

LABORATORY PERFORMANCE EVALUATION OF MALARIA MORPHOLOGICAL IDENTIFICATION IN EQA PROGRAMS

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INTRODUCTION

- Malaria, one of the main worldwide health diseases, is caused by *Plasmodium* species being of utmost importance the correct identification of each *Plasmodium* spp. (1)
- Since 1995, the National Program for External Quality Assessment (PNAEQ) has implemented a Parasitic Morphology program which aims to evaluate the performance of participant laboratories in the identification of parasitic structures.
- To continually improve their performance, PNAEQ, in collaboration with a work group, provide updated scientific reports, courses and, when needed, implement corrective actions.



The aim of this study is to evaluate performance of the participants in the Parasitic Morphology program, in the identification of *Plasmodium falciparum*, *Plasmodium malariae* and *Plasmodium ovale*, from 2011 to 2018.

METHODOLOGY



Among three annual rounds, the program provided blood smears (control samples) with instruction letters and result forms to each participant to perform the identification.



Results were analyzed using the χ^2 test from Excel Office 365 program. For each species and year, results were grouped by laboratory type (outpatient or hospital).

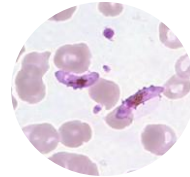


It was established that the performance values were:

- Satisfactory $\geq 60\%$
- Unsatisfactory $< 60\%$

RESULTS

P. falciparum is one of the most important malaria species. Therefore, PNAEQ sends frequently to the participants blood smears containing this species.



In this study, *P. falciparum* was present in the control samples sent to the participants in 2011, 2016, 2017 and 2018.

According to Figure 1, the performance of participants was mainly satisfactory. Hospital laboratories obtained satisfactory results in all years, except outpatient laboratories which failed in 2016 (57%).

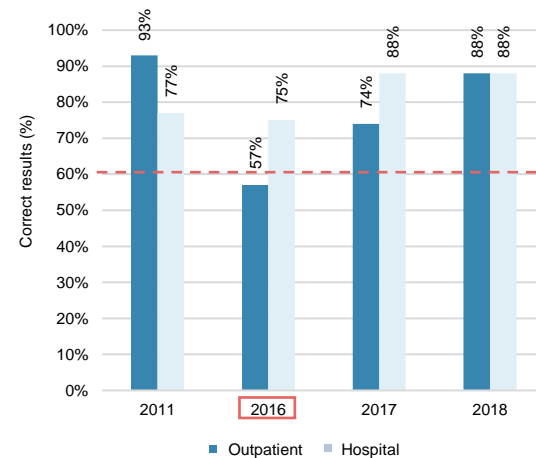
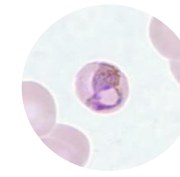


Figure 1. Participant's performance of *Plasmodium falciparum* identification.

P. malariae was present in blood smears sent to the participants in 2011 and between 2014 and 2018. This species is known to have a low parasitemia, which may difficult their identification.



In Figure 2, performance results showed that the identification was satisfactory for outpatient laboratories in 2015 and 2017 and for hospital laboratories between 2015 and 2018. In 2012 and 2014 both hospital and outpatient laboratories had unsatisfactory results. In 2016 and 2018 outpatient laboratories had results below 60%.

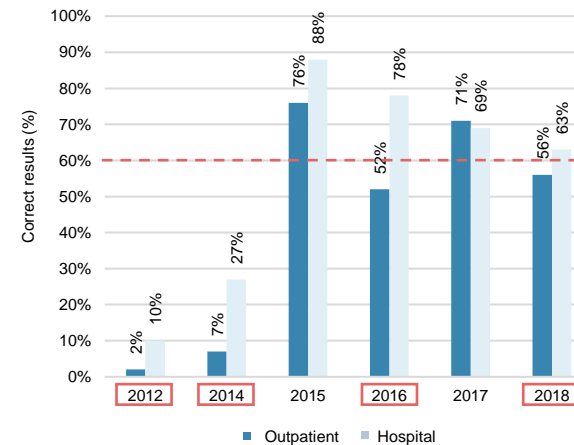
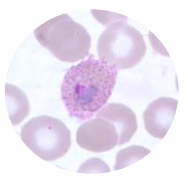


Figure 2. Participant's performance of *Plasmodium malariae* identification.

P. ovale was present in the control samples sent to the participants in 2011, 2012, 2014 and 2018. This species has a low parasitemia, such as *P. malariae*.



Statistical analysis revealed that performance results of *P. ovale* identification were mostly unsatisfactory (Figure 3), except made to 2011 revealing satisfactory results in each of laboratory type. The performance in the identification of these last two species was extremely low in 2012 and 2014, possibly justified by a mixed infection present in the blood smears. Normally, this type of sample is analyzed by molecular methods due to its high complexity.

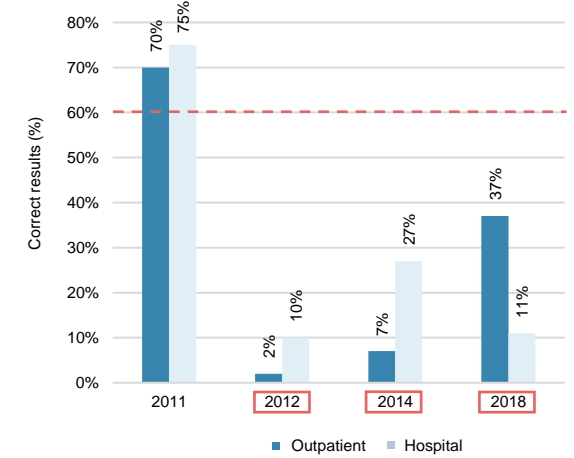


Figure 3. Participant's performance of *Plasmodium ovale* identification.

CONCLUSION

Malaria as a serious disease impose a correct identification of *Plasmodium* spp. in order to guide the clinicians into the adequate therapy. These results showed that the laboratory capacity for parasites identification differ across the three species. Therefore, the participation in EQA program in Parasitic Morphology is crucial for the continuous improvement of laboratory performance to monitor the quality of results and to assist in the adequate corrective measure to apply, since it is an area with methodologies that not only depend on theoretical knowledge but also on the performance of the operator's technician.