
Methods
And
Materials

CHAPTER 4

METHODS AND MATERIALS

Significant research findings are established on credible methodologies. In this chapter, all methodology and experimental designs that were used are mentioned and discussed in detail to accomplish the objectives of the study.

The present research was designed as a community-based 'cross-sectional' study entitled '***Action Research on Advocating Use of Fortified Foods amongst the parents of the students studying in the Faculty of Family and Community using Diffusion of Innovation Model*'.**

The study was conducted to increase the awareness and consumption of Fortified staples amongst the enrolled subjects by using ***e***-intervention strategies in the Vadodara district of Gujarat. This chapter outlines the experimental design and discusses the methods and materials used to fulfill the objectives of the study under the following heads.

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The experimental design of the study is depicted in figure 4.1.

Experimental Design

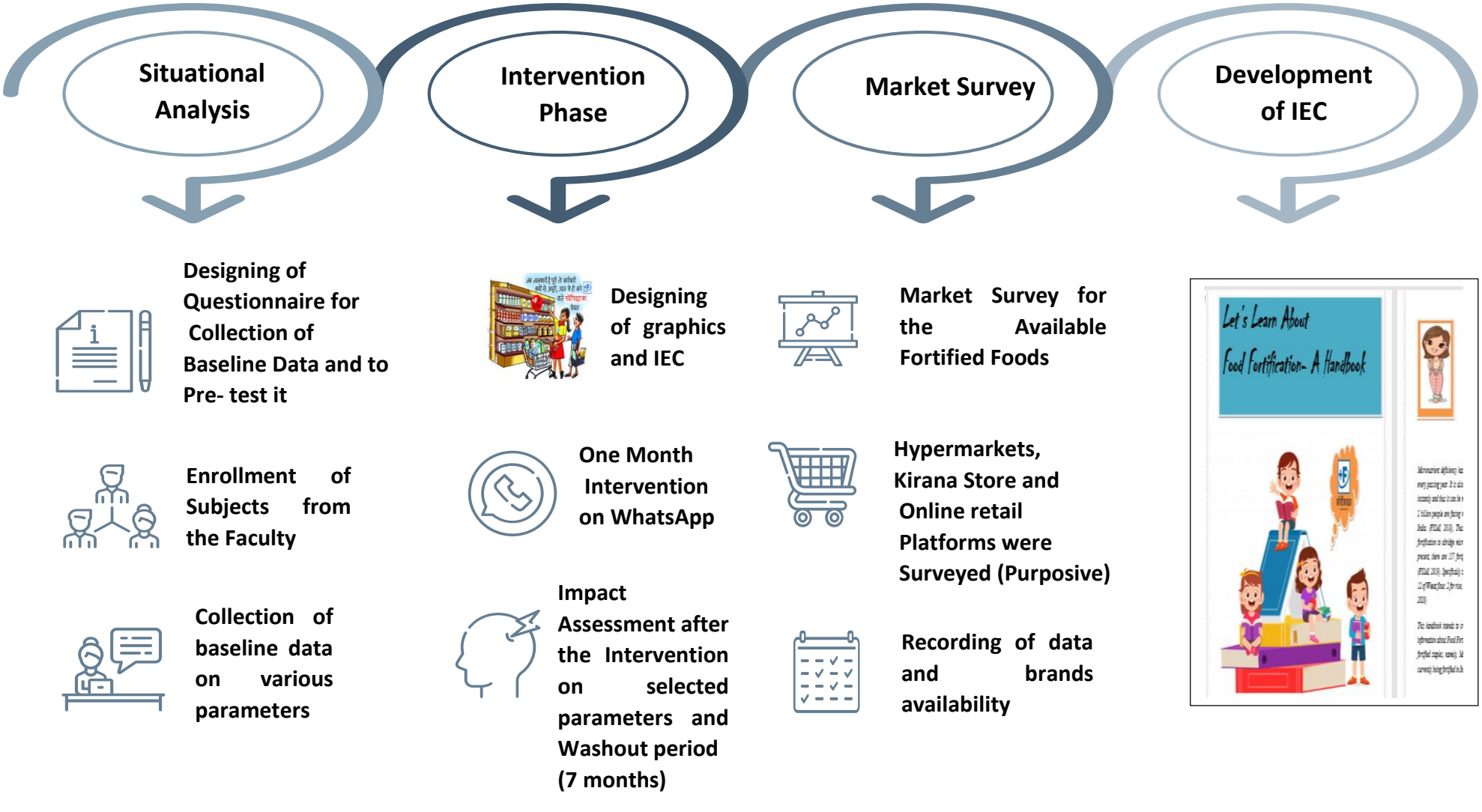

Figure 4.1: Experimental Design

4.1. The Locale of the study:

The study was conducted in the Vadodara city of Gujarat (India). According to the census of 2011, the population of Vadodara is 3 million (GOI, 2011).

Department of Clothing and Textiles, Department of Extension and Communication, Department of Family and Community Resource Management, Department of Food and Nutrition, Department of Human Development and Family Studies in the vicinity of The Faculty of Family and Community Sciences, The MS University of Baroda, Gujarat were purposively selected for carrying out the current research**.**

4.2. The sample size for the enrolled subjects:

Using a cross-sectional study design, parents of the students (N=1600) from the Foods and Nutrition department of the Maharaja Sayajirao University of Baroda were screened to elicit the data. A total of 349 parents participated until the completion of the study (Fig 4.2). Subjects who were responsible for buying groceries for the family, having an active internet connection and WhatsApp, and could comprehend the Hindi language was included in the study.

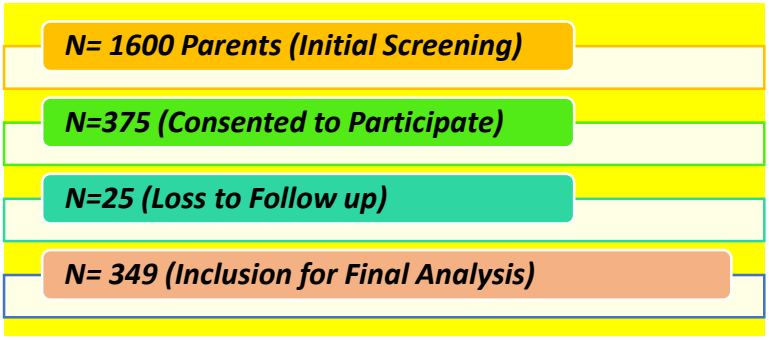

Figure 4.2: Sample Selection for the study

4.3 Phases of the Study

The study was divided into 4 Phases: -

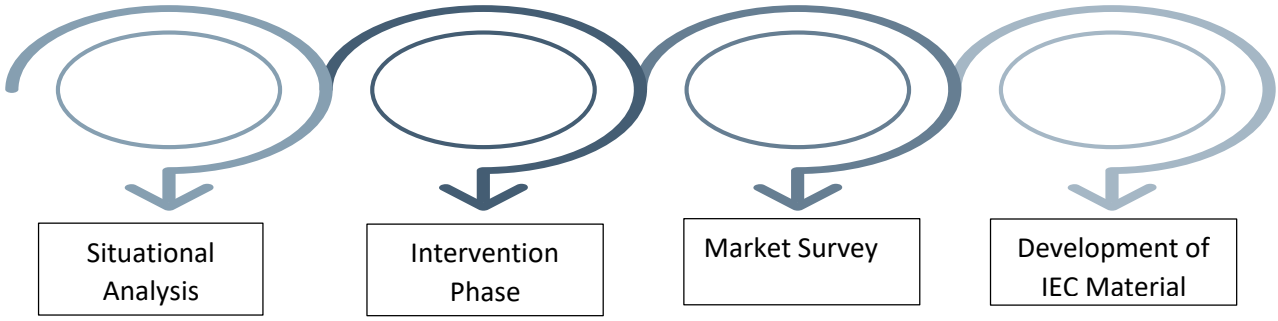

Figure 4.3: Phases of the study

4.3.1. Phase I: Situational Analysis

4.3.1.1 Questionnaire Development

A validated Google questionnaire was developed in Hindi and English to collect the baseline information (A detailed Questionnaire is appended in Annexure I-Pre Assessment Form).

4.3.1.2 Enrolment in the subjects

Permission was taken from the Dean of the Faculty of Family and Community Sciences to collect the contact numbers of students of the different departments (Annexure-II). Parents of students who consented to participate in the study, from the Faculty of Family and Community Sciences, (The Maharaja Sayajirao University of Baroda Department) were enrolled in the study

Note: Faculty of Family and Community Sciences have various streams from the nutrition and non-nutrition department- clothing and textiles, family and community resource management, extension and communication, human development, and family studies.

4.3.1.3 Collection of the baseline information of the subjects on the following heads:-

a. Socio-economic profile (Educational qualification, Family Income, Profession, Family type)
b. **Awareness of Fortified Foods (**existence and availability of Fortified Foods**,** source of knowledge about Fortified Foods**,** knowledge about +F logo on the labels**,**)
c. **Beliefs about Fortified Foods (**purchase, acceptability, willingness to pay for Fortified Foods)
d. Purchase **practices for Fortified Foods (storage, consumption, purchase).**
e. Knowledge regarding micronutrients used as Fortificants (Health benefits, sources, and signs of deficiency)

Steps for collecting baseline Information

1. WhatsApp Group was created for the subjects who agreed to participate in the study
2. Consent was taken by all the enrolled subjects (Parents of the students)
3. Upon Enrolment, a link to Google forms was shared with the subjects

for pre-assessment of their awareness, beliefs, and purchasing practices towards Fortified Foods

4.3.2 Phase –II Intervention Phase

4.3.2.1 Tool Development: Development of graphics in the national language (Hindi), for the e- Intervention on topics stated below: (Appended in Annexure III: Post Assessment Form and Annexure IV: Graphics)

a) What is Fortification
b) Why it is important
c) Current deficiency rates of different vitamin/micronutrients
d) Health benefits of different vitamins/micronutrients
e) Staples which are being Fortified and their Fortificants
f) Where we can buy Fortified food from
g) Information that the sources are vegetarian
h) Claim for Thalassemia Patients
i) Identification of logo only on packed branded foods and not on unpacked/local Items

4.3.2.2 Steps of Intervention

a. One month was allotted to the intervention period, where 5 messages every week were shared by the participants on various topics, (Messages were in the form of Memes, Videos, Audio, and illustrations).
b. Existing open videos by FSSAI and of 'EAT RIGHT MOMENT' focusing on Fortification were shared with the enrolled subjects via WhatsApp
c. A selfie contest along with the Fortified product or the bill of their purchase for Fortified food was organized for the enrolled subjects, they were requested to share their selfies with the +F Fortification logo (Appended in Annexure V- Whatsapp Group Screenshots)
d. Participants were asked to fill in the purchase form for the diffusion of innovation model on Sundays (Appended in Annexure VI).

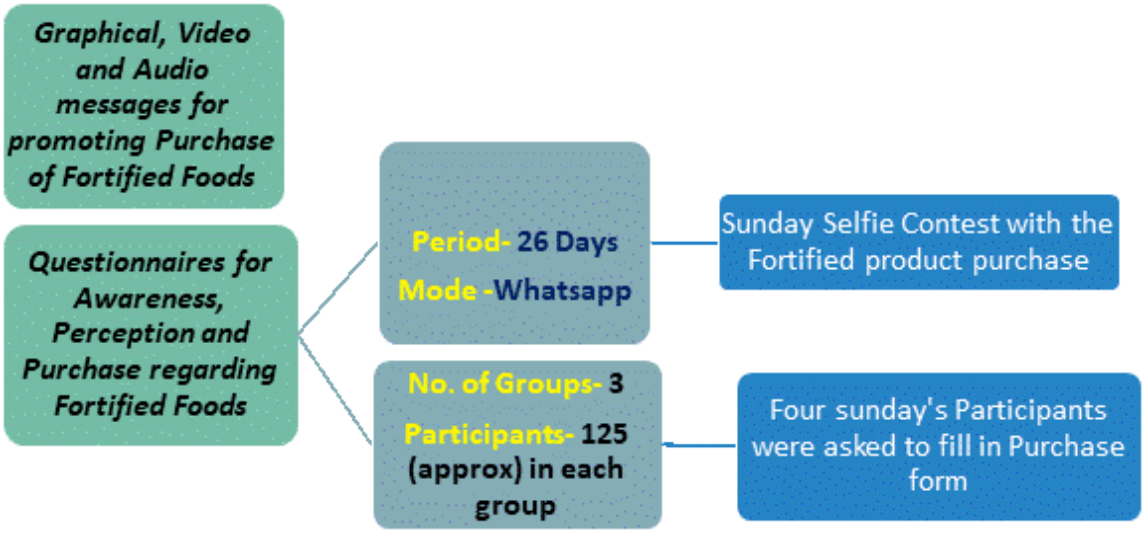

Figure 4.4: The e- Intervention Methodology

4.3.2.3 Messages Shortlisted for the Intervention Period were:

1. **What is Fortification and why do we need it? - Knowledge**

   Fortification is the addition of key vitamins and minerals such as Iron, Iodine, Zinc, and Vitamins A and D to staple foods such as rice, wheat, oil, milk, and salt to improve their nutritional content. These nutrients may or may not have been originally present in the food before processing or may have been lost during processing.

2. **Why do we need it? - Attitude**

   Access to safe and nutritious food is a must and sometimes due to lack of consumption of a balanced diet, lack of variety in the diet, or unavailability of food does not get adequate micronutrients. Often, there is a considerable loss of nutrients during the processing of food as well. One of the strategies to address this problem is the Fortification of food.

3. Health and prevalence - Knowledge

India has a very high burden of micronutrient deficiencies caused by Vitamin A, Iodine, Iron, and Folic Acid leading to Night Blindness, Goitre, Anaemia, and various birth defects. According to the National Family Health Survey (NFHS-4)

58.4 percent of children (6-59 months) are anemic

53.1 percent of women in the reproductive age group are anemic

35.7 percent of children under 5 are underweight

4. Safety of Consuming Fortified Foods- Attitude

Consumption of Fortified Foods is a safe method of improving nutrition among people. The addition of micronutrients to food does not pose a health risk to people. The quantity added is small and well under the Recommended Daily Allowances (RDA) and is well regulated as per prescribed standards for safe consumption. It does not alter the characteristics of the food like the taste, aroma, or texture of the food.

5. Knowledge

Staples that are being Fortified under FSSAI 2018 Regulation and their Fortificants

Milk- Vitamin A and D

Salt: Double Fortified with Iron and Iodine

Wheat- Iron, Folic Acid, and Vitamin B12

Rice- Iron, Folic Acid, and Vitamin B 12

Oil- Vitamin A and Vitamin D

Table 4.1: Benefits of various Fortificants (FSSAI, 2018a)

Vitamin A	Helps against Night blindness
Vitamin D	Supports strong bones
Vitamin B12	Imp for maintaining normal functioning of the nervous system and blood formation
Folate and folic acid	Imp for fetal development and blood formation
Iron	Fights anemia
Iodine	Req for normal growth thyroid and brain function

Zinc (optional)	Supports a healthy immune system
Thiamine (optional)	Req for normal nerve and heart function
Riboflavin (optional)	Necessary to release energy from food
Pyridoxine (optional)	Necessary to release energy from food

6. **Identification of Fortified Foods through +F logo and where it can be found on the label – Practice**

   +F logo on the front label in blue color and people need not worry because the source is purely Vegetarians are thus safe for every person to consume +F foods

7. **Attitude** Fortified staples should be consumed by every person irrespective of their age group, Gender, Religion, or Caste. (Males and Females, old, young, Infants and adolescents).

8. **Knowledge** Fortified staples are only the branded ones, loose wheat grains, rice, etc. are not being Fortified yet, and thus it is important to shift to branded ones to easily identify Fortified Foods with the +F logo. One can shop these from any *K*irana store, supermarket, or online retail shop.

9. **Knowledge** – Consumption of all Fortified staples together regularly will not harm your body as the dosages added to the staples are adjusted to provide only 30-50 percent of an individual's daily nutrient requirement so it is advisable to start purchasing and consuming Fortified Foods.

10. **Attitude -**Food Fortification is a "complementary strategy", and "not a replacement of balanced, diversified diets" to address malnutrition. Dietary diversification is indeed the best choice but with the current eating habits it's not possible or either difficult to get all our micronutrient requirements, thus consumption of Fortified Foods is being promoted.

11. **Practice -**The incremental cost of Food Fortification is minimal. by incurring these minimal costs, the disease burden of widely prevalent problems like anemia can be reduced. Thus anyone can easily afford it without disturbing their monthly budget.

12. **Video Message 1:** Fortified Rice and Wheat FSSAI video on 'How Fortified Foods are helpful during pregnancy.

13. **Video Message 2**: Fortified Oil and Milk FSSAI Video on 'How Fortified food helps in making one feel energetic and improves bone health

14. **Video Message 3**: FSSAI Message featuring Sakshi Tanwar

15. **Video Message 4:** FSSAI Message Featuring Virat Kohli

16. **Video Message 5**: FSSAI 'EAT RIGHT QUICK TIPS' video on Salt Iodization

17. **Video Message 6:** FSSAI 'Eat Right Quick Tips' Video on Fortified Wheat Flour and Rice

18. **Video Message 7**: Shreemati Vlogger on Fortified food and Healthy Tips, also on awareness on Fortification guidelines and website for the general population to refer to for more information. Awareness about the vegetarian source being used and not different in taste, smell, etc.

19. **Video Message 8**: on Documentary of Fortification of Food from FFRC Website (Annexure VII)

4.3.2.4 Impact Evaluation of enrolled subjects on Fortified Foods and its Components

A pre-tested Google questionnaire was used to mark the impact of ***e-*** intervention sessions on their purchase practices for Fortified Foods. The assessment was done thrice – at pre intervention stage, during the intervention, and after the e- intervention.

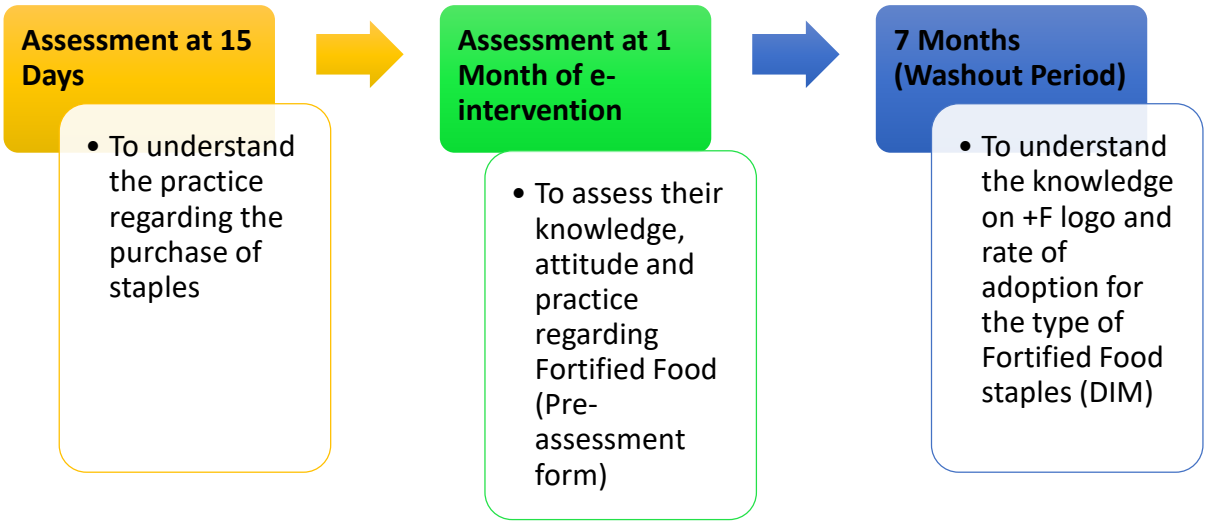

Figure 4.5: Stages of Assessment after e-intervention

4.3.3 Phase- III Market Survey

A market survey was added to supplement the research work as per the request by respondents who were willing to know where Fortified Foods are available. Markets were selected purposively, two from each zone of Vadodara.

a. Kirana stores were visited to track the availability of Fortified staples in the market (Rice, wheat flour, oil, double Fortified salt, and milk). Two Kirana Stores were selected purposively from the four zones of Vadodara North, East, West, and South

b. Online Grocery stores like Amazon, Big basket, Jio mart, and Grofers were explored for the availability of Fortified Foods for the 5 staples (Rice, wheat flour, oil, double Fortified salt, and milk).

c. Hypermarkets like Big Bazaar, Spencer's, and D-Mart were visited to track the availability of Fortified staples in the market (Rice, wheat flour, oil, double Fortified salt, and milk)

Refer to Figure 4.4 for the detailed methodology for the market survey

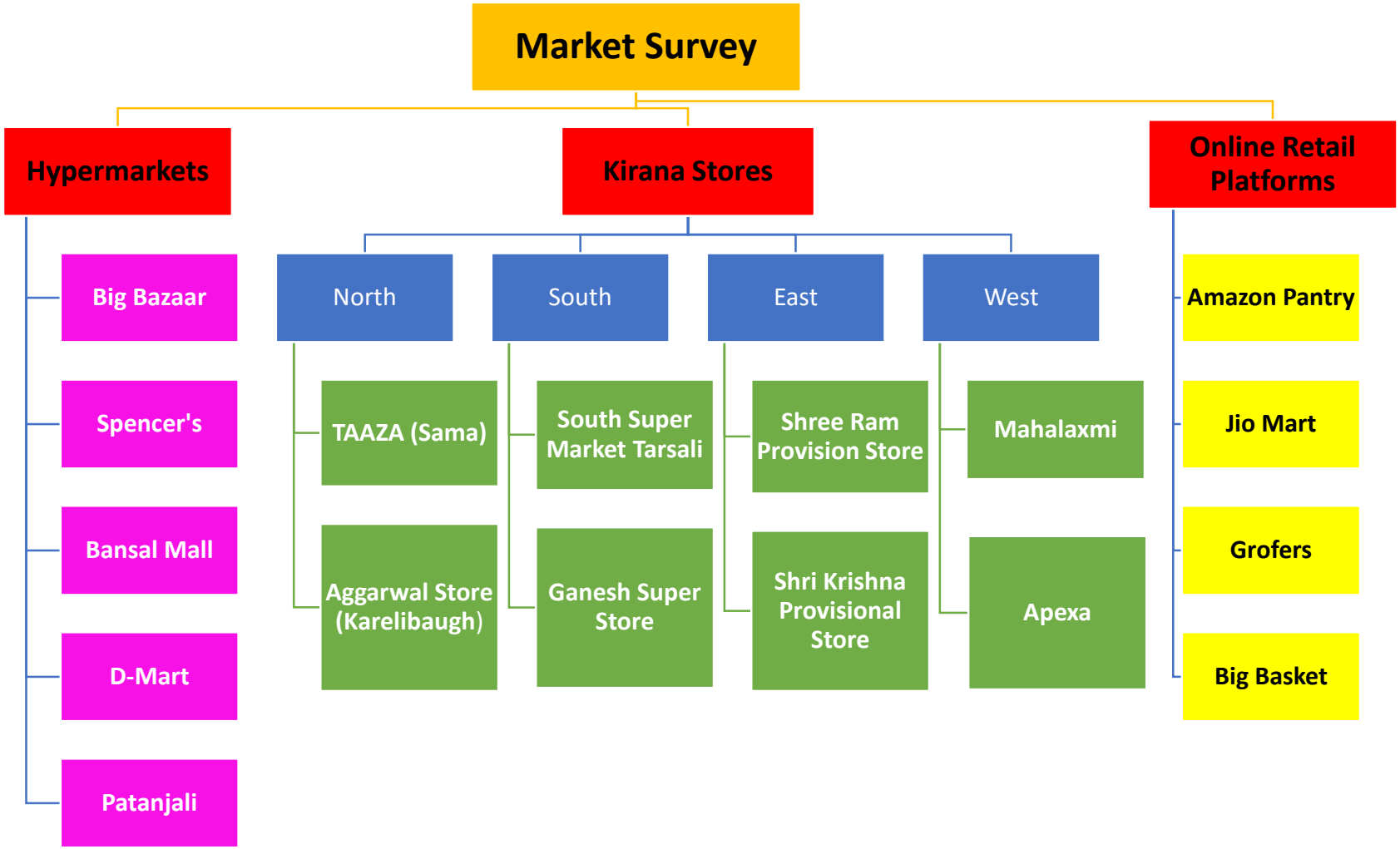

Figure 4.6 Methodology for identification of Fortified food staples in selected markets of Vadodara

4.3.4 Phase IV- Development of IEC Material

Food Fortification Booklet was developed for sensitizing the general population at large for the following components"-

A. Benefits, signs of deficiency, and food sources for various micronutrients being used as Fortificants
B. Need for Fortified Foods and their benefits
C. Identification of Fortified Foods through its logo
D. List of stores and brands where Fortified staples are available

4.4 Inclusion and Exclusion Criteria

➢ **Inclusion Criteria**

- Parents of the students from the Faculty of Family and Community Sciences from a various socioeconomic backgrounds
- Subjects who gave consent to participate in the study
- Subject buying groceries for their family
- Subjects having access to Smartphones and active internet connection

➢ **Exclusion Criteria**

- Subjects who did not have WhatsApp accounts
- Subjects were not residing in Vadodara

4.5 Expected Outcomes

➢ **Expected Primary Outcomes**

- Improved Purchase Practice for Fortified Foods
- Awareness of FORTIFIED SAMPOORNA POSHAN SWASTH JEEVAN logo amongst the subjects

➢ **Expected Secondary Outcome**

- Positive perception towards Fortified Foods
- Improved knowledge of various micronutrients

4.6 Statistical Analysis

Categorical variables were presented as proportions while continuous variables were either presented as mean with standard deviation (SD) or median with range. Categorical variables were compared by Fisher's exact test or Pearson's Chi-square test. The McNemar test was used to determine if there were differences in a dichotomous dependent variable between two related groups. All tests were 2-tailed and a p-value of less than 0.05 was considered significant. Data were analyzed using SPSS software version 25 (Armonk IBM Corp). The Statistical analysis was outsourced by a professional statistician.

4.7 Ethical approval for the study: -

The study was approved by the Institutional review board of the Department of Foods and Nutrition, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda. The ethical number was allotted on 6th November 2020. The ethical approval of the number is IECHR/FCSC/ 2020/62

4.8 Tools and Parameters used in the study:

4.8.1 Diffusion of Innovation Model Adopted in the Study

The diffusion of innovation theory seeks to explain how, why, and at what rate new ideas and technology spread through cultures 'as defined by sociologist Everett Rogers in 1962. The newness of Innovation depends on: -

1. Knowledge
2. Persuasion
3. Decision to adopt

The four main elements of the diffusion model are: -

1. **The innovation –** What an Innovative idea is about
2. **Communication channels –** How the message is being spread amongst the population
3. **Time –** Certain amount of time is needed to spread the idea amongst the masses.
4. **Social system –** According to Rogers, a social system is "a set of interrelated units that are engaged in joint problem solving to accomplish a common goal."

In this model roger has categorized the adopters based on their time of adoption: -

1. **Innovators:** Those who are interested in trying new ideas or technology. Thus in our study, we have defined innovators as those who have adopted Fortification staples within the 1st week of intervention.
2. **Early adopters:** These are those who can be the opinion leaders as they measure the advantages and disadvantages of the innovation and decide whether they want to adopt the innovation or not, further these are the people who persuade others to adopt that product or technology that is being promoted. Thus in our study, they have been categorized as those who adopt Fortification within 2nd week of intervention
3. **Early majority:** They are categorized as those who purchase in the 3rd or 4th week of intervention
4. **Late majority:** They are skeptical to adopt the new idea; they are categorized as those who purchase in the 5th week of intervention
5. **Laggards:** Those who are more skeptical and have less knowledge regarding innovation, are categorized as those who do not adopt at all or were in doubt.

Five stages of the Innovation Model

1. Knowledge
2. Persuasion
3. Decision
4. Implementation
5. Confirmation/Continuation

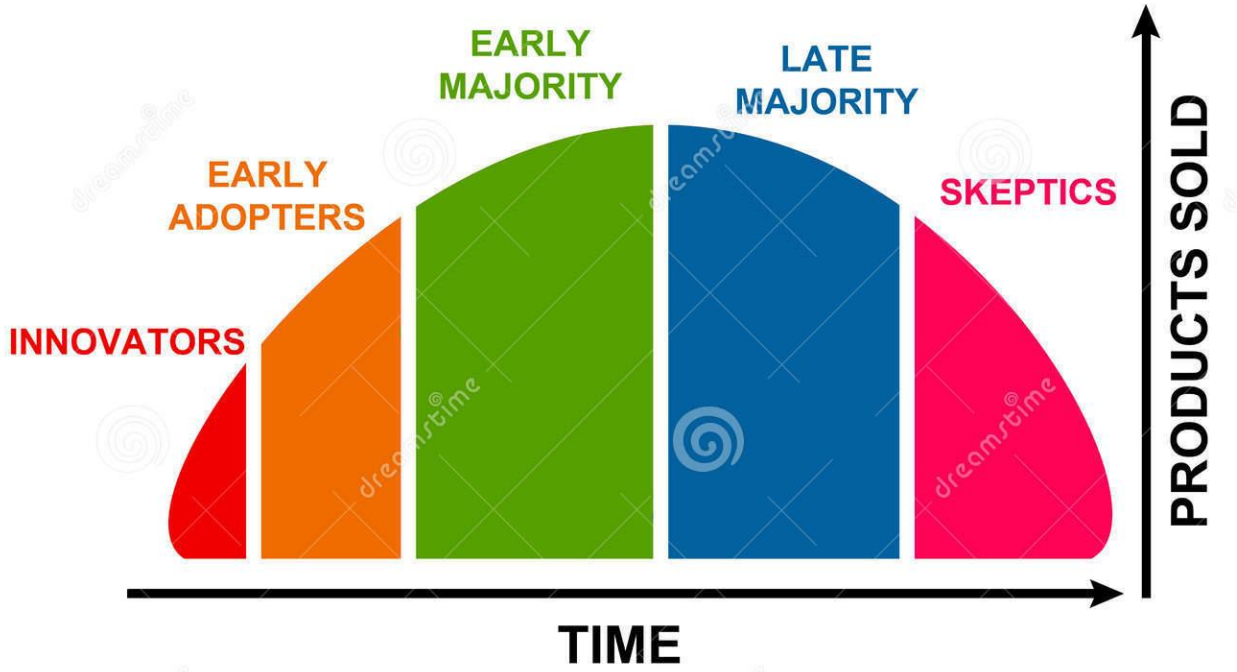

Fig 4.7: Adopters categorization in DIM

4.8.2 Kuppuswamy Socio-Economic Scale: The most important determinant of health status is the Socio-Economic Status of the Individual. The Kuppuswamy scale was used in the study for categorizing the socioeconomic status of the families. Kuppuswamy takes into consideration Education, Family Income, and Occupation of the head of the family.

Table 4.2 Socioeconomic status scale-Kuppuswamy

Education of head of family			Score
Professional degree			7
Graduate or postgraduate			6
Intermediate or post high school diploma			5
High school certificate			4
Middle school certificate			3
Primary school certificate			2
Illiterate			1
Occupation of head of family			
Professional (white collar)			10
Semi-professional			6
Clerical, shop-owner/farm			5
Skilled worker			4
Semi-skilled worker			3
Unskilled worker			2
Unemployed			1
Monthly income of family			
In 2001 (Base year)	**In 2017 (January 2017 CPI)**	**In 2019 (February 2019 CPI)**	**Score**
≥15,197	≥41,430	≥52,734	12
7,595-15,196	20,715-41,429	26,355-52,733	10
5,694-7,594	15,536-20,714	19,759-26,354	6
3,793-5,693	10,357-15,535	13,161-19,758	4
2,273-3,792	6,214-10,356	7,887-13,160	3
761-2,272	2,092-6,213	2,641-7,886	2
≤760	≤2,091	≤2,640	1
Socioeconomic class			**Total score**
I	Upper		26-29
II	Upper middle		16-25
III	Lower middle		11-15
IV	Upper lower		5-10
V	Lower		01-04

Table 4.1 Socioeconomic status scale- Kuppuswamy (Chowdhury and Chakraborty, 2017)

Since the **CPI** for February **2019** is 307, the conversion factor for February **2019** was 307/88.428 = 3.47. Multiplying the income **scale** of 2001 by 3.47 updates the **scale** for February **2019** (Chowdhury and Chakraborty, 2017)

4.8.3 Hyper Markets

A **hypermarket** is a retail store that combines a department store and a grocery **supermarket**. Often a very large establishment, **hypermarkets** offer a wide variety of products such as appliances, clothing, and groceries (Kenton, 2020). It is a self-service market with a wide range of products and brands for the customers. Some of the Features of hypermarkets are:-

a. Discount Prices are provided in hypermarkets with profit margins that local competitors might not be able to sustain
b. Wide range of products available in these stores
c. Freebies available which attract more people

4.8.4 **Fortified Staples: '**The Food Safety and Standard's (Fortification of Foods) Regulations, 2018 have been notified in the Gazette of India on 2nd August 2018. The new standards provide a range for the Fortification of staples like wheat flour (atta), maida, rice (with Iron, Folic Acid, and Vitamin B12), double Fortified salt (with Iodine and Iron), vegetable oil, and milk (with Vitamin A and Vitamin D); the dosage of the micronutrients has been adjusted to provide 30 to 50 percent of the daily requirements. In Wheat Flour and Rice Fortification, bioavailable sources of Iron have been added. Further, Vanaspati Fortification has been excluded'. Food Safety and Standards have used the term 'Staples' in their Gazette of India and so the research also categorizes Wheat Flour, Rice, Salt, Milk, and Oil as staples (MoHFW and FSSAI, 2018).

4.8.5 **Traditional Grocery Stores (Kirana**): A small, usually family-owned shop selling groceries and other sundries. These stores remain relevant and thrive based on their value propositions of (1) local access and convenience, (2) having locally relevant goods, (3) the store owner's amazing pulse on the needs of the local consumers, (4) building a personal relationship with customers, (5) providing a relationship-based credit facility to known and regular customers, (6) free home delivery by the store staff and, (7) serve as a local community building venue (*Kirana Store Business*, n.d.).

4.8.6 ***e*-Health Communication:** The crafting and delivery of messages and strategies, based on communication consumer research, to promote the health of individuals and communities through the Internet and related technologies (Eysenbach, 2001).