

**“Getting rid of the plague”: jiggers removal program in Bungoma, Kenya  
Community and health workers perspectives on tungiasis in a high prevalence area.**

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Faculty of Medicine and Dentistry  
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*“The jigger flea makes me feel as I’m tortured”* (infected woman). Picture taken with permission. Photographer: Åse Mørkve.



Front page: Picture taken with permission. Photographer: Åse Mørkve.

## **Abstract**

**Objectives:** Tungiasis is caused by a flea, *tunga penetrans*/ jiggers, which enters the epidermis of humans/ animals. The skin gets painful and itchy, and if untreated, bacterial infection occurs. Jiggers are easily transmitted among the poor living in urban slums and in rural and fishing communities. Millions are at risk worldwide. Fighting jiggers remains NGOs' task. Bungoma Red Cross, Kenya conducts removal clinics since 2005. The study's aim was to explore experiences with fighting the vermin.

**Methodology:** Qualitative participatory research was performed in Bungoma County during a two-month fieldwork. In-depth interviews, group discussions, observation and informal talks were conducted with: NGO- and public health workers; persons affected by jiggers and key-informants (e.g. teachers). 19 health-facility informants and 36 community-based informants were interviewed.

**Results:** Those infected feel tortured by multiple penetrations on hands and feet which are painful and physically disabling, resulting in work-incapacity and school drop-out. People feel stigmatized, neglected and dependent on assistance to remove the jiggers. Children and elders are particularly vulnerable. Different traditional and modern methods are used for removing/eradicating the flea. There is confusion about effective approaches and guidelines are lacking. Where the attack rate was extreme, reoccurrence after treatment was apparently inevitable. Animals were not perceived as reservoirs of jiggers. The government did not seem to pay attention to this vermin affecting several communities, and NGOs/ Bungoma Red Cross feel they are left alone. The program is time consuming and costly, and lacks manpower and medicine. Collaboration with government health-workers is necessary to sensitize and follow up the community, yet they also lack resources.

**Conclusion:** Tungiasis is a debilitating problem affecting individuals' households, and increasing the vicious circle of poverty. High-prevalence communities need coordinated measures by the public health sector to combat re-occurrence and environmental infestation. Research on prevalence, prevention and treatment is needed.

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## 1. Introduction

### 1.1 Background and aim of the study

The aim of this study was to explore the activities and relevance of a mobile jiggers' removal program in a high prevalence area, such as is the case in Bungoma in Kenya. Through this case study, I aimed at understanding the views of those infected with jiggers, of the staff and volunteers at the NGO (Non-Governmental Organization) and of other health workers. Reported research results about jiggers in East- Africa are few or lacking (Mazigo et al. 2012). In general, sand fleas infestation as a public health problem is poorly recognized. The specific study area in Kenya was chosen because Bungoma County is a high tungiasis prevalence area. Bungoma Red Cross, which is operating in the county, is an organization twinning with Hordaland Red Cross in Norway, where I have worked as a volunteer since 2010. My global health interest developed gradually. I have a degree in sports science with specialization in rehabilitation and health, in addition to work experience in cancer rehabilitation, physical disability and as a refugee consultant. After studies on "Corporate Social Responsibility" in Argentina as well as volunteering in Bergen Red Cross Rescue, I became interested in understanding how health promotion projects may function abroad, in this case in Kenya. Additionally, learning about tungiasis, a problem I knew little about was interesting.

### 1.2 Definition of jiggers

Tungiasis is a parasitic skin disease caused by the sand flea *tunga penetrans* (Heukelbach, Franck and Feldmeier 2004). Around the world, different names are used for the flea, such as *jigger flea*, *chigoe flea* and *sand flea* in English, or the *chique* in French. In South- America the flea is commonly called *nigua*, *pique* and *chica* (Pampiglione et al. 2009). In Kiswahili, the flea is named *funza* (Cooper 2007). In this report the infection is described as jiggers because it is the most common English name used on the lesion in Kenya. There are different definitions of *tunga penetrans* infection. The medical dictionary describes it as: "Prevalent in subtropical and tropical America and Africa; infection is caused when the pregnant female burrows into the skin of the feet, legs, or other part of the body, causing intense irritation and ulceration, sometimes leading to spontaneous amputation of a digit" (MedicalDictionary 2012). *Jigger tunga penetrans* is a mite from the family tungidae of the flea species Siphonaptera. The mite causes zoonosis<sup>1</sup> which is spread by a broad spectrum of animals,

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<sup>1</sup> A disease that can be transmitted to humans from animals (OnlineDictionary 2013a).

with chickens, pigs, dogs, cats and rats as the principal reservoirs in resource poor settings (Cheki n.a.).

### **1.3 History**

The first author to mention this parasitic infection was Gonzalez Fernandez in 1525. Fernandez described many instances of Spanish conquerors in Haiti who suffered from it (Heukelbach et al. 2001). Prior to 1872, the flea was only reported in Latin America and the Caribbean. That same year a ship came to Angola from Brazil with infected ballast sand. Tungiasis spread quickly all over Sub-Saharan Africa, through trade routes and through military expeditions. Heukelbach et al. (2001) reported that in 1899, Indian soldiers got infected in Africa, and brought the disease further to India. The flea was however never widely distributed in India. The most affected areas of jiggers are still in Latin America, Sub Saharan Africa, and the Caribbean, even though some cases have been reported in Asia and Oceania (ibid). Throughout history jiggers have normally occurred in urban slums, in rural communities and in traditional fishing communities (Winter et al. 2009).

### **1.4 Pathology**

The flea is about 1 mm in length. It is found in various types of soils, although dry and sandy grounds seem to be particularly suited to their development (Heukelbach et al. 2001). The flea penetrates into the epidermis of a host; humans and animals. Since the flea cannot jump high, the penetration is most likely to occur on the feet however it can occur on the entire body. Both male and female fleas feed on blood but whereas the male flea dies after copulation (Sachse, Guldbakke and Khachemoune 2006) the pregnant female flea burrows into the epidermis (Ruttoh, Ochieng and Wanyama 2012) for four to six weeks (Feldmeier, Kehr and Heukelbach 2006a). Within 24 hours the penetration site gets irritated, and within 2-3 days it gets painful. The female flea can now be seen, but it is almost completely buried into the epidermis (Eisele et al. 2003). After 8-12 days the flea has obtained a size up to 1 cm. As the penetration is itching (Heukelbach et al. 2001) hundreds of eggs are spread when scratching, which help to expel the flea's eggs (Pilger et al. 2008a). The flea can expel eggs for several weeks. When the flea has released the eggs, she dies and the remains of the flea are expelled. However severe infection can produce honeycomb-like lesions. With proper treatment and removal of the flea, the disease itself is a self-limited infection. However without appropriate treatment, bacterial infection is often seen in endemic areas (Ariza et al. 2010). When a complication due to the jiggers infection arises on a later stage it might not be attributed to the flea, yet still be caused by it (Heukelbach et al. 2001).

### **1.4.1 Associated complications**

The lesion is associated with morbidity such as loss of nails, formation of ulcers and fissures, inflammation, suppuration (Pilger et al. 2008b, Feldmeier et al. 2006a), chronic lymphedema (Heukelbach et al. 2004) and sepsis. Bacterial super infection can lead to tissue necrosis (Joseph et al. 2006). Those who are seriously attacked by the lesion will have visible disabilities. The infected part of the body may impair the functionality of individuals, and may hinder them of walking and gripping (Ugbomoiko et al. 2007a, Mazigo et al. 2012). For those who are not vaccinated, jiggers' infections are associated with tetanus (Heukelbach et al. 2004, Feldmeier et al. 2006a, Buckendahl et al. 2010), and gangrene (Buckendahl et al. 2010). A study from Brazil found that in 10 % of the tetanus cases, jiggers were identified as the place of entry (Feldmeier et al. 2003a). Secondary infections due to jiggers might cause auto- amputation of digits and death (Ruttoh et al. 2012).

### **1.5 Prevalence**

A worldwide prevalence of this parasitic disease is unknown, although it is reported that hundreds of million people are at risk of the infection in more than 70 nations (Pampiglione et al. 2009). There are several studies describing the prevalence in certain high risk areas. In Brazil, the prevalence rates reach up to 60 % among children living in squatter camps outside big cities and in under-developed rural areas (Heukelbach et al. 2004). Feldmeier et al. (2006) described that a prevalence of more than 50 % in high risk populations is common, without specifying which areas (Feldmeier et al. 2006a). A review article estimated a prevalence rate as high as 76 % in certain endemic areas (Sachse et al. 2006) and children and elderly are most exposed to this infection (Winter et al. 2009). Research reported that investigation of cats, dogs and human populations in an urban slum and in a traditional fishing village in Brazil. They found that among the animals there was a prevalence of 67 % in both communities. The human prevalence rate in the urban slum was 54 %, and 52 % in the fishing village (Heukelbach et al. 2004).

### **1.6 Risk factors and preventive measures**

Generally speaking the prevalence of jiggers is highest in poor communities. Lack of education and knowledge about the condition is often mentioned in literature as risk factors of getting jiggers. However there are other important reasons for this (Heukelbach, Mencke and Feldmeier 2002). Animal reservoirs, poor hygiene and poor infrastructure are important reasons for the high prevalence. Poor communities are often located outside the biggest cities, where it tends to be more animals. Animals are reservoirs of jiggers, and the more infested

animals in a community, the higher is the risk of infestation among humans. Poor households often share house with animals, which increase the risk of infestation (Heukelbach et al. 2002). The lack of rubbish disposals in poor communities increases the number of rats and mice in the high prevalence areas. Rats and mice might be carrier of the jiggers lesion, and this contributes to an increased jiggers prevalence in high endemic areas (Feldmeier et al. 2003a).

Insufficient or non- existing sanitation (ibid), lack of clean water and soap and resulting poor hygiene are other important factors that increase the prevalence of jiggers infestation (Karuga 2011). Further, a study from a rural community in Nigeria mentions sand or clay floor inside the house, and having a common resting place outside the house as important risk factors for getting jiggers (Ugbomoiko et al. 2007a). Sleeping on a non- solid floor also increases the risk of penetration (Pilger et al. 2008a). A study from Brazil supports these findings, and adds that walking barefoot and the presence of garbage littering in the area increase the risk of infection (Winter et al. 2009).

Looking at preventive measures, using socks and shoes prevent the flea from penetrating (Ugbomoiko et al. 2007a). Applying the plant based repellent Zanzarin as a preventive measure twice per day on the feet is reported to reduce the number of lesions with 87 % (Feldmeier et al. 2006a). Also, the use of insecticides, and fumigating with products as Malthion in the victims' houses and in the surroundings will kill the flea and then also decrease the multiplication of the flea and the numbers of penetrations (Ruttoh et al. 2012). Finally, prevention of the lesion is most important during the dry season, as the jiggers' prevalence is significantly higher this time of the year (Heukelbach et al. 2005, Heukelbach et al. 2001, Ruttoh et al. 2012).

### **1.7 Treatment and reoccurrence of the sand flea**

Looking at the issue of treatment, the early extraction of the flea is the first line therapy, although there are several suggested recommendations on how to remove the jiggers (Sachse et al. 2006). First of all, when removing the lesion, one needs medical antiseptics, such as alcohol or disinfectants such as Savlon or Dettol on the affected part of the body (Karuga 2011, AhadiKenyaTrust 2007a). Furthermore, when removing the flea with a sharp and sterile instrument (Heukelbach et al. 2001) in the household one need skills, appropriate light (Heukelbach et al. 2004), and time to investigate the body carefully, which makes treatment options limited in the poor areas (Feldmeier et al. 2006a, Heukelbach, Franck and Feldmeier

2004). In addition, removal of the lesion with a sharp instrument is painful (Heukelbach et al. 2004). You must “dig” around the infected area, and be careful that you do not rupture the inflated eggs sac, as if the egg sac ruptures it will cause a re-infestation (Karuga 2011). If the flea is not appropriately removed and bursts during removal, severe inflammation is unavoidable (Heukelbach et al. 2001). When removing the lesion it has been reported that people share needles, which may be a risk in terms of HIV/AIDS infection (Karuga 2011). Finally, traditional methods to remove the flea are still in use. In Northern Brazil for instance, it is reported that those suffering with jiggers use a mixture of candle wax and kerosene to kill the flea (Sachse et al. 2006).

Studies from the fishing village and urban slum in Brazil show that knowledge about the lesion was sufficient. However follow up and education was suggested as necessary as the individuals did not continue appropriate treatment (Winter et al. 2009). Heukelbach et al. (2004) suggested that the reason for the lack of follow up by individuals is the extremely high attack and reoccurrence rate (Heukelbach et al. 2004).

### **1.8 Perceptions about the jiggers plague**

The disease, as other vermin ailments, is associated with stigma, and is often described as a “poor man disease”. According to the literature, mothers who have kids with jiggers prefer to remove the lesion at home. The reason for this may be because they feel ashamed and that people accuse them for not taking care of their children properly (Heukelbach et al. 2001). This is partly the reason why health agents, nurses and physicians only marginally contribute to knowledge on this disease. Moreover, poor health care- seeking by those affected results most likely in underestimates of the prevalence of jiggers (Heukelbach et al. 2003). According to local media in Kenya and East- Africa, perceptions about jiggers, cultural believes and social stigma might hinder those infected with jiggers to seek help (Sharma 2010).

### **1.9 Jiggers in Kenya**

In Kenya, health issues regarding jiggers are the responsibility of the Ministry of Public Health and Sanitation; Department of environmental health and sanitation; vector and vermin control (Onwong'a 2011). The aim of the department is to enhance health and quality of life through safe, effective and environmentally sound integrated vector, rodent and vermin management services. According to the Ministry of Health's (MOH) departmental webpage, important vector-borne diseases are malaria, filariasis, yellow fever, rift valley fever, trypanosomiasis, leishmaniasis, Dengue fever and schistosomiasis. In the case of vermin, control of jiggers is mentioned both as past and as future major activity (ibid). The Ministry's

objective is to promote collaboration with various stakeholders, whereof communities and it seems that the private sector has been investing most efforts in this vermin control. There are indeed several NGOs working with jiggers eradication, such as for instance Jiggers Ahadi Trust (AhadiKenyaTrust 2007a).

Still, information about this parasitic infection in Kenya is difficult to find. Scientific literature about the burden and the prevalence of jiggers in Kenya was not found after a literature search in the databases PubMed and Google Scholar. However jiggers are mentioned in local media in Kenya. According to the NGO Jigger Ahadi Trust, 2, 6 million, or 6.5 %, are infected with jiggers in the country. By 2011, a newspaper reported that due to jiggers, 50 000 kids dropped out of school the last 20 months. It also mentioned that 265 people died because of jiggers-related causes in the same period (Karuga 2011). By 2012, a lower estimate of 1.4 million Kenyans translating to 4 percent of the total population suffering from jigger infestation is suggested, with the highest prevalence rates found in Central, Nyanza, Western, Coast and Rift valley Provinces. According to Mr. Peter Wanjohi, Senior Assistant Chief Public Health officer at the MOH (Cheki n.a.). Still, data from East Africa are virtually nonexistent, and jiggers are not regarded as a health threat by the scientific community (Mazigo et al. 2012). Therefore, research on prevalence, prevention and treatment is needed.

This thesis will focus on the issue of jiggers by concentrating on the work Red Cross does in order to prevent and treat jiggers' infestation in a poor community and high endemic area in Bungoma County in Kenya.

### **1.10 Mobile jiggers removal programs**

A mobile unit is defined as “a vehicle supplied with the basic equipment or materials necessary for a particular purpose” (OnlineDictionary 2013b). There is limited literature on the functioning, limitations and strengths of mobile jiggers' removal programs in high jiggers' prevalence areas. However, in Haiti, an example of a mobile jiggers removal clinic run during 2004 was described (Joseph et al. 2006). In this particular case, community health workers informed the residents about the mobile clinic's date, place and purpose weeks prior to arrival. On the day of removal a treatment station was organized which was available for self-referred patients for one full day. Tungiasis lesions were diagnosed and treated, and those severely attacked by the flea were targeted with follow up visits by local health workers three

and five weeks after the removal day. Even though 130 patients were successfully treated, the report concluded that the effect will be temporary unless these efforts are continued and expanded (ibid). Similar mobile clinic services are offered by NGO's in Kenya.

### **1.10.1 The mobile jiggers removal program, Bungoma Red Cross**

Bungoma has a mobile jiggers program, which is run by the Kenyan Red Cross. To exemplify their undertakings, a Bungoma Red Cross report is used to give an overview over common activities in 2011. Bungoma Red Cross is an organization providing various activities, such as first aid training, disaster management training, adequate water supply, green house with vegetables production and Red Cross clubs for youths in school. According to the report, during the third quartile of 2011, the jiggers program in Bungoma targeted four different rural districts; Kanduyi, Bumula, Chwele and Malakisi. Bungoma County consists of 10 districts. Depending on the need, different areas of these districts are visited each quartile. During the reported quartile, a total of 445 individuals used the mobile clinic in the four districts.

To illustrate how the program was conducted, a typical example is given from Chwele. One week before the program was to be conducted, volunteers and staff of Bungoma Red Cross went to Chwele to inform local health workers about the program. The health workers were asked to mobilize those affected by jiggers to come to a specific public place, for instance a dispensary or primary school. After one week, volunteers and staff of Bungoma Red Cross went to Chwele to conduct the removal program. Those infected were with a mix of different drugs such as Potassium Permanganate<sup>2</sup>, Hydrogen Peroxide<sup>3</sup>, Liasol<sup>4</sup>, Tincture of Iodine<sup>5</sup>, Sodium Hypochlorite<sup>6</sup>. Finally Jigex cream or Vaseline was used on the affected area to protect broken skin and wounds from infection. Those infected with jiggers soak their affected areas into the different solutions, one at the time (Picture 1). The treatment takes approximately one hour per individual. The program does not exclusively focus on jiggers' removal and care, but also on awareness raising around jiggers. Therefore, the Bungoma Red Cross staff spoke with those affected, teachers, health workers and others attending the sessions.

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<sup>2</sup> An oxidizing agent, disinfectant and antiseptic

<sup>3</sup> Oxidizing, antiseptic and deriding agent

<sup>4</sup> Cleaning and disinfectant agent

<sup>5</sup> Disinfectant agent

<sup>6</sup> Disinfect and sanitizes wounds

Bungoma Red Cross is an organization twinning with Hordaland Red Cross, by which it is financially supported (Appendix 1). Every second year, Hordaland Red Cross has a one week exchange visit to Bungoma. It also receives reports from the activities in Kenya.



**Picture 1** Jiggers removal program session conducted at a local dispensary. Picture taken with permission. Photographer: Åse Mørkve.

A scientific paper from Kenya report that without eradication of the sand flea, achieving the Millennium Development Goals (MDG) remains a dream in Kenya (Ruttoh et al. 2012). Because jiggers are a serious public health problem in Bungoma and Kenya, as in many other high prevalence areas in the world, and because nobody has ever done work on patients and staff perspectives on this mobile jiggers' removal program, it was interesting and relevant for me to study the project. My objectives and research questions to be answered will now be presented.

## **2.0 Aims and objectives:**

### **2.1 General objective**

The main aim of the study is to explore the perspectives of patients and staff in an ongoing Jiggers Removal Program in Bungoma Red Cross, together with the viewpoints of public servants in this Kenyan district.

### **2.2 Specific objectives**

1. To describe individual and local perceptions of living with jiggers in specific Kenyan communities
2. To explore the utilization of the jiggers removal program in the Bungoma area, and factors that affect sand flea eradication at an individual level, at the local community level and at the public health level.
3. To explore what does seem to work (or not), and what the challenges are in such jiggers eradication programs according to stakeholders at various levels?

### **3. The theoretical body**

#### **3.1 The social determinants of health and health promotion theory**

The effectiveness of public health interventions can be enhanced by use of theory based planning frameworks. Commonly used theories in health promotion are the individual- based theories. However Diclemente, Crosby and Kegler (2009) address that theory can and must as well play a crucial role in addressing public health disparities such as disease burden and health outcomes between high and low income groups (Diclemente, Crosby and Kegler 2009, Green and Tones 2010). This is because social determinants of health at all levels, from global forces to sub-national and local factors will affect individual health and wellbeing (WHO 2006). Therefore, both individual and community based aspects and a structural perspective of health promotion theory will be applied in this study, using for example the explanatory model of health as well as the social ecological model of health.

#### **3.2 Explanatory model of health and illness**

To explain how people explain and experience jiggers, and how they believe that it can (or cannot) be prevented, Kleinman's anthropological theory of explanatory models of health and illness will be applied when appropriate (Kleinman 1976). According to Kleinman (1976) people make sense of their illness and their experiences of it. The model helps analyzing how people view their illness in terms of *how it happens, what causes it, how it affects them, and what will make them feel better* (ibid).

#### **3.3 The social ecological model**

To be able to include all factors that may influence the utilization of the jigger removal program under study, at different levels, a social ecological model approach was opted for (McCloskey et al. 2011). The model is developed to better understand health issues and health promotion. The social ecological model focuses on different factors that might affect health, and it understands health as being the result of the interaction between the individual, the group/ community, and the physical, social and political environment (ibid) (see Figure 1).



**Figure 1** The social ecological model of health (McCloskey et al. 2011).

The first level of the model, the individual part, includes individual and personal characteristics; such as age, income, education and health history. The second level, the relationship part, includes a person's closest circle; family, friends, partners, and all of whom influence a person's behaviour and contribute to his or her experience. The third level, the community part, includes a person's setting in broader social relationships; such as school, neighbourhoods, local dispensaries and workplace. The fourth level, the societal factors, includes cultural and social norms and the health, educational, social and economic policies that help to create, maintain or lessen health inequalities and socioeconomic inequalities between groups (ibid). The methodology used in the current study will now be presented.

## 4. Methodology

### 4.1 Study design

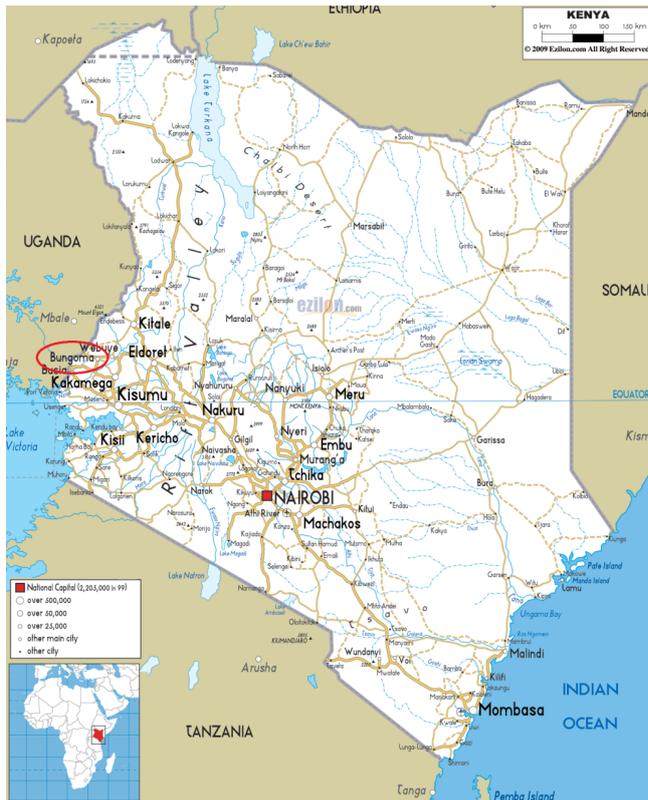
Because the aim of the study was to achieve a broad and deep understanding of experiences within the community and in health institutions on the issue of jiggers, a qualitative approach was used, including fieldwork, observation, informal talks and interviews and group discussions. The aim was to seek answers such as *why* jiggers are considered a problem, and *whether* the program is considered important or not, *how* the jiggers' issue is perceived, how the program was functioning and *what* was seen as needs, challenges and resources in Bungoma and in the jiggers removal program at stake (Green and Thorogood 2004). Malterud describes qualitative research as appropriate to obtain knowledge about specific human matters such as beliefs, emotions, experiences and motives (Malterud 2011). The aim of the current study was to explore and understand more about jiggers' infestation and eradication by examining the perspectives of patients, staff and health workers about the program and services' perceived functioning, rather than to measure or evaluate the program (Green and Thorogood 2004). The participatory fieldwork component was important in order to better understand the context of the jiggers' plague in a socio-ecological perspective. In the following paragraphs, the geographical, physical, social and political environment of Kenya and Bungoma County is presented.

### 4.2 Study area

#### 4.2.1 Kenya

The study was carried out in the Republic of Kenya. Kenya is located in East Africa (Map 1), with borders to Somalia, Ethiopia, Sudan, Uganda and Tanzania. Kenya has the Indian Ocean in the east and the Victoria Lake in the west, and large parts of Kenya are located in the highlands. Bungoma County is situated in the Mid-West of the country.

In 1963 Kenya got independent from Great Britain. The capital of Kenya is Nairobi, which is also the largest city (SNL 2012). The total population in 2009 in Kenya was 38, 6 million inhabitants (Brinkhoff 2011).



**Map 1** Map of Kenya (see Bungoma situation) (EzilonMaps 2009).

22 % of the population live in urban areas (WHO 2011). In 2010, GDP (Gross Domestic Product) per capita was estimated to be 875 US dollar. In 2011, as much as 40 % of the population in Kenya lived on less than 2 US dollars per day. The official languages are English and Kiswahili, however there are also numerous indigenous languages (Globalfinance 2011). The main religion is Christianity, but Islam and traditional African religions are also widely adopted. Together with tourism, agriculture is one of the biggest economic activities (SNL 2012). Life expectancy at birth is 60 years and the under 5 mortality rate is 84 per 1000. Of adults between 15 and 49 years old, 63 out of 1000 are HIV infected (WHO 2011). The HIV epidemic among adults together with population growth and high fertility rate in Kenya (4, 6) (USAID 2010) contribute to the low median age, which was 18 years in 2006 (Globalfinance 2011). Total expenditure on health was in 2009 68 US dollar per capita per year (SNL 2012). Even though Kenya is facing many great challenges to be able to improve the health and living conditions, it is also one of the most economic developed countries in Sub Saharan Africa. Generally speaking Kenya is improving in health and living conditions every year in fields like education, life expectancy and GDP per capita (ibid).

#### 4.2.2 Bungoma area

The current study was carried out mainly in Bungoma area as defined by Red Cross, in Bungoma County, Kenya (Map 2).



**Map 2** Map of Bungoma County (Flickr n.a.). The divisions that were included in the study are marked with a number; Ndivisi<sup>1</sup>, Chwele<sup>2</sup>, Bumula<sup>3</sup>, Kanduyi<sup>4</sup> and <sup>5</sup>, Nalondo<sup>6</sup>, and Amagoro<sup>7</sup>.

Bungoma County is located in Western Kenya, on the boarder to Uganda. Bungoma town is headquarter of the district, and is located in South Bungoma. In 2009, Bungoma town had a population of 56, 000 (Brinkhoff 2011). Bungoma County is the second largest county in Kenya, with a total population of 1,375,000, and an urban population of 299, 000 (21, 7%) (KenyaOpenData 2011). The population rate is increasing every year and 60 % of the population in Bungoma County live below the poverty line (IcFEM 2006).

Bungoma Red Cross conducted the jiggers removal program in high prevalence area in Bungoma and in the neighboring Teso County. The divisions in Bungoma County which are included in this study are; Ndivisi (Mihuu village)<sup>1</sup>, Chwele (Luhome village)<sup>2</sup>, Bumula (Namusasi village)<sup>3</sup>, Kanduyi (Namwach village and Mwikhupu village)<sup>4</sup> and <sup>5</sup> and Nalondo (Nalondo village)<sup>6</sup>. In addition, the study was conducted in Teso County (Amagoro village)<sup>7</sup>. All the included divisions were situated in rural areas, and the concerned area is marked with a number in the attached map of Bungoma County. Typically, the rural area consists of villages with 2000 – 3000 inhabitants, which are led by a head woman or man. English,

Kiswahili and Luhya are the spoken languages in Bungoma County. In the urban area, different ethnic groups from all of Kenya are represented, but in the rural area the majority is Bukusu, who are considered as a sub-tribe of Luhya. Luhya is the largest ethnic group in western Kenya. Agriculture is the most important economic activity. In Bungoma County there are six hospitals, and several health care centers and dispensaries, located in the most populated areas (Broesch 2009). Finally, the doctor patient ratio in Bungoma is 1: 142, 000 (IcFEM 2006).

### **4.3 Fieldwork preparation and data collection**

My fieldwork was conducted between July and September 2012, and it allowed me to collect as much relevant information as possible. Prior to this, the fieldwork had been planned over some months. First, a research proposal was written and submitted to Centre for International Health in April 2012. I established contact with an ethical committee in Kenya aiming to get a research clearance prior to my arrival. After searching on the web, I contacted Jiggers Ahadi Trust aiming to get more knowledge on the issue of jiggers in Kenya. My collaboration with Bungoma Red Cross was established through Hordaland Red Cross in April, and the planning process with Bungoma Red Cross started at this point. From earlier I had experienced that it might be important to establish collaboration before traveling. Practical issues such as how to get from Nairobi to Bungoma, where to stay and what to bring were solved. In addition we also shared expectations and thoughts about the forthcoming fieldwork.

Once in the field, several qualitative methods were used to explore the topic and collect data such as: semi structured in depth interviews, natural group discussions and observation/informal talks.

#### **4.3.1 Semi structured in depth interviews**

To gather data from the perspective of health professionals and other important informants such as village elders and teachers, a semi- structured in depth interview approach was used (see Appendix 2). This is the most common interview type in qualitative health research (Green and Thorogood 2004). The researcher sets the agenda and the terms of the topic are covered by using a discussion guide. However it is the interviewees' response, which determines the kind of information that is produced about the different topics, and the importance of the different topics. When using a semi- structured approach, the aim was to encourage the informant to speak open and in length about his/her personal opinion about the various themes. I did not interrupt the interviewees, who were probed to give more information if necessary (ibid).

### 4.3.2 Natural group discussion

Community members, both those infected and not infected with jiggers, were interviewed in a *natural group* (Appendix 3-4). Natural group discussion is described as an interview or discussion with participants that already know each other (Green and Thorogood 2004). In this case, the groups were natural in the sense that they were using the same service, and that they were in a known environment with people they already knew. For the natural group discussion it was not planned how to assemble the groups of informants, as is the case of focus group discussions. The group was already a natural group as defined by Green and Thorogood (2004), and informants were asked on the spot to participate in the discussion. Since the respondents tended to know each other, as they were living in the same village or went to school together, this seemed to be the most appropriate type of group discussion. The aim with this type of discussion is not to come to an agreement but to have an open and friendly conversation and sharing thoughts about the topic in a small group (ibid) (see Picture 2). The topic was covered by using a discussion guide with relevant themes. The groups mainly consisted of people who participated in the jiggers removal program, which is a free of charge program typically addressing poor communities. The groups of participants were thus expected to have similar socio-economic backgrounds, which was important for the purpose of group discussions (Kitzinger 1995).



**Picture 2** “*Epuka funza*”; Prevent jiggers. “*Dumisha usafi*”; maintain cleanliness. “*Vaa Viatu*”; use shoes. Natural group discussion in a classroom. Picture taken with permission. Photographer: Åse Mørkve.

### **4.3.3 Participant observation and informal talks**

As the interviews only provided access to what people was saying and not what they were doing, an observation approach was adopted (Green and Thorogood 2004). Observational methods are described as the gold standard of qualitative methods, as observation gives direct access to what people do, as well as what they say they do. During the jiggers' removal program in Bungoma area, we also used a participant approach (ibid). That means that I helped the staff in Bungoma Red Cross with removal of the jiggers. This was to be able to get more insight into the program, observe how the program was run and create trust between those attending and myself, the researcher. In addition to observe ongoing activities, I also observed the environment users of the service typically live in during households' visits. Such an approach increases the validity of findings, as for instance, people might inform that they live in a clean and safe environment during the interview, but observations could disclose a more nuanced picture of that same environment. Walking around in villages and conducting household visits also allowed us to have informal talks with different actors, such as whole families who were infected, pupils, village elders and others we met by coincidence. As re-occurrence of the jiggers after treatment seemed to be a major issue, households were also visited after the campaign, to explore living environments. Informal talks with the participants about the treatment session and the re- occurrence of the jiggers were conducted in their household.

For ethical reasons and for protecting informants, no tape recorder was used in these cases, something which is also recommended in the literature (ibid). However after such events both informal talks and observational notes were written down in a field notebook.

### **4.3.4 Brochures and information from the public health sector**

Initially I was supposed to get an overview of the information that was distributed by the public health sector and by NGO's on the issue of jiggers. Brochures on prevention of jiggers, and information to those affected and to health workers were attempted gathered, with no success. It seemed that such written information about the vermin and the infections it caused did not exist in Bungoma County. So I decided to focus on how oral information was given instead.

## **4.4 Recruitment and informants**

In the initial phase of my fieldwork and in cooperation with supervisors and translators/guides a work plan was composed. We identified people that could be important informants due to their experience from working with the issue of jiggers' infestation. We requested if they

would participate in the study. The main informants were the staff and volunteers in Bungoma Red Cross, and other health workers that had knowledge about jiggers, as well as those infected with jiggers. 32 interviews were conducted in total, and all together 55 persons participated in the interviews and discussions (Table 1). Interviews were conducted until saturation was achieved (Green and Thorogood 2004).

For the health facility based informants a semi structured in depth interview approach was used. The staff and volunteers of Bungoma Red Cross, with knowledge and experience about jiggers and the jiggers removal program were interviewed. Typically, the staff in Bungoma Red Cross had a diploma or bachelor in public health, while the volunteers either were students or had no higher education. The unemployment rate is high in Kenya (UNDP 2013) and those who could not get a job or were students, were working as volunteers in Bungoma Red Cross to get work experience.

Other health workers in the County were recruited during the mobilization day. On the mobilization day I and one of the translators/ guides would talk with village elders, community health workers, teachers and public health officers to plan for the jiggers removal program. In addition, we also planned when we could interview appropriate health facility informants. All NGO and public servants informants were interviewed with a semi- structured in depth interview approach, except for one natural group discussion with seven head teachers. The natural group was initiated due to convenience as we arrived when a meeting was about to end, and those attending had an hour available were we could talk.

For the community-based informants, natural group discussion approaches were used. At the removal day, these users of the services that were thought to be relevant informants were identified together with the local staff in Bungoma Red Cross. This was done in cooperation with local leaders such as community health workers, public health officers, village elders or teachers, and they were asked to participate in a natural group discussion. Those who approved met after the removal program had finished the same day. There were in total five natural group discussions, in five different villages that were visited with the mobile jiggers program (Table 1). Ideally it was supposed to be 5-7 informants in each group (Green and Thorogood 2004). However, due to poor participation in one of the jiggers' clinics the discussion with adults infected with sand fleas only consisted of two participants. The four remaining discussions were carried out with five participants.

Re- visits to four different households, with a total of approximately 35 persons, who participated in the removal program, were conducted. No formal interviews were used, but rather informal talks and observation in the homestead. Recruitment for the re- visit to the household was done together with the local leaders during the jiggers’ removal day. Families were asked if they would welcome a re-visit from Red Cross after 16 to 21 days.

#### 4.5 Organization of the interviews and discussions

**Table 1** Overview of informants

<b>Health facility based component</b>	<b>(N= 19)</b>	<b>Community based component</b>	<b>(N= 36)</b>
Staff and volunteers of Bungoma Red Cross	5	Pupils infected with jiggers	5* 5*
Staff and volunteers from other NGOs	4	Infected adults	2* 1
Public Health Officers	5	Infected elderly persons	5*
Community Health Workers	4	Non-infected pupils	5*
Health Worker in charge of dispensary	1	Head teachers	7*
		Teacher in charge of hygiene	1
		Village elder	1
		Re- visits to households infested with jiggers	4

\* Natural group discussion

#### 4.6 Conducting, transcribing and translation of the interviews

My two translators/ guides conducted the natural group discussions in Swahili, as well as transcribing and translating them. During the discussion a tape recorder was used; one of the translators/ guides conducted the interview and the other wrote notes to make sure no information was missed. Together the two translators/ guides transcribed the interviews in Swahili based on the recorded tape and the notes, and thereafter they translated them to English. I was present during the entire process. We worked closely together during my entire fieldwork and I carefully informed them about the study, the aim and the interventions. They

were trained in how to lead a natural group discussion and how to transcribe and translate. This way they were confident about their role in the study.

Except from the natural group discussions with affected persons, I conducted the remaining interviews in English and transcribed them myself, as the other informants spoke well English.

#### **4.7 Supervisor and translators/guides**

In the current study I had one main supervisor, one co- supervisor and two assistants from Bungoma Red Cross; which were defined as translators/guides. The main supervisor is a social anthropologist and health scientist. She has been working with research projects in Norway, Sudan and Tanzania since 1992. The Co- supervisor is working at Moi University in Kenya. She is a trained nurse with specialization in Public Health.

The two translators/ guides were from Bungoma. They were working as volunteers in Bungoma Red Cross. One of the translators/ guides was a primary school teacher and the other was the leader of community services in Bungoma Red Cross. The last one had been a volunteer in the branch for 7 years.

Cooperation with the co- supervisor and the translators/guides was mainly limited to the time of my fieldwork in Bungoma. The main supervisor has supervised me throughout the two years period of the Master Degree. Both the supervisors and translators/guides were throughout the study crucial to ensure that the right information was gathered from the right people, and interpreted in an appropriate way. To ensure quality, it was essential to discuss and share thoughts with experienced supervisors, as well as with the translators/guides that were familiar with the current study area and the program.

#### **4.8 Ethical considerations**

Ethical approval was given from the Regional Ethics Review Board in Western Norway (Appendix 5) and from the institutional research and ethics committee (IREC) at Moi University in Eldoret, Kenya (Appendix 6). A letter of approval signed by IREC at Moi University was presented to the staff at Bungoma Red Cross and to health workers in Bungoma County. During the mobilization day, informal approval to conduct my research was obtained orally from village elders or other local community leaders in the visited village. Before the interviews started, the health workers had to read and sign the informed consent (Appendix 7). Due to illiteracy and the informal focus in the natural group discussions, oral information was given about the study and the consent issue prior to the discussion with

people in the community (Appendix 7-8). It was explained that the informants could choose whether they would participate. They could withdraw whenever they wanted and they were free to speak or ask questions at any time. When the informants allowed it, a tape-recorder was used during the interview. One informant did not accept to be recorded and therefore notes were taken instead. Juice and biscuits were provided to the participants after the discussion.

#### **4.8.1 Confidentiality**

Interviews with the staff of Bungoma were conducted in a private room at Bungoma Red Cross' house. The other interviews with health workers were conducted in the field.

Cooperation with the village elder or other health workers in the area ensured that a private room was available for interviews throughout the day of the program. Health workers who were interviewed on other times than the removal day were either interviewed within their own office, or at another private place at their work. For instance, public health officers or other valuable informants who were not around the day of our visit were asked for an appointment at a convenient place and day for them.

#### **4.8.2 Voluntary participation in the study**

As Bungoma Red Cross conducted the program, my fieldwork went along with the program's activities thus allowing for the group discussions with those infected with jiggers to be conducted. Therefore, it might be possible that those infected felt obliged to some degree to participate in the discussions. On the other hand, I experienced that Red Cross is an organization that is highly accepted and respected in Bungoma and that people in the community really appreciated their assistance and presence. We emphasized that this was a voluntary decision. My experience was that those we asked to participate in the discussion wanted to do so. Also, it might be that the informants were afraid of speaking openly about limitations of the Red Cross jiggers' removal program, as the interviewees were part of it. We emphasized that the conversations were confidential, and that they could speak openly about any topic, and that mentioning limitations of the program might help Bungoma Red Cross to improve in the future.

#### **4.9 Data analysis**

The data collected during the fieldwork was analyzed by applying a *qualitative content analysis* (Graneheim and Lundman 2004). A qualitative content analysis provides an overview of important concepts, procedures and interpretation in qualitative analyzing, such as manifest and latent content, unit of analysis, meaning unit, abstraction, content area, code

category and theme. Even if this is a description of a linear process, it is important to bear in mind that the process of analysis in my study involved a back and forth movement between the whole and parts of text.

The *manifest* content describes the visible and obvious component and what the text actually says. The *latent* content describes the underlying meaning of the text. Both contents deal with interpretation, but vary in depth and level of abstraction. For the current study, manifest content was mainly used; what the informants actually said. This approach is recommended for students and researchers with limited experience in the qualitative field. However, the latent content was attempted taken into account, when appropriate. The *unit of analysis* refers to whole interviews or observational protocols that should be large enough to be considered as a whole, but small enough to be possible to keep in mind. Initially all interviews were read several times to obtain a sense of the whole (ibid).

Thereafter, interviews were transferred into OpenCode 3.2 and the computer software helped to systemize, organize, structure and code the data. The following steps of qualitative content analysis were performed in OpenCode and will now be described as illustrated in Table 2. The text was sorted into *content areas*; which sheds light on a specific explicit area of content identified based on theoretical assumptions from the literature. In the current study, the content areas were predetermined from the theory; with the individual level, the relationship level, community level and societal level of the health problem and health promotion challenges and resources. Thereafter the text was divided into *meaning units*. A meaning unit is considered as the words, sentences or paragraphs that relate to the same central meaning through their content and context. Further, the meaning units were *abstracted* and labeled with a code and thereafter a category. A *code* is a suggested tool to think with since labeling a condensed meaning unit with a code allows the data to be thought about in a different and new way. From the individual level; codes as; “constant itching”, “cannot sleep” and “not able to walk properly” emerged. A *category* is the core feature of qualitative content analysis. It refers to a descriptive level of content and can be seen as an expression of the manifest content of the text. The codes mentioned above were gathered in the *category*; “suffering experience with jiggers”. Finally, the concept of *themes*; has multiple meanings and creating themes is a way to link the underlying meanings together in categories. A theme can be seen as an expression of the latent content of the text and a meaning, unit, code or category (ibid). The example above was finally gathered under the theme: “suffering experience and consequences of jiggers’ infection”. Figure 2 shows a mind map with the eight different

themes that were modified and developed during the process of analyzing data (ibid). The figure is inspired by the socio ecological model of health. The individual, relationship, community and societal levels are separated in the socio ecological model (ibid). However in the figure and current analysis and discussion of findings, phenomena will be presented across such levels.

**Table 2** Example of the process of analyzing data, applying a qualitative content analysis

Meaning unit	Content area	Code	Category	Theme
You want to scratch yourself all the time	Individual level	Constant itching	Suffering experience with jiggers	Suffering experience and consequences of jiggers infection



**Figure 2** Mind map modified and developed during the process of analyzing the data

The findings and discussion will now be presented, based on the theory, methodology and mind map described above.

## **5. Findings and discussion**

As indicated in the introduction chapter, jiggers infestation cannot be studied at the individual level only, and a social ecological model which recognizes the complexity of health problems is suitable for the purpose of addressing public health challenges holistically and contextually (McCloskey et al. 2011). Given that the present study focuses on different contextual factors that might affect health, it is important to illustrate local settings where people live and where data was collected. A first paragraph in the present chapter will provide a description of common home and community environments for the actors at stake. Here after, the multiple levels of the phenomenon of tungiasis will be discussed on the base of findings illustrating different determinants and challenges: at the individual and relationship level, at the community level and finally at the societal and national policy level (ibid). The aim is to understand how socio-cultural, socio-economic and policy/ political factors impact on tungiasis in Bungoma.

### **5.1 A living environment**

To better understand the issue of jiggers, I will describe what could be defined as a typically high tungiasis prevalence environment. As research has documented thus far, jiggers are mainly a problem in urban slums and rural areas (Heukelbach et al. 2004). During fieldwork, I visited many homes in rural Bungoma, and my first visit to a household is a representative example on how people live in the county. At the District hospital we had met a father and his son who were admitted at the hospital due to jiggers' infection. According to a doctor working there, this was in fact one of the first cases ever visiting the hospital due to jiggers' infestation. The following day, I and one of my translators drove back to the home of this family, to see whether other family members were infected, and to observe the environment they were living in. It was difficult to get to the house by car, because the roads were destroyed by the previous day's rain. We walked the last two hundred meters because there was only a small path to the house. Maize is the main crop and livelihood base in the area, and was grown around the huts.

When we arrived to the house, children and adults came to greet us. Two families lived in two different huts. In one hut the man we met at the hospital lived with his two wives and 6 or 7 kids. One of his wives told my guide that it was the first time that someone in the family sought health care due to jiggers' infection. She also told that they got infected with jiggers one year ago, and that the entire family now was infected, even their one year old daughter (Picture 3). She further explained that her 18 years old son had died the last month due to

jiggers' infestation. Looking around, I could observe that those who lived there walked barefoot, and they were wearing worn out t-shirts. Animals, mostly hens and dogs, were all over the place, both outside and inside the hut. The huts were built of mud, as well as the floors. The hut contained one big room with only one bed, and all the children slept on the floor. Garbage was stored both outside the huts, and inside the huts in a corner (see Pictures 4 and 5). There was no access to electricity, and people were living in the dark after sunset at 7 p.m. A family member who rode with us back to Bungoma told us that he thought that the family was bewitched. He explained that they had never had jiggers before, but last year a hen came to their hut. They did not know who owned the hen and decided to sell her on the market. The next day, jiggers had infested their homes. In fact, much of what I observed that day is repeatedly described as typical risk factors for jiggers' infestation (Karuga 2011, Heukelbach et al. 2002).

The following paragraph will address which groups that are apparently most vulnerable of getting infected with jiggers.



**Picture 3** One year old girl with feet infected with jiggers. Picture taken with permission. Photographer: Åse Mørkve.



**Picture 4** Dwelling in rural Bungoma. Picture taken with permission. Photographer: Åse Mørkve.



**Picture 5** Inside the sleeping room in a hut in rural Bungoma, where a family of 6 and their animals slept together, with only one small bed in the corner. Picture taken with permission. Photographer: Åse Mørkve.

## **5.2 Vulnerable groups affected by jiggers**

Among all informants there was a widespread agreement that those who are most commonly infected with jiggers are the children and elderly. These are also the groups that most frequently used the jiggers' removal service. The informants elaborated that these groups are most vulnerable because they are not able to neither take care of themselves or to remove the jiggers. In addition some informants mentioned that mentally disturbed persons, "drunkards" and families that are separated also are vulnerable groups.

## **Children**

When asked about why children often are infected with jiggers, an employee from Red Cross explained the same thing as most others:

*“The adults leave their homes early in the morning and they come back late in the evening. They do not have time to take care of the kids. They are only able to provide them with enough food for the day. So these kids may go for days without taking a bath, they are using the same clothes and the beddings are the same. You know kids can urinate on the beddings and these are not changed”.*

In addition, many of those who talked about children as vulnerable also explained that they play in a dusty environment, which make them more exposed to jiggers’ infection.

## **The elderly**

An elderly woman explained the following during a natural group discussion; *“When I was young I took care of myself in terms of cleanliness but now I am not able”.*

An employee from Red Cross also emphasized the lack of care given to elderly:

*“The elders also are victims. When elderly get infected with jiggers it is because the family and society give up taking care of them. It’s like they just are saying; it is only an old man, let him just die because there is nothing we can do”.*

## **The mentally disturbed**

A handful mentioned that mothers who are mentally retarded are not able to take care of their families, and therefore they are more exposed of being infected with jiggers. It was also mentioned that mentally retarded were more likely to be infected because they cannot take care of themselves, and they might not be able to tell that they feel pain or are infected.

## **The “drunkards”**

Both members in the community as well as health workers suggested that “drunkards” who do not take care of themselves are likely to be infected. An infected pupil explained that:

*“In most cases most of them are drunkards and when they are drunk and you ask one of them to bath, he will tell you: I have been enjoying myself and here you want me to bath and finish my strength? He refuses to bath, and goes to bed just like that”.*

Another infected pupil further explained that these “drunkards” do not care in which surroundings they live:

*“A man I know who is infected with jiggers used to take beers and therefore he did not shower. He didn’t eat and he didn’t smear<sup>7</sup> the house. He was sleeping in a dirty place, he dressed shaggily and he was just dirty... People feared him and the jiggers multiplied on his body”.*

Those infected with jiggers often referred to others infected as “drunkards”, and it might be that they were afraid to speak openly about their own personal experience with jiggers, so as not to be associated to this stigmatized group.

### **Vulnerable households and orphans**

Finally, some added that when families were separated, members were more exposed to jiggers’ infection because they were not capable of paying enough attention. A public health officer elaborates that:

*“The breakup family is more vulnerable, where the mother and father do not stay together. And also orphans... In some households there are only children, and they do not have a caregiver that can take care of them, that is a problem. And AIDS is a contributing factor.”*

In Bungoma County there are 88,000 orphans (Broesch 2009). High HIV/AIDS prevalence is a contributing factor (IcFEM 2006), which supports that many children are suffering due to family separation. In addition to children, the elderly and the disabled are more vulnerable to jiggers’ infection because they are less able to take care of themselves alone. They are dependent on help from relatives, who might not be around, or not willing or able to do so. Former studies also support that children and elderly are most exposed to jiggers infestation (Winter et al. 2009), and that children between 5 and 10 years old are most commonly infested (Joseph et al. 2006). A chief public health officer at the Division of vector and vermin control at the Ministry of Health, Peter Wanjohi, reports on the issue of jiggers to the African Science News. He elaborates that the risk population in Kenya are those children under 10, the elderly and the physically and mentally disabled persons in the affected areas. That means that approximately 10 million Kenyans are at risk of getting jiggers (Cheki n.a.). On the issue of alcoholism, it is not only people at the community level who relate alcohol

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<sup>7</sup> The smearing of the house with insecticide

abuse to tungiasis. The leader of the NGO Jiggers Ahadi Trust Stanley Kamau also blames alcoholism for the increased jiggers threat. To the newspaper “All Star” Kamau elaborates that: "Central region especially Murang'a County has been greatly affected by alcoholism and this is to blame for the increased jigger menace in this area as most of the alcohol addicts have no time to observe hygiene" (Mwangi 2013). Kamau is blaming the high unemployment in Kenya as a reason for alcoholism. He calls upon the government and society to make concerted efforts to fight alcoholism in Kenya (ibid).

In the next chapter I will discuss how those infected experience physical and psychosocial strain as well as stigma.

### **5.3 Suffering experiences and consequences of jiggers infection**

According to Kleinman's (1976) people make sense of their experiences of illness in terms of *how it affects them* (Kleinman 1976) which I will discuss in the following paragraphs.

#### **5.3.1 Physical impairment, itching and pain**

When infected with sand fleas, people may suffer several problems. An infected pupil explained for instance that those severely infected could not walk, eat or work properly, something which several others supported; *“Jiggers can make someone fail walking and the infected cannot hold things properly. They even cannot eat if the jiggers have affected their fingers”*.

That people get disabled when infected with jiggers is reported previously in studies in Tanzania and Nigeria (Mazigo et al. 2012, Ugbomoiko, Ofoezie and Heukelbach 2007b). Informants in Bungoma also added that those infected are forced to stay at home and then become a burden to the household. They become a load because they are not able to take care of themselves or their family, and because their fingers and legs get deformed. Another common consequence of jiggers and cause of disability is pain, which can be severe. As a woman infected by the flea puts it: *“I have had so much pain in my legs that I'm almost not able to walk”*.

Indeed, both those infected with jiggers and the health workers focus on the pain when the flea has penetrated, as well as the pain when removing it. When I was discussing with outsiders (from Norway and from urban Kenya) it seemed like they often found it difficult to understand the pain when the jiggers have penetrated, and they would ask; *“if it is so painful,*

*why it is not removed?”* Others explained that people are afraid of removing jiggers because it will add even more pain when you have to cut out the jiggers with a pin or razor blades.

Those severely infected might indeed have several hundred jiggers and it *is* painful to remove it. A woman explains: *“I really feel pain, because when you remove it is painful, but when it is in the leg it is also painful. When you put on shoes it is painful. The whole body aches”*.

Furthermore, many explained that they were itching constantly when infected. Due to this many reported that they could not sleep or carry out their daily activities. An infected woman clarified that: *“The worse part of being infected with jiggers is the itching. You cannot sleep or settle. The jiggers flea makes me feel as I am physically tortured!”*

Naturally, all those infected reported that they were scratching the infected area due to the constant itching. As an infected pupil explained *“... You want to scratch yourself all the time”*. Scratching the infected part of the body may release hundreds of eggs, which again increase the multiplication of the sand flea, thus furthering infestation (Pilger et al. 2008a).

Thus, the pain and itching because of sand flea infection was much talked about by many informants. The pain those infected feel when the jiggers have penetrated into the body (Sharma 2010) and the pain when removing the jiggers (AhadiKenyaTrust 2007a, Heukelbach et al. 2004) is described extensively, and the suffering caused by jiggers in Africa was already elaborated in the early 20<sup>th</sup> century by Declé (1900). He explained that jiggers caused severe morbidity among the indigenous population, and that the suffering was so intense that affected individuals cut off their inflamed toes in sheer desperation (Feldmeier, Sentongo and Krantz 2013).

### **5.3.2 Jiggers as psychological and psycho-social strain**

Being psychologically affected when infected with jiggers was one of the most recurrent themes in all of the interviews. Most of the informants agreed that infestation of jiggers caused people to be mentally disturbed. The main explanation for this was that those infected could not sleep at night, because of the constant itching, and in addition they would stay inside all day because they were afraid to leave the house and meet others. A woman affected by jiggers experienced the psychological strain on both herself and her family. A month before the interview, she had lost her son due to jiggers. She explained that: *“ I feel that the jiggers attack my brain. I become confused, and I have also seen in some cases that people become mentally confused due to the jiggers infestation”*.

The Kenyan newspaper “Education insight” gave a similar representation, claiming that severe jiggers infestation might lead to mental disorder (Jack 2009). According to Heukelbach et al. (2001) those infected with jiggers are indeed struggling psychologically. However, there is limited knowledge about how mental health is affected. In Bungoma, this was one of the most recurrent topics, and this may indicate that the psychological strain of having jiggers is perceived as a major problem that should receive more attention (Heukelbach et al. 2001).

### 5.3.3 Stigma and harassment

In addition to physical and mental suffering caused by the fleas, infection also resulted in many cases of social exclusion. Many informants mentioned that pupils infected with jiggers were barred from social settings such as schools. Neighbors and friends tended to stay away from those infected. When those infected with jiggers were harassed, they tended to hide, keep isolated or stay at home. An infected adult narrated that: *“Neighbors cannot even step into our homestead because my children have jiggers. They also tell their children not to come because they will get infected”*. Another elderly infected person explained that; *“Sometimes people move away when they see me”*.

A pupil who was not affected told indeed that he did not want to be too close to those who were infected:

*“You have to wear shoes when you are with infected people. You have to make sure that you wash your hands after being with them. And put on protective gloves... When the people that have jiggers kick the ball, the jiggers’ flea might stick to the ball and when they kick it to me, the flea can infect me”*.

That people suffering of jiggers are harassed is also mentioned in local media. In November 2010, an article in the Tanzanian newspaper “Top News” described that in addition to the physical pain of being affected by jiggers, psychological pain is likely to occur. The article described that those infected often experienced social stigma and isolation (Sharma 2010). Feldmeier et al. (2013) discuss this too and they explain that in Nigeria and Brazil those affected suffer from social stigmatization and that children in Kenya are teased and ridiculed (Feldmeier et al. 2013). I saw myself that infected pupils at school were not as sociable as others, due to poor functionality and because others did not want to play with them. They tended to lay or sit in the grass or sand, while others were playing. Also, in class some reported that those infected were not included by other pupils or activated by teachers. Social harassment due to jiggers infection might be a setback for development among pupils, and

might also be a contributing factor to drop out from school (Rutttoh et al. 2012). However, this must be further investigated. Indeed, understanding the determinants of social exclusion is of importance in health promotion initiatives (Green and Tones 2010), such as jiggers eradication.

#### **5.3.4 Perceived consequences of being infected**

Those affected in the community mainly focused on the fact that jiggers made them lose blood which the jiggers sucked out of them, and also on the loss of blood during the removal of the jiggers. In addition, many of the informants expressed that they were worried and aware that jiggers might lead to infections and other ailments. An employee of Bungoma Red Cross supported this, and he added about the increased risk of getting tetanus:

*“The infection can kill them; they can get tetanus and anaemia. In severe cases jiggers are everywhere, even on the private parts. The jiggers live by sucking your blood so you become anaemic. When you become anaemic you don’t go to the health facilities, you just stay inside the house. And again the infections, I think that is the major thing”.*

Some suggested that they became more vulnerable to malnutrition. An affected woman explained: *“All my children, as well as myself are growing thinner and thinner and we are malnourished and anaemic because of the jiggers”.*

Finally, both those infected with jiggers and others in the community emphasized that the jigger could cause death. An elderly woman who was infected explained that; *“I know that the jigger flea might kill”.*

None of those infected mentioned the increased risk of getting open wounds and tetanus, and the need to take the vaccine. Only some health workers mentioned it. The risk of getting tetanus is confirmed in other studies (Heukelbach et al. 2004). The increased risk of getting gangrene is also described in former studies (Buckendahl et al. 2010), however this was not mentioned by any of the informants. Finally, the risk of getting HIV/ AIDS if sharing pins is reported in some studies (Karuga 2011), but this was not mentioned by any of the Bungoma informants with jiggers, and it was rarely mentioned by the health workers.

To sum up, the informants seemed to know that jiggers could cause general discomfort, illness and that it might lead to death. However, there might be lack of knowledge about why jiggers’ infection can cause death, and that it might be an entrance to concrete and dangerous

diseases, such as tetanus, HIV/ AIDS, and gangrene, if not properly removed and treated (Ruttoh et al. 2012).

### 5.3.5 Consequences of jiggers for school and work

There was a wide agreement among all interviewees that jiggers' infestation affects the youngsters' performance at school. This is due to the fact that jiggers are itchy and painful and the pupils are not able to focus. A pupil infected with jiggers explained that; *“you cannot concentrate in class when the jiggers are itching you”*. Also, drop out from school is a major issue because pupils feel sick when they are plague-ridden with jiggers. They cannot walk to school, and as discussed earlier they may experience stigma and harassment, as teachers and other pupils might laugh at them. Others suggested that pupils at school are not able to hold the pen or to play. A man working in Bungoma Red Cross describes that; *“Jiggers are a major problem because it creates poverty. Kids that are infected with jiggers are not attentive at school, which mean that they will not perform”*. He further explained that when pupils are not able to perform at school, they will not increase their knowledge, which again made it difficult to find the way out of poverty.

One of the MDGs is to achieve universal primary education (United Nations 2013). Children with tungiasis have disproportionately high absenteeism at school, and there is evidence that pupils with jiggers have lower performance than the unaffected pupils (Feldmeier et al. 2013). The drop-out rate at school was high among children in Bungoma County. 97 % started primary school, but only 17 % completed secondary school some years ago (IcFEM 2006). It is not known how many of these pupils quit due to jiggers infection, however according to the NGO Jiggers Ahadi Trust, 50 000 pupils dropped out of school in a twenty month period in Kenya in 2010/ 2011 (Karuga 2011). According to Ministry of Health information, in Kenya's Central Province, a total of 1,350 persons suffered from jigger infestation in one location in Murang'a District, and 700 of them were school going children. The study revealed that 50% of the infested children did not attend classes (Kimani et al. 2012). Recent information from another Kenya Red Cross project in Muhoroni District confirmed the problem's dimension for school pupils. There, jiggers infestation had forced pupils in 17 primary schools in the District to drop out of school according to the Kenya Red Cross Society (KRCS) secretary (Oduoromondi 2013).

Even though there is no numeric evidence in the case of Bungoma County, it might be reasonable to believe that drop out due to jiggers infection is an important issue to be addressed.

Many of the informants were teachers and pupils, and probably due to that most participants in the study focused on the drop out and poor performance at school. However some of them also focused on the fact that people are unable to work when infected with jiggers. Already in the 20<sup>th</sup> century Declé (1900) described the lack of ability to work due to jiggers infestation; “they were so rotten with ulcers from jiggers that they had been unable to work in their fields, and could not even go to cut the few bananas that they had been growing” (Delce 1900 in Feldmeier et al. 2013).

In Bungoma County too, jiggers were considered an important factor for why people lacked basic needs. Many people explained that when infected with jiggers they were not able to walk, grip or focus, which again meant that they could not work, and most people referred to farming. Agriculture is the most important economic activity in Bungoma County, and 70 % of the population is depending on cultivating maize, sunflower, sugarcane, coffee, tobacco, potatoes and beans as main crops, and some cattle keeping. Naturally, when you are not able to work, the income decreases and basic needs become difficult to cover. Furthermore, impaired mobility will negatively affect the household economically. A public health officer described it as following: “*Those infected cannot work. Especially in farms the productivity is low. It is one of the big problems for economic growth in our country*”.

## **5.4 Curing and coping with jiggers: the quest for treatment and the issue of reoccurrence**

The previous section described how jiggers might affect those infected. The following section will, also inspired by Kleinman (1976) describe what those infected do to *feel better*; how they cope with jiggers, how they treat it and the issue of reoccurrence after treatment (Kleinman 1976).

### **5.4.1 Removing the jiggers at home: a time consuming duty**

Those infected with jiggers apparently rarely sought help from health facilities for treatment in Bungoma. Jiggers were removed within the household, either by those affected themselves or with assistance from other family members. Informants explained that it is difficult to remove jiggers on one’s own because it is painful. Also, it is difficult to remove the whole flea and it is time consuming. An elderly woman for instance explained during the group

discussion that she was not able to remove the flea herself and that her grandchildren had to remove the jiggers on her feet and hands.

The most common way to remove the jiggers at home is to use sharp instruments such as needles, pins and razor blades. A study conducted in Kenya reported that almost all individuals in a sample of 271 households reported to use such instruments to remove the flea (Kimani, Nyagero and Ikamari 2012). Bungoma Red Cross applied this method earlier, and some community health workers and public health officers reported that they still use this method when treating those infected. However, some of the interviewees mentioned that if you are not able to remove the entire flea it might burst and multiply. Then there is an increased risk of getting secondary infections and infectious diseases, something that is supported by the literature (Heukelbach et al. 2004, Mazigo et al. 2012, Pilger et al. 2008a). Some health workers discussed that removing the jiggers with a sharp instrument might do more harm than good if you don't remove it properly; others meant that this was the only option people had to get rid of the flea.

Removing one flea at the time with a sharp instrument is also very time-consuming, and health workers reported that they would use an entire day on removing jiggers from just one person. A man working in Bungoma Red Cross elaborated: *“I've had jiggers myself and it is really difficult to remove it. I remember when I was a kid. I used 30 minutes to remove one. Think of those who have 200!”*

After removing the flea many reported that they poured paraffin on the wound to be sure the entire flea was killed. Some informants also reported that they soaked their feet into hot water to remove the jiggers. An elderly woman explained that: *“I was infected by March this year, and I was asked to visit a hospital but I refused. I used boiled water and soaked my feet in the water”*. The effectiveness of such traditional methods of treating and preventing jiggers has not been reported in the literature.

It is recommended to use insecticides to kill the flea in the house and surroundings (Ruttoh et al. 2012). However as the different insecticides cost money the community most commonly used local measures. An example of this is the use of cow-dung to smear the house and kill the flea. This is a mix of cow faeces and water. Also, local herbs were used for smearing the house as well as the detergent OMO mixed with water. Some community health workers recommend those infected to use cow-dung, local herbs and OMO, even if they were not sure about how effective it is. They felt it was better than doing nothing.

As the informants explained, getting rid of jiggers is not perceived as an easy task. First of all, most lack proper equipment to remove the jigger. Others, especially the most vulnerable, may have nobody helping them to remove the parasites. In addition, there seemed to be poor knowledge about how to remove them properly as well. Finally, and not the least, removing jiggers systematically is an extremely time-consuming duty. Jiggers' control has indeed been shown to be a problem that is difficult to solve because of the lack of knowledge on correct removal at home (Heukelbach et al. 2004). The Bungoma informants' individual coping strategies and problems illustrate that this is still true, and that if control is to be achieved, problems must be addressed at a community, societal and public policy level. In the next paragraph, the use of health facilities to treat jiggers will be addressed.

#### **5.4.2 Use of health facilities and treatment of jiggers infection**

It seemed to be a widespread assumption among people in the communities, both those infected and those not, that jiggers are not a disease or illness. This is probably one reason why it was not common to use the health facilities to get rid of jiggers. As a boy with jiggers explained; *“the hospital is a place to treat sick people, not to treat those with jiggers!”*

Still, socio-cultural perceptions as the one just described are influenced by structural factors too, which have a major influence on health and health related behaviour (Green and Tones 2010). The distance of and transport to the health facility seemed to be one important factor why infected persons did not go to the health facility to get treated. In Bungoma County there are six hospitals, and several health care centers and dispensaries, located in the most populated areas (Broesch 2009). However there are long distances between the health facilities. There are 1158 km of roads in Bungoma County, but only 165 km are paved (IcFEM 2006). I experienced that it sometimes was difficult getting to the rural areas in Bungoma even by car. Sometimes we had to drive a motorbike and sometimes we even had to walk. As many of those infected had difficulties of walking, and it costs money to get transportation, attending health facilities was easily ruled out, even in case of emergencies. Moreover, the local health centers and dispensaries were not necessarily expected to have drugs to treat jiggers anyways. The situation resembles that of other plague-ridden contexts. Research conducted in Haiti reports that 40 % of the high tungiasis prevalence population does not have access to health care facilities close by (Joseph et al. 2006). It is often difficult to access health facilities because these are far away and it is difficult to walk (Feldmeier et al. 2013). Similar arguments as in Bungoma have also been described in local media in neighboring Uganda. An infected person explained he cannot access the hospital as it is 20

km from his home, and he is not able to walk fare distances due to the jiggers` infection (Jawoko 2011).

Those infected explained that they feared to be laughed at by neighbours, at the market, at school, or during jiggers` removal campaigns. However, the majority mentioned the fear of being ridiculed at the health facilities as their main concern. For instance an elderly man claimed that; *“I did not want to go to the health centre because I was afraid of being stigmatized”*.

A recent research report from Kenya supports this finding, and found that most of the respondents preferred home- based treatment rather than at the hospital, because they feared to let many people know about their condition (Ruttoh et al. 2012). It is also reported that people all over East Africa are afraid of being stigmatized when visiting the health facilities (Sharma 2010). A literature review from Africa and Latin America supported the fact that people living in homesteads with infected kids were said to prefer to remove the flea themselves at home (Heukelbach et al. 2001). In Northern Brazil it was shown too that communities suffering from tungiasis do not recognize the flea as an important health threat, and that the fleas are normally removed by the caretaker. Reluctance towards using health facilities seems to be true in many places where sand fleas are a problem, and the same arguments are used (ibid). However, it might also be necessary to study how health facilities and health workers in general meet those persons with jiggers who might reach the facilities, and whether there is a need to invest in awareness-raising, skills- and resource provision to the health sector to promote better services for those affected.

Finally, the fact that people do not use the health services to treat jiggers might indicate the importance of mobile jiggers` removal clinics, as these reach those suffering from jiggers at their home places, also if they are living in distant areas. This might be important, given the reoccurrence problem that will be addressed now.

#### **5.4.3 Reoccurrence after treatment: *“Everyone got infected again...”* (elderly man)**

In addition to the fact that individual prevention and treatment is difficult, reoccurrence seems to be difficult to avoid. This is another complicating factor. Indeed, the flea multiplies fast, and even though those infected try to avoid reoccurrence after treatment, they expressed that it is somehow impossible to prevent it. Such as a man in charge of a dispensary stated, explaining why those affected did not attend health facilities: *“...They feel it is hopeless to come to the dispensaries”*.

Most of those infected explained that within more or less seven days after being treated during the jiggers' clinics, they started to feel itching again. A woman who had participated in the program, and who was re-visited, called upon the need for continuous help due to the reoccurrence of the sand flea:

*“After treatment my health improved and especially the shape of the toes and also the itching stopped. I am now stronger than I used to be, but what disturbs me is that this week I feel strong, but jiggers have started to re- infest me and next week I will again be weak. So please, I urge you to continue helping me to eradicate the jiggers”.*

Observation and conversations with persons infected, and with the health workers, confirm the high reoccurrence rate. Most of the people in the community agree that it is the persons themselves that should do something about the jiggers' infestation. However, when jiggers keep on reoccurring after treatment, it seemed hopeless for those affected to buy drugs every week. A woman with plague-ridden children explained that; *“As long as you [the Red Cross clinic] are helping us we can be able to prevent, but alone we cannot manage to prevent”.*

To date there is no controlled study to investigate the effectiveness of insecticides for eradication of jiggers (Sachse et al. 2006). Due to the issue of reoccurrence (Heukelbach et al. 2004), this favours the use of preventive measures to fight the jiggers epidemic rather than a drug to kill the flea (Feldmeier et al. 2006b). In a study conducted in Brazil for instance re-infestation of the sand flea on 47 individuals had reached 100% after three weeks (Heukelbach et al. 2004). However, to know how prevention measures should be organised, it is important to understand how those affected explain the plague, and what they perceive to be the causes. In the following section, perceptions about why jiggers occur are discussed.

## **5.5 Perceptions of causes of jiggers' infection and infestation**

Inspired by Kleinman's theory (1976) I will first discuss what people living in the community perceive to be the *causes* of jiggers' infection (Kleinman 1976). Thereafter, health workers' perceptions towards jiggers' infestation will be discussed.

### **5.5.1 The community's perception of causes of jiggers**

#### **5.5.1.1 Lack of basic needs**

Poverty and material deprivation are two important causes of health inequalities (Green and Tones 2010). When asking different people why jiggers are such a big problem in Bungoma County and Kenya, almost everyone answered that it is due to poor hygiene and poverty. A

public health officer clearly identified the causal relation between these factors: “...and poor hygiene is a result of poverty”. A man working in Bungoma Red Cross also explained poverty as the underlying cause for the jiggers’ epidemic; “If we don’t address the poverty issue, we will not be able to address the jiggers’ issue”. The fact that people are not able to fight the jiggers epidemic due to the lack of basic needs often emerged as an explanation on what causes jiggers.

***Prioritizing between multiple needs: “First, I buy food to my children” (mother)***

As suggested by several informants, when the household has not fulfilled the basic needs, such as food to yourself and your family, this is your main concern, and not the jiggers’ infection. The population rate in Bungoma County increases every year and 60 % of the population in the County live indeed below the poverty line (IcFEM 2006). Other basic goods often lacking were water and soap.

***Lack of water and soap***

As a non-infected pupil explained: “Not so many people have soap because some people are very poor. They think that buying soap is just wasting money and they rather spend it on food”.

Thus, another cause of jiggers is that people cannot afford to keep themselves clean. Some suggested that lack of water is an important cause for why people fail to keep themselves clean, and indeed only 65 000 out of 200 000 households have access to piped water in Bungoma (IcFEM 2006). However, many of the informants from the community did in fact not consider this a big problem, as it frequently rains in Bungoma County and people used buckets to gather rainwater while others used water from rivers nearby.

Lack of water and soap are indeed mentioned as risk factors for getting jiggers in Kenya (Karuga 2011). Given that only a bit more than a ¼ of the Bungoma population had close access to water, and that gathering water in buckets and fetching it from the river is a time consuming and demanding task, large families and poor and vulnerable households may still lack the resources needed for promoting the personal hygiene of all its members, as well as environmental hygiene around the homestead. Moreover, the gendered division of labour in care work of children and the elderly might also need attention. The burden of collecting water, washing and cleaning most often is concentrated on women, in addition to the production and preparation of food. Finding time for daily and systematic jiggers’ hygiene of

several dependent family members might be quite demanding for the female head of household. In addition to lack of food, clothing, soap and water the necessary footwear, which helps preventing jigger infection, is lacking in most homes in Bungoma County.

***Lack of shoes: “Most children walk barefoot”***

Many people mentioned lack of shoes in the household as a reason for why people got infected with jiggers. Previous studies from Kenya and other countries support that walking without shoes makes people more vulnerable to jiggers. Lack of shoes is in fact an important risk factor as the flea directly penetrates the feet of the host (Winter et al. 2009, Ruttoh et al. 2012).

Post-treatment provision of shoes should however be organized with care. For instance, the child that was admitted to the hospital due to jiggers, as explained during the description of a typical affected homestead, was given a pair of shoes. However, because of long-term impaired walking, and because of the amount of soars he still had, he was not able to walk properly with the shoes, and he fell when trying to run. Therefore, he did not want to use shoes, and took them off. A study from Haiti had similar findings when distributing 1000 pairs of shoes to affected people in the community. Joseph et al. (2006) reported that those infected often removed the shoes inside the house and that people found it inconvenient to walk with shoes. In addition, those that did not receive shoes complained that they were not protected from the sand flea (Joseph et al. 2006).

Therefore, it seems as the use of shoes rather should be introduced as a preventive measure, before children get infected in high prevalence areas. Yet, given the expenses that shoes imply for poor families, these should maybe be part of the school uniform set for primary school children in endemic areas, and this should ideally be given for free by the government.

***Lack of drugs***

Virtually all those infected with jiggers whom we spoke with, told that they could not afford to buy drugs or insecticides to treat the infection or to spray their house and nearby surroundings. This problem is reported in former studies, where it is claimed that without access to drugs (Heukelbach et al. 2004) and insecticides (Ugbomoiko et al. 2007a), it is difficult to control the jiggers epidemic within the homesteads. At the same time, many of those infected explained that they would not spend money on drugs instead of on food, as the jiggers most likely would reoccur within short time anyways.

Thus, poor economic means at the household level and poor infrastructure and distribution of basic goods such as water impaired the maintenance of appropriate personal and environmental sanitation. All informants referred to these factors as main causes for the jiggers' vermin, and this is discussed in the next paragraphs.

#### **5.5.1.2 Personal hygiene**

Those infected with jiggers seemed to be aware about the importance of personal hygiene and of taking care of one's body, and this was a recurrent theme in all the interviews. Most claimed that they did bath and clean themselves: as an infected pupil stated; *"I do bath every day"*. In a natural group discussion with an infected mother whose children also were affected, she explained; *"To prevent jiggers you are supposed to take hygiene precautions, like bathing, washing yourself and your beddings and make sure that you and the surroundings are clean"*. Another woman in the discussion added that: *"I have the same opinion, we take hygiene precautions where we are living... I also boil the water when I wash my children"*.

However several of the informants spoke about "others" infected with jiggers in third person and explained that those ones urinated in the house and the beddings. A teen infected with jiggers for instance explained that one might get infected if *"you do not take care of your own body"*. He exemplified by explaining: *"You tell them [those infected with jiggers] to shower, but they don't want to, so they just continue being dirty"*.

Even though it might be that some of the informants felt restricted to speak openly about personal hygiene, and claimed that they showered every day while others did not, the conversations confirmed that people meant that maintaining good hygiene is important. At the same time, it is unclear what was meant by "good hygiene", and whether this implied an understanding of the necessity of a daily check-up, removal and disinfection of jiggers on hands and feet. Indeed, washing oneself is not sufficient. Former studies emphasize the importance of personal hygiene to prevent jiggers (Heukelbach et al. 2002), and it is documented that most people do have knowledge about the importance of personal hygiene in order to prevent jiggers (Kimani et al. 2012). However, many of those infected described in the current study that as long as basic needs such as shoes and soap were not covered, proper personal hygiene could not alone prevent the penetration of the flea in high prevalence environments. Finally, it might be that even though people have the necessary knowledge, they feel it is hopeless and meaningless to maintain proper hygiene, as the jiggers will infect

them anyways (Heukelbach et al. 2004). In addition to personal hygiene, there was also awareness about the need for environmental hygiene.

#### **5.5.1.3 Environmental sanitation**

The environment influences health (Green and Tones 2010) and this was most frequently mentioned as a cause of the high prevalence of jiggers in Bungoma. Poor environmental sanitation at home was told by various persons to increase the prevalence of jiggers.

People infected with jiggers explained (here also in third person) that those affected lived in muddy houses with only one room, that the kids do not have a bed to sleep in, they do not have a place to put their garbage and they do not have a toilet or latrine. Observation during household visits supported these statements about infected persons' living conditions. This is also described in former studies from Kenya, where it is reported that most of the houses with jiggers did not have adequate hygiene on their compounds, and most of the houses had cracked walls with dusty floors (Ugbomoiko et al. 2007a). As a public health officer put it: *"The flea prefers to stay in the dust"*. Therefore, the prolonged dry spells in Kenya are said to aggravate the jiggers epidemic (Ruttoh et al. 2012) as the sand fleas multiply better in the dry sand soil (Heukelbach et al. 2005).

Some also mentioned the dirty environment at school as a cause for jiggers' infestation. As a 13 year old pupil infested with jiggers put it: *"The cement has worn out and the class is just dirty"*. Pupils, health workers and teachers explained that most pupils did not wear shoes at school. The floor is not cemented and is filthy because it is not washed properly. They also explained that most schools do not have grass, so that the environment around the school is dusty and sandy. A few mentioned that the latrines at schools were unclean and disgusting. Health workers, teachers and pupils suggested that in order to fight the jiggers epidemic, the environment at school has to be improved. A study from Kenya supports that classrooms made of mud walls, sandy floors and small sized classrooms with many pupils increased the multiplication of the flea at school (Ruttoh et al. 2012). When visiting the communities I saw that the risk factors that Ruttoh (2012) mentioned, in fact were found in all schools. In addition several of the schools also had animals, such as hens, walking freely around both inside the classrooms and outside in the playing areas. Some few informants also suggested that that the dusty roads and playfields increased the prevalence of jiggers as well.

It was not only the dryness and dustiness of the soil that was blamed for promoting jiggers, some soil types were believed to be worse than others. As a public health officer put it: *"The*

*red soils are a major issue*". Some of the health workers as well as the clinic's users suggested that jiggers were only a problem in certain areas, because of the different types of soils. Especially where there is red volcanic soil, the prevalence of jiggers is believed to be higher. Public health officers elsewhere in Kenya relate jiggers to the type of soil (Oduoromondi 2013). Mazigo et al. (2010) has reported that the red clay soil gives much dust during the dry season (Mazigo et al. 2010). It might be interesting to do further investigations on the connection between type of soil and sand flea prevalence.

In any case, poor environmental sanitation and poor personal hygiene were both explained as a result of basic needs not being met. People could not afford to implement measures to improve sanitation in the surrounding area, which allowed the jiggers to multiply fast.

#### **5.5.1.4 High prevalence and reoccurrence**

As already discussed, reoccurrence of the sand flea was locally associated to high prevalence of the jiggers. No matter what people did, the jiggers would still infect them: *"You see, I have a toilet, and I always sweep my house, I arrange utensils and I clean them. So I don't know where the jiggers come from"*. This affected woman explained, supported by others, that as long as people are living in poor conditions in high jiggers prevalence areas, the jiggers would remain a problem, even if the environment were kept clean. Similarly, another woman explained that jiggers were everywhere and that; *"We can even be infected when we are sleeping"*.

A study conducted in Brazil report that children in average had 15 new penetrated fleas per week. The most severe case had 145 embedded fleas. In a family with 3-4 children this means that the adult carer must remove 6, 5 to 8, 5 newly penetrated fleas every day. According to this same study, all infected were re- infected again three weeks after treatment (Heukelbach et al. 2004). When discussing with both health workers and those infected they explain that jiggers are a major issue, and the problem is increasing as the jigger flea multiplies fast. Those infected feel it is impossible to combat the problem by themselves. This corresponds with former research (ibid). Constant reoccurrence might result in a form of disempowerment and fatalism. A village elder told me that due to this, some people in the community explained jiggers as something supernatural, which was beyond their ability to combat the problem.

#### **5.5.1.5 Witchcraft as explanation**

The feeling of disempowerment in front of the plague and the fact that those affected experienced the infestation to occur so suddenly brought some to believe that there were other

causes for the problem. For instance, some asked why one house would be fully infested, while the neighbour's house would not have any jigger fleas in their house, even if they were living in the same conditions.

Ideas about witchcraft varied. Most of the infected pupils explained that they did not believe in witchcraft and that only the elders in the community believed in such. During another group discussion pupils stated though that “...we believe that maybe we have been bewitched”. Witchcraft might be a sensitive topic and those infected might have been afraid to discuss it openly. When discussing the topic in groups, one could see that many of the participants giggled and became shy of speaking. Health workers explained that they faced challenges with infected people who believed they were bewitched, and that this was a common feature. A woman working in Bungoma Red Cross explained:

*“Some victims believe that they are cursed or bewitched. So they laugh at me when I come to their house and say that I can help... They think that we just are wasting their time and that those things will never go away. They think that since my grandfather and father died of this, how can I survive?”*

Some health workers elaborated that it is a challenge if those infected with jiggers believe that they are cursed or bewitched, because they will not take precautions on preventing jiggers, nor try to remove the jiggers. Witchcraft believes causes strong local stigma and keeps those affected from seeking help, it keeps victims isolated and unable to participate normally in their communities. In Murang'a district in Kenya, 12% of a study's participants reported that jigger sufferers either have specific blood or are from certain families, and almost 60% believed in myths and misconceptions on jiggers (Kimani et al. 2012). In Muhoroni District, which is also highly affected by jiggers, the Red Cross Coordinator dismissed those who associated jigger infestation with witchcraft urging them to stop misguiding the public but instead emulate the humanitarian support demonstrated by the NGO (Oduoromondi 2013).

Jiggers and witchcraft are associated with each other in other countries as well. In Uganda, a medical officer explained that people simply die instead of trying to prevent and treat the infestation; and that people must stop believing that witchcraft causes jiggers. He suggests that in order to be able control the outbreak of jiggers in high prevalence tungiasis areas, there must be an increased awareness among people on what actually causes the infestation, how it spreads and how you prevent and treat the jiggers infestation (Jawoko 2011). This might apply in Kenya too.

#### **5.5.1.6 Animals as reservoirs**

Previous studies describe that animals can be carriers of jiggers (Heukelbach et al. 2002, Feldmeier et al. 2003b), and that the infestation is difficult to eradicate due to animals reservoirs (Heukelbach et al. 2004). However neither the health workers nor those infected with jiggers knew or focused much upon animals as potential reservoirs and causes of jiggers' infection. Some knew that animals could be carriers but did not know which animals, while others did not know. It seemed as they did not have enough knowledge about the topic, and there was confusion around it. An infected woman for instance said that; *“people say that when you go to a place where the goats sleep there are jiggers there”*, however she was not sure whether this was true and if other animals than goats might be reservoirs of jiggers.

During the households visits we saw that most households had animals, and people and animals lived together in the huts. Interviews and informal talks in communities supported these findings. We also visited two different veterinarians, but they did not have much information about jiggers on animals. They did sell a spray to use on animals if they were infected with jiggers, but they explained that the community rarely came to buy this drug. Further, the veterinarians explained that only small dogs were infected with jiggers. This statement is not corresponding with what is documented in the literature. Various animals have been found infected such as dogs, cats, pigs, sheep, goats, horses, chickens, birds, elephants, monkeys and finally rats and mice (Heukelbach et al. 2001). A teacher in charge of hygiene at a primary school also suggested that hens and chicken could not be infected with jiggers. This might indicate that even though both those infected and health workers seem well informed about what jiggers are, there is a lack of knowledge and awareness on the fact that animals are reservoirs of jiggers.

#### **5.5.1.7 Lack of rubbish disposals**

During my visit in the community, I saw that all households were lacking rubbish disposals. People usually stored their rubbish both inside and outside their houses, which increases the number of rats and mice in the high prevalence areas. Rats and mice might be carrier jiggers, and an important reservoir to control (Feldmeier et al. 2003a). I observed that there were many rats and mice in rural Bungoma, something that was confirmed by others. However this was rarely mentioned in connection with the high prevalence of jiggers.

## 5.5.2 Health workers perceptions towards jiggers' infestation

### 5.5.2.1 "People do not care about washing themselves" (public health officer)

Many of the health workers whom I interviewed felt that the community did not care about their hygiene. They described people as lacking knowledge, and being ignorant about how to live in a healthy environment and they said that people did not follow up on their advises. A community health worker explained that:

*"We give them advises, how to handle it. The first thing is that we make sure they live in a clean environment... But because people are ignorant, they do not smear the house regularly. They might smear it the two first days... Even if you go there and advise them, they do not take it seriously... When we go away they just leave it like that".*

It seems that some health workers blame individuals for being infected with jiggers and refer to them as illiterate, ignorant and lazy. This seems to be a common perception, as a study in a Kenyan rural district showed that almost 60% held the opinion that jigger infested persons are lazy (Kimani et al. 2012). This represents an obstacle in communication between health workers and community members, which will be discussed later.

### 5.5.2.2 Jiggers as "normality"

Many of the health workers pertained that the people in the community do not care about their own health. A District public health officer expressed the following:

*"They don't see it as a big health problem, when it start itching they don't do anything. I know the tunga flea and why it exists, but the community people do not even know why it is there and what it is... So many people are having jiggers. It almost looks like a fashion".*

He further explained his explicit choice of the word "fashion" because in many communities' everyone has jiggers and it is almost like a normal part of life.

The same alleged lack of education and knowledge about jiggers is emphasised as a cause of the infection by health workers in other studies (Heukelbach et al. 2002). However, it might be questioned whether this way of "blaming the poor" might be due to poor communication between health workers and communities, and whether ways at improving dialogue should be found. As suggested in the case of other diseases, one cannot blame those with jiggers since poverty is the underlying issue of the epidemic (Crawford 1977).

The next chapter will focus on the mobile jiggers removal program that Bungoma Red Cross are conducting, how it is functioning, the importance of such a program as well as the challenges encountered.

## **5.6 Mobile jiggers removal program, Bungoma Red Cross: a case study**

The particular case of the local NGO and civil society association will now be discussed, as seen from various informants' perspectives.

### **5.6.1 Providing relief and care: “He said that we eradicated his suffering when removing the jiggers” (employee in Bungoma Red Cross)**

Everyone agreed that the program conducted by Bungoma Red Cross is important and benefiting the individuals in the infected community. A woman with children infected with jiggers express her appreciation for the program; *“We see a lot of difference when stepping into the medicine solution, our legs become okay... The drugs you have been giving us have really helped”*.

Some also mention that the program increases the knowledge on how to prevent and treat jiggers' infestation, and explain that the removal program is important. A woman with infested kids explained that she came to the clinic to learn how to remove the jiggers. At all, health workers, teachers, family members or infected persons themselves were usually very grateful that someone came to help them with this neglected epidemic.

The economic aspect of the free-of-charge services the NGO is providing was emphasized by all; by those infected, as well as by personnel at the dispensaries and hospitals. All were grateful for the assistance that Bungoma Red Cross provides. But that being said the jiggers' removal program had also some challenges.

### **5.6.2 Challenges faced by Bungoma Red Cross**

All the informants working with jiggers' eradication in different NGOs whom I spoke with were concerned about the deficient economy and the lack of funding. The reason for this seems to be because they had met increasing challenges in having access to the necessary equipment for the program.

#### **Availability of drugs**

Bungoma Red Cross stopped to use pins when removing the jiggers because it was so painful, and chemicals were used for the last two years. For buying the chemicals that they used for the removal program, the cost was approximately 10 000 KES, or 115 USD. The bottles

lasted for 3-4 removal sessions, depending on the number of patients that attended the services. A man who worked in Bungoma Red Cross explained that: *“It is the material support that is lacking and it is making it very hard for the program to move on”*. Thus, regular provision of the necessary chemicals for the services seems to be vital for the viability of the program.

### **The need for and dependence on voluntary work**

Considering the general shortage of health personnel and of facilities in low-income countries, the need for voluntary work seems obvious. This is also emphasized in research on jiggers, where the importance of community health workers and volunteers to fill the resource gap, and to provide effective services to treat cases of jiggers is shown (Joseph et al. 2006).

However the dependence on voluntary work creates some challenges. Bungoma Red Cross depends on “man power” to sensitize, mobilize and conduct the program in order to have a successful jiggers’ removal clinic, and the program is totally dependent on voluntary work in addition to those employed. Almost all work conducted by Bungoma Red Cross is voluntary. Normally volunteers in Bungoma Red Cross get an allowance of 300 KES, or 3.5 USD, for a full day of work. If the economy does not allow giving allowance to the volunteers, it is difficult to get enough manpower to complete the activities that the branch is conducting. Even though most of the volunteers have an urge to help, as a man working in Bungoma Red Cross explained; *“Most of the volunteers are lacking basic needs themselves”*. It is therefore difficult for them to be motivated, and to help others when they have not fulfilled basic needs such as food themselves.

### **Bungoma Red Cross; dependent on the assistance from Hordaland Red Cross?**

As described earlier Hordaland Red Cross and Bungoma Red Cross are twinning organizations, and they have been partners for 5 years, and 2013 will be the last year of the partnership. Those working in Bungoma Red Cross emphasize how important the funding from Hordaland Red Cross has been. An employee in Bungoma Red Cross said the following; *“We pray to God that they will continue funding Bungoma Red Cross, so that we are able to continue with helping and assisting the community”*.

Hordaland Red Cross supports Bungoma Red Cross with a significant amount each year. But even though Hordaland Red Cross is funding Bungoma Red Cross, they explain that it is not enough to conduct many jiggers removal programs, as it is expensive.

One of the purposes of the twinning cooperation is to make Bungoma Red Cross independent. For example, the local Red Cross organization has been able to build a greenhouse to cultivate vegetables. A significant amount is used to pay volunteers, transportation costs, drugs, fuel to the car and similar running expenses. When I was in Bungoma, the local Red Cross organization had not received the money transfer from Hordaland Red Cross due to complications with the bank in Kenya. Several volunteers and staff then explained that their level of activity usually decreased when the transfer from Norway was awaited or delayed. Former studies support that dependability might be an issue, when donors from high-income countries, partner with low-income countries for a period of time, as it might provoke a “donor dependency” (Najam 1996). The jiggers’ removal program is an expensive program due to the costs of drugs, transportation costs and lunch allowances to the volunteers. As the partnership expires, several people working both in Hordaland Red Cross and Bungoma Red Cross have expressed their concern over these expensive activities. One may therefore ask about the contribution of the public health sector to fight the plague.

### **5.6.3 Cooperation between NGOs and the local health sector: mobilization for the jiggers removal program**

The quality and effectiveness of health promotion programs are depending on sufficient planning. The planning process can also be a vehicle to involve all the stakeholders (Green and Tones 2010). During the mobilization day, staff or volunteers from Bungoma Red Cross usually visited the public health officer of the infested area to solve practical issues as when and where Bungoma Red Cross could conduct the program. Focal Red Cross volunteers, village elders and community health workers were also involved to mobilize and inform those infected about the program. Typically the program was conducted a week after mobilization. The jiggers’ removal program is usually conducted at a central place in the village and those infected must seek the service themselves. Some health workers in the community called upon a more consistent mobilization, and better communication with the NGO program. A public health officer explained for instance during a removal day:

*“This morning I was not informed that I was supposed to assist you... I had to rush. We need a proper program so we know what date and what time, so that we can organize all the patients and we can organize the community health workers to inform people... So that everybody knows that this day is a removal day”.*

Another health worker supported this statement by explaining that; *“They [Bungoma Red Cross] need to involve the health workers. Sometimes they have been doing things without informing health workers”*.

On the other hand, some of the staff in Bungoma Red Cross and other informants explained that some health workers are not informing those infected in the community about when and where the jiggers removal program will be conducted. Challenges in communication regarding the Red Cross visit were also observed at a community level. An elderly man said for instance during a spontaneous group discussion that he did not know about the program before the day of removal and that: *“the village elder does not convey information about this program to everyone in the community”*. Thus, some people could be left out of the services even when the Red Cross visited the village. A pupil infected with jiggers indeed explained the poor participation rate at the jiggers removal program with; *“Others have not been informed about the program”*.

Partnership between different sectors is crucial to tackle the determinants of health and illness. This requires leadership, shared vision, clarity about responsibility and good communication (Green and Tones 2010). The importance of cooperation between stakeholders at different levels; the government, public health officers, community health workers, the Ministry of Health and NGOs, has been emphasized by employees and volunteers in Bungoma Red Cross and by other stakeholders in the community. At the local level, both the health workers in the community and at the NGOs agreed that it is crucial to cooperate when conducting the jiggers’ removal program. Both groups admitted that there are some communication issues, but that this had improved over the last years, and that it was important to continue the cooperation. An employee from Bungoma Red Cross elaborated on this:

*“When we started six years ago they [the health workers in the community] did not want to collaborate. We were just going there on our own. We tried to talk to them but they were not concerned. But a year ago, they started to cooperate with us. So there has been a change. I’ve been working with this program since it started in 2005 and I have seen a change”*.

Still, there was a perception that the government and public health authorities were missing their responsibilities: *“We are just supposed to be an NGO helping”* (Child welfare officer, NGO ACE – Africa). People who worked and volunteered in various NGOs in Bungoma

County felt that due to the low involvement by the government at a societal level, they had to step in and do something with the jiggers' epidemic. Most NGOs felt that they were left to solve the issue. They felt that the government did not do anything to fight the epidemic, and that public health servants in the county considered it an NGO issue. This causes problems with the follow up of such programs.

#### **5.6.4 Follow up in the community after the removal program: “...The follow-up is not ours” (Red Cross staff)**

Even though Bungoma Red Cross aims at eradicating the jiggers' problem, it will most likely re- occur within short time. A man working in Bungoma Red Cross explained that:

*“We treat it, we go away and we hope that the community health worker will follow up the cases. At times the number of community health workers is not enough. And they are not only dealing with jiggers, they also deal with other health issues”.*

Health workers in the community and Bungoma Red Cross are both aware of the importance of following up the community after treatment, but they all explained that the lack of resources made it difficult to do the actual follow up. Former research from a jiggers' removal program in Haiti reported that even if the program successfully removed the lesions for 132 persons, the effect would only be temporary unless these efforts are continued and expanded. Follow up using focal community health workers are suggested as an effective measure in eradication of the sand flea (Joseph et al. 2006). Several of the community health workers in Bungoma did indeed agree, and they saw it as their task to visit and re- visit the households. However, they too faced several challenges that will be discussed now.

#### **Lack of drugs in public facilities**

First of all, some public health officers mentioned that due to the lack of medicine to treat those infected with jiggers, it is difficult and de- motivating to conduct the follow- up. For instance, one claimed; *“We don't have medication at all”.*

Furthermore, a health worker explained that it is difficult to visit the households only to give advises, without bringing anything to those infested: *“If you come they [the community] expect that you are coming to treat them... If you don't have drugs they will ask you; why are you coming then?”*

Also the Ministry of Public Health and Sanitation in Kenya report on the issue of lack of drugs in health facilities. They state that inadequate drug supplies particularly in government-

run facilities contribute significantly to the prevailing low quality of services (Heugo 2008). It has been further explained in studies from Brazil that those working at health facilities feel they do not have the resources to treat those with jiggers due to a lack of drugs (Heukelbach et al. 2004). Poor health worker motivation has often been identified as a central problem at the community level in health service delivery. From the perspective of health professionals, the challenges include lack of equipment, frequent shortages of supplies and a mounting workload (Mathauer and Imhoff 2006).

**Priorities in healthcare: “...*That [individual treatment] is too time consuming...*”  
(community health worker)**

Some health workers did explain that since they do not have access to medication, they remove the jiggers manually with a pin. However as this tends to be too time consuming, most of the health workers explained that the only thing they could do was to recommend those infected how to maintain personal hygiene and how to keep a clean environment. As a community health worker explained: “*We can just recommend. It can take a whole day to remove jiggers from just one household. That is too time consuming*”.

In addition, some community health workers explained that their workload is too big. The Ministry of Public Health and Sanitation also reports that the lack of workforce in local health facilities is an issue (Heugo 2008). Furthermore, health workers that were interviewed reported that they have many other concerns than jiggers’ eradication. The biggest health alarms in Bungoma County are HIV/ AIDS and malaria (Broesch 2009), which are interpreted as more severe than jiggers. Health workers explained that jiggers therefore tend to be ignored, as there is no time to follow up all those who participate in the jiggers removal program.

**The costs of Outreach services**

The issue of transportation costs often emerged from discussions with the various stakeholders. Distances are often long in the rural area in Bungoma, which means that the community health workers depend on transport for the mobilization and the follow up. As transportation is expensive and the means of transport are limited, this might hamper the efficiency of providing health care. At an individual level, those infected with jiggers cannot afford transport and it is painful and difficult to walk for long distances, so they are not able to visit the dispensaries.

Transportation cost is a challenge for several health services in low-income countries. In rural Kenya it was found that health personnel working on insecticide- treated nets to reduce the burden of malaria costs about US\$1 per net delivered, including allowances, administration, and transport (Curtis 2003). A suggestion might be to combine several health outreaches. The Ministry of Public Health and Sanitation suggests that targeting more than one disease will maximize resources (Heugo 2008). For instance distribution of nets, spraying houses and information about preventive measures for jiggers eradication as well as preventive measures for other diseases will indeed be more cost- effective and time saving for health workers. This brings us to the health policy stance of jiggers' eradication, and to perceptions about societal and national level responsibilities in fighting the plague.

## **5.7 Governmental health policies and the tungiasis epidemic**

### **5.7.1 Local perceptions about the role of public health authorities**

The development of healthy public policy is of great importance to health promotion (Green and Tones 2010), and the issue of jiggers is indeed addressed by the Ministry of Public Health and Sanitation; Department of Environmental Health and Sanitation; Vector and Vermin Control (Onwong'a 2011). According to the Ministry's home page their main goal is "to enhance health and quality of life through safe, effective and environmentally sound integrated vector, rodent and vermin management services" (ibid). Even though jiggers is not mentioned on their list of major vector diseases, control of jiggers is mentioned as a past and present activity in the Vector and Vermin division (ibid). According to Jiggers Ahadi Trust lack of political goodwill has been a challenge in jiggers eradication. However, collaboration between the Jiggers Ahadi Trust and the government has, according to themselves, boosted the anti- jiggers campaign in Kenya since 2007 (AhadiKenyaTrust 2007b). I tried to contact the NGO Jiggers Ahadi Trust and the Ministry of Public Health and Sanitation several times before, during and after my fieldwork, as I thought that it would be useful to discuss the issue of jiggers with these actors. However, none of them responded to my requests.

Jiggers' awareness has increased among stakeholders such as NGOs and the government. However, published information by the government regarding knowledge, attitudes and practices as well as about the jigger situation in general is scanty and fragmented (Kimani et al. 2012). Furthermore, none of the informants in the current study felt that the government is seriously involved in jiggers' eradication and that interventions mainly happened in the Central province of Kenya. It was suggested by some informants that jiggers are not prioritized and that other vector and vermin diseases such as malaria, dengue fever and yellow

fever are the government's main focus. A woman explained during an informal talk that jiggers are a neglected problem, which does not receive much attention because other diseases are more severe:

*“Malaria can kill a child in two days, with jiggers you can survive for years! When infected with jiggers you don't have an urgent need for help. That's why the government is not focusing on jiggers”.*

A man working in Bungoma Red Cross emphasized the need for several actors working together to fight the plague, but not least the health authorities' responsibilities:

*“For now our program is a temporary help. The permanent solution is when the issue of poverty is addressed, when they built proper schools with floors... Bungoma Red Cross cannot fight poverty alone... I don't want to point a finger at the government because I believe it is a collective responsibility for everyone to take care of their own hygiene... Red Cross is doing it now because no one else is... But it should be an issue for all of us; Red Cross, the government, politicians, the community... It is a public health issue, for the government; the Ministry of Health and the public health officers. That is why we pay them and that is why we pay taxes. NGOs should just come and supplement it”.*

A man working in Bungoma Red Cross elaborated on the political challenges:

*“I remember when we talked to members of the parliament in Bumula [one of the most infected areas in Bungoma]. We told them that we wanted to conduct a jiggers' removal program. They said there was no problem with jiggers in that area. The problem does not get highlighted because of the stigma and nobody accepts that the problem is there. So it all goes back to those infected. It is left for them to make an effort to see how they can help themselves.”*

He further explained that politicians do not want to admit that they have jiggers in their area, because that is the same as saying “we are poor”, and then they might lose votes at the election.

It is important to raise awareness on health issues such as jiggers among policy actors (Green and Tones 2010). Virtually all informants agreed that the government is not concerned, and does not give attention to the jiggers' epidemic. An employee from Bungoma Red Cross stated that poor engagement from the government is due to “poor leadership”. It was

suggested as essential to get the government involved in fighting this neglected epidemic; not just at the local community level in Bungoma County, but also at the national level in Kenya. Another employee in Bungoma Red Cross elaborated that:

*“Both the ministry of health and the local leaders must be deeply involved in this. The next thing Red Cross should do is to sensitize the ministry and the leaders to take their part seriously”.*

When I spoke with the health administration officer at a District hospital, he was surprised to hear that jiggers were a problem in this area. Also when speaking to the district public health officer in Teso, she thought it was appropriate that Bungoma Red Cross was responsible for the jiggers removal campaign. She argued that the government did not have finance to fight the jiggers. These examples might underline the frustration that the NGOs feel.

The fact that the government is not involved in jiggers’ eradication might result in lack of common strategies and information about jiggers, which in turn will hamper jiggers’ eradication. This will be discussed in the following paragraph, together with suggestions on the way forward to achieve jiggers’ eradication.

## **5.8 The way forward: Some suggestions from the grassroots**

### **5.8.1 Poverty as an underlying issue**

The issue of jiggers is complex and there is a wide agreement among health workers and those affected that it is not possible to prevent and eradicate jiggers when people live in constant poverty in high jiggers’ epidemic areas. Poverty is an underlying determinant for the jiggers’ epidemic. Previous studies (Heukelbach et al. 2001, Heukelbach et al. 2002, Sachse et al. 2006), support that the prevalence is highest in poor communities and that people suffering of jiggers are less economically productive, which again raises poverty levels. Finally, poverty hampers the jiggers’ eradication and therefore, the NGO Jiggers Ahadi Trust has initiated beekeeping and banana planting projects in some areas in Kenya. This is to generate income and break the poverty cycle for those infected with jiggers (AhadiKenyaTrust 2007a). Similar activities were not found in Bungoma, however I did indeed experience the poverty cycle where those infected could not carry out their daily activities. Jiggers infestation might therefore be an additional obstacle to achieve the MDG goal concerning eradication of extreme hunger and poverty (UnitedNations 2013).

### 5.8.2 The need for prevalence studies

Epidemiological measures contribute to our understanding of health (Green and Tones 2010). During one of our mobilization and sensitization operations, we spoke with a head teacher who insisted that we should come to his school for the jiggers' removal campaign. However, on the removal day, only a few attended the program, and some pupils told us that other places nearby people were much more infested.

Volunteers in Bungoma Red Cross mentioned that in areas where they had focal persons reporting to them, they had frequent visits, but that in other places that may be needed more assistance, there could be no outreach activities at all. A man working in Bungoma Red Cross called upon the need for mapping the situation to assure proper sensitization;

*“There is a need for a systematic survey to be done, about where the jiggers are, in which areas, and in which populations. If we can do it with malaria, why can we not do it with jiggers? ... We should do a mapping of the villages and [after that] we can do a campaign in the areas most infested”.*

The prevalence of the parasitic disease worldwide is not known (Heukelbach et al. 2004). Studies indicate that the prevalence of jiggers in high prevalence areas can be more than 50 % on humans and animals (Feldmeier et al. 2006a). During my study, no research being conducted in Kenya was found on the prevalence of jiggers. But according to the NGO Jiggers Ahadi Trust 2, 6 million (6,5 %) people are infected in Kenya and 10 million are at risk of being infected (Karuga 2011). As experienced by the Bungoma health workers, it is difficult to know how and where to respond to the infestation when epidemiological data are lacking, and much might be left to coincidence: *“We start with those that call us, and if we have time and recourses after that we can do assessment in other areas”.*

Therefore, several informants suggested that in order to be able to reach the most needed areas, there is a need for a more systematic approach. Mazigo et al. (2012), who did a study in Tanzania, state that prevalence data from East Africa are virtually non-existent and this is true in the case of Kenya too (Mazigo et al. 2012).

### 5.8.3 The need for research on drugs to eradicate the sand flea

Looking at different drugs that are used to kill the flea, a health worker in Bungoma elaborated on the different treatment methods they have had over the years:

*“When I started we removed the jiggers with pins and surgical blades. Then we*

wanted to change way, and some doctors suggested that these methods were making those infected losing blood and it was painful for them. They decided that we should use antiseptics and disinfectants to remove the jiggers. Two months ago a pharmacist came who suggested that we should not use the disinfectants that we were using. It was the actelyx soap. It used to kill the flea but the pharmacist was concerned by the side effects. So we agreed that we should use Potassium Permanganate, Hydrogen Peroxide, Liasol, Tincture of Iodine, Sodium Hypochlorite, and finally Jigex cream or Vaseline. So we are using these drugs right now”.

She elaborated that those infected soaked their affected area in the different solutions for approximately one hour in total. The Jiggers Ahadi Trust, which is the biggest NGO working with jiggers removal in Kenya, recommend however that those infected should soak their feet for about 15 minutes, in an alcohol solution; for instance hydrogen peroxide or other commercial antiseptic and disinfectants like Dettol and Savlon (AhadiKenyaTrust 2007a)<sup>8</sup>. In a study from Haiti drugs reportedly used were antibiotics; trimethoprim/ sulfamethoxazole and metronidazole, amoxicillin and metronidazole, or amoxicillin/ clavulanate for treatment of those with severe infections (Joseph et al. 2006). Previously, the anthelmintic<sup>9</sup> substance Niridazole was a recommended drug therapy, but has now been withdrawn due to potential side effects on the central nervous system (Sachse et al. 2006). Finally, according to Sachse et al. (2006), there is also a lack of research to investigate the efficacy on the use of insecticides in the homesteads (ibid).

These ranges of different prophylaxis and treatment methods indicate that there is a need for research and clear guidelines on which procedures and drugs that are recommended for humans as well as animals suffering jiggers, as there is still a lot of confusion on the topic.

#### **5.8.4 The lack of common strategies and information materials**

There was a wide agreement among health workers that they miss clear guidelines and strategies on how to eradicate jiggers. Neither those infected with jiggers, nor health workers who worked with jiggers' removal had any access to written information or brochures on how to prevent and treat jiggers' infestation. As described earlier, the different programs addressing jiggers use different disinfectants to kill the flea. Also, some health workers in Bungoma County reported that they still used the traditional method, with pins or blades, even

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<sup>8</sup> Interestingly, in a letter in the British Journal of Dermatology it was suggested that the blunt mechanical way of removing the parasite with a pin was appropriate (Gibbs, 2008). Yet this might only be a useful approach when infection is limited and indeed performed at home.

<sup>9</sup> A substance capable of destroying or eliminating parasitic worms (OnlineDictionary 2013 c).

though it is painful, leaves open wounds and increases the risk of secondary infections or even of sharing diseases such as HIV/AIDS. As a district public health officer explained; *“There are no proper guidelines on the most effective way to treat jiggers. There are different methods and thoughts about what is the most effective way to treat it”*.

A younger man working in Bungoma Red Cross supported this statement, and expanded what several others had said;

*“I call upon the need for proper research to be made by the Ministry of Health so that we can come up with proper guidelines. It would be of importance for both us and those affected”*.

Former studies support these findings. Even though it seems like people exposed to the flea and health workers have knowledge on jiggers (Kimani et al. 2012), there was confusion around specific preventive and treating measures. Researchers call upon the need for proper methods for treatment, prevention and control of the jiggers epidemic as these have never been evaluated scientifically (Heukelbach et al. 2001, Buckendahl et al. 2010, Feldmeier et al. 2006a)

#### **5.8.5 Collaboration between NGOs**

The importance of collaboration between the public health sector and NGOs is crucial. Yet, better collaboration between different NGOs also emerged as fundamental for the eradication of jiggers according to different informants.

The number of NGOs that work towards eradicating jiggers is increasing. This is especially true in central Kenya, but lately also in the western part of Kenya where Bungoma County is located. Studies have indicated that several NGOs working on the same issue in the same area increase the chance for duplication. De Jong (1991) focuses on the risk of having duplicating services in general. She elaborates that few countries in sub Saharan Africa have sufficient information to coordinate activities between NGOs, or to set guidelines for the latter's performance. Weak state capacity might be a primary reason for this situation, and the risk is that there is a lack of mutual exchange of information between different NGOs, thus resulting in duplicate services (DeJong 1991).

I experienced several times when travelling around to conduct interviews that other NGOs were present to assist with the jiggers eradication. However, they were not aware that

Bungoma Red Cross and other NGOs already worked with the same issue in the same area. Some NGOs being interviewed in Bungoma in fact experienced that especially the biggest and most sponsored NGO in Kenya, Jiggers Ahadi Trust, are reserved to cooperate and share experiences with others. This might be due to the fact that there is competition about providing the services, and that some NGOs wish to keep the field for themselves. Volunteers and staff at Bungoma Red Cross explained however that they had partnered and taught other NGOs how to remove the jiggers, and that they always welcome other NGOs to join their programs. There seems to be a need for coordination of the work of NGOs so as to cover all the communities and places in need of services, as well as to avoid duplication of services and waste of resources in some few places. Finally, it would probably be more efficient if the coordination of the work of the different NGOs were a responsibility of the public health authorities.

#### **5.8.6 Fighting jiggers with prevention and awareness raising**

Due to the high prevalence and reoccurrence of the sand flea it might be favourable to focus on preventive measures to fight the jiggers epidemic.

##### ***5.8.6.1 The school as arena for jiggers prevention***

Health education has a key role in development and can raise awareness on factors that influence health and it can empower both individuals and groups to tackle these factors and take action (Green and Tones 2010). As explained earlier many health workers feel that those infected are ignorant and lack knowledge on jiggers, and they emphasized the need for health education, in the community and in schools. They were persuaded that to eradicate jiggers, the level of education had to be improved. Furthermore, they emphasized the importance of teaching the community about proper preventive measures as well as removal of the flea.

All interviewed teachers explained that they teach the pupils about hygiene in general, such as washing hands and brushing teeth, but not about jiggers specifically. Most teachers together with health workers and affected people in fact agreed that it would be useful to teach pupils about jiggers specifically.

Furthermore, some informants suggested that the issue of jiggers should not be under the Ministry of Health and Sanitation – Vector and Vermin control, but rather under the Ministry of Education. It was argued that at least these two ministries should cooperate to eradicate the jiggers' epidemic, as sufficient knowledge about this neglected infestation in the community is lacking.

A study conducted in rural Kenya found that the knowledge on jiggers' infestation and symptoms was high. However it had not been translated into prevention and control in the area (Kimani et al. 2012). It is likely that the school is an appropriate measure to provide specific health promotion information about prevention of jiggers. Another suggested measure to raise awareness on the epidemic is the use of media.

#### **5.8.6.2 The use of media**

Mass media can raise awareness, influence attitudes and transmit simple information in health promotion (Green and Tones 2010). Several health workers explained that there has been an increased focus on jiggers' infection in the media last years. This has been of great influence since it is boosting knowledge on the issue of jiggers in Kenya, although no studies have documented the effectiveness of increased information. A systematic review of the effectiveness of media interventions on changing knowledge, attitudes and behaviours related to HIV/ AIDS in developing countries, found that the effect size of using media was small to moderate (Bertrand et al. 2006). Several health workers and people living in the community told me that increasing information about jiggers in the media might have a positive effect in fighting the epidemic. It might increase the transparency around jiggers as well as awareness on prevention and treatment. However, mass media are more effective when combined with personal interaction (Green and Tones 2010). Therefore it might be reasonable to suggest that jiggers' awareness at school and in media should be combined to fight the epidemic.

#### **5.8.7 House to house removal program; a better approach to eradicate the jiggers' epidemic?**

Several health workers in different NGOs and at dispensaries in Bungoma suggested that instead of gathering those infected in one group, it would be more appropriate for the jiggers' removal program to do house to house visits in order to treat those infected. Another NGO called ACE- Africa working with jiggers' eradication in Bungoma are using the house-to-house approach. They think this is more appropriate because they are able to talk to those infected and "*when you do house to house activities, you find the cause of infestation*". It is suggested in health promotion literature that house to house interventions might be favourable as it involves a participant approach and thereafter empowers those affected (Green and Tones 2010). Sitting down and talk with all the family members, and seeing the environment they live in helps understanding where and why they have been infected with jiggers. Health workers might also be able to reach excluded and disadvantaged groups (ibid) who are afraid of using health facilities due to stigmatization; those who cannot walk, or those who do not

know about the program etc. Research from Haiti supports that for jigger interventions to be successful and not only temporary, efforts should be continued and expanded, and assessment of the households should be included (Joseph et al. 2006).

Changing organizational structures takes however time (Green and Tones 2010). Challenges mentioned were that house-to-house programs are time-consuming. Given that jiggers' eradication often is dependent on voluntary work, such as in Bungoma, it might be difficult to apply such time-consuming measures. Moreover, transportation of the volunteers is expensive, and it is difficult to just recommend infected households how to avoid jiggers if they do not bring any drugs.

Finally methodological reflections will be presented, followed by conclusion and recommendations of the current study.

## **6. Methodological reflections**

Proper research methods are essential to ensure good quality of the data (Green and Thorogood 2004). This chapter discusses some factors that might affect the validity of the data collected. The analysis illustrates the use of concepts related to the research procedure, and proposes measures to achieve trustworthiness. Credibility, dependability, transferability (Graneheim and Lundman 2004) and reflexivity (Green and Thorogood 2004) have in qualitative research been used to describe various aspects of trustworthiness (Graneheim and Lundman 2004).

### **6.1 Credibility**

Credibility deals with the focus of the research and refers to confidence in how well data and processes of analysis address the intended focus. Choosing participants with various experiences, genders and age increases the possibility of shedding light on the research question from different perspectives (Graneheim and Lundman 2004). In the current study, female and male pupils, adults and elderly infected with jiggers were all interviewed. Health workers with different experience, age and gender were interviewed as well, and observation and informal talks were frequently used and written down. My lack of familiarity with the context made the close cooperation with local research assistants crucial, and strengthened the quality of the data, such as in being able to meet the right and relevant health workers and to mobilize for the jiggers' removal day. Interviews were conducted till no new information occurred and saturation was achieved, thus also adding to the credibility of the findings. Credibility also involves how well categories and themes cover data; that no irrelevant data is included, or no relevant data is excluded. It is also a question on how to judge the similarities within and difference between categories (ibid). In the current study a mind map (Figure 2) was developed in the initial phase and flexibility and frequent critical reflexions during the entire analysis process ensured the development of appropriate meaning units. As Graneheim and Lundman (2004) suggests, a way to approach appropriate meaning units is to use quotations (ibid), which are used in the Discussion of Findings chapter.

### **6.2 Dependability**

Dependability takes into account both factors of instability and factors of phenomenal or design induced changes. This is the degree to which data change over time and alterations made in the researchers' decisions during the analysis process (Graneheim and Lundman 2004). It is important to ask the same type of questions to all participants, but on the other hand, observing and interviewing are evolving processes while interviewers acquire new

insights into the phenomenon under study. This might influence the focus of observation and follow-up questions. For the present study, the fieldwork lasted for two months. Even though it might be argued that the data did not change, decision-making changed during the fieldwork. This is due to the fact that in the beginning, I and the translators/ guides had limited experience in conducting qualitative interviews. To compensate for this, before, during and after the fieldwork, I had an open and critical dialogue with several persons with knowledge about qualitative research, jiggers' and/ or the local setting.

### **6.3 Transferability**

Transferability refers to the extent to which the findings can be transferred to other settings or groups (Graneheim and Lundman 2004). The author might come up with suggestions about transferability; however it is the readers' decision whether the findings are transferable or not. To facilitate transferability it is important that the researcher gives a distinct and clear description of the context and culture (ibid). In this study, contextual factors were described throughout the study. An example of this was in the discussion of findings chapter where a typical jiggers' environment were described. Finally, vigorous presentations of findings together with quotations were pursued to enhance their transferability (ibid). The findings of this study were presented with a repeated use of appropriate quotations in paragraphs and according to various analytical themes and levels. These were discussed systematically, theme after theme, and in line with the socio-ecological model approach discussed earlier.

### **6.4 Reflexivity**

Green and Thorogood (2010) explain reflexivity as the process where you reflect on your own effect on the data generated and on the social and cultural process of the research. I work as a volunteer in Hordaland Red Cross and the two translators/ guides worked as volunteers in Bungoma Red Cross. Hordaland Red Cross and Bungoma Red Cross are twinning organizations, which is a factor that might affect the study. Green and Thorogood (2010) explain the importance of careful and rigorous analysis, and that analysis of the data should be done in a way to ensure that the researcher does not aim for confirming former assumptions, that he or she does not see what they were hoping to see. In this study subjective interpretation was attempted avoided by ensuring rich descriptive data; a tape recorder was used when allowed, rather than only taking notes during interviews and then relying on thin data from the different informants. Thin data increases the chance that the researcher makes biased interpretations of the data from the informants (Green and Thorogood 2004). Given that the interviews with community members were dependent of multiple translations during

the interviews and during transcriptions, and that volunteers in Bungoma Red Cross conducted, transcribed and translated the natural group discussion, it is not possible to be sure about the degree of bias in the data. However, I discussed the topic, the study and the importance of truthful data widely with my two-translators/ guides. I also discussed frequently with my supervisors and others that have knowledge about jiggers, as other people will have a different understanding of the topic (ibid).

Most of the evidence on the use and effectiveness of community- based approaches to improving the health of the public is developed in a Europe and American settings. It is therefore important to be aware that theories and interventions must be applied to specific social-cultural conditions. Since I come from a different culture, with different social norms, cultural norms and a different language, it might create a gap between myself and the informants, and it is necessary to be familiar with cultural norms and representations in the study area (Diclemente, Crosby and Kegler 2009). However, the guides/translators who live in the study area helped me to understand social and cultural norms. In addition, I attempted to participate in other social settings, both to better adapt to the context and to participate in informal talks about the study topic.

## 7.0 Conclusion and recommendations

This study aimed at exploring individual and local perceptions of being infected with and/ or living in jiggers` affected environments, the utilization of the jiggers` removal program conducted by Bungoma Red Cross and the challenges of jiggers` eradication. In this qualitative study, the socio ecological model of health was applied to analyze, from various perspectives, the experiences of those affected as well as of those trying to address the epidemic. Sand flea infestation is a public health problem that is poorly recognized, and data in East Africa are scarce (Mazigo et al. 2012). Furthermore, research recently suggested that without eradication of the sand flea achieving the MDGs remains a dream (Ruttoh et al. 2012). There is lack of scientific literature on patients` and health workers` perspectives on jiggers removal programs and on their functioning, limitations and strengths in high prevalence areas (Joseph et al. 2006). This case study on an NGO program in rural Kenya aimed at contributing with qualitative data on the processes at stake when fighting the scourge.

According to our findings, at an individual level people explain that the flea affects them negatively in terms of physical, psychological and social well-being. Being affected is a stigmatizing condition. Many informants explained causes of the high infection rates with lack of basic needs; such as lack of food, water, soap and shoes. Poverty, poor hygiene and poor environmental sanitation were frequently mentioned as reasons for the plague, as well as the type of soil or construction materials of housing and schools. Witchcraft was seldom mentioned. An important finding was the pervasive perception about high prevalence and unavoidable reoccurrence of infestation, expressing some degree of fatalism. Several informants explained that prevalence is so high in the county that no matter what they did, the jigger flea would multiply and infect people in the community. The issue of reoccurrence might indeed demonstrate the need to focus on preventive measures instead of treatment only, thus attacking the causes. That would also be more cost-effective, in a long-term perspective.

General knowledge and awareness about the causes of jiggers and about the fact that it could lead to other infections and ailments was apparently good. However, knowledge on important actions such as spraying the house with insecticide and other preventive measures, the role of animals as reservoirs, the need for proper rubbish disposals, the need for immediate removal of penetrated jiggers`, the risk of severe infection and even gangrene when soars are left untreated and the need for vaccination to avoid tetanus was poor. Virtually all who removed the jiggers did it themselves at home by excision. Education on proper removal methods and

disinfection should be emphasized, as it is a difficult task. Many health workers indeed highlighted the need for jiggers' education. Some suggested that jiggers should be an issue under the Ministry of Education, to boost the knowledge of the epidemic from early on, by targeting school children. Today, pupils only learn about hygiene in general and it was suggested that it would be effective to teach them about jiggers specifically, as well as on how to prevent and treat the vermin.

The mobile jiggers' removal program that Bungoma Red Cross conducted is appreciated by the health workers and by people living in the community. Future recommendations on a national level include developing a clear overview about the prevalence of jiggers in the county and country, which should be promoted by public authorities. Furthermore, cooperation between different NGOs and between NGOs and the public health services should be strengthened in order to maximize the utilization of jiggers' eradication measures as well as to avoid duplication of services. According to those involved, the issue of tungiasis should not only be under the NGOs, but also be a topic for all relevant development stakeholders in Bungoma and Kenya. It was suggested that a house to house approach to fight the epidemic would be more appropriate because of health workers seeing the true environment where people are living and to reach those who do not turn up during the removal program. It might be useful to study these issues more in depth.

Finally, there is a strong call among almost all health workers in the study that clear guidelines and strategies on how to eradicate jiggers are necessary. No one I spoke with had access to brochures or written information on prevention and treatment of jiggers<sup>10</sup>. There are different methods and thoughts about how to prevent and treat jiggers, but there seems to be a need for evidence based recommendations. The issue of jiggers' eradication is under the Ministry of Sanitation – Vector and Vermin control, and proper guidelines on both preventive and treatment measures are expected developed and implemented.

To sum up, combating jiggers apparently needs a holistic and multi-sectorial approach at multiple levels; where socio-economic development addressing the environment in communities and institutions such as schools; awareness about and control of animal reservoirs, and health education and empowerment of communities to take control over the

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<sup>10</sup> This study in fact resulted in the on-going development of information brochures to health workers about jiggers, through collaboration between Bungoma Red Cross, Hordaland Red Cross and Norges Kreative Fagskole (Norwegian School of Creative Studies) (see Appendix 9).

infestation, should be promoted. Public authorities should take the lead in coordinating the work of communities, civil society and NGOs and public institutions and services.

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## Appendix 1: Cooperation letter between Hordaland Red Cross and Bungoma Red Cross



All correspondence to be addressed to:-  
**The Secretary General**  
South "C" (Bellevue)  
Red Cross Road, Off Popo Road  
P.O. Box 40712, 00100-GPO, Nairobi, Kenya  
Tel: (254-20) 603593/ 608681/13  
Fax: (254-20) 603589  
Mobiles: 0722-206958 or 0733-333040  
Email: info@kenyaredcross.org  
Website: www.kenyaredcross.org

1<sup>st</sup> November 2011

Inger Nygaard,  
Norwegian Red Cross  
C/o IFRC  
**NAIROBI**

Dear Inger,

**Re: Third Quarter 2011 Bungoma Twinning Report**

Greetings from the Kenya Red Cross Society

Enclosed herewith, please find attached the Third Quarter 2011 Bungoma Twinning Report for your review and records.

Please get in touch with the undersigned for any clarification and/or additional information.

Thank you for your continued support and cooperation

Yours Sincerely

A handwritten signature in blue ink, appearing to read "for Dr. James Kisia".

**Dr. James Kisia**

**Deputy Secretary General**

Encls.

DM/JK

---

**Patron:** H.E. Hon. Mwai Kibaki CGH, MP, President of the Republic of Kenya    **Governor:** Paul Birech

## Appendix 2: Discussion guide

The following discussion guide is a draft of conversations with people on various levels that had experience with people infected with jiggers. These informants were public health workers, community health workers, staff and volunteers from Bungoma Red Cross and other NGOs, health worker at a dispensary, village elder and finally teachers.

- Personal data
  - a. Age, sex, level of education.
- What is your personal and working experience with people infected with jiggers?
- Do you as a public health officer/ community health worker think jiggers are a problem in Kenya?
  - a. And in Bungoma District?
  - b. Why/why not do you think it is a problem?
  - c. What are the challenges?
- What do you think are the personal challenges for those infected with jiggers?
  - a. Economically, social (relation to families and others), bodily, situational (at work, at home).
- What are the guidelines and procedures when one meets people suffering from jiggers?
  - a. Which method do you use for removing the jiggers?
- How useful (or not) is a program such as the Bungoma Red Cross program?
  - a. Do you cooperate with Bungoma Red Cross?
  - b. How did you get in contact with/ how did you hear about Bungoma Red Cross?
  - c. Do you know how the follow up is in the community after the Red Cross removal program?
    - i. If it is the first time Red Cross is here, how do you think the follow up will be?
- What do you think are the limitations of such a program in Bungoma Red Cross?
  - a. Do you have any suggestions how the program could be improved?
- Why do you think that some people choose not to use health services to get rid of this problem?
- Where do those affected of jiggers typically try to find help in the community?
  - a. What kind of help/treatment/advice do they get?
  - b. Do you provide any written information to those affected of jiggers on how to treat and prevent the jigger flea?

- i. If no, do you think it would be useful?
- What is the government/ public authorities' responsibility for this problem?
  - a. What is done at a central, regional and local level?
  - b. Has there been a change last years?
- Do you think it is possible to eradicate jiggers?
  - a. What do you think are the greatest challenges in jiggers eradication?
  - b. What do you think the public health sector/you as a health officer can do?  
What can other sectors contribute with?

**The following three questions were asked to staff and volunteers in Bungoma Red Cross:**

- How and why was it decided to deliver services in the areas/ villages where the Red Cross is working? (Is it because the problem of jiggers was biggest there, or because you already had other programs etc.?) Do you think the « right », most needy places where chosen? (why/ why not?)
- For how many years have this program been running in Bungoma Red Cross?
  - a. Have you seen an increased knowledge about the program among the users of the service during this period of time?
    - i. How?
  - b. Have you seen an increased knowledge about jiggers treatment and prevention among the users of the service during this period of time?
    - i. How?
  - c. Are there others actors than Red Cross working with this issue? Who? Are you collaborating?
  - d. Have you seen an increased involvement by the local authorities, such as health officers, local leadership?
- How do you promote the service to the different villages?
  - a. Do you think this is an appropriate way of promoting the service?
  - b. Do you have any information how the follow up is functioning in the different villages?
  - c. Have you ever revisited an area? What did you experience there?

Do you have anything more you want to add concerning this topic, before we end the interview?

Thank you!

## Appendix 3: Discussion guide users of the jiggers` removal program (English)

The following discussion guide is a draft of conversations with people infected with jiggers, and people in the community who were close to those infected.

Thank the informant so much for participating in the interview. Read the informed consent and get oral approval on tape recorder for each participant.

A few general questions about their background:

- Age
- Educational status
  
- When and how did you hear about the program?
  - a. Have you heard about this program before?
  - b. Have you participated in this program, or similar programs before?
    - i. If you have participated in this program or similar programs before, please explain
      1. What type of program was it, how was it, did it help...?
  
- Previously, have you been visiting health services such as dispensaries because of jiggers infestation?
  - a. If yes, how were you treated?
  - b. If no, why do you think that people choose to not visit health services or programs as this?

*(Those people in the community that were close to people infected were asked whether they knew about others that have been visiting health services).*
  
- Do you think that such programs are welcomed in this village?
  - a. If yes, why? If no, why not?
  
- Do you think jiggers are a problem in Bungoma district?
  - a. Why/ why not do you think it is a major problem? For whom mainly? (Children, elderly, the disabled, all actually?)
  - b. Why do you think that people get infected with jiggers?
  - c. Do you think that some people in your village believe that it is because of a curse or witchcraft that they are infested?
  
- Do people remove jiggers themselves at home?
  - a. If yes, how? If not, why not?
  
- Do you think that people become more aware about how to remove jiggers at home after participating in this program?
  - a. If yes, how? If no, why not? What are the challenges?
  - b. (If any has participated in similar programs or visited health services because of this problem before, did they become more aware after using the service?)
  
- Can jiggers infestation be prevented? How can people prevent infestation of jiggers at home?

- a. At home?
  - b. In the community?
  - c. Is it peoples themselves who should do something with it, or the community/district leaders? If you think leaders/ authorities should do something, who is this?
- How do you think that people get affected when they get infected with jiggers (side effects and challenges; both psychological and physical)?
  - a. What type of situations is most problematic for people that are infested of jiggers (social settings, relation to family and neighbours, at work...)?
  - b. How do you think that people infested with jiggers feel about themselves?
  - c. Do you think that the jiggers infestation change your relationship to people around you?
    - i. Why? How?
  - d. Do you think that people that are affected of jiggers has a changed performance at school or work?
    - i. Why? How?
- Have the jiggers infestation affected you economically?
  - a. If yes, how? (Had to quit working, costs of treatment, insecticides..)

*(Those people in the community that were close to people infected were asked whether those infected with jiggers were affected economically).*
- How do the people in your village speak about jiggers in social setting?
- What are the benefits with such a program as Red Cross are doing?
- What are the limitations of this program?
  - a. Do you have any suggestions how the program could be improved?
- Do you think this program should be extended?
  - a. Should it be continued over time? Why?
  - b. Now that you are treated, do you think it is likely that the jiggers' infestation will reoccur?
    - i. If yes, why? If no, why not?
- Do you think the services should be a part of other health services at local dispensaries/ health centres?
  - a. Is it already like that?
- Do you think that Red Cross should continue with this program here, or rather work with other health programs?

Do you have anything more you want to add concerning this topic, before we end the interview?

Thank you!

## Appendix 4: Discussion guide, users of the jiggers` removal program (Kiswahili)

### MWONGOZO WA MAJADILIANO

- Shukuru mjumbe sana kwa kujitolea kuhudhuria mahojiano hayo.
- Soma maelezo, wote wakisikiliza na upate ruhusa ya kila mmoja wao kurekodiwa.
- Baadhi ya maswali kuwahusu:
  - Umri
  - Masomo
  
- Ni lini na vipi ulipata kusikia kuhusu mpango huu?
  - a. Umewahi kusikia kahusu mpango huu awali?
  - b. Umewahi kuhusishwa katika mpango huu au mpango mwingine wa aina hii?
    - I. Kama umewahi husishwa katika mpango huu au mwingine wa aina hii awali, tafadhali eleza.
      - i. Ulikuwa ni mpango wa aina gani, ulikuwaje, ulisaidia...?
- Awali, umekuwa ukitembelea vituo vya afya kama zahanati kwa sababu una funza?
  - a. Kama ndio, ulitibiwa aje?
  - b. Kama hapana, kwa mafikirio yako, mbona watu huamua kutotembelea vituo vya afya au mpango kama huu?
- Unafikiri kuwa mipango kama hii hukubaliwa vijijini?
  - a. Kama ndio, kwa sababu ipi?
  - b. Kama hapana, kwa sababu gani hapana?
- Unafikiri kuwa funza ni shida kubwa katika wilaya ya Bungoma?
  - a. Unafikiri ni kwa sababu gani ikawa shida kubwa/kuu? Kwa watu gani zaidi(watoto, watu wazima, walemavi, wote yaani)?
  - b. Unafikiri ni kwa sababu gani watu huadhiriwa na funza?
  - c. Unafikiri kuwa baadhi ya wanakijiji huamini kuwa ni kwa sababu ya laana au uchawi ndio hufanya wakaadhiriwa?
- Je, watu hutoa funza wenyewe nyumbani?
  - a. Kama ndio, aje? Kama hapana, sababu gani hapana?
  - b. Ni vizuizi vipi hutokea mnapotoa funza wenyewe nyumbani?
  - c. Je, kuondoa funza ukiwa nyumbani ni chungu?
- Unafikiri kuwa watu hupata kujua Zaidi jinsi ya kutoa funza nyumbani baada ya kushiriki kwa mpango huu?
  - a. Kama ndio, aje? Kama hapana, kwa sababu gani hapana? Ni shida gani wanapitia?
  - b. (Iwapo kuna yeyote ameshiriki katika mipango ya namna hii au ametembelea vituo ya afya kwa sababu ya shida hii awali, waliweza kupata kujua zaidi baada ya kuudumiwa?)
- Je, kuadhiriwa kwa funza kwaweza kuzuiliwa? Watu waweza kuzuia uvamiwaji wa funza nyumbani?

- a. Nyumbani?
  - b. Katika jamii?
  - c. Ni watu wenyewe wanastahili kufanya jambo kuzuia funza au jami nzima/ viongozi wa wilaya? I wapo unafikiri ni viongozi/ Mamlaka mbaimbali ambao wenastahili kufanya jambo, ni nani hawa?
  - Unafikiri ni vipi watu huumia baada ya Kuadhiriwa na funza (shida na matatizo mengine: yote kiakili na kimwili)?
    - a. Ni hali aina gani ndiyo ya shida zaidi kwa wale walioadhiriwa na funza(jinsi watu hukaa vijijini,uhusiano wa familia na majirani,kazini...?)
    - b. Unadhani ni vipi watu walioadhiriwa na funza hujihisi kujihusu?
    - c. Unafikiri uvamiwaji wa funza hubadilisha uhusiano wako na watu walio karibu nawe?
      - i. kwa nini? Aje?
    - d. Unafikiri kuwa watu walioadhiriwa na funza wamebadili utendajikazi shuleni au kazini?
      - kwa nini? Aje?
    - e. Je, funza wamewaadhiri kiuchumi?
      - kama ndio,aje?
      - (mmewacha kazi,gharama ya matibabu,njia ya kuzuia)
  - Je,watu kijijini mwako huongea vipi kuhusu funza katika vikao mbalimbali?
  - Ni manufaa yapi mnapata kupitia kwa mpango huu kama vile msalaba mwekundu wanavyofanya?
  - Ni upungufu upi hutokea kwa ajili ya mpango huu?
    - a. Una maoni gani yoyote yanayoweza kusaidia kuboresha mpango huu?
  - Unafikiri mpango huu unastahili kuendelezwa?
    - a. Unastahili kuendelezwa kwa muda? kwa sababu gani?
    - b. Hivi sasa umetibiwa,unadhani kuna wezekano kuadhiriwa na funza kutatokea tena?
      - I. Kama ndio,kwa sababu gani? kama hapana,kwa sababu gani hapana?
13. Unafikiri kuwa mpango huu unao endeshwa na shirika la Msalaba Mwekundu la Bungoma wapaswa kuendelezwa?
14. Au wafikiria kuwa mpango huu wa uondoaji wa funza wastahili kuwa kati ya huduma za kiafya katika zahanati/ vituo vya afya vilivyo karibu nasi wala sio mpango unaoendeshwa na Msalaba Mwekundu? (Kuchochea: kwa nini unafikiri iwe hivyo).
- a. Je, Zahanati/ Vituo vya kiafya vya kinyumbani viko na huduma ya aina hii?

## Appendix 5: Ethical clearance REC Norway



UNIVERSITY OF BERGEN

Regional Committee for Medical and Health Research Ethics, Western-Norway

To whom it may concern

Your ref

Our ref  
2012/739

Date  
07.06.2012

### Confirmation of Ethics Approval

We hereby confirm that the project, *"Mobile Jiggers removal program: a case study in Bungoma, Kenya. Perspectives from patients and staff in a poor community and high tungiasis prevalence area"* by associate professor Grazillella Van den Bergh (supervisor) and Åse Mørkve (student), Centre of international Health, University of Bergen, Norway, is reviewed and approved by The Regional Committee for Medical and Health Research Ethics, Western-Norway (Institutional Review Board).

The approval is conditioned upon the following:

- If oral consent is necessary (i.e. participants are illiterates), an independent witnesses must confirm that the consent is given.
- Local legislation must always be followed and the project must be submitted to the local IRB.

Sincerely yours

Arne Salbu  
Advisor (sign)

## Appendix 6: Ethical clearance IREC Kenya



MOI TEACHING AND REFERRAL HOSPITAL  
P.O. BOX 3  
ELDORET  
Tel: 3347112/3

Reference: IREC/2012/148  
**Approval Number: 000865**

Ase Morkev,  
Bergen University,  
Centre for International Health,  
P.O.Box 7804,  
**NORWAY.**



MOI UNIVERSITY  
SCHOOL OF MEDICINE  
P.O. BOX 4606  
ELDORET  
Tel: 3347112/3  
24<sup>th</sup> August, 2012



Dear Ms.Ase,

**RE: FORMAL APPROVAL**

The Institutional Research and Ethics Committee have reviewed your research proposal titled:

***"Mobile Jigger Removal Program: A Case Study In Bungoma District Kenya: Perspectives From Both Patients And Staff, In A Poor Community And High Tungiasis Prevalence Area."***

Your proposal has been granted a Formal Approval Number: **FAN: IREC 000865** on 24<sup>th</sup> August, 2012. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 23<sup>th</sup> August, 2013. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Yours Sincerely,

**PROF. E. WERE**  
**CHAIRMAN**  
**INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE**

cc: Director - MTRH  
Dean - SOM  
Dean - SPH  
Dean - SOD  
Dean - SON

## Appendix 7: Informed consent form (English)

### INFORMED CONSENT FORM

**Name of Principle Investigator:** Aase Moerkve, Centre for International Health, University of Bergen

The master thesis is designed in collaboration between the researcher, Hordaland Red Cross and Bungoma Red Cross. The goal of this thesis is to explore a jiggers removal program. Both staff from Bungoma Red Cross, other stakeholders that have experience with jiggers and participants of the Bungoma program will be interviewed, to explore the issue of jiggers' eradication.

The researcher will sit down with you and go through a prepared discussion guide, taking notes of what you are saying. If you approve it a tape recorder will be used.

You are being invited to take part in this research exercise, because I feel that your experience can contribute to my understanding of the topic. There will be no direct benefit to you, but your participation is likely to help me find out more about the topic. There are no risks of participating in this interview, and you are free to answer or not to the questions asked.

Your participation in this research is entirely voluntary, and you can at any time choose to participate or not, or to stop participating, and this will not have any inconveniences for you.

I will not be sharing information about you to anyone. The information that I will collect from this research will be kept private. Any information about you will have a number on it instead of your name. Only the researcher will know what your number is and the information will be kept in a locked place. Nothing that you tell me during the interview will be shared to anyone with your name; however the master thesis will be published at Centre of international health. The tapes will be destroyed by June 2013.

If you have any questions, you can ask them now or later. If you wish to ask questions later, you can contact Aase Moerkve, my phone number is 07 33 69 94 92 and my mail address is [ase\\_morkve@hotmail.com](mailto:ase_morkve@hotmail.com)

**This informed consent form has been reviewed and approved by the Centre for International Health, University of Bergen, Norway and Moi University, Kenya.**

**Certificate of Consent**

I have been invited to participate in a research; which explore the issue of jiggers’ eradication. I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this research exercise.

**Name of Participant** \_\_\_\_\_

**Signature of Participant** \_\_\_\_\_

**Date** \_\_\_\_\_  
**Day/month/year**

**Statement by the Interviewer**

I have accurately read out the information sheet to the potential participant. I confirm that the participant was given an opportunity to ask questions about the research exercise, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of the informed consent form has been provided to the participant.

**Name of Interviewer/person taking the consent** \_\_\_\_\_

**Signature of Interviewer/person taking the consent** \_\_\_\_\_

**Date** \_\_\_\_\_  
**Day/month/year**

\_\_\_\_\_  
**Signature of co-supervisor Jackline Sitienei**

**Date** \_\_\_\_\_  
**Day/month/year**

## Appendix 8: Informed consent form (Kiswahili)

### FOMU TA MAELEZO YA RUHUSA

#### Zaidi inahusu jamii

**Tina ya Mtati Mkuu:** Åse Mørkve, kituo cha Afya cha Kimataifa, Chio Kikuu cha Bergen.

Kazi ya utafiti imetengenezwa baina mtatiti, shirika la Msalaba Mwekundu la Hordaland na Bungoma. Lengo kuu la utafiti huu ni kuchunguza kwa kina mpango wa utowaji wa funza. Kisa pamoja, viongozi kutoka shirika la Msalaba Mwekundu la Bungoma na kutoka shirika la Ahadi Trust na washiriki wa mpango wa Bungoma watahojiwa, kutafiti kuhusu uangamizaji wa funza.

Fomu ya ruhusa itasomwa kupitia mazungumzo, na unaweza kupata aina nyingine ya fomu kama lui iwapo wahitaji. Sio lazima kutia sahili. Makubaliano yalijo- rekodiwa kuhusu kushiriki wakati wa majadiliano ya kikundi yanarideisha i wapo uko chini ya miaka kumi na sita mlezi wako anastahili kukubaliana na kushiriki kwako katika masomo haya.

Utafiti huu utahusisha kushieiki kwako katika majadiliano ya kikundi. Anayehoji na mwenzake kutoka shirika la msalaba mwekundu la Bungoma wataketi pamoja na kikundi na kupitia maswali yahjoandalinsa, huku wakinakili yoyote wewe na wenzako katika kikuni mtusemu. I wapo kikundi kitukubali kurekodisa, rekodi itatumika.

Hiyo basi unakaribishwa kusirik, katika masomo haya, kwa sababu ninahisi kwa uzoefu wako kama mtumiaji wa huduma hu waweza kuchangu kuelewa kwangu kwa mada lui. Hakutakuwa na faida kwako wewe, lakini kushiriki kwako kutanisaidia kujua mergi kuhusu mada hii. Hakuna mambo ya kudluru janayotokana na kushieilai kwako katika mahojiano haya, na unaamuwanyewe mada ungependa kutunumzia au la.

Kushiriki kwako katika utafiti huu ni wa kujitolea. Wakati wowote utaamua kutoshiriki au kutochangia haita kuadhiri kwa chochote.

I wapo una maswali yoyote waweza kuuliza maswali baadaye waweza kuwasiliana na Åse Mørkve, nambari yangu ya simu ni 0733 699 492 na barua pepe yangu ni [ase\\_morkve@hotmail.com](mailto:ase_morkve@hotmail.com). Waweza pia kuwasiliana na aitha wale waliojitolea kufunya kazi na shirika la msalaba moekundu tawi la Bungoma au afisa wa afya ju jamii katika jamii jako i wapo una maswali yoyote.

Ujumbe wa fomu hii umepitiwa na kudhibitishwa na kituo cha afya cha kimataifa, chuo kikuu cha Bergen, ureno na chuo kikuu cha Moi, Kenya.

**Cheti cha ruhusa**

Nimealikwa kushiriki katika utafiti; ambayo inazungumzia zaidi uangamizaji wa funza. Nimesoma habari hui yote au nimesomewa. Nimekuwa na fursa ya kuuliza maswali kuihwa na maswali yoyote ambayo nimeuliza nimejibiwa na nakaridhika. Ninajitolea kushiriki katika kazi hii ya utafiti.

**Tina la mshiriki/  
mlezi** \_\_\_\_\_

**Saini ya mshiriki/  
mlezi** \_\_\_\_\_

**Tarehe** \_\_\_\_\_  
**Siku/ mwezi/ mwaka**

**Maelezo ya anayehosi**

Nimesoma kwa makini na kina ujumbe huu kwa mshiriku mhusika.

Ninadhibitisha kwa mshiriki alipewa fursa ya kuuliza maswali kuhusu kazi hui ya utafiti, na maswali yote yaliyoulizwa na mshiriki nimeyajibu kwa kweli na kwa uwezo wangu wote. Ninadhibitisha kwa mtu binatsi hakushurutishwa kupeana habari na habari imetolewa bure na kwa kujitolea.

Nakala nyingine ja fomu ya ujumbe wa ruhusa imepewa mshiriki.

**Tina la anayehoji/  
anayetafuta habari** \_\_\_\_\_

**Saini la anayehoji/  
anayetafuta habari** \_\_\_\_\_

**Tarehe** \_\_\_\_\_  
**Siku/ mwezi/ mwaka**

\_\_\_\_\_  
**Saini ya Jackline Sitienei**

**Tarehe** \_\_\_\_\_  
**Siku/ mwezi/ mwaka**

## Appendix 9: Information brochure about jiggers` infection

### DAILY ROUTINE

Wash hands



Clean houses and the entire surroundings



Wear shoes all the time



### CONTACT INFORMATION



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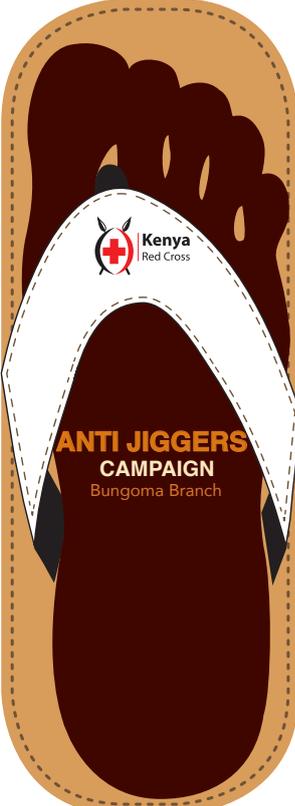
kenyaredcross@yahoo.com

### ANTI-JIGGER CAMPAIGN IN BUNGOMA RED CROSS

The Kenya Red Cross Society, Bungoma Branch has been carrying out jigger campaigns over the years.

The Anti-Jigger Campaign aims to sensitize the community on the causes, effects and prevention and treatment of jiggers with an emphasis on prevention.





**ANTI JIGGERS CAMPAIGN**  
Bungoma Branch



### BACKGROUND ON THE JIGGER PROBLEM IN KENYA

Jigger infestation is becoming a major public issue in the country. Over 2.6 million People in Kenya are infected with jiggers. Most of them are rural dwellers. 1.5 million children of school going age are infected with jiggers

#### IN BUNGOMA COUNTY

The menace has affected several communities in Bungoma County. The most affected divisions in the County include Bumula, Malakisi, Nalondo, Chwele and Kanduyi.

### EFFECTS OF JIGGERS

- Inability to walk and/or gripping
- Inability to carry out daily activities like work, study and play
- Stigmatization
- Low self esteem
- Formation of ulcers and fissures
- Inflammation



- Suppuration
- Chronic lymphedema
- Loss of nails
- Tetanus if not vaccinated
- Infections such as HIV and AIDS due to sharing of needles
- Death



### TREATMENT OF THE JIGGER FLEA

Soak the affected area in disinfectants such as hydrogen peroxide or Dettol for 15minutes daily for about 2 weeks



### PREVENTION OF THE JIGGER FLEA

Bath daily, clean houses and the entire surroundings

Wear shoes all the time to prevent fleas from entering the feet

Don't sleep in the same room as animals. They can be carriers of jiggers

Use rubbish disposals



Fumigate the homes with insecticides such as malathion

Apply repellent such as Zanzarin to the skin to prevent flea attacks

Check feet every day for freshly burrowing jiggers and remove the flea immediately. The flea appear as black spots.

When located an infected area burn it or spray with suitable insecticides in order to kill the fleas.

Spraying and prevention of the flea is most important at the beginning and during the dry season