



# The Open AIDS Journal

Content list available at: <https://openaidsjournal.com>



## RESEARCH ARTICLE

### Longitudinal Analysis of HIV Disclosure Intention: The Implication of Duration of Diagnosis Knowledge and CD4 Counts Among Asymptomatic Treatment-seeking People Living with HIV/AIDS

A. O. Olaseni<sup>1,\*</sup>

<sup>1</sup>Department of Psychology, University of Ilorin, Ilorin, Nigeria

#### Abstract:

##### Introduction:

The spate of non-disclosure among individuals diagnosed with Human-Immunodeficiency-Virus and Acquired-Immune-Deficiency-Syndrome (HIV/AIDS) has continually been a primary global concern, especially in developing countries. Meta-analysis findings in Nigeria reported poor disclosure rates of 12.5% - 39.5%, which were far below the average disclosure benchmark of 79.0% standard stipulated for developing nations by the World Health Organization. There is no consensus regarding the roles of CD4 counts in disclosure intention. In Nigeria, there is a paucity of literature providing detailed understanding of the predictors of disclosure intention by the duration of diagnosis knowledge and CD4 counts.

##### Methods:

This study, therefore, investigated the implication of duration of diagnosis knowledge and CD4 counts in the prediction of HIV disclosure intention among people seeking HIV treatment. Longitudinal survey research designs were adopted. 390 participants were purposively selected to respond to HIV Self-Disclosure Intention Index ( $\alpha=0.92$ ), while information on CD4 counts and Duration of Diagnosis Knowledge was obtained from the selected respondents' case files periodically. Binomial logistic regression analysis was used to analyze data at 0.05. Respondents' mean age was  $39.5 \pm 10.5$  years.

##### Results:

Findings revealed that the duration of diagnosis knowledge and CD4 counts interactively predicted the outcome of disclosure intention among treatment-seeking PLHIV. ( $\chi^2 = 12.78$ ,  $df = 2$ ,  $p < 0.001$ ) and further showed that the likelihood of disclosing HIV positive status increases by 13% between Time 1 (OR = -0.49,  $p < 0.01$ ; 95%CI = 01.14-12.74) and Time 2 (OR = -0.36,  $p < 0.05$ ; 95%CI = 01.11-10.93). Increase in CD4 counts was also found to increase the likelihood of HIV self-disclosure by 15% between Time 1 (OR = - 0.84,  $p < 0.01$ ; 95%CI = 01.09-03.06) and Time 2 (OR = - 0.99,  $p < 0.01$ ; 95%CI = 00.29-03.06).

##### Conclusion:

It was concluded that the duration of diagnosis knowledge and CD4 counts have significant implications in determining the intention to disclose HIV positive status. The study limitations and recommendations were further discussed.

**Keywords:** AIDS/HIV, CD4 T-Cells, Duration of diagnosis knowledge, Disclosure intention, Treatment-seeking PLHIV, Binomial logistic regression.

#### Article History

Received: April 20, 2020

Revised: August 04, 2020

Accepted: August 06, 2020

## 1. BACKGROUND OF THE STUDY

The spate of non-disclosure among individuals diagnosed with Human-Immunodeficiency-Virus and Acquired-Immune-Deficiency-Syndrome (HIV/AIDS) has continually been a primary global concern, especially in developing countries. The

low disclosure prevalence has been widely linked to most persistent problems thwarting the effort of authorities saddled with responsibilities of curbing the menace of HIV/AIDS. The unabated issues have been a global health concern with lots of committed efforts in terms of research and intervention [1]. The west and central sub-Africa alone having over 7 million populates diagnosed with HIV/AIDS accounted for over 4.94% of the global AIDS/HIV death rate [1]. In Nigeria, 1.5%

\* Address correspondence to this author at the Department of Psychology, University of Ilorin, Ilorin, Nigeria; E-mail: [olaseni.ao@unilorin.edu.ng](mailto:olaseni.ao@unilorin.edu.ng)

prevalence of HIV infection was reported [2], invariably suggesting that approximately 1.9 million of the populace is infected with HIV/AIDS [3]. Cases of HIV/AIDS in Nigeria are prominent, such that the awareness level in Nigeria was reported as high as 93.8%, yet the non-disclosure intention rate remains so low in Nigeria. For instance, the study of Salami *et al.* [4] and Olley, *et al.* [5] reported disclosure prevalence of 12.5% and 39.5% respectively. However, the World Health Organization [6] recommended the prevalence rate of 79% as a benchmark for a developing country like Nigeria.

There are established benefits associated with self-disclosure of HIV positive status [6, 7]. Disclosures have been spotted to play significant critical duties in determining the coping mechanism of an individual diagnosed with HIV or AIDs. In other words, disclosure exerts significant impacts on victims' general and mental health, such as stress reduction, enhanced social support, readily decrease in the probabilities of transmitting HIV to self-network and others [8]. Disclosure rises access to material and social support which consequently improves both the physical and psychological health of PLWHA [9].

## 2. INTRODUCTION

HIV/AIDS non-disclosure behavior is not limited to Nigeria but other African countries, *e.g.*, Kenya. HIV disclosure rate has been reported at a low level in Kenya. For instance, it was reported in the annual spreadsheet of Kenya AIDS Indicator Survey [10] that not much than fewer individuals (35%) are knowledgeable about the HIV positive status of their spouses, while 78% people reported being not knowledgeable about their sexual partner HIV status [11]. Sarna *et al.* [12] reported a 63% non-disclosure rate among the Mombasa population.

In another research study, the study area was Ondo State. The state has persistently been representing southwest states being the only state in the region among the top ten states with the highest HIV prevalence in Nigeria at 4.3% [13]. There is a paucity of studies that had reported the prevalence of disclosure rate in the region. The study conducted by Olley *et al.* [5] revealed 22% disclosure rate among PLHIV, which invariably indicated 78% non-disclosure rate. Haven identified the disclosure prevalence of HIV/AIDS in Africa, Nigeria, and Ondo state in particular; it is worrisome to know that the rate of incidence of disclosure among people living with HIV/AIDS was far below the expected or international standards (79% disclosure rate stipulated by WHO for developing countries).

Furthermore, common cognitive barriers to self-disclosure may be the fear of getting a negative or an unpleasant reaction from their partner, fear of abandonment, broken marriages or relationships, emotional and physical emotional abuses, discrimination and stigmatization, and loss of economic support [14]. Disclosure behaviour or intention has been implicated to have a strong link with the severity of illness as determined by the CD4 counts of the participants.

The CD4 count is a reflection of the quality of the human immune system and it is otherwise referred to as CD4 T-cell. CD4 T-cells contained in the white blood cells in the human body fight bacteria and viruses potentially attacking the

human's immune system. The more the CD4 counts in the body, the better or stronger the carrier's system. In the study, it was used as the determinant of severity of illness because CD4 counts are the cells that the HIV virus kills, such that as the HIV infection progresses, the number of these cells declines. The normal range for CD4 cells in the body is about 500-1,500, and in the situation of a drop below 200 counts, the person is diagnosed with AIDS [15].

The study of Antelman *et al.* [16] purported to examine the predictors of HIV status disclosure in a prospective study among HIV infected pregnant women in Dar es Salaam. It was revealed that the length of diagnosis knowledge has a strong influence on disclosure. Disclosure to a partner was reported to increase tremendously by 80% after four years. Studies among heterosexual men and women, young people, and attendees of an outpatient HIV clinic found that disclosure had a positive association with the length of time since diagnosis [17] and with disease progression [18].

Stacey *et al.* [19] examined the socio-demographic correlates of disclosure among children living with HIV. It was revealed that the duration of illness (HIV), diagnosis or duration of medication are strongly associated with disclosure. In other words, the longer the duration of HIV diagnosis knowledge, the higher the tendency of disclosing HIV positive status. Other identified correlates are HIV medications, deceased biological father among others. In addition, Stacey *et al.* [19] further revealed that CD4-T lymphocyte count and socioeconomic status are not associated with disclosure among people living with HIV.

Based on the background and literature gap, there has not been an agreement regarding the conclusion of the influence of the duration of diagnosis and CD4 counts in determining HIV/AIDS self-disclosure behaviour or intention. The inconsistency in the conclusions of the previous studies validates the necessity for the current study to hold ground on the impact of years of diagnostic knowledge on disclosure intention among PLHIV.

However, there is a paucity of studies that have attempted to explore the concept of disclosure from the internalizing perspective (self-intention); instead, overwhelming studies have explored disclosure from the behavioural perspective (majorly, involuntary disclosure), which has been proven to be significantly ineffective in tackling the menace associated with non-disclosure among PLWHA [20].

The general purpose of the study is therefore to investigate the implication of duration of diagnosis knowledge and CD4 counts in the prediction of HIV disclosure intention among people seeking HIV treatment. The following are the specific research objectives of the study, which are to;

- Examine that being a respondent with early years (1-5years) of diagnosis knowledge will significantly decrease the tendency of self-disclosing HIV positive status when compared to counterparts in other categories (5years and above) in a 6 months follow-up.
- Explore that being a respondent with lower ( $\geq 100$ ) CD4 T-cell will significantly decrease the tendency of

self-disclosing HIV positive status than counterparts with higher (>200) CD4 T-cell in a 6 months follow-up.

### 3. MATERIALS AND METHODS

#### 3.1. Study Area/Setting

The study was conducted in Ondo State University Teaching Hospital (OSUTH, formerly State Specialist Hospital). The sampled population was reached and made to engage in the research in the Heart to Heart (H2H) unit of the Hematology Department. OSUTH is a government-owned health facility in Akure south local government area of Ondo state. The health institution provides HIV/AIDS care majorly to people diagnosed with HIV/AIDS in Ondo state, Nigeria. This setting was considered appropriate for this study because it is the largest and government accredited facility for the treatment and management of HIV/AIDS in the state with over six thousand registered PLWHA.

#### 3.2. Research Design/Participants

The study was conducted using a longitudinal survey design among selected patients, living with HIV/AIDS (PLWHA). The design enables the researcher to consistently retrieve data information from the same sampled population repeatedly in the study. The target populations were registered HIV patients attending the clinic at the time of data collection. The data was gathered from three hundred and ninety (n=390) PLWHA.

#### 3.3. Inclusion-Exclusion Criteria

The study entails some salient criteria that required the exclusion and inclusion of essential characteristics that are necessary to be considered in the study. The inclusion criteria include individuals receiving HIV treatment and management in the state facility; HIV/AIDS asymptomatic patients, participants being adults (not less than 18 years). Only consented HIV/AIDS patients were strictly engaged, and participants were to be free from any psychological disorders; however, those who reported inability to read and write in the English Language were excluded.

#### 3.4. Research Instruments

Questionnaire booklets were made up of widely used and psychometrically sound instruments for the data collection in the study. The questionnaire was made up of two sections,

Section A and B; **Section A:** Socio-Demographics Section measured respondents' data such as Research Identification Number (RIN), age, gender, marital status, highest educational attainment, occupation, and religion, CD4 counts among others and **Section B:** HIV Self-Disclosure Intention Index (HIV-SDI-Index, developed by Olley and Olaseni [21],) designed to measure the extent of respondents' intention to disclose their status to people around. Attitude (Personal Beliefs about disclosure) as measured by Item 1 – 9, Normative (Subjective norm) as measured by item 13 - 19, Perceived Behavioural Control as measured by Item 20 – 25 and disclosure motivation as measured by Item 10 – 12. The HIV Self-Disclosure Intention Index reported a strong internal reliability of Cronbach alpha reliability at 0.92 ( $\alpha = 0.92$ ) and Guttman Split-Half reliability Coefficient of 0.82 and as well as a validity outcome. Items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 23, 24, and 25 were directly scored, while items 14, 19, 20, 21, and 22 were reversely scored. Scores above the mean indicated high disclosure intention of respondents' HIV serostatus, while scores below the mean indicated low disclosure intentions.

#### 3.5. Sampling Techniques/Procedures

The sampling technique adopted in the study was purposive sampling technique. The sampling technique allows the researcher to select appropriate respondents that are qualified to participate in the study.

### 4. RESULTS

This section presents the results and interpretation of data collected on the implication of duration of diagnosis knowledge and CD4 counts on disclosure intentions among three hundred and ninety (390) treatment-seeking people living with HIV/AIDS. The collected data was analyzed using the SPSS package (version 20). The analyses of binomial logistic regression are presented below.

#### 4.1. Sample Characteristics

The total sample with a complete 6-month follow-up assessment was 390 and eligible for this analysis. The mean age was  $39.5 \pm 10.5$ . The majority of the participants in the study were middle adults (35-55years), 80.30% were female respondents, 51.1% were married/cohabiting, 89.5% had 1-5years of diagnosis knowledge, and 67.9% of the respondents nominated their mother as the choice of treatment support specialist (Table 1).

**Table 1. Socio-demographic characteristics of People Living with HIV with Disclosure Intention challenges at the baseline stage.**

Socio-Demographic Variable	Frequency (n)	Percentage %
<b>Sex</b>	-	-
Male	77	19.70
Female	313	80.30
<b>Marital Status</b>	-	-
Unmarried (Single) Respondents	156	40.0
Married Respondents	199	51.1

(Table 1) contd....

Divorced	10	02.6
Widowed/Widower	25	06.4
<b>Age Grades</b>	-	-
Young Adults (18 – 35 years)	23	05.9
Middle Adults (35-55 years)	279	71.5
Late Adults (56 years above )	88	22.6
<b>Duration of Diagnosis Knowledge</b>	-	-
1 - 5 Years	349	89.5
6 - 15 Years	41	10.5
<b>Choice of Treatment Support</b>	-	-
Father	12	04.8
Mother	171	67.9
Spouse/Sex Partner	13	05.2
Others	03	01.2
Colleagues	02	00.8
Child(ren)	21	08.3
Sibling	30	11.9

**4.2. Longitudinal Analyses of HIV Self-disclosure Intention**

Logistic results as reflected in Table 2 indicated that at Time 1 (3months post-baseline assessment), high disclosure intention among treatment-seeking PLHIV was significantly determined by duration of diagnosis knowledge (odds ratio [OR] = -0.49, p < 0.01; 95%CI = 01.14-12.74). This result implies that being a respondent within the category of 1-5 years diagnosis knowledge significantly decreased the likelihood of disclosing HIV positive status by 49% than respondents in other categories of years of diagnosis knowledge.

Longitudinal analysis at Time 2 (6 months post-baseline assessment) revealed that high disclosure intention was significantly determined by duration of diagnosis knowledge (odds ratio [OR] = -0.36, p < 0.05; 95%CI = 01.11-10.93). This result implies that being a respondent within the category of 1-5years diagnosis knowledge significantly decreased the likelihood of disclosing HIV positive status by 36% than respondents in other categories of years of diagnosis knowledge. In other words, the higher the duration of diagnosis knowledge, the higher the tendency of self-disclosing HIV positive status.

Furthermore, at Time 1 (3months post-baseline assessment), high disclosure intention was significantly

determined by reported CD4 counts (OR = - 0.84, p < 0.01; 95%CI = 01.09-03.06). This result implies that being a respondent equal or greater than 100 CD4 counts (≥100 CD4 T-cell) significantly decreased the likelihood of reporting high disclosure intention by 84% when compared to respondents with greater (>200) CD4 counts.

It was presented at Time 2 (6months post-baseline assessment) that high disclosure intention was significantly determined by reported CD4 counts (OR = - 0.99, p < 0.01; 95%CI = 00.29-03.06). This result implies that being a respondent with equal or greater than 100 CD4 counts (≥100 CD4 T-cell) significantly decreased the likelihood of reporting high disclosure intention by 99% when compared to respondents with greater than 200 CD4 counts (>200 CD4 T-cell).

The binomial regression analyses at Time 2 showed that duration of diagnosis knowledge and CD4 counts interactively predicted the outcome of disclosure intention ( $\chi^2 = 12.78, df = 2, p < .001$ ). The phi coefficient analysis of Nagelkerke R-squared value revealed that 44% of the variance observed in the outcome of disclosure intention among treatment-seeking PLHIV was jointly accounted for duration of diagnosis knowledge and CD4 counts.

**Table 2. Binomial logistic regression analyses of predictors of high disclosure intention by duration of diagnosis knowledge and CD4 counts.**

	Baseline (n)%	Time 1 (3 months Post-Baseline)		Time 2 (6 months Post-Baseline)		R <sup>2</sup>	$\chi^2$
		Exp(B) (95%CI)	p	Exp(B) (95%CI)	P		
<b>Duration of Diagnosis</b>						0.44	12.78***
1 - 5 Years	89.5	-0.49 (01.14-12.74)	<0.01	-0.36 (1.11-10.93)	< 0.05		
Older Years (6 - 15 Years)	10.5	1.00		1.00			
<b>CD4 Counts</b>							
(≥100 CD4 T-cell)	76.4	-0.84 (01.09-03.06)	< 0.01	-0.99 (0.29-03.06)	< 0.01		
(>200 CD4 T-cell)	23.6	1.00		1.00			

Reference category is Low Disclosure Intention. CI=Confidence interval Duration of Diagnosis and CD4 Counts were dummy coded.

The outcomes of the study were in support of the study hypotheses which proposed that being a respondent with early years of diagnosis knowledge (1-5) will significantly decrease the tendency of self-disclosing HIV positive status than respondents with older years of diagnosis knowledge (5 years and above) in a 6 months follow-up. Also, being a respondent with lower CD4 counts ( $\geq 100$  T-cell) will significantly decrease the tendency of self-disclosing HIV positive status than respondents with higher CD4 counts ( $> 200$  T-cell) in a 6 months follow-up. The study hypotheses were therefore accepted.

## 5. DISCUSSION

The study found that respondents in the category of early years (1-5 years) of diagnosis knowledge reported a decreased tendency of self-disclosure of HIV positive status when compared to respondents with older (5 years and above) years of diagnosis knowledge in a 3 months follow-up. Further analysis revealed that after 6 months, chances of disclosing HIV positive increased by 13% (-0.49 – 0.36) in the space of three months. This result is in agreement with the study of Antelman *et al.* [16], O'Brien *et al.* [18], and Niccolai *et al.* [17], that concluded a significant positive relationship between the length of time since diagnosis and disclosure, indicating that the longer the time of HIV diagnosis, the higher the rate of disclosing HIV positive status among people living with HIV. The study of Antelman *et al.* [16], O'Brien *et al.* [18], and Niccolai *et al.* [17] found that disclosure had a positive association with the length of time since diagnosis or disease progression.

The study further found that respondents with lower viral load ( $\geq 100$  CD4 T-cell) reported decreased likelihood of self-disclosing HIV positive status when compared to respondents with higher viral load ( $> 200$  CD4 T-cell) in a 3 months follow-up. However, further analysis revealed that after a 6 months follow-up, the likelihood of disclosing HIV positive increased by 13% (-0.49 – 0.36) in the space of three months. This result is in agreement with numerous studies that examined the implication of the duration of diagnosis on disclosure among PLHIV. For instance, the study of Kankou, Bouchaud, and Lele [22] reported that the HIV viral load is significantly associated with disclosure among PLWHA in France. On the contrary, the earlier findings of Stacey *et al.* [19] reported that CD4-T lymphocyte count and socioeconomic status were not associated with disclosure among people living with HIV. The findings may be due to the variation in the possibilities that some relatives and loved ones of the asymptomatic people living with HIV/AIDs may be sensitive enough to notice a slight change in physical and emotional signs, which may elicit mounting pressure till intention to disclose is achieved.

## 6. STUDY LIMITATIONS

The results of the study should be interpreted with caution due to a handful of limitations. The findings of the study are limited to HIV/AIDs patients who are asymptomatic and with not less than 100 CD4 counts during the data collection in a basic treatment center in Nigeria. Further, data collection is limited to just the southwestern part of the six geopolitical zones in Nigeria; therefore, findings cannot be generalized.

Most of the variables considered in the study were assessed through respondents' self reported means, which may be prone to introspective biases or socially desired responses. In addition, the error called classifier bias is reported in the study due to sampling bias. The focus in the study was on people diagnosed with HIV and therefore data classification prevailed the duration of diagnoses [23]. This is considered a rare event for the longer the years of diagnosis, the higher the chances of being diagnosed with AIDs (exclusion criterion for the study).

Furthermore, the sample size of the population at the end of the study was considered relatively small and may have introduced an outcome bias [24]. Moreso, numerous concepts/variables that may influence the respondents' disclosure intention or actual intention were not integrated or a part of this study's scope and should be included in future researches. In other words, the phi coefficient value revealed the contributory role of the study's independent variables over the dependent variable in the binomial logistic regression, which however depicts that some other variables (not accounted for in the current study) may have influence disclosure intention.

## CONCLUSION

The study in a 6-month follow-up found that among people living with HIV (PLHIV), respondents with an earlier duration of diagnosis knowledge usually between day 1 to 5 years are less likely to disclose their HIV positive status than respondents with the older duration of diagnosis knowledge, usually 5 years and above. In other words, the higher the time of diagnosis, the higher the likelihood of disclosing HIV positive status. However, the more the CD4 counts of the respondents over the period of 6 months, the higher the intention of disclosing HIV positive status to helpful disclosure targets.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethical Review and Research Ethics Committee of the State Ministry of Health (SHREC: AD.4693 Vol.II/5) and the Department of Clinical and Health Psychology of the Heart to Heart unit of the facility in Nigeria.

## HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

## CONSENT FOR PUBLICATION

An informal consent was obtained from the study participants.

## AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are not published due to restrictions applied to the availability of these data, which was assured under license and consent policy for

the current study, and so not publicly available. Upon confidential request, data shall be made available from the author with granted permission from the members of Ethical Review Committee of the Ministry of Health, Ondo State.

## FUNDING

The author declares no external grants or research funds from any private or public organization for the purpose of carrying out the study. Therefore, the study outcomes are not biased or hold allegiance to any party or organization.

## CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

## ACKNOWLEDGEMENTS

Declared none.

## REFERENCES

- [1] UNAIDS. 2020 Global AIDS Update: Seizing the Moment; July 2020 UNAIDS AIDS info website 2020. available at: <http://aidsinfo.unaids.org/>
- [2] Federal Ministry of Health. 2010.National HIV Seroprevalence Sentinel Survey Available at: [www.nigeria-aids.org/](http://www.nigeria-aids.org/)
- [3] UNAIDS. HIV and AIDS estimates 2013. Available at: <http://www.unaids.org/en/regionscountries/countries/nigeria>
- [4] Salami AK, Fadeyi A, Ogunmodede JA, Desalu OO. Status disclosure among People Living with HIV/AIDS in Ilorin, Nigeria. *West Afr J Med* 2011; 30(5): 359-63. [PMID: 22752825]
- [5] Olley B, Seedat S, Stein D. Self-disclosure of HIV serostatus in recently diagnosed patients with HIV in South Africa. *African Journal of reproductive health Women's health and action Research centre* 2004; 8(2): 71-6.<http://bioline.utoronto.ca/archive/00002780/01/rh04028.pdf> <http://hdl.handle.net/1807/3919>
- [6] WHO. Gender Dimensions of HIV Status Disclosure to Sexual Partners: Rates, Barriers and Outcomes A Review Paper. WHO Geneva Edition 2004.
- [7] Centers for Disease Control and Prevention. (2011). Update on HIV/AIDS epidemic in Guangxi. Mahwah, NJ. Lawrence Erlbaum Associates. 2011.
- [8] Greene K. Disclosure of chronic illness varies by topic and target: The role of stigma and boundaries in willingness to disclose. *Balancing the secrets of private disclosures*. Mahwah, NJ: Lawrence Erlbaum 2003.
- [9] Waddell EN, Messeri PA. Social support, disclosure, and use of antiretroviral therapy. *AIDS Behav* 2006; 10(3): 263-72. [<http://dx.doi.org/10.1007/s10461-005-9042-x>] [PMID: 16496089]
- [10] Kenya AIDS Indicator Survey [KAIS]. Republic of Kenya Nairobi 2007.[http://guidelines.health.go.ke:8000/media/KAIS\\_2007\\_Final.pdf](http://guidelines.health.go.ke:8000/media/KAIS_2007_Final.pdf)
- [11] National AIDS and STI Control Programme, Ministry of Health, Kenya [NASCOP]. Report on the Joint AIDS programme Review. Nairobi, Kenya 2007.
- [12] Sarna A, Chersich M, Okal J, *et al*. Changes in sexual risk taking with antiretroviral treatment: Influence of context and gender norms in Mombasa, Kenya. *Cult Health Sex* 2009; 11(8): 783-97. [<http://dx.doi.org/10.1080/13691050903033423>] [PMID: 19557584]
- [13] National Agency for the Control of AIDS, (2009) HIV Strategic Plan 2010 to 2015 Ondo State, Nigeria National Agency for the Control of AIDS
- [14] Amoran OE. Predictors of disclosure of sero-status to sexual partners among people living with HIV/AIDS in Ogun State, Nigeria. *Niger J Clin Pract* 2012; 15(4): 385-90.<http://www.njconline.com/text.asp?2012/15/4/385/104507> [<http://dx.doi.org/10.4103/1119-3077.104507>] [PMID: 23238184]
- [15] Sofia A, Battistini G, Nilmarie G. Acquired Immune Deficiency Syndrome (AIDS) CD4+ Count National Center for Biotechnology Information 2018.<https://www.ncbi.nlm.nih.gov/books/NBK513289/>
- [16] Antelman G, Smith Fawzi MC, Kaaya S, *et al*. Predictors of HIV-1 serostatus disclosure: A prospective study among HIV-infected pregnant women in Dar es Salaam, Tanzania. *AIDS* 2001; 15(14): 1865-74.<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6261328/> [<http://dx.doi.org/10.1097/00002030-200109280-00017>] [PMID: 11579250]
- [17] Niccolai LM, King E, D'Entremont D, Pritchett EN. Disclosure of HIV serostatus to sex partners: A new approach to measurement. *Sex Transm Dis* 2006; 33(2): 102-5. [PubMed: 16432481]. [<http://dx.doi.org/10.1097/01.olq.0000194591.97159.66>] [PMID: 16432481]
- [18] O'Brien ME, Richardson-Alston G, Ayoub M, Magnus M, Peterman TA, Kissinger P. Prevalence and correlates of HIV serostatus disclosure. *Sex Transm Dis* 2003; 30(9): 731-5. [PubMed: 12972799]. [<http://dx.doi.org/10.1097/01.OLQ.0000079049.73800.C2>] [PMID: 12972799]
- [19] Kallem S, Renner L, Ghebremichael M, Paintsil E. Prevalence and pattern of disclosure of HIV status in HIV-infected children in Ghana. *AIDS Behav* 2011; 15(6): 1121-7. [<http://dx.doi.org/10.1007/s10461-010-9741-9>] [PMID: 20607381]
- [20] Salami AK, Olatunji PO, Oluboyo PO. Spectrum and prognostic significance of opportunistic diseases in HIV/AIDS patients in Ilorin, Nigeria. *West Afr J Med* 2006; 25(1): 52-6. [PMID: 16722359]
- [21] Olley BO, Olaseni AO. Development of a screening Instrument for HIV/AIDS Self Disclosure Intention (HIV-SDI-Index). *Afr J Psychol Study Soc Issues* 2016; 9(3): 1-15.[http://www.ajpssi.org/index.php/ajpssi/article/view/182/pdf\\_137](http://www.ajpssi.org/index.php/ajpssi/article/view/182/pdf_137)
- [22] Kankou JM, Bouchaud O, Lele N, *et al*. Factors associated with hiv status disclosure in hiv-infected sub-saharan migrants living in france and successfully treated with antiretroviral therapy: Results from the ANRS-VIHVO study. *J Immigr Minor Health* 2017; 19(4): 843-50. [<http://dx.doi.org/10.1007/s10903-016-0423-1>] [PMID: 27125911]
- [23] King and Zeng. 2013. Logistic Regression in Rare Events Data <https://gking.harvard.edu/files/0s.pdf>
- [24] Peltzer K, Ramlagan S. Safer sexual behaviours after 1 year of antiretroviral treatment in KwaZulu-Natal, South Africa: A prospective cohort study. *Sex Health* 2010; 7(2): 135-41. [<http://dx.doi.org/10.1071/SH09109>] [PMID: 20465976]