



Economic Burden of Accessing Antiretrovirals Among People Living with HIV; Findings from a Cross-Sectional Survey in Lagos State, Nigeria

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Abstract: *Background:* HIV/AIDS is one of the major diseases with multifaceted burdens; health, emotional and financial. After the introduction of the Antiretroviral Therapy (ART), HIV/AIDS became a chronic disease that requires long-term management thus competing with other day-to-day economic obligations of People Living with HIV/AIDS (PLWH). There have been limited studies assessing economic burden of accessing ART treatment vis-a-vis catastrophic health expenditure (CHE) in this environment. Therefore, this survey explores the CHE resulting from accessing ART treatment and identifying some of the predictors for CHE among PLWH in Lagos State, Nigeria. *Materials and methods:* This study was a descriptive cross-sectional, quantitative survey that was carried out among 217 consenting PLWH recruited from 15 Support groups in Lagos State, Nigeria. The data was collected using 29-items self-administered questionnaire (research assistants aided PLWH who cannot read or write) developed from the review of relevant literatures. The data were analyzed using SPSS version 20. Chi-square at p-value of < 0.05 was used to determine significance of factors associated with CHE. Results: Age of the respondents was 42.81±8.517 years. Female respondents were more than 70% (171) and about half of the respondents, 109 (50.2%) were married. Above half, 129 (59%), of the respondents attend drug pick-up sites for their ARVs monthly. Less than 60% of the respondents (mean annual income 1111.203±821.371 dollars) earn below \$1000 annually with 41.2%, 39.0% and 19.8% of the respondents in low, middle and high income groups respectively. Only 5% of the PLWH expend \$200 annually for refill of ARVs. Considering the global definition of CHE (health expenditure>10% of household consumption,) 40% of the surveyed respondents experienced CHE. Using chi-square to determine factors associated with CHE among respondents; occupation, income group and ARVs refill frequency were significant at P<0.05. However, the binary logistic regression identified formal occupation (aOR=0.025, 95% C.I=0.02-0.35, p-value=0.006), being in middle income group (aOR=0.007, 95% C.I=0.001-0.05, p-value=0.0001) and high income group (aOR=0.035, 95% C.I=0.10-0.12, p-value=0.0001) and visiting health care facility for ARVs refill bi-monthly (aOR=17.555, 95% C.I=4.64-66.40, p-value=0.0001) as predictors of CHE among respondents. Conclusions: The results of this survey revealed that having formal employment, belonging to middle and high income groups protects respondents from CHE while bi-monthly ARVs refill predisposes PLWH in this survey to CHE.

Keywords: Catastrophic Health Expenditure (CHE), Antiretroviral Therapy (ART), Antiretroviral (ARV), People Living with HIV (PLWH), Income Groups

1. Introduction

The Institute for Health Metrics and Evaluation's Global Burden of Disease Study 2017 ranked HIV/AIDS as the 8th leading cause of early death globally in 2017 [1]. Joint United Nations Programme on HIV/AIDS (UNAIDS) revealed that 35.4million people have died from AIDS-related illnesses since the start of the epidemic, 36.9million people were living with HIV globally with 1.8million people becoming newly infected with HIV in 2017 [2]. UNAIDS further revealed that 6.1million people are currently living with HIV in Western and Central Africa in 2017 beside about 370,000 newly infected with the virus [2]. The Nigeria HIV/AIDS Indicator and Impact Survey (NAIIS) 2018 estimated that 1.9 million Nigerians are living with HIV at a National prevalence of 1.4 [3].

The discovery and prescription of Antiretroviral Therapy (ART) to People Living with HIV/AIDS (PLWHA) has made HIV a chronic disease and a lifetime need for medical treatment, care and support with a resultant effect on not just the emotions of the infected and affected but also their economic buoyancy. Since HIV/AIDS affects more of the working age population, 15-45 years old, it reduces savings, encourages productive assets being sold and increases indebtedness on the affected family [4-7]. This has resulted in increment of poverty and scarce resources being utilized on ill-health [8]. ART is distributed free of charge at designated health facilities across Lagos State at an agreed routine with the client, there are still some medical and non-medical cost implications for assessing ART treatment that must be borne by the PLWHA. These costs can lead to worsened poverty especially in Nigeria where payments for healthcare access is predominantly out-of-pockets (OOPs). Poverty, low-to-no productive assets and OOP payment often leads to catastrophic health expenditure (CHE) [9].

Ekman defined CHE as out-of-pocket spending for health care that exceeds a certain proportion of a household's income with the consequence that households suffer the burden of disease (s) while Ezat illustrates it as expenditure for medical treatment that can pose a threat towards a household's financial ability to maintain its subsistence needs [10, 11]. A total health expenditure of 10% or more from the total income and a health expenditure exceeding 40% of the income remaining after subsistence needs have been met are considered as indications of CHE [11].

Since ART is considered free, a few surveys had considered the economic burden of accessing treatment on PLWHA. The findings of this survey will add to the body of knowledge on economic burden of free treatment of HIV/AIDS especially the CHE experienced by the indigent PLWHA. The results of this survey will also aim to inform policy-makers and program-implementers in designing novel strategies in reducing CHE among PLWHA in Nigeria. In this survey, CHE was considered as annual health expenditure exceeding 10% of the annual income of respondents [12].

2. Materials and Methods

This survey was a descriptive cross sectional, quantitative survey among 217 consenting PLWHA recruited from 10 support groups for PLWHA in Lagos State, Nigeria. Approval to carry out the survey was sought and obtained from a review panel of the Lagos State AIDS Control Agency and the technical team of the State's support group. Participation of the respondents was entirely voluntary and those who decided to withdraw were permitted to do so. The 29-item self-administered questionnaire used for this survey was developed from the review of relevant literatures on catastrophic health expenditure and was pretested among members of the State's support group (who were thus exempted from the survey). As an inclusion criterion, only PLHIVs that has been on ARV for more than one-year were included in this survey. Research assistants who had been trained on the content of the questionnaire and dynamism of eliciting information administered the questionnaire on some of the respondents who were not literate enough to respond to the questionnaire on their own.

To collate the annual income of the respondents, the following assumptions were made:

- Annual income of respondents in formal sector - monthly salary x 12
- Annual income of respondents that are volunteer health workers - monthly stipends x 12
- Annual income of respondents in informal sector/artisans/contract jobs - daily income x 5 x 10
- Cost per hour=Annual income/Total working hour (total working hour=8x5x50)

To aggregate the earning capacity of the respondents, the formulae proposed by Bhavsarl and Srivastava was adopted; households with annual per capita income less than "half of the standard deviation being subtracted from the mean of the annual income" (Mean - ½ SD) were categorized into Low Income Group (LIG), whereas households with annual per capita income more than "half of the standard deviation being added to the mean of the annual income" (Mean + ½ SD) were categorized as High Income Group (HIG), the rest were put in Middle Income Group (MIG) [13].

The data were analyzed using SPSS version 20 [14]. Chi-square test was used to measure association between categorical variables while logistic regression was used to control for confounding variables by including factors with p values ≤ 0.20 at bivariate level into the logistic regression model to determine predictors of CHE among respondents. Exchange rate at the time of survey is 1US dollar=365 Naira.

3. Results

3.1. Socio-demographic Information of Respondents

Age of the respondents was 43±8.5years with majority, 171 (79%), as female. Half, 109 (50%), of the PLWHA in this survey were married, 98 (45%) of them had a tertiary education with over 211 (90%) of the respondents having one or more dependents. Many of the respondents, 91 (42%), were employed in volunteering capacities-mentor mothers, adherence counselor and community mobilizers among others. However, only 9 (4%) were formally employed.

3.2. Annual Income of Respondents

The mean annual income of respondents was \$1111±821.37. PLWHIV who earned below or equal to \$1000 annually was 96 (56%), only 5% earned above \$3000 annually.

Table 1. Socio-demographic characteristics of respondents.

Variable	Frequency	Percentage (%)
Ages (in years)	(n=217)	
≤30	16	7.4
31-40	79	36.4
41-50	81	37.3
51-60	32	14.7
≥61	9	4.1
Sex of respondents	(n=217)	
Male	46	21.2
Female	171	78.8
Academic qualification	(n=216)	
No formal education	3	1.4
Primary	24	11.1
Junior secondary	10	4.6
Senior secondary	81	37.3
Tertiary education	98	45.4
Marital status	(n=217)	
Single	28	12.9
Married	109	50.2
Separated	33	15.2
Divorced	13	6.0
Widowed	34	15.7
Occupation	(n=217)	
Formal (salary, wages)	9	4.1
Informal/artisans (crafts job, product selling)	57	26.3
Business/contract jobs	23	10.6
Volunteering capacities	91	41.9
No defined source of income	37	17.1
Financial compensation from volunteering capacities	(n=91)	
Yes	83	91.2
No	8	8.8
Dependents on respondents	(n=217)	
Yes	211	97.2
No	6	2.8
Number of dependents	(n=211)	
≤3	62	29.4
4-6	130	61.6
≥7	19	9.0

3.3. Respondents' Antiretroviral Refill

About 129 (60%) of the respondents attended ARV clinics

monthly for refill, while 30 (14%) reported spending up to 60 minutes or less at the clinic on drug pickup days.

Based on the extrapolation (from the assumption stated above), 73% of the respondents reported to be spending \$100 or less annually on transportation (to and fro) for their ARV pickup, while 95% expend \$5 or less as value of time used for drug pickup. Overall, 157 (72%) of the respondents spent \$100 or less annually on ARV pickup. The proportion of the respondents who experienced CHE was 40% (n=68).

Table 2. Annual income of respondents.

Annual income of respondents (\$)	Frequency (n=172)	Percentage (%)
Mean±SD: 1111.203±821.371		
≤1000	96	55.8
1001-2000	53	30.8
2001-3000	15	8.7
≥3001	8	4.7

Table 3. ARV refill frequency and waiting time for refill.

ARVs refill frequency	Frequency (n=217)	Percentage (%)
Weekly	8	3.7
Monthly	129	59.4
Bi-monthly	59	27.2
Quarterly	15	6.9
Others	6	2.8
Waiting time (in minutes)	n=217	Percentage (%)
Mean±SD: 185.92±119.26		
≤60	30	13.8
61-120	66	44.2
121-180	41	18.9
181-240	32	14.7
241-300	15	6.9
≥301	33	15.2

Table 4. Annual cost of ARV refill and type of health expenditure involved by respondents.

Annual cost for refill (\$)	Frequency	Percentage (%)
Direct cost - DC (Cost for transportation)	n=216	
≤100	157	72.7
101-200	46	21.3
≥201	13	6.0
Indirect cost - IC (Cost for wait-time)	n=171	
≤5	162	94.7
6-10	7	4.1
≥11	2	1.2
Total Health Expenditure (DC + IC)	n=169	
≤100	121	71.6
101-200	39	23.1
≥201	9	5.3
Health expenditure	n=172	
Catastrophic Health Expenditure (CHE)	68	39.5
Normal Health Expenditure (NHE)	104	60.5

*CHE - Annual Health Expenditure > 10% of Annual Income.

*NHE - Annual Health Expenditure < 10% of Annual Income.

3.4. Associated Factors for Catastrophic Health Expenditure Among Respondents

There was significant association between respondents' occupation ($X^2=8.352$, $p=0.039$), income group ($X^2=58.515$, $p=0.0001$), ARV's refill frequency ($X^2=27.245$, $p=0.0001$) and catastrophic health expenditure.

Table 5. Factors associated with CHE among respondents.

Indicators	Catastrophic Health Expenditure?			X ²	p-value
	Yes (%)	No (%)	Total		
Sex of respondents					
Male	19 (11)	19 (11)	38 (22)	2.235	0.135
Female	49 (28.5)	85 (49.4)	134 (77.9)		
Academic qualification				5.469	0.065
Primary	10 (5.8)	12 (7.0)	22 (12.9)		
Secondary	34 (19.9)	36 (21.1)	70 (40.9)		
Tertiary	24 (14.0)	55 (32.2)	79 (46.2)		
Marital status				5.111	0.276
Single	7 (4.1)	14 (8.1)	21 (12.2)		
Married	33 (19.2)	54 (31.4)	87 (50.6)		
Separated	14 (8.1)	15 (8.7)	29 (16.9)		
Divorced	7 (4.1)	4 (2.3)	11 (6.4)		
Widowed	7 (4.1)	17 (9.9)	24 (14.0)		
Dependents				1.914	0.215
Yes	64 (37.2)	102 (59.3)	166 (96.5)		
No	4 (2.3)	2 (1.2)	6 (3.5)		
Respondents occupation				8.352	0.039*
Formal	1 (0.6)	8 (4.7)	9 (5.2)		
Informal	28 (16.3)	29 (16.9)	57 (33.1)		
Business/contract jobs	5 (2.9)	18 (10.5)	23 (13.4)		
Volunteering capacities	34 (19.8)	49 (28.5)	83 (48.3)		
Income group				58.515	0.0001*
Low income earner	52 (30.2)	19 (11.0)	71 (41.3)		
Middle income earner	13 (7.6)	54 (31.4)	67 (39.0)		
High income earner	3 (1.7)	31 (18.0)	34 (19.8)		
ARVs refill frequency				27.245	0.0001*
Monthly	35 (20.3)	71 (41.3)	106 (61.6)		
Bi-monthly	32 (18.6)	15 (8.7)	47 (27.3)		
Quarterly	1 (0.6)	18 (10.5)	19 (11.0)		

3.5. Catastrophic Health Expenditure Among Respondents

Multivariate analysis showed that respondents that were employed in the formal sector were 40 times less likely to experience catastrophic health expenditure (aOR=0.025, 95% C.I=0.02-0.35, p-value=0.006) and that respondents that were middle income earners (aOR=0.007, 95% C.I=0.001-0.05, p-value=0.0001) and high income earners (aOR=0.035, 95% C.I=0.010-0.12, p-value=0.0001) were 143 times and 29 times less likely respectively to experience CHE. However, respondents who take up their ARV on a bi-monthly basis were 18 times more predisposed to CHE.

Table 6. Predictors of CHE among surveyed PLHIV.

Variable	aOR*	95% C.I**	p-value
Sex of respondents			
Male	3.049	0.90 - 10.33	0.073
Female	Ref		
Academic qualification			
Primary	Ref		
Secondary	0.412	0.07 - 2.50	0.334
Tertiary	0.315	0.05 - 1.89	0.206
Dependents			
Yes	0.893	0.034 - 23.50	0.946
No	Ref		
Respondents occupation			
Formal	0.025	0.02 - 0.35	0.006*
Informal	2.106	0.53 - 8.40	0.291
Business/contract jobs	1.211	0.21 - 7.07	0.832
Volunteering capacities	Ref		

Variable	aOR*	95% C.I**	p-value
Income group			
Low income earner	Ref		
Middle income earner	0.007	0.001 - 0.05	0.0001*
High income earner	0.035	0.10 - 0.12	0.0001*
ARVs refill frequency			
Monthly	Ref		
Bi-monthly	17.555	4.64 - 66.40	0.0001*
Quarterly	0.114	0.11 - 1.21	0.071

4. Discussion

The outcome of this survey revealed that though ART medication is given freely, respondents of this survey reported experiencing unfavorable financial expenditure in accessing treatment as about half of them were estimated to have experienced CHE in the course of accessing ARV treatment. Several other literatures on economic burden of diseases reported similar findings to varying degrees especially in settings where health expenditures are predominantly out-of-pockets [6, 13, 15-18].

It is further established by this survey the inverse relationship between financial capacity of participants and burden as a result of CHE, that is, respondents with steady source of income through formal employment and respondents that, based on their annual income, were classified as middle and high income earners were less likely to experience CHE in the course of accessing ART treatment. This is in consonance with the findings of Onwujekwe that reported that the poorest

households suffered the highest catastrophic health expenditure for outpatient treatment [19]. Etiaba also reported that the level of CHE increased among respondents of lower socio-economic status [17], this was also corroborated by Adisa as well as Bhavsarl and Srivastava [20, 13] whose studies revealed that lower income households face more monetary burden than higher income households. This is an obstacle in the quest for attainment of Universal Health Coverage (UHC) as more poor households' drifts further into poverty. However, it is worthy of note that the inverse relationship between CHE and socio-economic status was not limited to low and middle income Countries (LMICs), as previous research had documented the inequalities in some high income countries as well [21-23].

The routine for ARV refill was predicated on the adherence of PLWHA with patients with optimal adherence enjoying reduced return-rate to facilities for drug pick-up. This survey elicits that frequent, bi-monthly, ARV-refill exposes respondents to CHE. Since this survey documents transportation cost as the highest percentage of the total health cost (Table 4), frequent expenditure accrued through transportation cost could worsen clients' impoverishment and thus exposes them to CHE. However, this not only increases the economic burden on them, it may also instigate sub-optimal adherence among respondents. Nsimba, Kagee and Joglekar reported that the increased burden of CHE on poorer PLWHA could lead to poorer adherence to ART [24-26]. Poor adherence will most likely result to clinical failure, which progresses to immunologic failure and ultimately in anti-HIV drug resistant and thus poor health outcomes among PLWHA.

5. Limitations of the Study

Caution should be exercised in generalizing the outcome of this study since the study sample was taken from a selected number of PLWH groups in Lagos State. The costing model used was primarily based on remembrance of expenditure made and time spent at facilities which is subject to recall bias and the projection of reported values to annual figures might have overshoot or under-reported the actual values used in estimating the CHE in this survey. This survey did not elicit information on other costs incurred by PLWH in accessing treatments such as registration fee, laboratory fees, treatment of opportunistic infections and, consultation fees. Overall, it has contributed to existing knowledge about this area of research work.

6. Conclusions

This survey discovered 40% CHE among its respondents which further established that PLWH still experience catastrophic health expenditure despite the free HIV/AIDS services. Major contributing factors to this CHE were employment status and income group of respondents and frequency of hospital/facility visit for refills by respondents. Efforts should be made by policy makers to design a more

resilient client-centered system that will: reduce facility visitations; and subsidize transportation/subsistence feeding cost of indigent PLWH. The effect of CHE, if not addressed could worsen retention and adherence among PLWH and with the dwindling external funds the HIV response is experiencing globally, the sustainability of the gains achieved by over 20years of HIV response becomes threatened.

7. Future Studies

1. This research should be implemented among a diverse and larger population of PLWH to compare with the outcome of this study.
2. This survey should be implemented with a more elaborate direct (cost for transportation, registration, consultation, laboratory investigations, drug for OIs) and indirect cost (waiting time, reduction in earning capacity, special diet) to further reveal predictors of catastrophic health expenditure not elicited by this survey.
3. The subsidization of economic burden through voucher cards/virtual money to ART stable PLWH should be studied.
4. Novel strategies to reduce the frequency of stable PLWHA visits for refill should be adopted, multi-month scripting dispensing (MMSD).
5. Evaluating the financial coping strategies of PLWH in dealing with the economic impact of HIV-seropositivity.

References

- [1] The Institute for Health Metrics and Evaluation's Global Burden of Disease Study 2017. 2017 GLOBAL HIV STATISTICS, pg 1-6.
- [2] Joint United Nations Programme on HIV/AIDS (UNAIDS) Data 2018.
- [3] The Nigeria HIV/AIDS Indicator & Impact Survey (NAIIS 2018). NAIIS 2018 National summary sheet for preliminary findings pg1-5. March 2019.
- [4] Mahlet Gezahegn & Mukti Upadhyay, 2014. "The Effect of HIV/AIDS on Economic Growth of Southern African Countries," Asian Economic and Financial Review, Asian Economic and Social Society, vol. 4 (9), pages 1146-1157, September.
- [5] Bell C, Devarajan S, Gersbach H. The long-run economic costs of AIDS: theory and an application to South Africa. Germany: University of Heidelberg; 2003.
- [6] Kumarasamy N, Ventatesh KK, Mayer KH, Freedberg K. Financial burden of health services for people with HIV/AIDS in India. Indian Journal of Medical Research. 2007; 126: 509-17.
- [7] Duraisamy P, Ganesh AK, Homan R, Kumarasamy N, Castle C, Sripriya P, Mahendra V, Solomon S. Costs and financial burden of care and support services to PLHA and households in south India. AIDS Care. 2006; 18 (2): 121-7.
- [8] Poudel, A. N., Newlands, D., & Simkhada, P. (2017). The economic burden of HIV / AIDS on individuals and households in Nepal: a quantitative study. *BMC Health Services Research*, 1-13. <https://doi.org/10.1186/s12913-017-1976-y>.

- [9] Onoka C, Onwujekwe O, Uzochukwu B, Ezumah N (2012) Why are states not adopting the formal sector programme of the NHIS and what strategies can encourage adoption? Policy brief. Health Policy Research Group, College of Medicine, University of Nigeria, Enugu.
- [10] Ekman B. Catastrophic health payments and health insurance: some counterintuitive evidence from one low-income country. *Health Policy* 2007; 83: 304-13 doi: 10.1016/j.healthpol.2007.02.004 pmid: 17379351.
- [11] Ezat, S., Puteh, W., & Almuallm, Y. (2017). iMedPub Journals Catastrophic Health Expenditure among Developing Countries, 1-5. <https://doi.org/10.21767/2254-9137.100069>.
- [12] Wagstaff Adam, Gabriela Flores, Justine Hsu, Marc-François Smits, Kateryna Chepynoga, Leander R Buisman, Kim van Wilgenburg, Patrick Eozenou (2017). Progress on catastrophic health spending in 133 countries: a retrospective observational study. *The Lancet Global Health* volume 6, issue 2 December 13, 2017 [http://dx.doi.org/10.1016/S2214-109X\(17\)30429-1](http://dx.doi.org/10.1016/S2214-109X(17)30429-1).
- [13] Bhavsarl, A. B., & Srivastava, D. (2015). Economic burden of HIV / AIDS on households: Cross-sectional study in the context of Navi Mumbai, India. *Global Journal of Medicine and Public Health*, 4 (6), 1-11.
- [14] <https://www.ibm.com/support/pages/spss-statistics-20-available-download>.
- [15] Onoka, C. A., Onwujekwe, O. E., Hanson, K., Uzochukwu, B. S. (2011). Examining Catastrophic Health Expenditures at Variable Thresholds Using Household Consumption Expenditure Diaries. *Tropical Medicine and International Health* 16 (10): 1334-1341. doi: 10.1111/j.1365-3156.2011.02836.x.
- [16] Cleopatra, Ibukun., & Eunice, Komolafe. (2018). Household Catastrophic Health Expenditure : Evidence from Nigeria. *Scientific & Academic Publishing*, 6 (1), 1-8. <https://doi.org/10.5923/j.m2economics.20180601.01>.
- [17] Etiaba, E., Onwujekwe, O., Torpey, K., Uzochukwu, B., & Chiegil, R. (2016). What Is the Economic Burden of Subsidized HIV / AIDS Treatment Services on Patients in Nigeria and Is This Burden Catastrophic to Households?, 1-14. <https://doi.org/10.1371/journal.pone.0167117>.
- [18] Apanga S, Punguyire D, Adjei G (2012) Estimating the cost to rural ambulating HIV/AIDS patients on Highly Active Antiretroviral Therapy (HAART) in rural Ghana: a pilot study. *The Pan African Medical Journal* 12.
- [19] Onwujekwe O, Dike N, Chukwuka C, Uzochukwu B, Onyedum C. (2009) Examining catastrophic costs and benefit incidence of subsidized antiretroviral treatment (ART) programme in south-east Nigeria. *Health Policy* 90: 223±229. doi: 10.1016/j.healthpol.2008.10.006 PMID: 19036466.
- [20] Adisa, O. (2015). Investigating Determinants of Catastrophic Health Spending Among Poorly Insured Elderly Households in Urban Nigeria. *International Journal for Equity in Health* 14: 79. DOI 10.1186/s12939-015-0188-5.
- [21] Wabiri N, Taffa N (2013) Socio-economic inequality and HIV in South Africa. *BMC Public Health*.
- [22] MarôÁ-Dell'Olmo M, Rodrô Águez-Sanz M, Garcia-Olalla P, PasarôÁn MI, Brugal MT. (2007) Individual and community-level effects in the socioeconomic inequalities of AIDS-related mortality in an urban area of southern Europe. *Journal of Epidemiology and Community Health* 61: 232±240. doi: 10.1136/jech.2006.048017 PMID: 17325402.
- [23] Dray-Spira R, Lert F (2003) Social health inequalities during the course of chronic HIV disease in the era of highly active antiretroviral therapy. *AIDS* 17: 283±290. doi: 10.1097/01.aids.0000042941.55529.da PMID: 12556681.
- [24] Nsimba SED., Irunde H., Comoro C. Barriers to ARV adherence among HIV/AIDS positive persons taking Anti-Retroviral Therapy in two Tanzanian regions 8-12 months after program initiation. *Journal of AIDS and Clinical Research*, 2010; 1: 111.
- [25] Kagee A., Remien RH., Berkman A., Hoffman S., Campos L., Swartz L. 2011. Structural barriers to ART adherence in South Africa: Challenges and potential ways forward. *Global Public Health*, 2011 January, 6 (1): 83-97.
- [26] Joglekar N., Paranjape R., Jain R., Rahane G., Potdar R., Reddy KS., Sahay S. Barriers to ART adherence & follow ups among patients attending ART centres in Maharashtra, India. *Indian Journal of Medical Research*, 2011 Dec; 134 (6): 954-959.