Application of machine learning to HIV prevention and care continuum among key populations in Sub Saharan Africa

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Introduction

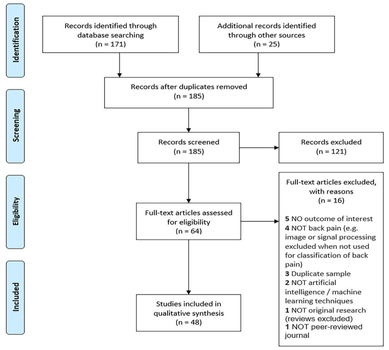
Key populations are disproportionately affected by HIV due to specific risk behaviors, marginalization, and structural factors such as stigma, discrimination, violence, human rights violations, and criminalization which contribute to a lack of access to health services. This lack of access to health services has resulted in a lack of appropriate assessment and reporting of the key populations' HIV vulnerability, transmission, and treatment. It is important to know the contribution rate of key populations to the overall transmission of HIV and establish timely appropriate measures to minimize their contribution.

Objectives

To explore the use of machine learning on HIV prevention (PrEP, condom use) and care continuum (diagnosis of HIV infection/HIV testing, linkage to HIV care, HIV treatment initiation, retention in care, viral suppression) for key populations in Sub Saharan Africa.

Methods

A review of the literature published from 2018-2019 (pre-COVID-19) and 2020-2021 (peri-COVID-19) will be conducted. The review will be done in line with the guidelines specified in the Preferred Reporting Items for Systematic Reviews and Meta-analyses statement for protocols (PRISMA and be registered in the International Prospective Register of Systematic Reviews (PROSPERO) database.



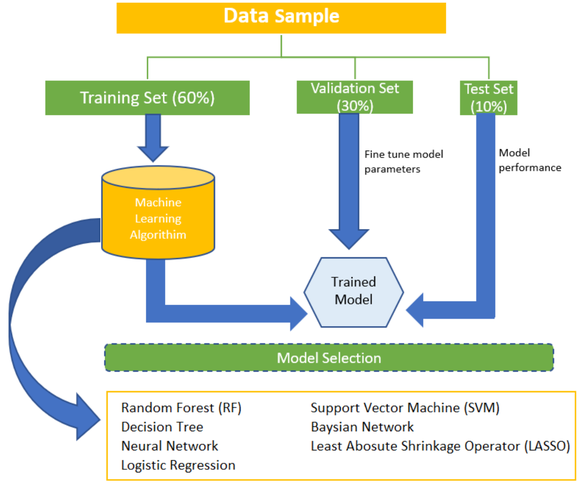
The PRISMA Flow of the systematic review (source: Tagliaferri et al., 2020)

Methods Cont'd

Identification (database searching), screening, eligibility and studies included in the systematic review.

Results

This study established that machine learning can help to track people who are accessing HIV services including those who have the potential to transmit the virus. In addition, machine learning can help to determine patients who are likely to fail to adhere to HIV care services including accessing medications in time or not accessing them at all. Furthermore, statistical predictive modeling can enhance the selection of interventions based on differentiated models of prevention and care before people living with HIV discontinue accessing HIV services including prevention and care for the sake of enhancing patient outcomes. Machine learning approaches can be applied for building models on HIV prevention and care continuum among key populations in Sub Saharan Africa. Algorithms can be trained and validated on specific proportions of the available data and the remaining data proportions can be used for testing the models to predict prevention and care of HIV. Machine learning significantly improves identification of HIV positivity and individuals with a higher likelihood of contracting the disease.



Machine learning processes (Source: (Olatosi et al., 2021)

Conclusions

There remains a gap in HIV prevention and treatment, sufficient HIV care due to stigmatization especially for key populations who are unable to access and discrimination in societies. With this status quo, the possibility of maximum suppression and an AIDS-free generation cannot be realized unless we are able to control and prevent HIV transmission through key population groups. This study will focus on the epidemiology of HIV infection in South Africa.

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