

# **Malaria Knowledge, Beliefs, and Behavior In Ghana and Its Effect On the Implementation of National Malaria Prevention Initiatives**

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# Introduction

- Malaria is a major worldwide health problem, especially in Africa.
- World Health Organization (WHO) predicts that between 1.5 and 2.7 million people die of malaria, while 300–500 million clinical cases occur annually with over 90% of the malaria cases occurring in Africa. Malaria accounts for 9% of the disease burden in Africa and is the cause of one in every four deaths in children aged 0–5 years.

# National Malarial Prevention Strategy

- Ghana has implemented a national malaria programs to reduce the disease burden.
- However, like many African governments, the costs of intensive malaria programs may reach over 1% of the gross domestic product to effectively treat malaria.
- High cost of treating malaria has lead to an emphasis on low cost preventative measures to reduce the incidence, most notably the benefits of insectide treated nets (ITNs).

# Benefits of Insecticide Treated Nets (ITNs)

- Several controlled trials have shown ITNs to reduce clinical malaria by about 48% and protect 6 in 1000 children aged 1 – 59 months (6). This evidence had made the advocacy of ITNs an important component of many hyper endemic countries malaria prevention control strategies.

# Ghana National Malaria Program

- ITNs are mass distributed for free to children under 1 year and pregnant women during National Immunization Days
- ITNs sold at two Ghana Cedis by health workers and volunteers.
- Despite this effort, malaria continues to be a major health problem due to several environmental, cultural, and socioeconomic factors.

# Project Objective

- The purpose of this study was to study the knowledge, beliefs, and behaviors in Apam and Mampong to better understand how effective public health initiatives and education have been in these regions and identify persistent barriers to change.

# The Basics on Malaria

- The malaria is a parasitic and infectious disease caused by the Plasmodium.
- There are 4 different Plasmodium species, with P. Falciparum accounting for 90-98% of all cases in Africa.
- The parasite is transmitted through the bite of infective female Anopheles mosquito during a blood meal from one person carrying the parasite to the other.
- Malaria is hyper endemic in Ghana with transmission occurring year round with the peak transmission between June and October.

# Host Factors Affecting Transmission

- Age less than 5 years, however all age groups are susceptible to malaria in high endemic areas
- Pregnant women are at increased risk of malaria.
- Sex is not a major factor
- Genetic factors like the presence of Hemoglobin S (HbS)/ Sickle cell trait reduces the severity of *P falciparum* infections

# Environmental Factors Affecting Transmission

- **Temperature:** Temperatures below 16 C- does not allow for parasite development. The best condition is a mean temperature of 20-30C.
- **Humidity:** Humidity lengthens the life of the mosquito with a relative humidity of at least 60% being most ideal.
- **Strong Winds:** may prevent their egg-laying and may extend their flight range to infect more people.
- **Rainfall:** Excessive rainfall- destroys breeding places and sweep away larvae. Adequate rains and distribution over the month create breeding places for the mosquito. High rainfall pattern is thus associated with high malaria transmission.
- **Altitude:** Places with high altitude and low temperatures tend to be associated with lower rates of transmission.

# Socioeconomic Factors Affecting Transmission

- **Sanitation:** Poor sanitation and environmental management.
- **Housing :** Poor housing, not protected, not properly sited
- **Occupation:** working at night and sleeping outside
- **Education:** ability to understand the process of transmission and our ability to control malaria with resources available to us.
- **Poverty:** poor housing, malnutrition, accessibility to interventions e.g. ITNs, proper treatment
- **Wars and Large-scale population movements:** Malaria Epidemics

# Management of Malaria in Ghana

- Uncomplicated malaria is treated with Artesunate and Amodiaquine combination therapy as first line treatment.
- Severe malaria is treated with Quinine.
- Chloroquine therapy is no longer used as therapy due to widespread resistance

# Methods

- Research in Apam Catholic Hospital in Gomoa District of Central Ghana and the Mampong Government Hospital in Mampong, Ghana.
- In Apam, malaria is the number one cause of outpatient morbidity in the region with 3160 new cases in 2006 accounting for 29.8% of all new cases.
- In Mampong, malaria is the second leading cause of outpatient morbidity with 620 new cases in 2006(8).

# Methods

- To understand the community's basic understanding of malaria, the use of mosquito nets, and local interventions to treat the disease, four research questions were used to ask random patients and their families.
- The questions included the following:
  1. How do people get malaria?
  2. Do you use a mosquito net?
  3. If you don't use a mosquito net, why?
  4. When you develop (a) fever/signs of malaria, what do you do?
- The age and gender of every individual was also surveyed.

# Methods

- In the Apam Catholic Hospital, from March 27th through April 15, 2008, fourteen random patients with fever in the outpatient department were surveyed using language interpretation by different nurses and nurse assistants.

# Methods

- In the Mampong Government Hospital, data was gathered in medical records and admissions department from April 21st through April 25, 2008 and surveyed 192 patients and their families before they were seen in the outpatient department.
- The medical records department head personnel translated my questions to over 80% of the individuals interviewed while the remainders were translated by the other medical records staff members.

# Research Findings

- Of 206 individuals surveyed, 135 people (65.5%) identified mosquitoes to be the causative agent of malaria, while 71 people (34.5%) did not know the cause of malaria.

# Malaria Transmission Misperceptions

- The 71 individuals that did not know the cause of malaria had several different explanations for how malaria is obtained including the following:
  - Don't know (52 individuals; 73.2%)
  - Heat (6 individuals; 8.5%)
  - Poor sanitation - gutters, sewers, dirty places (6 individuals; 8.5%)
  - Bad food (2 individuals; 2.8%)
  - Insects (1 individual; 1.4%)
  - Unweeded places (1 individual; 1.4%)
  - Drinking dirty water (1 individual; 1.4%)
  - Running (1 individual; 1.4%)
  - Rashes (1 individual; 1.4%)

# Mosquito Net Use

- The survey also revealed that 90 people (43.7%) used mosquito nets while 116 people (56.3%) did not use mosquito nets.

# Knowledge of Malaria Transmission and Mosquito Net Use

+ Knowledge of malaria transmission and + use of mosquito net 72/135 (53.33%)	+ Knowledge of malaria transmission and – use of mosquito net 63/135 (46.67%)
-Knowledge of malaria transmission and + use of mosquito net 18/71 (25.4%)	-Knowledge of malaria transmission and – use of mosquito net 53/71 (74.6%)

# Reasons for use of Mosquito Nets in those who did not recognize mosquitos as a vector for malaria

- To protect against mosquitoes.
- To protect against insects.
- Mosquitoes bring on diseases.

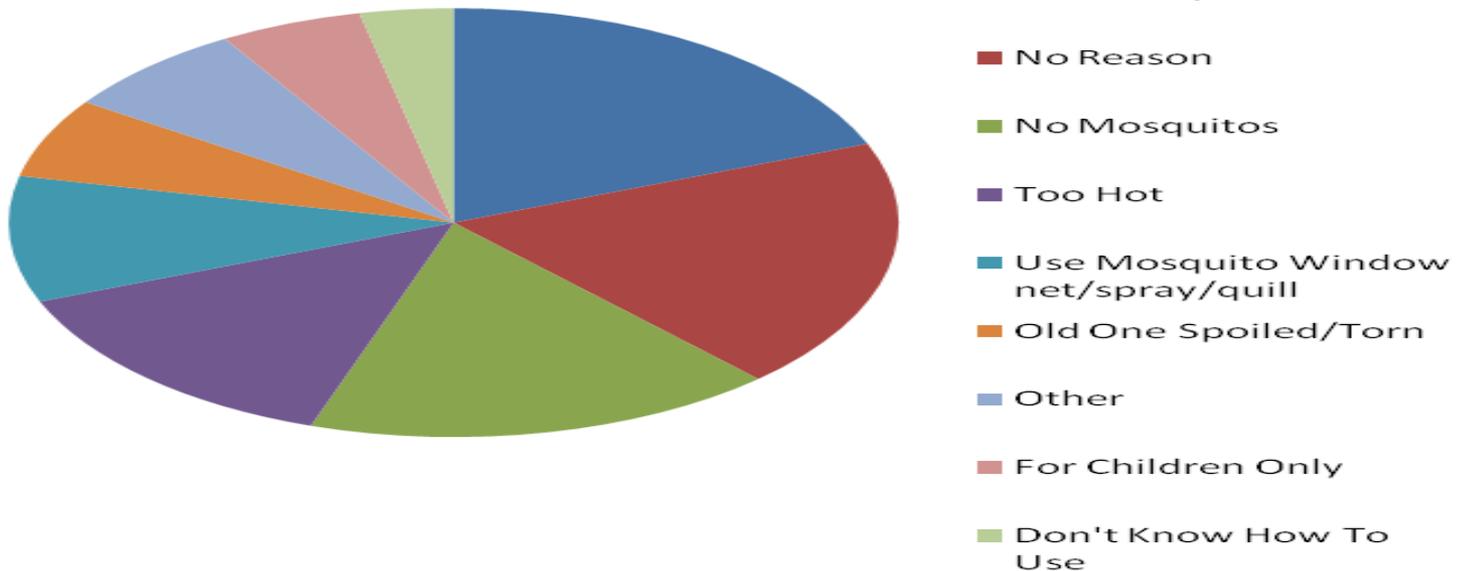
# No knowledge of cause of malaria and use of mosquito net???

- This finding has been shown in past studies which found motivation for purchasing and utilizing bednets was dependent on the nuisance level of mosquitoes and other insects.

# Reasons for not using a mosquito net

- The 116 individuals that did not use a mosquito net had a number of different reasons why they did not use it including the following:
  - No money – 22 individuals (19.0%)
  - No reason - 22 (19.0%)
  - No mosquitoes – 20 (17.2%)
  - Too hot – 16 individuals (13.8%)
  - Use mosquito window nets/spray/quill – 11 individuals (9.5%)
  - Other - 8 (6.9%)
  - Old one spoiled/torn – 7 individuals (6.0%)
  - For children only – 6 individuals (5.2%)
  - Don't know how to use- 4 individuals (3.4%)

# Reasons for not using a mosquito net continued



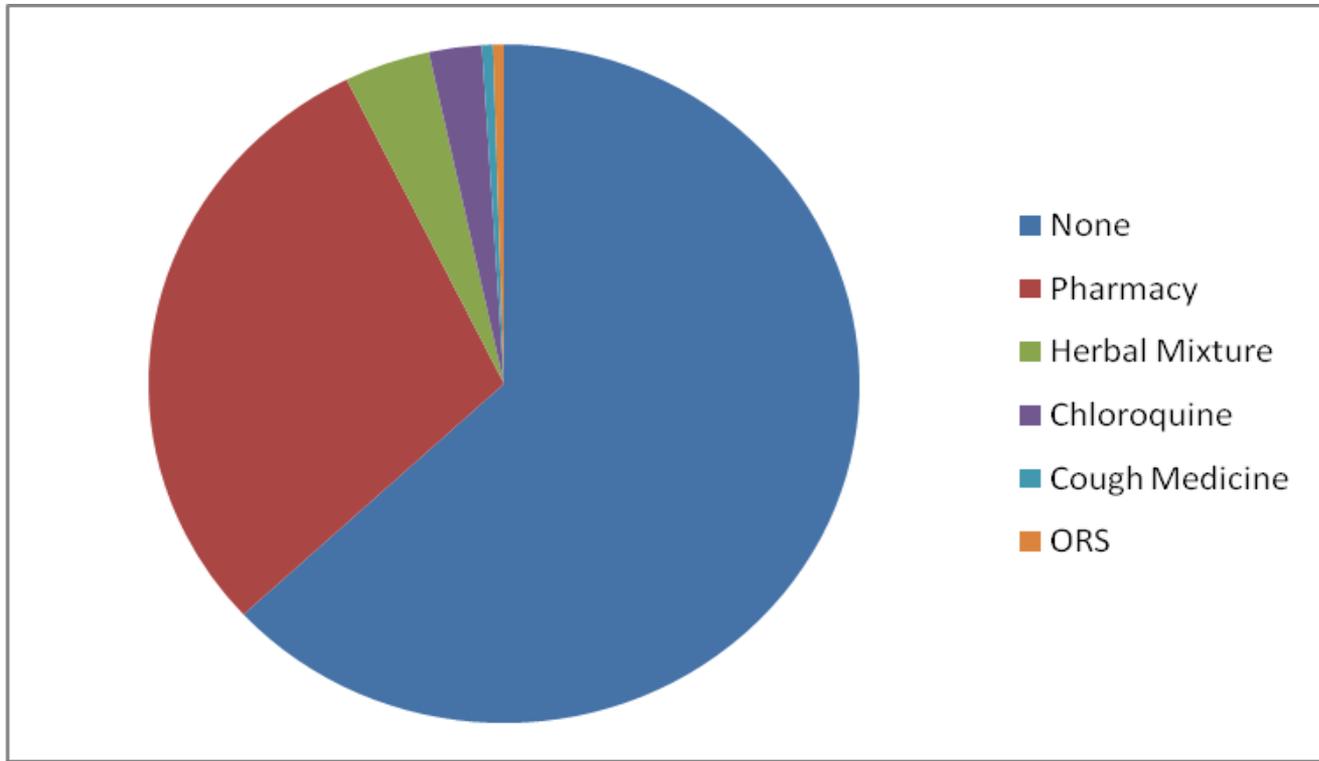
## Other Reasons for not using a mosquito net

- “Parents haven’t bought one for me.” – 2 patients
- “I’m a watchman, I don’t sleep at night.” – 1 patient
- “If I get malaria, then I will use it.” – 2 patients
- “I don’t feel comfortable using it. I’m not used to it.” – 2 patients
- “I sleep outside on a veranda.”- 1 patient

# Actions Taken with Perceived Malarial Symptoms

- No intervention- Come straight to clinic – 130 individuals (63.1%)
- Go to pharmacy to purchase antimalarials/paracetamol/first aid – 61 individuals (29.6 %)
- Herbal mixture – 8 individuals (3.9%)
- Chloroquine – 5 individuals (2.4%)
- Cough medicine – 1 individual (0.5%)
- ORS – 1 individual (0.5%)

# Actions Taken with Perceived Malarial Symptoms continued...



# Documented Malaria treatment intervention in Ghana

- Previous studies have shown that many people associate a fever/hot body with malarial disease among other symptoms like vomiting, chills, headache, and loss of appetite
- Thus, there was a tendency for families to self treat with traditional and orthodox medications from local pharmacies before going to a clinic.

# Traditional Therapies

- Burning green or dried leaves of special plants, burning by-products from the production of shea butter oil to generate smoke, or using fresh strong-scented leaves arranged around their beds to drive away the mosquitoes.
- Pineapple peels, the bark of the *Nyamedua* mango and pear trees, the leaves of the guava nim, bamboo and pawpaw trees and wild bush tea, and roots of the mango tree are also used and the plant products are usually boiled together with some other ingredients such as lemon, lime, ginger and camphor into concoctions and used for drinking, bathing, inhaling and enema. They are usually self-prepared at home except in severe cases, when herbalists are consulted.

# My Study Results

- 63.1% reported straight to the clinic with no intervention and 29.6% went to the pharmacy for antimalarials and analgesics. The two group account for 92.7%, while the remaining 7.3% used herbs, chloroquine, cough medicine and ORS.

## Visit to 3 local Pharmacies

- I visited 3 local pharmacies to observe what type of medications are given to patients with presumptive malarial symptoms.

# Pharmacy One

- Pharmacist told me that he does not dispense any antimalarial drugs without a doctor's prescription and at most will dispense paracetamol analgesic 500mg three-four times a day.

## Pharmacy Two and Three

- Two other pharmacists stated that they dispense either paracetamol or Fen par(Ibuprofen and paracetamol mixture) along with Artemos (Artesunate) to individuals coming in with presumed malarial symptoms.

# Chloroquine Use

- All pharmacists denied the dispensal of expired drugs or use of chloroquine. However, 5 respondents reported taking chloroquine for malaria.
- Possible reasons for report of chloroquine use:
  - that these patients used the term chloroquine to describe antimalarial drugs purchased at the pharmacy
  - they had old chloroquine drugs stored in their homes from prior purchase before the National recall of chloroquine
  - they bought the drugs from pharmacies or local shops other than the places that I visited.

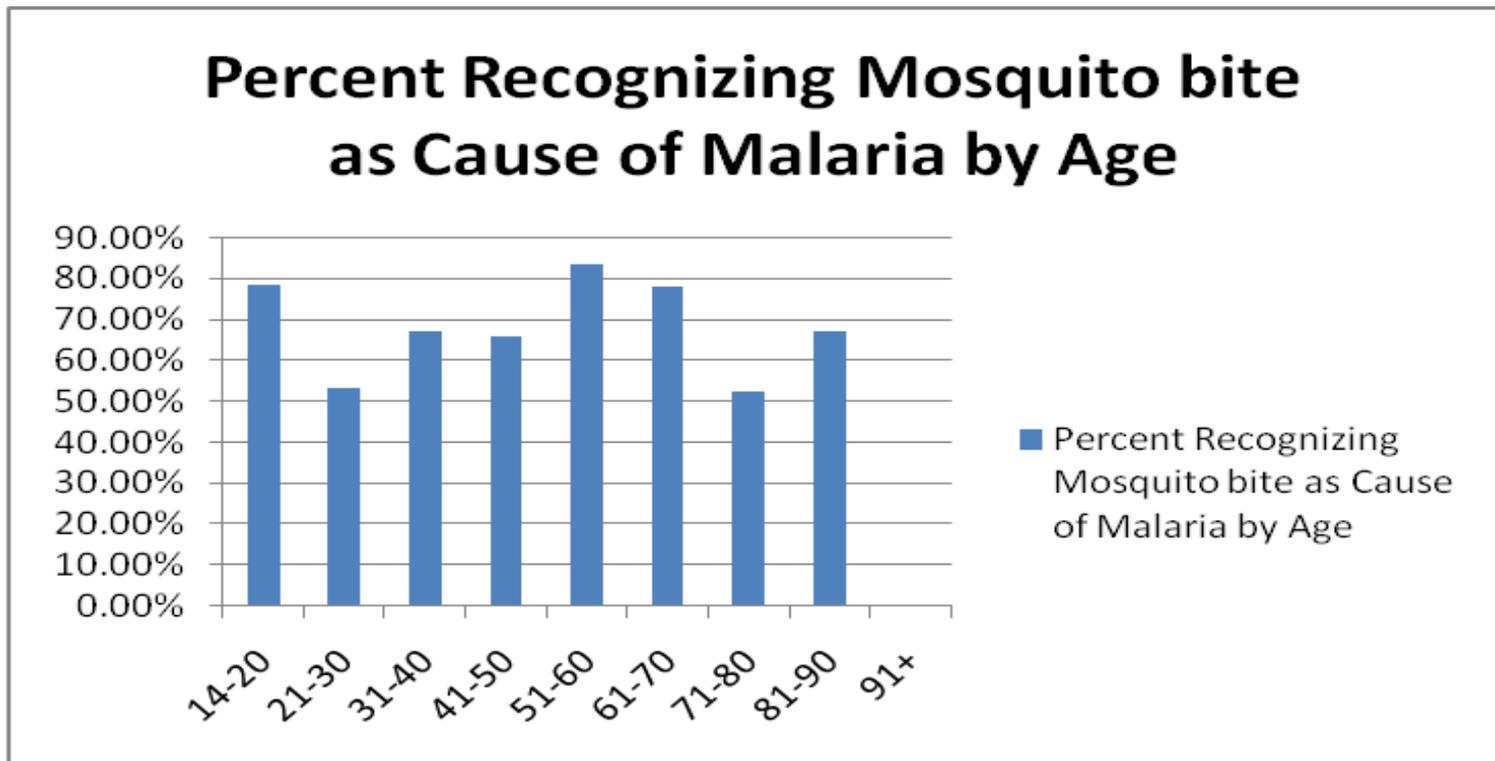
## Continued assessment of medication used for treatment of malaria

- Two patients reported using cough medicine or ORS to treat malaria. These patients likely did not understand the question or lack understanding of the symptoms of malaria.

# Interpretation of Results

- The utilization of orthodox medical management greater than traditional medicine suggests either that
  - there is a greater confidence in orthodox therapy for management of malaria
  - the implementation of the National health insurance allowed for greater health care assess
  - and/or the result is a reflection of selection bias of individuals who are more educated or prone to come to the clinic.
- It is likely that interviewing people in the community may have yielded different results.

# Percent of Respondents Recognizing a Mosquito Bite as the Cause of Malaria By Age



# Is there an relationship between age and knowledge of malaria transmission?

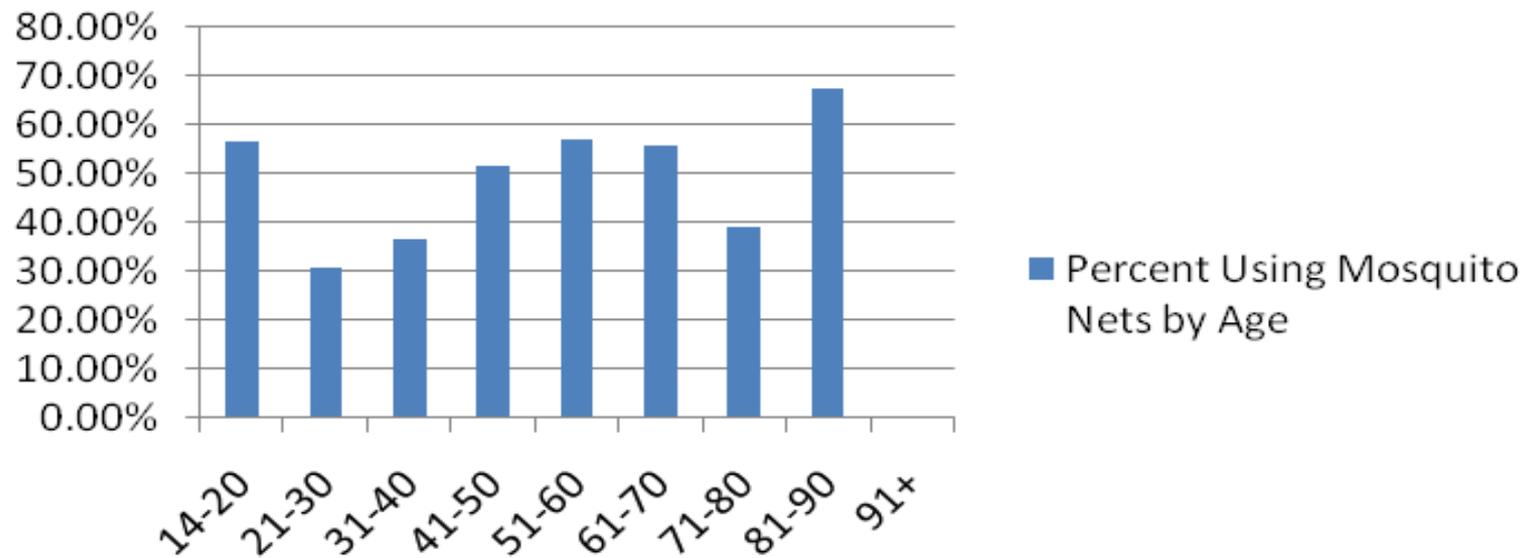
- Age differences regarding knowledge of mosquito transmission were random with 6 of the age categories being slightly to significantly above the average mean of 65.5%, and three age groups including 21-30 (53.1%), 71-80(52.2%), and 91+(0%) below the mean.

# Age Related Disparities in Knowledge of Malaria Transmission

- It would be expected that the older population would have been less knowledgeable than school-aged individuals and young adults.
- However, the results in the 21-30 age category were similar to the results found in the 71-80 age category. The 51-60 age category had the highest average at 83.3%.
- These sporadic results may be attributed to relatively small sample size and different education levels in the population across all age groups.

# Percent Using Mosquito Nets by Age

## Percent Using Mosquito Nets by Age



## Age Related Disparities in mosquito net use?

- Five age group categories were above the mean of 43.7%, while four including the groups 21-30(30.6%), 31-40(36.4%), 71-80(39.1%), and 91+ (0%) were below the mean.

# Age Related Disparities in mosquito net use?

- The 21-30, 71-80 and 91+ age categories represent groups that had the lowest knowledge of malaria transmission and hence lowest usage of mosquito net use.
- It is possible that the 21-30 random group sample has a low education level thus leading to results similar to the older population.

# Gender differences in Use of Mosquito Nets

- More females used mosquito nets than males with a rate of 48.1% compared to 37.7%.

# Relationship of knowledge of malaria transmission and use of mosquito nets

- There seems to be a some association between knowledge of a mosquito bite and use of mosquito nets given that a greater percentage of those aware of mosquito bite transmission used nets than those who did not know the cause of malaria.
- However, other social and cultural factors clearly influence the use of mosquito nets as well.

# Gender Differences?

- 65.5% of total respondents recognized mosquitoes as a vector for malaria transmission.
- Thus, there were no significant gender differences in knowledge of mosquitoes as a cause of malaria with 63.3% of males and 66.7% of females identifying mosquitoes as a vector for transmission.

# Study Limitations

- Use of a limited number of patients interviewed in Apam Catholic Hospital.
- All the patients interviewed in Apam had a fever versus Mampong where all patients and their families were interviewed. It is possible that the few febrile patients in Apam had less knowledge about disease transmission and bed net use, but the number was too small to extrapolate any conclusions.

## Study Limitations Continued...

- Secondly, communication was a barrier due to the use of different translators to ask and interpret survey questions. Some interpreters asked the question of the cause of malaria transmission hinting mosquitoes as the cause before the patient could answer the question. Luckily, in Mampong greater than 80% of the patient's interviewed were asked by the same interpreter who seemed reliable.

## Study Limitations continued...

- A third limitation previously noted limitation is possible selection bias. The patient's surveyed were patient's who were probably more likely to come to the doctor than the general community and thus most likely had greater education and have confidence in orthodox treatment.

# Study Limitations Continued...

- The prevalence of malaria was different in Apam versus Mampong which could affect behavior and attitudes in the different communities.
- A comparison study versus a single study from both sites might have been a better option had more patients been surveyed at Apam.

# Summary

- Observation of knowledge of malaria transmission in the population, use of mosquito nets, and use of self malarial therapy in Apam and Mampong shows evidence that Ghana National Health Initiatives need to be heightened.

# Summary

- The knowledge in the community about the cause of malaria at 65.5% means that greater than a third of the population does not know the cause of malaria.
- More females used mosquito nets than males but by less than a 12% margin.
- Age related differences were sporadic suggestive of different education levels across all age groups.
- Majority of patients either sought medical care or bought antimalarials and analgesics from local pharmacies when malarial symptoms were present.

# Solutions

- Better public education of basic malaria transmission and epidemiological facts and mosquito net use to reach out to broader communities.
- While it is clear that control of environmental factors would be the ultimate primary prevention method, the use of mosquito nets is most cost effective in developing countries like Ghana and has the potential to drastically reduce disease prevalence.
- Adjunctive interventions to mosquito net use include secondary preventative measures such as distribution of malaria diagnostic lab tests in all hospitals and ongoing research on drug and insecticide resistance.

# Current Worldwide Research and Interventions

- Currently, research exploring the creation of a vaccine is in progress.
- Several world organizations are involved in the effort to eradicate malaria. For example, funds for malaria research have been provided by the National Institutes for Health, the Wellcome Trust, and the Gates Foundation.

# World Health Organization Roll back Malaria Initiative

- The World Health Organization of the Roll Back Malaria (RBM) initiative has raised the profile of malaria control and set ambitious targets including “achieving 60% access to effective treatment, protection during pregnancy, use of ITN or other appropriate measures of vector control by at-risk groups across Africa by 2005, and a reduction in global mortality from malaria by a half by 2010.”

# President's Malaria Initiative

- President Bush launched the President's Malaria Initiative, a \$1.2 billion effort in 2005 which was supported by the Gates Foundation to help build on progress against malaria.

# Acknowledgements

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Thank You : )