

Invecchiare con HIV in Ghana: un'analisi degli over 50.

Ageing with HIV in Ghana: an analysis of the age group 50 years plus.

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Riassunto

Informazioni sull'HIV nei gruppi di età superiori ai 50 anni sono relativamente scarse in molti paesi, compresa l'Africa sub-sahariana. Scopo principale di questo studio è quello di descrivere le caratteristiche di un insieme di persone anziane che vivono con HIV (PLHIV). Inoltre, lo studio ha cercato di identificare se le caratteristiche analizzate rivelassero eventuali disparità di genere.

È stata effettuata un'analisi retrospettiva dei dati dei pazienti di una clinica privata in Ghana. Sono stati selezionate le informazioni demografiche, comportamentali e cliniche di 282 PLHIV, che all'ultima consultazione avessero 50 o più anni. I dati sono stati raccolti tra il 2015 e il 2019. Per l'analisi sono state usate statistiche descrittive e inferenziali.

L'età mediana era di 56 anni, e il 57% dei soggetti erano donne (162/282). L'attività sessuale era confermata dal 44.2% (111/251) dei soggetti, più frequentemente dagli uomini. Quasi tutti i pazienti (97.3%, 249/256) erano in terapia antiretrovirale, e il 70.2% (172/245) con buona aderenza. Una carica virale <1000 copie/ml era raggiunta dal 63.6% (89/140) dei pazienti, più frequentemente dalle donne. Il 73.5% (191/260) dei pazienti, in misura Maggiore le donne, non avevano rivelato il loro stato HIV.

Questa elevata proporzione di persone che non rivelano il loro status HIV può indicare che lo stigma e la discriminazione sono tra le maggiori sfide per questo gruppo di età. Per quanto riguarda l'obiettivo dell'OMS del "quarto 90", sono necessari ulteriori studi sulla situazione e i bisogni sanitari dei PLHIV over 50, specialmente in un'area geografica dove sono pochi i dati specifici su HIV.

Abstract

Data on HIV amongst the age group 50 years and above are relatively poor in many countries, including sub-Saharan Africa. The main goal of this study was to provide a set of baseline characteristics of older people living with HIV (PLHIV). Furthermore, the study sought to identify whether the analysed characteristics revealed gender disparities.

A retrospective analysis of patient data at a private HIV clinic in Ghana was performed. Demographic, behavioural and clinical characteristics of 282 PLHIV aged 50 years or older at their most recent consultation between 2015 and 2019 were selected. Descriptive and inferential statistics were used for analysis.

The median age was 56 years, and 57% (162/282) of subjects were female. Sexual activity was confirmed by 44.2% (111/251) of subjects, more frequently by men. Nearly all patients (97.3%, 249/256) were on antiretroviral treatment, and 70.2% (172/245) adhered well. Viral suppression with < 1000 copies/mL was achieved by 63.6% (89/140) of patients, more frequently by women. Non-disclosure of HIV status was reported by 73.5% (191/260) of patients, with more women not having disclosed their status.

Our finding of high non-disclosure rates could indicate that stigma and discrimination are amongst one of the biggest challenges for this age group. With regard to the WHO "fourth 90" target, further research is needed to learn more about the health situations and needs of PLHIV aged 50 and over, especially in a geographical area where specific HIV data are sparse.

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Introduction

The longevity of people living with HIV (PLHIV) has risen since the advent of life-prolonging antiretroviral medication (1,2). The number of older PLHIV has increased steadily in recent years and currently stands

at 8.1 million people diagnosed with HIV worldwide aged 50 and over (3,4). More than 4 million PLHIV aged 50 and over live in sub-Saharan Africa (4), a figure that is expected to rise in the coming years (5). However, reporting on HIV data historically ends at

the age of 49, and information on older PLHIV/AIDS is still relatively poor (1,2). While HIV prevention, intervention programmes and sexuality studies in sub-Saharan Africa have focused mainly on the younger adult population aged 15-49, little has been done to understand the sexual behaviour of the population aged 50 and over (6). Bendavid, Ford and Mills (7) found that people aged 50 years and over show HIV risk behaviour similar to younger age groups, but it is paired with poor HIV awareness and low perception of their own risk of acquiring HIV.

Ageing with HIV could lead to various physical challenges, including general age-related comorbidities, such as cardiovascular disease or cancer and organ system injuries as a result of HIV infection or the toxicity of antiretroviral treatment (ART) (8). Regarding the psychosocial challenges, the impact of stigma and discrimination can be devastating for older PLHIV in sub-Saharan Africa, as they face fears of rejection and exclusion from society (9). Moreover, the perceived lack of confidentiality of health workers increases the concerns of PLHIV about stigmatization or involuntary disclosure of their HIV status (10,11).

In Ghana, where this analysis was carried out, HIV prevalence in the general population is 1.7%, with prevalence rates in the key population disproportionately high, such as female sex workers (6.9%) and men who have sex with men (18%) (12). While Ghana is also confronted with a paucity of accurate HIV data (13), specific information about Ghanaian PLHIV belonging to the age group 50 years plus are also sparse. According to the Ghana National AIDS Control Programme, there are no accurate data on adherence to ART or on the number of patients on ART who have achieved viral suppression (13). This data is also necessary to assess the current status of the UN-AIDS 90-90-90 goals (i.e., by 2020), 90% of people living with HIV know their status, 90% who know their status receive sustained treatment and 90% of those on treatment are virally suppressed (14). Additionally, the expansion of the WHO targets by the “fourth 90”, concerning health-related quality of life, also requires corresponding data (15). Therefore, further efforts are needed not only to improve baseline data for the general population diagnosed with HIV but also to integrate the 50 years plus age group into HIV monitoring and reporting systems (2).

Therefore, the main objective of this study was to identify a set of baseline characteristics in older PLHIV. As a secondary objective, the study sought to deter-

mine whether the characteristics analysed revealed gender disparities.

Material and methods

Setting

The study was conducted at the International Health Care Center, a private ART-accredited health facility in Accra, Ghana, a lower middle-income country in West Africa. The community outpatient clinic is one opened to the general public with a focus on infectious diseases. It has been providing medical care and support to PLHIV since 1999. HIV services are fully integrated into the services of the clinic, and in addition to other services, the clinic provides counselling for patients on issues such as disclosure of HIV status and therapy adherence.

Study design and sample

A retrospective analysis of routinely collected patient data from electronic medical records was carried out. PLHIV were eligible if they were 50 years old or older at their most recent medical consultation at the facility between January 2015 and June 2019. Both the initial admission and follow-up appointments were considered medical consultations.

Ethical considerations

The data analysis of our research originated from an internal project for quality improvement at the clinic. The retrospective analysis was based on routine data without actual physical involvement of clients. Due to the retrospective character of the project, consents from the patients were not available. All data were de-identified prior to analysis. The anonymity of the sample was guaranteed, and no conclusions could be drawn about the identity of any one patient.

Data source and variables

Routinely collected patient data were exported from the electronic clinical information system. The data export was programmed to obtain the latest available data for each variable. The selected variables were divided into demographic, behavioural and clinical characteristics. Answers such as *unknown* or *not applicable* were treated as missing data. The variables had been recorded electronically by trained physicians, nurses and laboratory technicians. For obtaining viral load results, blood

samples were taken in-house and routinely sent to a teaching hospital in Accra for analysis, and the results were sent back to the health facility.

Data analysis

We described frequencies of the selected variables, which were stratified by gender. To test the associations between gender and the nominal variables, we used Pearson's chi-square test and Fisher's exact test if the assumptions of the chi-square test were not reached. To compare the continuous and ordinal variables between women and men, we used the non-parametric Mann-Whitney test. We used an alpha level of 0.05 for all statistical tests. After the chi-square test detected significant associations, we evaluated the strength of the association using Cramer's V. The effect size Cramer's V can reach a maximum of one, with values of 0.10 for small, 0.30 for medium and 0.50 for large effects (16). Statistical analysis was performed using Microsoft Office Excel 2016 and IBM® SPSS Statistics, version 25.

Results

We identified 286 PLHIV aged 50 years or older at their most recent medical consultation at the International Health Care Center between January 2015 and June 2019. Four cases were excluded due to a lack of relevant data. A total of 282 cases was finally included in the study. Since complete medical records were not available for all cases, the actual numbers for each variable are shown below. All gender-specific results can be seen in **Tables 1-3**.

Demographic characteristics

The sample of patients consisted of 57% women (162/282) and 43% men (120/282). The age of the patients ranged from 50 to 91 years, with a median age of 56 (IQR, 52-61). The majority of patients (199/282, 70.6%) were in the 50-59 age group. More than half of the patients were married (113/220, 51.4%). Men were more likely than women to be married or widowed (75.8% vs. 60.5%). The association between marital status and gender was significant with a small effect ($\chi^2(1, N = 220) = 5.68, p = 0.020, V = 0.16$). The majority of the sample group were Christians (225/240, 93.8%), while 5% (12/240) of the sample group were Muslims. Men were more likely than women to have finished secondary level education (53.4% vs. 21.7%).

Table 1. Demographic characteristics of people living with HIV aged 50 years and over at a Ghanaian HIV clinic, 2015 – 2019.

| | Total | Female | Male | p-value |
|------------------------------|------------|------------|------------|-------------------|
| | n (%) | n (%) | n (%) | |
| | 282 (100) | 162 (57) | 120 (43) | |
| Median age (IQR) | 56 (52-61) | 56 (53-62) | 55 (52-59) | .069 ^a |
| Age groups | 282 | 162 | 120 | |
| 50-59 | 199 (70.6) | 107 (66.0) | 92 (76.7) | .057 ^a |
| 60-69 | 65 (23.0) | 43 (26.5) | 22 (18.3) | |
| 70-79 | 14 (5.0) | 10 (6.2) | 4 (3.3) | |
| ≥80 | 4 (1.4) | 2 (1.2) | 2 (1.7) | |
| Marital status | 220 | 129 | 91 | |
| Married/widowed | 147 (66.8) | 78 (60.5) | 69 (75.8) | .020 ^b |
| Single/separated/divorced | 73 (33.2) | 51 (39.5) | 22 (24.2) | |
| Educational level | 188 | 115 | 73 | |
| finished secondary level | 64 (34.0) | 25 (21.7) | 39 (53.4) | .000 ^b |
| not finished secondary level | 124 (66.0) | 90 (78.3) | 34 (46.6) | |
| Religion | 240 | 142 | 98 | |
| Christian | 225 (93.8) | 133 (93.7) | 92 (93.9) | .999 ^c |
| Muslim | 12 (5.0) | 7 (4.9) | 5 (5.1) | |
| Traditional | 1 (0.4) | 1 (0.7) | 0 (0.0) | |
| None | 2 (0.8) | 1 (0.7) | 1 (1.0) | |

^aMann-Whitney test, ^bPearson's chi-square test, ^cFisher's exact test. All values are n (%) or median (IQR).

The association between education and gender was significant with a moderate effect ($\chi^2(1, N = 188) = 19.97, p < 0.001, V = 0.33$). All results of demographic characteristics are shown in **Table 1**.

Behavioural characteristics

Current sexual activity (not further specified) was confirmed by 44.2% of patients, and the frequencies differed significantly between gender ($\chi^2(1, N = 251) = 45.02, p < 0.001$). The effect was moderate ($V = 0.42$). Men were more likely than women to report sexual activity (69.2% vs. 26.5%). Occasional use of condoms (sometimes) was reported by 67.1% (96/143) of the patient group. Good adherence to ART with zero pills missed in the last 3 days was reported by 70.2% (172/245) of patients. Nearly three-quarters of the patients (191/260, 73.5%) had not disclosed their HIV status to family, friends or sexual partners (**Figure 1**). Women were more likely than men not to have disclosed their HIV status (82.9% vs. 60.2%).

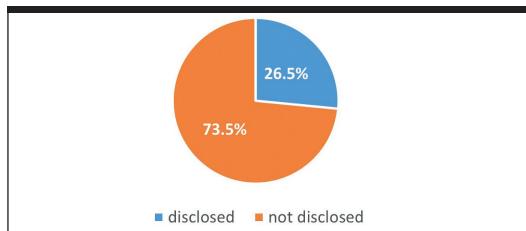


Figure 1. Disclosure of HIV status (n=260).

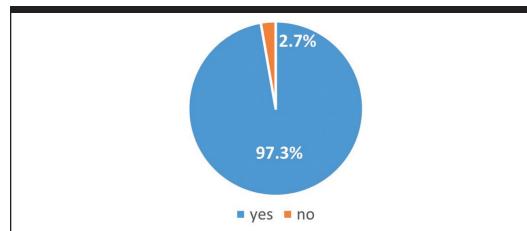


Figure 2. Patients on ART (n=256).

Table 2. Behavioural characteristics of people living with HIV aged 50 years and over at a Ghanaian HIV clinic, 2015 – 2019.

| | Total n (%) | Female n (%) | Male n (%) | p-value |
|-------------------------------------|----------------|-----------------|---------------|-------------------|
| Sexual activity | 251 | 147 | 104 | |
| Sexually active | 111 (44.2) | 39 (73.5) | 72 (69.2) | .000 ^a |
| Not sexually active | 140 (55.8) | 108 (73.5) | 32 (30.8) | |
| Condom Use | 143 | 72 | 71 | |
| Always | 28 (19.6) | 9 (12.5) | 19 (26.8) | .097 ^b |
| Sometimes | 96 (67.1) | 53 (73.6) | 43 (60.6) | |
| Never | 19 (13.3) | 10 (13.9) | 9 (12.7) | |
| Adherence to ART last 3 days | 245 | 145 | 100 | |
| 0 pill missed | 172 (70.2) | 103 (71.0) | 69 (69.0) | .685 ^b |
| 1-2 pills missed | 14 (5.7) | 9 (6.2) | 5 (5.0) | |
| 3-4 pills missed | 11 (4.5) | 6 (4.1) | 5 (5.0) | |
| >5 pills missed | 48 (19.6) | 27 (18.6) | 21 (21.0) | |
| Disclosure of HIV status | 260 | 152 | 108 | |
| Disclosed | 69 (26.5) | 26 (18.6) | 43 (39.8) | .000 ^a |
| Not disclosed | 191 (73.5) | 126 (82.9) | 65 (60.2) | |

^a Pearson's chi-square test, ^b Mann-Whitney test. All values are n (%).

The relationship between disclosure and gender was significant, however, with only a small effect ($\chi^2 (1, N = 260) = 16.70$, $p < 0.001$, $V = 0.25$). All results of behavioural characteristics are shown in **Table 2**.

Clinical characteristics

Almost half of the patient group were classified as WHO clinical stage I (118/264, 44.7%). Nearly all patients of the sample group with available data (249/256, 97.3%), were on ART (**Figure 2**). Viral load test results were available for 140 patients who were on ART for at least 6 months. Among them, 63.6% (89/140) were virally suppressed with < 1000 copies/mL (**Figure 3**). Women were more likely than men to have achieved viral suppression

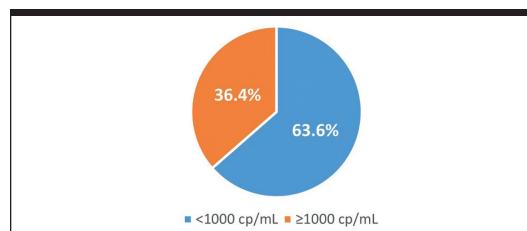


Figure 3. Viral load on ART (n=140).

(71.6% vs. 52.5%). The association between viral suppression and gender was significant with a small effect ($\chi^2 (1, N = 140) = 5.36$, $p = 0.022$, $V = 0.20$). All results of clinical characteristics are shown in **Table 3**.

Discussion

We performed a retrospective analysis of routinely collected patient data from an outpatient clinic with integrated HIV services in Accra, Ghana. The main goal was to provide a set of baseline characteristics of older PLHIV.

Our study sample of 282 PLHIV aged 50 years plus showed a high proportion of sexually active men (69.2%). This is comparable to the findings of other studies in sub-Saharan Africa. Country reports from this area have shown that, within the general population, about 74% of men aged 50 years and over are sexually active and that the majority of them are engaged in high-risk sexual behaviour, such as having multiple sex partners and not using condoms (6,17). A study from South Africa also revealed the tendency of elderly men to have multiple partners, while women accepted the male promiscuity (18). The study further stated that both genders blame each other for the spreading of HIV/AIDS. Both elderly men and women should be more strongly approached for HIV prevention and treatment. Whereas men over 50 years of age are at risk of infection due to unsafe sexual behaviour, women in the subregion are also at high risk

of acquiring HIV for cultural and physical reasons (9). Gender inequality still results in insufficient negotiating power for women in marital relationships. Lack of control over decisions or financial resources can prevent them from gaining access to health facilities for HIV testing or treatment (11). Sexually active women over 50 years of age are at additional risk of HIV infection from hormonal changes (9). A thinner postmenopausal vaginal wall promotes, among other things, tissue injury and thus HIV transmission during sex (9,19).

More than two-thirds of the patients reported that they adhered well to ART. Other authors have described high adherence to ART in the older population, suggesting that adherence is the key factor for older PLHIV when it comes to better virological responses as compared to that for younger age groups (20,21). However, it should be noted that older people's adherence to treatment may decrease due to simultaneous suffering from age-related chronic diseases or difficult socioeconomic conditions leading to food insecurity or lack of resources to transport them to a clinic (22).

Furthermore, we found that a high proportion (73.5%) of women and men living with HIV did not disclose their HIV status, neither to family or friends nor to current sexual partners. This result, which is more significant amongst women, showcases the difficulties PLHIV in Ghana face openly talking about their status. Unlike our findings, Obermeyer et al. (23) reported disclosure rates of over 74% among adults diagnosed with HIV in sub-Saharan Africa but with strong variations between the countries. The authors found no clear evidence as to whether more men or more women had disclosed their status. Nevertheless, gender differences have been revealed in a study (24) in Ethiopia. Regarding the reasons for non-disclosure, the authors found that men were inclined to report that they did not want to reveal infidelity, while women were more likely to report fear of violence or abandonment. Ojikutu et al. (25) examined the disclosure behaviour of female PLHIV in Thailand, Brazil and Zambia. The predictors for non-disclosure they identified were HIV stigma at the community level, depression, self-stigma and older age, with similar findings in all three geographical areas. The authors, therefore, recommended focusing mainly on community interventions to reduce stigmatization and discrimination against PLHIV (25).

Table 3. Clinical characteristics of people living with HIV aged 50 years and over at a Ghanaian HIV clinic, 2015 – 2019.

| | Total | Female | Male | p-value |
|--|------------|------------|------------|-------------------|
| | n (%) | n (%) | n (%) | |
| WHO clinical stage | 264 | 155 | 109 | |
| Stage I | 118 (44.7) | 72 (46.5) | 46 (42.2) | .422 ^a |
| Stage II | 66 (25.0) | 40 (25.8) | 26 (23.9) | |
| Stage III | 67 (25.4) | 34 (21.9) | 33 (30.3) | |
| Stage IV | 13 (4.9) | 9 (5.8) | 4 (3.7) | |
| Patient on ART | 256 | 150 | 106 | |
| Yes | 249 (97.3) | 147 (98.0) | 102 (96.2) | .453 ^b |
| No | 7 (2.7) | 3 (2.0) | 4 (3.8) | |
| Viral load on ART (min. 6 months) | 140 | 81 | 59 | |
| < 1000 copies/mL | 89 (63.6) | 58 (71.6) | 31 (52.5) | .022 ^b |
| ≥ 1000 copies/mL | 51 (36.4) | 23 (28.4) | 28 (47.5) | |

^a Mann-Whitney test. ^b Pearson's chi-square test. All values are n (%).

In Ghana, the question "Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had HIV?" was answered "No" by two out of three people in 2014 (12). This persistently strong stigma in society makes it difficult for PLHIV to talk about their infection. In order to promote PLHIV disclosure initiatives, supportive and trustworthy framework conditions must be created (26).

In 2016, the WHO Test-and-Treat policy was adopted in Ghana, which made all PLHIV eligible for ART regardless of the WHO clinical stage or immunological conditions (13). The most frequently prescribed first-line ART in our sample were Lamivudine 150mg / Zidovudine 300mg / Nevirapine 200mg tablets. The dose for a regimen was Lamivudine / Zidovudine combined in one pill 450mg twice daily and Nevirapine 400mg twice daily. Nevirapine could be switched with Efavirenz 600mg once daily. Zidovudine could be switched with Tenofovir 300mg once daily. It should be mentioned that Dolutegravir was only available in Ghana after the cut-off date of our sample (i.e. after June 2019). Analysis of our sample showed almost complete coverage of patients on ART (97.3%), while the estimated coverage of adult patients in Ghana was at 35% (12).

The high number of treated patients in our sample may be the result of consistent implementation of

the WHO policy in the participating health clinic. This result shows that it is possible to achieve at least one of the UNAIDS 90-90-90 goals at the community level.

In our data, we had viral load results for 140 cases. Viral suppression, defined as < 1000 copies/mL was achieved for 63.6% of patients. This result amongst our elderly PLHIV, although not at the UN target of 90%, is close to reaching the target, compared to that of the general adult population with HIV in sub-Saharan Africa, which stands at 29% for viral suppression (14). The effect of age on the response to ART in this area is so far not well documented (27). However, as mentioned before, the 50 years plus PLHIV age group have been characterized with good adherence to treatment. Moreover, several studies with older PLHIV on ART reported similar or even better virological responses of older groups as compared to those of younger age groups (20,21). A finding that requires further investigation is the moderate amount of available viral load data. Low availability of viral load results was also stated by other researchers and appear to be found in most limited-resource countries (27). Testing and monitoring of viral load is essential to enable physicians to make timely and accurate medical decisions about the treatment of their patients with HIV (14). UNAIDS recommends a combination of centralized laboratories and point-of-care tools to provide easy and affordable access to viral load testing for pa-

tients in all situations, urban and rural (14). Our study contains some limitations. The sample is based on one outpatient health facility and may not represent other populations diagnosed with HIV. In addition, the method of data extraction from the electronic medical records leads to some restrictions for statistical evaluation, since the data of a patient case may originate from two or more follow-up appointments in the clinic. Finally, as a general limitation, the accuracy of self-reported answers to questions about sexual activity, condom use or adherence to treatment may be limited due to socially desired responses (28).

Nevertheless, in a geographical area where specific HIV data are sparse, further research is needed to learn more about the situations, needs and challenges of the 50 years plus age group. As more differentiated information becomes available, healthcare institutions can further develop patient-oriented and gender-specific services and optimize medical and psychosocial care and support for this growing HIV population.

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BIBLIOGRAFIA

1. Brennan-Ing MG, MacPhail C, Seeley J, et al. *Global ageing with HIV: Differences between high- and low-resource settings*. *Innov Ageing* 2017; 1: 622. doi:10.1093/geroni/igx004.2185
2. Mahy M, Autenrieth CS, Stanecki K, Wynd S. *Increasing trends in HIV prevalence among people aged 50 years and older*. *AIDS* 2014; 28: 453-459 doi:10.1097/QAD.0000000000000479
3. UNAIDS. UNAIDS DATA 2019. Geneva: UNAIDS; 2019. http://www.unaids.org/sites/default/files/media_asset/2019-UNAIDS-data_en.pdf. Accessed 07 Nov 2021.
4. UNAIDS. AIDSinfo. Geneva: UNAIDS; 2020. <http://aidsinfo.unaids.org>. Accessed 07 Nov 2021.
5. Hontelez JAC, Tanser FC, Naidu KK, Pillay D, Bärnighausen T. *The effect of antiretroviral treatment on health care utilization in rural South Africa: A population-based cohort study*. *PLoS ONE* 2016; 11: e0158015. doi:10.1371/journal.pone.0158015
6. Odimegwu CO, Mutanda N. *Covariates of high-risk sexual behaviour of men aged 50 years and above in sub-Saharan Africa*. *Sahara J* 2017; 14: 162-170. doi:10.1080/17290376.2017.1392340
7. Bendavid E, Ford N, Mills EJ. *HIV and Africa's elderly: The problems and possibilities*. *AIDS* 2012; 26: 85-91. doi:10.1097/QAD.0b013e3283558513
8. Althoff K, Smit M, Reiss P, Justice AC. *HIV and ageing: Improving quantity and quality of life*. *Curr Opin HIV AIDS* 2016; 11: 527-536. doi:10.1097/COH.0000000000000305
9. UNAIDS. *The Gap Report*. Geneva: UNAIDS; 2014. http://files.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2014/UNAIDS_Gap_report_en.pdf. Accessed 07 Nov 2021.
10. Adjetey V, Obiri-Yeboah D, Dornoo B. *Differentiated service delivery: A qualitative study of people living with HIV and accessing care in a tertiary facility in Ghana*. *BMC Health Serv Res* 2019; 19: 1-7. doi:10.1186/s12913-019-3878-7

- 11.** Musheke M, Ntalasha H, Gari S, Mckenzie O, Bond V. A systematic review of qualitative findings on factors enabling and deterring uptake of HIV testing in Sub-Saharan Africa. *BMC Public Health* 2013; 13: 1-16. doi:1471-2458/13/220
- 12.** UNAIDS. *Country factsheets GHANA 2020. HIV and AIDS Estimates*. Geneva: UNAIDS; 2020. <http://aidsinfo.unaids.org/>. Accessed 07 Nov 2021.
- 13.** Ali H, Amoyaw F, Baden D, et al. *Ghana's HIV epidemic and PEPFAR's contribution to-wards epidemic control*. *Ghana Med J* 2019; 53: 59-62. doi:10.4314/gmj.v53i1.9
- 14.** UNAIDS. 90-90-90: An ambitious treatment target to help end the AIDS epidemic. Geneva: UNAIDS; 2014. http://files.unaids.org/en/media/unaidsscontentassets/documents/unaidspublication/2014/90-90-90_en.pdf. Accessed 07 Nov 2021.
- 15.** Lazarus JV, Safran-Harmon K, Barton SE, et al. Beyond viral suppression of HIV – the new quality of life frontier. *BMC Medicine* 2016; 14: 94. doi: 10.1186/s12916-016-0640-4
- 16.** Cohen J. *Statistical power analysis for the behavioral sciences*. 2 ed. Lawrence Erlbaum Associates USA 1988.
- 17.** UNAIDS. *The Prevention Gap Report*. Geneva: UNAIDS; 2016. http://www.unaids.org/sites/default/files/media_asset/2016-prevention-gap-report_en.pdf. Ac-cessed 07 Nov 2021.
- 18.** Lekalakala-Mokgele E. *Exploring gender perceptions of risk of HIV infection and related behaviour among elderly men and women of Ga-Rankuwa, Gauteng Province, South Africa*. *Sahara-J* 2016; 13: 88-95. doi:10.1080/17290376.2016.1218790
- 19.** Wessels JM, Felker AM, Dupont HA, Kaushic C. *The relationship between sex hormones, the vaginal microbiome and immunity in HIV-1 susceptibility in women*. *Dis Model Mech* 2018; 11: 1-15. doi:10.1242/dmm.035147.
- 20.** Silverberg MJ, Leyden W, Horberg MA, et al. *Older Age and the Response to and Tolerability of Antiretroviral Therapy*. *Arch Intern Med* 2007; 167: 684-691. doi: 10.1001/archinte.167.7.684
- 21.** Wellons MF, Sanders L, Edwards LJ, et al. *HIV infection: Treatment outcomes in older and younger adults*. *J Am Geriatr Soc* 2002; 50: 603-607.
- 22.** Newman J, Iriondo-Perez J, Hemingway-Foday J, et al. *Older adults accessing HIV care and treatment and adherence in the leDEA central Africa cohort*. *AIDS Res Treat* 2012; 1-8. doi:10.1155/2012/725713
- 23.** Obermeyer CM, Baijal P, Pegurri E. *Facilitating HIV disclosure across diverse settings: A review*. *Am J Public Health* 2011; 101: 1011-1023. doi:10.2105/AJPH.2010.300102
- 24.** Deribe K, Woldemichael K, Bernard N, Yakob B. *Gender difference in HIV status disclosure among HIV positive service users*. *East Afr J Public Health* 2009; 6: 248-255.
- 25.** Ojikutu BO, Pathak S, Srithanaviboonchai K, et al. *Community Cultural Norms, Stigma and Disclosure to Sexual Partners among Women Living with HIV in Thailand, Brazil and Zambia (HPTN 063)*. *PLoS ONE* 2016; 11: e0153600. doi:10.1371/journal.pone.0153600.
- 26.** Obiri-Yeboah D, Amoako-Sakyi D, Baidoo I, Adu-Oppong A, Rheinländer T. *The 'Fears' of Disclosing HIV Status to Sexual Partners: A Mixed Methods Study in a Counseling Setting in Ghana*. *AIDS Behav* 2016; 20: 126-136. doi:10.1007/s10461-015-1022-1
- 27.** Balestre E, Eholie SP, Lokussue A, et al. *Effect of age on immunological response in the first year of antiretroviral therapy in HIV-1-infected adults in West Africa*. *AIDS* 2012; 26: 951-957. doi:10.1097/QAD.0b013e3283528ad4
- 28.** Guest G, Bunce A, Johnson L, Akumatey B, Adeokun L. *Fear, hope and social desirability bias among women at high risk for HIV in West Africa*. *J Fam Plann Reprod Heal Care* 2005; 33: 285-288. doi:10.1783/jfp.31.2.285