ABSTRACT

Objective: The highly mobile population and a large immigrant population within City of Matlosana Local Municipality contributes to the high tuberculosis and HIV burden. This study seeks to use routine HIV laboratory data to compare facilities' viral suppression rates using geospatial techniques. Geospatial techniques give a visual presentation of the data including trends over time and patterns across facilities.

Design: This was a longitudinal study design based on secondary data obtained from the NHLS laboratory in Klerksdorp for 19 health facilities in City of Matlosana Local Municipality between 2011 and 2015.

Method: Program data extracted from the NHLS CDW database was used for the study. Data were collected each time a client comes for routine laboratory tests. The database contained data for all patients from the City of Matlosana Local Municipality who had their HIV care follow up tests done in the public sector between 2011 and 2015. Facility geocodes were used for mapping out suppression rates by facility and to present the data on a descriptive map. The choropleth map was computed using the functionality on QGIS that shows the dependent variable using color codes based on the corresponding percentage. This was done at baseline and over the follow up period to 2015 (spatiotemporal trends). STATA version 15 was used for the examination of the presence of clustering, where the Moran's Index was computed at 5% level of significance. The Simultaneous Autoregressive model was used to examine factors associated with suppression while adjusting for geocodes. Akaike Information Criterion was used for determining the best model fit.

Results: Of the total number of facilities assessed, 47% had the viral suppression rates between 60% and 70% while 21% of the facilities had their viral suppression ranging from 70 – 80%. The overall viral suppression rates were lowest in Klerksdorp hospital with 43.7% and the highest at Stilfontein municipal clinic with 78.2%. The viral suppression rates at Klerksdorp Hospital were the lowest throughout the entire study period. These rates started at 29.3% in 2011 and gradually rose over time, reaching a peak of 59.7% in 2015. The viral suppression rates across health facilities increased over time with Orkney and Stilfontein reporting highest performing. The yearly viral suppression rates showed a general increase in the viral suppression rates ranging from 69.4% in 2011 to a peak of 73.1% in 2012 and dipping in 2015 with a final rate of 72.1%. The local and global measure (Moran's I and Getis – Ordi) test for spatial autocorrelation was insignificant ($p=0.611>0.05$) and therefore spatial autoregressive models could not be used. However, results from general linear regression showed that viral suppression increased by 0.64 for every unit increase in age of clients tested (95%CI: 0.25 – 1.02; $p<0.01$). Furthermore, viral suppression decreased by 0.41 for every unit increase in white cell count (95%CI: -0.80 – -0.02; $p<0.05$).

Conclusion: Geospatial techniques can be employed to present a visual presentation of viral suppression rates, to identify trends over time and patterns across facilities. Results from the study showed that viral suppression rates ranged from 60% to 80% among the majority of facilities in the City of Matlosana Local Municipality. The lowest and highest viral suppression rates were at Klerksdorp hospital and Stilfontein municipal clinic respectively. Viral suppression rates across facilities were declining from 2012 to 2014, however there were sharp increases from 2011 to 2012 and from 2014 to 2015. White cell count and age for clients tested were significantly associated with viral suppression. In addition, there was no clustering of viral suppression rates in the City of Matlosana Local Municipality, implying that HIV viral loads varied across the health facilities.

Key words: Viral suppression rate, health facility, spatial distribution, CD4 count, GPS