High prevalence of asymptomatic malaria in urban settings in Douala, Cameroon

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University of Douala / Partec Afrique Centrale
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1. Introduction

The context
Malaria in Cameroon / Douala

2. Methodology

Parasitological assessment in the CCA/SIDA – ExxonMobil Project

3. Results

4. Conclusive remarks: DTB Approach
Recent developments in diagnostic testing present new opportunities for malaria surveillance systems. Availability of inexpensive, quality-assured RDT means that malaria surveillance can be based on confirmed rather than suspected cases at all levels of the health system. As malaria control measures expand and the proportion of fevers due to malaria falls rapidly, it becomes increasingly important to track confirmed malaria cases, so that resources can be targeted to areas where problems remain and progress in malaria control is accelerated.

3/4 of managers in SS Africa attest the negative impact of malaria on their activity

RBM REPORT 2006
Douala

Economic capital of Cameroon

Biggest town of the whole CEMAC zone of 6 countries in central Africa

Population 2,446,945[1] (2012 est.)
MALARIA IN CAMEROON

- First cause of morbidity and mortality
- 41% of morbidity
- 50% of hospitalizations
- 24% of death in hospital
- 40% of infant mortality
- 1st cause of absenteeism in school and at work
Plasmodium falciparum

- Predominant in Douala
- Resistance against chloroquine established
Since the 90s
- High gametocytemia during treatment
Paraclinical = laboratory test

- Parasitologic
- Microscopy
- QBC
- GS
- Fluorescence

*Less expensive, rapid, detection of symptomatic/asymptomatic cases practical for mass diagnosis*

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Introduction

DIAGNOSTICS

- Sérologic
- Molecular biology

ELISA

RDT (Immunochromatography)

PCR

Cytometry

SD FK60 Malaria Ag

Pf/Pan® adopted by MoH in Cameroon
The most common vector in Douala
Active period 10 PM – 5 AM
Night peaks between 1 & 2 AM
61.17 infective bites /human /year.

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Evangelic School  Carrière Ndog-Passi II

Prevalence = 77%
Insalubrity score = 8/10
Malaria sensitization in small and medium enterprises and communities in Douala

Sponsored by ExxonMobil Foundation
**OBJECTIVE**

Evaluation of the intervention in six communities and three enterprises

<table>
<thead>
<tr>
<th>Activity</th>
<th>Partners</th>
<th>Sponsors</th>
</tr>
</thead>
</table>
| Distribution of LLINs and Indoor spraying in 2011 | [CCA+SIDA](http://example.com)  
Coalition de la Communauté des Affaires contre le SIDA, la Tuberculose et le Paludisme  
[ExxonMobil](http://example.com) | [ExxonMobil](http://example.com)                  |
| Screening October 2012 - July 2013 | [Université de Douala](http://example.com)  
[PARTEC Afrique Centrale](http://example.com) | [PARTEC Afrique Centrale](http://example.com) |

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FIELD WORK

- Questionnaire
- Microscopy
- Production of results and reporting

3 microscopists 300 tests/in 8 hours

1min 36s / Test

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Characteristics of the LED fluorescence microscope CyScope® (Partec, Germany)

- UV (wavelength 365 nm) excitation
- White light
- Achromate Objectives: 20x, 40x, 100x

- Option CCD camera (visualization slides on PC with Windows™ interface)
- Powered by rechargeable battery
- 6 hours of energy autonomy
Malaria diagnostic with CyScope®

Etape 1
Piquer au bout du doigt

Etape 2
Déposer la goutte de sang sur la lame "P-DAPT" au-dessus du réactif. Recouvrir avec une lamelle et attendre 1 minute

Etape 3
Passer à l'observation sur le CyScope en lumière UV
Results

WBC

*Plasmodium* parasites
Screening in enterprises
### Average prevalence of malaria in enterprises

<table>
<thead>
<tr>
<th></th>
<th>Hysacam</th>
<th>G4S</th>
<th>Chococam</th>
<th>combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>103</td>
<td>56</td>
<td>44</td>
<td>212</td>
</tr>
<tr>
<td>Négative</td>
<td>346</td>
<td>153</td>
<td>121</td>
<td>652</td>
</tr>
<tr>
<td>Total</td>
<td>449</td>
<td>209</td>
<td>165</td>
<td>823</td>
</tr>
<tr>
<td>Prevalence</td>
<td>22.9%</td>
<td>26.8%</td>
<td>26.7%</td>
<td>24.67%</td>
</tr>
</tbody>
</table>

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## Knowledge of malaria among workers

### Treatment

<table>
<thead>
<tr>
<th></th>
<th>Chococam</th>
<th>Hysacam</th>
<th>G4S</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correct answer</strong></td>
<td>61 (38.1%)</td>
<td>83 (19%)</td>
<td>80 (38.3%)</td>
<td>224 (27.8%)</td>
</tr>
<tr>
<td><strong>Paracetamol</strong></td>
<td>14 (8.7%)</td>
<td>151 (34.5%)</td>
<td>80 (38.2%)</td>
<td>245 (30.8%)</td>
</tr>
<tr>
<td><strong>Chloroquine</strong></td>
<td>9 (5.6%)</td>
<td>81 (18.5%)</td>
<td>16 (7.6%)</td>
<td>106 (13.2%)</td>
</tr>
</tbody>
</table>
## Knowledge of malaria among workers

### Causes

<table>
<thead>
<tr>
<th></th>
<th>Chococam</th>
<th>Hysacam</th>
<th>G4S</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasmodium</td>
<td>49 (30.6%)</td>
<td>89 (20.4%)</td>
<td>73 (34.9%)</td>
<td>211 (26.2%)</td>
</tr>
<tr>
<td>Others</td>
<td>111 (69.4%)</td>
<td>348 (79.6%)</td>
<td>136 (65.1%)</td>
<td>595 (73.8%)</td>
</tr>
</tbody>
</table>

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## Number of persons per LLIN

<table>
<thead>
<tr>
<th></th>
<th>Hysacam</th>
<th>G4S</th>
<th>Chococam</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of LLINs</td>
<td>101</td>
<td>316</td>
<td>300</td>
<td>717</td>
</tr>
<tr>
<td>Persons / household</td>
<td>247</td>
<td>1150</td>
<td>831</td>
<td>2228</td>
</tr>
<tr>
<td>Persons/ LLIN</td>
<td>2.44</td>
<td>3.63</td>
<td>2.77</td>
<td>3.10</td>
</tr>
</tbody>
</table>
Screening in communities

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### Results in communities

#### Prevalence of Malaria

<table>
<thead>
<tr>
<th></th>
<th>BALI</th>
<th>BONAMIKANO</th>
<th>DIKOLLO-BALI</th>
<th>BONANDOUMBE</th>
<th>MABANDA</th>
<th>SODIKO</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive</strong></td>
<td>302</td>
<td>153</td>
<td>131</td>
<td>221</td>
<td>472</td>
<td>419</td>
<td>1698</td>
</tr>
<tr>
<td><strong>Negative</strong></td>
<td>507</td>
<td>173</td>
<td>189</td>
<td>239</td>
<td>664</td>
<td>843</td>
<td>2615</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>809</td>
<td>326</td>
<td>320</td>
<td>460</td>
<td>1136</td>
<td>1262</td>
<td>4313</td>
</tr>
</tbody>
</table>

**Prevalence**

- BALI: 37.33%
- BONAMIKANO: 46.93%
- DIKOLLO-BALI: 40.94%
- BONANDOUMBE: 48.04%
- MABANDA: 41.55%
- SODIKO: **33.20%**
- **Total**: 39.37%
## Results in communities

### Prevalence related to possession of LLINs

<table>
<thead>
<tr>
<th></th>
<th>LLIN</th>
<th>NO LLIN</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITIVE</td>
<td>1007</td>
<td>536</td>
<td>1543</td>
</tr>
<tr>
<td>NEGATIVE</td>
<td>1458</td>
<td>785</td>
<td>2243</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2465</td>
<td>1321</td>
<td>3786</td>
</tr>
</tbody>
</table>

**Prevalence**

- 40.85%
- 40.58%
- 40.76%
## Prevalence by age group

<table>
<thead>
<tr>
<th></th>
<th>POSITIVE</th>
<th>NEGATIVE</th>
<th>TOTAL</th>
<th>PREVALENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>323</td>
<td>484</td>
<td>807</td>
<td>40.02%</td>
</tr>
<tr>
<td>5-10</td>
<td>501</td>
<td>803</td>
<td>1304</td>
<td>38.42%</td>
</tr>
<tr>
<td>11-15</td>
<td>237</td>
<td>353</td>
<td>590</td>
<td>40.17%</td>
</tr>
<tr>
<td>&gt; 15</td>
<td>687</td>
<td>975</td>
<td>1612</td>
<td>39.52%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1698</td>
<td>2615</td>
<td>4313</td>
<td>39.37%</td>
</tr>
</tbody>
</table>
Conclusive remarks

1 – Rapid detection of asymptomatic malaria cases is feasible in endemic areas using fluorescence microscopy.

2 - Malaria prevalence remains high in Douala despite control measures (54% in schools, 40% in communities and 25% in enterprises)

3 - Only 3.5% of positive cases had fever in this study
Contribution for malaria elimination strategies

1 - Why not treat systematically?

2 - Why not protect Systematically?
Every positive case is a parasite reservoir, which must be closely protected against Anopheles bites for about 6 weeks.
Diagnosis

+ Barrier

Elimination of Pv & Ph (in 4-6 weeks)

Monitoring/Cleaning up

Treatment + Barrier

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Our approach for elimination

D & T & B
Conclusive remarks

- Asymptomatic malaria is highly prevalent in Douala and should be considered for elimination.

The DTB approach specifically targets positive cases and reduces prevention costs.

- Malaria patients should be prioritized in bednet distribution campaigns, at least those under treatment.
Priority: communication for protection of all patients from mosquito bites

No more Unprotected hospitalized patient
Acknowledgments

- Participants, Traditional chiefs:
  - CHOCOCAM, HYSACAM, G4S
- CCA/SIDA
- ExxonMobil Foundation
- URED – DOUALA
- PARTEC