Trends in laboratory confirmation of malaria cases in the Achimota Hospital in Accra, Ghana

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Abstract

Malaria is an important public health problem and a leading cause of morbidity and mortality [in sub-Saharan Africa] that requires accurate diagnosis. But in many sub-Saharan countries treatment relies on presumptive diagnosis without laboratory confirmation. In Ghana, with children under 5 years and pregnant women are the most affected. Efforts to describe the epidemiological trend of malaria could enable directed interventions. This study was conducted to estimate annual incidence rates and to describe the trend in Laboratory cases in the Achimota Hospital in Accra, Ghana. A descriptive cross sectional study design was used to describe the magnitude of laboratory confirmed cases and clinical trend of laboratory confirmed cases. The data source for this study was essentially secondary and retrospective. A total of 9686 suspected malaria cases (between 2009 and 2011) were tested at the laboratory out of which 1194 were confirmed as malaria (12.3%). Of the confirmed cases, children under five were 351 (29.4%). Those above 5 years were 751 (62.9%) and pregnant women were 79 (6.6%). There was a decreasing trend in the incidence of malaria among all the vulnerable groups. More episodes of malaria occurred among females than males.

Keywords: Malaria; Laboratory confirmation; Plasmodium falciparum; Achimota

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1. Introduction

1.1. Background of the Study

People are at risk of malaria in 109 countries worldwide (W.H.O, 2008) and varies in levels of intensity and the *Anopheles* mosquito species that transmit it. Thirty-five (35) countries are responsible for 98% of the total malaria deaths world-wide and contribute to 96% of malaria cases and morbidity in sub-Saharan Africa. Approximately 694 million people are estimated to be at risk of malaria in African countries, representing 21% of the global population at risk (WHO, 2008).

Laboratory services play an important role in supporting health workers (in respect to malaria disease) in correct diagnosis, identifying the malaria causing agents, helping clinicians to determine the right treatment and thus rational drug uses. Improving disease recognition such as malaria improves the accuracy of statistical reporting and promotes effective national health planning. However, precise statistics on malaria parasite are unknown because many cases occur in rural areas where people do not have access to hospitals and/or the means to afford healthcare. Consequently, many cases are undocumented.

The Greater Accra Region [in Ghana] annual report (MOH 2008), states that there is a problem of low laboratory confirmation of malaria diagnosis. Most cases reported as malaria were labeled as "febrile illness presumed malaria" and only 5.7% of cases diagnosed as malaria were confirmed. Although there were more reported cases of malaria in 2008 than in previous years, it is uncertain how much of this was a real increase in cases and how much of it was an increase through diagnosis (MOH 2008).

Quite often, national disease burdens are either not estimated or estimated using inaccurate methods. This may be explained by the fact that data sources for assessing disease burden (e.g. nationally representative household surveys, demographic surveillance sites, and routine health information systems) have their limitations. An important step forward is a consistent quantification of the population at risk of malaria. It is important to assess trends of clinical cases.

In Ghana, diagnosis is progressively being shifted from clinical approach to laboratory confirmation as the basis for treatment; which means that in patients with suspected malaria, a confirmed diagnosis is recommended before given anti-malarial treatment. However, in line with WHO and Integrated Management of Childhood Illness [IMCI] guidelines and the epidemiological distribution of malaria in Ghana, children under 5 years of age are exempted from being treated presumptively. Also as part of Ghana's policy, a microscopic diagnosis should be carried out when possible and microscopic testing should be the standards at health facilities. In general rapid Diagnostic Test [RDT] is required at sub district level health facilities such as health centres and CHPS compounds.

1.2. Problem statement

Malaria is hyper endemic in Ghana and the leading cause of morbidity and mortality. Prompt and accurate diagnosis of malaria within 24 hours is key to effective disease management, and is essential to a holistic improvement. However, the implementation process is faced with challenges including poor access to

accurate laboratory diagnosis of malaria and non–adherence to national policy on laboratory diagnosis and treatment.

Indeed, very few research studies have been carried out on the trend of laboratory confirmation of malaria in Ghana and very little is known in the Achimota Municipality concerning this very important subject.

Correct diagnosis of malaria is crucial for proper treatment of patients and surveillance of the disease. However, laboratory diagnosis of malaria in Ghana is normally constrained by inadequate infrastructure, inaccurate microscopy and symptomatic diagnosis of malaria and insufficient skilled personnel. Although numerous efforts have been made to fight malaria in many endemic countries, achievements have been minimal due to relying on inadequate laboratory confirmation and appropriate treatment of cases. This study therefore seeks to find out the trends in laboratory confirmation of malaria in Achimota Hospital from 2009 to 2011 as a guide for policy decisions.

1.3. Significance of the study

The study intends to provide adequate information to policy makers to provide suitable healthcare programmes for Achimota Hospital. The findings of the study will clarify certain management issues of laboratory diagnosis to adopt best practices, such as establishing a reliable malaria surveillance system which could detect cases and monitor trends, based upon laboratory confirmation of *Plasmodium infection* in persons with fever.

In an attempt to strengthen strategies to reduce the incidence of prevailing health events, there is an urgent need to critically study the existing trend of the diseases which is essential as well as dissemination of information for policy decision at all levels.

1.4. Research questions

The following research questions were posed:
- What are the trends in laboratory confirmation in children below five (5) years?
- What are the trends in laboratory confirmation in pregnant women?
- What is the general trend in malaria laboratory confirmation between 2009 and 2011?
- What are the trends in laboratory confirmation in children above five years?

1.5. Objective of the study

1.5.1. The general objective of this study is to:

Identify the trend in laboratory confirmation of malaria in Achimota hospital from 2009 to 2011.

1.5.2. The specific objectives of this study are to:

- Identify the trend in laboratory confirmation in children below five (5) years.
- Identify the trend in laboratory confirmation in people above five years.
- Identify the trend in laboratory confirmation in pregnant women.
- Document the trend in malaria laboratory confirmation from 2009 to 2011.

2. Research methodology

2.1. Introduction

The section outlines the research processes, procedures and techniques adapted in the project. This includes the research design, sampling procedure, sources of data collection and analysis. It also presents the corporate profile of Achimota Hospital and provides a brief historical background of the organization under study.

2.2. Research design

A descriptive cross sectional descriptive study design was used to describe the magnitude of laboratory confirmed cases, clinical trend in comparison with laboratory confirmed cases, comparison of laboratory diagnosis with RDT and age and sex distribution of malaria cases. The data source for this study was essentially secondary and retrospective.

2.3. Sources of data

Secondary source of data were used for the research. Most of the data gathered were from Achimota hospital records. Other data were gathered from other sources such as related journals and hospital documents on to the topic.

2.4. Research population

Targeted population or the criteria for inclusion in this study were registered nurses working in Achimota hospital, healthcare assistants employed by the hospital, laboratory assistants employed in the Achimota hospital and hospital records in the Greater Accra Region of Ghana.

2.5. Sample size

In this study, the total numbers of different categories of health workers were seven (9). These health workers were three (3) registered nurses, [health information officer], two (2) healthcare assistants and two (2) laboratory technicians, Disease control officer were chosen based on their level of experience in handling malaria cases both in the laboratory and patient care.

2.6. Sampling procedure

Purposive sampling was also used in this study. Parahoo (1997:232) describes purposive sampling as "a method of sampling where the researcher deliberately chooses who to include in the study based on their ability to provide necessary data". The rationale for choosing these procedures was that the researcher was seeking knowledge about the health persons' opinion of symptoms and trends of malaria cases in the hospital under study.

2.7. Data analysis

The raw data from the respondents were tabulated using Microsoft Office Excel software and transferred to SPSS software version 16 for final analysis. Statistical analysis (using SPSS version 16) were performed and presented in Graphs, [pie charts, line graphs], Frequency Tables and in line with the study objectives.

2.8. Ethical consideration

The protocol for this study was reviewed and certified by the School of Public Health of University of Ghana, after satisfying with the modalities of data collection and ethical issues. Informed consent was sought from the Medical Superintendent of the Achimota Hospital by explaining the rationale for the study and data collection approaches. A copy of the final report was presented to the Medical Superintendent to aid decision making and also serve as a reference document. The study did not require individual patient's informed consent as names of patients was not relevant and hence was not captured in the data source.

2.9. The study area

2.9.1. History of Achimota Hospital

Achimota Hospital was established in 1927 by the Achimota School authorities ten (10) years after the establishment of the Achimota School in 1917.

It is situated within the Achimota School and was originally built to cater for the health needs of the students, staff and other institutions within its catchment area such as Accra Girls' and Presbyterian Boys' Secondary Schools. In 1974 the hospital was handed over to the Ministry of Health and was declared a public facility. The hospital now caters for most of the educational facilities within and outside the catchment area as well as the communities in the surrounding towns and villages.

The hospital is situated in Okaikoi Sub- Metro, but serves both the Ayawaso and Okaikoi Sub- Districts as it is near their bothers. It is situated at the Western part of Accra.

The area is bounded on the North by Ga District (Haatso), the South by Achimota Railway, the East by Ayawaso District (Legon) and on the West by the Ga East district (Dome). The area is a mixed community with a projected population of 57, 376 (2011) and a growth rate of 4.40. The community is made up of mostly employees, traders and individuals who engage in small- scale businesses.

3. Data analysis and interpretation

This section of the research describes data collected from Achimota Hospital. The data which are basically secondary was used to answer the objectives of this study. The chapter is divided into subheadings in line with the study objectives and presented as follows;

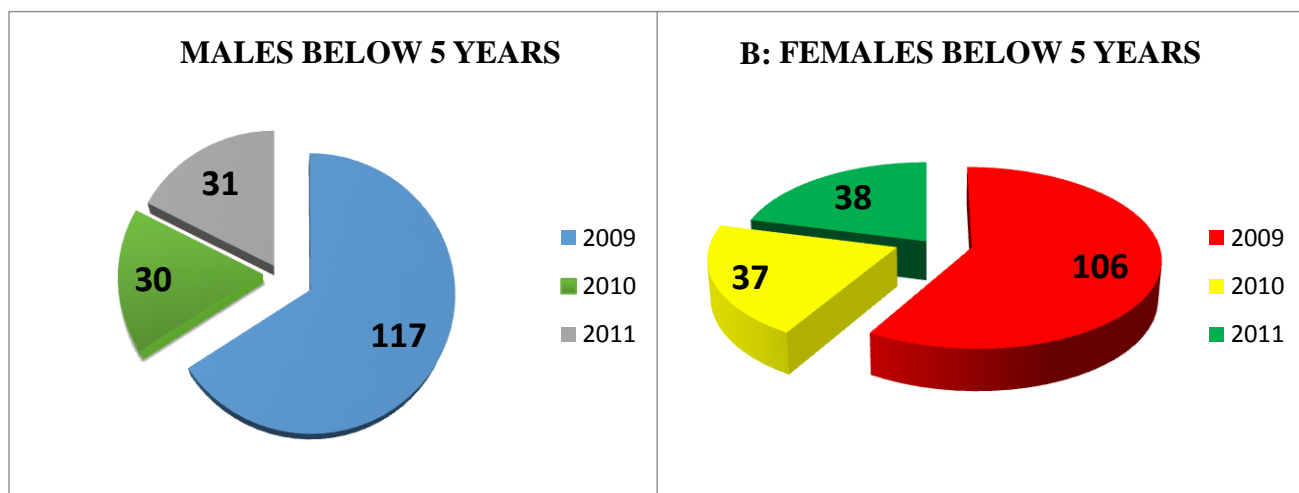3.1. Trends in laboratory confirmation in children below five (5) years

Figure 1. Laboratory Confirmation in Children below Five Years (2009, 2010 and 2011)

Figure 1A and 1B describe the data collected on laboratory confirmation in children below five years of age. The data collected were categorised into male and female children. It was found that in 2009, one hundred and seventeen (117) male children were confirmed in the laboratory to have malaria. Subsequently, in 2010 thirty (30) males under 5 years were also confirmed in the laboratory with malaria and in 2011, thirty-one (31) males were also confirmed with malaria in the laboratory showing a gradual trend of disease.

Furthermore, laboratory results comfirmed that one hundred and six (106) females under the age of five (5) were confirmed to have malaria [in the laboratory] in 2009, thirty-seven (37) females under age five were also confirmed with malaria [in the laboratory] in 2010. Later in 2011, the number of females under five years who were confirmed to have malaria was thirty-eight (38). From the above data collection and the analysis derived, the trend of malaria infection declined steadily from the year 2009 to 2011.

3.2. Identifying the trend in laboratory confirmation in pregnant women

The second objective was to identify the trend in the laboratory confirmation of malaria in pregnant women. Like the first objective, pregnant women are vulnerable to malaria. It was therefore relevant to find out how often they get affected with malaria through laboratory confirmation. Figure 2 shows the trend of malaria in pregnant women from the year 2009 to 2011.

PREGNANT WOMEN CONFIRMED
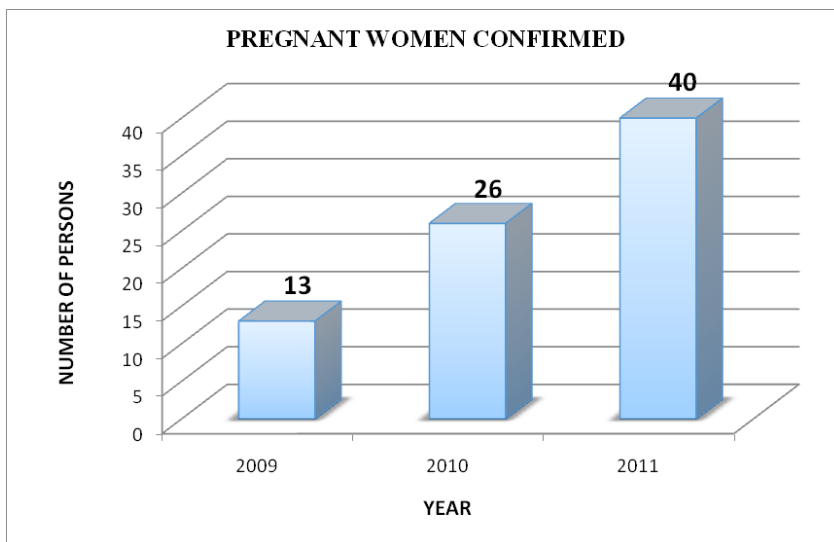
Figure 2. Laboratory Confirmation of Malaria in Pregnant Women

As presented in figure 2, pregnant women who were confirmed in the laboratory to have malaria were, thirteen (13) in 2009 and twenty-six (26) in 2010. In 2011, the number of pregnant women with malaria from confirmed laboratory results were forty (40) showing a gradual trend of increase. The trend in laboratory confirmation of malaria in children five years and above were analysed and presented in figure 3.

3.3. Trend of laboratory confirmation in above 5 years

A: MALES 5 YEARS AND ABOVE

B: FEMALES 5 YEARS AND ABOVE
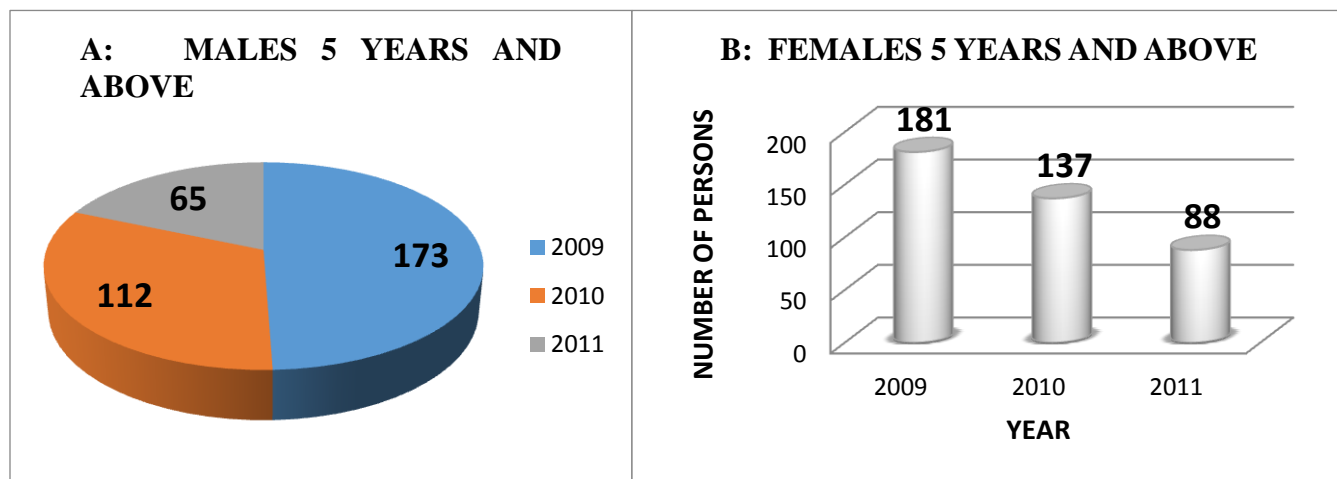
Figure 3. Laboratory Confirmation of Malaria in Children Five Years And Above

The pie chart in Figure 3a describes males who were confirmed in the laboratory to have malaria from the year 2009 to 2011. One hundred and seventy three (173) males, representing a greater chunck of the pie

were connfirmed in 2009. Laboratory confirmation results showed that one hundred and twelve (112) males had malaria and sixty-five (65) of males who were five years and older were confirmed in the laboratory to have malaria in 2011.

The analysis as presented in Figure 3B shows that, one hundred and eighty-one (181) females in [2009] were all confirmed in the laboratory to have malaria. In 2010, one hunndred and thirty-seven (137) females had malaria confirmed in the laboratory. In 2011, eighty-eight (88) females had malaria confirmed in laboratory.

3.4. The general trend in malaria laboratory confirmation within the years 2009 and 2011

The pie chart in figure 4 gives a pictorial analysis of trends in malaria laboratory confirmation on all persons in Achimota Hospital from the year 2009 to 2011.
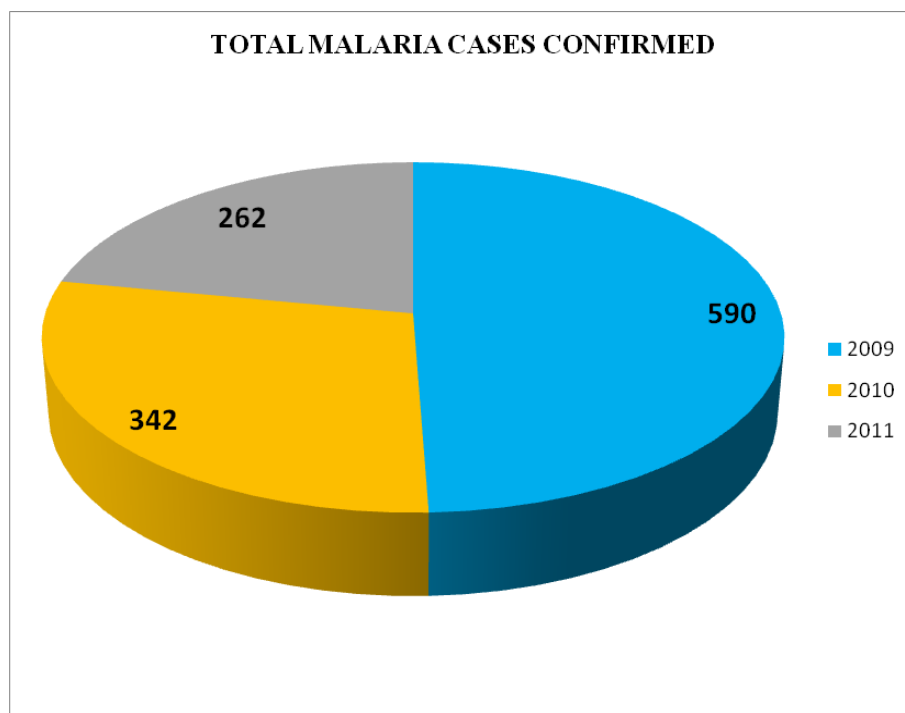
Figure 4. Total Laboratory Confirmation of Malaria from Year 2009 to 2011

About five hundred and ninety (590) persons, consisting of children and adults, were tested and confirmed to have malaria in the laboratory in 2009. Later in 2010, three hundred and forty-two (342) persons were confirmed in the laboratory to have malaria and two hunndred and sixty-two (262) people had a confirmation from the laboratory to contract malaria. The analysis of the chart above shows that the number of persons confirmed from the laboratory with malaria declined within the three years of study.

This developmennt can be described as encouraging although much could be done to reduce the trend in the Achimota hospital.

3.5. Trend of confiremed monthly malaria cases 2009-2011
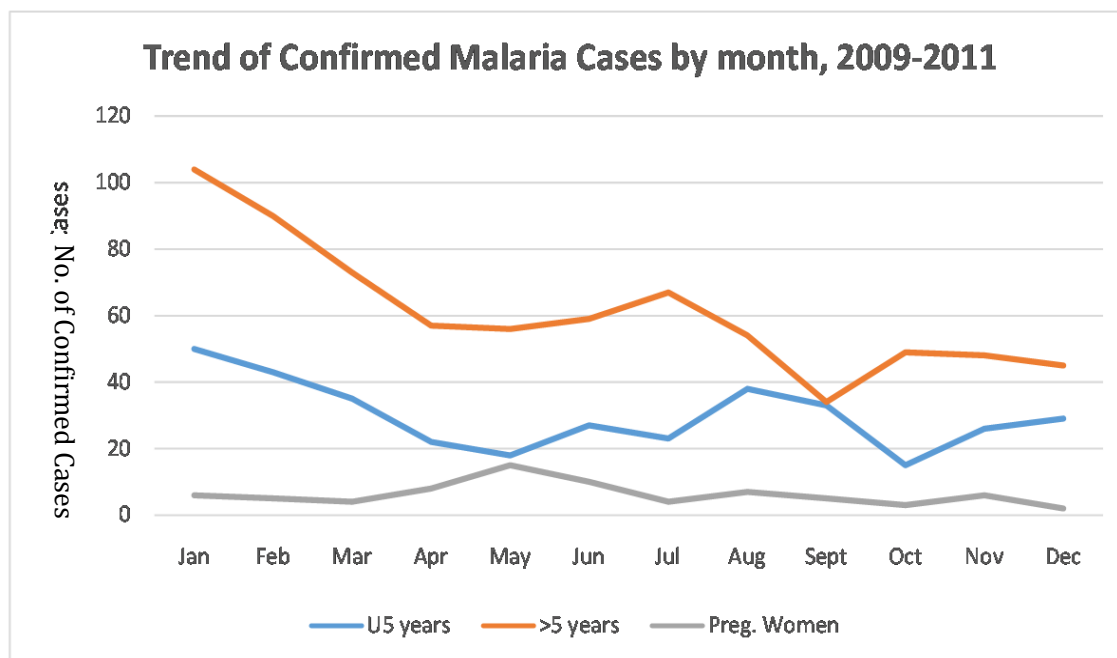
Figure 5. Trend of monthly Confirmed Malaria cases among vulnerable groups, 2009-2011

The graph shows a decreasing trend in all the vulnerable groups [U5 and >5] for the period 2009-2011. There was a decrease in cases from January to April before decreasing steadily in December. In children above 5 years there was a gradual increase of malaria cases from May to August. Children below 5 years also had an increase from May to August. This could be explained by the fact that raining season [May and September] provided the environmental condition for mosquitoes to breed. In the case of pregnant women, after an increase from March to May there was a gradual decrease of confirmed malaria cases from May to December. The decrease in parasites in children under 5 years and pregnant women, could be explained by the fact that the focus of malaria control programme is mostly on the vulnerable groups.

4. Summary, conclusions and recommendations

This study was conducted for the purpose of finding out the trend in laboratory confirmation of malaria in Achimota hospital for the period, 2009 to 2011. This was done through the collection of secondary data from the hospital. Data were also collected from employees, mainly laboratory technicians and assistants from the hospital.

4.1. Trends in laboratory confirmation in children below five (5) years

The first objective of the study investigated the trend in laboratory confirmation in children below the age five (5). In 2009, male children who were tested for malaria were five hundred and eighty-three (583) and out of that number, one hundred and seventeen (117) were confirmed to have malaria. Subsequently in 2010, two hundred and seventeen (217) of these children were tested and only thirty (30) of them were confirmed to have malaria. In 2011 two hundred and seven (207) were tested and only thirty-one (31) were confirmed. In all, a total of one thousand and seven (1007) female children were tested in the laboratory for malaria and one hundred and seventy-eight (178) were confirmed to have malaria after the diagnosis, representing 17.7% of the total.

Female children under 5 years who were confirmed with malaria [2009 to 2011] were one hundred and eighty one (181). Thus one hundred and six (106) in 2009, thirty seven (37) in 2010 and thirty eight (38) in 2011. This is 14.3 percent of the total number of one thousand two hundred and sixty two (1262) tested.

Children under five (5) with laboratory confirmation has decreased. This may be explained by the fact that measures were taken by Achimota hospital authorities to give daily health education on the prevention of malaria and the need to test for malaria at the Out Patient Department.

4.2. Trend in laboratory confirmation in pregnant women

The second objective of the study sought to examine the trend in laboratory confirmation in pregnant women. Four hundred and forty-six (446) pregnant women were tested and out of that number, seventy-nine (79) were confirmed with malaria which represents 17.7% of number tested. Unlike the children, pregnant women who checked their malaria status increased over the years and subsequently, those who were confirmed with malaria increased.

4.3. Trend in laboratory confirmation in persons five (5) years and above

The third objective of the study examined trends in laboratory confirmation in persons five (5) years of age and above. From the findings, three thousand six hundred and eighty (3680) were recorded as cases of adults (from 5 years and above) in the laboratory of which one thousand nine hundred and eleven (1911) were males and one thousand seven hundred and sixty-nine (1769) were females. In 2010, one thousand seven hundred and ninety-six (1796) were tested for malaria. One hundred and twelve (112) were males and one hundred and thirty-seven (137) were female making a total of two hundred and ninety-six (296) confirmed cases. The total number who were tested for malaria in 2011 were one thousand four hundred and ninety-five (1495); sixty-five (65) were males and eighty-eight (88) were females and a total of one hundred and fifty-three (153) confirmed to have malaria.

Overall, six thousand seven hundred and ninety-one (6791) patients above five (5) years and seven hundred and fifty-six (756) above five (5) years were confirmed to have malaria; 10.8% of the total.

4.4. Trend in laboratory confirmation of malaria, 2009-2011

The fourth objective of this study seeks to find out the general trend in malaria laboratory confirmation from 2009 to 2011. From the analysis, the total number of people, [young, old, pregnant and irrespective of their gender] who came to the laboratories of Achimota Hospital to check for malaria decreased. Overall, five thousand one hundred and twenty-two (5122) cases were tested and five hundred and ninety (590) were confirmed in 2009. However in 2010, two thousand four hundred and four (2404) cases were tested in total and three hundred and forty-two (342) were confirmed cases. In 2011, the number further reduced to two thousand one hundred and sixty (2160) as total cases tested and two hundred and sixty-two (262) of them were finally confirmed with malaria after the diagnostics.

5. Conclusions and recommendations

5.1. Conclusions

Based on the results of the study, the following conclusions are drawn:

- There is a decreased trend in the incidence of confirmed malaria in the Achimota Hospital.
- There are more episodes of malaria in males than females.
- Children under five are more vulnerable to malaria.

5.2. Recommendations

- Management should equip the laboratory with instruments, staff and reagents so that more people could be tested for Malaria.
- Regular in-service trainings should be given to staff working at the laboratory so that they would be current with procedures for testing malaria.
- The malaria control programme should subsidize the cost involved in testing for malaria so that more people could test for malaria.
- There is the need for further investigation into why children under five years and pregnant women are more vulnerable to malaria.

Acknowledgement

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APPENDIX

Appendix 1: Confirmed Malaria Cases Data Capture form

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CONFIRMED MALARIA CASES: TREND ANALYSIS OF MALARIA DATA COMPILATION FORM

DATE OF EXTRACTION……………………………………………………...YEAR……………………

MONTH	TOTAL MALARIA CASES											CONFIRMED MALARIA CASES											
				Under 5yrs			Above 5yrs (excluding preg. Women)			Pregnant				Under 5yrs			Above 5yrs (excluding preg. Women)			Pregnant
	M*	F*	Tot*	M	F	Tot	M	F	Tot	Women	M*	F*	Tot*	M	F	Tot	M	F	Tot	women
Jan.																				
Feb.																				
Mar																				
Apr																				
May																				
Jun																				
July																				
Aug																				
Sept																				
Oct																				
Nov																				
Dec																				
TOTAL																				

*M=Male *F=Female *Tot=Total