Implementing the 3-test strategy for HIV diagnosis in Malawi Experiences and lessons learned

Webinar ICAP/CQUIN and ASLM **18 June 2024**

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From 2 to 3-Test Strategy for HIV Diagnosis

HIV testing strategies for diagnosis of HIV infection
- **2 consecutive** reactive rapid tests
- **3 consecutive** reactive rapid tests

WHO Guidance
- Prior to 2019
  - >5% HIV positivity **among the population tested**: use 2-test strategy
  - <5% HIV positivity **among the population tested**: use 3-test strategy
- Since 2019: **all countries** should use 3-test strategy
  - Simplification: all country testing programs are assumed to see <5% positivity
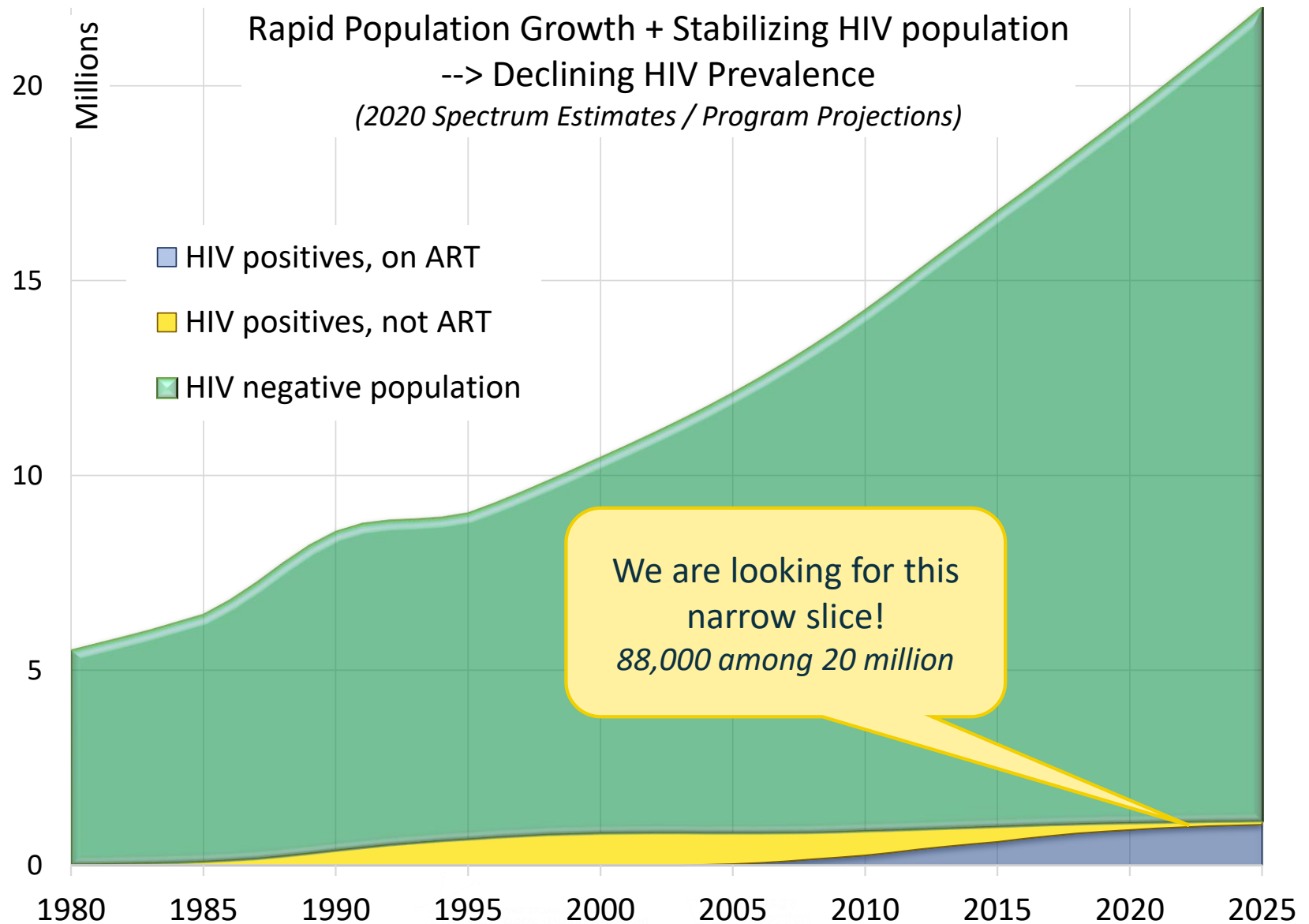 - To minimize the risk of (positive) misdiagnosis

Malawi's 2023 HIV testing guidelines
- Full transition from 2- to 3-test strategy
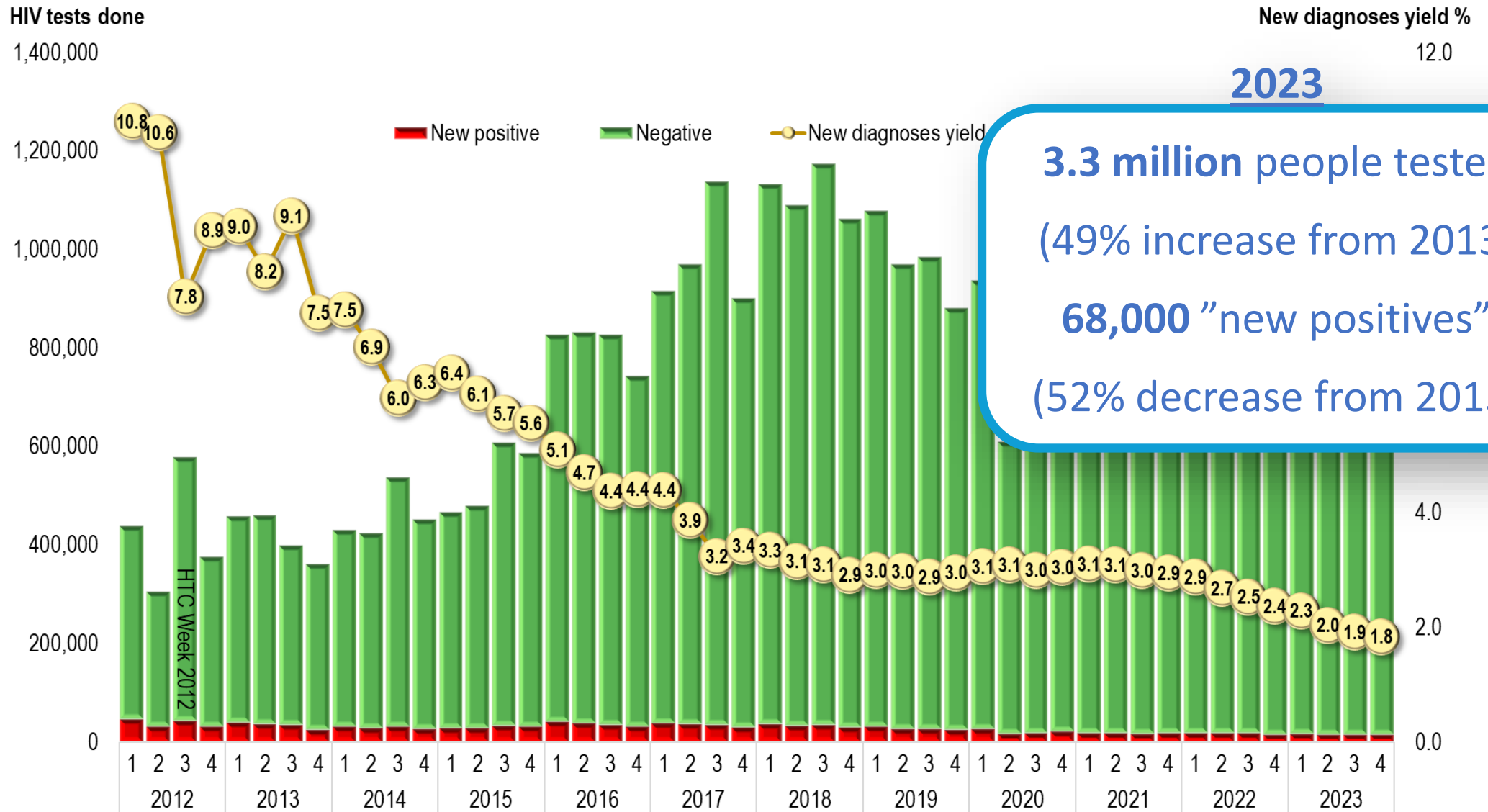
Rationale of 3-test strategy

Declining positivity among people tested

- 91% of <u>all PLHIV</u> have been diagnosed

- 84% of <u>all PLHIV</u> are on ART

➤ Fewer remaining **undiagnosed PLHIV** "hidden" in a large population

Rapid Population Growth + Stabilizing HIV population --> Declining HIV Prevalence
(2020 Spectrum Estimates / Program Projections)

Legend:
- HIV positives, on ART
- HIV positives, not ART
- HIV negative population

We are looking for this narrow slice!
88,000 among 20 million

Rationale of 3-test strategy

Declining positivity in the national HIV testing program

2023

3.3 million people tested
(49% increase from 2013)

68,000 "new positives"
(52% decrease from 2013)

Rationale of 3-test strategy

Positivity among testers
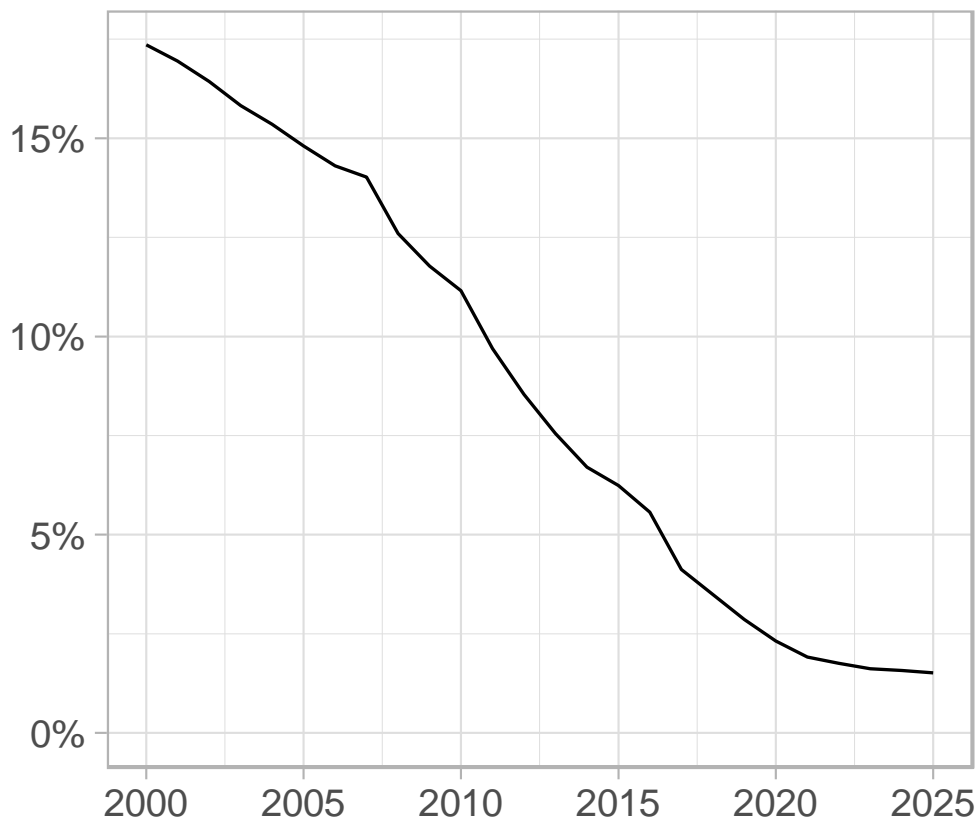
Positive predictive value (PPV)
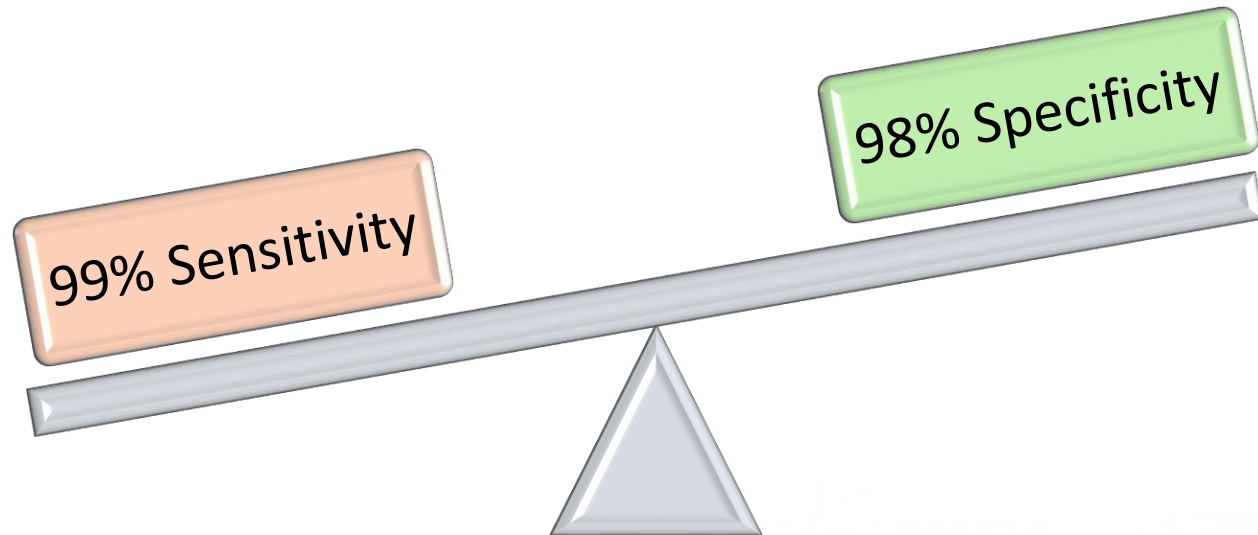

strategy
- — 2-test
- — 3-test
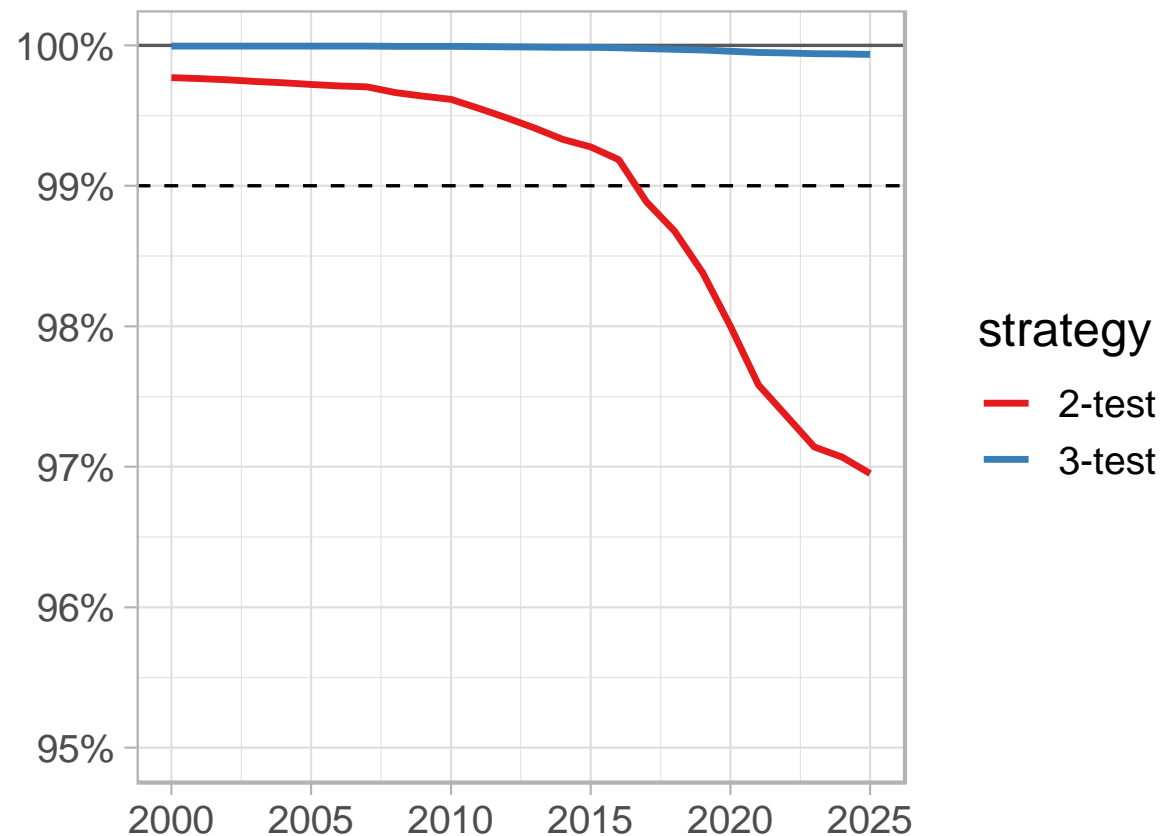
- **PPV:** probability that someone with a **positive test result** is **truly infected**

- **PPV** depends critically on true HIV prevalence <u>among clients tested</u>
  - PPV drops for ANY testing algorithm with declining prevalence

- 3-Test strategy ensures PPV remains above WHO's 99% threshold

Rationale of 3-test strategy

Aim: give 100% accurate result to all people tested

- No test kit is perfect!
- Trade-off between
  - Sensitivity: ability to give positive result for all people actually infected
  - Specificity: ability to give negative result for all people NOT infected
- *WHO minimum requirement for HIV rapid test kits:*

99% Sensitivity

98% Specificity

The Malawi 3-Test Strategy

1st: Determine HIV1/2

- Highly sensitive: positive result for all HIV+ people
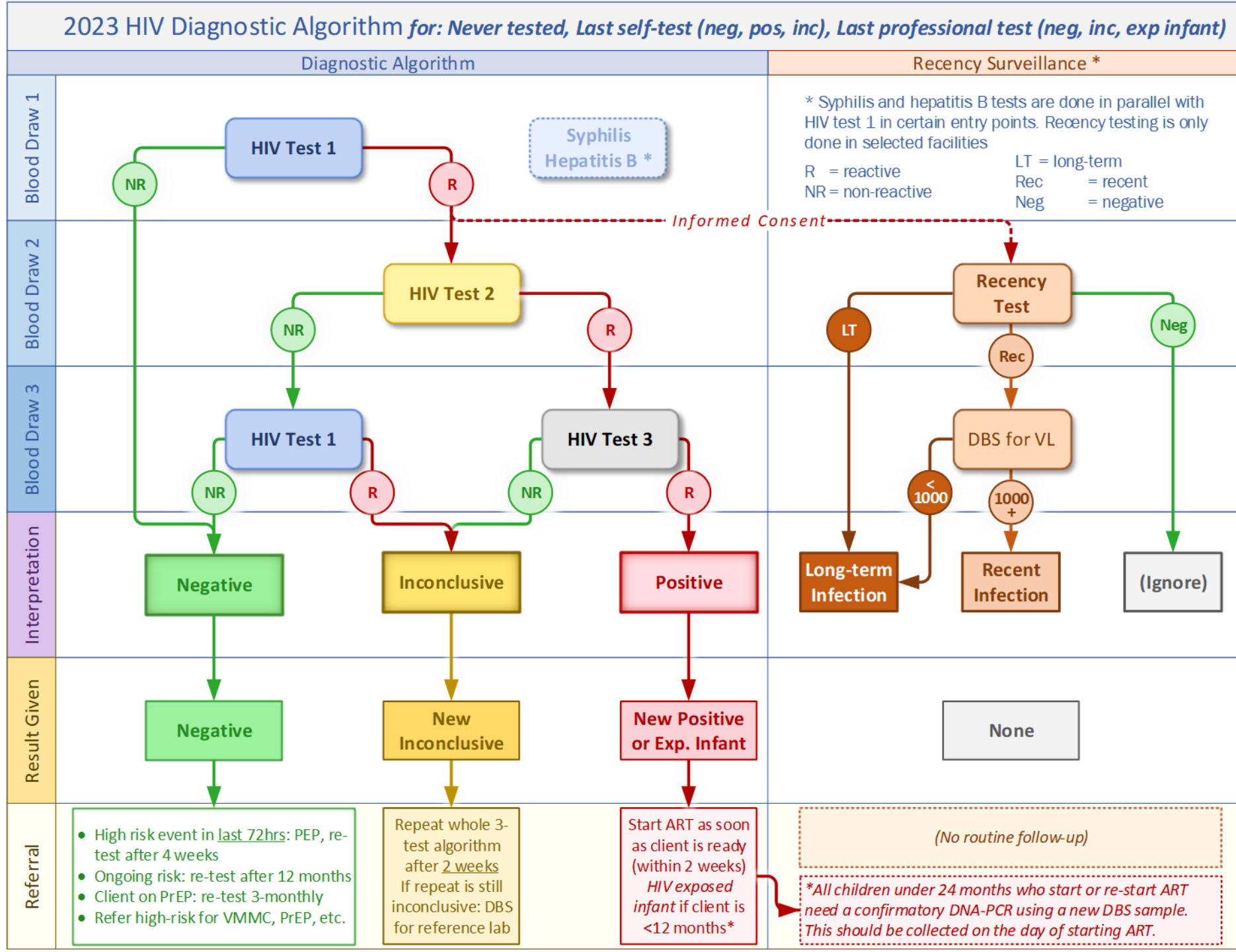→ **But:** some false positives expected

2nd: Uni-Gold HIV1/2

- Highly specific: negative result for all NON-infected people
→ **But:** some false positives may still slip through

3rd: SD Bioline HIV1/2

- Highly specific: covering different range of antibodies
→ **Minimal** risk of false positives

Full Algorithm

2023 HIV Diagnostic Algorithm *for: Never tested, Last self-test (neg, pos, inc), Last professional test (neg, inc, exp infant)*
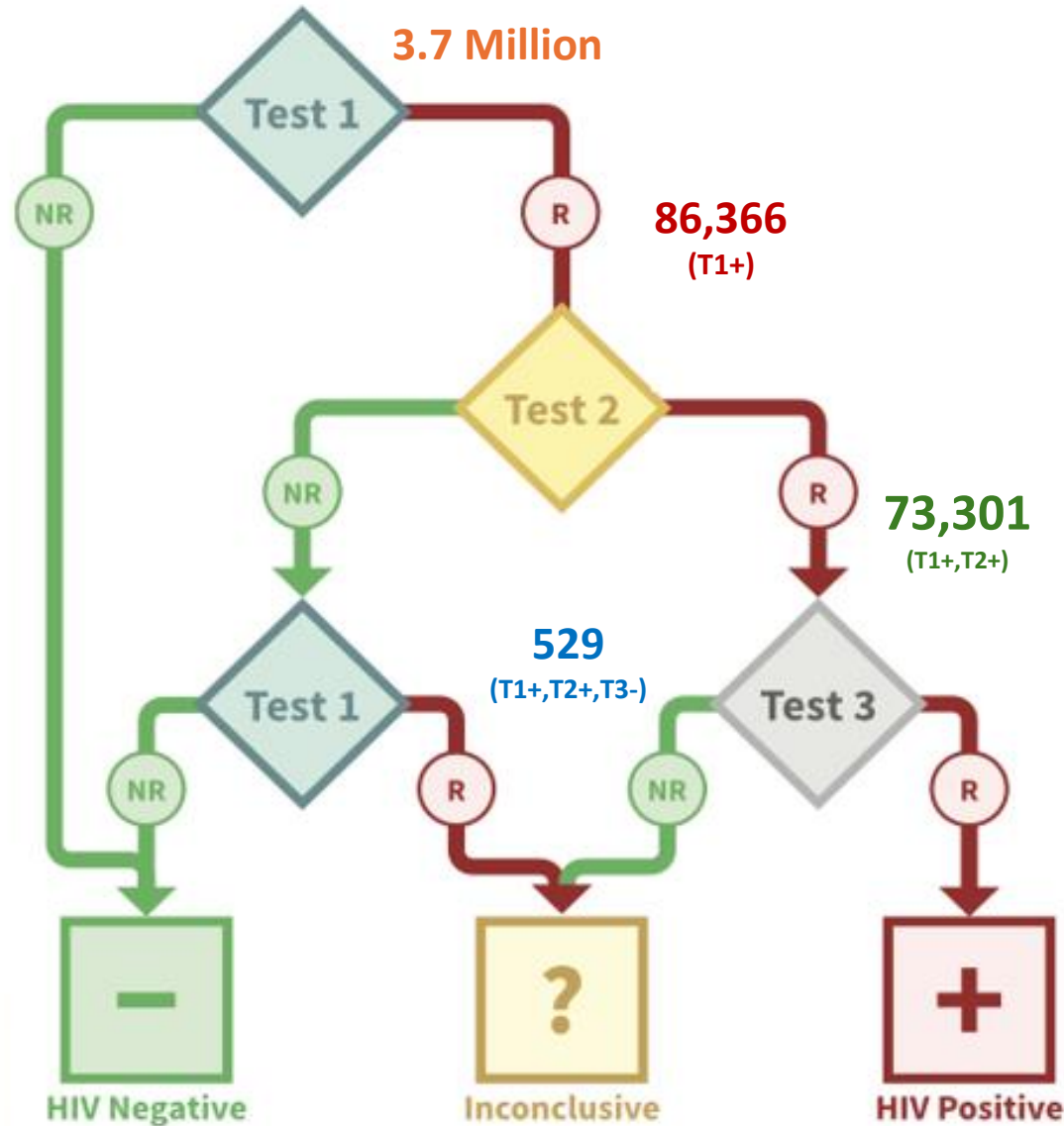
Diagnostic Algorithm | Recency Surveillance *

Blood Draw 1

HIV Test 1 → NR / R

Syphilis Hepatitis B *

* Syphilis and hepatitis B tests are done in parallel with HIV test 1 in certain entry points. Recency testing is only done in selected facilities

R = reactive
NR = non-reactive
LT = long-term
Rec = recent
Neg = negative

Blood Draw 2

HIV Test 2 → NR / R

Informed Consent

Recency Test → LT / Rec / Neg

Blood Draw 3

HIV Test 1 → NR / R
HIV Test 3 → NR / R

DBS for VL → <1000 / 1000+

Interpretation

Negative
Inconclusive
Positive
Long-term Infection
Recent Infection
(Ignore)

Result Given

Negative
New Inconclusive
New Positive or Exp. Infant
None

Referral

- High risk event in last 72hrs: PEP, re-test after 4 weeks
- Ongoing risk: re-test after 12 months
- Client on PrEP: re-test 3-monthly
- Refer high-risk for VMMC, PrEP, etc.

Repeat whole 3-test algorithm after 2 weeks
If repeat is still inconclusive: DBS for reference lab

Start ART as soon as client is ready (within 2 weeks)
HIV exposed infant if client is <12 months*

(No routine follow-up)

All children under 24 months who start or re-start ART need a confirmatory DNA-PCR using a new DBS sample. This should be collected on the day of starting ART.

Malawi's transition journey

Step	Processes	Timeline
1	**Field evaluation** • 9 pilot facilities • To measure performance in the hands of the routine task-shifted providers (HIV Diagnostic Assistants)	March-July 2021
2	Pilot of digitization for revised paper-based M&E tools through use of OCR AI (ScanForm)	March-July 2021
3	Curriculum revision and updating of M&E tools	August 2021 –June 2022
4	Training of providers in the new algorithm and tools	June 2022 - Ongoing
5	3-test algorithm Roll-out in health facility Lilongwe –Phase 1	Nov 2022
6	Roll-out in all districts –Phase 2 to7 • (601/ 800) facilities activated • 80% of national data	Jan 2023-now

Lessons learnt

3-Test Algorithm saving from misdiagnosis

Nov 2022 to April 2024

3.7 Million

Test 1
- NR
- R → **86,366** (T1+)

Test 2
- NR
- R → **73,301** (T1+,T2+)

Test 1
- NR
- R

529 (T1+,T2+,T3-)

Test 3
- NR
- R

HIV Negative (−)
Inconclusive (?)
HIV Positive (+)

- **592 (0.7%) with (T1+,T2+,T3-) out of 73,301 with (T1+,T2+) marked as "inconclusive"**

3-Test Algorithm

- Repeat whole 3-test algorithm after 2 weeks If repeat is still inconclusive: DBS for reference lab

2-Test Algorithm

- likely been given a false positive result and started on ART on the same day.

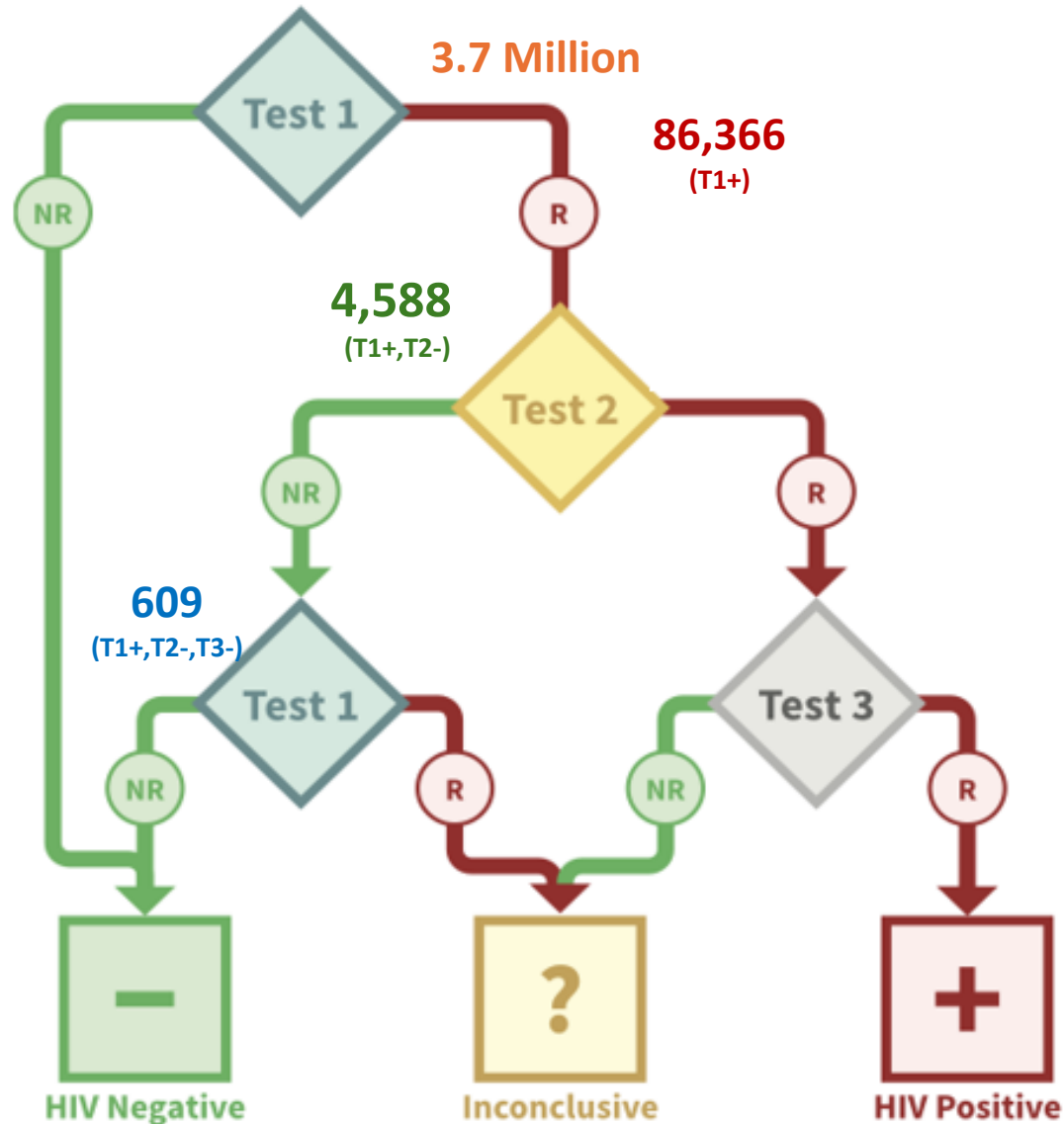# 3-Test Algorithm saving from re-testing
Nov 2022 to April 2024

- **609 (13%) with (T1+,T2-,T3-) out of 4,588 with (T1+,T2-) marked as "HIV negative"**

3-Test Algorithm
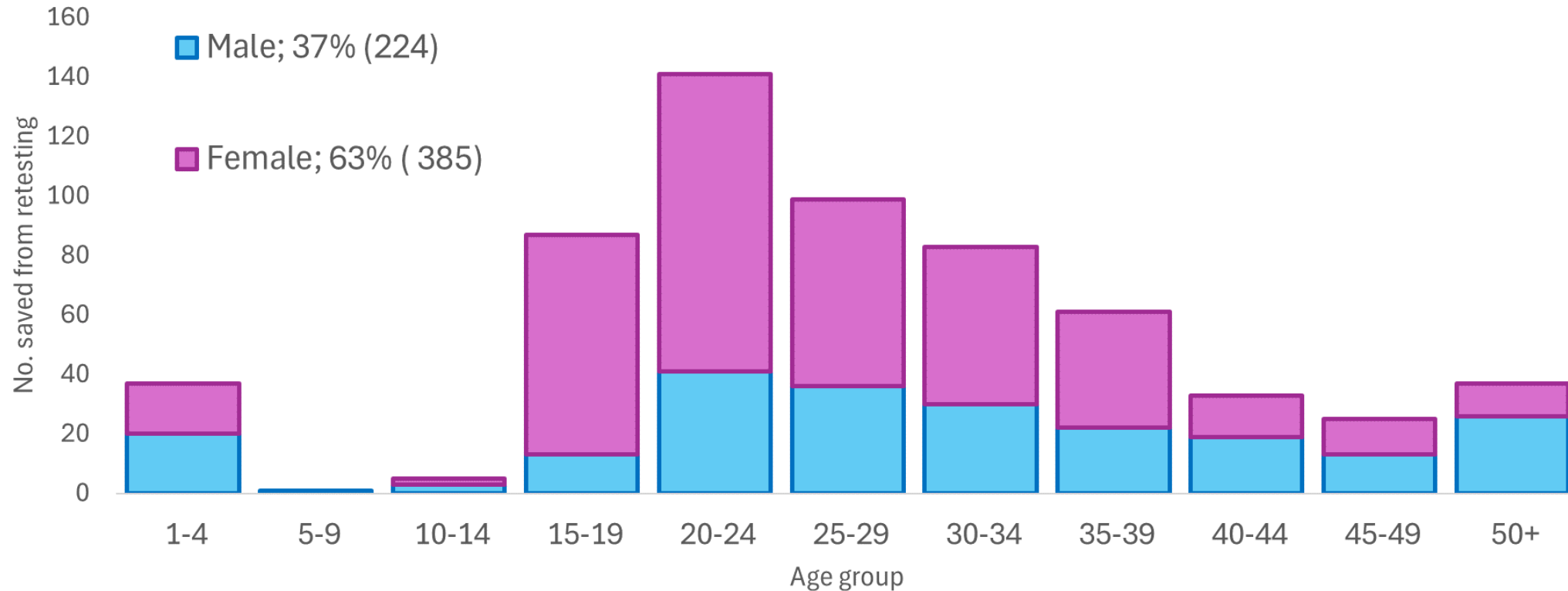
- Final result: "Negative"

2-Test Algorithm

- Final result : "Inconclusive" and Re-test after two weeks

3-Test Algorithm saving from re-testing
Nov 2022 to April 2024

Distribution by age and sex for the **609 Individuals** saved from retesting

Nov 2022- April 2024

■ Male; 37% (224)

■ Female; 63% (385)

No. saved from retesting

Age group

Lessons learnt

1. **99.96% correct implementation of 3-test strategy**
   - High quality training of providers
   - Continuous quality improvements efforts
     - Remote monitoring via dedicated national portal
     - Mentorship visits by MoH and IP coordinators

2. **Use of ScanForm* has helped to get near real time data for quality assurance**
   - Individual level data
   - Close monitoring of sites which are deviating from protocol
   - Automatic standard monthly and data quality reports
   - Automatic DQA reports

3. **Roll-out to all sites takes time**
   - Re-training of all providers
   - Full transition is expected by June 2024

4. **Cost of transition**
   - Retraining of providers
   - Addition of 3rd test increases commodity cost by only 3% of the total test quantities

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*ScanForm technology
- AI that digitize handwritten data from customized paper forms and registers
- Data abstraction is using simple picture taken of each page in the register using Android Phone

Thank you!