The microeconomic impacts of diarrhoeal infections on rural and suburban households in Uganda

The microeconomic impacts of diarrhoeal infections on rural and suburban households in Uganda

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Abstract

Health economists, public health workers, and the World Health Organisation are becoming increasingly concerned about the economic impact of diarrhoeal diseases and about infectious diseases in general. The direct and indirect economic burdens caused through ill-health by diarrhoeal diseases impact people especially at the individual and household level. Also, the financial burdens caused by diarrhoeal infections are suspected to have a huge impact on the socio-economic and demographic structure of a society (WHO 1996 & 2002). But even more important, ill-health and infectious diseases often hinder and avert the development processes of less developed countries.

This thesis will analyse how diarrhoeal infections economically impact people at the household level in Uganda. A field study has been conducted to investigate direct and indirect financial spending related to the infection of a household member with diarrhoeal infections, and to find out what economic impact this situation has again on all household members together. Data have been collected in the three South-Eastern districts Kampala, Wakiso, and Jinja in Uganda, by applying a household survey, observations, and semi-structured interviews with health experts.

The analysis shows that households which are impacted by ill-health through diarrhoeal infections often suffer a large economic and financial burden, which is mainly caused by expenses for medical treatment and special food. Disease prevention costs can also substantially decrease the household's financial equity and stability. The study assumes that on average, the financial burden for households suffering from diarrhoeal infections is as high as 20% of the total direct and monthly household income, and the costs for disease prevention alone can be as high as 10% of the household income.

Policy measures and health and sanitation interventions on the communal and government level are urgently needed to protect especially Uganda's poor people from further economic pressure caused mostly through preventable diarrhoeal infections. Such interventions would also bring benefits to the Ugandan macro-economy and would therefore support overall development.

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1. Introduction

1.1 Introduction

The subject of infectious diseases has increasingly gained importance among biologists, physicians, and epidemiologists since the first pathogens have been identified in the 19th century. Traditionally, water-born and diarrhoeal infections like e.g. cholera and typhus have been, and are still of major importance due to their high epidemic potential to infect a very high number of people in only a very short time. Since the end of World War Two, infections with diarrhoeal diseases have become less an issue in the Western World, but due to various climatic and environmental factors, and due to missing infrastructure and insufficient health systems, they are still a common problem in the less developed world, and especially in Sub-Saharan Africa. Even more worrying, diarrhoeal infections have become, due to their large number of incidences, a serious threat for local economies and for the general process of development.

The first chapter introduces the economic impacts which infectious diseases have on more and less developed societies, and gives also a description of disease prevention methods, and of Uganda and its people. First of all, the main issues concerning infectious diseases will be described in section 1.2 in order to understand the macro- and micro-economic impacts ill-health can cause. Secondly, a brief biological introduction to the most common gastrointestinal pathogens will be presented in section 1.3. Thirdly, as the mitigation of diarrhoeal diseases plays an important role in reducing the burden of infectious diseases, disease prevention methods will be explored in section 1.4. To get an impression of Uganda and its people's living conditions, section 1.5 introduces Uganda's topographic and demographic features. The chapter conclusions are drawn in section 1.6.

1.2 The economic impact of infectious diseases

The economic impact of infectious diseases has been studied since the major outbreaks of plague and cholera during the middle age in Europe, and is still of major importance for economists and public health workers today. Especially, when taken into consideration, that a good health condition is a precondition for any kind of human development and action. Ill-health can lead to a decrease in human productivity and therefore averts overall development, which is especially an issue for developing nations (Schultz 1961). According to Schultz (1961) health is a human capital which we need to protect and invest in to increase the overall economic output. Ill-health caused by infectious diseases can have many different

economic impacts. The most important direct economic impacts threatening society are: premature death and consequent loss of productivity, sickness and limited loss of production, the individual's reduced resistance to other causes of disability or reduced future productivity, the cost of detection, treatment, rehabilitation of infections, and attempts to prevent diseases. Also, on the macroeconomic level, poor health affects the size and composition of the population (Weisbrod 1961).

The social, demographic, and economic burdens caused by ill-health through highly contagious diseases like for example cholera are experienced by many different regions in the world, and are still seen, due to their severity and extent, as one of the major obstacles for sustainable and economic development in Africa. Especially diarrhoeal infections account for a huge proportion of the global disease burden and mortality, and infections occur predominantly in tropical regions like Sub-Saharan Africa where there are no or often only insufficient sanitation facilities available. Moreover, water is increasingly becoming a dramatic issue on the African continent, as insufficient or contaminated water sources are the major cause of diarrhoeal infections, respectively, of high child mortality rates (WHO 1996). For example, in 1998, 308,000 people died of war in Africa, but more than two million died because of diarrhoeal diseases (WATSAN 2008).

Uganda, located in Eastern Africa in the Great Lakes Region between Lake Victoria and Lake Albert is one of the hotspots with regard to the prevalence of infectious diseases causing diarrhoeal symptoms. Due to Uganda's topography, its hot and wet tropical climate, the prevalence of a wide range of different disease transmitting vectors, and the scarcity of clean water and sanitation measures, diarrhoeal diseases impact the life of Uganda's population at all levels, but especially of rural and poor people, and there is suspicion that this situation might impact Uganda's micro and macro economy and its process of development (Lucas et al. 1999). According to the Uganda Demographic and Health Survey 2006, malaria and diarrhoeal diseases are the major infectious diseases, impacting the whole country and especially the western and northern districts; 26% of all children under the age of five years are, on average, infected with some kind of diarrhoea causing infection (Uganda Bureau of Statistics 2006). Uganda is also on a regular basis affected by cholera and dysentery epidemics, and has a high rate of infection with giardiasis, typhoid fever, and hook worms which further contribute to the overall burden of diarrhoeal diseases.

Various studies in Africa have therefore analysed the different impacts of such infectious diseases on their victims and their environments, and proved, that infectious diseases are responsible for a wide range of social and micro- and macroeconomic impacts

on the population (Weisbrod 1961 & 1973; Russell 2004; McIntyre et al. 2006). The consequences of diarrhoeal diseases are especially a threat for economic growth and development, and its impacts can be observed on the micro- and macroeconomic level. Various economic assessments and impact studies from Sub-Saharan African countries with similar conditions like in Uganda have already outlined some important economic impacts like e.g. the costs of medical treatment and medication, transport costs to the hospital/doctor, as well as the loss of household assets at the microeconomic level; and e.g. disease prevention costs, and the detraction and loss of the labour force at the macroeconomic level (Russell 2004; WHO 2002). For example, the African Medical and Research Foundation (AMREF) recons that distance and cost play a major part in Uganda's health crisis, as about 13% of Uganda's people do not seek medical attention because they cannot afford it or because they cannot reach a health facility. Though, today 72% of the Ugandan population lives within 5km of a health facility, as compared to 49% five years ago (AMREF 2008). However, the direct and indirect microeconomic impacts of diseases and ill-health are different in every country, and due to the lack of sufficient data, there is still a lack in understanding the relations between disease and economics, and the effects on individuals.

One can already indicate that such economic impacts caused by infectious diseases will contribute to further poverty, with regard to Whitehead's et al. (2001) medical poverty trap, which argues that ill-health may lead to more poverty and poverty lead to more ill-health. Prescott (1999) highlights that a cost burden higher than 10% of the household income is likely to be catastrophic and it can lead households into poverty. Furthermore, the importance of analysing economic impacts of diseases is often underestimated, even if such data is essential for cost-effectiveness analysis in the health and sanitation sector, and for justifying further pharmaceutical research, and disease prevention methods (Hutton et al. 2004).

In less developed countries (LDCs), diarrhoeal infections are the major killers. For example in 1998, 2.2 million people died because of diarrhoeal diseases, and most of them were children under five years of age; and the number of cholera incidents increased in 2006 by 79% (236,896 officially reported cases) (WHO, 2007).

In Uganda, the percentage of diarrhoeal infections in urban areas increased from 2.2% in 2003 to 7.3% of the population in 2006. In the same time, the percentage of diarrhoeal infections in rural areas increased from 4.4% to 9.8% of the population. In the northern districts of Uganda, the percentage of diarrhoeal infections reaches as high as 13.8% of the overall population (Uganda Bureau of Statistics 2006).

Sub-Saharan African has the highest number of diarrhoea and cholera cases, and cholera has become an important public health issue in western Kenya and Uganda, and may become an endemic pathogen in this region (Shapiro et al. 1999).

Due to the increasing dissemination and prevalence of diarrhoeal diseases, the social and economic development of many LDCs, and their prospects of a better future, is being threatened by the burden of such diseases. For example, the increasing emergence of cholera has been noted in parallel with the increasing amount of poor and vulnerable populations living in unsanitary conditions. Therefore, the World Health Organisation (2007) points out, that diarrhoeal diseases such as cholera remain a threat to public health in LDCs and are used therefore as a key indicator of social development. Furthermore, diseases can have dramatic economic impacts at the micro and macro level, and ill-health is increasingly associated with households being impoverished (DFID 2000). Concern about the relation of diseases, ill-health, and economic loss has placed health at the centre of development and poverty reduction strategies (Russell 2004).

The same argument was also put forward by Weisbrod who did some very interesting and relevant research in North America and the Caribbean concerning the economic impact of diseases and ill-health, and his studies (1961 &1973) clearly proved, that ill-health has an enormous impact on the micro and macro economy, particularly in less developed countries. For example, after the successful eradication of hookworm infections, which mainly cause diarrhoea, in the American South in the early 1920s, the school enrolment and attendance rates, and the rate of alphabetisation increased and therefore contributed to the macroeconomic development (Bleakley 2007). In contrast, there is sufficient evidence that the parasitic disease schistosomiasis, which causes diarrhoea and which is endemic in most tropical countries, is responsible for a decline in the overall productivity of the population impacted. The disease doesn't kill its host, but weakens its physical abilities and therefore slows down its productivity (Sorkin 1976). Similar effects have been also observed among populations highly impacted by malaria, which also became less productive. Such situations will have an impact on the personal and household level as well as on the macroeconomic level (Sachs et al. 2002; Sorkin 1976). On the microeconomic or household level, incidents of disease infections often have a huge impact on people's and household's incomes and savings, as costs for e.g. medical treatment, rehabilitation, and disease prevention can lead to a financial ruin. Generally, economists must distinguish between direct and indirect economic impacts, like e.g. the direct loss of household finances, or the indirect loss of

household productive labour, however, both scenarios will have a major economic impact on the household level (Russell 2004).

Therefore, it's the aim of this thesis to further contribute to the understanding of the microeconomic impacts of infectious diseases causing diarrhoeal and gastroenterological symptoms, respectively, to find out how diarrhoeal infections directly and indirectly impact individuals in Uganda at the household level.

1.3 Diarrhoeal infections, prevalence, and methods of treatment

To fully understand the relationship between economics and ill-health, one should have a closer look at the definition and concepts of ill-health and diarrhoeal infections, respectively, how they impact individuals in physiological terms.

Diarrhoea and dysentery are not diseases themselves; they are symptoms of many diseases and mostly of gastroenterological and gastrointestinal infections. Infectious diseases causing diarrhoea are on average the most dangerous illnesses, and they kill over two million people every year, mostly children under the age of five years. There are approximately four billion cases of diarrhoea world wide each year, which can be caused by a variety of more than 100 different pathogens including bacteria (e.g. cholera), protozoa (e.g. schistosomiasis) and viruses (e.g. rotavirus) (WaterAid UK 2007). Pathogens causing diarrhoeal infections are spread through contaminated food (food-borne disease) or drinking-water (water-borne disease), through unsanitary disposal of human waste, or from person to person as a result of poor hygiene (WaterAid UK 2007). Though, many infectious and non-infectious diseases can cause symptoms of diarrhoea like e.g. malaria or cancer, this study tried to concentrate on victims and patients affected by the major water-borne and water-related pathogens causing diarrhoea. These are, according to the WHO, *Ancylostoma duodenale*, *Camplyobacteriosis*, *Cryptosporidium*, *Entamoeba histolica*, *Escherichia coli*, *Giardiasis intestinalis*, Norovirus (virus type: *Caliciviridae*), *Salmonella typhi* and *bacteria*, *Shingella enteritis*, Rotavirus (virus type: *Reoviridae*), and *Vibrio cholerae*. However, because no diagnostic laboratory tests have been conducted, the researcher can not exclude the possibility that this study included victims suffering from diarrhoea which has been caused by a disease not related to the above described criteria.

According to a survey conducted by the Ugandan Bureau of Statistics (2006), are the percentages of households in urban and sub-urban areas, which have been impacted by at least one case of diarrhoea two weeks prior the survey, with on average 19.7% much lower compared to 26.5% in rural areas.

Generally, diarrhoeal infections cause fast depletion of water and sodium in the victim's body, and if these are not replaced quickly, the victim becomes dehydrated and its salt and physiological balance becomes severely damaged. If more than 10% of the body's water is lost, the victim dies. Children, old people, and people who are malnourished or already weak are most vulnerable to such symptoms, and become even weaker and more malnourished. The three diseases responsible for most diarrhoea related death are bacillary dysentery*, Vibrio cholerae,* and *Salmonella typhi* (see Figure 1.1 and 1.2), and these pathogens are highly endemic in Africa's Great Lakes Region.

Bacillary dysentery is more dangerous compared to amoebic dysentery, and it is estimated that 140 million people get infected with this bacteria each year, and more than 300,000 victims don't survive this infection, mainly children below the age of five years (WaterAid 2007). One of the areas with the highest prevalence is Sub-Saharan Africa. Bacillary dysentery is caused by the bacterium *Shingella enteritis*, which is transmitted via contaminated water, food, and arthropods (e.g. flies), and which then infects the intestines.

Figure 1.1 ***Salmonella typhi***

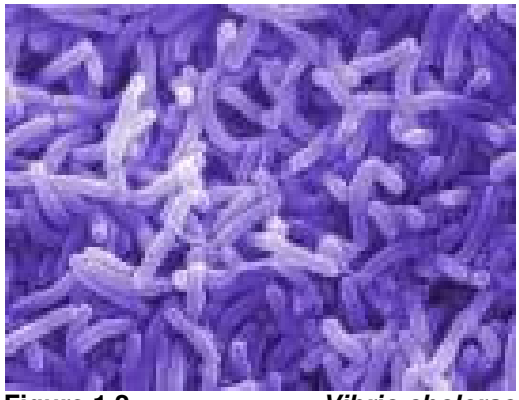


Figure 1.2 ***Vibrio cholerae***

(Source: WHO 2008)

The major symptom is severe watery and bloody diarrhoea. Treatment is usually based on an oral rehydration salt solution, high intake of fluids, and in some cases on antibiotics such as e.g. Ciproflax® (WHO 2008).

The highly infectious disease cholera, which is caused by the bacterium *Vibrio cholerae*, is often described as the classic water-borne and diarrhoea causing disease (Sack et al. 2004). The pathogen is mainly transmitted via contaminated water and food, and is endemic in most tropical and sub-tropical regions. Originally, the pathogen was only endemic in the Indo-Bengal region, but it spread in the 18th century all over the world and caused severe pandemics and left thousands of people death. Similar to *Shingella enteritis*, cholera kills mainly children between the age of two and four years, as well as old people, and people suffering from malnutrition. In 2000, 118,932 cases of cholera were reported in

Africa, and officially 4,690 people died. The number of unreported cases was probably much higher (Naldoo et al. 2002). Major symptoms are severe watery diarrhoea (adults can lose more than 14 litres of body fluids a day) and vomiting. Treatment is based on the concept of replacing fluids as fast as they are being lost, followed by the intake of oral rehydration solution (ORS) or an intravenous polyelectrolyte solution. Antibiotics can shorten the time of recovery, but should only be used in limited cases as they increase the risk of the development of resistant bacteria (Sack et al. 2004). The prevalence of cholera (in 2005) can be seen in the epidemiological map below (Figure 1.3).

Another very common diarrhoea causing disease in Africa is typhoid fever, which is caused by the bacteria *Salmonella typhi*. It is estimated that typhoid fever infects approximately 17 million people per year, and about 600,000 infected people die each year (WaterAid 2007). Almost all typhoid cases occur in less developed countries as the pathogen is virtually eliminated in the developed world through sanitation facilities and vaccines. The disease causes high fever, diarrhoea, and in some cases even intestinal haemorrhaging or perforation. In contrast to cholera infections, victims infected with typhoid are often long-term carriers who spread the pathogen over a long time period (Sack et al. 2004). A vaccine against typhoid is available, but doesn't provide full protection against infection. Typhoid fever is mainly treated with antibiotics (WHO 2008).

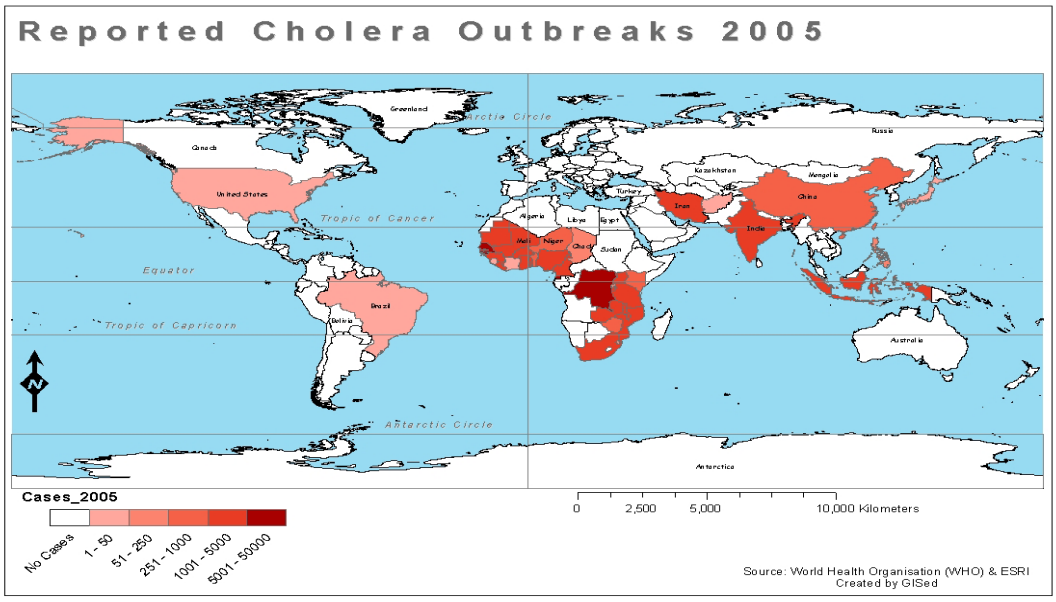


Figure 1.3 Map of reported cholera outbreaks in 2005 (Source: GISed 2008)

However, the most common infection causing symptoms of diarrhoea in tropical regions and especially in Africa is an infection with hookworms. It is estimated that about 740 million infections occur through this protozoa in the world's tropical and sub-tropical regions each year (Hotez et al. 2004). In Sub-Saharan Africa the disease (which often becomes

chronic) is mostly caused by the hookworm *Ancylostoma duodenale*, which penetrates the skin or mucous membranes from contaminated soil, water, or food items. The worm then lives in the small intestines and causes major blood losses into it, which often results in anaemia, especially in people whose dietary iron level is already low (Feachem et al. 1986). Children are very vulnerable to this disease as an infection with hookworms can damage their growth and symptoms can become chronic. The disease can be treated with a single dose of albendazole, mebendazole, levamisole, or pyrantel, which is the standard treatment for all infections caused by soil-transmitted helminths (WHO 2002).

1.4 Disease prevention methods

Appropriate and fast treatment is very efficient in reducing the mortality from diarrhoeal infections, however, this can not reduce the agents responsible for the infection nor does it decrease the incidents of diarrhoea. The prevention of infectious diseases is one of the key factors to reduce the human and economic burden caused by the disease. Prevention of diarrhoea primarily means to protect susceptible people most at risk (these are children, old people, and people who are already ill or weak) from acquiring diarrhoea causing diseases. Adequate food, safe water, and personal hygiene are the key words for proper diarrhoea prevention techniques (Mukhopadhyay et al. 2005).

The WHO (1990) has given priority to the following strategies and interventions for the prevention of diarrhoeal infections:

First, the promotion of exclusive breast feeding during the first 4 to 6 months of life, because immunological properties in the breast milk help to protect infants from infection and breast milk is generally clean.

Second, improved weaning practise, this requires the selection of nutritious food for children over 4 to 6 months old, and good hygienic education and practice such as e.g. washing hands before and during food preparation.

Third, the risk of getting infected with a disease causing diarrhoea can be significantly reduced by using exclusively clean and disinfected water. Prevention of the contamination of stored water at the household level is therefore important to decrease the transmission of diarrhoeagenic pathogens. The preferred methods are boiling water or chemical treatment.

Fourth, personal hygiene like proper hand washing with soap and water before preparing food, before feeding children, and during ablution reduces diarrhoeal infections. House and kitchen hygiene is also important for the prevention of diarrhoea related diseases.

Fifth, constant access and use of clean, functioning latrines and proper disposal of faeces of both humans and animals are essential in preventing the spread of pathogens causing diarrhoea. And last, immunisation against measles reduces the incidents of measles related diarrhoeal symptoms (WHO 1990). There are also vaccines widely available against the infections with typhoid, cholera, rotavirus, and *Shigella*, though they are expensive and still lack full effectiveness. These prevention measures are especially important during post flood or post cyclone situations. Also, the supply of safe drinking water and the vaccination of children against measles are always the first steps to be taken (Mukhopadhyay et al. 2005). For example, the Water and Sanitation Resource Centre in Uganda (WATSAN) recons that the simple act of washing hands with soap and water can reduce diarrhoeal infections by one-third (WATSAN 2008). Furthermore, health officials, local communities, and households must be actively involved in the process of planning and implementing water resource projects. If local people have power over their own water sources, they are more likely to protect them (Hunter et al. 1993).

1.5 Uganda, its population, and the research locations

The field research and data collection for this study took place in Uganda, which is located in East Africa in the Great Lakes Region between Kenya and the Democratic Republic of Congo. The topography of the country is defined by tropical bushland, tropical rain forest, and tropical mountain forest, and the meteorology is strongly influenced by two rain seasons (from March until June and from September until November). The climate in Uganda during the field research period was wet and hot and very humid with temperatures between 20˚C and 35˚C and a high rate of rainfall due to the impact of the main rain season lasting from March until June.

The Republic of Uganda gained independence from the United Kingdom in 1962, and is currently governed by the democratically elected President Lt. Gen. Yoweri Museveni who has held on to power since 1986. Uganda is also, together with Kenya and Tanzania, part of the East African Community (EAC). The country has 29 million inhabitants, with about 85% of the population living in rural areas, and with 1.9 million people living in the capital Kampala. The official language is English, but tribal languages like Luganda, Luo, Iteso Rwanyankole, and Swahili are also widely used. The Baganda are with 16.9% of the population the largest ethnic group in Uganda followed by the Banyakole with 9.5% and the Basoga with 8.4% (CIA factbook 2008). The major minorities in Uganda are international and internally displaced people (refugees) who in the main have migrated from war suffering

neighbouring countries like the Democratic Republic of Congo, Rwanda, and South Sudan. But also from Northern Uganda, where a rebel group called the Lord's Resistance Army abducted more than 20.000 children and displaced more than one million people (Human Rights Watch 2008).

These internally displaced persons (IDPs) live in hundreds of IDP-camps all scattered across Northern and Central Uganda.

Despite some unrest in Uganda's north and along the borders, the economy is growing and the national monthly average income per person and capita for all districts in Uganda is about $90, though a high proportion of the salaries are earned through the informal business sector. The national alphabetisation rate is 67%, but school attendance in urban and suburban areas is generally higher than in rural areas (CIA factbook 2008).

The study locations for suburban interviews were located in and near the Ugandan capital Kampala, and for rural interviews they were located in the surrounding districts Wakiso and Jinja in the South-Eastern part of the country.

Figure 1.4 **Map of Uganda with marked research area**

The few urban areas in Uganda often still impart a rural expression compared to other East African cities. Thanks to the equatorial climate and the high fertility of the soil, there are plants and crops growing everywhere in urban places, even next to major roads in the city centres. Apart from the commercial and traffic impacted city centres and from the nice and green expatriate settlements, the majority of the poor urban and suburban population lives in suburbs and slums scattered around the city centres. The target population for this study are people who live in such slums mainly around Kampala and in rural communities in neighbouring districts. The main forms of people's livelihoods located in slums are based on small-scale businesses, on wage and day labouring, and on begging. Livelihoods are mostly structured very simply and usually concentrated only on gaining basic needs for survival. During the rainy seasons, these slums are often impacted by floods, and often the slums lack the most basic infrastructure like paved roads, adequate housing, electricity, or piped fresh water and sanitation facilities.

Rural areas in South-East Uganda like the districts Wakiso and Jinja are shaped mostly by tropical bushland as well as by large tea, banana, and cane sugar plantations. The villages and their fertile fields lie between forests and wetlands as the districts Wakiso and Jinja are located next to Lake Victoria. Jinja district is also shaped by the magnificent source of the Victoria Nile River, which crosses the whole district from south to north.

The livelihoods of households located in rural places were predominantly shaped by subsistence farming and by wage labouring through the commercial farming sector. Though, most forms of livelihoods in rural places were as simple and basic as in the suburban slums, most households were at least self-sufficient due to subsistence farming.

The shape and the level of infrastructure in villages depend usually on the region in Uganda, on its topography, and on its accessibility. Some rural communities, especially the ones near the capital Kampala, even have access to electricity and to tap water, while people in more remote rural communities still live very traditional without any infrastructure. With regards to water supply and sanitation, the access to a clean water sources in Uganda has increased from 44% in 1990 to 60% in 2004. During the same timeframe, sanitation coverage has also increased considerably. However, water and sanitation coverage in rural areas, where 88% of the population lives, is lower than in urban areas (WHO & UNICEF 2006). In urban areas, fresh water is usually supplied by the National Water and Sewage Corporation (NWSC), a public corporation working on a commercial basis. In contrast, in rural areas, the local and district governments are responsible for adequate water supply and sanitation coverage (DANIDA 2009).

Additionally, every slum and every village, or a part of it, is controlled and administered by a chief or community leader who manages local concerns, and most business, development, and research related activities must be first approved by him. The chief or community leader usually belongs to the main ethnic group dominating in the region and is very respected by all community members.

1.6 Conclusion

This chapter introduced and outlined the severe macro- and micro-economic impacts which diarrhoeal disease can have on societies, by giving at the same time an insight into the biological part of this subject. Major micro-economic impacts caused through ill-health have been identified as premature death and the consequent loss of productivity, sickness and the limited loss of production, the individuals reduced resistance to other causes of disability, the costs of detection, treatment, rehabilitation, and of attempts to prevent ill-health. The researcher briefly introduced the most common gastrointestinal pathogens like e.g. cholera and typhus, and also highlighted how infections with them can be prevented. The sub-chapter about disease prevention showed, that it is not too late nor is it impossible to reduce the burden of infections, preconditioned people and governments show concern and provide the needed finances to condemn this global problem. As the study took place in Uganda, we have also briefly learned about its topography and its demography to get an impression about local conditions and setting.

2. Sectoral and policy context

2.1 Introduction

The present chapter presents and outlines the sectoral and policy context in which this study took place. First of all, a summary of the different agents and sectors which are involved in the prevention and treatment of ill-health and diarrhoeal infections will be given in section 2.2 in order to understand the complexity of Uganda's health system and its connections and dependencies to related sectors. Secondly, as the level of sanitation plays an important role in people being at risk to diarrhoeal infections and to ill-health, the water and sanitation sector and its related policies will be explained and discussed in section 2.3. Thirdly, in section 2.4, NGOs and other organisations involved in health and sanitation practise, respectively their roles and activities will be described. The chapter conclusions are drawn in section 2.5.

2.2 The Ugandan health sector

According to Uganda's Health Sector Strategic Plan 2, which main purpose it is to guide and to manage the national health sector, there are a number of different sectors and agents directly and indirectly involved in the health prevention, delivery, and policy process. Apart from the Ministry of Health, following government sectors are counted to the health related sector and are also actively involved in fighting diarrhoeal infections:

1. Ministry of Finance, Planning and Economic Development
   - Mobilisation of resources

2. Ministry of Lands, Water and Environment
   - Mapping availability water sources for all health facilities
   - Development of water sources
   - Provision of sanitary services

3. Ministry of Gender, Labour and Social Development
   - Mainstreaming gender in plans and activities of all sectors including the engendering of the budget
   - Development of policies for social protection of the vulnerable groups

4. Ministry of Works, Housing and Communication
   - Construction and maintenance of roads for accessing health facilities to facilitate patients flow and referral of patients

5. Ministry of Education
   - Interpreting information for promoting and adopting healthy lifestyles
   - Incorporating public health training into the curricula of schools at all levels
   - Training of health workers
   - Research and development

6. Ministry of Local and District Governments
   - Recruitment and deployment of appropriate trained staff health workers by District Service Commissions
   - Delivery of health services
   - Supervision and monitoring of health service delivery

(Uganda Ministry of Health 2005)

As outlined above, Uganda's national health system is shaped by different sectors and agents, and consists of public health facilities including the health services of the army, police, and prisons, and of private health delivery systems. However, most institutions directly involved in health delivery are controlled and managed by the Ministry of Health, and as it is beyond

the scope of this study to consider all agents involved, the health sector itself will be in main focus in this sub-section.

The private health sector is divided between private-not-for-profit organisations (PNFP) including missionary health centres, private health practitioners (PHP), and between the traditional and complementary medicine practitioners (TCMP). Some communities also provide private health services (Uganda Ministry of Health 2005). Public health facilities are divided into different levels. They are structured in national level institutions, national referral hospitals, regional referral hospitals, district health services, and in sub-district health services like local health centres and village health teams. In contrast to private health services, medical services provided by the public health facilities are now generally free of charge, even if Christiaensen et al. (2005) argue that payment for both public and private health facilities has in practise long been the norm in Uganda (Christiaensen et al. 2005). However, according to interviews, there are a lot of public health facilities short on adequate medication and on medical equipment, and patients are often forced to buy the prescribed medication by themselves through the private health market. Furthermore, according to Christiaensen et al. (2005) and to various articles published in the local press, corruption and illicit practise as well as the employment of unqualified staff are not unseen within the public health services.

However, the Ugandan Ministry of Health has created a public private partnership for health to improve health services and relations between both sectors. Efforts will be directed to strengthening and broadening the partnership through more active engagement with other health related sectors, professional associations, private health care providers, civil society, and representatives of the principal consumers (Uganda Ministry of Health 2005). The Ugandan Ministry of health is also concerned about the equitable access for vulnerable communities and individuals to health services, and therefore included a policy in its Health Sector Strategic Plan 2 to support these people (Uganda Ministry of Health 2005). The public health sector considers vulnerable individuals and high-need groups as poor people, children, orphans, elderly people, women, displaced people, and people living in areas with insecurity. The efforts of the Ministry for Health are particularly accomplished through increased funding to primary health care services, the abolition of user fees, and through the targeted use of the Primary Health Care Conditional Grant (Uganda Ministry of Health 2005).

Furthermore, due to the fact that over 75% of Uganda's disease burden is considered to be preventable as it is primarily caused by poor personal and domestic hygiene and inadequate sanitation practices, the Ministry of Health increasingly supports health

promotion, disease prevention strategies, and community health initiatives, and included new policies concerning these issues in its Health Sector Strategic Plan 2. Diarrhoeal diseases, which are suspected of diminishing productivity and increasing poverty, are on top of the list of preventable diseases (Uganda Ministry of Health 2005). Therefore, the public Mulago Hospital in Uganda's capital Kampala has created a diarrhoea management unit, which specialised on paediatric treatment and on epidemiological research.

With regards to the health policy frame work, Uganda has developed (together with international partners and advisors, notably UNICEF), a compact policy frame work that aims at the improvement of Uganda's health status and at decreasing infectious diseases. Especially, the Health Policy Advisory Committee (HPAC) has proved beneficial in providing overall policy guidance to the sector (Uganda Ministry of Health 2005). The lead paper of this frame work is the Health Sector Strategic Plan, which has first been introduced in 2000 after the introduction of the newly created National Health Policy (1999). The policies included in the plan focus on cost sharing of health services, on setting up health management committees that include participation from local communities, and on the abolishment of user fees. With regards to the study's focus, the policy's paragraph about the abolishment of user fees is very interesting, as it is suspected to have a positive effect on people who are impacted by diarrhoeal infections, because it decreases the financial burden of patients who seek care in public health facilities. As required by the National Health Policy (1999), the Health Sector Strategic Plan focuses as well on health promotion, on disease prevention, and on equitable access to health services for vulnerable communities and people (Uganda Ministry of Health 2005). Following targets of the Health Sector Strategic Plan are especially interesting with regards to the study's focus and research question:

- reduction of incidences of annual cases of epidemic diarrhoeal diseases from 3/1000 to 1.5/1000
- reduction of the cholera specific case fatality rate from 2.5% to 1.0%
- increase of the proportion of patients with epidemic diarrhoea receiving appropriate treatment within 12 hours of onset of symptoms

Subsequently, following core interventions of the Health Sector Strategic Plan are as well very interesting with regards to the study's focus and research question:

- Diarrhoeal disease surveillance, and epidemic preparedness and response
- Prompt and appropriate case management

- Community education and mobilisation
- Reactivation of the Protocol of Cooperation of Countries in Great Lakes Region

Unfortunately, there is no national or social health insurance system in Uganda yet, but the Ministry of Health is currently in the process of drafting the law and legal base to govern the scheme. To provide further support for the subsidisation of medical costs, Community based Health Insurances Schemes (CBHI) have recently been introduced. However, low recruitment and retention rates, high management costs, and low uptake by poor people slow down its success. Still, inadequate financing remains the major constrain inhibiting the development of the national health sector in Uganda and the funding of health services has dramatically declined (Lucas et al. 1999). For example, funding a basic package of services in developing countries has been estimated at US$ 30 - $ 40 per capita, but the current level of public funding from the Ugandan government for health services per capita is only about US$ 8 (Uganda Ministry of Health 2005). Furthermore, the World Bank made new loans for the support of health facilities conditional on the introduction of a national health system based on user-charges. However, the opposite happened and user fees got abolished. Today, the health sector and the water sector have been identified as key sectors under the 2004 Poverty Eradication Action Plan (PEAP), Uganda's main strategy to fight poverty (Republic of Uganda 2009).

2.3 The Ugandan water and sanitation sector

The water and sanitation sector is the second most important sector (after the health sector) for the prevention, mitigation, and control of diarrhoeal infections and therefore plays also a vital role when it comes to the prevention of disease burdens. Uganda's water and sanitation sector is defined by a variety of different agents (similar to the health sector) that provide the following services: clean water for domestic use, water for agricultural use, mobilisation and training for community management and awareness, and sanitation and hygienic services (DANIDA 2009). To improve its effectiveness and coverage the sector was reformed through several laws in 1995, leading to decentralisation and increased private partnership (UN-Water 2006). The lead agency for most concerns related to water and sanitation is the Ministry of Lands, Water and Environment, respectively, its Directorate of Water Development (DWD). It provides regulations and policies, coordination, support, capacity building, and some implementations that cannot be handled by the local governments such as town piped water

supply. The Directorate of Water Development is supported in its role by the semi-private National Water and Sewerage Corporation (NWSC) that implements and manages the piped water supply in sub-urban and urban areas (DANIDA 2009). Also, the Environmental Health Division (EHD) controlled by the Ministry of Health is in charge of an integrated and national sanitation strategy (Uganda Ministry of Health 2005).

Overall, Uganda has a relatively well-developed framework of national sanitation policies. Laws and regulations have been created or revised to support these policies, a process that is still incomplete but currently continuing. For example, the new constitution established in 1996 states that every Ugandan has the right to a clean and healthy environment, including drinking water (IRC 2009).

The legislative arm of the national water and sanitation policies is the Ministry of Lands, Water and Environment, and the executive arm is the Directorate of Water Development which also supports the local governments and other service providers (DWD 2009). The current legislative water sector framework, implemented through the 1995 Water Statute, has the objectives to promote rational water use and management, to provide clean, safe, and sufficient domestic water supply to all people, to develop water and its use for other purpose like e.g. irrigation and industrial use, and to control pollution and the safe storage, treatment, discharge, and disposal of waste that may cause water pollution or other threads to the environment and human health (Republic of Uganda 1995). The management of the water sector is controlled by following policies:

- The sector policy and legal framework includes the Constitution of the Republic of Uganda (1995).
- The Local Government Act (1997), Uganda Water Action Plan (1995).
- The National Water Policy (1999), Water Statute (1995).
- The Water Resources Regulations (1998).
- The Water Supply Regulations (1999).
- The Water (Waste Discharge) Regulations (1998).
- The Sewerage Regulations (1999). Others include: The Environment Management Statute (1995).
- Land Act (1998), National Health Policy and Health Sector Strategic Plan (1999).
- The National Gender Policy (1997).

(DWD 2009)

The National Water Policy (1999) is especially important, as it promotes the principals of integrated water management and water supply. It also recognises the economic value of water and supports the participation of all stakeholders in all stages of water supply and sanitation (DWD 2009). There have also been several efforts to develop an official national sanitation policy, the latest being the draft National Environmental Health Policy for Uganda. These policies take into account the needs of different population groups in urban centres,

small towns, rural growth centres and rural communities, and have led to the preparation of development approaches and technical guidelines that have been adjusted to the social and economic conditions of the user communities (IRC 2009). Therefore, the policies stated above together with the health policies create a well connected legal framework which should decrease diarrhoeal infections as well as its burden, if implemented effectively.

2.4 NGOs and other organisations involved in health and sanitation practise

To some extent the essential follow-on activities and interventions are occurring primarily through donor-funded programmes for health, water supply, and sanitation. The emphasis, however, tends to be on sanitation and water supply projects, though funding allocations tend to favour urban over rural areas. Sanitation is not considered to be a separate programme area, either in funding or project development terms. Moreover, individual households, where sanitation needs are greatest, generally receive no material support for the construction or maintenance of latrines (IRC 2009). Promotional and technical guidance for sanitation is available at the household level, but even these means of assistance are inadequate to meet the need (IRC 2009). To overcome this issue several international and non-governmental organisations are active in Uganda's health and water sectors. Out of these NGO activities emerged the Uganda Water and Sanitation Network (UWASNET) that functions as a NGO umbrella organisation providing coordination and capacity building support. Major contributors and donors are the development corporations of Denmark, Sweden, Germany, Austria, Great Britain, and the European Union. Especially DANIDA and DED/GTZ/KFW are very active in the water and sanitation sector. As well as the NGOs African Medical and Research Foundation (AMREF), WaterAid, the Water & Sanitation Resource Centre (WATSAN), and the International Centre for Diarrhoeal Disease Research, that all have a special focus on the prevention and treatment of diarrhoeal diseases. Major joint-interventions are the National Sanitation Working Group, the National Sanitation Week, the National Hand-Washing Campaign, and the Water and Sanitation Sector-Working Group (WSSWG). All of these interventions aim at increasing the participation between the different stakeholders, at increasing safe water supply and adequate sewage disposal, and at preventing water-borne and water-related diseases such as diarrhoeal infections (DANIDA 2009).

2.5 Conclusion

As outlined, Uganda has developed a structured framework of policies aimed at fighting diarrhoeal diseases and is still in the process of doing so. The information about the different sectors and agents involved in Uganda's health, water, and sanitation sectors are an important base for the study's economic analysis, as most costs created through ill-health are suspected to emerge from the health sector and to a small extent from the water sector. Especially the National Health Policy (1999) will be of advantage to the people as it aims at preventing diarrhoeal diseases as well as its burden through the abolishment of user fees. The water and sanitation sector also created a range of different laws aiming mostly at the safe supply of water and at the safe discharge of sewage, which is essential for the prevention of diseases and ill-health. Additionally, a lot of NGOs are active in this field, and sanitation interventions seem to become more frequent and effective. However, in terms of policy, there still seems to be a lack with regards to cost-recovery. Some patients need to consult private health facilities if they are nearer by, or require additional treatment that cannot be provided by the public health sector, which creates extra cost. Also, medication and drugs are not always provided for free under the National Health Policy (1999), and there is no system to compensate for lost productive labour time such as a national health insurance, though the Ugandan government is aware of the issue and plans for a national insurance scheme are going ahead. In any way, the research conducted through this study can help to further adjust the policy framework and to give further recommendations for policy building.

3. Theoretical Framework

3.1 Introduction

The present chapter further introduces the relations of infectious diseases, ill-health, and the economy, and also highlights the health economic theories relevant for this study. First of all, health economic literature and theories will be described in section 3.2 in order to understand the major coherences between ill-health and the economy. Secondly, to understand how people mitigate and cope with the burden of ill-health, household livelihoods and the meaning of risk-economies and coping strategies will be discussed in section 3.3. Thirdly, as poverty is a status which is suspected to be closely related to ill-health, the concept of the medical poverty trap will be explored in section 3.4. On the basis of the reviewed literature and of the introduced theory, the researcher's rationale for studying the micro-economic

impact of diarrhoeal infections on households will by explained. Lastly, section 3.6 highlights the study's research question and sub-questions. The chapter conclusions are drawn in section 3.7.

3.2 Health economics concerning the economic impact of diseases

"Much present morbidity is unnecessary, much mortality premature. Better health is within our grasp if only we choose to pay its price."

(Weisbrod 1961)

Theoretical approaches concerning the micro- and macroeconomic assessment of infectious diseases have been applied since the first cholera epidemics in Europe during the 19th century. And the English economist Alfred Marshall analysed already in the early 20th century the rational and irrational motives that led individuals, families, and employers to invest in human capitals, of which health is one of them. He used this knowledge for analysing patterns of labour supply and household incomes and his theories still influence health economics (Agich et al. 1986).

Knowledge and data regarding the economic impact of infectious diseases is becoming again very important due to recent poverty reduction efforts, due to the rising demand in new health insurance schemes in developing nations, and due to rising incidence of infectious diseases caused by global warming. In setting priorities among control efforts across many different types of diseases, it is essential for development and health authorities to measure the welfare, capital, and asset loss inflicted upon a population by a given disease (Philipson, 1999). Moreover, information on the economic impact of infectious diseases is needed to target interventions efficiently and to justify further investments in disease research, mitigation, and control. Policy makers and planners need exact numbers and statistics of e.g. disease incidents and their financial impacts to justify e.g. sanitary interventions (Chima et al., 2003). Such economic health information are also of importance for cost-effectiveness analysis e.g. in the water and sanitation or development policy sector, and as argued by the WHO (2002), data about economic costs and effects of disease prevention and intervention programs as well as about the economic impact of water-related diseases remain critically important (WHO, 2002; Hutton et al., 2004). Also, microeconomic health data concerning the extent of diseases is necessary to assess health sector reforms as e.g. the current trend of privatisation going on most African countries (McIntyre et al., 2006). If medical expenses are

becoming less subsidised, public spending will obviously rise and private savings will decline, making the household more vulnerable to impoverishment.

Breyer et al. (2005) argue that health is the most important precondition for economic development, because ill-health decreases and impedes individual and commercial productivity enormously. Therefore, it is important to analyse what kind of commodities and assets someone is willing to trade-off in exchange for well being and good health; and also, to analyse what kind of commodities and assets someone is willing to trade-off in exchange for the re-establishment of a good health status in the case of ill-health (Breyer et al. 2005). According to the Grossman model, which argues that health is an integral part of the human capital, health and capital are both inter-connected assets and the values and optimums of both are controlled over time by the individual. Therefore, increasing costs for health services and products also increase the necessary level of investments in the total health capital, respectively, decrease the total health capital. However, with the progress of the individual aging process, the level of amortization will increase, and the investment in a good health status becomes less profitable. Also, a good health status or the total health capital is influenced by happenstance and is therefore not super imposable and tradable. Moreover, in the case of less affluent individuals or households, the health status correlates negatively with the demand of health services, as individuals impacted by ill-health can't afford the necessary services to restore their health status (Grossman 1972).

However, for developing, infrastructure, and health authorities to be able to finance and subsidise medical expenses, respectively to prevent them so that they cannot cause economic impacts at the household level, they rely on data about what micro and macroeconomic damage ill-health and diseases can cause. Without this data, economists are not able to carry out cost-effectiveness and cost-benefit analyses to evaluate demand for health services, health interventions, or expenditures for health care. The cost-effectiveness analysis (CEA) is an economic analysis that compares the relative expenditures and outcomes (effects) of two or more courses of action. Cost-effectiveness analysis is often used where a full cost-benefit analysis is inappropriate e.g. when the problem is to determine how best to comply with a legal requirement. This analysis is also often used to analyse the "cost-effectiveness" of health interventions, or disease prevention strategies (Murray et al. 2000). Cost-benefit analysis (CBA) is mainly used to assess the value for money of very large private and public sector projects like e.g. the installation of water and sanitation facilities. This is because such projects tend to include costs and benefits that are less amenable to being expressed in financial or monetary terms (e.g. environmental damage) (Folland et al. 2007). In health

decision making, such as in bio-medical and disease research, the cost is often replaced by risk, and the cost-benefit analysis is turned into a risk-benefit analysis.

According to various sources, the household-level and its microeconomic relations are the preferred unit of analysis for assessing the cost of diseases and illness, by including indirect and direct incomes and expenditures of the targeted households (Russell, 2004). An analysis from the microeconomic perspective is important in this study as microeconomics focus on how individuals and households make decisions to allocate limited resources. Also, microeconomics considers issues as how households reach decisions about consumption and savings (The Economist 2008).

3.3 Livelihoods and risk-economics at the household level

Inadequate access to health care is a major health and development issue, which is closely linked to people's livelihoods and their ability to generate livelihood assets such as e.g. human or financial capital. Moreover, economic coping strategies at the household level, respectively household risk-economics, are largely shaped by the availability and diversification of livelihood assets (Obrist et al. 2007).
This declaration is especially true, when seen through the livelihood approach, which emphasises people's need to a diverse mix of assets including material and social resources. Livelihood assets include human and social capital, natural capital, physical capital, and financial capital. And people's health seeking behaviour, e.g. whether a sick person consults a pharmacy, a traditional healer, or a professional doctor first, depends largely on the household's ability to access livelihood assets of the household and the wider society (Obrist et al. 2007). Basically, people's livelihoods determine their ability to cope with economic and health shocks. Therefore, the access to livelihood assets is a key issue for sustainable livelihoods. However, many people have difficulty in accessing household and community assets, which often constrains their ability to cope with diseases.

As every household needs to apply a set of coping strategies and risk-economics when impacted by ill-health, regardless of whether it is rich or poor, the analysis of household's risk-economics and vulnerability is a key feature of livelihoods and of the understanding of poverty (Devereux 2001). For example, diarrhoeal diseases are a major risk factor for households and for people's livelihoods in Sub-Saharan Africa, as they can result in a decline of productivity and financial equity. And according to Christiaensen et al. (2005) infectious diseases are one of the major determinants for household vulnerability in non-arid areas in Eastern Africa such as in Uganda.

To mitigate such a risk, individuals or entire villages can, for example, join a community based health insurance as part of their strategy to mitigate risk from disease (Wiesmann et al. 2000). To protect the livelihood assets necessary for such insurances, government and development agencies could, through public interventions, enhance livelihood-protection functions such as e.g. fertilisers and seed subsidies (Devereux 2001). Another form of risk-economics and of decreasing household's vulnerability is to diversify the household income. This strategy is often preferred by households which want to smoothen their income *ex ante* a household economic crisis, as the household would be very unlikely be able to smoothen its income and consumption *ex post* (Christiaensen et al. 2005). Informal insurances and self-insurance through household assets would also be an alternative method of risk-economics as compared to private commercial insurances which are almost nonexistent in Sub-Saharan Africa anyway. Unfortunately, most households are constrained to adapt this strategy, probably because access to assets is often limited and asset markets are poorly functioning during and after a crisis (Dercon 2002).

However, risk-management should be distinguished from coping strategies. According to Dercon (2002), risk-management strategies attempt to decrease the risk upon income processes *ex ante*, therefore, risk-management is income smoothing. In contrast to coping strategies, which deal with consequences of income risk *ex post* and are therefore consumption smoothing (Dercon 2002).

For example, households which cannot afford medical treatment costs because they are poor and lack any form of insurance, are often avoiding medical treatment completely or substitute for low quality medical treatment. But even if both of these coping strategies reduce the financial burden caused by ill-health, they are not ideal, and may even enlarge the issue (Prescott 1999).

The most common coping strategies applied by households impacted by ill-health and disease in Sub-Saharan Africa are: intra- and inter-household labour substitutions, engagement in labour activities other than normal work, financial borrowing from formal and informal sources, use of savings, change of consumption patterns, and the sale of assets (Chima et al. 2002, Lucas et al. 1999). Other structural factors which help households to cope with consumption shocks can include a high level of adult literacy, accessibility of the markets with regard to livelihood assets, and even the availability of electricity (Christiaensen et al. 2005). Usually, coping strategies are defined as strategies adopted by family and household members to minimise the impacts of ill-health on the welfare of all concerned (Chima et al. 2002). Still, all these measures of crisis prevention, compensation and

substitution strongly rely on people's livelihoods and on the availability of livelihood assets. It is usually not a question about whether assets are lost trough ill-health, but about the amount and the value of the assets and about how fast they can get replaced.

3.4 The medical poverty trap

The insecurity of livelihoods and of the access to livelihood assets is also part of a poverty circle which is driven, among other things, by ill-health and disease. However, livelihood insecurity is not only a symptom of poverty and ill-health; it is a contributory cause (Devereux 2001). This phenomenon has been already explained in Whitehead's et al. (2001) definition about the medical poverty trap, which argues that ill-health may lead to poverty and poverty may lead to ill-health. The medical poverty trap theory also focuses on households and their micro-economy to analyse the economic impacts of diseases and ill-health, and how these factors lead to poverty. Household expenditures created by ill-health negatively affect household productions and earnings, investment and consumption patterns, and household health and consumption, and finally can lead to poverty. Basically, being poor often leads to ill-health, and in turn, ill-health and activities to prevent it also lead to reduced income capacities (Nelson 1994). Nelson (1994) referred to this ongoing cycle under the term "drift hypothesis", as ill-health can cause a downward drift in the socioeconomic status. This assumption deeply correlates with the arguments put forward by Breyer et al. (2005). Moreover, the consequences of ill-health on a household and its activities and survival strategies can be quite complex, and affects most social and economic actions of a household (Feachem et al. 1992).

Lwanga-Ntale et al. (2003) also highlight, that chronic poverty among individuals and households, is often a consequence of poor health and poor health care systems.

Ill-health leads to the spending of household savings, to the sale of household assets such as e.g. land and livestock, and to the decline of the household's labour power (Lwanga-Ntale et al. 2003). Poor households affected by ill-health often need to apply strategies to survive this difficult period and to cope with the economic burden caused by actions to improve the health status. Sauerborn et al. (1996) analysed risk-management and coping strategies applied by households in Sub-Saharan Africa. They found out that most poor households rely on a mix of following economic strategies when affected by ill-health: intra-household (labour) substitution, mobilisation of finances and household savings, sale of assets (livestock), income diversification, and receiving loans and gifts from relatives and friends. These coping strategies secure the economic survival and vitality of the household, but only

for a limited timeframe. If applied over a long period of time, coping strategies related to severe and long-time ill-health would harm the microeconomic structure of a household, and they would lead to household impoverishment (Sauerborn et al. 1996).

To overcome this cycle of ill-health and poverty, development interventions should tackle household's vulnerability to ill-health and diseases as well as the reduction of poverty. As poverty correlates with a lack of livelihood assets, any development intervention which increases access to natural, social, and financial assets will indirectly support livelihood security, and therefore break this cycle (Devereux 2001). The reduction of official and unofficial costs and fees for health services, measures against corruption within the health system, a less constricted access to health services, and a better management of public finances could also be solutions to stop the medical poverty trap (Whitehead et al. 2001).

However, one of the aspects of the medical poverty trap which has been often overlooked is the fact that people often cannot even get access to health services because they are simply to poor or hardly own any livelihood assets. This issue should be taken into consideration, as it is not uncommon for people to dispense medical treatment because of their socioeconomic status (Obrist et al. 2007).

3.5 Rationale for the attention to the economic impact of diseases

There is a diverse range of reasons justifying increased research in relations between development, economics, households, and ill-health caused by infectious diseases. Infectious diseases are currently the major cause of mortality world wide and they already have a significant impact on macro- and microeconomic structures (Philipson 1999). Furthermore, a high level of good health and wellbeing among the average population is also a precondition for any development activities. As already outlined, poor health and the prevalence of infectious diseases slow down the productivity of individuals and of the community and the wider society, and therefore can severely damage asset generating structures. Many households especially in Sub-Saharan Africa are forced into persistent poverty because they cannot cope anymore with the social, physical, and financial burdens of ill-health. Only if we find out more about exactly how diseases impact households and their micro-economies, and what kind of damage they cause (apart from physiological damage), will we be able to efficiently create measures to alleviate the impact of ill-health and disease.

The evaluation of ill-health from an economic point of view is particularly important, as economic analysis divides the health effects of public policies from those of private

decision making (Philipson 1999). With regards to Uganda's policy framework, more specific data about the impact of diseases is needed as well to adjust current policies and to build new ones. Also, in setting priorities among control and prevention measures among many different types of diseases and health threats, public health authorities must find out more about the direct welfare loss inflicted upon a population by a given disease or threat (Philipson 1999). Moreover, such data are of critical importance for agencies and authorities to further justify investments in disease specific research. Unfortunately, only if the economic burden is significant enough, will funding for health research be made available (Chima et al 2003). The evaluation and the assessment of health sector reforms such as e.g. the ongoing trend of privatisation in African countries, as well as the carrying out of cost-effectiveness and cost-benefit analysis especially in the water and sanitation sector is very difficult without knowing the exact effects of ill-health on welfare (McIntyre et al. 2006). And the newly emerging market of public and private health insurance schemes in Sub-Saharan Africa is strongly relying on such data too. The insurance companies will most likely be unable to run their business, nor be able to calculate revenues and premiums if they are not able to pre-calculate and estimate future spending on disease specific medical treatments.

Awareness of the economic impact of infectious diseases, and especially about diarrhoeal diseases, is recently brought into focus by ongoing poverty reduction efforts. Development and health authorities are becoming more and more aware of the whole impact diseases can cause, and are increasingly looking for strategies to eradicate, or at least to reduce, them. This will not be easy, as it is predicted by the Intergovernmental Panel on Climate Change (2007) that the prevalence and incidence of infectious diseases will dramatically rise and especially food-borne and water-borne diseases are expected to occur more often in future.

3.6 Research question and sub-questions

The introduction and the theoretical background have outlined the importance of this subject, as they highlight the relation between ill-health and poverty and therefore justify the need for further and improved research in this field. With regard to previous studies, children, rural, and poor people are most affected by diarrhoeal infections and their consequences. Therefore, it will be necessary to focus on the economic burden caused at the individual and household level, to get an improved understanding of the microeconomic impacts.

This study intends to understand how the victims and affected households subsidise or cope with the financial and overall economic impacts inflicted by infections causing

symptoms of diarrhoea, and whether these coping and risk reducing strategies lead to further impoverishment. To analyse the total microeconomic burden, the impact of health seeking behaviour, the impact of prevention methods and expenses on household assets and savings, as well as on the loss of the victim's and their family's labour time must be measured too.

Furthermore and according to the *Uganda Demographic and Health Survey 2006*, some people, especially in rural areas in Uganda, seem to prefer medical treatment based on traditional and herbal medicine instead of medical treatment based on scientific medicine. This probably has an affect on the financial expenses for medical treatment expenditure. Though, this practise is more common in Southern and Northern Uganda. Also, a sick person does not always seek the attention of a doctor, but often applies some kind of self-treatment.

It would also be very interesting to find out, if there are any associations between the households (financial) wealth, the rate of infections, and the efforts of households to prevent diseases and diarrhoeal infections. Moreover, what are the differences between the rural and sub-urban medical seeking behaviours, and what could be the reasons?
For these reasons, the following research question and sub-questions have been formulated:

Research question:

What are the financial consequences for households in dealing with diarrhoeal infections in South-Eastern Uganda?

Sub-questions:

1. What kind of medical treatment (public, private, or traditional) is used and preferred by the people, with regard to infections causing symptoms of diarrhoea?

2. Are there any differences between rural and sub-urban households in health seeking behaviours, and in cost burdens caused through ill-health?

3. How do households cope with the financial burden caused through diarrhoeal infections and ill-health?

3.7 Conclusion

We are now able to understand how infectious diseases and ill-health are able to influence and economically impact individuals and households. As argued, health is an important precondition for development and also an integral part of the human capital. To be able to increase people's health status, to protect them from ill-health, and to justify further research and improvements, it is crucial to assess the economic damage caused by various infectious diseases. This data is also of importance for medical insurances and other health agencies to be able to carry out cost-effectiveness and cost-benefit analysis. As justified, it is the household-level and its micro-economic relations that is the preferred focus of assessing the cost of disease and ill-health.

Poor households suffer more than averagely from the consequences of ill-health and therefore constantly need to apply risk-economics and coping strategies to mitigate and decrease the burden of ill-health. Common coping strategies include for example: intra- and inter-household labour substitutions, financial borrowing from various sources, and the sale of valuable assets.

The researcher also introduced the concept of the medical poverty trap, which argues that ill-health leads to poverty and that poverty leads to ill-health. This theory explains why chronic poverty among individuals and households is often a consequence of a poor health status and poor health services. To overcome this cycle of ill-health and poverty, development interventions should tackle a household's vulnerability to ill-health and to poverty. As this study intends to understand the micro-economic impacts caused by diarrhoeal infections on households in Uganda, the following research question has been outlined: how do diarrhoeal infections economically impact rural and suburban households in Uganda? The researcher also formulated three sub-questions to further investigate any differences between suburban and rural locations, and in the health seeking behaviour.

4. Methodology

4.1 Introduction

The present chapter presents and describes the study's methodological techniques. First of all, the study's epistemology will be described in order to understand the philosophical background the study is based on in section 4.2. Secondly, the study's conceptual framework will be outlined in section 4.3, followed by the description of the operationalisation of the concepts, which will be discussed in section 4.4. Thirdly, to appoint the focus of this study,

the target population will be explored in section 4.5; and in order to make it possible to determine the sample units, the selection of the sample size will be explained in section 4.6. Section 4.7 outlines the sampling methods, variables, and indicators which are necessary to collect the relevant data in order to answer the research question. Subsequently, section 4.8 describes the process of analysing and processing the collected data, before moving on to the ethnical considerations described in section 4.9. The chapter conclusions are drawn in section 4.10.

4.2 Epistemology

The research is largely based on the philosophical and epistemological stances of objectivism, justified by the economic and epidemiological concepts used within this study, which are both mostly of a quantitative nature. "Objectivistic research supports the view that things exist as significant entities independently of consciousness and experience, that they have truth and meaning residing in them as objectives, and that scientific research can reach this objective truth and meanings" (Crotty 1998, p. 5).

The theoretical perspective is mainly based on positivism. Even if some of the collected data are of qualitative nature, most of the findings are quantitative data and indicators. However, as some of the methodological indicators such as e.g. indirect costs related to ill-health and social aspects can only be measured indirectly, they have become a subject of interpretivism. For example, some information collected through methods such as interviews and observations are not always as clear to interpret as e.g. quantitative data. Its interpretation is therefore more theoretical and findings can be very relative with regard to people's different views and perspectives. Moreover, due to the lack of knowledge (before the process of data collection) about the significance of some of my anticipated methodological indicators, and due to the need to consider socio-economic aspects, the researcher needed to include some aspects of subjectivism into his epistemology, supported by the theoretical perspective of phenomenology. In comparison with natural scientists, it is often more difficult for social scientists (including economists) to prove something exactly and phenomena are rarely verified exactly. With regard to the epistemological framework of the study, the process of data collection is predominantly shaped by a household survey, and as already justified, to a smaller extent by phenomenological research techniques such as informal interviews and observations. Furthermore, the study has been approached with quantitative measures like health economic models and theory and has been analysed in such a way.

4.3 Conceptual scheme

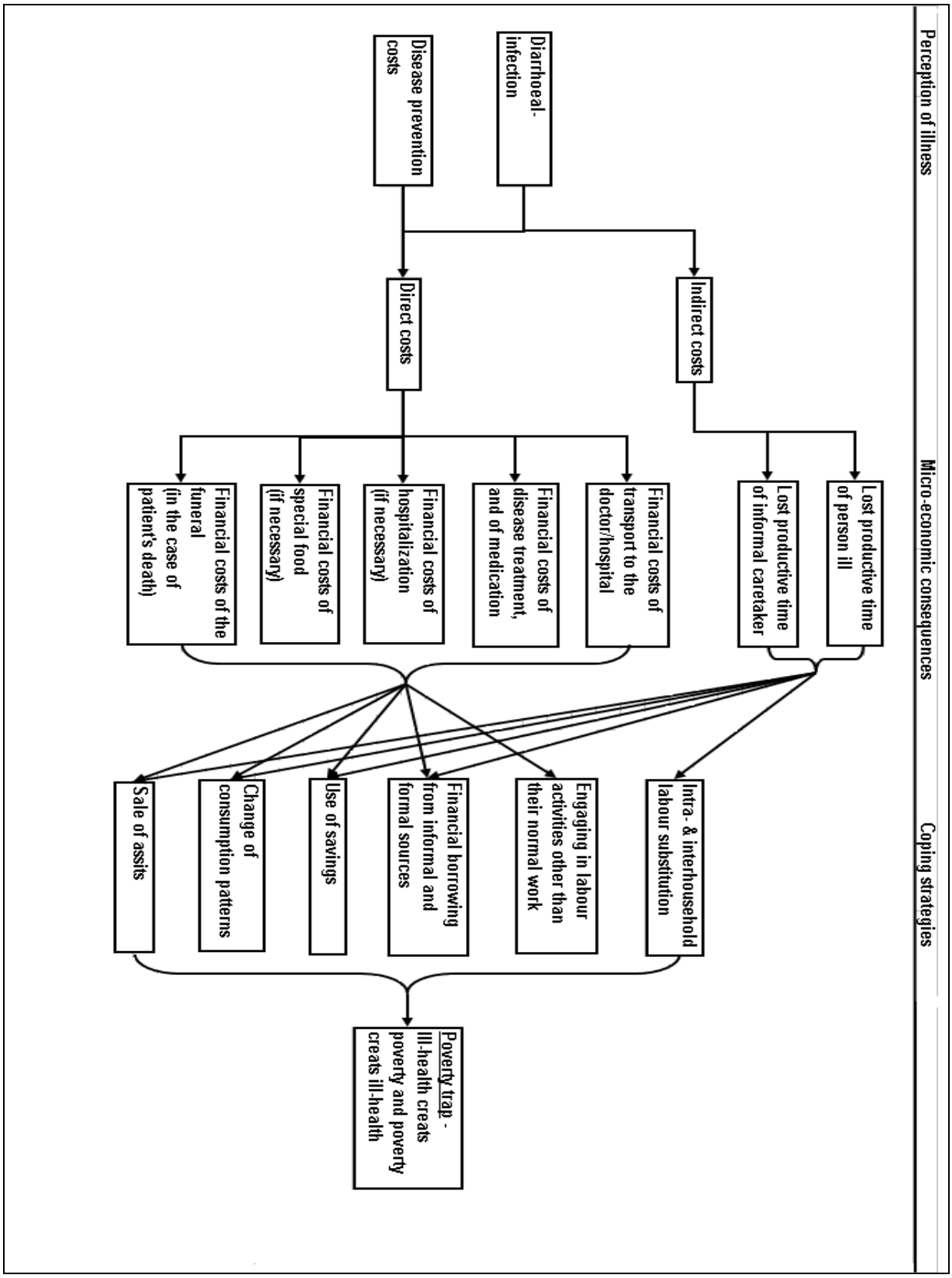


Figure 4.1 Flow-chart of the conceptual framework for analysing the economic burden of infectious diseases on the microeconomic and household level

4.4 Definition and operationalisation of concepts

4.4.1 Diarrhoeal infection

Diarrhoeal diseases lead to symptoms of gastrointestinal infection, which can be caused by a variety of bacterial (e.g. cholera), viral (e.g. rotavirus) and parasitic (e.g. schistosomiasis) organisms. Infection is spread through contaminated food or drinking-water, or from person to person as a result of poor hygiene (WHO 2008).

Though, many diseases can cause symptoms of diarrhoea, this study will concentrate on victims and patients affected by the major classified water-borne and water-related pathogens causing diarrhoeal infections. These are, according to the WHO, *Vibrio cholerae*, *Giardiasis intestinalis*, *Escherichia coli*, *Salmonella typhi* and *Entamoeba histolica*.

Unfortunately, due to a high proportion of households and their victims suffering from symptoms of diarrhoea which are not professionally diagnosed, the definition of the term diarrhoeal disease has been difficult to operationalise, and has therefore been changed to the definition of diarrhoeal infection instead which describes any infection causing symptoms of diarrhoea. Due to this operational issue, the study therefore concentrated on all diarrhoeal infections reported by the household members.

Usually, professional laboratory tests for the correct determination of the pathogen have only been applied in acute and severe cases, due to a lack of finance and equipment. Therefore, the researcher did consider all people reporting severe, long-lasting, or chronic watery, bloody or rice stool as victims of a diarrhoeal infection. This is the same procedure most local physicians follow. Infections with hookworms were easier to diagnose as this parasitic pathogen can be seen with the human eye.

4.4.2 Household

A household in this study was defined and characterised as an individual, or group of persons who, on average, occupy a common dwelling (or part of it). They provide themselves jointly with food and other essentials for living. Basically, they live together and share their resources as a unit. Other explanations can be related to the phrases “eating from the same pot” and “cook and eat together”. The researcher decided also for this definition as this is the most convenient way to observe a household within a household survey in Sub-Saharan Africa (Statistics South Africa 2005). The household units surveyed for this study included also family members, who may work or live most of the time away from the household, but who are significantly contributing e.g. financially to the household spending and savings, and who also have a close family connection to at least one permanent household member. For

example, a husband or close relative who is working and living at a distant location, but who is sending money home to its family or household. Some information about the household structure and its members are important for this study, as for example the number of children and adults, and the number of employed household members within one household have an influence on the medical treatment behaviour and on the economic burden.

The researcher's rationale for the decision to observe and analyse households and their household members as a whole unit was based on experiences collected in similar household studies and surveys conducted in Sub-Saharan Africa (Statistics South Africa 2000 & Sahn et al. 2000). Similar methods used to calculate the incomes and expenditures of households in Sub-Saharan Africa and elsewhere like e.g. the social accounting matrix (SAM) take the household as a unit as well (Statistics South Africa 2000). Moreover, and with regard to the research question, the major aim of this project is to analyse the financial impact inflicted upon the whole household unit and not upon individuals within the household as this would deviate from the main focus. All of the household asset indexes used in the analysis have been measured on a per household basis. The implicit reason for doing so is that financial economies and economies of scale of the assets within households are infinite if all possible aspects are taken into consideration (Sahn et al. 2000). Again, the analysis of individuals within a household unit would require a complex analysis about intra-household and social differences first, which is beyond the scope of this study.

However, the researcher recognises the fact that there are maybe intra-household differences such as e.g. gender or age inequalities within a household unit, which could be related to unequal access to health care and to unequal spending for individual's health and well-being. For example, Moss (2002) highlights that the household is the most intimate location for the abuse of power, authority, and control, and women are often affected in a number of ways. Often, male partners and in-laws control women's access to money, food, and health services (Moss 2002). And Osmani and Sen (2003) even argue that women's exclusion in terms of proper nutrition and healthcare rebounds on the whole society in the form of their children's ill-health. One example is the fact that malnutrition of the mother can affect the development of their foetus (Osmani et al. 2003). However, they realise as well that this phenomena is deeply influenced by geographical location, culture and by religion. The described phenomenon is far less a problem in Sub-Saharan Africa than for example in South Asia, North Africa, and the Middle East, where women are primarily excluded from their rights. Several studies indicated that, based on anthropometric indicators, intra-household gender inequality is sometimes less of an issue in Sub-Saharan Africa as compared to

inequalities based on age (Haddad et al. 1993. & Sauerborn et al. 1996 & Garg et al. 1998). The underlying reason for this issue is that the household's income spent for healthcare is usually concentrated on productive members instead of spreading it between all indigent household members (Sauerborn et al. 1996). As women usually are contributing much more work to the household as men it would be irrational to not invest in their health. Mainly, children below the age of five years are more excluded from modern health services (Sauerborn et al. 1996), and ill-health is usually associated with higher expenses for medical care when adult household members are involved (Su et al. 2006). In addition, there are 2.6 % more women than men in Uganda, 25% of all households are headed by women (Uganda Bureau of Statistics 2006b), and the life expectancy of women in Uganda is 53.4 years, higher than male life expectancy (51.3 years) (CIA factbook 2008). Also, the number of unattended birth deliveries is decreasing and maternal health care is increasing (43% of all pregnant women in Uganda were treated with SP/Fansidar® to protect them against an infection with malaria during pregnancy) (Uganda Bureau of Statistics 2006b).
Women usually receive more disadvantages in education as they are often referred to as cheap labour, but this issue is not the focus of this study. As already justified, this study concentrates only on the monetary and financial impacts created through costs for health services for the household in whole, and individual inequalities are less of a concern, and would require an intra-household analysis.

4.4.3 Poverty

"Poverty: a human condition characterized by the sustained or chronic deprivation of the resources, capabilities, choices, security and power necessary for the enjoyment of an adequate standard of living and other civil, cultural, economic, political and social rights." (Source: UNHCHR 2002)
This research focuses mainly on poverty in economic and financial terms, while also considering social aspects of poverty such as e.g. the number of family members.
The poverty of e.g. human rights, political stability, or other "poor considered processes" which are not directly related to ill-health will not be included in this study.

As poverty is a very relative explanation and is differently experienced in other cultures, local (Ugandan) perceptions of poverty will be respected and taken into consideration. In other studies about Uganda, poverty is defined by the poor themselves as: A persistent situation like "*rain that soaks the poor and does not stop*" in which "*one survives marginally*", with "*problems that follow you*", "*living hand-to-mouth*" and in "*perpetual*

need" "*due to lack of the basic necessities*" of life and the "*means of production*", lack of social support; and feelings of negativity, frustration, and "*powerless*" to "*influence the things around one*" because "*one has no source of life*" (Lwanga-Ntale et al. 2003).

4.4.4 Microeconomics

Microeconomics is the part of economics that studies how individuals and households make decisions to allocate limited resources. Also, microeconomic considers issues such as households reach decisions about consumption and savings (The Economist 2008).

4.4.5 Assets

Assets are defined as any items of economic value owned by an individual, household, or business, especially that which could be converted into cash. Examples are cash, securities, accounts receivable, inventory, real estate and land, a car and other property. On a balance sheet, assets are equal to the sum of liabilities, common stock, preferred stock, and retained earnings (InvestorWords 2008).

4.4.6 Direct costs

Any (visible monetary) cost, that can be directly attributed and related to the purchase of a certain product or service, or respectively, to the loss of values and assets.

4.4.7 Indirect costs

Indirect costs are the opposite of direct costs. Indirect costs are usually not obvious and are often hidden or not visible. Also, they are often related to direct costs or results from them. Basically, indirect costs are expenses which are not directly attributable to a product or impact.

4.4.8 Medical treatment costs

Any financial expenses and costs at the microeconomic and household level attributed to traditional and scientific medicine treatment. Including, direct costs for hospitalisation, medication, and for transportation to the doctor or the hospital.

4.4.9 Coping strategies

Coping strategies can be defined as actions that aim to manage and subsidise the costs and impacts of an event or process (e.g. ill-health) that threatens the welfare of one or more

members of the household. Basically, coping strategies are trying to sustain the economic viability and sustainability of a household (Russell 2004).
Coping strategies in this study are more seen as economic instruments to analyse the economic survival of a household. Basically, all actions the household members take to stabilise the economic impacts of a diarrhoeal disease. An example would be, to send a household member away to live with e.g. wealthier relatives to decrease household expenses. The term "coping strategies" in this study can not be related to the psychological definition of this term.

4.4.10 Disease prevention costs

Any financial expenses and costs at the microeconomic and household level attributed to the prevention, reduction, and interruption of the transmission and infection of disease causing pathogens.

4.5 Target population

The main target population in this study have been rural and sub-urban households in Uganda in which members were previously (within the last six month) and/or are currently affected by infections causing gastrointestinal and gastroenterological symptoms. With regard to the definition and operationalisation of the term diarrhoeal infection, the households and their members chosen should have been impacted previously by ill-health caused by infections with *Ancylostoma duodenale*, *Camplyobacteriosis*, *Cryptosporidium*, *Entamoeba histolica*, *Escherichia coli*, *Giardiasis intestinalis*, Norovirus (virus type: *Caliciviridae*), *Salmonella typhi* and *bacteria*, *Shingella enteritis*, Rotavirus (virus type: *Reoviridae*) and *Vibrio cholerae*.

In addition and by referring to the thesis's sub-section (1.4) about Uganda and its people, most forms of people's livelihoods located in suburban slums are based on small-scale businesses, begging, and day labouring; whereas most forms of people's livelihoods located in rural areas are based on subsistence farming (Uganda Bureau of Statistics 2006b). Subsequently, the survey conducted within this study concentrated on households and their members which had the same forms of livelihood just described.

Therefore, the main target population were households which were relatively poor in financial terms, and households which lack proper access to fresh water and sanitation facilities. The target population were based in suburban slums and in rural villages and their

forms of livelihood were usually very simple and predominantly based on wage labouring and subsistence farming.
This particular target population has been chosen, because the described households and their members are most vulnerable to infections with diarrhoeal diseases and to the burden of diseases due to their limited access to proper sanitation and health care facilities.

The second target population in this study, though much smaller in size, consisted of health workers and physicians working for either private or public health facilities. Respectively, qualified experts in the health sector who deal with diarrhoeal infections. This target population was mainly used for background and reference data and to confirm and compare findings from the household survey. After the arrangement of an appointment for interviewing, they were interviewed at their workplace usually in a health facility.
The researcher has chosen this particular target population because their responses were expected to be more specific, precise, and technical when being interviewed about e.g. sanitation and water infrastructure, medical treatment and epidemiological data as compared to the mostly quantitative data gained through the household survey. Also, these people are experts in their field of profession, and they see issues in a different perspective, usually a more scientific one.

As more precisely outlined in the following sub-chapter 3.4, expert interviews were conducted with physicians from Mulago Hospital and Mengo Hospital, and the researcher interviewed a physician from the Mukwano Consultation Clinic which is a private health facility based within Katanga slum. In Wakiso district, one interview was held with a public village health centre, and in Jinja district one interview was held with a missionary health centre.

4.6 Selection of sample size

With regard to the mostly quantitative nature of the study's methodology, households from three different Ugandan districts have been included in a survey, and in each district, representatives of between 10 and 40 households have been interviewed. The research has been conducted in the districts of Wakiso, Kampala, and Jinja. As already outlined in section 3.2, the researcher decided on these particular districts in South-East Uganda as they are regarded as the most safe and accessible ones according to current information of the German Ministry of Foreign Affairs. At the time the field research was planned, the German Ministry of Foreign Affairs was warning travellers, to travel in Uganda not outside Kampala and

neighbouring districts due to incidents of crime, conflict, and disease outbreaks (e.g. ebola, cholera, and sleeping sickness) (Auswärtiges-Amt 2008). Also, field research was limited only to the South-Eastern region because of rebel activities in the Northern region and because of conflicts along the Congolese, Rwandan, and Kenyan borders, amongst from other security issues. Another issue were insufficient, bad, or missing modes of transport. It always takes a long time to reach rural places due to very bad roads and during the rain seasons it is almost impossible to travel anywhere in the country. As the researcher needed to find rural and suburban study units with relatively small distances in between, it was finally decided to conduct the data collection in the districts of Kampala, Wakiso, and Jinja. Kampala district is mostly dominated by urban settlements and has the most slums, compared to the districts of Wakiso and Jinja which are more dominated by rural villages and agricultural activities. The researcher decided also for these districts, as most households and their livelihoods are dominated by the same livelihood assets and activities which the researcher anticipated to

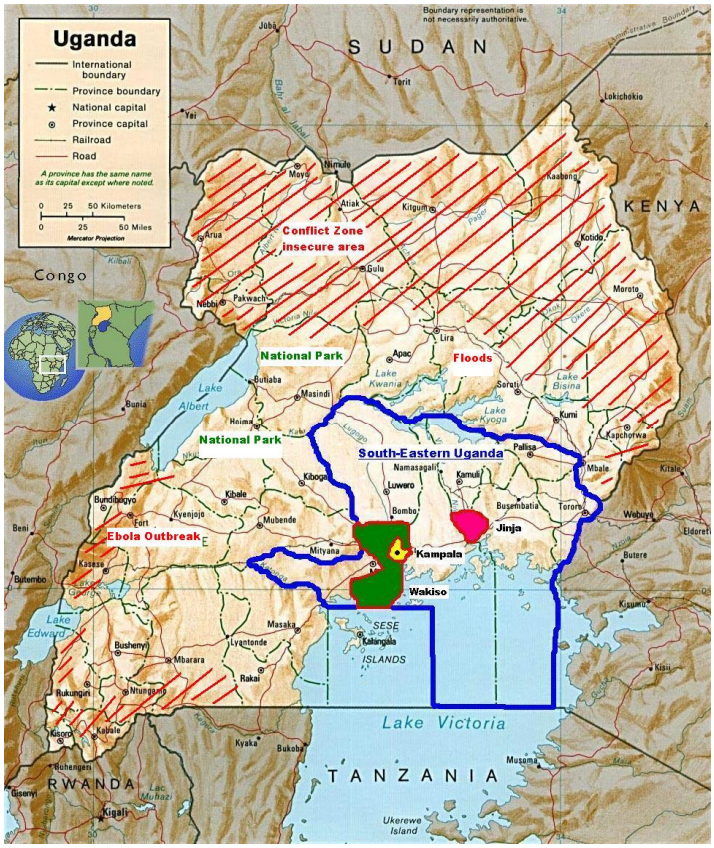


Figure 4.2 Locations of research areas within Uganda

focus on, with regard to the target population outlined in the previous chapter.

Figure 4.2 outlines the locations of the districts where data sampling took place, including insecure areas, and areas were research was not possible due to disease outbreaks and other restrictions.

The researcher and the local supervision of this study were based in Kampala. The local supervisor was a health economist and physician working for the School of Public Health which is part of Makerere University and of the Mulago hospital complex (the largest health facility in the country). Supervision by this particular researcher was chosen, because he has extensive experience in analysing economic impacts of diseases. To prevent any misunderstandings, and to increase the quality of the communication during interviews, the researcher was also, through the contacts of the local supervisor, assisted by an interpreter as most people in the villages and slums speak their tribal languages. Also, the interpreter is an academic, and has experience with sampling survey data in slums and rural villages.

During the first consultations with the local supervisor and the interpreter, the researcher together with the local supervisor and the interpreter decided on the most appropriate rural and suburban places for collecting the data. Three different slums and suburban areas in Kampala district, two villages in Wakiso district, and one village in Jinja district were chosen. To be more reliable and objective, and to make the results more statistically significant, a number of different communities have been chosen to generalise the outcome for all the three different districts where the data collection was conducted. Criteria for the selection of places were suburban and rural settings, sanitary and housing conditions, people's standard of living, and the prevalence of diarrhoeal infections. The researcher was committed to find places for data sampling with a high prevalence of infectious diseases. Accessibility and security of the research area were also included in these criteria, with regard to advice from the local supervisor and the researcher's interpreter. And as it was very complicated to find places with victims affected by diarrhoeal symptoms, who have been professionally diagnosed with one of the infectious pathogens stated above, the researcher needed to consult local medical experts, and the local slum/village chiefs to find its anticipated target groups. Another condition was that the selected community has at least one traditional, one public, and one private health care provider (with regard to the outline of the Ugandan health sector described above) within the community or near by (not more than five kilometres away).

As there are many areas and places in the districts Wakiso, Kampala, and Jinja which share the same distinct conditions and features as described above, the researcher randomly selected the communities relevant for this study. As mentioned above, the local supervisor and the interpreter also advised the researcher about areas best to go, but still, the researcher randomly decided for the research locations relevant for this study. The three sub-urban areas (slums) finally chosen within Kampala district were Bukesa, Katanga, and Katwe. The two

rural villages chosen within Wakiso district were Lutete and Lwadda. And the village chosen within Jinja district was Nabulesa.

To be objective and to keep the sample group representative, the researcher interviewed in total 80 households in suburban and in rural communities. The exact numbers of interviews per study location are outlined in relation to the population size of the study location in Table 4.1. In each of the three suburban and of the three rural study locations, the researcher interviewed between 10 and 15 households, and each interview lasted between 30 and 45 minutes.

Table 4.1 Sample size per study location

Type of study location	Study location	Sample size per study location	Population per study location
Suburban	Bukesa	15	ca. 34,000
	Katanga	15	ca. 3,400
	Katwe	15	ca. 8,500
Rural	Lutete	13	ca. 360
	Lwadda	12	ca. 290
	Nabulesa	10	ca. 470

Expert information has been gained from various public and private medical facilities being located in and near the Ugandan capital Kampala and in the surrounding districts. After consultation with the local supervisor, the researcher approached medical experts, mostly local physicians, who deal with diarrhoeal diseases and their victims. Due to matters of accessibility, all expert interviews took place in and around Kampala. After arranging appointments with them, the researcher usually went to the health facility where the expert is working and interviewed him or her there. Most of these interviews took place in an office or directly in the surgery.

Expert interviews were conducted with physicians from Mulago Hospital and Mengo Hospital, which are Uganda's largest public health facilities based in Kampala close to the three suburban research locations Bukesa, Katanga, and Katwe. Also, the researcher interviewed a physician from the Mukwano Consultation Clinic which is a private health facility based within Katanga slum. In Wakiso district, one interview was held with a public village health centre, and in Jinja district one interview was held with a missionary health centre. All experts interviewed were working in health facilities close to the household survey locations. Therefore, the choices of health experts and facilities interviewed cover all

health sectors available in Uganda, and expert information was gained from all the three districts visited within the household survey.
These expert interviews were especially helpful with regard to epidemiological and medical treatment information.

4.7 Sampling methods, variables, and indicators

This study is based on a combination of quantitative and qualitative data collection techniques. The researcher used for this study a survey and conducted informal and semi-structured interviews, as well as observations.

A survey at the household level was carried out, usually interviewing the head of household or the mother by using a questionnaire. The questionnaire was made up of 30 questions with mainly closed questions, but some were created in an open-ended style to allow more flexible responses (see Appendices).
The questionnaire structured the questions as based on the different indicators and variables as explained in the conceptual scheme (see Figure 3.1). Addressed were: family and household structure, occupations and direct / indirect disposable household income, disease infections, medical treatment behaviour and its costs, special nutrition and its direct cost, household coping strategies, and disease prevention methods. Questions focused also on data such as, for example, the costs for medication, hospitalisation, or disease prevention methods. And they focused on the type of medical treatment (traditional or scientific), and in the case of the victim's death, the questionnaire also asked for funeral costs. Additionally, household specific data like e.g. the number and gender of the household members and their profession were recorded. The concepts used in this study and the indicators and variables used in the questionnaire survey and their interrelations are similar to the concepts and indicators used in previous and subject related studies by Chima, R.I. et al. (2003); Grossman, M. (1972); McIntyre, D. et al. (2006); Russell, S. (2004); Sauerborn, R. et al. (1996); and Uganda Bureau of Statistics (2006).

The researcher recognises the current debate about how to measure household economic status as there are different approaches discussed currently. In economic literature on poverty and well-being, there are three approaches that stand out: the income-based approach, the expenditure-based approach and the asset-based approach which emerged mainly out of Amartya Sen's theories about household assets (Morris et al. 2000 & Klasen 2000). Also, a fourth approach focuses on the availability of food and basic needs. This

approach determines where the poverty line should be drawn, by measuring food consumption, income, expenditures, or asset holdings. Morris et al. (2000) analysed different indicators used in household surveys and described that out of 14 studies in less developed countries six where based on the income-based approach (Morris et al. 2000). Most household and welfare studies conducted in South Africa are also based on the disposable monetary income available per household unit (Statistics South Africa 2000). Empirical studies of poverty are usually based on one-dimensional indicators of individual welfare such as income or expenditures per-capita or per-equivalent adult (Bibi 2005). According to Lloyd et al. (1993) there is no internationally agreed approach for assessing the relative income of households that vary in size and structure, therefore the researcher decided to measure the direct disposable income available for the whole household unit. Also, it is often more simple to assess the financial income only, instead of measuring the household's consumptions and expenses. The most conventional technique is to divide the household income by household size to get an approximate estimate of income per head (Lloyd et al. 1993).
In addition, Milanovic (2002) actually highlights, that it is actually a potential problem that some surveys measure wealth in income and some in expenditures, as both are recognised welfare indicators.

Though, this method can only be used to analyse the household unit as the income and the consumption needs of individuals are usually different and as they can change by e.g. gender and age. One of the advantages of the income-based approach is that it measures the whole disposable and monetary income available whereas the expenditure-based approach can't estimate a household savings (Deaton 2001).

However, the disadvantages of the income-based approach compared to the expenditure-based approach are that it gives only a short-term impression and fluctuates more, and consumption smoothing and home produced assets can be less accurately measured (Klasen 2000). In some cases, consumption smoothing is an important matter due to national and international price fluctuations, and especially expenses for health care are often subject to very high price fluctuations. Therefore, expenses for health care should be ideally measured in a long-term study to be less biased by market and price fluctuations. However, as the researcher had only a limited time-frame available to collect his field data, this study had to rely on a cross-section set of data instead of long-term panel survey data.
Nevertheless, imputed values and assets of e.g. home production are only of importance if they can be turned in monetary assets, as this is the currency mainly used in health facilities.

The study's household survey tried to assess the household's expenses for health care caused by diarrhoeal infections for the previous six month, and therefore, the household's monthly average disposable income has also been assessed for the previous six months. The researcher has chosen this particular time-frame, because incomes generated through, in particular, the informal sector are often very unreliable and unstable and people therefore often have difficulties to remember their monthly total amount of income over a longer time period. In addition, as people often don't keep track of their (health) expenses, it is also difficult for them to remember expenses for things paid further in the past.

Therefore, the questions in the questionnaire have been formulated with regard to the concepts mentioned above and mainly focused on indicators and variables such as household structure, disposable household income, direct and indirect expenses for health care, and coping strategies. As already mentioned, it is not always easy to measure or answer questions and indicators in a "yes – no" mode, that is why some questions in the questionnaire have been open-ended, which made it easier to record all (socio) economic impacts.

According to traditional rules, and due to the fact that most communities in Africa have a leader or chief, the researcher needed to consult (usually with the help of the interpreter) the community leader before he was able to take up any research in the designated area. The process of data sampling was only possible after the community leaders have given their permission. When the chief or community leader was absent, or when he did not agree with any data collection activities, the researcher was forced to leave the community and to shift to a different place where data collection was possible. Therefore, the procedure of consulting the community leadership was an essential part of the data sampling methods, and strongly influenced the choices for study locations.

After the identification and consultation of the potential communities and areas for data sampling mentioned above, households have been purposely approached and interviewed by applying a non-random sampling method as the rate of disease incidents was generally high (above average). Also, a random sample was not always possible as not all households were willing to participate in the survey, and some household communities were absent too. Non-random sampling is a valuable method for sampling a small number of units impacted by typical issues, like e.g. diarrhoeal infections. However, one disadvantage of this method is how to assess how typical the sample really is (Crotty 1998).

The households approached usually consisted of a single house, dwelling, or hut with the characteristics mentioned in the previous subchapter. The interpreter then asked for the head of the household or for the mother (the mother of the family is usually responsible for

the care of ill household members) whether he or she was willing to participate in the survey. In each household, the researcher consulted the head of the household, respectively, the person who manages most of the household activities in particular related to food, and child care (which is usually the mother). Due to the fact that most men were busy with work during day hours, most participants in the household survey were women. Yet, the mother of the household usually manages most of the household and its economic activities anyway. The researcher interviewed at leased 10 households in every study location.

The household members were told that participation was on a voluntary basis and that the collected data would be treated confidentially and would only be used for research purposes. As it can be difficult to approach and interview somebody suspected to have a diarrhoeal infection, the researcher and the interpreter needed to be especially sensitive when collecting the data. In case the reply was positive and after the introduction of the researcher to the household members, the researcher together with his interpreter, started to interview the head of the household or the mother. The interview was introduced through a normal not subject related conversation, and always took place in a confidential and private setting.

Semi-structured interviews and informal conversations have been organised with experts in this research field as mentioned in the previous sub-chapters. Most experts were medical doctors treating disease affected patients, as well as officials employed in the health and sanitation sector. With regard to the research technique of triangulation, the interviews helped to find out if the study's methodological indicators are significant enough, respectively, if the impacts described by the experts are similar to the concepts and variables used by the researcher. Moreover, informal conversations and formal interviews helped to expose any hidden or indirect disease related economic impacts not covered by the questionnaire. And the interviews helped the researcher to understand how patients get treated and what costs are related to the treatment.

Triangulation is used to create checks and balances at different levels of aggregation in data research to increase the data's variability and credibility.

The set of questions which were asked during these interviews were more professional compared to the questions in the household survey and to informal interviews, because experts often see the issue from a different perspective. Also, they were able to give more detailed information about statistical and numerical data as well as about the costs and expenses related to the health care system.

Observations were also applied in the areas relevant for research, to get a general impression about people's livelihoods, about what kind of sanitation and health facilities

were available, and about how people deal with ill-health. This tool was very important, as the researcher was able to directly observe e.g. how people prepare food, what they eat, or how the people managed their water supply.

4.8 Data processing and analysis

The data and findings from the questionnaire have been statistically analysed with the help of the computer programs Microsoft -Excel and Minitab, and then presented in a numerical context. Numerical tables and charts like frequency/contingency tables and bar charts helped to analyse and understand the collected data. All the quantitative results from the 80 questionnaires have been first analysed with frequency tables in Excel to get via cross tabulations a general overview and expression of the outcome, and to measure as well if there are any associations and correlations between the different categories and variables. If an association was suspected, a chi-square test has been carried out between the two variables to prove the association. Furthermore, data assumptions, and relationships and correlations between variables have been analysed with the regression analysis and with scatter plots (Mukherjee et al. 1998). To find out if treatment costs, total disease related costs, and prevention costs are dependent on the direct financial household income; chi-square tests and regression analysis have been carried out to test the associations and correlations between treatment costs, total disease related costs, prevention costs, and the direct financial household income.

To answer the main research question, the total direct and monthly disposable mean household income has been compared with the total financial mean disease related expenditures (including and excluding prevention costs). According to Prescott (1999) a cost burden greater than 10% of the total financial household income will have a catastrophic impact on the household.

The informal and semi-structured interviews have been transcribed to the relevance, significance, and objectivity of the content. And the content was analysed according to the relevant themes. Same as the findings from the formal semi-structured expert interviews, which have been examined and transcribed in a similar way as the informal interviews, their results have been set in an (socio)-economic context. The findings from all interviews have also been used to cross reference the outcomes from the quantitative survey analysis and from observations.

After analysing the various forms of data, the results have been used to answer the research question and sub-questions, and have also been compared to previous research

completed by the Ugandan Bureau of Statistics (2006), and to the "medical poverty trap theory" and the other theories used in the theoretical base of this study.

4.9 Ethical considerations

To protect human rights, and to comply with the ethical and scientific regulation in Uganda, a research proposal summarising this study has been submitted to the ethical committee at the Uganda National Council of Science and Technology (UNCST). This is a normal administrational procedure to formally register as an academic researcher in Uganda and to get the necessary legal and ethical approvals. After examination by the committee, the researcher was granted research permission.

As highlighted in sub-section 3.4 and with regard to traditional and ethical rules, the researcher always needed to consult the community leader or chief first before he was able to take up any research in a designated study location. The process of data collection was only possible after the community leaders have given their permission. To comply with local ethics the researcher always respected this tradition, but in some cases the community leader's permission was refused. Reasons were that the community leader demanded a small "compensation" which the researcher was not willing to pay; or they complained, that already many "white people" had come to their community with promises of help which were never fulfilled.

Health and gender specific research and data is generally very sensitive and must always be treated confidentially. To meet this standards, to protect and respects the human rights of the study's participants, and to comply with the regulations and conditions set by the Uganda National Council of Science and Technology, the researcher followed ethical regulations. Interviews and discussions have been conducted in a private location where it was not possible to overhear them. The researcher took particular care in ensuring that no other people were present to observe the interviews, to protect privacy. Data obtained from participants was for evaluation purpose only. No identifying information has been collected from participants in the survey. All research material was maintained in a locked cabinet with access only to the researcher. Collected information will not be passed on to any third party, and will be treated confidential. Furthermore, the researcher can assure that there have been no risks to participants during this study.

Participants and households will benefit from this study inform of knowledge improvement regarding the economic impact of diarrhoeal diseases. Also, the risk-benefit ratio is favourable since there are no risks but immediate benefits to participants. The

participants have been introduced to the purpose of the data collection activities and have been asked for participation. And the researcher explained that participation is voluntary, and that if a person agrees to participate, he/she can still refuse any question. No compensation has been provided or paid to participants.

The analysed results and findings from the study will be predominantly used to support a master thesis, however, the findings will also be made available to the School of Public Health in Uganda for the benefit of the participants. Furthermore, a copy of the final thesis will be submitted to the Council of Science and Technology as contribution to local health research. The researcher will make sure, that all participants have access to the collected data through the Uganda National Council of Science and Technology, so that they can benefit from it.

4.10 Conclusion

In concluding the study's methodology, the study's epistemology is based on the philosophical stances of positivism as the study is mostly of quantitative and objectivistic nature. This choice has been justified in imitation of Crotty (1998), who argues that things exist as significant entities independently of consciousness and experience, that they have truth and meaning residing in them as objectives, and that scientific research can reach this objective truth and meanings.

The target population have been households located in rural and suburban areas in South Eastern Uganda. The researcher decided to study the household as a unit, and also justified his decision to measure the direct financial and disposable household income for the study's assessment of the micro-economic burden caused through diarrhoeal infections.

The main tool for data collection was a household survey based on a questionnaire, which has been carried out in three different South Eastern districts. The questionnaire focused on themes such as e.g. household structure, household income, health seeking behaviour, costs for medical treatment, and disease prevention methods.
Other techniques included semi-structured interviews and observations. Criteria for the selection of communities for data sampling were suburban and rural settings, sanitary and housing conditions, people's standard of living, and the prevalence of diarrhoeal diseases. Together with his interpreter, the researcher purposely surveyed and interviewed on average ten households per community. Interviews have also been conducted with local health experts.

The findings from the household survey will be statistical analysed with the computer programs Microsoft-Excel and Minitab, and the findings from interviews and observations will be transcribed in accordance to their relevance. The outcomes are analysed and displayed in the following chapters.

Finally, the researcher highlighted the ethical considerations to prove the study's concern for the ethical rights of the communities and people studied. Main issues are the general sensitivity and legitimisation of the subject as well as the question about how the participants can benefit from this study.

5. Analysis of locations, households, and of sanitation standards

5.1 Introduction

The present chapter presents and analyzes the study findings with regard to the selected households in the sub-urban and rural samples. First of all, the main characteristics of the household livelihoods will be described in order to understand the major income earning activities of the members of these households in section 5.2. Secondly, their location and living conditions in terms of housing structures and access to facilities and services, notably sanitation, will be discussed in section 5.3. As the level of sanitation plays an important role in people being at risk to diarrhoeal infections, the sanitation standards will be explored in-depth. Thirdly, in section 5.4, on the basis of the survey, observation, and interview data collected a comparison will be drawn between the two selected samples in order to determine which households are relatively more at risk to diarrhoeal infections. The chapter conclusions are drawn in section 5.5.

5.2 Household livelihoods

According to the household survey and to the researcher's observations, most agricultural activities are almost impossible in the suburban and urban areas and slums due to the lack of land and space available. Therefore, people's livelihoods are mainly shaped by the need to create some form of financial income to purchase their needed commodities and groceries for survival. Subsequently, the dominant forms of livelihoods of the survey's respondents in urban and suburban areas in Uganda are formal and informal small-scale businesses, which offer services like e.g. the trade of fruits, charcoal, and self-brewed alcohol to polishing shoes, while the livelihoods of others is shaped by day labouring, and begging. Day

labouring and low paid physical and service work is the major type of disposable income for most men and their households, while women usually manage all household related activities including caring for children and dependents. Often they also have a small-scale business going on to further support the financial and disposable household income. Women and teenager in urban areas in Uganda often sell newspapers, cell-phone cards, crafts, or food products like e.g. sweets and fruits in the streets and therefore contribute to a large proportion to the informal business sector.

In contrast, people's livelihoods in rural areas are mainly defined through agricultural activities such as e.g. the farming of livestock and crops like bananas, cane sugar, and maize. Day labouring in the formal and informal agricultural sector and subsistence farming are the common forms of disposable income generation. Some people also sell crafts and food items like fruits and vegetables next to major roads. As a high proportion of household livelihoods in rural areas are shaped by subsistence farming only, they are often more vulnerable to seasonal variations like e.g. dry seasons or floods, though, the climatic conditions are relatively stable in most of Uganda due to its geographical position on the equator. However and in contrast to households in suburban slums, rural families and household often own a small piece of land and livestock like e.g. chickens or a cow, and are able to survive therefore through subsistence farming, which makes them less vulnerable to economic and financial fluctuations. Also, people from rural areas often have better access to food such as crops, meat, and dairy products, and the costs for food and housing are, compared to urban areas, much lower.

One major disadvantage of the informal business sector compared to formal employment is the lack of financial and social security. People who base their livelihoods on informal kinds of income don't receive paid holidays or paid sick leave, and are usually not insured against e.g. medical costs or death. For example, if the main "bread-earner" of a household is ill, this situation will have consequences for all household members. Therefore, households often need to find ways to mitigate and cope with unexpected (financial-) crises. According to the survey, money for medical expenses, in both suburban and rural locations, is in most cases extracted from the direct disposable household incomes. If the disposable income is not enough, money is often borrowed from relatives or household items like e.g. the mobile phone or the stereo are sold to create such finances. Though, as financial assets in rural areas, compared to other livelihood assets, are of less importance it is often not possible for households to invest much money in health care. If people in rural areas are in need of

expensive or private medical care they often need to sell other assets like e.g. livestock or a piece of their land to generate money.

Nevertheless, due to the fact that most livelihood assets are gained through the formal and informal business sector, people in urban areas are less affected by seasonal and climatic variations. Though, changes in weather can influence the costs of local food, external factors related to the world trade market have a much larger impact on people's disposable income, especially in urban areas. This is one of the reasons why the urban household incomes fluctuate much more in accordance to inflation rates and disposable money in circulation. Therefore, the disposable incomes of people living off day labouring and begging are very unreliable, and these people are usually more vulnerable to ill-health and to the financial burden of diseases, with regard to the medical poverty trap explained in section 3.4.

When taken into consideration that rural households are less affluent in financial terms, by including the affects of seasonal variations, rural households seem to be more vulnerable to the financial burden of diarrhoeal infections.

5.3 Living conditions and access to health and sanitation facilities

With regard to the household survey, the number of people sharing one household ranges from 2 to 9 household members in suburban communities, and from 2 to 10 household members in rural communities. The average size of a group of household members sharing one household in a rural community is with 4,8 household members slightly higher than to 4,5 household members in sub-urban communities (Table 5.1). Table 5.2 presents the average mode of occupation, of main water source, and of dimensions of housing and property separated by location.

Table 5.1 Household structures by location

Location	Mean No. of household members on average	Mean No. of female household members on average	Mean No. of children below the age of 12 years
Sub-urban *N = 45*	**4,5**	**2,3**	**1,9**
Rural *N = 35*	**4,8**	**3,1**	**1,8**
All *N = 80*	**4,7**	**2,7**	**1,9**

Table 5.2 Mode of occupation, and of water source; and dimensions of housing

Location	Mode of occupation	Dimensions of housing space and of spaces between houses on average	Source of fresh-water on average mode
Sub-urban	**Small-scale business**	**Small**	**Community tap water source**
Rural	**Farming**	**Middle**	**Community tap and ground water source**

Women and children represent the largest groups of household members. The researcher also counted the number of female headed households; however, the number was low on average. The number of children per household below the age of 12 years in suburban and rural communities ranged equally from zero to five children. However, rural households had on average more children, which could be explained by the greater availability of farmed food and by the higher demand in agricultural labour. Out of 45 suburban households, only two households were female headed; and out of 35 rural households, no households turned to be out as female headed. The researcher assumes that the ratio of female headed households could be higher as estimated in this survey, as the sample size was relatively small compared to the population size. It was the impression of the researcher that there is a much higher number of female headed households in suburban and slum areas, which could be related to the higher number of HIV/Aids infections among men in suburban areas.

With regard to informal conversations held with the mothers of households, the rate of children from urban slums who receive basic education is relatively high compared to rural areas; despite the fact that most households struggle to pay the school fees.
Also, security in the slums is only an issue during night time, even if some slums are subject to organised crime. The researcher was able to observe, that the use of narcotic drugs like opium and cannabis is common especially among street children.
Furthermore, rural villages are traditionally governed by a chief and the different districts of a slum are controlled by a community leader who usually belongs to the major ethnic group of the region. He controls most community activities and acts as a communal leader.

Most people in the slums have access to public, private, and traditional health facilities and most medication is available through the private market. As most facilities available within the Ugandan health sector are concentrated in suburban and urban areas, households located in such places have a greater availability and choice of treatment. However, as private medical facilities are usually much better in terms of treatment and hospitalisation,

appropriate and professional medical treatment is still a matter of money and depends on the disposable household income available. Therefore, households or people who have only very limited financial resources available, are usually only able to consult public health services or health services provided by non-governmental organisations, which are mostly free of charge. With regard to interviews held with local physicians, the prevalence of infectious diseases in the slums is generally high and the most common illnesses, especially among children and older people, are acute/viral respiratory infections, measles, and gastrointestinal infections like typhus and hook worms. HIV/AIDS is also a common issue among people living in slums. For example, an interviewed physician from the Mukwano Consultation Clinic in Katanga slum mentioned: "*yes, diarrhoeal diseases are very common here in the slum and the level of sanitation standards is severe, however, diarrhoeal diseases are still more common the rural areas due to the lack of proper functioning medical facilities*".

Access to health care in rural areas is much lower and major health facilities like public and private hospitals are mainly located in urban areas. Health services in rural areas are dominated by public health centres and by some small semi-private health facilities managed by religious missions or by non-governmental organisations like e.g. *Medecins sans Frontieres* (Uganda Ministry of Health 2005). Also, the density of pharmacies in rural areas is much lower. However, the traditional health sector still has considerable influence in some rural places, and often they can be paid with items like food instead of money which again saves the household's finances. Nevertheless, the prevalence of infectious diseases in rural areas such as in the districts Wakiso and Jinja is much higher. Especially children below the age of five years and people older than 60 years suffer often from infections with malaria, HIV/Aids, acute respiratory illnesses, and diarrhoeal diseases like typhus and hook worms. The interviewed physicians also mentioned that sleeping sickness (*African Trypanosomiasis*) is increasing in rural places, especially in north and east Uganda. Outbreaks caused by flaviviruses (e.g. yellow fever) and by viral hemorrhagic fevers like the Ebola and Marburg virus are not uncommon in Uganda's western districts. A major Ebola outbreak had just been embanked before the researcher arrived in Uganda. Malaria, acute respiratory infections, and diarrhoeal infections are the major causes of childhood mortality in rural areas (Uganda Bureau of Statistics 2006).

The researcher observed that the level of sanitation standards in the slums is often very limited and the only facilities are communal latrines and communal water taps, which create a perfect ground for pathogens related to diarrhoeal infections. The urban infrastructure of the piped fresh water and sewage system is only of basic standard and can not adapt fast

enough to the growth of the slums, and the piped water is despite disinfection with chlorine not regarded as drinkable without further treatment such as e.g. boiling or chemical disinfection. Most people often need to queue for a long time until they can fill up their canister with only a limited amount of water. Also, most houses in rural and sub-urban communities lack proper toilet facilities, though, most rural houses have a private latrine, and most urban slums are provided with communal latrines. However, in the urban slums, hundreds of people often need to share one public latrine and often there is no possibility for the user to even wash their hands. Furthermore, due to the lack of adequate sanitation and drainage, babies and small children often play on grounds contaminated with sewage, which probably is one of the reasons why they form the largest group of victims infected with diarrhoeal diseases. Moreover, the relatively small and vulnerable bodies of children suffer more from diarrhoeal infections because they contain less water and their immunity is weaker. Generally, hygienic conditions or at least the overall hygienic situation with regard to the disposal of organic waste, is much better in rural communities.

In rural villages and communities the researcher was able to observe, that the density of the population and their houses and properties is much less, and the amount of people using the same latrine is much lower too. The number of people living under one roof is often much higher in rural places, and their houses are often larger and in a better shape compared to the huts found in the suburban slums. Most people in rural areas live in small villages which usually lack proper sanitation facilities and infrastructure. However, compared to urban areas, most latrines are pit-latrines and are not connected to an (open) sewage system. And more than 12 out of 100 people in rural places have no access to any kind of latrine or toilet (Uganda Bureau of Statistics 2006). Potable water supply is also only basic in rural areas, but most villages and communities possess their own well or borehole and therefore have constant access to clean groundwater, if not contaminated by animal faeces. An increasing number of rural villages are also gaining access to the piped water system as more infrastructure projects are being implemented.

As everywhere in South-East Uganda, rural places are often impacted by floods during the rainy season, and the people live very close to their livestock, which can lead to the contamination of their houses with sewage. A major flood caused by heavy rains had just occurred between the towns of Entebbe and Kampala when the researcher arrived in Uganda, and according to the local supervisor "*this is the best time to arrive in Uganda for research about diarrhoea*", as many people fell sick with diarrhoeal infections due to the flooding of fresh water depots and open sewage canals.

5.4 Comparison of samples

One of the most obvious differences observed by the researcher with regard to rural and suburban housing was that the density of the population and of the housing is extremely high and concentrated in suburban communities in comparison to rural communities. Most people there live in small huts made out of clay or corrugated iron sheets which are build often next to open sewages. Whereas rural houses and properties tend to be larger in size and often also contain some form of land used for the cultivation of crops.

It was the researcher's impression, that with appointment to hygiene and environmental health, rural areas often seemed to have a cleaner and healthier environment, especially in terms of sanitation and sewage disposal as descript in section 5.3. Even if the systems for water supply and sewage disposal are more advanced and developed in the suburban and urban locations, as observed by the researcher, the overall hygienic and sanitary conditions seemed to be much better in the rural villages, which is probably due to the lower population desity and to lower numbers of people who use the same latrines and water sources. Additionally, and with regard to Hunter et al. (1993) stated in chapter 1.4, households in rural locations seem to have more power over their water sources, as the water usually comes from bore holes and wells belonging to the local community, and these water sources are not yet connected to the public water system. Rural households are therefore more likely to protect their water sources against contamination.
However, as the network and the accoutrements of urban health facilities is more advanced, the rate of diarrhoeal diseases is according to one of the interviewed physicians still higher in most rural locations. The prevalence of diarrhoeal infections will be analysed and compared in more detail in the following chapter.

The household survey also revealed that the number of household members is slightly higher in the rural villages as compared to the number of people sharing one household in the suburban slums. Furthermore, when taken into consideration that rural households are less affluent in financial terms (as argued in section 5.2), by including the affects of seasonal variations, rural households seem to be more vulnerable to the financial burden of diarrhoeal infections. Nevertheless, people from rural areas often have a better access to food like crops, meat, and dairy products, and the costs for food and housing are compared to urban areas much lower.

When comparing all the differences in housing, livelihoods, and medical and sanitation facilities between suburban slums and rural locations, the researcher would clearly argue that

rural households are less at risk from diarrhoeal infections, though medical treatment is better in the urban centres.

5.5 Conclusion

According to the findings presented in section 5.3, there are considerable differences between suburban and rural locations as well as between their households and people's livelihoods. In both areas, people lack proper access to fresh water and appropriate sanitation facilities. Interestingly, most of the rural places visited by the researcher had higher sanitation standards when compared to the suburban slums. With regard to the literature reviewed in chapters 1.3 & 1.4 about disease prevalence and prevention, one explanation for this difference could be the extremely high density of households and people located in the slums, followed by the fact that the ratio of people using the same water source and the same latrine is also much higher in suburban slums as compared to rural villages.

The structures of the households showed no major differences between suburban and rural locations, though the household survey revealed that the mean numbers of the total household members and of females living in one household are slightly higher in rural locations.

People's livelihoods and their sources of income differ considerably between suburban and rural areas. Rural livelihoods are usually based on farming and on the agricultural sector, whereas suburban and urban livelihoods are much more diverse in nature, ranging from small-scale businesses to day labouring and begging. These findings correlate with the literature revised about Uganda and its people in section 1.5, and also show that people's livelihoods in suburban locations are more diverse. In contrast, household incomes in rural places are less a subject to fluctuations due to the increased possibility of income smoothing based on subsistence farming.

In conclusion, the analysis of the living conditions and of the medical and sanitation facilities shows that households located in the slums are, despite better medical access, more at risk to diarrhoeal infections due to the severe environmental and sanitary conditions.

6. Analysis of the prevalence of diseases and ill-health

6.1 Introduction

This chapter presents and analyzes the study findings with regard to the prevalence of diarrhoeal infections and ill-health in the sub-urban and rural sample units. First of all, the number and frequency of reported episodes of diarrhoeal symptoms among the households interviewed will be measured in section 6.2, and secondly, the outcomes will be discussed and compared with the location and the mean number of household members in section 6.3. As these findings highlight the mean epidemiological rate of diarrhoeal infections among the households surveyed, the epidemiological rate will be explored in-depth. This section will also continue with the analysis and comparison of the samples, started in section 5.4, in order to determine which households are relatively more at risk to diarrhoeal infections. The chapter conclusions are drawn in section 6.4.

6.2 Disease prevalence and rate of infection

The findings of the household survey displayed below in Tables 6.1 and 6.2 reveal, that the rate of households in which at least one household member suffered at least once in the previous six months from a diarrhoeal infection is, on average, 60% much higher in sub-urban slums as compared to a rate of 42% in rural areas. The researcher assumes, as already mentioned in the previous chapter, that this result is probably created due to the much higher rate of population and housing density in these areas, and due to better sewage disposal in rural areas. Another explanation could be, that the rate of HIV/Aids infections is much higher in suburban and urban areas, and that one of the symptoms of this disease is diarrhoea. However, these assumptions are only speculations and cannot be proven through this survey.

The statistical analysis of the survey also declares that the number of different episodes of diarrhoeal infections is also higher among sub-urban households compared to rural households. These findings presented in Tables 6.1 and 6.2 show a clear contrast to the data of Uganda's Demographic and Health Survey, which argues that more rural households are affected by disease infections (Uganda Bureau of Statistics 2006a). However, the Demographic and Health Survey compares the data from all Ugandan districts, including the very poor ones in Northern and Southern Uganda and the refugee camps situated in rural areas, where infection rates are generally higher as in Uganda's South-Eastern region. This could explain why diarrhoeal infections are statistically more common in rural areas.

According to interviews with medical doctors, children are most affected by diarrhoeal infections and more than half of the victims suffering from diarrhoea are children below the age of five years. Nevertheless, this fact is already widely recognised by health experts, and this finding also correlates with findings presented by the WHO (1996) and by Uganda's Demographic and Health Survey (2006).

Despite the fact that these findings represent a timeframe of six months only, they suggest a generally high prevalence of infectious diseases and of diarrhoea causing pathogens in both rural and sub-urban areas over a longer time period and therefore demonstrate the need for action.

Additionally, the analysis of the survey data declares, that only one of the interviewed households suffered from a case of death which has been related to a diarrhoeal infection. This finding suggests that most diarrhoea causing infections are less severe than infections from other diseases like e.g. malaria or measles, and that their impact might be less dramatic as if impacted by diseases which end more often deadly. Further research on this issue would be necessary to be able to draw any definite conclusions.

Table 6.1 Rate of households impacted by diarrhoeal infections by location

Location	No. of households interviewed	No. of diarrhoea impacted households over past 6 month	Rate of total households	Average household size
Sub-urban	**45**	**27**	**60%**	**4,5**
Rural	**35**	**15**	**42%**	**4,8**
All	**80**	**42**	**51%**	**4,7**

Table 6.2 Rate of infection compared to No. of episodes and type of pathogen

Location	Percentage of households infected	Mean No. of episodes of symptoms of diarrhoea on average among positive households	Mode of common types of pathogens causing diarrhoea on average
Sub-urban ***N = 45***	**60%**	**2,6**	**Salmonella, Typhoid, Worm-infections**
Rural ***N = 35***	**42%**	**1,5**	**Salmonella, Typhoid, Worm-infections**
All ***N = 80***	**51%**	**2,1**	

The most common pathogens causing diarrhoeal infections are according to interviews with experts conducted with local doctors are caused by the novo and rota virus, *Salmonella typhi* and *bacteria*, *Cryptosporidium*, *Shingella enteritis*, and by hookworms such as e.g. *Ancylostoma duodenale*. According to an interview with a paediatrician from the Mulago Hospital in Kampala, more than 50% of all children in rural and in suburban areas suffer from hookworm infections.

The researcher also found out through the same interview, that in response to this high level of infection, the Ugandan Health Ministry launched anti-worm campaigns, where antihelmintic medication is given to all children below the age of six years, basically before they are enrolled in primary-school.

As already outlined in chapter 1.3, infections with hookworms can cause anaemia and therefore reduce the physical and mental development of especially children. Also mentioned in chapter 1.3, a high endemic rate of hookworms can have dramatic impacts on the micro- and macroeconomy. The interviewed paediatrician stated as well, that lots of children in the slums die from infections with measles, compared to high malaria infection rates in rural areas. However, she also said: "*children are still most impacted by diarrhoeal diseases, and they are the ones who are least able to cope with the affects of ill-health*", furthermore "*especially infections with typhus and e.coli are common among young children, and immediate treatment is essential to avoid death*".

When asked about the gender ratio of people infected with diarrhoeal diseases seeking treatment, the interviewed paediatrician interestingly mentioned: "*most patients are male children*". This answer was similar to the answer of the interviewed physician from the Mukwano Consultation Clinic who stated "*most patients are adult males*", though his clinic is a private health facility. However, the researcher is not able to prove if this finding is a result of gender specific disadvantages or if the infection rate of males is simply higher.

Another physician from Mengo Hospital in Kampala stated: "*the number of people infected with diarrhoeal infections is relatively high among the poor people living in the slums, however, this is not only an urban issue*", also "*the lack of clean water and of proper sanitation facilities seems to be the main problem, and people need to be better educated about hygiene practices*".

6.3 Comparison of samples

With regard to prevalence of diarrhoeal pathogens, and with regard to the groups mostly impacted them, the findings from the expert interviews clearly correlate with the findings

presented by the WHO and WaterAid which have been stated in chapter 1.3. As indicated by the literature, children are among the most affected by diarrhoeal infections. Also, poor sanitary standards and a poor knowledge of hygienic practise seems to be a problem, which again are good conditions for the prevalence of diarrhoeal infections with regard to information provided by WaterAid (2007).

The results of the statistical analysis of the household survey clearly show that the rate of diarrhoeal infections is considerably higher in the suburban slums as compared to the rate of infections in the rural areas. Interestingly, this finding stands in contrast to the findings of the Ugandan Bureau of Statistics (2006) presented in chapter 1.3.
Additionally, when comparing this finding to the poor living and sanitary conditions of the slums mentioned in chapter 5.4, it is not surprising that households located in slums are more affected by ill-health. Moreover, this finding correlates with the widely accepted assumption that diarrhoeal infections are strongly related to poor sanitary conditions.
Though, the researcher visited only three different rural locations and therefore can't generalise this finding for all of Uganda.

Nevertheless, sanitary measures in the slums were disastrous as compared to the three villages surveyed, and therefore the researcher sees his assumption made in chapter 5.5 confirmed, and again argues, that households located in the slums are, despite better medical access, more at risk to diarrhoeal infections.

6.4 Conclusion

In conclusion, the analysis of the epidemiological rate of diarrhoeal infections reveals that the surveyed slums have a much higher rate (60%) of households impacted by diarrhoeal infections as compared to the rate of infections of the surveyed rural villages (42%). Also, the mean number of episodes of diarrhoeal infections is higher among sub-urban households (2.6) as compared to rural households (1.5), see Table 6.2.
With regard to the study's findings already outlined, it is suspected that the poor environmental and sanitary conditions found in the slums, are the main cause for the high rate of infections with diarrhoeal diseases. Generally, the rate of diarrhoea causing infections is, on average 51% considerably high, and therefore highlights the need for action.

7. Health seeking behaviour

7.1 Introduction

The present chapter presents and analyses the study findings with regard to people's health seeking behaviour. First of all, the rates of diarrhoea impacted households which consulted public, private, and alternative health facilities as well as the related costs for medical treatment, and transport used to reach the facility will be analysed in section 7.2. Secondly, a chi-square test and a regression and scatter plot analysis will be carried out in section 7.3, to find out, if the total medical treatment costs, respectively, if the behaviour of paying for such services, is related to the direct financial and disposable household income. Thirdly, the researcher will analyse in section 7.4 the costs for special food, which is often needed by infected patients for recovery from ill-health. Section 7.5 will analyse disease prevention methods of the households as well as the related cost burdens. In order to find out, if the costs for disease prevention methods are related to the direct disposable household income, a chi-square test and a regression and scatter plot analysis will be carried out in section 7.6. Finally, in section 7.7, on the basis of the survey, observation, and interview data collected a comparison will be drawn between the two selected samples in order to determine and to discuss any differences found, followed by the chapter's conclusion.

7.2 Analysis of the health seeking behaviour

The findings from the household survey and its different variables and concepts defining the health seeking behaviour are displayed below in Tables 7.1 to 7.10 and in Figure 7.1 and 7.2 with regard to the study's findings. The direct disposable income and spending is presented in the local currency Ugandan Shilling (UGX), which is currently in relation to US$ 1 UGX 1,700. Also, this study considers, in accordance with the Ugandan *Health Sector Strategic Plan 2*, all non-public health facilities as private-sector health facilities. This includes as well missionary hospitals and health facilities operated by non-governmental organisations.

The rate of households in rural communities impacted by diarrhoeal infections which were seeking professional medical treatment is according to the survey (see Table 7.1) with 87% considerably higher as compared to households in sub-urban communities. On average, most victims (74%) of diarrhoeal infections are seeking professional medical attention.

The percentage of people who consulted a traditional healer was according to the household survey surprisingly very low (see Table 7.1). The interview held with the

physician from the private Mukwano Consultation Clinic confirmed this finding: "*the rate of people who consulted a traditional healer only is declining since the Ugandan government disposed most user fees for the public health system. However, in very remote regions of the country are traditional healers still very common, especially in Southern and Western Uganda*".

Table 7.1 Health care seeking behaviour

Location	Percentage of positive cases who took up professional medical treatment	Percentage of positive cases who took up alternative treatment
Sub-urban *N = 27*	**61%**	**8%**
Rural *N = 15*	**87%**	**0%**
All *N = 42*	**74%**	**4%**

As described in Table 7.2, the average rate of people being affected by diarrhoeal infections who consulted a pharmacist only was with 13% considerably low too. Still, households located in sub-urban locations consulted pharmacies on average more often.

Table 7.2 Pharmacy consultation only

Location	No. of diarrhoea impacted households who only consulted a pharmacy for treatment	Percentage of diarrhoea impacted households who only consulted a pharmacy for treatment
Sub-urban *N = 27*	**3**	**11,1%**
Rural *N = 15*	**1**	**6,7%**
All *N = 42*	**4**	**9,5%**

The transport time for people to reach professional medical care has in all cases been less than six hours (see Table 7.3), which indicates that the network of medical facilities is relatively well expanded. Also, the financial amounts spend for transportation is on average not very high, and don't seem to have such a big impact on the household's savings. Costs for transport range in suburban areas from only 500 UGX to 2,000 UGX (US$ 0.30 – 1.18), and in rural areas from 400 UGX to 3,000 UGX (US$ 0.24 – 1.77).

Most people seeking medical attention are, especially in sub-urban areas, accompanied by a household member. Though, most patients who are being accompanied by somebody are children who come together with their mothers. In contrast, adults suffering from

diarrhoeal infections are almost never accompanied by another household member, whereas children are almost always accompanied by someone.

Table 7.3 Time, transport, and company

Location	Mean time spend for examination, treatment, transport on average	Percentage of positive cases who have been accompanied	Money spent on transport to the doctor/hospital on average
Sub-urban *N = 27*	**< 6 h**	**88%**	**1.000 UGX**
Rural *N = 15*	**< 6 h**	**57%**	**1.730 UGX**
All *N = 42*	**< 6 h**	**73%**	**1.365 UGX**

During the process of surveying and due to observations, the researcher also found evidence which indicates that the health seeking behaviour within a household or a family is often influenced by certain hierarchies. Often, only the man or father of the family makes major decisions and decides about major household spending or if a household member is brought to a hospital. Adult household members impacted by severe and bloody diarrhoea are almost always granted permission for ambulant and stationary medical treatment. In contrast, it is suspected that especially in very poor households children are often denied access to costly medical treatment and are therefore suffering most. These inequalities based on age are in line with observations made by Haddad et al. (1993), Sauerborn et al. (1996), Garg et al. (1998), who argue (see chapter 4.3) that the underlying reason for this issue is that the household's income spent for healthcare is usually concentrated on productive members instead of spreading it between all indigent household members.
The interviewed physician from the Mukwano Consultation Clinic also mentioned that most of his patients are adults, though his clinic is a private health facility which charges UGX 20.000 ($12) per standard consultation. Also, this finding confirms the findings of Su et al. (2006) who argue that ill-health is usually associated with higher expenses for medical care when adult household members are involved (see chapter 4.3).

In contrast to the survey results gained from rural locations, is the rate of people affected by diarrhoeal infections in sub-urban areas who consulted a public health facility with 63% almost double compared to the same rate of people living in rural areas (see Table 7.4). Even if the medical treatment in public hospitals is (according to the researcher's observations) often very basic and inadequate, and most public hospitals lack proper medication and drugs. According to the interview held with the paediatrician from the public

Mulago Hospital, private health facilities often also offer a better cost-performance ratio as most fees for private medical treatment already include the costs for medication and drugs. In contrast to patients seeking treatment at public health facilities, who usually get

Table 7.4 Medical treatment costs

Location	Percentage of positive cases who used public health facilities	Money spend for treatment only on average	Money spend for medication/drugs from pharmacies only on average
Sub-urban ***N = 27***	**63%**	**8.280 UGX**	**2.000 UGX**
Rural ***N = 15***	**29%**	**11.400 UGX**	**2.940 UGX**
All ***N = 42***	**46%**	**9.840 UGX**	**2.470 UGX**

medication prescribed which the public facility can't afford and which are not available at this facility. But often, most people can't afford them either, and as a result of poor medical supply, they need to abstain from them and therefore receive inadequate treatment. However, public health facilities provide a prophylaxis against worm infections, and most major vaccinations against childhood infections are free of charge for all children under the age of six. Unfortunately, according to the interview, a lot of poor households in sub-urban and rural areas are not aware about these complementary services.

According to the household survey, costs for private or semi-private health services seem to be much higher in suburban and urban areas. This is very likely due to the fact, the most private-sector health facilities in rural areas are dominated by non-governmental organisations like e.g. mission hospitals. In contrast, most private-sector health facilities in urban areas are dominated by private health practitioners (PHPs), who charge much higher fees. The costs for medical treatment only ranged in suburban areas from zero to 40,000 UGX (US$ 23.53) and above, and in rural areas from zero to 15,000 UGX (US$ 8.82). The expenses for professional medical treatment of diarrhoeal infections are on average slightly higher in rural areas, but make up a huge proportion of the disease related economic burden in both, rural and sub-urban areas. The costs for medication only are much lower as compared to the treatment costs. They ranged from 500 UGX to 16,000 UGX (US$ 0.29 – 9.41) in suburban areas, and from 500 UGX to 10,000 (US$ 0.29 – 5.88) in the villages. Although, according to interviews, some people collect traditional herbs for self treatment, and therefore don't have any expenses.

Another issue discussed in all interviews, is the fact that most public doctors and hospitals don't apply laboratory tests to properly diagnose the exact pathogen which caused

the infection. Public health facilities often lack finances, proper diagnostic equipment, and expertise to carry out laboratory tests. However, a physician from Mengo Hospital mentioned: "*the situation is improving in sub-urban and urban areas. For example, Uganda's capital Kampala developed a good network of public and private laboratories, and laboratory specific studies and university courses are being extensively supported through a government education scheme*". Still, doctors can often only guess the reason for the infection based on clinical symptoms, and often link symptoms of diarrhoea to malaria or to bacterial infections and therefore almost always apply a treatment based on the availability of either chloroquine, Coartem® (*artemether-lumefantrine*) or on antibiotics like Ciprofloxacin or Doxicycline, or on a oral dehydrations therapy (ORT). Also, as most diarrhoeal infections are treated in a similar way anyway and often even with the same medication, standard treatment procedures based only on symptoms are still a much better solution as compared to doing nothing.

7.3 Chi-square test, regression and scatter plot analysis

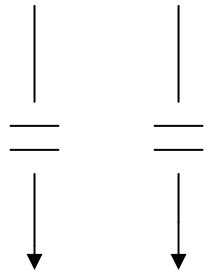
To find out, if the total medical treatment costs (including costs for medications/drugs, transport, and special food), respectively if the behaviour of paying for such services, are related to the direct disposable household income, a chi-square test and a regression and scatter plot analysis have been carried out.

Table 7.5 Association between medical treatment costs / direct household income

Chi-Square Test: test for association between total medical treatment costs and direct household income

```
Expected counts are printed below observed counts
Chi-Square contributions are printed below expected counts

               C1          C2    Total
    1         500       30000    30500
          2594,87    27905,13
         1691,212     157,264
```



```
   31       32000     180000   212000
         18036,46  193963,54
        10810,346   1005,243
   N
Total      378000    4065000  4443000

Chi-Sq = 362782,528; DF = 30; P-Value = 0,000
```

Null hypothesis: there is an association between the total medical costs and the direct household income.

Result: the null hypothesis can be rejected as the P-value is below 5%

Conclusion: there are no associations between the total treatment costs and the direct household income. Therefore, the investment in medical treatment is not dependent on the household income.

Table 7.6 Correlation between medical treatment costs and direct household income

Regression Analysis: Medical treatment costs versus Direct household income

```
The regression equation is
Medical treatment costs = 6265 + 0,0452 Direct household income

Predictor            Coef  SE Coef     T      P
Constant             6265     4028  1,56  0,131
Household income  0,04521  0,02571  1,76  0,089

N = 31  S = 12270,3   R-Sq = 9,6%   R-Sq(adj) = 6,5%

Analysis of Variance

Source          DF          SS          MS     F      P
Regression       1   465584782   465584782  3,09  0,089
Residual Error  29  4366253928   150560480
Total           30  4831838710

                  Medical
     Household  treatment
Obs     income      costs    Fit  SE Fit  Residual  St Resid
  9     150000      40000  13047    2257     26953      2,23R
 19      40000      40000   8074    3216     31926      2,70R
```

Null hypothesis: the population correlation between the total medical treatment costs and the direct household income is zero.

Results: the Null hypothesis cannot be rejected as the P-value is above 5% and the regression square is only 9.6%.

Conclusion: the population correlation is not significantly greater than zero, and there is no linear relationship between X and Y for each value.

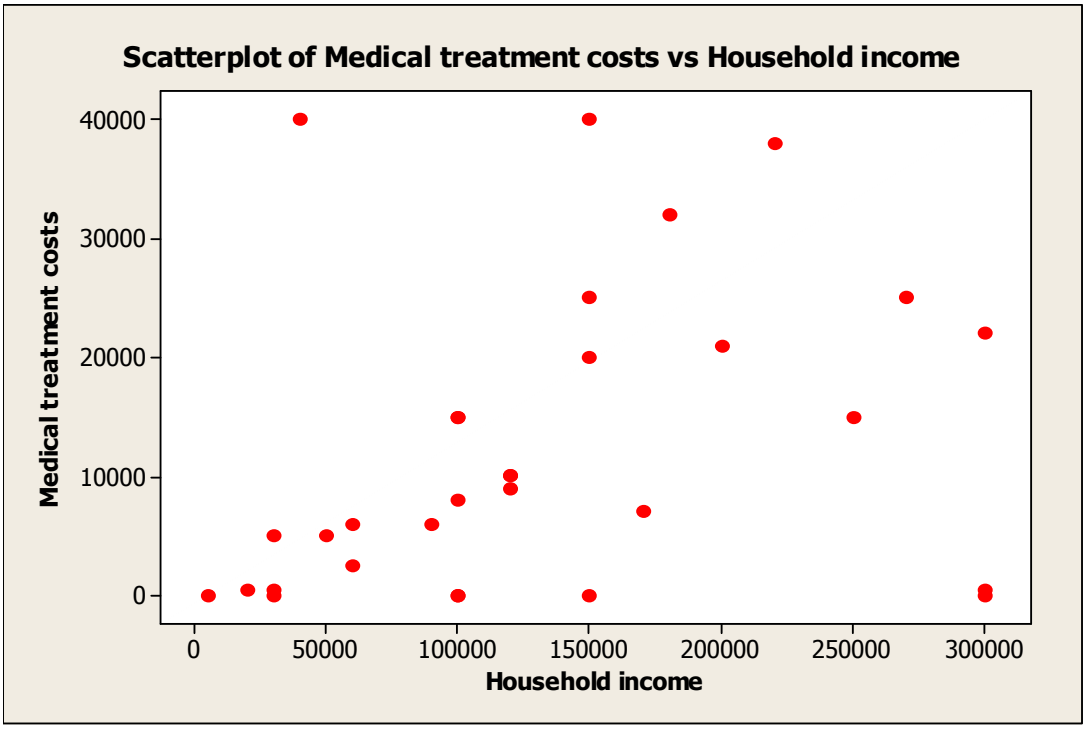


Figure 7.1 **Scatterplot of medical treatment costs vs. direct household income**

The results outlined in Tables 7.5 and 7.6 and in Figure 7.1 reveal, that there are no associations or correlations between the total medical treatment costs and the direct disposable household income. Also, the population correlation between both variables is almost zero. However, by close inspection of the scatter plot (Figure 7.1), and by excluding the most extreme outliers, the scatter plot analysis reveals a weak association between the total medical costs and the total direct disposable household income.

7.4 Special food

Many households affected by ill-health through diarrhoeal infections changed food consumption patterns, either as part of the victim's therapy or to prevent future infections.

The statistical analysis of the household survey reveals, that special food based on a high quality and on a high nutrition content like e.g. beef, fresh vegetables, milk powder, or vitamin tablets is usually more expensive, and can (as presented in Table 7.7) make up a high proportion of the total treatment costs and of the economic burden caused by diarrhoeal infections. According to the survey's findings, costs for special food in suburban areas and in slums ranged from zero to 40,000 UGX (US$ 23.53) compared to a maximum price of 30,000 UGX (US$ 17.65) in rural areas. Also, more households in rural areas invest in special food after being hit by diarrhoeal infection, compared to households in sub-urban areas. Moreover, the costs for special food are on average nearly as high as for professional

medical treatment. However, especially households in rural communities are often able to farm and produce their own food and can therefore subsidise financial losses through this ability. Therefore, it is not surprising that the rate of people in rural communities who required special food is 24% higher as compared to the rate in suburban communities (see Table 7.7). Moreover, rural households often sell their agricultural surplus, and therefore

Table 7.7 Special Food

Location	Percentage of affected households who required special food	Money spend on special food on average per month
Sub-urban *N = 27*	**30%**	**11.700 UGX**
Rural *N = 15*	**54%**	**10.080 UGX**
All *N = 42*	**42%**	**10.890 UGX**

increase their risk-economic ability, which gives them a strong advantage compared to their urban counterparts. However, this procedure can be influenced by seasonal variations and rural households can therefore not always rely on their own farm output.

According to the household survey, the expenses for special food are among the highest, apart from disease prevention costs and medical treatment costs. Therefore, unplanned household expenses for special food can cause an enormous economic burden for households, especially for suburban and urban households.

7.5 Disease prevention methods

According to the household survey most people in rural and in sub-urban areas are aware about the prevalence of infectious diseases, and about the fact that the piped water is not drinkable, therefore most households (about 95%) apply disease preventive measures.

The most common disease prevention methods, mentioned by households during the survey, are the boiling of water, the use of mosquito nets, and the appliance of hygienic measures like hand-washing and the use of soap. According to the survey, out of 45 interviewed households in suburban communities 34 households (76%) boiled their water before using it, 23 households (50%) used soap when washing their hands, 12 households (26%) used mosquito nets during the night, and 5 households (11%) even used chemicals (e.g. purification tablets based on silver ions, chlorine, and natriumdichlorisocyanurat) for water treatment.

In contrast, out of 35 interviewed households in rural communities 25 households (71%) boiled their water, 22 households (63%) used soap, 13 households (28%) used mosquito nets, and 3 households (8%) used chemical prevention methods. One household head explained, that he disinfects his water by mixing it with aloe-Vera before drinking it. The analysis shows, that boiling of water and chemical treatment for water disinfection are more popular among suburban households. Though, water purification tablets are expensive and often not available in rural areas. Interestingly, rural households use on average 13% more soap for personal hygiene compared to suburban households.

Furthermore and according to the cross tabulation (see Table 7.8 & 7.9), the results from the survey clearly show that households which have a higher disposable income suffer much less from diarrhoeal infections (see Table 8.1 in the following chapter).
Additionally, disease prevention techniques can be considerably expensive with regard to the survey's outcomes, as people e.g. need to by charcoal to boil water or they need to buy soap for personal hygiene. Households in sub-urban communities invest on average more money in disease prevention compared to households in rural communities. The reason for this could be the fact, that the rate of infections is much higher in sub-urban areas.
On average, about 10% of the total monthly household income in rural and sub-urban areas is being invested in disease prevention methods.

Table 7.8 Rate of infection versus investments in disease prevention 1

Location	Percentage of mean infection rate *N = 80*	Money spent for disease prevention measurements on average per month - positive cases only *N = 42*	Money spent for disease prevention measurements on average per month - negative cases only *N = 38*
Sub-urban	**60%**	**10.330 UGX**	**20.594 UGX**
Rural	**42%**	**9.375 UGX**	**12.313 UGX**
All	**51%**	**9.853 UGX**	**16.454 UGX**

Table 7.9 Rate of infection versus investments in disease prevention 2

Location	Percentage of mean infection rate *N = 80*	Money spent for disease prevention measurements on average per month - all cases	Total rate of disease prevention costs compared to the total direct income
Sub-urban	**60%**	**15.462 UGX**	**13.70%**
Rural	**42%**	**10.844 UGX**	**8.30%**
All	**51%**	**13.154 UGX**	**11.0 %**

7.6 Chi-square test, regression and scatter-plot analysis

To find out, if the costs for disease prevention methods, respectively if the behaviour of investing in such techniques, are related to the direct disposable household income, a chi-square test and a regression and scatter plot analysis have been carried out. The results (which are outlined below in Tables 7.10 and 7.11 and in Figure 7.2) reveal that there are no associations or correlations between the total disease prevention costs and the disposable household income. Also, the population correlation between both variables is almost zero. Though, households with an income above the average generally invest more in disease prevention methods. Most households, including the poor ones, adapt their level of disease prevention efforts to the environmental conditions they live in. Also, by close inspection of the scatter plot (see Figure 7.2), and by excluding the most extreme outliers, the scatter plot analysis reveals a weak association between disease prevention costs and the total direct disposable household income. Still, the result of the scatter plot analysis is clearly negative due to the high number of outliers.

Table 7.10 Association between disease prevention costs and household income

Chi-Square Test: Association between Disease prevention costs and direct household income

```
Expected counts are printed below observed counts
Chi-Square contributions are printed below expected counts

          Disease
       prevention  Household
            costs     income     Total
    1        2000      30000     32000
           2304,88   29695,12
            40,329      3,130

   80        3500      158000    161500
          11632,46  149867,54
          5685,544    441,302
   N
Total      919000    11840000  12759000

Chi-Sq = 927454,662; DF = 79; P-Value = 0,000
```

Null hypothesis: there is an association between the costs for disease prevention

methods and the direct household income.

Result: the null hypothesis can be rejected as the P-value is below 5%

Conclusion: there are no associations between the costs for disease prevention methods and the direct household income. Therefore, the investment in disease prevention is not dependent on the household income.

Table 7.11 Correlation between disease prevention costs and household income

Regression Analysis: Disease prevention costs versus Household income

```
The regression equation is
Disease prevention costs = 2995 + 0,0574 direct household income

Predictor            Coef  SE Coef     T      P
Constant             2995     2871  1,04  0,300
Household income  0,05738  0,01603  3,58  0,001

N = 80   S = 14465,9   R-Sq = 14,1%   R-Sq(adj) = 13,0%


Analysis of Variance

Source          DF           SS          MS      F      P
Regression       1   2683138041  2683138041  12,82  0,001
Residual Error  78  16322349459   209260890
Total           79  19005487500

                  Disease
     Household  prevention
Obs     income       costs    Fit  SE Fit  Residual  St Resid
 19     320000       52000  21358    3196     30642      2,17R
 34      90000       50000   8159    1865     41841      2,92R
 43     200000       50000  14471    1819     35529      2,48R
 45     300000      100000  20210    2924     79790      5,63R
 48     650000        3500  40294    8206    -36794     -3,09RX
```

Null hypothesis: the population correlation between the costs for disease prevention and the direct household income is zero.

Results: the Null hypothesis cannot be rejected as the P-value is above 5% and the regression square is only 14.1%.

Conclusion: the population correlation is not significantly greater than zero, and there is no linear relationship between X and Y for each value.

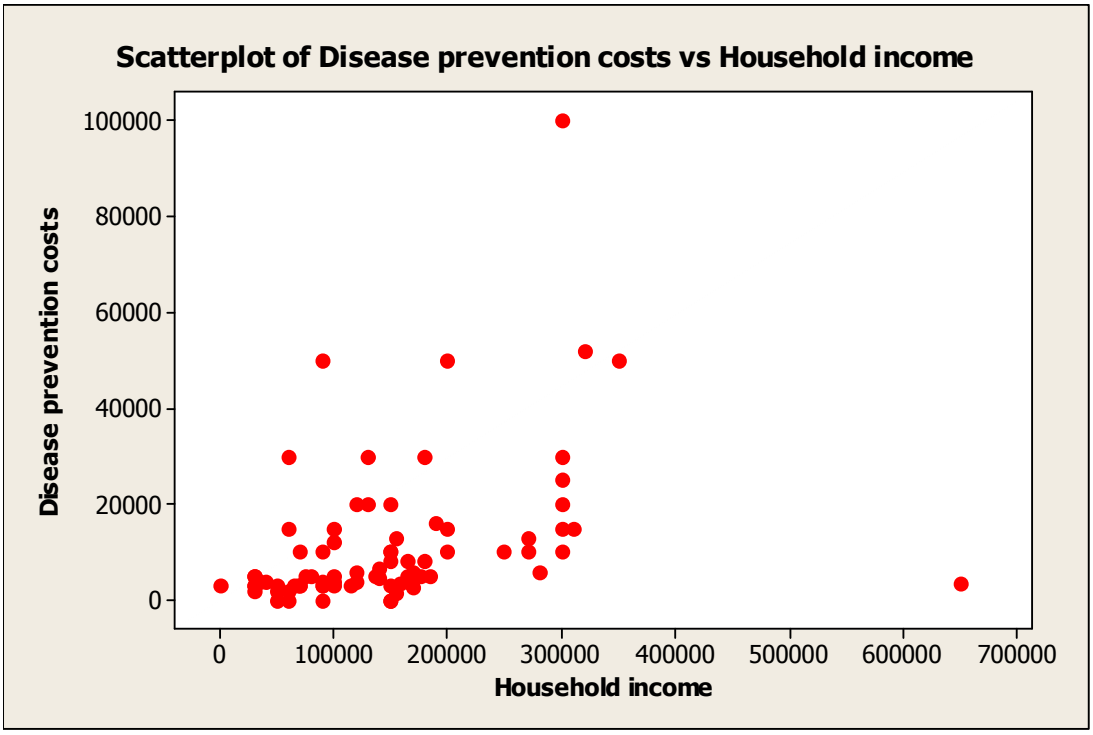


Figure 7.2 **Disease prevention costs vs. direct household income**

7.7 Comparison of samples and conclusion

The findings from the household survey clearly show some differences between the slums and the rural villages with regard to health seeking behaviour and with regard to disease prevention methods.

With regard to the analysed survey data, the analysis of the health seeking behaviour reveals that on average 74% of people suffering from symptoms of diarrhoea consulted for professional medical treatment. Interestingly, the rate is with 87% slightly higher in rural locations as compared to the rate of 61% in sub-urban communities. As the health sector is less developed in rural areas, the only explanation for this outcome the researcher could think of is that maybe that in rural places the diarrhoeal infections and their pathogens are on average more severe as compared to most infections in suburban places. However, as this study implies no laboratory analysis, the researcher can only assume this suspicion.

Furthermore, the rate of people affected by diarrhoeal infections in sub-urban areas who consulted a public health facility is with 63% almost double as high as compared to the same rate of people living in rural areas (see Table 7.4). This finding is probably explained by the fact that costs for private or semi-private health services seem to be much higher in suburban and urban areas. Also, most private-sector health facilities in rural areas are dominated by non-governmental organisations like e.g. mission hospitals. In contrast, most private-sector health facilities in urban areas are dominated by private health practitioners (PHPs), who

charge much higher fees. Also, competition between the private health facilities is much greater in urban areas as observed by the researcher.

With regard to the chi-square test and the regression and scatter-plot analysis, the researcher was not able to find any associations between the medical treatment costs and the direct disposable household income. This finding indicates that the health seeking behaviour is not always connected to the household's wealth, but to the severity of the disease. Though, as the study analysed the disposable household income only, it may underestimates the consumption levels of the rural poor and their ability for consumption smoothing. The researcher recons, that the outcomes might very well be different when another measure of household income would have been used.

The times for the patient's transportation to the health facilities were in all cases below six hours, and none of the interviewed patients paid considerable high amounts for it. The only small difference observed was, that patients from rural locations pay on average UGX 1,000 ($0.60) more for transportation to a health facility, which is probably due to the fact that the network of health facilities in rural areas is less dense, and that distances between the health facilities are larger as compared to urban areas. Nevertheless, even small amounts contribute to the total financial burden caused by the diarrhoeal infection and have therefore been taken into consideration. Meanwhile, the low figures for transport time and costs are probably explained by the researcher's choice for research locations near (max. 5 kilometres) health facilities.

The analysis of the expenses for special food revealed, that less than 42% of the surveyed households, which have been impacted by a diarrhoeal infection, required special food. However, the costs for special food were much higher in the sub-urban locations as compared to the rural villages. This is may explained due to the fact, that most livelihoods of rural households are based on subsistence farming, and that the prises for food are therefore lower in rural areas. Also, more households in rural areas demanded special food after being hit by diarrhoeal infection, compared to households in sub-urban areas.
Moreover, the costs for special foods are on average nearly as high as for professional medical treatment and therefore contribute to a very high proportion to the total cost burden of diarrhoeal infections.

Furthermore, the researcher found out through his survey that almost all households in suburban and in rural household apply some kind of disease prevention method. Interestingly, the rate of households in sub-urban and in rural areas which boiled water for disinfection, which used mosquito nets during nights, and which used chemicals for

disinfection was almost equal. Only the rate of households, which used soap when washing hands, was with 63% higher in rural communities as compared to the sub-urban communities. The chi-square test, the regression and the scatter-plot analysis revealed that there is no clear association between the direct disposable household income and the costs for disease prevention methods. One explanation for this finding could be, that the prevalence of pathogens and of their hosts is so high in certain areas (like e.g. in slums) that the households have no choice and are constrained to apply disease prevent methods if they don't want to be impacted by ill-health. Generally, the costs for disease prevention methods are very high and also contribute to a large proportion to the total cost burden of diarrhoeal infections.

Concerning the answering of the study's research questions, and with respect to the findings made within this chapter, the researcher is now able to answer the first, and partly, the second sub-question, thus: rural households seem to prefer private and traditional health care as compared to sub-urban households which prefer public health care. Though, this conclusion is based only on quantitative findings, which is why the researcher believes, that this outcome is less influenced by choice but by the availability and by people's possibilities to access public, private, or alternative health care facilities.

8. Economic burden of diarrhoeal infections on households

8.1 Introduction

This chapter presents and analyses the study findings with regard to the household's economic and financial burden caused through diarrhoeal infections. First of all, the overall financial burden for the sub-urban and rural households will be assessed through a statistical analysis in section 8.2. Secondly, a chi-square test, a regression and a scatter-plot analysis will be conducted in section 8.3 to find out, if the total disease related costs are related to the disposable household income. Thirdly, in section 8.4, on the basis of the household survey, a comparison will be drawn between the two selected samples in order to determine which households are financially more impacted by the burden of ill-health and by diarrhoeal infections, followed by the chapter's conclusion.

8.2 Analysis of the financial impact

As already outlined in chapter 5.2, people's livelihoods in rural areas are dominated by farming, and livelihoods in sub-urban and urban areas are mainly dominated by small-scale

and informal businesses, followed by day labouring and begging. Interestingly and according to the analysed results of the household survey, people in rural areas seem to earn on average a little bit more money (see Table 8.1) compared to people who work in the slums. Nevertheless, one should keep in mind, that Uganda's South-Eastern rural districts are relatively well developed (for African conditions) due to large-scale industrial farming activities, whereas paid labour is difficult to find in the slums or in refugee camps. Furthermore, rural communities have the major advantage that they can produce their own food and they can sell their agricultural surplus to the urban centres. However, the direct income range in suburban areas is, according to the survey, with zero to 650,000 UGX (US$ 382) larger than the direct income range in rural areas, which is between 20,000 and 350,000 UGX (US$ 12 – US$ 206); however, the number of working household members is higher in rural areas. These findings also correlate with the data presented in Uganda's National Household Survey (Uganda Bureau of Statistics 2006b).

Table 8.1 Income versus rate of infection

Location	Percentage of mean infection rate *N = 80*	Direct income on average per month - positive cases *N = 42*	Direct income on average per month and per household capita - negative cases *N = 38*	Direct income on average per month and per household capita - all cases *N = 80*
Sub-urban	**60%**	**113.000 UGX**	**135.500 UGX**	**124.250 UGX**
Rural	**42%**	**130.000 UGX**	**220.000 UGX**	**175.000 UGX**
All	**51%**	**121.500 UGX**	**177.750 UGX**	**149.625 UGX**

Table 8.2 Income ratio between infected and uninfected households and working household members

Location	No. of working household members on average *N = 80*	Direct income on average per month and per household capita - positive cases *N = 42*	Direct income on average per month and per household capita - negative cases *N = 38*	Direct income on average per month and per household capita - all cases *N = 80*
Sub-urban	**1**	**113.000 UGX**	**135.500 UGX**	**124.250 UGX**
Rural	**2**	**130.000 UGX**	**220.000 UGX**	**175.000 UGX**
All	**1,5**	**121.500 UGX**	**177.750 UGX**	**149.625 UGX**

Moreover, the results from the cross tabulation in Tables 8.1 and 8.2 indicate, that the direct disposable income of most households which suffered from diarrhoeal infections is lower on average compared to the income of households which didn't suffered from ill-health and diarrhoeal infections in the previous six month of the survey.

According to the results of the survey outlined in chapter 7, households impacted by diarrhoeal infections suffer in financial terms most from the direct costs for professional medical treatment and from the costs for special food, if required. Additionally, after counting all the different expenses caused through the diarrhoeal infection together, such as e.g. costs for medical treatment, transportation, medication, and special food, the results reveal, that the total rate of disease related expenses per episode of diarrhoeal infection, compared to the total direct and monthly disposable household income, makes up on average more than 20% of the total disposable household income (see Table 8.3). And if counted together with the total costs for disease prevention methods, the total rate of disease related expenses, compared to the total household income, makes up on average even more than 30% of the total disposable household income. Therefore, the study's findings suggest that diarrhoeal infections do have an enormous economic impact on individuals and on household's finances.

Table 8.3 Total financial burden caused by diarrhoeal infections on households

Location	Total rate of disease prevention costs compared to the total income	Total rate of disease related costs compared to the total income excl. prevention costs	Total rate of disease related costs compared to the total income incl. prevention costs
Sub-urban ***N = 45***	**13,70%**	**20,30%**	**34.00%**
Rural ***N = 35***	**8,30%**	**20,21%**	**29,51%**
All ***N = 80***	**11,00%**	**20,21%**	**32,21%**

The direct financial burden caused by diarrhoeal infection has been set in relation to the direct and disposable monthly household income on average. However, when the total financial disease burden is compared to the direct household income over a longer time period such as e.g. one year or longer, the total financial disease burden will be more evenly spread too and therefore becomes less severe. Though, this depends on the household's ability and strategies to cope with the economic burden, on the number of episodes, and on its ability to evenly spread the financial burden over several months. Nevertheless, this calculation has measured only the direct financial costs created through diarrhoeal infections,

but not the indirect costs like e.g. lost productive time and power. Therefore, the real economic burden caused by ill-health would probably be much higher, if all variables would have been taken into consideration.

8.3 Chi-square test, regression and scatter-plot analysis

To find out, if the total disease related costs are related to the direct disposable household income, a chi-square test and a regression and scatter plot analysis have been carried out. The results (which are outlined below in Tables 8.4 and 8.5 and in Figure 8.1) reveal that there are no statistical associations or correlations between the total diseases related costs and the direct disposable household income. Also, the population correlation between both variables is almost zero. However, this does not mean, that ill-health caused though diarrhoeal infections has no economic impact. It basically means that the level or amount of disease related costs is not dependent on the disposable household income. But again, by close inspection of the scatter plot (see Figure 8.1), and by excluding the most extreme outliers, the scatter plot analysis reveals a weak association between the total disease related costs and the total direct disposable household income.

Table 8.4 Association between total disease related costs and direct household income

Chi-Square Test: Association between total disease related costs and direct household income

Expected counts are printed below observed counts
Chi-Square contributions are printed below expected counts

	Total disease related costs	Household income	Total
1	2500	30000	32500
	6074,33	26425,67	
	2103,249	483,463	
31	17000	180000	197000
	36819,78	160180,22	
	10668,821	2452,385	
N			
Total	934400	4065000	4999400

```
Chi-Sq = 436133,869; DF = 30; P-Value = 0,000
```

Null hypothesis: there is an association between the total disease related costs and the direct household income.

Result: the null hypothesis can be rejected as the P-value is below 5%

Conclusion: there are no associations between the total disease related costs and the household income. Therefore, the investment in better health is not necessarily dependent on the direct household income.

Table 8.5 Correlation between disease related costs and direct household income

Regression Analysis: Total disease related costs versus Household income

```
The regression equation is
Total disease related costs = 19882 + 0,0782 direct household income

Predictor            Coef  SE Coef     T      P
Constant            19882     6760  2,94  0,006
Household income  0,07824  0,04315  1,81  0,080

S = 20595,8   R-Sq = 10,2%   R-Sq(adj) = 7,1%

Analysis of Variance

Source          DF           SS          MS     F      P
Regression       1   1394559800  1394559800  3,29  0,080
Residual Error  29  12301475684   424188817
Total           30  13696035484

                 Total
                disease
     Household  related
Obs     income    costs    Fit  SE Fit  Residual  St Resid
 11     300000    85000  43355    8172     41645      2,20R
 13      90000    70000  26924    4103     43076      2,13R
```

Null hypothesis: the population correlation between the total disease related costs and the household income is zero.

Results: the Null hypothesis cannot be rejected as the P-value is above 5% and the regression square is only 10.2%.

Conclusion: the population correlation is not significantly greater than zero, and there is no linear relationship between X and Y for each value.

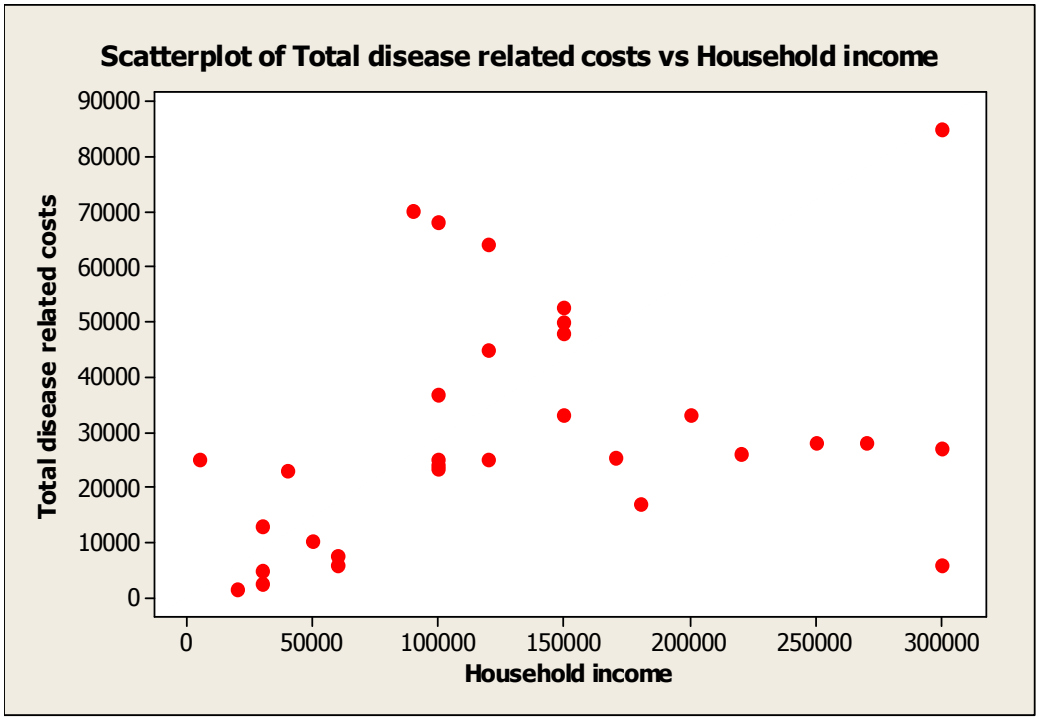


Figure 8.1 **Total disease related costs vs. direct household income**

8.4 Comparison of samples and conclusion

Interestingly, when the disposable household income is set in comparison to the location the survey reveals, that people in rural areas seem to have a higher income compared to people who live in the sub-urban slums. Nevertheless, one should keep in mind that the unemployment rate is relatively high in the slums, and as mentioned in chapter 5.2 the income in urban areas fluctuates more. Furthermore, rural communities have the major advantage that they can produce their own food as most of their livelihoods are based on subsistence farming, and they can sell their agricultural surplus to the urban centres. However, the financial income range is when set in comparison to the location, much larger in the sub-urban areas, which is not surprising when considering that most livelihoods there are based on small-scale and service industries. In contrast, the number of working household members is higher in rural areas, which is most likely explained by the fact that most rural households gain their income from agricultural activities.

Moreover, the results from the cross tabulation in Tables 8.1 and 8.2 indicate, that the direct disposable income of most households which suffered from diarrhoeal infections is lower on average compared to the income of households which didn't suffered from ill-health and diarrhoeal infections in the previous six month of the survey. This finding could indicate that household incomes decreased through the burden of the diarrhoeal infection, or that the household got impacted because of limited finances available. The fact is, with

regard to the medical poverty trap explained in chapter 3.4 by Whitehead et al. (2001), that this finding indicates that ill-health is somehow related to poverty and low incomes. Also, it was found out that there are no statistical associations or correlations between the total disease related costs and the direct disposable household income. This means that low income households suffer more from the burden of ill-health when seen from an economic perspective.

Additionally, after counting all the different expenses caused through the diarrhoeal infection together, the results reveal, that the total rate of disease related expenses per episode of diarrhoeal infection, compared to the total direct and monthly disposable household income, makes up on average more than 20% of the total disposable household income. And if counted together with the total costs for disease prevention methods, the total rate of disease related expenses, compared to the total household income, makes up on average even more than 30% of the total disposable household income. The financial burden caused through ill-health is, when compared between the locations, slightly higher for the sub-urban household. Supported by the comparisons made in chapters 5.4 and 6.3, this outcome suggests again, that households located in slums are relatively more at risk to the financial burden of ill-health. However, and as mentioned already in the previous chapter, as the study analysed the disposable household income only, it may underestimates the consumption levels of the rural poor and their ability for consumption smoothing. The researcher recons, that there is a potential that the outcomes might very well be different when another measure of household income would have been used.

In addressing the research question, we can now argue that diarrhoeal infections have an enormous impact on household finances, in both, sub-urban and rural areas. With regard to Prescott (1999) stated in chapter 1.2, a cost burden of more than 10% can be catastrophic for households, therefore the results from this study indicate that diarrhoeal infections and ill-health have a considerable potential to increase poverty among the people which are already poor, regardless of the location.

9. Risk-economics and coping strategies at the household level

9.1 Introduction

The present chapter presents and analyzes the study findings with regard to the risk-economics and coping strategies applied by the households in the sub-urban and rural samples. The risk-economics and coping strategies of the surveyed households will be

analysed in section 9.2 in order to understand how individuals and households financially manage the burden of ill-health, respectively, how they mitigate such burdens. Afterwards, in section 9.3, on the basis of the survey outcomes, the findings will be discussed and then concluded.

9.2 Analysis of risk-economics and coping strategies

With regard to the findings made by Chima et al. (2002) and of Lucas et al. (1999) and stated in chapter 3.3,the researcher analysed the risk-economics and coping strategies applied by the households by the following criteria: inter-household labour substitution, engagement in other labour, spending of savings, change of consumption patterns, sale of assets, and borrowing of money. Subsequently, the questionnaire used within the survey contained one question for each criterion mentioned.

The findings of the household survey reveal that most households in both rural and sub-urban communities which have been financially impacted by ill-health through diarrhoeal infections apply coping strategies. According to the survey, out of 42 households which have been affected by at least one episode of diarrhoea, 28 households (67%) applied at least one coping strategy to substitute for the economic burden caused. Furthermore, economic coping strategies are strongly associated with ill-health and diseases by most households surveyed and coping strategies are not experienced as an unusual phenomenon

Table 9.1 Range of coping strategies

Coping strategy	Suburban/slums *N = 27*	Rural *N = 15*	All *N = 42*
Inter-household labour substitution	4	8	12
Engagement in other labour	2	0	2
Spending of savings	19	11	30
Change of consumption patterns	9	4	13
Sale of assets	9	6	15
Borrowing of money	9	2	11

especially among the poor. As outlined in Table 9.1, 9.2, and 9.3, the most common coping strategies at the household level are based on spending first the household savings, followed by the sale of household assets, and by intra-household labour substitution. Usually, households affected by ill-health use first their monetary/financial savings to compensate medical treatment costs. Intra-household labour substitution is very common among rural households, which is not surprising, as agricultural work can easily be transferred to another person, respectively, household member.

Table 9.2 Household coping strategies 1

Location	Percentage of affected households which substituted for lost productive time	Percentage of affected households which engaged in other labour activities to cope with extra costs	Percentage of affected household which spend extra savings to cope with extra costs
Sub-urban *N = 27*	**15%**	**7%**	**70%**
Rural *N = 15*	**53%**	**0%**	**73%**
All *N = 42*	**34%**	**4.5%**	**72%**

Table 9.3 Household coping strategies 2

Location	Percentage of affected households which changed consumption patterns	Percentage of affected households which sold household assets	Percentage of affected households which borrowed money
Sub-urban *N = 27*	**33%**	**33%**	**33%**
Rural *N = 15*	**27%**	**40%**	**13%**
All *N = 42*	**30%**	**37%**	**23%**

The least favourite coping strategies applied by disease impacted households are the engagement in other labour activities, followed by a change of consumption pattern and borrowing money. However, the engagement in other labour activities than normal is conditioning on the availability of other labour opportunities.
According to the survey, household assets which have been most often sold are mainly electronically goods like e.g. mobile phones or stereos.

Rural households have in terms of risk-management an advantage, as they are able to produce and to trade their own agricultural products. According to observations and interviews most rural households store parts of their harvest for iniquitous times. Moreover,

as the prices and profit-margins for agricultural products are subject to many different indicators such as e.g. the weather or national inflation rates, some households store their surplus until the prices reach the highest level. Often, this time is during or after disasters like e.g. politically unstable situations or severe weather events. Though, this practise is as already outlined a subject to seasonal variations and can not always be relied on.

9.3 Discussion and conclusion

The findings show, that almost all households which have been impacted by diarrhoeal infections apply at least one kind of coping strategy, though, the range of coping strategies is very diverse. Most households, in both, sub-urban and rural locations, used first their savings to compensate for medical expenses. This behaviour is quite rational as most costs for medical treatment and medication usually need to be paid relatively fast upon outbreak and discovery of the infection. Therefore, it is most logical for impacted households to use the money which they already have in their hands first.

Rural households also seem to prefer labour substitution, very much in contrast to sub-urban households. But with regard to their main livelihood which is subsistence farming, and with regard to the higher number of household members (see chapter 5), it is understandable that this strategy is very effective in replacing the output of a lost productive household member. In contrast, as agricultural work is less of importance, and as formal employment is more common in urban places, it is more difficult to substitute for lost labour.

However, the rate of households which sold assets and which changed consumption patterns was quite equal between both locations. It is very logical that households which have only limited finances available are trying to turn non-monetary assets into monetary assets to create the capital needed. In terms of risk-economies, assets like livestock or other valuable possessions are a very good insurance against financial burdens. Furthermore, the strategy of changing consumption patterns is a good method to save money before an episode of ill-health as well as after. It is therefore a good method in terms of risk-economic and coping strategies.

With regard to the third sub-research question, which was enquiring how households cope with the financial burden created by diarrhoeal diseases, we can now argue that in sub-urban location households mainly prefer to spend savings followed by a strategy-mix of changing consumption patterns, the sale of assets, and borrowing money from friends and relatives. In contrast, rural households also spend their savings first, but then prefer labour substitution, and the sale of assets such as e.g. livestock.

10. Discussion and Conclusion

10.1 Introduction

This chapter will discuss the findings and outcomes that were presented in the previous chapters. The discussion here will focus on the assumptions and conclusions made in the thesis's analysis. First, in section 10.2, the limitations of this study will be outlined to highlight and justify the constraints and boundaries of this study and of the assumptions made in the analysis. Secondly, the findings will be discussed and major assumptions will be concluded in section 10.3. Lastly, recommendations for policies, the prevention of diarrhoeal infections, and for the prevention of related economic burdens will be discussed in section 10.4.

10.2 Study limitations

There have been several limitations within this study, mostly related to feasibility of the data sampling process.

One major limitation was that most people who were affected by diarrhoeal infections lived in districts in northern Uganda and along the Congolese border, which were due to security issues not accessible for field research. And the fact that northern Uganda is extremely insecure limited the research to the south-eastern part of the country. Furthermore, the researcher would have been constrained to hire for almost every different part and district of the country a different interpreter due to the researcher's inability to speak local tribal languages. Also, large distances between major towns, bad roads which were almost non existent, and the limitation of public transport to highly insecure motorbikes (*boda bodas*) or over aged buses (*matatatus*) which drivers usually not even had a driving licence, made it often a challenge to travel between places.

Another limitation was also the dependency on an interpreter, and on the permission for data collection from the community leader or village chief. Though, the interpreter was very helpful, data collection through an interpreter limits sometimes the accuracy of the results, as data is sometimes interpreted differently or influenced by the interpreter's perceptions. Additionally, not all community leaders or village chiefs were corporative, and some even demanded a small "compensation" for their services, which created extra challenges for the researcher, as he was not willing to pay for the access of scientific data. When the chief or community leader was absent, or when he did not agreed with any data collection activities, the researcher was forced to leave the community and to shift to a different place where data

collection was possible. Therefore, the process of surveying the sub-urban and rural households was controlled by and depended on the community leader's or chief's courtesy.

The data collection methods needed also some adaptations as the originally planned random household sample has been changed to a household sample which purposefully allocated its targets, which means that it is difficult to generalise the results for the whole community. Furthermore, the researcher planned originally to interview also patients affected by diarrhoeal infections who were currently treated at local hospitals, as well as their caring family members or friends who accompanied them, but due to the lack of permissions from the medical facilities, and more importantly, due to the lack of privacy for interviews, this was not possible.

The operationalisation of the term diarrhoeal disease, respectively the correct definition or diagnoses of the pathogen responsible for the diarrhoeal infection was also not easy. The issue was that most cases of diarrhoeal infections don't get properly diagnosed in a laboratory due to the lack of finances and proper medical equipment. Most physicians can only guess the reason for the infection based on symptoms, and apply a more general form of treatment. This procedure is not always optimal, because it limits the validity of the diagnosis, respectively, of the method of treatment. Therefore and as already outlined in chapter 4.4, the researcher used the term diarrhoeal infection which is less specific and much easier to operationalise in this circumstances.

Also, the collected data is limited and don't represents the situation for all of south-eastern Uganda due to the relative small number of samples chosen. The study would have been more representative if the researcher would have included a higher number of samples of both sample units, but this was difficult due to the limited time frame.
Moreover, as it is very difficult to measure indirect household incomes like e.g. home farmed groceries or home produced food, the comparisons and analysis based on household income data is limited to the direct reported disposable household incomes only. Nevertheless, the researcher is aware that the study's definition of the household income is a limitation. However, the total income could be measured by transforming consumption expenditures and patterns into some income measure.

Lastly, it could be argued that not all household members benefit or suffer equally from the household income or its loss, respectively, not all household members suffer the same burden inflicted by ill-health or by a given disease infection. The researcher takes this issue into account, but makes clear that this study sees the household as one social and economic

unit as done in similar household and income surveys, and reminds that intra-household issues are not of primary focus within this study.

10.3 Discussion and conclusion of assumptions made

The outlined and reviewed literature based on previous studies in this academic field highlighted already the dramatic impacts of ill-health on the individual and household economic level. It is argued by several academics and health experts, that good health is an essential human capital, and also a major precondition for personal as well as for micro- and macroeconomic development. Furthermore, good health conditions among a society are dependent on the availability of livelihood assets to secure the generation of further human, physical, and financial capitals (Obrist et al. 2007). But when livelihood assets are not available and when people are impacted by ill-health and only spend assets and are not able to replace them, then their economic situation will degrade continuously. And when individuals and households are already weakened through the human and economic burden caused by diarrhoeal infections, it will be even more difficult for them to reverse this situation, as argued by Whitehead et al. (2001). Also, if too many households are threatened by poverty through ill-health, the overall rate of development in a society will discretionary decline too.

To improve the original evidence and literature, the aim of this thesis was to investigate and to analyse how exactly diarrhoeal infections economically impact individuals and households in Uganda. After conducting a household survey and after collecting field data in South-Eastern Uganda, the analysis clearly suggested that households which are impacted by ill-health through diarrhoeal infections often suffer a large economic burden, mainly caused by expenses for medical treatment and special food. Disease prevention costs can also substantially decrease the household's financial stability and equity. On average, the direct economic burden for households suffering from diarrhoeal infections and diseases is as high as 20% of the total direct and monthly household income. And the costs for disease prevention alone can be as high as 10% of the direct monthly household income. With regard to the theoretical evidence and because the overall economic burden for households impacted by diarrhoeal infections is on average above 10% (Prescott 1999), this study indicates that diarrhoeal infections significantly impact households and their economic and financial structures in many ways. Households are affected especially in their income and asset spending behaviour, in their process of income and asset generation, and as well as in their

risk-economic abilities. The research question stated in this thesis can therefore be answered with positivistic confidence, as the consequences for households impacted by diarrhoeal infections were large financial casualties and income losses. However, as the study analysed the disposable household income only, it may underestimates the consumption levels of the rural poor and their ability for consumption smoothing. The researcher recons, that the outcomes might very well be different when another measure of household income would have been used. But as already justified in the study's limitations, it is not very easy to calculate the value of (agrarian-) products that are non-disposable or gained through subsistence farming.

Surprisingly, the rate of households suffering from infections with diarrhoeal infections was much higher in suburban communities. It was originally assumed by the researcher that it would be the way around and that rates of infections would be higher in rural areas as indicated by the Uganda Demographic and Health Survey (Uganda Bureau of Statistics 2006a). The researcher links these results to the observed fact that the environmental, living, and sanitary conditions are much inferior in the suburban and urban slums compared to rural villages. Also, another explanation could be, that the rate of HIV/Aids infections is much higher in suburban and urban areas, and that one of the symptoms of this disease is diarrhoea.

The health seeking behaviour analysed revealed, that hardly any victims suffering from diarrhoea in this part of Uganda used traditional or alternative medicine. And only a small fraction of people consulted a pharmacy only. Subsequently, the findings indicated that most people prefer professional medical treatment. However, most people in suburban areas consult a public health facility, compared to rural areas, where most people consult private health facilities. This could be explained by the fact, that according to the study's household survey, the average incomes are slightly higher among rural households compared to the household incomes in suburban slums. However, public health facilities are more common in urban centres and often difficult to reach in rural areas. Nevertheless, private health facilities and health facilities organised by religious or non-profit organisations are more concentrated in remote places, which could explain why households located in rural areas consult more private or semi-private health facilities.

The study was also able to find out, that to prevent or cope with an economic burden caused by ill-health; most households surveyed applied a set of risk-economic and coping strategies. The most common coping strategies applied by the households are based on labour substitution, and spending household savings, and on a change in consumption patterns. The study's findings indicate, that households affected by ill-health use first their monetary

savings to compensate medical treatment costs. The least favourite coping strategies applied by disease impacted households are the engagement in other labour activities, followed by borrowing money, and by the sale of household assets. These actions were justified by most heads of households with the fact, that spending spare money and household savings as well as changing consumption patterns for a limited period of time would impact the household's abilities to cope with further economic burden less, than making financial debts or the selling of valuable household investments and assets. Household and livelihood assets, like e.g. livestock, are often seen as a kind of insurance in terms of risk-economic strategy, and they shouldn't be sold off too quickly.

The researcher looked as well for associations and correlations between the different indicators and variables used in the survey, and suspected relations between the rate of disease infection, between disease prevention measures, between the household locations, and the direct household income. But after applying chi-square tests, and regression and scatter plot analysis, these assumptions could be rejected with the results that there is no clear association or correlation between these indicators and variables. Though, the scatter plot analysis revealed that wealthier households tend to be slightly less impacted by diarrhoeal disease even if they are spending on average less on disease prevention methods. And most of these wealthier households are based outside the suburban slums in rural communities.

These finding could be interpreted by the assumption, that wealthier households can usually afford better living and sanitation standards. Moreover, even if the general disposable household income in rural areas would be as low as in the slums, the environmental and sanitary conditions in most rural communities are much better and therefore result in a correspondingly lower infection rate with diarrhoea causing diseases. For example, the cholera epidemic in the year 2000 in Durban (South Africa) clearly demonstrated that even if sufficient sanitation facilities like pit latrines are installed in the townships, the risk of infections isn't lowered when the concentration of latrines and of people using them is to high (Koenig 2008). However, one should not forget, that the prevalence of diarrhoea causing pathogens is not necessarily related to wealth but to the standard of sanitation and hygiene.

Most of the study's findings highlight in a similar way that ill-health has a serious impact on people's finances and on poverty as presented by findings of previous studies conducted in this field and mentioned in the theory; though their sample units were larger in size and often more representative. The coping and prevention methods applied by the interviewed households, respectively their impacts, were also very similar to the household reactions studied by for example McIntyre et al. 2006; Chima et al. 2003; Russel et al. 2004,

in other Sub-Saharan African countries. But even if the average economic burden for households is above 10% of the direct household income, the overall economic damage caused by these economic impacts must be seen differently compared to economic burdens caused by other infectious (e.g. Aids) and non-infectious diseases (e.g. cancer and diabetes), because the majority of diarrhoeal infections usually do not last very long, and most victims are children. Nevertheless, general assumptions about the impact of health costs can not be made in this study, as the number of samples studied was relatively low, and due to the fact that ill-health and related costs are defined through many different variables and indicators, like e.g. different forms of diseases, therapies, or health perceptions, which make it difficult to state definite assumptions. Therefore, further conclusions should not be drawn without additional information and research conducted in this field. However, this study can be an indicator and a stimulator for further research in this field and in this geographic region, and it helps to get an idea about the impact of infectious diseases.

Subsequently, as diarrhoeal diseases are still one of the major causes for overall morbidity and death in Sub-Saharan Africa, actions and interventions on all levels are urgently needed to improve the health and economic status of Africa's people.

10.4 Recommendations

The suggestions for improvement of the current situation in Uganda focus mainly on the prevention of diarrhoeal diseases and of ill-health in general. Also, the researcher recons that children must get special attention and treatment to combat the cycle of ill-health and poverty. One step forward could be to launch more vaccination campaigns which could help to lower the rate of new infections with diarrhoeal diseases, as new vaccines become approved. For example, several studies conducted in South-East Asia proved that the vaccination of children against the infections with the rotavirus is very cost-effective to combat the economic burden caused by diarrhoea causing diseases (Podewils et al. 2005; Fischer et al. 2005).

However, the most effective and sustainable measures to decrease the rates of new infections and therefore of ill-health are the installation of efficient water and sanitation facilities, the improvement of existing sewerage systems and of wastewater treatment plants, followed by the education of especially women and children about personal and general sanitation and hygiene (Hutton et al. 2004).

With regards to Uganda's policy structure, there still seems to be a gab when it comes to cost-recovery. As mentioned in chapter 2, some patients need to consult private health

facilities if they are nearer by, or require additional treatment that cannot be provided by the public health sector, which creates extra cost. Also, medication and drugs are not always provided for free under the National Health Policy (1999), and there is no system to compensate for lost productive labour time such as a national health insurance, though the Ugandan government is aware of the issue and plans for a national insurance scheme are going ahead. Such interventions would also bring benefits to the Ugandan macro-economy and would therefore support the overall development of the country.

Moreover, health interventions should also focus more on ill-health and disease prevention to tackle the issue at its roots. Though, some NGOs and organisations are already busy in this field but not all communities and people can be reached yet. Disease prevention is often regarded as more cost-effective compared to disease treatment and eradication measures. For example, a very sustainable and newly emerging prevention measurement is the instalment of urine-diversion latrines (UDs) which separate urine and faeces and therefore allow faster decomposition of sewage. This technique could be a real improvement for crowded urban slums which have a high density of pit latrines (Koenig 2008). In contrast, another emerging prevention measurement is the Community-Led Total Sanitation approach (CLTS) which concentrates on a change in sanitation behaviour through community participation rather than constructing only pit latrines. This approach concentrates on the whole community rather than on individual behaviours, and the collective benefit from stopping open defecation can encourage a more cooperative approach. People decide together how they will create a clean and hygienic environment that benefits everyone (WATSAN 2008). In any way, the research conducted through this study can help to further adjust the policy framework and to give further recommendations for policy building.

Currently, the coverage of the supply of safe drinking water in Uganda is between 56% and 62%, but the Ugandan government plans (in accordance with the Millennium Development Goals) to supply safe access to drinking water to all Ugandans by the year 2015. As the lack of safe drinking water correlates with the rate of diarrhoeal infections, and as they again correlate with economic burdens at all levels, actions to combat this cycle are vital and need to be taken urgently. However, this goal can only be achieved if changes and improvements in the infrastructure and water sector occur fast, and if all parties are included in this development process.

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List of Abbreviations

AMREF: African Medical and Research Foundation

CBA: Cost-benefit analysis

CBHI: Community based health insurance scheme

CEA: Cost-effectiveness analysis

CLTS: Community-Led Total Sanitation Approach

CIA: Central Intelligence Agency

DFID: Department for international development

DWD: Directorate of Water Development

EAC: East African Community

EHD: Environmental Health Division

HPAC: Health Policy Advisory Committee

LDC: Less developed country

IDP: Internally displaced people

MDG: Millennium Development Goals

NGO: Non-governmental organisation

NWSC: National Water and Sewage Corporation

ORS: Oral rehydration solution

ORT: Oral rehydration therapy

PEAP: Poverty Eradication Action Plan

PHP: Private health practitioners

PNFP: Private-non-for-profit organisation

SSA: Sub-Saharan Africa

TCMP: Traditional and Complementary Medicine Practitioners

UD: Urine-diversion

UGX: Ugandan Shilling

UNCST: Uganda Council of Science and Technology

UNICEF: United Nations International Children's Fund

UWASNET: Uganda Water and Sanitation Network

WATSAN: Water & Sanitation Resource Centre

WHO: World Health Organisation

WSSWG: Water and Sanitation Sector-Working Group

Appendices

Household questionnaire

Survey about the microeconomic impact of diarrhoeal diseases on rural and sub-urban households in Uganda

This survey questionnaire will support the research for a graduate thesis, which is supervised by the University of Amsterdam in Holland.

The aim of this survey is to improve the scientific understanding of the (micro-) economic impacts caused by diarrhoeal diseases on individuals and households.

Questionnaire

The collected information will be treated confidentially and will only be used for scientific purposes by the researcher. Furthermore, the collected information will not be passed on to a third party.

Gender:

Male ☐ Female ☐

Age:

15 – 35 ☐ 36 – 60 ☐ 61+ ☐

Permanent location of the individual or household interviewed: …….

Rural ☐ Sub-urban ☐ Urban ☐ Refugee camp ☐

1. How many people in total belong to your household?

Please state the number of household members:

2. How many of these household members are female?

Please state the number of household members:

3. How many of the total household members are below the age of 12 years?

Please state the number of household members:

4. Are you physically or financially supporting and contributing to a household?

Yes ☐ No ☐ If yes, please specify your contribution: …….....

5. How many household members are physically or financially supporting and contributing to your household?

Please state number of household members:

6. Have you, or a member of your household, recently (in the past 6 month) been affected by an infection causing symptoms of diarrhoea, or watery or bloody stool?

Yes ☐ No ☐

7. If yes, how many episodes of symptoms of diarrhoea, or watery or bloody stool occurred in the household in the past 6 month?

Please state the frequency of episodes:

8. If yes, do you know what kind of disease caused the symptoms of diarrhoea, respectively, was the disease professionally diagnosed?

If professionally diagnosed, please state the cause for the diarrhoea: ……

9. Did you, or the effected household member, took up any medical treatment from a doctor or in a hospital to reduce the health impact of the disease?

Yes ☐ No ☐

10. Did you, or the effected household member, took up any traditional or alternative treatment to reduce the health impact of the disease?

Yes ☐ No ☐

(If no professional medical or traditional treatment has been applied, please go to question 17)

11. How much time in total did you, or the effected household member, spend for medical examination and treatment, including for the return transportation?

< 6 hours ☐ > 6 hours ☐ > 12 hours ☐ > 24 hours ☐ > 48 hours ☐

12. Have you, or the effected household member, been accompanied by another household member when you took up medical or traditional treatment?

Yes ☐ No ☐

13. How much money did you, or the effected household member, spend for the transport to the doctor?

Please state the amount in Ugandan shilling (UGX):

14. Was the doctor or medical facility private or public?

Private ☐ Public ☐

15. How much money did you, or the effected household member, spend for the treatment and/or for the hospitalisation?

Please state the amount in Ugandan shilling (UGX):

16. How much money in total did you, or the effected household member, spend for medication (including traditional medication) to treat the infection and the diarrhoea?

Please state the amount in Ugandan shilling (UGX):

17. How much is the total household income on average per month?

Please state the amount in Ugandan shilling (UGX):

18. How much money are you, or the infected household member, earning per week?

Please state the amount in Ugandan shilling (UGX):

19. Did you, or the effected household member, required special food due to the impact of diarrhea and ill-health?

Yes ☐ No ☐

20. If yes, how much extra money did you, or the effected household member, spend for the special food during the entire time period of ill-heath?

Please state the amount in Ugandan shilling (UGX):

21. Did a member of your household recently (in the past 6 month) died as a result of an infection causing symptoms of diarrhoea?

Yes ☐ No ☐

22. If yes, how much money did you, or the household, spend for the funeral costs?

Please state the amount in Ugandan shilling (UGX):

23. Did household or family members needed to substitute for lost productive time due to your, or your household member's, infection with a diarrhoeal infection?

Yes ☐ No ☐

24. Did you, or the effected household member, needed to engage in labour activities other than your normal work, to cope with the extra costs caused by the diarrhoeal infection?

Yes ☐ No ☐

25. Did you, or the effected household member, needed to spend any extra savings to cope with the extra costs caused by the diarrhoeal infection?

Yes ☐ No ☐

26. Did you, or the entire household, needed to change any consumption patterns, due to the extra costs caused by the diarrhoeal infection?

Yes ☐ No ☐

27. Did you, or the household community, needed to sell any (household) assets like livestock or property, to cope with the extra costs caused by the diarrhoeal infection?

Yes ☐ No ☐

28. Did you, or the effected household member, needed to borrow money to cope with extra costs caused by the diarrhoeal infection?

Yes ☐ No ☐

29. Do you, or the household, apply any methods or techniques to prevent infections and ill-health?

If yes, please specify the prevention methods or techniques: ……

30. How much money do you spend per month for any disease prevention methods or techniques?

Please state the amount in Ugandan shilling (UGX):

Thank you very much for supporting my research and for completing this questionnaire!