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Educational intervention on the misperception and usage of double fortified salt (DFS) among women dwelling in rural areas of Puducherry, utilizing validated educational materials: A qualitative study

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Abstract:

Background: Iodine deficiency disorder (IDD) and nutritional anaemia continue to be the most significant public health issues in low- and middle-income nations, including India. The purpose of this study was to investigate qualitatively the reasons and causes for low double-fortified salt (DFS) consumption. Thus, we investigated the knowledge gap about DFS utilisation by women in rural Puducherry and to evaluate the efficacy of the educational intervention. **Methods:** Over the course of six months, a community-based qualitative study was undertaken with 50 rural women. After gaining informed permission, five Focus Group Discussions (FGD) were performed, followed by the production of health education materials (a flipbook) and intervention. For transcripts, a manual thematic content analysis was performed. The readability and comprehensibility of the instructional content were evaluated to ensure its effectiveness. **Result:** The participants' mean age was 25.30 ± 4.25 years. Misconceptions regarding DFS include that "chemicals were put in the salt" and "it harms people's health," among others. The education material score indicates that it was somewhat to relatively simple to comprehend and implement. About 98% of respondents indicated that their understanding of DFS has expanded.

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Conclusion: Existing knowledge regarding DFS use was limited, and this study demonstrated the positive influence of education on its usability. To sustain DFS utilisation, a need-based, culturally contextualised nutritional intervention on the significance and advantages of DFS is necessary. Additionally, community knowledge gained through the active engagement of grassroots workers and behaviour change communication may affect the favourable attitude of households regarding DFS consumption.

Keywords: Double fortified salt; Iodine deficiency disorder; Nutritional anemia; Health education; Knowledge gap

Highlights

- **What is already known on this topic**: *However, there are several misconceptions about the usage of double-fortified salt (DFS) in rural regions, despite the fact that it has been recognised as a vehicle for iodine and iron supplements to combat iron deficiency anaemia and thyroid issues.*

- **What this study adds** – *In this study, a health education intervention was conducted using created and validated materials. The goal of this study was to get an understanding of how an intervention might influence a family's decision to use DFS.*

- **How this study might affect research, practice, or policy** *The dissemination of information is crucial, especially in rural regions. The outcomes of this study give individuals who work in public health a greater understanding of how health education through reliable sources may improve the knowledge, attitudes, and behaviours of rural communities.*

Introduction

- Each year, more than nine million pregnant women and eight million children suffer from micronutrient diseases such as iodine deficiency disorder (IDD) and nutritional anaemia, each year.[1] This will have a negative impact on job productivity and pregnancy, which compromises thyroid metabolism, cognitive function, child and foetal development, and maternal health. [2–5] The World Health Organization (WHO) has advised cost-effective approaches, such as the use of double-fortified salt (DFS) in IDD and an anaemia prevention programme, to fight this issue. [6,7] To be successful, however, these initiatives must reach the entire community. Awareness of proper salt usage and storage, as well as monthly nutrition surveys to check this, are crucial to the program's success. [7]

The National Family and Health Survey (NFHS-5) reveals that the prevalence of anaemia among children, adolescents, and women of reproductive age in rural India varies from 52.2% to 67.1%. [8] Similarly, it has been determined that no Indian state is IDD-free, since more than 200 million people are believed to be at risk and 71 million people are affected by goitre and other

IDDs. [9] DFS with iodine and iron is a new way for combating iodine and iron shortage illnesses by supplying a tiny but essential quantity of nutrients through food. [2,6] Its formulations are intended to deliver 100% of the daily iodine requirement and 30%–60% of the daily iron requirement. [10] Using salt as a medium for iodization was advantageous due to its frequent and consistent daily use on a worldwide scale. The anticipated economic benefit-to-cost ratio for DFS in India is 4.2:1, suggesting that it will be an inexpensive and acceptable food product for enhancing the nutritional status of the people. [11,12] Although 93% of rural families use fortified salt, only 70% actually eat it, and the cause for the remaining homes' non-use is unknown. [8]

Typically, the Department of Community Medicine at a private medical college in Puducherry analyses food samples as part of its ordinary academic activities. Under this activity, household salt from the field practice area was collected and analysed for the presence of iodine and iron using a WHO testing kit. Based on our observations, almost sixty percent of the sampled salt lacked iodine, and prior studies done in that region revealed a significant prevalence of anaemia. In rural and hard-to-reach regions, the misperception regarding the use of DFS remains, and the gap in the utilisation of iodized salt necessitates a well-established and personalised intervention to assure its consumption. In order to solve this dual issue, the following objectives were established for the present study. To explore the knowledge gap in the usage of double-fortified salt (DFS) in women residing in rural region of Puducherry. To devise the need-based health education material on DFS to fill the knowledge gap & to assess the effectiveness of the educational intervention on DFS among the study participants

Method

Study setting and participants

This study was undertaken in villages located within the rural field practice region of a medical college of higher education in Puducherry. Women (homemakers), antenatal moms, and postnatal mothers who were willing and loud were the participants.

Study design

This research was a qualitative investigation done in three parts (The course of the investigation is depicted in Figure 1) This study was founded on a content analysis methodological approach. **Study duration:** The duration of the study was six months.

Phase 1: Focus group discussion

FGD [13] was undertaken with women, both antenatal and nursing mothers, to investigate their DFS knowledge and usage behaviors. No participants dropped out of the research once they were

recruited using a method of purposive sampling and approached face-to-face. There were around 50 vocal and willing volunteers. [14]

After obtaining written informed permission, five FGDs with six to twelve individuals per group were performed. Every interview lasted between 35 and 47 minutes. The female lead investigator performed FGDs in their native Tamil language, utilising a semi-structured interview guide with wide, open-ended questions (she has been trained in qualitative research for three years). The sessions were audio-recorded with the participants' prior agreement, and the note-taker jotted down key topics. To guarantee participant validation, at the conclusion of the FGD, a debriefing was conducted, and participants were asked for their feedback. The FGDs were performed until data saturation was reached, at which point no new information was gleaned from the conversations. [15,16] On the same day as each FGD, verbatim English transcripts were transcribed from audio recordings.

It was meticulously proofread, and theme content analysis was performed manually by two qualified qualitative researchers. Disagreements between the two were resolved by consensus. The transcript-derived codes were blended to generate broad groups. Themes were classified throughout the coding process. There was no software used for the analysis.

Phase 2:

Development of health education materials: The information obtained from the FGDs was used to develop health education materials (a flipbook) based on the Program for Appropriate Technology in Health (PATH) Guidelines, as people are more likely to meet their health management goals and achieve positive health outcomes if they are provided with engaging, easy-to-read educational materials. [17] (See figure 2 for the stages used in developing health education materials in accordance with PATH recommendations.) In Stage I, text and images were taken from a pilot document based on the theme analysis. Attention was devoted to readability and understanding. To strengthen the face validity of the draught material, medical social workers in the field and senior faculty members of the department were consulted. Using the Flesch-Kincaid Reading Ease and Grade Formula (FKRE&G), the readability was measured (adapted for the German language by Amstad). The score runs from 0 to 100 and indicates the readability of the written material. It is one of the gold standards for measuring readability. [18,19] (Flesch-Kincaid reading grade calculation: 0.39 (total words/total sentences) plus 11.8 (total syllables/total words) minus 15.59) 28.6 was the readability of the pilot draught (hard to read). In phase two, the draught was validated with similar participants, eliminating the study population and geography, and expert advice was sought once again. In the third step, a final version of the document was created, combining the opinions and ideas of the experts and participants. The final readability rating was evaluated. The final validation of the generated content was evaluated using The Patient Education Materials Assessment Tool, a 26-item scale (PEMAT-P ver. 1.0, Agency for Healthcare Research and Quality, Rockville, Maryland). The

grading scale consists of two domains: understandability (the ability to comprehend and include clear and intelligible material) and actionability (if the tool describes activities to be taken and directly refers to patients). (0 - Disagree, 1 - Agree, N/A - Does not apply). This instrument shows high comprehension (score > 70%) and low comprehension (score > 70%) for instructional materials. [20,21] (Table 1). Thus, a realistic method created by Betschart et al. was applied to the construction of textual educational materials through their validation. [22] The final form of health education materials was designed as a 16-page, A3-sized flipbook with a Tamil-language visual description on DFS.

Phase 3: Health Education

To close the knowledge gap, comprehensive health education and sensitization were implemented as part of social mobilisation on several occasions, such as health observance days, Village Health Nutrition Day (VHND) days, and IDD prevention days. The social process model for health care programmes [23] was utilised to maintain the acquired knowledge from the educational intervention. Throughout this stage, volunteers assisted with community mobilisation. At the conclusion of the study, FGD was used to evaluate the efficacy of the educational intervention. The content of [24] was analysed, and comparable descriptive codes were grouped into a single topic. (Table 2)

Ethical issues: For the conduct of the study, administrative authorisation was sought. All participants provided their written informed permission. Respect for the individual, privacy, and privacy were upheld throughout the duration of the study.

Reporting Guidelines:
The “Consolidated Criteria for Reporting Qualitative Research (COREQ)” checklist was used for reporting the findings of the study.[25]

Result

· In table 3, sociodemographic information on the research participants is provided. The participants had a mean age of 25.30± 4.25 (SD) years and a mean education level of 12.52± 3.50 years (SD). Everyone in the group was from a rural background.

Perceptions on DFS

Due to the fact that few individuals were aware of the correct definitions and applications of DFS, several misunderstandings continue to exist to this day. A couple of them commented, *"It is bad to ingest salt when chemicals are added," "It will hinder my baby's development, and my child may develop mental disorders,"* and so on (Table 4). Few participants are aware of the significance of the DFS and have indicated that "it will improve my baby's growth and avoid brain damage and other mental disorders," *"it will prevent thyroid problems," etc. One*

participant in the 30s age group stated, "I have hypertension; my doctor advised me to take fewer than 5 grammes of sodium per day and to avoid salty and processed meals." In addition, a nurse mother in her twenties stated, *"The iodine in the salt will increase my child's IQ; therefore, I use DFS salt in my diet."* In addition, I am aware that it contains iron, which helps treat anemia; therefore, I always offer it to my neighbours and patients and provide them with health education. The broad findings from the FGD on their misperceptions were given first, followed by the theme-specific results. Observations were also made on the varying responses and data density of participants between groups. The statements that arose from the target audience's habits and knowledge were grouped into themes and displayed in Table 4. Italicized remarks are direct quotes from participants.

Readability assessment

The FKRE&G formula was utilised for the readability and comprehension evaluation. The average number of words per phrase in the final version of the educational material was 21.32, and the average number of syllables per word was 1.52. FKRE was computed and yielded a value of 59.9, and the grade level was 10.6, indicating that the content was medium to relatively readily comprehended (easily grasped by > 15 to 16-year-olds) and readable, which was the aim for the material produced for the participants.

Comprehensibility assessment

The PEMAT-P scale was utilised to evaluate accessibility. The understandability of flip charts was evaluated between 79.6% and 100%, while their actionability was graded between 75% and 100%. The scores for each module ranged from 95 to 100 percent, with the exception of the health issues module, which scored below 80 percent for both domains. This demonstrated that the flipbook's modules were easily understood. Overall, the newly produced and arranged health education materials were well received by the participants and had a favourable influence on the community level (Table 1). After six months, the effectiveness of the health education was evaluated. Ninety-eight percent of the fifty participants reported that their awareness of iodized salt usage has expanded. Their declarations were included in Table 2.

Discussion

This community-based study in rural Puducherry is connected to the production of need-based health education materials (identifying the knowledge gap) for the most vulnerable women in society, including housewives, ANC moms, and PNC mothers. The rationale for selecting the target audience, their awareness, and their behaviours all play a crucial part in enhancing the health of family members and the community as a whole. The mean age of the participants was 25.30 ± 4.25 (SD), which is comparable to Banumathi et al.'s [26] research. All of the individuals came from a rural background, which is mostly consistent with previous research. [26-29]

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Development of health education material

This research is tied to the creation of need-based, context-specific health education materials to assure a rise in DFS knowledge, attitude, and practice. The use of FRE&GF to evaluate the medical material offered context-specific and valid comprehensibility, which was compatible with the research conducted by Tulbert et al. and Betschart et al. [22, 30]. The readability of educational materials is vital for assessing the usefulness of patient-oriented information resources and enhancing patient understanding. Similarly, the PEMAT method was used to assess the quality of the content, which was consistent with the research used to analyse the diabetes education material. [31] This demonstrates that the offered content in our study was culturally aware and action-oriented within the local context.

Knowledge and Attitude

This study relates to the prevalence of certain DFS-related misconceptions. They claim that chemicals have been added to the salt, causing it to have a different hue, such as yellow, which is detrimental to the health of youngsters. In contrast, people believe that sun-dried sea salt is in its purest form and is brought directly from saltpans without the addition of chemicals, which demonstrates their lack of understanding about iodized salt. Similar to the study done by Roy R et al., only a handful of the participants had good attitudes toward iodized salt and obtained information from ANM, ASHA (health workers), and the media. [29] Even though they have access to a wealth of knowledge, their belief in "adding chemicals" continues stubbornly. To overcome this issue, then, it was necessary to implement a comprehensive education and training programme involving several parties. Our study also examined knowledge on the health implications and application of DFS. Regarding the health issues, the participants' reactions were divided. Few individuals held a favourable opinion about the statements "it protects against thyroid illness" and "for developing youngsters," while the other viewpoints include that the use of chemicals creates health issues. In addition, salt is primarily used for flavouring and palatability, not for its nutritional value. This matched the findings of investigations conducted in Tripura, Pakistan, and Bangladesh. [28,32,33] Improving the usefulness of the DFS requires a severe intervention in the public's knowledge of the DFS.

Practices

The increased prevalence of anaemia and thyroid-related issues in rural locations as compared to their urban counterparts may be attributable to obstacles such as increased usage of sea salt without fortification, improper storage techniques, and a lack of information about DFS. [8] According to the findings of our study, the majority of individuals purchase salt from local vendors at a low price (unpackaged). Similar findings have been discovered in studies conducted knowingly, despite being aware of their harmful consequences. [26,27,29] The Tamil Nadu Salt Corporation has suggested providing beneficiaries with reinforced salt at reasonable costs

through ration stores and consumer marketplaces. [34] Despite the fact that fortified salts were accessible at ration stores, the change in hue (yellow) discouraged consumers from purchasing the salt. Due to exposure to heat and the presence of antioxidants in the packaging film, potassium iodate is converted to elemental iodine, causing the colour shift. [35] This may be prevented by using dark storage facilities and maintaining the package in good shape. Yet, successful fortification remains challenging due to the difficulties of preserving the salt's stability and colour, as well as the iron's bioavailability. The majority of participants in this study stored salt in ceramic (Jadi) or plastic containers and left them open near the gas or sundries, according to the findings of this study. In addition, people have a tendency to apply salt early on in the cooking process. These results mirrored those of research conducted in India. [26,27,29,36] All of these procedures diminish the efficacy of iodine and iron due to heat stability and relative humidity. [35] Educating consumers about fortified ingredients and their properties enables them to properly store DFS, and the habit of adding salt may assist in restoring iodine levels. Similar to the studies undertaken by Roy R et al. and Mohebi et al., participants were unaware of the "smiling sun symbol" or "+F" on the salt packets, with the exception of about nine to twelve people. [29,32]

Capacity building

To overcome the information gap among this vulnerable population (women, ANC, and PNC mothers), education-based capacity development was implemented. Their understanding of proper cooking techniques, salt storage, and the health benefits of fortified salt is crucial to the general health of the community. In order to sustain this activity, a number of collaborative measures were implemented, including health education and counselling on: Healthy food habits, avoidance of foods that cause thyroid problems and anaemia, correct cooking practises on usage of iodized salt and its benefits, and regular screening for anemia, thyroid disorders, and the significance of iron supplements, vitamins, and micronutrients. During health education, nutritional counselling for dietary diversity must also be provided. Consequently, it is vital that long-term goals be monitored in order to raise public knowledge through educational initiatives on the use and advantages of iodized salt. IDD awareness camps should be encouraged.

Strengths and limitations of the study

The true perception (Emic) of the vulnerable population on the topic of interest improved our comprehension of the community. Group interaction enabled participants to agree and disagree, resulting in a more nuanced answer. The FKRE&G and PEMAT-P scales were used to examine the validity of health education materials. The FKRE&G assessment enhanced the validity of the materials. The principal limitation of the study on the goitre survey and ration survey in the community would provide a better understanding of the issue. It is necessary to compare the urban and rural populations.

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Conclusion

Existing knowledge regarding DFS use was limited, and this study demonstrated the positive influence of education on its usability. To sustain DFS, a need-based, culturally contextualised nutritional intervention on the significance and advantages of DFS is necessary. In addition, community knowledge will improve with the active engagement of grassroots workers and communication about behaviour change, which may impact favourable attitudes regarding DFS usage at the home level.

Recommendation

To achieve the IDD control objective and reduce nutritional anaemia related to iron in India, a "community strategy" emphasising the need for collaboration among all stakeholders is required.

Various sensitization and IEC initiatives should be strengthened. Collective action through an intersectoral effort is a necessary component. Regular surveillance and monitoring must be established and conducted to continue this activity. In addition, it has been suggested that monitoring and evaluating the progress of the anaemia prophylaxis programme and the eradication of IDDs should be implemented at the local level.

Abbreviations:

ANC – Antenatal Care mothers; ANM – Auxiliary Nurse Midwives; ASHA – Accredited Social Health Activist; DFS – Double Fortified Salt; FGD – Focus Group Discussion; FKRE&G – Flesch Kincaid Reading Ease and Grade formula; IDD – Iodine Deficiency Disorder; IEC – Information, Education and Communication; NFHS – National Family Health Survey; PATH – Program for Appropriate Technology in Health; PEMAT-P – Patient Education Material Assessment Tool – Printable; VHND- Village Health and Nutrition Day; WHO – World Health Organization.

Declarations:

Ethics approval: The Institutional Ethical Committee (IEC: 55/2018) of Sri Manakula Vinayagar Medical College and Hospital, Puducherry, approved this study's ethical conduct.

Consent to participate: All participants provided their written informed permission. Respect for the individual, privacy, and secrecy were upheld throughout the duration of the study.

Availability of data and material: The data supporting the conclusions of this investigation are accessible from the corresponding author upon request. The data are not available to the public owing to ethical or privacy concerns.

Conflicts of interest/Competing interests: The authors declare that they have no competing interests.

Funding: Not applicable

Author's contribution:

SE offered the study's concepts and design, along with the intellectual content definer. JFMJ participated in the literature search, data gathering, data analysis, and data interpretation pertaining to the knowledge components of the DFIS and the production of educational materials. JFMJ and RM contributed significantly to the preparation, drafting, and evaluation of the work. SR participated to the design of the study as well as the manuscript's editing and revision.

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Table 1: Assessment of comprehensibility of the health education material by PEMAT-P tool among the study participants [N = 50]

Unit No	Module units (Flipbook)	Understandability score (%)	Actionability score (%)
	Fortification – uses and its impact	90.4	84.0
	Salt – sources, types, and availability	100.0	100.0
	Storage and transportation of DFS	100.0	80.1
	Health benefits and uses of DFS	81.2	75.0
	Detection and testing for the presence of nutrient at home	99.3	87.9
	Limitations of DFS	77.6	71.1
	Misconception buster	98.3	99.4
	Other sources of iron and iodine	100.0	100.0
	Summary	96.0	89.7

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Table 2: Thematic content analysis on DFS knowledge before and after an education intervention [N = 50]

S. No	Broader themes	Before intervention n (%)	After intervention n (%)
	Usage iodized salt	28 (56.0)	49 (98.0)
	Fortification with iron and iodine is good	14 (28.0)	47 (94.0)
	Usage of salt at the end of cooking	12 (24.0)	46 (92.0)
	Storage of the salt in closed container	27 (54.0)	46 (92.0)
	Salt to be place away from stove and sunlight	14 (28.0)	45 (90.0)
	Looking for +F in the salt packet	9 (18.0)	41 (82.0)
	Salt prevents the thyroid problems	28 (56.0)	39 (78.0)
	Salt to be consumed <5 g/day	15 (30.0)	37 (74.0)
	Screen for thyroid problems and anaemia at regular interval	26 (52.0)	33 (66.0)

Statements in Italics indicates themes emerged from the FGD

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Table 3: Socio-demographic details of the participants (N = 50)

Variables	**n (%)**
Total number of participants	
Homemakers	21 (42.0)
Ante-natal mothers	18 (36.0)
Post-natal mothers	11 (22.0)
Age (Years)	
21 – 30	22 (44.0)
30 – 40	19 (38.0)
> 40	9 (18.0)
Occupation[$]	
Involves more physical activity	33 (66.0)
Involves less physical activity	17 (34.0)
Education*	
Illiterate	7 (14.0)

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Primary	15 (30.0)
Secondary	19 (38.0)
Graduate	9 (18.0)
Religion	
Hindu	34 (68.0)
Muslim	9 (18.0)
Christian	7 (14.0)

***** **Education:** Primary – Includes Pre-primary (Grades 1-2), Latter Primary (Grades 3-5); Upper Primary (Grades 6-8)

Secondary – Includes Secondary (Grade 9-10); Higher secondary (Grade 11-12)

Graduate – Education more than 13 years

$ **Occupation:** Involves less physical activity – Housework, business, profession, and unemployment
Involves more physical activity – Agriculture, daily wage labour, animal rearing

Table 4: Perceptions about double fortified salt (DFS) evolved form FGD

Category	**Misconception statements/ codes**
About DFS	*'Chemicals were added to the salt and harm to consume'* *'Fortification is just adding chemicals to salt and advertising that it is healthy'*

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Fortification means	*'Chemicals are added to increase the colour and quality of the product'* *'Adding unwanted substance or chemicals in the salt by the corporates so that health of the people gets hampered, and many people will get admit, so the money can collect'*
Source of salt used	*'Sea salt is best for health as it comes directly from the sea and had no contact with chemicals'* *'Salt from salt-flat or pans dried in sunlight that kills all germs'* *'Pink colour salt and sea salt were purer and nutrient'*
Place of purchase	*'Salt, we purchased from the ration shop is no good quality, no taste and even the colour is yellow at sometimes, so we buy sea salts from local vendors which were tastier than table salt and grind them to use it'* *'I buy salt in loose quantity (unpacked) available in nearby or local shops'* *'Government providing us salt in ration shop at cheaper price, so based on our economic status we buy and use from ration shop'*
Need for consumption	*'For taste in food'* *'Without salt, the sensation of taste was lost, and food become unpalatable'*

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Amount of consumption	*'Salt can be added according to taste, if there is reduced salt taste in my food, then I will add the salt again and I won't measure it'* *'I am adding the salt at the beginning of the cooking, and at the end I'll check for the taste then add further'* *'I never measure the salt; the only thing is taste'* *'I used to take salt while eating the food, for additional taste or I go with pickle'*
Storage and placement of DFS	*'I store in ceramicware (Jadi)'* *'First the salt needs to be dried in sunlight again, and then we will keep them in an open vessel, so it won't be dampened'* *'We are storing in the plastic container if available or directly using from the open cover'* *'Kept in an open vessel near the stove'*
Health aspects of DFS	*'It causes kidney problems and heart problems'* *'Adding iodine or whatever leads to health problems especially for the kids and pregnant mothers'* *'Doctors said I am having thyroid problem due to reduced salt consumption, but I am having hypertension asking me not to take sea salt, but to use salt in packets. It looks like it is purely money motive to ask as take salt and impair our health'*
Use of DFS	*'No idea, it's just chemical'* *'No use of this salt'* *'Packet salts are mixed with agenomoto which is very dangerous'*

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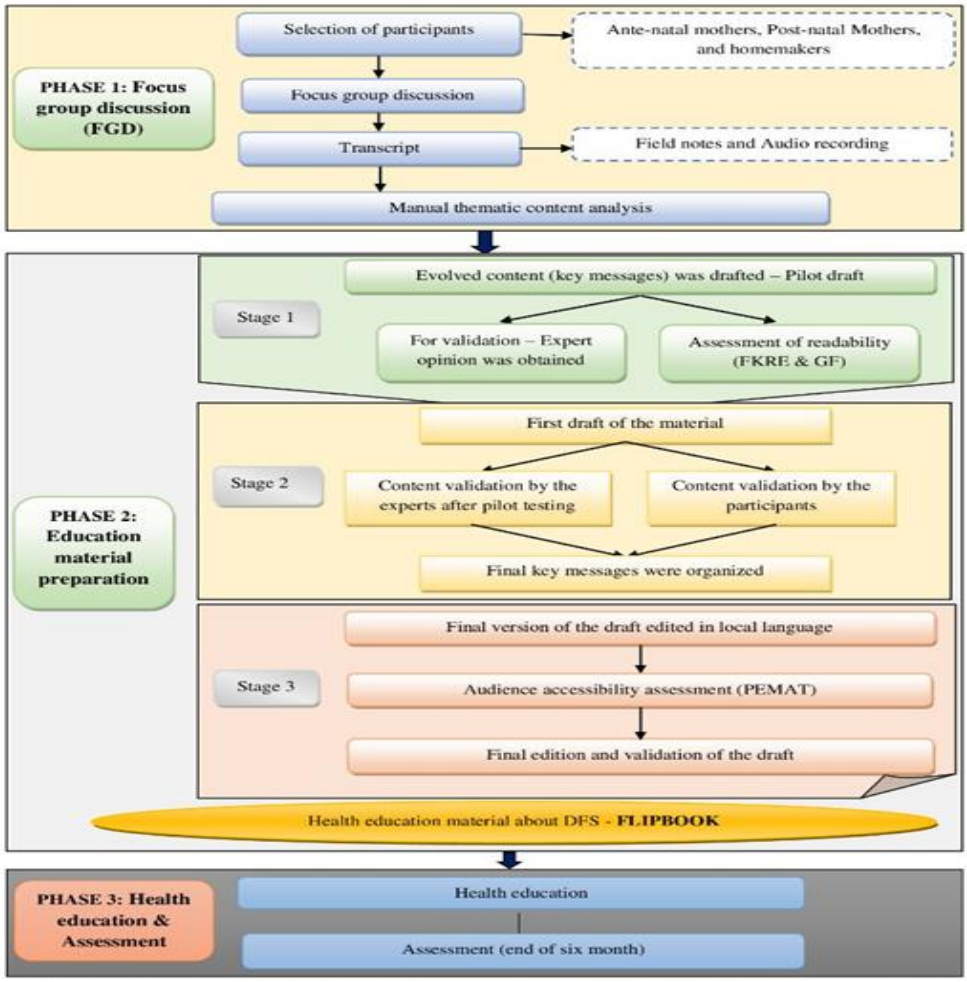
Awareness & recognition of DFS	*'We are not aware of the 'smiling sun sign' or '+F' in the government providing packets'* *'Government using various methods to tell us that this salt is good and healthy, but I think sea salt is much healthier than this chemical added salt'* *'Salt is salt, what do you want to know'*

Statements in Italics indicates direct statements from participants.



FGD – Focus Group Discussion; FKRE&GF – Flesch- Kincaid Reading Ease and Grade formula; PEMAT – Patient Education Materials Assessment Tool; DFS – Double Fortified Salt.

Figure 1: Schematic representation of the flow of study. Phase 1shows the flow of FGD, where selection of participants and the analysis of the transcripts. In Phase 2, development of the education material and its process. It used the validation process involves assessment of readability, face and content validation, and PEMAT-P assessment for the materials developed. At the end of phase 3, intervention was done with health education and assessment at the end of six months.

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ANC – Ante-nata mothers; PNC – Postnatal mothers; FGD – Focus group discussion; DFS – Double fortified salt; PATH – Program for Appropriate Technology in Health Guidelines.

Figure 2: Steps followed in the development of Flipbook for Double fortified salt using PATH guidelines. PATH guidelines, involves understanding the patients and their perspective as they likely to meet their health management goals and achieve positive health outcomes when they receive engaging, and easy-to-read educational materials, which to be developed. It involved five steps with audience defining, audience research, development of education message, development of education material development, and pretesting with revision of material to finalize.