the literature on consumer acceptance of fortified foods before examining fortified edible oil in India specifically, investigating how Indian consumers conceptualize, perceive, and intend to (or not) consume it, given their lived practices, values, social influences, and trust and ambivalence. This motivates the following research questions:

RQ1: Do Indian consumers' knowledge & health perceptions, as well as cultural values & social influences, affect their perceptions toward fortified edible oils?

RQ2: How do perceived benefits, perceived barriers, trust, and ambivalence affect consumers' intentions to adopt / disadopt of fortified edible oils?

2. Literature Review

2.1 Fortified Foods and Consumer Acceptance

Consumer acceptance is a key determinant of the success of food fortification programmes. Surveys of consumer attitudes, acceptance of fortified foods consistently links to five themes: perceived health benefits, nutritional value, product quality, sensory features, and trust in the fortification process (Okubanjo et al., 2025; Chaurasia et al., 2025). Among these, belief in the product's efficacy appears most strongly linked to acceptance (Chiba et al., 2021).

Talsma et al. (2013) found vitamin A-enriched cassava well received by Kenyan school children when it matched local taste, texture, and colour preferences, with consumption intention driven by understanding, perceived barriers, and cues to action. Atanasova et al. (2025) similarly found biofortified-crop acceptance in Nigeria driven by awareness, affordability, and preference. In a fortified-rice distribution programme, perception, familiarity, and communication strategy were significant (Chowdhury et al., 2022), though users received rather than purchased the product. In India, Khare and Arora (2025) found city dwellers preferred iron-fortified products for taste and assumed health benefits, while Chaurasia et al. (2025) confirmed that perceived risk versus benefit shapes willingness to act. Across this literature, sensory quality, perceived benefit, and trust recur as drivers via structured, quantitative instruments that applied to staples other than oil, mostly

outside India — a gap this study addresses directly. The wider consumer-behavior literature reinforces trust's centrality: consumers rely on layered cues where an attribute such as fortification cannot be directly verified (Wu et al., 2021), and willingness to pay a premium is conditional on first accepting a health claim as credible (Alsubhi et al., 2023). Global coverage of mandatory fortification likewise remains uneven even where regulation exists (Rohner et al., 2023), underlining that mandate alone does not secure uptake.

2.2 Theoretical Framework

2.2.1 Theory of Planned Behavior (TPB)

TPB remains the most widely applied behavioral theory in the sustainable and health-food literature, though it is regularly extended to explain findings it cannot predict alone (Bourke et al., 2024). It accounts for fortified-food consumption intention through attitude, subjective norm, and perceived behavioral control. Talsma et al. (2013) found control beliefs the primary driver of intention to consume pro-vitamin A cassava, and Andaregie et al. (2024) confirmed TPB's explanatory value for Ethiopian consumers' intention to consume Spirulina-fortified bread. Hojjati et al. (2025), extending TPB with health consciousness, risk perception, and self-identity, found health consciousness the strongest single predictor of intention to consume fortified dairy. In India, Chaurasia et al. (2025) found TPB constructs strong predictors of consumption, and Brahma et al. (2026) extended the model with digital trust and ambivalence to explain erratic adoption of fortified edible oil, a study whose sample and setting most closely anticipate the present one. What TPB explains less well is where ambivalence and digital trust originate.

2.2.2 Value–Attitude–Behavior (VAB)

VAB traces how core values shape attitudes, which in turn shape intention and behavior. Tudoran et al. (2009) found that health-benefit information raised consumers' health values, attitudes, and purchase intentions toward fibre-enriched fish products in sequence, consistent with VAB's mediating logic. Sajdakowska et al. (2021) documented a shift toward evaluating dairy products through a health lens, and Grujić and Grujić (2023) linked the functional food market's growth to consumers' desire for a healthier lifestyle. For fortified edible oil specifically, Brahma et al. (2026) showed how eating culture and health concern shape consumer perception via VAB, consistent with Khare and Arora's (2025) Indian findings, while Asmithaa et al. (2025) found multi-source edible oil acceptance conditioned by affordability as well as health benefit. Where VAB is comparatively silent is on skepticism toward the fortification claim itself: the model assumes values translate smoothly into attitude but has no mechanism for the health-conscious rejection of fortified products that this study's findings describe.

2.2.3 Health Belief Model (HBM)

HBM explains health-related food choices through perceived susceptibility, benefit, and barriers, and cues to action, closely related to the health consciousness that predisposes a consumer to engage with these constructs at all. Talsma et al. (2013) found that awareness of pro-vitamin A cassava's benefits shaped a positive health-behavior identity, while perceived barriers (color, taste concerns) worked against intention and cues to action (information sessions, health-worker endorsement) were significant independent predictors. Chaurasia et al. (2025) found Indian consumers who perceived themselves susceptible to nutrient deficiency, and who recognized fortification's benefits, substantially more likely to adopt fortified foods, while Nutrition International (2024) reported that government- and social-media-driven cues to action meaningfully increased fortified oil and rice consumption. Using an extended TPB-HBM lens, Hojjati et al. (2025) found health consciousness the single strongest predictor of intention toward fortified dairy, a finding echoed closely enough elsewhere (Sajdakowska et al., 2021; Khare & Arora, 2025) that health consciousness functions, in effect, as this literature's operationalisation of HBM's susceptibility and benefit constructs. Purchase intention functions as the shared outcome variable across this literature: Tudoran et al. (2009) linked positive attitudes to purchase intention, Wang et al. (2025) confirmed consumer preference's centrality to purchase intention in the Chinese plant-milk market, and Chowdhury et al. (2022) and Andaregie et al. (2024) both found intention shaped by information exposure and social environment, though in contexts (subsidised distribution, East African bread markets) that do not map directly onto discretionary retail purchase of fortified oil in urban India.

No single framework accounts on its own for the ambivalence, digital trust, and cultural-value dimensions that

emerged from this study's focus groups: TPB under-specifies where trust and ambivalence originate, VAB does not accommodate health-conscious rejection of a fortified product, and HBM's cues-to-action construct says little about digital or institutional trust. Accordingly, the study adopts a qualitative design that is informed by theory without being confined to it: TPB's perceived control and norms, VAB's subjective values, and HBM's susceptibility/benefit/barrier constructs shape the interview guide and initial coding, while remaining open to new codes and themes.

Much of this literature assumes health-conscious consumers hold favourable attitudes toward fortified foods, yet the same health motivation can also drive rejection of a product perceived as processed. Quantitative surveys establish which determinants matter but reveal little about how consumers form these views in everyday purchasing — a gap this study addresses through Focus Group Discussions (FGDs), generating interpretive, India- and oil-specific insight that a purely quantitative approach would not surface.

Collectively, the literature explains many determinants of fortified-food acceptance but offers limited insight into how consumers interpret fortification in everyday choices: quantitative surveys establish associations between predefined constructs but reveal little about the meanings consumers attach to fortification, naturalness, trust, and household decision-making, and evidence on fortified edible oils in India specifically remains scarce despite their strategic policy importance. Accordingly, this study adopts a qualitative focus group approach, informed by TPB, VAB, and HBM, to explore how consumers construct, negotiate, and justify acceptance or rejection of fortified edible oils.

3. Method

3.1 Qualitative Research Design

This study used Focus Group Discussions to investigate Indian consumers' perceptions, evaluations, and willingness to use fortified edible oil. Participants aged 25–60 were recruited using purposive sampling (Creswell, 2015). Recruitment and data collection continued until thematic saturation was reached (successive groups ceased to generate new codes relative to the developing codebook) rather than against a fixed sample target. Seven sessions were conducted in total (Section 3.2); the final two were compared code-by-code against the accumulated codebook, and no new codes emerged, at which point recruitment was concluded.

3.2 Participant Characteristics

The final sample comprised 32 participants across seven sessions (25 men, 7 women). Five sessions (Groups 1–5) were all-male, and two sessions (Groups 6–7) were all-female. This gender-specific group formation was a consequence of participants' availability as well as calendar constraints, rather than being a requirement of the design of the study. This has been presented here as one of the aspects of the sample's configuration. Still, gender-segregated groups may allow participants to feel more at ease when discussing household food practices. Aged range was from 26 to 55+. All sessions were virtual - via Microsoft Teams - and conducted by the main researcher. Table I shows participants' characteristics that have been anonymized; Table II summarises participants' geographic distribution across Indian states, and Table III summarises the primary cooking oils participants reported using.

Table I. Cross-tabulation of Participant Characteristics by Focus Group

Participant Characteristics	Group 1 (n=5)	Group 2 (n=5)	Group 3 (n=5)	Group 4 (n=5)	Group 5 (n=5)	Group 6 (n=4)	Group 7 (n=3)	Total (N=32)
Gender								
Male	5	5	5	5	5	-	-	25 (78.1%)
Female	-	-	-	-	-	4	3	7 (21.9%)
Age Group								
26–35	-	1	-	-	-	-	-	1 (3.1%)

36–45	5	1	3	-	5	3	2	19 (59.4%)
46–55	-	3	2	3	-	1	-	9 (28.1%)
55+	-	-	-	2	-	-	1	3 (9.4%)
Education								
Postgraduate	5	5	5	-	5	4	1	25 (78.1%)
Doctorate	-	-	-	5	-	-	2	7 (21.9%)

**Note. Participant codes (P1–P32) are used throughout in place of names to preserve anonymity, consistent with the ethical undertakings described in Section 3.5. Groups 1–5 (n=25) were all-male; Groups 6–7 (n=7) were all-female. Group and FGD numbering are aligned throughout the manuscript.*

Table II. Summary of Geographic Representation

State	Participants
Odisha	7
Maharashtra (including Mumbai)	7
Delhi	3
Karnataka	4
West Bengal/Kolkata	2
Madhya Pradesh	3
Uttarakhand	2
Uttar Pradesh	2
Telangana	1
Kerala	1
Total	32

Table III. Primary Cooking Oils Used by Participants

Cooking Oil**	Frequency (n=32)
Mustard oil (alone or combination)	19
Sunflower oil	9
Rice bran oil	5
Groundnut oil	2
Olive oil	4
Coconut oil	3
Refined oil	4
Ghee	2
Soybean oil	1
Palm Oil	2
Sesame oil	1
Fortified oil	2

Unspecified / "don't know" / "any oil"	2
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***Participants could report more than one cooking oil; therefore, totals exceed the number of participants.*

3.3 Data Collection Procedure

All seven discussions were conducted online via Microsoft Teams, chosen to draw participants from as many Indian states as possible and to reach locations where in-person data collection would have been difficult. Employment and household income above INR 1,00,000/month were fixed inclusion criteria alongside age (25 and above); they are not shown in Table I because, by design, they did not vary. This produced a related selection effect on education and digital access: all participants held at least a postgraduate or doctoral qualification, and the sample skews toward professionals with stable internet access and video-conferencing familiarity — a limitation addressed further in Section 6.

Institutional Review Board approval was obtained before recruitment began (Section 3.5). Individuals aged 25 and above were recruited via an online system that captured name, age, gender, education, employment, income, location, main household cooking oil, and availability before registration. Each session was recorded upon securing informed consent, and the lead author transcribed all sessions. To cross-check transcription accuracy, a 30-minute sample session was independently transcribed and reviewed by a second researcher, and both transcripts were checked for consistency before finalisation. All transcribed material, field notes, and coding output were stored in NVivo (Lumivero, 2023).

3.4 Analytical Approach

The study used an abductive, hybrid thematic analysis: a literature-based codebook was used provisionally alongside inductive coding of emergent themes. Unlike a purely inductive reflexive thematic analysis (Braun & Clarke, 2019), the interview guide and initial coding were pre-structured around TPB, VAB, and HBM constructs (Section 2.2), while remaining open throughout to codes these frameworks did not anticipate. Following Braun and Clarke's six-step logic, the lead researcher first read the transcripts repeatedly for familiarisation, then built an initial codebook from TPB/VAB/HBM constructs and extended it with codes identified inductively in the data. Initial codes were then grouped into candidate themes, checked against the full dataset, given descriptive names and definitions, and integrated into an analytical account linking each theme to specific interview context. This sequence follows Braun and Clarke's general logic but, rather than being driven only by an inductive process, remains theory-informed throughout: an abductive style of thematic analysis.

As a consensus-coding step, the lead researcher and two additional team members independently applied the provisional codebook to a randomly selected transcript sample, then met to compare and discuss their coding decisions in NVivo. Percentage agreement in coding is often used as a quality marker for reflexive thematic analysis. Braun and Clarke (2019) Though point out that coding is interpretive coding and not purely mechanical work, the usage of percentage-agreement statistics is a wrong approach. This step is only reported here, and the three coders conversed on a shared, justifiable interpretation of the provisional codebook as agreement across the compared segments varied from 86% to 100% before discussion and the rest of the disagreements were settled through consensus, not as a reliability coefficient that certifies objectivity. This consensus process resembles the collaborative coding used in Consensual Qualitative Research (CQR) more than a fixed-coefficient reliability check, and it strengthened confidence in the codebook ahead of full-dataset coding.

3.5 Ethical Considerations

Ethical approval was obtained from the authors' host institution's Institutional Review Board prior to data collection. A participant information sheet was provided to all participants via email, and written informed consent via email was obtained before participation. Participants could withdraw at any time without penalty. No personal information was retained in transcripts or analytical reports; names were replaced throughout with anonymized codes (P1–P32; Table I). Only the research team had access to audio recordings and transcripts will be deleted upon completion of the research.

3.6 Positionality Statement

The lead researcher initiated this study out of professional and academic interest in food policy and consumer behavior, with no personal or commercial stake in the edible oil or fortification industry. This interest shaped the conceptual models behind the interview guide, though we deliberately kept some distance from that theory and stayed open to unexpected themes at every analysis stage. The guide introduces the definition of "fortified food" before respondents describe their own views — a choice that can invite demand characteristics, a trade-off we acknowledge in using it deliberately.

4. Findings

A note on attribution: direct quotations are grouped by discussion group (FGD1–FGD7) rather than assigned to individual participant codes. Speaker names in the transcripts and the anonymized P1–P32 codes in Table I were collected through separate procedures at different stages of the research, and no correspondence could be reconstructed between them afterward — a limitation of the anonymization procedure rather than an editing omission. Each quoted passage is therefore identified by FGD number only.

4.1 Overview

Coding of the seven transcripts in NVivo produced 41 initial codes, grouped into 14 candidate subthemes and consolidated into eight main themes, following the sequence in Section 3.4. Each theme below is discussed alongside the sensitising constructs from TPB, VAB, and HBM (Section 2.2) and illustrated with anonymised verbatim quotes, with minority and disconfirming voices reported alongside dominant patterns.

4.2 Theme 1: “Fortified” is an unfamiliar label sitting on top of a familiar practice

The participants across all seven groups said that they did not know or were not familiar with the term "fortified edible oil" even though many had bought fortified oils. In FGD1, asked directly if they had heard the term before, every participant said “*No never,*” “*No, never,*” “*Not ever,*”; one elaborating: “*I was aware that these are like supplements kind of, but they are called as fortified foods, like the definition you gave was not aware.*” Some of them tried to explain that they knew about fortified foods but did not call them by that name. Others would recognize fortified oils by the added vitamins (e.g. A, D, E) on labels, but they would refer to fortified oils only indirectly or guess that “*maybe we are using it but never know it is fortified one.*” Besides, a few of the participants confessed that they had heard the word "fortified" but had not paid much attention to it. In FGD6, one participant comments: “*I’ve heard this word fortified but never paid much attention to it. There are too many things in the market with various additions and modifications.*” *Another participant explains that the gap may be the time constraint,* “*we are so busy that we do not ideally actually give emphasis to all the terms like fortified food, what is the FSSAI number and all that.*” But FGD2 participants said that they recognize the term by the advertisements, discussions in brand campaigns, rather than by labels or rules: “*Saffola for cardiac health, that’s what I’ve heard.*” These results offer indirect confirmation of HBM’s cues-to-action construct: participants encountered the stimulus (advertising, on-pack wording) without registering the concept it was meant to convey.

4.3 Theme 2: Health consciousness driving oil choice — but away from, not toward, fortification

Healthfulness remained the common explanation of the change in oil purchase habits that came up regularly across all the groups in harmony with the value-attitude link of VAB and the susceptibility/benefit rationale of HBM. This change was mainly to less-processed, single-ingredient oils (cold-pressed mustard, groundnut, or coconut oil, and ghee) rather than to fortified oils. One member of FGD1 put the situation of his household quite plain: “*we stopped consuming any fortified oils... the past experience and the chemical used during the processing.*” Another mentioned a return to the diet of pre-industrial times and distrust of “*any marketing of Omega 3 fatty acids or Vitamin.*” Through FGD2 to FGD3, most participants viewed health-conscious shopping as removal rather than addition of certain substances: “*My attention is Mostly directed at identifying certain ingredients that ought not to be there... more than putting in, I’m taking out.*” This framing of health-conscious decision-making as removal rather than addition ran counter to expectations: both VAB and HBM assume a health-conscious buyer values a product more as beneficial nutrients are added.

4.4 Theme 3: Purity, naturalness, and the artisanal-oil turn — a disconfirming thread

A sizeable move away from fortified or branded commodity oils toward artisanal, cold-pressed, or wood-pressed oils, expressing distrust of "chemical processing" rather than pointing out any specific safety incident. A participant from FGD 1 rejected the idea of eating fortified foods totally: *"I'm allergic to any kind of food additive... I always want natural or simple kind of oil."* One of the FGD5 participants said: *"I've never chosen the oil labeled with fortification... even if the cost is 2 or 3 times higher, I want to go for cold pressed oils,"* while questioning the underlying motive: *"if our elder generation never faced vitamin D deficiency according to pure natural resources, why cannot I get the same nutrient from the same natural resources?"* A FGD6 participant who had given up on using refined oil also described how her concern for fortification gradually disappeared after switching to an unrefined oil. This pattern runs counter to VAB's assumption that health values translate into positive attitudes toward a fortified product: here, the same health motivation produced rejection rather than acceptance. The finding is consistent with a naturalness bias, in which consumers equate "natural" with "unprocessed" and naturalness per se without the proven nutritional benefit is regarded as the main evidence of a healthy product (Roman et al. 2017); in such case fortification is seen as processing at least instead of the evidence for an additional benefit.

4.5 Theme 4: Low institutional trust and the demand for clinical proof

General disbelief in Indian FMCG oil companies' fortification claims was the most significant barrier, consistent with HBM's perceived-barriers and TPB's subjective-norm/trust logic. FGD1 put it starkly: *"The level of trust from Indians is very low... the oil companies' trust is Zero. So, even if you say anything, your label is the only one; people won't rely on it,"* adding that only third-party clinical verification could restore trust. FGD2 questioned unverifiable claims directly: *"where is the vitamin D and how much have they actually added?"* FGD5 and FGD6 raised fraudulent labeling, citing "approximately 60 products having a false claimed label" and noting "you can't believe the labels... you don't know what's written and what's truth." Not everyone was skeptical: an FGD3 member favored an existing brand (*"I personally would go for Tata Sampann which I consider highly reliable"*), and one FGD2 member who had used a branded fortified groundnut oil for over a year had been won over by experience, rare exceptions within an otherwise "zero trust" pattern.

4.6 Theme 5: Family gatekeeping of the purchase decision, with a gendered locus of control

Consistent with TPB's subjective-norm construct, family members, overwhelming spouses, emerged as the primary influence on which oil entered the household, with doctors as a secondary, occasional influence and social media/advertising as a background influence rather than a decisive one. A distinctive pattern separated the five male groups from the two female ones. Men consistently described themselves as witnesses rather than decision-makers when discussing purchases (*"the main person who makes the decision is my wife... it's not a decision that's come after a conversation with me"; "we are not the decision makers, obviously"*). By contrast, members of the women-only groups (FGD6, FGD7) consistently spoke as the decision-makers themselves and never mentioned their husbands as gatekeepers. This imbalance reflects how the achieved sample happened to sort by gender across sessions (Section 3.2), not a planned design choice, and should be read as a between-group pattern rather than confirmed evidence that oil purchase is generally a female-governed household domain (further disentangled in Sections 5.4 and 6). With that caveat, the pattern is consistent with men reporting broad support for fortified oil without translating it into purchasing behaviour. Peer groups emerged as a separate channel affecting the buying decision: *"my building compound and everything else has quite a few women groups... when there is a novelty introduced... we get lots of reactions. So, they are potential strong influencers."* In FGD6, one of the participants narrated about how her school-going son read the labels for her: *"he will be telling me, mama, this we should not purchase... their school is like very much into the nutrition line."*

4.7 Theme 6: Price is a secondary constraint once a trust/quality threshold is cleared

Trust, purity, and taste outweighed price in this higher-income sample (households above INR 1,00,000/month), a narrower and more affluent frame than the Indian oil market overall. FGD1 mentioned that: *"we will consume less oil, but only after we are sure that it is the good quality... no matter how high you price it."* In the same way, FGD3 expressed *"definitely not price... it's price at last."* When price did come in for re-

mentioning, it was through a family composition and generational stage rather than the distinction between the fortified and non-fortified product: FGD6's member said in case of large family of "7 to 8 people... the price is going to take priority ... but they have to consider price," and another noticed a generation difference: younger people "don't go with a price... they go with health benefit," while senior consumers are "they are not very concerned about the product types already..." Price therefore mattered indirectly, mediated by family size and generation rather than by the fortified/non-fortified distinction itself.

4.8 Theme 7: Ambivalent digital trust — reviews over research, doctors over algorithms

Given the Teams-mediated recruitment and delivery (Section 3.3), digital information sources warranted particular attention. Respondents clearly made a distinction among the channels instead of seeing "online information" as one big category. The same level of doubt was found for e-commerce product descriptions and on-pack digital claim messages compared to printed labels ("it is misleading... what they are writing", "FGD6") whereas informal peer reviews were greatly trusted: "we rely more on the reviews... than research" (FGD6). YouTube influencers were identified in FGD7 as a kind of intermediary who is considered trustworthy: "from the YouTube influencers we learn... we trust their recommendations." Doctors proved to be the single trusted source across all age groups; FGD2 and FGD6 members said they would switch products on a doctor's recommendation. This range, from mistrust in platform claims to strong trust in scientific experts, shows that "digital trust" is not one homogeneous concept: source type, not delivery medium, determines credibility.

4.9 Theme 8: Regional and generational taste anchoring conditions openness to change

Oil choices reflected regional cooking identity: mustard oil was preferred among eastern and northern households, groundnut oil in Maharashtra, and coconut oil in coastal Karnataka/Kerala. Flavour, rather than health, was the main factor behind these preferences, as one participant explained: "Taste and the smell should not be affected. So, if this is the case, there will always be a question mark..." (FGD2). Several expressed elders' preferences as a bottleneck preventing the introduction of a new oil: "if you are living with your aged parents, you can't introduce new thing immediately in the cooking... you can't say 'food is healthier... it has to be accepted gradually by the family members'". (FGD6) Notably, no participant cited religious reasoning for refusing fortified oil, in contrast to dairy or meat, where religious or ethical restrictions are more commonly reported. Table IV summarises how each of the eight themes relates to TPB, VAB, and HBM, and where the findings extend these frameworks.

Table IV. Summary of Qualitative Themes and Their Relationship with TPB, VAB, and HBM

Theme	Supports TPB	Supports VAB	Supports HBM	New Finding / Theoretical Extension
Theme 1: "Fortified" is an unfamiliar label sitting on top of a familiar practice	Partial support through subjective norms influencing awareness	Limited support	Supports HBM's Cues-to-Action, but reveals that exposure alone does not generate understanding	Consumers frequently encounter fortified products without recognising the concept of fortification, suggesting that awareness requires cognitive interpretation, not merely repeated exposure.
Theme 2: Health consciousness driving oil choice—but away from, not toward, fortification	Attitudes influence behavior, but in an unexpected direction	Supports value-driven behavior but challenges the assumed positive pathway	Supports perceived benefits and barriers	Health-conscious consumers often equate fortification with processing, creating a subtraction-over-addition decision process where naturalness outweighs added nutrients.

Theme	Supports TPB	Supports VAB	Supports HBM	New Finding / Theoretical Extension
Theme 3: Purity, naturalness, and the artisanal-oil turn	Consumer attitudes shape behavioral intention	Challenges VAB assumption s that health values favor fortified products	Supports perceived barriers	Introduces Naturalness Orientation as an important construct influencing consumer acceptance, extending existing behavioral models.
Theme 4: Low institutional trust and the demand for clinical proof	Strong support for subjective norms and perceived behavioral control through institutional trust	Limited support	Supports perceived barriers	Demonstrates that institutional trust and scientific credibility function as prerequisites before health claims are accepted.
Theme 5: Family gatekeeping of the purchase decision	Strong support for Subjective Norms	Indirect support	Limited support	Reveals that household decision authority, particularly female gatekeeping, mediates the translation of attitudes into actual purchasing behavior.
Theme 6: Price is a secondary constraint once a trust threshold is cleared	Supports perceived behavioral control regarding affordability	Limited support	Supports perceived barriers	Suggests that among higher-income consumers, trust and perceived quality outweigh price, indicating a sequential rather than simultaneous evaluation process.
Theme 7: Ambivalent digital trust—reviews over research, doctors over algorithms	Supports normative influence through trusted information sources	Limited support	Extends cues-to-action	Introduces a hierarchical digital trust model, where doctors are most trusted, followed by peers and influencers, while digital advertisements and product claims receive the least trust.
Theme 8: Regional and generational taste anchoring conditions openness to change	Subjective norms and cultural influences shape intentions	Values influence attitudes through regional food culture	Limited support	Identifies regional culinary identity and generational food traditions as boundary conditions influencing acceptance of fortified edible oils.

5. Discussion

5.1 Awareness without acceptance: revisiting HBM's cues-to-action construct

Unfamiliarity with the term "fortified" observed in Theme 1, despite general exposure to these products, enriches HBM's cues-to-action concept (Talsma et al. 2013; Nutrition International, 2024). Literature treats cues to action as levers that, once activated, put the benefit calculation in place. Participants were consistently

exposed to the cue (advertising, on-pack vitamin mentions) never recognised as “fortified food.” This confirms the results of Chiba et al. (2021) that fortification knowledge predicts behavior in food choices. Yet a different policy implication arises from the situation: what is the actual obstacle? A missing cue is not the problem rather an effective cue which is out of sync with the regulatory concept - a situation that branded health communications such as (“Saffola Heart,” “Sundrop”) seem to have created a breach and have widened the gap rather than filled it.

5.2 A qualified challenge to the VAB pathway

Theme 2 and, more sharply, Theme 3 (the artisanal oil/distrust thread) connects directly to the VAB gap identified and described in Section 2.2.2. Tudoran et al. (2009) and Sajdakowska et al. (2021) model health value as translating relatively smoothly into positive attitude toward enriched products; this study’s participants instead often held health as their single strongest value yet used it to justify moving toward less-processed alternatives. This does not contradict VAB’s core logic but reveals a second, unmodeled branchpoint: whether “added nutrients” are read as evidence of benefit or of processing/adulteration. Given similar adulteration concerns raised for other food categories (FGD6), fortified oil may be judged less on its own merits than as one instance of a broader suspicion of processed food — a halo effect running opposite to VAB’s usual assumption, consistent with why Brahma et al., 2026 extended VAB with an ambivalence construct.

5.3 Trust as the binding constraint, and its partial resolution through brand history

Theme 4’s near-uniform demand for clinical validation and “clean labeling,” alongside a self-reported “rock bottom” trust floor, is consistent with Brahma et al., 2026 on erratic, trust-mediated adoption, and with Wu et al.’s (2021) argument that consumers lean on layered third-party cues when a claimed attribute cannot be verified directly: participants described an evidentiary bar — dose-response clinical data, a multi-year track record — that no brand had cleared. Counter-evidence (FGD2’s positive experience with a fortified groundnut-oil brand, FGD3’s default trust in an established name) suggests trust here is brand-specific and experience-accumulated rather than category-wide, closer to TPB’s perceived-behavioral-control logic than a persuasion model, and that a narrow, stable set of claims may outperform marketing that keeps adding new ones, which participants read as gimmicky (“today company will say something... tomorrow, they will level something... it’s a confusion”, FGD1).

5.4 Gendered decision locus: a finding the theoretical framework did not anticipate

None of TPB, VAB, or HBM theories (Section 2.2) distinguish the household member with the attitude from the one who acts on it. But Theme 5 reveals a regular operation of this distinction along gender lines: the male participants of the five groups mainly characterized their role as attitude-holders who rarely took part on the actual purchase, whereas the two female groups were represented more as behavioral agents. This household division of labor indicates to a missing link between attitude and behavioral control rather than a deficiency in either construct alone; because the pattern emerges from a sample that happened to be gender-segregated (Section 3.2), it is only a between- or among- group pattern that would be supported by mixed-gender or dyadic design.

5.5 Layered digital trust and the Teams-mediated setting

Theme 7’s finding that participants sharply distinguish e-commerce and on-pack digital claims (low trust) from peer reviews (moderate trust), YouTube nutrition influencers (moderate-to-high trust), and doctors (high trust) offers a more granular picture than HBM’s single cues-to-action construct, or the largely undifferentiated treatment of “information exposure” in Andaregie et al. (2024) and Chowdhury et al. (2022). Because recruitment occurred entirely over Microsoft Teams (Section 3.3), it is notable that a sample selected for digital fluency still expressed considerable skepticism toward digital claims — consistent with the influencer functioning as a trusted human intermediary rather than trust being a property of the platform itself.

5.6 Convergence and divergence with the wider literature

This study converges with Khare and Arora (2025) and Chaurasia et al. (2025) in finding perceived health benefit the dominant driver of engagement with fortified categories, and with Hojjati et al. (2025) in finding

health consciousness the strongest attitudinal predictor. But it diverges sharply: high health consciousness did not reliably translate into positive attitudes toward fortified oil. Because the reviewed quantitative studies typically measure acceptance of a fortified category, they may be less able to surface this rejection pathway than an open-ended qualitative design, suggesting the erratic adoption Brahma et al., 2026 documented is a genuine feature of how health-motivated urban Indian consumers reason about this staple, not a measurement artifact.

5.7 Proposed Conceptual Framework

Figure 1 sets out how the study's findings extend the existing theoretical base. Rather than discarding TPB, VAB, or HBM, the framework retains all three and adds five constructs drawn inductively from participants' accounts: Naturalness Orientation, Institutional Trust, Household Gatekeeping, Layered Digital Trust, and Regional Culinary Identity. These constructs matter because acceptance or rejection of a fortified product in this sample rested not only on attitude, subjective norms, perceived behavioral control, health beliefs, and values, but also on culturally embedded judgements about naturalness and institutional credibility, on who in the household holds decision authority, and on which information sources are trusted. The framework is offered as a context-specific tool for understanding fortified-food adoption in other low- and middle-income settings where fortification is a public-health priority.

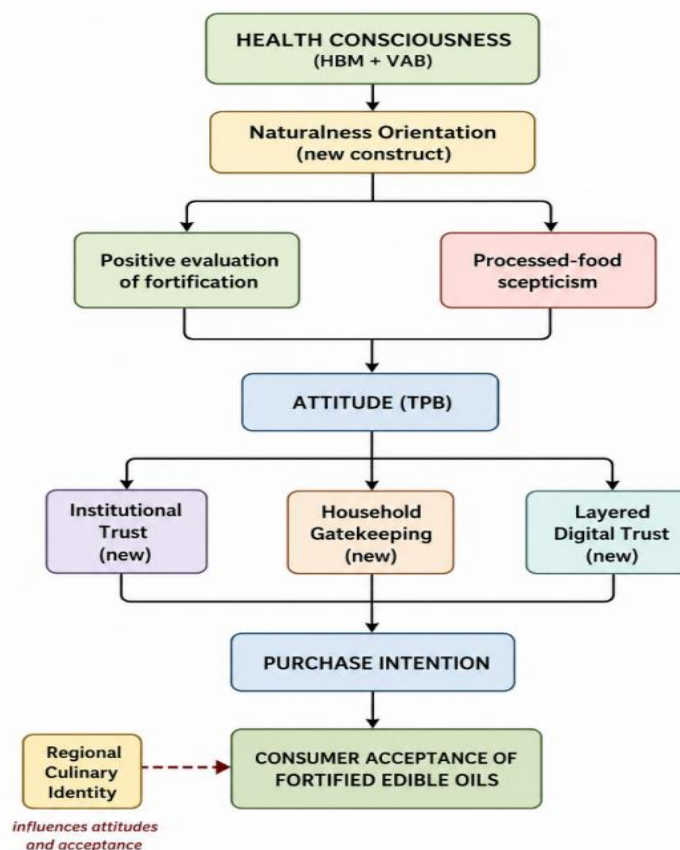


Figure 1. Proposed integrated conceptual framework of consumer acceptance of fortified edible oils derived from the qualitative findings. The framework illustrates how the emergent constructs (Naturalness Orientation, Institutional Trust, Household Gatekeeping, Layered Digital Trust, and Regional Culinary Identity) extend TPB, VAB, and HBM in explaining consumer acceptance of fortified edible oils in India.

5.8 Theoretical Implications

Together, the eight themes suggest that TPB, VAB, and HBM explain much of consumer decision-making but cannot fully account for acceptance of fortified edible oils in this Indian context. The findings support these theories while proposing Naturalness Orientation, Institutional Trust, Household Gatekeeping, Layered Digital Trust, and Regional Culinary Identity as constructs extending rather than replacing existing theory, offering a

more grounded, localised account of fortified-food acceptance in developing-country settings.

5.9 Practical Implications

For marketers, Theme 4's low-trust pattern suggests clinically substantiated, independently verified claims build trust more effectively than incremental label additions, which participants read as gimmickry (Section 5.3). Since Theme 7 shows doctors and peer or influencer voices trusted well above packaging and e-commerce claims, doctor-endorsement or nutrition-influencer partnerships may outperform further label or digital-advertising spend. Theme 5's gendered decision locus suggests campaigns should reach both the attitude-holder and the household's purchase-decision-maker to convert favourable attitudes into behaviour. For policymakers, Theme 1 indicates that regulatory awareness campaigns explaining what "fortified" means may need to run separately from brand advertising, since exposure to branded products alone did not build recognition of the regulatory concept; Theme 3's naturalness-driven rejection suggests such messaging should also address scepticism toward processing, not only nutrient content.

6. Limitations and Future Directions

This study's reliance on online recruitment via Microsoft Teams, while enabling geographic spread across Indian states, produced a sample uniformly postgraduate- or doctorate-educated and drawn entirely from households earning above INR 1,00,000/month. The findings reflect a digitally connected, highly educated, higher-income subset of Indian consumers and should not be generalized to rural, lower-income, or lower-literacy populations, who make up a substantial share of the market and may relate to fortification and institutional messaging differently; future research should extend this inquiry to those populations through in-person or hybrid data collection. The sample is also geographically skewed: recruitment through the lead researcher's personal network produced disproportionate representation from Odisha and Maharashtra (7 of 32 participants each; Table II), together accounting for half the sample, so state-level patterns should be read as indicative rather than representative, and future work should recruit through channels not anchored to a single researcher's network.

Three further limitations bear on the Findings and Discussion. First, the achieved sample was gender-segregated by group rather than by design, so the gendered decision-locus pattern in Theme 5 was observed between rather than within groups. Second, the moderator opened each session with a definition of "fortified food" before eliciting participants' own understanding (Section 3.6), a known source of demand characteristics bearing on Theme 1's low-awareness finding. Third, the study is limited to a single country and food category; the artisanal-oil/distrust and layered-digital-trust findings may not extend to other fortified staples (atta, rice, salt, milk) under the same 2016 regulations.

Future research should, alongside the rural/lower-income extension noted above, pursue mixed-gender and couple-dyad designs to test the gendered decision-locus finding; comparative FGDs across fortified staples to test the generality of the artisanal/purity-driven rejection pathway; content analysis of nutrition-influencer messaging on fortified oil, given this channel's emerging trusted role; and a quantitative follow-up testing whether the subtraction-over-addition pattern in Theme 2 predicts rejection at scale.

7. Conclusion

This study set out to understand how urban, educated Indian consumers perceive fortified edible oil and what shapes their willingness to adopt it. Across seven focus groups, participants showed broad exposure to fortified oil products but little recognition of the regulatory term itself; health consciousness that as often moved consumers away from fortification as toward it; persistently low institutional trust pending clinical proof; a gendered division between who holds an attitude and who converts it into a purchase; a layered hierarchy of digital trust topped by doctors rather than platforms; and regional and generational taste preferences that bound openness to change. None of TPB, VAB, or HBM alone accounts for this pattern; read together with the naturalness-orientation, institutional-trust, household-gatekeeping, layered-digital-trust, and regional-culinary-identity constructs proposed in Section 5.7, they offer a fuller account of why a regulator-backed, nutritionally sound intervention has struggled to secure discretionary consumer uptake. The findings come from a digitally recruited, highly educated, higher-income, and geographically skewed sample (Section 6), so

they should be read as an in-depth account of this specific consumer segment rather than a representative picture of Indian oil consumers as a whole; even so, they indicate that closing India's micronutrient gap through fortified oil depends as much on rebuilding institutional trust and reaching household decision-makers as on the underlying nutrition science.

The interview guide and coding book used in this study are available from the corresponding author on reasonable request.

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