

SHORT META-ANALYSIS · HELD · abstract de-corrupted against repo · quantitative claims flagged unreproducible

# Africa Forecast: Causal Health Forecasting for 54 African Countries 2026-2036

Nakhabi Anna

Short Meta-Analysis · Volume 6

Published 2026-06-06 · Diamond open access · CC BY 4.0

Article 107 · Volume 6 · Published 2026-06-06 · DOI: not assigned

## Abstract

Can causal Bayesian methods forecast health trajectories across all 54 African countries while identifying modifiable intervention targets? We assembled panel data from WHO, World Bank, and IHME covering mortality, vaccination, and health expenditure indicators for 54 African nations from 2000 to 2025. A Bayesian hierarchical vector autoregression with causal graph constraints was fitted using directed acyclic graphs encoding known public health pathways.

Ten-year forecasts to 2036 yielded posterior mean coverage gains of 12 percentage points (95% credible interval 8 to 17) for DTP3 immunization under a sustained-investment counterfactual scenario. Counterfactual removal of health expenditure increases reversed 60 percent of projected mortality gains, confirming expenditure as the dominant modifiable driver. Ensemble forecasts combining BHVAR with gradient-boosted and ARIMA baselines reduced mean absolute error by 18 percent relative to any single model.

The approach cannot account for political instability, conflict, or pandemic shocks not represented in historical data.

## Editorial reproducibility note

This paper is reproduced with its quantitative claims **flagged as not reproducible** against the project's public repository ([github.com/mahmood726-cyber/africaforecast](https://github.com/mahmood726-cyber/africaforecast)), pending author-supplied computed outputs. The abstract above is the repository's own authoritative E156 body (E156-PROTOCOL.md); two transcription errors present in the journal submission were corrected against it: "DTP3 ... coverage of 12%" was restored to "DTP3 ... coverage gains of 12 percentage points", and inline citation markers that the repository body never contained were removed.

**Why the numbers are flagged.** (1) The headline values — a 12-percentage-point DTP3 coverage gain (95% credible interval 8–17), a 60% reversal of mortality gains, and an 18% reduction in mean absolute error — appear only in the 156-word narrative body; the full manuscript draft (`paper/p1_methods.md`) marks each of these same quantities as "[TBD]". (2) Run on the real WHO/World Bank/IHME panel, the do-operator counterfactual engine produced no DTP3 or mortality trajectory and forecast 2031–2045 rather than the stated horizon. (3) The pipeline's validation step does not complete as wired; run correctly on a representative subset it yields roughly a 5% improvement over the naive baseline — not 18% — with 0% empirical coverage of the 80% and 95% prediction intervals (i.e. badly miscalibrated). (4) The interactive dashboard's forecast and ranking figures are produced by a seeded random-number generator (synthetic placeholders), which is why no dashboard figure is embedded here as a result. (5) A 12% DTP3

coverage *level* would also contradict the repository's own data (data/panel.csv shows recent African DTP3 coverage averaging ~81%).

**Method note.** The abstract describes an ensemble of “BHVAR with gradient-boosted and ARIMA baselines”, whereas the implemented engine and the manuscript draft both use Ridge regression, a Gaussian process, and exponential smoothing. The author should reconcile this before publication. No replacement numbers were introduced by this correction; values that could not be reproduced were flagged, not invented.

#### HOW TO CITE

Nakhabi Anna. Africa Forecast: Causal Health Forecasting for 54 African Countries 2026-2036. Synthésis. 2026;6(1). Article 107. Available at <https://synthesis-medicine.org/index.php/journal/article/view/107>. Licensed under CC BY 4.0. DOI: not assigned.

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