SOCIOECONOMIC AND ENVIRONMENTAL FACTORS ASSOCIATED WITH MALARIA PREVALENCE IN BUSHENYI-ISHAKA MUNICIPALITY, BUSHENYI DISTRICT, UGANDA

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ABSTRACT

Malaria is among the top causes of morbidity and mortality in sub-Sahara Africa. It has high prevalence and case fatality rates especially the most vulnerable groups; pregnant women and children below the age of five years. Despite efforts put up in the fight against malaria, prevalence is still high especially in Uganda where the prevalence is as high as 19%, with regional variations of course. Bushenyi has been on record as to have high malaria prevalence rates and data on factors as to why this might be so, is still so scanty. A descriptive, population based, cross-sectional study set out to assess the household socioeconomic and environmental factors associated with malaria prevalence in Bushenyi-Ishaka Municipality and involved 370 respondents who had a case of malaria within the household within 6 months preceding the study. The 6-month prevalence of malaria was high at 28.01% with distance of the nearest health facility from home found statistically significant (p-value: 0.0024, C.I. 95%). Monthly domestic expenditure, education level, use of insecticide treated nets, and indoor residual spraying were all not found to be statistically significant.

Keywords: Socioeconomic factors, Environmental factors, Prevalence,

DECLARATION

I, **Umar Ibrahim Abdu**, hereby declare that this research dissertation is my original work and has not been previously presented for any academic award to any other University.

Sign: ……Date …….....

APPROVAL

This dissertation titled ***'Socioeconomic and Environmental Factors Associated with Malaria Prevalence in Bushenyi-Ishaka Municipality, Bushenyi District'*** has been approved for submission in partial fulfillment for the award of Bachelor of Medicine and Surgery of Kampala International University with my support as supervisor.

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LIST OF ACRONYMS

HMIS	Health Management Information System
IREC	Institutional Research and Ethics Committee
ITNs	Insecticide Treated Nets
KIU	Kampala International University
MDGs	Kampala International University Teaching Hospital
SCT	Social Cognitive Theory
SES	Socio Economic Status
UBOS	Uganda Bureau of Statistics
UDHS	Uganda Demographic and Health Survey
UGX	Uganda Shillings
UMIS	Uganda Management Information System
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
US	United States

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CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter presents the background, research problem, research objectives, research questions, as well as the conceptual framework.

1.1 Background of the study

Malaria is caused by Plasmodium parasites. The parasites are spread to people through the bites of infected female Anopheles mosquitoes, called "malaria vectors." There are 5 parasite species that cause malaria in humans, and 2 of these species – P. falciparum and P. vivax – pose the greatest threat. Malaria is an acute febrile illness and in a non-immune individual, symptoms usually appear 10–15 days after the infective mosquito bite. The first symptoms – fever, headache, and chills – may be mild and difficult to recognize as malaria. If not treated within 24 hours, P. falciparum malaria can progress to severe illness, often leading to death (Guyatt & Snow, 2001).

Children with severe malaria frequently develop one or more of the following symptoms: severe anaemia, respiratory distress in relation to metabolic acidosis, or cerebral malaria. In adults, multi-organ failure is also frequent. In malaria endemic areas, people may develop partial immunity, allowing asymptomatic infections to occur. In 2017, (Sousa-Figueiredo et al., 2012).

Most malaria cases and deaths occur in sub-Saharan Africa. However, the WHO regions of South-East Asia, Eastern Mediterranean, Western Pacific, and the Americas are also at risk. In 2017, 87 countries and areas had ongoing malaria transmission (World Health Organization, 2018).

Some population groups are at considerably higher risk of contracting malaria, and developing severe disease, than others. These include infants, children under 5 years of age, pregnant women and patients with HIV/AIDS, as well as non-immune migrants, mobile populations and travellers. National malaria control programmes need to take special measures to protect these population groups from malaria infection, taking into consideration their specific circumstances (World Health Organization, 2018).

Vector control is the main way to prevent and reduce malaria transmission. If coverage of vector control interventions within a specific area is high enough, then a measure of protection will be conferred across the community (World Health Organization, 2018).

World Health Organization recommends protection for all people at risk of malaria with effective malaria vector control. Two forms of vector control – insecticide-treated mosquito nets and indoor residual spraying – are effective in a wide range of circumstances.

According to the latest World malaria report, released in November 2018, there were 219 million cases of malaria in 2017, up from 217 million cases in 2016. The estimated number of malaria deaths stood at 435 000 in 2017, a similar number to the previous year. The WHO African Region continues to carry a disproportionately high share of the global malaria burden. In 2017, the region was home to 92% of malaria cases and 93% of malaria deaths. In 2017, 5 countries accounted for nearly half of all malaria cases worldwide: Nigeria (25%), the Democratic Republic of the Congo (11%), Mozambique (5%), India (4%) and Uganda (4%). Children under 5 years of age are the most vulnerable group affected by malaria; in 2017, they accounted for 61% (266 000) of all malaria deaths worldwide. P. falciparum accounted for 99.7% of estimated malaria cases in the WHO African Region, as well as in the majority of cases in the WHO regions of South-East Asia (62.8%), the Eastern Mediterranean (69%) and the Western Pacific (71.9%). P. vivax is the predominant parasite in the WHO Region of the Americas, representing 74.1% of malaria cases (World Health Organization, 2018).

Malaria is one of the world's most serious and complex public health problems; it holds a particularly heavy burden across many countries in Africa where in 2015, 88% of global cases and 90% of global deaths due to malaria were recorded (Scott et al., 2016). Malaria results in approximately 1.5 to 2.7 million deaths annually, out of which, more than 90% occur in Africa (Niringiye & Douglason, 2010). It is the number-one killer of children, pregnant women, and the elderly on the continent (van Eijk, Hill, Noor, Snow, & ter Kuile, 2015); constituting 10% of the continent's overall disease burden (WHO, 2013). Moreover, malaria causes at least 300 million cases of acute illness each year costing Africa more than US$12 million annually and slows economic growth in African countries by 1.3% a year thus trapping malaria vulnerable countries into poverty (Mutero, Schlodder, Kabatereine, & Kramer, 2012).

In Uganda, the number of epidemics of malaria has been on the increase. In 2002 and 2003, there were 5,694,342 and 7,147,152 reported cases of malaria, which resulted in 6,735 and 8,500 deaths, respectively (Wandiga et al., 2010). Malaria is the leading cause of death and illness in Uganda, taking hundreds of lives every day. The most vulnerable are pregnant women and young children (Yeka et al., 2012). Controlling malaria is crucial if Uganda is to achieve the UN Millennium Development Goal of halving the incidence of infectious diseases such as malaria, tuberculosis and HIV/AIDS.

Although malaria is one of the most climate-sensitive vector-borne diseases (Niringiye & Douglason, 2010), several other factors have been identified as contributing to its emergence and spread. These include environmental and socio-economic change, deterioration of health

care and food production systems, and the modification of microbial/vector adaptation(Parham et al., 2015), as well as population density (English et al., 2009).

In theory, Malaria prevalence can be studied utilizing the Albert Bandura's 1970s framework for understanding human behaviour, which he named the Social Cognitive Theory (SCT). The SCT assumes that people and their environments interact continuously. In social cognitive theory (SCT), human behaviour is explained in terms of a three-way, dynamic, reciprocal theory in which personal factors, environmental influences, and behaviour continually interact (Thuilliez et al., 2010).

1.2. Problem statement

Malaria remains one of the leading health problems of the developing world, and Uganda bears a particularly large burden from the disease; it is clear that the prevalence of malaria infection, incidence of disease, and mortality from severe malaria all remain very high (Yeka et al., 2012). Uganda has made progress in implementing key malaria control measures, especially distribution of insecticide impregnated bed nets, indoor residual spraying of insecticides, utilization of artemisinin-based combination therapy to treat uncomplicated malaria, and provision of intermittent preventive therapy for pregnant women.

However, despite enthusiasm regarding the potential for the elimination of malaria in other areas, there is no convincing evidence that the burden of malaria has decreased in Uganda in recent years (Yeka et al., 2012). Transition in economic and environmental conditions are known to be associated with improved health indicators (Munthali, Jacobs, Sitali, Dambe, & Michelo, 2015). In Bushenyi, there has been high incidences of malaria in the communities and yet the district is considered one of the fastest improving in terms of economic and hygiene status (Tushabomwe-Kazooba, 2006).

To date, no study reviewed has highlighted how household socio-economic and environmental conditions are associated with malaria within Bushenyi-Ishaka Municipality, Bushenyi district. Such knowledge is important and will help to predict the level of socioeconomic and environmental change required to prevent malaria within the municipality. It is on this basis that this study is proposed.

1.3. Research Objectives

1.3.1. General Objective:

To investigate socioeconomic and environmental conditions associated with the prevalence of Malaria in Bushenyi-Ishaka Municipality, Bushenyi District, Uganda

1.3.2. Specific Objectives:

i. To describe socioeconomic conditions associated with prevalence of malaria in Bushenyi-Ishaka Municipality, Bushenyi district.
ii. To describe environmental conditions associated with prevalence of malaria in Bushenyi-Ishaka Municipality, Bushenyi district.

1.3.3. Study Hypotheses

1.3.3.1. Hypothesis 1

Null Hypothesis (H_0): Socioeconomic conditions are not associated with prevalence of malaria in Bushenyi-Ishaka Municipality, Bushenyi district.

Alternative Hypothesis (H_1): Socioeconomic conditions are associated with prevalence of malaria in Bushenyi-Ishaka Municipality, Bushenyi district.

1.3.3.2 Hypothesis 2

Null Hypotheses (H_0): Environmental conditions are not associated with prevalence of malaria in Bushenyi-Ishaka Municipality, Bushenyi district.

Alternative Hypotheses (H_1): Environmental conditions are associated with prevalence of malaria in Bushenyi-Ishaka Municipality, Bushenyi district.

1.4. Significance of the Study

1.4.1. Contribution to science

This research is expected to serve as a baseline for students and other researchers being that no study reviewed has highlighted how changes in socio-economic and environmental conditions are associated with malaria prevalence within Bushenyi-Ishaka municipality and the district at large.

1.4.2. Importance to the community

It is assumed that establishing the socioeconomic and environmental conditions associated with the prevalence of malaria will foster better sensitization on malaria prevention in the municipality and District at large.

1.5. Scope of the study

1.5.1. Content scope

The main focus of this study is to investigate household socio-economic and environmental conditions associated with malaria prevalence in Bushenyi-Ishaka municipality, Bushenyi District.

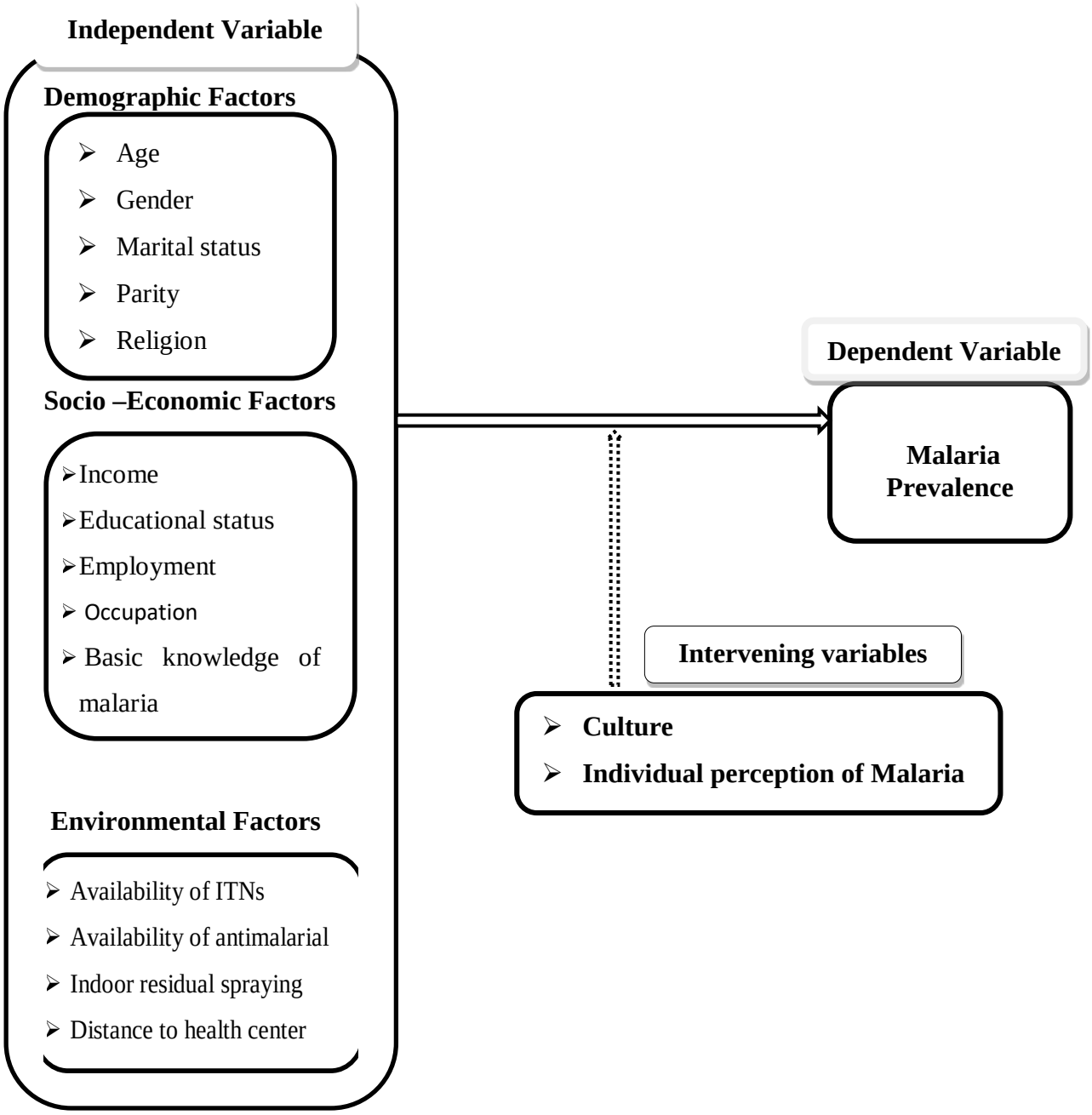
1.5.2. Geographical scope

This study was carried out in Ishaka municipality, Bushenyi district. The district is located in south western Uganda, 320km from Kampala the capital city of Uganda and 75km from Mbarara, the nearest biggest Town along Mbarara-Kasese high way. Bushenyi district has Rubirizi, Buhweju, Sheema, Mitooma and Rukungiri as bordering districts. As at 2014 the district had a total population of 234,440 comprising 116,410 males and 118,030 females. It had an estimated 51,378 households with an average household size of 4.5 as well as seven sub-counties namely: Bumbaire, Kakanju, Kyamuhunga, Kyeizooba, Nyabubare, Kyabugimbi and Bushenyi-Ishaka municipality. (UBOS, 2011). Ishaka municipality constitute of the sub-counties in the district. It has been reported to have a total population of 41,217 with an estimated 9,774 households. The municipality has an adult population (18 years and over) of 20,733.

1.5.3. Time scope

The study was conducted in July, 2018. The stated time period was scheduled for data collection.

1.6.Conceptual Framework



CHAPTER TWO: LITERATURE REVIEW

2.0. Introduction

This chapter, reviews relevant studies to help in the understanding of the socioeconomic and environmental factors prevalence of malaria. The literatures will focus on recent literature outcomes.

2.1. Epidemiology of Malaria in Uganda

Malaria is reported by the Ministry of Health (MOH) as the leading cause of morbidity and mortality in Uganda, accounting for approximately 8–13 million episodes per year, 30–50% of outpatient visits at health facilities, 35% of hospital admissions, 9–14% of hospital deaths (nearly half of those in children less than 5 years of age) and a great many deaths occurring outside of health-care settings (Uganda Ministry of Health, 2005). Available data include a Uganda Demographic and Health a Uganda Malaria Indicator Survey (UMIS) in 2009 (Uganda Bureau of Statistics, 2010), and Survey (UDHS) in 2006 (Uganda Bureau of Statistics, 2007), ongoing health facility-based data routinely collected through the Health Management Information System (HMIS). These data may be limited by incompleteness in collection, variations in reporting rates between sites and over time, and biases inherent to facility-based data. Nonetheless, they offer a valuable picture of the malaria control situation in Uganda, showing some impressive recent advances in the coverage of control interventions. However, these and other available data argue that the malaria burden in Uganda has not decreased notably in recent years, and it may even be increasing.

2.1.1. Prevalence of Malaria in Uganda

Malaria remains the leading cause of morbidity and mortality in Uganda. The illness contributes, more than any other, to the high burden of disease in the country. This undermines investment in social and economic development (NPA, 2010). In Africa, Uganda ranks third in the number of deaths attributable to malaria and has some of the highest recorded malaria transmission rates. Whereas the 2009 Uganda Malaria Indicator Survey, which used rapid diagnostic blood testing (RDT), showed that 52 percent of children under age 5 had malaria (UBOS and ICF Macro, 2010). Findings from the 2009-2010 Uganda National Household Survey (UNHS) revealed that slightly more than half of the population that fell sick 30 days prior to the survey reported malaria or fever as the major illness responsible (UBOS 2010). The 2009 UMIS measured a prevalence of malarial parasitemia, assessed based on microscopy, of ~30–50% in children 6–59 months of age (Uganda Bureau of Statistics, 2010). Anemia was also very common, with a hemoglobin <11 g/dl seen in well over half of children. Prevalence

was high (38–63% by blood smear) in all regions except Kampala (5%), the major city, and in the southwestern region, which includes highland areas (12%).

2.2. Factors Associated with Malaria Prevalence

A number of factors have been reported to be responsible for the prevalence of malaria among them socioeconomic and environmental conditions of the household.

2.2.1. Household Socio-economic Conditions

Socio-economic status (SES) is one of the most important social determinants of health and disease. Baker, (2014) defined socio-economic status as a measure of one's combined social and economic status and tends to be positively associated with better health. Socio economic status is generally thought to influence health in three different ways: first, SES influences health through the ability to purchase health promoting resources and treatment, secondly SES influences health through socialization of early health habits and continuing. Lastly it has been posited that rather than SES influencing health, health influences SES (Baker, 2014).

Bowling, (1997) in a study investigating health and health services reported that those in higher socio-economic groups are more likely to pursue a good healthy life style than those in lower social - economic groups. Malaria prevalence has been linked to socio economic factors; the disease is argued to impose financial hardship on poor households, and hold back economic growth and improvement in living standards(Sachs & Malaney, 2002). It has been argued that the poor are less likely not only to use the effective preventive measures but also in an appropriate manner, this is because they live in poor houses, vulnerable rooms, and normally can't afford medicines or good hospitals. The expenses on prevention methods are related to income, wealth, education and occupation, though, the relationships are often not clear. However, studies examining malaria incidence by socio-economic status at the household level have not yet been able to provide reliable results on the distribution of malaria incidence between poor and less poor population groups because they are always contradictory (Nkumama, O'Meara, & Osier, 2017).

2.2.1.1 Level of Education

The effect of education on people is seen most clearly in relation to standard of living and life style of an individual(van Eijck & Bargeman, 2004). Nam, (1968), states that levels of living standards and the life styles are associated with the given amount of education, which identifies the social environment within which individuals regulate their health care (Social Impact Investment Taskforce, 2014). The knowledge an individual has gained about the way to avoid death improves his life chances and person with high level of education usually have greater

knowledge about the means of mortality postponement than persons with little education (Mechanic, 2007).

At the household level, mothers are responsible for management of the diseases, while fathers as the heads of households and have a final say on treatment seeking (Onarheim, Sisay, Gizaw, Moland, & Miljeteig, 2017). Their education levels are important on reducing the malaria prevalence as education can reduce the number of malaria cases in some areas of the developing world by recognition of the disease symptoms earlier, or can help in eradication of breeding grounds for the parasite and mosquito, thus cutting down the risk of the transmission among people. In addition, education level is strongly associated with contraceptive use, fertility and health (Larsson & Stanfors, 2014)

2.2.1.2 Basic Knowledge about Malaria

Most of mosquito larval habitats in urban and rural communities of Africa are man-made such as man-made pools, drainage canals and burrow pits (Imbahale et al., 2011). People's knowledge influences their attitude and actions towards malaria. With knowledge, it is easier to control malaria incidents; for instance, a research in Kenya reported that peri-urban residents knew more about mosquitoes' role in malaria transmission compared to rural people (Imbahale et al., 2011).

2.3. Household Environmental Conditions.

An estimated 24% of the global disease burden and 23% of all deaths can be attributed to environmental factors (Prüss-Ustün, Wolf, Corvalán, Bos, & Neira, 2016). Of the 102 major diseases, disease groupings and injuries covered by the World Health Report in 2004, environmental risk factors contributed to disease burden in 85 categories. The specific fraction of disease attributable to the environment vary widely across different disease conditions.

Malaria has been reported to constitute one of the diseases with the largest absolute burden attributable to modifiable environmental factors alongside diarrhoea and lower respiratory infections. The proportion of malaria attributable to modifiable environmental factors (42%) is associated with policies and practices regarding land use, deforestation, water resource management, settlement siting and modified house design, e.g. improved drainage (Prüss-Ustün, Wolf, Corvalán, Bos, & Neira, 2016).

2.3.1. Availability and use of ITNs

Insecticide treated bed nets (ITN) have been shown to be the most cost-effective prevention method against malaria and are part of Millennium Development Goals (MDGs) (Willey, Smith, Mangham, Car, & Armstrong, 2012). ITNs are more effective in preventing bites than untreated nets; ITNs reduce the transmissions of malaria within

individuals by both repelling and when they land on the net killing mosquitoes that have come to feed (Atieli et al., 2011). However, Ssempiira et al., (2017), argues that the inability to afford an ITN in some cases due to lack of financial resources and others may relate to the low value people place on ITNs compared to their market price. Other household members believe that they do not need one and this relates to malaria prevalence. Thus, by investing in expansion of public knowledge on ITNs and how to use them, the Ugandan communities will succeed at raising awareness on how serious malaria is; but the issue is whether the ITNs reach the rural poor.

2.3.1. Indoor Residual Spraying (IRS)

IRS is the practice of spraying insecticides on the interior walls of homes in malaria affected areas (West et al., 2014). This practice helps in killing the mosquitoes that are sheltered within the houses before they can infect people. However, there are variations in household spraying due to wealth. Wealthier households are more likely to use IRS compared to poorer households. Overtime, insecticide resistance has emerged as a threat to the efficiency of this practice as a result of evolution of mosquitoes.

2.3.2. Distance to Healthcare Facilities

Distance to healthcare facilities has been reported to be one of the influential factors in malaria prevalence (Wesolowski et al., 2015). Malarial complications and deaths are largely preventable through health services that are often available at local health facilities, including childhood immunizations and antenatal care for pregnant women (GBD 2013 Mortality and Causes of Death Collaborators, 2015). People living in malaria endemic areas and who live at great distances from health services, whether governmental, non-governmental or commercial markets and pharmacist, are more likely to suffer more from the disease than those who have such services close at hand (Dixit et al., 2016). However, access may be limited by other factors apart from distance; close-by health facilities that have unreliable drug supplies, poorly trained and unsupervised staff, or charge fees unaffordable to affected populations are no better than non-existent or distant services. Moreover, malaria is more common in those people living in particularly poor and hard to reach areas (Yeka et al., 2012).

CHAPTER THREE: METHODOLOGY

3.0. Introduction

This chapter presents the research procedure that will be used in the study and it also delivers a study frame work. A detailed presentation of study design, study area, study population, sample size and sampling procedures, description of research instruments, validity and reliability of instruments, data analysis techniques and ethical considerations.

3.1. Study Design

The study conducted was a descriptive cross-sectional population based study.

3.2. Study Area

This study was carried out in Bushenyi-Ishaka Municipality. Located in South-western, Bushenyi district is 320km from Kampala the capital city and 65km from Mbarara the nearest biggest Town along Mbarara-Kasese high way. Bushenyi district has Rubirizi, Buhweju, Sheema, Mitooma and Rukungiri as bordering districts. The district as at 2014 has a total population of 234,440 comprising 116,410 males and 118,030 females. It has an estimated 51,378 households with an average household size of 4.5 persons (UBOS, 2017).

3.3. Study Population

The study population comprised all households in Bushenyi- Ishaka Town council.

3.4. Target Population

The target population for this study was respondents from families with members who have suffered malaria in the last six months preceding the study.

3.5. Sample size determination

The samples size was estimated using Slovin's formula. Slovin's formula is a statistical methods used to determine sample size in a survey whose population is well over five thousand people (Tejada, Raymond, & Punzalan, 2012).The formula is denoted by:

$$n = \frac{N}{1 + N(e)^2}$$

Where

N: Is the population size,

n: Sample size required

e: Is the acceptable degree of error

Given that the total population of adults aged 18 and above in Ishaka-Bushenyi municipality council was 20,733 people in 2014(UBOS, 2017), our sample size will be calculated as thus:

$$n = \frac{20{,}733}{1 + 20{,}733(0.052)^2}$$

n =370

3.6. Sampling Procedure

Purposive sampling was employed to select households from which samples of respondents who were to participate in providing insight into the topic of study were selected. This included households with at least one-member reporting having suffered from malaria in the last six months.

3.6.1. Inclusion and Exclusion Criteria

3.6.1.1. Inclusion Criteria

All adult household members (18 years and above) in families which have reported having a family member who suffered malaria in the last six months were included in the study.

3.6.1.2. Exclusion Criteria

Minors and mentally ill household members were excluded from the study.

3.7.Data Collection Methods

Researcher-administered questionnaires were used for data collection in this study.

3.8.Data Quality Control

To ensure the quality of data to be collected, the reliability and validity of the data collection tools were assessed. Randomness of the sampling procedure was employed to reduce errors and bias. Also, completed questionnaires were reviewed before leaving the field to guarantee completeness and uniformity of the data gathered.

3.8.1. Validity of Data Collection Tools

Validity is the extent to which the research results can be accurately interpreted and generalized to other population. It's the extent to which research instruments measures what they are intended to measure. To measure validity, the instrument will be given to two experts to evaluate the relevance of each item in the instrument to the objective of the study and to rate each item on the scale of very relevant (4), quite relevant (3), somewhat relevant (2) and not relevant (1). Validity will be determined using Content Validity Index (CVI). CVI = item rates 3 or 4 by both experts divided by total number of items in the questionnaire.

Therefore,

$$CVI = n\frac{3}{4}/N$$

3.8.2. Reliability of Data Collection Tools

This will be assessed by pretesting using 10% of the total questionnaire in a similar population so as to remove vague questions.

3.9.Data Processing

Crude data was sorted, cleaned and entered into MS Excel version 2013.

3.10. Data Analysis

Socio demographic and other baseline characteristics were analyzed based on type/scale of measurement they assumed. Numerical variables were analyzed by way of central tendency i.e. mean and median and measures of variation i.e. standard deviation and interquartile ranges respectively. All statistical analysis was carried out using SPSS version 20.

Objective I: ***To determine household socioeconomic conditions associated with prevalence of malaria in Bushenyi-Ishaka Municipality, Bushenyi district***

The independent t-test and chi-square test was used to analyse differences according to sex. Continuous variables were expressed as means and standard errors while nominal variables were expressed as frequencies and percentages

Objective II: ***To describe the household environmental conditions associated with prevalence of malaria in Bushenyi-Ishaka Municipality Bushenyi district***

The independent t-test and chi-square test were used to analyse differences according to sex. Continuous variables were expressed as means and standard errors while nominal variables will be expressed as frequencies and percentages

3.11. Study Limitation and Delimitation

Language barrier was a major limitation in this study being that the principal researcher did not understand the local language. This was however tackled by using trained research assistants to understand the context of the study and help with interpretations whenever necessary.

3.12. Ethical Consideration

3.12.1. Informed Consent

Informed consent was acquired from adult participants as shown in appendix II

3.12.2. Autonomy

Involvement in the study was totally voluntary. In the event that a participant took an interest to fill the given questionnaires, the participant had the right to leave out any question that he/she would prefer not to reply. Participants were at liberty to pull out from the study whenever, without penalties.

3.12.3. Confidentiality

All reactions were kept confidential. Only members of the research team and associated support staff were allowed to see the completed questionnaires. No information was addressed in a way that would permit a reader to relate any reactions to individual respondents. Results of the study were accounted for as summative information.

3.12.4. Human Right

Participants were at liberty to decline to take part in the study and to pull out from the study willingly with no penalties.

3.12.5. Benefits and Risks

There were no direct benefits for participating in this study. However, the findings of this study generated information that will provide a better understanding of the magnitude of the problem in that particular study population. There were no known foreseeable risks for participating in this study.

3.13. Dissemination of Study Findings

The coded results from the study were shared between researcher, supervisors and examiners. Feedbacks on major findings from the study was given to the community through the District Health officer.

CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION

4.0. Introduction

This chapter deals with analysis and presentation of data on the demographic characteristics of the respondents and the objectives of the study.

4.1. Prevalence of malaria

A total of 1,321 households were visited during the study whereby, according to the inclusion criteria, only 370 positively reported a physician-diagnosed and managed case of malaria within that household and were thus recruited into the study. This gave a 6-month prevalence of malaria of 28.01%.

4.2. Demographic characteristics of respondents

A total of 370 respondents took part in the study, 370 questionnaires were administered with the same number returned and analysed. This gave a response rate of 100%. The following were the demographic characteristics of the respondents.

4.2.1. Age of the respondents (N=370)

AGE (YEARS)	FREQUENCY	PERCENTAGE (%)
18 – 27	170	45.95
28 – 37	93	25.14
38 – 47	39	10.54
48 – 57	39	10.54
58 – 67	15	4.05
68 – 77	10	2.70
78 – 87	4	1.08
TOTALS	**370**	**100**

Table 1: respondents' age (N=370)

The majority (45.95%) of the respondents were between the ages of 18 and 27 years with the youngest being 19 years and the oldest 80 years giving a range of 61. The mean age of the respondents was 33.91 years and a standard deviation of 14.28.

4.2.2. Sex of respondents (N=370)

SEX	FREQUENCY	PERCENTAGE (N)
Male	239	64.60
Female	131	35.40
TOTALS	**370**	**100**

Table 2: Respondents' sex (N=370)

More than half (64.60%) of the respondents were males while 35.40% were females. The male: female ratio was 1.82: 1.

4.2.3. Religion of respondents (N=370)

Majority (91.89%) of the respondents were Christians. Protestants (243, 65.68%) made the large proportion of the Christians, followed by Catholics (63, 17.03%), and Seventh-Day-Adventists (34, 9.18%). Muslims were the least, contributing 8.11%.

4.2.4. Marital status of respondents (N=370)

MARITAL STATUS	FREQUENCY	PERCENTAGE (%)
Single	209	56.49
Married	146	39.46
Divorced	10	2.70
Widowed	5	1.35
TOTALS	**370**	**100**

Table 3: respondents' marital status (N=370)

Most of the respondents were single. They were 209 (56.49%), while 146 (39.46%). 10 (2.70%) had been divorced while 5 (1.35%) were widowed.

4.3. Factors associated with malaria

4.3.1. Household socio-economic factors

4.3.1.1. Employment status and monthly expenditure

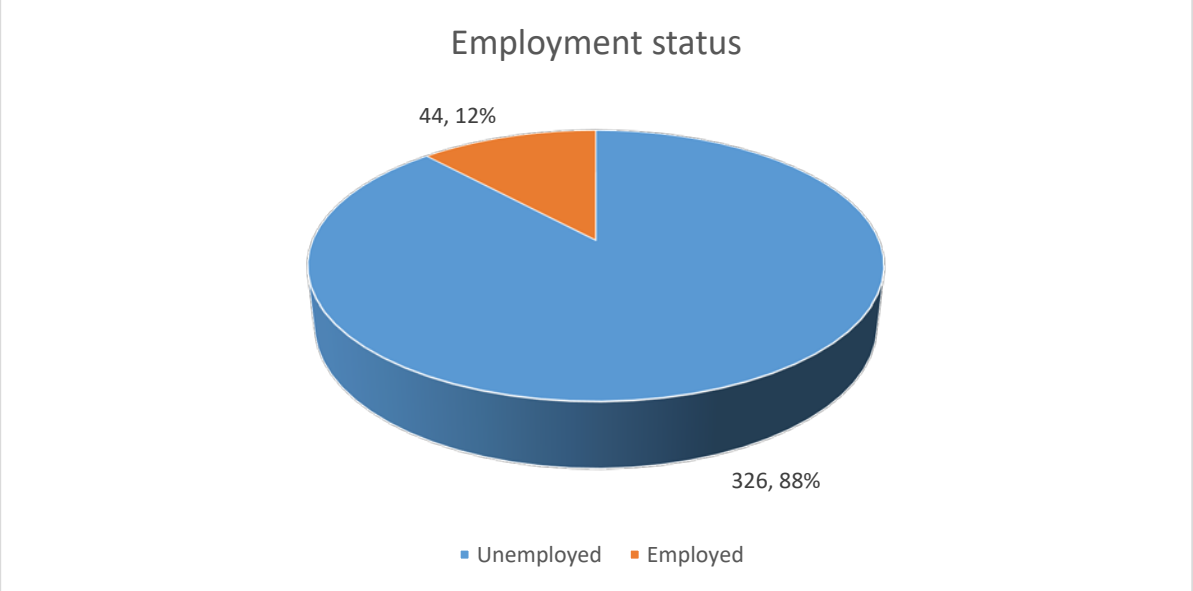


Figure 1: Employment status and malaria (N=370)

Most of the respondents from households with a history of malaria were unemployed. 326 (88%) were unemployed compared to 44 (12%) who were employed. The unemployed odds were about 55 times the odds of the employed (OR: 54.89). This implies that the odds of a

household with a history of malaria in the preceding 6 months was about 55 times in the unemployed compared to the employed.

As per the exchange rate of the day, 1 US dollar was exchanging for about 3,769.50 Uganda shillings. The respondents were grouped as per their reported estimates on domestic financial use. This comprised of four groups as shown in the table below.

MONTHLY EXPENDITURE (UGX)	FREQUENCY (N)	PERCENTAGE (%)
Less than 125,000	142	38.38
125,000 – 249,999	206	55.68
250,000 – 500,000	20	5.40
Above 500,000	2	2.54
TOTALS	**370**	**100**

Table 4: Respondents' monthly expenditure (N=370)

The reference value of 1 US dollar was used as the definition of poverty below which an individual is termed poor if their daily domestic expenditure does not reach that amount. A person spending about a dollar a day will be spending about 113,085 Uganda shillings. This value was then rounded to 125,000 Uganda shillings and used as reference so as to bring out the financial standing of the respondents.

From Table 4 above, a majority of the respondents (94.06%) live on a monthly expenditure slightly above 66 US dollars (less than 250,000 UGX). These are not financially well off compared to the remaining 5.94%.

The odds (15.81) were higher that a household that reported malaria spend less than 250,000 UGX per month for domestic use than the odds (0.0633) in those whose monthly expenditure was 250,000 UGX or more (OR: 249.76). Despite these results, monthly expenditure and malaria were found to be statistically insignificant (p-value: 0.2825, 95% C.I.)

4.3.1.2. Education level

EDUCATION LEVEL	FERQUENCY	PERCENTAGE (%)
None	126	34.04
Primary	122	32.97
Secondary	68	18.39
College	54	14.60
TOTALS	**370**	**100**

Table 5: Education of respondents (N=370)

Most of the respondents' education level was primary or below. 67.03% of the respondents had not gone beyond primary. Those with a secondary level education were 68 (18.39%) while

only 54 (14.60%) had gone to college. Despite this being the case, the results were not statistically significant (p-value: 0.054, 95% C.I.)

4.3.2. Household environmental factors

4.3.2.1. Availability and use of ITNs

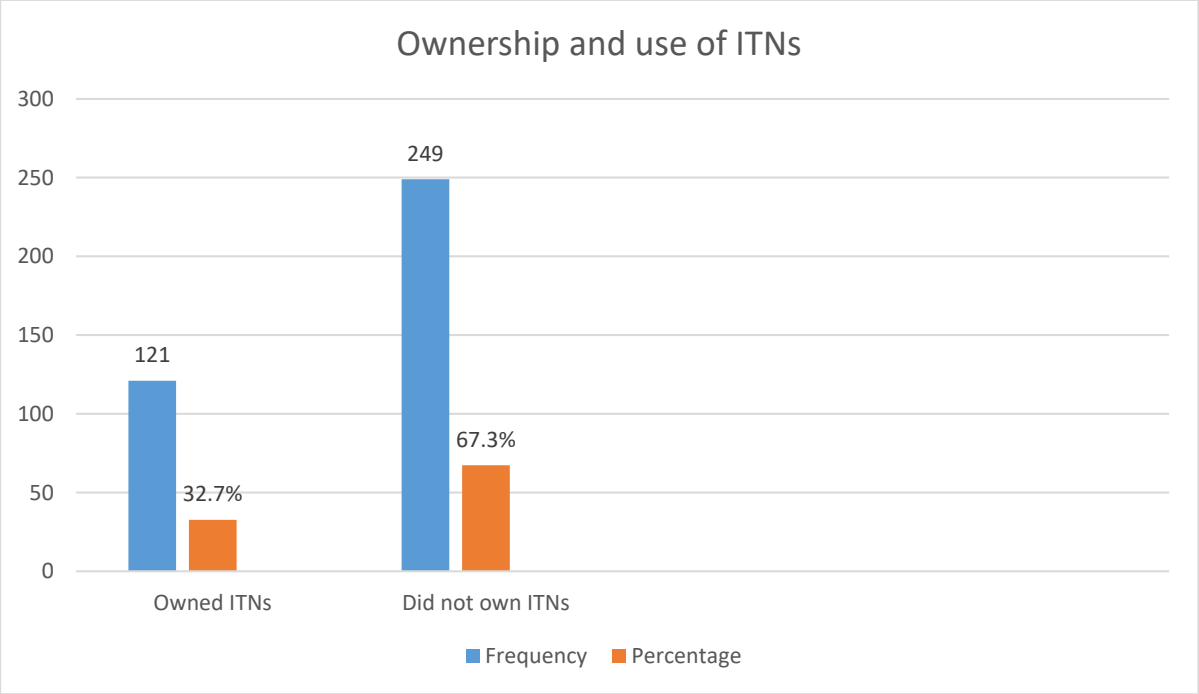


Figure 2: Ownership and use of ITNs (N=370)

Most households did not own or use ITNs. The ones who said that they owned an ITN, they affirmed regular and proper use by all family members. There were only 121 (32.7%) of those who owned and used ITNs while 249 (67.3%) did not. The odds (0.4859) of ITN use in a household with a history of malaria was lower than the odds (2.0579) of non-use of ITN in the household; they were actually slightly less than half (OR: 0.4593).

4.3.2.2. Indoor residual spraying

The respondents were asked on their use of mosquito repellent sprays and regularity of use. Only 47 (12.70%) affirmed regular spraying. The remaining 87.30% either rarely sprayed or did not spray at all.

4.3.2.3. Distance from the nearest health facility

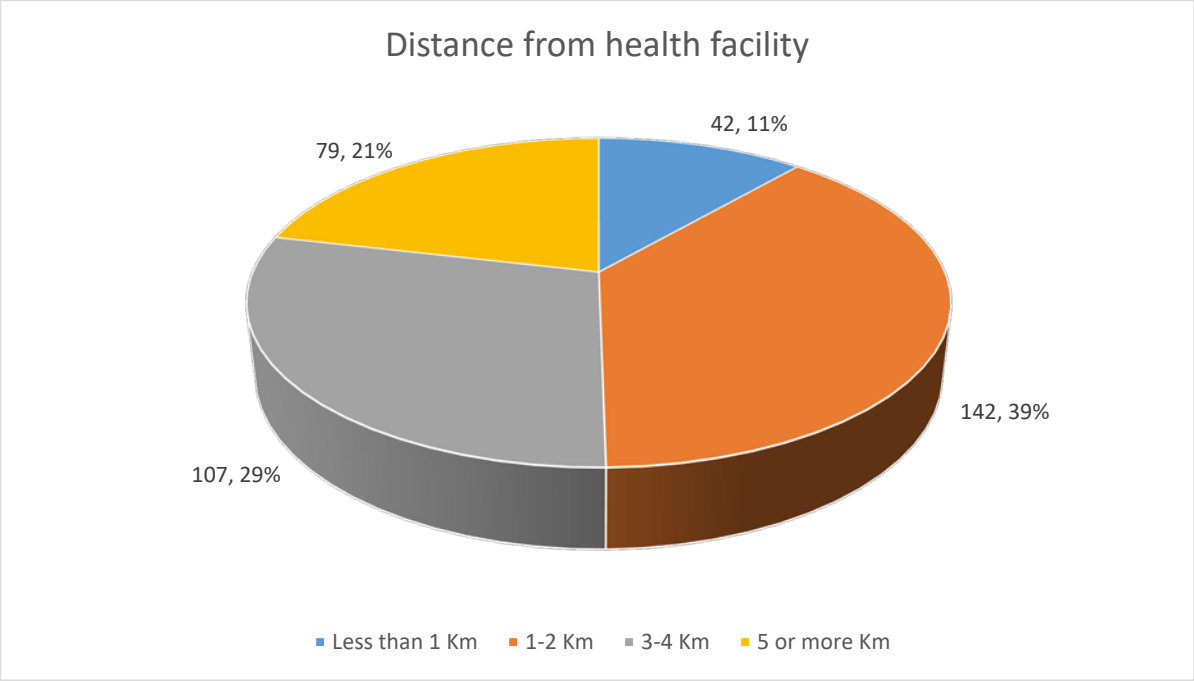


Figure 3: Distance od home from nearest health facility (N=370)

Most (39%) respondents travel 1 – 2 Km to the nearest health center and 3.4 Km (29%). In regression analysis, the distance from the nearest health facility was found to be significant to malaria prevalence (p-value 0.0024, C.I. 95%).

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.0. INTRODUCTION

This chapter deals with the discussion of study findings and their implication, the conclusions derived and the recommendations made to various parties.

5.1. DISCUSSION

5.1.1. Prevalence of malaria

The 6-month malaria prevalence was high at 28.01%. This finding agrees with (UBOS and UDHS, 2015) latest survey report that reported high prevalence of malaria in Uganda, with Apac diatrict, Oyum district and Kiryandongo refugee camp reporting the highest prevalence due to continued intense transmission (Proietti et al., 2011), that has seen transmission and spread to other districts.

5.1.2. Household socioeconomic conditions and malaria

Household monthly domestic expenditure was used as an indicator of the socioeconomic standing of the household. Respondents' households were categorized into 4 groups; those spending less than 125,000 UGX, those that spend between 125,000 and 249,000 UGX, those between 250,000 and 500,000 and lastly those estimated their expenditure to be beyond 500,000UGX. It was observed that households spending less than 250,00 UGX monthly made the largest proportion of the households with a history of malaria in the preceding 6 months.

Statistically speaking, however, despite the probabilities and odds being high among these households spending less than 250,000 UGX, the findings were found to be statistically insignificant as the null hypothesis that socioeconomic status is not associated with malaria prevalence could not be rejected (p-value 0.2825, C.I. 95%).

These findings disagree with those by (Sachs & Malaney, 2002) that linked malaria prevalence to socioeconomic status and have gone further to disprove the argument that the poor are less likely to make effective use of preventive measures and in an appropriate manner. This shift in argument could be attributed to the fact that, the poor and the most vulnerable in the society, with their pregnant women and children under the age of five years, currently benefit from free ITNs and are adequately instructed on their proper and regular use. This could have had an effect in reduction of transmission rates and spread of malaria (Sangaré et al., 2012). These findings also shoot down the argument that preventive measures, being expensive and related to income and wealth, are problematic to acquire by those of low socioeconomic status. This is because of the widespread free distribution of ITNs, one among the most effective preventive measures at present (Lindblade et al., 2015). By the mere fact that these study findings disagree with the above-mentioned studies affirms the argument that reports have not been able to

provide reliable results on the distribution of malaria between the poor and less poor populations and reports have always been contradictory (Nkumama et al., 2017).

The same is evident about education level and malaria prevalence. It is true, from the findings, that most of the respondents had an education level of primary and lower, but what still comes out is that these findings lack any statistical significance and, again, the null hypothesis that education level is not associated with malaria prevalence cannot be rejected (p-value: 0.054, 95% C.I.). It follows, therefore, that the alternative hypothesis that education level affects malaria prevalence cannot be adopted. This disagrees with (Larsson & Stanfors, 2014) that education levels are important on reducing prevalence of any disease, malaria inclusive, through early recognition of symptoms.

5.1.3. Household environmental conditions and malaria

While it is true that a large proportion of the households with a history of malaria in the preceding months did not own or use ITNs, and also true that the odds of ITN use among these households were low (OR: 0.4593), statistical significance is hard to prove since other than the odds ratio that we have to work with, we are unable to reject the null hypothesis that ITN use is not associated with malaria prevalence and neither can we accept it. The same is seen for indoor residual spraying. The proportions of households that practiced residual indoor spraying are low, and that is all that can be said about that.

What showed statistical significance, however, was the distance of the nearest health facility from the home. The study findings show that those who lived 3 or more kilometers away from the nearest health facility made the largest proportion of households with malaria history. Distance from the nearest health facility was significantly associated with malaria prevalence (p-value: 0.0024, C.I. 95%) and this means that the null hypothesis that distance from the nearest health facility is not associated with malaria prevalence is rejected and the alternative hypothesis adopted. This agrees with the findings by (Wesolowski et al., 2015) that reported that distance to healthcare facilities is one of the influential factors in malaria prevalence and (Dixit et al., 2016) who reported that people in malaria endemic areas living great distances from health services are more likely to suffer more from the disease than those who have such services close at hand. The findings find truth in the statement that malaria is more common in people living in particularly poor and far to reach areas (Nankabirwa et al., 2015).

5.2. CONCLUSIONS

The prevalence of malaria in Bushenyi-Ishaka was high at 28.01% due to increased transmission rates and spread.

Household socioeconomic factors including education (p-value: 0.054, 95% C.I.) level and monthly domestic expenditure (p-value: 0.2825, 95% C.I.) were not found statistically significant in association to malaria prevalence.

The only household environmental factor found to have statistical significance in malaria prevalence was distance of home from the nearest health facility (p-value: 0.0024, C.I. 95%). Use of ITNs and indoor residual spraying were found to be insignificant.

5.3. RECOMMENDATIONS

5.3.1. To the respondents

Need to increase their ownership and proper use of ITNs as they are offered free in all government health facilities in Uganda. Regular and proper use of ITNs at all times, is among the most effective methods of malaria control.

Regular indoor residual spraying (IRS) of their houses to kill the mosquitoes since ITNs and IRS achieve maximum desired results when used together.

5.3.2. To the community leaders

Organize regular malaria prevention activities within the locality such as bush clearing, town cleaning, distribution of ITNs and indoor residual spraying drives. Also do spot checks to confirm use of ITNs for the intended purpose and put measures that would deter diversion of the ITNs to other uses such as fishing, and enclosures for chicken and their brood among others.

5.3.3. To fellow researchers

This study was limited by feasibility logistics that made the researcher to zero in on only those households that had reported cases of malaria in the preceding 6 months. The duration of the study could be extended to one year and the population under study enlarged to include all households within the study area. This might come up with richer data that could give a clearer picture on association of some factors with malaria prevalence. More factors such as host factors (age, sex, comorbidities), and vector factors (such as feeding patterns and resistance to insecticides) enrichen the data further.

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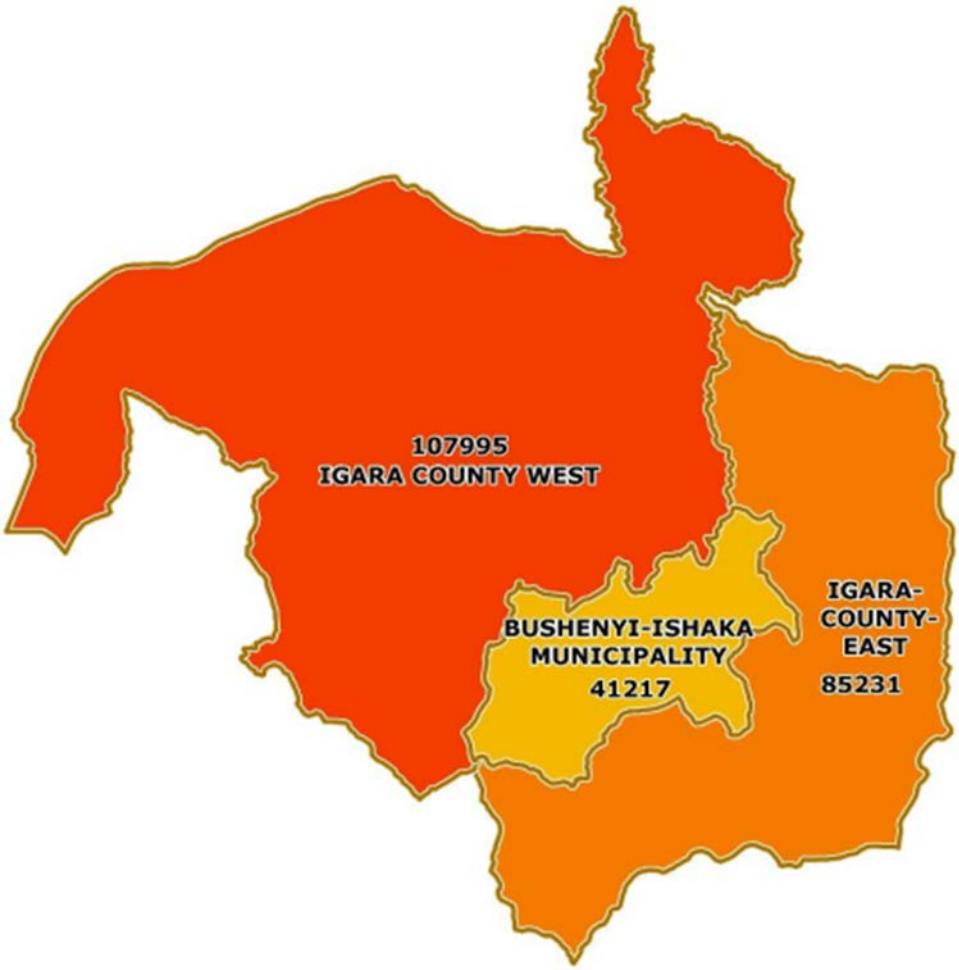
APPENDICES

Appendis I: Map of the study area



Source: www.monitor.co.ug

Appendix II: Consent form

Title of Research Project: "Socioeconomic and Environmental Conditions Associated with Malaria Prevalence in Bushenyi-Ishaka Municipality, Bushenyi District, Uganda"

Principal Investigator: UMAR Ibrahim Abdu

Address: Kampala International University, Western Campus
P.O Box 71, Bushenyi

1. Invitation

I am **Umar Ibrahim Abdu**, a student of Bachelor of Clinical Medicine and Dentistry at KIU Western Campus who is going to carry out research on "*Socioeconomic and Environmental Conditions Associated with Malaria Prevalence in Bushenyi-Ishaka Municipality, Bushenyi District, Uganda"*. I am requesting you to become a participant in this study after you have read the information that follows and understood what is to be done and what you are required to do. You are free to ask for explanations and clarification on anything that you feel is not clear to you.

2. The following have been agreed:

a) The aim of the study is to investigate "*Socioeconomic and Environmental Conditions Associated with Malaria Prevalence in Bushenyi-Ishaka Municipality, Bushenyi District, Uganda"*

b) To enable the researcher to collect the information required in the study, I have been told that I will be asked a number of questions.

c) It has also been explained to me that some of the questions will cover my household socio-economic and environmental conditions.

d) I have also been told that answering questions will take approximately 20 minutes.

e) It has been explained to me that by participating in the survey, I am not going to get direct benefits but that all people might gain from the research since it may provide information from which the researcher may be able to make recommendations on how to prevent malaria.

f) It was also explained to me that the information I will give will be kept confidential and that it will be used anonymously when making the findings known to other scientists and for recommendation purposes.

f) Where explanations and clarifications were required I have been allowed to ask questions.

g) It was clearly explained to me that I can refuse to participate in the research or can stop answering the questions at any time during the interview, without being disadvantaged in any way, and it will not be held against me.

Declaration by the participant

I have read and understood all the information provided about the research and all the questions I asked have been answered to my satisfaction. I, therefore, hereby consent voluntarily to participate in the above mentioned study. It has also been agreed that I will keep a signed copy of this document.

Participant's name……Signature/Thumb-print…… …….Date……..

Witness' name…… Signature/Thumb-print …… …….Date……..

Investigator's name……. …….Signature …… ……..Date……

Message to the participant:

1. Your honest and sincere cooperation will be highly appreciated.
2. Should an emergency arise as a result of the research, or you require any further information with regard to the study, kindly contact the principal investigator: Umar Ibrahim Abdu, on Tel No. …….

Appendix III: Study questionnaire

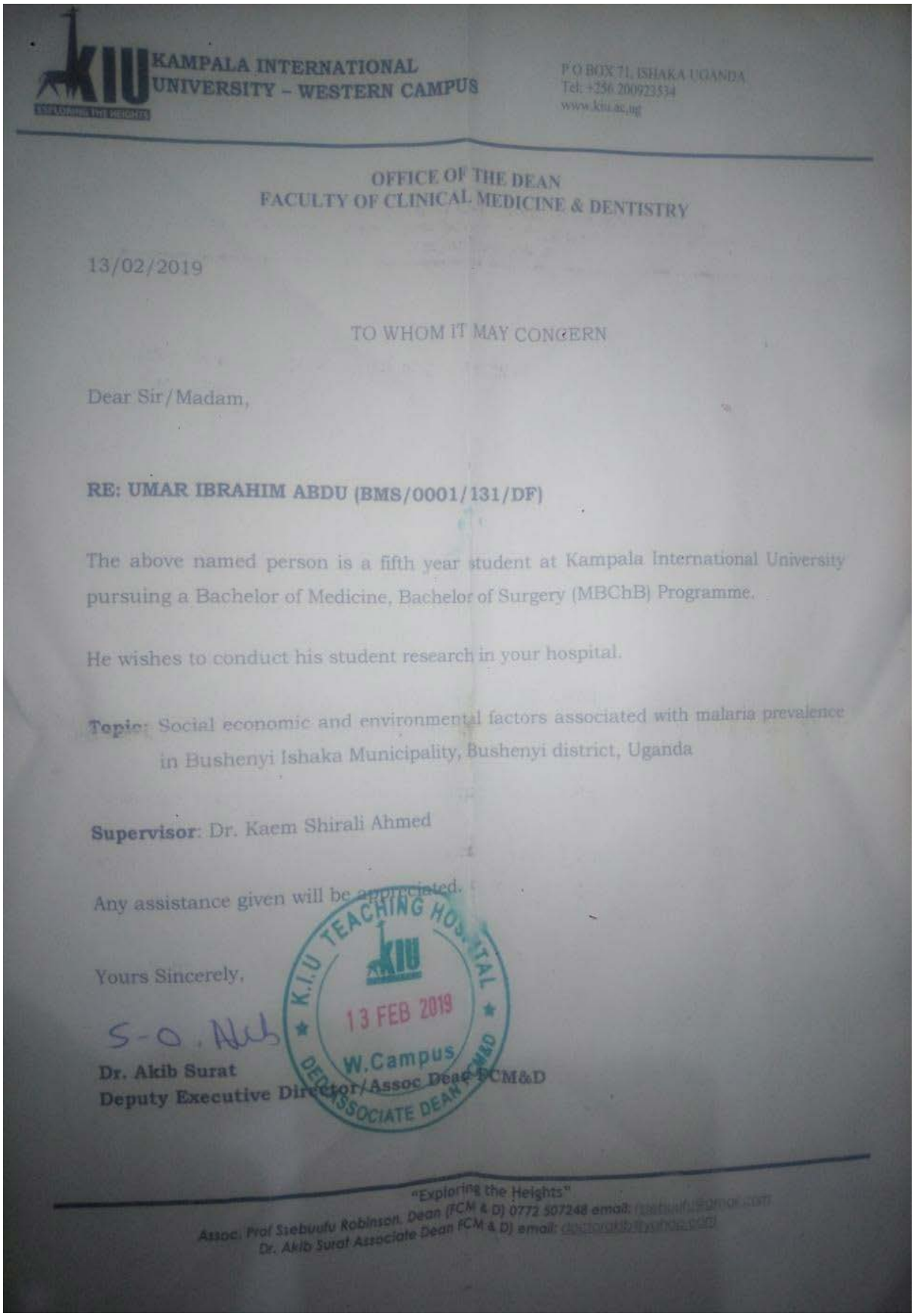
Thank you for accepting to participate in this study. Please complete this questionnaire by providing honest responses to the questions below. In case you are in doubt of the implications of any question, ask for clarifications in case need should arise.

Demographics	Q1	Age (yrs.)	
	Q2	Sex 1= Male 2= Female	
	Q3	Religion	
	Q4	Marital Status 1 = Married; 2 = Single 3= Divorced 4= Widow (er)	
SES	Q5	Education level 1= None; 2 = Primary; 3 = Secondary; 4 = College	
	Q6	Employed: 1 = Yes; 2 = No	
	Q7	Occupation	
	Q8	Average monthly income/expenditure:	
		Basic Knowledge about malaria	
	Q9	Say which of the under listed are the symptoms of malaria	
	i	Headache? 1= yes 2= No	
	ii	Fever? 1= yes 2= No	
	iii	Joint pains? 1= yes 2= No	
	iv	Nausea/ vomiting? 1= yes 2= No	
	v	Convulsions? 1= yes 2= No	
	vi	I don't know	
	Q10	**Which of the following do you think people can do to protect themselves against malaria**	
	Use of insecticides treated mosquito nets 1= Yes 2= No		
	Burn local plants 1= Yes 2= No		
	Indoor and outdoor spraying of insecticides 1= Yes 2= No		
	Use of mosquito repellent 1= Yes 2= No		
	Take anti-malaria drugs 1= Yes 2= No		
	Q12	Do you own an insecticide treated mosquito nets in your household? 1= No 2= Yes	

Household Environmental factors	Q13	Who in your household uses a mosquito net? (circle all that apply) 1= children under 5yrs 2= pregnant women 3= children and women 4= men 5= everyone	
	Q14	How frequently do you (your family) sleep under mosquito nets? (Circle only one) 1= throughout the year 2= rainy season 3= dry season 4= I don't know	
	Q15	Where do you (your family members) often spend the evenings? 1= indoors 2= outdoors	
	Q16	Do you use mosquito repellents? 1= yes 2= No	
	Q17	What type of mosquito repellent do you use? 1= burning 2= smearing	
	Q18	Does the house you are living in have wire gauze? 1= Yes 2= No	
	Q19	Have you ever sprayed your house with insecticides? 1= Yes 2= No	
	Q20	How often do you spray your house with insecticides? 1= always 2= sometimes 3= never	
	Q21	When did you last spray your house with insecticides? 1= 1month 2= 2 months 3= 3-5 months 4= never.	
	Q22	How far from your house is the nearest health facility? 1= < 1km 2= 1km 3= 2-3km 4 = 4-5km 5= >5km	

Thank You for your Participation

Appendix IV: Approval letter from IREC, KIU



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OFFICE OF THE DEAN
FACULTY OF CLINICAL MEDICINE & DENTISTRY

13/02/2019

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: UMAR IBRAHIM ABDU (BMS/0001/131/DF)

The above named person is a fifth year student at Kampala International University pursuing a Bachelor of Medicine, Bachelor of Surgery (MBChB) Programme.

He wishes to conduct his student research in your hospital.

Topic: Social economic and environmental factors associated with malaria prevalence in Bushenyi Ishaka Municipality, Bushenyi district, Uganda

Supervisor: Dr. Kaem Shirali Ahmed

Any assistance given will be appreciated.

Yours Sincerely,

S-O. Akb

Dr. Akib Surat
Deputy Executive Director/Assoc Dean FCM&D

K.I.U TEACHING HOSPITAL
13 FEB 2019
W.Campus
DEPUTY/ASSOCIATE DEAN FCM&D

"Exploring the Heights"
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