The impact of performance-based financing schemes in the health sector on child and maternal care in Mozambique

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on behalf of the Performance-based financing mechanisms for health system strengthening in Africa PEMBA project Team

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Introduction

Sustainable Development goal (3): *Good Health and Well-being*

- Universal Health Coverage
- Child and Maternal Health

How can we improve access and delivery of child and maternal care?

- Performance-based-financing (PBF) proposed in many countries as a strategy to increase access and improve quality

- Payment of budget to health care providers based on the achievement of pre-defined targets for selected indicators

- Incentive payment is accompanied by increased supervision and monitoring
Evidence on Performance-based Financing

Globally, evidence is so far mixed

- Existing research has focused mostly on the delivery of targeted health care services (Basinga et al., 2011; Eijkenaar et al., 2013; Bonfrer et al., 2014; Rajkotia et al., 2017; Gergen et al., 2018)

- Little is known on heterogeneous effects and on health outcomes

In Mozambique Rajkotia et al., 2017 also found mixed evidence on targeted indicators

- Higher impact: Pregnant women HIV positive start ARV and complete PTV, Pregnant women attend 4 or more ANC visits

- Mixed impact: institutional delivery, full vaccination

- No impact: Malaria and other non-Incentivised indicators
PBF in Mozambique

- Implemented in health facilities in Gaza and Nampula
- 21 indicators in 5 groups incentivised
- Incentives: quantity-based bonus weighted by quality and HF remoteness
- Monthly reporting and quarterly reports using HF-registers
21 Targeted PBF Indicators

<table>
<thead>
<tr>
<th>Adult HIV Care and Treatment</th>
<th>Paediatric HIV</th>
<th>Maternal and Child Health</th>
<th>Preventing vertical HIV transmission</th>
<th>Other HIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Nb. HIV-infected adults (excluding pregnant women) initiating ART</td>
<td>• Nb. PCR tests for HIV for children (4-8weeks) of HIV-infected mothers</td>
<td>• Nb. pregnant women &gt;=4 ANC-visits</td>
<td>• Nb. HIV-infected pregnant women receiving antiretroviral prophylaxis</td>
<td>• Nb. HIV-infected patients lost to follow up coming back for ART</td>
</tr>
<tr>
<td>• Nb. of adults co-infected with HIV and tuberculosis (TB) who initiated ART</td>
<td>• Nb. HIV rapid tests for children 9-12months of HIV-infected mothers</td>
<td>• Nb. pregnant women who delivered at the health facility</td>
<td>• Nb. HIV-infected pregnant women initiating ART</td>
<td>• Nb. Male partners tested for HIV</td>
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<tr>
<td>• Nb. HIV-infected patients who initiated Isoniazid to prevent TB</td>
<td>• Nb. HIV-infected children 0-23months initiating ART</td>
<td>• Nb. children who receive full vaccination for BCG, DPT, polio and measles in 9 months</td>
<td>• Nb. HIV-infected pregnant women receiving family planning and contraceptives</td>
<td>• Nb. HIV-tests at HF</td>
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<td>• Nb. of HIV-infected adults alive 12 months after initiating ART</td>
<td>• Nb. HIV-infected children 2-14yearsmonths initiating ART</td>
<td>• Nb. women (excluding HIV-infected) receiving family planning and contraceptives</td>
<td>• Nb. HIV-infected children 0-23months initiating ART</td>
<td>• Nb. Children acute malnutrition, treated and discharged</td>
</tr>
</tbody>
</table>

Other HIV
• Nb. HIV-infected patients lost to follow up coming back for ART
• Nb. Male partners tested for HIV
• Nb. HIV-tests at HF
Demographic Health Survey (DHS)

Women report all pregnancy and related care 5 years prior interview

Construct pooled cross-sectional conceptions 2006-2015
GPS info and health facility data

Need to identify if:

a.) closest health facility is PBF-exposed

b.) district is PBF-district

Link mothers to districts and closest HF and identify if HF is PBF-exposed:

- **WHO-SARA**: info about health facilities geo-coordinates;
- **EGPAF**: info about HF-PBF status

**DHS**: GPS-location of HH in clusters (5km positional error)
Nampula

- Health facility
- DHS cluster 2015
- DHS Cluster 2011
- Health facility – PBF Phase 1
- Health facility – PBF Phase 2
- Health facility – PBF Phase 3
- Health facility – PBF Phase 4
Outcome variables

**ANTENATAL CARE (ANC):**
- At least 4 ANC visits
- HIV test offered at ANC visit
- Tested for HIV at ANC visit
- Knowledge: Vertical HIV transmission
- Knowledge: Drugs to avoid vertical HIV transmission

**DELIVERY AND POSTNATAL CARE:**
- Institutional delivery
- Vaccination within 1 year
- Vaccination within 9 months

**CHILD MORTALITY:**
- Neonatal mortality
- Infant mortality
Sample(s)

I: Analysis of ANC, delivery and postnatal care effects

- N=5,031; Gaza: 561 (HF:83; D:226), Nampula: 451 (HF:63; D:186), ROC: 4,055

II+III: Analysis of child mortality effects

- Neonatal mortality: N=8,889; Gaza: 824, Nampula: 789, ROC: 7,276
- Infant mortality: N=5,996; Gaza: 541, Nampula: 532, ROC: 4,923
Average Treatment Effect (ATE)

\[ Y_i = \beta_0 + \beta_1 DID_i + \beta_2 PBF_i + \beta_3 After_i + \beta_4 Dist_i + \beta_5 SQ(Dist_i) + X_i \beta_6 + \beta_7 BYr_i + \beta_8 DHS_i + \beta_9 Supply + \epsilon_i \]

- \( \beta_1 \) is the ATE
- \( PBF_i \) PBF area
- \( After_i \) conception after PBF started

- \( X_i \) set of control variables
- \( Dist_i \) is distance to closest HF
- \( SQ(Dist_i) \) non-linear distance

Fixed effects:
- Supply side
- Birth Year
- DHS Cohort

Clustered SE
Heterogeneity of Effect

\[ Y_i = \beta_0 + \beta_4 D\text{ID}_i \times \text{VAR}_i + \beta_5 \text{PBF}_i \times \text{VAR}_i + \beta_6 \text{After}_i \times \text{VAR}_i + \beta_7 \text{VAR}_i + \cdots + \epsilon_i \]

\( \text{VAR}_i \) is here a placeholder for three binary variables, either:

- individual lives in a **household below median**
- individual has **no education**
- individual lives in **Gaza province**

\( \beta_4 \) is PBF-effect difference when using respective binary indicator comparison.
Results: Average Treatment Effect

PBF effects **HF-level** (95% CI)

PBF effects **district-level** (95% CI)
Results: Below median wealth vs Above

### PBF effects **HF-level** (95% CI)

- 4 ANC Visits
- HIV Test offered
- HIV Know. 1 (P)
- HIV Know. 2 (P)
- Inst. Delivery (P)
- Vacc. 12months (P)
- Vacc. 9months (P)
- Neon. Mort. (P)
- Infant Mort.

### PBF effects **district-level** (95% CI)

- 4 ANC Visits
- HIV Test offered
- HIV Know. 1
- HIV Know. 2
- Inst. Delivery (P)
- Vacc. 12months
- Vacc. 9months
- Neon. Mort.
- Infant Mort.
Results: No education versus all other

PBF effects **HF-level** (95% CI)

PBF effects **district-level** (95% CI)
Results: Gaza versus Nampula

PBF effects **HF-level** (95% CI)

PBF effects **district-level** (95% CI)
Results: Sensitivity analysis

1. *Maputo city effects* → *no difference in effects*

2. Spill-over effects in treated provinces → *no difference in effects*

3. District selection into PBF → *no difference in effects*

4. Treatment definition → *no difference in effects*

5. Border cluster effects → *no difference in effects*

6. Asses area effects → *no difference in effects*
Limitations

- Assumption of limited mobility of mothers → exiting studies suggest low internal migration among females
- Can only assess limited set of indicators → data permits ind. level analysis and to test identification assumptions
- Limit child mortality data; ideally assess 5-year mortality
- Covariates observed at time of interview → low variation in DHS wealth index and education
- Small sample size of treated mothers may in particular drive findings for health facility level analysis
Discussion

• **Effects on district level** → larger health care provider level → referral system in place…?

• **Strong positive effects on HIV-testing** offered (14pp), HIV-tested (21.5pp), knowledge *vertical transmission* (7pp), knowledge **drugs avoid transmission** (24pp) → in line with previous research (Rajkotia et al., 2017)

• **Heterogenous by education** → PBF with potential to overcome socio-economic inequalities in health care access

• **Stronger effects in Nampula vs Gaza** for HIV-related outcomes → in line with previous research (Rajkotia et al., 2017)

• **Stronger effects in Gaza vs Nampula** for Vaccination → different to previous research (Rajkotia et al., 2017)
Conclusion

• Positive effects on maternal HIV knowledge and HIV testing on district level
• No effects on child and maternal care nor on neo-natal and infant mortality
• PBF-effects strongly varies by local heterogeneities in health care need
• PBF can overcome inequality in health care access (education) for outreach services

Future Research

• Understand PBF-effect on child health and child/maternal mortality
• Understand underlying pathways to effect, e.g. supply or demand driven?
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Thank you for your attention!
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<tr>
<th>Province</th>
<th>Phase1</th>
<th>Phase2</th>
<th>Phase3</th>
<th>Phase4</th>
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</thead>
<tbody>
<tr>
<td>Gaza</td>
<td>D: 8/14 HF: 9</td>
<td>D: 13/14 HF: 29</td>
<td>D: 14/14 HF: 54</td>
<td>D: 14/14 HF: 75</td>
</tr>
</tbody>
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Difference-in-Difference Estimation

Ref: Thanks to the internet