

Short Communication

Insights into student perspectives regarding food fortification in a private medical and engineering college, Bhubaneswar, Odisha: a qualitative study

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ABSTRACT

Food fortification is a crucial public health intervention aimed at addressing nutrient deficiencies and improving overall health outcomes. There is need in diet enhancement as macronutrient and micronutrient deficiency can lead to malnutrition in the long run. Young adults are the budding future of the community and their perception on food fortification and its adaptation can help the policy makers to generate better ways to implement it. This review article presents findings from a qualitative exploration of awareness regarding food fortification among students in a private college in Bhubaneswar, Odisha through an academic program. Through focus group discussions (FGDs), we investigated students' (medical and engineering) understanding of the advantages and disadvantages of food fortification. Among the medical students, 50% were aware about food fortification, 40% were in favour of it and only 10% had misconception regarding food fortification. Whereas, among the engineering students, 72.2% were aware, 45.45% were in favour and none had any misconception or myth related to food fortification. To create awareness and promote fortified food, engineering students suggested better ideas than medical students. This analysis revealed insights into perceptions, knowledge gaps, and potential strategies for enhancing awareness and promoting the adoption of fortified foods.

Keywords: Food fortification, Focus group discussion, Health care, Food safety, Health promotion

INTRODUCTION

Food fortification involves the addition of essential vitamins, minerals, or other nutrients to staple foods to address nutrient deficiencies in populations. The most prevalent deficiencies are those in iron, iodine, folate, vitamin A, and zinc. These deficiencies frequently contribute to poor growth, impaired cognitive development, decreased intelligence, prenatal difficulties, and an increased risk of morbidity and mortality on an individual basis.¹ A dietary intervention is necessary to enhance energy and nutrient intakes because malnutrition is a progressive disorder that can get worse over time. As a "food-based" strategy to improve the diet quality of the

target population, "fortification" has been employed to raise the nutritional richness of easily ingested food items as a preventive step. Deficits in micronutrients are associated with a decline in human capital and economic growth.² Labelled as "hidden hunger," micronutrient deficiency affects one-third of consumers worldwide.^{3,4} The consumption of folate, iron, vitamins, iodine, and minerals has increased dramatically as a result of fortification, which has supported micronutrient levels. The majority of fortified food consumers are older children and young adults. Intervention studies have shown some promise in addressing micronutrient deficiencies in particular, which may lower the population's risk of anemia, other illnesses, and all-cause

mortality.⁴ Iodine, iron, folate, and vitamin A are among the nutrients whose availability has significantly increased in some places as a result of food fortification (FF), according to compelling data.³ Despite its proven effectiveness in combating malnutrition, awareness of food fortification remains limited among various demographic groups, including students. One of the biggest obstacles to supplying "novel" fortified meals is consumer acceptability. The coverage and consumption of fortified foods are lower than expected because of inadequate design and/or implementation. A programme needs to meet a minimal number of requirements in order to have an impact.⁵ It is critical for world health to eradicate micronutrient deficiencies.⁶⁻⁸ Ending hunger and malnutrition by 2025 is the first millennium development goal (MDG).⁹ The primary obstacle to the uptake of fortified foods is still the absence of empirical data on consumer awareness, preference, and demand.⁶ Although awareness of fortified food products may not always result in a purchase, it can influence a consumer's choice to make a purchase. It has been shown that awareness-raising intervention tactics can be implemented more effectively when the level of knowledge of the customers is known.⁹

Understanding students' perceptions of the advantages and disadvantages of food fortification is essential for informing educational campaigns and public health initiatives aimed at promoting its uptake.

METHODS

As part of an academic program, FGDs were conducted referring to WHO guidelines, after due permission from institutional head and department head. Since this was an academic activity, ethics permission was waived off.

The study employed qualitative research design through FGDs to explore awareness regarding food fortification among 2 distinct groups: 1st year students of engineering school and 1st year students of medical school of a university in Bhubaneswar, Odisha. Participants were purposively selected based on their enrollment in either the engineering or medical program. Each focus group comprised of 9-10 participants to facilitate interaction and ensure representation of diverse perspectives, irrespective of gender. Discussion in each group took place for 30-40 minutes and were held in Hindi and English. It was recorded audio-visually, in addition to taking notes concurrently. Consent to participate and being recorded, was obtained prior to the discussion.

Discussions were initiated by a semi-structured checklist which covered topics such as knowledge of fortified foods, perceived benefits and drawbacks of fortification, and suggestions for increasing awareness. Facilitators posed questions informally to the participants and recorded their involvement and responses using templates. It was ensured that no prompting was made.

Thematic analysis was employed to identify key themes and patterns in the data. The transcripts and infograms of the discussion were analysed.

Main theme

Do you know what is Food fortification? Do you think food fortification should be carried out? Are there any specific factors or barriers that might prevent individuals from consuming fortified foods? If yes, specify factors or barriers that might prevent individuals from consuming fortified foods.

Sub-theme

How familiar are you with the concept of food fortification? Can you provide any example of fortified foods? What do you perceive to be the benefits of consuming fortified foods? Are you aware of any potential drawbacks/ concerns associated with food fortification? If yes, what are the potential drawbacks/ concerns associated with food fortification? How do you think food fortification can contribute to addressing nutritional deficiencies in the population? Do you have the perception of fortified food being expensive? Have you ever encountered any misconceptions or myths about food fortification? If yes, what are the misconceptions or myths about food fortification you have encountered? Could you suggest ways to promote awareness regarding food fortification?

After the FGD session was over, the groups were apprised regarding nutritional requirements and deficiencies, food fortification's concept and public health impact, and strategies for community engagement and advocacy and other community-based interventions.

RESULTS

Several themes emerged from the FGD, highlighting students' perspectives on food fortification. Perceived advantages of food fortification included improved nutritional status, prevention of nutrient deficiencies, and potential health benefits. However, concerns were also raised regarding the quality and safety of fortified foods, potential adverse effects, and ethical considerations surrounding fortification practices.

Medical student FGD

The FGD group comprised of 10 medical students, 6/10 (60%) participated in the discussion; with equal participation irrespective of gender, 5/10 (50%) were aware regarding food fortification and 4/10 (40%) were in favour of FF.

The 4/10 (40%) shared views on barriers that might prevent individuals from consuming fortified food. 4 participants said price, illiteracy and altered taste of food after fortification to be the barriers while 1 (10%)

participant specified distrust of consumer on food manufacturers, undermining confidence on fortified food to be a barrier.

When asked to provide any examples of fortified foods, 4/10 (40%) gave the response-rice and salt, while 2/10 (20%) said Bournvita to be fortified food.

The 1/10 (10%) participant reported to have encountered a misconceptions/myth regarding food fortification which was “unnaturalness of fortificants like synthetic vitamins and minerals”.

The 5/10 (50%) participants reported that through social media, TV and health awareness camps, fortified food can be promoted to enhance its acceptance. The infogram (Figure 1) represents the response and interaction of the medical students during the activity.

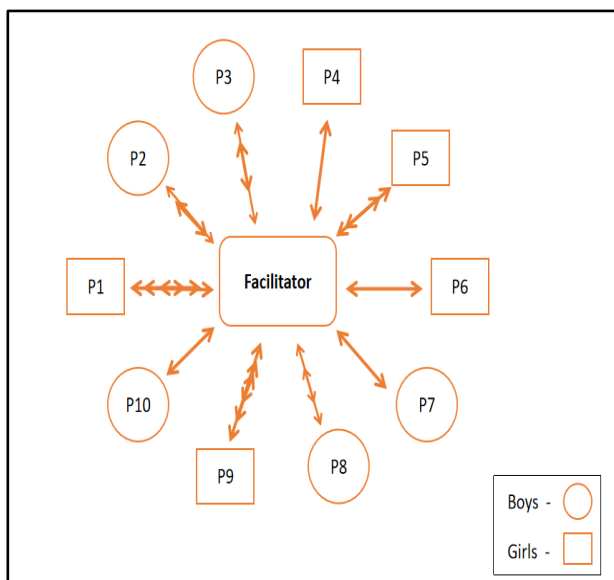


Figure 1: Infogram for FGD among the medical students.

Engineering student FGD

The FGD group comprised of 11 engineering students. Figure 2 depicts the interaction of the students during the FGD.

The 8/11 (72.7%) participated in the discussion; with majority participation by the girls, 8/11 (72.7%) were aware regarding food fortification, 5/11 (45.45%) were in favour of FF and 5/11 (45.45%) shared views on barriers that might prevent individuals from consuming fortified food. They specified taste, price, and illiteracy to be the barriers to acceptance of fortified food.

None of the participants had encountered any misconceptions/myth regarding food fortification. When asked to provide any examples of fortified foods, 7/11 (63.63%) reported fortified salt. The 7/11 (63.63%)

participants reported that through social media, newspaper, TV and radio, fortified food can be promoted. Two out of these participants (2/7; 28.57%), suggested that having large symbols or signs indicating fortified food on display labels over food product could be beneficial to create awareness and promote fortified food.

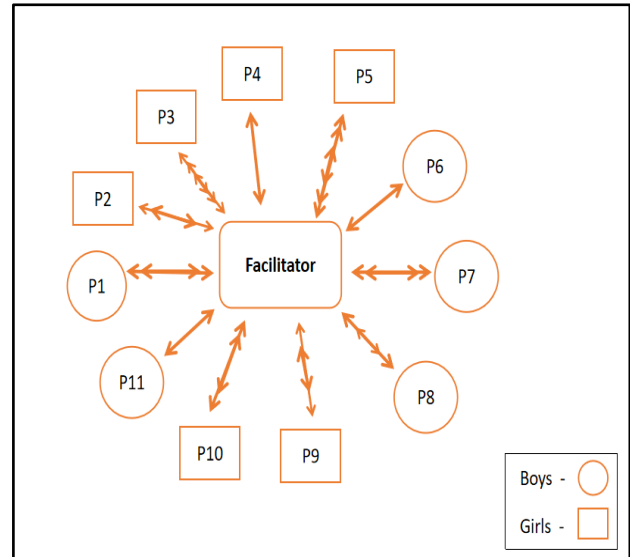


Figure 2: Infogram for FGD among the engineering students.

DISCUSSION

Varying levels of awareness regarding fortified foods was demonstrated by the participants in both the groups, with some expressing familiarity with fortified products such as iodized salt, while others exhibited limited knowledge in the present study among medical and engineering students.

In our study, 50% of medical students were aware regarding food fortification, whereas 72.7% of engineering students were aware regarding food fortification. In a study done by Linda et al in Kenya, just 28% of the participants knew what was meant by the term “food fortification”.¹⁰ Similar results found in another study in Kenya, where merely 32.9% of participants possessed knowledge regarding food fortification.⁶ A study done by Battalwar et al in females, found out that 43% participants were aware about the definition of food fortification.¹¹ In a study done by Geetha et al 44.78% of urban respondents and 49.59% of rural respondents were aware of biofortification.¹⁴ The 40% medical students and 45.45% engineering students were found out to be favouring food fortification in our study whereas, 56% of participants favoured fortified food because it is healthy; as reported by Battalwar et al in their study.¹¹

Both medical (40%) and engineering (45.45%) students said price, illiteracy and altered taste of food after fortification to be the barriers that might prevent individuals from consuming fortified food in present

study. The 10% among the medical students specified distrust of consumer on food manufacturers, undermining confidence on fortified food to be a barrier while, a study done by Chiba et al in Japan found that the main reasons for not having fortified food were; 32.1% thought their regular diet would be sufficient for them, 24.1% did not want to spend money on fortified meals, while 28.1% thought it was pricey.¹² Battalwar et al in her study on female participants listed lack of knowledge, cost, lack of benefit, and lack of availability in their location as the main obstacles to consuming fortified food.¹¹ In a study by Gupta et al they listed a number of reasons why fortified programmes haven't been implemented, including a lack of information about the status of micronutrient deficiencies, a lack of awareness of the seriousness of these deficiencies and the financial burden they place on the healthcare system, a lack of knowledge about food consumption patterns, concerns from the food industry regarding consumer acceptance, costs, and effects on competition, and a lack of proactive political and administrative leadership to plan, launch, oversee, and maintain mass fortification programmes.¹³

In the current study, 40% of medical students said rice and salt; 20% said Bournvita to be examples of fortified food. The 63.63% of engineering students reported fortified salt as example of fortified food where the awareness level is higher than the finding reported in the study by Battalwar et al where 54% participants said that breakfast cereals, biscuits, salt, milk products are fortified with vitamins/minerals in India.¹¹

It was found that 10% of medical students reported to have encountered a misconceptions/myth regarding food fortification which was "Unnaturalness of fortificants like synthetic vitamins and minerals". Whereas, none of the participants from engineering college had encountered any such misconceptions/myth. In study done by Geetha et al 64% of the respondents thought that biofortification meant physically adding micronutrients to food products while they were being processed, and 45% thought it meant giving nutrients through tablets, syrups, or pills.¹⁴ In economically backward nations, households have restricted access to fortified food items, and many are not inclined to buy these enriched food items which might be attributed to their awareness level as well.¹⁵ White et al added that, the access to health promotion, education, and grocery stores is restricted for many consumers, particularly the poor. Cost, accessibility, and availability of fortified food products remain persistent challenges.¹⁶

Consumers face a variety of obstacles when it comes to selecting fortified foods, including high costs compared to income, skepticism regarding label claims, naturalness, and insufficient health-related information.⁹ When asked about suggestions to promote awareness regarding food fortification, 50% of medical students reported that it can be done through social media, TV and health awareness camps, whereas 63.63% participants from engineering reported that it can be done through social media,

newspaper, TV and radio. 2 out of these engineering students (28.57%), suggested that having large symbols or signs indicating fortified food on display labels over food product could be beneficial to create awareness and promote fortified food. In a study by Serubugo et al they proposed that children need all the necessary nutrients in suitable amounts because they are a group that is still developing their body structure.⁹ The marketing message ought to focus on making mothers aware of the advantages that fortified food products offer for their kids. In order to urge all women of childbearing age to eat fortified food products for the health of their newborns, health practitioners and marketers should specifically target the pregnant mother group of customers through clinics and television advertising. This is because mothers compete with their babies for nutrients.⁹

In study by Geetha et al when enquired about the need for product promotion and advertising, Ads and promotions for biofortified products to be made, 86% respondents in urban areas and 90% respondents in rural areas were in favour of it.¹⁴ Previous study has shown that the nutrition content of advertisements can promote the use of fortified foods among consumers.¹⁷ Especially in cities, grocery stores are brimming with goods with health-promoting labels like "high in omega-3, low in sodium, and reduced fat".¹⁸ Client is encouraged to purchase 32 health-fortified items by these promotional phrases. The marketing messaging prompts a purchasing action by informing and convincing customers of advantages of reinforced goods.¹⁸ Vicentini, Liberatore and Mastrocola through their study, emphasized on production of new goods with images and directions about food fortified with health benefits gaining market share.¹⁹⁻²⁰ Might be attributed to fact that visual awareness create better impact and tends to last longer. It has also been observed that graphic designs significantly influence consumers' decisions to purchase healthful foods.²⁰ Extra health information boosts customer assurance.²⁰ The demand for enriched dairy products has expanded as a result of nutritionists' and doctors' advice, and marketers and doctors work together to provide reliable information.²¹

Findings underscore importance of targeted educational interventions to enhance awareness of food fortification among students. Strategies such as incorporating nutrition education into curricula, leveraging digital media platforms for information dissemination, and engaging students in interactive learning experiences can help address knowledge gaps and promote informed decision-making regarding fortified foods. Moreover, efforts to address concerns related to the safety and efficacy of fortification processes are warranted to foster trust and acceptance among consumers.

CONCLUSION

Promoting awareness among college students regarding food fortification is essential for improving nutritional outcomes and fostering healthy dietary habits.

This qualitative exploration provides valuable insights into students' awareness of food fortification and highlights the need for targeted educational initiatives to promote its benefits and address concerns. By enhancing awareness and understanding of food fortification among students, we can contribute to improved nutrition outcomes and better health for all.

Incorporate into curriculum about food fortification into relevant courses across disciplines such as nutrition, public health, and food science.

Implement interactive learning activities such as quizzes and competitions to reinforce knowledge and engage students, also organize workshops, seminars and guest lectures focused on food fortification. Encourage student-led research projects and initiatives on food fortification, allowing students to explore relevant topics, conduct surveys, and contribute to this area.

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REFERENCES

- Embling R, Neilson L, Mellor C, Durodola M, Rouse N, Haselgrove A, et al. Exploring consumer beliefs about novel fortified foods: A focus group study with UK-based older and younger adult consumers. *Appetite*. 2024;193:107139.
- Mkambula P, Mbuya MN, Rowe LA, Sablah M, Friesen VM, Chadha M, et al. The unfinished agenda for food fortification in low-and middle-income countries: quantifying progress, gaps and potential opportunities. *Nutrients*. 2020;12(2):354.
- Beal T, Massiot E, Arsenault JE, Smith MR, Hijmans RJ. Global trends in dietary micronutrient supplies and estimated prevalence of inadequate intakes. *PloS one*. 2017;12(4):e0175554.
- Bailey RL, West Jr KP, Black RE. The epidemiology of global micronutrient deficiencies. *Ann Nutr Metabolism*. 2015;66(2):22-33.
- Neufeld LM, Baker S, Garrett GS, Haddad L. Coverage and utilization in food fortification programs: critical and neglected areas of evaluation. *J Nutr*. 2017;147(5):1015S-9S.
- Aura LA. Consumer Knowledge, Attitudes and Practices on Food Fortification in Kenya. Doctoral dissertation, JKUAT-CoANRE. 2022.
- Habeych E, van Kogelenberg V, Sagalowicz L, Michel M, Galaffu N. Strategies to limit colour changes when fortifying food products with iron. *Food Res Int*. 2016;88:122-8.
- Tanumihardjo SA. Vitamin A fortification efforts require accurate monitoring of population vitamin A status to prevent excessive intakes. *Procedia Chemistry*. 2015;14:398-407.
- Serubugo A. Fortification of food products: a consumer perspective. 2019. Available at: https://openscholar.dut.ac.za/bitstream/10321/4247/3/Serubugo_A_2019_Redacted.pdf. Accessed on 15 June 2024.
- Linda AA, Kyallo F, Okoth JK, Kahenya P, Makokha A, Sila D, et al. Food Fortification: The Level of Awareness among Kenyan Consumers. *J Nutr Metabol*. 2020;2020:1-7.
- Battalwar R, Syed BF. A Study on Awareness and Consumption of Fortified Foods among Female Adults Mumbai. *Int J Sci Res*. 2017;6(4):1242-52.
- Chiba T, Nanae Tanemura, Nishijima C. The Perception of Minerals and Their Prevalence in Fortified Foods and Supplements in Japan. *Nutrients*. 2022;14(13):2586-6.
- G R, Gupta A. Fortification of Foods with Vitamin D in India. *Nutrients*. 2014;6(9):3601-23.
- Geetha ML, Venkatesh P, Jha GK, Singh DR, Sangeetha V. A study on consumer awareness, perception and willingness to pay for biofortified products in Delhi, India. *Curr Sci*. 2023;125(7):728.
- Jalal C, Wuehler S, Osendarp S, De-Regil LM. Estimating nutrient fortification levels in condiments and seasonings for public health programs: considerations and adaptations. *Ann N York Academy Sci*. 2016;1379(1):28-37.
- White M, Addison C, Jenkins BWC, Henderson F, McGill D, Payton M, et al. Factors Affecting Dietary Practices in a Mississippi African American Community. *Int J Environmental Res Publ Heal*. 2017;14(7):718.
- Lu J. The effect of perceived carrier-ingredient fit on purchase intention of functional food moderated by nutrition knowledge and health claim. *Brit Food J*. 2015;117(7):1872-85.
- Dodds A, Chamberlain K. The problematic messages of nutritional discourse: A case-base critical media analysis. *J Appetite*. 2017;108:42-50.
- Vicentini A, Liberatore L, Mastrocola D. Functional foods: Trends and development of the global market. *Italian J Food Sci*. 2016;28(1):338-51.
- Kaur N, Singh DP. Deciphering the consumer behaviour facets of functional foods: A literature review. *Appetite*. 2017;112:167-87.
- Bazhan M, Kalantari N, Keshavarz-Mohammadi N, Hosseini H, Eini-Zinab H, Alavi-Majd H. Applying social marketing mix to identify consumers' preferences towards functional dairy products in Iran. *Nutrit Food Sci*. 2018;48(1):45-60.

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