OVERUSE AND UNDERUSE OF ACUTE HEALTHCARE: EVIDENCE FROM MALI

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Introduction: curative care and the challenge of misallocation

- Global health has seen great advances in *preventive care* in the last two decades (e.g. Bhatt et al. 2015).

- **Today:** further significant improvements require better care for *acute illness*.

- In curative care: whether and when a given individual needs treatment varies based on (unobserved) health status.
  
  → *Misallocation* – underuse and overuse – is a core challenge for efficient and high-quality provision of acute care.

- Linked to **Good Health And Well-Being (SDG 3)**
Introduction: underuse and overuse in LMIC contexts

Underuse remains a challenging problem despite substantial progress:
  • In 2019, 5.2 million children under 5 died, mostly from preventable and treatable causes

Part of the policy response: a shift to free care for children and mothers, away from “user fee” model (incl. in Mali, Adepoju, 2019).

At the same time: medication misuse documented since at least 1990
  • WHO medicines use summary report 2006
  • Experimental and audit study evidence (Das et al. 2012, 2016, Currie et al. 2011, 2014, Cohen et al. 2015)

Subsidies for patients may reinforce financial incentives for providers.
Introduction: multiple constraints to the optimal allocation of care

Efficient allocation of care influenced by multiple, complex decisions.

Many potential sources of misallocation:

- Financial or informational constraints
- Misaligned incentives between government, providers, caregivers, and patients
- Asymmetric information: the “informed expert” problem

Different issues may interact or mutually reinforce each other. Example: lack of trust by patients → lack of effort to diagnose by providers (Hussain et al. 2021)

This talk: 3 (+1) studies from Mali: experimental evidence on underuse and overuse of curative care, with new measurement approaches.
RCT of healthcare subsidies and health information provided by CHW.

1. Subsidies, Information, and the Timing of Children’s Health Care in Mali 
   (Sautmann, Brown & Dean, 2020)
   • Examine decision to seek care (extensive margin) for children under 5: construct illness spells, assess need for provider evaluation using C-IMCI guidelines for CHW

2. Gender Differences in Children’s Antibiotic Use and Adherence 
   (Blandhol & Sautmann, 2021)
   • Examine antibiotics adherence: construct treatment “spells”, compare with W.H.O. guidelines for minimal treatment length

Decisions about children’s care at home

Home survey: 9 weeks of daily health diary data
Behavior during the provider visit

RCT to isolate contributors to misallocation of subsidized malaria medication.

3. Does Patient Demand Contribute to the Overuse of Prescription Drugs? (Lopez, Sautmann & Schaner, 2021)

**Intervention:** vouchers for malaria ACT either directly to patients, or to the provider

When doctors have discretion, do they steer patients towards more or less use?

+ The Effect of Provider Training vs. Improved Patient Information on Malaria Treatment Misallocation (Lopez, Sautmann & Schaner, unpublished)

**Intervention:** information on malaria test (RDT) efficacy to either doctors -- through a day-long training -- or patients -- through a short informative video.

**Does information encourage adherence to test results?**
Connecting the dots: how do underuse and overuse interact?

In care seeking,

- Underuse (by IMCI) alleviated, but not eliminated, by subsidies
- Overuse significant *share* of the newly created provider visits (30%)
- Information does not improve this allocation.

Esp. when costs are low, *providers* at the clinic fail in their “gatekeeping” function

- Patient pressure a significant factor in overuse
- Informed doctors are better gatekeepers, yet patient satisfaction falls.

**Medication use:** after purchase, cost is low -- but underuse (low adherence) is common and even higher for girls than boys.

**Multiple margins of overuse and underuse:**

- Do these interact and possibly reinforce each other?
- What are “net” effects on health outcomes?
The Setting

Healthcare overuse and underuse in Mali
Primary health care provided by community health clinics (CSComs)

- Public health in Mali: decentralized, community-based care funded by user fees
  - 47% of mothers in Bamako took child with fever or cough to a CSCom (DHS 2013)
  - ~70 clinics and associated reference hospitals in Bamako.

- A typical CSCom in our malaria data set (data set 2, N = 59):

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-reported patient load/day</td>
<td>29.7</td>
<td>22.1</td>
</tr>
<tr>
<td>Has a laboratory (microscopy)</td>
<td>87%</td>
<td>35%</td>
</tr>
<tr>
<td>Has a pharmacy/dispensary</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>Average number of staff with prescription power</td>
<td>11.1</td>
<td>4.4</td>
</tr>
<tr>
<td>Stockouts of any malaria drugs (out of 6 clinic-days)</td>
<td>69%</td>
<td>47%</td>
</tr>
<tr>
<td>Stockouts of all malaria drugs (out of 6 clinic-days)</td>
<td>1.7%</td>
<td>13%</td>
</tr>
</tbody>
</table>
Our Samples

- **Action for Health data**: home survey of 1768 children in 642 compounds; families eligible for the subsidy/CHW program

- **Clinic data**: 2055 patients with acute symptoms at 60 CSComs in Bamako

<table>
<thead>
<tr>
<th></th>
<th>Action for Health (household head)</th>
<th>Clinic data (patient)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literate</td>
<td>46%</td>
<td>26%</td>
</tr>
<tr>
<td>Salaried employment</td>
<td>13%</td>
<td>-</td>
</tr>
<tr>
<td>Household members</td>
<td>6.2</td>
<td>10.3</td>
</tr>
<tr>
<td>Average monthly income p.p. in CFA</td>
<td>26,000</td>
<td>22,000</td>
</tr>
<tr>
<td>Average distance to clinic in meters</td>
<td>512</td>
<td>-</td>
</tr>
</tbody>
</table>
Care Seeking for Children

The effects of user fee removal and CHW visits on the decision to visit a clinic
Motivation

- Subsidies reduce underuse due to access barriers (credit constraints, incorrect beliefs,..) but may also lead to overuse; information may improve allocation.

- Experiment: compounds randomly selected to receive…
  - subsidies: pay clinic user fees for five most common conditions
  - Information: biweekly community health worker visits

- Policies that reduce the cost of acute care often have little health outcome effects (or even utilization effects, e.g. King et al. 2009, Thornton et al. 2010)
  - Measure health utilization with diary data against C-IMCI benchmark
  - Caveat: assume that compliance with IMCI improves health (“underuse”)

- Treat decision to seek care as a “stopping problem”: go today, or wait another day?
  - → IMCI: classify as “early for care” or “care required (today)”
The Data Collection

- Surveyor assisted health diaries: 10+5 symptoms...

**Symptoms**

<table>
<thead>
<tr>
<th>Days with any symptoms (pre care)</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>of which:</td>
<td></td>
</tr>
<tr>
<td>Cold symptoms</td>
<td>51%</td>
</tr>
<tr>
<td>Coughing</td>
<td>33%</td>
</tr>
<tr>
<td>Hot skin</td>
<td>32%</td>
</tr>
<tr>
<td>More than 3 loose stools</td>
<td>9%</td>
</tr>
<tr>
<td>Vomiting everything</td>
<td>5%</td>
</tr>
</tbody>
</table>

- ...and doctor consultations and medication purchases

**Type of visit**

<table>
<thead>
<tr>
<th>Type of visit</th>
<th>Number</th>
<th>Cost (Price)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCom</td>
<td>646</td>
<td>1344 (3767)</td>
</tr>
<tr>
<td>CSCom with subsidy</td>
<td>508</td>
<td>933 (3794)</td>
</tr>
<tr>
<td>CSCom without subsidy</td>
<td>138</td>
<td>2850 (3666)</td>
</tr>
<tr>
<td>Private provider</td>
<td>89</td>
<td>5470</td>
</tr>
<tr>
<td>Informal/no consultation</td>
<td>2691</td>
<td>218</td>
</tr>
</tbody>
</table>
Probability of care seeking on each illness spell day, by “care required” classification using the IMCI

Control

Subsidy only

CHW only

Subsidy & CHW

3747 spells
6.4 days avg
3 care-req. days avg

Healthcare overuse and underuse in Mali
Summary of findings

• >5x higher probability of care on care-required days than on early days
  → Parents can clearly distinguish differential need for care by child’s health status
• Subsidy increases care seeking probability by 250%
  • ~70% of new visits are IMCI recommended care.
  • 71% of care-required spells still don’t receive care.
  → Underuse alleviated, but not eliminated, by subsidies (with caveat)
  → Underuse and overuse increase at the same rate; despite minimal *probability of* overuse, a significant *share* of total use (30%)
• Additional information provided by CHW does not improve the allocation.
Patient Demand for Treatment

Does patient demand contribute to the overuse of malaria drugs?
The overtreatment puzzle

• The policy challenge: when at the clinic, a lot of overtreatment/wrong treatment

• From home visit data:
  • 42% of malaria-negative patients receive treatment
  • 20% of malaria-negative patients and 53% of malaria-positive cases receive treatment for severe malaria

• Is this driven by providers?
  • Patients do not always buy prescription
  • Severe treatment >2x more expensive

• Or driven by patients?
  • Before consultation, 55% of patients believe to have malaria
  • 57% of health workers report pressure to prescribe

Requires “reluctant compliance”
Randomized rotational design: three pricing conditions for “simple” malaria treatment (ACTs)

- **C** “Control days”: no malaria discounts available
- **PV** “Patient Voucher” days: voucher for free simple malaria treatment (ACTs) given to patients
  - Not valid for “severe” treatment (injections)
  - Received *before* seeing the doctor
- **DV** “Doctor Voucher” days: doctors obtain the same vouchers to give to patients as they see fit
  - Same terms and conditions as PV
  - Patients do not know ACT is free before seeing the doctor.
Who drives overtreatment? Different predictions for treatment effects

• **Vouchers to patients (PV):** increases their demand for “simple” ACT tablets at the expense of “no” and “severe” treatment

• **Vouchers to doctors (DV):** at same prices, they can use the information advantage to either
  1. keep overall demand low, reduce demand for severe treatment only → **patient-driven overtreatment**
  2. increase overall demand, keep demand for severe treatment high → **doctor-driven overtreatment.**
Patient-Driven Demand: More Vouchers, More Malaria Treatment in PV vs. DV

Used Voucher

- DV: 26
- **: 35
- PV: 35

Antimalarial Rx

- C: 62
- DV: 64.3
- ** PV: 68.9

Antimalarial Purchase

- C: 46
- DV: 54.7
- ** PV: 61

Healthcare overuse and underuse in Mali
Additional results

• No evidence of doctor-driven demand: less severe treatment in both DV & PV

• Poor illness-treatment match, worse in PV than DV (although some improvement from greater purchases as a result of the subsidy)

• Intervention 2: doctors who received additional training make better prescriptions
  • But: lowers patient satisfaction
Summary of findings

• (Some) overuse driven by patient demand

• Information (training) has effects on the doctor side but not on the patient side.

→ “Twin problem”: underuse at the extensive margin (whether care is received) but overuse at the intensive margin (how much care is received)
  • Do these reinforce each other? A problem of distrust? (Hussain et al. 2021)

• A challenging policy issue:
  • The provider is the “informed expert”
  • Monitoring would require observation by another qualified provider
  • Can empowering providers improve the allocation?
Treatment Adherence

Gender and parental education as factors in antibiotics treatment adherence
Antibiotics use conditional on child gender and household characteristics

- Construct antibiotics treatment spells and benchmark “exit” against WHO recommendations
- Estimate probability of starting and completing treatment as a function of gender and other variables (correcting for selection)

<table>
<thead>
<tr>
<th>Antibiotics taken</th>
<th>Standard recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>712</td>
</tr>
<tr>
<td>of which:</td>
<td></td>
</tr>
<tr>
<td>Co-Trimoxazole</td>
<td>33% 5 days, 3 for bacterial enteritis</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>25% 5 days, 3 for tooth infections</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>16% 5 days, 3 for giardiasis</td>
</tr>
<tr>
<td>Other/unspecified</td>
<td>12%</td>
</tr>
<tr>
<td>Ceftriaxone, Gentamicin, Erythromycin,</td>
<td>14% 5-7 days for most uses.</td>
</tr>
<tr>
<td>Ampicillin</td>
<td></td>
</tr>
</tbody>
</table>

Healthcare overuse and underuse in Mali
Antibiotics use conditional on child gender

- 38% completion rates for girls
- Boys: 9-12% higher
Antibiotics completion conditional on education of household head

- The entire “completion advantage” accrues to sons of educated household heads.

Gender effect by education level.
Reference category: no formal schooling.
Summary of findings

• Despite low costs of adherence:
  • significant underuse
  • the presence of a (literate?) parent matters significantly
    → Subtle biases may affect other aspects of treatment success.

Given high levels of overprescription – is low adherence “underuse”?

What is the correct policy response?
Conclusion
Conclusion

- Multiple margins of misallocation in the healthcare decision process
- ”Blunt instruments”: subsidies may address underuse at the extensive margin, but exacerbate overuse at the intensive margin

**Need for research:**
- How do incentives and policy interventions change utilization at different decision margins?
- How do these changes, individually and in the aggregate, map into welfare-relevant outcomes (health, income, happiness)?

**Two new methods of measurement:**
- Health diary data on illness and medication spells
- Facility entry and exit interviews combined with home testing to assess the match of illness with correct treatment
Thank You!