**Table S2. Likelihood components**

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| --- | --- | --- | --- | --- | --- |
| **Component** | **Data** | | | **Weight** | **Correlation structure** |
| **Definition** | **Source; stratifications and years available** | **Measurement error** |
| Incidence | New HIV infections (absolute number) | Source: UNAIDS Aidsinfo1  Stratifications: Total, age, age\*sex  Years: 1990-2021 | AIDSinfo\* | 2 | Auto regressive  Base correlation of 0.5 |
| Prevalence | People living with HIV (absolute number) | Source: UNAIDS Aidsinfo1  Stratifications: Total, age, age\*sex  Years: 1990-2021 | AIDSinfo | 1 | Auto regressive  Base correlation of 0.5 |
| HIV mortality | AIDS-related deaths, as a percentage of people living with HIV | Source: UNAIDS Aidsinfo1  Stratifications: Total, age  Years: 1990-2021 | AIDSinfo | 1/256† | Auto regressive  Base correlation of 0.5 |
| Awareness | Percent of people living with HIV who know their status | Source: UNAIDS Aidsinfo1  Stratifications: Total, age\*sex  Years: 2015-2021 | AIDSinfo | Up weighted based on relative number of data points compared to incidence and prevalence \*\* | Compound symmetry  Base correlation of 0.5 |
| Engagement | Percent of people who know their status who are on ART | Source: UNAIDS Aidsinfo1 (on ART)  Stratifications: Total, age\*sex  Years: 2015-2021 | AIDSinfo | Up weighted using same method as awareness | Compound symmetry  Base correlation of 0.5 |
| Suppression | Percent of people who know their status who achieve viral suppression | Source: UNAIDS Aidsinfo1  Stratifications: Total, age\*sex  Years: 2019-2020 | AIDSinfo | Up weighted using same method as awareness | Compound symmetry  Base correlation of 0.5 |
| Population | Total number of individuals | Source: UN World population prospects2  Stratifications: Total, age, sex, age\*sex  Years: 1950-2021 | Estimated standard deviation as square root of observed data | 1/200000‡ | Auto regressive  Base correlation of 0.5 |

\* AIDS Info reported 95% confidence interval; we calculated standard deviation for calibration as ((upper-lower)/2)/1.96 [used exact estimate via qnorm(0.975)]

† Down weighted because of skepticism about accuracy of actual data

\*\* I.e., Incidence and prevalence each have 264 data points, with 162 points before 2010, 70 points between 2010 and 2018, and 32 points after 2018; awareness has 21 points, with 9 points between 2010 and 2018 and 12 points after 2018; ((162\*0.25) + (70\*1) + (32\*4))/((9\*1)+(12\*4)) = 4.18 🡪 factor by which awareness was upweighted

‡ Down weighted because of magnitude/volume of data points

**Abbreviations:** Joint United Nations Programme on HIV/AIDS(UNAIDS); antiretroviral therapy (ART)

1. HIV/AIDS JUNPo. AIDSInfo. <http://aidsinfo.unaids.org/>. Published 2019. Accessed August 30, 2019.

2. Nations U. *World Population Prospects 2022: Methodology of the United Nations population estimates and projections.* 2022.