Context

Malaria is the leading health burden in Nigeria and is the first-ranking cause of years of life lost due to premature death.\(^1\) Together with the Democratic Republic of the Congo, Nigeria accounted for more than 35 percent of the global total estimated malaria deaths in 2015.\(^2\)

Nigeria has implemented various initiatives to improve service delivery related to malaria prevention and treatment. In this context, the Malaria Control Booster Project (MCBP) was implemented with support from the World Bank from 2007 to 2015 to serve seven States,\(^3\) which together represents more than 25 percent of the country’s population.

Intervention

Under the MCBP, two specific interventions were carried out to complement malaria-related service delivery through public health facilities. First, Community-Directed Distributors (CDDs) were trained to provide malaria control services to members of their extended families. They were also provided with free rapid diagnostic tests (RDTs) for accurate diagnosis of malaria and with ACTs, the first-line treatment for malaria. Second, Patent Medicine Vendors (PMVs)—private drug retailers—were trained in diagnosis of malaria and the appropriate sale of subsidized ACTs.

Impact Evaluation

The MCBP CDD and PMV Impact Evaluation was designed to answer the following questions: (1) how do the CDD and PMV interventions affect malaria prevention and treatment-related knowledge, attitude, and practice on the household side? (2) What is the relative and joint effectiveness of the CDD and PMV service delivery channels in improving key health-related and economic outcomes?

Key Points

- The MCBP in Anambra and Gombe State was successful in engaging community-level providers with sufficient knowledge of malaria prevention and treatment to provide effective malaria-related health services.
- There is some evidence that the interventions improved elements of household-level knowledge of malaria prevention and treatment, though this does not appear to have translated into improved malaria-related health and other outcomes.
- There are several potential reasons why, overall, the CDD and PMV interventions did not produce positive impacts, each of which contains important policy lessons which fall under two main groups: (1) operational design and implementation and (2) broader health system constraints. These two points are further discussed in this brief.

---

2. World Malaria Report 2015 (WHO).
3. Seven States include Kano, Jigawa, Gombe, and Bauchi in the North and Akwa Ibom, Rivers, and Anambra in the South.
To test the effectiveness of CDD and PMV interventions, 280 wards from Anambra and 106 wards from Gombe States were randomly assigned to one of the following four study arms: (1) CDD study arm, (2) PMV study arm, (3) CDD+PMV study arm, and (4) control study arm. Baseline data was collected from January to April 2013, the interventions were implemented from April 2013 to March 2015, and endline data was collected from December 2014 to January 2015.

The randomization was successful in creating groups of wards which were equivalent on average in terms of household characteristics, providing a valid basis for testing the impact directly caused by the CDD and PMV interventions on household-level outcomes. This brief presents the key findings by comparing endline results in each treatment study arm—CDD, PMV, and CDD+PMV—to the control study arm.

Key Findings and Policy Lessons

How did CDDs and PMVs perform after the intervention?

Overall, endline survey results for PMVs and CDDs suggest that the MCBP in Anambra and Gombe State was successful in engaging community-level providers with sufficient knowledge of malaria prevention and treatment to provide effective malaria-related health services. For example, in both States, almost all trained CDDs and PMVs recognized ACT as the best treatment for malaria after the intervention.

PMVs, consistent with their status as private sector businessmen and women, did not promote malaria prevention to their customers but rather focused on the sale of (subsidized) ACT. CDDs, on the other hand, were much more engaged also in malaria prevention activities.

Most of the trained health-providers in Anambra State followed the training guidelines in diagnosing and treating malaria.

Policy Lesson: Results suggest that activities by PMVs and CDDs may be complementary and that there may be gains to harnessing the respective comparative advantage of these agents to create an optimal environment for malaria prevention and case management.

| % of PMVs treating their last patient with fever with ACT |
|---------------|---------------|
| Treatment     | Comparison    |
| %             | %             |              |              |
| Anambra       | Gombe         |              |
| 83%*          | 72%           | 69%          | 53%          |

* Statistically significantly higher percentage for trained PMVs in Anambra.
Policy Lesson: Stock-outs in the Nigerian public primary health sector are a well-documented problem, and for any intervention aiming to extend primary healthcare services to achieve its full potential in promoting accurate diagnosis and treatment of malaria, more reliable supply chains are needed. This conclusion extends to the primary healthcare system as a whole: 41% of surveyed primary healthcare facilities in Anambra and 27% in Gombe State reported stock-outs of ACT in the past 3 months.

In Gombe State, only 34% of trained CDDs and 69% of trained PMVs reported treating their last patient with fever with ACT. CDDs and PMVs from Gombe State suffered from stock-out as well—only 16% of trained CDDs and 68% of trained PMVs had ACT available at the time of the interview.

*Are there any impacts at the household level?*

The intervention appears to have improved household knowledge on malaria diagnosis and treatment. In Anambra State, a higher percentage of households from the treatment study arms have heard of RDTs compared to households from the control study arm. Also, a higher percentage of households from the treatment study arms recognized ACT as the best treatment for malaria.
Policy Lesson: The break in the causal pathway between knowledge and behavior suggests that consumer education efforts are needed. Consumer education campaigns may help households to make use of their mosquito nets and encourage patients/customers to demand an RDT test prior to purchasing medication.

Policy Lesson: Traditionally, most interventions related to malaria focus on children under five and pregnant women as they are the most vulnerable groups to malaria. The relatively high percentage of malaria prevalence among children between 5 and 12 suggests, however, that efforts to address malaria in this population group, which may have developed some immunity and therefore showing no visible symptoms, remain important.

The CDD and PMV interventions, in particularly, targeted malaria in children under 5 and pregnant women. The following figure shows malaria prevalence among the two primary target groups and children from 5 to 12. A significantly higher percentage of households from the treatment study arms recognized ACT as the best treatment for malaria compared to households from the control study arm.

Households from both States are knowledgeable of the importance of mosquito nets and own at least one mosquito net. This does not, however, translate into responsible action: 58% of the target population (in this case, children under 5 and pregnant women) from Anambra and 72% from Gombe slept under a mosquito net the night preceding the survey with no significant difference across study arms.

Despite the relatively high malaria-related knowledge, households from both States were not appropriately diagnosed nor treated for malaria. Among the surveyed individuals who had fever in the past 4 weeks, only 29% from Anambra and 38% from Gombe were diagnosed with RDT or microscopy. Among those who took medication to treat malaria, 30% from Anambra and 40% from Gombe took ACT with no significant difference across study arms.

Though there is some evidence that the interventions improved elements of household-level knowledge of malaria and treatment-seeking behavior, this does not appear to have translated into improved malaria-related health and other outcomes. When accounting for the fact that we expect to observe some statistically significant differences between treatment and control groups by chance when looking across a range of variables, we cannot reject the hypothesis that the CDD and PMV interventions did not produce any household-level impacts.

The CDD and PMV interventions, in particularly, targeted malaria in children under 5 and pregnant women. The following figure shows malaria prevalence among the two primary target groups and children from 5 to 12. A significantly higher percentage of households from the treatment study arms recognized ACT as the best treatment for malaria compared to households from the control study arm.

Households from both States are knowledgeable of the importance of mosquito nets and own at least one mosquito net. This does not, however, translate into responsible action: 58% of the target population (in this case, children under 5 and pregnant women) from Anambra and 72% from Gombe slept under a mosquito net the night preceding the survey with no significant difference across study arms.

Despite the relatively high malaria-related knowledge, households from both States were not appropriately diagnosed nor treated for malaria. Among the surveyed individuals who had fever in the past 4 weeks, only 29% from Anambra and 38% from Gombe were diagnosed with RDT or microscopy. Among those who took medication to treat malaria, 30% from Anambra and 40% from Gombe took ACT with no significant difference across study arms.

Though there is some evidence that the interventions improved elements of household-level knowledge of malaria and treatment-seeking behavior, this does not appear to have translated into improved malaria-related health and other outcomes. When accounting for the fact that we expect to observe some statistically significant differences between treatment and control groups by chance when looking across a range of variables, we cannot reject the hypothesis that the CDD and PMV interventions did not produce any household-level impacts.

The CDD and PMV interventions, in particularly, targeted malaria in children under 5 and pregnant women. The following figure shows malaria prevalence among the two primary target groups and children from 5 to 12. A significantly higher

<table>
<thead>
<tr>
<th>Malaria Prevalence in Anambra and Gombe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anambra State</strong></td>
</tr>
<tr>
<td>Children under 5</td>
</tr>
<tr>
<td>7%</td>
</tr>
<tr>
<td>Children between 5–12</td>
</tr>
<tr>
<td>15%</td>
</tr>
<tr>
<td>Pregnant Women</td>
</tr>
<tr>
<td>7%</td>
</tr>
<tr>
<td><strong>Gombe State</strong></td>
</tr>
<tr>
<td>Children under 5</td>
</tr>
<tr>
<td>21%</td>
</tr>
<tr>
<td>Children between 5–12</td>
</tr>
<tr>
<td>25%</td>
</tr>
<tr>
<td>Pregnant Women</td>
</tr>
<tr>
<td>15%</td>
</tr>
</tbody>
</table>
percentage of children between 5 and 12 are malaria-positive compared to the two primary target groups in Anambra and Gombe States.

**Why did the CDD and PMV interventions not produce positive impacts?**

There are several potential reasons for the lack of evidence that the CDD and PMV interventions produced positive impacts, each of which contains important policy lessons which fall under two main groups: (1) operational design and implementation and (2) broader health system constraints.

**Operational Design and Implementation:**

- The scale, length, and intensity of implementation of both interventions may not have been sufficient to fully take root as extensions of the public health system and thus generate positive household and population-level outcomes.
- There is a break in the causal pathway between knowledge and behavior. High levels of household-level knowledge on malaria prevention do not translate into high levels of net use. Furthermore, consumer knowledge and demand for appropriate diagnosis and treatment needs to be improved.

**Broader Health System Constraints:**

- Both CDDs and PMVs suffered from high rates of stockouts of ACTs and, for CDDs, of RDTs.

**Policy Recommendations**

- Results suggest that activities by PMVs and CDDs may be complementary and that there may be gains to harnessing the respective comparative advantage of these agents to create an optimal environment for malaria prevention and case management. However, for any such interventions to be effective their design will need to be altered and should be subject to further testing. In seeking to make ACT more accessible and affordable, one important potential challenge is in ensuring that the subsidy offered to PMVs (or any other healthcare provider) for the purchase of ACT is passed on to consumers.
- **Consumer education campaigns** may help households to make use of their mosquito nets. Additionally, such campaigns should encourage patients/customers to demand an RDT test prior to purchasing medication, and to demand the appropriate medication for their illness. Effectively promoting behavior change at a large scale remains an elusive goal and new and innovative methods should be considered.
- **Broader health systems constraints remain an important barrier.** For example, ensuring a consistent and reliable supply of commodities is essential for community-level agents to serve as active and effective partners in the fight against malaria.

This impact evaluation was implemented as a collaboration between the Nigerian Federal Ministry of Health, Anambra State Ministry of Health, Gombe State Ministry of Health, the World Bank’s Development Impact (DIME) and Health Global Practice, and University College, London. For more details on these results, please contact DIME (dime@worldbank.org).