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**QWeCI**

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

**D5.1.a – Report on the needs of African decision makers regarding the depth of analyses necessary for the decision process**

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**Lead contractor:** UOC  
**Coordinator of deliverable:** Prof. Dr. Andreas H. Fink  
 Dr. Volker Ermert

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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)	

## Introduction

Projects like QWeCI are confronted with various requirements. On the one hand, complex scientific climate-disease results will be generated by various work packages (WPs). On the other hand, the scientific results must be transferred to the stakeholders in the target countries. The final goal of QWeCI is to put science into action. This task will be mainly supported via the development of a multi agency system, which will consist of different decision support tools for evaluating management options in terms of climate-disease related health issues. This challenge includes the translation of the highly complex scientific information to decision-makers, with an individual knowledge. The last issue will be to overcome by an intense capacity development of the local partners and by an user-friendly processing of the data output.

The QWeCI research project plans to develop a multi agency system. Within the framework of the multi agency system *Decision Support Systems* (DSSs), *Information Systems* (ISs), and *Monitoring Tools* (MTs) shall be constructed for the decision support. A DSS is an interactive software-based system, which has a dynamic core and generates new information from a combination of raw data, model data, and personal knowledge, to identify and solve problems and make decisions. An IS only presents, by contrast, gathered information or illustrates data that is produced outside of the system. By contrast, a MT is a flexible system for computerised real-time mapping and monitoring purposes based on, for example, weekly or monthly disease reports from health clinics. The multi agency system will be based on modern software technologies such as the object oriented Java programming language as well as the *Google Web Toolkit* (GWT) for creating optimised web applications. This web-based Java framework intends to present the output from seamless model approaches rendering climate and disease risk information in the targeted countries. Risk maps from dynamic disease models could be provided for specific regions and communities suffering from health impacts.

According to Enders et al. (2010) different aspects must be included by the decision support:

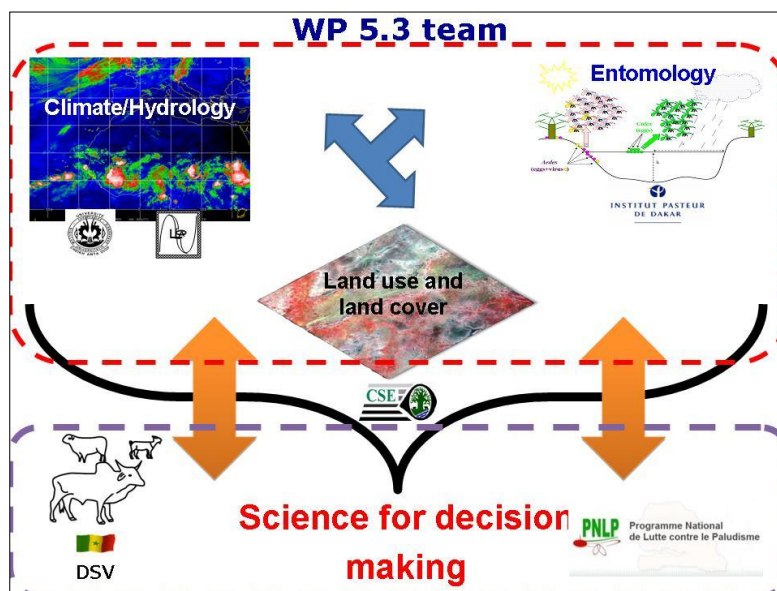
- 'Project aspect: What are the requirements regarding the individual aspects of decision support from the' QWeCI project 'point of view?'
- 'General aspect: With which requirements is' the multi agency system 'confronted in general?'
- 'Organizational aspect: What does' QWeCI needs 'to successfully implement' the systems 'and who must be involved? What is the appropriate communication structure concerning the development and implementation of the' systems? 'How can this communication be supported?'
- 'Societal aspect: What is the demand of the users - who is the target group?'
- 'Scientific aspect: Which functions are needed for' the 'different systems? Which functionality assures scientifically correct preparation, implementation, and presentation of the systems?'
- 'Technical aspect: What are the technical standards to be fulfilled? Are there specific technical requirements of the target group that must be taken into account?'

Therefore, the setting up of a continuous dialogue with stakeholders and decision makers in the pilot areas was the first and an important task of WP 5.1. By means of a variety of activities, numerous doctors and health officials from the countries health ministries were included into the stakeholder dialogue. The dialogue intended to define the need of information of stakeholders as well as the required depth of analyses based on the decisions stakeholders have to make. The overall idea was to learn more about the needs of African decision makers for the tools that will be developed within the QWeCI project.

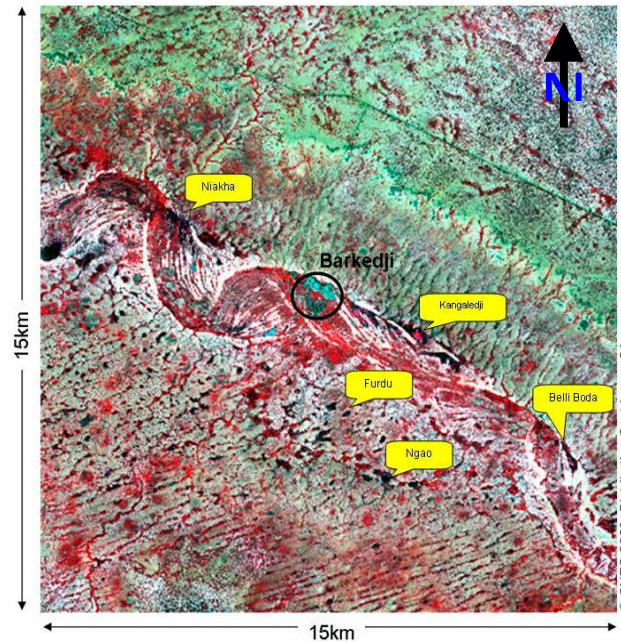
According to the target pilot areas stakeholder dialogues were taken out in Senegal, Ghana, and Malawi.

## Stakeholder dialogue in Senegal

The WP 5.3 (Senegal pilot project) within QWeCI project is collaborating with scientific and end-user partners (Figure 1). The scientific research team comprise the *Institut Pasteur de Dakar* (IPD), the '*Laboratoire de Physique de l'Atmosphère et de l'Océan Siméon Fongang*' (LPAO-SF) of the University Cheikh Anta Diop de Dakar (UCAD), as well as the '*Centre de Suivi Ecologique*' (CSE). CSE, UCAD, and IPD work closely together on the field site and ensure that various observations are integrated into the project. CSE focuses on land use and land cover change monitoring, processing, and the integration of remote sensed data sets, as well as on the quality of water in ponds. UCAD is responsible for climate and hydrology field measurements and the related data analysis. IPD undertakes the entomological field survey in conjunction with the '*Programme National de Lutte contre le Paludisme*' (PNLP; i.e. the national malaria control program) for malaria and the '*Direction des Services Vétérinaires*' (DSV) for *Rift Valley Fever* (RVF). The two national stakeholders and end users PNL and DSV will contribute to the development and implementation of decision support systems. They are in addition in charge of health data sets. All teams are working in the Barkedji Health-Environment Observatory (Figure 2).



**Figure 1:** The Senegal pilot project (WP 5.3) of the QWeCI project. The scientific partners are surrounded in red and the stakeholders in purple. The two arrows show the interactions between the two communities.



**Figure 2:** An overview of the Barkedji Health-Environment Observatory from a SPOT 5 (French: 'Satellite Pour l'Observation de la Terre') satellite image.

## Summary of discussions

The dialogue with the two stakeholders PNLP and DSV helps the QWeCI project to identify their needs and they are resumed in three preoccupations:

- to identify periods under risk;
- to identify zones under risk;
- to acquire a strong *Health Early Warning Systems* (HEWS).

Their main concern is how to integrate environmental and climate issues in the field with their monitoring work. They are aware that they would like to improve their knowledge on mechanisms of disease emergence, before going forward in building a HEWS. One key question of PNLP and DSV is the following: *How can we use climate and environment data to predict disease outbreaks?* This is the big issue for the debate and they strongly require such knowledge.

PNLP and DSV want to focus on the onset and the end of the rainy season as well as the wet and dry spells during the rainy season. They require more information about the set up and skill of seasonal forecasts and their monthly update. Information with regard to long term environmental changes and socio-economic data (human settlements, population density and human activities, migration, transhumance habits, ecosystems behaviours, etc.) could also provide PNLP and DSV additional details to better understand the ecology of vectors and hosts and interactions between different disease agents.

Both stakeholders are aware about the climate change issue and its impact on health. However, PNLP and DSV do not know how to react with regard to the impact of climate change in terms of the setting up of monitoring activities in the near future.

PNLP and DSV also know that useful information can be obtained by remote sensing data and the *Geographic Information System* (GIS). Remote sensing will bring a strong contribution to their field activities. However, PNLP and DSV require a capacity development program to provide basic concepts in order to improve the monitoring and

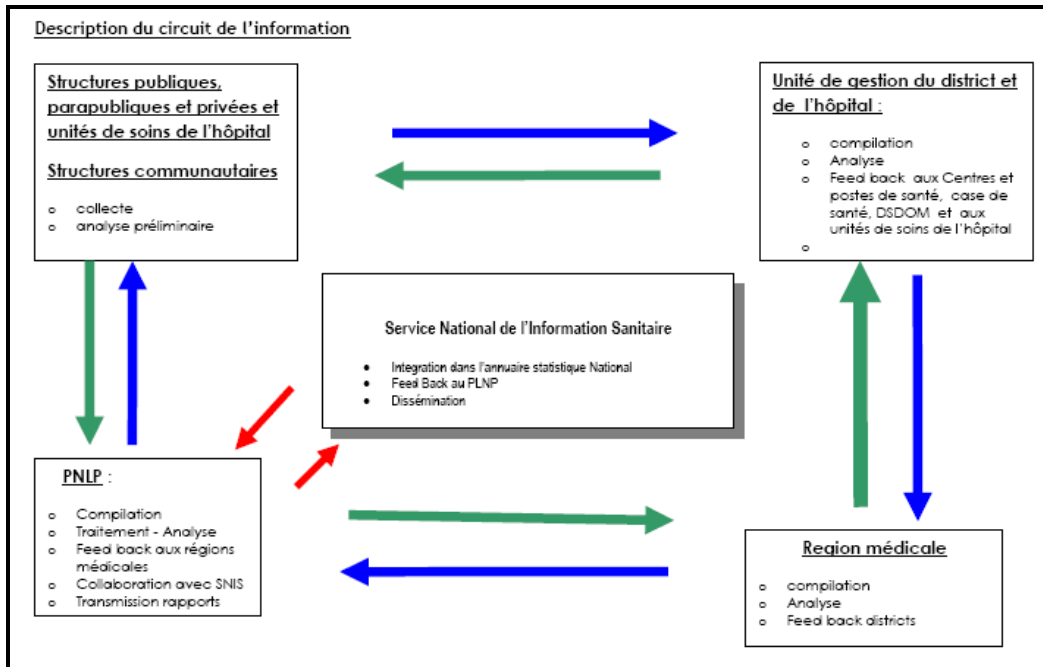
control of diseases.

The exchanges with PNLP and DSV identified also the channels or paths to bring the information to the stakeholders and end users: web pages and email are the priority today thanks to the recent steps in information and communication technologies. Small bulletins (2-3 pages) can also be a support for decision makers. These bulletins could be posted on a web site of the project. PNLP and DSV and other people of interest could then download the information and they could further disseminate it as much as possible. In addition, the emission of broadcasts could increase the awareness and provide information to the people. Radio and TV broadcasts can allow PNLP and DSV to share their information to the public, especially at the beginning of the rainy season just before the regular start of the malaria transmission. Of course the success of these measures should be monitored and their success should be assessed.

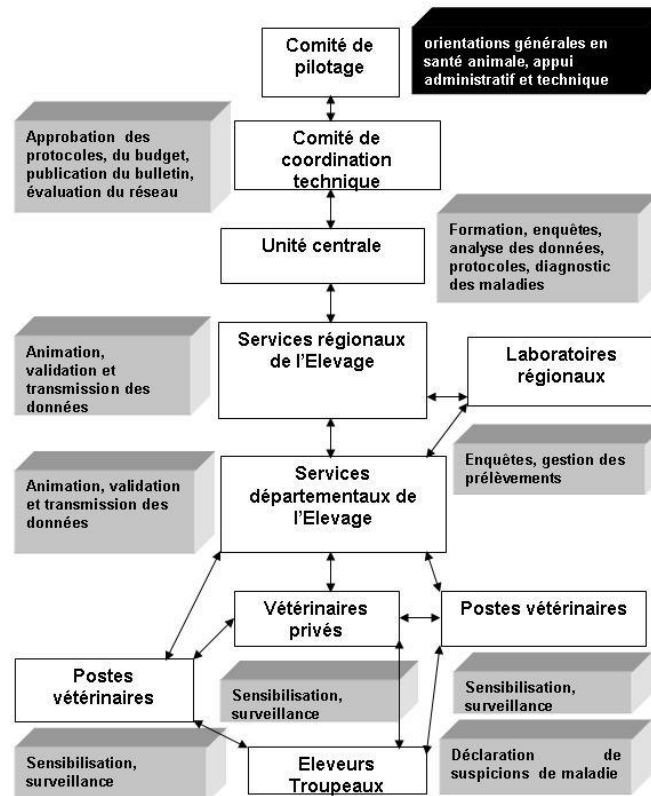
Concerning the issue related to the dissemination of information, PNLP and DSV have their own procedures and strategies for the dissemination of environmental information. They also know how to integrate this information into the decision making process (Annexes 1 and 2). In this context, it should be noted that the national livestock service (in french: '*Le système national de surveillance épidémiologique des maladies animales au Sénégal*', SNSE) has set up a national epidemiological surveillance system on animal diseases.

PNLP and DSV note that seasonal disease forecasts will be very useful in general, when the forecast is disseminated before the rainy season. This is mainly due to the fact that they are working on issues related to vector- and water-borne diseases. In summary, the environmental information should be provided to PNLP and DSV just before the rainy season has started and this information should be updated in the following 2-3 months.

## Annex 1: Description of the PNLP network in Senegal.



## Annex 2: Description of the DSV network in Senegal.



## **Stakeholder dialogue in Ghana**

KNUST undertook a stakeholder dialogue in the Ashanti Region of Ghana in terms of the malaria disease. Fairly different stakeholders were identified by the KNUST team. The stakeholders included health administrators, medical doctors, paramedics, nurses, biomedical scientists, disease control officers, pharmacists, and others who completed the distributed questionnaires.

### ***Briefing of Stakeholders on QWeCI***

The QWeCI Ghana pilot project on urban, peri-urban and rural malaria in the forest belt of Ghana, i.e. the Ashanti Region, began in February 2010. Study sites (hospitals) were selected and officially written to by the project secretariat to inform them of the interest and intention to conduct the study in their jurisdictions. District and metropolitan directors together with hospital administrators/directors were subsequently contacted, seeking for permission to conduct the study in their respective areas.

The research team, led by the KNUST project coordinator Prof. S. Danuor, visited all directors and administrators to brief them about the aims and objectives of the research within the QWeCI project and how QWeCI is expected to contribute to the national malaria control program. They were subsequently informed of an impending stakeholder meeting to be held in November 2010. These visits were also used to solicit for written informed consent to enable the research team to acquire ethical clearance for the commencement of the study.

### ***Meeting with Stakeholders***

On 24 November 2010 a meeting was held with the stakeholders in the health sector from the Emina, Nkawie, Manhyia, Ejisu, and southern Kumasi hospitals at the Kumasi metropolitan health directorate in Kumasi (Ashanti Region). Attending were representatives from the metropolitan and districts health directorates. Medical directors, hospital administrators, and other paramedics (medical laboratory technologists, field technicians, nurses, etc.) as well as community opinion leaders were present for the meeting.

A similar meeting was held on 29 November 2010 at the Agogo Presbyterian hospital, in the Asante Akin North District. This meeting was held there because they could not attend the first meeting in Kumasi due to the long distance between Kumasi and Agogo.

### ***Agenda***

The common agenda of the meetings was as follows:

- i. Overview of the research project
- ii. Discussion of inputs from the stakeholders
- iii. Determine research interest of stakeholders
- iv. Any Other Business

The research team gave an overview of the study and its objectives to the stakeholders present. After the presentation, the participants asked questions for clarifications on the study objectives. Others wanted to know how the outcome of this study would contribute to malaria control in Ashanti Region and Ghana. Some of them shared their experiences with



the research team on malaria control efforts in their jurisdictions and the region.

### ***Concerns raised by the participants***

- The scope of the study is limited only to few areas of the Region.
- The scope of the study is limited only to the middle part of Ghana.
- Knowledge of climate drivers of diseases among medical professionals is woefully inadequate; health professionals in general need to be equipped with knowledge about climate and disease associations.
- Collaboration amongst various sectors of the ministries in Ghana is non-existent.
- Application of the findings of research into day-to-day life is virtually absent.

### ***Recommendations by the participants***

The participants would like the following points to be considered by the QWeCI project:

- Extend the scope of the study to cover beyond the forest belt of Ghana.
- Incorporate studies on weather, climate, and climate-disease relationships into health professionals training curricular.
- Policy makers should bring various sectors of ministries together to share their experience and knowledge.
- A malaria early warning system should be user-friendly and adaptable in any part of the country.
- Devise appropriate platforms for dissemination of research findings to various categories of professionals.

These concerns were noted by the research team and which also promised to share the findings of the research with the participants and other end-users. The attendants have shown much enthusiasm by their contributions and concerns raised during the meeting. In order to gather views on the relevance of the study for stakeholders and what areas of malaria control and research is carried out in communities, a questionnaire was developed on the followings to solicit relevant responses from them:

- Strategies for malaria prevention in communities
- Malaria interventions
- Developing malaria early warning systems
- Internet access/computer skills
- Additional areas of malaria research, control and prevention methods that should be incorporated into the present study

The questionnaire was given to various professionals at the study sites including medical doctors, nurses, pharmacists, managers/administrators, disease control officers, nutritionists, biomedical scientists, community health workers, assemblymen, and community/opinion leaders to gather responses for the study.

Below is a report of the questionnaires, which were received until January 2011. The report will be updated when other questionnaires are received.

### ***Preliminary results from the stakeholders' questionnaire***



This is a summary of preliminary results from questionnaires collected from stakeholders from the various study sites in the Ashanti Region. The stakeholders varied from professions including health administrators, medical doctors, nurses, biomedical scientists, disease control officers, pharmacists, and others who completed the questionnaires that were distributed to solicit information on various topics relevant for the present study. However, the majority of the respondents were paramedics while the minority group was opinion leaders from the communities. A few of stakeholders are directly involved in malaria control and prevention efforts in their community.

### ***Malaria interventions***

The most predominant method for malaria intervention activities in the communities was the use of insecticide treated bet nets. Most of them stated they do not experience floods during rains.

### ***Strategies for malaria preventions in communities***

Strategies that were rated high for malaria preventions included the following:

- Mass spraying of rooms in the communities
- Collecting and identifying mosquitoes in the communities
- Usage of malaria morbidity data at health facility to serve as impetus for policy decision
- Promoting the use of climate models to forecast malaria

Some of the strategies for malaria preventions that were rated low included the following:

- Conducting-house to house sensitization on malaria controls
- Regular training and orientation of staff on new national malaria control guidelines
- Identifying and mapping mosquitoes breeding sites

### ***Developing malaria early warning systems***

For the following areas, the respondents strongly agreed that developing a malaria early warning system on these areas would be appropriate:

- Developing programs to predict malaria outbreak in the communities and to determine which control and prevention methods would be effective
- Using local meteorological data to predict indicators for an malaria outbreak and mapping out malaria risk areas and seasonality
- Promoting climatic forecast models to predict and prepare communities to take the right actions
- Providing easily readable visual information on malaria prone areas on timely bases for decision makers on malaria control

Respondents however strongly disagreed with developing malaria early warning systems using quantification of weather and climate impact on malaria. There might be capacity development needed with regard to this aspect.

### ***Highest priority area for developing malaria early warning systems***

The highest priority score for developing malaria early warning system was early detection and control, forecasting and prevention of malaria outbreaks. The least priority was rated

as identifying malaria species in the community.

### **Computer and internet facility**

Majority of the respondents have access to computers but only a few have a regular access to the internet.

### **Mode of dissemination and educating community members**

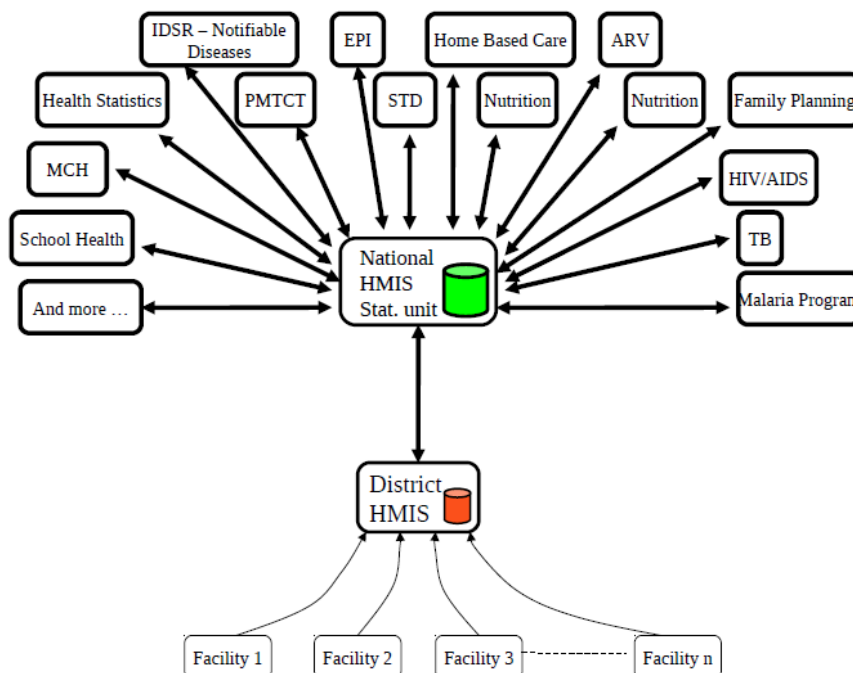
The best strategies for disseminating malaria information to the communities are community durbars (village and town gatherings of people) and house to house dissemination whiles the mode of communicating the information are radio, TV, and using information vans.

## **Stakeholder dialogue in Malawi**

The first dialogue meeting was initiated in November 2010 along with ICTP and UNILIV QWeCI members. This dialogue process established strong relations with the main stakeholder, the Ministry of Health.

### **Background information**

For the past years medical data has been manually recorded on paper from rural clinics, remote hospitals and other health facilities. This information is sent to a central office at district level where all the health facilities of a particular district report to. This medical information is then summarised and forwarded to the Ministry of Health. This traditional way of collecting data has proved to be ineffective, as it takes more time for the decision makers to be aware of the remote current trends. Apart from submitting invalidated data, some information is lost as paper is not the best way of storing information.



**Figure 3:** Model of integration of a Health Management Information System – moving away from a paper based system

## ***Challenges and way forward addressed during the meeting***

The main objective of the Malawi pilot project is to disseminate malaria risk forecasts with the use of long WiFi technology deployed from Blantyre to Mangochi. First and foremost, after introducing the project objective and concepts, the ministry had some reservations as there were other organisations and programs with similar ideas that have already put in place medical data collection systems and have strong ties with the ministry. The QWeCI group was then advised to discuss with these organisations and collaborate to avoid the replication of ideas.

However, the ministry indicated a gap which could be filled by the research work on developing a malaria prediction system and also the development of malaria risk maps for the country that can assist governmental and non-governmental programs, for example those that distribute malaria drugs and insecticide treated mosquito nets, just to mention a few. Through the risk maps, the team could be aware of which areas to concentrate the most, unlike currently where there is no systematic distribution technique. On the other hand, since this is an untapped field here in Malawi, there was no indication of how best the analyses should be presented. Consequently, it is up to the QWeCI team to come up with the best model to integrate with the Ministry's and other stakeholders' decision making process.

Through the recommendations made by the Ministry, QWeCI established collaborative relations with BAOBAB and *Health Information Systems Program* (HISP), which are the key players that assist the Ministry in collecting data through the use of computer networks. BAOBAB collect patient level data while HISP collect more comprehensive data of a health facility ranging from drug stock to number of cases of particular disease. As a result, it was further agreed to connect the QWeCI WiFi system to the HISP national database which is directly linked to the Ministry of Health. The system uses an application called *District Health Information System* (DHIS2) developed in Norway at the University of Oslo. The package is broad and comprehensively collects every data from health facilities that can assist in decision making of the ministry's departments.

Further dialogue meetings could be planned once research results start to flow as the ministry might point out on some areas to improve on.

## **Summary and conclusions**

For Senegal, the two principal stakeholders are PNLN and NMPC. According to their need, environmental and climate predictors should be identified in terms of disease outbreaks. The stakeholders require capacity development and information regarding their monitoring activities and future work. The stakeholders raised their need in terms of the identification of periods and areas of health risk. Furthermore, the health situation in Senegal could strongly benefit from the development of a health early warning system. Information should be presented for Senegal via the usage of the web pages and QWeCI could benefit from existing dissemination strategies.

In terms of Ghana, fairly different stakeholders were identified by the KNUST team. The stakeholders included health administrators, medical doctors, paramedics, nurses, biomedical scientists, disease control officers, pharmacists, and others who completed the distributed questionnaires. The predominant method for malaria control in the communities is the use of insecticide treated bed nets. The generation of malaria early warning system to forecast malaria outbreaks by means of meteorological data was rated high. Easily readable risk maps should be produced and decision makers require information regarding the cost-effective malaria control measures. The dissemination of information to

stakeholders can be performed via the internet. Regarding communities, village and town gatherings of people are the best way to pass information.

In Malawi, the stakeholder dialogue with the Ministry of Health started in November 2010. Identified was the need for the way away from the paper storage of disease incidence data from remote hospitals and health facilities. QWeCI is now in collaboration with BAOBAB and the HISP in terms of the development of the District Health Information System (DHIS2). Incidence data has been connected with the WiFi system, which was established by the QWeCI project. Required are further the development of a malaria prediction system and the provision of malaria risk maps for the country that could be used by governmental and non-governmental malaria control programs.

## **References**

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