Background
- HIV viral load (VL) is the principal determinant of mother-to-child transmission (MTCT) risk; rapid lowering of VL is a principal goal of antiretroviral therapy (ART) for PMTCT. There are few data on VL trajectories and time to viral suppression (VS) following ART initiation in HIV-infected pregnant women, particularly in sub-Saharan Africa.
- Data from Europe and North America suggest that ≥70-80% of women achieve VS at delivery, but these insights are from diverse populations and historical ART regimens.
- We examined VL trajectories during pregnancy and time to VS, and their predictors, in a cohort of HIV-infected pregnant women starting ART in Cape Town, South Africa.

Methods
- We followed a cohort of ART-eligible pregnant women seeking antenatal care (ANC) in a large primary care clinic.
- Consecutive pregnant women were recruited at their first ANC visit and followed through cohorting all pregnant women starting ART in Cape Town, South Africa.
- We followed a cohort of ART-eligible pregnant women seeking antenatal care (ANC) in a large primary care clinic.
- Consecutive pregnant women were recruited at their first ANC visit and followed through ART initiation and then delivery; all women initiated once daily TDF300mg + FTC300mg + EFV600mg; all ART-related services were provided by the public sector, with a parallel set of study visits conducted at a separate research clinic for study measures.
- VL (Abbott RealTime HIV-1) was measured prior to initiation (pre-ART), 2-4 weeks after initiation, during the 3rd trimester, and up to 28 days postpartum.
- Analyses examined changes in log10 VL after initiation using fractional polynomial and probit regression.
- VL (in log10 copies/mL) over time using product-limit methods; and the probability of VS at delivery using a model of predicted VL (Abbott RealTime HIV-1) was measured prior to initiation (pre-ART), 2-4 weeks after initiation, during the 3rd trimester, and up to 28 days postpartum.
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Results
- Most pre-ART specimens were collected on the day of ART initiation.
- The median duration of ART use before delivery was 118 days (IQR, 77-151).
- The median pre-ART VL was 4.0 log copies/ml (IQR, 3.4-4.6 log copies/ml).
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Discussion
- Novel data on VL over time in pregnant women initiating ART in routine PMTCT services in a high prevalence setting.
- Rapid VL reductions observed: most women reach <1000 copies/mL in 1 month.
- Pre-ART VL is the principal determinant of VL reductions; women with high pre-ART VL may take up to 4 months to achieve viral suppression <50 copies/mL.
- Gestation at ART initiation limits the duration of ART received before delivery; women initiating ART after 20 weeks gestation have a substantial risk of not reaching viral suppression <50 copies/mL.
- Metaphorically, identifying women initiating ART with high VL, particularly late in gestation, are needed along with interventions to reduce viraemia rapidly to maximise the benefits of ART for HIV-infected pregnant women & their children.

Table 1. Description of the cohort at ART initiation

<table>
<thead>
<tr>
<th>Category</th>
<th>n=96</th>
<th>n=218</th>
<th>n=343</th>
<th>52 (54)</th>
<th>124 (57)</th>
<th>38 (54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous antiretroviral exposure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No past ART use</td>
<td>42 (44)</td>
<td>104 (48)</td>
<td>161 (47)</td>
<td>374 (59)</td>
<td>51 (35)</td>
<td>0.918</td>
</tr>
<tr>
<td>Past ART use</td>
<td>54 (57)</td>
<td>114 (53)</td>
<td>243 (73)</td>
<td>448 (65)</td>
<td>73 (49)</td>
<td>0.759</td>
</tr>
<tr>
<td>Past PMTCT: NVP+AZT</td>
<td>36 (38)</td>
<td>80 (37)</td>
<td>116 (34)</td>
<td>210 (31)</td>
<td>30 (20)</td>
<td>0.200</td>
</tr>
<tr>
<td>Past PMTCT: NVP only</td>
<td>18 (19)</td>
<td>34 (16)</td>
<td>52 (15)</td>
<td>93 (27)</td>
<td>13 (10)</td>
<td>0.157</td>
</tr>
</tbody>
</table>

Table 2. Fractional polynomial model of predicted VL after ART initiation in all women (*a* & *b*). 

<table>
<thead>
<tr>
<th>Pre-ART VL categories</th>
<th>n=96</th>
<th>n=218</th>
<th>n=343</th>
<th>52 (54)</th>
<th>124 (57)</th>
<th>38 (54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-ART VL&gt;100,000</td>
<td>18 (19)</td>
<td>34 (16)</td>
<td>52 (15)</td>
<td>93 (27)</td>
<td>13 (10)</td>
<td>0.157</td>
</tr>
<tr>
<td>Pre-ART VL 10,000-100,000</td>
<td>54 (57)</td>
<td>114 (53)</td>
<td>243 (73)</td>
<td>448 (65)</td>
<td>73 (49)</td>
<td>0.759</td>
</tr>
<tr>
<td>Pre-ART VL 1000-10,000</td>
<td>36 (38)</td>
<td>80 (37)</td>
<td>116 (34)</td>
<td>210 (31)</td>
<td>30 (20)</td>
<td>0.200</td>
</tr>
<tr>
<td>Pre-ART VL&lt;1000</td>
<td>18 (19)</td>
<td>34 (16)</td>
<td>52 (15)</td>
<td>93 (27)</td>
<td>13 (10)</td>
<td>0.157</td>
</tr>
</tbody>
</table>

Figure 1. 

- Fig 1a: Kaplan-Meier plots of time to VS<50 copies/mL, vs time to pre-ART VL categories.
- Fig 1b: Kaplan-Meier plots of time to VS<1000 copies/mL.

Figure 2. 

- Fig 2a: Violin plot of baseline VL categories.
- Fig 2b: Median time to VS.<50 copies/mL, stratified by pre-ART VL categories.

Figure 3. 

- Fig 3a: Forest plot from probit model predicting probability of VS<50 copies/mL at delivery according to pre-ART VL (log copies/mL) and gestation at ART initiation (in weeks).

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