

Electronic laboratory information system and HIV data quality: Time-series analyses at eight public health laboratories in Côte d'Ivoire

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INTRODUCTION

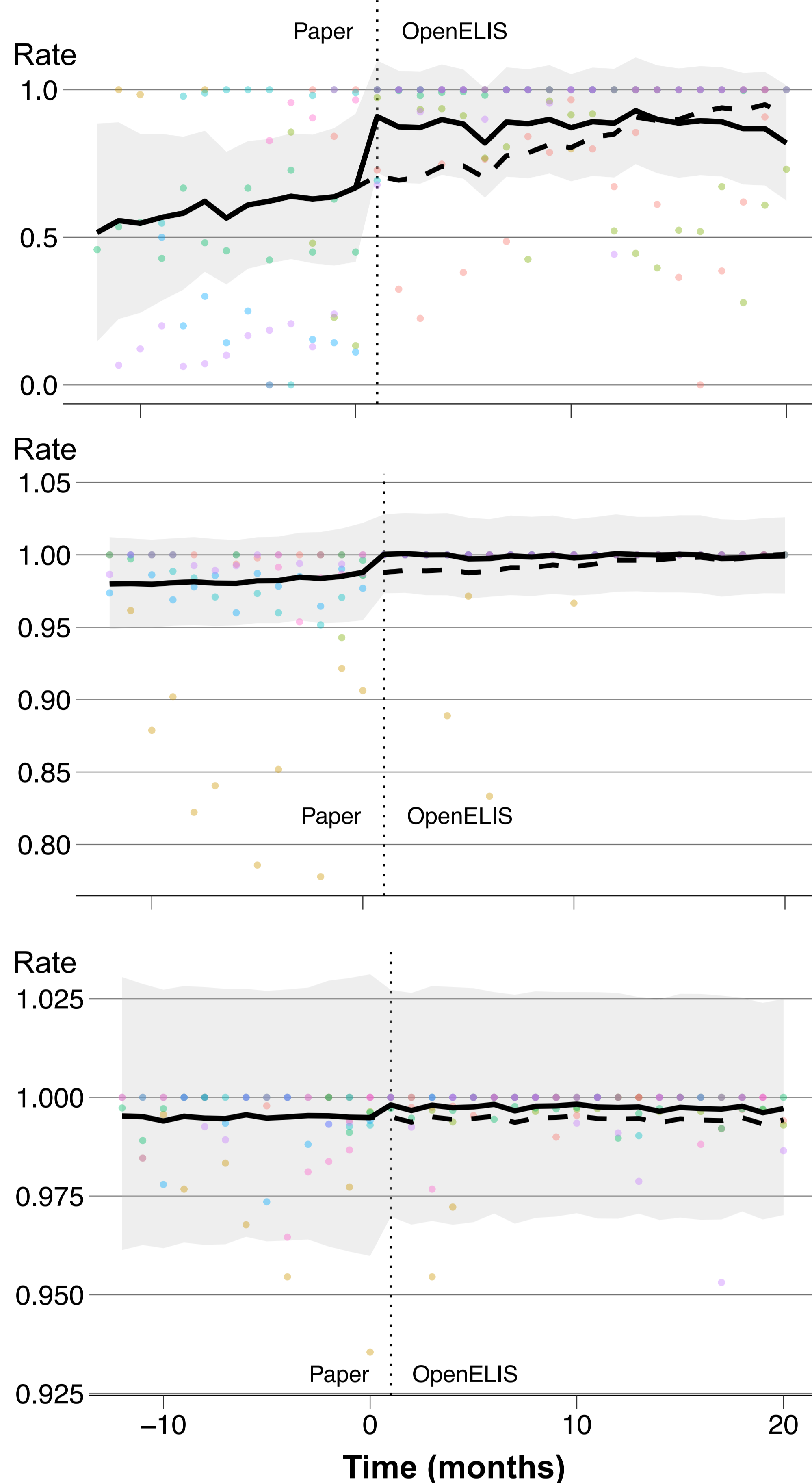
- **OpenELIS:** open-source electronic laboratory information system (LIS) tailored for public health laboratories in **low- and middle-income countries** (LMICs).
- Côte d'Ivoire Ministry of Health and PEPFAR have been collaborating since 2009 to implement OpenELIS for **HIV data management** as a larger effort to **strengthen the laboratory system**.
- **Study aim:** Quantify the initial and enduring effects of OpenELIS implementation on HIV data quality outcomes, including completeness, timeliness, and validity.

METHODS

- Examined data quality before vs. after OpenELIS implementation in 8 labs in 5 regions, serving about 38,100 PLHIV
 - Pre-OpenELIS: 12 months per lab
 - Post: 11-70 months (data until 31 December 2020)
 - **N** = 319 lab-months
- Extracted de-identified individual CD4 testing data from paper registries and OpenELIS databases
- Interrupted time series analyses
- Negative binomial mixed-effects regression
- **Key estimates:** Relative risks of monthly data quality outcomes compared with counterfactual outcomes had the laboratories not adopted OpenELIS.



RESULTS



Solid lines: fitted lines of observed values. Shaded areas: 95% CIs for fitted lines. Dashed lines: fitted lines of counterfactual values had the labs not implemented OpenELIS. Points in color: monthly data for each lab; each color corresponds to one lab.

CONCLUSIONS

- Data quality improved shortly after labs adopted OpenELIS.
- The improvements did not regress and were **sustained** throughout implementation.
- **Ease** of software implementation, **continuous technical support**, and relative **advantage** of OpenELIS compared to paper registries have facilitated **routine use** of OpenELIS and **sustainment** of data quality improvements.
- Data in higher quality are **more likely to be used and useful** in HIV care and treatment
- The findings provide evidence for **future scale-up** of OpenELIS in LMICs to serve HIV surveillance and management.

Data timeliness improved by 28.5%.

This means the average rate of producing test results within 1 day upon sample reception increased by 28.5% (95% CI: 1.026, 1.608; p<0.05).

Data completeness improved by 1.3%.

This means the average rate of completing the required data fields (client ID, sex, age, result date) for a given record increased by 1.3% (95% CI: 1.001, 1.024; p<0.001).

Data validity improved by 0.3%*.

This means the average rate of CD4 cell counts falling within the valid range (0-2000 cells/mm³) increased by 0.3% (95% CI: 1.000, 1.006; p=0.09).

Compared to paper registries, **laboratory information system** improved HIV data **timeliness, completeness, and validity**. Improvement **sustained** over time.

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Abbreviations:
CI: confidence interval
HIV: human immunodeficiency virus
LIS: laboratory information system
LMICs: low- and middle-income countries
OpenELIS: open-source enterprise laboratory information system
PEPFAR: United States President's Emergency Fund for AIDS Relief
PLHIV: people living with HIV

Learn more about OpenELIS
in 18 countries

