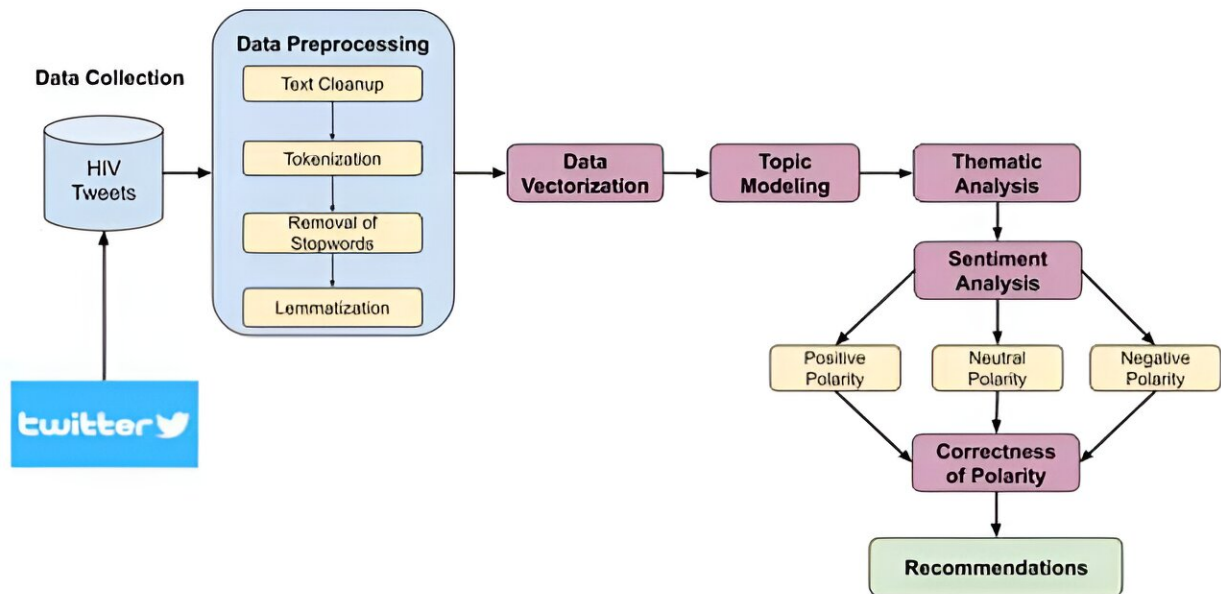


Researchers use AI, social media to identify health concerns of people living with HIV and AIDS

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Using Machine Learning to Establish the Concerns of Persons with HIV/AIDS During the COVID-19 Pandemic from their Tweets. Credit: *IEEE Access* (2023). DOI: 10.1109/ACCESS.2023.3267050

Machine learning, artificial intelligence (AI) and social media are providing researchers with the opportunity to analyze valuable information about social issues in relation to health and mental health,

particularly in relation to topics people may be reluctant to discuss in other settings, according to Richard Lomotey, associate professor of information technology at Penn State Beaver.

Lomotey, along with researchers from Penn State, the University of Saskatchewan and Dalhousie University, recently used artificial intelligence to mine data from X, formerly Twitter, to learn about the frustrations and concerns of people living with HIV and AIDS during the COVID-19 pandemic. The team published their [findings](#) in *IEEE Access*.

They developed a machine learning algorithm to analyze more than 200,000 English-language tweets related to HIV and AIDS posted between March 1, 2020, and April 30, 2022, finding 14 common themes across the dataset.

These themes—such as testing, role of government, stigmatization and misinformation—could help better inform [policy makers](#) to develop more comprehensive and compassionate regulations related to health, according to the researchers.

"With the advent of AI and [machine learning](#), we wanted to see how we can use such technology to address social issues, especially deficiencies in the [health care sector](#)," said Lomotey, lead author on the paper.

The researchers focused on the complexities of health care related to a syndemic, or more than one pandemic at a time. HIV, discovered in 1983 as the virus that causes AIDS, is an ongoing pandemic, and COVID-19 was declared a pandemic on March 11, 2020.

Lomotey and his research collaborators—Ralph Deters, professor of computer science at the University of Saskatchewan, Sandra Kumi, a doctoral student at the University of Saskatchewan, Rita Orji, associate professor of computer science at Dalhousie, and Maxwell Hilton, an

undergraduate student and research intern at Penn State Beaver—set out to learn how people were impacted by the syndemic, what underlying conditions they were living with, how they were feeling and their morale levels.

"Our paper sheds light on the pressing concerns of individuals living with HIV/AIDS, especially during the COVID-19 pandemic," Orji said. "It uncovers a range of challenges, including stigmatization, late diagnosis, limited access to medications and a lack of urgency in vaccine development. These findings underscore the critical societal needs of people living with HIV and AIDS, emphasizing the need for targeted interventions and policy reforms to address these longstanding issues."

The team collected data globally, which meant there were some challenges with technical limitations. Since some languages are not fully captured or readily available digitally, AI cannot yet comprehend all languages, Lomotey said. Because of this limitation, they only used English language tweets.

The team chose to use X because of the volume of data, which allowed them to get a general feel of the topic and then zero in on specifics, Deters said. According to Kumi, the nature of social media and the ability to remain relatively anonymous meant that many of the posts provided insight into the sentiments and issues that people may not otherwise be willing to voice.

"We need to know more about the people, but we don't want to cause negative outcomes for individuals," Deters said. "Every community has to find their own balance between society controlling and providing improvements. We want to empower people to control their data, but also trust in how it will be used ... We have to design systems that can't be abused."

Lomotey said access to testing as well as health care, medication and support resources emerged as an issue in their findings.

"Even in the United States, people from areas of Virginia were asking for help," he said, noting that [minority groups](#)—including women, children and Black men in same-sex relationships—were the most affected by the syndemic and lack of care and resources.

The researchers said they also found "blatant misinformation" to be a pervasive problem.

"For me that was so surprising," Lomotey said. "There is so much misinformation on HIV, and where there is education, people appreciate it a lot. Even information on getting treatment is hard to come by."

According to Orji and the team, the results could help inform policy and other decisions related to health care.

"The findings suggest a need for targeted policies that address the identified themes, such as increasing health care accessibility, tackling stigmatization, and expediting vaccine development," Orji said. "Policy makers should consider these insights to formulate strategies that are responsive to the dynamic challenges faced by people living with HIV and AIDS."

They also said that their work demonstrates the value of [social media](#) for policy makers, health care providers and advocacy groups to better understand evolving concerns and public sentiments.

Next, the researchers said they hope to next examine issues felt by people living with disabilities in vulnerable regions and growing economies.

More information: Richard K. Lomotey et al, Using Machine Learning to Establish the Concerns of Persons With HIV/AIDS During the COVID-19 Pandemic From Their Tweets, *IEEE Access* (2023). [DOI: 10.1109/ACCESS.2023.3267050](https://doi.org/10.1109/ACCESS.2023.3267050)

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