

Increasing the quality of malaria detection through microscopy and external quality assessment at the regional level in Haiti

Alexandre Existe¹, Hamel Edet², Marie Yolande Eugene², Yves Joseph²

BACKGROUND

Malaria remains endemic in Haiti and the Dominican Republic – two Caribbean countries that share a border. This is in part because diagnostic systems in Haiti are underperforming, which hinders the use of the most appropriate treatment.

Although microscopy is standard for the detection of plasmodium falciparum (PF), in Haiti rapid diagnostic testing (RDT) is preferred because:

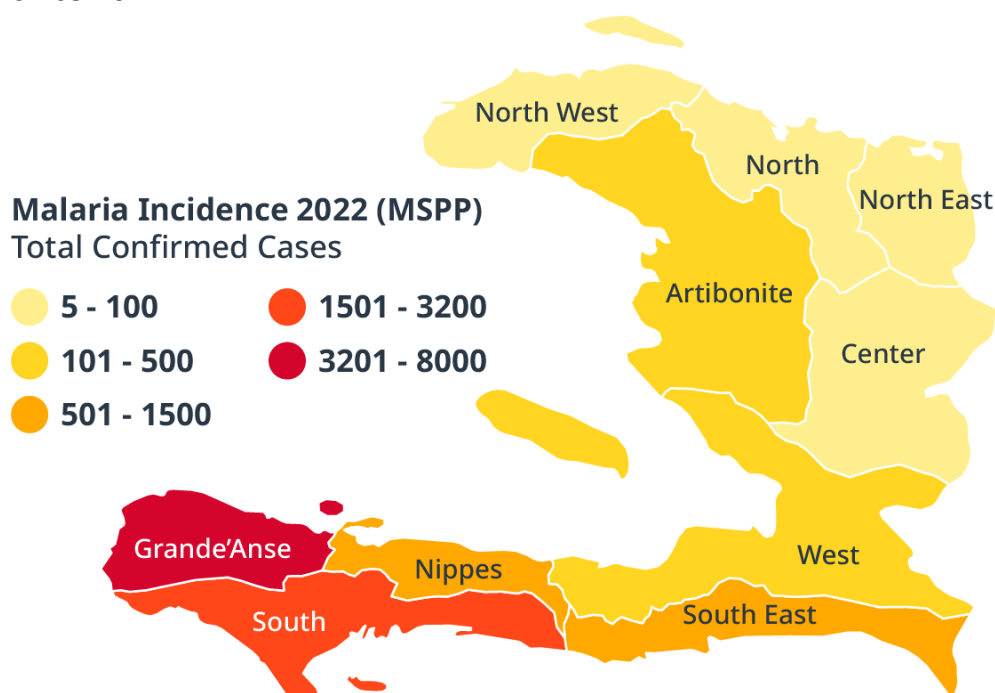


Results are available more quickly.



There is a lack of capacity in community referral hospitals (CRHs), Level II and university and departmental hospitals. Level III to confirm a suspected case of malaria and to identify the correct species.

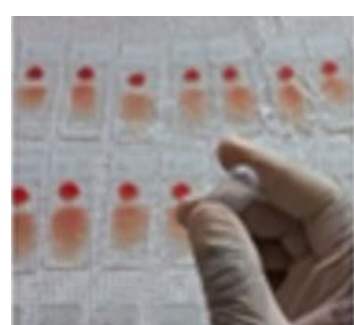
In addition, although the Haitian Ministry of Health policy mandates use of external quality assessment (EQA) to objectively assess laboratory performance, due to poor governance and lack of necessary resources, EQA testing panels have been unavailable since 2017.



OBJECTIVES & METHODS

The Enhancing Global Health Security (EGHS) project is:

- Improving the capacity for microscopic diagnosis of malaria in Level II and III health institutions.
- Ensuring sufficient malaria slides (thick drop / goutte épaisse (GE) and thin pap smear) are available at the National Laboratory of Public Health (LNSP) for EQA.



Lab specialist preparing fine smears and thick drops on malaria-positive samples at CS les Anglais laboratory. Yves Joseph/FHI 360

EGHS supported the LNSP to collect 13 malaria positive blood samples at 7 regional hospitals with high malaria incidence rates:

- Community hospital representatives and laboratory managers in Haiti's South Department (Tiburon, les Anglais, Port-à-Piment, Roche à Bateaux, Coteaux, Torbeck and Les Cayes city) took venous blood from patients with malaria signs and symptoms.
- LNSP and EGHS prepared 1,727 panels of thin and thick smears using fresh specimens and stained them with 10% GIEMSA following national standards.
- Independent microscopists conducted parallel testing by microscopy (GE / thin smear) to ensure accuracy and by RDT using two test kits to confirm PF presence and to verify test kit robustness.

A subset of the testing panels was used to train laboratory technicians on malaria diagnosis through microscopy at CRHs in Grande Anse, South, South-East and Nippes.

Laboratory specialists were trained in microscopy and Ag-RDT and on quality assurance and quality control (QA/QC) for microscopic diagnosis of malaria.

RESULTS

Parallel testing confirmed CRH test sensitivity.

In total, 630 laboratory technicians were trained on malaria diagnosis through microscopy at CRHs. Post training participant scores increased on average by 36% (35% vs. 72%) for theoretical knowledge and 28% (44% vs. 72%) for practical knowledge across the four departments.

Following a 5-year gap, LNSP has reinitiated distribution of test panels at the departmental and site level and resumed malaria EQA. Test panels have been used to assess laboratory staff skills in microscopic malaria diagnosis across 10 health departments.

In coordination with the National Program for Malaria Control, LNSP and EGHS conducted supportive supervision to ensure compliance with the QA/QC process and to review and update testing procedures at each site.

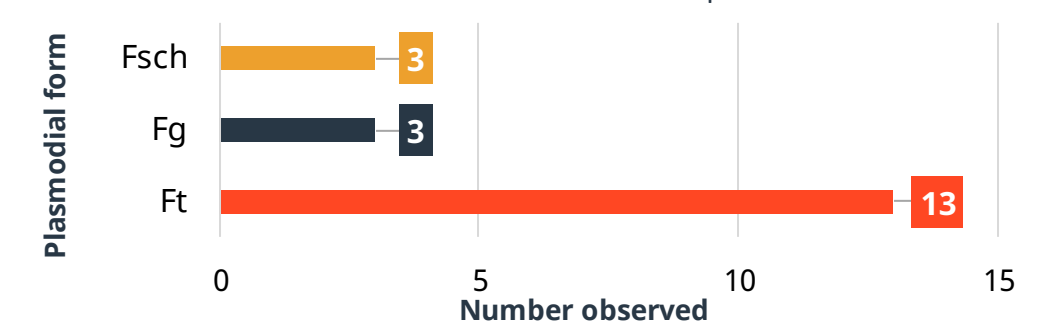
LNSP is incorporating mentoring visits at the testing sites that received test panels to perform EQA. Training on microscopy and EQA for laboratory technicians was expanded to 7 departments.

TABLE 1. Results of malaria samples tested by RDT and microscopy

| # of Samples | Results RDT 1 | Results RDT 2 | Microscopy results | Number of Smears & GE |
|---------------------|---------------|---------------|------------------------|-----------------------|
| A1-23 | Positive | Positive | Pf, Ft 3+ | 120 |
| A2-23 | Positive | Positive | Pf, Ft 1+ | 94 |
| A3-23 | Positive | Positive | Pf, Ft 1+ | 167 |
| A4-23 | Positive | Positive | Pf, Ft 4+, Fg+ | 247 |
| A5-23 | Positive | Positive | Pf, Ft 4+, Fg3+, Fsch+ | 211 |
| A6-23 | Positive | Positive | Pf, Ft4+, Fsch+ | 146 |
| A7-23 | Positive | Positive | Pf, Ft3+ | 150 |
| A8-23 | Positive | Positive | Pf, Ft4+ | 100 |
| A9-23 | Positive | Positive | Pf, Ft3+, Fg 3+ | 98 |
| A10-23 | Positive | Positive | Pf, Ft2+ | 100 |
| A11-23 | Positive | Positive | Pf, Ft4+, Fsch+ | 100 |
| A12-23 | Positive | Positive | Pf, Ft4+ | 114 |
| A13-23 | Positive | Positive | PF, Ft4+ | 80 |
| Total Smears | | | | 1727 |

Notes: Fsch = Schizonts Forms Fg = Gametocyte Forms Ft = Trophozoite Forms Pf = Plasmodium falciparum GE = Thick Smear / goutte épaisse.

FIGURE 1. Plasmodial forms observed across 13 samples



CONCLUSIONS

- Malaria elimination in Haiti requires all laboratories and laboratory staff to apply the national standards for quality detection.
- Making available testing panels facilitated the resumption of EQA and microscopy confirmation of suspected malaria cases.
- EGHS technical assistance enabled LNSP to conduct quality control testing on malaria test kits before distribution to sites, collect blood samples, and create microscopic slides for QA/QC.
- Capacity strengthening on microscopy and QA/QC improved laboratory processes for accurate, reproducible, reliable, timely, and cost-effective results. Application of continuous quality improvement approaches at the institutional level also helped to determine the capacity and training needs of health institution providers.
- Strong national leadership and governance regional-level capacity building and mentorship ensured quality malaria detection and improved laboratory staff capacity
- Low-income countries with high malaria endemicity require support from the global community to ensure equitable access to testing supplies and to strengthen capacity and mentorship to implement global standards at national and regional levels.



RECOMMENDATIONS



1) Staining thin smears and thick drops; and 2) Specimen testing by rapid tests (Ag-RDT) at the Southern Regional Laboratory. Yves Joseph/FHI 360

- Haiti and the Dominican Republic should collaboratively implement a public health policy involving civil society, regional authorities, and local and international partners to address diseases with epidemiological potential, especially malaria.

- Prepare test panels annually to facilitate EQA at the LNSP and to support training and retraining of laboratory technicians.
- Develop a prioritization plan initially for bi-annual and then for quarterly EQAs in line with WHO standards.
- Establish a good governance policy to ensure the availability of necessary resources to maintain the microscopy standards/procedures, including adequate management of stock and inputs, training, and supervisory visits from central and departmental levels.

AFFILIATIONS: ¹National Laboratory of Public Health (LNSP) - Ministry of Public Health and Population (MSPP), ²FHI 360

Enhancing Global Health Security (EGHS) is funded by U.S. Centers for Disease Control and Prevention (CDC) and implemented by FHI 360 and its partners. The contents are the responsibility of FHI 360. The findings and conclusions in this poster do not necessarily represent the views of the CDC or the project partners.

