

# Consumer Knowledge, Attitude and Practice of using Fortified Food in India: A Study among Women in Urban Delhi

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## ABSTRACT

**Background:** Food fortification has been proven to be one of the effective strategies to combat micronutrient deficiency around the world. Many staple food items are fortified with vitamins and minerals such as wheat flour, cooking oil, milk, and salt. Still, micronutrient deficiencies are one of the major public health problems globally.

**Objective:** The study aimed to determine the knowledge, attitude, and practices towards the usage of fortified food among urban females of Delhi.

**Materials and Methods:** Data for this community based cross-sectional study were collected using an interviewer-administered questionnaire. A total of 150 urban women aged 18-30years were selected from four areas in Delhi, India.

**Results:** The mean age of the participants was 23.2±3.3 years. 56.6% of participants were aware of the term food fortification and 48 % knew about the food fortification logo on food labels of pre-packaged food items. More than fifty percent knew that food fortification prevents micronutrient deficiency. 69.8% of participants thought that food fortification is important and 61% of participants had no problem paying more for buying fortified food. The Participants reported no difficulty in cooking fortified food (61.7%).

**Conclusion:** The knowledge and practices of using fortified food were low among women. Mostly women are the ones who cook and purchase food in India. Therefore, it is important to create awareness about prevalent micronutrient deficiencies and the importance and identification of fortified food available in their local market.

**Keywords:** Micronutrients, Micronutrient Deficiency, food fortification, knowledge, attitude, practice.

## INTRODUCTION

Micronutrients are required in small amounts but play an important role in proper in the human body. [1] They also help in the proper functioning of the brain and the immune system. [2] Micronutrient deficiencies are related to many health conditions like stunting, wasting, nutritional anaemia, neural tube defect in newborn babies. [3] According to World health organization (WHO) report, approximately more than 2 billion people are suffering

from micronutrient deficiency diseases [MNDs]. [4] MNDs is prevalent in both developed & developing nations. [5] Iron, iodine, folate, vitamin A, and zinc deficiencies are the most widespread MNDs. Women of child bearing age and children are at higher risk of developing micronutrient deficiency than any other age group. [6] According to WHO 1.9 million pregnant women and 190 million pre-schoolers were having vitamin A deficiency globally. [7] Iron deficiency is prevalent

around the world 42% of pregnant women and 47% of pre-schooler are anaemic. [8] In India, the prevalence of anaemia is high, according to National Family Health Survey-4 [NFHS-4] data showed that 55.3% of women were found to be anaemic. Also, 69.4% of children of age group 6-59 months were found to be anaemic. [9] A study done in 2015 in Udepur district of Gujarat, found a high prevalence of vitamin A and iron deficiency in that area. [10] A similar study done in 2013 found a high prevalence of anaemia in pregnant women in a rural area of Kashmir. [11] Food fortification is one of the effective strategies to prevent micronutrient deficiency around the world from centuries. [12] Food fortification is known as increasing the content of one or more essential micronutrients to commonly consumed foods to provide public health benefits. [12] In India, food items fortified with vitamins and minerals are milk & milk products, oil and recently salt is double fortified with iron and iodine. [13] The Food Safety and Standards Authority of India (FSSAI) with support from TATA TRUSTS launched Food Fortification Resource Centre. [13] As per as Food Safety and Standards Regulation 2018, every packaged fortified food shall carry the '+F' logo on the label. [13] The Ministry of Women and Child Development in 2018 has made it mandatory for the use of fortified wheat flour, edible oils, double fortified salt in Integrated Child Development Services (ICDS) and mid-day meal schemes. [13] There are limited studies that are assessing the knowledge and awareness about fortified food among consumers in India. A Study conducted in Jaipur, Rajasthan found that only 53.3 % rural and 65.3 % urban women were aware of Targeted fortified food. [14] In another study conducted in Mumbai city among female and male of 18 to 60 years also found poor awareness and consumption of fortified food. [15,16] The micronutrient status of people could be improved by the use of fortified food. Therefore, the current study was conducted to assess the knowledge, attitude and

practice towards use of fortified food among women residing in Delhi.

## MATERIALS AND METHODS

This community-based survey was conducted in January and February 2020 as part of the master's research dissertation. The participants of the study were belonging to four areas of Delhi namely Dwarka, Janakpuri, Tilak Nagar, and Rajouri Garden. We used a convenience sampling method to recruit 150 women of the age group 18 to 30 years. The participants with minimum secondary school or higher education; cooperative and granted their consent were included in the study. Women from nutrition and dietetics background were excluded from the study. A pilot-tested interviewer-administered questionnaire was used to collect data on socio-demographic details, the knowledge; practice, and attitude related questions on fortified food. The questionnaire contained 16 questions; 8 specifically on knowledge of food fortification; and 8 questions assessed practices and attitude towards using fortified food. The participants answered on a range of different scales such as "very important, "good, bad", and "yes, no". The baseline characteristics of the participants were summarized as proportions overall and for subgroups defined by the level of education, defined as school group (32%) and college group (68%). The p values 0.05 or less were considered significant for the chi-square test applied to parameters. The data were analyzed using STATA 12.0 version. The Institution review board of Manav Rachna International Institute of Research Studies (MRIIRS), Faridabad, Haryana, India provided ethics approval for the study. The verbal informed consent was obtained from all the study participants before the study.

## RESULTS

### Socio-demographic characteristics of study participants:

There were a total of 150 females agreed to participate in the survey. The mean age of the study participants was

23.2±3.3 years. Most of the participants were studying either in school (79%) or college (63%). There were anticipated socio-demographic differences between


school and college group (Table 1) The result showed that all demographic characteristics differ between the educational groups (p<0.01)

	Overall N=150 Frequency (%)	School group n=48 Frequency (%)	College group n=102 Frequency (%)	p-value
<u>Age (years)</u>				
18-24	94 (62.67)	41 (85.42)	53 (51.96)	0.000
25-30	56 (37.33)	7 (14.58)	49 (48.04)	
<u>Occupation</u>				
Employed	37 (24.67)	2 (4.17)	35 (34.31)	0.000
House maker	11 (7.33)	8 (16.67)	3 (2.94)	
Student	102 (68.0)	38 (79.17)	64 (62.75)	
<u>Average monthly household income (INR)</u>				
10,000-24999	25 (16.67)	15 (31.25)	10 (9.8)	0.000
25,000-49,999	50 (33.3)	10 (20.83)	40 (39.22)	
50,000-1,00,000	47 (31.3)	20 (41.67)	27 (26.47)	
>1,00,000	28 (18.67)	3 (6.25)	25 (24.51)	
<u>Eating preference</u>				
Non-vegetarian	62 (41.33)	29 (60.42)	33 (32.35)	0.001
Vegetarian	88 (58.67)	19 (39.58)	69 (67.65)	

\* P-value for differences in frequencies between the education groups

\*\*p<0.001

### Knowledge about food fortification:

Knowledge Questions	Overall N=150 Frequency (%)	School group n=48 Frequency (%)	College group n=102 Frequency (%)	p-value
<u>Knows about food fortification</u>				
Yes	85 (56.67)	21 (43.75)	64 (62.75)	0.053
No	43 (28.67)	16 (33.33)	27 (26.47)	
Don't know	22 (14.67)	11 (22.92)	11 (10.78)	
<u>Knows fortified food help in reducing micronutrient deficiency</u>				
Yes	91 (60.67)	21 (43.75)	70 (68.63)	0.002
No	38 (25.33)	14 (29.17)	24 (23.53)	
Don't know	21 (14.0)	13 (27.08)	8 (7.84)	
<u>Knows about micronutrient deficiency</u>				
Yes	97 (64.67)	21 (43.75)	76 (74.51)	0.000**
No	32 (21.33)	19 (39.58)	13 (12.75)	
Don't know	21 (14.0)	8 (16.67)	13 (12.75)	
<u>Knows about nutrient added in fortified food</u>				
Vitamins and minerals	65 (43.33)	14 (29.17)	51 (50.0)	0.000**
Fats	4 (2.67)	2 (4.17)	2 (1.96)	
Protein	17 (11.33)	10 (20.83)	7 (6.86)	
All the above	58 (38.67)	16 (33.33)	42 (41.18)	
Don't know	6 (4.0)	6 (12.5)	0 (0.0)	
<u>Knows about  food fortification logo used on a food label in India</u>				
Yes	72 (48.0)	18 (37.5)	54 (54.94)	0.077
No	78 (52.0)	30 (62.5)	48 (47.06)	
<u>Knows about fortified food available in India</u>				
Yes	60 (40.0)	12 (25.0)	48 (47.06)	0.01
No	90 (60.0)	36 (75.0)	54 (52.94)	
<u>Source of information about fortified food</u>				
Food Label	28 (18.67)	7 (14.58)	21 (20.59)	0.000**
Social Media	32 (21.33)	9 (18.75)	23 (22.55)	
Family members	17 (11.33)	13 (27.08)	4 (3.92)	
All the above	35 (23.33)	4 (8.33)	31 (30.39)	
Don't know	38 (25.33)	15 (31.25)	23 (22.55)	
<u>Knows that the Indian government made fortification compulsory</u>				
Yes	113 (75.33)	32 (66.67)	81 (79.41)	0.236
No	11 (7.33)	5 (10.42)	6 (5.88)	
Don't know	26 (17.33)	11 (22.92)	15 (14.71)	

\* P-value for differences in frequencies between the education groups

\*\*p<0.001

There were several significant differences in the knowledge reported by school and college group (Table 2) ( $p < 0.001$ ). More than 50% of the participants were aware of the term 'food fortification'. The differences in subgroups' knowledge about food fortification were significant ( $p \leq 0.05$ ). Sixty-eight percent of the college group and 43.7% of the school group knew that fortified food helps in reducing micronutrient deficiency ( $p < 0.001$ ). The knowledge about nutrients added in food was more among the college group. These differences were highly significant ( $p < 0.001$ ). Only 48 % of the participants knew about the food fortification identification logo used on food labels in India. The majority of the participants (75.3%) were aware of the fact that the Indian government made food fortification compulsory on staple foods.

### Attitude and practice of participants

Attitude and practice of using fortified foods are presented in Table 3. More than 60 percent of the participants think it is important to fortified food. The significant numbers of participants are willing to pay more for buying fortified food ( $p < 0.01$ ). However, only 46% of the participants reported that the government should make food fortification compulsory. The difference in opinion among both the education group were highly significant ( $p < 0.001$ ). The majority of the participants in different education groups were willing to learn more about fortified food. More than 60 % of the participants said they read food labels before buying fortified food. Nutritive value (58%) was the main factor among them before purchasing fortified food. Most participants didn't use micronutrient powder to supplement their food.

**Table 3: Attitudes and Practices by the level of education (N = 150)**

	Overall N=150 Frequency (%)	School group n=48 Frequency (%)	College group n=102 Frequency (%)	p-value
Think about food fortification				
Important	104 (69.8)	28 (59.57)	76 (74.51)	0.119
Not at all important	7 (4.7)	4 (8.51)	3 (2.94)	
Don't know	38 (25.5)	15 (31.91)	23 (22.55)	
Think to pay more for fortified food				
Yes	92 (61.33)	21 (43.75)	71 (69.61)	0.002
No	58 (38.67)	27 (56.25)	31 (30.39)	
Think food fortification should be compulsory in India				
Yes	70 (46.67)	10 (20.83)	60 (58.82)	0.000
No	17 (11.33)	8 (16.67)	9 (8.82)	
Don't know	63 (42.0)	30 (62.50)	33 (32.35)	
Think to learn more about fortified food				
Yes	137(91.33)	42 (87.5)	95 (93.14)	0.252
No	13 (8.67)	6 (12.5)	7 (6.86)	
Practice questions				
Read food label before buying food				
Yes	98 (65.33)	33 (68.75)	65 (63.73)	0.546
No	52 (34.67)	15 (31.25)	37 (36.27)	
Factors affecting fortified food purchase				
Price and availability	35 (23.33)	12 (25.0)	23 (22.55)	0.304
Taste	28 (18.67)	12 (25.0)	16 (15.69)	
Nutritive value	87 (58.0)	24 (50.0)	63 (61.76)	
Do you cook fortified food in the same way as unfortified food				
Yes	92 (61.33)	29 (60.42)	63 (61.76)	0.874
No	58 (38.67)	19 (39.58)	39 (38.24)	
Do you use any micronutrient powder to fortify your food				
Yes	10 (6.67)	3 (6.25)	7 (6.86)	0.888
No	140(93.33)	45 (93.75)	95 (93.14)	

\* P-value for differences in frequencies between the education groups\*\* $p < 0.001$

## DISCUSSION

Our study assessed the knowledge, attitude, and practices of using fortified food

available in India among the females residing in various areas of Delhi. In this pilot study, we found a low level of

knowledge among females having school level of education about fortified food or nutrient added in food and micronutrient deficiency as compared to females having college-level education. This may be due to educational differences between the two groups. Similar to the findings in FSANZ report, [17] the Majority of the participants considered food fortification important and ready to pay extra to buy fortified food. Most of the college level educated females' read the food label before buying. Most of the participants did not add any micronutrient supplement powder into their food. The overall knowledge of fortified food was low among the study participants, similar to the findings reported in the previous studies. [14,15,18] The level of education and awareness about fortified food among the participants could make a difference in more consumption of fortified food. There are limited studies conducted to assess the knowledge and consumption of fortification and fortified food respectively. Fortified foods would be one of the easy ways to deal with micronutrient deficiency especially in countries like India where the majority of the vegetarian population resides. The findings from the present study have important implications for designing large scale cross-sectional studies in different parts of India. Various studies had shown that daily consumption of fortified food could significantly control and prevent micronutrient deficiencies. [10] Enhancing the public's awareness is a necessary first step to increase the consumption of fortified food.

### **Strength and limitations**

The present study targeted adult women as their micronutrient requirement increases mainly during pregnancy and lactation period. There is very limited research done on this topic, this study marks a stepping stone for others. Furthermore, this study may be useful to prepare a nutritional policy to improve the consumption of fortified food. The study had few limitations. First, the small sample size using the convenience sampling method

was used to select participants due to time limitations in the master's program. Secondly, the knowledge, attitude, and practices of using fortified food were self-reported and therefore are susceptible to information bias. Nevertheless, in-person interviews are one of the most common methods of data collection. Also, due to the unavailability of a standardized questionnaire to collect this data, we pilot tested the questionnaire and modified before it was administered.

### **CONCLUSION**

The present study findings indicate low levels of knowledge about micronutrient deficiencies and the availability of fortified staple foods. Tailored public awareness for micronutrient deficiencies is imperative. This type of study should be conducted on a large population sample along with the fortification of the food campaign.

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