Prognostic factors influencing survival among infants enrolled for Early Infant Diagnosis (EID) services among women of low socio-economic backgrounds in Nairobi, Kenya.

Dr. Elizabeth.M.Kiilu, Prof. Simon Karanja, Prof. Gideon Kikuvi
Jomo Kenyatta University of Agriculture and Technology (JKUAT), Nairobi, Kenya

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# Introduction

➤ In spite being a preventable disease, HIV continues to cause morbidity and mortality in infants more so in SSA (Taylor *et al.,* 2017; NASCOP 2016).

➤ Effective HIV Prevention strategies for infants - eMTCT and Early Infant Diagnosis (EID) (UNAIDS 2018; WHO 2019).

➤ EID is testing of infants for HIV at **4-6 weeks** of life or at the earliest opportunity thereafter, to **promptly link infants** to **care & treatment (**Ashino *et al.,* 2017).

➤ Without prompt EID interventions, ⅓ of HIV exposed/infected infants die before their 1st birthday & half before 2nd birthday (WHO 2019).

# Background

➢ Globally, the MTCT rate of HIV is 9% with sub-Saharan Africa accounting for 90% of these infections (UNAIDS, 2019).

➢ Eastern and SA, MTCT rates were 9% (2018) a drop from 18% (2010) (Taylor, *et al.,* 2017).

➢ Kenya 5th largest no. PLHIV, MTCT 11.5%, accounting 8.9% of global infections (GOK, 2018).

➢ Nairobi MTCT 8.5% (2018), a decline from 17.5 in 2010 [2], target to reduce to <5% & <2% in breastfeeding and non-breastfeeding infants by end 2021 (GOK, 2018; Abrams *et al.,* 2017).

# Aim of the study

➢ The study aimed to determine prognostic factors influencing survival among infants enrolled for EID services among women of low socio-economic backgrounds in Nairobi, Kenya.

➢ Survival in this study was defined as a function of number of HIV negative infants at the end of the 12-month follow up period.

# Study Methods

➢ Study area: Mathare North Health Centre, Mbagathi County Hospital, and Kibera South Health Centre within the catchment area of Kibra and Mathare slums.

➢ Kibera and Mathare slums are the two largest informal settlement areas in Kenya, with a 12% prevalence of HIV compared to 5% prevalence among non-slum dwellers.

➢ A prospective cohort study design was adopted. Mother-infant pairs were followed up for a period of 12 months.

# Study Methods

➢ Simple random sampling was used to select 166 infants. The Post-natal register was used as the sampling frame.

➢ Data were collected from the mothers using open-ended interviewer administered questionnaires, and a Data abstraction tool.

➢ Mother-infant pairs data was abstracted from child welfare booklet and mothers CCC file.

➢ Infant follow-up was scheduled to coincide with the Kenya Immunization Program (KEPI) timetable at 6, 10, and 14 weeks and 12 months. Infants were also followed up at 6 months as per the GOK EID schedule.

# Data analysis

➢ Log-rank tests and Cox-proportional regression were used to analyze data.

➢ Multivariable modeling was carried out through a forward elimination strategy using the likelihood ratio test and Bayesian Inclusion Criterion.

➢ All significant variables at $p \leq 0.1$ were used in the forward and backward modelling process to determine the best model.

➢ The Schoenfeld residual test was used to assess if the Cox-hazard proportion assumption was met for each model that was created.
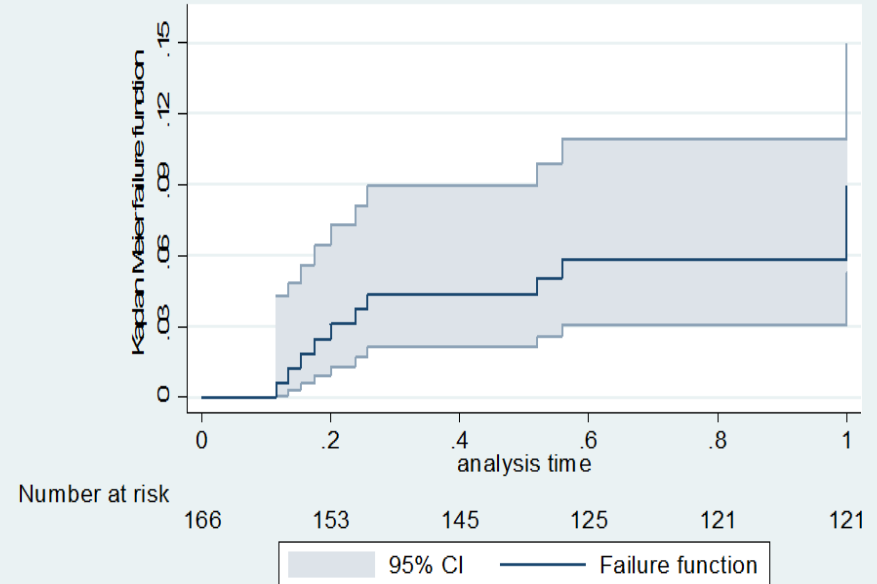
# Results

➢Infant HIV incidence rate over one-year follow-up was 9 cases per 100 person-years (95% CI: 5.4, 16.2).

➢Failure event was defined as infant HIV positive status with total failures being 13 (9.4%) over 12 months.
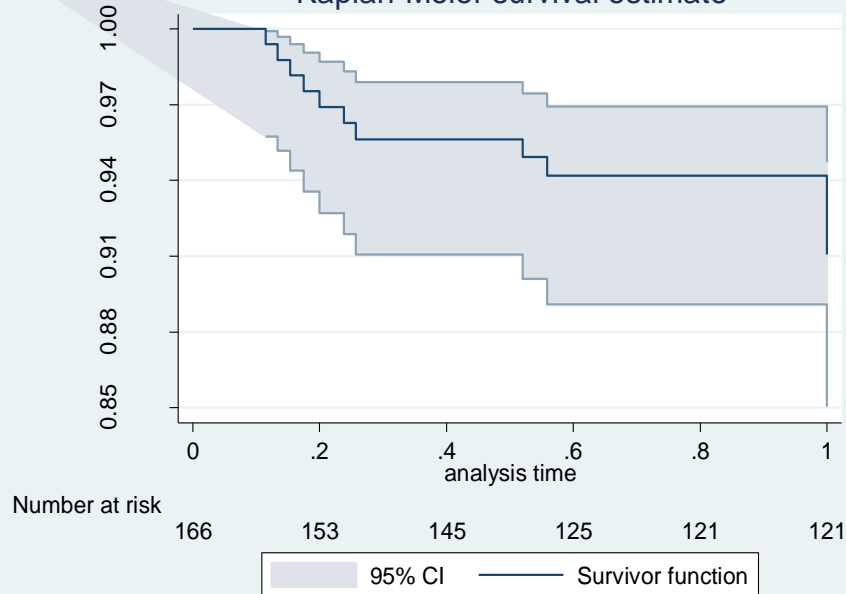
| Baseline maternal characteristics | | |
|---|---|---|
| **Maternal characteristics** | **Time-points** | |
| | **Recruitment (6 weeks)** | **Endpoint (12 months)** |
| **n=166** | **Frequency (%) (n=163)** | **Frequency (%)(n=131)** |
| *Age in completed years* | | |
| 18-24 | 34(20.5) | 27(20.6) |
| 25-34 | 75(45.2) | 58(44.3) |
| 35-44 | 57(34.3) | 46(35.1) |
| *Highest Level of Education* | | |
| ≤Primary | 93(56.0) | 75(57.3) |
| ≥Secondary | 73(44.0) | 56(42.8) |
| *No. of persons living in the household* | | |
| 2-5 | 121(72.9) | 88(67.2) |
| 6-8 | 45(27.1) | 43(32.8) |
| *Respondent marital status* | | |
| Single | 25(15.1) | 18(12.7) |
| Married | 141(84.9) | 113(86.3) |
| *Employment status* | | |
| Formal | 27(16.3) | 21(16.0) |
| Informal | 108(65.1) | 79(60.3) |
| Unemployed | 31(18.6) | 31(23.7) |
| *Monthly income (Ksh.)* | | |
| ≤6000 | 34(20.5) | 37(28.2) |
| 6001-12000 | 95(57.2) | 67(51.2) |
| ≥ 12001-18000 | 37(22.3) | 27(20.6) |

**Socio-economic/demographic & PMTCT factors influencing infant survival over one year**

| Maternal characteristics n= 166 | P-value | Infant Survival over 12 month follow-up period | |
| --- | --- | --- | --- |
| | | HR (95%CI) | AHR (95%CI) |
| *Age in years* | | | |
| 35-44 *(Ref)* | | 1.00 | |
| **18-24** | **0.029** | **5.97**(1.20, 29.58) | |
| 25-34 | 0.422 | 1.96 (0.38, 10.13) | |
| *Year confirmed +ve* | | | |
| > 2years since HIV diagnosis *(Ref)* | | 1.00 | |
| **≤ 2years since HIV diagnosis** | **0.003** | **6.97**(1.96, 24.76) | |
| *Employment* | | | |
| Unemployed *(Ref)* | | 1.00 | |
| Formal | 0.061 | 0.14 (0.02, 1.10) | |
| **Informal** | **<0.001** | **0.07** (0.02, 0.31) | |
| *Income* | | | |
| ≤ 6000 *(Ref)* | | 1.00 | |
| **6001-12000** | **0.002** | **0.10** (0.02, 0.44) | |
| **≥12000** | **0.046** | **0.12** (0.02, 0.10) | |
| *Given ARVs during pregnancy* | | | |
| No (Ref) | | 1.00 | |
| **Yes** | | **0.11** (0.02, 0.52) | |
| *Stage ARVs admin in Pregnancy* | | | |
| Third Trimester *(Ref)* | | 1.00 | |
| **Frist Trimester** | **<0.001** | **0.09** (0.02, 0.31) | |
| Second Trimester | 0.159 | 0.38 (0.10, 1.45) | |

| Maternal characteristics (n= 166) | Infant Survival over 12M follow-up period | |
|---|---|---|
| | HR (95%CI) | AHR (95%CI) |
| *Disclosed status to partner* | | |
| Yes *(Ref)* | 1.00 | |
| **No** | **5.10 (1.65, 15.82)** | |
| *Know partner's HIV status* | | |
| Yes *(Ref)* | 1.00 | 1.00 |
| **No** | **5.87 (1.80, 19.16)** | **4.56(1.27, 16.45)** |
| *ART Adherence* | | |
| Poor *(Ref)* | 1.00 | |
| **Good** | **0.05 (0.01, 0.23)** | |
| **Inadequate** | **0.14 (0.04, 0.50)** | |
| *Viral Load (VL)* | | |
| High VL *(Ref)* | 1.00 | |
| **Undetectable  VL** | **0.02 (0.01, 0.17)** | |
| **Low VL** | **0.12 (0.02,0.90)** | |
| *Maternal BMI* | | |
| Normal *(Ref)* | 1.00 | |
| **Underweight** | **6.29 (1.93, 20.47)** | |
| Overweight | 0.64 (0.12, 3.26) | |
| Obese | 0.80 (0.09, 6.90) | |
| *Timeliness into EID enrollment* | | |
| Timely (≤6weeks) *(Ref)* | 1.00 | |
| **Delayed (>6weeks)** | **4.00 (1.12, 14.32)** | |

*CONT… maternal disclosure status and factors at 12 months influencing infant survival*

**Conclusions**
➢ Maternal prognostic factors associated with poor infant survival over one-year follow-up period were young maternal age i.e. ≤ 18 years and recent maternal HIV diagnosis i.e. ≤ 2years since HIV diagnosis.
➢ Additionally, infants born to underweight mothers had increased hazard ratio 6.29 (95% CI:1.93, 20.47) of vertical transmission of HIV.

**Recommendations**
➢ Development of an intervention package for young mothers and mothers with recent HIV diagnoses with more rigorous ART adherence & nutritional counseling.
➢ Additionally, the package should include consistent and close monitoring, to improve infant survival as they go through the EID program.
➢ The above interventions should be integrated into the EID program