

Effectiveness of a dolutegravir-based regimen in HIV-1 patients attending the Bamenda Regional Hospital Treatment Centre, Cameroon: a retrospective observational study

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Abstract

Background

Improving current and future antiretroviral treatment is crucial to ending AIDS by 2030. Treatment failure, drug toxicity and resistance remain major obstacles to durable viral suppression. In 2019, the World Health Organization (WHO) recommended a dolutegravir-based regimen (DTG) as preferred first- and second-line antiretroviral therapy to help address these challenges. However, data on its real-world impact on viral suppression among routine patients remain scarce. This study evaluated the rate of viral suppression among HIV-1 patients receiving DTG in a real-world clinical setting in Cameroon.

Methods

This retrospective observational study was conducted at the Bamenda Regional Hospital HIV Treatment Centre. It included the medical records of HIV-1 patients aged above 18 years, with an adherence rate of at least 95%, without comorbidities, who received dolutegravir as part of combined antiretroviral therapy (cART) between January 2020 and May 2022. The primary outcome was virologic suppression, defined as a plasma HIV-1 viral load below 1000 copies/mL at 6 months (week 24) and 12 months (week 48). Secondary outcomes included the incidence of and reasons for DTG discontinuation at 12 months, and factors associated with sustained viral suppression.

Results

A total of 157 participants were included. At 6 months, the rate of virologic suppression was 95.5%, and 4.5% of participants had not achieved suppression. At 12 months, the rate of virologic suppression was 99.4%, with 0.6% of participants experiencing virologic failure leading to treatment discontinuation. There was no association between persistent viral suppression and advanced HIV disease at diagnosis. Alcohol use at baseline was significantly associated with viral suppression at 6 months ($p = 0.002$). By week 48, the median weight change in the study population was + 2.0 kg (interquartile range [IQR] 0 to 4).

Conclusions

In this real-world cohort, DTG-based cART demonstrated excellent virologic effectiveness at both 24 and 48 weeks, irrespective of baseline HIV disease stage, supporting its continued use as the preferred regimen for HIV-1 management in similar resource-limited settings.

Background

Since the discovery of antiretroviral therapy (ART), HIV-related morbidity and mortality at all stages of HIV infection have greatly declined [1–4], as has HIV transmission [5, 6]. Based on new evidence

assessing its benefits and risks, the WHO in 2019 recommended the dolutegravir-based regimen (DTG) as the preferred first- and second-line antiretroviral treatment for all populations, including pregnant women and those of childbearing potential [7]. DTG was thereafter recommended as a core antiretroviral (ARV) drug for treating both HIV-1 and HIV-2 infection [8]. This regimen has proven superior to almost all other core ARVs in both treatment-naïve and treatment-experienced HIV-1-infected individuals [9, 10].

Following the recommendation of DTG-based cART, real-world data on the effectiveness of this regimen among people living with HIV-1 have shown high safety and effectiveness [11]. As patient-oriented evidence constitutes only about 2.6% of published drug studies compared with drug studies from clinical trials [12], there is growing interest in “real-world data” gathered from heterogeneous patient populations through surveys and observational cohort studies [13]. This study aimed to describe the treatment outcomes of HIV-1 sub-populations receiving a daily dose of DTG as part of cART in Cameroon.

Methods

Study design

This was a retrospective observational study conducted from February 2022 to May 2022.

Setting

This study included the medical records of HIV-1 patients initiated on treatment and followed up from January 2020 to May 2022 at the Bamenda Regional Hospital (BRH) HIV Treatment Centre, Cameroon.

Participants

We included records of HIV-1 patients above 18 years of age who were taking daily dolutegravir as part of their combined antiretroviral therapy, had no comorbidities, and had an adherence rate of more than 95% [14]. Sociodemographic information, HIV history, and viral loads at 6 months (week 24) and 12 months (week 48) were recorded for each participant.

Variables

Variables included age, sex, weight, marital status, level of education, alcohol and smoking history at initiation, duration of HIV infection before initiation, WHO clinical stage of HIV at initiation, line of treatment at initiation, treatment status, cotrimoxazole prophylaxis, and viral load at 6 and 12 months of treatment.

Data sources/measurement

Data were obtained from the medical records of HIV-1 patients followed up at the Bamenda Regional Hospital HIV Treatment Centre.

Bias

This study was conducted at a single centre, and adherence was determined by pill counting, a method that is both subjective and objective; some participants may have reported an inaccurate pill count.

Study size

Using data from a retrospective study conducted in Belgium to determine the effectiveness of the DTG regimen in a real-world setting across six centres, in which loss of virologic suppression was 7% [15], we applied this value in a sample-size formula for proportions, yielding an estimated minimum sample size of 110 participants.

Quantitative variables

Viral suppression was defined as a viral load < 1000 copies/mL, according to WHO criteria [16]. The prevalence of each outcome was calculated as a ratio in which the denominator was the estimated number of eligible participants recruited and tested during the study period, and the numerator was the estimated number of such individuals with the outcome of interest.

Statistical methods

Sociodemographic data were used to describe the overall study population, together with two subsets of patients defined by sex. Analyses of both primary and secondary endpoints were performed on the overall study population and on sub-groups defined by sex, HIV treatment status and viral load. The time points used for analysis were baseline (the time at which DTG was initiated for each patient), 6 months (week 24), and 12 months (week 48). Data were entered in Microsoft Excel 2016 and analysed using Epi Info version 7.2. Frequency distribution tables were used to summarise categorical variables, while means and standard deviations, or medians and interquartile ranges, were used for continuous variables depending on their distribution. Comparisons between sub-populations were performed using Student's t-test and the chi-square test, with a p-value below 0.05 considered statistically significant.

Ethics approval

Ethical approval

and administrative clearance for this study are detailed in the Declarations section below.

Results

In total, 368 files were reviewed and 157 participants were included; 211 records were excluded (missing data, n = 137; adherence < 95%, n = 55; different regimen, n = 14; comorbidities, n = 4; and death, n = 1). Ninety participants (57.3%) were female and 67 (42.7%) were male, with mean ages of 41.99 ± 12.48 years for females and 47.10 ± 13.29 years for males. By 12 months (week 48), the median change in weight for the study population was + 2.0 kg (IQR 0 to 4). Baseline sociodemographic characteristics are summarised in Table 1.

Sociodemographic characteristics

Table 1
shows the sociodemographic characteristics of the study population.

Variables	Male, n (%)	Female, n (%)	Total, n (%)
Number of participants	67 (42.68)	90 (57.32)	157 (100)
Marital status			
Married	39 (58.21)	28 (31.11)	67 (42.68)
Single	22 (32.83)	38 (42.22)	60 (38.22)
Divorced	3 (4.48)	7 (7.78)	10 (6.37)
Widowed	3 (4.48)	17 (18.89)	20 (12.73)
Residence			
Bamenda 1	2 (2.99)	5 (5.58)	7 (4.46)
Bamenda 2	42 (62.69)	51 (56.67)	93 (59.24)
Bamenda 3	7 (10.45)	7 (10.45)	14 (8.92)
Other	16 (23.88)	27 (30.00)	43 (27.38)
Level of education			
Did not attend school	1 (1.49)	5 (5.56)	6 (3.82)
Primary	31 (46.27)	34 (37.78)	65 (41.40)
Secondary	28 (41.79)	35 (38.89)	63 (40.13)
Tertiary	7 (10.45)	16 (17.78)	23 (14.65)
Occupation			
Trader	16 (23.88)	28 (31.11)	44 (28.03)
Farmer	6 (8.96)	28 (31.11)	34 (21.66)
Hairdresser	0 (0.00)	10 (11.11)	10 (6.37)
Student	3 (4.48)	6 (6.67)	9 (5.73)
Other	42 (62.69)	18 (20.00)	60 (38.22)
Alcohol history			
Yes	56 (83.58)	56 (62.22)	112 (71.34)
No	11 (16.42)	34 (37.78)	45 (28.66)
Smoking history			
Yes	5 (7.46)	0 (0.00)	5 (3.18)

Variables	Male, n (%)	Female, n (%)	Total, n (%)
No	62 (92.54)	90 (100.00)	152 (96.82)

Clinical characteristics

Baseline clinical data showed that most participants, 108 (68.79%), had a duration of known HIV infection of less than 5 years; a large proportion, 110 (70.06%), had WHO clinical stage 1 disease; 105 (66.88%) were treatment-naïve; and 144 (91.72%) were taking cotrimoxazole prophylaxis, as shown in Table 2. In this study, 156 participants (99.36%) were taking tenofovir/lamivudine (TDF/3TC) and 1 (0.64%) was taking abacavir/lamivudine (ABC/3TC) as the concomitant nucleoside backbone to DTG.

Table 2
Clinical characteristics of the study population

Variables	Male, n (%)	Female, n (%)	Total, n (%)
Duration of HIV (years)			
<5	48 (71.64)	60 (66.67)	108 (68.79)
5–10	5 (7.46)	13 (14.44)	18 (11.46)
10–15	9 (13.43)	9 (10.00)	18 (11.46)
>15	5 (7.46)	8 (8.89)	13 (8.28)
WHO clinical stage at diagnosis			
1	49 (73.13)	61 (67.78)	110 (70.06)
2	6 (8.96)	15 (16.67)	21 (13.38)
3	12 (17.91)	12 (13.33)	24 (15.29)
4	0 (0.00)	2 (2.22)	2 (1.27)
Treatment status at ART initiation			
Treatment-naïve	47 (70.15)	58 (64.44)	105 (66.88)
Treatment-experienced	20 (29.85)	32 (35.56)	52 (33.12)
Cotrimoxazole prophylaxis			
Yes	61 (91.04)	83 (92.22)	144 (91.72)
No	6 (8.96)	7 (7.78)	13 (8.28)

Viral suppression at 6 months (week 24)

Within the first 6 months, 150 participants (95.54%) attained virologic suppression, defined by the WHO as a plasma viral load below 1000 copies/mL, while 7 (4.46%) did not, as shown in Table 3.

Table 3
Viral load distribution at 6 months

Viral load at 6 months (copies/mL)	Male, n (%)	Female, n (%)	Total, n (%)
0–49	59 (88.06)	83 (92.22)	142 (90.45)
50–199	3 (4.48)	2 (2.22)	5 (3.18)
200–999	1 (1.49)	2 (2.22)	3 (1.91)
≥ 1000	4 (5.97)	3 (3.33)	7 (4.46)

Viral suppression at 12 months (week 48)

After 12 months of daily antiretroviral therapy, 147 participants (93.63%) had a plasma viral load below 50 copies/mL, and 156 (99.36%) had a viral load below 1000 copies/mL; only 1 participant (0.64%) had a viral load above 1000 copies/mL (14,138 copies/mL). Table 4 summarises the distribution of viral load at 12 months.

Table 4
Viral load distribution at 12 months

Viral load at 12 months (copies/mL)	Male, n (%)	Female, n (%)	Total, n (%)
0–49	60 (89.55)	87 (96.67)	147 (93.63)
50–199	5 (7.47)	3 (3.33)	8 (5.10)
200–999	1 (1.49)	0 (0.00)	1 (0.64)
≥ 1000	1 (1.49)	0 (0.00)	1 (0.64)

Factors associated with sustained viral suppression

At 12 months, 156 participants (99.36%) had attained virologic suppression, compared with 150 (95.54%) at 6 months. There was no significant association between virologic suppression and sex, marital status, low education, WHO stage 3 or 4 at initiation, smoking, HIV duration, or cotrimoxazole intake at either 6 or 12 months of daily DTG use. However, there was a significant association between alcohol use at baseline and viral suppression at 6 months ($p = 0.002$), as shown in Table 5.

Table 5
Factors associated with sustained viral suppression at 6 and 12 months

Variable	6 months			12 months		
	Suppressed, n (%)	95% CI	p-value	Suppressed, n (%)	95% CI	p-value
Male sex						
Yes	63 (94.0)	0.5 (0.1–2.5)	0.46	66 (98.5)	NA	NA
No (ref.)	87 (96.7)	1		90 (100.0)	1	
Age < 40 years						
Yes	58 (96.7)	1.6 (0.3–8.4)	0.71	60 (100.0)	NA	NA
No (ref.)	92 (94.5)	1		96 (99.0)	1	
Single						
Yes	57 (96.6)	1.5 (0.3–8.1)	1.00	59 (100.0)	NA	NA
No (ref.)	93 (94.9)	1		97 (99.0)	1	
Low education						
Yes	67 (94.4)	0.6 (0.1–2.8)	0.70	71 (100.0)	NA	NA
No (ref.)	83 (96.5)	1		85 (98.8)	1	
Smoking						
Yes	5 (100.0)	NA	NA	5 (100.0)	NA	NA
No (ref.)	145 (95.4)	1		151 (99.3)	1	
Alcohol use						
Yes	111 (99.1)	17.1 (2.0–146)	0.002	112 (100.0)	NA	NA
No (ref.)	39 (86.7)	1		44 (97.8)	1	
Treatment-naïve						
Yes	100 (95.2)	0.8 (0.1–4.3)	1.00	104 (99.1)	NA	NA
No (ref.)	50 (96.2)	1		52 (100.0)	1	
WHO stage 3 or 4						
Yes	25 (96.2)	1.2 (0.1–10.4)	1.00	26 (100.0)	NA	NA
No (ref.)	125 (95.4)	1		130 (99.2)	1	
HIV duration < 5 years						

Variable	6 months			12 months		
	Suppressed, n (%)	95% CI	p-value	Suppressed, n (%)	95% CI	p-value
Male sex						
Yes	106 (96.4)	1.8 (0.4–8.4)	0.43	109 (99.1)	NA	NA
No (ref.)	44 (93.6)	1		47 (100.0)	1	
Cotrimoxazole prophylaxis						
Yes	137 (95.1)	NA	NA	143 (99.3)	NA	NA
No (ref.)	13 (100.0)	1		13 (100.0)	1	

Key: NA, not applicable; CI, confidence interval; M6, 6 months; M12, 12 months.

Summary of the discontinued case

This participant was a 54-year-old monogamous man, a builder by profession, who was diagnosed HIV-positive in 2011 with a high CD4 count (1365 cells/ μ L) on 07/09/2011 and was not initiated on ART at that time. On presentation with persistent weight loss (< 10%) and swelling of the right elbow on 27/01/2020, a diagnosis of abscess was made in the context of WHO stage 2 HIV disease. The same day, he was initiated on TDF/3TC/DTG (300/300/50 mg), daily cotrimoxazole (sulfamethoxazole 800 mg + trimethoprim 160 mg), and isoniazid (900 mg), in line with WHO recommendations for opportunistic-infection prophylaxis in HIV management [17, 18]. He reported neither smoking nor alcohol use, had four children (the youngest aged 25 years), and had a negative Xpert MTB result at initiation.

After 6 months of daily ART, his viral load on 24/07/2020 was 14,443 copies/mL. Three sessions of enhanced adherence counselling (EAC) were conducted, and he was graded as having “good adherence” by the adherence counsellor. At 12 months, the viral load measured on 05/01/2021 was 14,138 copies/mL, and a diagnosis of treatment failure was made, with the clinician suspecting primary resistance to the DTG-based regimen. He was switched to a second-line regimen per national guidelines (AZT/3TC 300/150 mg twice daily + ATV/r 300/100 mg once daily) (National Directives on HIV Management, July 2019, p. 88). At follow-up 12 months after switching to second-line ART, his viral load measured on 05/01/2022 was 7595 copies/mL. As of the study period, his ART-resistance panel was not yet available. This was the only case of treatment discontinuation recorded in the study, and it was attributable to virologic failure.

Discussion

In this study, women made up a larger share of the adherent sub-population than men, no factor was independently associated with sustained viral suppression, DTG-based cART showed excellent

effectiveness across all stages of HIV disease, and the sole case of DTG discontinuation was attributable to treatment failure.

The 2018 Cameroon Demographic and Health Survey reported an HIV prevalence of 2.7% among males and 3.7% among females aged 15–49 years. This pattern is reflected in our study, in which 57.3% of participants were female and 42.7% were male, with mean ages of 41.99 ± 12.48 years for females and 47.1 ± 13.29 years for males, and a peak age range of 40–50 years, consistent with findings from other studies [19]. In our cohort, most participants had attained only primary-level education (41.4%), consistent with a study from Zambia showing that HIV prevalence decreases with increasing neighbourhood-level education [20]. At 12 months (week 48), the median weight gain observed in our cohort (+ 2.0 kg, IQR 0 to 4) was similar to that reported in a Belgian cohort of patients on daily DTG (+ 2.0 kg, IQR – 1 to 5) [15].

In examining factors associated with sustained viral suppression, we found no significant association between virologic suppression and sex, marital status, low education, HIV disease stage, smoking history, HIV duration of less than 5 years, or cotrimoxazole intake at 6 or 12 months of daily DTG-based treatment, consistent with findings from other studies worldwide [15, 21]. However, we found a significant association between alcohol use at baseline and viral suppression at 6 months ($p = 0.002$). This finding contrasts with an observational study showing that heavy alcohol consumption (exceeding recommended weekly limits) was significantly associated with poorer HIV viral suppression [22]; in our cohort, alcohol use was recorded only as a baseline characteristic and may have changed over the course of therapy, which could explain this discrepancy and should be interpreted with caution.

At 6 months, 90.45% of participants had viral loads below 50 copies/mL, and 95.54% of the study population had achieved virologic suppression (viral load below 1000 copies/mL). At 12 months (week 48), 93.63% of participants had a viral load below 50 copies/mL, similar to a phase 2b randomised study in which once-daily dolutegravir rapidly reduced viral load to below 50 copies/mL in 93% of participants [23]. At 12 months, 99.36% of participants had achieved virologic suppression (viral load below 1000 copies/mL), with only 0.64% remaining unsuppressed. This proportion is slightly higher than the 96.8% rate of virologic suppression maintained over 48 weeks among treatment-experienced participants in another cohort study [21], and is comparable to a phase 3 trial of switching to a two-drug DTG/3TC regimen, in which only 0.3% of participants had a viral load above 50 copies/mL [24].

Only one participant discontinued DTG-based treatment, after persistently elevated viral loads ($> 14,000$ copies/mL) at both 6 and 12 months, consistent with treatment failure. This participant was switched to a second-line regimen (AZT/3TC + ATV/r). Given the pattern of his viral load response on the second-line regimen, this case may represent an additional instance of DTG-based regimen resistance in Cameroon, consistent with a previously reported case of dolutegravir- and darunavir/ritonavir-resistant multidrug-resistant HIV-1 identified in Cameroon in 2020 [25].

This study adds real-world evidence, from a Central African setting, that a dolutegravir-based regimen has excellent virologic effectiveness across HIV disease stages in both treatment-naïve and treatment-

experienced populations, complementing the existing evidence base, which is drawn largely from clinical trials and cohorts in other regions.

Limitations

This study has several limitations, including the relatively small number of participants, the single-centre design, the short follow-up duration, and the use of pill counting to assess adherence, which is subject to both subjective and objective error. These factors may limit the generalisability of our findings and should be considered when interpreting the results.

Conclusions

Despite the limitations of this study, including the relatively small number of participants and short study duration, our findings provide further real-world evidence that DTG-based cART has excellent virologic effectiveness across all stages of HIV disease, in both treatment-naïve and treatment-experienced Cameroonian populations living with HIV-1. In our cohort, the main reason for DTG-based treatment discontinuation was virologic treatment failure.

Abbreviations

3TC
Lamivudine
ABC/3TC
Abacavir/lamivudine
ART
Antiretroviral therapy
ATV/r
Ritonavir-boosted atazanavir
AZT/3TC
Zidovudine/lamivudine
cART
Combined antiretroviral therapy
DTG
Dolutegravir-based regimen
EAC
Enhanced adherence counselling
TDF
Tenofovir disoproxil fumarate
VL
Viral load
WHO

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Institutional Review Board of the Faculty of Health Sciences, University of Bamenda (Project identification number: 2022/0411H/UBa/IRB). Administrative authorization to conduct the research was obtained from the North West Regional Delegation of Public Health, and permission to conduct the study at the HIV Treatment Centre was obtained from the Director of Bamenda Regional Hospital. As this was a retrospective review of existing medical records, the Institutional Review Board granted a waiver of individual informed consent. All methods were carried out in accordance with the relevant guidelines and regulations, including the Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

RMT, AMJ, MSP and AZB conceived and designed the study. RMT, JHD, AMJ, EN, FAN and AZB contributed to the methodology. RMT and AMJ performed the data analysis. RMT, MSP and SOB wrote the manuscript. All authors read and approved the final manuscript.

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References

1. Severe, P. et al. Early versus standard antiretroviral therapy for HIV-infected adults in Haiti. *N Engl. J. Med.* **363** (3), 257–265 (2010).
2. TEMPRANO ANRS Study Group et al. A trial of early antiretrovirals and isoniazid preventive therapy in Africa. *N Engl. J. Med.* **373** (9), 808–822 (2015).
3. INSIGHT START Study Group. Initiation of antiretroviral therapy in early asymptomatic HIV infection. *N Engl. J. Med.* **373**, 795–807 (2015).
4. Kitahata, M. M. et al. Effect of early versus deferred antiretroviral therapy for HIV on survival. *N Engl. J. Med.* **360** (18), 1815–1826 (2009).
5. Mofenson, L. M. et al. Risk factors for perinatal transmission of human immunodeficiency virus type 1 in women treated with zidovudine. Pediatric AIDS Clinical Trials Group Study 185 Team. *N Engl. J. Med.* **341** (6), 385–393 (1999).
6. Wood, E. et al. Longitudinal community plasma HIV-1 RNA concentrations and incidence of HIV-1 among injecting drug users: prospective cohort study. *BMJ* **338**, b1649 (2009).
7. Iacobucci, G. HIV: dolutegravir should be the preferred treatment option in all populations, says WHO. *BMJ* **366**, l4831 (2019).
8. Gibert, C. L. Treatment guidelines for the use of antiretroviral agents in HIV-infected adults and adolescents: an update. *Fed. Pract.* **33** (Suppl 3), 31S–36S (2016).
9. Cruciani, M. & Parisi, S. G. Dolutegravir-based antiretroviral therapy compared to other combined antiretroviral regimens for the treatment of HIV-infected naive patients: a systematic review and meta-analysis. *PLoS One.* **14** (9), e0222229 (2019).
10. Messiaen, P. et al. Clinical use of HIV integrase inhibitors: a systematic review and meta-analysis. *PLoS One.* **8** (1), e52562 (2013).
11. Walmsley, S. L. et al. Dolutegravir plus abacavir–lamivudine for the treatment of HIV-1 infection. *N Engl. J. Med.* **369** (19), 1807–1818 (2013).
12. Ebell, M. H., Barry, H. C., Slawson, D. C. & Shaughnessy, A. F. Finding POEMs in the medical literature. *J. Fam Pract.* **48** (5), 350–355 (1999).
13. Sherman, R. E. et al. Real-world evidence – what is it and what can it tell us? *N Engl. J. Med.* **375**, 2293–2297 (2016).
14. Byrd, K. K. et al. Antiretroviral adherence level necessary for HIV viral suppression using real-world data. *J. Acquir. Immune Defic. Syndr.* **82** (3), 245–251 (2019).
15. Nasreddine, R. et al. Effectiveness of dolutegravir-based antiretroviral therapy in a real-world setting in a Belgian cohort of 4101 HIV patients. *AIDS* **34** (8), 1151–1159 (2020).
16. World Health Organization. *The role of HIV viral suppression in reducing transmission and improving individual health: policy brief* 1st edn (World Health Organization, 2022).
17. World Health Organization. Guidelines on post-exposure prophylaxis for HIV and the use of co-trimoxazole prophylaxis for HIV-related infections among adults, adolescents and children: recommendations for a public health approach: December 2014 supplement to the 2013

- consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Geneva: World Health Organization; (2014).
18. World Health Organization. *Guidelines for intensified tuberculosis case-finding and isoniazid preventive therapy for people living with HIV in resource-constrained settings* (World Health Organization, 2011).
 19. Mehari, E. A., Muche, E. A. & Gonete, K. A. Virological suppression and its associated factors of dolutegravir-based regimen in a resource-limited setting: an observational retrospective study in Ethiopia. *HIV AIDS (Auckl)*. **13**, 709–717 (2021).
 20. Kayeyi, N., Sandøy, I. F. & Fylkesnes, K. Effects of neighbourhood-level educational attainment on HIV prevalence among young women in Zambia. *BMC Public. Health*. **9** (1), 310 (2009).
 21. Carlo, D. D. et al. Dolutegravir-based regimen for maintenance of viral suppression in people living with HIV: 48-week results in a real-life setting. *AIDS Res. Hum. Retroviruses* ;**37**(6). (2021).
 22. Cook, R. L. et al. Alcohol consumption patterns and HIV viral suppression among persons receiving HIV care in Florida: an observational study. *Addict. Sci. Clin. Pract.* **12**, 22 (2017).
 23. van Lunzen, J. et al. Once daily dolutegravir (S/GSK1349572) in combination therapy in antiretroviral-naïve adults with HIV: planned interim 48-week results from SPRING-1, a dose-ranging, randomised, phase 2b trial. *Lancet Infect. Dis.* **12** (2), 111–118 (2012).
 24. van Wyk, J. et al. Efficacy and safety of switching to dolutegravir/lamivudine fixed-dose 2-drug regimen vs continuing a tenofovir alafenamide-based 3- or 4-drug regimen for maintenance of virologic suppression in adults living with human immunodeficiency virus type 1: phase 3, randomized, noninferiority TANGO study. *Clin. Infect. Dis.* **71** (8), 1920–1929 (2020).
 25. Fokam, J. et al. The first case of dolutegravir and darunavir/r multidrug-resistant HIV-1 in Cameroon following exposure to raltegravir: lessons and implications in the era of transition to dolutegravir-based regimens. *Antimicrob. Resist. Infect. Control.* **9** (1), 143 (2020).