Children as Health Change Agents in the Fight Against Malaria
– A case study in Babati town, Tanzania

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Abstract

The aim of this study is to examine schoolchildren’s knowledge about malaria in Babati, Tanzania. It will also examine the impact of the disease on children’s education and if schoolchildren in Babati have the possibility to act as health change agents and be a part of combating the high malaria prevalence. The thesis is based on a qualitative method with secondary information retrieved from scientific articles and previous studies. It is also based on empirical data collected during a field study in Babati, Tanzania in 2012. Both structured and semi structured interviews were made with schoolchildren, teachers and health care personnel. The studies showed that malaria affects children’s education primarily through absence, but can also cause cognitive impairment as well as neurological damage. The interviews revealed the students to have varying knowledge about the disease and it also revealed that children only have the ability to act as health change agents if teachers with help of the government, the hospital or an NGO are willing to cooperate and provide the students with information.

Keywords: knowledge, absence, cognitive impairment, primary school, diffusion
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1 Introduction

Scientists believe that malaria has existed for more than 25 000 years, it was not until the end of the 19th century that they discovered how the disease is transmitted to people. The last case of malaria in Europe was reported in the late 1960's (Swahn & Wahlgren 2012), today the disease is widespread mainly in the world's tropical regions and the majority of the cases and the deaths due to the disease are found in Sub-Saharan Africa. In 2010 more than 3,3 billion people were in danger of getting infected by malaria. The same year there were about 216 million reported cases of malaria in the world and 655 000 malaria cases were fatal (WHO 2011a, p. 73). There are various reasons to why the prevalence of malaria is so high and why it is so difficult to control in Africa. It is partly due to the parasite’s increased resistance to antimalarial drugs. The widespread poverty and the limited access to proper health care have also contributed to the high malaria prevalence. The burden of HIV/AIDS, as well as humanitarian crises, overshadows the problem of malaria and has also contributed to the difficulties in controlling the disease (Roll Back Malaria Partnership 2008, p. 121).

Malaria is a parasite that is spread from one person to another through a bite from an infected female mosquito called Anopheles. The most dangerous and deadliest type of malaria is Plasmodium falciparum, since it rapidly multiplies in the human body and causes the most severe, life threatening malaria cases. Since there is no vaccine against malaria, people have to use preventative measures to combat the disease. First of all it is important to diagnose and treat the disease early to reduce transmission of malaria and to prevent death. Secondly it is important with vector control and peoples protection against mosquito bites. Since the mosquito prefers to feed during the night, the main way to protect from malaria is sleeping under insecticide treated mosquito nets (ITNs) and using indoor sprays (WHO 2011b). Other ways to decrease malaria transmission are to remove the mosquitos breeding sites and to wear clothes that cover the skin during the night (WHO 2011a, p. 6).

It is estimated that malaria causes about 10 – 20 per cent of all deaths among schoolchildren in developing countries. Children are particularly vulnerable to malaria because their immune system is not fully developed, therefore they are at greater risk of getting infected. Malaria infections vary in severity depending on the type of malaria a child is infected by. It is divided into two categories: uncomplicated and severe (cerebral) malaria. Symptoms of a child with
uncomplicated malaria are usually high fever, headache and nausea but can also be cramps, diarrhoea and vomiting. If a child is suffering from severe malaria they may have seizures, cerebral damage or end up in a coma. Without adequate treatment children are at risk of getting permanent damage to their health or even death (WHO 2007, p. 5). Children’s impaired health can affect their education and increase school absence. In Africa, 2 - 8 per cent of all absenteeism is due to malaria (Lalloo, Olukoya & Olliaro 2006, p. 785). Studies show that impacts of malaria in schoolchildren are not only absenteeism, but also poor performance and dropouts. It has been shown that children exposed to repeated malaria impair their performance in school and impacts their learning abilities. This can result in children falling behind and facing difficulties in catching up with their classmates or even have to repeat classes (Ibid, p. 786).

In many malaria endemic countries, the primary focus on malaria transmission and treatment is on pregnant women and children under the age of five, which is due to the high mortality and morbidity rate amongst the two groups. This has contributed to less focus on malaria transmission among other groups in society such as adolescents (aged 10 to 19 years) (Ibid, p. 788). Schoolchildren have been neglected and not prioritized when it comes to the spread of malaria. They are important actors when it comes to combating the spread of malaria and they can function as health change agents. By disseminating knowledge about malaria to their family, friends and society, and improving the knowledge of the disease they can be part of improving the health of the community (Ayi et al. 2010, p. 2).

The school has an important role in reaching children and educating them about health and malaria. With health education the schools can teach children about malaria prevention and treatment and encourage the children to spread the knowledge to their families and the community. They also have the ability to reach large parts of the community and increase the
knowledge of malaria, which can result in a demand for affordable and appropriate treatment, thus improving the health care services (WHO 2007, p. 8).

Figure 1: Education about malaria to schoolchildren can reach a large part of the community (WHO 2007, p. 8)

1.1 Background

The United Republic of Tanzania is located in eastern Africa and has a population of approximately 42 million, of which 42 per cent are under the age of 15 (CIA 2012). About 70 per cent of the population is at high risk of being infected by malaria. In 2010 it was estimated that about 8 to 12 million people were infected with malaria and the death rate due to the disease were about 15 000 (WHO 2011a, p. 222), making malaria a leading public health problem in Tanzania (WHO 2009, p. 5). *P. falciparum* is responsible for 96 per cent of the malaria infections in Tanzania and the disease is prevalent and endemic throughout most parts of the country (President’s Malaria Initiative 2011, p. 11).

Tanzania has adopted several programmes and projects to combat malaria. The country has a long history of implementing school health programs to improve the health among Tanzanian students (Jukes & Ngorosho 2000, p. 4). More recently, they removed tariffs on mosquito nets, drugs and insecticides for indoor spraying to make them more available to the people. To overcome the growing resistance to antimalarial drugs, the government have made policy
changes such as banning the use of only one drug when treating malaria (ALMA 2011). There have also been strategies implemented for behaviour change to reduce malaria transmission. A project involving community based activities and information spread through mass media was launched in 2008 by the government together with United States Agency for International Development, with intention to increase people's knowledge about malaria prevention and treatment (The Communication Initiative Network 2011). Despite efforts made the last years to combat malaria and reduce prevalence of the disease, there are still challenges to overcome and things that need to be done. The Ministry of Health, responsible for the health service in Tanzania, has the past years been financed by over 40 per cent of their budget by external agencies, making the health system unstable and dependent on others. Although the country has assistance to finance their health system there is a gap between available resources and requirements within the health care. There is a lack of qualified health workers and there is not sufficient supply of essential medicines (WHO 2009, p. 10).

Children in Tanzania start primary school at the age of 7 and studies for seven years before proceeding to secondary school. Primary education is mandatory and today nearly all children attend school (Husén, 2012). Children learn about malaria when they read science in primary school. Malaria is taught along with other tropical diseases, and they spend about two days learning basic knowledge about the spread of the disease and its consequences (Interview with primary school teacher, February 28, 2012).

Babati is a district located in the Manyara Region in the northern part of Tanzania. The district is divided into Babati rural and Babati urban. Babati urban, also known as Babati town, is a small town located near Lake Babati. The town’s population is estimated to be over 30 000 (City population 2011) and as in the rest of the country almost half of the population is under the age of 15. Malaria is the leading public health problem and the disease that causes the most deaths among children between the ages 5 and 18 in Babati (Statistics from Babati District Hospital 2012).
1.2 Formulation of the problem

Malaria is the leading public health problem in Tanzania, as well as in Babati, and it is a major cause of morbidity and mortality (Ibid). Children are vulnerable to malaria because they have not developed sufficient immunity, meaning they are at greater risk of becoming infected and suffer severe health problems (WHO 2011b). Malaria can also affect children’s education with increased absenteeism, deteriorating performance and dropouts (Udonwa et al. 2010, p. 1).

A large part of the population in Babati is under the age of 15 and is attending primary school (Statistics from Babati District Hospital 2012). Schools have an important role in the prevention of malaria and can through education and training increase children's knowledge and reduce the risk of transmission. They also have the ability to reach young people in an age where behaviours are designed. Children are important in the fight against malaria, with increased knowledge and skills they can participate and engage in a healthier life and promote better health for their families and the society (Onyango-Ouma et al. 2005, p. 1712).

1.3 Purpose

The main aim of this thesis was to examine children’s knowledge about malaria in Babati, Tanzania and to retrieve an understanding of whether or not schoolchildren in Babati have the capability to be a part of combating the high malaria prevalence. Additionally, to obtain an understanding of why it is important for children to act as health change agents, the impact of the disease on children’s education was also examined.

1.4 Research questions

- What is the impact of malaria on children’s education?
- What do schoolchildren in Babati know about malaria?
- Can children in Babati work as health change agents in order to prevent malaria transmission in the society?
2 Theoretical framework

This part provides an account of previous studies that have been used to identify suitable theories for this study. They were selected as they contained information about malaria's impact on education and how children can participate and act as health change agents to prevent malaria transmission. Additionally, this section also includes a theory regarding how knowledge is spread within a society.

2.1 Malaria and cognitive impairment

Most studies about malaria show that common impacts of the disease in the human body are organ failure, anaemia, coma and death but few discuss the hidden consequences of the disease (WHO 2011b). Previous studies have shown that proper treatment helps the body to recover from malaria, and neurological complications are not very common. This knowledge has changed in recent years as research has found that this is incorrect. A literature review of articles, regarding consequences of malaria, made by Fernando, Rodrigo and Rajapakse (2010) shows that malaria can affect the brain and its functions causing cognitive impairment that in turn can have a negative impact on children’s education, and thus affect their entire lives and prevents them from achieving their full potential. Cognitive impairment affects the brain the ability to think, concentrate, solve problems and remember. This is caused by both severe (cerebral) malaria and uncomplicated malaria, although cognitive impairment is more common for those with severe malaria (Roll Back Malaria Partnership 2012).

Several studies have examined the impact of severe malaria on children’s school performance. One study made in Uganda evaluated 23 children with cerebral malaria and it revealed that malaria had caused the children cognitive and neurological impairment. This led to hearing and speech impairments, blindness, weakness in parts of the body and behavioural problems. All these disorders have an impact on children's chances to attend school and their ability to learn and thus preventing their development (Fernando et al. 2010, p.2). Another study evaluated children's memory, both children who had suffered from severe malaria and those who had experienced uncomplicated malaria were included. The everyday memory was assessed by a test to review the memory required to perform daily activities. Children with severe malaria had considerably lower memory than children with uncomplicated malaria. The
weakening was particularly in memorizing previous events and recognition, which made the children unable to perform at their best in school (Ibid, p. 3).

A study made in Sri Lanka measured the impact of malaria on cognitive performance for children with uncomplicated malaria, which they had been treated for and recovered from. Several studies were carried out to find out how the children’s cognitive abilities affected their school performance. The study was made to measure malaria impact on educational performance in 325 children by a test to evaluate their mathematical achievement and their writing and language abilities. The results revealed that children who had suffered more than five attacks of malaria had poorer results in several areas than those who had fewer malaria attacks or those who never had malaria. To verify these results, two further studies were conducted in Sri Lanka. The first study examined malaria's impact on educational performance, monitoring 571 children over a six-year period. Through specific examination papers and results from the schools, it was found that malaria infections affect children's academic achievements in mathematics and language. The other study’s aim was to define the impact of uncomplicated malaria, diagnosed and treated early, on short-term educational outcomes and school absences on 648 children in ages 6 to 11. Again, studies show that children with malaria perform poor in mathematics and language as compared to healthy children. This study also revealed that absenteeism due to malaria was common and also had a negative affect on children's school performance (Ibid, p. 4). The results of these studies, that uncomplicated malaria affects educational performance, shows that malaria has a significant impact on children's schooling since uncomplicated malaria often occurs repeatedly for children living in malaria endemic regions (Ibid, p.5).

Besides malaria, other factors that can affect children’s cognitive domains are nutrition, other parasitic infections, poor access to health care and proper education. Studies have showed distinct neurological changes due to cerebral malaria affecting children’s hearing, sight and causing behavioural problems. These problems are not synonymous with cognitive impairment but they may hinder children’s learning capabilities and thus hamper their personal development. Although other factors may affect, the results of these studies revealed that there are important links between severe or uncomplicated malaria infections and cognitive impairment or educational performance (Ibid, p. 6).
2.2 Children as health change agents

Schoolchildren have the ability to work as health change agents and be a part of combating malaria. Through health education in schools they gain knowledge about preventive measures such as the use of insecticide-treated mosquito nets and how to reduce the environmental risks. It can also teach the children to recognize the symptoms and know when to seek medical care. Education to schoolchildren about malaria is an effective way to improve the health of young people and also a way to improve the health of the society (Jukes & Ngorosho 2000, p. 19).

This has been proven in a number of studies. In a study from Ghana, where malaria prevalence is high, schools and local health and education authorities cooperated in order to involve children in reducing the malaria prevalence. First, the teachers were taught about malaria and its prevention, treatment and symptoms as well as different teaching methods. Then, teachers designed health education activities concerning malaria for schoolchildren. The children learned about malaria transmission and prevention and they were also involved in educating the society. Interviews and parasite-based diagnostic testing was made before and after the intervention to study the impact of school based malaria education. The result was that the knowledge about malaria improved in the whole community, both for children and adults. Treating bed nets with insecticides increased among the adults from 20 to 50 per cent. The most positive outcome of the implemented project was that malaria prevalence in the schools decreased from 30 to 10 per cent. The study showed the importance of school based malaria education and to engage children as health change agents to improve the health in the society (Ayi et al. 2010, p. 1-6).

Another study, in Kenya, was carried out in order to determine the schoolchildren's potential as health change agents. Children from primary school were given education from their teachers about malaria, diarrhoea and hygiene. Their knowledge and daily practices, as well as their classmates’ and guardians’ knowledge and practices, were studied before and after the implementation of the health education. The study showed enhanced knowledge about health in all the target groups and the changes in daily practices were more apparent among children than among adults. It also showed changes in both the school and the home environment (Onyango-Ouma et al. 2005, p. 1711). The actions taken had impacts on hygiene routines and
improved the health awareness. Children were proven to play an important and leading role in changing health behaviour in the society (Ibid, p. 1717).

In an additional study conducted in Lao People's Democratic Republic it was concluded that children could act as health change agents. Malaria is one of the largest health problems in the country with a majority of the population at risk of getting infected. The study was conducted in collaboration with the education and health offices in order to determine the affects of school based malaria education on societies in developing countries. Participants in the study were children in primary school, their guardians and married women without children in the target group. Studies on knowledge, practices and attitudes concerning malaria were made before and after the intervention. Teachers were trained to provide health education to the schoolchildren, which in turn were involved in educating the society (Nonaka et al. 2008, p. 76). The result of this project was that malaria education for children in primary school improved their knowledge, attitudes and practices not only for themselves but also throughout the society. Children have the opportunity to serve as health change agents and communicate the health message to the community (Ibid, p. 80)

2.3 Diffusion of Innovations

Rogers (1995) is discussing theories regarding how innovations spreads and tries to explain how, why and at what pace new ideas and technologies are disseminated within communities. Rogers uses four key elements in his research: diffusion, innovation, social system and communication channels. According to Rogers, diffusion is a process of which an innovation is spread through different channels over a period of time among people in a social system. Through diffusions, the innovation can establish and influence the conditions of a social system (Rogers 1995, p 5). In practice, this means that the result of the increased spread of knowledge about malaria could be seen through a reduction in the prevalence of the disease and with reduced mortality and morbidity rates. An innovation is a new idea, practice, or object, which an individual (or organization) chooses to use. If the user perceives an idea as new, it is an innovation (Ibid, p. 11). Innovation in this study is about using the schools as a tool to increase awareness of malaria among schoolchildren in Babati so that they can act as health change agents and increase the awareness in the society. A social system is defined as a composition of interrelated actors engaged together in solving problems to achieve common goals. This may involve individuals, community groups or organizations (Ibid, p. 23). Dis-
Semination of knowledge about malaria occurs in different social systems: in health care centres and hospitals between doctors and patients, within NGOs and governmental actors using projects to reach out with information and through mass media to the public. A *communication channel* is the means by which knowledge of an innovation is transmitted from one individual to another; this applies to everything from personal contact to the media (Ibid, p. 17).

There are five steps to describe how an innovation is spread to individuals and organizations: *knowledge, persuasion, decision, implementation* and *confirmation*.

- **Knowledge**: the first step that the recipients learn about the existence and functions of the innovation.
- **Persuasion**: the process of which the recipient becomes convinced of the innovation’s value. With more knowledge about the innovation, the recipient is more likely to seek information about the innovation and about its possible consequences.
- **Decision**: the recipients decide whether or not to embrace the innovation.
- **Implementation**: the process where an individual (or organization) puts an innovation into use and start trying to use its values.
- **Confirmation**: the final step in which the recipient uses the innovation fully or decides to take the innovation out of use.

This is a decision making process. An innovation is spread through various communication channels over a time period among people in a social system. This procedure allows the recipient to obtain knowledge about an innovation as well as being able to choose whether or not to use it (Ibid, p. 162).

There are various characteristics of innovations that affect a person’s decision to accept or reject an innovation. Rogers has divided them into five different factors:

- **Relative advantage**: how an innovation has improved over previous generations and if it is better than the idea it replaces. It is central whether or not people find the innovation beneficial and important enough to adopt. The more favourable the innovation is, the faster people adopt it.
- **Compatibility**: is whether or not an innovation fits into an individual's life, if it is consistent with existing values and past experiences. Innovations that do not fit in the social systems’ values and standards take longer to adopt (Ibid, p. 15).
• **Complexity:** is if an innovation is perceived as difficult to understand or to use. Innovations that are more complex take longer to be accepted by society because it often requires individuals to develop new knowledge and abilities.

• **Trialability:** is the availability to experiment an innovation. An innovation that is possible to examine involves less uncertainty for individuals who are considering using it and therefore becomes more attractive to adopt.

• **Observability:** the visibility of the results of an innovation. The more visible the result is the greater the probability that individuals will adopt it. It can also increase the communication within personal networks, which in turn can create more positive reactions about the innovation.

Research shows that these characteristics of innovations help new ideas to accelerate acceptance by individuals and society (Ibid, p. 16).
3 Methodology

This section describes how the empirical data for this thesis was collected during a three-week field study in Babati, Tanzania in February/March 2012. It contains a description of chosen method, an explanation on how the interviews were conducted, and the secondary sources used as well as a critical review of the chosen method.

3.1 Qualitative method

The study is based on a qualitative method with data gathered from interviews during the field study and secondary data from earlier studies and reports. A qualitative method is useful for the study to create a deeper and more complete understanding of children's knowledge about malaria, the disease impact on children's education and their possibilities to act as health change agents (Holme & Solvang 1997, p. 101). A qualitative method shows the overall picture and enables a better understanding of social processes and contexts. Instead of including many survey units, the method concentrates on a few units to gain a deeper understanding of the issue (Ibid, p. 79). Using qualitative methods allow the study to be flexible and thus changing the arrangements during the study. Flexibility can however also be negative since the results may be difficult to compare with other studies (Ibid, p. 80).

3.2 Interviews

Interviews have been conducted with different respondents in order to collect data about children’s knowledge about malaria, the disease impact on children’s education and whether or not children can act as health change agents. The interviews have both been of structured and semi structured character. The interviews with the children have partly been structured with a number of specific questions in order to determine children's knowledge of malaria (Gillham 2008, p. 116). The interviews have also been semi structured. This means that the questions are not fully structured, but a number of key questions are phrased with open response options. Depending on what is said during the interviews, a number of follow-up questions are formulated. Semi structured interviews allow a flexibility that provides data of good quality (Ibid, p. 103).
Interviews were conducted with 14 primary school students, both girls and boys, in the ages 10-13 years old. The schools visited were both private and public and were located in Babati town. All respondents were selected according to guiding principles of requirement, such as the children being of a certain age, with help from a field assistant, in order to fit into the study. The interviews with the students were in both English and Kiswahili, they contained the same questions for all respondents and were both structured and semi structured. Questions about malaria transmission, prevention and symptoms were structured in order to determine children's knowledge, while other questions were semi structured to receive a deeper understanding of the study area and to receive the children's knowledge and perceptions of the disease.

In order to obtain a comprehensive view of malaria’s impact on children's education and children's potential role as health change agents interviews with three teachers and a school nurse from primary school as well as health personnel from Babati District hospital was conducted. The interviews were semi structured with a few broad questions and some follow up questions to obtain as much information as possible. Besides the semi structured interviews, interview with one of the hospital staff was structured in order to gain statistics of the prevalence of malaria.

To extract as much information as possible and to ensure that the respondents did not feel limited during the interviews, and have the courage to speak freely, anonymity was assured to all respondents. There were no recordings of the interviews, instead notes were taken. To avoid losing information the interviews were transcribed the same day while they were still fresh in memory. However, since the interviews were not recorded there is a possibility of information getting lost.

### 3.3 Secondary sources

Scientific articles and previous studies as well as literature from organizations working with malaria issues were chosen to be used as in-depth literature and to obtain relevant material and knowledge of malaria impact on children and their ability to act as health agents. The majority of the existing literature regarding malaria focuses on how children under five and pregnant women are affected and therefore there were difficulties in finding how adolescents are affected. However, the literature found has been sufficient since they revealed similar re-
sults. The literature is received from known organizations such as The World Health Organization and Roll Back Malaria Partnership. Literature is also received from established scientific scholars and authors within malaria research like Sumadhya Deepika Fernando, David Laloo and Irene Ayi as well as Everett Rogers, who established the theory about diffusions of innovations. There is always a risk of information being biased and not objective but since the literature has been gathered from many different and reliable authors with different perspectives on the topic it shall not affect the results of the thesis. Although previous studies and articles have been evaluated and analysed with awareness and a critical approach, there is a possibility that an incorrect interpretation has been made of the content that may have influenced the results.

3.4 Critical approach

A limited case study involves a risk of valuable information not being included. It is important to be conscious of what impact it may have on the results. It is also important to have in mind the existence of uncertainty about to what extent the study can be used to generalize the results of the essay (Bryman 1997, p. 107). This thesis represents the respondents and does not provide a general picture of peoples’ reality in Babati. However, the study provides an insight about children's knowledge about malaria and the disease impact on their education as well as their abilities to work as health change agents.

It was mandatory for the students at the private school to speak in English, which they also did during the interviews. Attempts were made to have them respond in Kiswahili, since it is often easier for people to express themselves in their native language, but many of them continued to respond in English even though it clearly was easier to answer in Kiswahili. The fact that the children did not answer in their own language may have resulted in them having difficulties expressing themselves, which in turn may have affected their responses. Teachers at the private school spoke fluent English, which made the interview more direct and more like a conversation. All the other interviews were conducted in Kiswahili and translated by the field assistant to English. This may have caused some challenges since information may have been lost in translation and the interpreter may have influenced the results by making own valuations of the response. In many cases it was difficult to interview the children due to their shyness. In order to get the children to open up and have the courage to speak they were encouraged by both the researcher and the field assistance during the interviews. This proved to be
successful in majority of the interviews. However, this may have resulted in incorrect information. Children's responses may have been formulated according to what they think the researcher wanted to hear, thereby giving a misleading picture of their situation.

When conducting a study it is also important for the researcher to be aware of their role and to have distance to their own interests. Objective research without personal values is difficult. Since researchers are influenced by their backgrounds, opinions and knowledge, it is impossible for them to retain their objectivity, which may affect their studies (Holme & Solvang 1997, p. 30-31) and which may also have affected this study.

The thesis could have been more reliable if supplemented with quantitative data through surveys to obtain a better understanding of the level of knowledge among students. Surveys are a suitable method to generate data on large numbers of people and could have broadened the study (Bryman 1997, p. 20), but this was not chosen due to time constraints and the desire to obtain more in-depth results. The number of respondents may have affected the study's results and it is important to have in mind that the result might have been different if more schools had been visited and if more respondents had been included.
4 Findings

In this section there will be a presentation of the empirical data collected from the interviews made during the field study in Babati, Tanzania. A majority of the interviews were conducted with schoolchildren in primary school (age 10-13), both in public and private schools. In order to obtain a comprehensive overview of the situation there were also interviews made with teachers, a school nurse and personnel at Babati District Hospital.

4.1 Children’s knowledge about malaria

All of the interviewed children knew that malaria is transmitted through a mosquito. There was no difference between students in private and public schools and about one third of the children had more detailed knowledge and knew that the parasites are spread from one person to another through a bite from an infected female mosquito called Anopheles. Every one of the respondents mentioned the use of mosquito nets as a preventive measure. Less than half of the students could describe other ways to prevent the spread of malaria. One girl said it was important to remove areas of water where mosquitoes breed, especially during rain seasons and one of the boys mentioned cutting grass so the mosquito could not breed. Other preventive measure that was mentioned was lotion and indoor spraying.

The students had different responses when asked about the symptoms of malaria. Less than half of them said recurrent high fever as a symptom of the disease while the majority mentioned fever-like symptoms such as feeling weak and cold, tired body and loss of appetite. Headache and feeling dizzy was also mentioned as symptoms for the disease. When asking the students on how malaria is treated, everyone said medicine. However, not everyone knew where he or she could receive medicine, but the majority mentioned from the doctor at the hospital.

There were different responses to the possible consequences of malaria. One of the boys believed severe malaria could make a person mad or crazy, when asked where he had gained that knowledge he said that it was something he had heard could happened to a person with malaria. Another boy said that malaria made people fail to be involved in community activities and missed out on their social life as well as loosing their income. One of the girls said that the disease was harmful to all children and that both children under and above the age of
five were dying due to the disease. They also mentioned the consequences on children’s education; with increased absence leading to failing exams and lagging behind the other students.

“Mosquitos are in every place, everywhere and they can bite you at any time day or night. There is no way to escape from it.”

- Boy in primary school, 13 years old

The children gave various explanations to the high malaria prevalence in Babati. One of the boys explained it as the impossibility to protect yourself against the disease since mosquitoes bite at all times and that mosquitoes could bite you without you knowing. Another boy said that a person could get infected even though he or she is sleeping under a mosquito net. It could be an undetected hole in the net or the mosquito might get under the net without anyone noticing. All of the interviewed children saw malaria as a problem. Not only due to the health problems it causes but also due to how it affects their everyday life and the fact that they perceived it difficult to avoid getting infected by the disease.

4.2 Children’s experience of malaria

Everyone, except one, of the interviewed students had suffered from malaria once or more than once. Even though they had different experiences of the disease, nearly all had been absent from school during the illness. There were differences in how long they had been absent due to the severity of the disease. The students that had suffered from severe malaria had been absent for about two weeks, while the other students had been absent for about 3 – 4 days. One of the girls did not have any absence at all from school during her malaria infection. When she became ill her parents took her to the doctor and she received medicine and because her symptoms were mild, she could get back to school without having missed any education. Three of the respondents knew with certainty that they had suffered from severe malaria. They were all absent from school for about two weeks, which resulted in the students missed out on the learning at school and lagged behind their classmates. Since they faced difficulties in catching up with the rest of the class, the teachers explained what they had missed and offered them extra teaching. This occurred both in the private and public schools. For students with fewer days of absence no extra teaching was offered. Instead those students were forced to turn to their classmates and had to copy their notes in order to find out what they had missed. They also had to study harder to catch up with their classmates and to avoid
lagging behind. None of the respondents had to repeat a grade or drop out of school due to the malaria infection. All of the interviewed children said that it was their parents or guardians who decided about their treatment and when to go to the hospital to seek health care.

Almost all of the interviewed students mentioned science in school as the primary source of information about malaria. Half of the children also mentioned their parents being an important source of information. One boy, that had been hospitalized, said he received information about malaria at the hospital from his doctor. Other sources that provided students with information about malaria transmission and prevention was the television and radio as well as newspapers and commercials.

4.3 Teachers view on malaria

All of the teachers mentioned absence to be the most prominent affect of malaria on children’s education. They said that children who were absent a longer period due to malaria had to study harder to get back on track. They also mentioned the disease affecting the children’s ability to learn and one of the teachers said the weak health of the children made them poor listeners. One of the teachers brought up that students affected by malaria often had difficulties in solving various problems and had hard time remembering things. Poorer results and grades were common when a child had been absent for an extended period. Besides the impact on children's education, one of the teachers also said that malaria affects children's social life at school. Children who are absent for a longer period from school misses out on social activities and this may lead to children being excluded from their friends and feeling lonely. Falling behind in school may also affect children's self esteem and could make them feel that they are not good enough. Such thoughts, for a child, can be difficult to get rid of and can affect their future schooling. One of the teachers said that it was rather easy to see if a student did not feel well or was ill since they often showed signs of having difficulties to focus and concentrate on school activities. Most of the interviewed teachers pointed out that it was difficult to know the reasons why a child was ill or absent. The sizes of the classes are often large and it is not uncommon to have 40 students in one classroom. This makes it difficult for teachers to keep an eye on all students. They also felt that due to the class sizes, they did not have as well contact with the parents as wanted. This meant that they did not always know why the children were absent. At the school with the school nurse they sent everyone who was ill to the school nurse, who in turn sent those really ill further to the doctor. This made it
possible for the school to keep a record over the diseases and to be more aware of whom and how many had been infected with malaria. At one of the schools they sent the children who appeared to be ill directly to the doctor at the hospital. Otherwise, it was the parents’ or the caregivers’ responsibility to take the children to the doctor. To try to see how the teachers perceived the prevalence of malaria they were asked to try to estimate how many of their students have or have had malaria. The answers were quite different; one of the teachers estimated her students being infected by malaria to be one out of ten, while the others responded four to five out of ten. In all schools where interviews were conducted, malaria was taught as a subject in science. They spent about two days on the subject dealing with symptoms, causes and prevention of the disease. All of the teachers appreciated the children to have good knowledge about malaria, but one teacher said that the knowledge differed depending on the age of the students. She claimed that the younger children had little knowledge and the older had more knowledge about the disease, while there were some children that did not have any knowledge at all.

4.4 Health care personnel and malaria

One of the schools had a school nurse who took care of the children if they became sick and she also sent the children to the hospital if she suspected malaria or other severe diseases. According to her records, many of the suspected malaria infections were in fact not malaria but other diseases. This made her believe that the prevalence of malaria among the students was not that high. She said that she did not know how malaria affected the children’s performance capacity during the lessons. However, she knew students who had been forced to repeat classes because they had suffered from severe malaria or had experienced malaria several times.

According to one of the personnel at the hospital, the majority of the population in Babati town visited Babati District hospital when feeling sick. The records of the hospital revealed malaria to be the leading public health problem and the disease that causes the most deaths among children between the ages 5 to 18 years in Babati. The hospital, through a coordinator, informs the schools about malaria both to the teachers and students. They also try to inform the public through meetings and seminars. One of the health workers emphasized the importance of funding as well as the lack of it. The hospital did not have enough resources to buy the needed equipment and medicines and not either to organize information events for the public. Despite the economic situation, he was highlighted the importance of education to the
community. According to the health worker the public knowledge about malaria was poor. He took as an example people’s belief that ITNs are toxic. It is common to believe that the chemicals used on ITNs can cause decreased sperm production in men. The fear of not being able to have any children makes people choose not to use ITNs. The people are ignorant and there is a need for more funding to be able to reach out to the community with proper information about malaria.

The doctor interviewed at the Babati District Hospital also shared this view. According to him, the government needs to take greater action and the schools need to increase malaria education in order to combat the disease. He saw children as potential key actors since they could disseminate the information on to their families and friends, but he also thought that it was important to increase the knowledge in the whole society so that everyone could participate in fighting malaria. The doctor also said it would be good if there was a programme introduced to visit schools to ensure malaria isproper taught and that the students have good knowledge about malaria. He explained what they did at the hospital to prevent the spread of malaria. First of all they tried to promote everyone to use ITNs and tried to explain the benefits of it. They also gave health education to patients, meaning they already were infected by malaria to receive information. The doctor also talked about information being disseminated to students through school programmes with projects dealing with many different diseases such as malaria and HIV/AIDS. The doctor mentioned the importance of proper care in time. Many patients seeking treatment for malaria often had an advanced malaria infection because they have waited too long before seeking treatment. He believed this was primarily due to people not knowing what symptoms they should respond to when it comes to malaria. He also talked about the consequences of malaria and that the younger a child is the more difficult is the impact on their health. If they do not receive treatment in time, school-age children are at risk of obtaining permanent brain damage such as blindness, speech and hearing difficulties and recurrent epileptic seizures. Malaria can also result in coma and even death.
5 Analysis

This section compares the empirical data from Babati and the previous studies made on the impact of malaria on children’s education as well as children’s opportunities to act as health change agents. In addition, it also contains analysis of the theory regarding diffusion of innovations with the previous studies and the empirical data.

In the previous studies about malaria’s impact on children’s education as well as in the empirical part of this study it was found that malaria do have an impact on children’s ability to learn. According to the previous studies both severe and uncomplicated malaria could cause cognitive impairment and affect people’s ability to concentrate, solve problems and remember (Roll Back Malaria Partnership 2012). The interviewed doctor at the Babati District hospital did not mention the cognitive damage malaria may cause but he spoke of neurological damage such as blindness, speech and hearing difficulties and seizures that also affect children's education. The doctor's statement is supported by the theories that also state that neurological changes can hinder children's learning capabilities (Fernando et al. 2010, p. 6). The fact that malaria causes cognitive impairment was supported by the teachers who said that children with malaria often had difficulties in solving problems and had impaired learning abilities. However, the main consequence of malaria, as the teachers rose, was absence. They emphasized absence more than the students decreased ability to concentrate for a longer time and their impaired memory. Absence caused the children lagging behind and made them perform less, which resulted in poor results and grades. Fernando et al. (2010) also addresses this by saying that absenteeism due to malaria is common and has a negative impact on children's education. The interviewed children also supported this theory, claiming it was the absence, which made them fall behind in school and caused them lower grades.

Children’s knowledge about malaria varied depending on who was asked. According to the teachers the children had good knowledge about malaria. One of the teachers said that the older children had more knowledge than the younger and there were some students that did not have any knowledge at all. The interviews with the children revealed that every one of them had some knowledge about malaria but the amount of knowledge varied with some of the children having a comprehensive knowledge of malaria, while others had less. For example, none of the students mentioned diarrhoea, cramps or vomiting as symptoms of malaria. The interviews also revealed that children had difficulties to name the most common symp-
tom of malaria, namely fever. Instead the majority mentioned fever-like symptoms which may be a sign of ignorance or that they simply do not know the word for the symptom. When asked about the consequences of malaria, it was noteworthy only one student who mentioned death. None of the respondents mention the use of ITNs and to wear clothes that cover the skin to protect themselves from mosquito bites as well as there were none mentioning of the fact that the mosquito prefer to feed during the night (WHO 2011b; WHO 2011a, p. 6).

The interviewed children had some knowledge of malaria, but not as good as desirable. Even though almost everyone at some time had suffered from malaria, they did not fully know how to protect themselves against the disease or the symptoms of the disease. To become health change agents and to be a part of combating malaria, children need to have proper and extensive knowledge about the disease (Jukes & Ngorosho 2000, p. 19). This is supported by studies made by Ayi et al. 2010, Onyanga-Ouma et al. 2005 and Nonaka et al. 2008. The previous studies also showed that teachers play an important role in educating students to become health change agents by providing them with health education. The teachers are the ones that children meet almost every day and which are able to give children proper knowledge about malaria (Ayi et al. 2010, p. 3; Nonaka et al. 2008, p. 76). The interviews revealed the science teachers as main informants to the students about malaria’s transmission, symptoms and prevention. Students confirmed this as they claimed the school to be the foremost source of information, which opens up the possibility for the students in Babati to become health change agents. The health care personnel at Babati District hospital both emphasized the importance of information to the community. The doctor believed that both the government and the schools needs to take greater action in order to increase children’s knowledge about malaria.

According to Rogers's theory "Diffusion of Innovations" it partly depends on the people in Babati if the schools can be used as a tool to increase awareness of malaria in the community and whether children can be used as health change agents or not. There has to be a need for the innovation and signs that it can deliver positive results to the inhabitants (Rogers 1995, p. 15). The interviews have provided some indicators of how people perceive the problem of malaria. It appears to be a mixed perception of whether malaria is a problem or not. All interviewed students believed that malaria was a major problem leading to serious consequences, while teachers only considered it to be a problem if you became infected. According to the interviews all students, except one, had been infected by malaria once or more than once but according to the teachers malaria prevalence was not that high. The school nurse also shared
this view while the two employees at the hospital believed that malaria was a major problem in the society since many people were infected and had little knowledge about the disease.

Rogers's theory is partly coherent with the previous studies made about children as health change agents. On one hand, Rogers writes about innovations being disseminated if they are important enough to be adopted and if people see them as beneficial. According to the theory, it also depends on whether innovations fit into people's lives by being consistent with their values and whether its success can be measured (Rogers 1995, p. 15). This applies to the previous studies, regarding children as health change agents, since it has been a need for reduced malaria prevalence among the population (Ayi et al. 2010, p. 1; Nonaka et al. 2008, p. 76). The theory also applies since the innovation has proved to be successful by reducing the malaria prevalence (Ayi et al. 2010, p. 6) and increased the awareness both among the target group (Onyango-Ouma et al. 2005, p. 1711) and the rest of the society (Nonaka et al. 2008, p. 80). However, Rogers theory also states that innovations needs to spread through different communication channels in order to be adopted (Rogers 1995, p. 180), and it also states that innovations that require individuals to develop new knowledge and abilities takes longer to be adopted, if they even are adopted (Ibid, p. 16). Studies made by Ayi et al. 2010, Onyango-Ouma et al. 2005 and Nonaka et al. 2008 all reveals that these requirements are not necessary in order to disseminate innovations. First of all, the spread of knowledge about malaria is not spread through various channels, as Rogers claims is important in his theory (Rogers 1995, p. 180), instead it has been disseminated through a rather one-way direction through the teachers and on to the children, who then has spread the knowledge further to the society (Ayi et al. 2010, p. 3; Nonaka et al. 2008, p. 78). The studies on using children as health change agents have required that those involved (children, teachers and the rest of society) developed new knowledge and abilities (Ayi et al. 2010; Nonaka et al. 2008; Onyango-Ouma et al. 2005). This goes against Rogers's theory concerning that it takes time to adopt new innovations (if they even are adopted) if people have to learn new skills (Rogers 1995, p. 16).
6 Discussion

It became evident through both the interviews and the secondary data that malaria has different effects on children's education. Malaria affects the education primarily through absence, but also by impairing children's ability to learn. The interviewed teachers emphasized the absence as a possible consequence of malaria. This could be explained by the fact that absence is easier to recognise than the cognitive or neurological damages. If a student is absent it is easy to ask and find out why, but if a student start having difficulties in remember things or have learning disabilities it is more challenging to know the underlying reasons if it is not known with certainty that the child suffered from malaria. The size of classes makes it even more difficult for a teacher to keep track of all their students.

The interviewed teachers, who meet the students almost every day, believed that the incidence of malaria was not particularly high in Babati. They perceived the disease as a problem, but only if one became infected (which was rather unusual, according to them). This may partly be because it was difficult for them to keep track of why students were ill and absent. It was not uncommon to have many students in one class, which may explain the teachers' view on the disease. The teachers claimed that the students had good knowledge of malaria, but this turned out to be incorrect during the interviews with the children. Their incorrect statements may be due to that they either believed children to be knowledgeable or they simply did not want to admit the children's ignorance.

This study demonstrates schoolchildren’s varying knowledge of malaria with some obvious deficiencies, such as knowledge about symptoms, consequences of the disease and preventive measures. It is remarkable that the children's experiences with malaria have not resulted in better knowledge of the disease. Schools were the children's main source of knowledge. Since primary education is compulsory in Tanzania, and the majority of children are attending, it can function as a useful tool to increase awareness about malaria. The study also reveals that schools as a source of knowledge may not be sufficient, in addition to improve the schools’ dissemination of knowledge other sources, such as mass media, may be important (Rogers 1995, p. 5). By only looking at children's knowledge, it is understandable that there is a high prevalence of malaria in Babati. However, malaria prevalence is not only due to ignorance but it also is depending on other factors such as poverty and limited access to proper healthcare (Roll Back Malaria Partnership 2008, p. 121). Poverty and poor healthcare are interrelated.
and are difficult to overcome, while ignorance is something that actually can be changed. Ministry of Health, responsible for the health care services in the country, are dependent on external aid to provide the people with proper health care (WHO 2009, p. 10). Involving children and schools in the fight against malaria would not only be efficient but also cost effective.

Knowledge is required in order for children to become health change agents. They can obtain this knowledge, if the teachers are willing to get involved in providing them with information. It also requires some support from the government, hospital or NGOs. All respondents, except for some of the teachers, considered malaria as a major problem in the society. In order to get children to act as health change agents it must be demonstrated to the teachers the prevalence of the disease and making them understand the importance of intervention. After persuading the teachers there is a need for someone to be in charge of the innovation. In the present situation it is more likely that an NGO could provide the support needed to implement this project, since the government lack sufficient resources (WHO 2009, p. 10). There are opportunities to engage children in the fight against malaria in Babati, but it requires the society’s commitment. To increase children’s knowledge about malaria and to engage them to work as health change agents it is important to identify what has been done in the past in order to demonstrate the advantages of the innovation (relative advantage). It is also important to investigate if the innovation responds to peoples needs and if it goes against old habits and norms or is perceived as non-functional (compatibility). To determine if children can act as health change agents it has to be investigated if the innovation is too complex and if it is easy to understand and use (complexity). There are two dimensions; if the children are able to receive information about malaria and if they are able to disseminate it to the community. It is also of importance to test the innovation in order to see if it works and to see the results (trialability) (Rogers 1995, p. 15-16). Allowing one school to educate their students to become health change agents and to see the outcomes could be one way to test the innovation. Another method could be to invite other schools in the country that have done such projects in order to hear about their experiences and results.

The fact that not all respondents believed malaria to be a widespread disease in Babati may be due to a normalization of the disease in the community and that the disease is seen as normal in peoples everyday life. This could be one of the reasons behind the insufficient knowledge among the children and the high prevalence of the disease. If people do not see malaria as a
problem it is not likely that preventive measures are implemented, and without action the disease will not be reduced and eliminated.

6.1 Recommendations for further studies

To obtain a comprehensive view of children's knowledge of malaria more extensive studies is needed. It is also needed to do further investigations on children's capabilities to act as health change agents as well as ways to prevent malaria transmission. Additionally, more studies on how malaria affects children of school age needs to be conducted since there are not many published concerning the subject. It would be of interest to further study how the inhabitants of Babati perceive malaria; if they see the disease as a problem or if it has become a normalization of the disease in the community that prevents it from be taken as seriously.
7 Conclusions

• What is the impact of malaria on children’s education?

Absence was the main impact of malaria on children's education according to the informants. The absence itself results in students lagging behind their classmates and they have to study harder to catch up. Children with malaria may have reduced ability to learn and difficulties in solving problems. They may also suffer from permanent neurological damage as well as cognitive impairment. All these factors may result in lower results and grades, and that students have to repeat classes or even drop out of school.

• What do schoolchildren in Babati know about malaria?

Students had varying knowledge of malaria. All the students knew that a mosquito spreads the disease and that mosquito net provides good protection. There were not many who could name other preventative measures and there was no one who mentioned the use of ITNs and to wear clothes covering the skin. The majority mentioned fever-like symptoms when being infected, but no one mentioned cramps, vomiting or diarrhoea. The children also had some knowledge of the disease impact on the everyday life but there were only one student that mentioned death as a possible consequence of the disease.

• Can children in Babati work as health change agents in order to prevent malaria transmission in the society?

With the knowledge children in Babati have today about malaria they do not have the ability to be involved and act as health change agents. If the teachers with help of the government, the hospital, or an NGO, are willing to provide the students with information, there is an opportunity for children to be involved in preventing malaria transmission in the community. There are indications that this is achievable as the staff at the hospital considered the children to be important actors in the fight against malaria, and as almost all respondents considered malaria to be a major problem in the society.
8 References


Studentlitteratur


