Predicting Viral Load at Six Months after Initiation of Antiretroviral Therapy in Lusaka District; A Multilevel Regression Analysis

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Abstract

Background: Zambia has made tremendous progress towards HIV epidemic control. In 2020, it become one of the first countries to attain the 90-90-90 UNAIDS targets. Expansion of ART services, a switch to dolutegravir-based 1st line and expanding VL testing platforms has been responsible for this success. To attain epidemic control, the ART programme needs to investigate the system-level factors affecting viral load suppression in Zambia.

Objective: This study aimed to investigate those factors.

Methods: This was a retrospective cross-section analytic study of PLHIV 6 months who enrolled on ART in Lusaka district between 2016 and 2020. Data was extracted from the SmartCare and analysed using Stata version 17. Data was analysed using mixed effects regression analysis.

Results: A total of 38 ART facilities with a total patient population of 22,329 were analysed. VLS was significantly different at primary level (91%) compared to (80%) at tertiary level. There was a high VLS rate among persons older than 50 years (92%) compared to children below 15 years (79%). Both late clinical stage and advanced HIV disease were associated with lower VLS rates at 61% and 70% respectively. Being on dolutegravir-based ART was associated with high VLS rates at 90% compared to LPV/ATV at 46%. The mixed effects analysis showed that 0.24% of variation in VL was associated with variation at facility level. Facility size was associated with reduction in VL at 6 months even when adjusted for facility level (pseudo R2=0.637) or age centred at the mean (pseudo R2=0.15). Receiving ART from higher level of care and increasing age by 1 year from the mean was associated statistically significant increase VL adjusting for facility size and facility mean age. The between-facility differences in VL were not affected by individual factors such as increase in mean age (LR=23.88, df =2, p<0.001).

Conclusion: The study shows that the variation in VL was associated to facility level differences. The ART programme will need to develop programmes that considers these facility-specific differences in order for the country to reach epidemic control.

Key words: ART, Mixed effects, Viral load, Intraclass correlation coefficient