DEVELOPMENT AND VALIDATION OF HEALTH EDUCATIONAL MATERIAL ON ANAEMIA PREVENTION IN PREGNANCY IN EKITI STATE, NIGERIA

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Abstract

Background: Anaemia in pregnancy is a major cause of feto-maternal mortality and morbidity, and pregnant women require necessary information through health education using educative material for its prevention. This study aimed to develop and validate flipchart on anaemia prevention among pregnant women in Ekiti State.

Methods: Multistage sampling technique was used to select 6 Comprehensive Health Centres (CHC) from selected LGAs, and an exploratory sequential mixed method was utilized for the study. The flipchart was developed based on eight (8) expert panel consensus and validated using the Content Validity Index (CVI). Sample size was calculated using Cochrane formular. The Qualitative data were analysed thematically based on themes explored from the focus group discussions. The Quantitative phase was analysed using McNemars test (a good tool for testing effectiveness).

Results: The integrated findings demonstrated that although pregnant women's awareness of anaemia in pregnancy was adequate, their knowledge of causes and prevention was inadequate. The newly developed flipchart on anaemia prevention was unanimously rated as valid with an S-CVI of 0.96 to 1.00 and S-CVI/UA of 0.75 to 1.00 by experts. The developed flipchart for appropriateness was evaluated favourably based on its contents, how well the pictures depicted feto-maternal consequences, and the primary messages it conveyed. There were significant differences in the effectiveness of the two educational methods for both control and intervention groups for pregnant women, using the McNemars test (post-test odd ratio = 7.458, pre-test odd ratio = 1.963, p =. 000 <. 05). McNemar p-value of 0.000 was significant at less than 0.05 significant level.

Conclusion: Conclusively, the developed flipchart is a valuable tool for health education and can be used to support patients' wellness.

Key words: Anaemia, Development, Health Education Material, Pregnancy, Prevention, Validation, Flipchart

INTRODUCTION

Anaemia is characterised by low blood haemoglobin (Hb) concentration levels in the body, which reduces red blood cells' ability to deliver oxygen to tissues.[1] The Centres for Disease Control and Prevention describe anaemia in pregnancy as having a haemoglobin level of less than 11 g/L (or a haemoglobin percentage of less than 33%). Anaemia affects more than 1.62 billion individuals (or 25% of the world's population), 56 million of whom are pregnant. It is one of the most prevalent nutritional deficient disorders identified worldwide.[2,3] Anaemia has been suggested to be the cause of over 115,000 maternal and 591,000 perinatal deaths annually worldwide.[4] The World Health Organisation estimates that the prevalence of anaemia during pregnancy varies between 8.3% and 23% in high-resource countries and between 53.8% and 90.2% in low-resource countries[(1)]. According to Meseret et al.[5], the World Health Organization's most recent estimate indicates that approximately 38% (32 million) of expectant mothers worldwide are anaemic. Of these, 9.2 million, or 46.3%, are in Africa. Recent estimates in low-resourced countries including Nigeria put the prevalence at 60.0% in pregnancy and about 7.0% of the women are said to be severely anaemic.[6]

Oluwafemi et al.[7] stated that there is a significant prevalence of anaemia during pregnancy, which necessitated the implementation of more health interventions, such as health education regarding the causes, risk factors, and prevention of anaemia.

A study conducted by Talabi et al.,[8] in Ekiti State Nigeria revealed that the prevalence of anaemia in pregnancy was 33.4%. The causes of anaemia during pregnancy are complex and evidence suggests that up to 90% of cases of maternal anaemia may result from inadequate dietary iron intake. Others include folate, vitamin B12, parasitic infections such as intestinal parasite infections and malaria.[9] Prevention of anaemia in pregnancy is one of the components of antenatal care which is unsuccessfully implemented by nurse-midwives.[10,11] Health education can help avoid pregnancy-related anaemia.[2]

This emphasizes the necessity of using pictorial materials and visual aids in health education since they improve people's ability to remember and comprehend information.[12] According to Abd-El-Rahman et al.[13], health education materials are instructional tools that provide health-related information and guidance to a certain group or spectator. To effectively transfer information into actions, high-quality health education resources are essential. According to Bhattad and Pacifico,[14] the efficacy of health education materials is contingent upon their integration into a comprehensive patient education strategy. Flipcharts are instructional tools used to present knowledge in an engaging and fascinating way by listing concepts in sequential order. In light of cultural norms, current taboos surrounding our system, and the possibility of preventing anaemia through behaviour modification and knowledge retention, it is imperative that health education materials be developed.
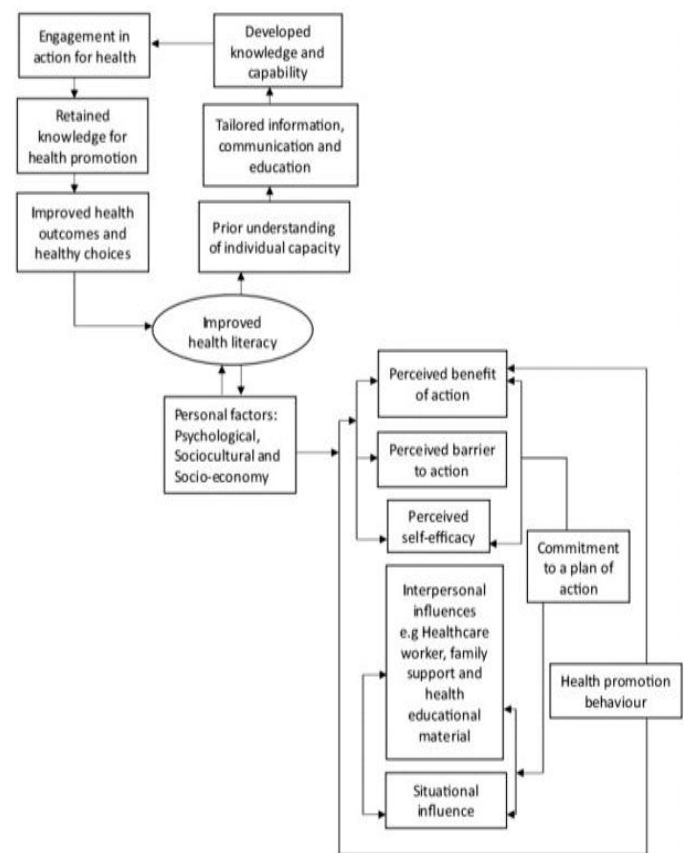
Conceptual Framework

Fig. 1: Representation of social cognitive theory and health promotion model (Abiodun-Ojo et al., 2024).

MATERIALS AND METHODS

Mixed methods design employed is characterized by an initial qualitative phase of data collection and analysis, followed by a phase of quantitative data collection and analysis. The setting encompassed six (6) comprehensive health centres from selected local governments within the three senatorial districts in Ekiti state. Pregnant women in selected comprehensive health care facilities in Ekiti State, Nigeria, made up the study's target group. Multistage sampling technique was used an in three stages;

Stage one: selection of all senatorial districts in Ekiti State.

Stage two: Simple random selection of two local Government Areas each from the senatorial district by balloting.

Stage three: A purposive selection of Comprehensive Health Centres (CHCs) from the designated local government was carried out due to the presence of a large number of health professionals, particularly midwives, a high monthly volume of expectant mothers, and the provision of antenatal care services.

Fig 2: Schematic framework for the development of Health Education Material on anaemia prevention in pregnancy (Abiodun-Ojo et al., 2024).

Experts' validation of flipchart: The experts used in this study were a total number of eight (8) members which included two (2) Nurses/midwives, two (2) obstetrics and gynaecology consultants, two (1) family physicians, one (1) nutritionist, (1) infographer and one (1) Health educator. Notable was the consideration given to choosing specialists with backgrounds in women's health (pregnancy), obstetric and gynaecology consulting, family medicine, and health education. On the other hand, professionals were specifically sought after by identifying women's health experts. This instrument consisted of three rounds with twelve (12) figures and twelve (12) scripts; the first round measured relevance of flipchart using a four-likert scale of not relevant= 1, of little relevance= 2, relevant= 3 and very relevant= 4.[15] The second round comprised of the clarity with a Likert scale of very clear, clear, slightly clear, not clear[15]. The third round which is the last round consisted of two items to be reviewed (ease of understanding and applicability to professional practice). They both also consisted of twelve figures and scripts as well with the use of a 4-likert scale. The flipchart's content included pertinent details about the health requirements of expectant mothers, presented in an easily understandable format with graphics that were well-suited for comprehension. Since the sessions were conducted online and via email, both the length of each session and the time allocated for them were enough.[16]

Sample size: The Cochran (1977) formula was utilized to estimate the sample size of 96 for this study. In order to make sample decisions based on data, the researcher gathered the sample and applied the results.[16] So, using equal proportion for the six selected comprehensive health centres= 96/6=16. Hence, 16 Antenatal women were used for the intervention and control group at 2 randomly selected facilities.

Sampling technique: Sixteen (16) pregnant women were selected by simple random sampling for the pre and post-test. Comparison was made to determine the effectiveness of two educational methods; simple health education by mere words only which is the most common method of health education among Nurses and; Flip chart which is an educational material in delivering health education on anaemia prevention to pregnant women. Effectiveness of the methods were measured based on the scores obtained in pre and post-tests.

One point was awarded for each accurate response; 0 points were awarded for each wrong response. Each of the twenty (20) knowledge questions had a possible score between 0 and 20 points. Using a modified version of Bloom's cut-off point, participants' overall knowledge was categorised as
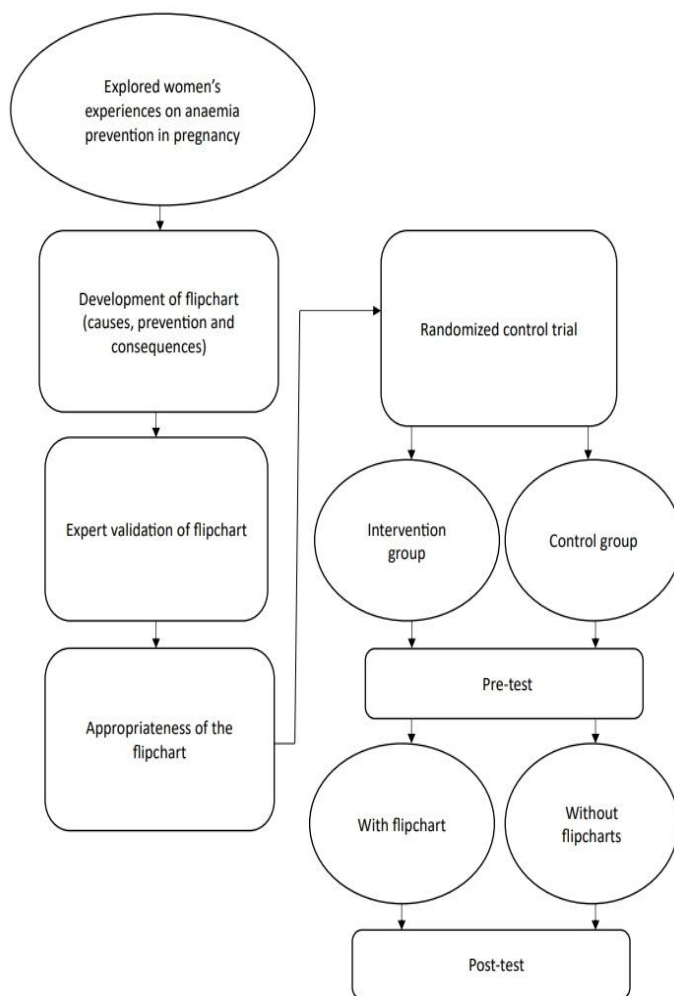
inadequate when it was less than 50% (<10 points), moderate when it was between 50% and 79% (10–15 points), and adequate when it was between 80% and 100% (16–20 points).[17] In addition to being frequently used in matched pair and case-control study analysis, the McNemar test was utilised to analyse pretest/post-test study designs.[18]

Study Instrument: The instrument is a standardized adapted questionnaire which consisted of two sections.[19] The twenty items in Sections A and B served as the instrument for gathering data from the expectant mothers. Twenty (20) general knowledge questions were used covering the idea of anaemia in pregnancy, its causes, symptoms, and effects on the mother's health as well as its prevention**.**

Section A: assessed the sociodemographic information pertaining to the respondents' (pregnant women's) age, religion, level of education, employment, marital status, parity, number of years married, gestational week, ethnic group, and annual income.

Section B: assessed the pregnant women's level of knowledge retention regarding preventing anaemia during pregnancy. Only one of the four (4) alternatives (A–D) on each of the twenty (20) multiple-choice questions that make up the assessment have the right answer. Elsharkawy et al.[17] state that the score spans from 0 to 20, with 0–9 representing low knowledge retention, 10-15 representing moderate knowledge retention, and 16–20 representing high knowledge retention.

Method of data collection: The officer in charge provided her office for use at both control and intervention facilities to avoid heat and undue noise during each class. This was carried out in three stages:
Stage one: the pretest instruments were administered to the pregnant women at both control and intervention groups on their antenatal booking day and they were retrieved same day from the respondents. Both groups had nil health education prior to their pre-test.
Stage two: The intervention group had three sessions of health education with the validated material while the control group had three sessions of health education using the traditional methods. Each session took place once in every month at the two designated facilities with same set of participants. The session did not exceed 45 minutes per health education
Stage three: This stage involved the administration of post test instruments for both groups which was done exactly after three months of monthly intervention classes as their

antenatal clinics were still on monthly basis. The post-test instrument was the same questionnaire used in stage one.

Data analysis: Data collected at pretest and post-test were sorted and coded to ensure that there were no error or missing data. Data was analysed using McNemar's test. Pre and Post-test results were compared to determine the knowledge retention of the pregnant women that may influence positive behavioural change in the prevention of anaemia in pregnancy.

RESULTS
Table I shows the socio-demographic Information of the Pregnant Women who participated in the study.

The experts' age ranged from 39 years to 58 years with a mean age of 46.91 ± 8.85 years and their professional status revealed that they are all at the peak of their chosen careers.

The experiences of pregnant women on anaemia prevention were analysed into themes and subthemes as shown on table 2.

Table 2: Themes and subthemes on the experience of pregnant mothers on anaemia prevention

Themes	Sub-Themes	Report based on general comments more than 60%
Knowledge of Anaemia	Awareness	Adequate
	Causes	Inadequate
	Symptoms	Inadequate
Dietary	Balanced diet	Inadequate
	Financial status	Inadequate
Prevention methods	Non-pharmacological	Inadequate
	Pharmacological	Inadequate
Health Seeking behaviour	Adherence to ANC medication	Inadequate
	Use of injections	Mixed report
	Blood transfusion	Many disagreed
Socio-cultural	Family income	Inadequate
	Culture and religion	Very true
Lived Experiences in pregnancy	Challenging	Yes
	Favourable	Fairly reported

Table 1: Participants Socio-demographic Information (Pregnant Women)

Variable (N = 60)		Frequency	Percentage (%)
Age (in years)	≤19	1	1.7
	20-23	3	5.0
	24-27	33	55.0
	28-31	16	26.7
	≥ 32	7	11.6
	Mean age = 27.3 (SD = 4.89)		
Age at marriage (in years)	18-20	7	11.7
	21-23	16	26.7
	24-26	35	58.3
	≥ 27	2	3.3
Education	No formal education	4	6.7
	Primary	5	8.3
	Secondary	40	66.7
	Tertiary	11	18.3
Number of children	Nil	14	23.3
	1	10	16.7
	2-3	31	51.7
	≥ 4	5	8.3
Ultrasound scan and baby(ies)	Scan not yet done	15	25.0
	1	42	70.0
	2	3	5.0
How far have you gone in this pregnancy?	1-3 months	8	13.3
	4-6 months	31	51.7
	≥7 months	21	35.0
Do you live with your husband?	Yes	46	76.7
	No	14	23.3
Occupation	Full housewife	17	28.3
	Business/Trading	25	41.7
	Civil servant	7	11.7
	Farming	5	8.3
	Private organization	4	6.7
	Apprentice	2	3.3
Have you heard of Anaemia before?	Yes	37	61.6
	No	23	38.3
If answer to 9 is yes, what is your source?	Friend	23	38.3
	Family members	26	43.3
	Clinic	7	11.7
	Media	4	6.7
Monthly income (₦)	≤ 10,000	15	25.0
	10,000 - 15,000	29	48.3
	16,000 - 20,000	5	8.3
	21,000 -50,000	2	3.3
	Depend on husband	9	15

Table 3: Expert panel consensus rating of the newly developed flipchart

Rating cycle	Sub-scale	S-CVI	S-CVI/UA	Significant
Round 1	Degree of Relevance (figure)	1.00	1.00	Very Good
	Degree of Relevance (Script)	0.96	0.92	Very Good
Round 2	Clarity (figure)	0.97	0.83	Very Good
	Clarity (script)	1.00	1.00	Very Good
Round 3	Ease of understanding (figure)	1.00	1.00	Very Good
	Ease of understanding (script)	0.97	0.75	Good
	Applicability to practice (figure)	0.98	0.83	Very Good
	Applicability to practice (script)	1.00	1.00	Very Good

Table 3 analysis results revealed that all the experts consensually rated the newly developed flipchart on anaemia prevention as very good for utilization and promotion of health awareness for all women in their reproductive age.

Table 4 is a 2 x 2 Classification table for McNemar analysis for the effectiveness of two educational methods (With and Without Flipchart) among Pregnant Women.

Table 4: McNemar analysis for the effectiveness of two educational methods

Intervention	*Control	Cross tabulation			Risk Estimate			
		Without flipchart		Total	McNemar Test value	Odds Ratio for post-test	Odds Ratio for Pretest	Decision
		Correct response	Incorrect response					
With flipchart	Correct response	265	55	320				
	Incorrect response	172	148	320	.000**	7.458	1.963	Significant
Total		437	203	640				

The result presented in Table 4 revealed a significant difference in the efficacy of two educational methods (with and without Flipchart) among pregnant women. It was found that there was a difference in the level of knowledge retention on the prevention of anaemia in pregnancy between the group educated with flip charts and those without flipcharts at Comprehensive health care centres in Ekiti State.

The McNemar *P-value* of 0.000 is significant at less than 0.05 significant level. To show where the efficacy of the two educational methods (with and without Flipchart) among pregnant women lies, a t-test statistical tool was used (Table 4).
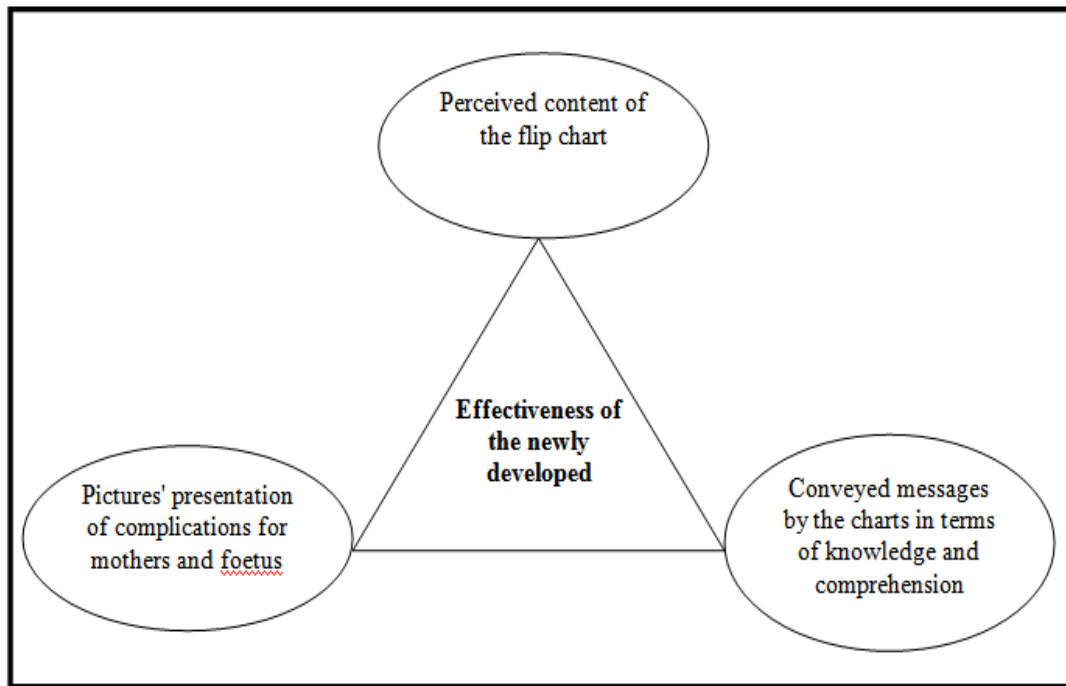
Fig. 3: Schematic diagram of the appropriateness of the developed flip chart (Abiodun-Ojo et al., 2024)
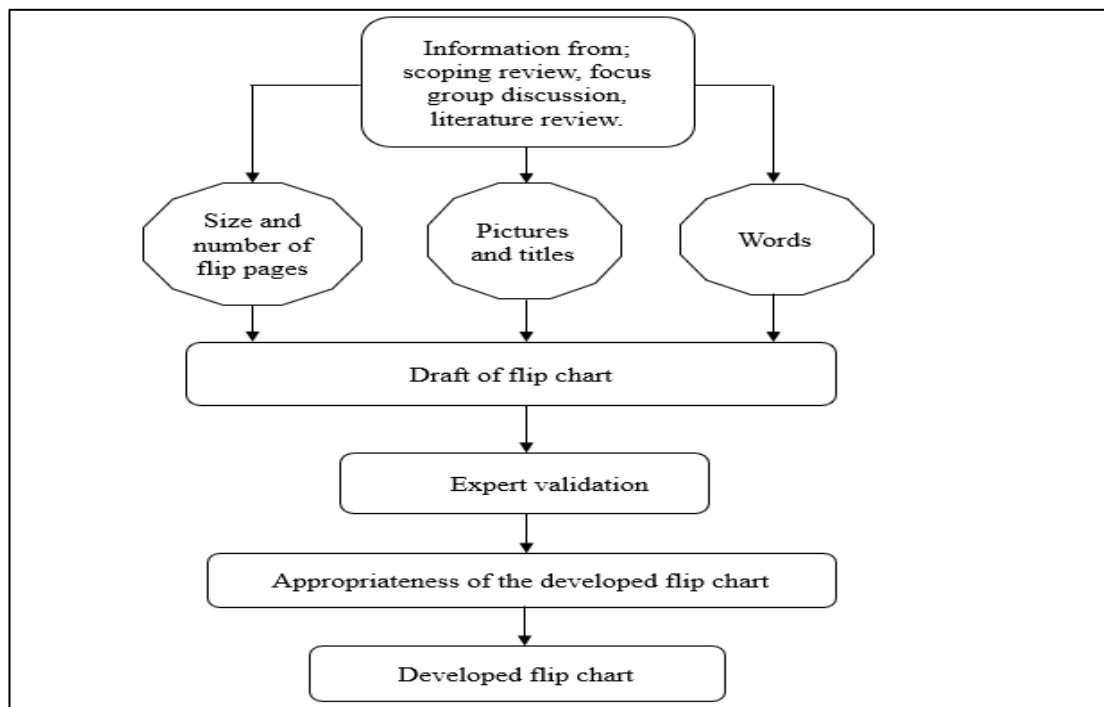
Fig. 4 Flowchart diagram of the development and validation of health education material (Abiodun-Ojo et al., 2024).

DISCUSSION

Socio-demographic characteristics and level of knowledge of pregnant women

According to Ademuyiwa et al.,[20] Socio-demographic characteristics of age, marital status, monthly income, and number of children were significantly associated with practice of anaemia prevention, and of which is in line with the result of this study. About 33 (55%) of the participants aged 24-27years, in which 35 (58.3%) married between the ages of 24 and 26 years. The educational status of the participants revealed that majority (66.7%) had secondary education while 31 (51.7%) already have 2-3 children prior to this study. The table further revealed that 42 (70%) of the pregnant women already gone for ultrasound scan were told they have a baby in their womb and 31 (51.7%) were in their second trimesters. Level of knowledge, perception and cultural practices showed a mixed and poor outcome. From this study, it was found that majority of the participants have good knowledge and perception on anaemia and its prevention in pregnancy. It was found that the participants identified poor feeding or nutritional deficiencies, proper care of oneself during pregnancy, and not taking folic acid during pregnancy, this is tandem with the findings of Appiah et al.[21] that anaemia in pregnancy is a major problem in both developed and developing countries. The commonest source of anaemia is nutritional deficiency of iron with evidence suggesting that up to 90% of maternal anaemia may be due to inadequate consumption of dietary iron; however, there are other causes which include worm infestation, HIV infection, and genetic disorders.

Expert panel consensus rating of the newly developed flipchart on anaemia prevention

The study showed that the newly developed flipchart on anaemia prevention was very good with S-CVI of 0.96 to 1.00 and S-CVI/UA of 0.75 to 1.00. The health education material on anaemia in terms of clarity, ease of understanding, degree of relevance, and applicability to practice were all unanimously rated very well. This implies that the newly developed flipchart on anaemia prevention was found adequate and able to meet the purpose for which it was developed. This finding suggested the necessity for high-quality educational resources in the medical field that can support patients' well-being. This is consistent with the study conducted by Dodt et al.[15], who said that the sub-theme was used to catalogue the figures and scripts. In addition to calculating the global CVI for the flipchart, the CVI for each figure and script were also determined. There was an exceptional degree of concordance among the professionals, as evidenced by the values of 0.92 and 0.97 for the figures (Fi) and scripts, respectively. This conclusion disagreed with a study by de Oliveira et al.[18], in which 20 pregnant women and 22 judges participated in a convenience-selected validation process. With a minimum score of at least 0.80, the item-level Content Validity Index (I-CVI) was deemed to be good in terms of content validation. The judges found that five of the six elements were relevant, and the mean I-CVI was 0.91.

Therefore, not every item was approved. Similar findings were reported by Isa et al.[19] on the validation of a bilingual educational brochure on the safety of prenatal ultrasounds. Following a round of reviews, the experts came to a consensus to validate the brochure with an I-CVI equivalent to 1.00. Only one item out of the 21 in the first round had an I-CVI below 1.00, thus the recommended changes were implemented. All 21 items in the second round received an I-CVI of 1.00, however the experts recommended making the brochure better. Since all 21 items had been validated, the third evaluation round served as the final one.

Appropriateness of the Developed flipchart

The outcome of this revealed the level of appropriateness of the newly developed flip chart in three major areas from the qualitative study. This was reflected in the content areas of each of the flip chart; the pictures' presentation of the complications of mother and foetus; and the main messages conveyed by the flip chart. This implies that the health education flip chart developed and used in this study is an important strategy in preventing anaemia and its success to improve the knowledge of anaemia prevention among the pregnant women greatly depends on the structure and its design - content, pictures presentation, and main messages conveyed. This study on appropriateness supported the findings of "The cater centre on trachoma heath education material"[22], where the flip charts consisted of large drawings that depict a story or message about trachoma control. Flip chart was developed using images that non-literate populations will understand. The large size of these images and their ease in portability allow health workers to conduct health education activities with a large group of people. An effective flip chart design incorporates the cultural context of its audience such as colors, clothing styles and household architecture. After the appropriateness was discussed, the chart was reported as a whole and not per flip chart pages. This finding learnt credence from previous studies that found that health education intervention program with various delivery methods were proven to significantly reduce the prevalence of anaemia in pregnancy such as

group discussion, health talk, poster presentation and educational pamphlet (Sholeye et al.[23]; Oluwafemi et al.[7] and Ademuyiwa et al,[20].

Effectiveness of two educational methods (intervention and control group)

On the efficacy of two educational methods (with and without Flipchart) among pregnant women, it came to light that the group of participants who were taught using flipcharts possessed a different level of knowledge on the prevention of anaemia in pregnancy than the group who did not at primary health care centres in Ekiti State. This corroborated the previous findings by Stephen et al.[24] and Rukmaini et al.[25] that showed that antenatal education programs without health education material as an intervention brought about a mild improvement in preventing anaemia in pregnant women. Munyogwa[26] and Udho et al.[27] concurred that pregnant women are more susceptible to anaemia than non-pregnant women, particularly in low-resourced nations, due to poor environmental cleanliness, malnourishment, hookworm infestation in addition to malaria, and physiological changes that occur during pregnancy. Furthermore, Elsharkawy et al.[28], which assessed the effect of the Health Information Package on expectant mothers' awareness of anaemia during pregnancy, is congruent with this particular study. Pregnant women (n = 196), aged 18–45, who were diagnosed with anaemia during the first trimester of their pregnancy, were randomly assigned to one of two groups: the intervention group (Health Information Package Programme plus routine care, n = 98), or routine care only (n = 98). At baseline and three months later, knowledge and the capacity to choose the right meal were evaluated, and at the conclusion of the three months, compliance was also tested. According to this study, the intervention group's post-education/test mean knowledge scores were considerably higher than those of the control group. According to this study, Balcha et al.[29] used two tools to increase the women's knowledge. The results showed that there are statistically significant differences in total satisfactory knowledge between pre- and post-implementation of health education programmes, as well as in pregnant women's reported practices regarding dietary diversity, eating habits, and meat and vegetable cooking methods.

Conclusion

The findings of this research have also proved the relevance of health education material in enhancing knowledge retention in anaemia prevention among pregnant women. It is therefore very necessary for every woman to be well trained on the use of health education material to sensitize pregnant women on the need for wellness throughout pregnancy and thus, prevent morbidity and mortality. It was discovered that the recently created flipchart on anaemia prevention was sufficient in its definition, causes, prevention and complication aspects. This suggests that to support patients' wellness, healthcare services need to provide high-quality educational resources. To effectively transfer knowledge into actions, high-quality health education resources are essential, and newly created resources underwent validation testing to ensure maximum efficacy.

Conflicts of Interest

There are no conflicts of interest

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