



Grant agreement no. 243964

QWeCI

**Quantifying Weather and Climate Impacts on Health
in Developing Countries**

**M5.2a: Longitudinal survey of entomological and confirmed malaria cases
(data)**

Start date of project: 1st February 2010

Duration: 42 months

Lead contractor : KNUST
Coordinator of milestone : S. K. Danour
Evolution of milestone

Due date : M12
Date of first draft : M13
Start of review : M15
Milestone accepted : M15

Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013)

Dissemination Level

PU	Public	PU
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

The report on Milestone M5.2a is made up of two parts:

- a. Report on longitudinal survey of confirmed malaria cases (data) between January – December, 2010 at some of the Hospitals of the Study Sites, and
- b. Report on longitudinal survey of entomological data

- a. Report on longitudinal survey of confirmed malaria cases (data) between January and December, 2010 at some of the hospitals of the study sites**

Background of the Ghana Pilot project

The Ghana pilot project includes urban, peri-urban and rural malaria. The main objective is to determine the effects of climate variables on malaria and its vector in Ghana using laboratory data from hospitals.

Study Sites

The study sites comprise 2 rural, 2 peri-urban and 2 urban districts in the Ashanti Region (forest belt) of Ghana.

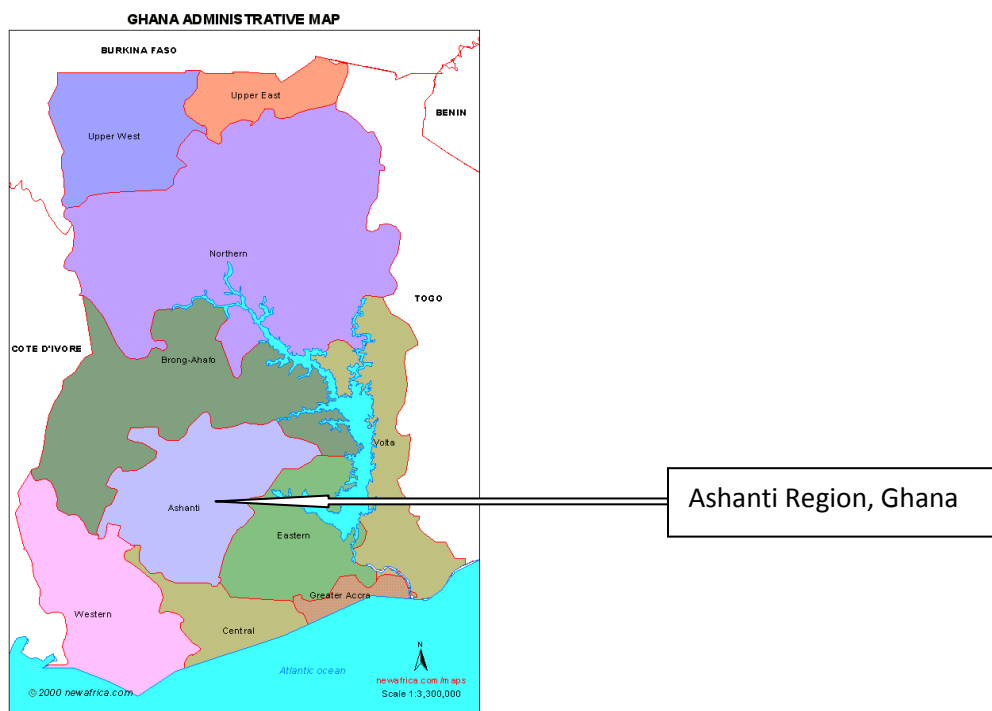


Fig. 1: Map of Ghana showing the Ashanti Region which lies in the forest belt.

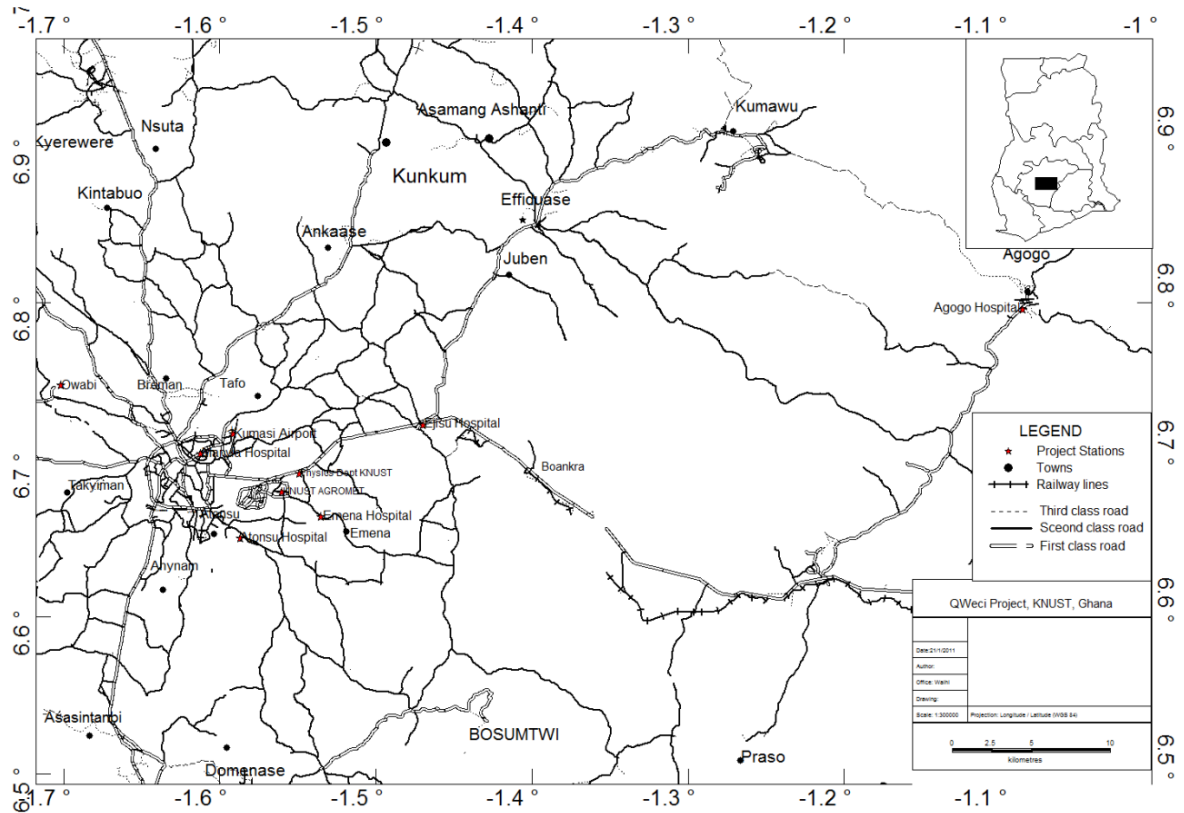


Fig. 2: Map of Ashanti region, showing in the QWeCI project sites;

Weather stations: Owabi, Kumasi Airport, Emena and KNUST;

Hospitals: Agogo (rural), Nkwawie (rural), Ejsu (peri-urban), Emena (peri-urban)

Atonsu (urban) and Manyhia (urban)

The map shown in Fig. 1 was created using GPS way points taken during visit to the hospital sites as well as the meteorological field sites.

Activities carried out:

1. Establishment of the QWeCI weather stations

For the purpose of getting a good monitoring network for recording the meteorological variables, some solar-powered automatic weather stations have been installed at the existing GMet weather stations and one at Emena hospital. The equipment was supplied by the University of Cologne to support the QWeCI project and the Meteorology and Climate Science programme at KNUST. The QWeCI weather stations are located at Emena Hospital, Kumasi Airport, Owabi and KNUST (Agromet Station).

2. Morbidity surveillance: the following activities have been carried out:

- Determination of plasmodium species using malaria rapid diagnostic kits (RDTs)
- Collection of laboratory confirmed malaria data from the hospitals (six sites : Jan – Dec, 2010); 2 peri-urban hospitals, 2 rural hospitals and 2 urban hospitals
- Identification of home districts of the patients

3. Record of GPS coordinates: the GPS coordinates of the following have been recorded:

- Study sites (health facilities and weather stations)
- Home locations of the patients

4. Meteorological data collection: data on the following parameters have been collected during the study period:

- Surface Temperatures at 2 and 4 m
- Rainfall
- Relative Humidity at 2 and 4 m
- Sunshine hours
- Evaporation
- Wind speed
- Soil matrix potential
- Soil heat flux
- Up and down shortwave and long-wave radiation
- Surface pressure

5. Graphical plots, statistical analysis and interpretation of meteorological variables and malaria cases

Graphical plots of the meteorological variables and malaria cases data have been carried out for the period January to December, 2010. Statistical analysis of the meteorological variables and malaria data have also been carried out for the same period to find out the impact of the variability of the climate variables on malaria prevalence and incidence.

6. First preliminary results of rainfall comparisons with malaria prevalence

Data analysis has been carried out for the malaria cases reported at the QWeCI project hospitals for the period January to December, 2010. Comparison of all the malaria cases recorded at the hospitals is shown in Fig.3. The results of the correlation of rainfall with the malaria cases are shown in Figs. 4, 5, 6, and 7. The results show increasing malaria cases with rainfall for Nkawie, a rural community.

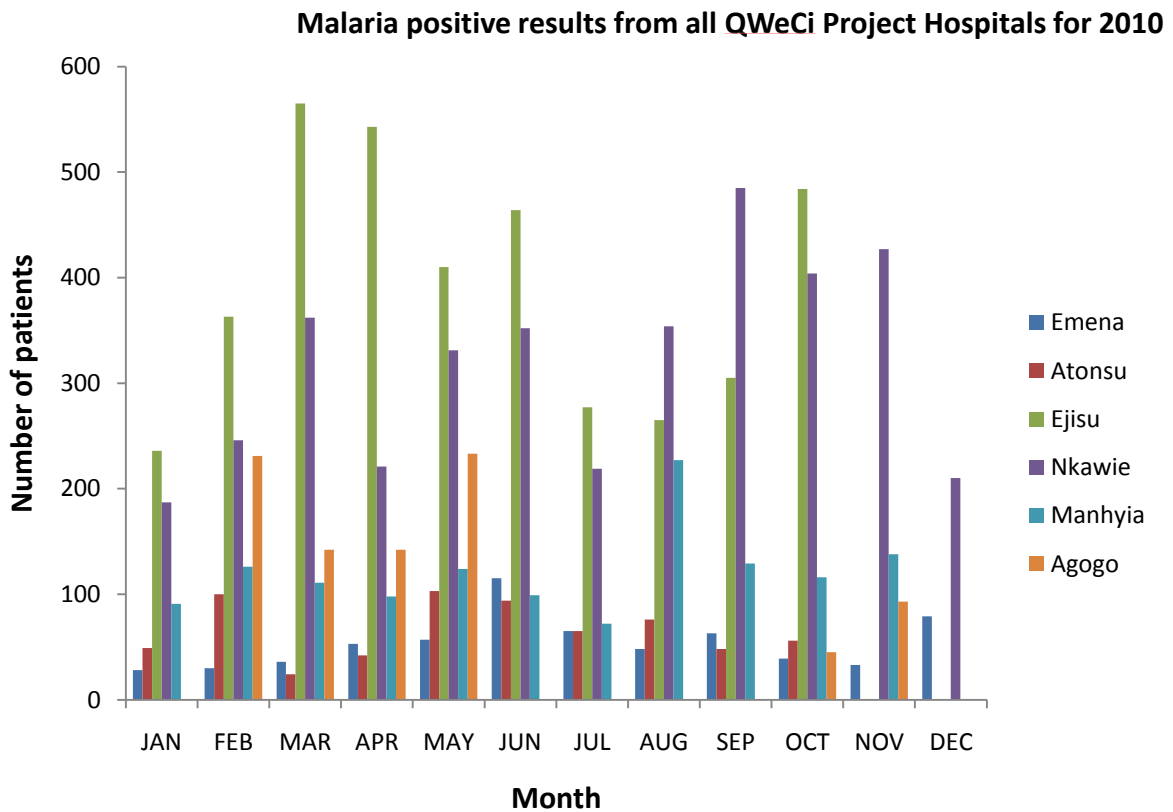


Fig.3: Summary of confirmed malaria cases (tested positive) from all the QWeCI project hospitals.

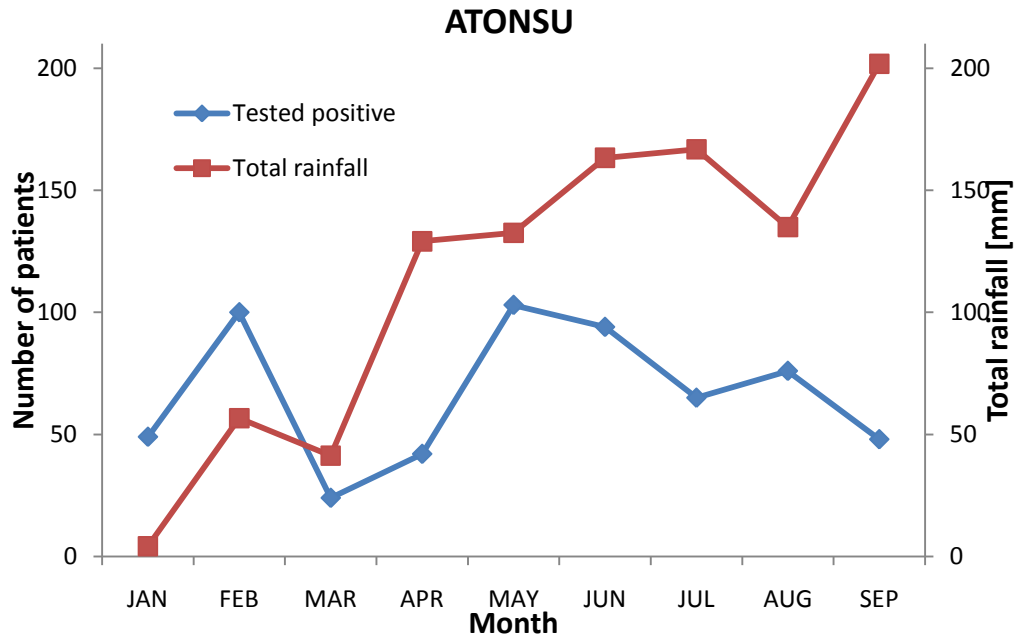


Fig.4: Comparison of Malaria cases with rainfall in the year 2010 for Atonsu hospital

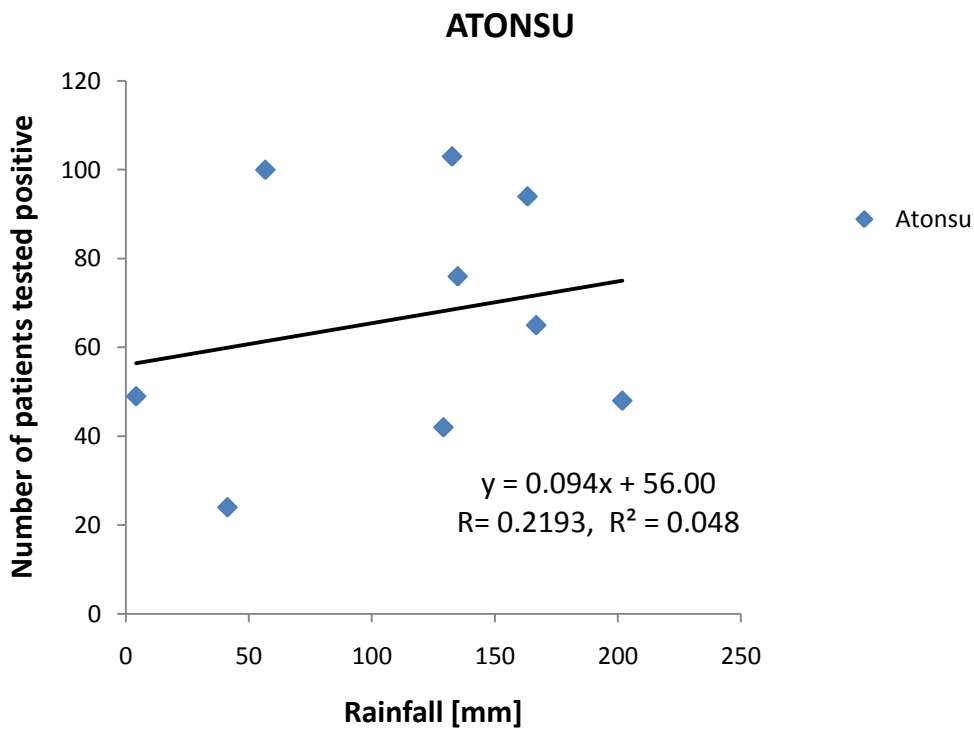


Fig. 5: Regression analysis of malaria cases with rainfall in the year 2010 for Atonsu hospital

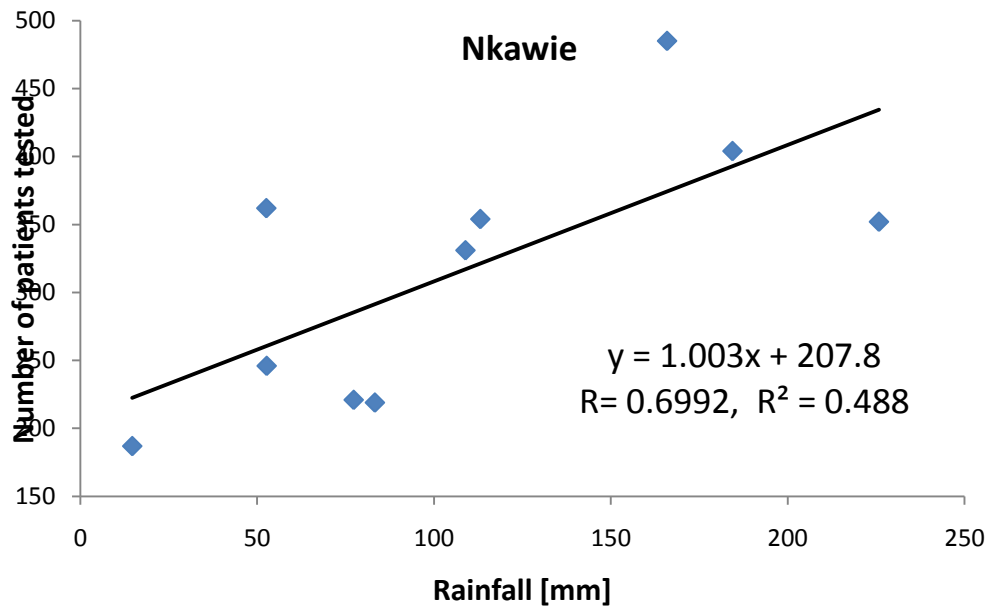


Fig.6: Regression analysis of malaria cases with rainfall in the year 2010 for Nkawie hospital

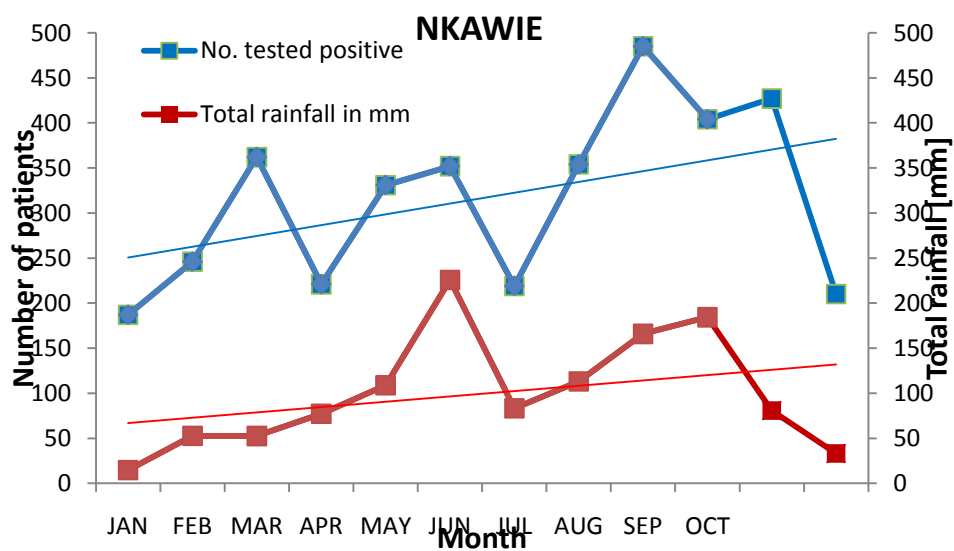


Fig.7: Comparison of malaria cases with rainfall in the year 2010 for Nkawie hospital

b. Report on entomological Survey

The objectives of the entomological survey are to determine the effects of climate variables on:

- Circumsporozoites Protein Rate
- Human Blood Index
- Species of mosquito vectors

The study is being carried out in the communities which make up the study sites located in rural, peri-urban and urban areas. The activities involve the following:

- using the **pyrethrum spray catch** (PSC) method to collect mosquitoes indoor.
- morphological identification
- microscopy
- host blood meal identification (precipitin ring test using the human anti-sera)
- ELISA (sporozoite detection & rate)
- PCR (*A. gambiae* s.s. molecular forms ss.1)

The following have been carried out:

- Training of MPhil students and mosquito collectors
- Search for open water bodies in the communities
- Taking temperature of the water bodies and noting other ecological factors
- Searching for breeding sites for the presence of larvae and taking larval dips
- Identification and systematically selecting houses to be sprayed
- Seeking informed consent from household heads
- Administer questionnaires to household heads
- Spray catch procedures, collection and storage of adult mosquitoes
- Enumeration of inhabitants of Pyrethrum Spray Catch houses (PSC)
- Taking GPS coordinates of PSC houses and larvae habitats

Summary

Meteorological parameters for studies involving the impact of climate variables on health are available from 1960 to date for the Ashanti Region of Ghana. A map of the study sites has been developed. Statistical analysis and interpretation of the meteorological and health data are continuously carried out and the results updated as new malaria data is collected. It is hoped that the ongoing entomological survey results will enhance the interpretation of the trends of the climate and malaria relationships in the study area.