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Prevention of Genetic Reproductive Health Problems among Reproductive Women in Delta State: The Role of Health Education

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Abstract. Genetic reproductive health problems constitute a major public health concern affecting women of reproductive age, particularly in developing regions such as Delta State, Nigeria. These problems, including sickle cell disease, Down syndrome, haemophilia, and rhesus factor incompatibility, contribute significantly to maternal and child morbidity, emotional distress, and economic burden. This study examined the knowledge and prevention of genetic reproductive health problems among reproductive women in Delta State, with specific emphasis on the role of health education. A descriptive research design was adopted for the study. The population comprised 1,411,082 women of reproductive age (15–49 years) in Delta State. A sample size of 1,226 respondents was selected using a multi-stage sampling technique. Data were collected using a self-developed questionnaire titled *Knowledge and Prevention of Genetic Reproductive Health Problems among Reproductive Women in Delta State: The Role of Health Education (KPGRHP)*. The instrument was validated through expert judgement and factor analysis, while reliability was ensured using appropriate statistical procedures. Data were analysed using descriptive and inferential statistics, with hypotheses tested at the 0.05 level of significance. Findings revealed that the level of knowledge of genetic reproductive health problems among reproductive women was generally moderate, with notable gaps in understanding genetic compatibility and inherited conditions. Acceptance of health education as a preventive strategy was high, while the practice and acceptance of premarital genetic screening remained relatively low. The study further established significant relationships between knowledge of genetic factors, acceptance of health education, premarital genetic screening, and the prevention of genetic reproductive health problems. The study concludes that effective health education plays a critical role in enhancing knowledge, shaping positive attitudes, and promoting preventive practices against genetic reproductive health problems. It is therefore recommended that sustained community-based health education programmes, improved access to genetic screening services, and policy-driven premarital genetic counselling initiatives be strengthened to reduce the burden of genetic reproductive health problems among reproductive women in Delta State.

Keywords: Prevention, Genetic, Reproductive Health, Reproduction Women.

1. Introduction

Reproduction is a fundamental characteristic of all living organisms and ensures the continuity of life. In humans, reproduction occurs sexually through the union of male and female gametes during intercourse, leading to fertilisation and the development of a foetus. For reproduction to occur normally, the reproductive systems of both males and females must be structurally and functionally sound. This optimal condition is referred to as reproductive health. Reproductive health involves the proper functioning of reproductive organs, balanced hormonal activity, and the absence of diseases that may hinder fertility or healthy pregnancy outcomes. In females, hormones such as oestrogen, progesterone, and prolactin regulate ovulation, implantation, and lactation, while in males, testosterone and the normal functioning of reproductive organs such as the testes and prostate are essential. Any disruption in these systems may result in reproductive health complications. Common reproductive health problems include fibroids, sexually transmitted infections (STIs), cancers of

reproductive organs, and genetic disorders such as sickle cell disease, rhesus incompatibility, haemophilia, and Down syndrome.

Genetic reproductive health problems have become a major public health concern globally and in Nigeria, particularly in Delta State. These conditions arise from abnormalities or incompatibilities in genes or chromosomes inherited from parents. Many reproductive women in Delta State lack adequate knowledge of genetic screening and fail to undergo compatibility tests before marriage. This has contributed to the rising incidence of hereditary disorders such as sickle cell anaemia, Down syndrome, haemophilia, and rhesus incompatibility. Genetic defects may lead to abnormal protein production or chromosomal abnormalities, resulting in foetal deformities, stillbirths, infant mortality, or long-term disabilities. The consequences of genetic reproductive health problems extend beyond physical health to emotional, social, and economic challenges for affected women and their families. Although many of these conditions can be prevented through proper knowledge and genetic screening before marriage, barriers such as inadequate health education, cultural beliefs, misconceptions, and limited access to reliable information hinder preventive practices among reproductive women. This situation raises critical questions about whether improved knowledge through health education can influence women's attitudes and behaviours toward genetic compatibility testing and prevention of hereditary disorders.

Studies have shown that reproductive women's knowledge of genetic conditions such as Down syndrome and sickle cell disease is often inadequate and characterised by misconceptions. While some women possess basic awareness of these conditions, many lack in-depth understanding of their causes, risk factors, and prevention strategies. Research across different contexts has revealed persistent myths, stereotypes, and misinformation about genetic disorders, which negatively influence reproductive decisions. In Nigeria and other developing countries, awareness of sickle cell disease is relatively high, yet knowledge of genetic counselling, screening, and preventive measures remains limited. Similarly, knowledge of Down syndrome is often superficial, with gaps in understanding of its causes, prevalence, and implications. Despite existing studies, little is known about the level of knowledge and preventive practices of reproductive women in Delta State regarding genetic reproductive health problems, particularly the role of health education in improving such knowledge and behaviours. Therefore, this study seeks to investigate whether health education can enhance reproductive women's knowledge and contribute to the prevention of genetic reproductive health problems in Delta State, Nigeria.

1.1 Research Questions

The following research questions guided the study:

- To what extent do reproductive women in Delta State understand specific genetic factors that may cause marital incompatibility and related reproductive health problems?
- What is the level of knowledge and acceptance of health education as a means of improving the prevention of genetic reproductive health problems?
- What is the level of acceptance of practising genetic health screening before marriage among reproductive women in Delta State?

1.2 Hypotheses

The following null hypotheses were formulated to guide the study:

- There is no significant relationship between knowledge of specific genetic factors and the prevention of genetic reproductive health problems among reproductive women in Delta State.
- There is no significant relationship between knowledge and acceptance of health education and the prevention of genetic reproductive health problems.
- There is no significant relationship between the practice of genetic health screening before marriage and the prevention of genetic reproductive health problems.

2. Research Methodology

This study employed descriptive research design. The population for this study was estimated at one million, four hundred and eleven thousand, and eighty- two (1,411,082) women of reproductive age (15 – 49 years age bracket). The process was described as follows, the population of persons in Delta State derived from the 2006 National Population census figures. 4,112,445 and with a projection of 2.5% annual growth rate up to 2024 was six million, four hundred and fourteen thousand, and seven (6,414,007). The estimated population of women of reproductive age that resulted to (1,411,082) was gotten by using 22% of total population of persons in Delta State (Delta State Health Insurance Scheme, 2019). Therefore, the

proportion of women of child bearing age ranging from 15 – 49 years of age, was 22% of total population of persons (6, 414, 007) in Delta State. Hence, 22% of 6,414, 007 resulted to 1, 411, 082 women of child bearing age. Sample – size for the study was One thousand, two hundred and twenty- six (1,226) respondents, and were drawn through a multi- stage sampling technique, comprised of simple random proportionate sampling technique and respondents' identification.

The Research Instrument used for this study was a self-developed questionnaire. The questionnaire made of Sections and they were as follow: Introductory letter from the researcher about the study. Section A consisted of (6) items elicited information on the demographic characteristics of the respondents such as their age, Local Government Area of residence, marital status, occupational status, educational status and religion. Section B sought information on the variables being studied from the respondents. The questionnaire was designed using the four - point adapted Likert – type Rating Scale which was applied in the construction, and scoring of the optional responses. This is ranging from four (4) for very high extent (3) High Extent, (2) Low Extent and (1) Very Low Extent.

The instrument was given to three experts in Measurement and Evaluation in the Faculty of Education, Delta State University, Abraka, for the purpose of vetting. Some of the items were modified according to their directives, in terms of their face and content validity. The face validity of the instrument was considered adequate by the experts' judgement. Regarding the content validity, care was taken to ensure that questions/ statements capable of providing required information on the variables indicated in the research questions were included in the questionnaire. In addition, content and construct validity of the instrument and factor analysis were used. The principal component analysis was used to estimate the content validity. Using the extraction method, the total cumulative variance was obtained as expressing the content validity estimate of each question.

The instrument was administered to fifty (50) respondents in (Abiokunla 1; Abudu), Orhionwon, Local Government Area (LGA) of Edo State, who were not part of the study area. Data collected were analysed using Cronbach Alpha for estimating the internal consistency of the instrument. This yielded reliability coefficient index of 0.91 for knowledge of genetic reproductive health problems. Thus, there exist good psychometric properties of reliability.

The researcher administered the questionnaire to the respondents with the aid of five (5) Research Assistants who were briefed appropriately on the data collection technique. The copies of the instrument were administered to reproductive women in the sampled households in each selected settlement under the sampled communities in each sampled local government area. In order to reduce the rate of instrument mortality, all copies of questionnaire administered were retrieved immediately. The entire data collection process from all the respondents in the households was carried out within a period of four weeks.

The research questions were answered with mean and Standard Deviation, while Linear Regression was used in analysing the stated hypotheses at 0.05 level of significance. Question items with mean greater than or equal to the criterion mean or bench mark of 2.50 indicates acceptance, agreement of opinion or high extent, while the items with mean less than 2.50 shows rejection, disagreement of opinion. Then question items with mean greater than or equal to the criterion mean 3.00 and above shows very high extent.

Mean and Standard deviation on knowledge of specific genetic health factors that may cause marriage incompatibility on reproductive women and their spouses or suitors.

S/N	Knowledge of Specific Genetic Health Factors	Mean	SD	Decision
	Congenital heart disease in both intended couples is associated with Down Syndrome, this is incompatible condition for them	1.69	0.68	Low
	Hearing as well as Vision problems are associated with Down Syndrome that could affect intended couples children with the condition	3.19	0.74	High
	Haemophilia is an inherited rare blood disorder that could make intended couples incompatible, if present in both of them	2.99	1.05	High
	High infant mortality is related to rhesus D negative pregnancy such as maternal-foetal blood incompatibility	1.82	0.76	Low
	Intended couples with sickle cell status in both are at increase risk of complications; as well as incompatible for marriage	2.95	0.92	High
	Total Grand Mean	2.53	0.83	

The result in table 4.2, indicates that in items 7, and 10 had mean scores range of 1.69 - 1.82 as low extent while items 8, 9 and 11 had mean scores range of 2.95 - 3.19 as a high extent and total grand mean of 2.53 which is above the cutoff point of 2.50. Hence, the result revealed high extent that women in Delta State have high knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their spouses or suitors.

Hypothesis 1: There is no significant relationship of the knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their spouses or suitors and the prevention of genetic health problems among reproductive women in Delta State.

Table 1: Linear regression analysis on the knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their suitors or spouses and the prevention of genetic health problems among reproductive women.

Model	**Sum of Square**	**Df**	**Mean Square**	**F**	**Sig.**
Regression	237.730	1	237.730	74.844	0.000[b]
Residual	3887.823	1224	3.176		
Total	4125.554	1225			
Coefficients					
Unstandardized Coefficients			Standardized Coefficients		
	B	Std. Error	Beta	t	Sig
(Constant)	18.067	0.352		51.317	0.000
Knowledge of Specific Genetic Health Factors	-0.239	0.028	-0.240	-8.651	0.000

$\alpha = 0.05$; R = 0.240; R Square = 0.058

a. Dependent Variable: Prevention of genetic Reproductive Health problems.

b. Predictors: (Constant), Knowledge of specific Genetic Reproductive Health factors

The result in the table 1, shows the F-value of 74.844 and a p-value of 0.000. Testing the null hypothesis at an alpha level of 0.05, the p-value of 0.000 was less than the alpha level of 0.05. Thus, the null hypothesis which states that "there is no significant relationship of the knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their spouses or suitors and that prevention of genetic health problems among reproductive women in Delta State" was rejected.

The unstandardized coefficient (B) for predicting the prevention of genetic health problem among reproductive women from the knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their spouses or suitors was -0.239 and the standardized coefficient (Beta) was -0.240. Therefore, the knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their spouses or suitors was significant at an alpha level of 0.05.

Research Question 1: To what extent would women have in the knowledge and acceptance of health education as a means of bringing about positive change in knowledge of genetic reproductive health problems among reproductive women in Delta State?

Table 2: Mean and Standard deviation on the knowledge and acceptance of health education as a means of bringing about positive change in knowledge of genetic reproductive health problems.
N= 1226

S/N	Knowledge and Acceptance of Health Education	Mean	SD	Decision
	Creates attitudes that are apparently new on intended couples towards knowing their genetic health status before marriage	2.52	1.15	High
	Gives reproductive women advice about different genetic health problems such as sickle cell disease, haemophilia and down syndrome, etc, in order to prevent them	2.54	1.26	High
	It provides specific knowledge to identify, as well to solve genetic reproductive health problems among intended couples	2.71	1.04	High
	Creates awareness among intended couples to be conscious about genetic factors that cause reproductive health problems	2.76	0.95	High
	Providing information about different genetic health problems such as sickle cell disease, haemophilia, down syndrome in order to sustain good health with their collective efforts.	2.71	1.05	High
	Total Grand Mean	2.65	1.09	High

The result in table 2 revealed that reproductive women agreed to items 33-37 with mean scores range of 2.52 – 2.76 and a grand mean of 2.65 which were above the cut off point of 2.50 as a high extent. This indicates that there exists a high extent that women have in the knowledge and acceptance of health education as a means of bringing about positive changes in knowledge of genetic reproductive health problems among reproductive women in Delta State.

Research Question 2: To what extent would women have in the level of acceptance in the practice of genetic health screening before marriage and the prevention of genetic reproductive health problems among reproductive among reproductive women in Delta State?

Hypothesis 2: There is no significant relationship in the knowledge and acceptance of health education, as a means of bringing about positive change in their knowledge of genetic reproductive health problems and prevention of genetic health problem among reproductive women in Delta State.

Table 3: Linear regression analysis on the knowledge and acceptance of health education as a means of bringing about positive change in their knowledge of genetic reproductive health problems among reproductive women.

Model	Sum of Square	Df	Mean Square	F	Sig.
Regression	211.893	1	211.893	66.270	0.000[b]
Residual	3913.661	1224	3.197		
Total	4125.554	1225			
Coefficients					
Unstandardized Coefficients			Standardized Coefficients		
	B	Std. Error	Beta	T	Sig
(Constant)	13.506	0.197		68.641	0.000
Knowledge and Acceptance of health education brings about positive change in knowledge of Genetic Reproductive Health Problems	0.117	0.014	0.227	8.141	0.000

α = 0.05; R = 0.227; R Square =
Dependent Variable: Prevention of genetic Reproductive Health problems.
Predictors: (Constant), Knowledge and Acceptance of health education bring about positive change in knowledge of Genetic Reproductive Health Problems.

The result in the table 3, indicates the F-values of 66.270 and a P-value of 0.000. Testing the null hypothesis at an alpha level of 0.05, the P-value of 0.000 was less than the alpha level of 0.05. Hence the null hypothesis was rejected. This implies that there is a significant relationship in the knowledge and acceptance of health education as a means of bringing about positive change in their knowledge of genetic reproductive health problems among reproductive women in Delta State.

The Unstandardised coefficient (B) for predicting the prevention of genetic health problems among reproductive women from the knowledge and acceptance of health education as means of bringing about positive change in their knowledge of genetic reproductive health problems was 0.117 and the standardized coefficient (Beta) was 0.227, t= 8.141. Therefore, the knowledge and acceptance of health education as a means of bringing about positive change in their knowledge of genetic health problems was significant at an alpha of 0.05.

Table 4: Mean and Standard deviation on the level of acceptance in the practice of genetic health screening before marriage and the prevention of genetic reproductive health problems.
N= 1226

S/N	level of acceptance in the practice of genetic health screening before marriage	Mean	SD	Decision
38	With health education, intended couples will be well informed on the need to go through medical screening before marriage	3.29	0.89	High
39	Provides adequate information to intended couples as regard the need to find out their compatibility status	3.06	0.80	High
40	Information provided by Health education will help prospective couples on medical screening issues regarding preventable reproductive health problems	2.93	1.26	High
41	Health education will help instruct intended couples with knowledge regarding the uptake of various medical screening before getting married	2.91	0.76	High
42	Health education information will encourage genetic health screening practice among reproductive women	3.16	0.99	High
	Total Grand Mean	3.07	0.94	

Table 4 shows, that reproductive women agreed to items 38-42 with mean range of 2.91 – 3.29 and a grand mean score of 3.07 which were above the cut off point 2.50 as high extent that women have in the level of acceptance in the practice of genetic health screening before marriage and the prevention of genetic reproductive health problems among reproductive women.

Hypothesis 3: There is no significant relationship in the practice of genetic health screening before marriage and the prevention of genetic reproductive health problems among reproductive women in Delta State.

Table 4: Linear regression analysis on the practice of genetic health screening before marriage and the prevention of genetic reproductive health problems among reproductive women.

Model	Sum of Square	Df	Mean Square	F	Sig.
Regression	11.563	1	11.563	3.440	0.064[b]
Residual	4113.991	1224	3.361		
Total	4125.554	1225			
Coefficients					
Unstandardised Coefficients			Standardised Coefficients		
	B	Std. Error	Beta	T	Sig
(Constant)	14.459	0.324		44.584	0.000
The Practices of Genetic Health screening before marriage	0.039	0.021	0.053	1.855	0.064

α = 0.05; R = 0.053; R Square = 0.003
a (Dependent Variable): Prevention of genetic Reproductive Health problems.
b (Predictors): (Constant), the Practice of Genetic Health screening before marriage.

Table 4, indicates the F-value of 3.440 and a P-value of 0.064. Testing the null hypothesis at an alpha level of 0.05, the P-value of 0.064 was greater than the alpha level of 0.05. Hence the null hypothesis which states that "there is no significant relationship in the practice of genetic health screening before marriage and the prevention of genetic reproductive health problems among women in Delta State" was accepted.

The unstandardised coefficient (B) for predicting the prevention of genetic health problems among reproductive women from the practice of genetic health screening before marriage was 0.039 and the standardised coefficient (Beta) was 0.053, t = 1.855. Hence, the practice of genetic health screening before marriage was not significant at an alpha level of 0.05.

3. The Knowledge of Specific Genetic Health Factors

The result in research question 2, revealed that there was a high extent that women in Delta State have high knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their spouses or suitors. The result shows that in items 7, and 10 had mean scores range of 1.69 - 1.82 as low extent while items 8, 9 and 11 had mean range of 2.95 - 3.19 as a high extent and total grand mean of 2.53 which is above the cut off point of 2.50. Hence, the result revealed high extent that women in Delta State have high knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their spouses or suitors. The total grand mean score of 2.53 was above the cut off point of 2.50.

The finding in hypothesis 2, shows that there was significant relationship off the knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their spouses or suitors and the prevention of genetic health problems among reproductive women in Delta State. This finding is at variance to the study of Ejimofor (2023), who declared in his study among reproductive women that knowledge on Rhesus incompatibility in Nigeria is poor, that participants are not aware as they choose their partners and the female partners get pregnant and undertake abortions. This finding is in agreement with the finding of Drelich et al. (2017) who conducted a study assessing the level of basic knowledge, clinical presentation, laboratory diagnosis, care and treatment as well as complications and prevention of haemophilia among reproductive women in Lagos. Based on the results the study found out that there was a moderate level of knowledge among reproductive women on symptoms, complications of haemophilia condition.

This finding is not in support of Oluwuole et al. (2022) who carried out a study on knowledge, attitude and premarital screening practice for sickle cell disease among young prospective couples in an urban community in Lagos and found out that less than half of the respondents (43%) knew their Hb genotypes, most (46%) of them took the test because of school entry and majority 80% were Hb AA genotypes. However, this finding is also at variance with the findings of Isah et al. (2016) whose respondents claimed to know their Hb genotypes and 73.1% of them claimed to be Hb AA.

The finding in research question 3, table 4, shows that there exist high extent of women knowledge and acceptance of health education as a means of bringing about positive change in Knowledge of genetic reproductive health problems among reproductive women in Delta State with mean range of 2.52 - 2.71 and a grand mean of 2.65.

Finding from hypothesis 3, revealed that there was significant relationship in the knowledge and acceptance of health education as a means of bringing about positive change in their knowledge of genetic reproductive health problems and prevention of genetic health problems among reproductive women in Delta State. The finding supports the views of Yahia et al (2014) on the effect of health education on knowledge of isoimmunisation among pregnant mothers and found the mean difference between pre and post-intervention knowledge of participants on isoimmunisation was 8,204 which implies that the intervention was effective. The increase in the knowledge observed at post intervention level could not have occurred by chance but due to educational intervention. This finding is also in line with the finding of Adeola et al (2012) on effect of health education on knowledge of sickle cell disease and medical screening among reproductive women and found the difference between pre and post – intervention knowledge of sickle cell disease and medical screening. The proportion of respondents who had a good level of knowledge increased by 64.1% after post intervention. This portrayed that health education intervention was effective in increasing the knowledge of the respondents.

4. The Practice of Genetic Health Screening before Marriage

The finding in research question 3, table shows that there exist high extent reproductive women have in

their level of acceptance in the practice of genetic health screening before marriage and the prevention of genetic reproductive health problems among reproductive women in Delta State with mean scores ranged of 2.91-3.29 and a grand mean of 3.07 from items 38 42.

The findings from hypothesis 3, table 4, indicates that there was no significant relationship in the practice of genetic health screening before marriage and the prevention of genetic reproductive health problems among reproductive women in Delta State. This finding was in line with the finding of Alkhaldi et al. (2016) who carried out a study on the attitude and knowledge level of intending couples towards sickle cell disease and medical genetic screening. It was found out that the attitude and knowledge levels of couples towards sickle cell disease and medical genetic screening were poor, and practical engagement in the programme was only unassuming. The finding was not in line with the views of Ugwu (2016) who stated that almost the respondents demonstrated a good attitude towards premarital genotype screening. However, this finding was in agreement with the finding of Otovwe et al (2019) whose respondents stated that premarital genotype screening could reduce their chances of marriage.

5. Findings

The following findings were obtained in the study:

- There was significant relationship of the knowledge of specific genetic health factors that may cause marriage incompatibility between reproductive women and their spouses or suitors and the prevention of genetic health problems among reproductive women in Delta State.
- There was significant relationship in the knowledge and acceptance of health education as a means of bringing about a positive change in the knowledge of genetic reproductive health problems among reproductive women in Delta State.
- There was no significant relationship in the acceptance and practice of genetic health screening before marriage and the prevention of genetic reproductive health problems among reproductive women in Delta State.

6. Recommendations

Government and health stakeholders should strengthen health education programmes on genetic reproductive health, since knowledge and acceptance of health education were found to significantly influence the prevention of genetic reproductive health problems among reproductive women in Delta State.

Public enlightenment campaigns should focus on educating reproductive women and their partners about specific genetic health factors that may lead to marital incompatibility, as increased knowledge was significantly associated with improved prevention of genetic reproductive health problems.

Although premarital genetic screening was not found to have a significant relationship with prevention in this study, counseling and educational support should accompany genetic screening services to improve understanding, acceptance, and effective utilization among reproductive women.

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