and specificity of RDTs.The sensitivity of SD Bioline in this study was found to be (86.9%) while its specificity was 75.0% for the diagnosis of *P. falciparum*. This findings is in sharp contrast with the observations of Agomo *et al.,* (2003) where SD Bioline's sensitivity and specificity was reported to be 54.84% and 42.9% respectively. The positive (PPV) and negative predictive values (NPV) around 68.0% are however at variance with the PPV of (73.9%) and NPV (87.6%) obtained in this study. This also varied with the work of Zacheaus *et al*., (2007) who reported 47% sensitivity, 100% for specificity and PPV but with a similarity of 83.2% NPV. Difference in the detection of HRP-2 in the study area could have been the reason for the difference observed as compared to other settings. For Carestart the sensitivity, specificity, PPV and NPV were 71.9%, 82.8%, 77.3% and 78.3%. This compares well with similarity with the study of Sheyin and Bigwan, 2013 who reported a sensitivity of 78.4% with Carestart pf but differed with the specificity 97.6%, PPV 97.3% and NPV 80.1%. It also didn't agree with that of Sani *et al.,* 2013 who reported 90.2%, 95.4%, 93.0% and 93.4% for sensitivity, specificity, PPV and NPV. When compared to that of SD Bioline used in this study the percentages varied in sensitivity, specificity and NPV but showed similarity in PPV. This may imply that the RDTs when used for detecting *P.falciparum* such differences should not arise. These differences may have been due to differences stemming from company composition of RDTs and it is likely that symptomatic subjects used in their studies are likely to have higher parasite densities. Antec pf/pv RDT showed a very low sensitivity of 50.8% but higher specificity 95.5% and PPV 90.2% with 70.4% for NPV. This low sensitivity is similar to Zachaeus *et al.,* 2007 and Agomo *et al*., 2003 who reported 47% and 54.84% sensitivities in their studies, also a high specificity and PPV of 95.5% and 90.2% reported in this study concurs with that of Zachaeus *et al*., 2007 and an NPV of 70.5%, this is however at variance with that of Agomo *et al*., 2003. Since the study was carried out in an endemic setting it was expected that the HRP2 test line should give a higher sensitivity but this wasn't so. The low sensitivity could mean a high rate of false negatives as confirmed by the report of previous authors that PLDH test perform less well than the HRP2 especially in low parasite densities (Abba *et al*., 2011; Kattenberg *et al*., 2012). However it has an advantage that it does not persist in the blood but clears about the same time as the parasites following treatment. The lack of antigen persistence after treatment makes the PLDH useful in predicting treatment failure unlike the Pf HRP2 that persists in the blood after parasite clearance.

The RDTs performed differently in different age groups. Microscopy was more effective in determining infection in four age groups namely 40-49 yrs (76.92%), 50-59 yrs (59.6%), 30-39 yrs (57.58%), 60-69 yrs (55.0%) and 10-19 years (53.42%). The lower performance of microscopy with younger age groups could be attributed to recurrent self - treatment at any attack of fever which could give false positives with the RDTs. SD Bioline performed more effectively in three age groups namely ≤ 9 years (69.0%), 10-19 yrs (67.12%) and 30-39 yrs (60.6%). Carestart and Antec were more effective in determining infection in one age group each namely 10-19 years (73.97%) and 80-89 years (33.31%) respectively. Antec was not as effective in determining infection as the other RDTs and microscopy. The differences in effectiveness of the diagnostic tests could be as a result of parasite densities in each person's blood as a result of level of exposure to the bites of infected mosquitoes and composition of the RDTs since they emanate from different manufacturers. The highest prevalence of infection with RDTs was in the age group of 10-19 yrs (73.97%) with Carestart and 40-49 years (76.92%) with microscopy. This might not be too different with the reports of Sheyin and Bigwan (2013) whose reports showed highest prevalence of infection in age group 0-20 years with

Carestart and microscopy. Increased exposure to mosquito bite due to the practice of improper utilization of long lasting insecticide nets might have led to the high prevalence recorded.

Gender related infective rates showedthat females (42.37%) were more vulnerable than males (39.59%) for malaria a finding that is similar to that of Sheyin and Bigwan (2013). This could be attributed to the fact that the women and girls were exposed to mosquito bites because they are more involved in agricultural activities than their male counterparts. Females have lower red blood count which is associated with excessive loss of blood which occurs during menstruation making them more susceptible to malaria infection. This finding differs from that of Adekunle *et al.,* 2014 and Ubiaru *et al.,* 2018 who reported higher a prevalence in males than females. Performances between the communities showed that in Umuevu (68.0%) and Umuawada (66.0%) microscopy was more effective than the RDT's. The higher prevalence in the two communities could be that the inhabitants sought treatment in the patent medicine stores rather than going to the health centers because of the distance. This recourse to self-medication will lead to anti–malaria drug resistance that usually worsens their malaria burden (Brieger *et al*., 2001, Amuta & Ikpa, 2005).

The lower performances of the RDTs could be due to delay in HRP2 surge after increased parasite density or *P. falciparum* with an HRP2 gene deletion or reduced HRP2 expression (Bell *et al*., 2005) and such patients never give a positive result with these tests (Moody, 2002). Some studies have also reported reduced sensitivity of RDTs as a result of low parasitaemia (Ishengoma *et al*., 2011). In Umuoma and Umuekpeke, RDTs performed better than microscopy and this may be as a result of nearness of these communities to the health center than the former. These communities visit the health centers and get diagnosed and treated thus, there may not be new episodes of malaria infection but persistence of malaria antigen in the bloodstream will give a positive result with the RDTs. It is also likely that some of the subjects with false-positive results may have performed self-medication with antimalarial drugs during an attack of fever. However, it is unlikely that these factors account for the entire set of false-positive cases. It is more probable that most of the false-positive cases were true positives which were not detected by microscopy, due to sequestration limiting the number of circulating parasites at the time of blood collection or due to the parasitaemia being below the detection limit of approximately 50/µl by microscopy.

5. Conclusion

Malaria is the most important infectious diseases that present a diagnostic challenge to laboratories in most countries especially in poor resource settings. This study has shown that some RDTs can outperform expert microscopy in detecting *P. falciparum* and thus can offer a useful alternative to microscopy in situations where reliable microscopic diagnosis procedures are not available.

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