

HIV Infant Diagnosis and Testing Turnaround Time in Malawi, 2012-2015

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Maternal to child transmission of HIV

- **Transmission can occur:**
 - During pregnancy
 - Labor
 - Delivery
 - Throughout breastfeeding



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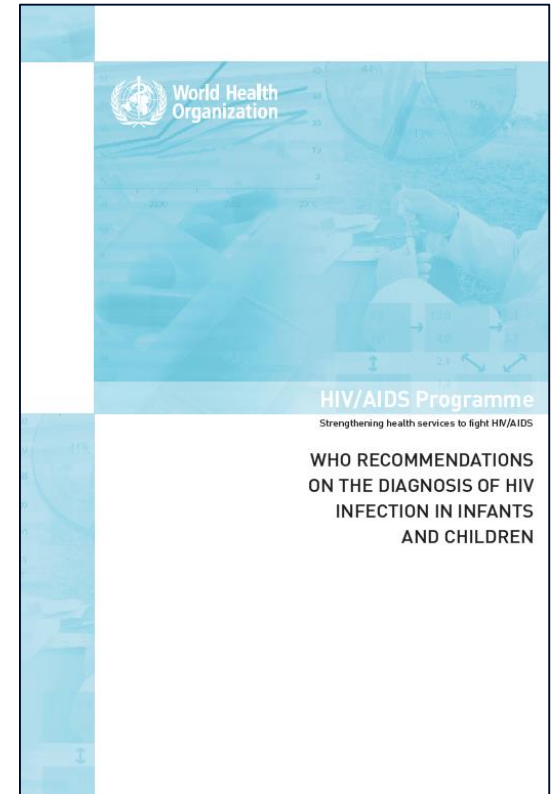
WHO.int

- **In the absence of interventions, transmission rates range from 15% to 45%**

- WHO recommends lifelong ART to women
- HIV prophylaxis for infants for 4-6 weeks

Infant HIV diagnosis

- **2010: WHO recommends HIV-exposed infants aged 4-6 weeks undergo virological testing**
 - Based on detection of virus or components



Turnaround time

Specimen collection



Receipt at laboratory



Testing



Result to clinic

Result to patient

Impact of longer turnaround time for HIV diagnosis

- **Longer TAT for HIV diagnosis delays detection of HIV infection**
 - Delays ART initiation
 - High mortality

Malawi LIMS

- **National LIMS collects data on virological testing for HIV**
- **Originally developed to project reagent needs**
- **Data that may be useful**
 - Testing results data
 - Turnaround time data

Objectives

- **To look at:**
 - **infant HIV diagnosis**
 - **factors associated with HIV diagnosis**
 - **test turnaround times**
- in Malawi using LIMS**

Methods

- **LIMS data**
 - All tests from all laboratories
 - De-duplicated
- **Logistic regression**

Infant HIV diagnoses, 2012-2015

- **76,008 tests**
- **Overall positivity: 4.41% (n=3,386)**
 - Reduced over time:
 - 2012:5.86%
 - 2015:3.15%

Factors associated with HIV infection (1)

	Crude OR (95% CI)	Adjusted OR (95% CI)
Region		
Central	1	1
Northern	1.02 (0.84 – 1.23)	0.10 (0.01 – 0.80)
Southern	1.20 (1.10 – 1.32)	2.14 (1.82 – 2.51)
Age		
Less than 3 months	1	1
3 to 6 months	2.39 (2.20 – 2.61)	2.20 (2.01 – 2.42)
6 to 9 months	4.21 (3.82 – 4.64)	3.35 (3.02 – 3.72)
9-18 months	5.54 (5.00 – 6.14)	4.14 (3.69 – 4.61)

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Factors associated with HIV infection (2)

	Crude OR (95% CI)	Adjusted OR (95% CI)
ART in pregnancy		
ART provided	1	1
No ART provided	9.79 (8.60 – 11.15)	3.43 (2.87 – 4.09)
Infant HIV prophylaxis		
Prophylaxis provided	1	1
No prophylaxis provided	8.48 (7.47 – 9.63)	3.00 (2.44 – 3.64)
Mother's HIV status		
Positive – alive on ART	1	1
Positive – alive not on ART	1.88 (1.60 – 2.21)	2.82 (2.25 – 3.53)
Dead	3.46 (1.05 – 11.41)	2.98 (0.87 – 10.11)

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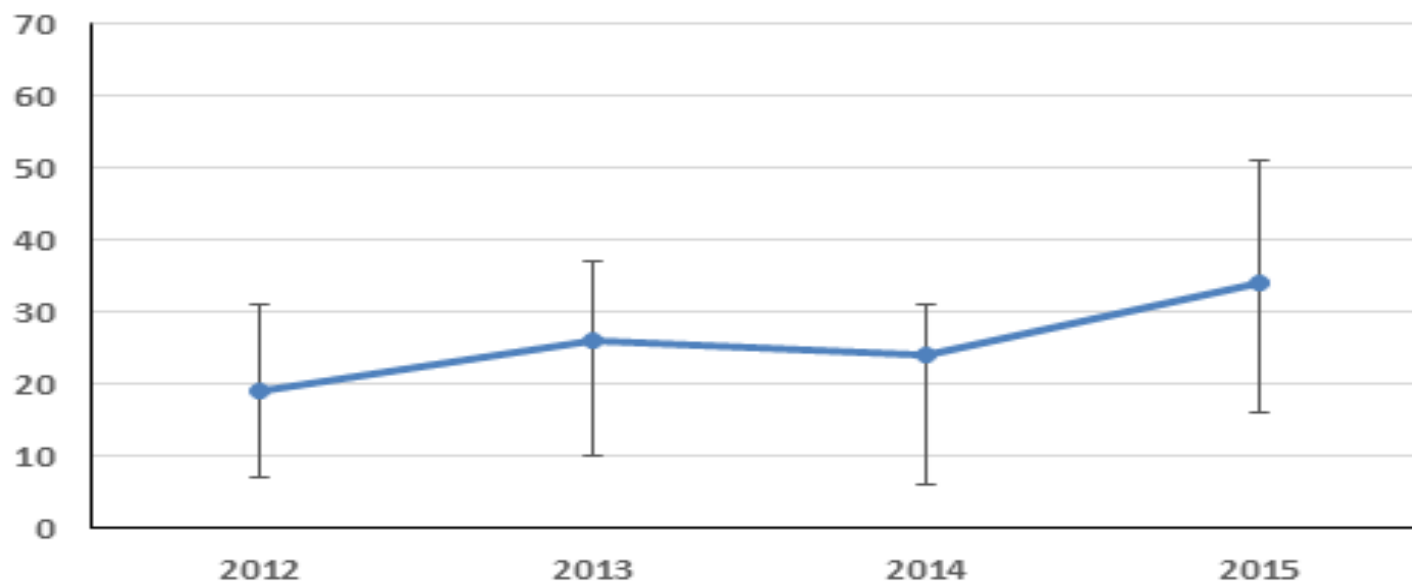
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Median turnaround time for HIV testing

Median time (2012 – 2015): 24 days



Median TAT between sample drawn and dispatch of results back to facility, with IQR, by year of test, 2012-2015

Recommendations

- **Increased efforts to adhere to WHO guidelines:**
 - Provision of HIV prophylaxis to all exposed infants
 - Test all exposed infants & treatment on diagnosis
 - Test and start
- **Improve services in high burden areas**
 - Exploration of other service delivery methods

Overall conclusions

- **LIMS**
 - Data extraction
 - Epidemiological analyses
 - Data-driven recommendations
- **Example for how to use LIMS to improve service delivery and program impact**

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- Davie Phiri

▪ DGHT Atlanta

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- Larry Westerman
- John Nkengasong

Zikomo!

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Extra slides

New HIV infections

- **New HIV infections have fallen by 6% since 2010.**
 - Worldwide, 2.1 million [1.8 million–2.4 million] people became newly infected with HIV in 2015, down from 2.2 million [2 million–2.5 million] in 2010.
- **New HIV infections among children have declined by 50% since 2010.**
 - Worldwide, 150 000 [110 000–190 000] children became newly infected with HIV in 2015, down from 290 000 [250 000–350 000] in 2010.

AIDS-related deaths

- **AIDS-related deaths have fallen by 45% since the peak in 2005.**
 - In 2015, 1.1 million [940 000–1.3 million] people died from AIDS-related causes worldwide, compared to 2 million [1.7 million–2.3 million] in 2005.

Prophylaxis vs treatment

Prophylaxis

- **All HIV exposed infants***
 - HIV prophylaxis Zidovudine also known as AZT (4-6 weeks)

Treatment

- **Infants diagnosed with HIV on testing**
 - At/after 4-6 weeks
 - Started with ART immediately on diagnosis

* <https://aidsinfo.nih.gov/guidelines/html/3/perinatal-guidelines/187/infant-antiretroviral-prophylaxis>

WHO recommendations for infant HIV testing

- **4-6 weeks** (or at the earliest opportunity thereafter):
 - HIV virologic testing
 - Infants with a positive result should initiate ART and a second specimen collected for confirmatory testing
- **9 months:**
 - Serologic testing
 - Positive serologic test should undergo virologic testing
- **18 months or older** (with suspected infection or exposure):
 - HIV serologic testing using the same algorithm as for adults
- **~HIV virologic testing at birth**

Other testing / MTCT considerations

- Successful HIV programs have reduced population HIV prevalence resulting in higher proportion of false positive NAAT results
- Ability of NAAT to detect HIV affected by ARVs taken by mother or infant for prophylaxis or maternal ART while breastfeeding (ARVs in breastmilk), resulting in false negatives
- Confirmatory testing is critical
- Testing times are aligned with routine maternal and child health services (immunization visits and co-trimoxazole prophylaxis): 1st DTP at 4-6 weeks of age, measles at 9 months
- Determination of final status after breastfeeding: currently WHO recommends that mothers living with HIV should breastfeed for at least 12 months and may continue breastfeeding for up to 24 months or longer

HIV epidemic in Malawi by region

- **Varies greatly across the country**
- **HIV prevalence in Southern regions of Malawi is twice as high as Northern and Central regions, at 14.5%.**

Exclusion criteria

	HIV infant diagnosis database
	n (%)
Total tests	125,665
Missing test result	25 (0.0%)
Missing ID	3,648 (2.9%)
Implausible date values	33,100 (26.3%)
De-duplication	12,313 (9.8%)
Data cleaning	571 (0.4%)
Total tests included	76,008

Factors included in the model

- **Factors included in the model**

- Region
- Age
- Gender
- Multiple gestation
- Birth order
- Provision of ART to the infant at delivery
- Continued provision of ART
- Various breastfeeding options
- Status of the mother (Alive and on ART, Alive but not on ART, dead)
- Provision of ART to the mother during pregnancy
- Provision of ART to the mother during labour
- Reason for PCR testing

Why present CIs

- **No CIs required**
 - If total population is included and is fixed
 - e.g. Census where everyone is sampled
- **CI can be reported**
 - If total population, however, estimates beyond a particular time point are desired and not just at the time point(s) included