m2m Impact

• 1,630,558 new and returning clients were reached through direct services and technical assistance, a 22% increase over 2020.

• 1,866 women living with HIV were employed directly by m2m as frontline health workers—22% increase over 2020.

• 544 locations in which Mentor Mothers provided direct services, including health facilities and in the surrounding communities.

• 0.7% is the mother-to-child HIV transmission rate among enrolled m2m clients—well below the 5% UN benchmark. This makes 2021 the eighth straight year we have achieved virtual elimination.

• 95-95-95 in 2021, m2m met all of UNAIDS’ ambitious 95-95-95 Fast Track Targets for ending HIV/AIDS, four years ahead of the 2025 target dates.

### Background

To tackle the spread of HIV in Africa, mothers2mothers (m2m) employs HIV-positive women as Mentor Mothers to counsel HIV-positive mothers and their families. We report on the progress of a project to predict which clients will exit from m2m’s health program for preventing mother-to-child transmission of HIV. The project uses two approaches to predict client exit: machine learning predictions from client data and predictions made by the Mentor Mothers.

Relying solely on app data without human involvement, we anticipate an AUC < 0.7, indicating poor performance. The machine learning approach might struggle to capture crucial nuances in human interactions, limiting its effectiveness. Human expertise, provided by the Mentor Mothers, is vital for achieving more accurate predictions.

### Abstract

**First Target Measure:** The first target measure is designed to identify clients who missed their first appointment within seven days of enrollment. Clients who exit the program for reasons unrelated to their appointment attendance are excluded from the data to ensure accurate predictions.

**Second Target Measure:** The second target measure is used to identify clients who did not attend their most recent appointment within the first 90 days of enrollment. This measure helps to capture a broader range of clients who might be at risk of exiting the program.

In XGBoost, the prediction is obtained by summing the predictions of all the individual trees, and each tree is constructed in an iterative manner to minimize a specific loss function. Additionally, regularization terms are applied to control the complexity of the model and prevent overfitting.

### Method

**XGBoost**

The XGBoost method is chosen because it is an ensemble method that uses multiple decision trees to make predictions. The model is trained using the training data and then tested on the test data to evaluate its performance. The performance metrics used are ROC AUC, precision, recall, and F1 score.

**Results**

The models were trained and tested on data from 20,726 and 8,033 HIV-positive women, respectively, who had their first meeting with m2m between January 2020 and January 2022. The models’ predictive performance for missing appointments was found to be poor, with ROC AUC scores of 0.62 and 0.65 for missing the first appointment and missing the most recent appointment, respectively.

### Next Step

To enhance the model’s accuracy in predicting missing appointments, we will expand the input features to include socio-demographic variables and past appointment history. We will conduct extensive parameter tuning and explore advanced machine learning techniques, like deep learning and natural language processing, to leverage textual data from clients’ interactions and optimize performance. Additionally, we will incorporate other relevant metrics to measure performance, such as precision, recall, and F1 score, to evaluate the model’s performance.

**References**

