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Socio-economic drivers and effects of contraceptive usage on breast cancer among women in Nigeria

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Abstract

Certain types of contraceptives might have adverse effects on women's health including the possibility of causing breast cancer (BC). Furthermore, the types of contraceptives used might depend on the socioeconomic status of women. The triangular linkage of socioeconomic factors, contraceptives, and some factors causing BC among women are scarce in the literature, especially in developing countries. Consequently, the objectives of the study are to investigate the socio-economic drivers of BC and assess effects of contraceptive on BC among women in Nigeria. Cross-sectional data were collected on a one-off participant at a particular point in time using questionnaires on 200 women with confirmed cases of BC in Southwest, Nigeria, on a continuous visitation to the hospitals over six months. Structural equation modeling (SEM) with strong evidence from path analysis was adopted to achieve the objectives. Exploratory factors analysis was adopted to identify the socio-economic factors. The study analysed certain socioeconomic pre-determinants of BC through the use of contraceptives among women in Southwest Nigeria. The study provided evidence that some tested socioeconomic factors influence women in the use of contraceptive implants (C2) and oral contraceptives (C3), at a 1% level of significance. While about 76.8% of variations in socio-economic factors cause women to adopt a contraceptive implant, 81.1% of socioeconomic factors cause women to adopt oral contraceptives. Again, the result further provided evidence that socioeconomic factors (CCT) are strong determinants of BC at a 1% level of significance. Given the women-specific peculiarities, implanted contraceptives and oral contraceptives should be carefully administered by medical scientists. *(Afr J Reprod Health 2022; 26[11]: 32-46).*

Keywords: Breast cancer, contraceptives, socioeconomic drivers, women

Résumé

Certains types de contraceptifs peuvent avoir des effets néfastes sur la santé des femmes, notamment la possibilité de provoquer un cancer du sein (CB). En outre, les types de contraceptifs utilisés peuvent dépendre du statut socio-économique des femmes. Le lien triangulaire entre les facteurs socio-économiques, les contraceptifs et certains facteurs causant le CC chez les femmes est rare dans la littérature, en particulier dans les pays en développement. Par conséquent, les objectifs de l'étude sont d'étudier les moteurs socio-économiques de la Colombie-Britannique et d'évaluer les effets de la contraception sur la Colombie-Britannique chez les femmes au Nigeria. Des données transversales ont été recueillies sur une participante unique à un moment donné à l'aide de questionnaires sur 200 femmes présentant des cas confirmés de BC dans le sud-ouest du Nigéria, lors d'une visite continue dans les hôpitaux pendant six mois. La modélisation par équation structurelle (SEM) avec des preuves solides de l'analyse des trajectoires a été adoptée pour atteindre les objectifs. Une analyse exploratoire des facteurs a été adoptée pour identifier les facteurs socio-économiques. L'étude a analysé certains prédéterminants socio-économiques de la Colombie-Britannique à travers l'utilisation de contraceptifs chez les femmes du sud-ouest du Nigeria. L'étude a fourni des preuves que certains facteurs socio-économiques testés influencent les femmes dans l'utilisation des implants contraceptifs (C2) et des contraceptifs oraux (C3), à un niveau de signification de 1 %. Alors qu'environ 76,8% des variations des facteurs socio-économiques poussent les femmes à adopter un implant contraceptif, 81,1% des facteurs socio-économiques poussent les femmes à adopter des contraceptifs oraux. Encore une fois, le résultat a fourni une preuve supplémentaire que les facteurs socio-économiques (TCC) sont de puissants déterminants de la Colombie-Britannique à un niveau de signification de 1 %. Compte tenu des particularités spécifiques aux femmes, les contraceptifs implantés et les contraceptifs oraux doivent être soigneusement administrés par des scientifiques médicaux. *(Afr J Reprod Health 2022; 26[11]: 32-46).*

Mots-clés: Cancer du sein, contraceptifs, moteurs socio-économiques, femmes

Introduction

The millennium development goals (MDGs) paved the way for the recent sustainable development goals (SDGs) at the end of 2015. One of the core thrusts of this new thinking is the acceleration of global access to sexual and reproductive health (SRH) services. Essentially, one of the main goals to attain the SDGs

is to encourage family planning. Again, the timely attainment of the target of family planning is anticipated to enhance attainment across the five SDG themes of people, partnership, planet, peace, and prosperity[1-6]. Family planning has greatly facilitated development as it advances the health of children and women by declining the proportion of highly risky pregnancies. It has also led to the decline in the number of women exposed to pregnancy-related health risks, hence reducing the number of unplanned pregnancies and births. Further, slow population growth rates could result from increasing access to voluntary family planning services.

Family planning is achieved using various types of contraceptives. These contraceptive types can be categorised into two. The first type includes among others the clinically categorised contraception methods mainly long-acting reversible contraception. These include the intrauterine device (IUD) or implant, diaphragms, minipill vaginal ring; hormonal contraception, also include the Depo Provera injection, or the corresponding pill. The second type entails the use of condoms otherwise known as barrier methods, fertility awareness, emergency contraception; and permanent contraception, such as tubal ligation and vasectomy. While research has confirmed a strong link between the first contraceptive type and BC, the second contraceptive type does not[7].

There are possible negative effects on the use of contraceptives among women, for instance, literature has shown that oral contraceptives can lead to adverse outcomes notably the possibility that family planning can lead to breast cancer[7]. Despite the negative health outcome effects of oral contraceptives, family planning has been proved to be effective in birth control, especially in Africa where the fertility rate is high. Consequently, it is important to advise the policymaker on how best to approach issues of high fertility rate. In this study, the interest is in the use of oral contraceptives since many arguments exist in the literature that it is a common type of contraceptive that causes breast cancer among women. We want to investigate whether women with confirmed cases of BC have a past historical record of oral contraceptive usage. Although oral contraceptives are our focus in this study, we intend to include some long-acting reversible contraception, such as the contra pill and implant alongside oral contraceptives as the former would act as control variables to guide in research decision.

Research has confirmed that oral contraceptive as a means of birth control, is one of the major factors resulting in BC among women globally[8-10]. Despite the high risk involved in the intake of oral contraceptives for birth control, its increasing usage remains very high among women in Nigeria[11]. This women's experience could be in learning theory. Learning theory accounts for the previous responses that a woman has learned due to similar stimuli. The desired behaviours result from positive experiences and associations, and also from reactions to stimuli. This theory reinforces behaviours through rewards, but they depend on continuous rewards; sex satisfaction could represent this formative reward[19]. The implication of learning theories/classical conditioning is the predetermining impulses flowing from reward (pregnancy prevention) and its consequences on BC patients.

Furthermore, the link between certain socioeconomic factors and the use of contraceptives among women has been strongly supported in the literature. These factors play the most crucial role in not only deciding the choice of contraceptive types to be used but also whether to use any method at all. Such socioeconomic factors include education, occupation, socioeconomic class, age, and the number of living children significantly affected the use of contraceptive[12-13]. Despite the paradox of the relationship between ssocioeconomic factors, contraceptives, and BC among women in Nigeria, no study to the best of the researchers' knowledge has been conducted to date in Nigeria, although few such studies exist among the developed economies. This has been of great concern to policymakers, as continuous intake of contraceptives may proliferate and endanger the increasing incidence of BC. The implication is to crowd out women's participation in the labour force, which already constitutes the vulnerable group in the Nigerian economy.

Hence, the study’s objectives are identified as follows: to investigate the socio-economic drivers of BC and assess effects of contraceptive on BC among women in Nigeria. To achieve these objectives, questionnaires were administered on 200 women with confirmed cases of BC, and possible socio-economic factors influencing their decision to use contraceptives in Southwest Nigeria were tested.

This data was collected from women with confirmed cases of BC over six months. Carved in the null hypothesis (H_0), the study postulates that socio-economic factors do not significantly influence the use of contraceptives among women in Nigeria. To test this hypothesis. The study adopted factor analysis and structural equation modelling as a method of analysis and estimation.

Review of literature

This section relates rational behaviour are ecological theories to the empirical investigation of extant works of literature to form the theoretical foundation of this study.

A strong retrospect from rational behaviour theory indicates that processes in decision-making that results in the optimal level of utility or benefit for an individual are an optimum rational decision[14]. This theory expects that the individual woman would rather engage in an action that benefits her rather than actions that harm or appear neutral to her. This theory has a strong link with the use of contraceptives, as every woman in Nigeria by the principle of rationality is expected to neglect the negative effects of OCs. The predisposed rational behaviours of women in Nigeria, as rational thinkers in making choices on OCs, have been associated with certain risk factors leading to the incidents of BC among women in Nigeria. In addition, of relevance to this study is the health belief model (HBM)[15-17]. HBM explains the possible impact an external predisposed behaviour has on a woman before illness results. In consonant to HBM is the cognitive model that explains the link between socio-economic behaviour and the pressure it exerts on women before the incidence of BC eventually ensues. It posits that by expectation, a woman's health outcome is determined by several stimuli that threaten her well-being[18-23].

Ecological theories and models can be traced to the work of[24]. The theories view health as a product of interaction between people and their immediate ecosystem, which includes their family, culture, community, and physical environment. The mutual interaction between women's health behaviour and their immediate environment contributes to both the health and malignant of BC because there is a mutual relationship between them. Women are influenced by the ecosystem and their immediate environment and vice versa[25]. The factors that influence behaviour include individual or intrapersonal factors, institutional and organizational factors, interpersonal factors, environmental factors, and public policy factors[21]. The implications of this theory rested on the causes and effects of cancer diseases on the patients. Since factors influencing behaviour could be internal or external. Environmental factors such as health institutions could assist in reducing the burden of BC among women through policy influencing contraceptives.

Empirical evidence

Numerous researchers have tested the theories that emphasised the application of rational decision-making on socio-economic factors together with the effects in the field of health economics. Hence, the empirical review in this study are classified into 1) the effects of socioeconomic factors on the adoption of contraceptive, 2) the analyses of varying degrees of contraceptive attributable to BC, and 3) the link between socioeconomic factors, the adoption of contraceptive and the effects on BC and some of the findings are submitted below.

Empirical study review on the effects of socioeconomic factors on the adoption of contraceptive

The first reviewed study examined the correlation between the adoption of contraceptives, and demographic and socio-economic factors prevalent among married women in Malawi. Ecological theories and models were tested from the collected data on women in Malawi[21,24-25]. Data from 2000 and 2004 were adopted in the research work[12]. The study's methodology includes the adoption of demographic and health surveys with a special interest in multivariate and bivariate logistic regression analyses to establish the relationships between the use of contraception and socioeconomic variables. The outcome of the research reveals that the major factors responsible for the use of contraceptives are partners' approval of family planning, age, the number of living children, family planning discussion with partner, education, work status and visit to a health center.

The determinants of socio-economic factors responsible for the use of modern contraception among women of reproductive age was another

study conducted in Ghana. Data were collected from the 2014 Ghana Demographic and Health Survey for the study[26]. To estimate socioeconomic determinants impacting the adoption of modern contraceptives from the context of local and global perspectives, a series of tests were conducted using Bayesian multilevel models and spatial autocorrelation estimation. The results provided evidence that there is a significant relationship between the use of modern contraceptives and socioeconomic factors such as work status, educational attainment, age, marital status, parity, and religious affiliation. Contextual factors such as exposure to the knowledge of family planning and the convenient location of health facilities also have a considerable positive impact on the adoption of modern contraceptives. Never-married women, uneducated and unemployed are disadvantaged in the adoption of modern contraception in Ghana.

Factors that determine the choice of family planning among married women in investigated in Southwest Nigeria[27]. While adopting the multistage sampling technique, the study randomly selected six hundred (600) married couples from five (5) Southwestern states in Nigeria. Questionnaires were distributed to gather information from the respondents. Five hypotheses were formulated from five research questions. The study adopted chi-square statistics for data analysis at a 0.05 alpha level of significance. The result indicated that religious factors, socio-economic status, and cultural norms failed to significantly influence the choice of couples, whereas, the involvement of partners in the choice of family planning and the educational background of the couples, significantly determine the choice of family planning among married couples in Nigeria.

Empirical literature: review analysing varying degrees of contraceptive types attributable to BC

The decision to use contraceptives among women with particular reference to the relationship between the adoption of hormonal contraception and the invasive risk of BC was examined in Denmark between forage 15 and 49[9]. Using time-series data collected on 1.8 million women from 1995 to 2012, the study finds a link between the decision of women to use contraceptives and the resultant incidence of BC. the study identified 11,517 BC cases and categorised contraceptives into current (recent) use and previous use. Morch *et al.* (2017) reported that the risk of BC increased among contraceptive users and the duration of use. Also, the study revealed that the BC risk associated with different products is the same.

USA-based research work was conducted to contrast the contraceptives in the pprevious studies with BC at the current time[8]. They argued that the recent adoption of contraceptives slightly increases risk, however, most studies on this concept based their findings on self-reported facts but failed to investigate the formulations of contemporary contraceptives. This nested case-control research work was conducted among female enrollees in a large U.S. integrated health care delivery system. Data collected covered the period 1989 to 2009 among women between the age bracket of 20 to 49 years (1102 cases of BC and matched controls of 21 952), the study reported that women who recently used contraceptives have a 50% increased risk than those who have never used it.

Another study noted that women who recently used contraceptives are exposed to BC by just 20% in the USA[28]. The investigation indicated there was an increase in the risk of BC in the current (within one year) contraceptive users. Further, the increased risk failed to persist 10 years after hormonal therapy was stopped. Other variables adopted in the study include the age of initiation, duration of use, and pharmacotherapeutic formulation, and findings indicated that these three factors had little additional effect on risk. The further report indicated that a current investigation of lifetime cancer risk in which women who adopted oral hormonal contraceptives had similar BC risk to never users within 5 years of discontinuing therapy.

Reasons why this study is unique from other studies conducted on BC in Nigeria

Separate studies on the effects of socioeconomic factors on the adoption of contraceptives exist, of course, few such studies have been reviewed. We also found few studies analysing varying degrees of contraceptive types attributable to BC from the comparison of current use of contraceptives from the early use. However, this study is unique from the following perspectives:

(i) To the best of our knowledge, the triangular links between socioeconomic factors, the adoption

of contraceptives, and the effects on BC is a scarce content in the literature. This study is unique in this sense.

(ii) The methodology of identifying which of the contraceptive types significantly lead to the incidence of BC is novel. Other studies generalize contraceptive use, but this study moved a step further by identifying which specific types of contraceptives has a link with the incidences of BC.

(iii) No study has adopted structural equation modelling, a more advanced estimating technique to investigate the relationship between socioeconomic factors, the adoption of contraceptives and the effects on BC.

(iv) With specific reference to Nigeria, the socioeconomic variables identified in this study are the first to be tested on women in southwest Nigeria. Despite the various efforts to prevent or avoid the incidence of BC in Nigeria, not much success has been recorded. This is partly due to the failure of various researchers to undertake a study that adequately addresses the factors influencing women's behaviour in the use of contraceptives in Nigeria. To the best of the researchers' knowledge, the reason why women go for contraceptives has not been adequately investigated in the literature, despite the vulnerability of women in the African cultural context that tends to make women's decision-making to be influenced by numerous factors. Research conducted on BC among women has so far failed to address most of these factors. Hence, the uniqueness and the urgent needs of this study.

Methods

Location of the study

The research conducted for this paper took place at three (3) Southwest Nigerian hospitals and was based on primary data gathering where the principal investigator, alongside the research assistants, had direct contact with women with BC. The choice of the areas was motivated by the fact it offered a conducive research environment because women were based in hospitals that are research-based health institutions. Consultants and chemotherapy equipment supplied by the government attract the movement of women with confirmed cases of BC to the centers. The hospitals include Federal Teaching Hospital, Ido Ekiti (100), Ekiti State University Teaching Hospital (70), and Ekiti State general hospitals (30). The paper's target population is BC patients (out- and in-patients of age 21-65 years) at these selected hospitals in Southwest Nigeria. Those patients on admission are regarded as in-patients, while those patients on visitation for consultation based on doctors' appointments are regarded as out-patients. The questionnaires were administered consistently to only one patient per questionnaire both in and out of the hospitals for six months.

The study's instrument, and the process of data collection

The researcher designed a questionnaire with a series of questions covering areas of concern of this study in Likert scale format, ranging from strongly agree to strongly disagreed. The researcher personally engaged with a team of consultants after official written permission was granted from the research Department of both medical centers. During consultation hours with BC patients, the doctors asked a series of questions from the patients based on the contents of the questionnaire. Certain information could not be retrieved from the patients due to poor health conditions and their level of education. Under such a situation, the medical personnel relied on the patient's historical record. However, on average 20 responses could not be gotten adequately. Consequently, the researcher has no choice but to remove such from the list of instruments collated. The collected data were stratified and structured and thereafter input into the SPSS-AMOS software for analysis.

Sample size

Knowing that the margin of error for confidence intervals is affected by the sample size, the study first used the conventional margin of 5% error. It then determined the minimum sample size that allows being within that error. Our sampling strategy was then to be guided by that estimate of the minimum sample size. To determine the minimum sample size to work with, the study used the following formula

$$n \geq \frac{z^2 * \sigma * (1-\sigma)}{(MOE)^2} \quad (1)$$

Where n is the minimum required sample size, z is the z-score needed to get the margin of error (1, 96

in this study), MOE is the margin of error (0, 05 in this study), and σ is the population of BC women standard deviation. The standard deviation of women with BC was unknown and was estimated at 0,12 based on the pilot study. Applying our parameters in the formula (1), we got the minimum sample size of

$$n \geq \frac{1.96^2 * 0.12 * (1-0.12)}{(0.05)^2} = 163$$

The study worked with a sample size of 200 women with BC, considering that some would drop out. Questionnaires were distributed to these women by the principal investigator and his assistants (See table 1 below on the nature of questionnaires administered to the women with clinically confirmed BC).

Data analysis

To address the research objectives about the socio-economic factors affecting contraceptive use believed to cause BC among women in Nigeria, the study used SEM modelling. Structural equation modelling is a multivariate statistical tool adopted to investigate structural relationships. This technique uses the combination of multiple regression analysis and factor analysis in its approach to measuring the relationship between latent constructs and measured variables. The study adopted exploratory factor analysis together with a factor correlation matrix to achieve objective one of the study. Confirmatory factor analysis adequately addressed objective two while the technique of path analysis in structural equation modelling (SEM) was employed to address the triangular nexus among socio-economic factors, contraceptives, and BC patients among women in Southwest Nigeria. SEM uses rigorous diagnostic procedures to analyse behaviour to arrive at an acceptable and reliable outcome to arrive at conclusions in this study. Structural Equation Modelling (SEM) is a suitable estimating technique for this study because of its flexibility in analysing the linear structural relationship. The modelling was appropriate for the investigation of these factors because they address some specific system relationship between the dependent variable and a set of prediction variables. It has the capacity of relating numerous outcomes variables each of which is affecting one another particularly when expectation on X impacts on Y, or when X, Y, and Z interrelate. In the model, a set of prediction variables interact to establish a set of relationships existing among them.

$X = y + \varphi$. Where X= measured variable; y = true score; φ = random error and systematic error**.**

Measurements of variables

The key outcome variables in this research are BC and behavioural variables indicating the rationality of choice among women on the use of contraceptives.

(i) The variables examined are marital or spouse influence.
(ii) Level of education of the woman
(iii) Poverty level. This is measured in terms of monthly income earned less than the average monthly expenses.
(iv) Nature of employment of the woman. The nature of employment can considerably assert much pressure on the woman's decision to take the risk of contraceptive. In Nigeria, some private organisations require (as a rule) that a woman must avoid pregnancy to keep her Job.
(v) Choices of contraceptives available for use during a sexual relationship could pose a challenge to the use of contraceptives.
(vi) The external influence that could directly impact a woman's choice to use contraceptives include sources of information such as popular science reading, newspapers, and periodicals, the internet, radio and television, family planning professionals, classmates, and friends.
(vii) Knowledge: here the knowledge of the woman were tested based on a self-survey method on whether there is any side effect in the use of contraceptives. All these are various instruments that assist us in this investigation.

The procedures for measuring study's variables

Socioeconomic variables: These are variables capable of influencing the decisions of women in the use of contraceptives. The study believed that in the absence of these variables, women in the average would not seek to adopt the use of contraceptives. All measurements were collected through the instruments of questionnaire using likert scale,

ranging from strongly agreed to strongly disagreed. The questionnaire were categorised based on the study's objectives. Category "A" addressed questions on biodata information. Information collated in this first stage, assisted the researcher to further compare responses to ascertain consistency in responses on marriage or marital status, level of education, general income level, types of business, etc.

(a) The influence of spouse (Marriage): Here, series of questions requiring responses on impact of spouse were requested. For instance, my husband's sexual urge requires the use of contraceptives to control for pregnancy.

(b) Education: In addition to biodata information showing educational level of women. Further questions testing the level of knowledge of participants were asked. For instance, sources of information on breast cancer, family planning and the use of contraceptives were asked to confirm the level of education.

(c) Income level; range of monthly income level such as #10,000-#50,000; #50,000-#100,000 etc. were asked from the participants and responses from each participant confirmed the income level of women under investigation.

(d) Nature of employment: Questions requiring responses on if a woman is a full house wife, petty trader, government worker etc were asked to confirm the nature of employment of women under investigation.

(e) Social influence: The responses to determine the impact of peer group and friends on the respondents were required. For instance, the questionnaire further confirmed if the source of contraceptive information emanated from friends. The researcher probed further on categories of friends; close confidants, or casual friendship. The study requires responses on the types of advice received from the confidants. More questions addressed the contraceptive types available for use.

(f) Contraceptive types: Questions on contraceptive types were mostly addressed by descriptions and by the help of medical record of the patents. To the women with low level of education**, q**uestions on whether the contraceptive types used included the followings were asked:

i. Contra pill
ii. Contra implant
iii. Oral contraceptives
iv. No contraceptive used

(g) Evidence of breast cancer**:** Evidence of breast cancer was conformed from the patient's record at the medical centres.

Analysis of findings (preliminary test)

Specific indebt questions meant to capture each attribute were posed to each of the respondent and outcome responses were collated for analysis purposes as identified in Table 1 below.

Table 1: Coding of attribute variables

No	Attributes	Coding
Socio-economic characteristics of factors		
1	The Influence Of Spouse (Marriage).	A1
2	Education	A2
3	Income Level	A3
4	Nature Of Employment	A4
5	Social Influence	A5
Contraceptive Types		
6	Contra Pill	C1
7	Contra Implant	C2
8	Oral Contraceptives	C3
9	No Contraceptive Used	C4
Evidence of Breast Cancer		
10	BC visible	B1
11	Full awareness and Knowledge of BC	B2
12	Signs of BC, Type 1	B3
13	Signs of BC, Type 2	B4
14	Signs of BC, Type 3	B5

Table 1 explains the codings in column 3. There are five variables answering questions on social economic influences. These variables are represented as A1-A5. It was followed by various types of possible contraceptives adopted by women in the Southwest Nigeria. These were represented by C1-C4 respectively. Finally, B1-B5 variables were various responses received during questionnaire administration to confirm cases of BC among

Table 2: Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
A2	198	1	5	2.74	1.659	0.432	-1.536
A3	198	1	4	2.00	0.825	0.274	-0.852
B2	198	1	5	2.34	1.418	0.667	-0.856
B4	198	1	5	2.18	1.207	0.811	-0.215
C1	198	1	4	1.61	1.208	1.496	0.239
C2	198	1	4	2.21	1.476	0.394	-1.864
C3	198	1	4	2.14	1.446	0.503	-1.746
Valid N (listwise)	198						

Source: Authors' computation, 2021

women in Nigeria. Table 2 that follows is on the descriptive statistics based on the study. Table 2 reports the result from descriptive statistics. The values around the mean indicate that all variables are closer to the minimum than the maximum. The result implies that average responses are relatively low but variance through standard deviation is rather lower which suggests responses clustered around the mean. This result together with skewness shows that all variables are positively skewness. Hence, the result from the respondent is reliable.

Table 3 explains the factor structure matrix representing the correlations between the variables in the study and the factors. The factor pattern matrix contains three (A, B, C) coefficients for the linear combination of the variables. No association between two variables is greater than 0.70 in the correlation matrix. For reliability, the Cronbach alpha is over 0.7 in all the cases. Hence, the multicollinearity problem is excluded from the model.

Table 3: Factor correlation matrix

Factor Correlation Matrix			
Factor	1	2	3
1 (A)	1.000		
2 (B)	-0.077	1.000	
3 (C)	0.041	0.143	1.000

Source: Authors' computation, 2021

The result from Table 4 reveals that composite reliability (CR) is above 0.70. This indicates an internal consistency within each factor co-moved together. The average variance extracted (AVE) above 0.50 is expected to establish convergent validity; the AVE and the diagonal should be greater than the correlation and this is reflected in the result. We observed convergent and discriminant validity as evidenced by the table. Convergent of AVE must be above 0.5. The discriminant is the square root of AVE and it is evidenced that when CR value is above 0.70, it indicates no correlations issues and reliability is high. This result validates the claim for a well-fitted model[29]. Hence, there is strong internal consistency and connectivity among socio-economic factors, contraceptive types, and BC among women in Southwest Nigeria.

The result of structural equation modelling (SEM)

This study employs the SEM technique to analyse the relationship among three endogenous (dependent variables) variables such as socioeconomic factors, contraceptive type, and BC (denoted by A, B, and C respectively) among women in Southwest Nigeria. Each of the constructs has a set of responses from the questionnaire coded A1, A2, A3, B1, B2, etc. The endogenous variable in this study is a variable determined by its relationship with other variables within the model. It is synonymous with a dependent variable, meaning it correlates with other factors within the system being studied. For instance, the Socioeconomic factor is determined by responses received from A1-A6. Hence, A1-A6 are explanatory variables that determine the endogenous variable.

Exploratory factor analysis

This section summarises the system factor loading aimed at categorising the reduced number of responses based on their relevance and significance.

Table 4: Reliability and validity

	CR	AVE	MSV	MaxR(H)	CCT	BC	PED
CCT (A)	0.834	0.627	0.006	0.835	**0.792**		
BC (B)	0.889	0.859	0.006	6.623	-0.080*	**1.691**	
PED (C)	0.748	0.508	0.002	0.688	0.007	-0.041	**0.639**

Source: Authors' computation, 2021. See the explanation of A, B, and C in Table 1 above
Note PED proxies contraceptives types; Breast cancer implies BC; the impact of socio-economic factors is represented by CCT

Socio-economic factors A1-A6 were condensed (according to the level of relevance) to only education (A2) and income level (A3). Full awareness and knowledge of BC (B2) alongside BC sign type 2 (B4) produced possible use of the contraceptive pill (C1), the contraceptive implant (C2), and oral contraceptive (C3) respectively. This result from factor loading is relevant and central to the study under investigation. It implies that the level of education and income are the socioeconomic factors that influence the type of contraceptive used by women. Knowledge acquisition through education and income could empower the women with the wherewithal to either object to or accept the use of contraceptive types.

This section is needed to determine the underlying constructs for a set of measured variables adopted in this study. Cronbach alpha scores in the factor loading for all elements are well above the 0.5 benchmarks for convergence validity. Hence, this result supports the loading amplitude on the pattern matrix above 0.5. Again, from the outcome the discriminant validity for all loadings on a single factor indicates there was no cross-loading or correlations, indicating support for the reliability of the study's result. All factors extracted explained at least 73% variations of responses.

Confirmatory factor analysis

Confirmatory factor analysis (CFA) permits us to test the hypothesis that there is a strong relationship between the observed variables in the model under investigation and their underlying latent constructs. Again, every result on the model fit from Table 6 above complies with the threshold as indicated in column 3. All outcome of the diagnostics tests confirms the consistency and the reliability of the relationship existing among socio- economic factors, contraceptive types, and BC among women in Southwest Nigeria under investigation. Figure 1 speaks on the theory's confirmation of the co-variances among the latent factors with the regression weights stated in Table 7. This confirms the relationship between contraceptive types (PED) that cause BC (BC); the impact of socio-economic factors (CCT) on BC (BC) and the relationship between contraceptive types (PED) and socio-economic factors respectively. Table 7 speaks to the confirmatory factor analysis results in Figure 1. It is evidenced from the result that socio-economic factors (CCT) influence contraceptive types (PED).

However, contraceptive types (PED) are a composite of the contraceptive pill (C1), contra implant (C2), oral contraceptives (C3), and no usage of any type of contraceptive type (C4). Among all the various contraceptive types, we provide evidence that only socio-economic factors (CCT) influence contraceptive implant (C2) and oral contraceptives (C3), as only C2 and C3 are statistically significant at a 1% level of significance. Again, while 76.8% of variations in socio-economic factors cause women to adopt contraceptive implants (C2), 81.1% of variations in socio-economic factors cause women to adopt oral contraceptives (C3). There are pieces of evidence from the result to indicate that socioeconomic factors with exclusive significance on educational and income levels, do influence the usage of contraceptive pills among women under investigation. It, therefore, implies that the level of education and income level of Southwest women in Nigeria are the strongest socioeconomic factors that determine the contraceptive type they use when the need arises. This study further supports the literature that oral and implant contraceptives could cause BC, but oral contraceptives have more effects on BC than all other types of contraceptives.

Table 5: Factor loadings

Cronbach alpha	0.704	0.719	0.722
A2			0.700
A3			0.765
B2		0.755	
B4		0.997	
C1	0.778		
C2	0.772		
C3	0.836		
Extraction Method: Maximum Likelihood.			
Rotation Method: Promax with Kaiser Normalization.			

Source: Authors' computation, 2021

Table 6: Model fit indices

Measure	Observed	Threshold	References
Chi-square	24.667		
DF	11		
DCIM/DF	2.242	2≤x≤5	Ullman, 2001, Schumacker & Lomax, (2004)
CFI	0.955	>0.95	Byrne, (2001)
RMSEA	0.079	<0.05	Stieger, (1990) Arbuckle, (1999)
PCLOSE	0.113	>0.05	
SRMR	0.0478	<0.08	Byrne, (2001)

Source: Authors' computation, 2021.
Note: DF connotes a degree of freedom; CFI= Comparative fit index; PCLOSE= P of close fit; RMSEA= root mean square error of approximation; SRMR= Standardized Root Mean Squared Error.

Diagnostics test for the structural model are taken into consideration in this section

Outliers and influential

Further, the study engaged a cook's distance analysis to investigate if there is a possible existence of any (multivariate) influential outliers in the variables adopted. The findings indicated that no case in the observed a cook's distance was greater than 1. In most cases, values were lesser than 0.0400. Since **c**ook's distance measures the effects of deleting a given observation, points with a large Cook's distance are considered to merit closer examination in the analysis. Hence, with the result of Cook's distance in Figure 2, strong merits are found in the outcome of the study's analysis.

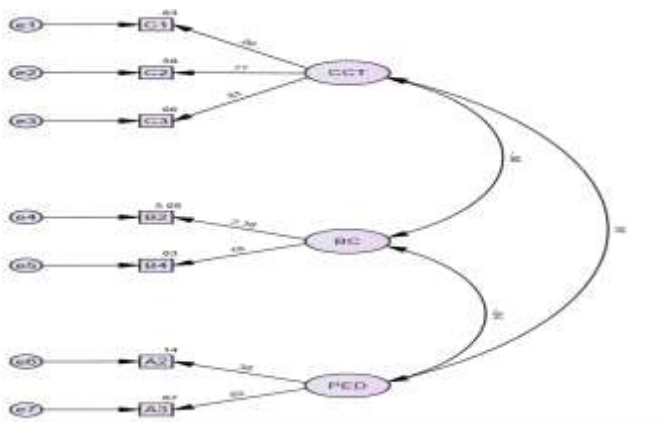
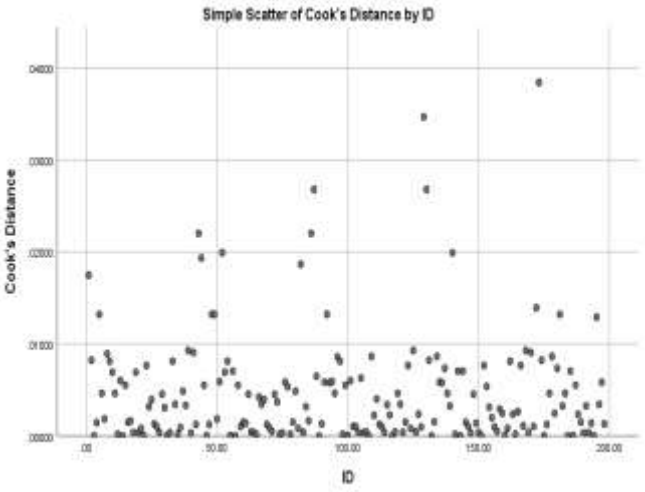


Figure 1: Confirmatory factor analysis

Table7: CFA regression weights

Predictor	Outcome	Std Beta
CCT	C1	0.796
CCT	C2	.768 ***
CCT	C3	.811 ***
BC	B2	2.384
BC	B4	0.186
PED	A2	0.38
PED	A3	0.819

Source: Authors' computation, 2021.
Notes: Significance of estimates: *** p < 0.001; ** p < 0.010; * p < 0.050



Source: Authors' computation, 2021

Figure 2: Cook's distance graph

Table 8: Variable inflation factors

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.729	.475		9.959	.000		
	CCTVar	-.084	.044	-.135	-1.893	.060	.993	1.008
	PEDVar	.056	.086	.052	.653	.515	.786	1.273
	poverty	.031	.386	.006	.080	.937	.780	1.281
a. Dependent Variable: BCVar								

Source: Authors' computation, 2021

Multicollinearity

We examined variable inflation factors (VIF) for all predictors on our dependent variables and oberved no VIFs greater than 2, which is far less than the threshold of 10. From theory, the VIF quantifies the extent of correlation between one predictor and the other predictors in a given model. It is useful for the diagnosis of multicollinearity, as higher values indicate that it is difficult to assess accurately the contribution of predictors to a model. Hence, the low values of VIF in Table 7 are an indication of strong accuracy in the predictive power of the predictors. Table 9 shows the metric measurement to further ascertain model fitness in this study. This is because this identified threshold adequately supports the claims in the study making the goodness of fit reliable. The metrics that ought to be reported are listed below, along with their acceptable thresholds. The goodness of fit is inversely related to sample size and the number of variables in the model.

Hypothesis

Figure 3 shows the hypothesis, testing the path analysis linking the influence of socio-economic factors (CCT) on contraceptive types (PED) and consequently on the BC. From the results in Table 7, oral contraceptives and implants are the two contraceptive types that appeared as the outcome of certain socio-economic factors (CCT), which invariably result in the complication of BC among women under investigation.

Table 10 is the result of the path analysis shown in Figure 3. It showcases the predictive power of socio-economic factors (CCT) and contraceptive types (PED) on BC among women in Southwest Nigeria. Apart from the existing evidence that socioeconomic factors (CCT) significantly determine the adoption of oral and implant contraceptives by women in the theoretical Table 7, this is further confirmed in the result of Table 9. The result provides evidence that socioeconomic factors (CCT) are strong determinants of BC (BC) at a 1% level of significance. However, the increasing influence of these socio-economic factors (CCT) decreases the average incidences of BC by 7.9%. This result is expected, as the knowledge and awareness of the risk effect of oral and implant contraceptives become visible, the spouse tends to reduce or discontinue the usage of these contraceptives (types) which result in a possible decline in BC. Apart from the fact that this result supports the a priori expectation from the argument of the health belief model and social cognitive theory, the findings in this study concord with the findings of other researchers with a clear indication that when the level of awareness and the knowledge of women increased and are skewed towards socio-economic status, it better prepares the women to take precaution on the usage of contraceptives and this caution prevents them from falling victim of the possible incidence of BC[9,8]. The findings that supported the argument that oral contraceptives lead to BC were reported by Mørch *et.al* [9]. Hormonal contraceptive leading to BC was confirmed by Barriga *et al* [30].

The implications of the findings

The outcome of this result study has numerous implications for women in Nigeria because of their vulnerable status in society. The age range of respondents captured under this investigation are women between the ages of 18-65. These categories of age range speak volumes about the education and income level of women. Lack of adequate education for women could expose women to the risk involved in the use of contraceptives since they often fail to

Table 9: Metrics confirmatory measurement of model fitness

Measure	Estimate	Threshold	Decision
CMIN	24.667	--	--
DF	11.000	--	--
CMIN/DF	2.242	Between 1 and 3	Excellent
CFI	0.955	>0.95	Excellent
SRMR	0.055	<0.08	Excellent
RMSEA	0.079	<0.06	Acceptable
PClose	0.113	>0.05	Excellent

Source: Authors' computation, 2021

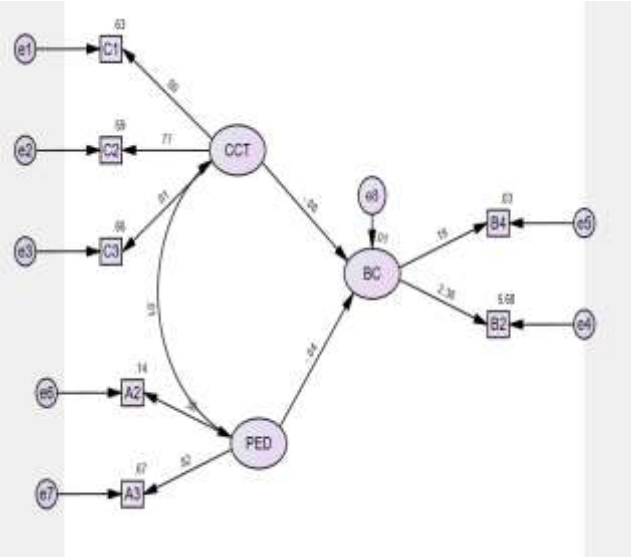


Figure 3: The hypothesis
Source: Authors' computation, 2021

Table 10: Predictive power of socio-economic factors (CCT) and contraceptives types (PED) on BC

Predictor	Outcome	Std Beta
CCT	BC	-.079 *
PED	BC	-.040
CCT	C1	.796
CCT	C2	.768 ***
CCT	C3	.811 ***
BC	B2	2.384
BC	B4	.186
PED	A2	.380
PED	A3	.819

Significance of Estimates: *** = p < 0.001;** = p < 0.010;* = p < 0.050

Source: Authors' computation, 2021

adequately consider the negative side effects. Although what determines the level of education may be subjective, exposure may sometimes allow a woman with only primary school education to be more enlightened than women with higher education. However, for this study, women with only basic primary school education are assumed to have low education when compared with women having secondary and higher education. Women with a low level of education hardly get good employment in both government and privately owned organisations and this leads to poor income levels for the affected woman. This argument was supported by the study conducted in Ghana where it was found that educational attainment and age determine women's decision on the use of contraceptive[26]. It was also assumed that decision on the use of contraceptive type could only be under the guidance of a medical practitioner but the choice is subject to the patient's decision.

Consequently, most often decisions on the use of contraceptives are partly taken by the spouse and assumed by trusted friends due to a lack of adequate knowledge and the outcome of this decision could be the wrong choice of contraceptive type, thereby exposing the victim to the possible incidence of BC. The result obtained confirmed the extant ecological theory[21, 24-25] and the findings on the work conducted by Palamuleni in Malawi[13].

Again, due to the vulnerable status of women in society, the low-income status of women often subjects women to coordinated decision-making in the same manner that a low level of education does and consequently with a similar outcome. This action was explained by the Keynesian theory of poverty which argues that poverty occurs unintentionally, mainly the outcome of unemployment and this leads to scarcity theory which proposes a scarcity mindset, forcing the poor to take less than optional decisions and behaviours[31].

Again, out of the contraceptive types which include contra pill, contra implants, oral contraceptives, and no contraceptives used under this investigation, contra implants and oral contraceptives have been found to significantly impact BC among women in southwest Nigeria. The risk involved in the usage of these contraceptive types could partly be because medical facilities in Nigeria are still underdeveloped and women sometimes visit practitioners that lack the adequate

skill and were not properly trained. The study's finding concord with the work conducted in Denmark by Morch *et al*.[9]. However, the conducted by Beaber *et al.* in 2014 in the USA found that only 50% effect of the contraceptive use on BC is expected[8].

Limitation

The study under investigation is to be conducted in most medical centers across Southwest Nigeria. However, covering all these centers was not possible due to factors beyond the control of the researcher. The nature of the ailment (BC), restricts some respondents from being ready to supply relevant information that could be of immense benefit to this study. The data gathering took place during COVID-19 in 2020. Consequently, many of the patients were not readily available for consultation in the hospitals for fear of being infected with COVID-19. To prove that the same socio-economic factors that influenced the use of implants and oral contraceptives among women who had BC are not similar among women who had no BC is difficult to ascertain in this study.

More importantly, although the author made references to past studies that link the use of oral contraceptives to BC, this study failed to show the specific Nigerian past studies and to establish the link as significant in a Nigerian population, and the particular types of implants and oral contraceptives. A randomized control trial (RCT) would have been more appropriate to establish a causal link between the use of oral contraceptives or implants and BC, comparing women of similar socioeconomic backgrounds. A case-control study would be good where RCT is not possible, comparing women who had BC and those who had no BC, this forms a gap for further study.

Ethical consideration

To access the in and out BC patients, the researcher received official permission from various health institutions. This study was conducted with the BREC unit's authorization at the University of Kwazulu-Natal, South Africa, with protocol permit number BREC/000009042019. BREC is registered with the South African National Health Research Ethics Council. This permission was received after the principal researcher received a training certificate from the Clinical Trial Centre, the University of Hong Kong on 2019/12/14. College of Law and Management Studies, University of Kwazulu-Natal is the sole financial sponsor of this research work.

Conclusion

At the beginning of this study, it was hypothesised that certain socio-economic factors do significantly influence the use of oral contraceptives, thereby leading to the incidence of BC among women in Nigeria. This study contributed to the literature in that it tested these hypotheses. The study adopted structural equation modelling as an appropriate method of analysis to test the responses from 200 women with BC in Southwest Nigeria. The socio-economic variables tested in this study include the followings: (1) the influence of spouses (2) the education of women (3) the level of income of women (4) the nature of employment (5) social influence (6) poverty level of the women. The contraceptive types tested in this study include (i) contraceptive pills (ii) contraceptive implants (iii) oral contraceptives (iv) abstinence from any form of contraceptive. The result from factor loading identified only the education and income level of women as being the social-economic factors that influence the contraceptive types used by women. This result is relevant and central to the study under investigation. Acquired knowledge through education and income could empower the women with the wherewithal to either object to or accept the use of contraceptive types. Again, results from the confirmatory factor analysis indicate that among all the various contraceptive types, we provide evidence that socioeconomic factors (CCT) influence contraceptive implant (C2) and oral contraceptives (C3) as only C2 and C3 are statistically significant at 1% level of significance. Furthermore, while 76.8% variations in socioeconomic factors cause women to adopt contraceptive implants, 81.1% variations in socioeconomic factors cause women to adopt oral contraceptives, indicating that socioeconomic factors influence women in the use of oral implant contraceptives. The study has submitted evidence to indicate that socioeconomic factors influence the usage of contraceptive pills among women under investigation. Again, the result further provides evidence that socioeconomic factors (CCT) are strong determinants of BC (BC) at a 1% level of significance. However, the increasing influence of

these socio-economic factors (CCT) decreases the average incidences of BC by 79%, indicating, for instance, increasing the level of education could better enlighten the women against the use of contraceptives that are capable of injuring the health of women. In the study, poverty is not a significant factor capable of influencing the decision of women to use contraceptives. This study strongly recommends that contraceptive implants and oral contraceptives should be revisited by medical scientists and studies and policies that would incorporate women's specific peculiarities alongside their usage should be encouraged. The education and income level of women which are socio-economic factors identified in this study are strong intruments in the hand of every woman to protect the womenfolk against any use of contraceptive type that could be injurious to their health.

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