

Positive Status Disclosure and Sexual Risk Behaviour Change among People Living with HIV in Northern Region, Ghana

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Abstract

Objective: To investigate sexual behaviour changes adopted by PLHIV on Antiretroviral therapy (ART) in the Northern Region of Ghana.

Methods: We employed a cross-sectional survey with a questionnaire to collect data from 900 clients from nine major ART centres within the region. Chi-square and logistics regression analyses were applied to the data.

Results: The common safe sexual behaviours adopted by more than 50% of PLHIV on ART included: condom use, reduction in sexual partners, abstinence, reduction in unprotected sex with married/regular partners, and avoidance of new casual sex partners. Also, the fear of others getting to know patients' HIV positive status ($\chi^2=7.916$, $p = .005$), fear of stigma ($\chi^2=5.201$, $p = .023$), fear of losing family support ($\chi^2=4.211$, $p = .040$) and not ready to disclose yet ($\chi^2= 4.475$, $p = .034$) were statistically significant predictors of non-disclosure of HIV positive status among the participants. Moreover, change in sexual behaviour is influenced by; "to avoid spreading the disease to others", [$R^2 = .043$, $F(1, 898) =40.237$, $p < .0005$], "to avoid contracting other STIs [$R^2 = .010$, $F(1, 898) =8.937$, $p < .0005$], live long [$R^2 = .038$, $F(1, 898) =35.816$, $p < .0005$], hide HIV-positive status [$R^2 = .038$, $F(1, 898) =35.587$, $p < .0005$], achieve good results from ART treatment [$R^2 = .005$, $F(1, 898) =4.282$, $p < .05$] and live a Godly life" [$R^2 = .023$, $F(1, 898) =20.880$, $p < .0005$].

Conclusion: Although a high self-disclosure rate of HIV positive status was identified, with more participants disclosing either to their spouses or parents, reasons for disclosure and non-disclosure differed from person to person. Future HIV prevention interventions should be tailored to facilitate open communication on disclosure status and positive sexual behaviour changes.

Introduction

Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) pandemic still pose global public health challenges despite decades of numerous interventions aimed at eradicating the disease [1]. HIV is the virus that brings about AIDS, the terminal stage of HIV infection. The virus can be acquired through heterosexual contact, mother-to-child (MTC) transmission, and contaminated blood transfusion [2, 3]. Apart from the vertical transmission, unprotected sex is the most common route of HIV infection among people living with HIV (PLHIV), while the route of infected needles sharing is the least [3]. Other risk factors and behaviours play important role in HIV transmission. For example, the use of infected sharp instruments, drug abuse, and having unprotected sexual contact with infected people, as well as the delay or failure to treat other sexually transmitted infections (STIs) can be other means of transmission. A recent study showed that the majority of males contracted HIV through narcotics injection, while the females contracted it through unprotected sexual contact with infected individuals [4].

The world continues to implement effective HIV prevention strategies to improve the quality of life of HIV-infected persons and their sexual and social networks [5]. HIV disclosure among HIV-infected persons is one of these strategies considered effective prevention and early management initiative [6]. Disclosure of HIV positive status is an adopted concept that has its roots in self-disclosure. Self-disclosure is a communication style in which an individual shares information about their lives [7]. However, the concept of HIV disclosure had been explained differently by other scholars. For instance, HIV status disclosure is explained as a process of letting another person(s) be aware of one's HIV positive status, an act done by the patient voluntarily (self-disclosure) or by a different person (secondary disclosure) [7]. There is evidence that disclosing one's HIV status affects one's behavior. For example, a study on HIV Prevention of Mother to Child Transmission (PMTCT) Program, revealed that among HIV-positive mothers, disclosing HIV positive status to family members, especially sexual partners improved adherence to exclusive newborn feeding [8].

AIDS risk reduction model (ARRM) provides a framework for explaining and predicting behavioural change efforts of persons with STIs such as HIV/AIDS [9]. This model operates around three tenants: recognition and labeling, commitment and action taking. The health belief model (HBM) explains the concepts that predict the reasons individuals take action to prevent, to screen for, or to control illness conditions [10]. It operates with primary concepts of perception: susceptibility, severity, benefits and barriers to behaviour, cues to action, and self-efficacy. Within the context of HIV/AIDS prevention and management, HIV disclosure is paramount. For instance, HIV status disclosure has a significant role in new HIV infections prevention and management [11]. Again, some studies have revealed that HIV positive status disclosure can bring about emotional/financial support, increase partner HIV testing and acceptance of condom use [12, 13]. Moreover, HIV disclosure is important in the context of ART which can lead to care support and treatment adherence [14].

Evidence shows that many people engage in risky sexual behaviour which puts them at risk of getting themselves and others infected with HIV and other STIs [15]. Previous studies have revealed that over 50% of PLHIV are sexually active and do engage in sexual risk behaviour when they are on ART [16, 17]. Comparatively, PLHIV and on ART do change their sexual risk behaviour [18, 19]. For instance, it has been established that PLHIV and on ART engage in consistent condom use, reduce the number of sexual partners or help in partner(s) HIV testing due to the counseling they receive before and after initiating the ART [16]. Again, Bolori, Mohammed Tahiru et al. [20] found that approximately 83% of respondents had an attitudinal change in their various ways after being diagnosed as HIV positive. Such changes include taking preventive measures against more serious STIs, avoiding the spread of the disease to others, and complying with medical advice on a regular basis.

The Ghana Ministry of Health in collaboration with the Ghana AIDS Commission implemented enhanced early access to ART at no cost to all PLHIV regardless of one's immunologic status or viral load in 2013 [21, 22]. However, despite the attempt, further reduction in the incidence of HIV in the country should remain an ongoing priority, particularly among populations at risk of infection [23]. The successful implementation of strategies to reach those at risk is crucial for decreasing the epidemic. HIV/AIDS

prevalence in Ghana still poses a public health concern despite national efforts to curb local transmission. For instance, the 2018 national HIV prevalence was 1.69% against 1.67% in 2017, with regional variations. Also, between 2017 and 2018, the Northern Region's HIV prevalence increased by 100% (0.2–0.4%) [24]. This trend suggests that people in the area are infected more frequently with HIV, which should be investigated further. Besides, most studies have investigated serological status disclosure within-between specific sub-groups such as men who have sex with men (MSM) [25], bisexual men [26], or women [27, 28], but has not explicitly assessed disclosure and behavioural patterns among subgroups of PLWHA across different populations with varied socio-cultural contexts.

Therefore, the purpose of this study was to explore the sexual behaviour changes adopted by PLHIV on ART in the Northern Region, and identify factors motivating such changes in sexual behaviour among patients.

Materials And Methods

Participants' selection criteria

There are twenty-nine ART centres in the Northern Region of Ghana that offer both therapy and counselling services to PLHIV. Out of this number, nine were considered major centres according to the regional HIV data manager. Thus, the nine major centres, Tamale Teaching Hospital, Tamale Central Hospital, Tamale West Hospital, Bimbilla, Saboba, Zabzugu, Yendi, Gushiegu and Savelugu Hospitals were selected using a purposive sampling method. These nine facilities were chosen because they are at the status of district hospitals or higher and are providing ART services to these patients in the region. Again, these centres have a lot of registered clients taking their treatment at the facilities. Moreover, most clients at these facilities had longer periods of therapy and they may have rich experiences to share during the study [24].

There were approximately 2,896 adults with PLHIV who registered for ART in these nine centers, as of October 2019 [24]. Therefore, an accidental sampling was used to recruit 900 patients, between August and September, 2020, a figure that represents a little above 31% of the population. This sample size was affected by the Covid-19 restrictions in the year 2020, which led to a reduced number of participants visiting the health facilities. However, this sample size is adequate for a survey, which is also studying a very sensitive phenomenon like HIV and AIDS patients [28].

Instrumentation

The 32-item questionnaire was developed based on literature and further put into three sections (A, B, and C). Section A had 10 items which collected data on socio-demographic characteristics of the patients such as age, gender, level of education, religious affiliation, marital status, duration of sexual relationship, employment status, sexual partner's HIV status, place of residence, and participants' current number of sexual partners. Participants responded to these items using a multiple choice scale. Section B contained

13 items that solicited information on respondents' sexual risk behaviour change and the factors influencing such behavioural change after they were diagnosed HIV positive. This section was measured on a four-point-Likert scale of always (4) to never (1), and strongly agree (4) to strongly disagree (1). Section C comprised 9 items that obtained information on HIV diagnosis, treatment, prevention, and positive status disclosure/non-disclosure process. Participants responded to these items using a dichotomous scale (Yes or No) as well as multiple-choice options.

The questionnaire was evaluated by three patients (who did not take part in the main study) and two senior research assistants. The instrument was later assessed by two senior faculty members in Health Promotion from the University of Cape Coast. Pretesting of the instrument was done at the Cape Coast Teaching Hospital using 35 PLHIV who were on the ART because the Hospital also handles clients similar to those at the Northern Region. The questionnaire yielded a reliability coefficient (Cronbach alpha) of .76. Specifically, respondents' sexual risk behaviour changes and the influencing factors yielded .72 and information on HIV diagnosis, treatment, prevention, and positive status disclosure/non-disclosure process gave .75.

Ethical approval was obtained from the Institutional Review Board (IRB) at University of Cape Coast, Ghana (UCCIRB/CES/2020/23). We also sought and gained permission from the Northern Regional Director of Health Services and the heads of all the ART centers. Moreover, each participant either gave written or verbal consent before taking part in the study.

Data analysis

Descriptive statistics (i.e., frequencies and percentages) were used to analyse the percentage of HIV positive status disclosure among the patients. Also, Chi-square was calculated to assess gender difference in HIV status disclosure percentage and sexual behaviour change adopted by PLHIV on ART in the Northern Region. A simple regression was used to determine factors influencing non-disclosure of HIV positive status by PLHIV on ART. Additionally, binary logistic regression analysis determined the factors influencing sexual behaviour change among the patients after their positive status diagnosis. The statistical significance was set at a 95% confidence interval and p-values less than 0.05 ($p < 0.05$).

Results

The results are presented according to demographic characteristics of participants, the positive status disclosure rate and gender difference in disclosure, reasons for non-disclosure, adopted sexual risk behaviour changes, and the factors influencing change in risky sexual behaviour among the patients.

Demographic Characteristics Of Participants

Out of 900 HIV patients on ART, 658(73.1%) were females and 242(26.9%) males. Overall, 387(43.0%) of the participants had no formal education, 599(66.6%) were Muslims, 595(66.1%) were married, with a

few, 72(8%) singles. Moreover, most of the patients (n = 396; 44%) were unemployed, and 54(6%) were students. In addition, majority of the participants, (n = 490; 54.4%) who were married or in sexual relationships, did not know their partners' HIV status. Meanwhile, 284(31.6%) had been married or in a sexual relationship for 10 years or more. Slightly more than half, (n = 452; 50.2%) of the participants were urban dwellers and most 689(76.6%) indicated having only one sexual partner.

Percentage Of Hiv Positive Status Disclosure Among Plhiv On Art In Northern Region

Percentage of HIV positive status disclosure among PLHIV on ART in Northern Region

Out of the 900 patients on ART, 540(60%) disclosed their HIV positive status to other people. Specifically, of those who disclosed, 52% of these patients disclosed their positive status to their spouse (wife or husband), while a few (39%) disclosed to their siblings and approximately 37% to their parents. However, a very small number (less than 14%) of the patients disclosed to their co-workers, employers, religious leaders and other relatives such as aunts, uncles, and grandchildren (See Table 1).

Table 1
Percentage of HIV Positive Status Disclosure or Non-disclosure among PLHIV on ART in Northern Region.

Variable	Yes f (%)	No f (%)
Self-disclosure of HIV positive status (n = 900)	540 (60)	360 (40)
Disclosure to parents (both or either) (n = 540)	198(36.7)	342(63.3)
Disclosure to husband/ Wife (n = 540)	280(51.9)	260(48.1)
Disclosure to Siblings (n = 540)	209(38.7)	331(61.3)
Disclosure to present sexual partner(s)(n = 538)	8 (1.5)	530(98.5)
Disclosure to Co-workers. (n = 538)	4 (0.7)	534(99.3)
Disclosure to Employer. (n = 538)	2(0.4)	536(99.6)
Disclosure to Religious Leader. (n = 538)	72 (13.4)	466(88.6)

Gender Difference In Hiv Positive Status Disclosure

The results further showed no statistically significant difference between males and females in their HIV positive self-disclosure status: $\chi^2 (1, n = 900) = .30, p = .58, phi = .02$. Even though the percentages of positive status disclosure indicated slightly more males (61.6%) than female respondents (59.3%), the chi-square analysis indicated that the gender difference in terms of positive status disclosure proportion was not significant (See Table 2). This implies that during counseling and treatment periods, both males

and females on ART in the Northern Region are most equally likely to tell someone about their HIV positive status. The results also revealed that 40% of the PLHIV did not self-disclose their positive status to other persons.

Table 2: Gender-stratified percentage distribution of HIV positive status disclosure

Disclosure of HIV status	Males (n=242)		Female (n=658)		χ^2 (df)	p-value	Phi coefficient
	n	%	n	%			
Yes	93	61.6	390	59.3	.30 (1)	.58	.02*
No	149	38.4	268				

* $P < 0.05$

Reasons For Non-disclosure Of Hiv Positive Status

Results from logistics regression revealed that the model was statistically significant in determining the non-disclosure status of the patients [χ^2 (11, N = 900) = 1063.59, $p < .001$]. Specifically, *fear of others getting to know patients' HIV positive status* ($\chi^2 = 7.916$, $p = .005$), *fear of stigma* ($\chi^2 = 5.201$, $p = .023$), *fear of losing family support* ($\chi^2 = 4.211$, $p = .040$) and *not ready to disclose yet* ($\chi^2 = 4.475$, $p = .034$) were statistically significant predictors of non-disclosure of HIV positive status among the participants. However, fear of verbal/physical abuse ($p = .289$), fear of losing a marriage/relationship ($p = .224$), and fear of losing a job ($p = .554$) were not statistically significant in predicting HIV status non-disclosure among the participants (See Table 3).

Table 3

Predictors of Non-disclosure of HIV Positive Status by PLHIV on ART in Northern Region (N = 900).

Variables	Wald	Df	Sig	Odds Ratio	95% C. I.
Fear of rejection by family	.337	1	.562	.646	.147-2.829
Fear of verbal/physical abuse	1.125	1	.289	3.478	.348-34.799
Fear of losing a marriage/ relationship	1.478	1	.224	.377	.078-1.817
Fear of many others getting to know of my HIV status	7.916	1	.005	.019	.001-.301 .009-.699
Fear of stigma from others	5.201	1	.023	.079	1.146– 374.040
Fear of losing family support	4.211	1	.040	20.702	
Fear of losing job	.350	1	.554	.556	.079-3.891
Not ready to disclose yet	4.475	1	.034	.176	.035-.880
Constant	1.916	1	.166	3.136	.000

Sexual Behaviour Changes Adopted By Participants After Knowing Their Hiv Status

The results again showed that 492(54.6%) of the patients used condoms always or sometimes during sexual intercourse, while 408(45%) never or rarely used condoms during sexual intercourse. Furthermore, 344(38%) never or rarely reduced the number of sexual partners they had, whereas 556(62.8%) did so as they got to know of their HIV positive status. Moreover, more than half, 551(61%), of the participants always or sometimes abstained from sexual intercourse, while 349(39%) never or rarely abstained. Again, majority, 586(65%), of participants indicated that they never or rarely engaged in unprotected sexual intercourse with their regular/married partners, while 314(35%) always or sometimes engaged in unprotected sexual intercourse with such partners. Besides, a little over half 465(52%) of the participants reported they never or rarely indulged in casual sexual intercourse, while 435(48%) did that always or sometimes (see Table 4 for details). As a result, more than half of PLHIV on ART in the Northern Region have adopted safe or positive sexual behaviors, such as the use of condoms, a reduction in the number of sexual partners, abstinence, a reduction in unprotected sex with married/regular partners, and avoidance of new casual sex after learning of their HIV positive status.

Table 4: Frequency Data on Sexual Behaviour Changes Adopted by Participants Three months after Positive Status Awareness

Variables	N <i>f. (%)</i>	R <i>f. (%)</i>	S <i>f. (%)</i>	A <i>f. (%)</i>
Condom use during sexual intercourse	273(30.3)	135(15)	183(20.3)	309(34.3)
Reduction in number of sexual partners	213(23.7)	131(14.6)	203(22.6)	353(39.2)
Abstinence from sexual intercourse	215(23.9)	134(14.9)	298(33.1)	253(28.1)
Unprotected sex only with married/regular partner(s)	438(48.7)	148(16.4)	144(16)	170(18.9)
Avoidance of new casual sexual intercourse	402(44.7)	63(7)	105(11.7)	330(36.7)

N= Never R= Rarely S= Sometimes A= Always

Source: Field Data (2020).

Factors Influencing Change In Risky Sexual Behaviour Of Plhiv And On Art

The results of regression analysis showed that the model containing all the predictors was statistically significant, and yielded a 3.9% of variance in the sexual behaviour change of patients who knew of their HIV positive status [$R^2 = .039$, $F(1, 898) = 36.268$, $p < .05$]. However, the most significant independent factor that influenced change in sexual behaviour (DV) is “to avoid spreading the disease to others”, [$R^2 = .043$, $F(1, 898) = 40.237$, $p < .0005$], explaining 4.3% of the variance in sexual behaviour change among the patients.

The result again showed that the lowest (.4%) independent predictor of change in sexual risk behaviour was “to gain support from family and others” [$R^2 = .004$, $F(1, 898) = 3.988$, $p < .05$]. The rest of the factors that significantly influenced a change in sexual behaviour were, to: “to avoid contracting other STIs [$R^2 = .010$, $F(1, 898) = 8.937$, $p < .0005$], live long [$R^2 = .038$, $F(1, 898) = 35.816$, $p < .0005$], hide HIV-positive status [$R^2 = .038$, $F(1, 898) = 35.587$, $p < .0005$], achieve good results from ART treatment [$R^2 = .005$, $F(1, 898) = 4.282$, $p < .05$] and live a Godly life” [$R^2 = .023$, $F(1, 898) = 20.880$, $p < .0005$]. However, “to avoid impregnating women or getting pregnant” was not a significant independent predictor ($p = .173$) of the change in sexual behaviour among patients on ART (See Table 5).

Table 5

Contribution of Individual Factors on the Prediction of Change in Risky Sexual Behaviours of PLHIV (N = 900)

Model Predictors	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	p-value
1 (constant)	1.862	.102	18.304		.000
To avoid spreading the disease to others	.192	.030	.207	6.343	.000
Model summary: R² = .043, F (1, 898) = 40.237, p < .0005					
1 (constant)	2.179	.107	20.288		.000
To avoid contracting other STIs	.097	.032	.099	2.990	.000
Model summary: R² = .010, F (1, 898) = 8.937, p < .0005					
1 (constant)	2.117	.066	31.931		.000
To live long	.128	.021	.196	5.985	.000
Model summary: R² = .038, F (1, 898) = 35.816, p < .0005					
1 (constant)	2.155	.060	35.669		.000
To hide my HIV-positive status	.123	.021	.195	5.966	.000
Model summary: R² = .038, F (1, 898) = 35.587, p < .0005					
1 (constant)	2.300	.096	23.946		.000
To achieve good results from the ART	.060	.029	.069	2.069	.000
Model summary: R² = .005, F (1, 898) = 4.282, p < .0005					
1 (constant)	2.427	.058	38.842		.000
To live a Godly life	.094	.020	.151	4.569	.039
Model summary: R² = .023, F (1, 898) = 20.880, p < .0005					
1 (constant)	2.606	.060	43.491		.000

Model Predictors	Unstandardized Coefficients		Standardized Coefficients		
To gain support from my family and others	-.430	.021	-.066	-1.997	.000
Model summary: $R^2 = .004$, $F(1, 898) = 3.988$, $p < .0005$					
1 (constant)	2.433	.050	49.097		.000
To avoid impregnating women or getting pregnant	.028	.020	.045	1.364	.173
Model summary: $R^2 = .002$, $F(1, 898) = 1.862$, $p > .05$					

Discussion

This study examined the rate of HIV status disclosure, sexual behaviour changes, and identify factors motivating such changes in sexual behaviour among PLHIV on ART in the Northern Region. The findings revealed a high level of HIV positive status disclosure (60%) among PLHIV and on ART in the Northern Region, with no gender difference. Moreover, patients who did not disclose their HIV positive status did so for a variety of reasons, including fear of others learning of their HIV status, stigma, loss of family support, and non-readiness to do so at the time of the study. Furthermore, more than half (50%) of PLHIV changed their sexual risk behaviour, to avoid spreading the disease, contracting other STIs, living long lives, concealing their HIV-positive status, achieving good ART results, living a Godly life, and gaining support from family, and others.

The increased use of condoms by these HIV positive patients may be due to the awareness of their positive status and knowledge gained, at the ART centers, of the preventive methods like consistent use of condom to reduce HIV transmission to their sexual partners. For instance, some studies revealed significantly high and consistent use of condoms among PLHIV on ART because of a rise in awareness of the preventive measures, and this is likely to be more common in male patients, especially when condom use is seen as a male act [16].

Similarly, condom use was revealed as an important strategy comprehensively and sustainably for the prevention of HIV and other STIs, especially among people living with HIV [30]. Therefore, enrolling on ART could be an effective means to encourage positive sexual behavioural change that helps in achieving the agenda 90, 90, 90 by the year 2030 [31].

Unfortunately, close to half (45%) of these HIV patients either never or rarely used condoms during sexual intercourse. This may be because of the perceived low sexual gratification and satisfaction associated with the barrier methods of contraceptive use. In that case, several individuals may engage in irregular

use of condoms during sexual intercourse. Similar finding [32] indicated that about 44% of the participants used condoms irregularly. However, evidence showed that PLHIVs were between 60 and 80% less likely to use a condom during sexual intercourse [33, 34]. These disparities could be attributed to the fact that the previous study [33] used less than 300 patients who were either on ART or not, whereas the other study [34] focused primarily on females. Thus, results and findings based on 300 participants may be too homogenous to be compared with those of 900. Also, since condom use is a predominantly male role, the only female participants likely revealed such low condom utilization.

More than half of the patients disclosed their HIV positive status to their spouses. Perhaps, these patients needed to get their partners' support in the ART treatment process, as well as provide their spouses with the opportunity to also test and know their HIV status. This finding is consistent with that of Nigeria where 66.3% of HIV positive clients disclosed their positive status to their spousal partners [35]. It is further shown that HIV positive status disclosure, especially to spouses, contributes to HIV and AIDS treatment and prevention [24]. Also, other findings observed that HIV positive status disclosure is for emotional and financial support, prevention, family closeness, and the freedom to openly access ART [13, 36]. Thus, many of the patients could have disclosed to their spouses for support towards ART [37]. Again, those who reported to their parents and siblings could be doing so in order to get their support for the treatment. Moreover, other studies have revealed that PLHIVs who disclose their positive status, especially to spouses, are more likely to gain trust and support during treatment, and constantly use condoms to protect their spouses [11, 14]. In support of the above, evidence [38] suggests that disclosure could allow partners to reduce sexual risk behaviours and also make informed future reproductive health decisions, including HIV testing in partners whose status is unknown.

Again, more than half of the participants disclosed their HIV positive status to their spouses. The reason for this could be that participants needed to get their partners' support in the ART treatment process, as well as provide their spouses with the opportunity to also test and know their HIV status. However, the 40% who did not declare their status may result in a lower percentage of ART treatment-seeking, contributing to a rise in HIV infection rates in the region.

No difference in HIV positive status disclosure between male and female clients on ART was identified in the Northern Region. This lack of gender disparity in HIV positive status disclosure is because both male and female patients are most equally open to discussing their HIV positive status with others via ART support services [37]. Similarly, studies from south-west Ethiopia among PLHIV showed no significant difference in the proportion of HIV positive status disclosure among men and women [39, 40]. Contrary to the current finding, a finding from Malaysia [41] revealed that among males, the percentage of disclosure was 66.7% compared with females (70.2%) and the difference was statistically significant. These authors revealed further that, men tend to avoid communication such as HIV disclosure and perceive that it is highly personal information compared with females. They further suggested that HIV positive men may want to protect their families from the stigma and shame associated with the infection by not revealing their positive status. However, the proportion of males who disclosed being HIV positive was higher (85.6%) than the females (79.5%), though not statistically significant [12]. These disparities could be

explained by differences in disclosure targets as well as the study design used in assessing disclosure. That is, the current study used the chi-square test of independence to establish the gender difference in disclosure rates, whereas the other study [12] used frequencies of self-reported disclosure proportions to reach the conclusion.

Other findings further suggest that in the Northern Region, fear of stigma, fear of family neglect, and lack of readiness to disclose HIV positive status are still high and are influencing patients' decisions to either report their HIV positive status. That is, as these factors continue to linger and affect this category of patients in the region, many patients will continue to conceal their HIV positive status. In such a situation, ART treatment-seeking is likely to be low which may contribute to an increase in infection rate of HIV in the region. Thus, HIV and AIDS burden on patients, families, healthcare system, healthcare workers, and other agencies will continue to heighten and achieving the goal of 90-90-90 will be far reached.

Limitations

This study provides us with some important information regarding positive status disclosure and sexual risk behaviour changes among PLHIV in Northern Region. However, it has a few limitations. The participants were selected by an accidental sampling which could limit the ability to generalize the findings to other populations. The data was collected during the height of COVID-19 when many were not regular at the ART centers due to movement restrictions on the general public. This actually resulted in the low number of clients visiting the health facilities to be selected as part of a representative sample for the study. Moreover, we believe that the disclosure status is relatively high because this is a facility study, where many of the patients on ART would be encouraged to do such disclosures to limit reinfection and infecting others.

Conclusion

There was generally a high self-disclosure percentage of HIV positive status with more of the patients disclosing either to their spouses or parents. Again, among patients who reported not disclosing their positive status, there was a general fear of stigma and the spread of information about their positive status to others. Furthermore, despite a majority of the clients adopted safe sexual behaviours after learning of their HIV positive status, a significant number of them were still engaging in high-risk sexual behaviours that could lead to reinfection or the spread of the HIV virus to others. This means that, to achieve agenda 90, 90, 90, and reduce new HIV infections, there is the need to enhance education on safe sexual practices among PLHIV during ART visits, as well as public education against stigmatizing PLHIV. Health workers at ART centers need to constantly remind their clients of the importance of disclosing their status and encourage them to do so, to at least one trusted person. It is believed that this would go a long way to improve the current 40% non-disclosure rate with its accompanying benefits. Males and females living with HIV need to be offered similar opportunities and support by health workers within the Northern Region to encourage HIV positive status disclosure. The Ghana Health Service (GHS), through its

agencies and workers within the region, need to intensify public campaigns against all barriers militating against positive status disclosure among PLHIV on ART within the region.

Declarations

1) Ethics approval and consent to participate

This study was approved by the Institutional Review Board (IRB) at University of Cape Coast, Ghana; ID: UCCIRB/CES/2020/23. We also sought and gained permission from the Northern Regional Director of Health Services and the Heads of all the ART centers. Participants eighter gave written or verbal consent before taking part in the study.

This study was carried out in accordance with relevant guidelines and regulations such as Helsinki Ethical Priniciples for Medical Reseaerch involving human subject research.

We also attached an informed consent form to the instrument which each participant signed before taking part in the study. Those who could not sign, gave verbal consent.

2) Consent for publication

Partpants were informed of the possibility that we could publish from the data, but with high level of confidentiality and anonymity of individual identifiable information.

3) Availability of data and materials

All relevant data are within the manuscript. The datasets used and/or during the current study are available from the corresponding author on reasonable request. We are also taking steps to deposit the data at Open Science Framework.

4) Competing interests

All authors declare that they have no competing interest.

5) Funding

This study received no financial support from any individual, institution or organization for its preparation, or publication.

6) Authors' contributions

PCK and EWA conceived the study. PCK, EWA and EJH desined the study, wrote the literature review and the method. PCK collected the data. PCK, EWA and EJH did the data analysis and PCK wrote the initial draft. All authors read, reviewed and approved the final paper for publication.

7) Acknowledgements

We are grateful to all the participants who spent their valuable time to provide us data for this study. We are equally thankful to the Director of Health Services, Northern Region and the Heads of the ART clinics for granting us permission to carry out the study at their facilities.

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