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*RESEARCH ARTICLE*

# EFFECTS OF EDUCATIONAL INTERVENTION ON SEXUAL HEALTH KNOWLEDGE, ATTITUDE AND BEHAVIORAL PRACTICES: A SCHOOL-BASED STUDY IN CALABAR, NIGERIA

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## Abstract

**Background:** High risk sexual behavior (HRSB) contributes significantly to sexually transmitted diseases (STIs) and unwanted pregnancy. This study was aimed at assessing effects of interactive educational intervention, on knowledge, attitude and practice of safe sexual behavior, among sexually active in-school adolescent girls in Calabar, Nigeria.

**Methods:** Quasi-experimental study design was used, with recruitment of one hundred and twenty (120) respondents in two senior secondary schools, comprising sixty (60) each, in groups 1 (control) and 2 (intervention). Group 2 received 2-hour daily, 3-day face-to-face educational teachings on sexual health. Outcome measures assessed at baseline, immediate post-intervention and 12-weeks follow-up, were level of knowledge, attitude and sexual health behavioral practices, with maximum scores of 62, 55 and 35, respectively. Independent t-test was used as inferential statistic, with p-value set at 0.05.

**Result:** Mean age was 17.2 ± 1.1 years (14-19 years). At baseline, comparing groups 1 and 2, there was no significant difference in level of knowledge (24.7 vs. 26.1), attitude (33.7 vs. 32.2) and practice (23.8 vs. 24.7) of sexual health. Compared with group 1 (control), respondents in group 2 (intervention) had significantly higher level of knowledge of sexual health at immediate post-intervention (25.5 vs. 56.4, $p<0.05$) and 12-weeks follow-up (24.0 vs. 50.8, $p<0.05$). There was no significant difference in practice scores between the groups comparing these periods ($p>0.05$).

**Conclusion:** Interactive educational intervention, is effective in improving knowledge of sexual health among sexually active adolescent girls. Concerted effort at establishing and sustaining school-based sexual health education should be encouraged.



## Introduction:-

Globally, there has been varying degrees of effects of sexual health educational interventions. These efforts have been aimed at reducing unacceptably high morbidity and mortality due to high-risk sexual behaviour (HRSB), including

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sexually transmitted infections (STIs) and unplanned pregnancies (Fatusi, 2016). Every day 1 million, and each year 376 million, new cases of STIs occur, due to high-risk sexual behaviors (HRSBs), mainly unprotected sexual intercourse (WHO, 2019). Also, globally, an estimated 121 million cases of unplanned pregnancies occur, with 61% ending in abortion, and disproportionately high burden borne by developing countries including Nigeria (Bearak et al., 2020). Unfortunately, much of these HRSB result in death or significant reduction in quality of life due to associated complications. For instance, unsafe abortion due to unplanned pregnancy, is key cause of maternal mortality and subsequent infertility (Akpanekpo, Umoessien, & Frank, 2017). Unplanned pregnancy also disrupts girl child education, career development and overall empowerment, thereby impairing attainment of satisfactory livelihood for the potentially single parent and her vulnerable child (Robinson, Stoffel & Haider, 2015). There is also poor access to effective treatment of STI in many LMICs (Newton-Levinson, Leichliter, & Chandra-Mouli, 2016). Consequently, lifelong complications such as infertility and even death makes STIs a significant public health problem (Unemo et al., 2017). Yet, some STIs, including HIV and hepatitis B and C, are currently incurable, implying lifelong infection, high cost of care, impaired quality of life, and even occurrence of life-threatening complications (Unemo, Bradshaw, Hocking & de-Vries, 2017).

Sexual health (SH) problems make significant contribution to global burden of disease, especially among sexually active people (SAP) (Bearak, et al., 2020; WHO, 2019). Among SAP, adolescents are most vulnerable, perhaps due to peculiarities of such transitory stage of human development which strides between childhood and adulthood (Baams, Dubas, Overbeek, & Van-Aken, 2015). Global estimates of burden of HRSB problems among adolescents indicate increasing trend, despite significant degrees of interventions. For instance, within a 25 year period from 1994 to 2017, there has been steady increase in burden of all forms of STI among adolescents (15-19 years), including 64.8% and 25.1% increase in prevalence rates for HIV and genital herpes, respectively (Liang et al., 2019). It is thought that this trend may be due to the characteristic hormonal changes among adolescents, which lead to rapid sexual maturation, that is attended by diverse forms of risky behaviour(Suleiman, Galván, Harden, & Dahl, 2017). These behavioural practices which include non-use of condom and other forms of contraception during sexual intercourse, increases risk and burden of STIs and unwanted pregnancies, as key consequences of HRSB, respectively (Ayang, Ndep&Adindu, 2016).

Adolescents in developing countries bear highest proportion of burden of disease due to these SH problems (Bearak, et al., 2020; WHO, 2019). In these settings, lack of prevention, treatment and care services, accentuates the effects of diverse drivers of SH problems among this vulnerable sub-population of sexually active but potentially inexperienced individuals (Unemo, et al., 2017). When these drivers of HRSB are unchecked, especially through evidence-based and cost-effective intervention measures, the consequences are often far-reaching. Design and implementation of these measures are thought to be the key role of youth friendly centers (YFCs), which seek to improve SH knowledge and practice among young people (Mazur, Brindis, & Decker, 2018).

Unfortunately, most developing country settings do not have functional YFCs (Sully et al., 2020). This unfortunate situation may largely be due to lack of political will to establish and maintain such services, especially amidst dwindling financial resources and presence of other competing communicable and non—communicable diseases (Oleribe et al., 2019). Yet, evidence-basis for sustainable establishment of YFCs is also lacking, due to paucity of literature on best sexual health intervention practices in the diverse multicultural developing country settings including Nigeria (Mazur, et al., 2018). Hence, this study, seeks to assess effect of interactive delivery of educational intervention aimed at improving SH knowledge, attitude and behavioural intentions, among in-school adolescents in a developing country setting.

## Materials And Methods:-

### Research Design:-

Quasi-experimental study design was used to assess effects of interactive intervention on SH knowledge, attitude and behavioural intentions. There were two study groups comprising control (group 1) and interactive educational intervention (group 2). Hence, baseline, immediate and twelve (12) weeks post-intervention assessment of SH knowledge, attitude and behavioural intentions, were assessed and compared between the study groups.

### Research settings:-

There are an estimated 376,196 people in Calabar Municipality, which is in in southern senatorial district of Cross River State. Key religions are Roman Catholic, Orthodox, and Pentecostal. Predominant ethnic groups are Efik, Ibibio, Yakurr, and Ejagham. Common occupations are civil service and business / trading.

**Description of study locations:-**
There are thirty-three (33) co-education public / government-run secondary schools, from where selection was carried out. The three schools randomly selected for the study. Each of the selected schools have perimeter fence with standby security, and more than half of the senior secondary school girls were alleged (by representative teachers) to be sexually active (even from SS1). On average, each of the selected schools had three arms (A, B and C) for each of the senior secondary classes (SS1, SS2 and SS3).

**Study Population:-**
Study population comprised sexually active adolescent senior secondary school girls aged 14-19 years old.

**Inclusion criteria:-**
Sexually active adolescent girls within 14-19 years in senior secondary class in the selected schools were eligible to participate.

**Exclusion criteria:-**
1. Participants who were ill, were also be excluded
2. Participants who report never having sex were excluded from participation
3. Participants who did not assent to participating, or whose parents/guardians did not consent to their participation were excluded

**Sample size and sampling technique:-**
**Sample size determination:**
The sample size was determined by applying the formula for quasiexperimental study (Araoye, 2004):

$$n = \frac{2(Z_{\alpha/2} + Z_{\beta})^2 P(1-P)}{(P_1 - P_2)^2}$$

Where,
n = the desired minimum sample size for each study group.
$Z_{\alpha/2}$ = standard normal deviate corresponding to 95% confidence level = 1.96
$Z_{\beta}$ = standard normal deviate corresponding to power of the study = 0.84.
$P_1$ = degree of improvement in SH knowledge following educational intervention =24.0% (Rokicki, et al., 2017)
$P_2$ = degree of improvement in SH knowledge following educational intervention =5.35% (Wirsiy et al., 2020)
P = average value of the sum of $P_1$ and $P_2$ = 14.68%

$$n = \frac{2 \text{ X } [1.96 + 0.84]^2 \text{ X } [0.1468 (1-0.1468)]}{(0.24 - 0.0535)^2}$$

**n =** 53.73

To take care of non-response rate of 10%, attrition was calculated using

$$N = \frac{53.73}{1 - r (\%)} = \frac{53.73}{0.90} = 59.69$$

Therefore, sixty (60) senior secondary school pupils wererecruited into each of the two study. Hence, total sample size of one hundred and eighty (**120**).

**Sampling technique:-**
Multistage sampling method was employed to recruit participants into each of the study groups. In the first stage, two (2) out of the existing forty-three (43) public secondary schools in Calabar Municipality, were selected purposively. The first and second schools selected, represented groups 1 (control) and group 2 (interactive educational) respectively. In the second stage, simple random sampling method by balloting was used to recruit sexually active female participants into the study. Sampling frame comprised all sexually active female students in each of the three senior secondary arms (SS1, SS2 and SS3). Sexual activity status was assessed initially by participant's voluntary self-report of prior sexual debut, following confidential inquiry by the most amiable female

teacher / administrator or counselor in the school. Thereafter, there was further confirmatory inquiry on the age and circumstances during their sexual debut, as well as last period of sexual intercourse. If a student was able to remember at least two of these three parameters, then she was assumed to be sexually active and therefore enlisted for sampling following their assent. Otherwise, she was considered to have inadequate evidence of being sexually active, and therefore considered ineligible to participate. Among the enlisted (sexually active female) students who gave assent to participating, and who now comprise the sampling frame, simple random sampling by balloting were used to recruit twenty (20) participants in each of the three arms in each of the two selected schools, to yield the estimated total sample size of one hundred and twenty (120). If a selected student was ineligible or their parents did not consent to their ward's participation in the study, her replacement was done via additional balloting among the other sexually active females that were not selected in initial balloting process. If a selected arm (e.g., SS1) in a selected school, did not have enough sexually active female students for recruitment, then additional balloting was done to recruit from the sexually active females that were not selected in any of the other arms. Recruitment continued until estimated sample size was completed.

**Instrumentation:-**

**Questionnaire for assessment of SH knowledge, attitude and high-risk sexual behavior:-**

Pre-intervention and post-intervention data collection, was carried out using validated (UNESCO, 2009) and pretested questionnaire which comprises four sections. Section 1 comprises sociodemographic data of participants. Sections 2 assessed SH knowledge using 52 items bordering on types, modes of transmission, symptoms, complications and prevention of STI and unwanted pregnancy, with Likert scale options of 'Yes', 'No' and 'I don't know'. Section 3 assessed attitude using 11 questions, with Likert scale options ranging from 'strongly agree' to 'strongly disagree'. Section 4 also assessed high-risk sexual behavioural practice using 12 questions, with Likert scale options of 'Yes' and 'No'.

**Content of interactive educational training modules** (for intervention group 2):-

Sexual Health interactive educational modules were didactic and delivered using PowerPoint slides. On average an hour session comprised 45 minutes of didactic but interactive PowerPoint presentation including use of several illustrative diagrams and pictures, followed by 15 minutes of further interaction, response to (anonymous and non-anonymous) questions and summarized reinforcement of session content. The content of each of the four (4) session was in tune with the UNESCO guidelines for sexual health education (UNESCO, 2009). The contents were as follows:

Session 1: Anatomy and physiology of male and female reproductive system, within context of pubertal changes; biological and psychosocial changes associated with adolescence, as well as correct sources of information on adolescent, sexual health issues.

Session 2: Key challenges and issues peculiar to adolescents, including proper communication, peer pressure, attitude and values, relationship changes and decision-making, related to various forms of high-risk sexual behaviour.

Session 3: STIs (including HIV/AIDS), with focus on types/examples, transmission, symptoms and complications.

Session 4: Complications and prevention of STI (including HIV/AIDS), with focus on abstinence among the ABC (abstinence, be-faithful and condom use) components of prevention. Queries, concerns, problems, myths, misconceptions and SH experiences will be entertained from content of all sessions.

**Content of placebo training modules on malaria prevention** (for control group 1):-

Modules for placebo educational training on malaria comprised entomology and life cycle of Plasmodium falciparum (session 1),clinical features and diagnosis (session 2), appropriate health-seeking behaviour concerning malaria (session 3), prevention and control of malaria (session 4).

**Validity and reliability:-**

The validity and reliability of the instrument was assessed and improved upon to suit purpose of the study. Experts in the field of psychology, sociology and health education were engaged to ensure content validity of the instrument, in view of specific objectives of the study. Constructs and items in each construct of the instrument were compared with similar measures in other standardized instruments, to ensure construct validity. Internal consistency for each

construct was done to assess reliability of the instrument, with modification of items towards attainment of Cronbach alpha levels of 0.78, representing average level for all constructs including knowledge of types, transmission, symptoms, complications and prevention of STI, as well as attitude towards sexual health, pregnancy prevention and sexual behavioral practices, respectively. Pretesting of the instruments was done among twenty (20) sexually active adolescent girls in sociodemographically similar but distant secondary school.

**Data collection procedure:-**
Following ethical approval from the Cross River State Ministry of Health Research Ethics Committee, permission was sought from the selected school authorities, research assistants were trained to assist in providing educational intervention, obtain quantitative data, and pretest the study instruments (already validated tools) (UNESCO, 2009) among approximately 10% of the estimated sample size. Participants were then recruited in each of the selected schools, while their parents were contacted (through the Parent Teacher Association) to obtain consent for their children's participation. Assent was also obtained from the participants before conducting the study. Thereafter, arrangements were made with the selected school authorities and head teachers, on the most convenient days and time for delivery of 2-hour daily, 3-day educational training intervention (for groups 1 and 2). Of the allocated sample size of 60 students per group / school, each interactive educational intervention session was delivered to subgroups of 30 students and therefore requiring two subgroup intervention sessions in each of the training days. Baseline or pre-intervention assessment of sexual and reproductive health knowledge, attitude and high-risk sexual behaviour was carried out for participants in each of the study groups. The interventions were then be made to run concurrently.

Group 1 (control) received placebo health education on malaria prevention, while group 2 received educational intervention on sexual health, with didactic PowerPoint-driven content in tune with guidelines from United Nations International Children Educational Fund (UNICEF) and United Nations Educational Scientific and Cultural Organization (UNESCO), with modifications in tune with finding from previous studies. The content of training materials for each of the sessions were be shown and approved by the principal of each selected school, before commencement of training.

Assessment of SH knowledge, attitude and behavioural intentions was done for all participants at immediate and 12 weeks post-intervention. Questionnaire were cross-checked for errors and corrected at the field. Information from questionnaire was entered into excel before exporting to Statistical Package for Social Sciences (SPSS) version 21.0. Data was rechecked for errors and cleaned before commencement of analysis

**Training of research assistants:-**
Five (5) research assistants received 2-hour daily training for three (3) days. The training comprised familiarization and efficient administration of the instruments, appropriate health communication with stakeholders, parents and participants, and adherence to the principles of research ethics. They were also taught how to identify and correct errors on the field, as well as adherence to study protocol and responses to potential questions from parents and participants.

**Study variables:-**
Key independent variables comprised gender, age, class, sexual experience, religion, parental marital status, previous exposure to SH education and other sociodemographic characteristics. These variables were considered independent predictors of level of SH knowledge and attitude as dependent variable. On the other hand, level of SH knowledge and attitude were also considered to be independent variables, which predict high-risk sexual behaviour as dependent variable.

**Data analysis and presentation :-**
Data was entered and analyzed using Statistical Package for Social Sciences (SPSS) version 21.0. Descriptive statistics such as means and standard deviation was used to describe participants' age, as well as knowledge, attitudes and behavioral practice scores and other continuous variables before and after the intervention.Categorical sociodemographic characteristics such age groups gender, parental occupation and other relevant variables, were compared between study groups using chi-square test and presented on frequency cross-tables. Each correct response to questions assessing knowledge of sexual health, contributed one unit to the corresponding component and the total knowledge score. Independent t-test was used to compare post—intervention differences in mean knowledge scores between each intervention and control groups. Attitude, as well as practice scores were also

obtained for each subject, in view of their response to questions with Likert scaled options. Each response contributed a unit, with higher scores indicating better attitude and practice. There was reverse scoring for questions where higher Likert scale responses indicated unsafe sexual attitude and riskier sexual behavioral practice. P-value will be set at 0.05.

**Ethical considerations:-**

Ethical approval from the Cross River State Ministry of Health Research Ethics Committees were obtained before conducting the study. Informed and signed written consent was also obtained from guardian/parents, while assent was obtained from adolescent participants before conducting the study. There was strict adherence to confidentiality, voluntary participation, justice, non-maleficence, and beneficence.

## Results:-

**Sociodemographic characteristics:**

Data was obtained from one hundred and eighty (120) respondents, comprising sixty (60) each, from group 1 (control) and group 2 (interactive intervention) (Figure 1). Mean age of respondents was 17.2 ± 1.1 years, ranging from 14 to 19 years. Approximately half (49.2% were married, while most respondents were younger than 18 years old (63.3%), had father (75.0%) and mother (59.4%) with at least secondary level of education (Table 1).

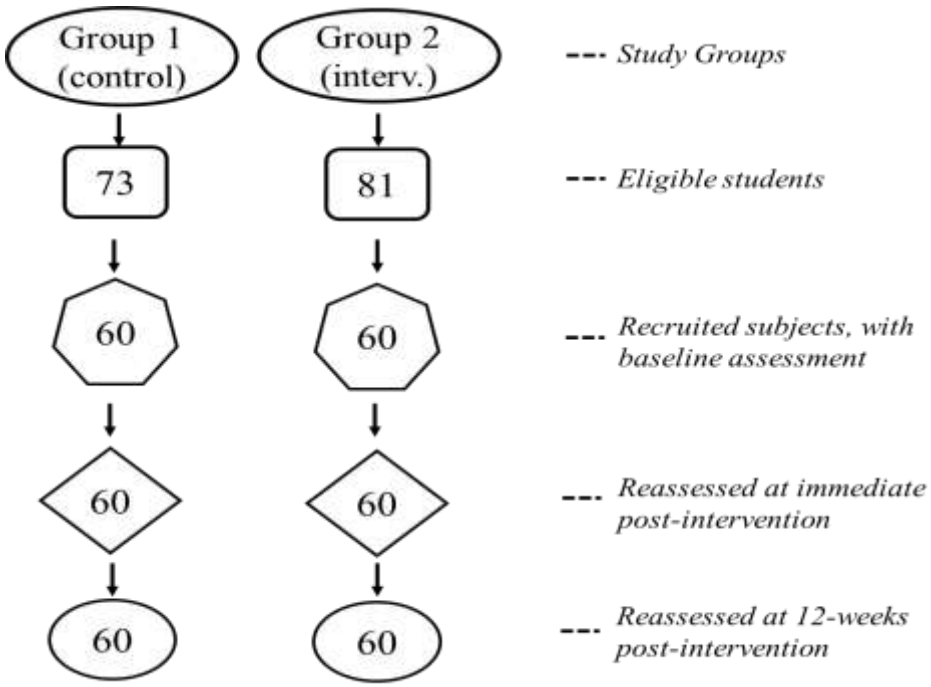


**Fig 1:-** Flowchart of respondents' recruitment and retention.

**Table 1:-** Sociodemographic characteristics of respondents (N=120).

| **Variable** | **Group 1** | **Group 2** | **Total** |
|---|---|---|---|
| | (Control) | (Inter Int.) | |
| | n=60 | n=60 | N=120 |
| | n (%) | n (%) | n (%) |
| **Class** | | | |
| SS1 | 25 (41.7) | 8 (13.3) | 33 (27.4) |
| SS2 | 20 (33.3) | 19 (31.7) | 39 (32.5) |
| SS3 | 15 (25.0) | 33 (55.0) | 48 (40.1) |
| **Age group** (in years) | | | |
| <18 | 45 (75.0) | 31 (51.7) | 76 (63.3) |
| >18 | 15 (25.0) | 29 (48.2) | 44 (36.7) |
| **Father education** | | | |

| | | | |
|---|---|---|---|
| None | 10 (16.7) | 4 (6.7) | 14 (11.7) |
| Primary | 5 (8.3) | 13 (21.7) | 18 (15.0) |
| Secondary | 30 (50.0) | 19 (31.7) | 49 (40.8) |
| Tertiary | 15 (25.0) | 24 (40.0) | 39 (32.5) |
| **Mother education** | | | |
| None | 10 (16.7) | 4 (6.7) | 14 (11.7) |
| Primary | 15 (25.0) | 18 (30.0) | 33 (27.4) |
| Secondary | 25 (41.7) | 16 (26.7) | 41 (34.2) |
| Tertiary | 10 (16.7) | 22 (36.7) | 32 (26.7) |
| **Parents marital status** | | | |
| Married | 25 (41.7) | 34 (56.7) | 59 (49.2) |
| Divorced/separated | 20 (33.3) | 18 (30.0) | 38 (31.7) |
| Widowed | 10 (16.7) | 3 (5.0) | 13 (10.8) |
| Cohabiting | 5 (8.3) | 5 (8.3) | 10 (8.3) |

**Baseline knowledge, attitude and practices on sexual health:**

Result in Table 2 shows level of knowledge, attitude and practice of sexual health at baseline, among respondents in the three study groups. Knowledge of the various components of sexual health was measured on a 62-point scale. At baseline, there was no significant difference in mean knowledge scores comparing groups 1 and 2 (24.7 vs. 26.1, $p>0.05$). There was no significant difference in knowledge scores comparing the two study groups for each of the components assessed ($p>0.05$). Attitude to sexual health was measured on a 55-point scale. At baseline, there was no significant difference in attitude scores comparing the groups 1 and 2 (33.7 vs. 32.2, $p>0.05$). Also, at baseline, there was no significant difference in mean practice scores comparing groups 1 and 2 (23.8 vs. 24.7, $p>0.05$).

**Table 2:-** Knowledge, attitude and practice of sexual health at baseline (N=120).

| **Variable** | **Maximum point scale** | **Group 1** (control) | **Group 2** (Inter. Int.) |
|---|---|---|---|
| | | n=60 | n=60 |
| **ALL KNOWLEDGE ITEMS** | | | |
| Score | 62 | 24.7 ± 10.4 | 26.1 ± 13.3 |
| t-test p-value | | | 0.52 |
| **Knowledge of anatomical, physiological & psychological puberty changes** | | | |
| Score | 5 | 2.6 ± 1.3 | 3.0 ± 1.3 |
| t-test p-value | | | 0.10 |
| **Knowledge of types of STI** | | | |
| Score | 10 | 3.5 ± 2.3 | 3.8 ± 2.8 |
| t-test p-value | | | 0.52 |
| **Knowledge about transmission of STI** | | | |
| Score | 15 | 7.0 ± 3.6 | 7.5 ± 4.1 |
| t-test p-value | | | 0.48 |
| **Knowledge of symptoms and signs of STI** | | | |
| Score | 10 | 3.8 ± 2.6 | 3.6 ± 2.2 |
| t-test p-value | | | 0.65 |
| **Knowledge of complications of STI** | | | |
| Score | 6 | 2.3 ± 1.7 | 2.0 ± 1.6 |
| t-test p-value | | | 0.32 |
| **Knowledge of prevention of STI** | | | |
| Score | 11 | 2.9 ± 2.2 | 3.7 ± 2.2 |
| t-test p-value | | | 0.05 |
| **Knowledge of unintended pregnancy and its consequences** | | | |
| Score | 5 | 2.9 ± 1.2 | 2.5 ± 1.5 |
| t-test p-value | | | 0.11 |

| | | | |
|---|---|---|---|
| **ATTITUDE TO SEXUAL HEALTH** | | | |
| Score | 55 | 33.7 ± 7.5 | 32.2 ± 3.8 |
| t-test p-value | | | 0.17 |
| **PRACTICE OF SAFE SEXUAL BEHAVIOR** | | | |
| Score | 35 | 23.8 ± 5.1 | 24.7 ± 4.8 |
| t-test p-value | | | 0.32 |

**Effect of interactive educational interventions on knowledge, attitude and practices of sexual health at immediate post-intervention:**

Results on Table 3 shows level of knowledge, attitude and practice of sexual health at immediate post-intervention. Compared with group 1 (control), mean level of total knowledge score, as well as knowledge score for each of the constructs, was significantly higher in group 2 (25.5 vs. 56.4, $p<0.00$). Also, compared with group 1 (control), mean level of attitude score was significantly higher in group 2 (37.3 vs. 41.3, $p<0.00$). There was no significant difference in mean practice scores comparing the groups ($p>0.05$).

**Table 3**:- Knowledge, attitude and practice of sexual health at immediate post-intervention (N=120).

| **Variable** | **Maximum point scale** | **Group 1** (control) | **Group 2** (Interv.) |
|---|---|---|---|
| | | n=60 | n=60 |
| **ALL KNOWLEDGE ITEMS** | | | |
| Score | 62 | 25.5 ± 5.0 | 56.4 ± 1.7 |
| t-test p-value | | | 0.00 |
| **Knowledge of anatomical, physiological & psychological puberty changes** | | | |
| Score | 5 | 1.87 ± 1.6 | 4.72 ± 1.34 |
| t-test p-value | | | 0.00 |
| **Knowledge of types of STI** | | | |
| Score | 10 | 3.5 ± 2.98 | 8.60 ± 2.8 |
| t-test p-value | | | 0.00 |
| **Knowledge about transmission of STI** | | | |
| Score | 15 | 6.50 ± 2.17 | 14.38 ± 4.38 |
| t-test p-value | | | 0.00 |
| **Knowledge of symptoms and signs of STI** | | | |
| Score | 10 | 3.69 ± 2.21 | 8.81 ± 2.87 |
| t-test p-value | | | 0.00 |
| **Knowledge of complications of STI** | | | |
| Score | 6 | 2.41 ± 0.16 | 5.03 ± 1.6 |
| t-test p-value | | | 0.00 |
| **Knowledge of prevention of STI** | | | |
| Score | 11 | 2.98 ± 2.07 | 9.86 ± 2.2 |
| t-test p-value | | | 0.00 |
| **Knowledge of unintended pregnancy and its consequences** | | | |
| Score | 5 | 2.94 ± 1.2 | 0.42 ± 1.46 |
| t-test p-value | | | 0.00 |
| **ATTITUDE TO SEXUAL HEALTH** | | | |
| Score | 55 | 37.3 ± 7.2 | 41.3 ± 5.7 |
| t-test p-value | | | 0.00 |
| **PRACTICE OF SAFE SEXUAL BEHAVIOR** | | | |
| Score | 35 | 24.0 ± 4.5 | 25.1 ± 4.8 |
| t-test p-value | | | 0.16 |

**Effect of interactive educational interventions on knowledge, attitude and practices of sexual health at 12-weeks follow-up**

Results on Table 4 shows level of knowledge, attitude and practice of sexual health at 12-weeks follow-up. Compared with group 1 (control), mean level of total knowledge score, as well as knowledge score for each of the constructs, was significantly higher in group 2 (24.0 vs. 50.8, p<0.00). Also, compared with group 1 (control), mean level of attitude score was significantly higher in group 2 (35.3 vs. 37.8, p<0.00). There was no significant difference in mean practice scores comparing the groups (p>0.05).

**Table 4**:- Knowledge, attitude and practice of sexual health at 12 weeks follow-up (N=120).

| **Variable** | **Maximum point scale** | **Group 1** (control) | **Group 2** (Inter. Int.) |
|---|---|---|---|
| | | n=60 | n=60 |
| **ALL KNOWLEDGE ITEMS** | | | |
| Score | 62 | 24.0 ± 4.5 | 50.8 ± 5.8 |
| F-test p-value | | | 0.00 |
| **Knowledge of anatomical, physiological & psychological puberty changes** | | | |
| Score | 5 | 1.88 ± 1.3 | 4.72 ± 1.34 |
| t-test p-value | | | 0.00 |
| **Knowledge of types of STI** | | | |
| Score | 10 | 3.3 ± 0.26 | 8.60 ± 2.8 |
| t-test p-value | | | 0.00 |
| **Knowledge about transmission of STI** | | | |
| Score | 15 | 6.76 ± 1.92 | 14.38 ± 4.38 |
| t-test p-value | | | 0.00 |
| **Knowledge of symptoms and signs of STI** | | | |
| Score | 10 | 3.87 ± 2.37 | 8.81 ± 2.87 |
| t-test p-value | | | 0.00 |
| **Knowledge of complications of STI** | | | |
| Score | 6 | 2.37 ± 0.15 | 5.03 ± 1.6 |
| t-test p-value | | | 0.00 |
| **Knowledge of prevention of STI** | | | |
| Score | 11 | 2.90 ± 2.51 | 9.86 ± 2.2 |
| t-test p-value | | | 0.00 |
| **Knowledge of unintended pregnancy and its consequences** | | | |
| Score | 5 | 2.93 ± 0.95 | 0.42 ± 1.46 |
| t-test p-value | | | 0.03 |
| **ATTITUDE TO SEXUAL HEALTH** | | | |
| Score | 55 | 35.3 ± 5.5 | 37.8 ± 5.2 |
| t-test p-value | | | 0.04 |
| **PRACTICE OF SAFE SEXUAL BEHAVIOR** | | | |
| Score | 35 | 24.0 ± 4.5 | 25.1 ± 4.8 |
| t-test p-value | | | 0.58 |

## Discussion:-

Adolescent girls constitute vulnerable subpopulation with largely unmet sexual health needs. This study was aimed at assessing effects of interactive educational intervention on knowledge, attitude and practice of sexual health behavior among adolescent school girls in Calabar, a developing country setting. Considering paucity of sexual health intervention studies in sub-Saharan Africa, this study makes significant contribution to literature on school-based intervention which assesses interactive medium for delivery of sexual health education, with focus on adolescent school girls.

Baseline level of knowledge on sexual health was poor across all two study groups, with mean score below half of maximum possible score. This implies that more than half of basic knowledge needed for sustainable safe sexual health attitude and behavioral practice, has not been acquired by sexually active school girls in the study setting. Poor level of knowledge may be due to long-term lack of sexual health interventions in the study region (Isiugo-Abanihe, Olajide, Nwokocha, Fayehun&Akingbade, 2015). Knowledge of STI prevention as key construct in sexual health, was significantly lower among group 2 respondents, perhaps due to differences in source of information on sexual health. This position is supported by reports of internet as common source of sexual health information among this study group compared with others. Internet, as source of sexual health information, may be largely unreliable and difficult to utilize for updating knowledge by vulnerable subpopulation of adolescent girls (Evers, Albury, Byron & Crawford, 2013).

Previous studies in eight sub-Saharan African cities (Finlay et al., 2020), South Africa (Ajayi et al., 2020), also found poor level of knowledge of sexual health among young sexually active people. However, more satisfactory level of knowledge of sexuality, was found in similar study among sexually active adolescents in Ogbomosho, South West Nigeria (Owonikoko et al., 2016). Differences in level of knowledge, may be due to potentially different levels of exposure to sexual health interventions via planned programs or passively through routine school-based teachings.

This study also found suboptimal level of attitude and practice of sexual health behavior, with no significant difference in attitude and practice scores comparing the study groups at baseline. Considering that baseline level of knowledge was similarly poor, this finding is not unexpected. In other words, adequate knowledge of sexual health is essential (though not sufficient) prerequisite for more positive attitude and appropriate sexual health behavioral practice. Besides poor level of knowledge on sexual health, other potential reasons for poor attitude and practice include adverse psychosocial environment that may be present in-school and out-of-school (Okunola, Alawode, Bolarinwa, Agbeja&Awoyele, 2020). In-school peer pressure may also contribute to poor sexual health attitude and behavioral practices among the already vulnerable subpopulation (Okunola et al., 2020). Previous similar studies in Ekiti, South-West Nigeria (Ajayi et al. 2017), Port-Harcourt (Imaledo et al., 2012) and Ekpoma (Osagiede et al., 2016) in South-South Nigeria, also reported poor sexual health behavioral practices.

In this study, higher level of knowledge on sexual health, among group 2 compared with group 1, at immediate and 12-weeks post-intervention, suggests beneficial role of interactive educational intervention on improving knowledge of sexual health among adolescent school girls. This is an expected finding, considering generally known beneficial effects of educating individuals that are ignorant of an issue of interest. Willingness to acquire knowledge on sexual health, as a relatively rarely discussed issue in the study setting, may have contributed to significant effects of the educational intervention (Chandra-Mouli, Lane & Wong, 2015). Also, high degree of audience attentiveness, enabling confidential learning environment and interactive nature of the educational sessions, may have contributed to improvement in level of knowledge post-intervention. These findings are in tune with previous similar studies in India (Phulambrikar et al., 2019), Thailand (Sommart et al., 2013), Ghana (Vander-Geugten et al, 2015), Northern Nigeria (Akuiyibo et al., 2021), which reported significant post-intervention improvement in knowledge of sexuality.

Yet, in this study, a 9.1% decrease in mean level of knowledge from 91.2% at immediate, to 92.1% at 12-weeks post-intervention, suggest potential progressive decline in beneficial effects over time. In other words, perhaps without reinforcement with refresher or continuing sexual health education, level of knowledge may continue to decline over the several months and years ahead (Chandra-Mouli et al., 2015). This scenario may potentially lead to much loss of initial highly beneficial effects of interactive sexual educational intervention.

Compared to group 1, respondents in group 2 had significantly better attitude to sexual health at immediate and 12-weeks post-intervention. This finding indicates beneficial role of interactive educational intervention on improving attitude towards sexual health issues. Sexual health knowledge acquired, including correction of myths and clarification of misconceptions, may have contributed to improving attitude post-intervention (Chandra-Mouli et al., 2015). However, improvement in attitude scores, did not translate to similar improvement in categories of attitude to sexual health, as well as sexual health behavioral practices comparing both study groups. This finding suggests that despite improvement in scores, sexual health attitude and behavioral practices were still potentially suboptimal. Hence, besides knowledge, other psychosocial factors including pubertal hormonal changes during adolescence, in-school and out-of-school peer pressure, personality type, family life experiences, prevailing cultural and religious

beliefs, may be contributing as eventual attitude and sexual health practices, in tune with theory of planned behavior (Okunola et al., 2020; Protogerou et al., 2012).

This study is not without notable limitations, which should be considered in the interpretation of the findings. First, there is possibility of response bias, with respondents potentially underreporting their attitude and practice of sexual health behaviors. Considering the sensitive nature of discussing sexuality in the study area and setting, assurance of confidentiality of information provided, may not have been sufficient to eliminate such bias, in tune with the principle of Hawthorn effects, where the respondents recognize that they are being studied. Also, restriction of sample population to adolescent girls recruited from selected public and day-oriented secondary schools, with exclusion of private and boarding schools, may limit generalizability of the study findings. In other words, private as well as boarding schools, may have unique features which influence sexuality and the potential effects of the various forms of educational interventions on sexual health knowledge, attitude and practice.

## Conclusion:-

There is unacceptably poor level of knowledge of sexual health among in-school adolescent girls in Calabar. There is also suboptimal level of attitude towards sexual health, as well as high prevalence of practice of diverse high-risk sexual behaviors among this vulnerable group. Interactive educational intervention is effective for improving knowledge of, and attitude towards sexual health at immediate and 12 weeks post intervention.

## Recommendations:-

1. There is urgent need for concerted efforts by all stakeholders, towards improving knowledge of sexual health, as well as attitude and practice of safer sexual behavior among adolescent girls in Calabar. Parents and teachers should be engaged (especially through the parent-teacher association of schools) by relevant governmental and non-governmental organizations, towards initiating and reinforcing active and passive forms of sexual health education for attainment of safer sex practices, especially among already sexually active adolescent girls.
2. Interactive educational intervention should be prioritized and institutionalized in all secondary schools in Cross River State. This may be effected via revival of the FLHE in all schools, as well as incorporation of sexual health education into the training and assessment curriculum in secondary schools.
3. Further research on the effects of interactive sexual health education intervention should be conducted in other similar and dissimilar settings. These settings may include rural-based, private and boarding secondary schools, which may have different dynamics of factors associated with sexuality as well as effects of such educational interventions.

**Declarations:-**

**Conflict of Interest:-**

There is no conflict of interest to declare.

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**Ethical Approval:-**

The Cross River State Research Ethics Committee approved the study. Informed and written consent from parents, as well as assent from respondents were obtained before data collection.

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