

Client Satisfaction: Understanding its Predictors to improve HIV treatment and care in a tertiary facility southwestern state, Nigeria.

Imhonopi GB¹[ID](#), Soyannwo T¹[ID](#), Ojo OY¹[ID](#), Fasiku MM¹[ID](#), Ahmed AK¹[ID](#), Temitayo-Obboh AO¹, Abdulsalam AR¹, Osindeinde IA¹

¹Department of Community Medicine and Primary Care, Federal Medical Center, Abeokuta

[ID](#): Orcid ID

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Abstract

Objective: Human Immunodeficiency Virus (HIV) infection is a major public health concern. Frequent hospital visits are needed on the part of the patient to achieve decreased prevalence, the efficacy of antiretroviral therapy (ART), and viral suppression. Patient satisfaction is needed to achieve the aforementioned outcomes of care. This study, therefore, was conducted to assess clients' satisfaction and perception of the quality of HIV/AIDS services and to elicit factors associated with dissatisfaction.

Method: A cross-sectional survey was done using a systematic sampling method to select the study population. Data were analyzed by descriptive statistics, chi-square test, and logistic regression at a p-value set at < 0.05.

Results: Most of the respondents (34.4%) were within the age range of 36- 44years. The mean age was 42.1± 11.5years. The overall satisfaction was 85.6%. The majority of respondents (95.2%) affirmed that the quality of care received was good. Unavailability of HIV educational materials was shown to predict clients' satisfaction more than other factors with 3.545; 95% CI: 1.519 - 8.275; p = 0.003. Likewise, clients who perceived health workers to be non-accepting and judgmental are 3.6 times more likely to be unsatisfied with HIV services provided compared to those who do not (3.580; 95% CI: 1.264- 10.141; p = 0.016).

Conclusion: The study demonstrated impressive overall clients' satisfaction with services provided at the health facility and the quality of care. Attention must be paid to the availability of HIV materials and training and retraining of staff to reduce stigmatization and discrimination against patients.

Keywords: Client satisfaction, Quality of care, HIV, Determinants, Patients

Plain English summary

The study was carried out to assess clients' satisfaction and understand the predictors of factors affecting satisfaction among patients attending the ART clinic at the Federal Medical Centre, Abeokuta, Ogun State. The study found that the majority (85.6%) of the clients were satisfied with the care given. However, waiting time was found to be a major factor among clients who were dissatisfied with the services provided. We recommended that there should be continuous training and retraining of staff to ensure quality service delivery.

Background

Human Immunodeficiency Virus (HIV) infection is a major public health concern. Reports from the

Joint United Nations Program on HIV/Acquired Immune Deficiency Syndrome (UNAIDS) described the global burden of HIV/AIDS as one

Correspondence:

Ahmed, Kayode A

Department of Community Medicine and Primary Care,
 Federal Medical Centre, Abeokuta, Ogun State Nigeria
 +2348035756623, abdulmuminahmed070@gmail.com

of the most destructive epidemics the world has ever witnessed. Sub-Saharan Africa is the worst hit by the infection with nearly 23 million of the 33.2 million people with infection living there. Global AIDS death in adults and children were estimated at 2.1million of whom 1.6 million was again from sub-Saharan Africa (1).

HIV and AIDS care requires frequent visits to the hospital. As a result, patient satisfaction with care services during hospital visits is important in considering the quality and outcome of care (2). To maintain a decline in the prevalence of HIV and efficacy of antiretroviral therapy (ART), it is better to keep the patients on treatment satisfied with ART services. Poor patients satisfaction is associated with poor virological and immunological response (3). It is also responsible for the development of resistant strains (3). Patients' satisfaction rating is both a measure of care and the person providing the care (4).

Patients' satisfaction ratings can measure the different aspects of the medical services received or different specific dimensions of the satisfaction or the overall level of satisfaction of total package often referred to as global satisfaction (4). Studies on patients' satisfaction with a healthcare need to be carried out intermittently so that factors responsible for their dissatisfaction can be promptly addressed before clinic default sets in. Provision of services for the management of HIV infection has become a concern to the team at Federal Medical Centre, Abeokuta, Nigeria. In the same vein, the satisfaction and perception of the quality of care by clients are of utmost importance. This study was conducted to assess clients' satisfaction, and perception of the quality of HIV/AIDS services to enhance the efficiency and quality of services.

Methods

Study Area

The study was conducted at the Anti-Retroviral Treatment Clinic (AIDS Prevention Initiative in Nigeria Clinic) of the Federal Medical Centre Abeokuta (FMCA). FMCA is a 500-bedded regional specialist hospital that came into existence on 21st April 1993 with a philosophy of excellence in the provision of medical services to the Gateway State of Ogun and other neighboring states. Ogun State has an HIV prevalence of 1.6% and has 327 centers for the management of HIV (5). There are 19,189 HIV-positive patients on treatment in Ogun State. Antiretroviral (ARV) services in Ogun State are currently being supported by APIN Public Health Initiatives and Prime health response initiatives (6).

Study Design

This was a descriptive cross-sectional study of clients' satisfaction with services at the antiretroviral treatment center and its determinants in Federal Medical Centre, Abeokuta.

Study population

The respondents in this study were adult HIV clients aged 18 years and above on treatment receiving ART services at the Federal Medical Centre, Abeokuta.

Inclusion and exclusion criteria

Patients who were aware of their diagnosis admitted into care for at least six months and with sufficient cognitive ability to answer questions were recruited for the study.

HIV patients who were on admission in the facility and clients who objected to being part of the study.

Sample Size Determination

The number of clients sampled was determined using Fischer's formula. A prevalence (p) of 90.0%, which was the proportion of clients satisfied with HIV services in a previous study conducted in Anambra (7). After a 10% adjustment for non-response, a minimum sample size of 142 was determined. A total of 270 clients were surveyed from the clinic.

Sampling Technique

A systematic sampling technique was used for the selection of respondents. The sampling frame was obtained from the clinic record. The first respondent was chosen by simple random sampling technique by balloting and subsequent respondents were selected using a predetermined calculated sampling interval until the required sample size was reached.

Study instruments/Data collection/Data analysis

The study instrument was a semi-structured interviewer-administered questionnaire. It was pretested among clients in a Primary Health Care facility offering comprehensive HIV services. The questionnaire had three sections. Section A assessed the socio-demographic characteristics. Section B measured patients' satisfaction under the following themes; Accessibility, User Friendliness/Information, Level of stigmatization/discrimination, confidentiality, and privacy, Comprehensiveness of HIV/AIDS services, and overall client satisfaction (8).

Section C assessed the perception of the quality of services.

Four resident doctors were trained for three days on the use of the study instrument, obtaining informed consent, and maintaining confidentiality. Data collected were entered into a computer and analyzed using SPSS version 21. Summary statistics were generated and presented using frequency tables. Appropriate tests of significance (chi-square test and regression analysis) were used to test statistics. Logistic regression analysis of independent variables was performed to determine predictors of clients' satisfaction. Statistical significance was set at a p-value.

Results

The population characteristics of the respondents are presented in table-1 where about 93 (34.4%) of the respondents were within the age range 36-44years. The mean age was 42.1± 11.5years. More than two-thirds 194 (71.9%) were females. A higher percentage 220 (81.5%) were of the Yoruba ethnic group. Christian respondents constituted the majority of 164 (60.7%) while 111 (41.1%) had secondary education. About 164 (60.7%) were married. Most of the respondents fall within the income range ≤ N10, 000 which is approximately \$29 as seen in table-1 below.

Table 1: Socio- demographic characteristics of respondents

Demographic	Characteristics	Frequency (n=270)	Percentage (%)
Age Group	16-25 Years	17	6.3
	26-35 Years	69	25.6
	36-45 Years	93	34.4
	>46 Years	91	33.7
Mean age	42.1± 11.5 Years		
Gender	Male	76	28.1
	Female	194	71.9
Ethnicity	Yoruba	220	81.5
	Igbo	24	8.9
	Hausa	7	2.6
	Others	19	7.0
Religion	Christian	164	60.7
	Islam	100	37.0
	Traditional	6	2.2
Educational Level	Primary	61	22.6
	Secondary	111	41.1
	Tertiary	86	31.9
	None	12	4.4
Marital Status	Single	34	12.6
	Married	164	60.7
	Divorced/Separated	27	10.0
	Widowed	45	16.7

Considering access to the HIV service point, most of the respondents 184 (68.1%) get to the facility within one hour. When asked if there were problems in getting transport to the hospital, the majority 238 (88.1%) reported an absence of transportation problems. A larger percentage 215 (79.6%) reported cost of transportation to the

health facility was affordable. Also, a larger percentage of the respondents 230 (85.2%) reported cost of consultation was affordable. Almost all clients 266 (98.5%) waited more than one hour before been attended to. Likewise, the majority 243 (90.0%) reported the drugs were adequate. (Table 2a)

Table 2a: Assessment of factors affecting clients' satisfaction

Variables	Frequency(n=270)	Percentage (%)
Time to the Facility		
≤/ 1 hour	184	68.1
>1hour	86	31.9

Transportation problems		
Yes	32	11.9
No	238	88.1
Cost of Transportation		
Yes	55	20.4
No	215	79.6
Waiting time		
< 30 Minute	4	1.5
>1 Hour	266	98.5
Cost of Consultation		
Yes	40	14.8
No	230	85.2
Drugs		
Adequate	243	90.0
Inadequate	27	10.0

This study found an overall clients' satisfaction of 231 (85.6%). Interestingly, 231 (85.6%) of respondents never had reasons to complain about the attitude of caregivers at the HIV clinic. The majority 229 (84.8%) said they never had an interruption of consultation, while 210 (77.8%) always had an adequate explanation about test results though, 155 (57.4%) of the respondents said they never had more time as they could have during a consultation. A majority, 218 (80.7%) reported never been uncomfortable discussing personal or intimate issues while with the caregiver. In the same vein, 175 (64.8%) of respondents never had any problem being involved in decision-making about their HIV treatment and care. Also, 230 (85.2%) said they

never had problems with asking the providers questions about HIV care. Almost all respondents 252 (93.3%) never had their complaints ignored. It's good to know that, almost all the respondents 263 (97.4%) had their consultation in a language they could understand and 88.5% never have a hard time understanding questions. Similarly, 208 (77.0%) of the respondents never had a delay of appointment. Conversely, 64 (23.7%) never had a delay in getting an appointment for urgent care and 63 (23.3%) reported never had a delay in getting an appointment for non-urgent care. However, only 62 (23.0%) of respondents reported always having access to available HIV-specific educational materials. (See Table-2b).

Table 2b: Clients Satisfaction and Perception of services provided at the HIV clinic.

Variable	Never (%)	Sometimes (%)	Usually (%)	Always (%)
Availability of HIV Specific educational materials	142 (52.6)	54 (20.0)	12 (4.4)	62 (23.0)
Delay of appointment	208 (77.0)	40 (14.8)	9 (3.3)	13 (4.8)
Delay in getting appointment for urgent care	64 (23.7)	30 (11.1)	27 (10.0)	149 (55.2)
Delay in getting appointment for non-urgent care	63 (23.3)	32 (11.9)	17 (6.3)	158 (58.5)
Delay in getting answers to questions when facility is contacted	40 (14.8)	10 (3.7)	16 (5.9)	204 (75.6)
Perception on interruption of consultation	229 (84.8)	24 (8.9)	4 (1.5)	13 (4.8)
Perception on providing adequate explanation on test results	28 (10.4)	14 (5.2)	18 (6.7)	210 (77.8)
Perception on providing more time during consultation	155 (57.4)	44 (15.6)	25 (9.3)	48 (17.8)
Perception on being uncomfortable discussing personal or intimate issues	218 (80.7)	15 (5.6)	14 (5.2)	23 (8.5)
Involvement in Decision making	175 (64.8)	50 (18.5)	17 (6.3)	28 (10.4)
Perception on unable to ask provider questions about HIV.	230 (85.2)	21 (7.8)	7 (2.6)	12 (4.4)
Perception on complaints ignored	252 (85.2)	5 (1.9)	6 (2.2)	7 (2.6)

Perception on inability to understand their answer.	239 (88.5)	12 (4.4)	4 (1.5)	15 (5.6)
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Furthermore, table-3 is about the factors associated with clients' satisfaction and perception of quality of care. The majority of respondents, 257 (95.2%), affirmed that the quality of care received was good though 239 (88.5%) complaint of lack of adequate equipment. About half, 139 (51.5%), of respondents, reported that health personnel accepted them and there were no judgmental feelings about their condition. Similarly, 264 (97.8%) believed their HIV status was kept confidential. Waiting time was a major determinant of satisfaction, in this study 229 (86.1%) of clients waited for >30minutes before

being consulted. About 58.9% reported the staff to be up-to-date with recent developments in HIV. Most of the respondents, 70.7%, acknowledged the staff to be respectful and 63.3% reported that the staff was understanding. Some of the associated factors to clients' satisfaction in this study were availability of HIV educational material (χ^2 -15.928, P-value= <0.001), not ignoring complaint of respondents (χ^2 -5.568, P-value=0.018), accepting and non-judgmental of clients (χ^2 -11.162, P-value=0.001), availability of equipment (χ^2 -6.031, P-value=0.014) were all found to be statistically significant.

Table 3: Clients satisfaction, quality of care, and factors influencing satisfaction

Variables	Frequency(n=270)	Percentage (%)	Chi-value	P-value
Perception on quality of care				
Good	257	95.2		
Poor	13	4.8		
Equipment				
Adequate	31	11.5		
Inadequate	239	88.5		
Level of Stigma and Discrimination Accepting and Non-judgmental				
Never	99	36.7		
Sometimes	22	8.1		
Usually	10	3.7		
Always	139	51.5		
Confidentiality and Privacy HIV Status kept confidential				
Yes	264	97.8		
No	6	2.2		
Waiting time				
30 minutes and less	2(50.0)	2(50.0)	χ^2 4.153	p-value 0.042*
>30minutes	229(86.1)	37(13.9)		
User-friendliness/Information Availability of HIV educational materials				
Yes	98(76.6)	30(23.4)	15.928	$<0.0001^*$
No	133(93.7)	9(6.3)		
Ignoring complaints of respondents				
Yes	12(66.7)	6(33.3)	5.568	0.018*
No	219(86.9)	33(13.1)		
Perception of respondents on interruption of consultation				
Yes	21(75.6)	10(24.4)	3.869	0.049*
No	200(87.3)	29(12.7)		
Level of Stigma and Discrimination Accepting and non-judgmental health provider				
Yes	137(80.1)	34(19.9)	11.162	0.001*
No	94(94.9)	5(5.1)		
Confidentiality and Privacy				
Yes	5(83.3)	1(16.7)	0.025	0.875

No	226(85.6)	38(14.4)		
Equipment				
Adequate	209(87.4)	30(12.6)	6.031	0.014*
Inadequate	22(71.0)	9(29.0)		
Respectful Staff				
Yes	74(93.7)	5(6.3)	5.951	0.015*
No	157(82.2)	34(17.8)		
Understanding Staff				
Yes	90(90.9)	9(9.1)	3.625	0.057
No	141(82.5)	30(17.5)		

Table 4 shows the logistic regression of predictive factors for clients' satisfaction. Respondents who reported unavailability of HIV educational materials were 3.5 times more likely to be unsatisfied with HIV services compared to those who do not (3.545; 95% CI: 1.519 - 8.275; p =

0.003). Likewise, clients who perceived health workers to be non-accepting and judgmental are 3.6 times more likely to be unsatisfied with HIV services provided compared to those who do not (3. 580; 95% CI: 1.264- 10.141; p = 0.016).

Table 4: Logistic Regression on predictors of satisfaction of HIV services

Variable	Odds Ratio	95% CI		P-value
		Lower	Upper	
Waiting time				
</1hour (ref)				
>1 hour	3.613	0.346	37.751	0.283
Availability of HIV educational materials				
Yes (ref)				
No	3.545	1.519	8.275	0.003
Ignoring complaints of respondents				
Yes (ref)				
No	2.230	0.651	7.636	0.202
Accepting and non-judgmental health provider				
Yes (ref)				
No	3.580	1.264	10.141	0.016
Interruption of consultation				
Yes (ref)				
No	2.022	0.761	5.377	0.158
Equipment				
Adequate	2.604	0.953	7.117	0.084
Inadequate (ref)				
Respectful staff				
Yes (ref)				
No	0.291	0.072	1.181	0.084
Understanding Staff				
Yes (ref)				
No	1.546	0.511	4.680	0.441

Discussion

The socio-demographic pattern of respondents in this study was similar to that found in another study by Opara et al (9) in Uyo, where the majority of People Living with HIV and AIDS attending HIV clinic at the University of Uyo Teaching Hospital, Uyo were aged 31-43 years (51.4%), this study found a mean age of 42.1±11.5 years. There was

a significant relationship in the mean age of participants in this study with another similar research by Helena Getenet et al (10) in Ethiopia which was 30.5 years for females and 35.2 years for the males. The findings in the two studies corroborate well with what we found in our study which showed that in most situations, HIV

infections were acquired at a younger age with the manifestation of infection very early in life.

In the same vein, the study found the majority of our respondents were females and married. Similar findings were reported in Nnewi (11), Uyo (9), and Ethiopia (10) this might indicate that females were either exposed to HIV infection early in life. Our study also found that most of the respondents had secondary education, followed closely by the tertiary level of education, this was similar to what Anthony Iwu et al (12) found in Orlu, south-east, Nigeria. In the same study, Anthony et al (12) found more widowed/separated, Opara et al (9) found a majority of their respondents were divorced/separated, while the majority of our respondents were married, these findings capture the significance of heterosexual intercourse in the transmission of HIV in Nigeria and Africa in general.

Patient satisfaction can be used as an indicator of health care quality because the more satisfied patient is the more likely patient cooperate with the healthcare provider and have a higher level of continuity with the provider which in turn improves the clinical outcome (2, 11). Access to care was an important domain by which satisfaction was measured (13). This study found most clients stayed more than one hour before the consultation. Findings from our study were similar to a study conducted in Kano, North-west Nigeria which showed a median time spent waiting to see a doctor as 40minutes (13). Studies carried out in Uganda (14), Iran (15) and South Africa (16) also reported the significance of access to a health facility. They emphasized that clients' satisfaction is also determined through access to healthcare services which encompasses the availability of health workers and drugs especially in public health facilities, distance to health facilities, and a longer waiting time to access healthcare services. In the area of general satisfaction with service provision, it was observed that there was a good level of overall satisfaction similar to the level of perception among the majority of the respondents, and as such, there could be a relationship between perception and satisfaction of the respondents which is not unusual as both satisfaction and perception depend on preconceived ideas, expectations, past experiences and achieved service performance (12, 17, 18). This general school of thought regarding perception and expectation was displayed in this study where there was a high overall clients' satisfaction among the respondents. Although a small fraction of the

respondents lamented the lack of availability of HIV-specific educational materials, most were satisfied with the lack of delay in appointment even for urgent and non-urgent care and getting answers to question when the facility is contacted.

This study found perception on quality of care to be good, the majority of our respondents believed the quality of services was adequate though they perceived that equipment was lacking and the waiting time was equally perceived to be lengthy. An average respondent spent more than 30minutes before consultation in this study. Although, this study was not a comparison between public and private facilities studies in Nigeria had shown that the quality was better in public compared with private facilities. Olowookere et al (19) and Osungbade et al (20) in Nigeria both reported that generally, a high level of satisfaction with services was observed among the participants from public hospitals. In sharp contrast to the findings in this study, Nwabueze et al (11) reported more satisfaction among private facility attendants in their study. Umeokonkwo Chukwuma et al (2) in Anambra, South-east, Nigeria argued that the differences observed among the public and private facilities were largely due to reasons of subsidies where services are largely subsidized by the government, users generally report a high level of satisfaction due to their little expectation.

Furthermore, Awatta Walter Ochan and colleagues observed that patients in public health facilities usually have higher perceptions and they should have had a bigger average gap but due to their higher expectations as well, which is difficult to meet. This is in line with the disconfirmation theory, which states that 'the higher the expectations, the lower the perception' leading to less satisfaction or negative disconfirmation (14). This observation was similar to what we discovered in this study where perception was high in most of the thematic areas considered except in the area of waiting time which most patients believed was too long and could greatly affect clients' satisfaction. A high proportion of clients" in this study reported that the attitude of health staff was never poor to them; never had any interruption of consultation, always had an adequate explanation about test results; although majority complaint of never had more time during the consultation. Chukwuma et al (2) report contrast sharply our observation, in their study the proportions that were satisfied were less than 50% in both public and private hospitals in technical quality and time spent with the doctor

domains. This could mean the patients' perception of the technical competency of their clinicians was suboptimal. The findings in our study were most likely due to the doctor-client ratio with most of the time spent on ensuring that more clients are seen at every clinic. The findings on not getting more time to consultation in this study were contrary to a South African study where clients interviewed agreed that their healthcare provider listened to their problems long enough. In this same study majority of the patients had an opportunity to ask their healthcare provider questions and were satisfied with the explanations provided (21). Similarly, this study showed that the majority of our respondents were never uncomfortable discussing personal or intimate issues; were involved in decision making on their care and treatment, and were never ignored when the complaint was made. A related study in the United States of America supported this assertion that patient involvement in decisions on treatment modalities had a strong correlation with the interpersonal quality of care satisfaction and with overall quality-of-care satisfaction (22).

These findings are quite similar to a study that was done by the National Agency for the Control of AIDS (NACA), Nigeria to assess the quality of care where the majority of clients were completely satisfied with confidentiality and respect of patients' privacy, the competence of HCWs, consultation, explanation and guidance of HCWs, the responsiveness of the HCWs to patients' questions and requests (21). The medical staff needs to pay more attention to privacy and the adequacy of the doctors' explanations of medical terms is more than important in clients' satisfaction which was also demonstrated by this present study. This observation further emphasizes the importance of health care provider's behavior such as the conduct and attention to the patient in improving patients' satisfaction. This has been noted by Dansereau et al (23), which showed that patients' ratings of health care provider behavior were an especially strong predictor of satisfaction. A similar study among clients in Bangladesh showed that health workers' attitudes and behavior were much more important than the technical competence of the provider (24).

Other factors that could influence patients' experiences are responsiveness and empathy. It was indicated that health workers' interpersonal skills and patients' trust influence the satisfaction with the provider stronger than the actual quality of medical care (24). The Bangladeshi study (24)

corroborated the finding in this study which demonstrated clients' confidentiality and privacy; accepting and non-judgmental attitude by a healthcare provider; not ignoring complaints of respondents and availability of HIV educational materials were found to be statistically significant predictors of client satisfaction. This goes to support Beller's (25) views that, "No matter how sophisticated and reputable a medical facility may be and no matter how brilliant and knowledgeable the physicians practicing there, patients will not perceive their care as being excellent unless they are satisfied concerning many of the behaviors cited above and that results in high patients' satisfaction is having physicians and other caregivers who are truly concerned about their patients" (25).

The predictors of clients' satisfaction of care received at the facility include unavailability of HIV educational materials and non-accepting and judgmental attitude of the staff. However, Jitta et al (26) in Uganda found total time spent in the facility and Joshua Amo-Adjei et al (27) in Ghana reported that regular drug supply is a factor influencing clients' satisfaction in their studies (2).

The observation in this study is a clear and unique opportunity to increase information sharing between caregivers and clients to increase clients' satisfaction with the services provided.

Limitations of the study

We did not explore the waiting time at different service points such as pharmacy, laboratory, adherence counseling, and HIV testing units to have an idea where the patient usually waits more but the study makes it clear there is an issue with waiting time.

Conclusion and recommendations

This study showed that clients attending HIV/AIDS clinic were satisfied with the services provided at Federal Medical Centre, Abeokuta. However, certain areas of concern have been elucidated which include reducing the waiting time before patients are seen, inadequate availability of educational materials, and the need to be non-judgmental and accepting on the part of the health workers. Improvement in these areas will further enhance the overall patients' experience and satisfaction thereby increasing the certainty of better treatment adherence and retention in medical care.

From the foregoing and observation arising from this present study, the following recommendation would improve clients' satisfaction and increase

treatment adherence and retention in care at the HIV clinic.

1. Reducing waiting time before medical consultation through training and retraining of healthcare workers.
2. Making adequate availability of Information Education and Communication (IEC) materials to all clients both new and old.
3. Unacceptable and judgmental attitudes by some staff were also found to strongly determine satisfaction. There should be training and retraining on behavioral change for all cadres involved in care and treatment to minimize stigmatization.
4. Despite the pressure of ensuring all clients who present at the clinic are seen, adequate time must be given to each client to hear their view of care they receive and make input in the decision on their care and treatment.

Declarations

Ethics consideration

Ethical approval for this study (FMCA/470/HREC/01/2019/10) was obtained from the Federal Medical Centre Ethical Review Committee. Clients were provided with informed consent forms explaining the study objectives and aims and the voluntary nature of the study. The interviews were conducted in privacy and anonymously. Respondents were informed about the objectives of the study and that the data collected would be treated with confidentiality. Written informed consent was obtained from all respondents signed or thumb printed before the start of the interview.

Consent for publication

The authors hereby give consent for the publication of this work under the Creative Commons CC Attribution. Non-commercial 4.0 license.

Availability of data and materials

All data generated or analyzed in this study are included in this article and are available at any request.

Competing interests

The authors declare that they have no competing interests

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Contributions of authors

Conception and design: IG, ST, OOO, and FMM

Acquisition of data: OOO and OIA

Analysis and interpretation of data: FMM

Drafting of the manuscript: AKA and AAR

Critical revision of the manuscript for important intellectual content: ST and AKA

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