The effectiveness of HIV/AIDS school-based sexual health education programmes in Nigeria: a systematic review

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Abstract

HIV/AIDS is one of the most important public health challenges facing Nigeria today. Recent evidence has revealed that the adolescent population make up a large proportion of the 3.7% reported prevalence rate among Nigerians aged 15–49 years. School-based sexual health education has therefore become an important tool towards fighting this problem. This systematic review assesses the efficacy of these educational programmes and examines how future programmes and their evaluations can improve. Primary literature published between January 2002 and May 2012, which measured sexual health outcomes among school-based Nigerians before and after a sexual health education programme was delivered, was identified. All seven studies that met the inclusion and exclusion criteria showed there had been positive changes in outcomes following these educational programmes. These included increased knowledge, healthier attitudes and safer sexual health behaviour. However, these studies each had methodological flaws which highlighted a range of important design, implementation and evaluation challenges that future programmes need to meet.

Introduction

There are ~168 million people living in Nigeria [1], 3 million of whom are estimated to be living with HIV [2]. This is the third largest number of people in the world after South Africa and India [2]. Nigeria also has the second largest number of new HIV infections in the world [3]. With AIDS claiming so many people’s lives—220 000 in 2009 alone [4]—Nigeria’s life expectancy remains low when compared with the Sub-Saharan region (53 years versus 56 years, respectively) and far lower than the global life expectancy (70 years) [5]. It is also estimated that 19.3% of Nigeria’s total population is aged 15–24 years (n = 33 600 000 people) [6], and that 1.2% of Nigerian males and 2.9% of Nigerian females in this age group are infected with HIV [7]. This is a significant proportion of the reported 3.7% prevalence rate among all Nigerian adults aged 15–49 years [8]. According to Unicef [9], young people are a particularly vulnerable group as Nigerian adolescents now begin to engage in sexual activities at an earlier age than in the past. A key risk factor for HIV infection is poor sexual health behaviour which is a particularly pressing matter for young people in Nigeria. For example, the adolescent fertility rate is estimated to be 113 per 1000 women aged 15–19 years—much higher than the global rate of 53 per 1000 and also higher than the Sub-Saharan African rate (106 per 1000) [10]. The percentage of Nigerians aged 15–24 years who have had sexual intercourse before the age of 15 years is reported to be 11.9% [11]. Contraceptive prevalence data also paint a concerning picture—only 15% of Nigerian women and/or their partners practise any form of contraception compared with 22% across Sub-Saharan Africa and, more strikingly, 62% globally, 79% in the United States and 84% in the UK [12]. Research examining adolescent
sexual health knowledge and perceptions further highlights the challenges of this issue. For example, in 2005, a national sexual health survey found that only 39% of adults had discussed sexual issues with their male children over 12 years of age [13]. A similar survey 2 years later reported that only 24.2% of women aged 15–24 years were able to identify ways of preventing the sexual transmission of HIV correctly and reject major misconceptions about HIV transmission [11].

The Nigerian government has targeted sexual health school-based education as a key method in alleviating these issues [14–16] and there are many reasons why school-based education programmes are a logical mitigation platform. First, schools are a single location where large numbers of youth can be reached. For example, 83 and 44% of Nigerian children are reported to attend primary and secondary school, respectively [1]. Second, schools offer an established and controllable venue which is ideal for intervention. Their location, population, methods and processes are known, making the introduction and rolling out of new educational programmes/interventions achievable. Schools are also frequently linked to local communities, thus extending their reach and enhancing local ownership of interventions [17, 18]. Additionally, as evidence suggests that a large proportion of Nigerians are engaging in sexual intercourse at a young age [11], school-based programmes offer a strong opportunity for preventing HIV/AIDS. The Global Campaign for Education [19] has estimated that effective universal primary education alone could prevent 700 000 new HIV infections globally each year. Such is the power of education to increase knowledge and safer behaviour and reduce infection rates that it has been described as the ‘social vaccine’ and potentially ‘the single most effective preventive weapon against HIV/AIDS’ [20].

Following this logic, over the past decade there have been a number of school-based educational programmes and interventions designed to improve sexual health behaviour and to help prevent rates of HIV/AIDS among Nigerian adolescents. This systematic review aims to synthesize the results of these studies in order to assess their level of effectiveness in improving sexual health outcomes. It also aims to understand what can be learned from these evaluative studies in order to facilitate future programmes and their evaluations.

### Methods

#### Inclusion and exclusion criteria

The following inclusion criteria were applied during the study identification process: peer-review journal articles, book chapters or reports with primary empirical data pertaining to school-based sexual health education programmes’ impact on knowledge, attitude and/or behavioural outcomes. Only studies based in Nigeria that sampled Nigerians aged between 10 and 24 years, written in English and published between January 2002 and May 2012 were included. Literature not published in peer-review journal articles, reports or book chapters, grey literature, secondary literature, literature containing non-empirical data, material not written in English, material published before 2002 and studies not evaluating the effectiveness of sexual health school-based education programmes were excluded from the review.

#### Searching strategy and study identification procedure

The electronic literature databases MEDLINE, PsychINFO and CINAHL were searched using the following keywords and Boolean operators: (Nigeria*) and (sex* or intercourse) and (education* or intervention* or program* or initiative* or project or package) and (adolescent* or youth* or young* or teenage* or child*) and (effect* or efficac* or knowledge* or attitude* or frequent* or outcome* or behaviour* or awareness or contracept*). The titles and abstracts of the papers identified from this search were then screened against the inclusion and exclusion criteria. Additional study titles and abstracts were obtained from checking the reference lists of papers that passed this screening test. Manual searches of the WHO, UNAIDS, UNICEF, International HIV/AIDS Alliance websites were also conducted. Hard copies were obtained for the papers that passed all screening tests.
Data extraction
Using Microsoft Excel, a data extraction spreadsheet was constructed to aggregate data from the included studies. The data extraction headings were: author, title of article, year of publication, aims and objectives, theoretical framework, hypotheses, sample population, sampling strategy, location and setting, design and method, sex education programme detail, outcome measures, results and study limitations. Information not directly fitting in the pre-defined categories were collated in an ‘other findings’ column and processed separately. A second researcher cross-checked all spreadsheet data with the hard copies to ensure data extraction accuracy. Discrepancies that were identified and did not have an immediate logical solution were agreed upon through discussion and consensus.

Quality appraisal
The included studies were critically appraised for methodological quality and rigour using a quality appraisal framework to assess study design, sampling strategy, eligibility criteria described, sample power, attrition, response rates, existence of a control arm, participant allocation method, blinding, contamination measures, existence of clear and ongoing monitoring processes, post-intervention outcome measure time(s), data analysis method(s), tested confounders, piloting of data collection tools, tool validity and reliability and whether consent and ethical approval processes were described. These are all important considerations in the appraisal of quasi-experimental study designs [21–24]. Data were quality assessed by one reviewer and independently checked for accuracy by a second reviewer.

Analysis
A narrative synthesis of the extracted data was conducted. This analytical method was selected as it allows reviewers to be reflexive and critical [25] through their choice of organizing narrative and because it is appropriate when synthesizing evidence from different study designs [26]. Structured summaries were developed, elaborating on and putting into context the extracted data [27]. The heterogeneity of the study designs, interventions and outcomes made a meta-analysis inappropriate.

Results
A total of 673 articles were identified through the electronic searches (n = 631) and reference list checking (n = 42). Twenty-two papers passed the initial abstract and title screening phase, but after a full text scrutiny, only seven articles met all the study inclusion and exclusion criteria and were included in the review (Fig. 1).

The seven studies were set in geographically diverse areas of Nigeria, including south-western regions [28, 29], the west [30, 31], the north-east [32], the south [33] and the ‘Middle Belt’ [34]. Four studies exclusively adopted a pre-post–quasi-experimental design [29–31, 34] and three studies used mixed quantitative and qualitative methods [28, 32, 33]. All the studies collected mixed gender samples from public secondary education schools. A full breakdown of the studies’ background information, methodological details and key findings is given in Table I.
Table I. Background, methodological details and key findings of the included studies

<table>
<thead>
<tr>
<th>Authors, date and location</th>
<th>Research aim</th>
<th>Study design</th>
<th>Sampling: recruitment method, participant details, characteristics and attrition</th>
<th>Educational programme</th>
<th>Study outcome measures</th>
<th>Key results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eset et al. [28], Lagos State</td>
<td>To address the efficacy of the ‘Family Life and HIV Education Curriculum’ educational program</td>
<td>Mixed: (1) a two-point, pre-post-cross-sectional questionnaire survey questionnaire and (2) follow-up qualitative focus groups</td>
<td>In total, 1563 junior secondary school students (from science and social studies classes) of mixed gender and aged 10–19 years were randomly selected from 17 schools spread across the three senatorial districts of the state. About 1366 (87%) were successfully resurveyed 8 months later. Follow-up focus groups with teachers and students in each school (numbers of focus groups and participants not specified)</td>
<td>The ‘Family Life and HIV Education Curriculum’ is a 3-year program integrated with science and social studies classes. The curriculum aims to delay the initiation of sexual intercourse and to reinforce knowledge about sexual responsibility.</td>
<td>Knowledge of reproductive health, gender-role attitudes, sexual pressure attitudes and sexual intercourse attitudes</td>
<td>Knowledge of reproductive health, gender role, sexual pressure and sexual intercourse attitudes all showed statistically significant positive changes.</td>
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| Ajuwon and Brieger [29], Ibarapa—a rural district in Oyo State, South West Nigeria. | To compare the relative effects of peer education, teacher instructions and a combination of the two on the reproductive health knowledge, attitudes, self-efficacy and sexual practices of secondary school students. | A pre-post-quasi-experimental design | Four secondary schools were purposively sampled from different parts of the district to avoid contamination. One school was randomly allocated to one of the four study arms. Students were then systematically sampled into each arm: teacher instruction only (n = 259), peer education only (n = 257), combination of the two (n = 248) and a control arm (n = 246). Sample sizes were based on power calculations. Genders, mean age and class types (junior or senior) were evenly balanced across each arm. A small proportion of the sampled students in each school/arm were married (between 0.8% and 5.8%). The majority of students in each arm were Christians except for the students allocated to the ‘combined intervention’ arm who were predominantly Muslim. All students were successfully resurveyed immediately after the end of the intervention period. | Teachers and students were nominated as the sources of reproductive health information and services. These teachers were trained for 5 days on adolescent sexuality, communication, human reproduction, pregnancy prevention, STD/HIV/AIDS, condom promotion and distribution, drug abuse, malaria and guinea worm infection. Teachers were then provided with course materials, educational materials, condoms and forms to document their activities and assigned to classes based on existing teaching arrangements. However, teachers on the peer education only study arm were not assigned to any class. Instead, they served as supervisors for the peer educators in that school. A similar 5-day training programme was delivered for each set of the 22 peer educators. They were then provided with condoms, educational materials and evaluation forms. The interventions ran for 9 months (one academic session). | Reproductive health knowledge; attitudes towards contraceptives, perceived self-efficacy for safe sex; proportion that have ever had sex; condom use | All three intervention schools showed statistically significant knowledge gains, whereas the control school students’ mean score increased slightly. Increase in knowledge was greatest among the combined arm. All the intervention schools showed a significant positive shift in attitudes. Perceived self-efficacy for safe sex and reported condom use was significantly higher in two of the intervention arms. Sexual activity increased in each arm, but only in the mixed arm were the differences in rates not significant. Condom use significantly increased in the mixed arm and peer education alone arms. Overall, the students from the combined arm showed the most improvement in knowledge, attitude, self-efficacy and sexual health behaviour. |

<p>| Esere [30], Ilorin—the capital of Kwara State | To determine whether the ‘Sex Education Intervention Programme’ would reduce at-risk sexual behaviours of school-going adolescents. | A pre-post-quasi-experimental design | In total, 24 children aged 13–19 years from a randomly selected mixed sex secondary school. These children were identified as being particularly at risk of poor sexual behaviour after all of the intervention group produced significantly better sexual behaviour at-risk scores than the control group. | The ‘Sex Education Intervention Programme’ was administered to the intervention arm. The programme lasted for 8 weeks (1 session per week). Active learning methods (e.g. | Risk of poor sexual health behaviour | The intervention group produced significantly better sexual behaviour at-risk scores than the control group. |</p>
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<td>Aderibigbe and Araoye [31], Ilorin—a large city and capital of Kwara State</td>
<td>To determine the effect of health education on risky sexual behaviour of students from public secondary schools in Ilorin</td>
<td>A pre-post-quasi-experimental design</td>
<td>A total of 521 students randomly sampled at the pre-intervention stage ( (n = 259 \text{ in the control arm}; n = 262 \text{ in the intervention arm}) ) across six public secondary schools ( (n = 3 \text{ schools allocated to the control arm}; n = 3 \text{ allocated to the intervention arm}) ). Students across both arms were similar in age ( (10–19 \text{ years}) ), gender ( (\sim 50–50 \text{ split}) ), ethnicity ( (\text{predominantly ‘Yoruba’}) ) and religion ( (\sim 50–50 \text{ split between Christianity and Islam}) ).</td>
<td>Students allocated to the intervention arm were provided with health education sessions consisting of lectures, films and written materials. No other specific details provided, including the control group.</td>
<td>Number of sexual partners in the past 3 months; frequency of sexual intercourse; number of students who had received gifts in return for sexual intercourse; condom use</td>
<td>The intervention group showed a statistically significant increase in condom use and a significant reduction in the number of sexual partners. No significant change was recorded for sexual intercourse frequency or for the number of participants who had received gifts in return for sexual intercourse.</td>
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<tr>
<td>Van der Maas and Otte [32], Izzi—a rural, north-eastern part of Ebonyi State</td>
<td>To assess the efficacy of a peer education programme among adolescents in a rural area of Nigeria.</td>
<td>Mixed: (1) a two-point, pre-post-cross-sectional questionnaire survey; (2) a comparative case-series questionnaire survey and (3) follow-up qualitative focus groups</td>
<td>For the cross-sectional survey, a systematic sample of 60 students from three secondary schools provided baseline data. About 75 students were surveyed from the same schools 2 years later. For the comparative case series survey, 250 students were systematically sampled at one time point: 125 students from five secondary schools receiving the education programme for at least 2 consecutive years and 125 students from another five schools not receiving the programme. A total of 80 students participated in the focus groups: eight students at five schools receiving the programme for the last 2 years ( (n = 40) ) and eight students from five schools which did not receive programme ( (n = 40) ) were conveniently sampled.</td>
<td>A peer education programme: Peer educators were selected by students and teachers of the schools. They received ongoing training and supervision for over 2 years. Peer educators educated fellow students about HIV and life skills at various times ( (\text{e.g. when teachers were absent and one-to-one discussions}) ). Methods varied from sketches, songs, quizzes, exhibitions, rallies, competitions and videos ( (\text{translated into the local language}) ).</td>
<td>Sexual health knowledge, misconceptions and attitudes ( (\text{including stigma and discrimination}) )</td>
<td>The programme resulted in significantly increased knowledge and decreased misconception about sexual risk behaviours as compared with participants not receiving peer education. These differences were apparent both over time and among cases versus controls.</td>
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<td>Authors, date and location</td>
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<tr>
<td>Mba et al. [33], Item state—a rural community in Abia state.</td>
<td>To assess the impact of a health education programme on knowledge and attitude towards reproductive health issues among school children</td>
<td>Mixed: (1) a pre-post-quasi-experimental design and (2) follow-up in-depth qualitative interviews.</td>
<td>A powered sample of 360 students systematically sampled from two randomly sampled secondary schools were allocated into an intervention or control arm. Subsequent to the intervention, 122 conveniently sampled students (across both arms) participated in the in-depth interviews. Both arms comprised mixed genders and the mean age across both groups was 14.3 years. Most students were Catholic (40.8%), Anglican (28.6%) or Pentecostals (25.3%). All students were successfully resurveyed 6 weeks later.</td>
<td>The students randomly allocated to the intervention arm received a 3 h education workshop on sexually transmitted diseases, HIV/AIDS and family planning. Students in the control arm received no intervention/programme</td>
<td>Knowledge about STDs, HIV/AIDS and family planning</td>
<td>The intervention group showed statistically significant increases in knowledge in all measured areas, including STD control measures, HIV/AIDS transmission and cure and family planning methods and uses.</td>
</tr>
<tr>
<td>Daboer et al. [34], Jos—a city in the middle belt of Nigeria</td>
<td>To assess the effectiveness of a health education intervention in changing the sexual risk behaviours of secondary school students.</td>
<td>A pre-post-quasi-experimental design</td>
<td>Four similar schools were randomly selected and recruited from a sampling frame of all public co-educational senior secondary schools in Jos North and Jos South. A statistically powered sample of 1246 students were randomly recruited: 620 students from one school were allocated to the intervention arm and 626 from the three other schools were allocated to the control group (not specified if allocation was random). Only eight control students did not complete the study. Students across both arms were similar in measured background characteristics. Post-intervention data were collected 6 months after the intervention period.</td>
<td>The students in the intervention arm were educated about the meaning of HIV and AIDS, routes of transmission of HIV, symptoms and signs of AIDS, activities considered high risk for HIV infection, the prevention and control of HIV/AIDS and life skills were taught. A total of 21 lessons spread over 4 weeks were given, each lasting for 1h (45 min of 'interactive teaching' and 15 minutes of questions and answers). Charts and posters were also used during the lessons. Additionally, a film about the consequences of HIV infection was shown to the intervention arm at the end of the intervention period. Students in the control arm received no intervention/programme.</td>
<td>Sexual behaviour (using a modified but validated version of the ‘Youth Risk Behaviour Survey Questionnaire [CDC, 1999]).</td>
<td>The sexual health education intervention delayed sexual initiation among students who were not sexually active. However, the intervention had no effect on the sexual behaviour of the students who were already sexually experienced.</td>
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Quality appraisal
There was also considerable variation in the methodological quality of the studies (Table II). Various forms of random sampling methods were employed across all studies, with five studies also conducting multi-level random sampling [29, 30, 32–34]. Only three studies explicitly described their sampling eligibility criteria [30, 32, 34] and collected statistically powered samples [29, 33, 34] with sample sizes ranging from 24 [30] to 1563 students [28]. Only one study described their response rates at each data collection stage [34], whereas three studies failed to report any response rates [28–30]. Control arms were used in all but one study [28]. Random participant allocation to the study arms were stated in three studies [29, 30, 33], whereas only one study also blinded participants to their arm allocation [30]. Attempts to prevent contamination and contagion were reported in two studies [29, 30] and ongoing monitoring and supervision of the study processes were found in three [29, 30, 34]. The post-study outcome measures were in most cases immediately run at the conclusion of the programme but also occurred at 6 weeks [33], 3 months [31] and 3 months [34] afterwards. Only three studies piloted their data collection tools [28, 29, 32] and tested for validity [28, 30, 34] and only one study examined its tool’s reliability level [30]. Details of the analytical procedures were patchy; the three studies that collected qualitative data did not mention their qualitative data analysis method [28, 32, 33], whereas two studies made no mention of using their quantitative analysis [28, 29]. Four studies examined the effect of various potential confounders [28, 30, 32, 34]. Two studies failed to report whether and how informed consent had been sought and only two studies described having received ethical approval [33, 34].

The most methodologically rigorous and appropriate studies were those conducted by Ajuwon and Brieger [29], Esere [30] and Daboer et al. [34]. These studies all used employed multi-level random sampling methods, produced powered samples and conducted ongoing programme monitoring. Between them, they also described their eligibility criteria and response rates, matched participants across arms, attempted to prevent contamination, examined confounding variables and tested their data collection tools for forms of validity and reliability.

Educational programme form, theoretical frameworks and study outcome measures
As can be seen in Table I, details of the programme’s content and structure are lacking in many of the studies. The Esiet et al. [28] study provided no details about the ‘Family Life and HIV Education’ course. The Van der Maas and Otte [32] and Ajuwon and Brieger [29] studies omitted details about the training, supervision and guidance of the peer educators and frequency of peer education. The Aderibigbe and Araoye [31] study provided no details about the nature of the programme’s lectures, films and written materials. Mba et al.’s [33] study provided no information about how the programme workshop was run.

The educational methods used across these studies were diverse, including sketches, songs, quizzes, exhibitions, rallies, competitions [32], videos [31, 32, 34], games, role-playing, leaflets [30] and charts and posters [34]. All the studies delivered their programmes through classroom, group-based environments and two also tested peer education as an effective conduit of knowledge acquisition [29, 32]. No study referred to a theoretical framework as a basis for their programmes. This is surprising, given the well-established importance of a theoretical framework in directing the production and evaluation of an intervention [35, 36]. However, all the programmes were implicitly founded on the assumption that increased knowledge of sexual health should lead to better behavioural outcomes. Most outcome measures focused on changes to sexual health knowledge [28, 29, 32, 33]; three measured attitude change [28, 29, 32] and changes in sexual behaviour [29, 31, 34] and two measured changes in the risk of poor sexual health behaviour [29, 30]. All seven studies used a questionnaire to measure their outcomes of interest and three also included qualitative data from focus group discussions [28, 32] and in-depth interviews [33].
<table>
<thead>
<tr>
<th>Authors and date</th>
<th>Study design</th>
<th>Sampling strategy</th>
<th>Eligibility criteria described</th>
<th>Powered sample</th>
<th>Response rates</th>
<th>Control group</th>
<th>Arm allocation</th>
<th>Arms matched</th>
<th>Blinding</th>
<th>Contamination measures</th>
<th>Monitoring</th>
<th>Time to evaluation</th>
<th>Analytical procedure</th>
<th>Confounders tested</th>
<th>Data collection tools—pilot</th>
<th>Data collection tools—valid/reliable</th>
<th>Consent process, ethical clearance</th>
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<tbody>
<tr>
<td>Esiet et al. [28]</td>
<td>Pre-post-quasi-experimental</td>
<td>Random at school level; systematic sampling at student level</td>
<td>Inferred yes</td>
<td>24/24</td>
<td>n/s yes Random no yes yes Immediate n/a Gender (1) yes</td>
<td>(1) Face validity n/a</td>
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<tr>
<td>Ajuwon and Brieger [29]</td>
<td>Pre-post-quasi-experimental</td>
<td>Random at school level; stratified sampling at student level</td>
<td>Inferred yes</td>
<td>521/512</td>
<td>Pre: n/s Post: 98% yes n/s yes no no no 3 months</td>
<td>(1) and (2) Binary logistic regression</td>
<td>(3) ANCOVA Gender</td>
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<td>Esere [30]</td>
<td>Pre-post-quasi-experimental</td>
<td>Random at school level; Random at student level</td>
<td>no n/s</td>
<td>521/512</td>
<td>(2) 60 / 75</td>
<td>(3) 250 / n/a</td>
<td>(4) n/a / 80</td>
<td>(2) pre: n/s post: 100%</td>
<td>(2) no</td>
<td>(3) yes</td>
<td>(4) yes</td>
<td>Non-random no no no no</td>
<td>Immediate</td>
<td>Age</td>
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<td>Adenhibie and Araoye [31]</td>
<td>Pre-post-quasi-experimental</td>
<td>(1) and (2) Systematic sampling at student level</td>
<td>yes no</td>
<td>360/360</td>
<td>(3) Pre: 100%</td>
<td>(4) n/a</td>
<td>122</td>
<td>(3) Pre: 100%</td>
<td>(4) n/a</td>
<td>Random no no no no</td>
<td>(1) and (2) Binary logistic regression</td>
<td>(3) ANCOVA</td>
<td>Age Gender</td>
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<td>Van der Maas and Otte [32]</td>
<td>Pre-post-quasi-experimental</td>
<td>Random at school level; systematic sampling at student-level</td>
<td>Inferrered yes</td>
<td>1246/1238</td>
<td>Pre: 100%, Post: 99% yes n/s yes no no yes 6 months</td>
<td>McNemar’s test Sexual experience</td>
<td>no</td>
<td></td>
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<td>Mba et al. [33]</td>
<td>Pre-post-quasi-experimental</td>
<td>(3) Random at school level; systematic sampling at student level</td>
<td>yes yes</td>
<td>1246/1238</td>
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n/s = not stated
Programme effectiveness

Sexual health knowledge

The four studies that measured changes in sexual health knowledge all produced statistically significant results (Table III). In Esiet et al.’s [28] evaluation of the ‘Family Life and HIV Education Curriculum’, the percentage of students having correct knowledge about sexual health issues increased from 46% to 54% ($P < 0.001$) over an 8 month period. This level of statistical significance remained after controlling for student gender. In Van der Maas and Otte’s [32] evaluation of a HIV/AIDS peer education programme, knowledge about transmission, symptoms and prevention of HIV/AIDS and about accessibility to various sources of HIV/AIDS information were assessed. The peer-educated students showed significantly better levels of knowledge than non-peer-educated students in all areas of transmission knowledge [all transmission modes were $P < 0.002$ except kissing ($P = 0.045$)]. Symptom knowledge was also significantly better ($P < 0.001$), as were most of the tested prevention and treatment-related questions (all $P < 0.001$). Their knowledge regarding access to different sources of HIV/AIDS information was also significantly better than non-peer-educated students (all $P < 0.05$, with the exception of ‘village meetings’ as a potential source, which was not significantly different).

Van der Maas and Otte [32] also tested the effect of the educational programme in a non-peer format (the case group) against a control group whose members did not receive the programme. The case group had significantly better knowledge scores in all tested areas of knowledge (all $P < 0.05$) compared with the control group, except when replying to a prevention question about using condoms. Knowledge of different sources of HIV/AIDS information was significantly better among cases compared with controls in all areas (all $P < 0.05$), although no improvement in understanding ‘village meetings’, ‘school lectures’ and ‘radio’ as sources of information was shown.

Mba et al. [33] evaluated the impact of a 3-h health education workshop on knowledge of sexually transmitted diseases and family planning. They found that the workshop had significantly positive effect on knowledge 6 weeks after it took place and that knowledge of symptoms, causative organisms, transmission and control measures and contraception uses, all significantly increased compared with their control group ($P < 0.05$ in all measured domains). Statistical significant gains in knowledge were also shown in Ajuwon and Brieger’s [29] evaluation of a reproductive health education programme. They produced a general knowledge score from questions on timing of conception, methods of contraceptives, routes of infection and prevention. They found that the programme was most effective in improving knowledge scores when it was delivered through combined peer education and teacher-led instruction methods ($P < 0.001$). Peer education and teacher-led instruction methods were also on their own significantly more effective in increasing knowledge than a control group (whose members received no programme) ($P < 0.001$ in both cases).

Sexual health attitudes

Esiet et al. [28], Ajuwon and Brieger [29] and Van der Maas and Otte [32] also measured effectiveness by attitude change. Esiet et al. [28] found that male students’ attitudes towards pressuring girls into sex did not change after the ‘Family Life and HIV Education Curriculum’. However, female students’ perceived ability to say no to boys’ sexual advances significantly increased from 82% to 88% ($P < 0.001$). A significant decrease in the percentage of students who stated that they would have sex with someone they liked was observed across all students (from 22% to 17%, $P < 0.001$). The percentage of students who believe people their age (11–13 years) should wait to have sex until they are older significantly increased from 68% to 81% ($P < 0.001$). These differences remained statistically significant when controlling for gender. In Ajuwon and Brieger’s [29] study, students allocated to the combined peer education and teacher-led instructional and the peer education alone arms showed significant improvement in their attitudes towards
### Table III. Programme effectiveness - quantitative outcome measure results

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<tr>
<th>Study authors [REF]</th>
<th>Knowledge</th>
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<th>Behaviour</th>
<th>Risk of poor sexual health behaviour</th>
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<td>Transmission</td>
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1: Peer-educated students versus non-peer-educated cases, 2: Non-peer-educated cases versus controls; *majority of specific items within measured domain were statistically significant; A = mixed peer education and teacher-led instruction method versus other methods, B = Peer education versus controls, C = Teacher-led versus controls; m = males pressuring females into sex, f = females perceived ability to reject male advances; Y = students sexually active prior to intervention, N = students not sexually active prior to intervention. *p ≤ 0.05, **p ≤ 0.001, ns = not significant
contraceptive use compared with control students (\(P < 0.001\) and 0.01, respectively), whereas students allocated to the teacher-led instructional arm alone did not show any comparative improvement.

Van der Maas and Otte [32] also qualitatively explored stigmatizing attitudes towards HIV-positive individuals. They found that stigma was more prominent among control students than among those in the experimental group during the follow-up qualitative focus groups. For example, most of the control students believed that people infected with HIV have committed adultery and many students stated that they would not associate with such people through fear of infection. Many also believed that they should be prohibited from entering employment and isolated from the rest of society.

**Sexual behaviour**

Three studies measured changes in reported sexual health behaviours. Ajuwon and Brieger [29] found that reported condom use was significantly higher among the peer education alone arm (from 16.7% to 62.8%, \(P < 0.05\)) and combined peer education and teacher-led instruction arm (from 22.8% to 53%, \(P < 0.05\)) than the teacher-led instruction alone arm (from 28.6% to 47.4%) and control group (from 25% to 45.8%). Sexual activity increased in each arm but not significantly among students in the combined arm. Aderibigbe and Araoye [31] evaluated the effect of a health education programme exclusively by sexual behaviour. They found that for the intervention arm the reported number of sexual partners in the past 3 months was significantly lower than what these students reported at the pre-intervention phase (\(P < 0.05\)), whereas no such difference was observed in the control arm. Condom use also significantly increased among students allocated to the intervention arm (pre-intervention: 48.6% reported using a condom during their last sexual intercourse; post-intervention: 85% had done so, \(P < 0.05\)), but not among controls (pre-intervention: 50%, post-intervention: 51.8%). However, the programme failed to detect a statistically significant change in reports of sexual intercourse frequency between the pre- and post-intervention periods. The study also examined the number of students who had received gifts in return for sexual intercourse. Again, the intervention produced no statistical significant effect on this outcome measure (pre-intervention, 27.5% of students in the intervention arm received gifts, compared with 31.2% post-intervention).

Daboer et al. [34] also assessed changes in sexual behaviours. Their evaluation of a 4-week health education programme found that sexual initiation was significantly more delayed among students who were not sexually active in the intervention arm compared with those in the control arm (3.1% of students in the intervention arm became sexually active for the first time 6 months after the programme compared with 13.7% in the control arm, \(P = 0.01\)). However, for students who reported sexual activity prior to the intervention period, the programme had no significant effect on reducing activity for those allocated to either arm (for those allocated to the intervention arm, 15% were sexually active at the pre-intervention period and 10.3% post-intervention; for those allocated to the control arm, 19.2% were sexually active at the pre-intervention period and 23% post-intervention).

Two studies measured changes in the risk of poor sexual health behaviour. Ajuwon and Brieger [29] measured risk according to students’ perceived self-efficacy of safe sex. They found that students in the peer education, teacher-led and mixed arms recorded statistically significant increases in perceived self-efficacy compared with control students between the pre- and post-intervention periods (\(P < 0.05\)). Students from the mixed arm recorded the largest improvement on this variable (\(P < 0.05\)), while students in the teacher-led arm also reported a significantly larger score (\(P < 0.05\)). Esere [30] evaluated the ‘Sex Education Intervention Programme’ on the basis of at-risk sexual behaviours among school students. The study revealed that the students allocated to the intervention arm had significantly better sexual behaviour at-risk scores than the control group (\(P < 0.001\)), including when gender was controlled for (\(P < 0.05\)).
Discussion

One of the aims of this systematic review was to assess how effective Nigerian adolescent sexual health programmes are in improving targeted outcomes. On the surface, the results are very positive. All of the reviewed studies revealed statistically significant improvements in at least one measured outcome. Moreover, the reviewed studies showed over 35 significant improvements in measured outcomes compared with only five non-significant results. A number of previous similar reviews have also concluded positive outcomes, particularly within the knowledge- and attitude-related domains. For example, Paul-Ebhohimhen et al.’s [37] review reported statistically significant knowledge improvements among 10 out of 11 studies with this aim and statistically significant attitude improvements among all four studies with this aim. Kirby et al.’s [38] large systematic review of school-based HIV interventions among developing countries also revealed widespread positive outcomes across these domains, including the behavioural domain in which the majority of the reviewed interventions were found to have led to reductions in sexual activity, increased condom use and/or increases in contraceptive use. These results appear to add weight to the theory that improving sexual health knowledge through targeted, focused school-based educational packages can positively impact on Nigerian school-going adolescents’ sexual health knowledge, attitudes and even their sexual health behaviour. This partially supports a number of established health behaviour theories. For example, the Health Belief Model includes knowledge as one of the several key modifying factors of perceived beliefs associated with a health problem, which in turn has an impact on behaviour and action [39]. Therefore, school-based programmes focused on increasing sexual health knowledge work to enhance adolescents’ recognition of their vulnerability and threat of the disease, and are subsequently more likely to act on what they have learned. The social cognitive theory also describes health knowledge (of risks and benefits) as a prerequisite (one of many) to behavioural change [36, 40] as increased knowledge and mastery of healthy skills develops one’s confidence in their power and ability to change their health behaviours (i.e. self-efficacy). School-based programmes that educate adolescents about what the risks of HIV are, the benefits of healthy sexual behaviours and which teach adolescents skills in engaging in healthy behaviours (e.g. practicing safe condom use), could increase personal self-efficacy and ultimately safer sexual health behaviour.

The results also suggest that a wide range of educational school-based methods can be effective in delivering targeted sexual health programmes. A range of written and visual materials were used effectively in classroom, lecture and workshop settings. Peer education had particularly positive results in the two studies that evaluated their efficacy [29, 32]. Even studies that evaluated very brief programmes had positive results [33, 34]. These programmes also appeared to be effective across the wide range of geographical settings that were covered by the seven included studies. The obvious implication of this is that well-designed school-based sexual health programmes in Nigeria may stand a good chance of being effective regardless of the local and regional social, demographic and cultural picture of the population.

The problem, however, is that these findings are largely being produced from studies with potentially problematic methodologies. The quality appraisal procedure clearly highlights this: powered samples, random allocation of participants, participant matching, blinding, contamination measures, systematic monitoring, piloting and tests of measurement validity and reliability—all crucial components of the programme and intervention evaluations were only reported by a minority of studies. Details regarding eligibility criteria, response rates, ethical approval, informed consent, data analysis procedures and justification for analytical choices were also inconsistent. It is particularly concerning that none of the studies that collected qualitative data referred to their analytical procedures [28, 32, 33] and that two of the studies did not describe their quantitative analysis [28, 29].
issues all raise doubts over the reliability of the results and serve to threaten internal validity. The lack of explicit consideration of theory as the basis on programme effectiveness is also worrying. A coherent theoretical understanding is needed in order to establish how an intervention causes change so that weaker links in the causal chain can be identified and strengthened [41, 42]. These findings are reflected in similar previous reviews. For example, Paul-Ebbohimhen et al.’s [37] review of school-based interventions in Sub-Saharan Africa also identified a range of methodological problems inherent in studies, including very few studies with theoretical bases. Thus, the view that these results support the theory that targeted school-based sexual health education can have an impact on sexual knowledge, attitudes and behavioural outcomes becomes more tentative. Moreover, the argument that evaluations have a better chance of succeeding when a programme has a coherent theoretical underpinning compared with a purely empirical and/or pragmatic approach [41, 43] has not been supported by this review’s findings. Another surprising omission from the reviewed studies was reference to whether and how their programmes had been adapted to the local culture and social context. This important consideration helps to ensure that programme structure and content is appropriate and acceptable to the local community and unlikely to cause harm [44–46]. There is, in fact, a strong evidence base that health programmes work best when they recognize and integrate group cultural values and norms into health promotion packages, including within the sexual health arena [47–49]. Therefore, the importance and power of socially and culturally tailoring interventions should not be ignored.

Given the issues described above, there are clearly a number of lessons about how future school-based adolescent sexual health educational programmes can be rolled out and evaluated successfully. Programmes that are focused on increasing knowledge are likely to yield positive sexual health outcomes, but as only two studies collected post-intervention data beyond the immediate programme period, it is unclear how long such effects might last for. Furthermore, increasing knowledge may not be sufficient in isolation. Theoretical frameworks and models need to be developed so that the usefulness of other moderating factors can be explored, such as the importance of working with local communities and ensuring cultural sensitivity and appropriateness. Future programmes should consider the use of peer education methods given their positive findings in this review and in previous research [50, 51] and also because they are unlikely to be as taxing on school and teaching resources as other methods. Indeed, given the Nigerian context, cost-effective programmes that are not resource-heavy are likely to be most feasible and particularly sustainable. Ultimately, only enduring programmes that are able to sustain low risk behaviours will protect individuals and help to reduce HIV prevalence. The two studies that evaluated longer term behavioural outcomes [31, 34] were the studies that reported the least successful results (50% success in both studies). Previous research of HIV prevention trials has also revealed that the effects of interventions diminish substantially over time [52]. This highlights the challenge that programmes have in producing sustained, long-term positive outcomes, particularly within the behavioural outcome domain. It may be that future interventions need to adopt an ecological approach in which factors related to Nigerian adolescent’s micro-, meso- and macro-systems are built in [53–55]. Using the mass-media to produce macro-system change, for example, have helped produce some of the best longer term outcomes [56, 57]. This review’s findings also provide some evidence that programmes which target younger students who are not yet sexually active stand a good chance at producing positive outcomes. For example, the Daboer et al. [34] study found that their programme only significantly improved behavioural outcomes among the younger students who were not yet sexually active. The Mba et al. [33] study also evidences this as it produced very positive findings from a sample with a low mean age (14.3 years). This provides support to Monasch and Mahy’s [58, p. 35] findings in their review of the HIV/AIDS literature among young people in developing countries, and their claim that ‘young people are much more likely to adopt
and maintain safe behaviours, and it is therefore important to implement interventions early. There are several limitations to these results that should be considered. First, as has been highlighted, this review’s findings on programme efficacy are based on studies that are methodologically flawed. The interpretation that increasing knowledge may have an impact on behavioural outcomes is based on unverified, self-reports, which have questionable levels of reliability and validity [59]. Biological outcomes such as HIV incidence can serve as an effective complementary measure or primary endpoint. However, none of the three studies aimed at implementing behavioural change using such measures, whereas findings from previous similar syntheses also report minimal [60] or no use of such measures [37]. Additionally, although a systematic searching method was employed and supported with manual, reference list checking, it is possible that not all evaluation studies that meet the inclusion and exclusion criteria for the study have been identified successfully. Authors of the included studies were not contacted and therefore additional details about each programme may have been missed. Excluding studies published prior to 2002 reduced the overall pool of evidence and therefore some doubt about the identified studies population representativeness and generalizability exists; however, this criterion was set due to the emphasis on school-based educational programmes in Nigeria over the past decade. Restricting the review’s focus to the Nigerian school context may also be viewed as a limitation. The findings of this review are also limited to school-going adolescents. This is important as children not attending school may be at a higher risk of early sexual behaviour. Finally, a meta-analysis of programme effect has not been conducted because of the heterogeneity of the study designs, interventions and outcome measures.

To our knowledge, this is the first study that has specifically systematically reviewed the effectiveness of Nigerian school-based sexual health educational programmes. No other recent review, including broader Sub-Saharan reviews [37, 60, 61] have comprehensively synthesized evidence from the Nigerian school-based literature from past 10 years. This was an important and timely aim given the particularly high number of adults and adolescents infected with HIV in Nigeria, and the national drive in school-based educational programmes in tackling this public health issue over the past decade. In doing so, this review clarifies that the latest evidence from such programmes consistently point to very positive outcomes across sexual health knowledge, attitudes and behavioural domains. However, the consistent methodological weaknesses in these programmes which compromise the strength and reliability of this evidence have also been highlighted. As such, future programmes are required to meet the range of design, implementation and evaluation challenges highlighted in this study. Programmes should also consider linking with local communities so to augment effectiveness and, importantly, to influence change among children not necessarily attending their school. Community-based interventions should highlight the benefits of school-based sexual health programmes as part of their work with children not attending school. Evidence from community-specific interventions among other developing countries is encouraging, particularly in relation to increased sexual health knowledge [61–63]. Future studies that are able to meet these methodological challenges will also be best placed to implement sexual behaviour improvements; a domain which remains a particular challenge for school-based sexual health programmes [36, 60, 64].

References

Effectiveness of sexual health education in Nigeria


