Disclosure of HIV Status to Sexual Partners Among People with HIV in Singida Regional Referral Hospital of Tanzania

by

Alex Gabagambi Alexander

Department of Population Health Sciences
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Hayden Bosworth

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Michael Relf

Thesis submitted in partial fulfillment of
the requirements for the degree of
Master of Science in the Department of Population Health Sciences
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ABSTRACT

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Abstract

Background: Human immunodeficiency virus (HIV) status nondisclosure to sexual partners remains a major challenge in Tanzania because it is still self-avoided among heterosexual partners with HIV. Voluntary HIV disclosure among sexual partners has both advantages and disadvantages. The advantages include helping people with HIV to ask for and receive social support, have safer sex, and assistance to access HIV treatment among sexual partners while disadvantages are such as being blamed, discriminated against, depressed, divorced, and verbally abused after a voluntary disclosure. This study assessed voluntary HIV status disclosure to sexual partners, its associated factors, and outcomes among people with HIV (PWH) in the Singida region of Tanzania.

Methods: A hospital based descriptive, cross-sectional study design, 380 persons with HIV were recruited from the Care and Treatment Clinic (CTC) at Singida Hospital located in Central Tanzania between June and August 2022. A Swahili questionnaire was used to obtain demographic and HIV disclosure information.

Results: About 78 % (n=297) of the study participants reported they disclosed their HIV status. Adjusted multivariable logistic revealed that HIV status disclosure to sexual partners was significantly associated with living with a sexual partner (AOR = 3.91, 95%, CI = 1.43-10.72), knowledge of HIV disclosure (AOR = 11.71, 95% CI = 2.88-47.63), known serostatus of the sexual partner (AOR =40.20, 95% CI, = 15.31-

105.56) and HIV disclosure related stigma (AOR = 0.92, 95% CI = 0.85-0.99). Ninety percent (n=267) of respondents' sexual partners tested for HIV after disclosure.

Conclusion: These findings suggest that there is a significant number of people with HIV who have not disclosed their HIV status to their sexual partners in Singida region of Tanzania, and more interventions should be adopted or designed to scale-up disclosure to sexual partners by addressing the significant factors.

Dedication

I would like to dedicate this thesis to my loving mother Regina Joseph Gabagambi, my beloved wife Noela, and my beloved daughter Regina Alex, all of whom have been tremendously supportive of me during my studies and the entire time that I conducted this work. Without them, I would not have progressed this far. I appreciate your unwavering love.

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List of Abbreviations

AIDS	Acquired Immuno-Deficiency Syndrome.
AOR	Adjusted Odds Ratio
ART	Anti-Retroviral Therapy
COR	Crude Odds Ratio
CTC	Care and Treatment Center
HIV	Human Immunodeficiency Virus
KCMC	Kilimanjaro Christian Medical Centre
MC	Municipal Council
NACP	National AIDS Control Program
PWH	People with HIV
SRRH	Singida Regional Referral Hospital

Acknowledgments

I would like to express my gratitude to my mentor, Professor Charles Muiruri, for his invaluable support in finishing this project. He was the chairman of my committee and provided me with a lot of assistance. Second, I want to express my gratitude to the other members of my committee (Professor Hayden Bosworth and Professor Michael Relf), whose advice and expertise was extremely valuable. Moreover, I would want to express my appreciation to Prof. Blandina Mmbaga for her support, which included helping me when I requested approval from the Ministry of Health to conduct this study and advising me on how to complete certain preparatory logistics prior to data collection. My gratitude additionally goes to NIH/FIC grant number D43 009595 under Professor John Bartlett for funding this thesis study. Last but not least, I would like to express my thanks to the SRRH-CTC clinic staff, the data collectors, and the participants in the study

1.Introduction

Human Immunodeficiency Virus (HIV) has remained a major challenge in Tanzania's health system as it is for other Sub-Sahara countries. Recently, UNAIDS estimated that the HIV prevalence in the general population of Tanzania is 4.7% which corresponds with 1.4 million people with HIV in Tanzania[1]. In 2020, there were 65000 new HIV cases diagnosed in Tanzania[1]. The National AIDS Control Program (NACP) 2020 report revealed that Singida region which is found in the central part of Tanzania had an HIV prevalence of 3.6% and a high rate of new HIV infection[2]. This high rate of HIV infection is accelerated by heterosexual transmission which accounts for up to 80% of HIV transmission among couples, a population known to have a high prevalence of HIV-voluntary non-disclosure[2,3]. HIV disclosure is self-avoided among many heterosexual persons with HIV[3]. Moreover, disclosure of one's HIV status to one's sexual partners remains an integral part of fighting HIV; therefore, understanding the context of disclosure is essential in both prevention of HIV and mitigation of its impacts on both individuals and communities [4]. Lack of voluntary disclosure among heterosexual couples remains one of the main factors associated with married couples and those in stable relationships to account for the highest percentage of new HIV infections in Tanzania[3,4]. These groups of HIV non-disclosing sexual partners need special attention so as to slow down the rate of HIV transmission.

Prevention of new HIV infection plays a big role in the fight against HIV. Preventing new HIV infections can be achieved by early HIV testing and early serostatus disclosure[4,5]. Both early HIV detection and voluntary disclosure of HIV status are important for the sustainable decline of HIV transmission [6]. An HIV-disclosure event is defined as "the verbal communication that occurs between a discloser with HIV and a confidant regarding the discloser's HIV status"(p 1618) [7]. However, voluntary HIV disclosure has been fluctuating across sub-Saharan countries [8,9] . In previous studies in sub-Sahara Africa, voluntary disclosure prevalence was reported to range from 57% to 95%[9-18]. Notably, both southern and northern parts of the sub-Saharan have countries with a low prevalence of HIV disclosure. Several studies conducted in Nigeria, Mozambique, Togo, and Ethiopia revealed that the prevalence of HIV disclosure to sexual partners were 21% to 65% [11,15,19-21]. While there is a scarcity of studies about the voluntary disclosure of HIV status to sexual partners in Tanzania, a study by Damian et al (2019) revealed the prevalence of serostatus disclosure of women living with HIV to their partners was 66%[9]. In a study in the same area, Ngocho et al (2019) identified the prevalence of HIV disclosure of pregnant women to their sexual partner was 84% [13]. Participants in the latter study were more likely to reveal their HIV status than the general women population who was not pregnant.

Several factors seem to be highly associated with voluntary HIV disclosure. Studies have shown that factors such as being educated with primary or higher education level, being female, knowing the status of one's sexual partner, received pretest or post-test HIV counseling, and being middle-aged or older were leading factors associated with

HIV disclosure [7,9,15,22,23]. Moreover, in Ethiopia, Gultie et al (2015) in Ethiopia showed that partner-related factors such as knowing the status of the partner increased the chance of voluntary disclosure almost forty-fold [23]. Both person-related and clinical-related factors play a major role in HIV disclosure to sexual partners.

Voluntary, self-disclosure among sexual partners is crucial and has various advantageous effects. Voluntary disclosures help people living with HIV to ask for and receive crucial social support, have safer sex, and obtain assistance to access HIV treatment among sexual partners[24-27]. Some studies have shown that self-disclosure usually promotes better mental health, good ART adherence and prevents the seroconversion of the person without HIV in a sexual relationship [7,25,28]. A study by Dessalegn et al (2019) revealed that 68% of participants reported receiving social support after disclosure while the remaining one-third of the participants didn't report having received the social support, and the same percent discussed safer sex with their sexual partners after disclosure [24]. Another study conducted in Ethiopia by Dessie et al (2019) revealed that adults living with HIV who disclosed their status had a 64% higher chance of having good ART adherence compared to participants who did not disclose [25]. In addition, people who disclosed their HIV status before and soon after initiation of ART had not only better adherence but also better viral load suppression outcomes; viral suppression was found to be four times higher in clients who disclosed their status than those who did not [29]. These potential benefits of disclosing are what may help an individual with HIV decide to tell his/her sexual partners about his HIV status.

Despite positive outcomes, HIV disclosure is also associated with several negative outcomes. Recently, studies have shown a slight increase in the magnitude of negative outcomes of HIV disclosure, which can explain why there has been a decline in HIV disclosure in some areas [9,30]. Participants of several studies reported being blamed, discriminated against, depressed, divorced, and verbally abused after disclosure [9,24]. These negative outcomes have been highly limiting voluntary HIV disclosure among sexual partners [9,24]. When seeking to encourage sexual partners to disclose their HIV status, policymakers, and healthcare professionals should take all these adverse effects into account. Policymakers and healthcare professionals unintentionally contributing to HIV transmission by failing to consider the negative consequences of HIV disclosure.

In Tanzania, the country is transitioning toward implementation of undetectable viral load is equivalent to the untransmissible (U=U) campaign [31]. However, this campaign cannot be used as a justification for not disclosing due to the following reason. First, HIV impact survey 2017 showed that there was a low proportion of viral load suppression (VLS) among people living with HIV in Tanzania; viral load suppression was 47%, 51%, and 50% among never-married, married, and divorced people living with HIV respectively [32].The prevalence of viral load suppression in this area is still low and it cannot offer sufficient protection against HIV transmission. Second, the newly diagnosed index client's viral load become undetectable up to 6 months after starting HIV medications and only if there is optimal adherence to medication, this time frame can be sufficient for the HIV transmission to be carried to another person [33,34]. Notably, the principles of U=U are achieved if there is sustained HIV suppression through optimal

ART adherence, and HIV is rendered untransmittable. Unfortunately, when ART adherence is suboptimal and HIV is not fully suppressed, U=U does not resolve issues of HIV disclosure to sexual partners[35]. Hence, early disclosure of HIV status to sexual partners needs to be facilitated, and we should not depend on undetected viral load as the justification for not prioritizing the battle against HIV non-disclosure. We should also incorporate other preventive methods like early disclosing and having safe sex [8]. It is evident that drivers of the disclosure may be different due to location, motives, and population mix. It is also important to understand the prevalence and drivers at other locations with different populations mixed by religion, rurality, urbaness, and others in order to develop interventions that are locally relevant.

The modified virtuous cycle of HIV illness disclosure is the model which guided this study. This model reveals that the process of HIV disclosure is interconnected with several influencing and influenced factors that are important for people with HIV to voluntary disclose[36]. It describes that voluntary disclosing HIV status usually increases general support received by a person with HIV, increases personal knowledge of someone living with HIV, and this lower HIV-related stigma, which in turn increases the likelihood of HIV testing for sexual partners and make a person adhere to her medication and this lead to reduction of HIV viral load [36].This theoretical model was modified to include the viral load suppression and ART adherence variables. Figure 1 outlines this model of the "Modified virtuous cycle of HIV illness disclosure."

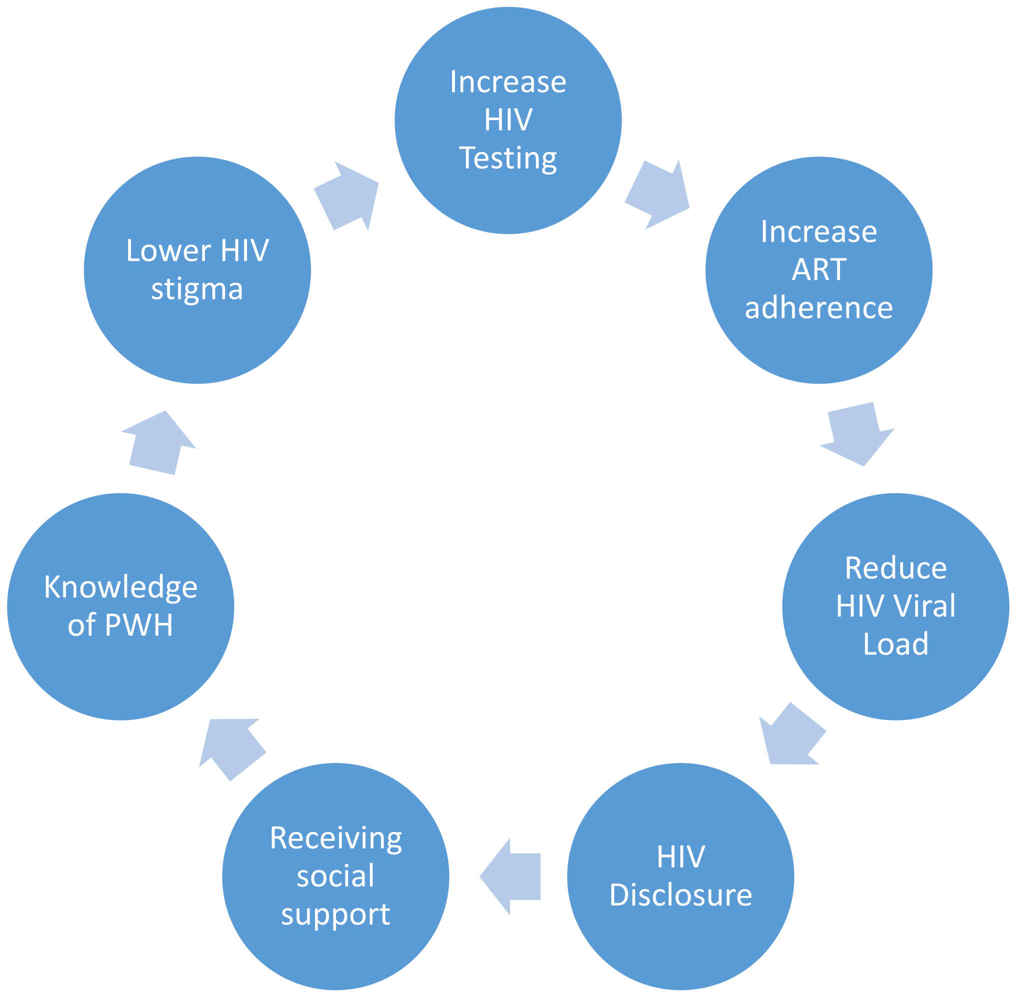

Figure 1:Modified virtuous cycle of HIV illness disclosure

There is knowledge gap regarding the trend in the magnitude of HIV disclosure in hyperendemic areas with high HIV prevalence including Tanzania [30]. A literature review did not identify any studies examining the factors and consequences of HIV disclosure to sexual partners in Tanzania [11,22,30]. Moreover, many studies which were conducted in Tanzania included HIV disclosure to the general population, few studies were specific to sexual partners [4,30]. To accelerate the World Health Organization's (WHO) goal of ZERO new HIV infection among discordant couples, this study focused on understudied areas in the previous studies.

We aimed to assess the level of HIV disclosure to sexual partners, factors associated with HIV disclosure, and its outcomes among women and men living with HIV in Tanzania. The assessment of HIV disclosure-associated factors will inform the current knowledge on HIV disclosure in Tanzania. Moreover, awareness of the negative outcomes of the disclosure will also assist policymakers to develop or adapt intervention-based solutions that can increase the disclosure rate among sexual partners.

2. Methods

2.1 Study design and study area

A hospital-based cross-sectional study was designed. Data was collected between June and August 2022 at Singida Regional Referral Hospital (SRRH) in Singida region of the United Republic of Tanzania. Singida region has seven districts and among these districts, Singida Municipal Council (MC) was the least populous council with 150,379 as per the 2012 population census but the district has the highest rate of new HIV infection of 1,301 cases in 2016[37]. Singida Region Referral Hospital is the only public hospital in Singida MC, and it has 6937 cumulative clients enrolled in HIV care at the facility up to June 2022 and 67% of those were females.

2.2 Study population and sampling

This study targeted people with HIV (PWH) who are followed up at Singida regional hospital's Care and Treatment Center (CTC). Nonprobability convenience sampling was used to recruit PWH aged 18 years and older who were receiving ART for at least 3 months and those who have ever had sexual partners since they were HIV diagnosed. We excluded a person living with HIV who mutually tested for HIV with her/his sexual partner. Participant were asked if they went to test for HIV with their sexual partner on the day when they were diagnosed with HIV and if the results were shared with them at the same time by a clinical attendant who tested them. Sample size was calculated using Kish and Leslie formula (1965)[38]:

$$N = Z^2P\,(1 - P)/\,d^2$$

Where N = sample size

Z = score for 95% Confidence Interval which is 1.96

P = proportion of HIV disclosure to sexual partners in Tanzania was 66%[9]

d = degree of precision was set at 5%.

Therefore N=345

With an assumption of a 10% non-response rate[24], the total sample size computed was 380.

2.3 Data collection

Data was collected by structured and pre-tested interviewer-administered questionnaires. The training on the purpose of the study, the contents of the questionnaire, particularly on issues related to the confidentiality of the responses, and the rights of participants were provided to the 3 research assistants on two consecutive days. The interviewers were proficient in Kiswahili, and they were staff members at CTC clinic. Female participants were interviewed by the female interviewer and male participants by male interviewers. The questionnaire was first prepared in English and then translated into Kiswahili and then translated back to English to check for consistency of the questions. The final version of the questionnaire. was reviewed by an expert panel to establish content validity. Participants were recruited consecutively at the CTC clinic during their follow-up visits. All consented participants were interviewed.

Potential study participants were identified in terms of the inclusion and exclusion criteria by using client interviews obtained when individuals came for a scheduled CTC appointment. We approached the individual before their scheduled appointments and after providing adequate information about the purpose of the study, individuals were invited to participate in the study. Those who consented to participate after a written informed consent was obtained were interviewed on exit soon after they had received their treatment from the health care providers. For those study participants who could not read and write, a hand-signature method mark on the document was applied to take their consent form.

2.4 Measurement

The primary outcome variable for this study was self-reported HIV status disclosure recorded as 'yes 'or 'no'. Explanatory variables included self-reported person-related factors such as age, sex, and education level (No school, Primary, Secondary, Post-secondary), marital status, type of relationship they currently had (primary partner, casual partner, a combination of casual and primary partners), and occupation. Partner-related factors included the partner's HIV status (as reported by the participant). Participants' clinical-related factors such as health status during diagnosis which was self-reported as sick or well, duration of anti-retroviral therapy (ART) follow-up care, WHO HIV stage at time of diagnosis, and type of HIV test used during diagnosis (whether it was Voluntary Counselling and Testing (VCT) or Provider Initiated Testing and Counselling (PITC), both these types of tests were obtained from participant's CTC card) [12,22]. Another measured variable was HIV-related stigma which is assessed using 29 items adapted from Sayles instrument[39]. The modifications of Sayles instrument were made in the development of the Tanzanian instrument, we had personal communication with Michael Relf who generated that modified instrument. This new questionnaire has an internal reliability of 0.92 and it forms subscales with a 5-point Likert-type response that includes none of the time, a little bit of the time, some of the time, most of the time, and all of the time. The scores are scaled in the positive direction implying that the higher the score, the higher the level of stigma. This instrument yields a total score for HIV-related stigma (range 29–123) as well as sub-scale scores in the following HIV-related stigma domains: disclosure stigma (range 3-15), perceived stigma (range 9-45), anticipated stigma (range 5-25), internalized stigma (range 6-30), heath-sector stigma (range 3-11), and experienced stigma (range 3-15) [40,41]. We also assessed knowledge on disclosure by using six questions, the maximum score for those questions was 6, and those participants with ≥5 scores had high knowledge, 4 to 3 had moderate, and those with scores below 3 had low knowledge of disclosure [4]. Furthermore, we assessed having risky sexual practices before disclosure to sexual partners by looking if the participant reported having unsafe sex with her sexual partner before disclosure.

The positive outcome of voluntary HIV disclosure was assessed by evaluating if the participant reported having received social support, discussed safer sex with her/his partner, report his/her partner has been tested after he/she voluntary disclosed and checking if the participant had good adherence to ART medication after voluntary HIV status disclosure to sexual partner [19,24].

The self-reported AIDS Clinical Trials Group (ACTG) adherence questionnaire was used to assess adherence as one of the positive outcomes of disclosure. Adherence was treated as a continuous variable and three questions from this questionnaire were used and the score for adherence ranged from (0-100)%[42]. In order to know how many individuals were adherent to ART medications, the data that were obtained from this section of adherence from the ACTG was dichotomized into adherent > 90% of the total score and nonadherent when the total score was ≤ 90% [42-44]. In addition, we checked the effect of disclosure on viral load count, the most recent viral load of the client after the disclosure was recorded from the client's CTC card. The client was considered to have a suppressed viral load count if he/she was having HIV-1 RNA copies less than 50 copies/mL after disclosure [29]. Assessment of negative outcomes focused on if the participant reported separation from the sexual partner, blamed or beaten, generally confused/depressed, stigmatized by his/her sexual partner, and verbally abused by his/her sexual partner after disclosure of their serostatus.

2.5 Ethical consideration

The study was approved by the Duke University Institutional Review Board (IRB) with the approval number Pro00111825-INT-1.0. Ethical approval to conduct this research in Tanzania was obtained from both Kilimanjaro Christian Medical Centre (KCMC) ethical committee and the National Institute of Medical Research (NIMR),

NIMR/HQ/R.8a/Vol. IX/4025. Then permission to conduct the study at Singida Regional Referral Hospital (SRRH) was obtained from the Tanzania Ministry of Health. Written and verbal consent were obtained from the study respondents individually. The right of the respondent to withdraw from the interview or not to participate at all was assured. In order to maintain participant confidentiality, the interviews were conducted in a private room with the door closed and all of the documents with participants' information were well protected in a closed locker and only the principal investigator had access to the key.

2.6 Data analysis

The analyses consisted of univariate analysis followed by both bivariate and multivariate logistic regression analyses. We conducted univariate analyses to examine the distribution of the socio-demographic, sexual behavior, and HIV-related variables. The frequency percentage of the data was presented in tables and Chi-square was used to test the relationship between two/more categorical variables at a 0.05 level of significance. Second, bivariate analyses were conducted with the disclosure variable and the socio-demographic and HIV- related variables. The variables that were significant in the bivariate analyses were included in the multivariate logistic regression models to examine predictors of HIV serostatus disclosure to sexual partners. We used the stepwise multivariate logistic regression to obtain the independent variables which could fit the final model. Multi-collinearity was examined, and all significant variables were introduced in a logistic regression model to derive the adjusted odds ratio of each of the dichotomous dependent variables. We included the following independent variables in our final model, living with a sexual partner, high knowledge on HIV disclosure, serostatus of sexual partner and HIV disclosure-related stigma. A 95% level of confidence was applied throughout and A probability (p) value of ≤ 0.05 was considered statistically significant. IBM SPSS for Mac, version 27.0 was used for this data analysis.

3. Results

3.1 Socio-demographic characteristics of study participants

A total of 380 people with HIV and receiving care and treatment follow-up were approached for the study and no individual declined to participate in the study. Three hundred and eighty people with HIV and receiving care and treatment follow-up were recruited with a 100% response rate. Female participants constituted 69.2% (n=263) of the study participants, and 51.8% (n=196) were 45 years old and above. Married and Muslim respondents were 41.3% (n=157) and 50.5% (n=192), respectively. SRRH has a large Muslim community living with HIV and many participants 51.3% (n=195) were in primary sexual relationships. Most of the participants had completed primary education 71.8% (n=273) and 74.2% (n=282) were self-employed (Table 1).

Table 1: Socio-demographic characteristics of respondents

Variables	Category	N	%
Sex	Male	117	30.8
	Female	263	69.2
Age	18-24	10	2.6
	25-34	70	18.4
	35-44	104	27.4
	45-54	121	31.8
	>55	75	19.7
Marital status	Never married	111	29.2
	Married/cohabiting	157	41.3
	Divorced/separated	49	12.9
	widowed	63	16.6
Religion	Islamic	192	50.5
	Christian	185	48.7
	others	3	0.8
Educational status	No school (unable to read/write)	50	13.2
	Primary	273	71.8
	Secondary/vocational college	47	12.4
	Post-secondary	10	2.6
Occupation	Employed/retired	57	15
	Self-employed	282	74.2
	Unemployed	41	10.8

3.2 Clinical condition, partner, and social-related factors

From the study participants, 52.6%(n=200) were well during the time of diagnosis and 62.1%(n=236) were in WHO's clinical stage I–II at time of diagnosis. About 71.1% (n=270) of the study participants knew the serostatus of their sexual partners and 69% (n=204) reported having risky sexual practices before disclosure to their sexual partners. Similarly, the majority of the study participants 95.3% reporting having prior discussions on the importance of HIV disclosure to partners with medical personnel and 79% had good medication adherence (Table 2).

Table 2: Clinical condition, partner, and social-related factors

Variable	Category	Frequency	%
Health status at HIV diagnosis	Sick	180	47.4
	Well	200	52.6
Baseline WHO stage of the disease	Stage 1	84	22.1
	Stage 2	152	40.0
	Stage 3	122	32.1
	Stage 4	22	5.8
Type of HIV testing	PITC	156	41.1
	VCT	224	58.9
Knowing partner HIV status	No	110	28.9
	Yes	270	71.1
HIV-status of your partner	With HIV	182	47.9
	Without HIV	91	23.9
	Unknown	107	28.2
How did you know your partner's HIV status	From the partner	129	33.9
	From other people	145	38.2
	Don't know	106	27.9
Having risky sexual practice before disclosure to sexual partner	No	204	68.7
	Yes	93	31.3
ART adherence status	Poor (≤ 90%)	80	21.1
	Good (> 90%)	300	78.9
Duration of ART follow up care in years	≤ 2years	75	19.7
	> 2years	305	80.3
Prior discussion on HIV testing with partner	No	6	1.6
	Yes	374	98.4
Prior discussion on importance of HIV disclosure to partner with a medical provider	No	14	3.7
	Yes	366	95.3
Being a member of anti-HIV/AIDS club	No	284	74.7
	Yes	96	25.3

3.3 Prevalence of HIV disclosure, HIV-related stigma, and knowledge of disclosure importance

In this study, 78.2 % (n=297) of the study participants voluntary disclosed their HIV status to a sexual partner; of these, 72% (n=213) disclosed within one month of their initial HIV diagnosis, the rate of voluntary disclosure was 2.37 higher in males than in females, and 81.1% (n=308) had high knowledge of the Importance of voluntary HIV disclosure. Most of the participants 53% reported having first disclosed to their relatives instead of their sexual partner (figure 2)

Table 3: Prevalence of voluntary HIV disclosure, HIV-related stigma, and knowledge of its importance

Variable	**Category**	**Frequency /Mean**	**%**
Voluntary HIV disclosure	No	83	21.8
	Yes	297	78.2
Knowledge of Importance of voluntary HIV disclosure	High	308	81.1
	Moderate	47	12.4
	Low	25	6.6
HIV-related stigma (Mean ± SD)	49±19		

3.4 Reasons for disclosing and non-disclosing

Most participants 62% reported having voluntarily disclosed their status because they wanted to initiate their partner to test. Other reasons for voluntary disclosing included not transmitting disease which was mentioned by 49.2% of the participants. One hundred and seventy-eight participants (60.3%) disclosed their status within one month of diagnosis, 82 (27.8%) between one to six months, and 35(11.9%) disclosed after six months of knowing their HIV status. Fear of divorce was a leading reason given by 25/

83(30.1%) participants who had not disclosed their status. Four participants (16%) who reported fear of divorce as the reason not to voluntary disclose were males.

Table 4: Reasons for disclosing and non-disclosing.

Variable	Category	Frequency	%
Reasons for disclosing	Not to transmit disease	147	49.5
	To get social support	34	11.6
	To adhere to medication	90	30.9
	Encouragement from a counselor	29	9.9
	To initiate partner testing	182	61.7
Reasons for non-disclosure	Fear of divorce	25	30.1
	Fear of being stigmatized	9	10.8
	Fear of being blamed/beaten	16	19.3
	Fear of depression	3	3.6
	Fear of breaking of confidentiality	17	20.5

3.5 Predictors of HIV status disclosure to sexual partners among ART clinic attendees

We used prior studies to select the following variables to include in multivariate analyses: age, sex, educational status, marital status, employment status, living with sexual partners, knowledge of HIV disclosure, ART medication adherence, Serostatus of sexual partner, type of HIV testing, member of the anti-HIV club, prior discussion about HIV testing, knowing sexual partners HIV status, viral load, number of sexual partners, subdomains of HIV-related stigma and being a member of the anti-HIV club were a candidate for multivariable analysis (Previous literature review)[23].

When keeping other variables constant in the final model, the likelihood of disclosing HIV status was 3.91 times higher among participants living with their sexual partners than in those who did not live with their sexual partners (AOR = 3.91, 95%, CI =

1.43-10.72), Study participants who had high knowledge of HIV disclosure were 12 times more likely to disclose than those who had low knowledge of disclosure (AOR = 11.71, 95% CI = 2.88-47.63), the odds of HIV status disclosure to sexual partners were 40 times more likely in participants whose sexual partners were positive than those who don't know the status of their sexual partners (AOR =40.20, 95% CI, = 15.31-105.56), and the likelihood of disclosing HIV status was 8% less among participants who had experienced HIV disclosure related stigma than those who had not (AOR = 0.92, 95% CI = 0.85-0.99)(Table 5)

Table 5: Predictors of HIV status disclosure to sexual partners among ART clinic attendees

Variable	Category	Disclosure status		COR (95% CI)	AOR# (95% CI)	P-value
		Yes, N (%)	No, N (%)			
Sex	Female	195(74.1)	68(25.9)	1		
	Male	102(87.2)	15(12.8)	2.37(1.29-4.36)		
Marital status	Never married	68(61.3)	43(38.7)	1		
	Ever married	229(85.1)	40(14.9)	3.62(2.17-6.02)		
People Living with sexual partner	No	149(66.8)	74(33.2)	1	1	0.015
	Yes	148(94.3)	9(5.7)	8.16(3.94-16.92)	3.91(1.42-10.72)	
Knowledge on importance of disclosure	Low	5(20)	20(80)	1	1	<0.001
	Moderate	24(51.1)	23(48.9)	4.17(1.34-12.98)	1.69(1.35-8.24)	
	High	268(87)	40(13)	26.8(9.52-75.43)	11.71(2.88-47.63)	
Serostatus of sexual partner	Positive	175(96.2)	7(3.8)	51.42(21.83-121.12)	40.2(15.31-105.56)	<0.001
	Negative	87(95.6)	4(4.4)	44.78 (15.18-131.42)	36.03(10.86-119.52)	
	Unknown	35(32.7)	72(67.3)	1	1	
ART adherence status	Poor	55(68.8)	25(31.3)	1		
	Good	242(80.7)	58(19.3)	1.9(1.1-3.3)		
Disclosure related stigma (Mean±SD)		8.3	10.5	0.92(0.88-0.96)	0.92(0.85-0.99)	<0.029
Number of sexual partners	One/no	227(81.7)	51(18.3)	1		
	Many	70(68.6)	32(31.4)	0.49 (0.29-0.82)		
Duration of ART follow up care in years	≤ 2years	51(68)	24(32)	1		
	> 2years	246(80.7)	59(19.3)	1.96 (1.11-3.44)		

#Adjusted for socio-demographic, partner-related, and clinical-related variables.

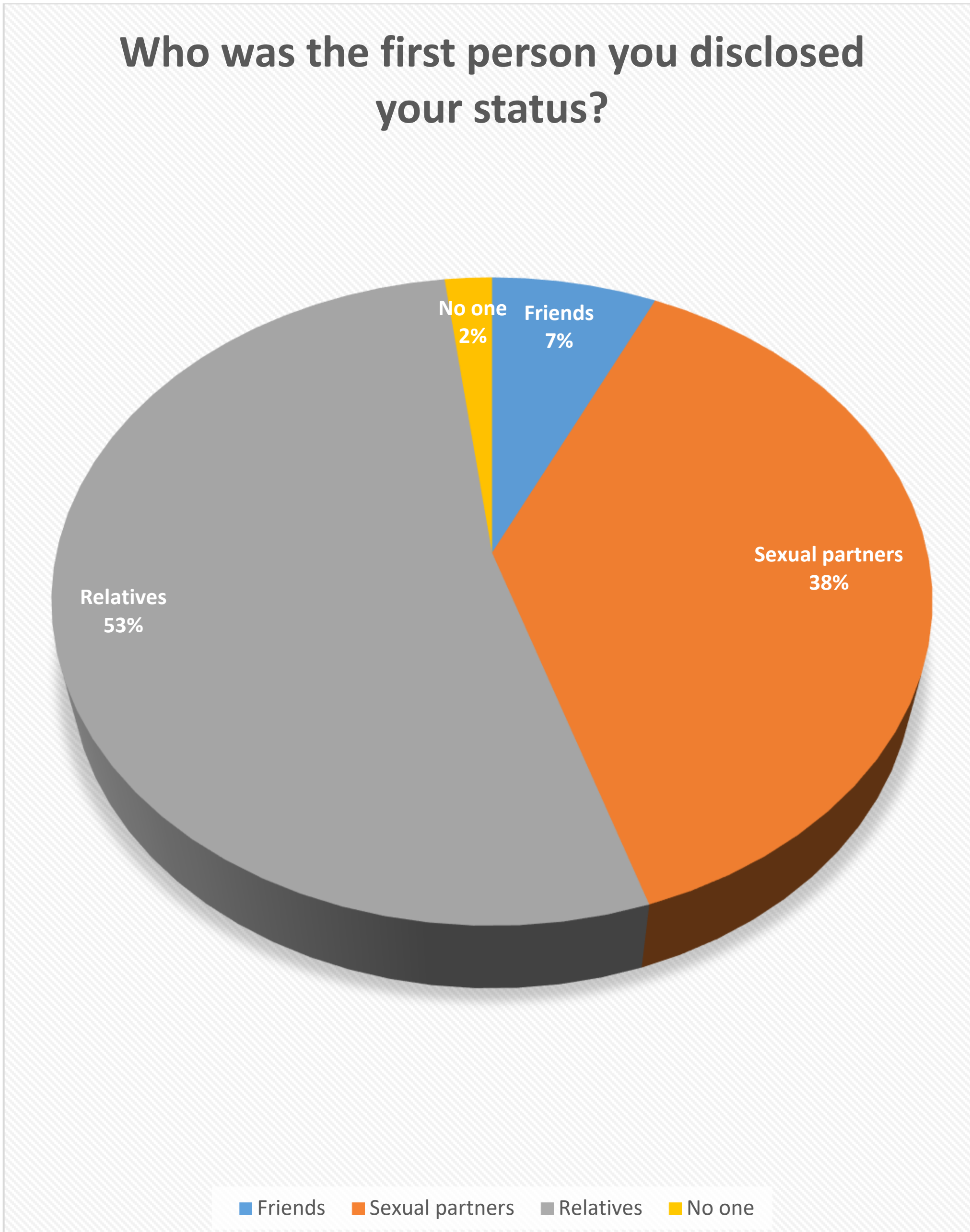

Figure 2: The first person you disclose

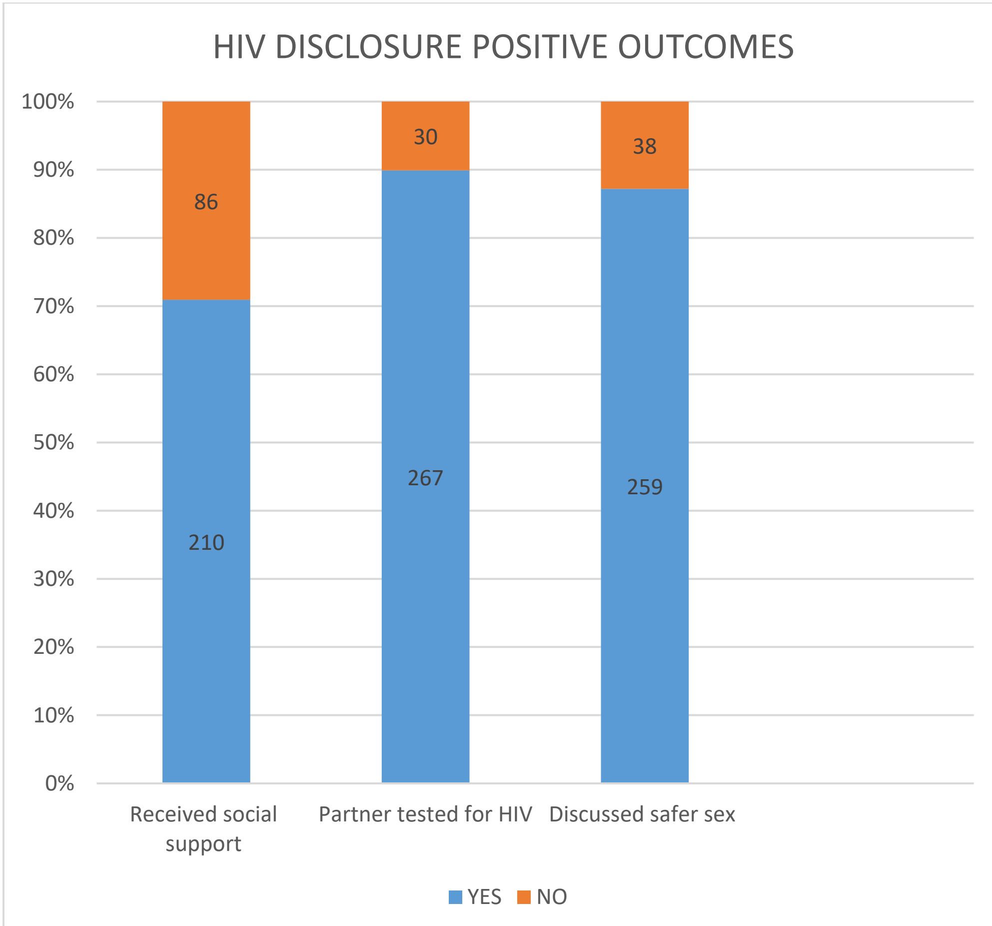

Figure 3: HIV Disclosure positive outcomes

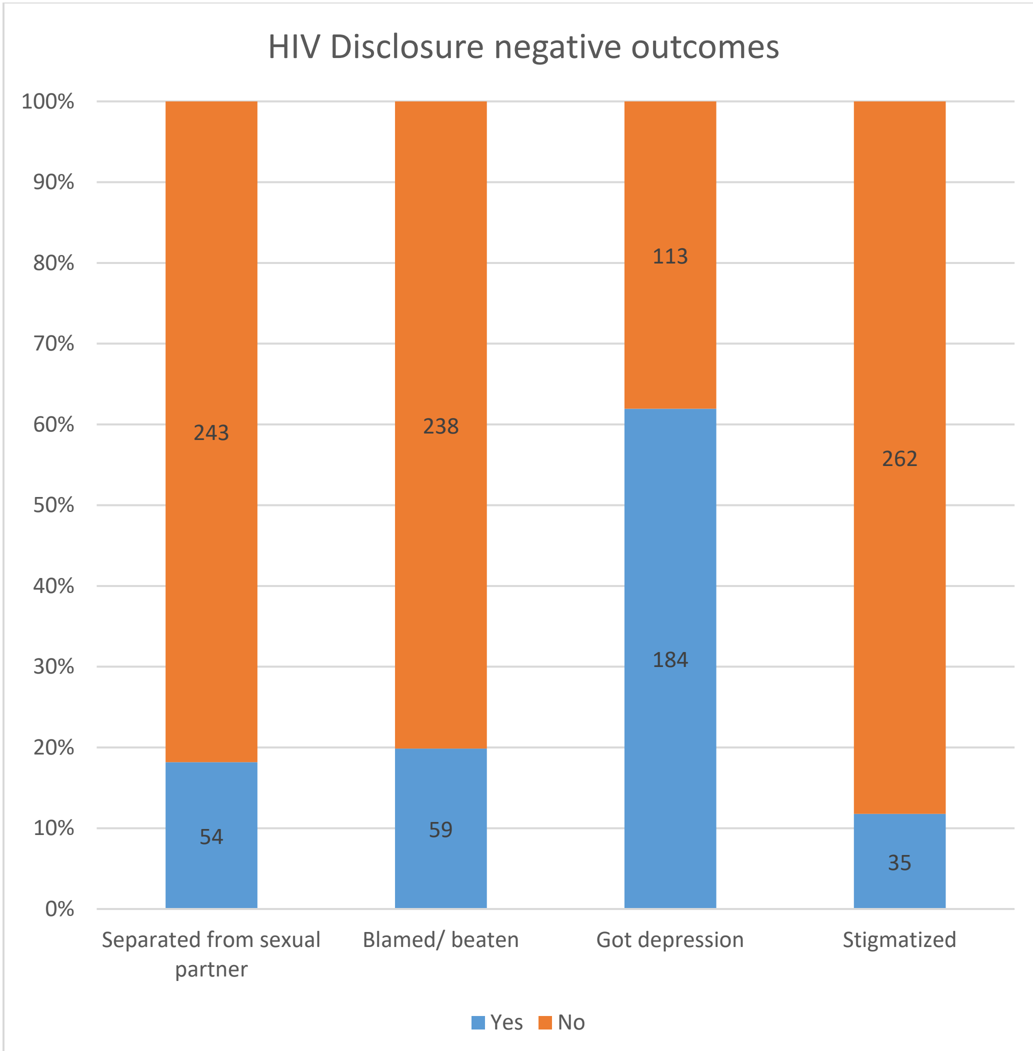

Figure 4: HIV Disclosure negative outcomes

3.6 HIV disclosure outcomes

We found that 70% (n=210), 90% (n=267), and 87% (n=259) of those who disclosed their status reported having received social support from their partners, their partners were tested after their disclosure and discussed safer sex with their sexual partner after disclosure respectively (figure 3). Sixty two percent (n=184), 20% (n=59), 18% (n=54), and 12% (n=35) of those who disclosed their HIV status reported having depression, being blamed/beaten, divorced, and being stigmatized respectively (figure 4).

4. Discussion

This study focused on voluntary HIV disclosure among persons receiving care and treatment follow-up in the Singida region of Tanzania. The current study revealed that more than three-quarters of participants had voluntary disclosed their HIV status to a sexual partner. This finding is similar to two other studies conducted in Moshi, Tanzania, with disclosure rates of 66%[9] and 84% among seropositive participants [13]. However, these studies differed in study population characteristics; the current study used both female and male participants, while the previous studies used only female participants. Moreover, HIV disclosure was higher in our study than that observed in three studies conducted in Nigeria[15], Ethiopia[23], and Mozambique[11] where prevalence of HIV disclosure to sexual partners were 52%,57%, and 58% respectively. The possible reason for the discrepancy might be the difference in the time since the studies were conducted. There has been a progressive improvement in acceptability of HIV with time[30].

The rate of voluntary disclosure was 2.37 higher in males than in females in this study, and this was consistent with another study conducted in Kisarawe district in Tanzania which reported that males had a higher proportion of voluntary disclosure than females[30,45]. This higher prevalence of voluntary disclosure in male participants could be explained by the existence of male dominance practice in these societies whereby men are freer to disclose without fear of negative outcomes. Moreover, the voluntary disclosure to close relatives was reported by almost half of the participants who told their HIV status and only 38% reported sexual partners as the first person they told their status. This is similar to Gladys et al study which revealed that 50% of the participants reported having voluntary disclosed to their family members/close relatives while 25% of participants reported having disclosed to their sexual partner [30].

We also observed that living with a sexual partner, knowledge of HIV disclosure, HIV disclosure related stigma, and serostatus of sexual partner were significant factors associated with disclosure of HIV status to sexual partners after adjusting for confounding variables. Participants living with their sexual partners were 3.91 times more likely to disclose their HIV statuses. The finding that living with partners was related to higher disclosure was consistent with studies which were conducted in Ethiopia and Morocco [23,46]. This increment of disclosure rate among participants living with their sexual partners could be explained by the intimacy of partners, the confidence they have with each other, the strength of their relationship, and the feeling of responsibility that might facilitate open and close communication, which in turn made them easily disclose their HIV status.

The level of knowledge of the importance of HIV disclosure was associated with voluntary HIV disclosure, the respondents with high knowledge on the importance of HIV disclosure were 12 times more likely to voluntary disclose their HIV status compared to those with low knowledge on the importance of HIV disclosure. Notably, the level of knowledge on the importance of voluntary HIV disclosure was high among the participants of this study. This finding is concordant with a study conducted in Ethiopia which also reported a high level of knowledge on the importance of disclosure [47].

We observed that there was a significant association between the serostatus of the sexual partner and HIV disclosure, whereby participants with sexual partners with HIV were 40 times more likely to disclose than those whose sexual partner's status was unknown. This is consistent with Deribe et al study which showed a similar significant association in which respondents that reported not knowing their partner's HIV status were 98% less likely to voluntary disclose to a sexual partner in comparison with those who did know their partner's status [12]. Generally, we observed that PWH who had a sexual partner without HIV or unknown serological status were less likely to expose their status than those who had a partner with HIV.

Under the unadjusted model, we observed a significant association between HIV disclosure and sex, marital status, number of sexual partners, ART adherence status, and duration of ART follow-up care in years. This is equivalent to the finding in other studies which showed similar associations[22,23].

We observed that 70%, 90%, and 87% of the participants who had voluntary disclosed reported to have received social support from their partners, their partners were tested after their disclosure and discussed safer sex with their sexual partner after disclosure respectively. These findings were consistent with a study by Dessalegn et al which revealed that 68% of participants reported receiving social support after disclosure, and the percent of participants who discussed safer sex with their sexual partners after the disclosure was 67% [24]. Unfortunately, 62%,20%, 18%, and 12% of disclosed participants reported having depression, being blamed/beaten, divorced, and being stigmatized respectively. These results were inconsistent with a study done in Tanzania which claimed that 11% of disclosed participants living with HIV claimed to be beaten or blamed by their sexual partners after the disclosure; while 7.3% and 3.3% reported that their partners either run away or were confused respectively [9]. The increase in the magnitude of the negative outcome can explain why there lacks significant improvement in HIV disclosure to sexual partners to date.

The result of this study supports our theoretical model that informs disclosing HIV status usually, but not always, increases general support received by a person with HIV, disclosure increases personal knowledge of someone living with HIV, and this lower HIV-related stigma, which in turn increases the likelihood of HIV testing. Early testing and disclosure can increase adherence to ART medication, and this can reduce the HIV viral load [36].

The findings of this study uniquely fill the significant gaps which were revealed in the previous studies in the following ways. First, our findings revealed the current magnitude of voluntary HIV disclosure to sexual partners among both women and men with HIV in the Singida region of Tanzania as one of the hyperendemic areas. Second, this study has provided the significant independent factors for voluntary HIV disclosure such as living with a sexual partner, knowledge of HIV disclosure, HIV disclosure-related stigma, and serostatus of sexual partner. Finally, SRRH has a large Muslim community living with HIV and therefore these results will be relevant to the intervention design that will consider the influence of religion. These results can be generalizable to other care and treatment centers found in Tanzania, especially in the central, Northeast, and Southern regions.

4.1 Strengths and limitations

This study provided information from a large CTC in Singida region which is representative of people with HIV in the region. The large sample size (380) and the 100% response rate enabled sufficient power to investigate the multifactorial nature of disclosure and find several independent factors. In order to overcome coercive pressures related to the repercussions of participation or refusal, participation in this study was not linked with the reception of treatment or care services at CTC. The small incentive equivalent to $2USD was provided to each participant for transport expenses, there was no other direct benefit to participants, potentially reducing the likelihood of reporting bias. Non-disclosed participants were referred for counseling.

The present study has some limitations, such as disclosure status was assessed through self-reporting questions which may have over or underestimated the disclosure status due to social desirability bias, and this study employed a cross-sectional study design which made it difficult to establish a causal relationship between the outcome and predicting variables. We did not consider important explanatory variables such as substance use, family income, and residence; some participants were coming from far villages as they were afraid to be registered in their nearby care and treatment centers which could have implications in the disclosure process.

4.2 Recommendations

Health education programs should encourage and promote mutual partner HIV testing to increase awareness of the partner`s HIV status. There should be educational forums with full community engagement and other stakeholders in fighting the HIV epidemic, and this will increase advocacy for disclosure, and emphasize the participation of couples instead of the male or female partner alone. This improvement of the disclosure can be done through the adoption and scale-up of partner services within the care and treatment center setup. Moreover, educational campaigns should encourage a reduction in the number of sexual partners as it is one of the factors which slow down the disclosure rate in Tanzania. More studies need to be done to develop strategies to convert the knowledge PWH have in the importance of disclosure to actual disclosure.

5. Conclusion

The disclosure rate of HIV disclosure noted in this study is a bit encouraging, but more interventions should be done to improve disclosure in Tanzania. Improved rates of disclosure can be attained by considering and intervening in the negative outcomes following disclosure reported in this study. There is a need to address the factors that are limiting the fruitful and early disclosure of HIV status in Tanzania. Generally, disclosure of HIV status to a sexual partner was strongly associated with Living with a sexual partner, knowledge of HIV disclosure, and Serostatus of a sexual partner.

Results from this study will be on display for employees at the SRRH-CTC office and the KCMC-Duke Collaboration office. Partial results were presented at the annual SBS symposium at KCMC and the Fogarty International Center (FIC) 3rd annual conference 2022, a venue for professionals from different parts of the world to present and discuss different health-related scientific matters. These results were also shared with stakeholders who participated in this study through a dissemination meeting at SRRH.

Appendix A

Questionnaire and informed consent

CONSENT TO PARTICIPATE IN RESEARCH STUDY

Disclosure of HIV status to sex partners among men and women with HIV in Tanzania

We are working on a research project supported by Duke universityuu We are conducting a study on disclosure of HIV status to sex partners among men and women with HIV in Tanzania. We will be listening to people with HIV and sexual partners who are attending at Singida Regional Referral Hospital Care and Treatment Center. They may have had some experience with health services around HIV, and we hope to learn about HIV disclosure, factors affecting disclosure, and outcomes of HIV disclosure.

Your participation in the interview and in every aspect of the study is completely voluntary. If some questions are difficult or make you uncomfortable, we can skip them. You may also ask me to clarify any questions if you do not understand them. You may also decide to stop the interview at any time.

All of the information that you provide for the study will be kept completely confidential. We record your responses, but the questionnaire will not have your name on it, and your responses to our questions are identified only by a number, never by name. If you have questions or concerns after we are finished, you may contact *ALEX ALEXANDER Phone number; +255758037723*

Although there are no direct benefits to you from participating in this survey, we hope that the survey will help to improve health services and support for people living with HIV and AIDS. The survey will take about *45* minutes. Do you have any questions about the survey? Would you be willing to participate in our study?

STATEMENT OF CONSENT

"I have read this consent form or have had explained to me to my satisfaction the information relating to this study. I understand what my participation will involve and agree to take part in this interview under the terms of this agreement. I have had the opportunity to ask questions about it, and my questions have been answered to my satisfaction. I consent voluntarily to participate in this study, and I understand that I have the right to withdraw at any time, without it in any way affecting my future medical care"

Name of participant…………………………….

Participant's signature………………………

QUESTIONNAIRE IN ENGLISH

SOCIODEMOGRAPHICS MODULE		
CODE	QUESTION	RESPONSES
DEM1	What is the sex of the respondent?	1. Female 2. Male
DEM2	How old are you?	______Years
DEM3	What was the last level of education you completed?	1. Illiterate 2. Primary education incomplete. 3. Primary education completes 4. Secondary education incompletes 5. Secondary education/vocational completes 6. Post-secondary education.

DEM4	What is your religion?	1. Protestant 2. Muslim 3. Roman catholic 4. Sabbath
DEM5	What is your marital status?	1. Never married. 2. Married or cohabiting. 3. Divorced or separated. 4. Widowed.
DEM6	What type of sexual relationship?	1. Primary partner 2. casual partner 3. mixed type (both casual and primary partners)

DEM7	What kind of work do you do/ what kind of activities keep you busy during an average day, whether you earn money from them or not?	1. Unemployed. 2. Self-employed. 3. Employed/Retired.
DEM8	Are you a member of anti-HIV club?	0. No 1. Yes
PARTNER RELATED FACTORS MODULE		
PRF1	Do you know the HIV serostatus of your sexual partner?	0. No 1. Yes
PRF2	What is the serostatus of your sexual partner?	1. Positive 2. Negative 3. Unknown
PRF3	How did you know his/her HIV serostatus? (Skip this question If the participant	1. From the partner 2. from other people

	answered 'no' in question 9)	(relative, friends, and medical personnel
CLINICAL RELATED FACTORS MODULE		
CRF1	What was your health status during diagnosis?	1. Sick 2. Well
CRF2	What was your WHO HIV stage during diagnosis? (Obtained from CTC card)	1. Stage 1 2. Stage 2 3. Stage 3 4. Stage 4
CRF3	What type of HIV test was used during diagnosis? (Obtained from CTC card)	1. Voluntary counseling and testing (VCT) 2. Provider initiated testing and

		counseling (PITC)
CRF4	How long you have been on ART medication?	____Months
CRF5	Did you receive pre-HIV test and post-HIV test counseling from the medical personnel?	0. No 1. Yes
CRF6	Did the medical personnel explain to you the importance of HIV disclosure to your sexual partner?	0. No 1. Yes 2. Don’t remember.
AWARENESS OF HIV STATUS MODULE		
AHS1	Have you disclosed your HIV status to your sexual partner? **(Skip questions 19, 20 and 21 for the ‘No’ response)**	0. No 1. Yes
AHS2	Who initiated you to disclose your	1. Self-initiated.

	serostatus?	2. Assisted disclosure. 3. Disclosure after partner asked.
AHS3	How long did it take for you to disclose your HIV status to your sexual partner since you were diagnosed? (months)	_______Months
AHS4	Did you have risky sexual practices before disclosure to your sexual partner?	0. No 1. Yes
AHS5	Have you changed sexual partner since you were diagnosed with HIV?	0. No 1. Yes
AHS6	How many sexual partners have you had since you were diagnosed?	_________
AHS7	Have you disclosed your HIV status to all of	0. No

	them?	1. Yes
AHS8	Who was the first person you disclosed?	1. Sexual partner. 2. Relative. 3. Friends. 4. No one
KNOWLEDGE ON IMPORTANCE OF HIV DISCLOSURE		
AHS9	Is it important to disclose your HIV status?	0. No 1. Yes 2. Don't know.
AHS10	Is it important to disclose your HIV status to your sexual partner?	0. No 1. Yes 2. Don't know.
AHS1	Disclosing HIV status to your sexual partner	0. No 1. Yes

1	can prevent HIV transmission	2. Don't know.
AHS1 2	Tanzania's laws require the person with HIV to disclose his/her HIV status to his/her sexual partner.	0. No 1. Yes 2. Don't know.
AHS1 3	HIV disclosure to a sexual partner can improve one's adherence to his/her antiretroviral medications	0. No 1. Yes 2. Don't know.
AHS1 4	HIV disclosure to a sexual partner by person with HIV can help the couple to plan for safer sex.	0. No 1. Yes 2. Don't know.
REASONS FOR DISCLOSING MODULE **(This question to be answered by a participant who responded 'yes' on question 18)**		

RFD	What were the reasons for disclosing your serostatus to your sexual partner? (Tick all reasons mentioned by the respondent)	1. Not to transmit disease. 2. To get social support. 3. To adhere to medication. 4. Encouragement from a counselor. 5. To initiate partner testing. 6. other (mention it) _____
REASONS FOR NON-DISCLOSING MODULE **(This question to be answered by a participant who responded 'No' on question 18)**		
RFND	What were the reasons for not disclosing your serostatus to your sexual partner? (Tick	1. Fear of divorce 2. Fear of being

	all reasons mentioned)	stigmatized 3. Fear of being blamed/beaten 4. Fear of depression. 5. Fear of breaking of confidentiality 6. Other (mention)_____.
HIV DISCLOSURE OUTCOMES MODULE **(These questions should be asked to those who responded 'yes' on question number 18)**		
HDO1	Have you received social support from your partner since you disclosed your status to him/her?	0. No 1. Yes
HDO2	Have you discussed safer sex with your	0. No

	partner since you disclosed your status to him/her?	1. Yes
HDO3	Has your partner been tested for HIV after you disclosed your status to him/her?	0. No 1. Yes
HDO4	In the last 30 days, on how many days did you miss at least one dose of any of your HIV medicine (write in number of days)	________Days
HDO5	In the last 30 days, how good a job did you do at taking your HIV medications in the way you were supposed to?	1. Very poor 2. poor 3. Fair 4. Good 5. Very good 6. Excellent
HDO6	In the 30days, how often did you take your	1. Never

	HIV medicines in the way you were supposed to?	2. Rarely 3. Sometimes 4. Usually 5. Almost always 6. Always.
HDO7	What is the result of the most recent viral load count and CD4 count taken within 6months ago (to be taken from CTC card)	________/__________
HDO8	Was that viral load taken after you disclosed your status?	0. No 1. Yes
HDO9	Have you separated from your sexual partner after disclosure of her/his serostatus?	0. No 1. Yes
HDO1 0	Were you blamed/beaten by your sexual partner after disclosure of your serostatus?	0. No 1. Yes

HDO1 1	Did you get depression after disclosure of your serostatus?	0. No 1. Yes
HDO1 2	Were you stigmatized by your sexual partner after disclosure?	0. No 1. Yes

HIV RELATED STIGMA

I am going to ask you some more questions about HIV and the perceptions that other people might have. We are doing this to gather important information so we can better understand these issues and whether these issues need more attention among groups of women living with HIV.

PERCEIVED STIGMA						
CODE	QUESTION	None of the time [0]	A little bit of the time [1]	Some of the time [2]	Most of the time [3]	All of the time [4]

PSTG1	HIV is different than other diseases like cancer because people with HIV are judged.	0	1	2	3	4
PSTG2	People assume I have done something bad to get HIV.	0	1	2	3	4
PSTG3	People think that if you have HIV then you got what you deserve.	0	1	2	3	4
PSTG4	People think that if you have HIV then you got what you deserve.	0	1	2	3	4
PSTG5	People blame me	0	1	2	3	4

	for having HIV.					
PSTG6	People assume I slept around because I have HIV.	0	1	2	3	4
PSTG7	People think that if you have HIV you do not deserve to have children.	0	1	2	3	4
PSTG8	People are afraid to let someone with HIV adopt a child.	0	1	2	3	4
PSTG9	People lose their jobs because they have HIV.	0	1	2	3	4
ANTICIPATED STIGMA						
ASTG1	I am concerned if I go to the HIV	0	1	2	3	4

	clinic someone, I now might see me.					
ASTG2	I am concerned if I have physical changes from the HIV medicines people will know I have HIV.	0	1	2	3	4
ASTG3	I am concerned if I go to an AIDS organization someone, I know might see me.	0	1	2	3	4
ASTG4	I am concerned people will find out I have HIV by looking at medical paperwork.	0	1	2	3	4
ASTG5	I am concerned that if I am sick	0	1	2	3	4

	people will find out about my HIV.					
HEALTH SECTOR STIGMA						
HSTG1	Medical providers assume people with HIV sleep around	0	1	2	3	4
HSTG2	Nurses and doctors treat people who have HIV as if they are contagious.	0	1	2	3	4
HSTG3	Nurses and doctors dislike caring for patients with HIV.	0	1	2	3	4
EXPERIENCED STIGMA						
ESTG1	People treat me as less than human now that I have	0	1	2	3	4

	HIV.					
ESTG2	People avoid me because I have HIV.	0	1	2	3	4
ESTG3	People I am close to are afraid that they will catch HIV from me.	0	1	2	3	4
INTERNALIZED STIGMA						
ISTG1	I feel abandoned by family members because I have HIV	0	1	2	3	4
ISTG2	I feel like I am an outsider because I have HIV.	0	1	2	3	4
ISTG3	Having HIV make me feel dirty	0	1	2	3	4

ISTG4	I feel guilty that I have HIV	0	1	2	3	4
ISTG5	I am ashamed that I have HIV	0	1	2	3	4
ISTG6	I feel worthless because I have HIV	0	1	2	3	4
DISCLOSURE STIGMA						
DSTG1	I feel ashamed to tell other people that I have HIV.	0	1	2	3	4
DSTG2	It is difficult to tell other people that I have HIV.	0	1	2	3	4
DSTG3	I hide my HIV status from others.	0	1	2	3	4

THANK YOU FOR YOUR PARTICIPATION IN THIS STUDY

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