# MODELING THE FUTURE OF HIV IN TURKEY:
# DISEASE IMPLICATIONS OF IMPROVING PREVENTION, DIAGNOSIS, AND TREATMENT

Emine Yaylali, PhD[1], Deniz Gökengin, MD[2], Volkan Korten, MD[3], Fehmi Tabak, MD[4], Yeşim Taşova, MD[5], Serhat Ünal, MD[6], Zikriye Melisa Erdoğan, MS[1], Fethi Çalışır, PhD[1], Berna Özelgün[7], Toros Şahin[7]

[1]Istanbul Technical University,[2]Ege University, [3]Marmara University, [4]Istanbul University-Cerrahpasa, [5] Çukurova University, [6]Hacettepe University, [7]Gilead Sciences

## BACKGROUND AND MOTIVATION

- There were 3,944 HIV cases diagnosed in 2019, and a total of 26,164 cases of HIV infection reported in Turkey[1].
- There has been an increasing trend in the number of HIV patients in recent years. Approximately 60% of total diagnosed patients are from last 5 years.
- There is limited data on undiagnosed patients or continuum of care.
- We aim to evaluate HIV incidence and prevalence, the current continuum of care, and the impact of improving diagnosis in the next 20 years.
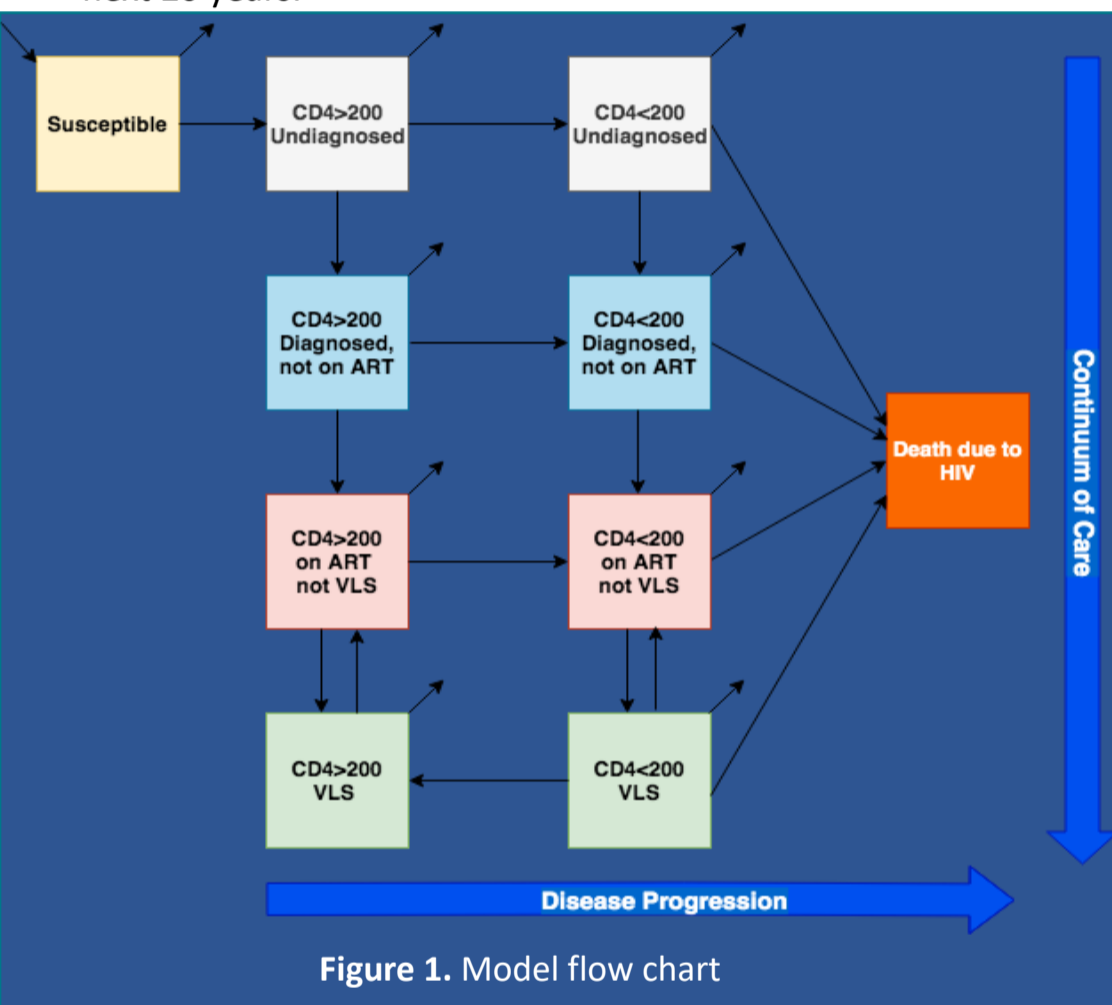


**Figure 1.** Model flow chart

## METHODS

- We developed a dynamic compartmental model of HIV transmission and progression.
- HIV patients are stratified among compartments by disease progression and continuum of care while susceptibles consist of HIV negative population between 15-64 age.
- The model is populated with demographic, epidemiological, behavioral, and clinical data.
- We calibrated the model to surveillance data on diagnoses and validated against HIV deaths. (Calibration period: 2005-2019 and prediction period: 2020 – 2040).
- To assess the effect of improving testing and diagnosis, we developed three scenarios where additional funding will result in improvement in the percent of diagnosis to achieve the national goals by 2024 as well as UNAIDS 90-90-90 targets as follows:
    - Low Scenario: Reaching 50% diagnosed in 2024
    - Medium Scenario: Reaching 70% diagnosed in 2024
    - High Scenario: Reaching 90% diagnosed in 2024

## RESULTS

- Model estimates 4,200 new HIV infections for 2019 in the base case compared with the 2019 surveillance estimate of new diagnoses 3,944.
- Percent diagnosed among HIV positive persons was estimated around 44% for base case.
- Estimated HIV incidence in 2020 was approximately 13,500 cases with around 5,000 would be diagnosed. Incidence would become approximately 375,000 (27% increase) in 2040 (Figure 2).
- At the end of 20 year prediction period, HIV prevalence is estimated to increase around 2.4 million cases.
- If testing and diagnosis are improved, total HIV infections prevented compared with base case in 20 years:
    - Low scenario: 780,000 (32% reduction)
    - Medium scenario: 2M (85% reduction)
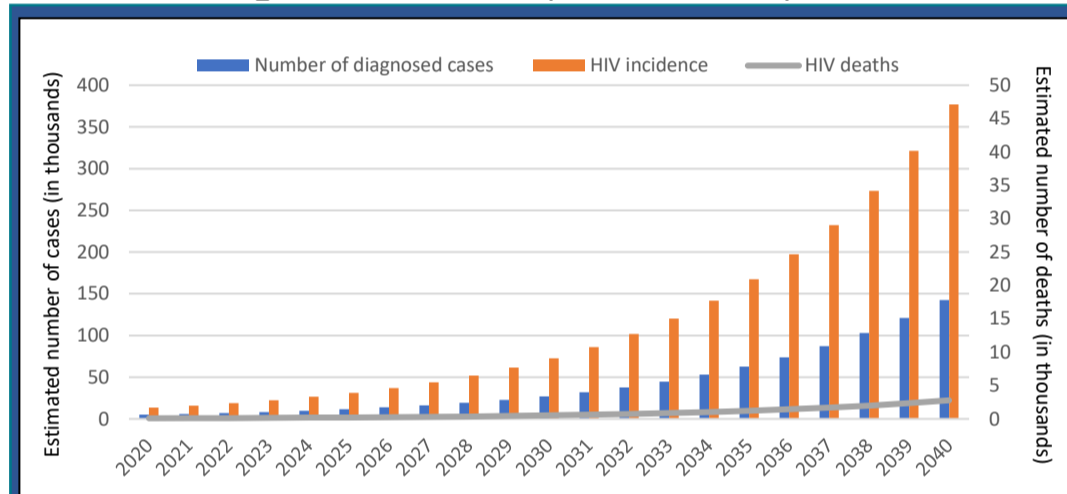    - High scenario: 2.3M (97% reduction)



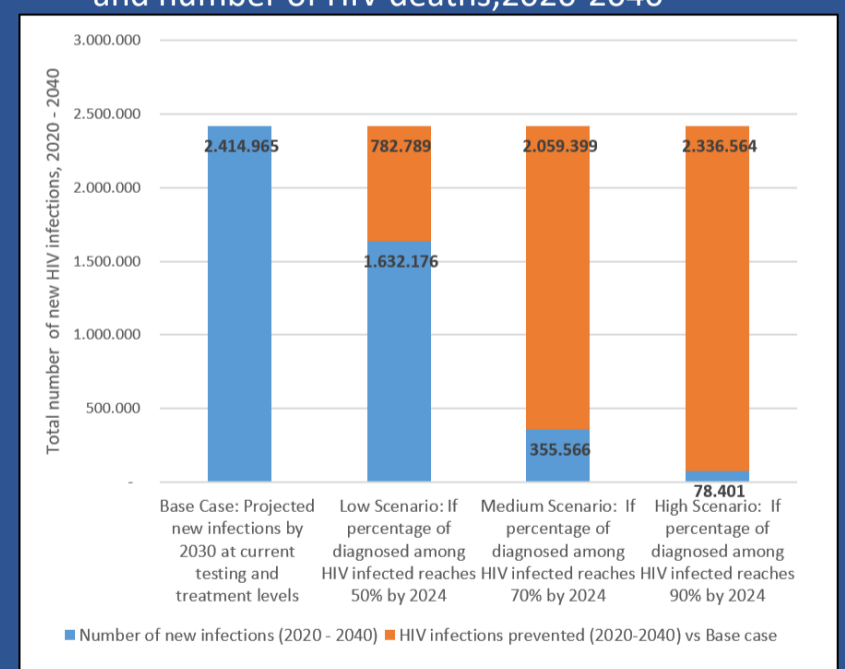**Figure 2.** Estimated number of diagnosed cases, HIV incidence and number of HIV deaths,2020-2040



**Figure 3.** Impact of improving testing and diagnosis in Turkey, 2020 -2040

## CONCLUSIONS

- In the base case, the annual HIV diagnosis were similar to the national surveillance data.
- If there is no improvement in the current continuum of care, model results showed that HIV incidence and prevalence will significantly increase over the next 20 years.
- As a result, HIV care and treatment could potentially place a major burden on the Turkish healthcare system.
- Improving strategies around prevention, testing and diagnosis will substantially reduce the number of infections by 2040.

[1] T.C. Sağlık Bakanlığı. HIV-AIDS İstatistik. https://hsgm.saglik.gov.tr/tr/bulasici-hastaliklar/hiv-aids/hiv-aids-liste/hıv-aids-istatislik.html%0A. Published 2020. Accessed on July 10, 2020.