

Baseline and Post-intervention Surveys of the Prevalence of HIV in an African Rural Population and Women in the Brothel

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Abstract

Backgrounds: HIV remains a major global public health challenge despite all efforts to end the endemic since the 1980s. This study is aimed to determine the baseline and postintervention HIV prevalence among female sex workers (FSW) and in the population of Bonny Island. **Materials and Methods:** The study is a quantitative study involving the general population of the Bonny Kingdom and the FSW in baseline and postintervention surveys. Blood samples were collected and tested for HIV. Data were analyzed with SPSS version 25. **Results:** A total of 1104 blood samples were tested for HIV in both surveys. The baseline HIV prevalence was 4.5% and 1.8% in the postintervention. The prevalence ratio of baseline/postintervention was 2.5 (confidence interval [CI] 1.2–5.8; $P = 0.011$). HIV prevalence was 4.5% in both males and females in the baseline survey as compared to 1.9% and 3.8% in postintervention. The HIV prevalence ratio in females was 3.8 (CI: 1.0–21.1, $P = 0.025$), but no significant difference was observed among males. Baseline HIV prevalence was 7.0 among age 25–34 years and 0.5% in postintervention with a prevalence ratio of 12.9 (CI: 2.0–54.9; $P < 0.001$). The highest prevalence in the baseline survey was observed among FSW (14.0%) and 1.2% in the postintervention with a prevalence ratio of 14.3 (CI: 2.2–60.3; $P < 0.001$). HIV prevalence was significantly higher among FSWs aged 25 or more, full time, had more than one client and have spent over a year in sex work ($P < 0.05$). **Conclusion:** The reduction in the prevalence of HIV seen at the postintervention survey could be attributed to the 3 years of interventions. However, the intervention programs should be sustained and ever scaled up to prevent, control of HIV.

Keywords: HIV prevalence, infectious diseases, intervention, sex workers

INTRODUCTION

Since HIV was identified in 1980, the endemic remains a major global public health challenge despite all efforts to end it. About 37.9 million people were living with HIV worldwide in 2018.^[1] The global HIV prevalence in this period was 0.8% among adults, and about 21% of these same people did not know their status.^[2] The majority of people living with HIV (PLWH) are from in low- and middle-income countries, and about 68% are located in sub-Saharan Africa.^[2]

Nigeria is ranked the second-largest HIV epidemic country in the world, with about 1.9 million PLWH infection in 2018.^[2,3] Furthermore, the 2017 UNAIDS report shows that about 67% of new HIV infections in West and Central Africa occur in Nigeria.^[1]

About 80% of new HIV infections in Nigeria are due to unprotected heterosexual sex and sex workers are among the most affected populations.^[4] The 2016 estimated prevalence of HIV among sex workers was 14.4%,^[5] which was a significant reduction from 24.5% in 2013.^[6] The prevalence of HIV among sex workers is about eight times higher than the general population.^[6] The prevalence of HIV among brothel-based sex workers in Nigeria was estimated at 27.4%, showing that they face a greater risk of HIV infection.^[7]

Nigeria is a large country where HIV infection remains an issue that requires a systematic and highly tailored intervention,^[8] particularly among the people living in rural areas and the key

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vulnerable populations such as the women in brothels. It has been proven that the control of HIV is largely associated with effective reporting and intervention programs.^[9-12]

The WHO set up the framework of interventions to reduce HIV transmission in sex work settings in three faces. The first is to reduce unprotected sex acts with an HIV-infected partner through regular and correct condom use, reduction in the number of sexual partners, increased HIV testing and counseling, and reduction of alcohol harm,^[13] The second and the third are reduction of HIV transmission strategy and sex workers empowerment programs.^[13]

Though many studies have documented the prevalence of HIV among the general population as well as among women in brothels, data about the impact of community-based interventions on the reduction of seroprevalence of HIV among the women in brothels are rather scanty. The objective of this study is to determine the prevalence of HIV among the general population and commercial sex workers in Bonny Kingdom of the Niger Delta region of Nigeria.

Bonny Kingdom is one of the most industrialized areas in Nigeria and a seat of large oil and coal companies. Due to the high concentration of industries and trading activities, the community has become a center of attraction to people from within the country and different parts of the world. This led to a high incidence of HIV in the community and in turn, prompted a baseline survey conducted in 2006 by the Society for Family Health (SFH). The report from the baseline survey was adopted for designing a prevention intervention program executed 3 years, stating from 2008 to 2011. The community-based interventions consist of reproductive education, HIV awareness training, free testing, empowerment programs for sex workers and the community people, provision of condoms, posters presentation, television, and radio programs among others. The radio and television programs include “Jann Kunne film,” “AIDS and You,” “Ireti alaafia,” “One thing at a time,” “Gari Muna fata,” “Odejinjin,” and “Abule oloke merin” among others such as posters, health talks, and several others. HIV testing was conducted for volunteers at the baseline and at the end of the prevention intervention program.

MATERIALS AND METHODS

This is a quantitative study conducted out in Bonny Island of Rivers State, Nigeria. The study used a structured questionnaire to collect data from the general population aged 15–49, including women in brothel, also referred to as female sex workers (FSW). The goal was to compare the prevalence of HIV in the baseline survey with the prevalence after the community-based interventions to determine the impact of the intervention programs.

An unlinked anonymous method of testing was used after administering a behavioral questionnaire. Twelve medical personnel in the community with prior knowledge of counseling were trained for 3 days and chosen to be part of the sentinel

team. Blood screening was done on-site, where the respondent was interviewed, and full privacy was ensured. The approved National algorithm of parallel testing or the use of two none cold chain dependent rapid test kits for the test procedure was adhered to. Furthermore, a third test kit of a polymerase chain-based was introduced as tie-breaker for results that indeterminate or had both negative and positive test results.

For positive cases, adequate referrals were made to General Hospital Bonny, NLNG RA Hospital for subsequent tests and treatment or Ibanise Initiative for further information. Counselors were also provided with condoms and Information, Education and Communication materials on Voluntary Counselling and Testing (VCT) and positive living to be distributed to respondents on the field. Blood samples were collected from 552 people (including FSWs) and tested for HIV in the postintervention survey and the results compared with the baseline results.

Data were inputted with CSPro and analyzed with IBM-SPSS for Windows version 25.0. Descriptive statistics were conducted to determine the demographic distribution of the study participants. Inferential statistics were done to determine the significant difference between HIV prevalence in baseline and postintervention. The prevalence ratio was determined at 95% confidence interval (CI), and *P* value < 0.05 was considered significant.

Approval was sought and obtained from the National Health Research Ethics committee (NHREC) of the Federal Ministry of Health (FMoH) with approval number NHREC Approval Number NHREC/01/01/2007-28/07/2011. The study participant’ informed consent was obtained by conducting an HIV test. Potential participants who were unwilling to take an HIV test after the counseling procedure were excluded from the study. Confidentiality was maintained with participants and was not forced to provide names as codes were assigned to their counseling forms.

RESULTS

This Section presents the HIV prevalence across the different target groups and also compares the prevalence rate of HIV between the baseline and postintervention surveys.

A total of 1104 blood samples were tested for HIV in both surveys, with 552 samples in each of the baseline and postintervention surveys. The baseline survey comprised 286 (51.8%) males and 266 (48.2%) females, including 63 (11.4%) allied workers and 114 (20.7%) women in brothels. The postintervention survey comprised 471 (54.1%) males and 400 (45.9%) females, of which Allied workers and women in brothel constituted 411 (47.2%) and 161 (18.5%), respectively.

The majority of the study participants were aware of the free counseling and testing program through radio (89.7%) and television programs (88.4%). A high proportion of the respondents were also aware of the program through roadshows (76.7%), public lectures (75.2%), and through

hospital/medical personnel (74.7%). Other sources include posters, handbills, pharmacy/chemists, and family planning clinics, as shown in Figure 1.

The proportion of female sex workers that were HIV positive among the general population in baseline and postintervention surveys

HIV tests were carried out among the general population and women in the brothel after guidance and counseling. The demographic distribution of HIV is presented in Table 1. HIV prevalence was 4.5% in the baseline as compared to 2.0% in the postintervention testing with prevalence ratio of 2.5 (CI

1.2–5.8; $P = 0.011$). HIV prevalence was 4.5% in both males and females in the baseline survey as compared to 2.3% and 1.2% in postintervention. HIV prevalence ratio of females was significantly higher in the baseline survey than the postintervention with a prevalence ratio of 3.8 (CI: 1.0–21.1, $P = 0.025$), but no significant difference was observed among males ($P = 0.152$). HIV prevalence among married people was also 3.0 (CI-1.0–10.5; $P = 0.029$) times higher in baseline than in postintervention, but no significant difference was observed among the singles (0.115).

The baseline HIV prevalence was significantly higher among young adults aged 25–34 years (7.0%) as compared to 0.5% in postintervention with a prevalence ratio of 12.9 (CI: 2.0–54.9; $P < 0.001$). The highest HIV prevalence in the baseline survey was observed among FSWs (14.0%) as compared to 1.2% in the postintervention with a prevalence ratio of 14.3 (CI: 2.2–60.3; $P < 0.001$).

Table 2 shows the sociodemographic distribution of HIV seroprevalence among the women in brothels in the Bonny Kingdom. HIV was more prevalent among FSWs aged 15–24 (15.3%) in baseline than those aged 25 years and above (12.7%). A similar trend was observed at the postintervention survey but with a significantly lower HIV prevalence of 1.9% and 0.9% for FSW aged 15–24 and 25 and above, respectively. HIV prevalent ratio was 5.6 (CI-0.7–247.4; $P = 0.064$) among FSW aged 15–24 years as compared to 9.8 (CI-1.3–441.7; $P < 0.008$) among the 25 years and above. The HIV prevalence ratio was significantly higher

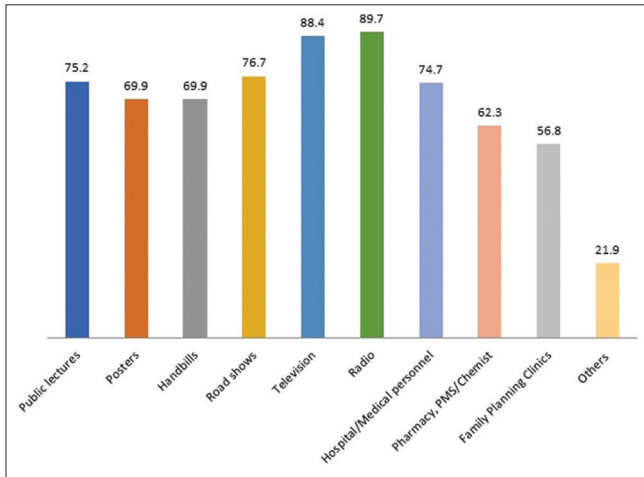


Figure 1: Sources of information about HIV intervention programme

Table 1: HIV prevalence by demographic characteristics for general population

Characteristics	Baseline (n=552)			Intervention (n=552)			Prevalence ratio (95%CI)	P
	Number positive	Total sample tested	Prevalence (%)	Number positive	Total sample tested	Prevalence (%)		
Sex								
Male	13	286	4.5	7	298	2.3	1.9 (0.7–5.7)	0.152
Female	12	266	4.5	3	254	1.2	3.8 (1.0–21.1)	0.025*
Marital status								
Single	11	264	4.2	4	234	1.7	2.4 (0.7–10.5)	0.115
Ever married	14	287	4.9	5	303	1.7	3.0 (1.0–10.5)	0.029*
Not stated	0	0	0.0	1	15	6.7	0	0
Age group (years)								
15–24	5	220	2.3	3	149	2.0	1.1 (0.2–7.3)	0.868
25–34	14	201	7.0	1	185	0.5	12.9 (2.0–54.9)	<0.001*
35 and above	6	131	4.6	6	218	2.8	1.6 (0.4–6.2)	0.373
Category								
Allied workers	2	63	3.2	4	260	1.5	2.1 (0.2–14.4)	0.393
FSW	16	114	14.0	1	102	1.0	14.3 (2.2–60.3)	0.001*
Community members	7	375	1.9	5	190	2.6	0.7 (0.2–2.8)	0.556
Length of stay in Bonny								
<1	2	109	1.8	2	119	1.7	1.1 (0.1–15.1)	0.93
1–3	6	131	4.6	3	108	2.8	1.6 (0.4–10.2)	0.475
4 and above	17	312	5.4	5	325	1.5	3.5 (1.2–12.3)	0.008*
Total	25	552	4.5	10	552	1.8	2.5 (1.2–5.8)	0.011*

FSW: Female sex worker, CI: Confidence interval

Table 2: Demographic distribution of HIV seroprevalence rate among women in the brothel

Characteristics	Baseline (n=114)			Intervention (n=114)			Prevalence ratio (95%CI)	P
	Number positive	Total tested	Prevalence (%)	Number positive	Total tested	Prevalence (%)		
Age group								
15–24	9	59	15.3	1	37	2.7	5.6 (0.7–247.4)	0.064
25 and above	7	55	12.7	1	77	1.3	9.8 (1.3–441.7)	0.008*
Age at first transactional sex								
Below 18	6	44	13.6	1	40	2.5	5.5 (0.7–250.9)	0.077
19 and above	10	70	14.3	1	74	1.4	10.6 (1.5–458.8)	0.005*
Activity type								
Full time FSW	8	55	14.5	1	72	1.4	10.5 (1.4–464.7)	0.006*
Part time	8	59	13.6	1	42	2.4	5.7 (0.8–252.7)	0.064
Average number of clients per day								
0–1 client	4	38	10.5	0	6	0.0	0.0	0.0
1–3 clients	5	37	8.1	1	37	2.7	7.0 (0.8–332.4)	0.038*
4–5 clients	4	27	14.8	0	17	0.0	-	-
6-above	3	12	25.0	1	54	1.9	19.0 (1.5–997.5)	<0.001*
Length of time in sex work								
<6 months	4	42	9.5	0	12	0.0	0.0	0.0
7–12 months	4	25	16.0	1	26	3.9	4.2 (0.4–204.9)	0.166
1 years and more	8	47	17.0	1	76	1.3	12.9 (1.7–574.0)	0.002*
Marital status								
Ever married	4	34	11.8	0	14	0.0	0.0	0.0
Never married	12	80	15.0	2	100	2.0	7.5 (1.7–69.0)	0.002*
Total percentage	16	114	14.0	2	114	1.8	8 (1.9–71.7)	0.001*

FSW: Female sex worker, CI: Confidence interval

across all demographics in baseline than the postintervention except among those that have been in sex work for 7–12 months ($P = 0.076$), aged 15–24 ($P = 0.064$), and FSW who had first transactional sex at age < 18 years (0.077).

DISCUSSION

Rivers State has the fourth largest prevalence of HIV in Nigeria with 3.8% and the majority of the new infections are found among the rural dwellers and the key populations such as sex workers, those who inject drugs, and men that sleep with men.^[14] The study found a very high impact of HIV prevention interventions through the media such as television and radio in the Bonny Kingdom as there was a drastic decline in HIV prevalence from 4.5% in the baseline to 1.8% after the community-based interventions. This was shown in responses from the majority of the study participants during the postintervention survey that they heard about HIV counseling and testing through radio (89.7%) and (88.4%) television programs.

This finding is similar to the report of Bamise *et al.*,^[15] who reported television (76.9%) and radio (75.5) as the major source of information about HIV in Osun State, Nigeria but in contrast with 16.4% reported for radio in Cameroun.^[16] NACA^[3] also recommended social and mass media, including radio and television programs, as the best ways of passing information about HIV/AIDS across to people in the rural

communities. Several intervention projects have also reported relying on media such as television and radio for successful HIV intervention programs.^[17–19] Radio and television significantly contributed to the high awareness seen in this study because the majority of villagers listen to the radio and watch television as major sources of information.

HIV prevalence among the general population and the women in brothels in the Bonny Kingdom

This study found a significantly lower HIV prevalence of 1.8% in the Bonny Kingdom, the HIV prevention intervention as compared to a high HIV prevalence of 4.5% at the baseline survey. The high HIV prevalence in the baseline may be attributed to a lack of sufficient information on HIV and lack of prevention interventions. Adequate knowledge and positive attitudes have been reported as the pillars for the prevention, control, and treatment of HIV/AIDS^[15,16,20] while poor knowledge or ignorance of HIV are the major factors contributing to the high rate of HIV infections, especially in rural areas.^[21–23] Some studies have also shown inadequate knowledge and stigmatization as barriers to accomplishing general access to HIV prevention programs.^[24] The prevalence after the intervention was significantly lower (2.0%) than the baseline. However, we consider this value still very high and require more attention.

Comparing baseline and postintervention results, this study found that the prevalence ratio was higher among females

than in males and among young adults aged 25–34 years than other age groups. Studies have documented that HIV affects young women aged 15–34 as twice as their male counterparts, and this is mostly piloted by heterosexual sex.^[25] Previous studies have shown a slight difference between the proportion of young people aged 15–34 infected with HIV as 3.2% and 3.6% in rural and urban areas, respectively.^[26,27] This is due to high sexual activities among young adults in agreement with the submission of the World Health Organization that there is a high burden of sexually transmitted infection in Sub-Saharan Africa with 40% of the global burden and the highest prevalence is found among young people aged 14–34 years.^[28] The higher HIV prevalence seen among young females in this study is also in agreement with the previous NACA report that HIV prevalence was 3.3% and 2.7% among young Nigerian females and males aged 15–24 years, respectively.^[29] This underscores the importance and the need for HIV prevention intervention programs among Nigerian adolescents and young adults, especially in rural areas.

This study discovered that women in brothel significantly contributed to the high prevalence recorded in the baseline (14.0%) as compared to 1.2% in the postintervention survey. This finding supports 80% of new HIV infections in Nigeria that was attributed to unprotected heterosexual sex, especially among sex workers,^[4] and 64% attributed to this group in 2018.^[30] It is also similar to the 14.4% prevalence of HIV among sex workers, as reported in 2016.^[5] It is also within the estimated range of 4%–30% among sex workers.^[25,30,31]

The significant decline in HIV prevalence after intervention can be attributed to the intensive HIV prevention program carried out in the region for 3 years though other contributing factors are not examined in our study. We believe that the impact of the intervention program in minimizing the risk behavior of the FSW has significantly contributed to the reduction of HIV prevalence at the postintervention survey. A previous study in Nigeria found that FSW underestimates their risk of infection, justify, defend their behaviors; they even display a very strong belief in fatalism, strong faith in their invulnerability to HIV infection as well as a strong belief in predestination that it has been ordained by God, those who will acquire HIV infection or not.^[32] This belief can be attributed to insufficient information on HIV, frustration, hopelessness, and lack of adequate HIV prevention interventions, which were addressed in Bonny during the 3 years program.

Although we do not rule out intervention programs in other places where HIV is very prevalent among FSW in Nigeria. We strongly believe that the impact of the community-based interventions, including regular awareness, counseling, and testing in the brothels, have significantly reduced new HIV infections among the general population and FSW in the Bonny Kingdom. HIV prevalence, especially among FSW, has been continually high in many parts of the country until the community-based intervention program started. In 2007, HIV prevalence among sex workers in Nigeria was higher than

30% and was even over 50% in cities like Kano and Abuja^[33] even though HIV prevalence was declining among the general population in the country from 5.8% in 2001 to 4.1% in 2011.^[34]

CONCLUSION

Niger Delta region is among the top regions with high HIV prevalence in Nigeria. This study has established a high prevalence of HIV in rural communities, especially among the FSWs (classified as a key vulnerable group). This underscores the need for more HIV prevention and control programs in rural areas rather than focusing only the urban settings. The significant reduction of HIV prevalence among women in brothels and the general population at the postintervention surveys in this study could be attributed to the intense health interventions over the 3 years. However, the intervention programs should be sustained and ever scaled up to prevent, control, or eliminate the scourge.

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Conflicts of interest

There are no conflicts of interest.

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