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PrEPCAST: a PrEP Forecasting and Impact Tool

Works in Progress: Transforming the HIV Response in a Time of Change, April 20-22, 2026 | Nairobi, Kenya

Why a new tool?

Tools exist for PrEP targeting and modeling

Individually narrow focus (short-term targets, logistics, etc)

limited geographic scope or sub-populations

Advanced modeling experience

Easily estimate and explore impact of PrEP product mix and allocation approaches

PrEP Tool Landscape – Comparison

	PrEPCAST	PrEP-it	Naomi / SHIPP	UNAIDS Target Tools	QUANTPrEP	Spectrum (Goals/AIM)
Decisions Supported	• Multi-year program planning • Product introduction strategy • Geographic/population prioritization	• Short-term supply chain management • Clinic-level logistics • Budget planning	• Where & whom to prioritize for prevention • Subnational resource allocation	• Aligning national plans with global guidance • Grant applications	• Avoiding stock-outs • Informing procurement cycles	• Long-term national strategy • Optimizing prevention portfolio investment
Primary Users	• Program managers • M&E officers • Strategic planners	• Supply chain logisticians • M&E officers • Program managers	• Epidemiologists • UNAIDS/ministry modelers	• National M&E officers • Global fund/PEPFAR planners	• Procurement & logistics personnel	• Health economists • National modelers • Ministry planners
Accessibility	• PEPFAR-internal web-app • Open access R code repository	• Freely accessible • Web-based	• Web-based (UNAIDS platform) • Requires some expertise	• Freely accessible • Excel-based (some web versions)	• Freely accessible • Excel-based	• Freely accessible • Desktop software • Requires formal training / modeling experience
Compared to PrEPCAST	–	• Less epidemiological modeling • No product mix or infections averted output (starting to in newest version)	• Upstream data source • No programmatic forecasting or scenario modeling	• National-level only • No subnational forecasting or product scenario modeling	• Procurement focus only • No epi modeling, product mix, or infections averted	• Stronger long-term epi modeling • Less operational & subnational granularity

PrEPCAST - Data Inputs

- All data disaggregated to
  - First sub-national unit (SNU) level
  - Sex (M/F)
  - Age group (15-24, 25-34, 35+)

Historical PrEP Data (PEPFAR MER data)

- **2022 Q1 to Current***
- **PrEP_NEW**
- **PrEP_CT**

Incidence Estimates (UNAIDS NAOMI data)

- **Population**
- **Infections**
- **Incidence**

*All dates converted to calendar year quarters

Background Analysis - Forecasting

Granularity

Timeseries generated for each disaggregate (country x SNU x age/sex group) and hierarchical structure maintained

Individual Models

Models fit for lowest level disaggregation and for new enrollment and continuation

Classify Series

- Time series classified by data quality and volume
- Models applied

Cross-Validation

- Models fit (ARIMA, ETS, SNAIVE, Drift, TSLM)
- Output applied against last 4 quarter holdout

Ensemble

- Top 3 models weighted by inverse RMSE
- Ensemble model generated

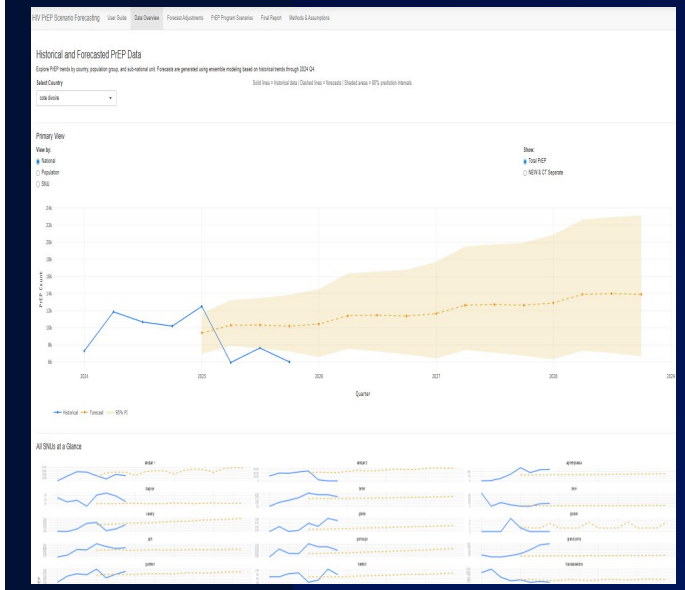
Forecast

- NEW and CT forecasts estimated.
- 4 qrt overlap hx data + 12 qrt future

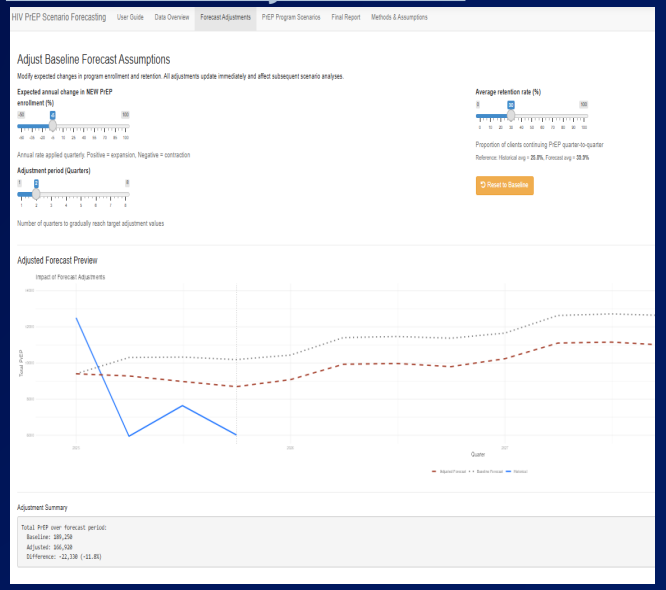
PrEPCAST -Dashboard

- Arranged Into 4 Core Modules
  - Baseline Forecast: Explore and evaluate generated forecast data.
  - Adjust: User adjustment of generated forecast data (expected changes to enrollment, retention)
  - Scenarios: User applied scenario for introduction of PrEP products and/or population allocation approaches
  - Impact: Final report of estimated infections averted based on scenarios
- Brief User guide tab
- Methods / Assumption tab
  - Duration of PrEP coverage [PY time calculations]
  - Effectiveness [Infections averted]
  - Retention [quarterly retention, forecasted PrEP CT]

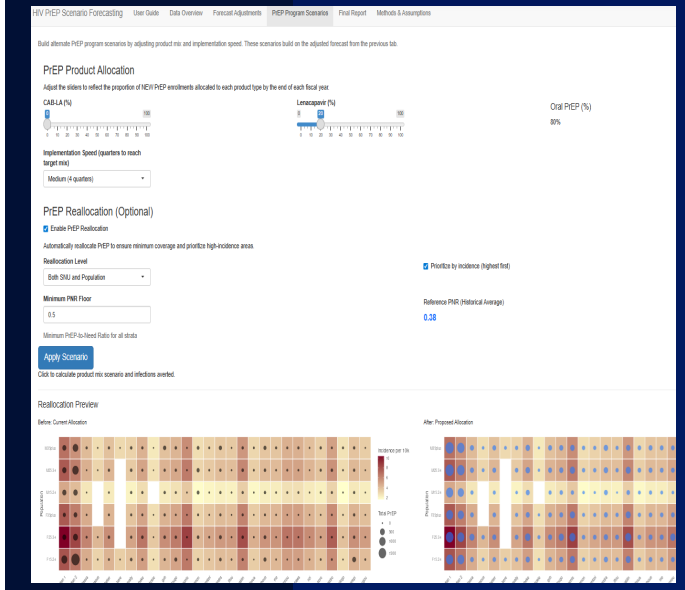
Forecast Overview



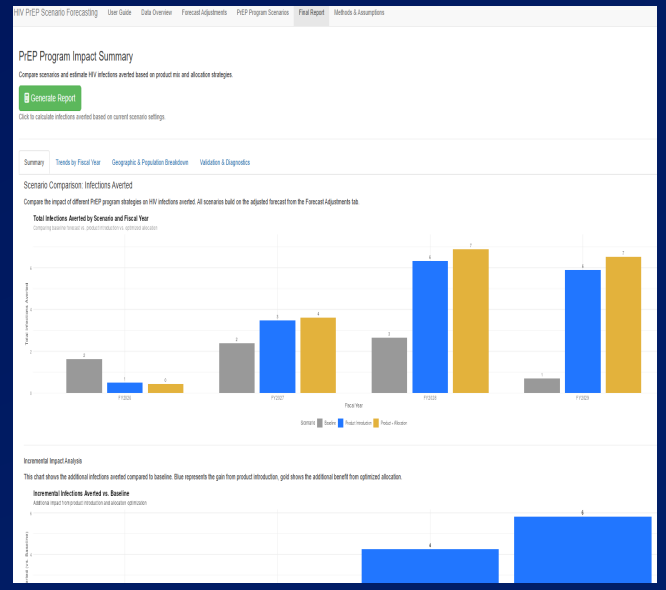
Forecast Adjustment



Program Scenarios



Impact Report



PrEPCAST – Product and Population Allocations

PrEP Product Allocation

Modify amount of PrEP distributed by type (Oral, CAB-LA, or LEN)

PrEP Population Allocation

Optional allocation stratified on Population (age/sex), geography (SNU), or both

Option only available if NAOMI incidence data available

Determine Strata Minimum

- Patients continuing PrEP from previous quarter
- Additional PrEP enrollment to meet user defined minimum threshold (PnR)

Determine Remaining Pool of PrEP

- Overall amount of PrEP estimated in Adjusted Forecast – Total amount of PrEP used in minimum
- By PrEP Type

Distribute Remaining PrEP

- Proportionally redistributed weighted by incidence (starting with LEN > CAB > oral PrEP)

Demo video

Next Steps

- **Finalize pilot testing of PrEPCAST app**
- **Complete forecasting for all PEPFAR countries**
- **Publish final tool and code repositories**
- **Follow-up questions/interest in use: Jesse Blanton (asi5@cdc.gov)**
- **PrEPCAST Tool: https://rconnect.edav.cdc.gov/connect/#/apps/c9599ce2-f259-4849-b8b0-ff0a314e3a9a**

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Thank you!

Extra slides

PrEP Tool Landscape – Comparison

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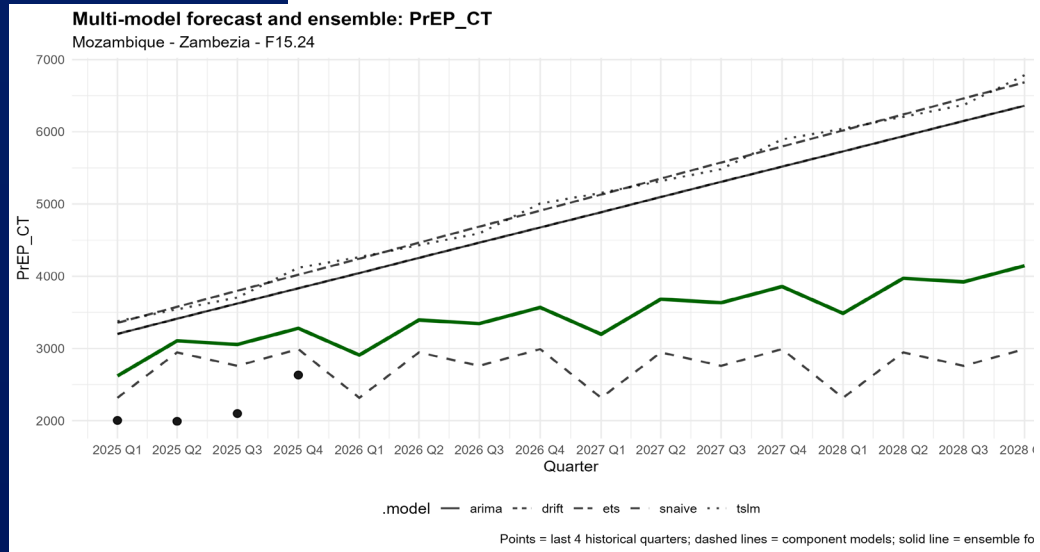
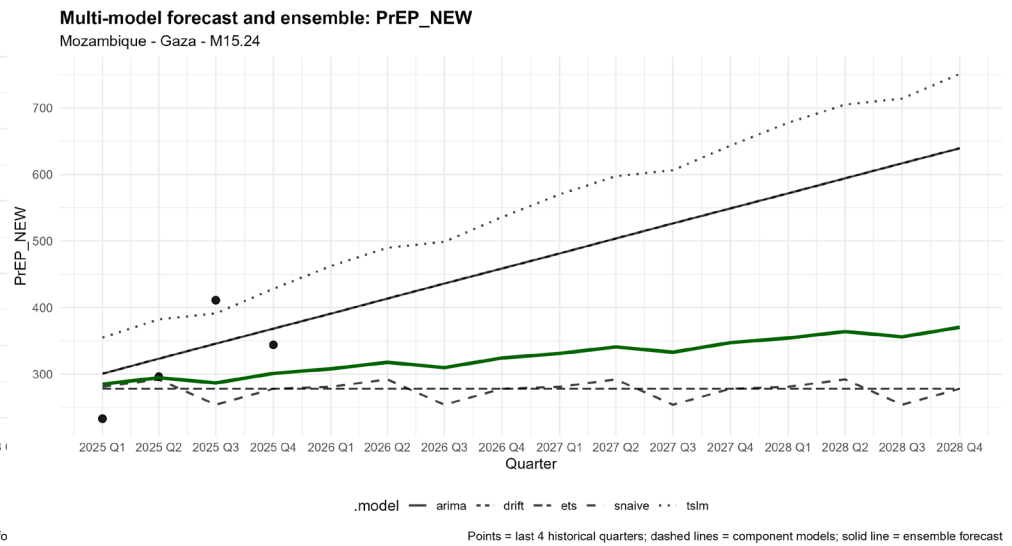
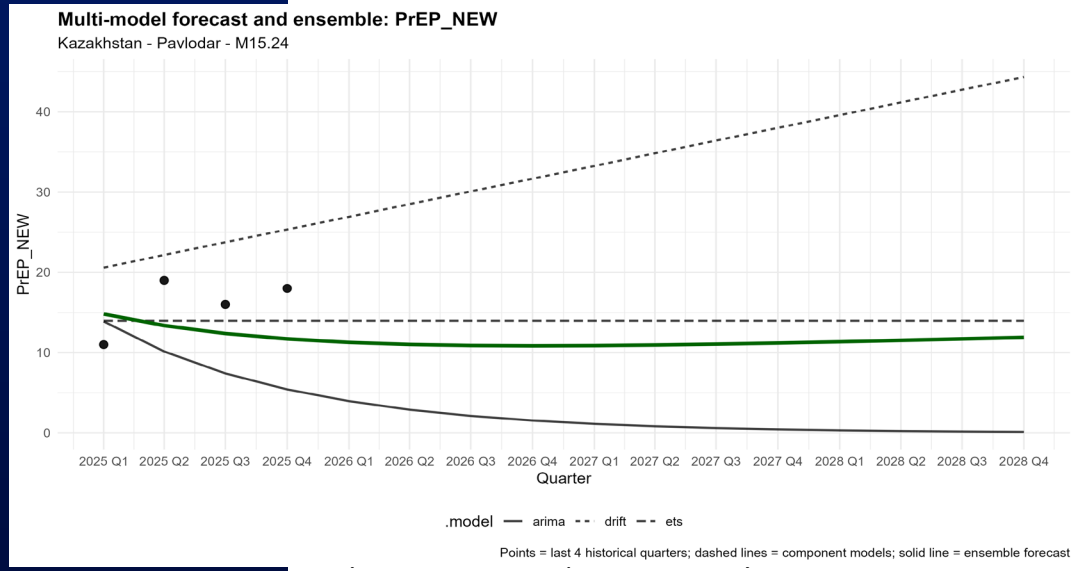
Primary Purpose	Forecast PrEP volume; model product mix & allocation impact	Translate targets into operational commodity plans	Estimate subnational HIV burden & prevention denominators	Set coverage targets for key/priority populations	Quantify oral PrEP procurement needs	Model long-term epidemic & cost-effectiveness impact
Key Data Inputs	• MER PrEP data • NAOMI incidence estimates	• PrEP initiations • User-defined retention curves • Unit costs	• Household surveys (DHS/PHIA) • Routine DHIS2 • Spatial population data	• Population size estimates • Baseline coverage • National incidence	• Current active PrEP users • Drop-out rates • Procurement lead times	• HIV surveillance • Behavioral data • Intervention coverage • Unit costs
Geographic / Population Granularity	• National : Subnational • age/sex disaggregated	• National : facility level • age/sex	• District-level • age/sex • Behavioral risk group	• National • Key & priority population groups	• National (aggregate)	• National • Modeled sub-populations
Output Types	Quarterly PrEP forecasts; product mix scenarios; infections averted estimates	Commodity forecasts; budget requirements; clinic visit projections	Subnational HIV incidence/prevalence estimates; population-at-risk denominators	Numerical coverage targets by population group	Procurement volumes by commodity; buffer stock requirements	Long-term HIV incidence trajectories; infections averted; cost-effectiveness ratios

Ensemble Modeling and Forecasting







Computational requirements for modeling and forecast increase with disaggregates

Example

- 2 countries / 2 SNUs / Sex / 3 age
- 2 indicators
- 48 timeseries
- 5 models
- 240 models (fit and validated)