Factors that influence pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda

by

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DEDICATION

To my family (Kevin, Flavia, Peggy, Timothy, Gloria), relatives and friends

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DECLARATION

I declare that “Factors that influence pregnant women’s utilisation of anti-malaria services in the Buikwe district of Uganda” is my own work and all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that the work has not been submitted before for any other degree at any other institution.

……

Bbosa Richard Serunkuma

20 November 2015.

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Factors that influence pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda

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ABSTRACT

Malaria is endemic throughout Uganda and the leading cause of morbidity and mortality. Malaria causes complications in 80.0% of all pregnancies in Uganda. This study attempted to identify factors that influence pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda. These factors were contextualised within the Social Learning Theory's major concepts.

The target populations comprised pregnant women attending antenatal clinics (phase 1) and midwives providing antenatal services (phase 2) at 16 clinics in the Buikwe district of Uganda during the data collection phase of the study. Structured interviews were conducted with a sample of 400 randomly selected pregnant women and with the accessible population of 40 midwives.

Pregnant women, who had progressed beyond primary school level education, were more likely to take intermittent preventive treatment (IPT) drugs and to use long lasting insecticide treated nets (LLINs) to prevent malaria. Pregnant women were more likely to implement malaria-preventive actions if they lived within five kilometres of clinics, were satisfied with available health services, were knowledgeable about the malaria preventive measures and had used IPT during previous pregnancies. Pregnant women who implemented one malaria-preventive action were likely to implement other actions as well (Pearson's correlation coefficient was 0.65; $p<0.05$).

Midwives' provision of malaria-preventive services to pregnant women were influenced by the availability of IPT drugs, accessibility of safe drinking water, frequency of giving health education to pregnant women, cooperation with village health teams, malaria-related in-service training, midwives' education level and experience.

Although 97.9% of the pregnant women had taken IPT and 84.2% of those who had received LLINs, utilised these nets, malaria prevention during pregnancy could be improved. All pregnant women should attend antenatal clinics at least four times during each pregnancy, commencing during the first trimester of pregnancy to receive adequate health education and prenatal services, including IPT and LLINs. All midwives should receive malaria-related in-service training. Regular audits of midwives' records should identify and address strengths and weaknesses related to the prevention and management of malaria during pregnancy. Such actions could enhance the prevention and management of malaria, estimated to affect 80% of pregnant women in Uganda.

Key words:

Anti-malaria services, antenatal care, intermittent preventive treatment (IPT), long lasting insecticidal treated nets (LLINs), malaria prevention in Uganda, prevention of malaria during pregnancy

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ACT	-	Arteminisin-based combination
ACTELLIC	-	Pirimiphos-methyl
AIDS	-	Acquired immune deficiency syndrome
AL	-	Artemether plus Lumefantrine
ANC	-	Antenatal care

API	-	Annual parasite index
AS	-	Artesunate
AS-AQ	-	Artesunate plus Amodiaquine
AU	-	African Union
CHW	-	Community health worker
CIA	-	Central intelligence agency
CQ	-	Chloroquine
DDT	-	Dichlorodiphenyl trichlorethene
DHA	-	Dihydroartemesinin
DOT	-	Directly observed treatment
DP	-	Dihydroartemisinin plus Piperaquine
DRC	-	Democratic Republic of Congo
FENDONA	-	Alpha-cypermethrin
FICAM	-	Bendiocarb
D6PD	-	Glucose 6-phosphate dehydrogenase
GDP	-	Gross domestic product
Hb	-	Haemoglobin
HBM	-	Health Belief Model
HC	-	Health centre
HIV	-	Human immunodeficiency virus
HSD	-	Health sub-district
ICON	-	Lambda-cyhalothrin
IEC	-	Information education and Communication
IPT	-	Intermittent preventive treatment
IPTc	-	Intermittent preventive treatment, children
IPTi	-	Intermittent preventive treatment, infants
IPTp	-	Intermittent preventive treatment, pregnant
IRS	-	Internal Residual Spraying
ITNs	-	Insecticide-treated nets
K-Otab	-	Deltamethrin
Kg	-	Kilogram

LLINs	-	Long-lasting insecticide-treated nets (see LLITNs)
LLITNs	-	Long-lasting insecticide-treated nets (synonymous with LLINs)
MCH	-	Maternal-child health
MCP	-	Malaria Control Programme
MDG	-	Millennium Development Goal
Mg	-	Milligram
MPH	-	Master of Public Health
MOH	-	Ministry of Health (of Uganda)
MTCT	-	Mother-to-child transmission
NGO	-	Non-governmental Organisation
NRH	-	National referral hospital
PHC	-	Primary health care
PMTCT	-	Prevention of mother to child transmission of HIV
PNFP	-	Private not for profit
PPQ	-	Piperaquine
PR	-	Parasite rate
Q	-	Semi-interquartile range
R	-	Range
RBM	-	Roll back malaria
RDTs	-	Rapid diagnostic tests (for malaria)
RRH	-	Regional referral hospital
SCT	-	Social cognitive theory
SLT	-	Social learning theory
SD	-	Standard deviation
SDG	-	Sustainable Development Goas
SP	-	Sulfadoxine-Pyrimethamine
SSA	-	Sub-Saharan Africa
UBOS	-	Uganda bureau of statistics
UNICEF	-	United Nations International Children’s Emergency Fund
TB	-	Tuberculosis
TBA	-	Traditional birth attendant

TSS	-	Tropical splenomegaly syndrome
UDHS	-	Uganda demographic and health survey
UK	-	United Kingdom
UN	-	United Nations
UNDP	-	United Nations Development Program
UNISA	-	University of South Africa
USA	-	United States of America
USD	-	United States dollar
USh	-	Uganda Shilling
VHT	-	Village health team
WHO	-	World Health Organization
ZAR	-	South African Rand

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

Malaria is a parasitic disease. It is one of the most important causes of fever in the tropical world. Malaria is caused by a parasite of the plasmodium species. There are five species of plasmodium capable of causing malaria in humans. These are plasmodium falciparum, plasmodium vivax, plasmodium ovale, plasmodium malariae and plasmodium knowlesi (Ehrhardt, Trein, Gottfried & Matthias 2013:283). However, plasmodium falciparum, plasmodium vivax, plasmodium ovale and plasmodium malariae are the known causes of malaria in Uganda and Africa in general (Meek & Hill 2010:6-7). The causative parasite of malaria is transmitted from one person to another through the bite of a female anopheles mosquito (Meek & Hill 2010:6). The disease threatens the lives of 3.3 billion people worldwide. Malaria occurs in 109 countries (World Health Organization [WHO] 2012a:1).

Worldwide, malaria is responsible for 243 million cases and 863 000 deaths annually. According to the WHO (2009:5-9), 89% of all malaria cases occur in sub Saharan Africa (SSA). In Africa, a child dies every 45 seconds from malaria and the major countries where malaria deaths occur are Nigeria, Democratic Republic of Congo (DRC), Uganda and Tanzania, accounting for 50% of all world-wide deaths due to malaria and contributing 47% to the global malaria cases (WHO 2012b:2).

According to Uganda's Ministry of Health (MOH 2012b:3-4: 17), 37% of all patients reporting at health facilities in Uganda were diagnosed with malaria during 2010/11 and malaria was the leading cause of death responsible for 21% of all hospital-based deaths in the same period. According to the WHO (2015), the global number of malaria-related deaths decreased from an estimated 839 000 in 2000 to 438 000 in 2015 and Uganda reported 1.6 million malaria cases during 2015.

The most common form of malaria is simple malaria. However, if simple malaria is not promptly treated, or if it is poorly treated, it may become complicated malaria. This is a devastating form of malaria that causes many complications including death (see section 2.3.6.2 of this thesis). Malaria has devastating effects in pregnant women and their unborn babies (MOH 2012b:9). The devastating effect due to malaria is because of the reduced immune status of pregnant women and the underdeveloped immunity in children. Low birth weight, maternal anaemia and maternal death are common complications of malaria during pregnancy (Brabin 2010:169-170). Gestational malaria, placental malaria and congenital malaria are public health concerns (Agudelo, Arango, Maestre & Carmona-Fonseca 2013:3416).

However, malaria is a preventable disease. Malaria can be prevented by either controlling the malaria vector, namely the mosquito or the malaria parasites. Mosquitoes can be controlled by reducing the mosquito population and by protecting humans from mosquito bites. The most effective strategy is a combination of two or more malaria control methods. According to the MOH (2012b:12), the prevention of malaria in Uganda is based on four strategies, namely:

- prevention of contact between mosquitoes and humans
- reduction of mosquito density and longevity
- the reduction of malaria parasites and
- the use of information education and communication (IEC) materials.

Contact between humans and mosquitoes can be prevented by the use of mosquito bed nets. Intact mosquito bed nets prevent mosquitoes from reaching a person who sleeps under them (MOH 2012e:49). They are hanged around beds to act as physical barriers against mosquitoes. To increase their effectiveness, bed nets are usually treated with insecticides. Such mosquito bed nets are referred to as insecticide treated mosquito nets (ITNs). When these mosquito bed nets are manufactured with insecticide incorporated into the fibre at the factory, such mosquito nets are referred to as Long Lasting Insecticidal Nets (LLIN). Good quality LLITNs will remain effective against mosquitoes after more washes than the conventional mosquito bed nets which are just dipped in insecticide materials (Curtis & Lines 2010:150)

Insecticide treated mosquito bed nets provide more protection than non-treated nets since they have an additional action of repelling mosquitoes and killing those which rest on these bed nets. Therefore, treated mosquito bed nets serve as both physical and chemical barriers resulting in a dual effect against mosquitoes. It is recommended that all people, particularly pregnant women, always sleep under treated mosquito nets (MOH 2012a:91).

Reducing the mosquito population can be achieved by killing adult mosquitoes or by preventing their breeding. The most commonly used method of killing mosquitoes is the use of chemical insecticides on walls inside residential houses (MOH 2012e:49). This may be done by internal residual spraying (IRS) of residential houses with long lasting insecticides. The major factors considered when selecting these insecticides are: safety, cost effectiveness, mosquito susceptibility to the insecticide and duration of action of the insecticide. Most of these insecticides are safe to humans, domestic animals and wildlife if they are used in recommended doses. When sprayed in their recommended doses, they kill mosquitoes but their durability of action is short (four to six months). Breeding of mosquitoes can be controlled by using oils to kill larvae of mosquitoes thus stopping the lifecycle of mosquitoes. Destruction of malaria larvae can be achieved by spraying oil on stagnant water. Oil works by preventing oxygen

from reaching the mosquito larvae therefore killing them. “Oils have been used as larvicides in control of malaria for many years” (Curtis & Lines 2010:12).

The reduction of malaria parasites involves the pharmacological intermittent preventive treatment (IPT) given to pregnant women to prevent malaria during pregnancy. It is given to all women attending ante-natal clinics as a single dose administered as directly observed treatment (DOT) (MOH 2012b:91-92). This implies that a pregnant woman swallows the pill in the presence of the health worker. According to the MOH (2012b:91), IPT, which is given in the 2nd and 3rd trimesters of pregnancy, is a routine and free service to all pregnant women attending antenatal care (ANC) clinics in Uganda (see section 1.4.4.1 of this thesis).

The strategy of the information, education and communication (IEC) is a very important way of controlling malaria. According to the MOH (2012b:13), health education is a major control measure against malaria as it provides the community with information/knowledge and skills. This is expected to influence their attitudes, resulting in behaviour changes by adhering to health practices that can prevent malaria (see section 1.4.4.5 of this thesis).

Upon realising that malaria has many effects on pregnant women and their unborn babies, Uganda’s government has devised strategies to provide malaria control services countrywide. Many of these control services specifically target pregnant women and their unborn babies. However, findings summarised in section 1.5.1 indicate that many of the malaria control services, provided by the Ugandan government, are poorly utilised.

Considering the importance of malaria and its effects on the population of Uganda, and of the Buikwe district in particular, prompted the necessity of conducting this study. A descriptive correlational study was conducted to identify factors that influence pregnant women’s utilisation of anti-malaria services in the Buikwe district of Uganda, one of Uganda’s 112 districts. The district is located in central Uganda

and malaria is endemic throughout the year with potentially lethal complications for pregnant women and children younger than five years.

1.2 BACKGROUND INFORMATION

According to the United Nations Development Program (UNDP 2012:1-3), during 2000, 189 countries made a promise to free people from extreme poverty and deprivation. This pledge resulted in eight millennium development goals (MDGs). The fifth MDG is to reduce maternal death by the year 2015 and the sixth MDG is to combat and control infectious diseases like auto-immune deficiency syndrome (AIDS), tuberculosis (TB) and malaria by the year 2015. Based on these MDGs, the United Nations (UN) member countries, including Uganda, have implemented several strategies to ensure that by the year 2015, there will be improved indicators towards achieving MDGs 5 and 6. In order to meet those goals, the MOH of Uganda extended anti-malarial services to pregnant women so that they, and their infants, can be protected from adverse effects of malaria (MOH 2012a:91-92). These anti-malarial services include preventive and curative services.

Preventive services include health education, internal residual spraying (IRS) of houses, intermittent preventive treatment (IPT), provision of long lasting insecticide treated mosquito nets (LLITNs). IPT is both a preventive and therapeutic service given to all pregnant women who visit ANC clinics during the second and third trimesters of their pregnancies. It is a single dose combination drug of sulfadoxine and pyrimethamine (SP) that is given to all pregnant women. This oral drug is taken in the presence of a health worker/midwife in the ANC clinic. The rationale for this treatment is described in section 1.4.4.1 of this thesis.

Curative services include blood testing and malaria case management. This service is provided to pregnant women at health facility level. Malaria treatment is free in all government facilities and treatment costs are subsidised in ‘private not for profit’

(PNFP) health facilities. Detailed malaria treatment in pregnant women is discussed in section 2.2.8.2.

1.3 RESEARCH CONTEXT

The study was conducted in the Buikwe district of Uganda. In order to contextualise the study site, some information about Uganda generally and about the Buikwe district specifically will be provided.

1.3.1 Information about Uganda

Uganda is a landlocked country in East Africa which is located on the equator (Buikwe District Council 2011b:4-5) and is a member of the East African Community, the African Union (AU) and of the UN. Uganda gained independence from British rule on 10 October 1962.

1.3.1.1 Geographic information

Uganda is located between latitude 4^0N and 1^0S and longitude 29^0E and 36^0E (Buikwe District Council 2011b:4). Uganda is bordered in the East by Kenya, in the South by Tanzania and Rwanda, to the West by the Democratic Republic of the Congo (DRC) and to the North by the Republic of Southern Sudan. Uganda shares Lake Victoria with Kenya and Tanzania. The country's total surface area is 241 550 KM^2. The surface area under water is 41 743 km^2 (Buikwe District Council 2011b:4-5).The country's temperature ranges between 15 and 31^0C throughout the year. It is a generally raised plateau with minimum altitude of 620 and maximum altitude of 5 110 metres above sea level in the Rwenzori mountains of South Western Uganda (Uganda Bureau of Statistics [UBOS] 2012:2). The country has a tropical climate which is warm and wet throughout the year and thus it has generally tropical savannah grassland vegetation, but tropical forest vegetation is found near the equator. This means apart from the mountainous areas of the south west which are

above 1 600 meters above sea level, most of the country has a conducive climate for malaria transmission throughout the year. It has 112 districts, as shown in figure 1.1.

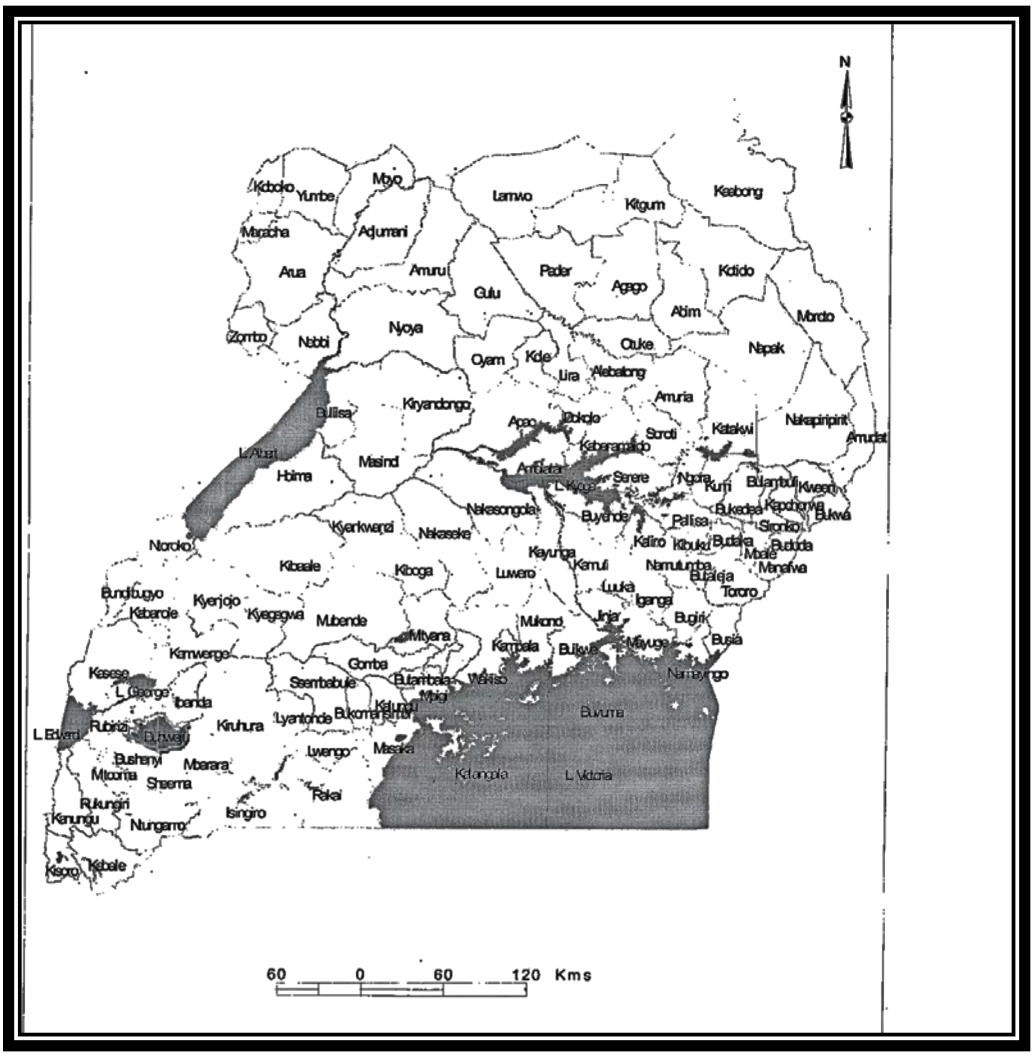


Figure 1.1: Map of Uganda showing the 112 districts

Source: Buikwe District Council 2013 (see Annexure J for a larger map of Uganda)

1.3.1.2 Demographic profile of Uganda

According to UBOS (2012:2-3), the country's projected population of 2013 was 35 189 473. The average fertility rate is 6.2 and the annual population growth rate is 3.4%. This growth rate is one of the highest in the world.

The population comprises ethnic Africans (99.0%) and others (including Asians, Europeans and Arabs) jointly making up about 1.0% of the population. The gender ratio of the population is 95 males to 100 females. The life expectancy is 50.4 years. The maternal mortality rate is 438 maternal deaths for every 100 000 live births (UBOS 2012:237). Because of a high growth rate and a generally low life expectancy, the population of Uganda can best be described as a young population with the population younger than 15 years comprising 52.0% of the total population. The Uganda demographic and health survey's (UDHS) findings show that 30% of all families are headed by women and 20% of all adult Ugandans have no formal education (UBOS 2012:56). The same survey found that family planning awareness in the country was almost 100%. However, the utilisation of family planning services, also referred to as the contraceptive prevalence rate, was only 34.0%.

1.3.1.3 The economy of Uganda

Uganda is classified as a low income country in the SSA region. The economy is generally based on small scale agriculture. The majority of the population depends on subsistence farming and agro-based industries. Uganda is self-sufficient in food production. Coffee is the main foreign exchange earner. The gross domestic product (GDP) per capita is US$ 430 (MOH 2010a:2). This means that Uganda is one of the poorest countries in the world. The country has generally a stable but small economy.

1.3.1.4 Uganda's disease burden

According to the Uganda Demographic and Health Survey (UDHS), as reported by UBOS (2012:12), the major diseases in Uganda are infectious and parasitic conditions. Studies have shown that 75% of all disease burdens in the country are preventable through improved sanitation and hygiene, child health immunisation, good nutrition and other preventive measures like the use of condoms and ITNs (MOH 2010b:6). The major reported causes of morbidity in the country is malaria,

respiratory tract infections, anaemia, gastro-intestinal diseases, peri-natal conditions and AIDS (MOH 2010a:2).

1.3.1.4.1 Malaria in Uganda

Malaria is the biggest cause of morbidity and mortality in Uganda. In 2007, the Malaria prevalence in Uganda was estimated at 12 792 759 cases and 47 000 malaria deaths occurred during the same year (MOH 2010a:4). Apart from those morbidity and mortality figures related to malaria, malaria morbidity leaves many of its victims with permanent damage like mental disorders and physical disabilities.

1.3.1.4.2 Malaria during pregnancy

Malaria during pregnancy is potentially a dangerous condition to the pregnant woman and her unborn baby. Yet, malaria is a common condition in malaria endemic areas of the tropical world. This is particularly true for Uganda. According to the MOH (2012a:5), during the 2011/12 financial year, 10% of all pregnant women attending ANC clinics across the country were diagnosed with and treated for malaria. This is a significant percentage considering the fact that many preventive measures are in place to minimise the occurrence of malaria in this vulnerable group of the population.

1.3.2 Information about Buikwe district, central Uganda

This study attempted to identify factors that influence the utilisation of anti-malaria services by pregnant women. The study was conducted in the Buikwe district, with an estimated population of 442 000 (2013 projection). The political boundaries of Buikwe district are shown in figure 1.2. The estimated annual number of pregnant women in the Buikwe district is 20 910. During 2014, 156 398 malaria-related outpatient department visits were recorded, amounting to 32.4% of all these visits, emphasising

the dire necessity of preventing malaria among pregnant women in the Buikwe district (Buikwe District Council 2013:4; 2015:7-15).

1.3.3 Buikwe district's health facilities

The Buikwe district has 50 health units, five hospitals, 11 health centres (level III) and 34 health centres (level II). Maternity and antenatal care (ANC) services are provided at health centre level III and at hospital level. As such, the district has 16 health units where ANC and maternity services are provided and where pregnant women could access malaria preventive treatment, including IPT.

Figure 1.2: Map of Buikwe District showing political boundaries (Buikwe District Council 2013). See Annexure K for a larger map of the Buikwe district.

1.3.4 Human resources for health

The health sector is a labour intensive sector implying that the availability of adequate numbers of health workers is important for providing quality health services. Uganda has a shortage of qualified health professionals. According to the MOH (2012d:44), the WHO recommends a ratio of 2.3 health care workers per 1 000 population to meet the MDGs. In Uganda, the ratio was 1.8 per 1 000 population. This is aggravated by the fact that the qualified health care staff members are inadequately distributed throughout the country.

Urban areas have more skilled health professionals compared to rural districts. According to the MOH (2012d:44-45), by 2010, while only 13% of the total population was considered to be staying in urban areas, 70% of all doctors in Uganda were working in urban areas. This implies that only 30% of the doctors were working in the rest of the country serving 87% of the population. Likewise, at the same time, 58% of all nurses were working in urban areas. According to the MOH (2012a:7), by the end of 2008, only 51% of established posts in health facilities were filled by qualified health workers. Reasons for inadequate staffing at health facilities include the insufficient training capacity of training institutions, and inadequate salaries. This leads to failure to attract and retain staff in health facilities. This situation is aggravated by the 'brain drain' whereby the highly skilled health workers are attracted by better paying countries in the region like Kenya and Rwanda. This failure to attract and retain staff is particularly pronounced among highly skilled health professionals (MOH 2012d:53-55).

1.3.5 The structure of Uganda's health care system

Health services in Uganda are coordinated by the MoH. There are two national referral hospitals and 14 regional referral hospitals. These referral hospitals are managed directly by the central government (MOH 2012d:53-54). Then, the general

hospitals, health centre level 4, health centre level 3 and health centre level 2, are managed by the respective districts.

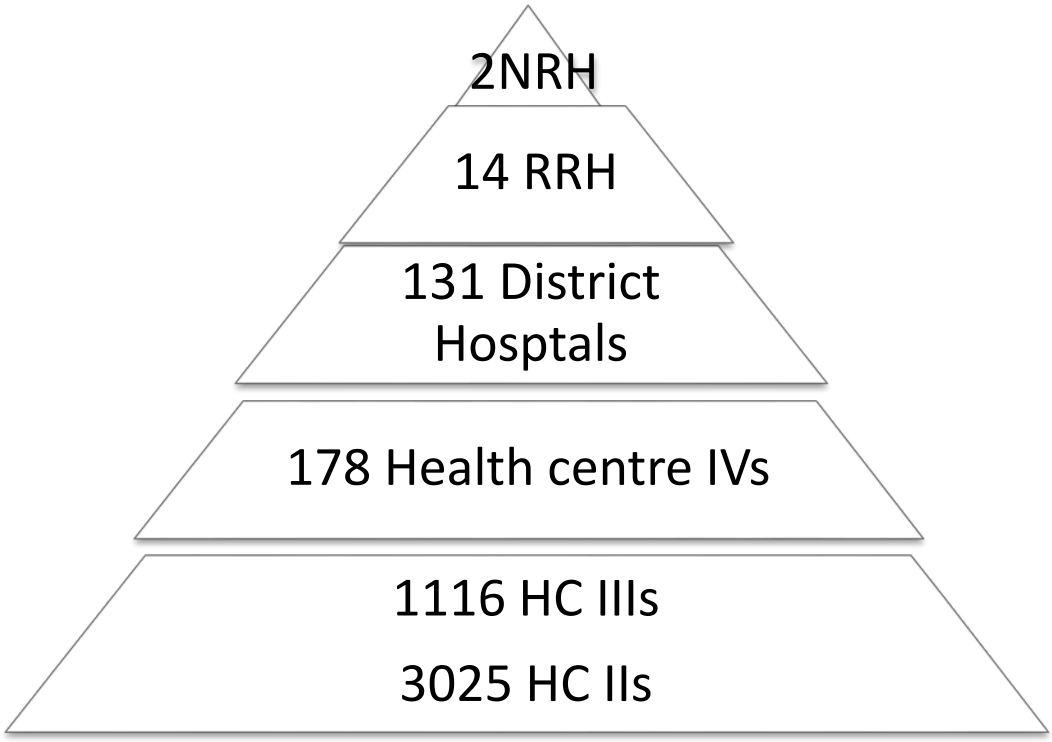


Figure 1.3: Number of hospitals and other health facilities in Uganda (Adapted from MOH 2010a:4)

(NRH – national referral hospital, RRH- regional referral hospital, HC- health centre).

According to the MOH (2012d:54), Uganda's health care system includes the following health facilities:

- 2 national referral hospitals
- 14 regional referral hospitals located in all regions of the country
- 65 general hospitals and
- 66 private hospitals.

Buikwe district has one government general hospital called Kawolo general hospital. However, the district also has four private hospitals giving a total of five hospitals in the district. Health care services are based on standard treatment guidelines and therefore basically the same in both private and government facilities (MOH 2010b:2).

The public hospitals offer services to the general population and those referred from lower health centres. User fees in private hospitals are subsidised by the government so that the community can afford these services and therefore can access them.

- Health centre level IV. These health centres are at county level. Buikwe district has no health centre IV.
- Health centre level III. These health centres are at the sub-county level. Buikwe district has 11 functional health centre IIIs. These are public health facilities that offer maternity services in addition to general health care services.
- Health centre level II. These health centres are at parish level. A parish is an administrative sub-division of a sub-county and 3-8 parishes form a sub-county. The Buikwe district has 36 functional health centre IIs. This gives a total of 50 health facilities /units in the Buikwe district.
- Community health workers (CHWs) are village community volunteers engaged in health-related activities like community mobilisation for immunisation. CHWs are unpaid volunteers who received basic training in health-related issues. They are trained by the MOH to support fellow community members for health promotion and disease prevention. Each of the 478 villages in the Buikwe district has such CHWs that comprise the Village Health Teams (VHTs). Such VHTs comprise a health centre I. Health centre 1 has no physical structures unlike other health units.

Table 1.1: Health infrastructure in Uganda

	Type of facility	Administrative level	Number in the country	Catchment population	Administrative arrangement
1	National referral hospitals	Country	2	30 million	Central government
2	Regional referral hospitals	Region	14	2.3million	Central government
3	District/general hospitals	District	131	263 000	District local government
4	Health centres level IV	County	178	187 000	District local government
5	Health centres level III	Sub-county	1116	84 000	District local government
6	Health centres level II	Parish	3025	14 900	District local government
7	Health centres level I (VHT)	Village	(478 VHTs in Buikwe district)	Village	Village volunteers

(Adapted from: MOH 2010a:4)

1.3.5 Accessibility of health care facilities in the Buikwe District

Health facilities are distributed throughout the country. Because of inadequate resources, the government is unable to establish health facilities in all parts of the country, particularly in the remote rural areas. As such, many parts of the country have poor geographic access to health services. According to the MOH (10:5-6), 72% of all households in Uganda live within five kilometres from a health facility (public and PNFP). This implies that 28% of all the population of Uganda have poor

geographic access to health services. Many other physical and nonphysical barriers limit the community's access to health facilities. Lack of medicines and other health supplies and shortages of human and material resources in the public sector, further constrain access to quality health services.

1.3.5.1 Accessibility to anti-malaria services

At various levels, malaria control activities take place. Preventive services like health education and internal residual spraying (IRS) take place at community level. At the level of health centre IIs, blood testing using rapid diagnostic testing (RDT) for malaria and first line treatment are offered. In addition to services offered at health centre IIs, health centre IIIs offer laboratory microscopic examinations, malaria treatment, including IPT services for pregnant women (see section 1.2 of this thesis). In addition to services offered at the lower level health services, at health centre IVs, rehabilitative services are offered in addition to malaria diagnosis and treatment. However, specialised services including diagnostic, treatment and rehabilitative services take place at hospital level. Such malaria control services, as described in section 1.2 of this thesis, could help to control malaria morbidity and mortality in Uganda, if utilised effectively.

1.3.6 Challenges faced by Uganda's health care system

The health system in Uganda, like those of many developing countries, faces many challenges because of limited resources. Such challenges arise from the fact that the country's economy is small and the health sector consequently has limited resources. According to Smart Global Health (2010:2-3), the Abuja declaration was signed on 25 April 2000 committing African heads of state to reduce deaths due to malaria by half by 2010, by providing financial, human, logistical support and research to fight malaria on the African continent. As such, 25th April was declared the African malaria day. However, in 2007, President Bush declared it to be a Malaria awareness day. In that declaration, African states committed 15% of their GDP to health care services.

However, in Uganda's case, the health sector gets about 9% of the country's GDP (UBOS 2012:45).

Limited financial resources result in limited numbers of healthcare professionals, inadequate skills and poorly motivated healthcare workers. Poor infrastructure and poor distribution of facilities is a big challenge. According to the MOH (2012d:14-15), all national and regional referral hospitals are located in urban areas. This leaves rural areas with smaller health facilities and with poorer services than the urban areas. Poor medical and logistical supplies to health facilities pose another major challenge to the country's health system. According to Bbosa (2009:88), one of the major bottlenecks of home-based anti-malarial treatment in Uganda was the poor supply of anti-malarial drugs. This affects the quality of health care offered by the country's health system.

1.3.7 Mother and child care services in Uganda

Mother and child health (MCH) services are available in all health facilities in the country, as well as ANC and maternity services. MCH services include immunisation, growth monitoring, HIV testing and prevention of mother to child transmission of HIV (PMTCT), IPT services, provision of LLITNs and general child health care services.

1.3.7.1 Antenatal care services

ANC services are available in all health facilities in Uganda. This implies that a pregnant woman can access ANC services from the smallest health centre II up to the more complex national referral hospitals. By policy, enrolled midwives are deployed at health centre IIs to offer this service. The policy of the MOH, in line with the WHO guidelines, recommends that a pregnant woman should attend antenatal clinics at least four times during the nine months of pregnancy. One of the four attendances of the ANC clinic should be during the first trimester. According to UBOS

(2012:105-106), only 21% of all pregnant women attend ANC clinics during the first trimester. However, 95% of all pregnant women do attend antenatal clinics at least once during pregnancy. The same findings indicate that only 47% of all pregnant women attend ANC clinics at least four times.

1.3.7.2 Maternity services

According to the MOH's policy, maternity services are available in all hospitals, health centres level IV and health centres level III. However, in practice, a few health centres level II, particularly the private health centres, offer maternity services in addition to ANC services. At health centres level III, maternity services are offered as well as other health care service like ANC services, malaria case management and other general medical care. At the level of health centres level III, uncomplicated deliveries can be conducted with the help of trained midwives. Buikwe district has five hospitals, no health centre level IV and 11 health centres level III that offer maternity services. Therefore, the district has a total of 16 health facilities that offer maternity services.

1.3.8 Millennium development goals: Uganda's perspective

During 2000, 189 nations promised to free people from extreme poverty and multiple deprivations (UNDP 2012:2). This pledge turned into the eight MDGs. These goals are significant for developing countries since the developed world have already achieved most of them, at least to some extent. Specific targets were also set for each of the eight goals so that by 2015, achievement for those goals could be measured by member countries. The eight MDGs are:

- MDG 1: eradicate extreme poverty and hunger
- MDG 2: achieve universal primary school education
- MDG 3: promote gender equality and empower women
- MDG 4: reduce child mortality

- MDG 5: improve maternal health
- MDG 6: combat HIV /AIDS, malaria and other diseases
- MDG 7: ensure environmental sustainability
- MDG 8: develop global partnerships for development

These eight MDGs are all relevant to the proposed study. However, the fifth goal of improving maternal health and the sixth goal of combating HIV/AIDS, malaria and other infections are the relevant MDGs to this study.

1.3.9 Global and regional control strategies

For hundreds of years, malaria has been the one of the most important human diseases of the world. Since malaria is a global public health problem, there have been global efforts to control malaria with some success. Eradication campaigns of the 1950s and 1960s ware effective in eliminating malaria from some parts of the world, including Europe and North America (Hill & Meek 2010:1-2). This indicates that malaria can be controlled.

1.3.9.1 The global malaria control strategy

In 1992, a ministerial conference was convened by the WHO. Health ministers from all over the world endorsed the malaria control strategy (Hill & Meek 2010:2). According to the WHO (2012b:2-3), the strategy had three components which include controlling malaria in 35 highly endemic countries, including Uganda and many SSA countries.

The second component of the strategy was the elimination of malaria in low endemic world countries. The third component of the strategy was the research component for discovering new tools and approaches for the fight against malaria.

1.3.9.2 The Roll Back Malaria (RBM) Programme

According to Hill and Meek (2010:1-2), in 1998, the roll back malaria (RBM) partnership was formed. The partnership was formed by the WHO, United Nations Children's Emergency Fund (UNICEF), the UNDP, and the World Bank. It includes governments, development agencies civil society organisations, professional associations, commercial organisations, research groups and the media. The RBM goal was to reduce the world's malaria burden by 50% by 2010. According to Hill and Meek (2010:4), this was to be implemented based on six elements of the RBM, namely:

- evidence-based decisions using surveillance and appropriate response and building community awareness
- rapid diagnosis and treatment
- better multi-pronged protection using ITNs to control mosquitoes and making pregnancy safer
- focused research to develop new medicines, vaccines and insecticides and to help epidemiological and operational activities
- coordinated actions for strengthening existing health services and policies, and providing technical support
- harmonising actions to building a dynamic global movement

1.4 MALARIA AS A PUBLIC HEALTH PROBLEM

Malaria is an important public health problem, because it affects and is affected by the socio-economic situation of communities, and secondly malaria-related health care services are not utilised effectively, even if these services are provided free of charge. As pregnant women and children aged up to five years are particularly susceptible to malaria attacks, all communities in malaria indigenous areas should be alert for signs and symptoms of malaria particularly among these two groups of susceptible persons.

1.4.1 Malaria and poverty

The World Bank (2010:4) estimates that the annual economic burden to Africa due to malaria is 12 billion US dollars. This is compounded by a huge direct cost in prevention and treatment plus indirect costs of labour time lost when people are sick or caring for the sick. In Uganda, the cost of treating a malaria case averages US$4.1 in urban settings and US$1.8 in rural settings. The proportion of household expenditure on malaria may reach 34.0% of their total income in poor families. In Uganda, malaria is estimated to reduce the gross domestic product (GDP) by 1.3% per annum.

1.4.1.1 The poverty-malaria-poverty cycle

Malaria kills the poorest of the society. Malaria is transmitted by the female anopheles mosquito that breeds in stagnant water. Mosquitoes enter homes without screened windows. They bite children and adults who do not sleep under the protection of LLITNs. So, the poor people who stay in such homesteads contract malaria and more than 30% of their income is spent on treating malaria (Malaria Consortium 2010:2).

This situation is aggravated by the time spent without working because of suffering from malaria or caring for those suffering from malaria. So, malaria aggravates poverty, and poor living conditions predispose disadvantaged communities to malaria attacks.

1.4.2 Malaria within the Ugandan context

According to the MOH (2012b:2), malaria is endemic throughout the year in all districts of Uganda. It is therefore a serious public health concern as it is the major disease in Uganda.

1.4.3 Malaria in pregnant women

Malaria during pregnancy causes special concerns since pregnant women suffer from malaria more often than the general population, and can suffer more serious consequences due to their suppressed immunity caused by their pregnancies. Pregnant women are four times more likely to be infected by malaria and twice more likely to die of malaria than other adults. Complications due to malaria are more common among pregnant women compared to the general population. According to the MOH (2012a:90), malaria parasitaemia during pregnancy is ten times higher than in the general population, and mortality due to malaria is also higher than in the general population. During their first pregnancies, women are more susceptible to complications due to malaria compared to other pregnant women.

In Africa, malaria during pregnancy is responsible for an average of 400 000 cases of severe maternal anaemia. This is because of the vulnerability of pregnant women to malaria because of their reduced immunity. It is also responsible for 200 000 deaths of new born babies per year (Malaria Consortium 2012:2). This is due to placental infection, premature birth and low birth weight (Agudelo et al 2013:341).

1.4.4 Anti-malaria services available to pregnant women in Uganda

Children younger than five years of age and pregnant women are more vulnerable to malaria than the general population. This means that the high morbidity and mortality figures are influenced by pregnant women and children younger than five years, the most vulnerable groups to malaria. In order to achieve the national targets for the MDGs, it is important to control malaria in pregnant women and children younger than five.

It is therefore the policy of the MOH to provide anti-malarial services to pregnant women (MOH 2012a:90-91). Such control services include IPT, the provision of LLITNs, IRS, malaria case management and the use of information education and communication (IEC) strategies against malaria.

1.4.4.1 Intermittent preventive treatment (IPT)

Because malaria poses a huge risk with serious adverse effects to both the pregnant woman and her unborn baby, the WHO (2013a:7) recommends that all pregnant women in malaria endemic areas should take preventive treatment against malaria. In Uganda, the malaria control programme of the MOH (2012a:91-92) recommends that routine IPT should be given to all pregnant women using two drugs combined, sulfadoxine and pyrimethamine (SP).

According to the MOH (2012a:91), this is a free preventive service available to all pregnant women without clinical signs and symptoms of malaria, attending ANC clinics. However, pregnant women diagnosed with malaria, are treated with the recommended first or second line treatment, depending on the clinical presentation of malaria. IPT is given to pregnant women in their second and third trimesters of pregnancy. These drugs, sulfadoxine and pyrimethamine (SP) are contra-indicated in the first trimester. This is because, the combination drug is given in single doses twice between the 6th and the 8th months of pregnancy (MOH 2012a:91-92). The interval between the two doses should be at least one month. This is because sulfadoxine and pyrimethamine (SP) are long acting anti-malarial drugs, implying that it should not be taken more frequently so as to avoid drug accumulation in the body. Such accumulation may lead to hepato-toxicity. However, the use of SP for IPT is contra-indicated in women who react to sulphonamides. Such pregnant women are advised to consistently use LLITNs for malaria prevention (MOH 2012a:91).

IPT drugs are given as a directly observed treatment (DOT). This means that the tablets are given by the midwife in ANC clinics and the pregnant woman swallows it in the presence of the midwife or any health worker who overseas that activity. This is to make sure that this important drug is not wasted by some of the pregnant women. Since IPT is free in Uganda, it should be accessible to all pregnant women visiting ANC clinics. According to Wurtz, Pascual, Diawara, Kowry, Baret, Diatta, Khadidiatou, Mbaye, Fatou, Dieme, Rogier, Bercoin, Briolant, Boubacar and Pradines (2012:6), IPT, comprising sulfadoxine-pyrimethamine with artesunate, resulted in a 90.0% reduction of clinical cases of malaria in Senegal among pregnant women. The reduction in malaria results in reduced cases of maternal and foetal anaemia. However, because of the prophylactic use of the drug, IPT might cause resistance of malaria parasites towards the IPT drugs, SP (MOH 2012a:93).

1.4.4.2 Long lasting insecticide treated nets (LLINs)

The female anopheles mosquitoes commonly bite their victims at night when they are asleep. So, prevention of mosquito bites at night is an important pillar in the prevention of malaria. This is particularly important in pregnant women. This is because malaria infection has devastating effects on pregnant women, as discussed in section 2.3.6.1 of this thesis. The LLITN is the latest version of mosquito bed-nets where the insecticide is incorporated into the material before the production of the fibre that makes the nets (Curtis & Lines 2010:150). In this way, the insecticide in LLITNs can be effective against mosquitoes for up to two years without re-treatment (Curtis & Lines 2010:150). Before the advent of that technology, mosquito bed-nets were simply dipped into insecticide then dried to produce what is referred to as insecticide treated mosquito nets (ITNs) (Curtis & Lines 2010:144-145).

The use of LLITNs is the best way of preventing mosquito bites while sleeping. Such mosquito bed-nets create a physical barrier which prevents mosquito to human

contact. The imbedded insecticides repel and kill mosquitoes without harming humans. According to Curtis and Lines (2010:146-153) insecticides used in the treatment of mosquito nets are pyrethroids and other chemicals certified by WHO toxicologists to be safe to humans. However, if one reacts to a particular chemical in specific types of LLITNs, it is advisable that one changes the brand of LLITN (MOH 2012b:96-98). Likewise, some mosquito bed-net users claim that they feel hot while sleeping under mosquito nets. Such users should be counselled and advised to use less night clothing. For pregnant women who react to IPT drugs, the use of LLITN is the major malaria preventive method available. Free mosquito nets are distributed to all pregnant women attending ANC clinics in Uganda. According to Hetzel, Gibson, Namarola, Makita, Siba and Mueller (2012:192), ownership and usage of LLITNs depend on large-scale free distribution of such nets.

Other preventive measures include the screening of doors and windows with wire meshes, the use of personal insect repellent creams on the skin and the use of insecticide-treated curtains (Curtis & Lines 2010:150-151). The screening of doors and windows with wire meshes acts as a physical barrier for preventing the entry of mosquitoes into houses. Considering that most households have poor housing conditions, this is an expensive way of prevention of malaria which cannot be used by the majority of the population (MOH 2012a:90-92). The application of insect repellent creams on skin can also be used for personal prevention of mosquito bites. Insect repellent creams have only a limited personal use when one is outdoors. Insecticide-treated curtains can be used over house openings like windows, doors and eave gaps. However, such curtains are of limited use for malaria prevention because it is difficult to ensure their retreatment (Curtis & Lines 2010:150).

1.4.4.3 Insecticide treated mosquito nets (ITNs)

These mosquito bed-nets are produced by applying or dipping the nets into insecticides. The nets are then dried and packed. The insecticide in such mosquito bed-nets is effective against mosquitoes for about six months (Curtis & Lines

2010:144-145). It is therefore important that ITNs are retreated regularly every four to eight months depending on the insecticide used. Like the LLITNs, these mosquito nets offer a physical barrier against mosquitoes. For six months after purchase or re-treatment, ITNs like LLITNs also repel and kill mosquitoes. ITNs are therefore an important tool in the prevention of malaria.

1.4.4.4 Malaria case management

Despite all preventive measures, clinical malaria remains a big problem for Uganda's health care system. According to UBOS (2012:169-170), a significant number of pregnant women are not keen to utilise such preventive measures, explaining why preventive measures often fail to stop malaria. Following failures of preventive measures, clinical cases of malaria then appear. Malaria case management is a control service that is available to all sectors of the population requiring such curative services. This includes first line treatment and second line treatment for complicated and resistant malaria. Details of malaria case management, including the management of malaria during pregnancy, will be discussed in Section 2.3.8 of this thesis.

1.4.4.5 Information, education and communication (IEC)

The use of the information, education and communication (IEC) strategy is very important in the control of malaria. According to the MOH (2012b:13), health education is a major control measure against malaria as it provides the community with information/knowledge and skills. This is expected to influence their attitudes, resulting in behaviour changes by adhering to preventive health practices that can prevent malaria. The use of information is important since it involves empowering communities and individuals with information for preventing malaria. This is a key strategy to control malaria. This involves the use of health education, community sensitisation, use of IEC materials, mass media including print and electronic media.

Through these channels, information about malaria is conveyed to communities which can help to prevent malaria.

1.4.4.6 The importance of anti-malaria preventive services

Preventive services against malaria are very important to control malaria and to reduce malaria morbidity and mortality figures. Resources which would have been required for treatment of malaria could be saved if malaria is successfully prevented. The time lost by an individual, being treated for or caring for persons suffering from malaria, is saved resulting in enhanced productivity of the population. This implies that preventive services against malaria have a cost benefit factor in economic terms.

1.5 RESEARCH PROBLEM

Malaria poses a real risk to the health of pregnant women. In view of this and in line with the WHO recommendations, the MOH, together with other development partners, have put in place anti-malaria policies and services for pregnant women in Uganda. In spite of these measures, according to the recent national and population survey in Uganda, IPT1 stands at 48% and IPT2 is only 27% (UBOS 2012:170-175). The use of LLITNs during pregnancy was 47% during 2011 while IRS of houses in 2011 was only 7.2% (UBOS 2012:172-175). These findings indicate under-utilisation of anti-malaria services among Uganda's pregnant women. Since malaria control services are available and 'free', the researcher speculated that possible barriers might prevent Ugandan pregnant women from using these freely available anti-malaria services. Such barriers could include personal factors of pregnant women like academic background, available information on malaria, financial resources, cultural beliefs, misconceptions and learning capacity of these pregnant women. Other barriers might be the geographic access of these available services, the responsiveness of the healthcare system, possible influence of elders or peers, availability and quality of services. Uganda had several targets for malaria control that were not achieved during the previous decade in spite of the availability of anti-

malaria services throughout the country. Malaria morbidity and mortality rates have remained high in communities throughout Uganda (refer to the malaria prevalence figures in Uganda in section 1.3.1.4.1). Pregnant women and children under five years of age are particularly prone to malaria attacks. Ensuring a healthy pregnancy and a healthy new-born baby in Uganda requires the prevention of malaria, as well as early diagnosis and effective treatment of malaria. Unless factors influencing pregnant women's implementation of anti-malaria actions are identified and addressed, the prevalence, incidence, morbidity and mortality statistics related to malaria in Uganda might not improve.

1.6 PURPOSE AND OBJECTIVES OF THE STUDY

The purpose of the study was to identify factors influencing pregnant women's utilisation of the available anti-malaria services in the Buikwe district of Uganda. Based on the findings of the study, recommendations will be made to enhance the utilisation of these services and to reduce the malaria morbidity and mortality rates of pregnant women and their new-born babies.

The objectives of phase 1 of the study were to identify:

- social-demographic characteristics like age, parity, education level, employment status and income levels that might influence pregnant women's utilisation of anti-malaria services
- environmental factors like geographic access to health facilities, availability of quality health services, traditional healers' and peers' potential influence on pregnant women's utilisation of anti-malaria services
- personal cognitive characteristics of pregnant women like knowledge about malaria during pregnancy and sources of malaria-related information that might influence their utilisation of anti-malaria services
- behaviour/health practices of pregnant women like IPT utilisation, utilisation of LLINs, use of anti-malaria drugs and other malaria control measures related to the utilisation of anti-malaria services.

The specific objectives of the second phase of the study were based on those of the first phase, namely to identify midwives':

- social-demographic characteristics like age, gender, education level, marital status, employment status and training levels that might influence midwives' provision and pregnant women's utilisation of IPT services
- environmental factors like public-private health facilities, availability and cost of IPT drugs and LLINs, availability of TBAs, VHTs and traditional healers that might influence midwives' provision and pregnant women's utilisation of anti-malaria services to pregnant women
- personal cognitive characteristics that might influence midwives' provision and pregnant women's utilisation of IPT services to pregnant women
- reported health seeking practices of pregnant women like time and frequency of ANC clinic attendance and IPT utilisation

1.7 SIGNIFICANCE OF THE STUDY

The envisioned significance of this study is that it will identify and suggest ways of addressing factors that could enhance pregnant women's utilisation of anti-malaria services. This is essential as UBOS (2012:170-175) reported that 48% of pregnant women took their first IPT dose while merely 27% took the second IPT dose and 47% used LLITNs during 2011 despite the fact that malaria complicates 80% of all pregnancies in Uganda (MOH 2012e:363). Findings and recommendations from this study could help to reduce malaria morbidity and mortality rates among pregnant women in Uganda generally and in the Buikwe district in particular by enhancing the utilisation of anti-malaria services during pregnancy.

1.8 DEFINITIONS OF KEY CONCEPTS

The following definitions were adopted during the current study and are presented so that the readers can share the researcher's meaning attributed to specific concepts.

1.8.1 Antenatal (ANC) clinic

This is a special clinic where care for pregnant women is provided by midwives and obstetricians to ensure that maternal and foetal health are satisfactory (Tiran 2005:13). According to the WHO (2013c:51) an ANC clinic is a special clinic where good care for pregnant woman and the developing unborn baby is given.

1.8.2 Anti-malaria services

These are preventive and curative services aimed at controlling malaria. According to the MOH (2010a:40-55), the preventive anti-malaria services include IPR for pregnant women, the use of LLITNs, internal residual spraying while anti-malaria curative services include malaria case management and home-based management of malaria for children younger than five years. Applied to this research, anti-malarial services are the services given to pregnant women in ANC clinics. Such anti-malaria services include malaria case management, intermittent preventive treatment of malaria and the provision of long lasting mosquito bed nets during an ANC visit (MOH 2012a:90-93).

1.8.3 Behaviours

Behaviour refers to one's observable conduct in a society (Hodder 2005:78). These are actions expressed or implemented by an individual or communities. In this study, behaviour is viewed in terms of pregnant women's utilisation of anti-malaria services from ANC clinics in Buikwe district.

1.8.4 Environmental factors

Environmental factors refer to external factors that include physical and social factors that can affect a person's behaviour (Glanz, Rimer & Lewis 2002:169-177). The physical environment includes living conditions, infrastructure and all circumstances

that surround an individual. The social environment includes family members, friends and colleagues. In this study, environmental factors included factors like the availability of healthcare services, proximity to antenatal health care services, household environment and social factors. Social factors include influence from family members, friends and peers. These factors could influence pregnant women's utilisation of antimalarial healthcare services in Uganda.

1.8.5 Fever

Fever, also known as pyrexia, is the rise of the internal or core body temperature above the normal temperature of 37^0C (Weller 2005:149). Fever is a manifestation of a disease process in the body. It is a common symptom of most infectious diseases. Fever is the most common symptom of malaria. In this thesis, the term fever is used to mean a raised body to touch or axillary temperature above 37^0C.

1.8.6 First line treatment of malaria

This is the recommended standard drug given to treat all cases and suspected cases of simple malaria. The recommended drug is COARTEM®. The recommended dose is four tablets given twice daily for three days. However, the first line treatment for pregnant women in the first trimester is oral quinine since the side effects of COARTEM® on the foetus during the first trimester of pregnancy are unknown (MOH 2012a:92). It should be noted that, in normal doses, quinine is safe in pregnant women (WHO 2010b:26-27). So, as a matter of policy, the MOH recommends the use of quinine in the first trimester (MOH 2012a:91-92). In a study done in Thailand, it was concluded that in therapeutic doses, quinine was found to be safe for use in the first trimester (McGready, Thwai, Cho, Looareesuwan, White & Nosten 2002:2-3). However, in high doses, quinine may stimulate uterine muscles causing abortions. So, during pregnancy, it should be used in recommended doses only when necessary.

1.8.7 Health facilities

According to Hornby (2010:526), health facilities include buildings, services, equipment and other resources that are used to provide health care. In this thesis, health facilities include hospitals, health centres and registered clinics that offer healthcare services to communities at various levels throughout Uganda.

1.8.8 Influencing factors

Influencing factors refer to one of several things that cause or influence a system or a process (Hornby 2010:526,769). The phrase 'influencing factors refer to conditions that modify or influence a situation. In this thesis, influencing factors refers to aspects that influence the health seeking behaviours of pregnant women concerning the utilisation of available anti-malarial services in Uganda.

1.8.9 Insecticide treated mosquito bed nets (ITNs)

These are mosquito bed-nets which are impregnated with insecticides which kill /repel mosquitoes that are applied over the bed to protect people against mosquito bites for malaria prevention (MOH 2012a:90).

1.8.10 Intermittent preventive treatment (IPT)

This is the preventive treatment given to all pregnant women between the 6th and 8th months of pregnancy to prevent possible malaria attacks. In Uganda, this is done by giving two rounds of a drug in single doses of three tablets of sulfadoxine-pyrimethamine (SP). The combination drug is given in single doses (comprising three pills) twice (MOH 2012a:91). The interval between the two doses should be at least one month. This is because sulfadoxine and pyrimethamine (SP) are long acting anti-

malaria drugs which should not be taken more frequently so as to avoid accumulation of the drug as it might cause hepato-toxicity.

1.8.11 Long lasting insecticide-treated mosquito bed nets (LLINs)

These are the insecticide treated mosquito bed-nets where the insecticide is integrated in the fibre during manufacturing (Curtis & Lines 2010:149-150). A mosquito bed-net produced in this way can be effective against mosquitoes for more than two years without re-treatment with insecticides (MOH 2012a:90). In this thesis, both abbreviations, LLITNs and LLINs are used as synonyms and refer to long lasting insecticide treated (or insecticide treated) mosquito bed nets.

1.8.12 Malaria

Malaria is an infectious febrile protozoan disease of the tropical and subtropical world that is transmitted to man by a bite of an infected female anopheles mosquito (Meek & Hill 2010:6). Malaria is caused by a parasite of the plasmodium species. In Uganda, there are four species of plasmodium capable of causing malaria in humans. These are plasmodium falciparum, plasmodium vivax, plasmodium ovale and plasmodium malariae (Meek & Hill 2010:6-7). The major signs and symptoms of malaria include fever, headache, joint pains, generalised malaise, jaundice, nausea and vomiting. When malaria is not promptly treated or poorly treated, complications can include severe anaemia, severe dehydration, cerebral malaria and death. In addition to those complications, malaria in pregnant women can cause abortions, low birth weights and intrauterine foetal deaths (MOH 2012a:90).

1.8.13 Pregnancy

According to the WHO (2014:1) pregnancy is the nine months or so for which a woman carries a developing embryo/foetus in her womb. This is the condition of having a developing embryo or foetus within the body; the state from conception to

delivery of the baby of the foetus (Tiran 2005:207). In this research, pregnant women refer to females between the time of conception to the time of delivery of the baby or abortion.

1.8.14 Second line malaria treatment

This refers to the anti-malaria treatment given to patients with complicated malaria or whose malaria attacks are resistant to first line malaria treatment. It is an injectable drug, called artesunate and the alternative is injectable quinine. The second line treatment of malaria for pregnant (1st, 2nd and 3rd trimester) and non-pregnant persons is the same (MOH 2012a:93).

1.8.15 The Buikwe district

According to Hornby (2010:425), a district refers to an area into which a country, town or state is divided for the purpose of organisation, with official boundaries. Uganda has 112 districts, implying administrative level government below the regional government level. In this research, the Buikwe district was selected as it reportedly had a high incidence of malaria and a large number of pregnant women, as discussed in section 1.3.2 of this thesis.

1.9 FOUNDATIONS OF THE STUDY

This section will present the research questions, meta-theoretical assumptions, theoretical framework, theoretical roots, the purpose and application of the Social Cognitive Theory (SCT), key theoretical concepts, the concept of reciprocal determination and observational/vicarious learning. These theoretical concepts will be applied to this study.

1.9.1 Research questions

The central question of this study was “what factors influence pregnant women’s utilisation of anti-malarial services in the Buikwe district of Uganda?” Related to the central question, this study was also guided by the following specific questions to address specific objectives of the study:

- What personal factors influence pregnant women’s utilisation of anti-malarial services in the Buikwe district of Uganda?
- What environmental factors influence pregnant women’s utilisation of anti-malarial services in the Buikwe district of Uganda?
- What socio-cultural factors influence pregnant women’s utilisation of anti-malarial services in Uganda?
- How do pregnant women implement anti-malaria control activities in the Buikwe district of Uganda?
- How could more pregnant women be enabled to utilise anti-malarial services in the Buikwe district of Uganda (based on pregnant women’s information in phase 1 and on midwives’ information in phase 2 of the study)?

1.9.1.1 Meta-theoretical assumptions

Assumptions are statements or principles which are considered or taken for granted or accepted to be true, based on logic or reason even though they have not been scientifically tested (Polit & Beck 2008:748). Assumptions or presuppositions are hypothetical statements that researchers choose not to submit to empirical testing. The assumptions that underpinned this study were:

- That each pregnant woman in the study area attend ANC clinics at one of the established health facilities in the Buikwe district
- That anti-malaria services for pregnant women are available in all 16 health facilities in the Buikwe district

1.9.2 Theoretical framework

This study was based on the Social Cognitive Theory (SCT), also referred to as the Social Learning Theory (Bandura 2013:2). The SCT is of the view that people learn by watching others. It explains personality in terms of how a person thinks about and responds to one's social environment (Lisa 2009:3). It explains human behaviour in terms of continuous reciprocal interactions between cognition, behaviour and environmental influences. The theory integrates concepts and processes from cognition, behaviour and emotional models of behavioural change. The dynamic interaction of the person, behaviour and environment in which the behaviour is performed comprises the concept of reciprocal determination. This theory explains how people acquire and maintain behaviour while providing a basis for intervention strategies. The theory can be used to investigate factors that determine health behaviour (such as the utilisation of anti-malaria services) and devise strategies to promote behaviour change (such as the improved utilisation of anti-malaria services by more pregnant women).

1.9.2.1 Theoretical roots of the Social Cognitive Theory

The SCT originated in the United State of America (USA) during the 1940s and 1950s. It is an interpersonal health behaviour theory which evolved from research based on the Social Learning Theory (Croyle 2005:19). The latter theory asserts that people learn not only from their own experiences, but by observing the actions of others and the benefits of those actions.

Bandura updated the Social Learning Theory by adding the construct of self-efficacy and renaming it the Social Cognitive Theory. "Though the Social Cognitive Theory is the dominant version in current practice, it is still sometimes called the Social Learning Theory" (Bandura 2013:2).

1.9.2.2 The purpose of the Social Cognitive Theory and its application to the current study

The SCT explains how people acquire and maintain certain behavioural patterns while providing a basis for intervention strategies. It provides explanations on how cognitive, psychosocial and environmental factors influence behaviour and behavioural change. This theory can be used to investigate the factors that determine health behaviour and devise strategies to promote behavioural change with regard to health (Bandura 1997:20). Thus the SCT is relevant to mass media, education, marketing, health education and health behaviour programmes. In this study, the SCT was used as the basis to develop the data collection tool. This therefore ensured that various aspects of the research topic were adequately covered.

1.9.2.3 The key theoretical concepts

According to Croyle (2005:20), the SCT integrates concepts and processes from cognitive, behaviourist and emotional models of behavioural change. Such concepts include reciprocal determination, behavioural capability, expectation, self-efficacy, observational learning (modelling) and reinforcement. For a better understanding of the SCT, these concepts will be discussed in more detail.

1.9.2.4 Concept of reciprocal determination

The concept of reciprocal determination was developed by Albert Bandura in his works of 1977. According to Croyle (2005:20), the concept of reciprocal determination is defined as the dynamic interaction of the person, behaviour and environment in which the behaviour is performed. These three factors influence one another in various ways (see figure 1.4). Personal factors are influenced by the environmental factors to determine personal behaviour. However, people's behaviours influence the environment and are actually part of the environment.

Behaviour partly creates the environment and the resultant environment in turn, influences the behaviour of people who stay there. This forms the basis of the Social Learning Theory (Hodder 2005:618).

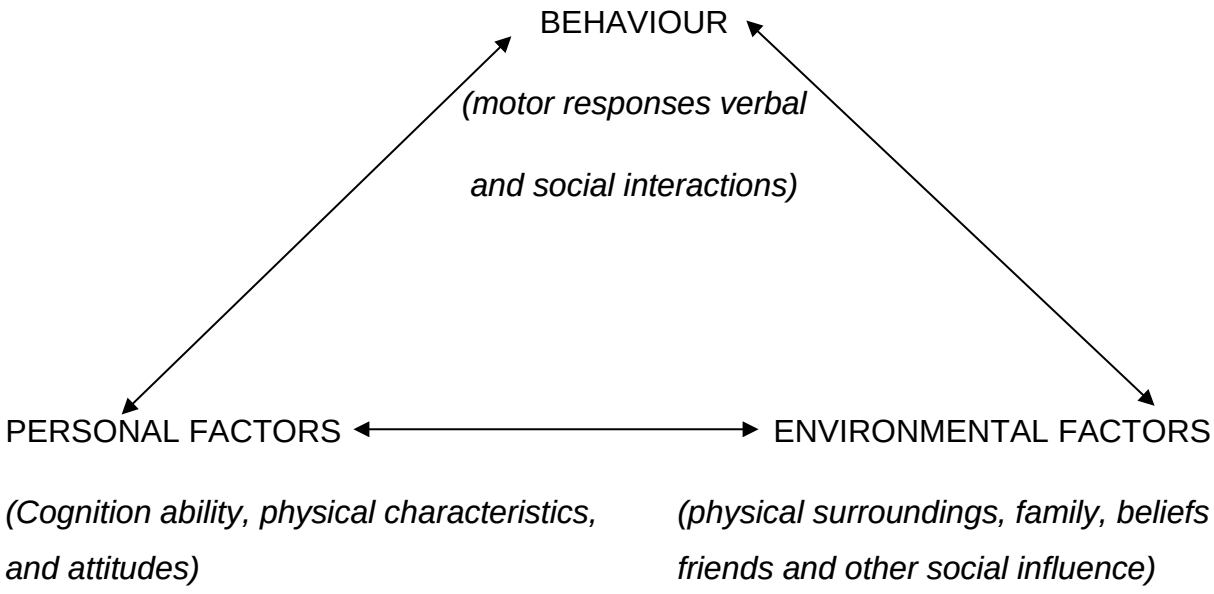


Figure 1.4 Conceptual Model of Reciprocal Determination

(Adapted from Christensen 2013:2-3)

1.9.2.4.1 Behaviour

Behaviour refers to one's observable conduct in a society (Hodder 2005:78). People's behaviours will determine aspects of their environment to which they are exposed, and behaviour in turn, is modified by that environment. This implies that an individual's behaviours influence and are influenced by environmental and personal factors. This theory stresses the need for personal, social, and behaviour skills development to enable individuals to put into practice their convictions regarding health-related decisions (Croyle 2005:19-20).

Behaviour choices may be expressed in the form of observable conduct like verbal statements, behaviour actions, and trial and error experiences. Such observable conduct depends on a person's decision to behave the way they do which is unique to that individual. In this study, behaviour is viewed in terms of pregnant women's utilisation of anti-malaria services from ANC clinics

The concept of behavioural capacity states that, "to perform behaviour, a person must know what to do and how to do it" (Croyle 2005:21). Thus, one must know the required behaviour and have skills to perform it. Knowledge and skills to perform a given activity are vital aspects of one's behaviour. It promotes masterly learning through skills training. This gives the educational or training dimension of this concept. People require clear instructions and training about what to do and how to do it before they can implement specific actions such as utilising anti-malaria services during pregnancy.

Self-efficacy refers to ones' ability to take action and persist in pursuing that action (Croyle 2005:20). People do not simply react to external influences. They exercise self-control by assessing their skills and their capabilities to translate those skills into action. Self-control implies personal regulation of goal-oriented behaviour or performance. They select, organise and transform impinging stimuli. In this way, they

exercise self-monitoring, self-reward, goal setting, problem solving and influence over their personal behaviour.

1.9.2.4.2 Environmental factors

Environmental factors refer to external factors that can affect a person's behaviour. According to Glanz et al (2002:169-177), the environment includes physical and social aspects. The physical environment includes living conditions, infrastructure and all circumstances that surround an individual. The size of the room, the ambient temperature/atmosphere and availability of certain foods are all part of the physical environment.

The social environment includes family members, friends and colleagues. In this study, environmental factors included proximity to health facilities, quality of available health services, household environment and other factors that affect personal behaviour. Social factors include influences from family members, friends and peers that could impact on pregnant women's utilisation of antimalarial healthcare services in the Buikwe district

1.9.2.4.3 Personal factors

The University of Twente (2010:2-4), describes personal factors as perceptions, beliefs, feelings, attitudes, values, expectations, goals and intentions. Perception is a personal attribute that influences how such a person understands or perceives ideas. Beliefs are one's convictions or acceptance that certain things are true. Feelings are expressions of emotions or sympathy. Attitudes are personal feelings or thoughts that portray one's disposition or mental state (Hornby 2010:80). Values are personal standards or one's intrinsic worth. Expectations are anticipatory outcomes of behaviour (Hornby 2010: 513). Expectations imply personal prospects for the future or looking forward to something in the future. Expectancies are values that a parson

places on a given outcome, incentives or outcomes of a change that have a functional meaning.

Goals are the objectives or something one strives to attain (Hornby 2010:641). A person's intentions are specific things that one intends to do or aim at. All these factors are unique to an individual and characterise individuals and influence their behaviours. These personal factors influence the way an individual responds to health-related programmes. Such factors include pregnant women's knowledge of malaria and its control, age and level of education. However, they are modified by environmental factors like the availability of good accessible health care services.

1.9.2.4.4 Observational/vicarious learning

The concept of observational learning is the behavioural acquisition that occurs by watching the actions and outcomes of others' behaviours (Croyle 2005:20). This concept suggests that people learn from each other by observing what others do and following their examples.

Observational learning can also be referred to as modelling (Croyle 2005:20). A model is the one who is being watched. This is usually a senior and respected person in the community. Modelling usually occurs spontaneously with no deliberate effort by the learner to emulate the model or any intention by the model to teach anything. The mere exposure to the model is sufficient for learning to occur (Hodder 2005:246).

Observational learning is relevant to the study because the exposure of the pregnant woman to experienced older peers, would likely influence the actions of the pregnant woman. This could be through imitation when one tries to behave or act in the same way as the model (Hornby 2010: 749). It is a kind of observational learning. It is one of the most effective forms of learning. Babies learn to speak by imitating the sounds of their parents. Older children learn a number of behaviours by watching teachers,

parents and peers. Adults also learn and imitate others, particularly those considered to be models.

Reinforcements are responses to a person's behaviour that increase or decrease the likelihood of reoccurrence (Croyle 2005:20). People learn through such responses or the outcomes of their behaviours. This means that people's previous experiences may determine whether they will repeat or abandon a particular action. When the outcomes of a particular action are positive, people are likely to repeat the action.

However, negative outcomes are likely to lead to the abandonment of the practice. In this study, pregnant women were asked if they had role models whom they imitated in the utilisation of anti-malaria services. So, it is expected that actions of pregnant women might be influenced by the practices of their peers.

1.9.3 Application of the Social Cognitive Theory to this study

The SCT served as a point of reference for this study. Based on this theory, practices, learning factors and pregnant women's health seeking behaviours were investigated as factors that influenced their behaviours.

The interview schedule for pregnant women included a section on the pregnant women's personal characteristics like age, gender and educational level. In addition to this, a section on personal factors that influenced participants' behaviours is included. This section covered aspects such as behaviour capacity, self-efficacy, beliefs, attitudes and expectations. The data collection tool also addressed pregnant women's knowledge about available malaria preventive measures that could have influenced their health seeking behaviours pertaining to the utilisation of anti-malaria services.

The data collection tools for pregnant women and for midwives were designed to capture environmental and personal factors that might influence pregnant women's malaria-related health seeking behaviours. As such, the data collection tools had specific sections:

- Section A's items focussed on social-demographic data of respondents like age, academic background, marital status, and household income (see annexure B1 for pregnant women's structured interview schedule and annexure B2 for midwives' structured interview schedule)
- Section B asked questions about environmental factors like geographic access to health services and the quality of available healthcare services, as well as the type of environment in relation to malaria prevalence. Such factors as stagnant water, malaria-related data for the household like the number of malaria cases in the household during the preceding 12 months
- Section C addressed personal factors like knowledge of the pregnant woman about malaria and its prevention
- Finally, section D attempted to identify personal health seeking behaviours of pregnant women and how they utilised anti-malaria services like previous use of IPT, ITNs and IRS of their houses.

1.10 RESEARCH DESIGN AND METHODOLOGY

A quantitative descriptive correlational study was conducted in the Buikwe district in Uganda. The district has a total population of 442 000 people (Buikwe district council 2013:3). This research was conducted to study factors that influence pregnant women's utilisation of anti-malaria services in the Buikwe district. The study was based on Bandura's SCT. The target population comprised all 22 100 pregnant women in Buikwe district at the time of data collection during 2014.

Random sampling was conducted at each of the 16 health facilities that offer antenatal and maternity services as described in section 3.4.1.2.4. From each of

these facilities random sampling was conducted and five respondents were selected for five days.

After consenting, 25 respondents were selected from each ANC clinic of each of the 16 health facilities of Buikwe district. As 25 respondents were randomly selected from each participating health facility, the sample size was 400 during phase 1 of the study. In phase 2, the population comprised 45 midwives working at the 16 participating health facilities. However, only 40 midwives (88.9%) were interviewed, comprising the sample of midwives for phase 2 of the study.

1.11 SCOPE AND LIMITATIONS OF THE STUDY

The limitation of this study was that about 5.0% of all Ugandan pregnant women do not use ANC services (UDHS 2011:105). Thus, only women who used ANC services during the data collection phase of the research could participate in the study.

This was a possible limitation of the findings of this study since a small section of the population was not available for the study, and women who were not pregnant and did not attend the 16 participating ANC clinics during the data collection phase were also excluded from participation.

The study was conducted in the Buikwe district and its findings would therefore not be generalisable to other districts in Uganda. No in-depth individual interviews were conducted which could have yielded richer data.

1.12 STRUCTURE OF THE THESIS

This thesis comprises six chapters as summarised in table 1.2.

Table 1.2: Structure of the thesis

CHAP-TER	TITLE	CONTENT
1	Orientation to the study	Information is provided about Uganda and about the specific research context. The research problem, the research purpose and the significance of the study are outlined. The key concepts are defined and the foundations of the study are outlined.
2	Literature review	The literature review contains information on malaria generally and specifically on malaria during pregnancy, according to recent scientific information on the subject.
3	Research methodology	This chapter describes the research design and method, and the ethical principles with which the researcher complied during the empirical stages of the study.
4	Analysis and description of research findings (phase 1)	The research findings and discussions, in relation to the reviewed literature, contextualised within the major concepts of the SCT, are presented. These findings are based on structured interviews conducted with 400 pregnant women.
5	Analysis and description of research findings (phase 2)	The research findings and discussions, in relation to the reviewed literature, contextualised within the major concepts of the SCT, are presented. These findings are based on structured interviews conducted with 40 midwives working at the 16 participating health facilities.
6	Conclusions, limitations and recommenda-tions	The research findings obtained from pregnant women (phase 1) are summarised and compared with those provided by the midwives (phase 2) Conclusions, limitations and recommendations are provided.

1.13 SUMMARY

This chapter presented the orientation to the study. The study is about factors that might influence pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda. The chapter discussed the general research context, Uganda's health care system, the research problem and objectives of the study. Key concepts of the study were defined. The chapter then discussed theoretical foundations underpinning the study and a summary of research methodology was also provided.

The next chapter reports about available scientific literature on malaria. It details the effects of malaria in humans and particularly the effects of malaria in pregnant women. The chapter addresses available anti-malaria control services in Uganda, specifically those available to pregnant women.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter provided an overview of factors that could influence pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda. This chapter reviews available scientific literature on malaria and its effects in pregnancy. It deals with the epidemiology of malaria, transmission and factors that determine its distribution. It also discusses the pathophysiology, clinical presentations, complications during pregnancy and the current management of malaria during pregnancy. Malaria prevention and control in pregnancy will also be addressed. Since the research is based on social cognitive theory, contextualisation of the information obtained from the literature review within this theory's major concepts will be done,

2.2 THE EPIDEMIOLOGY OF MALARIA

Epidemiology is the study of the distribution, frequency and determining factors of health problems and disease in human populations (Chandramohan 2010:21). Epidemiology is important to obtain, interpret and use health information to promote

health and reduce diseases. Understanding the epidemiology of malaria is important for deciding how best to use the available resources for appropriate malaria control activities. Epidemiology of malaria is determined by its transmission and factors that determine the transmission of malaria such as its vector, the female anopheles mosquito (MOH 2012a:9-10). Malaria is common in the tropical and sub-tropical regions of the world. It affects many of the people living between latitudes of approximately 60°N and 40°SS (Hill & Meek 2010:2-3). Plasmodium falciparum is the most common species of plasmodium in regions where malaria is highly endemic (Pond 2013:[2]). About a half of world population (Ingstad, Munthali, Braathen, & Grut 2012:[2]) are at risk of malaria attacks.

Endemicity is a term used to describe the level of malaria transmission in an area. According to Chandramohan (2010:21-23), in areas of high and regular endemicity of malaria like Africa, Papua New Guinea and Haiti, Plasmodium falciparum is the most common species of malaria parasite. Plasmodium vivax is the second most common species in Central America, North Africa and South Western Asia. Both plasmodium falciparum and plasmodium vivax are present in South America and the rest of Asia. Plasmodium malariae and plasmodium ovale species of malaria are less common and occur in areas where plasmodium falciparum is common (Chandramohan 2010:21-23).

Malaria is a seasonal disease since it tends to follow rainy seasons (Chandramohan 2010:21-22; MOH 2012c:4-9). It is important to identify peak transmission periods. This allows vital timely malaria control activities to be carried out. Epidemiological measures that are used to quantify malaria in an area are incidence rate, annual parasitic index (API) and prevalence (Chandramohan 2010:21-22).

The incidence rate is the number of new cases of malaria per unit of population in a given period of time. Annual parasite index (API) is the number of microscopically confirmed cases of malaria per 1000 population per year. However, prevalence rate

is the number of cases of malaria at a point in time per unit population (including both existing and newly diagnosed cases of malaria) (Chandramohan 2010:21-22).

2.2.1 Classification of malaria-related areas

Epidemiology and intensity of transmission of malaria in an area can be described in terms of endemicity. Endemic areas are where the incidence of malaria has been constant for many years. Epidemic areas are the areas where there is a sharp increase in incidence of malaria cases.

According to Chandramohan (2010:22-24), endemic areas are traditionally classified as hypoendemic, mesoendemic, hyperendemic and holoendemic. Hypoendemic areas refer to areas where the level of transmission and therefore the burden of malaria is low. Mesoendemic areas are typically found in rural areas of subtropical zones where there are moderate levels of transmission of malaria. Hyperendemic areas are those areas with intense seasonal transmission levels of malaria which tend to be related to climatic changes (refer to table 2.1). Holoendemic areas are found in regions with intense year-round transmission where there is a high immunity in all age groups except very young children. Holoendemic areas are often referred to as highly endemic malaria areas (Chandramohan 2010:22-23.

There are two ways of measuring the type of endemicity in an area, as shown in table 2.1 (Chandramohan 2010:23). These are spleen rate and parasite rate (PR). Spleen rate is the prevalence of enlarged spleens among children aged 2-9 years in an area, and an enlarged spleen in a child is a common sign of chronic malaria (refer to section 2.3.6.4).

The parasite rate (PR) or parasite prevalence is the percentage of people who have a positive blood slide test for malaria parasites (Chandramohan 2010:22-23) at a specific point in time, including both newly diagnosed and existing cases of malaria. This is measured through prevalence surveys.

Table 2.1: Measurement of different levels of malaria endemic areas

Levels of endemicity	Spleen rate	Parasite rate (PR) in 2-9 years old children
Hypoendemic area	<10% in 2-9 year-old children	Less than 10%
Mesoendemic area	<11-50% in 2-9 year-old children	11-50%
Hyperendemic area	<51-75% in 2-9 year-old children and >25% in adults	51-75%
Holoendemic area	>75% in 2-9 year-old children and low in adults	Over 75%

Source: Chandramohan 2010:23.

2.2.2 The prevalence of malaria

According to the WHO (2010a:5), malaria is one of the most important diseases in developing countries. It is one of the most common parasitic diseases worldwide. According to Namusoke, Ntale, Wahlgren, Kironde and Mirembe (2012:[2]), the annual number of malaria clinical cases range from 300 to 500 million cases globally. Worldwide, over a million deaths occur annually, particularly among African infants and young children (Lam, Harvey, Monroe, Muhangi, Loll, Kabali, & Weber 2014:[1-2]). During 2010, about 500 million cases of malaria were notified worldwide. In SSA, malaria reportedly caused 250 million cases and 900 000 deaths during 2010 (WHO 2010a:5-7; Wielgosz, Kato & Ringler 2014:[2]).

In 2007, the malaria prevalence in Uganda was estimated at 12 792 759 cases and 47 000 deaths during the same year (MOH 2010:4). In the Buikwe district, malaria was responsible for an estimated 153 512 cases (37.3%) out of a total of 411 512 cases treated for all types of ailments during 2010. In 2011, the district had 155 568

malaria cases (38.2%) out of a total of 407 348 all types of ailments managed at all health facilities in the district during that year (Buikwe District Council 2011:4). This means that out of all patients treated in the health facilities of Buikwe district in 2011, 38.2% were diagnosed as suffering from malaria. This makes malaria, the most common cause of disease in the Buikwe district.

2.3 THE BIOLOGY OF MALARIA PARASITES

In this section various aspects, concerning the biology of malaria parasites will be addressed, but emphasising the transmission of the malaria parasites from man to the female anopheles mosquito to man.

2.3.1 Definition of malaria

Malaria is an acute febrile parasitic disease caused by a protozoa organism (parasite) called plasmodium (MOH 2012e:38). The term malaria is derived from a belief of ancient Romans that malaria was caused by bad air of the marshes surrounding Rome (Krogstad 2008:[4]). There are five species of plasmodium parasites infectious to humans. These are plasmodium falciparum, plasmodium vivax, plasmodium ovale, plasmodium malariae and plasmodium knowlesi. Of these species of malaria, plasmodium falciparum causes the most dangerous form of malaria (MOH 2012b:2). It is responsible for complications like cerebral malaria, convulsions and severe anaemia. Plasmodium falciparum, plasmodium vivax, plasmodium ovale and plasmodium malariae causes clinical malaria in SSA. Plasmodium knowlesi has been documented to cause a few cases of clinical malaria in Asian countries like Thailand (Ehrhardt at al 2013:283).

The severe form of malaria, if not properly managed, can be fatal particularly in children and pregnant women. Plasmodium falciparum is the most common type of malaria in Uganda responsible for about 90% of all malaria cases (MOH 2012b:9).

The other four types combined contribute about 10% of all malaria cases. On the other hand, because of their lifecycle, plasmodium vivax and plasmodium ovale cause milder but often chronic forms of malaria (English & Webster 2010:52-53).

2.3.2 Malaria transmission

Transmission of a disease is the transfer of the causative agent from one person (host) to another. In the case of malaria, plasmodium species is the causative agent of the disease. Transmission of malaria is determined by factors related to three elements (Chandramohan 2010:28-29). These are;

- the agent
- the host
- the environment.

Regarding malaria transmission, the agent is the malaria parasite which is the plasmodium species and the vector is the female anopheles mosquito. The hosts are the humans. Environmental and climatic factors influence the prevalence and incidence of malaria. The sections 2.3.2.1 to 2.3.2.3 explain how these factors interplay in order for transmission of malaria to take place.

2.3.2.1 The agent

Malaria is caused by a blood parasite called plasmodium species. There are four types of malaria parasites which affect humans in Africa. The four types are plasmodium falciparum, plasmodium vivax, plasmodium ovale and plasmodium malariae. However, according to Figtree, Lee, Bain, Kennedy, Mackertich, Urban, Cheng and Hudson (2010:[2-3]) plasmodium knowlesi is now recognised as a cause of potentially fatal human type of malaria in the forests of south-east Asia. This implies that there are five types of malaria parasites which affect humans worldwide. Since plasmodium knowlesi is unknown in Africa, for the purpose of discussion of this study, the researcher concentrated on the four major cause of

malaria in Africa, plasmodium falciparum, plasmodium vivax, plasmodium ovale and plasmodium malariae. Of these, plasmodium falciparum is the sole cause of the most dangerous form of malaria (English & Webster 2010:40). Plasmodium falciparum is the most common type of malaria in Uganda (MOH 2012a:2), and is responsible for about 90% of malaria episodes in Uganda (MOH 2012a:2). Malaria occurs as a result of infection by one or more of the four types of plasmodium parasites. This means that, one can contract infection involving more than one type of plasmodium species (refer to table 2.3).

2.3.2.2 The vector

According to Meek and Hill (2010:7), malaria is transmitted from one person to another by the female anopheles mosquito after sucking blood from an infected person. In order for malaria to be transmitted, there must be a bite from a previously infected female anopheles mosquito. This is the only type of mosquito capable of transmitting the malaria parasite. There are four types of anopheles mosquitoes which most often transmit malaria in Uganda. These are anopheles gambiae, anopheles arabiensis, anopheles bwambae and anopheles funestus (MOH 2008b:2). Malaria transmitting mosquitoes tend to bite at night when people are indoors and asleep. This kind of feeding is referred to as endophagy.

Anopheles mosquitoes are attracted to their hosts (humans) by stimuli like carbon dioxide, warmth, moisture, lactic acid and other odours from the hosts. Due to increased maternal metabolic activity, these stimuli are stronger from pregnant women as compared to the rest of the population. As such, mosquitoes tend to be more attracted to pregnant women than to the rest of the population. This worsens the vulnerability of pregnant women to malaria infection (MOH 2012a:90). The situation is aggravated because pregnant women's immune responses are suppressed so as not to reject the foreign protein of the foetus.

In addition to mosquito transmission, malaria can also be transmitted by blood transfusions. Mother to child malaria transmission through the placenta might also possible but such transmission is uncommon (Meek & Hill 2010:11-12).

2.3.2.2.1 Life cycle of a mosquito

According to Meek and Hill (2010:11-12), a mosquito has four main stages of life. These are the egg, larvae, pupa and adult life stages. Each female is fertilised once and lays 70 to 200 eggs in a few days. These eggs are laid in water. After two to three days, these eggs hatch into larvae. The larvae feed by filtering algae and other materials from the water. During the three days' larval stage, they undergo three moults to become pupae. The pupa develops at the end of the third moult of the larva. It becomes the mobile pupa.

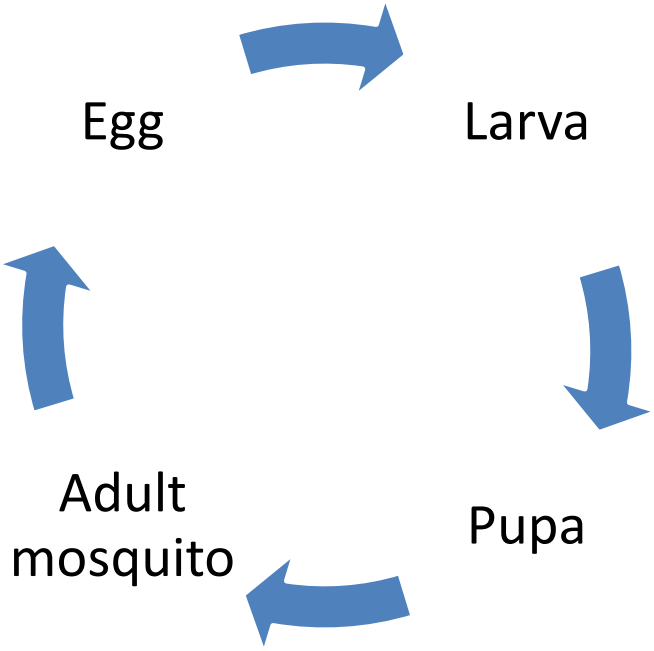


Figure 2.1 Lifecycle of a mosquito

(Adapted from Meek & Hill 2010:14)

The pupa does not feed. It breathes through two air trumpets while the adult develops internally. After two to three days of the pupa stage, the pupa splits and the adult climbs out, dries, hardens and flies off. The adult mosquito then emerges from the pupa. The adult mosquito has three parts of body, namely the head, thorax and abdomen (Meek & Hill 2010:12-13). The head has two large eyes, antennae, palps and mouthparts known as the proboscis. The thorax has two wings and six legs. The development of the mosquito from the egg to the adult mosquito takes about 7 to 10 days.

2.3.2.2.2 The lifespan of the mosquito

The life span of an adult mosquito varies in different species. The life span is also affected by temperature and humidity. If the humidity is less than 50%, and temperature higher than 35^0C, the mosquito's life span is shortened. The average lifespan of a female mature anopheles mosquito in favourable conditions is 10 to 14 days (Meek & Hill 2010:12-13). In order to be able to transmit malaria, it is critical that the lifespan of such a mosquito should be long enough to allow a complete life cycle of the malaria parasites inside the mosquito. However, male mosquitoes live for a shorter time (Meek & Hill 2010:12). As such, male mosquitoes are unable to transmit malaria.

2.3.2.2.3 Behaviour of adult mosquitoes

Anopheles mosquitoes are vital in transmitting malaria. As such, it is important to understand the characteristics of the vector of one of the worst enemies of humans. It is important to understand these characteristics. Knowing the strengths and vulnerability of mosquitoes is important for planning for mosquito control activities. It

is also important to know the susceptibility of mosquitoes to different insecticides when planning vector control activities.

Feeding time

The feeding time is specific for different species of mosquitoes. “Almost all anopheles mosquitoes take their blood meal at night…” (Meek & Hill 2010:15). Each species has its own characteristic feeding time. Anopheles gambiae mosquitoes are found in Africa and anopheles dirus mosquitoes are found in Asia. These two species feeds late at night. Meanwhile, anopheles farauti mosquitoes are found in the Solomon Islands and bite as soon as it is dark in the early evening (Meek & Hill 2010:15-17). Insecticide treated nets (ITNs) work best where the vectors bite late at night, when most people will be in bed. This means that mosquito bed nets work better against anopheles gambiae mosquitoes that are found in Africa and anopheles dirus mosquitoes found in Asia because of their feeding times.

Feeding and resting locations

Feeding and resting locations of mosquitoes are important characteristics of mosquitoes. Different mosquitoes have different feeding and resting locations. While planning mosquito control measures, it is important to know the mosquito feeding patterns and resting locations. After taking a meal of blood, female mosquitoes need to rest somewhere while digesting the blood and developing her eggs. Many anopheles gambiae species of mosquitoes prefer to feed while inside houses and rest inside the houses. Other species of mosquitoes prefer to feed while outside the houses and tend to rest outside. Indoor feeding and resting mosquitoes are easier to control with insecticide treated mosquito bed nets or house spraying as compared to those feeding outdoors (Meek & Hill 2010:14-16).

Mosquitoes can fly up to three kilometres (Meek & Hill 2010:16) and can be a source of malaria in areas near airports and sea ports. Even though malaria is otherwise not supposed to be a public health problem in and around airports and sea ports, there might be travellers from malaria endemic areas, suffering from malaria when bitten by local mosquitoes.

Breeding sites

According to Meek and Hill (2010:15-17), different species of anopheles mosquitoes lay their eggs in different types of water bodies. Some species of mosquitoes prefer specific locations that are relatively stable and easy to identify while others are less selective and breed in a range of sites. This means that for malaria control activities, sites to be targeted vary from region to region depending on species found there (refer to table 2.2). Anopheles mosquitoes do not normally lay their eggs in polluted waters. This explains why oils are effective in controlling mosquito-breeding sites of small enclosed stagnant waters (Curtis & Lines 2010:162).

Table 2.2: Breeding sites for some species of mosquitoes

#	Species	Preferred breeding sites
1	Anopheles darling	Slow moving rivers
2	Anopheles minimus	Foothill streams and ditches
3	Anopheles umbrosus	Complete shades
4	Anopheles gambiae	Typical small, numerous and shifting sites like small rain-puddles and hoof prints
5	Anopheles albimanus	Typical small, numerous and shifting sites like small rain-puddles and hoof prints
6	Anopheles stephensi	Wells and water tanks

(Source: Curtis and Lines 2010:160)

2.3.3 Host (human) factors

The risk and severity of malaria depends on host/human factors (Osterbauer, Kapisi, Bigira, Mwangwa, Kinara, Kamya & Dorsey 2012:[2-3]). According to Chandramohan (2010:29), human factors include natural resistance, acquired immunity, age, pregnancy, migration, beliefs and practices. Man is the only host of the five species of malaria parasites (Schull 2007:55). The incubation period of malaria is the time between the bite of an infected mosquito until the time of onset of signs and symptoms of malaria. It is usually about two weeks (Chandramohan 2010:33). However, it is often much longer but cannot be shorter than eight days. This is because the liver/tissue stage of development (exo-erythrocytic schizogony) of malaria parasite in humans takes at least six days (Meek & Hill 2010:8-9). Then, the blood stage of development of the malaria parasite (erythrocytic schizogony) takes a minimum of 48 hours (refer to figure 2.2). That is when malaria becomes symptomatic.

2.3.3.1 Immunity

Immunity is the resistance by the host against a foreign substance or natural pathogens. In this case, the malaria parasite is the foreign substance/pathogen. Some in-born factors of resistance against malaria have been documented. The immunity may be natural (innate) or acquired.

2.3.3.2 Innate immunity

According to Chandramohan (2010:29), certain genetic variants of red blood cells like the sickle cell trait, glucose 6-phosphate dehydrogenase (G6PD) deficiency and thalassaemia, may partially protect a person against severe attacks of malaria. Sickle cell disease is a term for a "… group of inherited hemoglobinopathies in which abnormal sickle haemoglobin (Hb S) partially or completely replaces normal adult haemoglobin (Hb A)… [Sickle cell trait] SCT is the heterozygous form of the disease in which the affected individual has both normal (Hb A) and sickle (Hb S) haemoglobin" (Monahan et al 2007:913-914). "SCT occurs when someone inherits

a normal haemoglobin gene from one parent (Hb A) and a sickle cell gene (Hb S) from the other (resulting in Hb AS)" (Wellcome Trust 2005:2). This is the case because the type of haemoglobin a person's body manufactures, depends on the types of genes inherited from both parents. Individuals with haemoglobin AS (sickle cell trait) are relatively resistant to falciparum malaria (Chandramohan 2010:29) because the sickle-shaped red blood cells rupture prematurely, adversely affecting the reproduction of plasmodium parasites. Persons with SCT can live normal lives, but can pass the Hb S gene on to their offspring. The increased protection against malaria in children with SCT rose from 20% in the first two years of life to over 50% among children aged 10 in Kenya (Wellcome Trust 2005:2).

However, persons with sickle cell disease (Hb S) have higher malaria-related morbidity and mortality rates than others, due to inadequate spleen functions caused by occlusion of capillaries by the increased coagulation of the sickle shaped red blood cells, and the spleen's function of clearing defective red blood cells. Impaired spleen functions make the person more susceptible to all infections. Children suffering from sickle cell disease "… not only suffer severe health problems but also a "massively increased" risk of death if they do develop malaria" (Wellcome Trust 2010:1).

The Duffy antigen is a receptor for merozoites of plasmodium vivax on red blood cells. The lack of the Duffy antigen on red blood cells offers protection against plasmodium vivax malaria infection (Chandramohan 2010:29). The lack of this antigen explains why certain individuals are less vulnerable to plasmodium vivax malaria than others in some West African communities and among black Americans.

2.3.3.3 Acquired immunity

Repeated exposures to malaria eventually leads to the development of some degree of immunity against malaria parasites. However, this immunity is never

complete but always partial. So, adults in malaria endemic areas are considered to be semi-immune (Chandramohan 2010:29-30). Without repeated exposure to the malaria parasite, this resistance fades after about five years. This implies that malaria attacks may occur in adults who were immune to malaria (before they left the malaria endemic areas) on return from non-endemic malaria areas.

Children, however, obtain passive immunity from maternal antibodies that last about six months from birth. After six months, many children younger than five years tend to get waves of severe malaria attacks (Chandramohan 2010:29-30). This happens because immunity to severe forms of malaria is slowly acquired. By the age of ten years, malaria attacks are much less severe than malaria attacks involving younger children and babies. This explains why, apart from pregnant mothers, adults in endemic areas tend to get fewer malaria attacks (Chandramohan 2010:29-30).

It is against these facts that it is possible to explain why malaria tend to affect certain groups of people. The most vulnerable population groups to malaria include:

- children under five
- pregnant women
- the elderly
- non- immune travellers
- individuals with sickle cell anaemia (as discussed in section 2.3.32)

2.3.3.4 Pregnancy

A successful pregnancy depends on many complex factors including changes in women's immune system. For most women, pregnancy is a normal and healthy state. Pregnancy can also make women more prone to infections. Pregnancy affects every physiological system in the body. Changes in immune function and hormonal balance can make pregnant women more vulnerable to infections and serious complications. This is because the developing baby is genetically distinct

from the mother. This means that the maternal immune system must be modified not to attack and reject the baby. During pregnancy, the maternal immune system is modified in order to achieve immune tolerance towards foetal cells (Gil & Cardenas 2010:425-433). The increased levels of oestrogen and progesterone during pregnancy bring about modifications that occur at foetal-maternal interface and in the systemic circulation.

The increased hormonal levels during pregnancy results in reduced maternal immunity leading to a special risk of developing severe forms of malaria during pregnancy (Brabin 2010:169). Furthermore, due to reduced maternal immunity, plasmodium falciparum malaria may not respond as well to anti-malarial treatment in pregnant women as it does in non-pregnant women (Brabin 2010:175-176). As such, pregnant women with symptoms of malaria require prompt treatment. It should be noted that, even low levels of parasitaemia present a risk to both the mother and the foetus. More efforts are needed to prevent and treat malaria promptly in the vulnerable groups, namely children under five years of age and pregnant women.

2.3.3.5 Environmental and climatic conditions

Ideal environmental factors are vital for the transmission of malaria. If these factors are not favourable, they may actually prevent the transmission of malaria.

Temperature and relative humidity affect the transmission of malaria (Chandramohan 2010:33). For transmission of malaria to take place, there should be adequate basic optimal factors of temperature, humidity and water, which provide ideal conditions for the hatching of larvae.

According to Chandramohan (2010:33-34), when the environmental temperature is below 16°C, malaria parasites cannot develop in mosquitoes. The ideal temperature

is 20 to 30°C. This temperature is attainable in the tropical and subtropical regions below an altitude of 1600 metres. It should be noted that when the temperature goes below 15^{0}c, the lifecycle of mosquitoes is delayed. Then, such mosquitoes are unable to mature into a form that can support the development of the malaria parasite (Chandramohan 2010:33).

The other important factor for the development of mosquitoes is a relative humidity exceeding 60.0%. A high relative humidity lengthens the lifespan of mosquitoes enabling them to bite more often during their life time, therefore transmitting malaria to more people. In addition to this, water is vital to provide the favourable conditions for the breeding of mosquitoes. In this regard, stagnant water is the best form of water that favours the breeding of mosquitoes. According to Chandramohan (2010:34), rainfall increases the number of breeding sites. After rainfall, there is a higher relative humidity that lengthens the mosquito's lifespan. There are therefore fewer mosquitoes during drought conditions in endemic areas of the world. Conditions for the breeding of mosquitoes become more unfavourable the further one moves away from the equator. That is the reason why malaria commonly affects people living between latitudes 60^{0}N and 40^{0} S (Hill & Meek 2010:2-3) because the temperature and humidity levels are ideal for the breeding of mosquitoes between these latitudes.

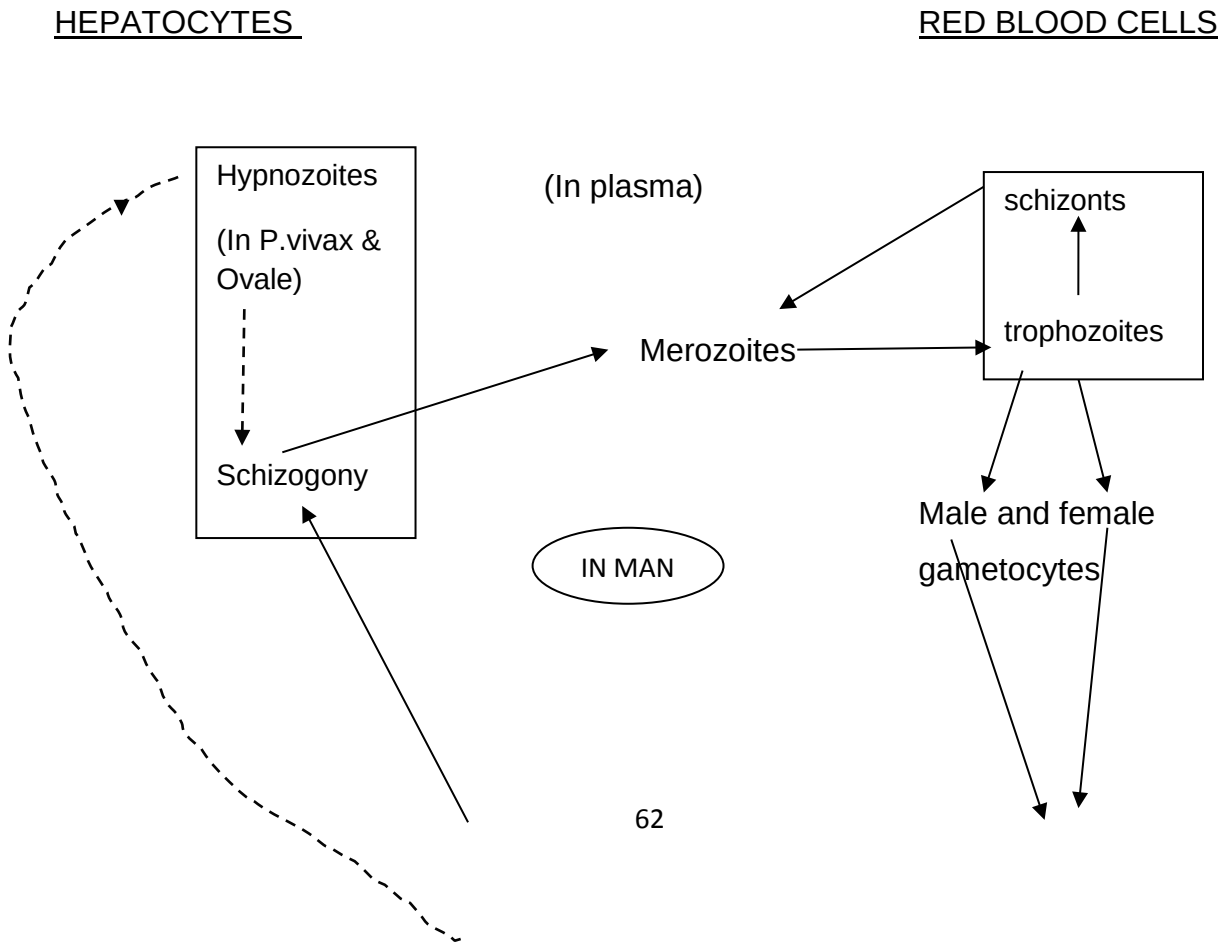
2.3.3.6 Social economic factors

Social economic factors are enabling factors for the transmission of malaria. Factors such as type of housing, sanitation levels, education and occupation can also have significant effects on the transmission of malaria. They can alter the contact between mosquitoes and human beings (Chandramohan 2010:34). Communities

with poor housing structures and poor sanitation levels tend to have higher prevalence levels of malaria. This is common in poor communities of Africa (United Nations Development Programme [UNDP] 2012:20-25; Matsiko 2009 104-107).

2.3.4 Pathophysiology

The pathophysiology of malaria is related to its life cycle of the malaria parasite in man. According to Meek and Hill (2010:8-10), when a mosquito injects sporozoites into a person's blood, many are destroyed by the host's immune system. Depending on the personal immunity of the victim, the surviving sporozoites enter the liver cells within about half an hour (Makanga 2014:2). They develop asexually into thousands of merozoites in the liver cells. This marks the liver stage also called the exo-erythrocytic schizogony (see figure 2.2). It is referred as exo-erythrocytic because it takes place outside the red blood cells. This takes six to sixteen days depending on the species (Meek and Hill 2010:9). After maturing, the liver cells burst to release thousands of merozoites into the blood stream.



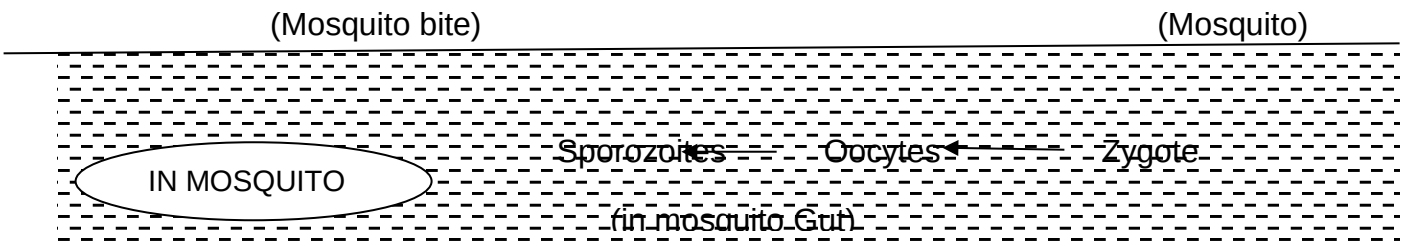


Figure 2.2: Life cycle of malaria parasites in humans and mosquitoes

Adapted from Meek and Hill (2010:7)

It should be noted that plasmodium ovale and plasmodium vivax infections have persistent liver parasites called hypnozoites (literally: sleeping animals) which develop directly from sporozoites (Meek & Hill 2010:8). These hypnozoites may persist in the liver for several months and may be the cause of fever relapses seen in plasmodium vivax and ovale malaria cases. Once in the blood, the merozoites enter the red blood cells to begin the erythrocytic cycle. Once merozoites enter the red blood cells, they become trophozoites. These trophozoites develop into schizonts which multiply asexually into three to five schizonts (Meek & Hill 2010:9). When the schizonts rupture, a new generation of merozoites are released into the blood stream for another round of attack of the red blood cells (see figure 2.2). The multiplication and development of parasites inside these blood cells inevitably destroy the red blood cells (haemolysis). Each erythrocytic cycle takes 48 hours in the case of plasmodium ovale and plasmodium vivax. This results in ‘tertian’ fever meaning that the body temperature rises on alternative days. However, it takes 72 hours in the case of plasmodium malariae. This results in ‘quartan’ fever meaning that the body temperature rises on the fourth day (Meek & Hill 2010:10). However, in the case of plasmodium falciparum, the erythrocytic cycle takes less than 48 hours. This results in less synchronised fever attacks to produce more constant fever in patients suffering from plasmodium falciparum that in patients suffering from other types of malaria.

When a new generation of merozoites is released into the host's blood, there is a bout of fever. Fever is particularly serious when plasmodium falciparum is involved. Because of the number of red blood cells destroyed during a malaria attack, the patient ends up with anaemia. The extent of anaemia caused depends on the type of plasmodium species. Plasmodium falciparum invades red blood cells at all stages of development of red blood cells, but particularly attack the young red blood cells. Plasmodium falciparum thus causes the most severe levels of anaemia compared to the other malaria species. It therefore causes the most severe form of malaria with more complications as compared to the other three species of malaria (English & Webster 2010:40). On the other hand, plasmodium vivax and plasmodium ovale invades reticulocytes, the old red blood cells which are normally about to be removed from circulation. Plasmodium malariae invades normoblasts which are the mature red blood cells (Todd, Lockwood & Sundar 2012:344).

Table 2.3: Selected characteristics of the four species of human malaria parasites

Feature	**Malaria species**			
	P. Falciparum	**P. Malariae**	**P. Ovale**	**P. Vivax**
Incubation period (days)	9-14	18-40 or longer	16-18 or longer	12-17 or up to 12 months
Duration of erythrocyte cycle (hours)	48	72	50	Approx. 48
Number of merozoites in liver schizont (approx.)	30,000	15,000	15,000	10,000
Average number of parasites per µl (mm^3) blood (parasitaemia)	20,000-500,000	6,000	9,000	20,000
Severity	Severe in non-immunes	Mild	Mild	Mild to severe

Relapses	No	No	Yes	Yes
Geographic distribution	Tropical and sub-tropical	Tropical and sub-tropical patchy distribution	Tropical	Temperate regions and much of the tropics
African distribution	Most common species	West and East Africa	Common in west Africa	Less common especially in west Africa

(Source: Meek & Hill 2010:10)

In the case of plasmodium falciparum malaria, the red blood cells containing schizonts adhere to the lining of the capillaries in the brain, kidneys, liver, lungs and the gut. Then, capillaries become congested and organs become anoxic. Schizonts then rupture to liberate more toxic and antigenic substances which cause further damage (Meek & Hill 2010:8-9). The main effects of malaria are therefore haemolytic anaemia and widespread organ damage.

2.3.5 Clinical presentation of malaria

The clinical signs and symptoms of malaria should be recognised by all CHWs in malaria-endemic areas. Lives can be saved and morbidities curbed if timely effective anti-malaria treatment is commenced at the PHC level closest to the patients' homes (Matovu, Nanyiti, & Rutebemberwa, 2014:[2-3]).

2.3.5.1 *Uncomplicated malaria*

Clinical presentation of malaria varies from person to person. Symptoms may be absent (asymptomatic), mild (un-complicated malaria) or severe (complicated

malaria) (MOH 2012e:36-37). Uncomplicated malaria is the most common and widespread presentation of malaria. At this stage, malaria is not life threatening.

Most of the signs and symptoms of malaria, particularly fever, are related to the rupture of parasitised red blood cells (erythrocytes) (MOH 2012e:37). This rupture releases toxic substances which, in turn, cause a rapid onset of fever plus other classic symptoms of malaria (Boon, Cumming & Tom 2010:345-347).The classic symptoms of uncomplicated malaria are a sudden onset of fever, loss of appetite, headache, generalised weakness, sweating, muscle aches, nausea and vomiting, haemolytic anaemia and jaundice (Malaria Consortium 2010:43-45). Depending on one's level of immunity (see section 2.3.3.3), these clinical manifestations can be mild in uncomplicated malaria. Malaria-related fever is intermittent meaning that fever occurs on and off in repeated cycles. Although fever is more constant in plasmodium falciparum cases, there are still temperature fluctuations. As such, the body temperature may be normal during visits to the health facility, but it may rise later.

According to the MOH (2012e:37), a typical malaria attack has three phases.

- The **cold stage.** This is when the patient feels cold and shivers. After rupture of red blood cells, pyrogenic substances (fever initiating agents) are released into the blood stream. Then physical body mechanisms generate heat that quickly raises the body temperature to 40°C. This stage takes about half an hour (Todd et al 2012:344-345). Vomiting is often troublesome and severe headaches occur during this stage and should be monitored as patients who vomit will not benefit from oral anti-malaria medications.
- The **hot stage.** This is when the patient feels hot. It follows the physiological actions in the cold stage that lead to the generation and conservation of body

heat. At this stage, the patient feels burning hot and may be delirious. The hot stage lasts one to six hours (Todd et al 2012:345).

- The **sweating stage.** This follows the hot stage. The sweating stage is associated with profuse sweating and then relief of symptoms. After this stage the patient feels reasonably well until the next attack the next day or alternate day depending on the type of plasmodium species. That is on alternate days, 48 hours in plasmodium ovale and vivax. In plasmodium malariae the cycle takes 72 hours. However, in plasmodium falciparum the cycle often takes less than 48 hours producing less synchronised severe fever cycles (English & Webster 2010:46-47).

The majority of malaria patients initially present with mild or uncomplicated disease, but if malaria is poorly treated or untreated, it can become severe. However, for plasmodium falciparum malaria, these manifestations may worsen and become life-threatening if not treated effectively in time. This is particularly true for children under five and pregnant women because of their lowered immunity (Chandramohan 2010:29-30). According to English and Webster (2010:43-46), in order to avoid the progression of malaria to the severe form, proper treatment should be implemented within twenty- four hours of the first signs of malaria. This treatment can be given in a community setting. This is particularly important in children because they are likely to develop the severe form of malaria if not treated timely (Kalyango, Alfven, Peterson, Mugenyi, Karamagi, & Rutebemberwa, 2013:[2]). However, in pregnant women, treatment and care takes place in health facilities but prevention efforts are aimed at community levels.

2.3.5.2 Fever

Fever, also known as pyrexia, is the rise of the internal or core body temperature above the normal temperature of 37^0C (Weller 2005:149). Fever is a manifestation of a disease process in the body. Fever is the normal immune response to infection.

It is a common symptom of most infectious diseases. Fever is the most common symptom of malaria (English & Webster 2010:46-47). In this study, fever implies a raised body to touch or axillary temperature above 37^0C.

2.3.6 Malaria in pregnancy

Malaria is a dangerous disease in pregnancy. The state of reduced immunity in pregnancy makes pregnant women vulnerable to many infectious diseases. This may be attributed to increased levels of steroidal hormones (cortisol and oestrogen). During pregnancy, the maternal immune system is modified in order to achieve immune tolerance towards foetal cells, regarded as foreign protein by the pregnant woman's body (Gil & Cardenas 2010:425-433). Changes in immune function and hormonal balance affect every physiological system in the body and make pregnant women more vulnerable to infections and serious complications.
According to the MOH (2012a:90-91), malaria in pregnancy deserves special attention because:

- Malaria and its complications are more common in pregnant women as compared to the general population
- Parasitaemia is ten times higher than in non-pregnant adult women
- Pregnant women are four times more likely to contract malaria
- Pregnant women are twice more likely to die of malaria as compared to other adults (MOH 2012b:90)
- Plasmodium falciparum is known to affect prime-gravid more than multi-gravid women (Brabin 2010:168-169).

Malaria in pregnancy tends to be atypical. It affects pregnant women differently with possibilities of more complications as compared to the general population. This makes malaria such an important condition in pregnant women. It means that a malaria attack in a pregnant woman should be taken as a special medical case. All

efforts must be in place for prevention and prompt treatment of any malaria attack in pregnant women.

2.3.6.1 Potential consequences of malaria in pregnancy

According to data from the MOH (2012e:363), malaria complicates 80% of all pregnancies in Uganda. Due to the compromised state of their immunity, children younger than five years and pregnant women are more likely to suffer from complications due to malaria. It is because of their reduced immune system that pregnant women are more vulnerable to malaria (Brabin 2012:90). Malaria normally presents with fever, headache, generalised body weakness, joint pains, nausea and vomiting, dehydration and anaemia.

Malaria infection during pregnancy can have adverse effects for pregnant women and their unborn children (Menaca, Pell, Taylor-Manda, Chatio, Afrah, Were, Hodgson, Ouma, Kalilani, Tagbor & Pool 2013:[1-2]). In addition to the mentioned symptoms, untreated or poorly treated malaria in pregnant women can lead to severe maternal anaemia. This is a serious complication which may result in death. Malaria parasites lead to pigmentation of the placenta which leads to irreversible placental changes. This placental pathology results in placental insufficiency that eventually results in complications to unborn babies attributable to insufficient placental functions. According to the MOH (2012e:363), such complications may include premature labour, abortions, low birth weight babies due to intra-uterine growth retardation and premature delivery (Kyabayinze, Tibenderana, Nassali, Tumwine, Riches, Montague, Counihan, Hamade, Van Geertruyden, & Meek, 2011:[6-7]). Because of the grave consequences of malaria to pregnant women, unborn babies and young children, there is a dire need for national and international efforts to control malaria targeting pregnant women and children younger than five years.

Table 2.4: Maternal and childhood effects of malaria

Maternal effects of malaria	Foetal /infant effects of malaria
Anaemia	Intra-uterine growth restriction
Abortion	Pre-term delivery
Cerebral malaria	Intrauterine foetal death
Other forms of severe malaria	Congenital malaria (very rare)
Increased risk of maternal death	Low birth weight
	Anaemia of the baby
	Growth retardation

Source: MOH (2012a:90)

2.3.6.2 Complicated malaria in children

Complicated malaria in children younger than five years usually occurs as a result of poorly treated or untreated malaria. It is particularly important that malaria is promptly and effectively treated since the immunity of children against infectious diseases is

poor. As such, malaria infection can easily result in a severe form of malaria with complications.

According to Eddleston et al (2007:15-16), complicated malaria is the severe form of malaria, involving extensive multi-system damage and is seen particularly in plasmodium falciparum malaria infection (English & Webster 2010:41). It is recognised by the presence of life-threatening signs like convulsions, coma, renal failure, pulmonary oedema and respiratory distress in addition to the initial signs which are associated with the uncomplicated form of malaria (see section 2.3.5.1).

Complicated malaria in children can result in fatal complications like severe vomiting, severe dehydration, severe anaemia, respiratory distress and circulatory

collapse (English & Webster 2010:43-44). Complicated malaria may lead to cerebral malaria in children and adult travellers with low immunity from non-endemic countries.

Cerebral malaria presents with an altered mental status. Cerebral malaria is one of the worst manifestations of malaria that may result in death or may leave the victim with permanent mental damage. Management of complicated malaria cannot be done in community settings. Depending on the severity of the condition, its management should take place in established health centres and hospitals.

2.3.6.3 Potential consequences of malaria co-infection

Malaria is a multi-system disease since it affects most systems of the human body (MOH 2012e:36-37). As such, malaria aggravates other diseases particularly sickle cell anaemia, HIV/AIDS and diabetes mellitus.

2.3.6.3.1 *Potential consequences of malaria in patients suffering from sickle cell anaemia*

Sickle cell anaemia is a common condition SSA countries including Uganda (see section 2.3.3.2). Sickle cell anaemia is a genetic condition that results in individuals that inherit a recessive gene, S, from each of the two parents (see section 2.3.3.2). Sickle cell anaemia is as a result of abnormal haemoglobin, S, that leads to the sickling (becoming sickle-shaped) as compared to the normal biconcave shape of red blood cells. Sickling of red blood cells occurs when they are exposed to an environment of low oxygen levels in body tissues, such as happens during severe malaria attacks when the malaria parasites destroy some red blood cells (Craig, McClelland & Ludlam 2012:1036). Sickle-shaped red blood cells impede the flow of blood in capillaries and coagulate more easily than normal bi-concave red blood

cells. This slowed-down rate of blood flow results in the rapid destruction of red blood cells leading to anaemia, generalised body pains, jaundice, growth retardation as well as tissue and organ damage and/or necrosis. Patients with sickle cell anaemia are vulnerable to severe forms of malaria because of their impaired immune functions attributable to the effects of SS on the spleen. Malaria aggravates the impact of sickle cell disease and is the leading cause of death in individuals with sickle cell disease. The proper management of individuals with sickle cell disease requires sustained malaria preventive actions (see section 2.3.9.4.1).

2.3.6.3.2 *Potential consequences of malaria in patients suffering from HIV/AIDS*

Human immunodeficiency virus (HIV) is a pandemic infectious viral disease. When an individual contracts the virus, the virus progressively destroys their immune system. This eventually leads to immune suppression. When the immune system is suppressed, this results in acquired immune deficiency syndrome (AIDS) (MOH 2012e:306). This means that one's immune system cannot defend one against attacks from any infections.

HIV is largely a sexually transmitted disease. It can also be transmitted by transfusion with HIV infected blood, mother to child transmission, or by using unsterilised medical equipment (MOH 2012e:306-307). The reduction in body immunity results in vulnerability to infections including malaria. Both malaria and HIV/AIDS are common diseases and major causes of death in Uganda. As a result of their reduced immunity, malaria infection rates are high among people living with HIV/AIDS, particularly those with CD4 counts of less than 350 cells/µL (MOH 2013e:322). This situation is aggravated by the fact that anti-malarial treatment is less effective in HIV infected patients (MOH 2012b:94). Therefore, malaria co-infection complicates the HIV/AIDS condition. This means that, individuals with HIV/AIDS should routinely use mosquito bed nets to prevent malaria infection. This is particularly important for pregnant women who are HIV positive.

2.3.6.3.3 Potential consequences of malaria in diabetes mellitus patients

Diabetes mellitus is a metabolic disease that results from the inability to metabolise sugars. This is because of the body's lack of production or insufficient production of insulin by an individual (MOH 2012e:149). Insulin is produced by the beta cells of the pancreas. Insulin is a metabolic hormone that is important for the absorption and metabolism of sugar by body cells (Fauci & Longo 2008:338). If sugars is not absorbed effectively into the body tissues, it remains in the blood. Insufficient insulin therefore leads to raised blood sugar levels. High blood sugar levels create a good culture medium for infections, resulting in increased susceptibility to infections (Fauci & Longo 2008:338). In turn, infectious diseases like malaria in diabetic patients make it difficult to stabilise blood sugar for such patients on anti-diabetic treatment. Since malaria worsens diabetes mellitus, it is important that prevention or early treatment of malaria is effective for diabetic patients. Prevention of malaria in patients with diabetes mellitus can be done by routinely using mosquito bed nets to prevent malaria infection (MOH 2012e:49). In addition to mosquito bed net use, pregnant women with diabetes mellitus must use IPT as recommended in section 2.3.9.4 of this thesis.

2.3.6.4 Chronic malaria

Persistent low levels of malaria parasites in the blood may lead to chronic malaria. Symptoms of chronic malaria include recurrent attacks of malaria, anaemia, diarrhoea, weight loss, and an enlarged liver and spleen (Meek & Hill 2010:10-11). It may resolve with the onset of partial immunity or persist with further complications. The most common manifestation of chronic malaria in children is the enlargement of the spleen. This enlarged spleen is called tropical splenomegaly syndrome (TSS). TSS is used as a measure of malaria endemicity in an area (see section 2.2.1 and table 2.1). It is characterised by massive splenomegaly, profound

anaemia, secondary infections, fever and jaundice. The resultant hyper-splenism leads to increased destruction of red blood cells with subsequent anaemia and jaundice.

2.3.7 Diagnosis of malaria

The correct diagnosis of malaria requires an alert and knowledgeable health care worker to recognise the clinical signs and symptoms of malaria. RDTs are useful for the immediate diagnosis of malaria, but where doubt exists, microscopic blood examinations are required (Mukanga, Tibenderana, Peterson, Pariyo, Kiguli, Waiswa, Babirye, Ojiambo, Kasasa, Pagnono & Kallander 2012:[5]).

2.3.7.1 Clinical diagnosis

The diagnosis of malaria is based on presenting signs and symptoms and confirmed by microscopic examination or rapid diagnostic testing (RDT). Since a microscopic examination can identify malaria protozoa in blood, it is referred to as the gold standard test for malaria (MOH 2012e:40).

2.3.7.1.1 Rapid diagnostic tests

Rapid diagnostic tests (RDTs) detect the presence of antigens of malaria parasites in blood using antibodies (De Beaudrap, Turyahikira, White, Nabasumba, Tumwebaze, Muehlenbachs, Guerin, Boum, MacGready & Piola 2013:[6-7]). “It uses immune-chromatographic methods which are visualised on a dipstick, test strip or test card” (English & Webster 2010:68). RDTs can provide results within a short period of time (10-20 minutes) and can be done by community health workers (CHWs) with limited training without expensive laboratory facilities (Mubi, Kakoko, Ngasala, Premji, Peterson, Bjorkman & Martensson 2013:[4]). If a person is infected

with malaria, the parasites produce antigens, and the RDT result will be positive. If there no parasites in the blood, there are no antigens and the RDT result will be negative.

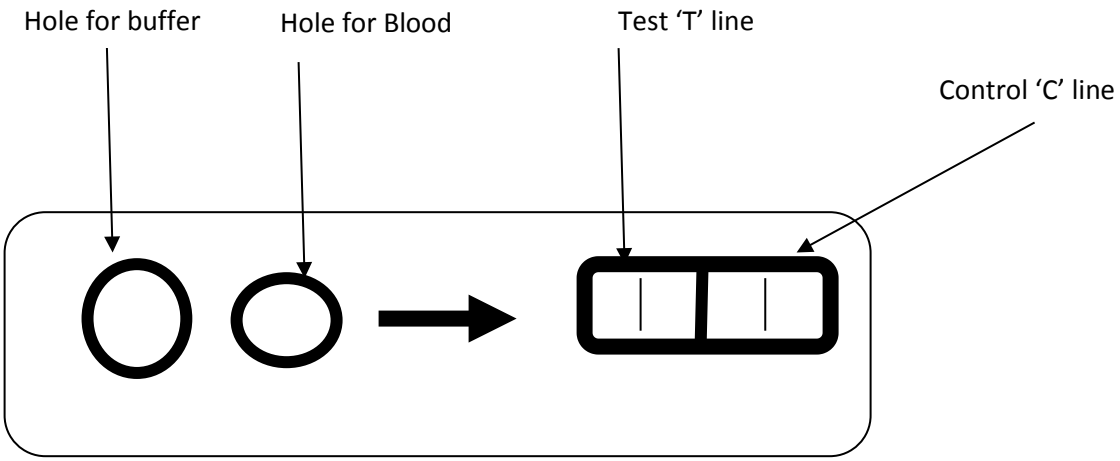


Figure 2.3: A diagrammatic representation of an RDT cassette with a positive result for a rapid malaria blood test

(Adapted from MOH 2012e:20)

The RDT works by putting a drop of the patient's blood and a buffer into different holes on the RDT cassette and waiting for 10 to 20 minutes. An RDT cassette has two holes for the buffer solution and the next hole for the blood drop to be tested (refer to fig. 2.3). The cassette's 'test window' is blank with no lines before a test is performed. Each cassette is used to perform one test. During testing, a drop of blood to be tested is put into the blood hole and a buffer solution is put into the buffer window. After 10-20 minutes, when two lines appear in the 'test window' is an indication of a positive malaria test (MOH 2012e:20-21). The extreme line is referred to as the control 'C' line and the line next to the hole for blood is the test 'T' line. However, the test is considered invalid when the 'C' is not present after 20 minutes irrespective of whether the test 'T' line appears or not. The malaria test is negative for malaria infection when the control 'C' line appears without the test 'T' line.

The major disadvantage of RDTs is that they can give false positive results for somebody who has recovered from malaria, because in such cases malaria antigens will still be present in the recuperated person's blood. It should be noted that malaria antigens may persist in one's blood for about two weeks after one has recovered from a malaria attack. In highly endemic areas, like most parts of Uganda, the use of these tests is of limited importance. Since most of the people have malaria antigens in their blood. According to the MOH (2012:20-21), the RDTs are, however, important in verifying epidemics in areas where malaria is of low endemicity. RDTs may be important in detecting infections in children younger than four months. According to Minja, Schmiegelow, Oesterholt, Magistrado, Bostrom, John, Pehrson, Andersen, Deloron, Salanti, Lemnge, Luty, Alifrangis, Theander and Lusingu (2012:12), RDTs are important for diagnosing malaria during pregnancy, especially in non-endemic areas.

2.3.7.1.2 Microscopic blood examinations

In general, proper diagnosis of malaria, particularly in hospital settings, must be confirmed by blood examinations. Proper diagnosis of malaria at hospital level requires microscopic examination of a thin and thick blood film. Since microscopic examination of malaria involves viewing the stained malaria parasite in blood, the microscopic examination of blood smear specimens remains the 'gold standard' in malaria diagnosis for malaria parasites (Pond 2013:2-3; MOH 2012e:40).

A thick blood film is made by smearing a large drop of blood over a small area of a glass slide. It is then allowed to dry and then stained before it is examined using light microscopy (English & Webster 2010:67).Thick blood films are important to diagnose low levels of parasites in blood (MOH 2012e:41).

On the other hand, a thin film is made by spreading a small drop of blood over a large area of the slide using the edge of another slide. This gives an area with a

single layer of red blood cells. This technique is important in confirming the diagnosis and identifying the species of malaria. It is also important in quantifying the parasites (English & Webster 2010:68). This is done by counting the percentage of red blood cells infected by malaria parasites. The percentage of infected blood cells helps to monitor the patient's response to treatment.

2.3.7.1.2 Benefits of RDTs versus microscopy

RDTs are simple and a fast way for health workers to test for malaria parasites in a patient's blood as compared to microscopic examination. RDTs can give results in 10-20 minutes thus less time to wait (MOH 2012:20-21). RDTs do not require expensive or complicated equipment. Most people, including CHWs, can be trained in a few hours to use of these RDTs while specially trained laboratory personnel are required to carry out malaria microscopic examinations.

2.3.7.1.2 Limitation of RDTs versus microscopy

RDTS cannot indicate the intensity of the malaria infection since they only test whether antibodies to parasites are present or absent (Mbonye, Lal, Cundill, Hansen, Clarke & Magnussen 2013:[4]). Therefore RDTs may give false positive results when one has recovered from malaria, but if antibodies to malaria parasites are still present in the blood. However, microscopy can estimate the number of parasites in a patient's blood therefore giving an indication of the severity of the malaria attack. Microscopy identifies the real malaria parasites in the blood, not the antigens like the RDTs. The accuracy of RDTs may be affected by heat and humidity (MOH 2012:21). Therefore, proper storage of RDT strips is important, but this might be difficult in hot and/or humid rural areas of Africa without electricity.

2.3.7.2 *Differential diagnosis*

“Malaria is a great mimic of many diseases and must be differentiated from several other clinical presentations” (Eddleston et al 2007:21). Malaria shares many symptoms with other several febrile illnesses (English & Webster 2010:49). The presentation with fever needs to be differentiated from other endemic bacterial and viral diseases like typhoid fever, brucellosis, dengue fever, influenza, measles, Ebola fever, acquired immune deficiency syndrome (AIDS). It should also be differentiated from infections of the respiratory tract, urinary tract infections, and infections of the ear like otitis media.

Other conditions that should be distinguished from malaria are meningitis, tonsillitis, abscesses and skin infections. Anaemia due to malaria should be differentiated from anaemia due to other tropical diseases like hookworm infestations, haemoglobinopathies, iron and vitamin B12 deficiency. Jaundice due to malaria must be distinguished from that of viral hepatitis A, B and C, yellow fever, biliary disease and drug/alcohol induced diseases. Cerebral malaria should be differentiated from encephalitis, TB meningitis, brain abscesses and other coma-inducing conditions (English & Webster 2010:49).

Since malaria is the major cause of fever in tropical areas, including Uganda, it should be suspected first whenever there is an attack of fever in tropical settings. However, it should be noted that suspecting (or even the diagnosis of) malaria doesn’t rule out the possibility of the occurrence of other diseases, as malaria can co-exist with other infectious and non-infectious diseases (MOH 2012e:40).

2.3.8 The management of malaria attacks

The management of patients suffering from malaria attacks requires pharmacological knowledge to administer the correct drug(s) in the correct doses for specific patients suffering from different types of malaria.

2.3.8.1 Pharmacological treatment

The WHO (20127:8) recommends that the first line anti-malaria treatments should comprise drug combinations with artemisinin, referred to as artemisinin combination therapies (ATC) (Muhindo, Kakaru, Jagannathan, Talisuna, Osilo, Orukan, Arinaitwe, Tappero, Kaharuza, Kamya & Dorsey. 2014:[2-3]). According to the malaria control programme of Uganda's Ministry of Health (MOH 2012:74-75), the recommended treatment for malaria in Uganda is in the category of first or second line category.

Table: 2.5: A table showing available ACTs on market by different manufacturers

Artemisinin combination drug (ACT)	**Trade name**	**Manufacturer**
Artemetther plus Lumefantrine (AL)	Coartem	Norvatis
	Artefan	Ajanta
	Luminer	Macleods
	Lumartem	Cipla
Artesunate plus Amodiaquine (AS-AQ)	Larimal	Ipca
	Falcimon	Cipla
	Arsucam	Marphar
	Amonate	Erfa Sa
	Amqunate	Cosmos
Dihydroartemisinin plus Piperaquine (DP)	Duocotecxin	Jiaxing Nanhu

(Source: MOH 2012a:56)

2.3.8.1.1 The first line treatment of malaria

The first line recommended drug for malaria is an oral drug in a tablet form. It is a combination drug of artemether (20mg) and lumefantrine (120mg) (Bagonza, Kibira, & Rutebemberwa 2014:[1-2]). The most common Artemisinin combination drug (ACT) as the first line drug in Uganda's public health facilities, called COARTEM® (refer to table 2.5), manufactured by Norvatis (Nabyonga-Orem, Sengooba, Macq & Criel 2014:[2-3]).

According to the treatment guidelines, ACTs like COARTEM®, must be avoided during the first trimester (first three months) of pregnancy. This is because COARTEM® is a new drug and its side effects on the foetus during the first three months have not been fully studied. Therefore, it should be avoided in the first trimester of pregnancy. In the first trimester, the recommended 1st line treatment for malaria is quinine tablets (MOH 2012a:92).

Quinine, administered in therapeutic doses, is a safe drug during pregnancy as recommended by the MOH (2012e:42-43) and by the WHO (2010b:26-27). All drugs in the first trimester must be used cautiously and given when they are absolutely necessary, following a positive blood examination. They must be given in recommended doses (see table 2.6). However, during the 2nd and 3rd trimesters of pregnancy, COARTEM® is the recommended fist line treatment for malaria as for the rest of the population.

Table 2.6 The Ministry of Health's (MOH's) recommended dosages for COARTEM ® tablets (Artemether 20mg & Lumefantrine 120mg)

Weight (kg)	**Age**	**Day 1 Dose taken twice a day (12 hourly)**	**Day 2 Dose taken twice a day (12 hourly)**	**Day 3 Dose taken twice a day (12 hourly)**

5-14	4 months-3 yrs	1 tablet	1 tablet	1 tablet
15-24	>3 to 7yrs	2 tablets	2 tablets	2 tablets
25-34	>7 to 12 yrs	3 tablets	3 tablets	3 tablets
>34	>12 yrs	4 tablets	4 tablets	4 tablets

(Source: MOH 2012e:42-43)

2.3.8.1.2 The second line treatment of malaria

A 'second line drug' is a drug given when the first line drug has failed to cure malaria or when the first line drug is contraindicated (MOH 2012a:72-74). The second line treatment is therefore given to resistant and complicated forms of malaria. They may be single drugs or combination drugs. There are several second line anti-malarial drugs recommended by the MOH which are available on the market.

t should be noted that severe malaria in children and pregnant women is often accompanied by severe vomiting, severe anaemia and other serious complications. In such cases, injectable drugs are recommended. Furthermore, proper management of complicated malaria should be done in hospital as it involves the management of associated complications (Jagannathan, Muhindo, Kakuru, Arinaitwe, Greenhouse, Tappero, Rosenthal, Kaharuza, Kamya & Dorsey 2012:[7-8]).

- Artesunate

The first choice recommended second line anti-malarial drug is the injectable artesunate. It is the recommended drug for the general population, children,

pregnant and non-pregnant women, as indicated in table 2.7. The dose is 2.4 mg per kg body weight twice daily (English 2010:128). The reason why artesunate was recommended as the first choice second line drug, ahead of quinine, is that it is cheaper to administer, better tolerated by patients yet it is effective against resistant malaria.

Table 2.7 The World Health Organization's (WHO's) recommended dosage for artesunate (AS)

Age	**Oral artesunate**		
	Day 1	**Day 2**	**Day 3**
5-11 months	15 mg	15 mg	15 mg
1-6 years	50mg (1 tab)	50mg (1 tab)	50mg (=1 tab)
7-13 years	100mg (=2 tabs)	100mg (=2 tabs)	100mg (2 tabs)
>13 years	200mg (=4 tabs)	200mg (=4 tabs)	200mg (=4 tabs)

(Source: MOH 2012e:41)

- Dihydroartemesinin plus piperaquine (Duocotecxin)

This is a co-formulated tablet containing 40mg of Dihydroartemesinin (DHA) and 320mg of piperaquine (PPQ). It is an alternative second line treatment given when the first line treatment fails to cure malaria. In adults, it should be given in a dose of three tablets (1,080mg), as indicated in table 2.8. In children, it should be given in doses as detailed in table 2.7. According to the MOH (2012a:50), any child who weighs above 40 kg should be given an adult dose of Duocotecxin.

Table 2.8 The Ministry of Health's (MOH's) recommended doses of Duocotecxin

Day	Adults	Children 11-15 years	Children 6-11 years
1	3 tabs	2 tabs	1.5 tabs
2	3 tabs	2 tabs	1.5 tabs
3	3 tabs	2 tabs	1.5 tabs
Total	9 tabs	6 tabs	4.5 tabs

(Source: MOH 2012:59)

- Quinine

Quinine has been a very important second line anti-malaria drug for many years. Oral or injectable quinine given at the dose of 10 mg per kg body weight eight hourly has been the drug of first choice as a second line drug for resistant malaria (MOH 2012e:43-44), as summarised in table 2.9. Since injectable artesunate became the currently recommended second line drug, quinine is considered an alternative second line drug for the treatment of resistant malaria. However, according to the MOH (2012a:92), oral quinine is still the drug of choice in the treatment of uncomplicated malaria during the first trimester of pregnancy. This means that quinine can be given during all stages of pregnancy in the prescribed dosages (MOH 2012a:92). Quinine is the recommended first line treatment of malaria in children younger than four months and all children weighing less than five kilograms (MOH 2012e:43).

Table 2.9 The Ministry of Health's (MOH's) recommended dosages of quinine tablets (containing 300mg quinine salt)

AGE	WEIGHT(KG)	DOSE (given every 8 hours for 5-7 days)
3 months up to 1 year	5 to 10	75 milligrams (mg), (1/4 tablet)
Above 1-5 years	Above 10 to 18	150 mg (½ tablet)
Above 5-7 years	19 to 24	225 mg (3/4 tablet)
Above 7-10 years	25 to 30	300 mg (1 tablet)
Above 10-13 years	31 to 40	375 mg (1 & ¼ tablet)
Above 13-15 years	41 to 50	450 mg (1 & ¼ tablet)
Above 15 years	51 to above	600 mg (2 tablets)

(Adopted from: Malaria Consortium 2010:130)

- Artemether

Artemether is an oil soluble anti-malaria single drug. Injectable artemether (1.6mg per kg body weight daily) is the other recommended alternative second line drug for malaria treatment (MOH 2012e:42). It is effective against resistant forms of malaria.

2.2.8.2 *Treatment of malaria in pregnancy*

Malaria in pregnancy should be treated with specific anti-malarial treatment and supportive treatment. The treatment for uncomplicated and complicated malaria is the same during the second and third trimesters of pregnancy (see section 2.3.8.1). However, during the first trimester, the first line treatment for malaria is quinine tablets (MOH 2012:92), as shown in table 2.10. This is due to the fact that COARTEM® is a new drug and its effects on the foetus in the first trimester (first three months of pregnancy) has not been fully studied and therefore remains unknown in this category of pregnant women. The effects of quinine on pregnancy have been studied and are considered to be minimal and that quinine, in therapeutic doses, is safe during pregnancy as recommended by the MOH (2012e:42-43). All drugs in the first trimester must be used cautiously and given when they are

absolutely necessary following a positive blood examination (McGready, Thwai, Cho, Looareesuwan, white & Nosten 2002:[2-4]). They must be given strictly according to the recommended doses (see table 2.6).

Table 2.10 The Ministry of Health's (MOH's) recommended treatment of uncomplicated malaria during pregnancy

Uncomplicated malaria treatment in pregnancy		**Uncomplicated treatment in adults**
1st trimester	Quinine tablets	ACTs like COARTEM®
2nd and 3rd Trimester	ACTs like COARTEM® or quinine tablets	ACTs like COARTEM®
Doses	Dose for COARTEM® and Quinine during pregnancy is the same as for other adults	As for pregnant women

(Source: MOH 2012:92)

2.2.8.2.1 Supportive treatment in addition to malaria treatment

In addition to specific anti-malaria treatment, pregnant patients suffering from malaria should be given supportive treatment. Giving antipyretic/analgesic drugs like paracetamol is important for relieving fever and related body aches. Analgesics are important for relieving headaches, body aches and joint pains. Giving a dose of antipyretic is an important aspect of malaria management at all levels (MOH 2012:92-93). Rehydration is very important in reversing the dehydration that usually accompanies malaria in pregnancy. Fluids and foods are important for the prevention of hypoglycaemia and for maintaining strength.

2.3.8.3 *Out-patient care*

Uncomplicated malaria is usually managed on an out-patient basis. Outpatient care is particularly important when a patient has had anti-malaria medication without improvement during the previous 14 days. When a patient has taken anti-malaria treatment and failed to fully recover from malaria or if malaria re-appears within two weeks, this might be a sign of resistance to that particular first line anti-malaria drug (MOH 2012b:77-79).

When such a situation occurs, the next step of treatment should be in a health care facility. The first step in the management of resistant malaria should be laboratory examination. Only after the confirmation of a malaria diagnosis, based on the result of a laboratory test, is the second line anti-malaria treatment prescribed. The second line drug of choice in such cases is injectable artesunate. However, quinine (injectable or oral) and injectable artemether are alternative second line drugs for the treatment of malaria (see section 2.3.8.1.2).

2.3.8.4 *Institutional malaria strategies*

Patients presenting with severe or complicated malaria are admitted and managed in health care institutions. This is because health facilities are equipped with trained personnel and facilities to manage malaria and its complications. After confirming malaria by laboratory examination, the management of complicated malaria requires the use of second line anti-malaria drugs (MOH 2012b:77-78). After patients have improved, then they can take oral forms of those drugs (see section 2.3.8.1.2). The management of complicated malaria involves the treatment of complications related to malaria (MOH 2012e:46-48). Complications include severe anaemia, vomiting and dehydration, convulsions, as well as respiratory distress. Failure to properly manage malaria could have disastrous results for the patient and the community. Severe malaria is life-threatening, particularly in pregnant women and children younger than five years. It may result in permanent physical and mental disabilities or death. This happens in many parts of the world due to poor health care facilities. The other outcome of poorly treated malaria is the public

health problem of the development of resistant strains of malaria. When available drugs are not effective, it is necessary for policy makers to recommend alternative effective drugs. This has already happened in the case of chloroquine which is no longer recommended for the treatment of malaria. This is due to resistance of malaria parasites to chloroquine in most parts of the world (Patricia, Silvia, Luis, Norma, Lucia, Ira, Venkatachalam & Kim 2013:[2-4]).

2.3.8.5 *Anti-malaria resistance patterns*

According to English (2010:89-91), anti-malarial drug resistance can be defined in terms of parasitological responses and clinical responses. Parasitological failure is when a drug fails to remove parasites from the bloodstream within a defined period of time. On the other hand, clinical failure is when the drug fails to clear signs and symptoms of the disease within a defined period of time. Parasitological cure and clinical cure are not necessarily the same. Sometimes, although there is clinical cure, blood films may show that parasitological cure had not been achieved. It is important that response to anti-malaria treatment is known in the country so that effective drugs are recommended in national treatment policies.

Studies to determine anti-malaria resistance patterns are regularly conducted to identify treatment failures with at least 14 days follow-up examinations at various sites in Uganda. By 2000 such studies showed that chloroquine had the highest resistance levels of up to 81.2% in some centres. The resistance levels lead to the conclusion that chloroquine had become a failing drug. In June 2000, Uganda adopted a change of chloroquine monotherapy which was replaced by chloroquine plus sulfadoxine-pyrimethamine (CQ + SP) in 2003. Over time, CQ + SP clinical failures levels exceeded 15.0% (MOH 2007b:20-21). Then in 2006 artesunate combinations had the lowest resistance levels. It was then necessary to change to Artemisinin-based combinations therapy (ACTs) (MOH 2012:92-93).

2.3.9 Prevention of malaria in Uganda

Malaria can be prevented by controlling the malaria vector, namely the mosquito, and the malaria parasites. Mosquitoes can be controlled by reducing the mosquito population. Humans could also be protected from mosquito bites. The most effective strategy is a combination of the two malaria control methods (Musoke, Karani, Ssempebwa & Musoke 2013:[2-3]). According to the MOH (2012:12), the prevention of malaria in Uganda is based on four strategies, namely:

- Reduction of mosquito density and longevity
- Prevention of contact between mosquitoes and humans
- Reduction of malaria parasites
- Use of information education and communication (IEC) and other strategies.

2.3.9.1 Reducing the mosquito population

Various strategies should be used to reduce the numbers of mosquitoes in any community (Zhou, Afrane, Dixit, Aiteli, Lee, Wanjala, Beilhe, Githeko & Yan 2013:[3]). The fewer mosquitoes there are, the smaller the chances that community members will be bitten by female anopheles mosquitoes transmitting malaria.

2.3.9.1.1 Internal residual spraying (IRS)

The mosquito population can be reduced by killing adult mosquitoes. The most commonly used method of killing mosquitoes is the use of chemical insecticides on walls inside residential houses (MOH 2012e:49). This may be done by IRS of residential houses (Sangoro, Kelly, Mtali & Moore 2014:[2]). The walls of residential houses are sprayed with long lasting insecticides like dichlorodiphenyl trichlorethene (DDT), lambda-cyhalothrin (ICON), bendiocarb (FICAM), or pirimiphos-methyl (ACTELLIC) (Curtis & Lines 2010:152-154). The major factors considered when selecting these insecticides are: safety, cost effectiveness, mosquito susceptibility to the insecticide and duration of action of the insecticide.

Most of these insecticides are safe to humans, domestic animals and wildlife if they are used in recommended doses (Mutero, Kramer, Paul, Lesser, Miranda, Mboera, Kiptui, Kabatereine & Ameneshewa, 2014:[2]). When sprayed in their recommended doses, they kill mosquitoes but their durability of action is short (two to six months).

DDT is a cost effective organocholine which has a prolonged duration of action of more than six months (Ediau, Babirye, Tumwesigye, Matovu, Simba, Okui, Wanyenze & Waiswa 2O13:[4]). DDT has, however, acquired a very bad reputation because of its heavy use in agriculture that resulted in harmful accumulation of the insecticide in wild birds and fish. The Stockholm Convention on Persistent Organic Pollutants, signed in 2001, contains an amendment which authorises the use of DDT specifically for vector control. The WHO has continued to recommend its use for household spraying against malaria mosquitoes (Curtis & Lines 2010:152-155), as summarised in table 2.11. Insecticide treated mosquito nets also help to kill mosquitoes (see 2.3.9.2.1).

Table: 2.11 Insecticides used for internal residual spraying (IRS) of houses

Chemical	Class	Trade Name	Dose (gm /m^2)	Persistence (in months)	Toxicity Problems
DDT	Organo-chlorine	-	1-2	6 or more	Residues in breast milk
Malathion	Organo-phosphate	-	2	2-3	Odour; can be contaminated
Fenitrothion	Organo-phosphate	Sumithion	2	2-6	Attacks cholinesterase
Pirimiphos-methy	Organo-phosphate	Actellic	1-2	2-3	None known
Bendiocarb	Organo-phosphate	Ficam	0.1-0.4	2-6	Toxic, available in sachets
Deltamethrin	Pyrethroid	k-Othrin	0.01-0.025	2-3	Irritant
Lambda-cyhalothrin	Pyrethroid	Icon	09.02-0.03	3-6	Irritant

(Source: Curtis & Lines 2010:152)

2.3.9.1.2 Insecticide hand sprays

Insecticide hand sprays can also be used to repel and kill mosquitoes. These insecticide hand sprays can be used indoors before bedtime (MOH 2012e:49). This method can be effective for a short time but it is not very effective over a long time. The method works for a short time because it has no residual activity. According to Curtis and Lines (2010:152-153), mosquitoes' resistance to insecticides is common. This resistance is due to inherited mutant genes of mosquitoes. Spraying with a particular insecticide will kill most of the mosquitoes that do not have the mutant genes. This means that those mosquitoes with mutated genes will survive the insecticide while the population of susceptible mosquitoes decreases. This implies that the proportion of mutated mosquitoes that survive the insecticide increases. When this population of mosquitoes with mutated resistant genes continue breeding, the insecticide-resistant mosquito population will increase towards 100%. This renders the use of insecticide hand sprays ineffective over a long time.

2.3.9.1.3 Sanitation control measures

There are known environmental and sanitation practices that reduce breeding of mosquitoes. It is one of the commonly recommended means of reducing mosquito populations in communities particularly at household level. Water stagnation is common in low lands with poor drainage and uneven ground level. Stagnant water can also accumulate in circumstances where unused or broken containers lie near homesteads. Sanitation control measures aim at reducing stagnant water which is an important factor that supports the breeding of mosquitoes. According to Curtis and Lines (2010:142-145), these sanitation practices aim at reducing the occurrence of water stagnation near homesteads and urban areas in order to prevent mosquitoes from breeding. This is done by land filling, implying the levelling off the ground with soil, gravel or concrete. This is done to prevent water stagnation. Stagnated water offers a good breeding ground for mosquitoes. Therefore land levelling and removal of unused containers near households deny favourable breeding grounds for mosquitoes.

2.3.9.1.4 Environmental control measures

Environmental control measures can also be used to control mosquitoes in the community. “This includes permanent and temporary alteration to the environment ranging from filling and draining breeding sites to planting or removing trees” (Curtis & Lines 2010:165). Some breeding sites can simply be filled with soil of gravel. It may be done by using hand tools or it may require the use of mechanised heavy equipment. This denies mosquitoes of breeding site by eliminating stagnant water (Curtis & Lines 2010:165-166).

According to Curtis and Lines (2010:165), another environment control measure which has been used in Southeast Asia to control mosquitoes, has been the construction of small dams. These small dams are fitted with automatic siphons or stoppers that periodically open to release water suddenly. The mosquito larvae which settle on the grass and other objects are periodically washed downstream. This interferes with the life cycle of the mosquitoes and prevents them from breeding (Curtis & Lines 2010:165-167).

2.3.9.1.5 Spraying oil on stagnant water

Oils kill larvae of mosquitoes (larvicides) thus stopping the lifecycle of mosquitoes. Destruction of malaria larvae can be achieved by spraying oil on stagnant water. Oil works by preventing oxygen from reaching the mosquito larvae therefore killing them. “Oils have been used as larvicides in control of malaria for many years” (Curtis & Lines 21012:163). Oils are safe and effective in small enclosed breeding sites. This can be an important way of controlling of malaria particularly in urban and peri-urban areas with isolated stagnant water-lodged areas. This method, however, may not be

used on a large scale since it would inevitably lead to pollution of water (Curtis & Lines 21012:162-163).

2.3.9.1.6 Biological control

Mosquito larvae may also be controlled biologically by the use of living organs to eat mosquitoes or their larvae. The larvae stage is one of the stages in the lifecycle during the development of mosquitoes. Vector-eating fish species, like *Gambusa Affinis* and *Poecilia reticulate,* eat the larvae of mosquitoes (Curtis & Lines 2010:166). This is therefore one of the ways of controlling the population of mosquitoes.

2.3.9.2 Prevention of contact between mosquitoes and humans

Mosquitoes need to come into direct contact with the human skin in order to bite the person and to inject malaria parasites into the person's blood stream. Thus any barrier between humans and mosquitoes could prevent, or at least reduce the risk of, mosquito bites and thus also the risk of contracting malaria.

2.3.9.2.1 Mosquito bed nets

Actual mosquito bites can be prevented by the use of mosquito bed nets (Monroe, Harvey, Lam, Muhangi, Loll, Kabali & Weber 2014:[2]). Intact mosquito bed nets prevent mosquitoes from reaching a person who sleeps under them (Loha, Kebede & Lindtjom 2013:2). ITNs are hung around beds to act as physical barriers against mosquitoes. To increase their effectiveness, bed nets are usually treated with insecticides (ITNs).

When these mosquito bed nets are manufactured with insecticide incorporated into the fibre at the factory, such mosquito nets are referred to as LLINs (Wanzira, Yeka, Kigozi, Rubahika, Nasr, Serwanga, Kamya, Filler, Dorsey & Steinhardt 2014:[2-3]).

Good quality long lasting insecticidal nets will remain effective against mosquitoes after more washes than the conventional mosquito bed nets which are just dipped in insecticide materials (Curtis & Lines 2010:150). Such insecticides include *lambda-cyhalothrin* (ICON), *deltamethrin* (K_Otab), and alpha-cypermethrin (FENDONA) (Curtis & Lines 2010:148), as shown in table 2.12. Household ownership of LLINs in SSA was estimated at 53% by 2012 (World Malaria Report 2012:9).

ITNs provide more protection than non-treated nets since they have an additional action of repelling mosquitoes and killing those which rest on these bed nets (Hetzel, Gideon, Lote, Makita, Siba & Mueller 2012:[2]). Therefore, ITNs serve as physical and chemical barriers resulting in a dual effect against mosquitoes. It is recommended that all people, particularly children younger than five years and pregnant women, should always sleep under treated mosquito nets (MOH 2012:91).

Table 2.12 Insecticides used for treatment of mosquito bed nets

Chemical	**Trade name**	**Formulation**	**Target dose**	**Concentration per net (15m^2)**
Permethrin (10.0%)	Imperator /Peripel	Emulsifiable concentrate	200-500mg/m^2	75ml
Deltamethrin 1.0%	K-othrin	Suspension concentrate	15-25 mg/m^2	40 ml
Deltamethrin 25.0%	K-Otab	Wettable tablet	15-25mg/m^2	1 tablet (1.6 g)
Lambda-cyhalothrin 2.5%	Icon	Micro-encapsulated	10-20mg/m^2	10 ml
Cyfluthrin 5.0%	Solfac	Oil-in-water emulsion	50 mg/m^2	15 ml
Etotenprox 10.0%	Vectron	Oil-in-water emulsion	200-500 mg/m^2	30 ml
Alpha-cypermethrin 10.0%	Fendona	Suspension concentrate	20-40mg/m^2	6ml

(Source: Malaria Consortium 2010:148).

2.3.9.2.2 Screening of houses

Offices and houses can be screened from insects (Musoke, Karani, Sempebwa, & Musoke 2013:[2-3]). Screening of houses is done by putting wire mesh in windows, doors and ventilators. This prevents the entry of mosquitoes and other insects into houses (Todd, Lockwood & Sundar 2012:347). This reduces contact between mosquitoes and humans which eventually prevents the spread of malaria (MOH 2012b:90-91).

2.3.9.2.3 Reduction of malaria parasites

Any intervention that reduces mosquitoes' numbers will reduce the malaria incidence.

2.3.9.3 Preventive treatment for malaria

2.3.9.3.1 Intermittent preventive treatment (IPT)

Intermittent preventive treatment (IPT) is the administration of full, curative doses of an effective anti-malaria at pre-defined intervals, regardless of whether there is parasitaemia, with the objective of reducing the malaria burden in a specified target population (Tutu, Lawson & Browne 2011:2). The WHO recommends IPT in countries with medium to high malaria burdens (Odongo, Bisaso, Byamugisha & Obua 2014:[2]). The WHO categorises IPT into intermittent preventive treatment pregnant (IPTp), intermittent preventive treatment infant (IPTi) and intermittent preventive treatment children (IPTc) (WHO 2012:6-7). In all different categories of IPT, the recommended drug is a combination drug of sulfadoxine and pyrimethamine (SP) (Armstrong Schellenberg, Werner, Kizito, Manzi, Mwifadhi, Adiel, Pedro Hassan, Marcel & Schellenberg 2011:[1-2]). According to the WHO (2012:34), recent evidence has concluded that, the drug sulfadoxine-pyrimethamine (SP) has continued to be a very beneficial drug for IPT even in areas where it is no

longer beneficial as a therapeutic agent (Chamberlain, Pennas, Mariin & Belay 2013:[2-3]; Diala, Pennas, Marin & Belay 2013:[2-4]). Further recommendations depend on the best approach to the prevention and management of malaria during pregnancy, considering the increased SP resistance and changes in the malaria burden (MOH 2012:34). In Uganda, policy makers of the MOH have adopted the use of IPT during pregnancy. (In this thesis, IPT refers to intermittent preventive treatment for pregnant women only). IPT is the recommended preventive treatment given to all pregnant women to prevent malaria during pregnancy Rogawski, Chaluluka, Molyneux, Feng, Rogerson & Meshnick 2012:[6]) . It is given to all women attending ante-natal clinics in Uganda. This is a routine and free service to all pregnant women attending ante-natal clinics is given during the 2nd and 3rd trimester (MOH 2012b:91). In Uganda, this is done by giving two rounds of a drug in single doses of three tablets of sulfadoxine-pyrimethamine (SP). The combination drug is given in single doses (comprising three pills) twice (MOH 2012a:91). The interval between the two doses should be at least one month. This is because sulfadoxine and pyrimethamine (SP) are long acting anti-malarial drugs which should not be taken more frequently so as to avoid accumulation of the drug as it might cause hepato-toxicity. IPT is given as a single dose as a directly observed treatment (Mpogoro, Matovelo, Dosani, Ngallana, Mugono & Mazigo 2014:[10]). This means that a pregnant woman is given the drug and she swallows the drug in the presence of the health worker in the ante-natal clinic. This is referred to as directly observed treatment (DOT) (MOH 2012b:90-91).

However, chemoprophylaxis prevents the development of immunity to malaria in individuals who use chemoprophylaxis for a long time. Pharmacological prophylaxis is therefore not recommended for most of the population. The exceptions to this policy are pregnant women and short time travellers/tourists from non-endemic areas. The general population is not given chemoprophylaxis so that they naturally develop immunity towards malaria (see section 2.3.4.2).

2.3.9.3.2 Pharmacological prevention for short time travellers from non-endemic areas

Chemoprophylaxis is recommended for residents with low immunity and all visitors from malaria free areas who travel to areas where malaria is endemic. Regular prophylactic anti-malaria drugs prevent the development of malaria parasites (trophozoites) in the blood (Schull 2007:66-67). This means that clinical malaria can be prevented (Todd et al 2012:347). The Maloprim combined tablet (Pyrimethamine 12.5mg plus dapsone 100mg) is the drug of choice for malaria prophylaxis. This combination drug is given as one tablet once a week. According to Todd et al (2012:347), other alternative malaria prophylactic drugs are mefloquine and proguanil. For prophylactic purposes, mefloquine is used at a dose of 5mg per kilogram body-weight weekly. Prophylactic proguanil in children 1-4 years is given at the dose of 50mg per day.

2.3.9.4 The use of information, education and communication (IEC) Strategies

Information, education and communication (IEC) strategies for health education is important in community mobilisation. According to the MOH (2012b:13), health education is a major control measure against malaria. This strategy is intended to empower communities and individuals with knowledge and skills required for malaria control (Dinho 2009:50-51). The provision of knowledge and skills influences people's attitudes so that they undertake malaria control practices at household and community level (MOH 2012e:50). In so doing, community participation in malaria control efforts is enhanced. This is a cost effective long term way of controlling malaria but it depends on sustained community participation.

2.3.9.5 Vaccines against malaria

Currently, there are no licenced vaccines against malaria or any other human parasitic disease. However, a few vaccines against malaria are being investigated. The most advanced is a vaccine against plasmodium falciparum, known as RTS,S/AS01. It is undergoing large clinical trials in seven countries in Africa and results are expected towards the end of 2015 (WHO 2013:6).

2.4 CONTEXTUALISATION OF INFORMATION OBTAINED FROM THE LITERATURE REVIEW WITHIN THE SOCIAL LEARNING THEORY'S MAJOR CONCEPTS

Personal factors ⟷ Behaviour ⟷ Environmental factors

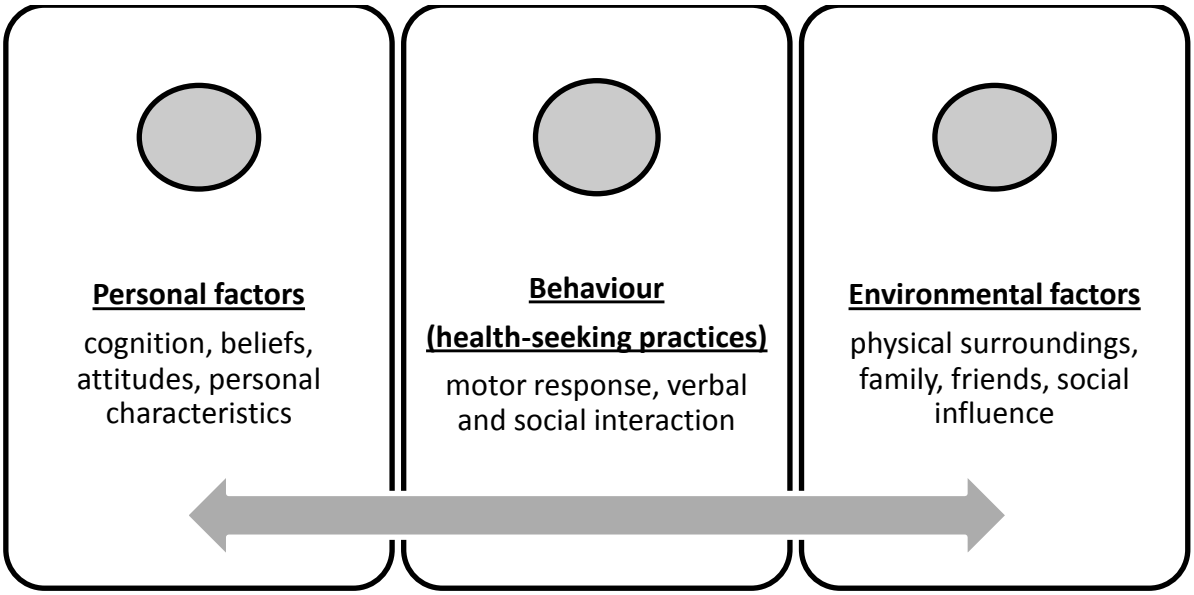


Figure 2.4 Reciprocal determination, conceptual model

(Adapted from Christensen 2013:2-3)

This study was based on the concept of reciprocal determination of Albert Bandura's social learning theory. The concept of reciprocal determination is defined as the dynamic interaction of the person, behaviour and environment in which the behaviour is performed. These three factors influence one another in various ways

(see figure 2.4). Personal factors are influenced by the environmental factors to determine personal behaviour. However, people's behaviours influence the environment and are actually part of the environment. Behaviour partly creates the environment and the resultant environment which, in turn, influences the behaviour of people who stay there. This forms the basis of the Social Learning Theory (Hodder 2005:618), as will be explained in the following sections.

2.4.1 Behaviour

Behaviour refers to one's observable conduct in a society (Hodder 2005:78). People's behaviours will determine aspects of their environment to which they are exposed, and behaviour in turn, is modified by that environment. This implies that individual's behaviours influence and are influenced by environmental and personal factors (see figure 2.4). This theory stresses the need for personal, social, and behaviour skills development to enable individuals to put into practice their convictions regarding health-related decisions (Croyle 2005:19-20). Behavioural choices may be expressed in the form of observable conduct like verbal statements, behavioural actions, and trial and error experiences. Such observable conduct depends on personal decision to behave the way they do which is unique to that individual.

In this study, behaviour is viewed in terms of pregnant women's health seeking practices for utilising anti-malaria services. During the literature review, utilisation of available antimalarial services like IPT, the role of LLINs and IRS was put into perspective. According to the national and population survey conducted in Uganda, IPT1 (first dose of IPT0 stands at 48% and IPT2 (second dose of IPT) was only 27% (UBOS 2012:170-175). The use of LLITNs during pregnancy was 47% during 2011 while IRS of houses in 2011 was only 7.2% (UBOS 2012:172-175). The literature survey depicted poor health-seeking practices of pregnant women in Uganda.

These findings from the literature review indicate under-utilisation of anti-malaria services among Uganda's pregnant women. These findings are in line with the research problem that the study set out to identify factors that influence pregnant women's utilisation of the anti-malaria services (refer to section 1.5 of this thesis).

2.4.2 Environmental factors

Environmental factors refer to external factors that can affect a person's behaviour. According to Glanz et al (2002:169-177), the environment includes physical and social aspects. The physical environment includes living conditions, infrastructure and all circumstances that surround an individual. The size of the room, the ambient temperature/atmosphere and availability of certain foods are all part of the physical environment. The social environment includes family members, friends and colleagues. In this study, environmental factors included proximity to health facilities, quality of available health services, household environment and other factors that affect personal behaviour. Social factors include influences from family members, friends and peer influence.

Since this study was based on the concept of reciprocal determination, the interaction of personal factors, behaviour and the environment in which the behaviour is performed comprises one of its assumptions. During the literature review, environmental factors like high prevalence levels of malaria due to conducive conditions in Uganda were documented (refer to section 2.2.2 of this thesis).

According to the MOH (10:5-6), 72% of all households in Uganda live within five kilometres from a health facility (public and PNFP). This implies that 28% of all the population of Uganda have poor geographic access to health services. This creates an environment of poor geographic access where the distance to health facilities is more than the recommended walkable distance of five kilometres.

Furthermore, the MOH (2012d:44) admits that Uganda has a shortage of qualified health professionals. This creates a shortage of health providers leading to poor access of health services. Poor infrastructure and poor distribution of health facilities pose environmental challenges, identified from literature review. According to the MOH (2012d:14-15), all national and regional referral hospitals are located in urban areas. This leaves rural areas with smaller health facilities and with poorer services than the urban areas. Poor medical and logistical supplies to health facilities pose another major challenge for the country's health system (Bbosa 2009:88). This creates an environment of poor quality of health care offered by the country's health system.

Still on environmental factors, the literature review revealed that, malaria was responsible for an estimated 153 512 cases (37.3%) out of a total of 411 512 cases treated for all types of ailments during 2010 in Buikwe district (see section 2.2.2). In 2011, the district had 155 568 malaria cases (38.2%) out of a total of 407 348 all types of ailments managed at all health facilities in the district during that year (Buikwe District Council 2011:4). This means an environment of high endemic malaria due to favourable conditions for the breeding of mosquitoes in tropical regions (see section *2.3.3.5*).

2.4.3 Personal factors

The University of Twente (2010:2-4), describes personal factors as perceptions, beliefs, feelings, attitudes, values, expectations, goals and intentions. Perception is a personal attribute that influences how one understands or perceives ideas. Other personal factors are discussed in section 1.9.2.4.3 of this thesis and include beliefs, attitudes, values and expectations. These personal factors influence the way an individual responds to health-related programmes. Such factors include pregnant women's knowledge of malaria and its control, age and level of education. However,

they are modified by environmental factors like the availability of good accessible health care services.

According to the Uganda Bureau of Statistics (UBOS 2012:2-3), the country's estimated population during 2013 was 35 189 473. The average fertility rate was 6.2 children per woman and the annual population growth rate was 3.4%. This growth rate is one of the highest in the world. The life expectancy was 50.4 years. The maternal mortality rate was 438 maternal deaths for every 100 000 live births (UBOS 2012:237). Because of a high growth rate and a generally low life expectancy, the population of Uganda can best be described as a young population because those younger than 15 years comprise of 52.0% of the total population. Furthermore, 20% of all adult Ugandans have no formal education (UBOS 2012:56). The utilisation of family planning services, also referred to as the contraceptive prevalence rate for women of reproductive age, was only 34.0%. The gross domestic product (GDP) per capita was US$ 430 (MOH 2010a:2). This means that Uganda is one of the poorest countries in the world.

This literature review shows that the pregnant women in Uganda are generally poor, young, with no formal education with high fertility rate due to poor utilisation of family planning services. This also indicates poor health seeking practices by community members. These literature review findings were in line with the research objective of studying personal factors like age, education level, parity, marital status, employment status and personal monthly earnings that might influence pregnant women's utilisation of anti-malaria services in Buikwe district of Uganda.

2.5 SUMMARY

In this chapter the reviewed scientific literature on malaria and its effects on pregnancy were summarised and contextualised within the theoretical model. It dealt with epidemiology of malaria, transmission and factors that determine its

distribution. It also discussed the pathophysiology, clinical presentation, complication in pregnancy and the current management of malaria in pregnancy. The chapter finally discussed available possible ways of preventing malaria. The next chapter discusses the research methods followed during the study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The previous chapter reviewed scientific information about malaria generally, and about malaria during pregnancy specifically. This chapter discusses the research methodology adopted by this study. This chapter discusses the population, the sample and sampling process, the data collection tools, data collection process, data management and analysis. Ethical issues pertaining to the research process are also addressed.

3.2 AIM OF THE STUDY

The aim of this study was to describe factors that influence pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda. It also intended to study correlations between factors that influence pregnant women's utilisation of anti-malarial services and to compare and contrast pregnant women's information (phase 1) with midwives' information (phase 2). In order to achieve that, phase 1 of the study had specific objectives, namely to identify:

- social-demographic characteristics like age, parity, education level, employment status and income levels that might influence pregnant women's utilisation of anti-malaria services
- environmental factors like geographic access to health facilities, availability of quality health services, traditional healers' and peers' potential influence on pregnant women's utilisation of anti-malaria services

- personal cognitive characteristics of pregnant women like knowledge about malaria during pregnancy and sources of malaria-related information that might influence their utilisation of anti-malaria services
- behaviour/health practices of pregnant women like IPT utilisation, utilisation of LLINs, use of anti-malaria drugs and other malaria control measures related to the utilisation of anti-malaria services

Phase 2 of the study identified midwives' perceptions about pregnant women's utilisation of anti-malaria services in the Buikwe district (presented in chapter 5) and to compare and contrast the information obtained from the pregnant women with the findings obtained from the midwives (presented in chapter 6).

Phase 2 of the study dealt with information from midwives working in ANC clinics and from pregnant women's ANC records. The major objective of the second phase of the study was to compare and validate the information from the first phase of the study (as presented in chapter 6 of this thesis). Institutional factors that might influence pregnant women's utilisation of anti-malaria services in the Buikwe district, as perceived by midwives providing ANC services, are presented in chapter 5). In order to achieve its major objective, the specific objectives of the second phase of the study were based on those of the first phase, namely to identify midwives':

- social-demographic characteristics like age, gender, education level, marital status, employment status and training levels that might influence midwives' provision and pregnant women's utilisation of IPT services
- environmental factors like public-private health facilities, availability and cost of IPT drugs and LLINs, availability of TBAs, VHTs and traditional healers that might influence midwives' provision and pregnant women's utilisation of anti-malaria services to pregnant women
- personal cognitive characteristics that might influence midwives' provision and pregnant women's utilisation of IPT services to pregnant women

- reported health seeking practices of pregnant women like time and frequency of ANC clinic attendance and IPT utilisation

3.3 RESEARCH DESIGN

A research design is the plan or blueprint of how a researcher intends to conduct the study. The research design should specify what one intends to study and determine the best way to do it (Babbie 2010:91). A quantitative, correlational, descriptive and cross-sectional study was conducted to describe factors that affect pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda.

A quantitative research design was considered to be appropriate for both phases of the current study because it enabled the researcher to provide statistical evidence of the research variables' correlations (Babbie 2010:422). This study was limited to a number of pre-specified variables. The study attempted to identify relationships between the health seeking behaviours of pregnant women and certain personal, environmental and learning factors without implying cause-effect relationships, making it correlational research. Where appropriate, correlations were calculated using Spearman's Correlation Coefficients and/or Spearman's Rank Order Correlation Coefficients. This analysis was done using Epi-Info and MS Excel computer programs. Correlational research is a "systematic investigation of relationships between two or more variables to explain the nature of relationships in the world and not to examine cause and effect" (Burns & Grove 2005:794). This study was also descriptive. According to Burns and Grove (2005:795) descriptive research "provides an accurate portrayal or account of the characteristics of a particular individual, event or group in real life situations for the purpose of discovering new meaning, describing what exists, determining the frequency with which something occurs, and categorizing information".

The study was cross-sectional because it examined a group of pregnant women's malaria-related behaviours at one point in time "with the intent of inferring trends over time" (Burns & Grove 2005:794). Phase 2 of the study was also cross sectional and descriptive as the midwives' perceptions about the utilisation of anti-malaria services by pregnant women were described at one point in time during structured interviews. The findings of phase 2 of the study were also analysed quantitatively and correlated with midwives' provision of anti-malaria services to pregnant women. Bandura's Social Learning Theory and the literature review guided the development of the data collection tools, augmented with relevant policies from the MOH (Christensen 2013:[2-5]). Control was imposed by pre-testing the pregnant women's structured interview schedule and by keeping the conditions of data collection constant. This was achieved by training the research assistants and by checking the completed interview schedules.

3.4 RESEARCH METHODOLOGY

This section deals with the population, sample and sampling procedure, sample size determination, eligibility criteria, research instruments, data collection process and data analysis procedures.

3.4.1 Population

According to Joubert and Ehrlich (2007:94), a population is the entire group that a researcher intends to study and make conclusions about them. This is also referred to as a study/target population. An accessible population is that portion of the target population to which the researcher has reasonable access (Babbie 2010:208-209). Such a population should be clearly defined in terms of place, time and other factors relevant to the study.

The population for phase 1 of this study comprised pregnant women attending ANC clinics in the Buikwe district during April/May, 2014. The estimated number of

pregnant women in the Buikwe district for the year 2014 totalled 22 100 (Buikwe District Council 2013:12).). For the second phase of the study, the study population of midwives working in ANC clinics was 45.

"A sampling frame is a list of units of a population from which a sample is selected" (Babbie 2010:208). Another term used instead of a sampling frame is a census. In this study all 16 health units, providing ANC services in the Buikwe district, were included in the study implying that no site sampling took place because the census of 16 health units participated in the study. In phase 1 of the study, sampling took place of pregnant women attending these 16 ANC clinics. Registers of ANC clinics served as the sampling frame at each clinic to randomly select 25 respondents at each clinic.

Pertaining to phase 2 of the current study, the population of 45 midwives, who provided ANC services at the 16 participating health care facilities, were invited to participate in the study by being interviewed, but only 40 (88.9%) could be interviewed as five midwives were unavailable.

3.4.2 Sample selection and procedure

A sample is a group of individuals or units chosen for the study from the accessible population. A sample is a subset or subgroup of individuals of the study population to be studied (Hornby 2010:1307). The larger a sample, the higher is the possibility that the sample is representative of the study population, provided that the sample was randomly selected (Babbie 2010:196-197). On the other hand, studying many more respondents than would be necessary is a waste of limited resources, especially time and money.

Sampling is the process of selecting a sample from the study population (Hornby 2010:1307). Random or probability sampling, in this study, was conducted in selecting pregnant women. In this study all 16 sites, providing ANC services were included, implying that no sampling took place of research sites.

Random sampling is based on the probability theory (Babbie 2012:196-197), assuming that all members of the study population have a known chance of being selected as respondents of the study. In phase 1 of the study, all pregnant women in the Buikwe district who visited any of the 16 ANC clinics, had a chance of being included in the study. In phase 1 of the study, simple random sampling without replacement was done at each of the 16 ANC clinics to select 25 respondents at each clinic. This resulted in a total of 400 respondents.

At each participating ANC clinic, pregnant women were registered as they reported at the clinic and each one was given a number. Then, health education talks were presented. After the health education talks, the pregnant women were examined and treated, if necessary.

During the time of data collection, the data collection team tried to fit into this normal routine of the ANC clinics. On a daily basis, the numbers assigned to the attending pregnant women were written on similar pieces of paper by a research assistant at each clinic. She folded the slips of paper into identical shapes and sizes and put them into a small box and thoroughly mixed them by shaking the closed box vigorously. Then, the research assistant randomly picked five papers without replacing the previously selected slips of paper, amounting to simple random sampling without replacement. The five selected numbers represented the five pregnant women sampled for interviews on a specific day. If the selected women met the eligibility criteria and consented to participate in the study, they were interviewed by the research assistant.

The selected pregnant women who did not meet the eligibility criteria and those who did not consent to participate in the study, were replaced by randomly drawing additional numbers from the closed container until five women were interviewed at each ANC clinic on a specific day. This sampling and interviewing was conducted daily for five days at each ANC clinic until 25 respondents had been interviewed at

each of the 16 ANC clinics in the Buikwe district. In so doing, a total of 400 (N=400) pregnant women were interviewed to collect data for this study.

During phase 2 of the study, all 45 midwives working at the 16 participating ANC clinics in the Buikwe district were invited to participate in the study. However, structured interviews could only be conducted with 40 (N=40) midwives as five midwives were unavailable.

3.4.3 Sample size determination

Whenever, a researcher conducts research, one of the most important questions is the size of the sample needed for the study. There are several ways of determining the sample size for studies. According to Glenn (2012:3-4), these include:

- using a census for small populations
- imitating a sample size of similar studies
- using published sample estimation tables
- applying formulas to calculate a sample size

The use of a population census is attractive for small populations like 200 members of the same village. It eliminates sampling errors and provides data on all individuals in the population. It might be the only way of achieving a desirable level of precision if the study population ranges between 40 and 200 (which was the case for phase 2 of the current study explaining why the population of 40 available midwives were interviewed). However, this has cost implications, making it impossible to use in large populations. The use of the same sample size as those of similar studies might be a simple way of determining the sample size. However, such an approach might risk repeating errors that were made in determining the sample size of other studies (Glenn 2012:3-5). The use of published sample size tables is another way of

determining the sample size for a specific study. In addition to their simplicity, sample size tables have the advantage of considering the precision, confidence levels and variability of the data. They are generalised for a variety of studies and thus important in providing a guide for determining sample sizes. The use of formulae to calculate sample sizes gives a more accurate way of determining sample size by considering a combination of precision, confidence levels and variability. There are various formulas that can be used but many of them are extremely complex.

In this study, the sample size of pregnant women was calculated using a formula that was originally formulated by Cochran (1963:75). According to Glenn (2012:3-4), the sample size is influenced by a number of factors. Such factors include the purpose of the study, population size, risk of selecting a non-representative sample, the acceptable size of the sampling error and available resources for the study. The sample size of this study was statistically determined. According to Glenn (2012:3), the minimum sample size for large populations can be calculated using a formula, $(n_o) = Z^2pq / e^2$. This formula was previously formulated by Cochran (1963:75), as follows:

n_0 is the minimum sample size (this means that the sample for the study should be equal or higher than the calculated figure. In that way, the assumed sampling error in comparison to the desired confidence level and population variability would be achieved)

Z is the area of tails under normal curve obtained from statistical tables

p is the estimated proportion of an attribute that is present in the population

q is 1-p

e is the desired level of precision.

According to Glenn (2012:3-4), the level of precision is often referred to as the sampling error. This is the range in which the true value of the population is estimated to fall. This range is often expressed in percentage points of for example

±5%. The desired confidence level of 95% was accepted as being appropriate in this study. In a normal distribution, if a 95% confidence level is selected, 95 out of 100 samples will have the true value within the specified range of precision (Glenn 2012:3-4).

Since a large population of unknown variability was to be studied, a maximum variability of p = 0.5, was assumed. The degree of variability in the attributes being measured refers to the distribution of attributes in the population (Glenn 2012:4-5). The more heterogeneous a population, the larger the sample size required to obtain a given level of precision. In more homogeneous populations, a smaller sample size could be adequate (Basomprah 2013 [5-7]). Related to this study, the population of the district is heterogeneous with a large segment of the population living in rural and some living in urban areas of the four town councils found in the district. So, maximum variability was assumed.

Sample size (n_0) $= Z^2pq / e^2$

$= (1.96)^2(0.5)(0.5) / (0.05)^2$

$= (3.8416 \text{ X } 0.25) / 0.0025$

$= 0.9604 / 0.0025$

=385 pregnant women.

385 was the calculated minimum sample size.

The current study's sample was to be selected at 16 participating ANC clinics in the Buikwe district. This meant that 25 pregnant women were selected from each of the 16 health facilities of the district, resulting in a sample size of 400 respondents, exceeding the calculated minimum sample size of 385 pregnant women. Fewer than

25 respondents per health facility would have resulted in a smaller sample than the calculated minimum sample size.

In phase 2 the population of 40 available midwives working at the 16 participating ANC clinics were interviewed, implying that no sampling took place.

3.4.4 Eligibility criteria

To be eligible for inclusion in phase 1 of the current study, pregnant women had to be:

- at least 21 years of age at the time of data collection
- residents of Buikwe district
- able to communicate in English or Luganda, the local language of the district, as the interview schedule was available in these two languages only
- willing to be interviewed and to sign consent to this effect.

This meant that pregnant women who could not conform to the eligibility criteria were not included for the study. Such exclusive criteria included pregnant women who were younger than 21 years of age, not residents of the Buikwe district and those with language barriers since the interview schedule was only available in two languages (English and Luganda). Pregnant women who were not willing to give consent were not coerced to participate. Any pregnant woman was only interviewed once. This was ensured by including an instruction to this effect to all respondents in the information section of the consent form. Since every respondent had to give consent to be interviewed, this ensured that no respondent was interviewed more than once.

Eligibility criteria for participation in phase 2 of the study required midwives to be working at one of the 16 participating ANC clinics and to be willing to be interviewed and to supply the relevant ANC statistics for the specific clinic (obtained from each

clinic's register). Out of the 45 midwives working at these 16 ANC clinics, five were not available.

3.4.5 Data collection procedure

Respondents had to sign consent before being interviewed. The research assistant read each item from the interview schedule and recorded every response (Polit & Beck 2008:414). The researcher was accessible by cell phone in case any interviewer required assistance. The researcher checked as many completed structured interview

schedules as possible for completeness on a daily basis. Incomplete interview schedule were discarded. In this case another number was randomly drawn (amounting to simple random sampling without replacement) from the closed container and the next randomly selected pregnant woman was invited to be interviewed. As the interview schedules were completed anonymously, it was impossible to identify any woman whose structured interview schedule was incomplete.

No pregnant woman was coerced to supply any answers and any respondent's decision not to answer any specific question was respected at all times. The research assistants also conducted structured interviews with the midwives working at the 16 participating ANC clinics after signed consent had been provided. Every interview was conducted in a private room.

According to Babbie (2010:274-275), a data collection tool, that is designed for responses to be entered by the interviewer, is referred to as an interview schedule, as applied in this study. The use of an interview schedule has advantages, including the possibility that items of this data collection tool can be re-phrased by the research assistant for improving the respondent's understanding of the specific question. The use of an interview schedule also has the advantage of ensuring a high response

rate and all items of the tool can be answered so that meaningful analyses of all variables can be performed. In Uganda, the literacy rates among women of child bearing age (15-49 years) was 64% in 2011 (UBOS 2012:33). It was thus important that an interview method of data collection was used in preference to a self-administered questionnaire so as to accommodate women who might have found it difficult to read and write.

However, one disadvantage of the interview method is the possibility that research assistants could introduce bias in the interview process while re-phrasing and clarifying items. The possibility of bias was minimised by the fact that items of the data collection tool for pregnant women were available in both English and in the local language, Luganda. The research assistants also underwent training and practised using the instrument during role play sessions.

3.4.6 Data collection instruments

A structured interview schedule for pregnant women was designed based on Bandura's Social Cognitive Theory (SCT), the literature review and the MOH's policies. The items were designed to address the specific study objectives (see section 1.5.2). The tool had 79 items. Items 4.30 and 4.34 were open-ended questions and others were closed-ended multiple-choice items. It had four sections (see Annexure B1):

Section A contained 12 items, which requested biographic information from the respondents.

Section B had 13 items requesting each respondent to give answers relevant to her circumstances. These items elicited data about the environmental factors that might have influenced the actions of pregnant women concerning the utilisation of anti-malaria services.

Section C's 20 items elicited data about personal factors of the respondents and data about factors influencing pregnant women's malaria-related knowledge and about available anti-malaria control services and how this knowledge was acquired.

Section D comprised 34 items. This section contained items that attempted to elicit data about the health seeking behaviour of pregnant women. The reason why this section had two open-ended items was that the researcher wanted to elicit as much information as possible about the reasons why some pregnant women did not use mosquito bed-nets if this was indicated as being the case in response to item number 4.30.

The open-ended item 4.34 intended to identify participants' preferred malaria preventive strategies. Table 3.1 summarises the content of the data collection instrument for pregnant women.

Table 3.1: Characteristics of the pregnant women's structured interview schedule

Section	Variables	Number of items
A	Social /demographical data of respondents	12
B	Environmental factors influencing the utilisation of anti-malaria services	13
C	Personal factors associated with learning about malaria and anti-malaria services and sources of that information	20
D	Pregnant women's health seeking behaviours	34
	Total	79

(See Annexure B1)

The structured interview schedule for midwives (see Annexure B2) comprised four major sections requesting midwives' social demographic information, environmental factors influencing pregnant women's utilisation of anti-malaria services, midwives' personal learning factors, and pregnant women's health-seeking behaviours.

3.4.6.1 Measures taken to prevent loss of meaning during translation of the structured interview schedule

An English-Luganda language expert was hired to translate items of the data collection tool for pregnant women (see Annexure B1) into Luganda, the local language (see Annexure E1). Another language expert in both languages was hired to translate the Luganda instrument back into English (see Annexure E2).

The two English versions of the data collection instrument were compared by the research team with the assistance of the language experts (see Annexures E1 and E2). By the end of the meeting, it was agreed that the items in the original English and the back-translated English version of the interview schedule had had no significant differences. The minor differences between the two documents were investigated and addressed in the Luganda interview schedule until consensus was achieved about every item of the interview schedule. This ensured that the English and Luganda items in the interview schedules had the same meaning. This implied that the meaning of each item in the Luganda version of the interview schedule was the same as the original English version of the interview schedule. This ensured that the meaning of items in both versions of the tool was not lost during translation.

The research assistant only read out items of the interview schedule in the language preferred by each respondent and recorded the responses on the interview schedule by ticking the relevant answer in the case of closed-ended questions. Answers in response to open-ended questions were recorded verbatim in the language used by the respondent. The responses recorded in Luganda were translated by the researcher and checked by a language expert for accuracy. The four research assistants were fluent in both English and Luganda.

During phase 2, the structured interview schedule (see Annexure B2) was only available in English as all midwives completed their midwifery training in English and

could communicate in English. All research assistants were fully bilingual in English and Luganda and could thus conduct the interviews with the midwives in English.

3.4.6.2 Pre-testing the structured interview schedules

Pre-testing is the trial administration of a newly developed instrument. “No matter how carefully researchers design data collection tools, there is a possibility indeed a certainty of error...” (Babbie 2010:267). Such errors may include ambiguous questions that are difficult to answer, irrelevant questions and incorrect numbering and sequencing of items. Pre-testing is therefore intended to identify flaws in the tool and

assess the required resources, including the expected time required, for the actual completion of interviews (Polit & Beck 2008:762).

In this study, pre-testing helped to determine the strengths and weaknesses of the item format, wording order and question pattern. During pre-testing, each research assistant and the researcher interviewed five pregnant women. Therefore a total of 25 pregnant women were randomly selected as described in section 3.4.1.2.5. Such pregnant women had to conform to the eligibility criteria as described in section 3.4.1.2.2. Just as in the actual study, pregnant women were interviewed at ANC clinics during pre-testing. These 25 women’s interviews were excluded from the analysis of the data.

As the population of midwives comprised 45 persons, of whom only 40 were available for interviews, no pretesting of the midwives’ structured interview schedule was done. However, the research assistants and the researcher met after the first five midwives had been interviewed. No problems were encountered during these initial interviews and no changes were required.

3.4.6.3 Changes implemented in the instruments after pre-testing

After pre-testing, the researcher and the statistician entered the data and analysed the data using the Epi-Info package. This was done as a trial run of the data entry and data analysis procedures to detect any potential problems prior to collecting the actual data. This data analysis together with suggestions from the research assistants after the pre-testing exercise helped to identify questions that provided ambiguous answers. Based on the interviewers' suggestions, some adjustments were made on the data collection instruments. These included:

- Proper numbering of items 3.16 to 3.20 in interview schedule B1 which had been incorrectly numbered.
- It was established that, on average, a research assistant used 25 minutes to conduct one interview. Thus it was possible to conduct five interviews per day, implying that each research assistant was able to cover a health facility in one week. This meant that it was possible for each research assistant to handle four health facilities in one month resulting in 16 facilities covered by the four research assistants during one month.

3.4.6.4 Reliability of the data collection instruments

Reliability is a major criterion for assessing the quality of a data collection tool. According to Polit and Beck (2008:452-455), reliability of the data collection instrument is the consistency with which it measures the targeted variables. It is the degree to which the data collection tool measures variables in the same way each time. This implies that reliability is the repeatability of the measurement, indicating that the finding is reliable if one's score on the same test, administered twice, is similar. According to Polit and Beck (2008:452), the reliability of an instrument also concerns its measure of accuracy. So, there are two interrelated ways of explaining the reliability of an instrument. These are consistency and accuracy. A reliable measure maximises the true score component and minimises the error component therefore an accurate measure ends up being consistent. This means that the two

ways of explaining reliability (consistency and accuracy) are interrelated (Polit & Beck 2008:452).

According to Parahoo (2006:307), there are two well-known reliability measures, namely test-retest reliability and internal consistency. Internal consistency is the most widely used reliability approach among researchers (Polit & Beck 2008:455). Internal consistency estimates reliability by comparing grouped questions in the interview schedule that measure the same concept. In this study internal consistency was established by calculating Cronbach's alpha coefficients for sections C and D of the pregnant women's interview schedule. Cronbach's alpha (or coefficient) measures the relationship of items as a group in a research tool (Polit & Beck 2008:452-453). The higher the coefficient (up to +1.0) the higher the reliability and 0.0 indicates no reliability. However, if "… the coefficient value were 1.00, each item in the instrument would be measuring exactly the same thing. When this occurs, one might question the need for more than one item" (Burns & Grove 2005:398). A reliability of about 0.8 is considered a good reliability (Polit & Beck 2008:452).

The calculated Cronbach alpha (a) for the pregnant women's structured interview schedule was 0.883 (items in section C) and 0.754 (items in section D). This implies that the research tool had an acceptable level of internal consistency. Similarly, the calculated Cronbach alpha (a) for the midwife's structured interview schedule was 0.732 (items in section C) and 0.749 (items in section D). This implies that both research tools had acceptable levels of internal consistency.

3.4.6.5 Validity of the data collection instruments

Validity is the strength of a study's conclusions, inferences or propositions (Parahoo 2006:300). "Validity in measurement is the degree to which an instrument measures what it intended to measure" (Polit & Beck 2008.768). "In conventional usage, validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration'' (Babbie 2010:153). For example, a

measure of knowledge about malaria should measure knowledge about malaria not knowledge about cholera. Validity therefore means that an instrument's items actually measure what they say they are measuring. In this study, efforts were made to design data collection tools that contained items addressing issues of malaria during pregnancy (refer to Annexure B1).

Furthermore, the Social Cognitive Theory and literature review (including the MOH's policies and guidelines) helped to focus the study area and to identify relevant items to be included in the structured interview schedule. The data collection tool captured all relevant aspects of the study's topic, based on the Social Cognitive Theory and the literature review. This ensured that items of the data collection tools were wide enough to cover the relevant contents of the topic (Polit & Beck 2008.458-461).
Content validity refers to how much a measure covers the range of meanings of the concept (Babbie 2010:155-156). A content validity index (CVI) was calculated. Five experts working in malaria-related services were requested to rate each item on a scale ranging from 1 to 5, with 5 indicating perfect validity and 1 no validity. Thereafter the scores of the five experts were calculated and only items scoring a mean content validity of at least 4 (out of 5) were included in the respective instruments. This implied that there was a good content validity of the tools used in the study.

Construct validity is the extent to which a data collection tool captures a logical relationship among variables (Babbie 2010:155-156). In a bid to ensure construct validity, five experts working in the field of malaria control were consulted about the tools' items. Their contribution was important in making the final adjustments to the content and style of items included in the structured interview schedules. These experts, who were thoroughly familiar with the MOH's guidelines and policies, included two doctors from Kawolo hospital and a doctor from Nyenga hospital plus two senior nurses from Kawolo hospital with midwifery experience.

Finally, the construct validity of the tool for this study was ensured and the relevance of every item of the tool was approved by the statistician and the supervisor of the study. They advised about the content and the relevance of the tools' items. By entering and analysing the data from the 25 structured interview schedules completed during the pre-test phase of the study, potential problems concerning data entry and analysis could be identified and addressed, prior to the actual data collection phase.

3.4.7 Research assistants

Research assistants were recruited through internal advertisements placed on the notice boards of the two midwifery training schools in Buikwe district. The advertisement requested qualified midwives, who were not employed in gainful service, to be research assistants for four weeks and to undergo one week's training. The suitable candidates had to be between the ages of 21 and 30. Suitable candidates were required to have a good command of both English and Luganda. Remuneration was Shs5 000 (about R20 or USD2 during 2014 at the time of data collection) per fully completed structured interview schedule.

Nine applications were received. They were all females. Based on requirements stated in the advertisement, five candidates were shortlisted and interviewed. After the interviews, four successful candidates were selected. The researcher briefed the successful candidates about what would be required of them and the need to be trained for effective data collection.

Four research assistants, fluent in both English and Luganda, were trained by the researcher to conduct structured interviews with pregnant women and with midwives and to record the findings correctly. They were also trained about ethical issues and to obtain informed consent from every respondent (see Annexure A). Each research assistant signed a confidentiality agreement with the researcher (see Annexure I), indicating that no information obtained during the interviews would be divulged to

anybody except to the researcher. Role play sessions were conducted to practise asking questions, recording the answers, and identifying any potential problematic issues during interviews. Research assistants were trained to avoid bias by adhering to the selected set of questions and they were also informed about the nature and purpose of the study. Clarifying items of the data collection tool was done cautiously and only when it was necessary. The research assistants also participated in the final stages of translating the research tool from English into Luganda and back to English. This ensured that the research assistants understood both versions of the tool and that they were fully conversant with the items of the interview schedule in both languages (see section 3.4.2.2). The four research assistants were trained by the researcher, but the statistician and the language experts also rendered inputs during the training phase.

The training covered several areas, including relevant information about malaria during pregnancy and the possible available control measures. Ethical issues, including the rights of respondents, consenting and responsibilities of research assistants, were also addressed. Those topics were presented by the researcher. The inclusion criteria, sampling and the actual sampling procedures that had to be followed were addressed by the statistician (see section 3.4.1.2.5). The training sessions included reviewing the English-Luganda interview schedule in detail, including discussions about the accuracy of the two versions of the interview schedule. This was facilitated by the language experts. This training was done before pre-testing the tool, and role play sessions proved useful to enable the assistants to practise asking the questions and recording the responses. This helped the research team to acquire relevant knowledge related to the study and to get insight into sampling procedures, obtaining consent from each respondent, being familiar with the data collection tool and the data collection procedure. Pre-testing the instrument helped to standardise data capturing and recording by the data entry clerk and the researcher. This training was very important in equipping the data collection team with the necessary skills to conduct structured interviews to collect data. It also

helped the researcher and the four research assistants to understand each item in a similar manner.

3.4.7.1 Procedure followed by research assistants during the interviews

The researcher visited each health facility prior to the data collection date. The researcher introduced himself to both the person in charge of the health facility and the person in-charge of the ANC clinic. Letters of permission to conduct research from the MOH and the District Health Office were presented to each of these persons to get approval to collect data at the ANC clinics during a specific week. The researcher explained details about the study and the data collection processes. Agreed-upon dates for data collection were arranged. Written approval was solicited from the person in charge of the facility (see Annexure D3).

On the first day of data collection in a facility, each research assistant was expected to reach the health facility by 8.30 am. The research assistant introduced herself to the person in charge of the health facility and then proceeded to the person in charge of the ANC clinic. Data collection was conducted at different health facilities in the same area on specific days. The researcher had a vehicle and maintained mobile telephone contact with all research assistants for coordinating the data collection exercise at four health facilities on one day.

At each participating ANC clinic, the researcher explained the purpose of the study and details of the data collection exercise including the sampling procedure. The researcher then requested the cooperation of midwives in the ANC clinic and explained what was expected of them. Each research assistant was deployed at one health facility and expected to collect data from the facility for one week. It was not practical to deploy all research assistants in one facility since not all facilities had high daily ANC attendances throughout the week. By the end of the week, 25 pregnant women had been interviewed at each ANC clinic.

The midwives were expected to support the research team by availing the ANC register to facilitate the sampling process. The midwives were also requested to ensure that the women did not lose their places in the queues because of being interviewed.

After the health education session, randomly selected pregnant women were told about the research. Detailed explanations were provided to groups of pregnant women. In a bid to create rapport, clients were encouraged to freely interact with the research assistant and ask questions. Then the selected respondents were requested to sign consent forms to participate in the research. About 90% of all selected pregnant women agreed to be interviewed, implying that 44 women refused to be interviewed. Their decisions were respected and nobody was coerced to agree to be interviewed and no one suffered any untoward consequences as a result of refusing to participate in the study. If any randomly selected pregnant women declined participation in the study, another pregnant woman's name was randomly drawn from the box containing the names of all women attending the ANC clinic on a specific day, maintaining random selection without replacement.

Each interview was conducted by a research assistant who read each item from the interview schedule and recorded every response. At the end of each interview, respondents were given a pamphlet with more information about malaria during pregnancy and how they could prevent malaria. They were thanked for participating in the study and were re-assured about the confidentiality and anonymity of information provided during the interviews (as specified in section 1.7 of this thesis). All completed interview schedules were collected by the researcher on a daily basis and as many as possible were checked for completeness. In a case where sections were incomplete, such an interview schedule was discarded and another pregnant woman was randomly selected and requested to participate in the study by being interviewed.

At each participating clinic, the research assistant also conducted interviews with the midwives (see Annexure B2) and collected the relevant data from the specific ANC clinic's register, as recorded in chapter 5 of this thesis.

3.4.8 Data analysis

According to Babbie (2010:467), data analysis is a process of inspecting, cleaning, transforming and modelling data in order to get useful information suggesting conclusions. Data analysis involves three distinguishable phases that include data cleaning, descriptive data analysis/statistics, and inferential data analysis/statistics. Statistics refer to the numeric summary of a given variable in a sample.

3.4.8.1 Data cleaning

Data cleaning is performed by identifying outliers, incomplete data and errors during recording (Polit & Beck 2008:644-645). In this study, the interviewers recorded each pregnant woman's responses on an interview schedule. Data checking was done by the researcher as soon after data collection as possible. Incomplete interview schedules were discarded and other pregnant women were randomly selected (without replacement) and requested to participate in the study by being interviewed. The research assistants were also informed about any problems detected in their completed interview schedules. This was possible because each research assistant had to enter her code on every interview schedule completed by her.

At the end of the data collection day, data were subsequently entered into the computer by a data entry clerk. This was done on a daily basis in order to eliminate data capturing errors that could have resulted from bulky work of data entry due to accumulated records. The researcher checked the entered data, by comparing the information on specific selected interview schedules with the data entered for these records. This was done on a daily basis to control the validity of the data entered into the computer program. This also served as a check for every variable entered into

the computer program. In this way problems with data entry could be addressed on a daily basis and the research assistants were informed about problems encountered with the previous day's recorded information.

3.4.8.2 Descriptive data analysis

Descriptive data analysis is the term given to the analysis of data that helps to describe, show or summarise data in a meaningful way, showing patterns that emerge from the data (Polit & Beck 2008:752). Descriptive statistics describe essential features of data analysis, namely to reduce or summarise, organise and give meaning to collected raw data. Analysis techniques depend primarily on the research design and the level of measurement achieved by the research instrument. For this study, descriptive data analyses were done. Responses to open-ended items were grouped and analysed quantitatively. The three main features that researchers use to describe and summarise data are frequencies, measures of central tendency (mean, median and mode) and measures of dispersion such as the range and standard deviation (Mubazi 2012:47).

Frequency distributions organise data and clarify patterns existing among specific variables (Polit & Beck 2008:563). In this study, the frequencies for the research variables were calculated and displayed using tables, histograms and frequency polygons. Measures of central tendency are the ways of describing central positions of a frequency distribution for a group of data. Only the mode can be used for nominal data, whereas both the mode and median can be used for ordinal data and all three measures can be used at the interval level measurement. Measures of spread/dispersion (such as range, variance and standard deviation) are ways of summarising a group of data indicating how spread-out or dispersed the data distribution is.

3.4.8.2.1 Correlation

Correlation is an empirical relationship between two variables such that changes in one are associated with changes in the other or changes in particular attributes of one variable are associated with particular attributes of another variable (Babbie 2010:3). Correlation in itself does not constitute a causal relationship between two variables, but it is one criterion of causality. Correlation is an association or bond between variables with variation in one variable systemically related to variation in another specific variable (Polit & Beck 2008:750). A correlational coefficient is an index summarising the degree of relationship between variables typically ranging from 1.0 for a perfect positive relationship through 0.0 for no relationship to -1.0 for a perfect negative relationship.

Correlation procedures describe relationships between two variables measured on the ordinal, interval or ratio scale (Polit & Beck 2008:568). For instance, correlation between variables and IPT utilisation was calculated using Pearson's (*r*) coefficient for interval and ratio scales. For ordinal level measures, Spearman's rho (*p*) coefficient was used (Polit & Beck 2008:568-571). The data analysis was done with the guidance of a statistician using SPSS (version 20) and MS Excel 2010 (see Annexure F for the statistician's letter).

3.4.8.3 Inferential data analysis/statistics

Inferential statistics are concerned with making predictions or inferences about a population from observations and analysis of a sample (Babbie 2010:476-477). It implies inferring the results obtained from a sample to the population from which this sample had been randomly selected. This research was a quantitative, descriptive correlational study that was conducted to describe factors that affect pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda (refer to section 3.3). Inferential statistics were calculated for bivariate analysis using Fisher's exact test for categorical variables. Pearson's Chi Square was also used. Detailed

analyses of variables related to pregnant women are presented in section 4.3.1 of this thesis.

3.5 VALIDITY OF THE STUDY

“Internal validity is the degree to which it is possible to make an inference that the independent variable is truly causing or influencing the dependent variable and that the relationship between the two is not the spurious effect of a confounding variable” (Polit & Beck 2008:295). This was not an experimental study and therefore, there were no control experiments, rendering the concept of internal validity less significant for this study.

External validity is the degree to which the study results can be generalised to settings or samples other than the one studied (Polit & Beck 2008:753). This concept looks at the possibility of generalisation of study findings to a larger population than the sample that participated in the actual study. In this research, external validity was enhanced by using a calculated sample size of 400 pregnant women. External validity was also enhanced by the use of random sampling (refer to section 3.4.1.2.3). This meant that all pregnant women of the Buikwe district at the time of data collection had a known chance of participating in the research. With those strategies, it was assumed that conclusions of the study applied to the population of pregnant women in the Buikwe district.

3.6 ETHICAL CONSIDERATIONS

Ethics in research refer to a system of moral values concerned with the degree to which research procedures adhere to professional, legal and social obligations of the researchers to the study participants (Polit & Beck 2008:753). In reality, ethics attempt to distinguish between what is right and what is wrong. In research, ethical principles apply to each stage of the research process, including the research topic, research design and publication of the findings. During this study, ethical

considerations were applied as approved by the research supervisor and the Higher Degrees Committee of the Department of Health Studies, University of South Africa (see Annexure C for the ethical clearance certificate). Permission to conduct the study was obtained from various levels of authority where the study was conducted. This included permission from the MOH (see Annexure D1). Further permission from the Buikwe district health office (see Annexure D2) and final authorisation from each person in charge of the 16 health facilities where data collection took place (see Annexure D3).

3.6.1 Protecting the human rights of the respondents

The protection of the rights of respondents involves the right to self-determination, privacy, confidentiality, anonymity, fair treatment and protection from harm. In this study, the principles of the right to self-determination, privacy, confidentiality, anonymity, fair treatment and protection from harm were taken into consideration in order to protect respondents (as discussed in sections 3.6.1.1- 3.6.1.3 of this thesis).

3.6.1.1 The right to self-determination

The right to self-determination means that humans are autonomous and thus have a right to make their own independent choices without external control and without risking any penalty (Polit & Beck 2008:171-172). In this study, the right to self-determination was ensured by obtaining informed consent from each respondent before commencing any interview. The research assistants provided explanations about the study and answered the respondents' questions. The respondents were informed about their right to participate voluntarily, refuse to answer any specific question and refuse to be interviewed, refuse to answer any specific question, or withdraw from the study at any stage during the interview. They were assured that non-participation would not influence their treatment from the health facility in any way whatsoever. Consent forms were read to them in Luganda or English, depending on their language of preference.

After receiving the relevant information, each respondent was asked to sign a consent form without any coercion whatsoever (see Annexure A). The structured interview schedule for pregnant women was available in both English and Luganda (see Annexure B1). This helped to ensure that every interviewee was asked the same questions by using the same words, and in the same sequence. That prevented possible discrepancies in 'on-the-spot' translations by the interviewers. Experts approved the English-Luganda-English translations as portraying the same meaning for specific items in both languages (see Annexures E1 and E2).

The structured interview schedule for midwives (see Annexure B2) was only available in English but all midwives completed their midwifery training in English and were thus conversant in English.

3.6.1.2 Right to privacy

The right to privacy entails the freedom of an individual to determine the extent, the time and general circumstances under which private information can be shared with or withheld from others. Anonymity and confidentiality are ingredients of privacy (Babbie 2010:71).

Anonymity is the protection of participants' confidentiality such that even the researcher cannot link any individual with information provided on a specific interview schedule (Polit & Beck 2008:747). Anonymity was ensured by not recording any respondent's name on the interview schedule. The consent forms (see Annexure A), which respondents signed, were kept in a separate container from the completed interview schedules. This meant that the responses in the interview schedule could not be linked to any specific respondent's completed consent form.

Confidentiality is the protection of study participants so that information provided for research purposes is never publicly divulged (Polit & Beck 2008:750). In this study,

confidentiality was ensured by conducting the interviews at ANC clinics in private rooms. No third party participated in the discussion between the interviewer and interviewee. The information provided during interviews was not shared with any other person. The four research assistants also signed confidentiality agreements with the researcher (refer to Annexure I).

3.6.1.3 Right to protection from harm

This right is based on the ethical principle of beneficence. This imposes a responsibility on researchers to minimise harm and maximise benefits (Polit & Beck 2008:170). This means that the risk/benefit ratio should be acceptable implying that the degree of risk to be taken by those participating in the study should never exceed the potential humanitarian benefits of the knowledge to be gained (Polit & Beck 2008:174). Since this study did not involve physical tests, there was no possibility of physical harm to respondents. There might have been a possibility of some emotional or social discomfort such as feeling embarrassed during the data collection process when responding to confidential or personal questions. Some respondents might have experienced emotional discomfort if someone in their families had died from malaria, especially if a baby had died from malaria.

As all research assistants were trained midwives, who had undergone a week's training about interviewing pregnant women, such situations could be handled. As the interviews took place in private rooms at ANC clinics, research assistants could obtain help from the available health workers in the clinic, if such help would be required by the interviewed women. The researcher, a medical doctor, was always available at the ANC clinics during the data collection phase or by cellular phone. He was thus available to assist any respondent who required help, but this was never necessary. The midwives were also interviewed in private rooms and assured about the anonymity and confidentiality of their information.

The benefits from the study should outweigh the risks because respondents and their communities could benefit from the study's findings. This research might stimulate other studies that could eventually improve the control of malaria during pregnancy. The fact that malaria-related information on cause, prevention and care was given to every respondent at the end of each interview, might have enhanced the knowledge of pregnant women about malaria (see Annexure G). Shortcomings in the midwives' malaria-related knowledge and expertise could be identified and addressed during in-service education. This could enhance the quality of malaria prevention and control services provided to pregnant women in the Buikwe district.

3.6.2 The rights of the institutions

Academic institutions have committees to review ethical aspects of research (Polit & Beck 2008:191). After reviewing the proposal, including the research instrument and the research methodology, the Ethics and Research Committee of the Department of Health Studies, University of South Africa (Unisa), granted permission to conduct the study (see Annexure C). This permission was subject to obtaining the required permission from the healthcare authorities where the data collection would take place. Initial permission was obtained from the MOH of Uganda (see Annexure D1). Then, further permission was obtained from the Buikwe District's Health Office which is responsible for all health-related issues in the district (see Annexure D2). Additional written authorisation was granted by persons in charge of the 16 health facilities where data collection took place (see Annexure D3). The written authorisation from the District Health Officer, was used as an introduction letter to persons in charge of health facilities. Permission was also requested from and granted by each person in charge of a specific ANC clinic where interviews were conducted. The interviews were conducted at times recommended by the manager of each ANC clinic.

All the conditions set by the institutions and communities were adhered to and respected. Such conditions included Unisa's requirement that a student had to

conduct original research and acknowledge all sources consulted without committing plagiarism. Care was taken to adhere to this requirement. The primary requirement of the MOH was the evidence of clearance from the research and ethics committee of the university concerned. The MOH also wanted to receive a copy of the final report of the research. In addition to evidence of clearance from the university's research and ethics committee, the district authorities wanted to get a summarised copy of the study's findings. Most health facilities emphasised that the interviews should not disrupt the routine work in ANC clinics and they wanted to receive a summarised copy of the results and recommendations of the study.

At an appropriate time, copies of the summarised report of findings and recommendations would be distributed to the persons in charge of health facilities and the District Health Office after approval of the thesis. A copy of the thesis will be made available to the MOH of Uganda.

3.6.3 Scientific integrity of the study

Ethical conduct in research involves efforts to maintain high standards of integrity and avoid any form of research misconduct like plagiarism, fabrication of results or falsification of data (Polit & Beck 2008:191). All translations were done by a professional bilingual expert. The integrity of the study was ensured by producing original data and authentic results. Proper analysis of the data was done with the support of an experienced statistician. All consulted sources were acknowledged in the text of this thesis and reflected in the list of references of this thesis. The researcher ensured that contributions of the research supervisor, the statistician, the language editor and all who contributed to this study were acknowledged. All these efforts helped to ensure that the principle of scientific integrity of this study was upheld.

3.7 SUMMARY

This chapter covered the research design and methods followed during this study. The chapter then discussed the sample and sampling process. It also described the data collection tools as based on the research objectives and the Social Learning Theory. The chapter detailed the data collection process, data management and how data were analysed. The chapter also described how ethical issues were managed during the research process. The next chapter presents the analysis and discussion phase 1 of the study's findings, portraying the information obtained from structured interviews conducted with 400 pregnant women in the Buikwe district.

CHAPTER 4

ANALYSIS AND DESCRIPTION OF RESEARCH FINDINGS (PHASE I)

4.1 INTRODUCTION

The previous chapter discussed the research methodology of this study. This chapter deals with data analysis and presents the findings of phase 1 of the study. The chapter presents data that were collected by conducting structured interviews with 400 pregnant women at 16 health facilities in the Buikwe district (as discussed in section 3.4.2. of this thesis).

The data were analysed with the assistance of a statistician using the SPSS (version 20) program and Excel 2010 to produce charts and graphs (see Annexure F – the statistician's letter).

4.2 RESEARCH OBJECTIVES

The purpose of the study was to identify factors influencing pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda. The specific objectives of phase 1 of the study were to identify:

- social-demographic characteristics like age, parity, education level, employment status and income levels that might influence pregnant women's utilisation of anti-malaria services
- environmental factors like geographic access to health facilities, availability of quality health services, traditional healers' and peers' potential influence on pregnant women's utilisation of anti-malaria services
- personal cognitive characteristics of pregnant women like knowledge about malaria during pregnancy and sources of malaria-related information that might influence their utilisation of anti-malaria services

- behaviour/health practices of pregnant women like IPT utilisation, utilisation of LLINs, use of anti-malaria drugs and other malaria control measures related to the utilisation of anti-malaria services

4.3 RESEARCH RESULTS

In this chapter, findings based on the analysis of the data obtained during the structured interviews conducted with 400 pregnant women, will be discussed according to the sections of the interview schedule (see Annexure B1). Where applicable, bivariate correlations were calculated for variables using Pearson's correlation coefficients and the corresponding probability values (p-values). The closer the correlation coefficient value is to +1 or -1, the stronger the positive or negative association respectively between variables. According to Burns and Grove (2005:137), 0.1-0.3 means a weak relationship, greater than 0.3-0.5 means a moderate relationship and greater than 0.5 implies a strong relationship. Where applicable, Pearson's correlation coefficient was calculated for all variables with IPT use by pregnant women. Furthermore, Pearson's Chi-square test (X^2) or Fisher's exact test was performed to statistically study the association of categorical variables with IPT use by pregnant women. The level of significance was set at .05.

4.3.1 Findings related to objective 1 of phase 1 of the study: social-demographic variables that might influence pregnant women's utilisation of anti-malaria services

The first objective of the study was to identify social-demographic characteristics like age, parity, education level, employment status and income levels that might influence pregnant women's utilisation of anti-malaria services. This study was based on the concept of reciprocal determination of Bandura's social cognitive theory (please see section 1.9.2 of this thesis). In relation to that theoretical framework, objective 1's findings are related to personal factors that influence health seeking behaviours of pregnant women, as reported in response to questions in section A of the data collection tool.

4.3.1.1 Respondents' ages

The respondents' ages ranged from 21 to 45 years and were categorised into five age intervals. Out of 400 respondents, 56.0% (*f*=224) were in the age group of 21 to 25 years, 35.8% (*f*=143) were 26 to 30 years old and 8.3% (*f*=33) were older than 30 years as shown in figure 4.1. The mean age of the interviewed pregnant women was 25.5 years, the median age was 24.0 years and the mode was 22.0 years (see table 4.1). The standard deviation was 3.93 and the range was 22.0 years. In a similar study conducted in Uganda involving 1 069 pregnant women, their median age was 24 years (De Beaudrap et al 2013:[9-10]), corresponding to the median age group of the current study's respondents.

Pearson's correlation coefficient was -0.019 and the p-value was 0.480. This meant that there was no correlation between the age of pregnant women and their utilisation of IPT. Pearson's Chi-square test (X^2) was 0.955 meaning that there was no association between the age of pregnant women and their IPT utilisation.

Table 4.1: Respondents' ages (N=400)

Number	Range	Minimum	Maximum	Mean	Mode	Std. Deviation
400	22.00	20.00	42.00	25.55	22	3.93

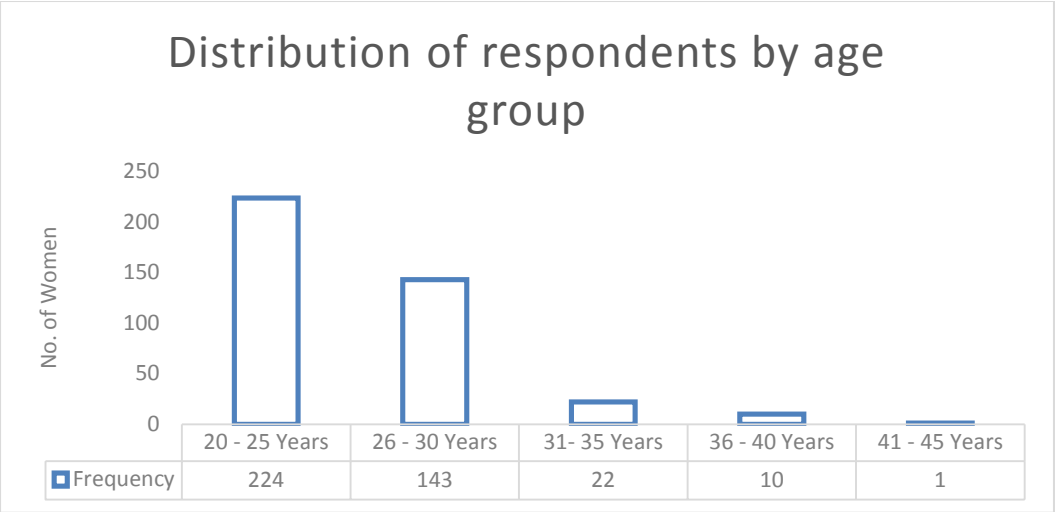


Figure 4.1: Age groups of respondents (N=400)

4.3.1.2 Marital status

Out of 400 respondents, 72.3% (*f*=289) were married and 11.3% (*f* =45) were cohabiting with their partners implying that 83.5% (f=334) of all respondents were in some kind of relationship. However, 0.8% (*f*=3) were widowed, 3.3% (*f*=13) were separated, 1.8% (*f*=7) were divorced and 10.8% (*f* =43) had never been married (see figure 4.2). This implies that, at the time of data collection, 16.5% (*f*=66) respondents were not in long term relationships with their spouses. A similar study, conducted in Nigeria, reported that the percentage of married pregnant women was 82.0% (n=150) (Diala et al 2013:[5]). The finding is comparable to the current study's finding that most pregnant women were married. Pearson's correlation coefficient was -0.003 and the p-value was p>0.05. Therefore, there was no correlation between marital status of respondents and their IPT utilisation.

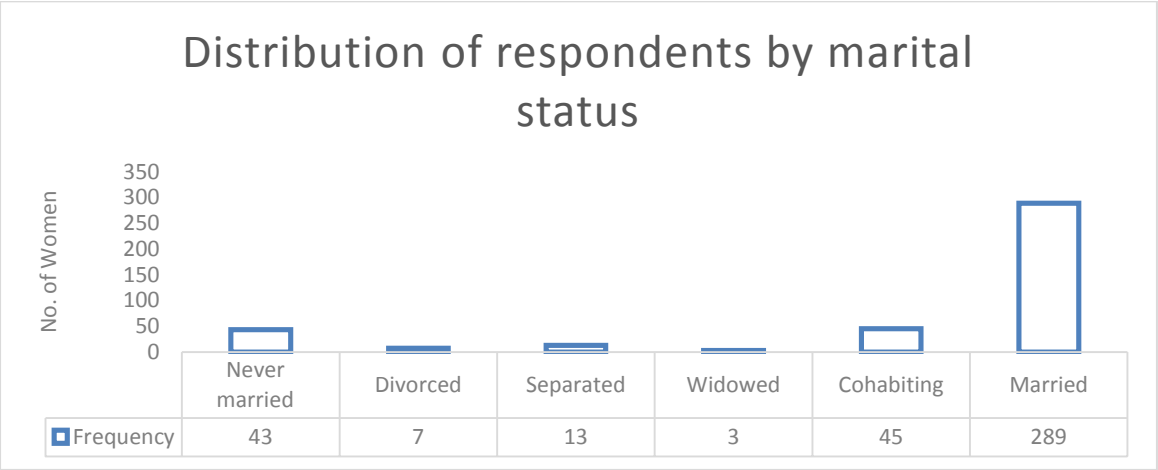


Figure 4.2: Marital status of respondents (N=400)

4.3.1.3 *Respondents' levels of education*

Figure 4.3 indicates that the respondents' education levels ranged from no education to university level education. Out of 400 respondents, 48.8% (*f*=195) had primary school education and 5.5% (*f*=22) had never attended school. This means that 54.3% (f=217) of all respondents had no or primary level education. Furthermore, 37.8% (*f*=151) had secondary while 8.0% (*f*=32) had post-secondary level education.

Another Ugandan study reported that 63.4% (n=453) of the respondents had no or only primary level education (De Beaudrap et al 2013:[10]). This implies that pregnant women in Uganda with low levels of education (either primary or no schooling) might find it difficult to understand the rationale for using IPT during their pregnancies. Diala et al (2013:[1]) reported that women might find it difficult to use medicines (such as IPT drugs) when they are not ill. Women with limited education might find it even more difficult to comprehend the benefits of IPT than educated women. In the current study, there was a positive correlation between education level and IPT use (Fisher's exact test =0.32). This implies that, educated pregnant women with secondary school or post-secondary school education were more likely to utilise IPT drugs than the less educated ones (with no schooling or only primary level schooling).

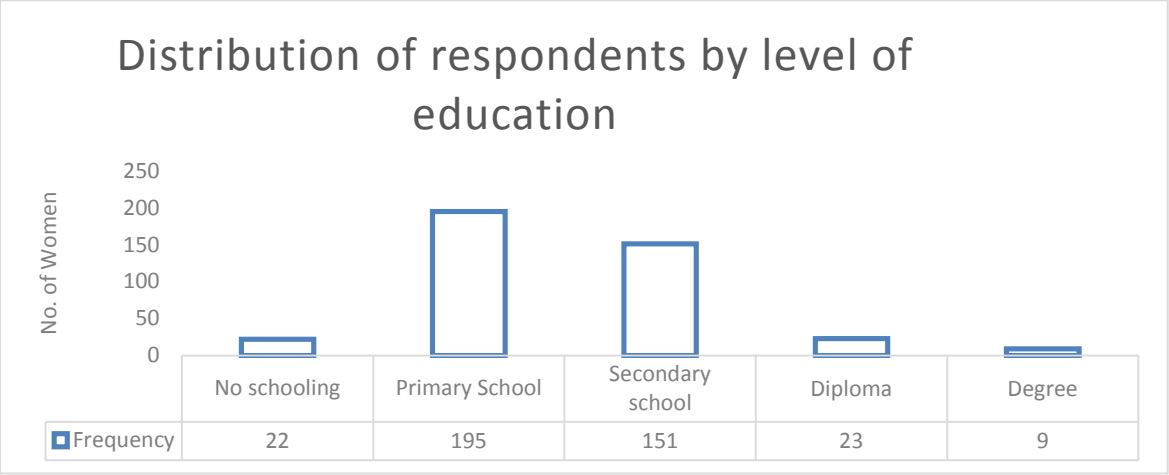


Figure 4.3: Respondent's levels of education (N=400)

4.3.1.4 *Respondents' employment status*

Out of 400 respondents, 53.8% (*f*=215) were housewives with no gainful source of income. However, 27.5% (*f*=110) of the respondents were employed in the government sector, by non-governmental organisations (NGOs) or self-employed. Furthermore, 3.5% (*f*=14) of the respondents were students and 15.3% (*f*=61) were unemployed. There was no association between employment status and IPT use

(Fisher's exact test >0.05). This implies that employment status of pregnant women was not a significant factor influencing their IPT utilisation.

The MOH (2010a:2-4) also confirmed that there was a high unemployment rate (of 9.8% during 2009) in Uganda, similar to the current study's findings. High unemployment rates might imply that women depended on their husbands/partners for their own and for their children's survival, and also for money to pay for transport to reach the health care facilities.

4.3.1.5 *Respondents' average monthly incomes*

Out of the 400 respondents, 80.8% (*f*=323) had average monthly incomes of less than Shs 200 000 (R1 = Shs 300; USD1 = Shs 3 450 during July 2014). Only 13.8% (*f*=55) of the respondents had monthly incomes of Shs 400 000 or more including 9.8% (*f*=39) of the respondents who had an average monthly income exceeding Shs 600 000. This is in agreement with the fact that most Ugandans are poor with a daily income of less than 1USD (R11.50) per day (MOH 2010a:2-3). In this study, there was no association between respondents' monthly incomes and IPT utilisation (Pearson 2-sided Chi-square=0.153). This implies that pregnant women's IPT utilisation was not related to their monthly incomes.

Table 4.2: **Respondents' average monthly incomes compared to the number of fever episodes during their current pregnancies (N=400)**

Average monthly income in Shillings	Number of fever episodes						Total
	None	One	Two	Three	Four	Five	
0 -199,999	140 (43.3%)	106 (32.8%)	48 (14.9%)	21 (6.5%)	6 (1.9%)	2 (0.6%)	323
200,000 -399,999	9 (40.9%)	7 (31.8%)	4 (18.2%)	2 (9.1%)	0 (0%)	0 (0%)	22
400,000 – 599,999	5 (31.5%)	5 (31.5%0	6 (37.5%)	0 (0%)	0 (0%)	0 (0%)	16
600,000 +	15 (38.5%)	8 (20.5%)	14 (35.9%)	1 (2.6%)	1 (2.6%)	0 (0%)	39
Total	169 (42.3%)	126 (31.5%)	72 (18.0%)	24 (6.0%)	7 (1.8%)	2 (0.5%)	400

Pearson's Chi-square test (17.978; p = 0.264) indicated that no significant correlation existed between the income groups and the number of fever episodes from which the pregnant women had reportedly suffered during their current pregnancies.

4.3.1.6 *Respondents' pregnancy trimesters*

During the data collection period (April 2014), out of the 400 pregnant women, 8.3% (*f*= 33) were in the first, 48.8% (*f*=195) in the second and 43.0% (*f*=172) in the third trimesters of their pregnancies (see table 4.3). This means that fewer pregnant women in the Buikwe district attended ANC clinics during the first trimester than during the second and third trimesters during the data collection phase of the current study. Pearson's correlation coefficient between the respondents' pregnancy trimesters and their taking of IPT drugs was -0.01 (p>0.05). Thus there was no correlation between the pregnant women's trimesters of pregnancy and their utilisation of IPT drugs.

Table 4.3: Respondents' reported pregnancy stages and number of fever episodes during their current pregnancies (N=400)

Months of pregnancy	Number of fever episodes during respondents' current pregnancy						Total
	None	One	Two	Three	Four	Five	
Two	4 (44.4%)	2	3	0	0	0	9
Three	12 (50.0%)	7	3	2	0	0	24
Four	39 (60.0%)	17	5	4	0	0	65
Five	34 (56.7%)	16	10	0	0	0	60
Six	27 (38.6%)	19	17	4	2	1	70
Seven	26 (35.1%)	28	14	3	2	1	74
Eight	18 (30.0%)	21	14	5	2	0	60
Nine	9 (23.7%)	16	6	6	1	0	38
Total	169 42.3%	126 31.5%	72 18.0%	24 6.0%	7 1.8%	2 0.5%	400 100%

Out of the 400 interviewed pregnant women, 57.8% (f=231) had suffered at least one attack of fever during their current pregnancies.

4.3.1.7 Respondents' number of pregnancies

Out of 400 respondents, 32.0% (*f*=128) were pregnant for the first time, 22.0% (*f*=88) for the second time, 17.0% (*f*=68) for the third time, 11.3% (*f*=45) for the fourth time and 17.8% (*f*=71) for the fifth time (or more), including the current pregnancies (see table 4.4). Pearson's correlation coefficient was 0.023 with a significance level of p>0.05. This implies that there was no correlation between the number of pregnancies of respondents and their IPT utilisation, as shown in table 4.4.

Table 4.4: Respondents' number of pregnancies (N=400)

Number of pregnancies (including their current pregnancies)	**Frequency**	**%**
First	128	32.0
Second	88	22.0
Three	68	17.0
Four	45	11.3
Five	40	10.0
Six	15	3.8
Seven	6	1.5
Eight	7	1.8
Nine	2	0.5
Ten	1	0.3
Total	**400**	**100.2**

4.3.1.8 *Number of fever episodes during respondents' current pregnancies*

Out of 400 respondents, 42.3% (*f*=169) had no episode of fever, 31.5% (*f*=126) had one episode, 18.0% (*f*=23) had two episodes and 8.3% (*f*=33) respondents had three or more episodes of fever during their current pregnancies (see table 4.3). This meant that out of 400 respondents, 57.8% (f=231) had at least one fever attack during their current pregnancies. However, the number of fever attacks was not correlated with the woman's stage of pregnancy. It is possible that women might have had more fever attacks by the time they had reached their third trimesters of

pregnancy compared to women in their first or second trimesters. Another study, done in Uganda, reported that on average 65.0% of those women suffered from fever attacks during pregnancies (Jagannathan et al 2012:[8]), slightly higher than the incidence of fever attacks in the current study of 57.8% (*f*=231). These studies' findings indicate a high prevalence of fever attacks during pregnancy in Uganda. (Although fever attacks do not necessarily imply malaria attacks, in the malaria-endemic areas, fever attacks are assumed to be malaria attacks until proven otherwise). The findings of both studies emphasise the dire necessity of taking IPT and implementing other malaria prevention measures during pregnancy in Uganda. Malaria during pregnancy implies health risks for the pregnant woman (abortion and severe anaemia) and there is a small risk of congenital malaria for the foetus. However, the risk of congenital malaria is greater if repeated malaria attacks occurred during pregnancy and if the malaria infection occurred within two weeks prior to the baby's birth (De Beaudrap et al 2013:[1]).

However, there was a weak negative correlation between episodes of fever during the respondents' current pregnancies and their utilisation of IPT drugs. Pearson's correlation coefficient was -0.210 (p= 0.018). This finding from the current study indicates that pregnant women who experienced fever episodes during their current pregnancies were less likely to have taken IPT drugs, emphasising the necessity of IPT utilisation during pregnancy to prevent malaria attacks.

4.3.1.9 Number of children who had malaria attacks during the 12 months preceding the interviews

Out of the 400 respondents, 45.0% (*f*=180) reported that no child had a malaria attack during the 12 months preceding the interviews, 27.3% (*f*=109) had one child, 16.5% (*f*=66) had two children and 11.3% (*f*=45) had three to eight children who had had malaria attacks during the previous 12 months (see table 4.5).

The findings in table 4.5 indicate that out of 400 respondents, 55.0% (f=220) reported that one or more of their children had attacks of fever during the previous 12 months. This is consistent with the high incidence of malaria in Uganda as reported by Jagannathan et al (2012:[8]) (see section 4.3.1.8 of this thesis).

However, there was no correlation between respondents' number of children, who had had fever attacks during the 12 months preceding the interviews, and the pregnant women's taking of IPT drugs as Pearson's correlation coefficient was -0.011 ($p>0.05$).

Table 4.5: Children who had malaria attacks during the 12 months preceding the interviews (N=400)

Number of children with malaria attacks in a family	Frequency	%
No child with malaria attack	180	45.0
One child	109	27.3
Two children	66	16.5
Three children	31	7.8
Four children	8	2.0
Five children	2	0.5
Six children	1	0.3
Seven children	1	0.3
Eight children	2	0.5
Total	**400**	**100.2**

4.3.1.10 Respondents' family members who had died from malaria during the 12 months preceding the interviews

Out of 400 respondents, 96.0% (*f*=384) reported no malaria-related family death during the 12 months preceding the interviews. However, 3.0% (*f*=12) had lost one, 0.8% (*f*=3) had lost two and 0.3% (*f*=1) had lost three family members due to malaria (see table 4.6).

These findings from the current study indicate a low mortality rate due to malaria similar to findings of another Ugandan study reporting one malaria-related death out of 100 children who received proper malaria treatment over a period of 48 months (Jagannathan et al 2012:[9]). This means that, with timely proper treatment, mortality outcomes due to malaria can be minimised.

Table 4.6: Number of family members who had died from malaria during the 12 months preceding the interviews (N=400)

Number of family members who had died of malaria	Frequency	%
None	384	96.0
One	12	3.0
Two	3	0.8
Three	1	0.3
Total	**400**	**100.1**

In the current study, Pearson's correlation coefficient between respondents' numbers of family members who had died of malaria during the past one year and their IPT utilisation was 0.016 ($p>0.05$). This meant that IPT utilisation among pregnant women was not related to the death of family members due to malaria during the 12 months preceding the interviews.

4.3.1.11 Pregnant women's utilisation of long lasting insecticidal treated nets (LLINs) correlated with social demographic factors

With regard to the utilisation of LLINs, out of 400 respondents, 91.3% (f=365) reportedly slept under these nets and 8.8% (f=35) did not sleep under mosquito bed nets. Most social-demographic characteristics had no significant statistical relationship with LLIN utilisation.

Concerning the education levels of pregnant women, out of 365 respondents who had slept under mosquito nets, 52.3% (f=191) had primary or no education while

47.7% (f=174) had acquired some post primary level of education. Furthermore, out of 35 respondents who had not slept under mosquito nets, 71.4% (f=26) had no or primary level of education while 25.7% (f=9) were of post-primary level of education (see table 4.8).

In this study, there was a weak positive relationship between education levels of respondents and the use of LLINs as Pearson's correlation coefficient was 0.250 ($p<0.05$). This implies that, educated pregnant women (with secondary school or further education after completing secondary schooling) were more likely to utilise LLINs than the less educated ones (with no schooling or only primary schooling).

With regard to previous malaria attacks during their current pregnancies, out of 365 respondents who had slept under mosquito nets, 55.9% (f=204) had previous malaria attacks during their current pregnancies while 44.1% (f=161) had no such malaria attacks during their current pregnancies. The study's findings indicated a negative relationship between previous malaria attacks during their pregnancies and the utilisation of LLINs. Pearson's correlation coefficient of -0.327 ($p<0.05$) between respondents' previous malaria attacks during their current pregnancies and their utilisation of LLINs, indicates that pregnant women who experienced fever episodes during their current pregnancies were less likely to have used LLINs than those who did not have such fever episodes during their current pregnancies. This finding emphasises the necessity of using LLINs during pregnancy to decrease the pregnant woman's risk of getting malaria. The importance of using LLINs during pregnancy cannot be overemphasised because such effective use reduces not only the incidence of malaria but also the incidence of "maternal anaemia, stillbirths and intra-uterine growth restriction" (Singh, Brown & Rogerson, 2013:[1]).

4.3.2 Discussion of findings related to social demographic issues and the utilisation of intermittent preventive treatment (IPT) services

Under the first objective based on the theoretical framework of this research, social demographic characteristics of respondents, were considered. These characteristics were presented in relation to their association with IPT.

4.3.2.1 Key findings pertaining to intermittent preventive treatment (IPT) utilisation and respondents' social demographic factors

There was no significant relationship between social-demographic variables of pregnant women and IPT utilisation. The p-values of pregnant women's ages (0.480)

and their income levels (0.208) related to IPT utilisation, were not significant and therefore had no correlation with IPT utilisation (see table 4.7).

In this study, there was no association between respondents' monthly incomes and IPT utilisation (Pearson 2-sided Chi-square=0.153). This indicates that there was no significant difference between the income groups in terms of fever episodes. However, out of 400 respondents, 295 (73.8%) had one or more fever episodes, irrespective of the average income range. Table 4:11 shows that malaria affected all social classes of society, including the poor and financially better off pregnant women.

In the current study, there was a positive association between education level and the taking of IPT drugs (Fisher's exact test =0.32). This implies that pregnant women, with secondary school or post-secondary school education, were more likely to utilise IPT drugs than the less educated ones (with no schooling or primary schooling).

Table 4.7: The correlation of respondents' intermittent preventive treatment (IPT) utilisation with social demographic variables (N=400)

		Independent variable: IPT utilisation - probability of pregnant women using IPT		
Dependent variable of pregnant women		Did not use IPT 13(3.3%)	Used IPT 387 (96.7%)	p-value
Age	< 25 Years	8(31.5%)	193(49.9%)	0.480
	> 24 Years	5 (30.8%)	194 (45.5%)	
Education Level	Primary /none	4 (45.5%)	179 (45.9%)	0.028
	Above Primary	9 (69.2%)	209 (54.1%	
Previous malaria	No	8 (61.5%)	167(43.1%)	0.018

attack during pregnancy	Yes	5 (38.5%)	220 (56.9%)	

Furthermore, there was a weak negative correlation between episodes of fever during the respondents' current pregnancies and their utilisation of IPT drugs. Pearson's correlation coefficient was -0.210 (p= 0.018). This finding indicates that pregnant women who experienced fever episodes during their pregnancies were less likely to have taken IPT drugs than those who did not experience such fever episodes. This emphasises the necessity of IPT utilisation during pregnancy to reduce the pregnant women's risk of getting malaria.

4.3.2.2 Correlations between respondents' utilisation of long lasting insecticide treated nets (LLINs) and their social demographic factors

In the current study, there was a weak positive relationship between education levels of respondents and the use of LLINs. This implies that, educated pregnant women (with secondary school or post school education) were more likely to utilise LLINs than the less educated ones (with no schooling or primary schooling). Pearson's correlation coefficient between education levels of respondents and their LLINs utilisation was 0.250 ($p<0.05$).

Table 4.8: Sleeping under mosquito nets correlated with social demographic factors (N=400)

		Independent variable: sleeping under mosquito nets		
Dependent variable		Did not sleep under LLNs 35 (8.8%)	Slept under LLINs 365 (91.3%)	p-value
Pregnant women's ages	< 25 Years	25(71.4%)	199(54.5%)	0.313
	> 24 Years	10 (28.6%)	166 (45.5%)	
Education Levels	Primary /none	26 (74.3%)	191 (52.3%)	0.038
	Above Primary	9 (25.7%)	174 (47.7%)	

Furthermore, the current study's findings indicated a negative relationship between previous malaria attacks during pregnancy and the utilisation of LLINs. Pearson's correlation coefficient between respondents' previous malaria attacks and their utilisation of LLINs was -0.327 ($p<0.05$). This finding indicates that pregnant women who experienced fever episodes during their pregnancies were less likely to have used LLINs (see table 4:9) than their counterparts who did not experience such fever attacks.

Table 4.9: Long lasting insecticide treated nets' (LLINs') use correlated with previous malaria attacks during the respondents' current pregnancies (N=400)

		Independent variable: sleeping under mosquito nets		
Dependent variable		Did not sleep under mosquito nets 35 (8.8%)	Slept under mosquito nets 365 (91.3%)	p-value
Previous malaria attacks during current pregnancy	No	8 (22.9%)	161(44.1%)	0.049
	Yes	27 (77.1%)	204 (55.9%)	

4.3.3 Findings related to objective 2 of phase 1 of the study: environmental factors' influence on pregnant women's utilisation of intermittent preventive treatment (IPT) services

The second objective of the study was to identify environmental factors like geographic access to health facilities, the availability of quality health services, traditional healers' and peers' potential influence on pregnant women's utilisation of anti-malaria services. This research was based on the concept of reciprocal determination of Bandura's Social Cognitive Theory (see section 1.9.2 of this thesis). In relation to that theoretical framework, objective 2's findings are correlated with environmental factors that could influence the health seeking behaviours of pregnant women.

4.3.3.1 *Distances from the nearest health facilities*

As demonstrated in figure 4.3, out of 400 respondents, 69.3% (*f*=277) lived within a walkable distance of less than five kilometres from a health facility. However, 30.8% (*f*=123) of the respondents lived five or more kilometres from health facilities. This implies that 69.3% (*f*=277) of the respondents lived within accessible distances (up to five kilometres) from health care services. Furthermore, 10.5% (f=42) respondents stayed 10 kilometres away, including those (3.3%; f=13) who stayed more than 15 kilometres away from health facilities (refer to table 4.13).

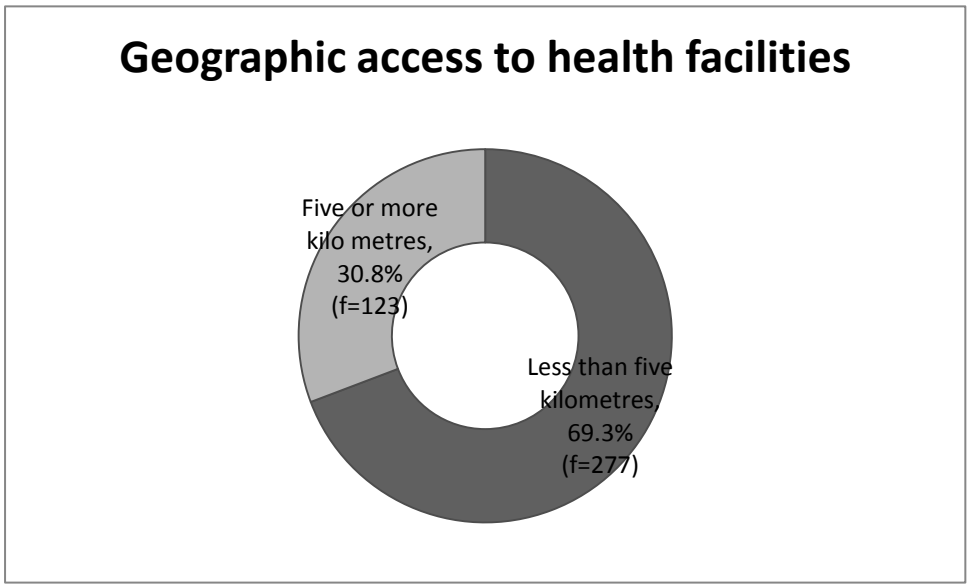


Figure 4.4: Respondents' geographic access to health facilities (N=400)

The current study's findings are indeed similar to those of another Ugandan study which reported that 69.7% of that study's respondents resided within walkable distances of less than five kilometres from health facilities (Mukanga et al 2012:[10]). This implies that a significant portion of pregnant women in Uganda had geographically accessible health services, including 69.3% (n=277) of the current study's respondents.

Table 4.10: Distances respondents lived from the nearest health facilities (N=400)

Distance	Frequency	Percent
Less than 5 kms	277	69.3

5 to 9.9 kms	81	20.3
10 to 14.9 kms	29	7.3
15 to 19.9 kms	8	2.0
20 + kms	5	1.3
Total	**400**	**100.2**

These findings compare favourably with the national findings indicating that 72% of all households in Uganda lived within five kilometres of a public health facility (MOH 2010a:5-7). Pearson's correlation coefficient between respondents' distances from health facilities and their IPT utilisation was -0.450 ($p<0.05$) in the current study. This meant that the nearer the pregnant women lived to a health facility the more likely they were to use IPT drugs.

Concerning the distance from the nearest health facility and the use of LLINs, out of 365 respondents who used LLINs, 74.8% (f=273) lived within five kilometres from a heath facility while 25.2% (f=92) stayed more than five kilometres from such facilities. Out of 35 respondents who did not use LLINs, 11.4% (f=4) stayed within five kilometres while 88.6% (f=31) stayed more than five kilometres from a health facility. There was a negative correlation between LLIN utilisation and distance from health facilities. Pearson's correlation coefficient was -0.420 ($p< 0.05$) which implies that the distances pregnant women had to travel to reach health facilities were related to LLIN utilisation (see table 4.26). Those pregnant women who lived within five kilometres of a healthcare facility were more likely to use LLNs than their counterparts who lived five or more kilometres from such a facility.

4.3.3.2 *Respondents' perceptions about the availability of long lasting insecticide treated nets (LLINs) at the health facilities*

Out of 400 respondents, 83.3% (*f*=333) indicated that mosquito bed nets (LLINs) were always available, 5.8 % (*f*=23) said they were rarely available while 11.0% (*f*=44) indicated that LLINs were never available at health facilities. Pearson's correlation coefficient was 0.132 ($p<0.05$), indicating a weak positive correlation between the perceived availability of mosquito bed nets at the health facility and IPT utilisation among pregnant women. This implies that pregnant women who reported

LLNs to be available at health facilities were more likely to use IPT than their counterparts who did not perceive this to be the case.

Table 4.11: The availability of long lasting insecticide treated nets (LLINs) at health facilities (N=400)

Availability of LLINs	Frequency	%
Always available	333	83.3
Rarely available	23	5.8
Never available	44	11.0
Total	**400**	**100.1**

In relation to LLIN use, out of 365 respondents who used LLINs, 89.0% (f=325) indicated that free LLINs were always available while 2.7% (f=10) indicated that free LLINs were rarely available and 8.2% (f=30) indicated that free LLINs were never available. Pearson's correlation coefficient was 0.450 (p-value= 0.032). That meant that LLINs use was related to the reported availability of free mosquito nets. LLINs are mostly distributed for free in Uganda (UBOS 2011:171-172), in line with international recommendations. "A free bed net distribution strategy is seen as the quickest way to improve coverage of effective malaria control tools especially among poor communities" (Njau, Stephenson, Menon, Kachur, & McFarland 2013:[1]).

4.3.3.3 Cost of long lasting insecticidal treated bed nets (LLINs)

Out of 400 respondents, 99.0% (*f*=396) indicated that mosquito bed nets from health facilities were issued free of charge (see table 4.12). Only 1.0% (*f*=4) indicated that LLINs costed Ushs 6 000 to 7 000 (R1 was equivalent to Ushs 300 during June 2015). According to the UDHS of 2011, all regions of Uganda had mosquito net coverage of 70%-80% that were largely free (UBOS 2011:171-172). There was a correlation between the reported costs of LLINs for the respondents and their taking of IPT drugs (Pearson's correlation coefficient was -0.01; $p<0.05$) as the statistical analysis shows a p-value that is lower than the set value of 0.05.

Table 4.12: Cost of long lasting insecticide treated nets (LLINs) (N=400)

Cost	Frequency	%
Free	396	99.0

Cost of Ushs 6 000	2	0.5
Cost of Ushs 7 000	2	0.5
Total	**400**	**100.0**

4.3.3.4 Perceived availability of anti–malaria drugs at health facilities

Out of the 400 respondents, 72.8% (*f*=291) indicated that anti-malaria drugs were always available (see table 4.13), 26.8% (*f*=107) said these drugs were often available and 0.5% (*f*=2) indicated that anti-malaria drugs were never available. In the current study, there was a positive correlation between the reported availability of anti-malaria drugs at the health facility and IPT utilisation by pregnant women as Pearson's correlation coefficient was 0.619 ($p<0.05$). This meant that IPT utilisation was better among respondents who reported anti-malaria/IPT drugs to be available at health facilities.

Table 4.13: Respondents' perceptions about the availability of anti-malaria drugs at health facilities (N=400)

Category	Frequency	%
Always available	291	72.8
Often available	107	26.8
Never available	2	0.5
Total	**400**	**100.1**

4.3.3.5 Reported unavailability of anti-malaria drugs at health facilities

Out of 400 respondents, 54.0% (*f*=216) indicated that the health facilities never encountered depletion or "stock-outs" of anti-malaria drugs during the past year. Only 6.0% (*f*=24) indicated that anti-malaria drugs were not available at clinics for one week or more during the previous year and 40.0% (*f*=160) of the respondents were unsure about "stock-outs" of anti-malaria drugs at health facilities (see table 4.14).

Table 4.14: Anti-malaria drug "stock-outs" at health facilities (N=400)

Absence of anti-malaria drugs	Frequency	%
No absence of anti-malaria drugs	216	54.0
Absence of drugs once	12	3.0
Absence of drugs twice	5	1.3
Absence of drugs on three occasions	4	1.0
Absence of drugs four times absence	1	0.3
Absence of drugs five times absence	2	0.5
Not sure about the frequency of the absence of drugs	160	40.0
Total	**400**	**100.1**

In this study, Pearson's correlation coefficient was -0.035, indicating no correlation between the perceived "stock-outs" of anti-malaria drugs at health facilities and IPT utilisation among pregnant women. These findings were comparable to findings about the perceived availability of anti-malaria drugs as indicated in section 4.3.3.4 of this thesis, that health facilities usually had supplies of anti-malaria drugs.

This is a commendable achievement for the health facilities in the Buikwe district because global shortages of artemisinin and artemisinin-based combination anti-malaria medicines have been reported since the scale-up of the utilisation of these drugs (Shretta & Yadav 2012[1]). "Stock-outs" of anti-malaria drugs seem to be a common occurrence in SSA countries. Sudoi, Githinji, Nyandigisi, Muturi, Snow and Zurovac (2012:[1]) warned that: "Health facility stock-outs of artemether-lumefantrin (AL), the common first-line therapy for uncomplicated malaria across Africa, adversely affect malaria case management".

4.3.3.6 Perceived effectiveness of anti-malaria drugs provided at health facilities

Figure 4.5 indicates that out of 400 respondents, 80.8% (*f*=323) considered drugs provided by the health facilities to be very effective, 13.5% (*f*=54) indicated that anti-malaria drugs were sometimes effective and 1.5% (*f*=6) said such drugs were often ineffective for treating malaria. However, 0.5% (*f*=2) of the respondents indicated that

these drugs were never effective in treating malaria and 3.8% (f=15) were unsure about these drugs' effectiveness.

There was a positive correlation between pregnant women's perceptions about the effectiveness of anti-malaria drugs provided at health facilities and IPT utilisation. This implied that more women who believed that anti-malaria drugs were effective, used IPT, compared to women who believed these drugs to be ineffective. Pearson's correlation coefficient was 0.736 ($p<0.05$).

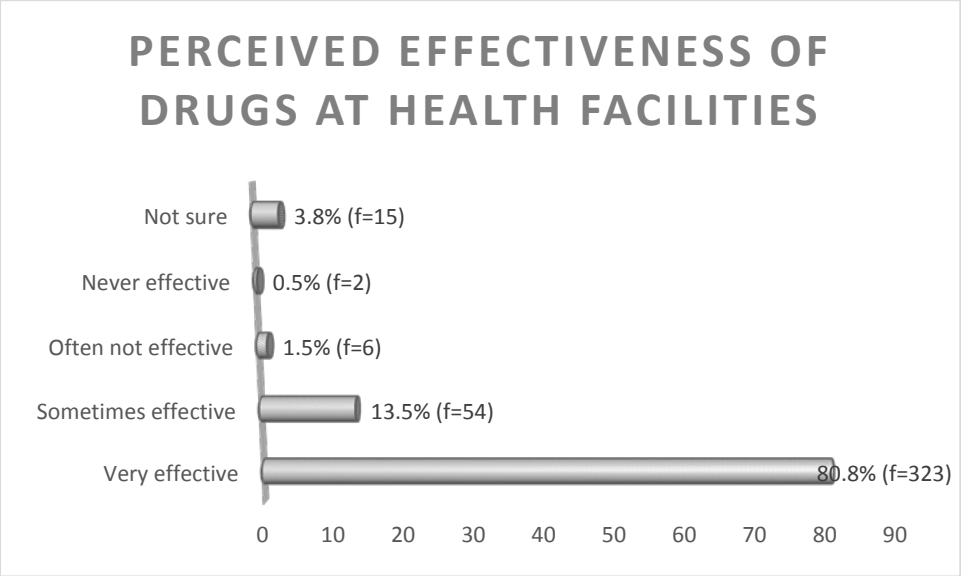


Figure 4.5: Respondent's perceptions about the effectiveness of anti-malaria drugs provided at health facilities (N=400)

4.3.3.7 Cost of anti-malaria drugs supplied at health facilities

Out of the 400 respondents, 98.0% (*f*=392) indicated that they did not pay for anti-malaria drugs supplied at the health facilities (see table 4.15). However, 2.0% (*f*=8) of the respondents indicated that they paid Ushs 3 000 to 12 000 for anti-malaria drugs at the ANC clinics.

Table 4.15: Cost of anti-malaria drugs at health facilities (N=400)

Payment for anti-malaria drugs (Ushs)	Frequency	%
Free	392	98.0
Paid 3 000	4	1.0
Paid 10 000	1	0.3
Paid 12 000	3	0.8
Total	**400**	**100.1**

There was no correlation between the reported cost of anti-malaria drugs at health facilities and pregnant women's IPT utilisation as Pearson's correlation coefficient was -.017 ($p>0.05$). Another study done in Uganda, also reported that anti-malaria drugs were generally provided free of charge at all government health facilities in Uganda (De Beaudrap et al 2013:[7]). This is in agreement with findings of the current study that anti-malaria drugs in Uganda were mostly issued free of charge. The MOH's policy is that all essential drugs (including anti-malaria drugs) should be freely accessible to all Ugandans (MOH 2012a:120-121).

4.3.3.8 Number of times respondents used anti-malaria drugs from public health facilities during the 12 months preceding the interviews

Out of 400 respondents, 35.5% (*f*=142) had not used any anti-malaria medicines from public health facilities during the 12 months preceding the interviews. However, 23.3% (*f*=93) of the respondents had used such medicines once, 26.5% (*f*=106) twice, 13.5% (*f*=54) three times or more often during the previous year (see table 4.16). This meant that, about half of all respondents (49.8%; *f*=199) used anti-malaria drugs once or twice during the preceding year.

Table 4.16: Frequency of anti-malaria drug usage from health facilities (N=400)

Number of times anti-malaria drugs had been used	Frequency	%
Never	142	35.5
Once	93	23.3

Twice	106	26.5
Three times	24	6.0
Four times	18	4.5
Five times	3	0.8
Six times	6	1.5
Seven times	2	0.5
Eight times	1	0.3
Nine times	3	0.8
Eleven times	2	0.5
Total	**400**	**100.2**

In this study, Pearson's correlation coefficient between the number of times respondents had used anti-malaria drugs from health facilities during the preceding one year and IPT utilisation was 0.706 ($p<0.05$). The current study's identified positive correlation between the number of times respondents had used anti-malaria drugs from health facilities and their IPT utilisation, meant that pregnant women who used IPT drugs were more likely to use anti-malaria drugs from health facilities.

Since IPT drugs are malaria preventive drugs, their use possibly resulted in fewer attacks of malaria and therefore a reduced need for anti-malaria drugs from health facilities. Women who used IPT might have been more knowledgeable about the signs and symptoms of malaria and the importance of early treatment, possibly explaining their unexpected more frequent use of these drugs. However, the reason for this finding was not explored during the interviews and could neither be accepted nor rejected on the basis of the available data.

4.3.3.9 Clients' levels of satisfaction with the services provided at the health facilities

Out of 400 respondents, 77.3% (*f*=309) indicated that the services offered at the health facilities were good and 22.8% (*f*=91) indicated that these services were poor.

That meant that more than three quarters of all respondents were satisfied with services provided at health facilities (refer to table 4.17).

Pearson's correlation coefficient between respondents' levels of satisfaction with services provided at the health facilities and their IPT utilisation was 0.603 ($p<0.05$). As such, there was a positive correlation between respondents' levels of satisfaction with services provided at the health facilities and IPT utilisation by pregnant women. This meant that the greater the level of satisfaction of health facility clients, the more likely they were to use IPT drugs.

Table 4.17: Respondents' satisfaction with services provided at the health facilities (N=400)

Rating of health services	Frequency	%
Good services at the health facility	309	77.3
Poor services	91	22.8
Total	**400**	**100.1**

In relation to LLIN use, out of 365 respondents who used LLINs, 80.8% (f=295) indicated that they were satisfied with services offered at ANC clinics while 19.2% (f=70) indicated that services at ANC clinics were poor. On the other hand, out of 35 respondents who did not use LLINs, 40.0% (f=14) indicated that services were good and 60.0% (f=21) indicated that ANC services were poor. Pearson's correlation coefficient between pregnant women who were satisfied with the services offered at the health facilities and the utilisation of LLINs was 0.421 (p-value =0.010). That meant that that pregnant women who were satisfied with the services offered at the health facilities were more likely to utilise LLINs.

4.3.3.10 The availability of traditional birth attendants (TBAs)

Out of 400 respondents, 27.0% (*f*=108) indicated that traditional birth attendants (TBAs) were always available, 13.8% (*f*=55) indicated that they were sometimes

available, 9.5% (*f*=38) indicated that TBAs were never available and 49.8% (*f*=199) had no information about the availability of TBAs within their communities (see table 4.18). Uganda's government policy prevents TBAs from conducting deliveries because they are untrained and therefore unqualified to conduct deliveries (MOH 2010b:2).

In this study, Pearson's correlation coefficient was 0.023 (p>0.05). This implies that there was no correlation between the respondents' reported availability of traditional birth attendants and IPT utilisation. That meant the availability of traditional birth attendants did not affect IPT utilisation among pregnant women.

Table 4.18: Availability of traditional birth attendants (TBAs) in the communities (N=400)

Category	Frequency	%
TBA always available	108	27.0
Sometimes available	55	13.8
Never available	38	9.5
No information	199	49.8
Total	**400**	**100.1**

4.3.3.11 The availability of anti-malaria drugs from village health workers

Out of 400 respondents, 74.0% (*f*=296) indicated that anti-malaria drugs were never available and 8.8% (*f*=35) indicated that anti-malaria drugs were sometimes not available in their communities from community health workers (CHWs) in their villages. However, 8.0% (*f*=32) of the respondents indicated that anti-malaria drugs were always available and 7.3% (*f*=29) indicated that anti-malaria drugs were often available from the community health workers. Furthermore, 2.0% (*f*=8) of the respondents had no information about the availability of anti-malaria drugs from community health workers (see table 4.19). The interviewers explained to the pregnant women that 'always available' implied that these drugs were available every single time they were required whereas 'often available' implied that these drugs were usually available but not every single time when required.

Table 4.19: The availability drugs from community health workers (CHWs) (N=400)

Availability of anti-malaria drugs from community health workers	Frequency	%
Always available	32	8.0
Often available	29	7.3
Sometimes not available	35	8.8
Never available	296	74.0
No information about availability	8	2.0
Total	**400**	**100.1**

In the current study there was no correlation between the availability of drugs from community health workers and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.038 ($p>0.05$). This meant that the availability of anti-malaria drugs from community health workers did not affect IPT utilisation among pregnant women who participated in the current study, probably because all respondents attended ANC clinics where they could obtain anti-malaria drugs.

4.3.3.12 Availability of local herbs to treat malaria

Out of 400 respondent, 39.3% (*f*=157) indicated that local herbs were always available and 22.5% (*f*=90) said these herbs were often available to treat malaria. However, 35.0% (*f*=140) indicated that such herbs were never available and 3.3% (*f*=13) were unsure about the presence of such local herbs (see table 4.20).

Pearson's correlation coefficient was -0.136 ($p<0.05$). This meant that there was a weak negative correlation between the availability of local herbs for treating malaria and IPT utilisation among pregnant women. IPT utilisation was thus less likely among women who reported that local herbs were available for preventing and treating malaria than among women who did not report ready access to and utilisation of such herbs. This finding might indicate that women who had access to local herbs for treating and preventing malaria might have been more likely to use such local herbs rather than IPT.

Table 4.20: Availability of local herbs to treat malaria (N=400)

Availability of local herbs	Frequency	%
Always available	157	39.3
Often available	90	22.5
Never available	140	35.0
Not sure	13	3.3
Total	**400**	100.1

4.3.3.13 Types of herbs used for treating malaria

In order to capture the available information concerning herbs used for treating malaria, this item allowed respondents to indicated one or more herbs they had used to treat malaria.

Table 4.21: Local herbs used for treating malaria (n=238)

Herbs used for malaria treatment	Frequency	%
Use mululuuza (Vermonia amygodaline)	110	46.2
Use bombo (Momodic foetida)	26	10.9
Use aloe vera (kigagi)	25	10.5
Nalongo (Albizia zygia)	6	2.5
Combinations of herbs	71	29.8
Total	**238**	**99.9**

A total of 238 responses were received from 160 women who answered this question. Out of these responses, 46.2% (*f*=110) used leaves of Vermonia amygodaline (mululuuza), 10.5% (*f*=26) used leaves of Momodic foetida (bombo), 10.5% (*f*=25) used extracts from aloe vera (kigagi) and 2.5% (*f*=6) used leaves of Albizia zygia (nalongo) for treating malaria. However, 29.8% (*f*=71) of the respondents indicated that they used a variety of combinations of herbs to treat malaria (see table 4.21).

A qualitative study done in Nigeria, reported that local herbs called ‘akon-a-tekor and yabulikponben’ were used to treat malaria (Diala et al 2013:[6-7]). The same source further stated that, such local herbs had advantages like producing rapid results, being cheaper and more readily available in the community than standard anti-malaria drugs.

On the other hand, Aborah, Akweongo, Adjuik, Atinga, Welaga and Adongo (2013:[1]) warned that the use of non-prescribed drugs to cure malaria, could contribute to the development of drug-resistant parasites and treatment failure and recommended that health education should curb these practices in Uganda.

In the current study the item, addressing the use of herbs for treating malaria, solicited multiple responses from the pregnant women. As such, bivariate Pearson’s correlation coefficient was not calculated.

4.3.3.14 Respondents’ utilisation of local herbs to treat malaria at home

Out of 400 respondents, 35.0% (*f*=140) had used local herbs for preventing and treating malaria and 65.0% (*f*=260) had never done so. This implies that although 160 respondents indicated that local herbs for the treatment of malaria were available in their communities, 140 had actually used them. According to Tutu et al (2011:[4-5]), in their study done in Ghana, out of 306 pregnant women 24.0% (74) had used preparations of local herbs to treat malaria symptoms. This is comparable to the finding of the current study reporting that 35.0% (f=140) of the Ugandan respondents had used local herbs. There was a weak negative correlation between the utilisation of local herbs to treat malaria and IPT utilisation among pregnant women as Pearson’s correlation coefficient was -0.101 ($p<0.05$). This implies that pregnant women who depended on local herbs for the prevention and treatment of malaria were less likely to use IPT drugs.

4.3.3.15 Respondents’ perceptions about the effectiveness of local herbs for treating malaria

Out of 140 respondents, who had used local herbs, 34.3% (*f*=48) indicated that their condition was cured, 59.3% (*f*=83) got temporary relief of their malaria-related symptoms and 6.4% (*f*=9) experienced no improvement after using these local herbs (see table 4.22). According to Diala et al (2013:[7]), local herbs in Nigeria were effective against malaria because they brought about rapid relief of the symptoms.

There was a weak negative correlation between the effectiveness of local herbs used for treating malaria and IPT utilisation among pregnant women as Pearson's correlation coefficient was -0.180 ($p<0.05$). That meant that the more effective the local herbs were perceived to be for treating malaria, the less frequently IPT had been used by the pregnant women who participated in the current study.

Table 4.22: Perceived effectiveness of local herbs for treating malaria (n=140)

Outcome of herbal treatment	**Frequency**	**%**
Condition cured	48	34.3
Symptoms temporally cured	83	59.3
No improvement	9	6.4
Total	**140**	**100.0**

4.3.3.16 Respondents' actions when local herbs were ineffective for treating malaria

Out of 140 respondents who had used local herbs to treat malaria, 62.9% (*f*=88) indicated that in cases where the herbs did not help to improve the condition of the patient with malaria, they went to a health facility/hospital, 15.7% (*f*=22) went to a private clinic, 20.0% (*f*=28) bought drugs from a drug shop and 1.4% (*f*=2) would stay at home and try other types of herbs in case the first type did not work (see table 4.23).

Table 4.23: Respondents' actions in case local herbs failed to cure malaria (n=140)

Actions taken when herbs did not cure malaria	Frequency	%
Go to a health facility/hospital	88	62.9
Go to a private clinic	22	15.7
Buy drugs from a drug shop	28	20.0
Try other herbs at home	2	1.4
Total	**140**	**100.0**

There was a negative correlation between respondents' actions when the local herbs did not successfully treat malaria and IPT utilisation among pregnant women as Pearson's correlation coefficient was -0.197 ($p<0.05$). This meant that there was less IPT utilisation among pregnant women who unsuccessfully used local herbs to treat malaria than amongst women who did so successfully.

4.3.3.17 The influence of 'significant others' on the healthcare seeking behaviours of pregnant women

The 400 respondents indicated that a variety of significant other persons influenced their healthcare seeking practices including their husbands (64.8%; *f*=259), mothers-in-law (2.8%; *f*=11), other relatives and peers (19.8%; *f*=79), and health workers (12.8%; *f*=51) (see table 4.24).

In a qualitative study conducted in Uganda, the findings indicated that husbands had a significant influence on pregnant women's health care decisions (Lam et al 2014:7-8).

However, in the current study, 'significant other persons' had no influence on the health-seeking behaviours of pregnant women and their IPT utilisation. This was so because Pearson's correlation coefficient between the significant other persons who

influenced the health-seeking behaviour of pregnant women and the respondents' IPT utilisation was 0.005 (p>0.05).

Table 4.24: Influence of significant others on pregnant women's health seeking behaviours (N=400)

Significant others	Frequency	%
Husbands	259	64.8
Mothers- in- law	11	2.8
Health workers	51	12.8
Other relatives and peers	79	19.8
Total	**400**	**100.2**

4.3.4 Discussion of findings related to objective 2 of phase 1 of the study: environmental factors' influence on pregnant women's utilisation of long lasting insecticide treated nets (LLINs) and intermittent preventive treatment (IPT) services

Under the second objective, based on the theoretical framework of this study, the researcher considered environmental factors that played a significant part in determining the respondents' health seeking characteristics. These characteristics are presented in relation to their association with IPT and LLIN utilisation.

4.3.4.1 Key findings about the relationship between environmental factors and intermittent preventive treatment (IPT) utilisation

With reference to table 4:29, distance to health facilities had a negative relationship with pregnant women's IPT utilisation as Pearson's correlation coefficient was -0.450 (p=0.014). That meant that pregnant woman who stayed nearer (within five kilometres) from a health facility were more likely to use IPT drugs than those who stayed further away from health facilities. The current study's findings indicate a

generally high IPT utilisation among pregnant women who participated in the study. Out of 277 respondents who stayed less than five kilometres from health facilities, 98.2% had used IPT while 93.5% of those who stayed five or more kilometres from a health facility had used IPT. Only 1.8% of pregnant women who stayed within a distance of five kilometres from a health facility did not take IPT as compared to 6.5% of those who stayed five or more kilometres from a health facility.

There was a positive relationship between pregnant women's positive perceptions about the effectiveness of anti-malaria medicines provided at the health facilities and their utilisation of IPT drugs. Pearson's correlation coefficient was 0.736 (p=0.006).

Likewise, pregnant women who had negative perceptions about the effectiveness of anti-malaria drugs, provided at the health facilities, were less likely to use IPT. As such, 13.0% of the pregnant women who believed that these medicines were not effective did not use IPT while only 2.7% did not use IPT among pregnant women who perceived these drugs to be effective.

Table 4.25: Intermittent preventive treatment (IPT) utilisation

		Independent variable: IPT utilisation			Comment
Dependent variable		Did not use IPT 13(3.3%)	Used IPT 387(96.7%)	p-value	
Distance from a health facility	< 5 kms	5(38.5%)	272(70.3%)	0.014	Significant
	> 5 kms	8(61.5%)	115(29.7%)		
Effectiveness of medicines provided at this health facility for treating malaria	No	3 (23.1%)	20 (5.2%)	0.006	Significant
	Yes	10 (76.9%)	367 (94.8%)		
Had used local plants/herbs to treat and/or prevent malaria	No	9(69.2%)	231 (59.7%)	0.223	Not significant
	Yes	4 (30.8%)	156 (40.3%)		
Availability of free mosquito nets	Always available	8(61.5%)	324 (87.2%)	0.032	Significant
	Rarely available	0 (0.0%)	12 (3.1%)		
	Not available	5(38.7%)	51 (13.2%)		
Satisfaction with healthcare services at	Services are good	5(38.5%)	279 (72.1%)	0.009	Significant

clinics (public health facilities) in communities or villages	Services not good	8(61.5%)	108 (27.9%)		
Reported availability of anti-malaria drugs at health facilities when respondents needed them	Always available	8(61.5%)	365(94.3%)	0.000	Significant
	Not available/unsure	5(38.5%)	22(5.7%)		

There was a weak positive correlation between pregnant women's perceptions of the availability of free mosquito nets at health facilities and their utilisation of IPT drugs as Pearson's correlation coefficient was 0.132 ($p<0.05$). Out of 387 pregnant women who used IPT, 324 (87.2%) indicated that free mosquito nets were always available at the health facility while only 51 (13.2%) of those respondents who indicated that mosquito nets were not always available had used IPT. This is an indication of a positive health seeking behaviour among pregnant women for various anti-malaria services. There was a significant positive relationship between pregnant women's satisfaction with healthcare services offered at the health facility and their IPT utilisation as. Pearson's correlation coefficient was 0.603 ($p=0.009$). Out of 284 respondents who indicated that services at the health facility were good, 98.2% (n=279) had used IPT. However, 93.1% (n=108) of 116 respondents who indicated that services were not good had also used IPT.

There was a positive relationship between pregnant women's perceptions about the availability of anti-malaria drugs at the health facility and IPT utilisation. Pearson's correlation coefficient was 0.619, ($p<0.05$). There was a generally high utilisation rate of IPT services among pregnant women. This is the case because 97.9% (n=365) pregnant women who indicated that drugs were always available had used IPT compared to 81.5% (n=22) out of 27 respondents who indicated that the drug supplies were unreliable.

There was a significant positive relationship between pregnant women who had used anti-malaria drugs from the health facility and IPT utilisation. Pearson's

correlation coefficient was 0.706 ($p<0.05$). That meant that pregnant women who had used anti-malaria drugs from health facilities were more likely to use IPT services.

4.3.4.2 Key findings about the relationship between environmental factors and respondents' utilisation of long lasting insecticide treated nets (LLINs)

Distance from health facilities

Table 4.26 indicates a negative correlation between LLIN utilisation and distance from health facilities. Pearson's correlation coefficient was -0.420 ($p< 0.05$) which implies that the distance a pregnant woman lived from a health facility was related to LLIN utilisation. It was found that 70.2% of pregnant women staying within a radius of five kilometres were using LLINs as compared to 29.9% of those staying further than five kilometres from health facilities. Similarly, 63.6% of the respondents who lived five kilometres or further away from health facilities where not sleeping under mosquito bed nets as compared to 36.4% who stayed within five kilometres of such facilities (see table 4.26).

Availability of free long lasting insecticide treated nets (LLINs)

Respondents' perceptions about the availability of free supplies of LLINs had a significant effect on their utilisation. Pearson's correlation coefficient was 0.450 (p-value= 0.032). Reportedly 84.2% of the pregnant women who had access to free LLINSs, were sleeping under these mosquito nets as compared to 9.1% and 13.8% who rarely or never accessed free nets respectively.

Satisfaction with health services

Table 4.26: Sleeping under mosquito bed nets (N=400)

		Independent variable: sleeping under mosquito nets			
Dependent variable		Did not sleep under LLINs (8.8%; *f*=35)	Slept under LLINs (91.3%; *f*=365)	p-value	
Distance from a health facility	< 5 kms	4(11.4%)	273(74.8%)	0.017	Significant
	> 5 kms	31(88.6%)	92 (25.2%)		
Respondents used local plants/herbs to treat malaria	No	11(31.4%)	229 (62.7%)	0.12	Not significant
	Yes	24(68.6%)	136 (37.3%)		
		Independent variable: sleeping under mosquito nets			
Dependent variable		Did not sleep under LLINs (8.8%; *f*=35)	Slept under LLINs (91.3%; *f*=365)	p-value	
Availability of free mosquito nets	Always available	8(22.9%)	325 (89.0%)	0.001	Significant
	Rarely available	9 (25.7%)	10 (2.7%)		
	Not available	18 (51.4%)	30 (8.2%)		
Belief that medicines from health facilities are effective for treating malaria	No	22 (62.9%)	37 (10.1%)	0.034	Significant
	Yes	13 (37.1%)	328 (89.0%)		
Satisfaction with services offered at ANC clinics	Services are good	14 (40.0%)	295 (80.8%)	0.010	Significant
	Services not good	21 (60.0%)	70 (19.2%)		

Pregnant women who were satisfied with the services offered at health facilities were more likely to utilise LLINs, according to the current study's findings.

4.3.5 Findings related to objective 3 of phase 1 of the study: the influence of pregnant women's personal cognitive characteristics on their utilisation of anti-malaria services

The third objective of this study's first phase was to identify personal cognitive characteristics of pregnant women like knowledge about malaria during pregnancy and sources of malaria-related information that might influence their utilisation of

anti-malaria services. This research was based on the concept of reciprocal determination of Bandura's Social Cognitive Theory. Therefore, in relation to this theoretical framework, objective three's findings are related to personal learning factors that could influence the environment and the pregnant women's utilisation of anti-malaria services.

Pearson's correlation coefficient was 0.421 (p-value =0.010). The LLIN utilisation among pregnant women, who were satisfied with health services offered at health facilities, was 97.6% (n=364) while the utilisation of LLNs among those, who were not satisfied with these services, was lower at 92.6% (n=25). Thus, the more satisfied the clients were with the health facilities, the more likely such clients were to utilise anti-malaria services offered at that facility.

4.3.5.1 Reported sources of malaria-related information in the community

The 400 respondents reported the following sources of malaria-related information:

- 74.5% (*f*=298) health workers
- 21.5% (*f*=85) electronic media
- 1.3% (*f*=5) traditional birth attendants
- 1.3% (*f*=5) places of worship
- 1.3% (*f*=5) schools
- 0.5% (*f*=2) information education and communication (IEC) materials.

No respondent indicated newspapers as a source of malaria-related information. A similar study conducted in Uganda, reported that out of 770 respondents, 80.0% (n=616) indicated that their preferred source of information about anti-malaria activities was health education provided by health workers (Ediau et al 2013:[5-7]) and that health care workers were the major sources of health education messages in Uganda, supporting the findings from the current study. This item solicited multiple responses from the pregnant women. As such, the calculation of a bivariate Pearson's correlation coefficient was inapplicable.

Table 4.27: Reported sources of malaria-related information (N=400)

Source of malaria information	Frequency	%
Health workers	298	74.5
Traditional birth attendants	5	1.3
Electronic media	85	21.3
News papers	0	0.0
IEC materials	2	0.5
Churches/Mosques	5	1.3
Schools	5	1.3
Total	**400**	**100.2**

4.3.5.2 Respondents' knowledge about the cause of malaria

Mosquitoes, as the cause of malaria, were mentioned by 79.8% (*f*=319) of the 400 respondents while other mentioned causes of malaria included: malaria parasites (18.3%; *f*=73); dirty water (16.3%; *f*=65); maize (10.0%; *f*=40) and un-boiled food (1.8%; *f*=7) (see table 4.28). Respondents were requested to mention all causes of malaria known to them. Thus, the total number of responses were 504 from the 400 respondents. Many respondents considered mosquitoes to be the causative agent of malaria although mosquitoes merely transmit malaria parasites from person to person (Meek & Hill 2010:6-7). However, at least these pregnant women were aware of the association between mosquitoes and malaria. For this variable, bivariate correlations were not applicable and thus not calculated.

Table 4.28: Respondents' knowledge about the cause of malaria (N=400)

Cause of malaria	Frequency	%
Mosquitoes	319	79.8
Malaria parasites	73	18.3
Dirty water	65	16.3
Unboiled food	7	1.8
Maize	40	10.0

Totals were not calculated because respondents could provide more than one response.

4.3.5.3 Respondents' knowledge about malaria transmission

Concerning the 400 respondents' knowledge about malaria transmission, 85.3% (*f*=341) said mosquitoes, 15.5% (*f*=62) dirty water and 2.3% (*f*=9) unboiled food (see table 4.29). Respondents were required to indicate all agents that they considered to transmit malaria, resulting in 412 responses from the 400 respondents. Although most respondents (85.3%; *f*=341) knew that malaria is transmitted from person to person through mosquito bites (Meek & Hill 2010:6), all people living in malaria endemic areas should have this knowledge.

Table 4.29: Knowledge about the modes of malaria transmission (N=400)

Malaria transmitter	**Frequency**	%
Mosquitoes	341	85.3
Dirty water	62	15.5
Un-boiled food	9	2.3

Totals were not calculated because item allowed respondents to provide more than one response.

4.3.5.4 Respondents' knowledge about the major malaria symptoms

Respondents were requested to indicate the major symptoms of malaria. As such, 872 responses were received from the 400 respondents. However, the percentages for replies concerning each symptom were calculated out of 400 as a maximum of 400 respondents could indicate any one specific symptom. Out of 400 respondents, 70.5% (*f*=282) knew that fever is a major symptom of malaria (see table 4.30). Other known symptoms of malaria included: headaches (48.0%; *f*=192), generalised body weakness (50.0%; *f*=200), joint pains (39.8%; *f*=159), diarrhoea (6.8%; *f*=27), coughing (1.8%; *f*=7) and anaemia (1.3%; *f*=5). These responses meant that most

respondents were knowledgeable about the major symptoms of malaria including fever, headaches, generalised body weakness, joint pains and anaemia (English & Webster 2010:43-45).

Table 4.30: Respondents' knowledge about the major malaria symptoms (N=400)

Malaria symptom	Frequency	%
Fever	282	70.5
Headache	192	48.0
Generalised body weakness	200	50.0
Joint pains	159	39.8
Diarrhoea	27	6.8
Cough	7	1.8
Anaemia	5	1.3

Totals were not calculated because each respondent could provide more than one response.

These findings were in line with findings of the current study that most pregnant women knew the major symptoms of malaria although not all knew that fever was a major symptom. This item solicited multiple responses from each respondent, therefore a bivariate correlation coefficient could not be calculated.

4.3.5.5 Knowledge about complications of malaria during pregnancy

Out of 400 respondents, 77.0% (*f*=308) indicated that abortion was a major complication of malaria during pregnancy. Other malaria-related complications during pregnancy mentioned by the respondents included premature delivery (36.5%; *f*=146), severe anaemia (30.5%; *f*=122), low birth weight of new born babies (20.5%; *f*=82), high blood pressure (4.3%; *f*=17) and high blood sugar levels (0.8%; *f*=3), as shown in table 4.31. These findings indicate that respondents had some knowledge about complications of malaria during pregnancy as stated by the MOH (2012e:363). Since respondents were requested to mention all relevant

complications, they could give multiple responses for this variable, rendering a correlation coefficient inapplicable.

Table 4.31: Major known complications of malaria during pregnancy (N=400)

Known complication	Frequency	%
Abortion	308	77.0
Low birth weight	82	20.5
Severe anaemia	122	30.5
High blood pressure	17	4.3
High blood sugar	3	0.8
Premature delivery	146	36.5

4.3.5.6 Comments about fever as a major sign of malaria

Factual statements about malaria during pregnancy were presented to the pregnant women being interviewed during the current study. Respondents' knowledge about each statement was tested and how that knowledge was acquired. Out of 400 respondents, 52.0% (*f*=208) reported that they had learned that fever is a major sign of malaria through health education and 40.8% (*f*=163) indicated that they had always known this fact while 6.0% (*f*=24) were learning something new during the interviews about the fact that fever is a major sign of malaria. However, 1.3% (*f*=5) of the respondents were unsure about this statement (see table 4.32). In this study, there was no association between knowledge about fever as a major sign of malaria and IPT utilisation among respondents. Pearson's Chi-square test was 0.500 ($p>0.05$).

4.3.5.7 Respondents' comments about malaria as a dangerous disease during pregnancy

Out of 400 respondents, 64.5% (*f*=258) had learned through health education that malaria is a dangerous disease during pregnancy, 20.3% (*f*=81) were learning something new during the interviews and 14.0% (*f*=56) had always known that

malaria is a dangerous disease during pregnancy. Only 1.3% (*f*=5) of the respondents were unsure about this statement (see table 4.32).

Table 4.32: Respondents' sources of malaria-related information (N=400)

Fever is a sign of malaria	**Frequency**	**%**
Learned this through health education	208	52.0
Had always known it	163	40.8
Learning something new during interviews	24	6.0
Not sure	5	1.3
Total	**400**	**100.1**
Malaria is a dangerous disease during pregnancy		
Learned this through health education	258	64.5
Had always known this fact	56	14.0
Learning something new during interviews	81	20.3
Unsure	5	1.3
Total	**400**	**100.1**

The fact is that reduced maternal immunity during pregnancy, to prevent rejection of the foreign protein of the foetus, causes a special risk for pregnant women to suffer from infections and diseases, including malaria. Due to pregnant women's impaired immunity, their resistance to malaria (and indeed to all infections) makes malaria during pregnancy a dangerous disease (Brabin 2010:169) and a pregnant woman's

risk for developing complications as a result of malaria infection is higher than for non-pregnant women.

In this study, there was no correlation between knowledge about malaria as a dangerous disease during pregnancy and IPT utilisation among pregnant women. Pearson's correlation coefficient was 0.001 ($p>0.05$).

4.3.5.8 Sources of information about malaria as a major cause of abortion

Out of 400 respondents, 60.8% (*f*=243) indicated that they had learned that malaria was a major cause of abortion through health education and 9.8% (*f*=39) had known this. However, 28.3% (*f*=113) of the respondents indicated that they were learning something new about malaria being a major cause of abortion during the interviews while 1.3% (*f*=5) were unsure about the correctness of this statement (see table 4.33). Pearson's correlation coefficient between knowledge about malaria as a major cause of abortion and IPT utilisation among pregnant women was 0.100 ($p<0.05$). This meant a weak positive correlation between knowledge about malaria as a major cause of abortion and IPT utilisation among pregnant women. This implied that pregnant women who knew that abortion is a major complication of malaria during pregnancy were slightly more likely to utilise IPT than pregnant women without this knowledge

Table 4.33: Comments about malaria and abortions (N=400)

Knowledge about malaria causing abortions	**Frequency**	**%**
Learned this through health education	243	60.8
Had always known it	39	9.8
Learning something new	113	28.3
Not sure	5	1.3
Total	**400**	**100.2**

4.3.5.9 Sources of information that malaria is caused by malaria parasites

Out of the 400 respondents, 60.8% (*f*=243) indicated that they had learned that malaria is caused by malaria parasites through health education and 24.5% (*f*=98) had always known this fact. However, 13.3% (*f*=53) of the respondents indicated that they were learning something new during the interviews and 1.6% (*f*=6) were unsure about malaria parasites causing malaria (see table 4.34).

For this variable, there was an association between knowledge about malaria as a major cause of abortion and IPT utilisation among pregnant women. Fisher's exact test was 0.573 ($p<0.05$). That meant that the knowledge that malaria is caused by a malaria parasite among pregnant women was associated with an increased likelihood that these pregnant women would use IPT drugs.

Table 4.34: Comments about mosquitoes and malaria parasites (N=400)

Malaria is caused by a malaria parasite (N=400)	**Frequency**	**%**
Learned this through health education	243	60.8
Had always known it	98	24.5
Learning something new	53	13.3
Not sure	6	1.5
Total	**400**	**100.1**

4.3.5.10 Sources of information that mosquitoes transmit malaria parasites

Out of 400 respondents, 63.3% (*f*=253) indicated that they learned that mosquitoes were transmitters of malaria from health education and 10.8% (*f*=43) had always known this while 24.3% (*f*=97) were learning something new during the interviews and 1.8% (*f*=7) were unsure whether or not mosquitoes transmitted malaria (see figure 4.6 and table 4.34).

In this study, there was a positive correlation between knowledge about mosquitoes as transmitters of malaria parasites and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.490 ($p<0.05$). That meant that there was a greater likelihood of using IPT drugs among pregnant women who knew that mosquitoes transmit malaria parasites than among pregnant women who did not know this.

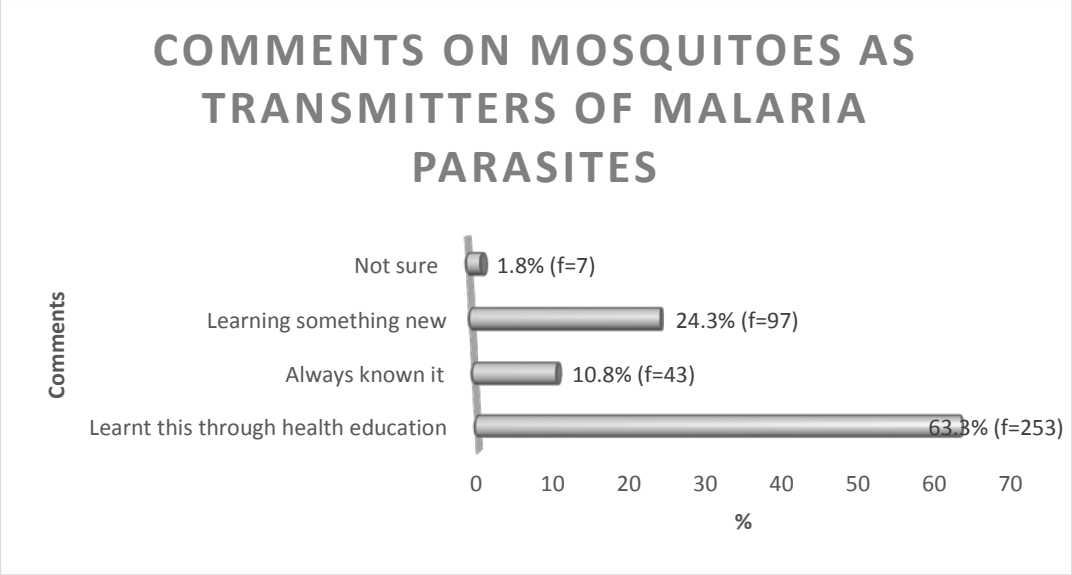


Figure 4.6: Comments about mosquitoes as transmitters of malaria parasites (N=400)

4.3.5.11 Sources of information that malaria can be prevented by the proper use of mosquito bed nets

Out of 400 respondents, 50.5% (*f*=202) indicated that they had always known that malaria can be prevented by the proper use of mosquito bed nets and 42.8% (*f*=171) indicated that they had learned this through health education. Only 5.3% (*f*=21) of the respondents indicated that they were learning something new during the interviews while 1.5% (*f*=6) were unsure about the statement's truth (see table 4.35).

Table 4.35: Sources of knowledge about malaria prevention by using mosquito bed nets (N=400)

Source of knowledge	Frequency	%
Learned this through health education	171	42.8
Had always known it	202	50.5
Learning something new	21	5.3

Unsure	6	1.5
Total	**400**	**100.1**

In the current study, there was a slight positive correlation between knowledge about the proper use of mosquito bed nets for preventing malaria and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.167 ($p<0.05$). This finding implied that there was a slightly better chance of utilising IPT drugs among pregnant women who knew that malaria could be prevented by the proper use mosquito bed nets than among pregnant women who did not have this knowledge.

4.3.5.12 Knowledge about internal residual spraying (IRS) of houses for preventing malaria

Out of 400 respondents, 53.0% (*f*=212) had learned that IRS of houses can prevent malaria from health education and 25.5% (*f*=102) had always known this. However, 20.0% (*f*=80) respondents were learning something new during the interviews and 1.5% (*f*=6) were reportedly unsure about the effect of IRS (see table 4.36). These findings are similar to those of Ediau et al (2013:[1]) who reported that fewer than 50% of their Ugandan respondents were knowledgeable about IRS.

In the current study there was a weak positive correlation between knowledge about IRS of houses for preventing malaria and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.127 ($p<0.05$). This meant that there was a slightly greater likelihood of IPT utilisation among pregnant women who knew about IRS of houses for preventing malaria than among women who lacked this knowledge.

Table 4.36: Comments about internal residual spraying (IRS) of houses (N=400)

Source of information about indoor residual spraying to prevent malaria	**Frequency**	**%**
Learned this through health education	212	53.0

Had always known it	102	25.5
Learning something new	80	20.0
Not sure	6	1.5
Total	**400**	**100.0**

4.3.5.13 Knowledge about intermittent preventive treatment (IPT) doses for malaria prevention during pregnancy

Out of 400 respondents, 60.0% (*f*=240) indicated that they were learning something new during the interviews and 35.5% (*f*=142) knew about IPT for malaria prevention during pregnancy through health education. Only 2.8% (*f*=11) indicated that they had always known this while 1.8% (*f*=7) were unsure about IPT for preventing malaria during pregnancy (see table 4.37).

Table 4.37: Knowledge about doses of intermittent preventive treatment (IPT) anti-malaria drugs and risk of malaria (N=400)

Pregnant women should get at least two doses of anti-malaria drugs (N=400)	**Frequency**	**%**
Learned this through health education	142	35.5
Had always known it	11	2.8
Learning something new during interviews	240	60.0
Not sure	7	1.8
Total	**400**	**100.1**
Pregnant women and children younger than five years of age are more at risk of malaria (N=400)		
Learned this through health education	149	37.3
Had always known it	20	5.0
Learning something new during interviews	225	56.3
Not sure	6	1.5
Total	**400**	**100.1**

Uganda's MOH (2012a:91-92) recommends that all pregnant women should get at least two doses of IPT drugs during each pregnancy. The first dose of SP is given during the second trimester of pregnancy and the second dose during the third trimester with at least one month between the two doses (MOH 2012a:91-92) to prevent potential hepatotoxicity from developing. In this study, there was a positive

correlation between knowledge about doses of IPT drugs and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.544 ($p<0.05$). This meant that there was a greater likelihood IPT utilisation among pregnant women who knew about the required two doses of IPT drugs during pregnancy.

4.3.5.14 Knowledge about the higher risk of malaria for pregnant women and children younger than five years of age

Out of 400 respondents, as shown in table 4.37, 56.3% (*f*=225) indicated that they were learning something new during the interviews that pregnant women and children younger than five were at greater risk of getting malaria than the rest of the population and 37.3% (*f*=149) indicated that they had learned this from health education. Only 5.0% (*f*=20) of the respondents indicated that they had always known this to be the case while 1.5% (*f*=6) were unsure and therefore non-committal about the statement (see table 4.37). Bi-variant correlation statistics were inapplicable for this variable and therefore not calculated.

4.3.5.15 Knowledge about malaria prevention by avoiding mosquito bites

Out of 400 respondents, 53.0% (*f*=212) indicated that they had learned this through health education and 26.0% (*f*=104) indicated that they were learning something new during the interviews from this statement (see table 4.38). However, 19.5% (*f*=78) of the respondents indicated that they had always known that malaria could be prevented by avoiding mosquito bites while 1.5% (*f*=6) of the respondents were non-committal about the statement.

In this study, there was a weak positive correlation between knowledge that malaria can be prevented by avoiding mosquito bites and IPT utilisation among pregnant women as Pearson's correlation was 0.282 ($p<0.05$). This meant that pregnant women who knew that malaria can be prevented by avoiding mosquito bites were more likely to use IPT than women without this knowledge.

However, there was a positive correlation between knowledge that malaria can be prevented by avoiding mosquito bites and LLIN utilisation among pregnant women.

Pearson's correlation was 0.422 ($p<0.05$). This meant that pregnant women who knew that malaria can be prevented by avoiding mosquito bites were more likely to use LLINs than women without this knowledge.

Table 4.38: Knowledge about malaria prevention by avoiding mosquito bites (N=400)

Source of knowledge	Frequency	%
Learned this through health education	212	53.0
Had always known it	78	19.5
Learning something new during interviews	104	26.0
Not sure	6	1.5
Total	**400**	**100.0**

4.3.5.16 Knowledge that traditional birth attendants (TBAs) should not assist women during their babies' births in communities

Out of 400 respondents, 68.5% (*f*=274) indicated that they were learning something new during the interviews, 26.8% (*f*=107) indicated that they had learned this through health education and 3.3% (*f*=13) indicated that they had always known that traditional birth attendants were no longer encouraged to conduct deliveries in communities. However, 1.6% (*f*=6) of the respondents were unsure about the statement's truth (see table 4.39).

In this study, there was a negative correlation between knowledge that traditional birth attendants should not conduct deliveries and IPT utilisation among pregnant women as Pearson's correlation coefficient was -0.196 ($p<0.05$). This meant that pregnant women who knew that traditional birth attendants should not conduct deliveries were slightly less likely to use IPT than their counterparts without this knowledge.

Table 4.39: Knowing that traditional birth attendants should not assist

women during the birth of their babies (N=400)

Source of knowledge	Frequency	%
Learned this through health education	107	26.8
Had always known it	13	3.3
Learning something new during interviews	274	68.5
Not sure	6	1.5
Total	**400**	**100.1**

4.3.5.17 Knowledge that antenatal clinic visits should commence during the first trimester of pregnancy

Out of 400 respondents, 65.3% (*f*=261) indicated that they were learning something new during the interviews, 29.3% (*f*=117) indicated that they had learned this from health education and 3.8% (*f*=15) indicated that they had always known that pregnant women should start attending antenatal clinic during the first trimester. However, 1.8% (*f*=7) of the respondents were unsure about this issue (see table 4.40).

Table 4.40: Sources of information concerning the commencement of antenatal care during the first trimester of pregnancy (N=400)

Category	Frequency	%
Learned this through health education	117	29.3
Had always known it	15	3.8
Learning something new during interviews	261	65.3
Not sure	7	1.8
Total	**400**	**100.2**

There was no correlation between respondents' knowledge that ANC clinic visits should commence during the first trimester of pregnancy and IPT utilisation among

pregnant women as Pearson's correlation coefficient was -0.003 (p>0.05). That meant that IPT utilisation among pregnant women did not depend on their knowledge that ANC visits should commence during the first trimester of pregnancy.

4.3.5.18 Comments about the statement that pregnant women should attend antenatal clinics at least four times

Out of 400 respondents, 59.3% (*f*=237) indicated that they were learning something new during the interviews, 36.3% (*f*=145) had learned this during health education 3.0% (*f*=12) had always known that pregnant women should attend ANC clinics at least four times during each pregnancy. However, 1.5% (*f*=6) of the respondents were unsure about the statement (see table 4.41).

In this study, there was a positive correlation between respondents' knowledge that pregnant women should attend ANC clinics at least four times during each pregnancy and IPT utilisation. Pearson's correlation coefficient was 0.769 (p<0.05). That meant that respondents with knowledge about the importance of attending ANC clinics at least four times during pregnancy were more likely to use IPT than pregnant women without such knowledge.

Table 4.41: Sources of information that pregnant women should attend antenatal clinics (ANC) at least four times (N=400)

Source of information	**Frequency**	**%**
Learned this through health education	145	36.3
Had always known it	12	3.0
Learning something new during interviews	237	59.3
Not sure	6	1.5
Total	**400**	**100.1**

4.3.5.19 Preventing mosquitoes from breeding to prevent malaria

Out of 400 respondents, 58.8% (*f*=235) indicated that they had learned from health education sessions that the prevention of mosquitoes' breeding would help to prevent malaria, 24.0% (*f*=96) had always known this while 15.8% (*f*=63) were learning something new about the prevention of malaria during the interviews. However, 1.5% (*f*=6) of the 400 respondents were unsure about the statement (see table 4.42). Every person living in a malaria endemic area such as the Buikwe district, should know that preventing mosquitoes from breeding, would reduce the number of mosquitoes in the area and thus also reduce the incidence of malaria.

In the current study, there was a weak positive correlation between respondents' knowledge about the importance of preventing the breeding of mosquitoes to prevent malaria and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.234 ($p<0.05$). That meant that IPT utilisation was slightly higher among respondents with knowledge about the importance of preventing the breeding of mosquitoes to prevent malaria than among their counterparts without this knowledge. However, there was a positive correlation between respondents' knowledge about the importance of preventing the breeding of mosquitoes to prevent malaria and LLIN utilisation. Pearson's correlation coefficient was 0.531 ($p<0.05$). That meant that LLIN utilisation was higher among respondents with knowledge about the importance of preventing the breeding of mosquitoes to prevent malaria than among their counterparts without this knowledge.

Table 4.42: Source of information about the importance of preventing the breeding of mosquitoes to prevent malaria (N=400)

Source of information	**Frequency**	**%**
Learned this through health education	235	58.8
Had always known it	96	24.0
Learning something new during interviews	63	15.8
Not sure	6	1.5
Total	**400**	**100.1**

4.3.5.20 Knowledge about COARTEM as the recommended first line treatment for malaria

Out of 400 respondents, 63.5% (*f*=254) indicated that they had learned that COARTEM was the preferred first line treatment for malaria during health education sessions, 30.3% (*f*=121) were learning something new during the interviews, 3.5% (*f*=14) had always known that and 2.8% (*f*=11) were unsure (see table 4.43).

There was a positive correlation between respondents' knowledge about COARTEM as the first line treatment for malaria and IPT utilisation as Pearson's correlation coefficient was 0.645 ($p<0.05$). That meant that IPT utilisation was higher among respondents with knowledge about COARTEM as the first line treatment for malaria than among those without this knowledge.

Table 4.43: Knowledge that COARTEM is the first line treatment for malaria (N=400)

Source of information	Frequency	%
Learned this through health education	254	63.5
Had always known it	14	3.5
Learning something new during interviews	121	30.3
Not sure	11	2.8
Total	**400**	**100.1**

4.3.6 Discussion of findings related to objective 3 of phase 1 of the study: intermittent preventive treatment (IPT) utilisation related to pregnant women's personal cognitive characteristics

In relation to the third objective that was based on the theoretical framework of this research, socio-cultural factors and personal learning factors of respondents were considered. These characteristics were presented in relation to their association with the utilisation of anti-malaria services including IPT and the utilisation of LLINs.

4.3.6.1 Key findings on intermittent preventive treatment (IPT) utilisation and

personal cognitive characteristics of pregnant women

In the current study, there was a positive correlation between knowledge about mosquitoes as transmitters of malaria parasites and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.490 ($p<0.05$). That meant that there was a slightly increased likelihood of using IPT drugs among pregnant women who knew that mosquitoes transmit malaria parasites. So health education among pregnant women could be an important factor for increasing these women's IPT utilisation.

There was a weak positive correlation between knowledge about IRS of houses for preventing malaria and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.127 ($p<0.05$). This meant that there was a greater likelihood of using IPT among pregnant women who knew about IRS of houses for preventing malaria than among those who lacked such knowledge.

In the current study, there was a positive correlation between knowledge about doses of IPT drugs and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.544 ($p<0.05$). This meant that there was a greater likelihood of IPT utilisation among pregnant women who knew about the doses of IPT drugs than among women who did not know the doses of IPT drugs.

In the current study, there was a strong positive correlation between respondents' knowledge that pregnant women should attend the ANC clinic at least four times during each pregnancy and IPT utilisation. Pearson's correlation coefficient was 0.769 ($p<0.05$). Respondents with knowledge about the recommended four ANC visits during each pregnancy were more likely to visit the ANC clinic four times during each pregnancy therefore enhancing their chances of IPT utilisation. As such, it is important to give such information to pregnant women for increased IPT utilisation. This implies that pregnant women without such knowledge were likely not to attend ANC clinics four times and were thus unable to have a chance of using IPT services effectively. There was a positive correlation between respondents' knowledge about COARTEM, as the first line treatment for malaria, and IPT utilisation. Pearson's

correlation coefficient was 0.645 ($p<0.05$). That meant that IPT utilisation was higher among respondents with knowledge about COARTEM as the first line treatment for malaria than among those without such knowledge.

4.3.6.2 Key findings on the use of long lasting insecticide treated nets (LLINs) and personal cognitive characteristics of pregnant women

In the current study, there was a positive correlation between knowledge that malaria can be prevented by avoiding mosquito bites and LLIN utilisation among pregnant women. Pearson's correlation was 0.422 ($p<0.05$). This meant that pregnant women who knew that malaria can be prevented by avoiding mosquito bites were more likely to use LLINs than women without this knowledge. This implies that utilisation of LLINs can be enhanced by increased health education and sensitisation of the community about the role of mosquito bites and transmission of malaria.

In the current study, there was a positive correlation between respondents' knowledge about the importance of preventing the breeding of mosquitoes to prevent malaria and LLIN utilisation among pregnant women. Pearson's correlation coefficient was 0.531 ($p<0.05$). That meant that LLIN utilisation was higher among respondents with knowledge about the importance of preventing the breeding of mosquitoes to prevent malaria than among their counterparts without this knowledge.

4.3.7 Findings related to objective 4 of phase 1 of the study: behaviour/health practices of pregnant women related to the utilisation of anti-malaria services

The fourth objective of the current study's first phase was to identify behaviour/health practices of pregnant women like IPT utilisation, LLIN use and the use of anti-malaria drugs related to the utilisation of anti-malaria services. Since this research was based on the concept of reciprocal determination of Bandura's Social Cognitive Theory, objective 4's findings are related to health seeking practices of pregnant women that could influence their personal characteristics and their environment as

became evident from their responses to the structured interview schedule's items in section D (see Annexure B1).

4.3.7.1 Having a child

Out of 400 respondents, 65.8% (*f*=263) affirmed that they had at least one child while 34.3% (*f*=137) indicated that they did not. A cross-sectional study done in Uganda, reported that out of 700 respondents, (74.6%) 522 had at least one child (Odongo et al 2014:[4-5]). This is comparable to findings of the current study where 65.8% (f=263) of pregnant women had at least one other child before their current pregnancies.

In this study, there was a positive correlation between respondents' history of having a child and their IPT utilisation because Pearson's correlation coefficient was 0.421 ($p<0.05$). This implied a higher rate of IPT utilisation among pregnant women who had at least one child prior to their current pregnancies compared to women having their first pregnancies. Furthermore, there was a positive correlation between respondents' history of having a child and their LLIN utilisation as Pearson's correlation coefficient was 0.401 ($p<0.05$). This meant a higher LLIN utilisation rate among pregnant women who had at least one child prior to their current pregnancies. This finding might indicate better health practices of pregnant women through experience, and possibly also from health education, received during previous pregnancies.

4.3.7.2 Babies born in hospitals/health facilities

Out of 263 respondents who had at least one child, 35.4% (*f*=93) gave birth to one child in hospitals/health facilities. The rest of these women gave birth to 2-7 babies in hospitals/health facilities as 31.6% (*f*=83) had two; 15.6% (*f*=410 had three; 6.8% (*f*=18) had four; 3.0% (*f*=8) had five; 2.7% (*f*=7) had six; and 0.8% (*f*=2) had seven babies who were born in hospitals/health centres (see table 4.44). However, 4.2% (*f*=11) respondents who had at least one child prior to their current pregnancies, had never given birth to any baby in a hospital/health facility.

A study done in Uganda reported that out of 714 pregnant women, 88.0% (n=633) delivered their babies in health facilities (De Beaudrap et al 2013:[9]). Similarly, in the

current study, 95.9% (f=252) of all pregnant women had delivered one of more of their babies in hospitals or health centres.

Table 4.44: Number of babies born in hospitals/health facilities (n=263)

Number of deliveries in a hospital/health facility	Frequency	%
One baby	93	35.4
Two babies	83	31.6
Three babies	41	15.6
Four babies	18	6.8
Five babies	8	3.0
Six babies	7	2.7
Seven babies	2	0.8
No baby born in a hospital/health facility	11	4.2
***TOTAL**	263	100.1

* In table 4.44 the percentages refer only to those 263 respondents who had at least one child.

There was a positive correlation between respondents' history of giving birth in hospitals/health facilities and their IPT utilisation as Pearson's correlation coefficient was 0.405 ($p<0.05$). This meant that pregnant women who had given birth to their other children in hospitals/health care centres were more likely to use IPT than pregnant women who had never given birth to any children in hospitals or health care centres.

4.3.7.3 Number of babies born with the assistance of traditional birth attendants (TBAs)

Out of 263 respondents who had given birth to at least one child, 73.8% (*f*=194) had never used the services of a TBA, 13.3% (*f*=35) used a TBA's assistance once and

10.3% (27) had such assistance twice. Generally, 26.2% (f=69) of all respondents reportedly used a TBA during at least one baby's birth (see table 4.45).

Table 4.45: Number of births with the assistance of traditional birth assistants TBAs (n=263)

Number of births with the assistance of TBAs	Frequency	%
One TBA-assisted birth	35	13.3
Two TBA-assisted births	27	10.3
Three TBA-assisted births	4	1.5
Five TBA assisted births	1	0.4
Six TBA assisted births	1	0.4
Nine TBA assisted births	1	0.4
No TBA assisted birth	194	73.8
Total	**263**	**100.1**

* In table 4.45 the percentages refer only to those 263 respondents who had at least one child.

In this study, there was no correlation between respondents' history of using TBAs' services during their babies' births and their IPT utilisation as Pearson's correlation coefficient was -0.049 ($p>0.05$).

4.3.7.4 Number of intermittent preventive treatment (IPT) *doses taken during the respondents' previous pregnancies*

Out of 263 respondents who had at least one child, 77.9% (*f*=205) indicated that they received the recommended two doses of IPT during their previous pregnancies. Only 3.8% (*f*=10) of all respondents indicated that they had received no IPT dose during their previous pregnancies. However, 9.5% (*f*=25) of the respondents indicated one,

7.6% (*f*=20) had three and 1.2% (*f*=3) had four reported doses of IPT during their previous pregnancies (see table 4.46). According to Namusoke et al (2012:[4]), in a study conducted at a Ugandan national referral hospital, 58.8% (n=120) of their respondents had used the recommended two doses of IPT while the current study found that 77.9% (n=205) of its respondents had used IPT, slightly below Uganda's targeted 80% IPT use among pregnant women (UBOS 2012:179-180). However, the current study's reported 77.9% of pregnant women who had used two doses of IPT during their pregnancies, was higher than 72.8% reported in Uganda by Mbonye, Yanow, Birungi and Magnussen (2013b:178) who implemented special interventions to enhance pregnant women's utilisation of IPT and to decrease the number of births outside hospitals/health facilities. Thus the reported 77.9% of pregnant women who had used two IPT doses during their pregnancies in the Buikwe district, almost met Uganda's target of 80% (UBOS 2012:179) and exceeded the accomplishment of Mbonye et al (2013b:178) who implemented special interventions to enhance IPT utilisation in Uganda.

Pearson's correlation coefficient between respondents' reported number of IPT doses taken during their previous pregnancies and their IPT utilisation during the current pregnancy was 0.716 ($p<0.05$). This implies that there was a strong positive correlation between respondents' reported number of IPT doses taken during their previous pregnancies and their IPT utilisation during the current pregnancy. This implies that, women who took IPT during their previous pregnancies were more likely to continue with the practice during their subsequent pregnancies.

Table 4.46: Intermittent preventive treatment (IPT) doses taken during respondents' previous pregnancies (n=263)

Number of IPT doses taken	Frequency	%
One dose	25	9.5
Two doses	205	77.9
three doses	20	7.6
Four doses	3	1.1
No dose	10	3.8
Total	**263**	**99.9**

* In table 4.46 the percentages refer only to those 263 respondents who had at least one child.

4.3.7.5 First antenatal care clinic attendance during the respondents' current pregnancies

Out of 400 respondents, 57.0 (*f*=228) had their first ANC visit during the second trimester, 32.3% (*f*=129) during the first trimester and 10.8% (*f=4*3) during the third trimester (see table 4.47). There was no correlation between respondents' first ANC clinic attendance during their current pregnancies and their IPT utilisation as Pearson's correlation coefficient was -0.054 (p>0.05). That meant that IPT utilisation among pregnant women was not related to respondents' trimester at their first ANC clinic attendance during their current pregnancies.

Table 4.47: First antenatal care (ANC) clinic attendance during the current pregnancy (N=400)

Trimester of pregnancy	Frequency	%
First trimester	129	32.3
Second trimester	228	57.0
Third trimester	43	10.8
Total	**400**	**100.1**

4.3.7.6 Number of antenatal care (ANC) clinic visits planned during the women's current pregnancies

Out of 400 respondents, 44.5% (*f*=178) indicated that they had planned to have four, 34.0% (*f*=136) had planned fewer than four and 17.5% (*f*=70) had planned more than four ANC visits during their current pregnancies. However, 4.0% (*f*=16) of the respondents were unsure about the number of planned ANC visits during their current pregnancies (see table 4.48). The current study found that 44.5% (n=178) of

the respondents planned to attend ANC clinics four times, as recommended by the MOH (2012a:92-93).

In this study, there was a positive correlation between respondents' number of planned ANC visits during the current pregnancy and their IPT utilisation as Pearson's correlation coefficient was 0.464 ($p<0.05$). This meant that respondents who planned four or more ANC visits were more likely to use IPT compared to respondents who planned fewer than four ANC visits. Likewise, there was a positive correlation between respondents' number of planned ANC visits during the current pregnancy and their LLIN utilisation. Pearson's correlation coefficient was 0.689 ($p<0.05$). This meant that respondents who planned four or more ANC visits were more likely to use LLINs compared to respondents who planned fewer ANC visits.

Table 4.48: Respondents' planned number of antenatal care (ANC) clinic visits during their current pregnancies (N=400)

Number of planned ANC visits	Frequency	%
Fewer than four	136	34.0
Four times	178	44.5
More than four	70	17.5
Unsure	16	4.0
Total	**400**	**100.0**

4.3.7.7 Presence of mosquito bed nets in respondents' homes

Out of 400 respondents, the majority (97.8%; *f*=391) had at least one LLN at home and 2.3% (*f*=9) had none. Another study done in Uganda, reported that out of 458 respondents, 78.3% were in possession of at least one bed net at home (Wanzira et al 2014:[4-5]). In the current study, (97.8%; *f*=391) of the respondents reported ownership of at least one mosquito bed net at home. This meant a high rate of ownership of mosquito bed nets. The current study's reported ownership of bed nets by pregnant women (97.8%) was higher than the national findings indicating that 59.0% of all pregnant women in Uganda had bed nets in 2012 (UBOS 2012:177).

This was because the study was conducted five months after mass distribution of mosquito nets in the Buikwe district (Buikwe District Council 2013:21-22).

In this study, there was no correlation between the possession of bed nets and the pregnant women's utilisation of IPT as Pearson's correlation coefficient was -0.031 ($p>0.05$).

4.3.7.8 Types of mosquito bed nets used in pregnant women's homes

Out of 391 respondents who had mosquito bed nets, 95.1% (*f*=372) indicated that they used permanent types of mosquito bed nets and 4.9% (*f*=19) used ordinary types of mosquito bed nets. According to Wanzira et al (2014:[4]), out of 458 Ugandan respondents, 78.4% (n=359) possessed at least one bed net at home of which 69.2% (n=317) were permanent type mosquito nets. This finding corresponds with the current study's finding that most pregnant women in the Buikwe district owned at least one permanent type mosquito bed net. This might be attributed to the fact that during the mass LLIN distribution, the Buikwe district distributed permanent type of mosquito nets (Buikwe District Council 2013:21-22).

There was a slight positive correlation between respondents' type of mosquito bed nets used at home and their IPT utilisation as Pearson's correlation coefficient was 0.167 ($p<0.05$). This meant that respondents with permanent type mosquito bed nets at home were more likely to use IPT than respondents without this type of bed net.

4.3.7.9 The condition of the respondents' bed nets

Out of 391 respondents with mosquito bed nets at home, 82.9% (*f*=324) indicated that their mosquito bed nets were intact without holes while 17.1% (*f*=67) indicated that their mosquito bed nets had holes. For effective prevention of malaria, the mosquito bed nets should be intact without holes as mosquitoes can enter through any holes in bed nets and bite the persons sleeping under such bed nets.

There was a positive correlation between the intactness of the respondents' mosquito bed nets and their IPT utilisation as Pearson's correlation coefficient was

0.318 ($p<0.05$). This meant that respondents who had intact mosquito nets were more likely to use IPT drugs.

4.3.7.10 Reasons for not having mosquito bed nets at home

Out of the nine respondents without bed nets at home, 66.7% (*f=6*) indicated that they were unable to buy bed nets, 22.2% (*f*=2) did not like bed nets and 11.1% (*f*=1) said their husbands disliked bed nets.

In this study, there was no correlation between respondents' reasons for not using mosquito bed nets and their IPT utilisation as Pearson's correlation coefficient was 0.048 ($p>0.05$).

4.3.7.11 Free bed nets received during the respondents' current pregnancies

Out of the 400 respondents, 77.5% (*f*=310) confirmed that they had received free bed nets and 22.5% (*f*=90) had not received free bed nets during their current pregnancies. The MOH (2012a:93) recommends that LLINs should be used particularly during pregnancy to offer physical protection and to repel mosquitoes in order to prevent malaria during pregnancy.

There was a slight positive correlation between respondents' receipt of bed nets during their current pregnancies and their IPT utilisation as Pearson's correlation coefficient was 0.102 ($p<0.05$). This meant that pregnant women who had received mosquito bed nets during their current pregnancies were more likely to use IPT than those who had not received bed nets during their current pregnancies.

4.3.7.12 Sleeping under bed nets

Out of the 391 respondents who had mosquito bed nets, 93.4% (*f*=365) reportedly slept under their bed nets at home while 6.6% (*f*=26) did not use the mosquito bed nets they had at home. These findings indicate a high utilisation rate of available bed nets by respondents.

A quantitative Ugandan study reported that out of 692 respondents who owned bed nets, 72.1% (f=506) actually slept under them (Wanzira et al 2014:[4-5]). Those findings are in agreement with findings from the current study of a high rate of utilisation of mosquito nets in the Buikwe district of Uganda.

There was a positive correlation between respondents' sleeping under mosquito bed nets and their IPT utilisation as Pearson's correlation coefficient was 0.840 ($p<0.05$). This meant that pregnant women who use bed nets were more likely to utilise IPT during their pregnancies.

4.3.7.13 Draining of stagnant water to curb the breeding of mosquitoes

On measures taken to curb the breeding of mosquitoes, out of the 400 respondents, 27.8% (*f*=111) indicated that they drained stagnant water on a daily basis, 50.5% (*f*=202) sometimes did so and 21.8% (*f*=87) never drained stagnant water for the purpose of curbing the breeding of mosquitoes (refer to table 4.49).

There was no correlation between respondents' implementation of draining accumulated water to curb the breeding of mosquitoes and their IPT utilisation. Pearson's correlation coefficient was 0.019 ($p>0.05$). This meant that pregnant women who practised the draining of accumulated water to curb the breeding of mosquitoes had generally the same level of IPT utilisation as respondents who did not do so.

Table 4.49: Frequency of draining stagnant water (N=400)

Frequency of drainage	**Frequency**	**%**
Every day	111	27.8
Sometimes	202	50.5
Never	87	21.8
Total	**400**	**100.1**

4.3.7.14 Clearing bushes near homesteads to curb the breeding of mosquitoes

Out of the 400 respondents, 14.0% (*f*=56) indicated that they cleared bushes on a daily basis, 71.5% (*f*=286) indicated that they sometimes did so and 14.5% (*f*=58) never did so (see table 4.50).

In this study, there was no correlation between respondents' clearing of bushes near homesteads to curb the breeding of mosquitoes and their IPT utilisation. Pearson's correlation coefficient was 0.019 ($p>0.05$).

Table 4.50: Frequency of clearing bushes near homesteads (N=400)

Frequency of clearing bushes near homesteads to curb the breeding of mosquitoes	Frequency	%
Every day	56	14.0
Sometimes	286	71.5
Never	58	14.5
Total	**400**	**100.0**

4.3.7.15 Disposal of containers with stagnant water

Out of 400 respondents, 38.3% (*f*=153) indicated that they disposed of containers with stagnant water on a daily basis, 50.8% (*f*=203) sometimes did so and 9.8% (*f*=39) never implemented such actions.

There was a weak positive correlation between respondents' implementation of disposing of containers holding water and their IPT utilisation. Pearson's correlation coefficient was 0.163 ($p<0.05$). This meant that pregnant women who disposed of

containers holding water were slightly more likely to utilise IPT drugs than those women who did not dispose of containers holding water.

4.3.7.16 Keeping water containers closed

Out of 400 respondents, 84.5% (*f*=338) indicated that they kept water containers closed on a daily basis in order to curb the breeding of mosquitoes (see table 4.51). However, 10.8% (*f*=43) of the respondents sometimes did so and 4.8% (*f*=19) had never done this to curb the breeding of mosquitoes.

There was no correlation between respondents' keeping water containers closed and their IPT utilisation as Pearson's correlation coefficient was 0.010 ($p>0.05$).

Table 4.51: Actions taken to keep water containers closed (N=400)

Keeping water containers closed	**Frequency**	**%**
Every day	338	84.5
Sometimes do it	43	10.8
Never done it	19	4.8
Total	**400**	**100.1**

4.3.7.17 Staying indoors after dusk to avoid mosquito bites

Out of 400 respondents, 70.0% (*f*=280) indicated that they stayed indoors after dusk to avoid mosquito bites. However, 25.0% (*f*=100) sometimes did so and 5.0% (*f*=20) never stayed indoors after dusk to avoid mosquito bites.

There was a slight positive correlation between respondents' staying indoors after dusk to avoid mosquito bites and their IPT utilisation. Pearson's correlation coefficient was 0.157 ($p<0.05$). This meant that pregnant women who stayed indoors

after dusk to avoid mosquito bites were slightly more likely to use IPT drugs than pregnant women who did not do so.

4.3.7.18 Internal residual spraying (IRS) of houses

Out of 400 respondents, 86.8% (*f*=347) indicated that they had never done IRS. Only 10.8% (*f*=43) of the respondents rarely did IRS of their houses and 2.5% (*f*=10) did so regularly every six months (see table 4.52). IRS is largely implemented as a government programme. The low IRS coverage could be attributed to the fact that Buikwe district did not have a government programme that implemented IRS at the time when the interviews were conducted in this district (Buikwe District Council 2013:10-14). This finding was comparable to the national finding that only 7.0% of all pregnant women in Uganda used IRS to control malaria during 2012 (UBOS 2012:172).

There was no correlation between respondents' implementation of IRS and their IPT utilisation. Pearson's correlation coefficient was 0.010 ($p>0.05$). This meant that IPT utilisation among pregnant women was not related to the practice of IRS of houses. This was so possibly because of the small number of pregnant women implementing IRS.

Table 4.52: Indoor residual spraying (IRS) correlated with having mosquito screens fitted to windows (N=400)

Implementation of IRS	**Frequency**	**%**
Regularly every six months	10	2.5
Rarely	43	10.8
Never	347	86.8
Total	**400**	**100.1**

4.3.7.19 Mosquito wire/gauze mesh in windows of respondents' houses

As indicated in table 4.53, out of the 400 respondents, 88.5% (*f*=354) indicated that they did not have mosquito wire/gauze mesh installed in the windows of their houses. Only 8.3% (*f*=33) had mosquito gauze screens in some windows and only 3.3% (*f*=13) had such mosquito wire mesh in all windows of their houses (see table 4.53). For the purpose of this research, wire/gauze meshes in doors were not checked but the women's answers to the relevant questions during the interviews were accepted.

There was no correlation between the presence of mosquito wire mesh in windows of respondents' houses and their IPT utilisation as Pearson's correlation coefficient was 0.005 ($p>0.05$).

Table 4.53: Mosquito wire mesh in windows (N=400)

Mosquito wire mesh in windows	**Frequency**	**%**
Yes, all windows had wire mesh fitted	13	3.3
Yes, some windows had wire mesh fitted	33	8.3
No windows had wire mesh fitted	354	88.5
Total	**400**	**100.1**

4.3.7.20 The acquisition of new malaria-related information during the structured interviews

Out of 400 respondents, 96.0% (*f*=384) indicated that they had acquired new malaria-related information during the structured interviews. However, 2.5% (*f*=10) indicated that they did not acquire any new information during the interviews and 1.5% (*f*=6) were unsure whether or not they had indeed acquired new information during the interviews (see table 4.54). For this variable, correlational statistics were not applicable and therefore not calculated.

Table 4.54: New malaria-related information acquired during interviews (N=400)

New malaria related information	**Frequency**	**%**

acquired		
Yes	384	96.0
No	10	2.5
Unsure	6	1.5
Total	**400**	**100.0**

4.3.7.21 Suggested ways to control malaria in communities

This item, intending to determine respondents' knowledge levels about possible malaria control measures, elicited 630 responses from the 400 respondents.

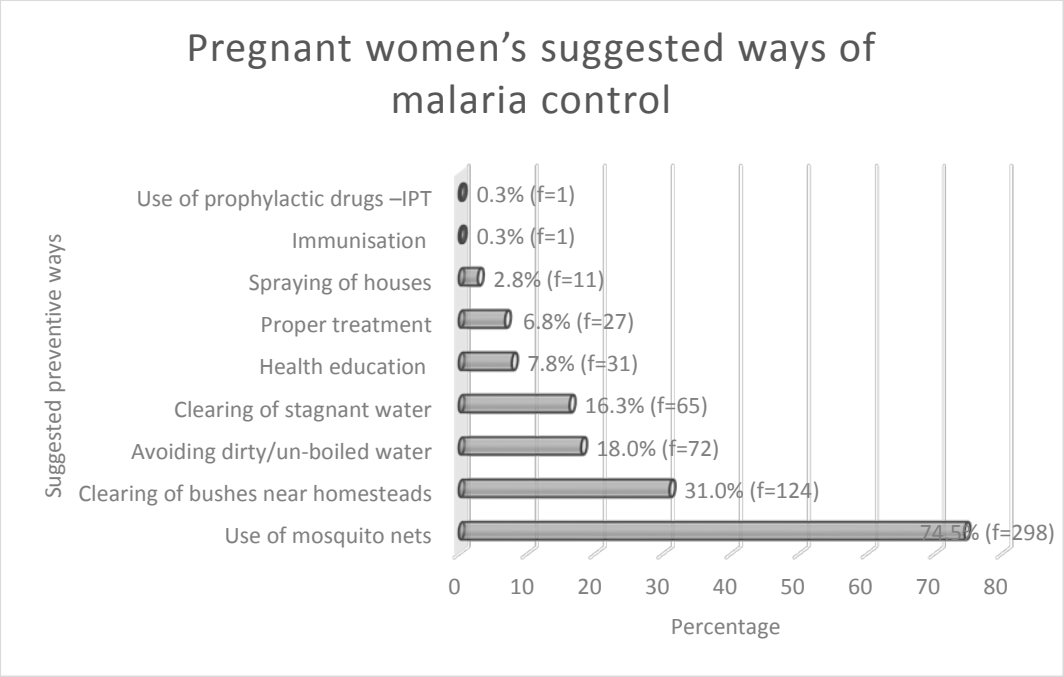


Figure 4.7: Suggested ways of controlling malaria (N=400)

In reference to figure 4.7, out of the 400 respondents the following control measures were indicated:

- 74.5% (*f*=298) using mosquito bed nets properly
- 31.0% (*f*=124) clearing of bushes around homesteads
- 18.0% (*f*=72) avoiding dirty water including boiling of drinking water
- 16.3% (f=65) clearing of stagnant water near homesteads

- 7.8% (*f*=31) obtaining information through health education
- 6.8% (*f*=27) treating malaria cases properly
- 2.8% (*f*=11) spraying of houses
- 0.3% (*f*=1) immunisation and only
- 0.3% (*f*=1) indicated that IPT is an important way of controlling malaria (see figure 4.7).

This item solicited multivariate responses. Therefore, Pearson's correlation coefficient was not applicable for this item and not calculated (refer to section 4.3 of this thesis).

4.3.8 Discussion of findings related to objective 4 of phase 1 of the study: respondents' behaviour and health care practices

Under the 4th objective of phase 1 of the current study, based on the theoretical framework of this research, behaviour and health care practices of respondents, were considered. These characteristics were presented in relation to their association with the utilisation of anti-malaria services including IPT and LLINs.

4.3.8.1 Key findings pertaining to intermittent preventive treatment (IPT) utilisation and health care practices of pregnant women

There was a significant relationship between pregnant women's sleeping under mosquito nets and their utilisation of IPT as Pearson's correlation coefficient was 0.840 ($p<0.05$). Out of 400 respondents, 90.0% (f=360) slept under mosquito nets and also used IPT drugs (see table 4:55). This meant that pregnant women who used one type of malaria preventive service were more likely also to use another type of malaria preventive service. This implies that an improvement in utilisation of one type of anti-malaria service is likely to be followed by an increased utilisation of another type of anti-malaria service among pregnant women.

In this study, there was a positive correlation between respondents' history of having a child and their IPT utilisation as Pearson's correlation coefficient was 0.421 ($p<0.05$). This meant a higher IPT utilisation among pregnant women who had at

least one child prior to their current pregnancies than among women without children. This might be an indication of better health practices of pregnant women based on their experience from previous pregnancies.

There was a positive correlation between respondents' history of giving birth in hospitals/health facilities and their IPT utilisation as Pearson's correlation coefficient was 0.405 ($p<0.05$). That meant that pregnant women who had previously given birth in hospitals/health care centres were more likely to use IPT than pregnant women who had never given birth hospitals or health care centres. Giving birth with assistance from trained practitioners is a recommended health practice and pregnant women who do this are more likely to utilise IPT services than those who did not give birth in hospitals/clinics.

There was a strong positive correlation between respondents' reported number of IPT doses taken during their previous pregnancies and their IPT utilisation during their current pregnancies. Pearson's correlation coefficient between respondents' reported number of IPT doses taken during their previous pregnancies, and their IPT utilisation during the current pregnancies, was 0.716 ($p<0.05$). That meant that, pregnant women who took IPT during their previous pregnancies were more likely to continue with the practice during their subsequent pregnancies.

Table 4.55: Relationship between utilisation and health care practices of pregnant women (IPT) utilisation and other anti-malaria actions

		Independent variable: IPT utilisation -			Comment
Dependent variable		Did not use IPT 13(3.3%)	Used IPT 387 (96.7%)	p-value	
Sleeping under LLINS	No	4 (30.7%)	27 (7.0%)	0.000	Most pregnant women who used IPT also used LLINs
	Yes	9 (69.2%)	360 (93.0%)		
Had a baby before	No	6(46.2%)	126 (32.5%)	0.038	Not significant
	Yes	7(53.8%)	261 (67.4%)		
		Independent variable: sleeping under mosquito bed nets			
Dependent		Did not sleep	Slept under a	p-	

variable		under a mosquito net 35 (8.8%)	mosquito net 365 (91.3%)	value	
Use of IPT	No	11 (34.4%)	19 (5.2%)	0.000	Respondents' use of LLINs was related to their use of IPT
	Yes	24 (68.5%)	346 (94.8%)		
Had a baby before the current pregnancy	No	20 (57.1%)	108 (29.6%)	0.028	
	Yes	15 (41.9%)	257 (70.4%)		

In the current study, there was a positive correlation between respondents' number of planned ANC visits during the current pregnancy and their IPT utilisation as Pearson's correlation coefficient was 0.464 ($p<0.05$). This meant that respondents who planned four or more ANC visits were more likely to use IPT compared to respondents who planned fewer than four ANC visits.

There was a positive correlation between the reported intactness of respondent's mosquito bed nets and their IPT utilisation as Pearson's correlation coefficient was 0.318 ($p<0.05$). This meant that respondents who had intact mosquito nets were more likely to use IPT drugs. This was an indication of good health care practices among such pregnant women.

4.3.8.2 Key findings comparing the utilisation of long lasting insecticide treated nets (LLINs) with pregnant women's other health care practices

In this study, there was a positive correlation between a respondent's history of having a child and LLIN utilisation as Pearson's correlation coefficient was 0.401 ($p<0.05$). This meant a higher LLIN utilisation rate among pregnant women who had at least one child prior to their current pregnancies than among pregnant women who did not have any children prior to their current pregnancies. This is an indication that better health practices of pregnant women might be based on experience from previous pregnancies and possibly also on health education received during previous pregnancies. The current study further found a positive correlation between respondents' IPT utilisation and LLIN utilisation. Pearson's correlation coefficient was

0.651 ($p<0.05$). This meant that the use of IPT among pregnant women was related to their use of LLINs. Thus, pregnant women who used one type of malaria preventive method were more likely to use another type of malaria preventive method.

Furthermore, there was a positive correlation between respondents' number of planned ANC visits during their current pregnancies and their LLIN utilisation. Pearson's correlation coefficient was 0.689 ($p<0.05$). This meant that respondents who planned four or more ANC visits during their current pregnancies were more likely to use mosquito bed nets compared to respondents who planned fewer ANC visits.

A Zambian study (Chanda, Coleman, Kleinschmidt, Hemingway,Hamainza, Masaninga, Chanda-Kapata, Baboo, Durrheim & Coleman 2012:[1]) concluded that: "Routine surveillance data proved valuable for determining the temporal effects of malaria control with two strategies, IRS and LLINs on severe malaria disease in different types of Zambian districts". The recorded effects of IRS and LLINs in that Zambian study included marked reductions in malaria-related morbidity, mortality and case fatality rates. Thus the incidence and prevalence of malaria could be reduced by employing both IRS and LLINs in malaria endemic areas such as the Buikwe district.

However, Ediau et al (2013b:[1]) reported that in Uganda people lacked knowledge about IRS and they also had negative attitudes toward IRS "… prominent especially among the rural and less educated individuals". The current study's findings could not support or negate Ediau et al's findings.

4.4 Summary of key findings

These findings are summarised according to the study's findings and major anti-malaria services of IPT and LLIN utilisation. They are presented in a tabular matrix format.

4.4.1 Objective 1 of phase 1 of the study: socio-demographic characteristics' influence on pregnant women's utilisation of anti-malaria services

The first objective was to study the social-demographic characteristics like age, parity, education level, employment status and income levels that might influence pregnant women's utilisation of anti-malaria services.

Table 4.56: Key findings related to objective 1 of phase I of the current study

Variables	**Pearson's correlation coefficient and P-values**	**Possible correlation**	**Remarks/ implications**
Pregnant women's education levels	(Fisher's exact test =0.32) (p<0.05)	positive correlation	Educated pregnant women with secondary or post-secondary school education were more likely to utilise IPT drugs than the less educated ones
Episodes of fever during respondents' current pregnancies	-0.210 (p<0.018)	negative correlation	Pregnant women who experienced fever episodes during their pregnancies were less likely to have taken IPT drugs
Education level of pregnant women	0.250 (p<0.05)	positive relationship	Educated pregnant women (with secondary school or post school education) were more likely to utilise LLINs than the less educated ones
Previous malaria attack during pregnancy	-0.327 (p<0.05)	negative relationship	Pregnant women who experienced fever episodes during their pregnancies were more likely not to have used LLINs - such utilisation during pregnancy was associated with a reduced risk of malaria

4.4.2 Objective 2 of phase 1 of the study: the influence of environmental factors on pregnant women's utilisation of anti-malaria services

The second objective of the study's first phase, was to identify environmental factors like geographic access to health facilities, availability of quality health services, traditional healers' and peers' potential influence on pregnant women's utilisation of anti-malaria services. The summary of the key study findings, related to objective two of phase 1 of the current study, are summarised in table 4.57.

Table 4.57: Key findings related to objective 2 of phase I of the current study

Variables	**Pearson's correlation coefficient and P-values**	**Possible correlation**	**Remarks/implication**
Respondents' distances from health facilities	-0.450 (p<0.014)	negative correlation	Pregnant women who stayed nearer to a health facility were more likely to use IPT drugs from these health facilities than those who lived further away from health facilities.
Pregnant women's positive perceptions about the effectiveness of health facilities' anti-malaria drugs	0.736 (p<0.006)	positive correlation	Pregnant women with positive perceptions about the effectiveness of anti-malaria medicines provided at the health facilities were more likely to utilise IPT drugs than those with negative attitudes
Pregnant women's satisfaction with health services	0.603 (p=0.009)	positive correlation	Pregnant women satisfied with healthcare services at health facilities were likely to utilise IPT drugs from those facilities
Pregnant women's perceptions about the availability of anti-malaria drugs at facilities	0.619 (p<0.05)	positive correlation	Pregnant women with positive perceptions about the availability of anti-malaria drugs at health facilities were more likely to use IPT than those with negative perceptions.
Respondents who had used	0.706	positive correlation	Pregnant women who had used anti-malaria drugs from health facilities

drugs from health facilities	(p<0.05).		were more likely to use IPT services
Respondents' distances from health facilities	-0.420 (p<0.05)	negative correlation	Pregnant women who lived nearer to health facilities were more likely to use LLINs from these health facilities than those who lived further away.
Pregnant women who had access to free LLINSs	0.450 (p<0.032)	positive correlation	Free mosquito nets had a significant effect on LLINs' utilisation
Pregnant women satisfied with health services	0.421 (p<0.010)	positive correlation	Pregnant women satisfied with health services offered at the health facilities were more likely to utilise LLINs

4.4.3 Objective 3 of phase 1 of the current study: the influence of pregnant women's personal cognitive characteristics on the utilisation of anti-malaria services

The third objective of this study's first phase was to identify personal cognitive characteristics of pregnant women that might influence their utilisation of anti-malaria services, like knowledge about malaria during pregnancy and sources of malaria-related information.

Table 4.58: Key findings related to objective 3 of phase I of the study

Variables	**Pearson's correla-tion coefficient and P-values**	**Possible correla-tion**	**Findings and implications**
Knowing that mosquitoes trans-mit malaria parasites	0.490 (p<0.05)	positive correlation	There was a greater likelihood of using IPT drugs among women who knew that mosquitoes transmit malaria parasites
Respondents' knowledge about doses of IPT drugs	0.544 (p<0.05)	positive correlation	There was a greater likelihood IPT utilisation among pregnant women who knew the correct doses of IPT.
Knowing that pregnant women should attend ANC clinics at least four times	0.769 (p<0.05)	positive correlation	Respondents with knowledge of the recommended four ANC visits were more likely to use IPT
Knowing about	0.645	positive	IPT utilisation was higher among

COARTEM is the first line treatment for malaria	(p<0.05)	correlation	respondents who knew that COARTEM was the first line treatment for malaria.
Knowing that avoiding mosquito bites will prevent malaria	0.422 (p<0.05)	positive correlation	Respondents who knew that malaria can be prevented by avoiding mosquito bites were more likely to use LLINs.
Knowing about the importance of preventing mosqui-toes' breeding to prevent malaria	0.531 (p<0.05)	positive correlation	The utilisation of LLINs was higher among respondents with knowledge about the importance of preventing the breeding of mosquitoes to prevent malaria than among their counterparts without this knowledge.

4.4.4 Objective 4 of phase 1 of the current study: the influence of pregnant behaviour/health practices on the utilisation of anti-malaria services

The fourth objective of phase one of this study was to identify behaviour/health practices of pregnant women like IPT utilisation, utilisation of LLINs, use of anti-malaria drugs and other malaria-related control measures pertaining to the utilisation of anti-malaria services.

Table 4.59: Key findings related to objective 4 of phase I of the current study

Variables	**Pearson's correlation coefficient and P-values**	**Possible correlation**	**Finding and implications**
Sleeping under mosquito bed nets	0.840 (p<0.05)	positive correlation	Pregnant women who used one type of malaria preventive services were also more likely to use another type of anti-malaria service
Having a child prior to current pregnancy	0.421 (p<0.05)	positive correlation	Higher IPT utilisation among pregnant women with at least one child prior to current pregnancies.
Babies' births in hospitals/health facilities	0.405 (p<0.05).	positive correlation	Respondents with previous hospital/health facility births were more likely to use IPT.
IPT doses taken during previous pregnancies	0.716 (p<0.05)	positive correlation	Those who used IPT during previous pregnancies were more likely to do so during current pregnancies
Planned ANC	0.464	positive	Those who planned four or more

visits during pregnancies		correlation	ANC visits were more likely to use IPT
Intactness of LLINs	0.318	positive correlation	Respondents with intact mosquito nets were more likely to use IPT.
Respondent's history of having a child	0.401	positive correlation	There was a higher utilisation of LLINs among pregnant women who had at least one child prior to their current pregnancies
Respondents' IPT utilisation	0.651	positive correlation	Those women who used IPT were more likely to use LLINs.
Planned ANC visits	0.689	positive correlation	Those who planned four or more ANC visits during current pregnancies were more likely to use mosquito bed nets

4.5 CONCLUDING COMMENTS

In summary, this chapter dealt with data analysis, presentation and description of research findings for the first phase of the study. It presented findings from the data collected from pregnant women attending ANC clinics in the Buikwe district of Uganda. The next chapter presents the data analysis and discussion of research findings for the second phase of the study when structured interviews were conducted with 40 midwives working at ANC clinics in the Buikwe district. The findings of the two phases of the study will be compared and contrasted, where relevant, in the final chapter (chapter 6) of this thesis.

CHAPTER 5

ANALYSIS AND DESCRIPTION OF RESEARCH FINDINGS (PHASE II)

5.1 INTRODUCTION

The previous chapter presented the research data that were collected by conducting structured interviews with pregnant women during the first phase of the study. This chapter presents the research findings from the second phase of the study.

The structured interview schedule for midwives (see Annexure B2) was designed based on the information obtained during the first phase of the study (using interview schedule B1 to conduct interviews with 400 pregnant women in the Buikwe district), the literature review and current RBM policies and guidelines of Uganda's MOH. The purpose of the second phase of the study was to compare information collected from pregnant women with that provided by midwives. This comparison will be provided in chapter 6. The current chapter focuses on the information provided by the midwives during structured interviews and pregnant women's ANC clinic registers, as reported by the midwives-in-charge of ANC clinics (please refer to section C of the midwives' structured interview schedule – Annexure B2).

Anti-malaria services, that midwives were supposed to provide to pregnant women, were assessed. In the context of the current study, IPT utilisation was accepted as the gold standard with which other anti-malaria services were compared. This was based on MOH guidelines that specify IPT as being the major anti-malaria service to be provided by midwives in ANC clinics (MOH 2012b:92).

During the second phase of the study, the research assistants conducted structured interviews with 40 midwives who were available (as five out of 45 midwives providing

ANC services in the district were unavailable). The reason why midwives were interviewed during this study was that pregnant women seek care from midwives, implying that through ANC clinics, midwives continuously interact with pregnant women. Midwives' own behaviour/health practices could influence pregnant women's utilisation of IPT and other anti-malaria services. After all, pregnant women can only utilise IPT services effectively if such services are available, and if appropriate health education is provided by midwives.

Data pertaining to objectives one to three of phase 2 of the study, comprised midwives' responses to specific items in the structured interview schedule for midwives (see Annexure B2). However, for items related to objective four, information was provided by the midwife-in-charge of the ANC based on the records of ANC clinic registers (see section C of Annexure B2). As such, items related to objective four were the major links between the first and the second phases of the study, namely IPT provision by midwives and its utilisation by pregnant women. These were the items where midwives' responses were based on records of ANC clinic registers such as the monthly average number of pregnant women attending ANC clinics (section 5.3.7.1), average time of first ANC consultation (5.3.7.2), pregnant women who attended the ANC clinics at least four times during their current pregnancies (5.3.7.3), recorded pregnant women's average number of ANC visits (5.3.7.4), major presenting complaints of pregnant women in ANC clinics (5.3.7.5), reported major complications of malaria during pregnancy (section 5.3.7.6), pregnant women treated with anti-malaria drugs at ANC clinics (section 5.3.7.7), pregnant women who received IPT drugs during the second and third trimesters of pregnancy (section 5.3.7.8) and pregnant women who received IPT during the first trimester of pregnancy (section 5.3.7.9).

The interviewed midwives were working at ANC clinics of the 16 health facilities of Buikwe district which participated in phase 1 of the study (section 3.4.2 of this thesis), comprising five hospitals and 11 health centre IIIs. Table 5.1 shows health facilities that participated in the research and the number of midwives from each health facility who participated in phase 2 of the study. Table 5.1also shows the IPT status in these facilities.

Intermittent preventive treatment (IPT) is the administration of full, curative doses of effective anti-malaria medication at pre-defined intervals, regardless of whether there is parasitaemia, with the objective of reducing the malaria burden in a specified target population (Tutu et al 2011:2). In Uganda, the recommended IPT for pregnant women comprises a combination of sulfadoxine and pyrimethamine (SP) (Armstrong Schellenberg et al 2011:2). This is a routine and free service for all pregnant women attending ANC clinics in Uganda which is given during the 2nd and 3rd trimesters of pregnancy (MOH 2012b:91). The interval between the two doses should be at least one month. This is because sulfadoxine and pyrimethamine (SP) are long acting anti-malaria drugs which should not be taken more frequently so as to avoid the accumulation of the drug which might cause hepato-toxicity (see section 2.3.9.4.1 of this thesis).

During phase 2 of the study, proper provision of IPT was considered based on the MOH and WHO recommendation that IPT should be given as directly observed treatment (DOT) (Mpogoro et al 2014:10). This means that a pregnant woman swallows the drug in the presence of the midwife in the ANC clinic. Since pregnant women are usually not sick, they are unlikely to take the IPT, thus, DOT could improve their compliance with IPT. The proper provision of IPT requires that the ANC clinic should have:

- IPT drugs
- clean drinking water for taking the pills

Midwives working in ANC clinics without all these basic requirements for providing DOT services were therefore recorded as being unable to offer the recommended IPT service as indicated in table 5.1. Other ways of giving IPT like dispensing the drug for pregnant women to take at home were not recorded as proper IPT services. As such, item 5.3.3.6 was the index item in this phase of data analysis about which correlations were made. That was to test effective IPT provision by the midwives (see section 5.3.3.6).

Table 5.1: Participating health facilities, midwives and intermittent preventive

(IPT) services

No	Name of the health facility	Midwives at the facility	Midwives who participated	Availability of IPT drugs	Availability of drinking water	Availability of proper IPT services
1	Buikwe HC III	2	2	Available	Available	Yes
2	Buikwe SCL hospital	5	4	Available	Available	Yes
3	Busabaga HC III	2	2	Available	Available	Yes
4	Buwagajjo HC III	2	2	Available	Available	Yes
5	Kasubi HC III	2	2	Available	Not available	No
6	Kawolo hospital	6	4	Available	Available	Yes
7	Makindu HC III	2	2	Available	Available	Yes
8	Makonge HC III	2	2	Available	Available	Yes
9	Mehta Hospital	4	3	Available	Available	Yes
10	Najjembe HC III	2	2	Available	Available	Yes
11	Njeru HC III	2	2	Available	Available	Yes
12	Ngogwe HC III	2	2	Available	Available	Yes
13	Nkokonjeru hospital	4	3	Available	Available	Yes
14	Nyenga hospital	4	4	Available	Available	Yes
15	Ssi HC III	2	2	Available	Not available	No
16	Wakisi HC III	2	2	Available	Not available	No
	Total	**45**	**40**			

As indicated in table 5.1, all 16 ANC clinics had IPT drugs but three ANC clinics did not have clean drinking water. Thus these three ANC clinics could not provide IPT as DOT, as prescribed by the MOH (2012b:91).

5.2 RESEARCH OBJECTIVES OF PHASE 2 OF THE STUDY

The purpose of the study was to identify factors influencing pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda. This research had a total of four specific objectives (refer to section 4:2 of this thesis). However, the purpose of the second phase was to correlate the information provided by pregnant women with information provided by midwives augmented with data from the ANC clinics' registers.

Study objectives for the first phase of the study were based on Bandura's Social Cognitive Theory (SCT), the literature review and the MOH's policies. In order to facilitate the comparison between the two phases of the study, objectives for the second phase of the study ware based on those of the first phase. As such, the specific objectives for the second phase of the study were to identify midwives'

- social-demographic characteristics like age, gender, education level, marital status, employment status and training levels that might influence their provision of IPT services to pregnant women
- environmental factors like public/private ownership of health facilities, availability and cost of IPT drugs and LLINs, availability of TBAs, village health teams (VHTs) and traditional healers that might influence midwives' provision of anti-malaria services to pregnant women
- personal cognitive characteristics that might influence midwives' provision of IPT services to pregnant women
- reported health seeking practices of pregnant women like time and frequency of ANC clinic attendance and IPT utilisation

5.3 RESEARCH RESULTS

The data for phase 2 of the study were collected by conducting structured interviews with 40 midwives working in 16 ANC clinics that participated in the current study. A structured interview schedule (see Annexure B2) was used during the interviews with the midwives (as discussed in section 3.4.2. of this thesis). The findings in this chapter will be discussed according to objectives of the second phase of the study, as stated in section 5.2 of this thesis.

Bivariate correlations were calculated for all variables using Pearson's correlation coefficients and the corresponding p-values (refer to section 4.3 of this thesis). Where applicable, Pearson's correlation coefficients were calculated for variables with the provision of IPT at the health facility concerned. Where applicable, the association of variables with the provision of IPT at the health facility was calculated using Pearson's Chi-square test.

5.3.1 Objective 1 of phase 2 of the study: midwives' social-demographic factors that could influence their provision of intermittent preventive therapy (IPT) to pregnant women

This study was based on the concept of reciprocal determination of Bandura's Social Cognitive Theory. Objective 1's findings concerned personal factors that could influence health-seeking behaviours of pregnant women, in terms of the theoretical framework of the study. The second phase of the study addressed the 40 midwives' social-demographic characteristics like age, gender, employment status, duration of midwifery experience, education level and training of midwives. This information could contextualise information about midwives' provision of effective anti-malaria services at ANC clinics and midwives' reported perceptions about factors that could influence pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda. Depending on the specific variables, descriptive and/or correlational analyses were performed.

5.3.1.1 Age of midwives

The midwives' ages ranged from 23 to 53 years, implying an age range of 30 years. Out of the 40 respondents, 45.0% (*f*=18) ware 21-30 years old, 27.5% (*f*=11) were 31 to 40 years old, 15.0% (*f*=6) were 41 to 50 years old while 12.5% (*f*=5) were 51 to 60 years old (see table 5.2). The mean age of midwives was 33.5 years, the median age was 32 years, the mode was 27 years, and the standard deviation was 8.8 (see table 5.2). These findings imply that 72.5% (*f*=29) of the midwives were 40 years of age or younger. According to the Buikwe District Council (2013:12-14), the district has a generally young workforce.

Pearson's correlation coefficient between midwives' ages and their provision of IPT services was 0.208 ($p>0.05$). That meant that there was a slight correlation between midwives' ages and their provision of IPT drugs to pregnant women at ANC clinics.

Table 5.2: Age groups of midwives (N=40)

Age categories	Frequency	%
21-30	18	45.0
31-40	11	27.5
41-50	6	15.0
51-60	5	12.5
Total	**40**	**100.0**

5.3.1.2 Midwives' gender

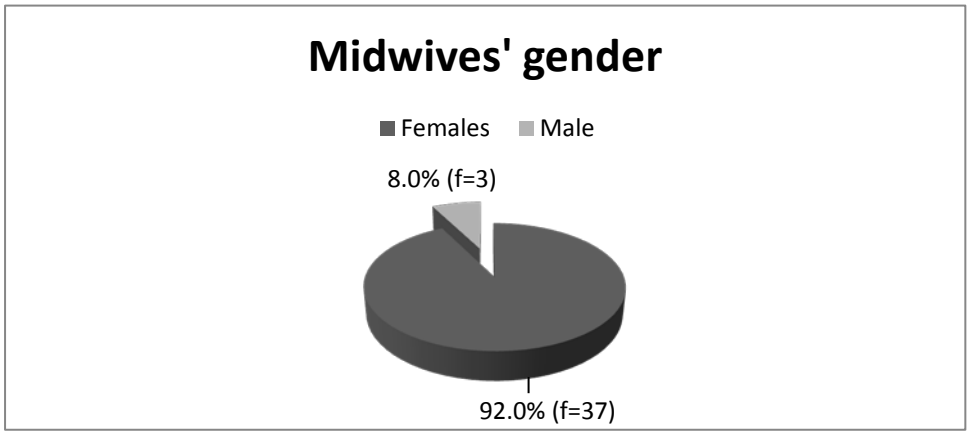


Figure 5.1: Midwives' gender (N=40)

As demonstrated in figure 5.1, out of 40 midwives who participated in the study, 92.5% (*f*=37) were females and 7.5% (*f*=3) were males. At the 5% level of significance, there was no association between midwives' gender and provision of IPT drugs at the health facility. Pearson's Chi square test was (X^2= 0.478, df=1, p=0.655), indicating no association between midwives' gender and provision of IPT drugs. According to Newman's (2014:8-10) study done in Kenya, Uganda and Zambia, there was a distinct difference in concentrations of female students in nursing and midwifery training schools, indicating that mostly women followed nursing and midwifery careers .

5.3.1.3 Marital status of midwives

Out of the 40 midwives, 65.0% (*f*=26) were married, 7.5% (*f*=3) were cohabiting, 15.0% (*f*=6) had never been married, 7.5% (*f*=3) were separated and 5.0% (*f*=2) were widowed (see table 5.3). That meant that 72.5% (n=29) midwives were staying with their spouses as married couples or cohabiting. In a study done in Uganda, married community health workers performed better than their unmarried colleagues possibly due to supplementary support from their spouses (Bagonza et al 2014:[8-15]). In the current study, there was a correlation between midwives' marital status and their provision of IPT drugs to pregnant women at the health facility as Pearson's correlation coefficient was 0.380 (p=0.056).

Table 5.3: Marital status of midwives (N=40)

Categories of marital status	**Frequency**	**%**
Never married	6	15.0
Divorced	0	0.0
Separated	3	7.5
Widow	2	5.0
Cohabiting	3	7.5
Married	26	65.0
Total	**40**	**100.0**

5.3.1.4 Midwives' years of service

Out of 40 respondents, 62.5% (*f*=25) had up to 10 years' midwifery experience, 25.0% (*f*=10) reportedly had 11 to 20 years' experience, 10.0% (*f*=4) had been working as midwives for 21-30 years and one (2.5%) did so for more than 30 years (see table 5.4). Years of service could be an important measure of midwives' expertise. In this study. According to a study that was conducted in Uganda, there was a significantly better performance by senior community health workers than by health workers with less experience (Bagonza et al 2014:[7-14]). Pearson's

correlation coefficient was 0.446, ($p<0.05$), implying that more experienced midwives were more likely to provide the recommended IPT services than the less experienced ones.

Table 5.4: Midwives' years of experience (N=40)

Years of midwifery experience	Frequency	%
1-10	25	62.5
11-20	10	25.0
21-30	4	10.0
31-40	1	2.5
Total	**40**	**100.0**

5.3.1.5 Midwives' highest level of midwifery training

According to the MOH (2012d:43-47), after the ordinary level certificate, a student has to train for two and a half years to become an enrolled midwife in Uganda. Enrolled midwives then train for one and a half years to get a diploma in midwifery and become registered midwives, implying four years' training to become registered midwives. Alternatively, a student with an advanced level certificate, could complete three years' training to obtain a diploma and become a registered midwife. Midwives at diploma level may train for three years to get a degree in nursing or midwifery to become graduate nurses/midwives. In the same way, comprehensive nurses, at enrolled and registration levels, could also be registered as midwives at various levels to practise as midwives.

Out of the 40 respondents, 32.5% (f=13) had certificates in midwifery (see table 5.6); 27.5% (f=11) had certificates in comprehensive nursing; 22.5% (*f*=9) had a diplomas in midwifery, 5.0% (*f*=2) had diplomas in comprehensive nursing, 5.0% (*f*=2) were graduate nurses and 7.5% (*f*=3) had nursing assistant certificates (see table 5.5). According to Bagonza et al (2014:[9-12]), in a study conducted in Uganda, health workers with higher levels of education were better performers than those with lower levels of education (OR 2.74; 95% CI, 1.23-6.08). Similarly, in the current study, Pearson's correlation coefficient was 0.298, ($p>0.05$) indicating that there was a

weak correlation between midwives' levels of training and the provision of IPT drugs at the participating health facilities.

Table 5.5: Midwives' highest qualifications (N=40)

Categories of midwives by training	Frequency	%
Nursing assistant certificate	3	7.5
Certificate in midwifery	13	32.5
Certificate in comprehensive nursing	11	27.5
Diploma in midwifery	9	22.5
Diploma in compressive nursing	2	5.0
Degree in nursing	2	5.0
Total	**40**	**100.0**

5.3.1.6 Midwives' designations

Out of 40 midwives, 60.0% (*f*=24) were appointed as enrolled midwives, 20.0% (*f*=8) as registered midwives, 10.0% (*f*=4) as enrolled comprehensive nurses, 2.5% (*f*=1) as comprehensive registered nurses while 7.5% (*f*=3) were nursing assistants (see table 5.6). There was a weak negative correlation between midwives' designations and their provision of IPT drugs as Pearson's correlation coefficient was -0.257, ($p>0.05$). The designations (positions) of midwives depend on their qualifications. Since there was a weak correlation between midwives' qualifications and their provision of IPT drugs, it was expected that midwives' designations would not be a significant factor in midwives' provision of IPT services.

Table 5.6: Designations of midwives (N=40)

Midwives' designations/positions (N=40)	Frequency	%
Nursing assistants	3	7.5
Comprehensive enrolled nurses	4	10.0
Enrolled midwives	24	60.0

Registered midwives	8	20.0
Comprehensive registered nurses	1	2.5
Total	**40**	**100.0**

5.3.1.7 Midwives' temporary versus permanent appointments

Out of 40 respondents, 87.5% (*f*=35) had permanent appointments while 12.5% (*f*=5) were "on probation terms of employment" implying that they had not yet been appointed permanently (see figure 5.2). According to Bagonza et al (2014:[10-12]) in a study conducted in Uganda, health workers with permanent appointment letters, were better performers than those without such appointments (OR 3.57; 95% CI, 2.00-6.25). In the current study, Pearson's correlation coefficient was 0.272, (p>0.05), indicating a weak correlation between appointment status of midwives and the provision of IPT drugs at health facilities.

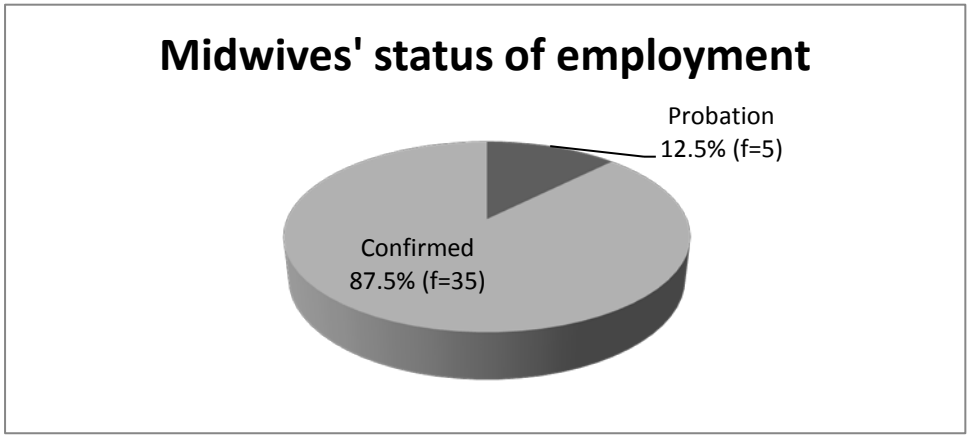


Figure 5.2: Employment status of midwives (N=40)

5.3.1.8 Midwives' training related to malaria control during pregnancy

Out of 40 respondents, 55.0% (*f*=22) had received no training about malaria control during pregnancy during the 12 months preceding the interviews while 45.0% (*f*=18) had reportedly received such training. Continuous nursing/midwifery education is the basis of licencing of health professionals in Uganda. Yearly re-licencing of health

professionals depends on evidence that one has had at least 100 hours of education annually (MOH 2010a:40-48)

There was a weak correlation between midwives' training related to malaria control during pregnancy and the provision of IPT drugs at the ANC clinics. Pearson's correlation coefficient was 0.286, ($p<0.05$), indicating that midwives who had been trained about malaria control during pregnancy were more likely to provide IPT during pregnancy. This implies that training related to malaria during pregnancy is important for the provision of proper IPT services to pregnant women.

5.3.1.9 Midwives' duration of training about malaria control during pregnancy

Out of the 18 midwives who had received training about malaria control during pregnancy, 66.7% (*f*=12) had one day's training, 27.8% (*f*=5) had two to five days training and one midwife's (5.6%) training lasted more than five days (see table 5.7). That meant that, out of 18 midwives who had been trained on malaria prevention during pregnancy, 94.4% (f=17) received training for two days or less.

There was a weak correlation between the duration of training and the provision of IPT drugs at the health facilities. Pearson's correlation coefficient was 0.266, ($p>0.05$). That meant that proper provision of IPT was weakly associated with the number of days of training received. However, this analysis might be inconclusive because of the small numbers of 18 midwives who had received such training.

Table 5.7: Midwives' duration of training on malaria control during pregnancy

Duration of training (N=18)		
One day	12	66.7
Two to five days	5	27.8
More than five days	1	5.6
Total	**18**	**100.1**

5.3.2 Discussion of phase 2's key study findings in relation to objective 1

Based on the theoretical framework, the first objective of phase 2 of the current study, was about social-demographic characteristics of midwives that could influence their provision of anti-malaria services to pregnant women. These characteristics were presented in relation to their association with IPT provision at participating ANC clinics.

Most social-demographic variables of the midwives showed no correlation with the provision of IPT to pregnant women. However, there was a positive correlation between midwives' years of experience and provision of IPT drugs. Pearson's correlation coefficient was 0.446, ($p<0.05$), indicating that more experienced midwives were more likely to provide IPT services than the less experienced ones. There was also a weak correlation between midwives' training in malaria control during pregnancy and the provision of IPT at the ANC clinics because Pearson's correlation coefficient was 0.286, ($p<0.05$).

5.3.3 Phase 2's study findings related to objective 2: environmental factors that could influence midwives' provision of intermittent preventive therapy (IPT)

This research was based on the concept of reciprocal determination of Bandura's Social Cognitive Theory. Objective 2's findings were related to the environment that could influence midwives' IPT provision to pregnant women. The second objective of the study thus aimed to identify environmental factors like geographic access to health facilities, availability of quality health services, traditional healers' and peers' potential influence on pregnant women's utilisation of anti-malaria services.

Midwives and the health care system comprise part of the environment in which pregnant women interact on a day to day basis. This section analysed data provided by midwives about environmental factors that could influence their provision of IPT drugs to pregnant women. Depending on the variables, descriptive and correlational data analyses were performed.

5.3.3.1 Public/private ownership of the antenatal care (ANC) clinics

Out of 40 respondents, 65.0% (*f*=26) indicated that their health facilities were government owned, 30.0% (*f*=12) were private not-for-profit faith-based health facilities (PNFP) and 5.0% (*f*=2) were private health facilities (see figure 5.3).

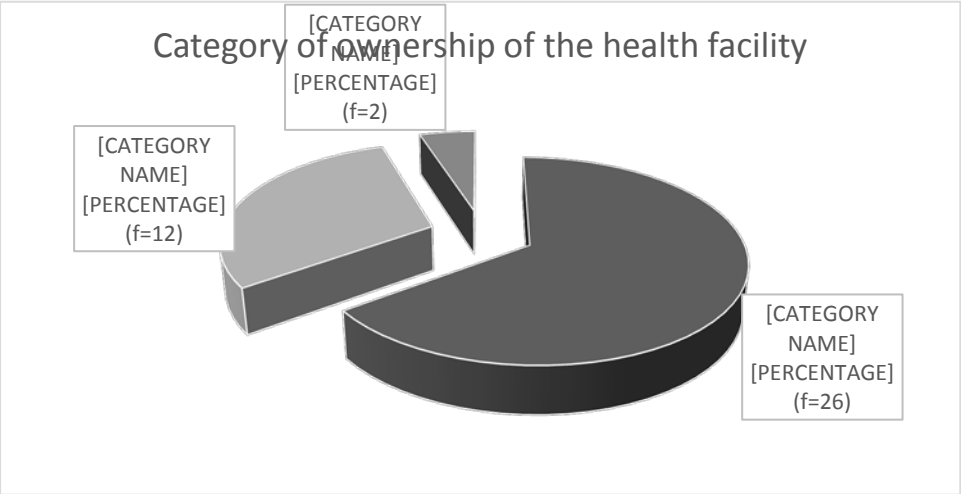


Figure 5.3: Ownership of the health facilities (N=40)

There was no correlation between ownership of the health facility and the provision of IPT drugs at the health facility. Pearson's correlation coefficient was -0.226, ($p>0.05$). That meant that the provision of IPT drugs at the health facilities was not influenced by public/private ownership of the facility.

5.3.3.2 Payment for antenatal care (ANC) services

Out of the 40 midwives, 62.5% (*f*=25) indicated that pregnant women were not supposed to pay for services provided at ANC clinics. However, 37.5% (*f*=15) of the participating 40 midwives indicated that pregnant women had to pay for some or all services offered at their ANC clinics (see table 5.8).

Since many Ugandans are poor, payment for ANC services could influence the non-utilisation of IPT by pregnant women (MOH 2010a:12-23). However, in the current

study, there was no correlation between payment for ANC services and the midwives' provision of IPT at the health facilities. Pearson's correlation coefficient was 0.018, ($p>0.05$), implying that the midwives' provision of IPT at ANC clinics was not related to payment for ANC services by pregnant women.

Table 5.8: Payment for antenatal care (ANC) services (N=40)

Category	Frequency	%
No	25	62.5
Yes, some services	14	35.0
Yes, all services	1	2.5
Total	**40**	**100.0**

5.3.3.3 Number of weekly antenatal care (ANC) clinic days

Out of 40 midwives, 65.0% (*f*=26) indicated that their ANC clinics operated for five or more days per week, while 35.0% (*f*=14) operated for less than five days per week, (see table 5.9). The weekly working number of days that the ANC clinics operate could have influenced pregnant women's utilisation of IPT services.

In this study, there was a positive correlation between the number of ANC working days per week and the provision of IPT at the health facilities. Pearson's correlation coefficient was 0.421, ($p<0.05$). That meant that provision of IPT at ANC clinics was positively related to the number of working days of these clinics. Midwives working in ANC clinics that were working for more days per week were more likely to offer the recommended IPT services. The more working days in a week means more availability of midwives for pregnant women, thus increased availability of ANC and IPT services.

Table 5.9: Antenatal care (ANC) clinics' weekly working days (N=40)

ANC working days per week	Frequency	%
Two days	7	17.5

Three days	2	5.0
Four days	5	12.5
Five days	23	57.5
Seven days	3	7.5
Total	**40**	**100.0**

5.3.3.4 The availability of intermittent preventive therapy (IPT) drugs at antenatal care (ANC) clinics

Out of 40 respondents, 87.5% (*f*=35) indicated that IPT drugs were always available at their ANC clinics while 12.5% (*f*=5) indicated that IPT drugs were often available. According to Bagonza et al (2014:12-14) in a study conducted in Uganda, it was concluded that drug availability was critical for the provision of health services to communities. Thus it could be a cause for concern that 12.5% (*f*=5) of the midwives implied that IPT drugs were not always available at their ANC clinics as no IPT can be administered without these drugs. However, shortages or 'stock-outs' of IPT drugs have also been reported in other East African countries such as Tanzania (Mikklesen-Lopez, Tediosi, Abdallah, Ntjozi, Amuri, Khatib, Manzi, & De Savigny 2013:444) and Kenya (Sudoi et al 2013:37).

There was a weal positive correlational in the current study's findings between the availability of IPT drugs and the provision of these drugs at the health facilities because Pearson's correlation coefficient was 0.208, ($p<0.05$). That meant that pregnant women were more likely to get the recommended IPT services from health facilities where IPT drugs were available. This was expected since without IPT drugs, no IPT services can be rendered or utilised.

5.3.3.5 Cost of intermittent preventive therapy (IPT) at antenatal care (ANC) clinics

Out of 40 respondents, 90.0% (*f*=36) indicated that IPT drugs were free while 10.0% (*f*=4) indicated that IPT drugs were not free at their ANC clinics. The MOH's policy on these basic essential drugs is that they should be free for all Ugandans (MOH 2012a:120-121). There was a weak negative correlation between the cost of IPT drugs and the provision of these drugs at the participating health facilities as Pearson's correlation coefficient was -0.108, ($p>0.05$). This implied that pregnant women were slightly less likely to buy IPT drugs if they had to pay for these drugs.

5.3.3.6 The administration of intermittent preventive therapy (IPT) at antenatal care (ANC) clinics

The MOH's policy guideline on IPT states that the drugs should be given as DOT in the presence of a health worker (MOH 2012b:91-92). As such IPT is a standard activity where the ANC clinic should have the two basic items, namely IPT drugs and clean drinking water. Any ANC clinic without these basic requirements for DOT services were therefore recorded as being unable to offer effective IPT services.

Out of 40 midwives who participated in the current study, 85.0% (*f*=34) indicated that IPT drugs were given to pregnant women as DOT in the presence of a midwife. However, 15.0% (f=6) of them were not providing IPT as DOT. In terms of the information displayed in table 5.1, only three out of the 16 participating clinics did not have clean drinking water. Thus it is unknown why three ANC clinics with clean water did not administer IPT as DOT in the Buikwe district of Uganda. However, a Tanzanian study emphasised that: "A combination of health facility understaffing, water scarcity and staff non-adherence to directly observed therapy instructions forced healthcare staff to allow clients to take SP at home" (Mikklesen-Lopez et al 2013:[1]).

5.3.3.7 Availability of mosquito bed nets at the antenatal care (ANC) clinics

Out of 40 midwives who participated in the current study, 80.0% (*f*=32) indicated that mosquito bed nets were always available and 20.0% (*f*=8) indicated that they were

often available at the ANC clinics. According to the MOH (2012b:90-95) the government of Uganda, together with support from partners, is supposed to make LLINs available in ANC clinics for use by pregnant women. There was a weak correlation between the availability of bed nets and the provision of IPT drugs at the health facilities as Pearson's correlation coefficient was 0.242, ($p>0.05$).

5.3.3.8 The type of mosquito bed nets provided to pregnant women

All midwives (100%; N=40) indicated that whenever they provided mosquito nets to pregnant women, they give out LLINs. This is possibly due to the fact that all health facilities' received LLINs from development partners and from the MOH (2012a:90-93). Since all respondents had a unanimous response, Pearson's correlation coefficient was not calculated.

5.3.3.9 Cost of mosquito bed nets at the antenatal care (ANC) clinics

All midwives (100.0%; N=40) indicated that mosquito bed nets were issued free of charge to pregnant women at their ANC clinics. All ANC clinics in Uganda are supposed to issue free LLINs to pregnant women as these LLINs are provided by development partners and by the MOH (2012a:90-94). As all midwives indicated that the LLINs were available free of charge there were no comparative groups, rendering correlational data analysis inapplicable to this case.

5.3.3.10 Number of mosquito bed nets provided to each pregnant woman during subsequent antenatal care (ANC) clinic visits

Most midwives (80.0%; *f*=32) indicated that no mosquito bed net was given to pregnant women at subsequent ANC clinic visits. However, 15.0% (*f*=6) of the respondents indicated that pregnant women received one bed net at a subsequent ANC clinic visit and only 5.0% (*f*=2) indicated that two LLINs were given to women during their subsequent ANC clinic visits (see table 5.10). The MOH (2010a:45-49) recommends one mosquito net for each pregnancy during the first ANC clinic visit. Thus 20% (*f*=8) of the midwives did not comply with the prescribed MOH guideline of issuing one LLIN to a pregnant woman during each pregnancy. Issuing more than

one LLIN to a pregnant woman during one pregnancy could cause a shortage of LLINs in the district implying that some people might be unable to obtain LLINs when needed. This is an important issue because donor funds are never unlimited. Briët and Penny (2013:[1]) warned that: “Stagnating funds for malaria control have spurred interest in the question of how to sustain the gains of recent successes with long-lasting insecticidal nets (LLINs) and improved case management (CM)”.

In the current study there was no correlation between midwives’ reports that pregnant women received LLINs at subsequent ANC clinic visits and the provision of IPT drugs at these health facilities as Pearson’s correlation coefficient was 0.092, ($p>0.05$).

Table 5.10: Number of bed nets provided to pregnant women during their subsequent antenatal care (ANC) clinic visits (N=40)

Bed nets given at subsequent ANC clinic visits(N=40)	**Frequency**	**%**
One bed net	6	15.0
Two bed nets	2	5.0
None	32	80.0
Total	**40**	**100.0**

5.3.3.11 Midwives’ knowledge about the required re-treatment of long lasting insecticide treated nets (LLINs)

Out of 40 midwives, 90.0% (*f*=36) indicated that the LLINs did not require any re-treatment and four respondents (10.0%) indicated that they needed re-treatment after six months and that this should be done at home. As indicated in section 5.3.3.8 of this thesis, only LLINs were provided at the participating health facilities, and LLINs do not require any re-treatment. Uganda’s MOH (2012b:90-92) policy is

that pregnant women should use LLINs for preventing malaria and reportedly all participating clinics adhered to this policy guideline.

There was a weak positive correlation in the current study between midwives' knowledge about the need for re-treatment of bed nets and the provision of IPT. Pearson's correlation coefficient was 0.284, ($p<0.05$). This meant that, midwives who had the correct information about LLINs' re-treatment were more likely to provide IPT to pregnant women.

5.3.3.12 Malaria-related blood tests performed at antenatal care (ANC) clinics

Out of 40 midwives interviewed during the current study, 85.0% (*f*=34) indicated that whenever necessary, blood testing for malaria diagnosis was done at ANC clinics and 15.0% (f=6) indicated that this was not done. Blood testing is vital for the proper diagnosis of malaria (English & Webster 2010:67).

There was a weak positive correlation between blood testing at ANC clinics and the provision of IPT. Pearson's correlation coefficient was 0.226, ($p<0.05$), indicating that at ANC facilities where blood testing for malaria was done, midwives were more likely to provide proper IPT to pregnant women.

5.3.3.13 The availability of traditional birth attendants (TBAs) in communities

Out of 40 respondents, 32.5% (*f*=13) indicated that TBAs were sometimes available and 30.0% (*f*=12) indicated that TBAs were always available in communities. However, one (2.5%) midwife indicated that TBAs were never available and 35.0%

(*f*=14) were unsure about TBAs' availability in their communities (see table 5.11). That meant that 70.0% (f=28) of all respondents had no or rare communication with TBAs. Uganda's health policy discourages TBAs from conducting deliveries since TBAs are not trained health professionals (Buikwe District Council 2013:25-28).

There was a weak correlation between the midwives' perceived availability of TBAs and their provision of IPT at ANC clinics. Pearson's correlation coefficient between midwives' perceived availability of TBAs and midwives provision of IPT at ANC clinics was 0.106, (p>0.05).

Table 5.11: The availability of and cooperation with traditional birth attendants (TBAs) (N=40)

Availability of TBAs in communities (N=40)	**Frequency**	**%**
TBAs always available	12	30.0
Sometimes available	13	32.5
Not available	1	2.5
Not sure	14	35.0
Total	**40**	**100.0**
Level of cooperation between health workers and TBAs (N=40)		**%**
Get reports from TBAs	5	12.5
Midwives have trained TBAs	5	12.5
No information about TBAs	30	75.0
Total	**40**	**100.0**

*5.3.3.*14 Level of cooperation between midwives and traditional birth attendants (TBAs)

Of the current study's respondents, 75.0% (*f*=30) had no information about TBAs. Thus, most midwives (75.0%; *f* =30) did not cooperate with TBAs. Only 12.5% (*f*=5) of the midwives indicated that they had received reports from TBAs and 12.5% (*f*=5) indicated that they had trained TBAs (see table 5.11). In this study, there was a weak correlation between cooperation between midwives and TBAs and the provision of IPT at the health facilities as Pearson's correlation coefficient was 0.277, (p>0.05).

5.3.3.15 Availability of village health team members (VHTs) in communities

Out of the 40 midwives who were interviewed during the second phase of the current study, 57.5% (*f*=23) indicated that village health team members (VHTs) were always available and 27.5% (*f*=11) indicated that VHTs were sometimes available when needed in communities. However, 15.0% (n=6) of the midwives indicated that VHTs were never available in communities (see table 5.12). In this study, there was no correlation between the midwives' reported availability of VHTs and the provision of IPT at the health facilities as Pearson's correlation coefficient was 0.092 (p>0.05). The MOH recommends that each village should have a VHT that is supposed to assist health workers in linking communities to health facilities (MOH 2010a:20-25).

Table 5.12: Midwives' information about the availability of village health team members (VHTs) (N=40)

Availability of VHTs (N=40)	**Frequency**	**%**
Always available when needed in communities	23	57.5
Sometimes available when needed in communities	11	27.5
Never available in communities even when needed	6	15.0
Total	**40**	**100.0**

5.3.3.16 Level of co-operation between midwives and village health team members (VHTs)

During the structured interviews, midwives were requested to indicate all applicable levels of their cooperation with VHTs. This item yielded 76 responses from the 40 respondents. Out of the 40 respondents, 57.5% (*f*=23) indicated that they had

registered VHTs, 42.5% (*f*=17) worked with VHTs in ANC clinics, 42.5% (*f*=17) received reports from VHTs and 27.5% (*f*=11) trained VHTs in ANC clinics. However, 20.0% (*f*=8) of the respondents indicated that they had no information about the availability of VHTs in their communities (see figure 5.4). In this study, there was a positive correlation between the reported level of cooperation between midwives and VHTs and the provision of IPT as Pearson's correlation coefficient was 0.387, ($p<0.05$).

The VHT policy of the MOH (2010a:20-24) states that VHTs should support health workers in linking communities to health facilities. This 'linking; might have occurred in the Buikwe district as there was a positive correlation (0.387; $p<0.05$) between such cooperation and the provision of IPT. However, this cooperation leaves room for improvement because 20.0% (*f*=8) of the interviewed midwives knew nothing about the availability of VHTs in communities. Okeibunor, Orji, Brieger, Ishola, Otolorin, Rawlins, Ndekhedehe, Onyeneho and Fink (2011:[9]) emphasised that: "…the training and development of community volunteers through health facility staff has the potential to strengthen ties with the formal health sector and to increase its reach into often underserved rural or marginalized communities". The WHO conducted a multi-country study and reported that: "… conditional on sufficient training and support, community implementers can effectively deliver essential health care to women of reproductive age, and support he delivery of IPTp and ITN services as well as counselling to communities" (in Centers for Disease Control and Prevention [CDC] 2007:1).

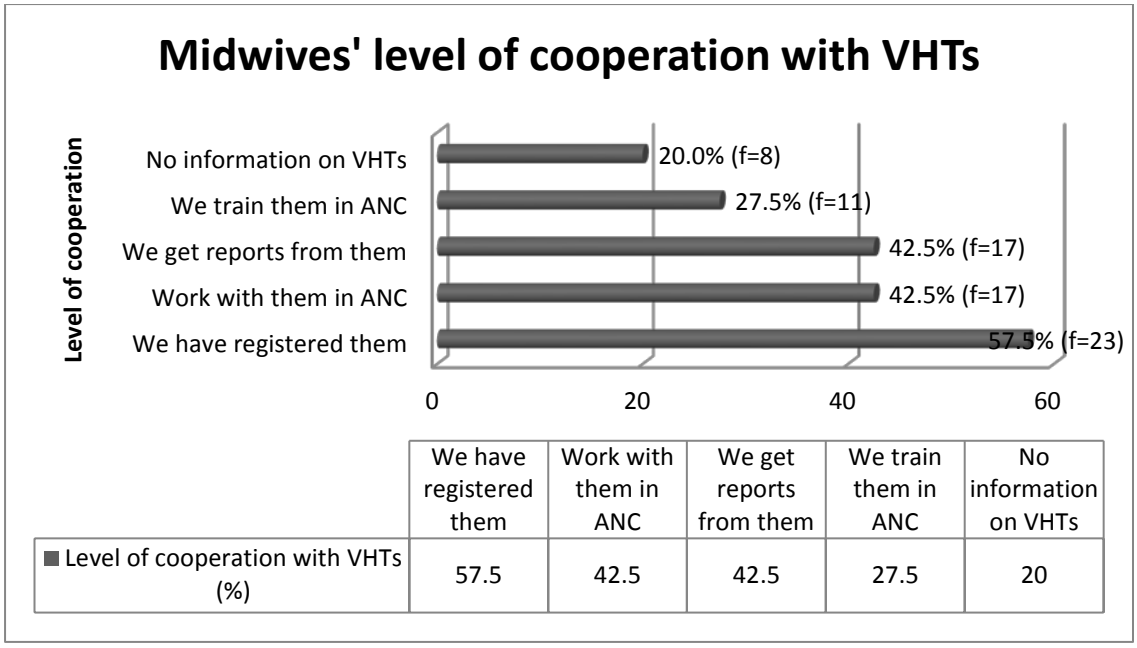


Figure 5.4: Midwives' levels of cooperation with village health team members (VHTs) (N=40)

5.3.4 Discussion of key findings related to objective 2 of phase 2 of the study

With regard to the theoretical framework of the study, the second objective addressed midwives' perceptions about environmental factors' potential influence on the provision of IPT services. These characteristics are presented in relation to their association with the provision of IPT drugs by midwives at ANC clinics.

Out of 40 midwives, 65.0% (*f*=26) indicated that their ANC clinics operated for five or more days per week. There was a positive correlation between the number of ANC working days per week and the provision of IPT at the health facilities as Pearson's correlation coefficient was 0.421, ($p<0.05$). In this study, midwives' provision of IPT drugs had a weak positive correlation with the sustained availability of IPT drugs at the ANC clinics as Pearson's correlation coefficient was 0.208, ($p<0.05$). There was also a weak positive correlation between midwives' knowledge about the re-treatment of bed nets and their provision of IPT. Pearson's correlation coefficient was 0.284, ($p<0.05$). This meant that midwives who had the correct information (that LLINs do not require re-treatment) were more likely to provide the correct IPT services to pregnant women. The MOH provides the type of LLINs at health facilities

in Uganda that do not require any re-treatment, according to the MOH's [2012a:90-92] policy. However, studies testing the deltamethrin (insecticide) concentration on LLINs, reported that after 24 months of use, approximately 10% of the original insecticide remained in the LLINs (Green, Mayxay, Beach, Pongvongsa, Phompida, Hongvanthong, Vanisaveth, Newton, Vizcaino & Swamidoss 2013:[1]).

There was a weak positive correlation between blood testing for malaria diagnosis at ANC clinics and the provision of IPT as Pearson's correlation coefficient was 0.226, ($p<0.05$). That meant that in facilities where blood testing for malaria was done at ANC clinics, midwives were more likely to provide IPT than in ANC clinics where such testing did not take place. In the current study, there was a moderate positive correlation between the level of cooperation between health workers with VHTs and the provision of IPT as Pearson's correlation coefficient was 0.387, ($p<0.05$). That meant that in health facilities where there was cooperation between VHTs and midwives, it was more likely that IPT drugs would be provided correctly. Cooperation between midwives and VHTs is important in linking care to communities, because VHTs live with pregnant women in communities. Okeibunor et al (2011:[1]) stated: "… community-based programmes can substantially increase effective access to malaria prevention, and also increase access to formal health care access in general, and antenatal care attendance in particular in combination with supply side interventions. Given the relatively modest financial commitments they require, community-directed programmes appear to be a cost-effective way to improve malaria prevention … and also promises to strengthen ties between the formal health sector and local communities.

5.3.5 Phase 2's findings related to objective 3: personal learning factors that could influence the environment and the midwives' provision of intermittent preventive therapy (IPT) to pregnant women

This study was based on the concept of reciprocal determination of Bandura's Social Cognitive Theory. Findings under the third objective were related to personal learning factors that could influence the environment and the midwives' provision of IPT to pregnant women contextualised within this theoretical framework. The third objective aimed to identify midwives' personal cognitive characteristics (like

knowledge about malaria during pregnancy and sources of malaria-related information) that might have influenced midwives' provision of anti-malaria services to pregnant women.

5.3.5.1 Frequency of offering health education to pregnant women

Midwives provided health education to pregnant women but the frequency differed between midwives. Out of 40 midwives, 72.5% (*f*=29) indicated that health education was always offered to pregnant women during their ANC visits, but 27.5% (*f*=11) indicated that this was not always the case. In this study, Pearson's correlation coefficient between the frequency of offering health education and IPT provision was 0.324, ($p<0.05$). That meant that there was a positive correlation between the frequency of offering health education and IPT provision by midwives. That implied that midwives who frequently offered health education were more likely to offer IPT services.

5.3.5.2 Inclusion of a topic on malaria during health education

All midwives (100.0%; N=40) indicated that topics on malaria during pregnancy were included during health education provided at ANC clinics. All respondents indicated that a topic on malaria was included whenever they educated pregnant women. Correlational data analysis was not applicable for this variable since 100.0% of the respondents gave the same response.

5.3.6 Discussion of phase 2's key findings related to objective 3: midwives' personal cognitive characteristics

With regard to the theoretical framework of the study, the third objective studied personal cognitive characteristics of midwives like knowledge about malaria during pregnancy in relation to sources of malaria-related information that could influence midwives' provision of IPT services to pregnant women.

Out of 40 midwives, 72.5% (*f*=29) indicated that health education was always offered to pregnant women during their ANC visits. The analysis showed a positive correlation between the frequency of offering health education to pregnant women

and proper IPT provision by midwives as Pearson's correlation coefficient was 0.324, ($p<0.05$). This meant that the more frequently midwives offered health education to pregnant women, the more likely they were to properly provide IPT to pregnant women.

5.3.7 Phase 2's study findings related to objective 4: health seeking practices of pregnant women

This study was based on the concept of reciprocal determination of Bandura's Social Cognitive Theory. The fourth objective of this study was to identify pregnant women's behaviour/health practices, including their IPT utilisation. As midwives continuously interact with pregnant women, midwives' own behaviour/health practices could influence pregnant women's utilisation of IPT services.

5.3.7.1 Monthly average number of pregnant women attending antenatal care (ANC) clinic

With reference to available records of the three months preceding the structured interviews conducted with the midwives, out of the 40 midwives, 67.5% (*f*=27) indicated that their ANC clinics managed an average of at least 201 pregnant women per month and 17.5% (*f*=7) indicated that one to 100 pregnant women attended their ANC clinics monthly. However, 15.0% (*f*=6) of the respondents indicated that their average monthly ANC clinic attendance ranged from 101 to 200 pregnant women (see table 5.13). That meant a generally high ANC attendance of about 200 pregnant

women per month as reported by 67.5% of all participating midwives. According to Maheu-Giroux et al (2014:10-12), the average ANC clinic attendance among pregnant women in the Eastern African countries of Uganda, Tanzania and Kenya was 90.0%, generally a considered to be a success story.

There was a positive correlation between the average monthly number of pregnant women who attended specific ANC clinics and the provision of IPT as Pearson's correlation coefficient was 0.424, ($p<0.05$). That implied that when more women

attended a specific ANC clinic, then the midwives in that clinic were more likely to offer IPT services.

Table 5.13: Antenatal care (ANC) clinic attendance (N=40)

Categories of average monthly numbers of pregnant women	Frequency	%
1-100 pregnant women per month	7	17.5
101-200 pregnant women per month	6	15.0
201 or more pregnant women per month	27	67.5
Total	**40**	**100.0**

5.3.7.2 Trimester at pregnant women's first antenatal care (ANC) clinic visits

With reference to available ANC clinic records, out of 40 respondents, 57.5% (*f*=23) indicated that on average their clients' first ANC visits occurred during the second trimester, 30.0% (*f*=12) respondents indicated the third trimester and 12.5% (*f*=5) the first trimester. That meant that most pregnant women (57.5%; *f*=23) commenced their ANC clinic attendance during their second trimester (see figure 5.5). This was in agreement with the Uganda national demographic and health survey finding that only 21% of all pregnant women attended ANC clinics during the first trimester (UBOS 2012:105-106). According to the MOH (12a:70-75), the recommended time of first ANC attendance is supposed to be during the first trimester. Early ANC attendance could help pregnant women to benefit from the available services, including IPT and other anti-malaria services. There was a negative correlation between recorded pregnant women's first ANC visit and midwives' provision of IPT drugs at health facilities as Pearson's correlation coefficient was -0.417, ($p<0.05$). That meant that pregnant women who commenced ANC clinic visits late during their pregnancies had a smaller chance of getting proper IPT treatment. The earlier the pregnant women started attending ANC clinics, the more likely the midwives were at these ANC clinics to provide proper IPT services.

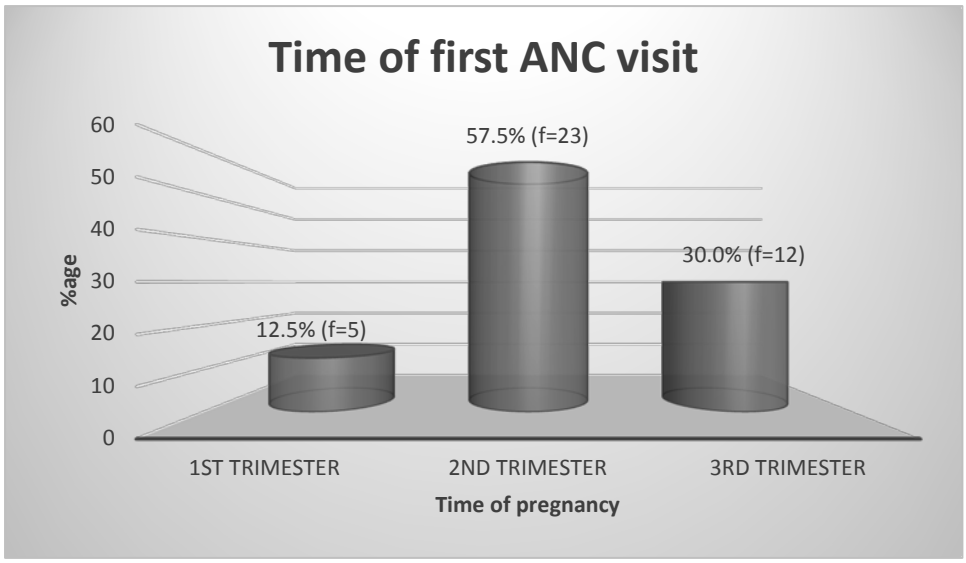


Figure 5.5: Time of first antenatal (ANC) clinic visit (N=40)

5.3.7.3 Pregnant women with at least four antenatal care (ANC) clinic attendances during their current pregnancies

Out of the 40 midwives, 55.0% (*f*=22) indicated that fewer than 30% of their clients had four ANC clinic visits, 40.0% (*f*=16) indicated that 30-60% of the pregnant women did so while 5.0% (*f*=2) indicated that 60% of the pregnant women in their ANC clinics managed four ANC clinic attendances (see table 5.14). This meant that most of the pregnant women did not attend the ANC clinics at least four times during their current pregnancies. These findings were higher than those reporting that fewer than 50.0%
of Ugandan women attended ANC clinics at least four times during their pregnancies (Odongo et al 2014:[7-9]). The current study's findings were also higher than those reported by UBOS (2012:106) indicating that only 47.0% of all pregnant women attended ANC clinics at least four times during their pregnancies.

In the current study, Pearson's correlation coefficient between the percentage of pregnant women who had at least four ANC visits and the provision of IPT was 0.245 ($p<0.05$). There was a weak positive correlation between the percentage of pregnant women who had at least four ANC visits and the provision of IPT. That meant that

midwives were more likely to provide the recommended IPT services when pregnant women attended ANC clinics at least four times during their pregnancies.

Table 5.14: Estimated average percentage of pregnant women with at least four antenatal care (ANC) clinic visits

Estimated average percentage of pregnant women with at least four ANC visits (N=40)		
Category	Frequency	**%**
<30%	22	55.0
30-60%	16	40.0
>60	2	5.0
Total	**40**	**100.0**

5.3.7.4 Pregnant women's recorded average number of antenatal care (ANC) clinic visits

Out of the 40 midwives, 55.0% (*f*=22) estimated that on average, their clients attended ANC clinics fewer than four times, 40.0% (*f*=16) said pregnant women managed the recommended four ANC visits and 5.0% (f=2) said women attended ANC clinics more than four times (see table 5.14). This was in agreement with the UBOS (2012:105-106) finding that only 47.0% of all pregnant women attended ANC clinics at least four times.

The current study's findings were in agreement with those of a Ugandan study which reported that 48.7% (n=269) of the pregnant women participating in their study had managed four ANC clinic visits (Odongo et al 2014:[7]). There was no correlation between the reported number of ANC visits by pregnant women and provision of IPT as Pearson's correlation coefficient was 0.010, (p>0.05) for the current study.

5.3.7.5 Major presenting malaria-related complaints of pregnant women at antenatal care (ANC) clinics

Out of 40 midwives, 55.0% (*f*=22) indicated that fever was the major malaria-related presenting complaint at the ANC clinics, while 15.0% (*f*=6) indicated generalised weakness and 15.0% (*f*=6) indicated headaches as the major presenting symptoms

of malaria during pregnancy. However, 10.0% (*f*=4) of the respondents indicated anaemia and 5.0% (*f*=2) indicated that coughing were the major presenting symptoms of malaria during pregnancy (see table 5.15). This information is in agreement with available literature about the known symptoms of malaria during pregnancy (English & Webster 2010:43-45). Since the item solicited multiple responses, bivariate correlational data analysis was not applicable to this item and therefore it was not calculated.

Table 5.15: Major presenting symptoms of malaria during pregnancy (N=40)

Category	Frequency	%
Fever	22	55.0
Generalised weakness	6	15.0
Headaches	6	15.0
Anaemia	4	10.0
Coughing	2	5.0
Total	**40**	**100.0**

5.3.7.6 Major complications of malaria during pregnancy

The 40 midwives were asked to identify one major complication of malaria during pregnancy commonly occurring in their ANC clinics. Out of 40 midwives, 50.0% (*f*=20) reported that abortion was the major complication of malaria during pregnancy, 30.0% (*f*=12) said it was severe anaemia, 15.0% (*f*=6) indicated premature delivery and 5.0% (*f*=2) indicated low birth weight (see table 5.16).

This information is in agreement with available literature about the known complications of malaria during pregnancy (English & Webster 2010:43). For this item, bivariate correlational data analysis was not applicable and therefore not calculated.

Table 5.16: Complications of malaria during pregnancy (N=40)

Category	Frequency	%

Abortions	20	50.0
Low birth weight of babies	2	5.0
Severe anaemia	12	30.0
Premature deliveries	6	15.0
Total	**40**	**100.0**

5.3.7.7 Pregnant women treated with anti-malaria drugs at antenatal care (ANC) clinics

Out of the 40 midwives, 75.0% (*f*=30) indicated that 1-20 pregnant women had received anti-malaria treatment at their ANC clinics during the month preceding the interviews. However, 25.0% (*f*=10) of the respondents indicated that 21 or more pregnant women had received anti-malaria treatment during this time at their ANC clinics. In another study done in Uganda, out of 700 pregnant women attending ANC clinics, 26.0% (n=182) of the respondents had malaria-related complaints that were recorded in the ANC clinics' registers (Odongo et al 2014:[8-10]).

In the current study there was a moderate positive correlation between the estimated number of pregnant women who had received anti-malaria treatment and the provision of IPT as Pearson's correlation coefficient was 0.486, ($p<0.05$). That meant that midwives were more likely to provide the recommended IPT services in ANC clinics where more pregnant women were treated with anti-malaria drugs. The reason for this correlation could not be determined from the available data but it is possible that midwives working at ANC clinics where many women suffered from malaria, might have been more acutely aware of the benefits of IPT than midwives working at ANC clinics with a lower incidence of malaria.

5.3.7.8 Pregnant women who received intermittent preventive therapy (IPT) during their second and third trimesters of pregnancy at the antenatal care (ANC) clinics

Out of 40 midwives, 80.0% (*f*=*3*2) indicated that their clients had received at least one dose of IPT and 20.0% (*f*=8) that their clients had not received any IPT doses during their second and third trimesters of pregnancy. That meant that not all women who came to ANC clinics during their second and third trimesters of pregnancy had received IPT drugs. Correlational data analysis was not applicable for this item and therefore not calculated. The MOH (2012b:91-3) guideline on IPT stipulates that the two IPT doses should be given during the second and third trimesters of pregnancy with at least a one month's interval between the two IPT doses.

In a study conducted in Tanzania, out of out of 265 pregnant women in the second and third trimesters of pregnancy, 85.7% (n=227) had received IPT drugs (Mpogoro et al 2014:6-9). Another study, done in Gabon, reported that IPT services were offered to 84.1% of the ANC clients (Boyou-Akotet, Mawill-Mboumba, & Kombila 2013:[1]). These findings are similar to findings of the current study meaning a high IPT utilisation in the region.

5.3.7.9 Pregnant women who received intermittent preventive therapy (IPT) during their first trimester of pregnancy

All 40 respondents (100.0%) indicated that none of their clients had received IPT during the first trimester. This was in agreement with the recommendation that IPT should be administered during the second and third trimesters of pregnancy (MOH 2012a:91). Since no pregnant women were given IPT during the first trimester, correlational data analysis was not applicable for this item and therefore not calculated.

5.3.7.10 Midwives' suggestions to control malaria in communities

The midwives were requested to suggest as many ways as possible that could be used to control malaria. This yielded 57 responses from 40 midwives, out of which 62.5% (*f*=25) suggested that proper use of mosquito bed nets should be used to control malaria. Furthermore, 37.5% (*f*=15) of the respondents suggested the use of IPT, 22.5% (*f*=9) suggested health education and 10.0% (*f*=4) suggested the proper treatment of individuals suffering from malaria as good ways of controlling malaria.

However, 5.0% (*f*=2) of the respondents indicated that clearing bushes around homesteads, 2.5% (*f*=1) suggested the spraying of houses and 2.5% (*f*=1) suggested the wearing of protective clothing (see table 5.17). Most of the midwives' recommendations were in line with the MOH's recommendations for preventing malaria (MOH 2012a:12-13). Bivariate correlational data analysis was not applicable for this item requesting multiple responses, and was therefore not calculated.

Table 5.17: Midwives' suggestions for controlling malaria (N=40)

Suggestion	**Frequency**	**%**
Use of mosquito bed nets	25	62.5
Use of IPT	15	37.5
Health education	9	22.5
Proper treatment of malaria	4	10.0
Clearing bushes around homesteads	2	5.0
Spraying of houses (IRS)	1	2.5
Wearing protective clothing	1	2.5
***Total**	**57**	

* As every midwife could provide more than one answer the total percentage cannot be calculated for table 5.17. However, as all 40 midwives could have provided the same suggestion for controlling malaria, the percentage for each individual suggestion was calculated out of 40.

5.3.8 Discussion of phase 2's key findings related to objective 4: midwives' own behaviour and health care practices

Under the fourth objective, based on the Social Cognitive Theory used as the theoretical framework for this study, behaviour and health care practices of midwives, were considered. These characteristics were presented in relation to their association with midwives' provision of IPT.

There was a moderate positive correlation between the reported average monthly number of pregnant women who attended ANC clinics and the provision of IPT as Pearson's correlation coefficient was 0.424, ($p<0.05$). That implied that when larger numbers of women attended an ANC clinic, then midwives at that clinic were more likely to provide IPT services as recommended by the MOH, than midwives at ANC clinics attended by fewer pregnant women. Furthermore, there was a weak correlation between the percentage of pregnant women with at least four ANC visits and the provision of IPT drugs as Pearson's correlation coefficient was 0.245, ($p<0.05$). That meant that ANC clinics where more pregnant women had at least four ANC visits, midwives were more likely to provide proper IPT than at ANC clinics where fewer women visited ANC clinics at least four times during their pregnancies.

There was a moderate positive correlation between recorded pregnant women who had received anti-malaria treatment and the provision of IPT as Pearson's correlation coefficient was 0.486, ($p<0.05$). That meant that at ANC clinics where midwives provided anti-malaria treatment to more pregnant women, they were also more likely to provide the recommended IPT services to pregnant women.

5.4 SUMMARY OF KEY FINDINGS OF PHASE 2 OF THE STUDY

Phase 2's key findings with significant correlations are summarised according to the study's objectives in table 5.18.

Table 5.18: Summary of key findings of phase 2 of the study

Independent variable: IPT utilisation			
Objective 1: midwives' social demographic characteristics			
Variables	**Pearson's correlation coefficient and p-values**	**Correlation**	**Remarks/ implications**

Midwives' duration of experience	0.446 (p<0.05)	Positive correlation	More experienced midwives were more likely to provide IPT services to pregnant women
Midwives' training in malaria control during pregnancy	**0.286** (p<0.05)	Weak positive correlation	Midwives' training about malaria during pregnancy is associated with a greater likelihood of providing recommended IPT services to pregnant women
Objective 2: Environmental factors' influence on the midwives' provision of IPT			
Variables	**Pearson's correlation coefficient and p-values**	**Correlation**	**Remarks/implications**
IPT drugs available at ANC clinics	0.208 (p<0.05)	Weak positive correlation	Midwives were more likely to provide IPT if IPT drugs were available at health facilities
Number of ANC working days per week	0.421 (p<0.05)	Moderate positive correlation	The more ANC clinic working days per week, the more likely the midwives were to provide IPT services
Midwives' knowledge about LLINs' re-treatment	0.284 (p<0.05)	Weak positive correlation	Midwives with correct information about LLINs' re-treatment was associated with their provision of IPT services to pregnant women
Blood testing for malaria diagnosis at ANC clinics	0.226 (p<0.05)	Weak positive correlation	Midwives in facilities where blood testing for malaria was done at ANC clinics, were more likely to offer the IPT services to pregnant women
Midwives' co-operation with VHTs	0.387 (p<0.05)	Moderate positive correlation	Midwives with good working relationship with VHTs were more likely to provide IPT services
Objective 3: Personal cognitive factors influencing midwives' provision of IPT			
Variables	**Pearson's correlation coefficient and p-values**	**Correlation**	**Remarks/ implications**
Frequency of offering health	**0.324** (p<0.05)	Moderate positive	The more often the midwives offered health education to pregnant women,

education and IPT provision		correlation	the more likely they were to provide IPT services as recommended
Objective 4: Health seeking practices of pregnant women as recorded by midwives			
Variables	**Pearson's correlation coefficient and p-values**	**Correlation**	**Remarks/ implications**
Number of monthly ANC attendances	0.424 ($p<0.05$)	Moderate positive correlation	If more women attended ANC clinics per month, midwives were more likely to provide IPT services
Pregnant women's first ANC visit	-0.417 ($p<0.05$)	Moderate negative correlation	Midwives who provided IPT services were more likely to encourage early attendance of ANC clinics
Pregnant women with four ANC visits	0.245 ($p<0.05$)	Weak positive correlation	Midwives were more likely to provide IPT services at health facilities where pregnant women made four ANC visits
Pregnant women treated for malaria	0.486 ($p<0.05$)	Moderate positive correlation	Midwives provided better IPT services in ANC clinics where more pregnant women were treated for malaria

This chapter dealt with data analysis, presentation and description of research findings for the second phase of the study. It presented findings from the data provided by 40 midwives working at ANC clinics in the Buikwe district of Uganda, in response to questions asked during individual structured interviews (see Annexure B2 – structured interview schedule for midwives). The next chapter presents a summary and comparison of the findings of the study's two phases, as well as conclusions and recommendations based on the findings of the study. The study's limitations will also be addressed.

CHAPTER 6

CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

6.1 INTRODUCTION

Chapters 4 and 5 presented the analysis of data collected from 400 pregnant women and 40 midwives at 16 ANC facilities in the Buikwe district respectively. This chapter presents a summary of significant findings of the study, as presented in chapters 4 and 5, and compares these findings, where appropriate to do so. It further presents conclusions and recommendations based on the current study's findings. The chapter then addresses the study's contributions and limitations.

6.2 RESEARCH DESIGN AND METHOD

A quantitative, descriptive correlational study was conducted to describe factors that affect pregnant women's utilisation of anti-malaria services in the Buikwe district of Uganda. The concept of reciprocal determination of Bandura's Social Learning Theory and a literature review guided the researcher during the development of the data collection tools. The study attempted to access personal, environmental and learning factors that could influence health seeking behaviours of pregnant women in the district. The study collected data by conducting structured interviews with 400 pregnant women attending ANC clinics (phase 1) and with 40 midwives working at 16 participating heath facilities in the Buikwe district (phase 2) during April 2014.

With the support of a bio-statistician, the data were analysed using Epi-Info and MS Excel computer programs (see annexure F for the statistician's letter). Control was imposed by pre-testing the data collection instruments, training the interviewers, and keeping the conditions of data collection constant. Where appropriate, correlations were calculated using Pearson's correlation coefficients.

6.3 A COMPARISON OF RESEARCH FINDINGS OF PHASES 1 AND 2 OF THE STUDY

In this section, a summary of the key research findings for phase 1 and phase 2 will be compared and contrasted, where appropriate to do so. Respondents for the first phase of the study were 400 pregnant women who were supposed to have used anti-malaria services. Respondents for phase 2 were 40 midwives who provided anti-malaria services at the ANC clinics in the Buikwe district.

Since respondents for the two phases of the study were not similar (being pregnant women for phase 1 and midwives for phase 2), there were not necessarily direct relationships between the pregnant women and the midwives for the first three objectives. According to Polit and Beck (2008:767-769) such comparisons of the various phases/sources of a study helps to enhance the reliability of a study's findings because it enables a comparison of the findings obtained from more than one population group, implying triangulation of data sources. These comparisons are presented according the research objectives of the study, as presented in chapters four and five. The study's objectives also correspond with the theoretical framework, namely the reciprocal determination of Bandura's Social Learning Theory (see section 1.9.2.4 of the thesis). Thereafter, conclusions and recommendations will be presented according to the objectives of the study. The primary research objectives for phase 1 of the current study were to identify:

- Social-demographic characteristics like age, parity, education level, employment status and income levels that might influence pregnant women's utilisation of anti-malaria services

- environmental factors like geographic access to health facilities, availability of quality health services, traditional healers' and peers' potential influence on pregnant women's utilisation of anti-malaria services
- personal cognitive characteristics of pregnant women like knowledge about malaria during pregnancy and sources of malaria-related information that might influence their utilisation of anti-malaria services
- behaviour/health practices of pregnant women like IPT utilisation, utilisation of LLINs, use of anti-malaria drugs and other malaria control measures related to the utilisation of anti-malaria services

During the second phase of the study, 40 midwives, were interviewed. The objectives for the second phase were adapted from the objectives of the first phase of the study. As such, objectives of the second phase of the study were to identify:

- midwives' social-demographic characteristics like age, gender, education level, marital status, employment status and training levels that might influence their provision of IPT services to pregnant women
- environmental factors like public-private ownership of health facilities, availability and cost of IPT drugs and LLINs, availability of TBAs, VHTs and traditional healers that might influence midwives' provision of anti-malaria services to pregnant women
- personal cognitive characteristics of midwives that might influence their provision of IPT services to pregnant women
- health seeking practices of pregnant women, like time and frequency of ANC clinic attendance, utilisation of IPT and LLINs, as recorded by midwives

These objectives correspond to items of the theoretical framework of the study (please refer to figure 6.1 and table 6.1). The study was based on the concept of reciprocal determination as formulated in Bandura's Social Learning Theory (please refer to section 1.9.2.4 of this thesis).

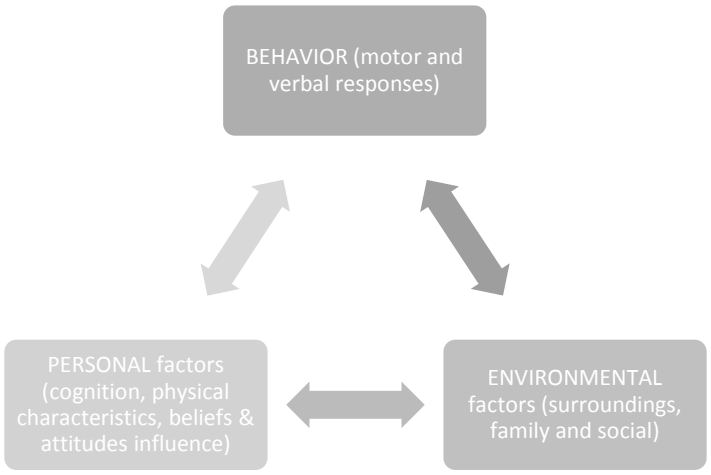


Figure 6.1 Bandura's Conceptual Model of Reciprocal Determination

(Adapted from Christensen 2013:2-3)

Table 6.1: Objectives of the current study related to Bandura's Social Learning Theory (SLT)

Specific objectives of the study	**Related items of Bandura's SLT**
Objective 1: to identify social-demographic characteristics like age, parity, education level, employment status and income levels that might influence pregnant women's utilisation of anti-malaria services	Personal factors: social demographic characteristics of respondents
Objective 2: to identify environmental factors like geographic access to health facilities, availability of quality health services, traditional healers' and peers' potential influence that might influence pregnant women's utilisation of anti-malaria services	Environmental factors like surroundings, family members, health facilities

Specific objectives of the study	Related items of Bandura's SLT
Objective 3: to identify personal cognitive characteristics of pregnant women like knowledge about malaria during pregnancy and sources of malaria-related information that might influence their utilisation of anti-malaria services	Personal factors like cognitive characteristics of respondents
Objective 4: to identify behaviour/health practices of pregnant women like IPT utilisation, utilisation of LLINs, use of anti-malaria drugs and other malaria control measures related to the utilisation of anti-malaria services	Behaviour like health seeking actions of respondents

6.3.1 Findings related to objective 1: to identify social-demographic characteristics that might influence pregnant women's utilisation of anti-malaria services and midwives' provision of anti-malaria services

The first objective of the study dealt with social-demographic characteristics of respondents of the two phases of the study. These social demographic characteristics of pregnant women were compared with their IPT and LLIN utilisation while the social demographic characteristics of the midwives were compared with their provision of anti-malaria services, especially proper IPT services, as the gold standard of providing anti-malaria services to pregnant women attending ANC clinics.

6.3.1.1 Key comparative findings about the utilisation of intermittent preventive treatment (IPT) related to objective 1 of the study

With reference to section 4.3.1 of this thesis, there was no significant relationship between pregnant women's utilisation of IPT services and most of the social-demographic variables like age, marital status, employment status, family income

and number of pregnancies. Likewise, most social-demographic characteristics of midwives showed no correlation with the proper provision of IPT to pregnant women.

The proper provision of IPT implies directly observed treatment (DOT) where the IPT medication is taken in the presence of a health worker (please refer to section 5.3.1 of this thesis), requiring the availability of the medication and clean drinking water. Thus the trend was similar because there was no significant relationship between the social demographic characteristics of pregnant women and their IPT utilisation nor between those of the midwives and the provision of proper IPT services, with the exception of education levels. Pregnant women who had received education beyond the primary school level were slightly more likely to use IPT services than those with no or only primary school level education (see section 4.3.1.3 of this thesis), as Fisher's exact test was .32.

Midwives' education levels had a slight correlation with the IPT services they provided. Pearson's correlation coefficient was 0.298, ($p>0.05$), indicating a weak positive correlation between midwives' levels of training and their provision of IPT services at the participating health facilities (refer to section 5.3.1.5 of this thesis).

There was also a moderate positive correlation between midwives' years of experience and provision of IPT medication. Pearson's correlation coefficient was 0.446, ($p<0.05$), indicating that more experienced midwives were moderately more likely to provide proper IPT services than the less experienced ones. The study also found a weak correlation between midwives' pregnancy-related malaria training and the provision of IPT at the ANC clinics as Pearson's correlation coefficient was 0.286, ($p<0.05$).

Out of 400 pregnant women, 57.8% (f=231) reported at least one fever attack during their current pregnancies. Pearson's correlation coefficient was -0.210 ($p= 0.018$) between episodes of fever during the respondents' current pregnancies and their utilisation of IPT drugs. This finding indicates that pregnant women who experienced fever episodes during their pregnancies were less likely to have used IPT drugs, but this correlation was weak. This item was not tested in phase 2 of the study. However, as indicated in section 5.3.3.4 of this thesis, 87.5% of the midwives said

IPT drugs were always available at their ANC clinics, while 12.5% said this was often the case. Thus the midwives ensured that IPT drugs were available for pregnant women's use.

6.3.1.2 Key comparative findings on the utilisation of long lasting insecticide-treated nets (LLINs) related to objective 1 of the study

Pearson's correlation coefficient between pregnant women's education levels and their utilisation of LLINs was 0.250 ($p<0.05$), as discussed in section 4.3.1.11 of this thesis. This indicates a weak positive correlation, implying that better educated women were slightly more likely to use LLINs than their counterparts with lower levels of education. Out of 400 respondents, 91.3% (f=365) slept under LLINs. Educated pregnant women (with secondary school or post school education) were more likely to utilise LLINs than the less educated ones (with no schooling or primary level schooling). The use of LLINs was not tested in phase 2 of the study and therefore no comparison could be made between pregnant women's and midwives' utilisation of LLINs. However, as discussed in section 5.3.3.7 of this thesis, 80.0% of the midwives said LLINs were always available and 20.0% said LLINs were often available at their ANC clinics. Thus the midwives ensured that LLINs were available for distribution to and utilisation by pregnant women in the Buikwe district.

There was a moderate negative correlation between previous malaria attacks during pregnancy and the utilisation of LLINs as Pearson's correlation coefficient was -0.327 ($p<0.05$). This finding indicates that pregnant women who did not utilise LLINs were more likely to report fever episodes during pregnancies than those who slept under LLINs. This emphasises the necessity of using LLINs effectively during pregnancy to reduce the risk of getting malaria, especially while pregnant.

These findings are in agreement with a government guideline that requires all pregnant women to sleep under LLINs (MOH 2012b:91-93).

6.3.2 Conclusions and recommendations related to objective 1

Table 6.2 presents the study's conclusions and corresponding recommendations related to objective 1: to identify the social-demographic characteristics that might influence pregnant women's utilisation of anti-malaria services

Table 6.2: Conclusions and recommendations related to objective 1 of the study

Conclusions related to objective 1	Recommendations related to objective 1
• Better educated pregnant women were more likely to use LLINs and IPT services that those with no or only primary level schooling • More experienced midwives and those who had received in-service training were more likely to provide effective anti-malaria services to pregnant women • The use of IPT services and LLINs reduced pregnant women's number of fever attacks during their current pregnancies.	• Women should be educated beyond the primary school level to enhance the use of anti-malaria services during pregnancy • More experienced midwives should be role models for less experienced midwives. In-service training should be sustained to ensure effective anti-malaria services for pregnant women. • IPT services and the utilisation of LLINs should be encouraged for at ANC clinics for every pregnant woman in Uganda.

6.3.3 Findings related to objective 2: to identify environmental factors that could influence pregnant women's utilisation of anti-malaria services and

midwives' provision of these services

The current study's second objective attempted to identify environmental factors like geographic access to health facilities, availability of quality health services, traditional healers' and peers' potential influence that could influence pregnant women's utilisation of anti-malaria services and midwives' provision of these services.

6.3.3.1 Key comparative findings on IPT utilisation related to objective 2 of the study

Out of 400 respondents, 69.3% (*f*=277) lived within a walkable distance of less than five kilometres from a health facility. Distance from health facilities had a negative relationship with pregnant women's IPT utilisation as Pearson's correlation coefficient was -0.450 (p=0.014). That meant that pregnant woman who lived nearer to health facilities were moderately more likely to use IPT drugs from these health facilities than those who lived further from health facilities (refer to section 4.3.3.1 of this thesis). Since midwives lived at the health facilities, this item had no relevance to midwives' provision of IPT and was therefore not tested.

There was a strong positive correlation between pregnant women's positive perceptions of the effectiveness of anti-malaria medicines provided at the health facilities and their utilisation of IPT drugs as Pearson's correlation coefficient was 0.736 (p=0.006). Out of 400 respondents, 80.8% (*f*=323) considered drugs provided at the health facilities to be very effective. Pregnant women, who had negative perceptions about the effectiveness of anti-malaria drugs provided at the health facilities, were less likely to use IPT. Midwives' perceptions about the effectiveness of anti-malaria medicines were not tested.

There was a significant positive relationship between pregnant women's satisfaction with the health facility's services and their IPT utilisation. Pearson's correlation coefficient between pregnant women's satisfaction with healthcare services and their IPT utilisation was 0.603 (p=0.009). Out of 284 respondents who indicated that services at the health facility were good, 98.2% (n=279) had used IPT. However,

93.1% (n=108) out of 116 women, who indicated that services were not good, had also used IPT. This implies that, pregnant women satisfied with services offered at a health facility were more likely to use IPT services. Midwives' satisfaction with services provided at health facilities was not tested since it was not relevant to the study's objectives.

There was a strong positive relationship between pregnant women's perceptions about the availability of anti-malaria drugs at the health facility and IPT utilisation as Pearson's correlation coefficient was 0.619, ($p<0.05$). There was a high utilisation rate of IPT services among pregnant women. Out of 373 respondents who reported that drugs were available at ANC clinics, 97.9% (n=365) had reportedly used IPT services compared to 81.5% (n=22) who indicated that the drug supplies were unreliable. That implied that pregnant women with positive perceptions about the availability of IPT drugs at the health facility were more likely to have utilised IPT services. Midwives' reported availability of anti-malaria drugs had a weak positive correlation with IPT services provided at that ANC clinic as Pearson's correlation coefficient was 0.208, ($p<0.05$). Out of 40 midwives, 87.5% (*f*=35) reported that IPT drugs were always available at their ANC clinics while 12.5% (*f*=5) indicated that IPT drugs were often available. That meant that pregnant women were more likely to get the recommended IPT services from health facilities where IPT drugs were available (refer to sections 5.1 and 5.3.3.4 of this thesis). These findings imply that a higher IPT utilisation among pregnant women with positive perceptions about the availability of anti-malaria drugs was similar to that where midwives reported higher availability of anti-malaria drugs (refer to figure 6.2).

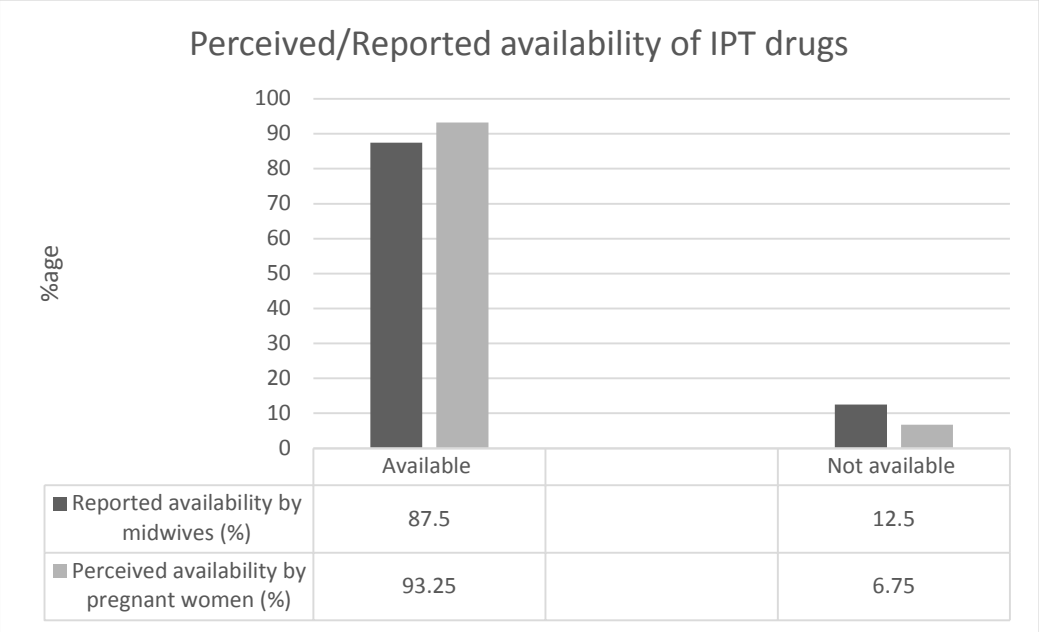


Figure 6.2 Midwives' and pregnant women's reported and perceived availability of intermittent preventive treatment (IPT) drugs

There was a significant positive relationship between pregnant women, who had used anti-malaria drugs from the health facility, and IPT utilisation as Pearson's correlation coefficient was 0.706 ($p<0.05$). That meant that pregnant women who had used anti-malaria drugs from health facilities were more likely to use IPT services (as discussed in section 4.3.3.8 of this thesis). This use of anti-malaria drugs was not tested during the second phase of the study. However, there was a weak positive correlation between blood testing for malaria diagnosis at ANC clinics by midwives and the provision of IPT. Pearson's correlation coefficient correlation was 0.226, ($p<0.05$). That meant that in facilities where blood testing for malaria was done at ANC clinics, midwives were slightly more likely to provide better IPT services than in ANC clinics where such blood testing did not take place.

6.3.3.2 Key comparative findings about the utilisation of long lasting insecticide-treated nets (LLINs) related to objective 2

There was a weak positive relationship between pregnant women's perceptions about the availability of free LLINs at health facilities and their utilisation of IPT drugs. Pearson's correlation coefficient was 0.132 ($p<0.05$). Out of 387 pregnant women who used IPT, 324 (87.2%) indicated that LLINs were always available at the health facility. Though the correlation was statistically weak, this was an indication of positive health seeking behaviours among pregnant women for various anti-malaria services. In that, pregnant women's positive perception of one type of anti-malaria service, like the availability of free LLINs at health facilities, was associated with IPT utilisation (see section 4.3.3.2 of this thesis). In order to compare the availability,

pregnant women's and midwives' perceptions were compared about the availability of LLINs at ANC clinics. Out of 40 midwives, 80.0% (*f*=32) indicated that LLINs were always available at their ANC clinics and the rest (20.0%) indicated that LLINs were often available. That meant that pregnant women's perceived availability was similar to the midwives' recorded availability of LLINs (see sections 5.3.3.7 and 4.3.3.2 of this thesis). According to the MOH (2012b:90-95), the government of Uganda, together with support from partners, supplies LLINs to ANC clinics for use by pregnant women. In reference to section 5.3.3.9 of this thesis concerning costs, all midwives (100.0%; N=40) indicated that, when available, LLINs were distributed free of charge to pregnant women at ANC clinics. Out of the 400 pregnant women, 99.0% (*f*= 396) indicated that they received LLINs free of charge from the health facilities while only 1.0% (*f*=4) indicated that they paid for LLINs (see section 5.3.3.9 of this thesis). Thus the pregnant women and the midwives agreed that LLINs were available free of charge. It could not be determined from the available information why four pregnant women did not consider LLINs to be free of charge, as this should have been the case.

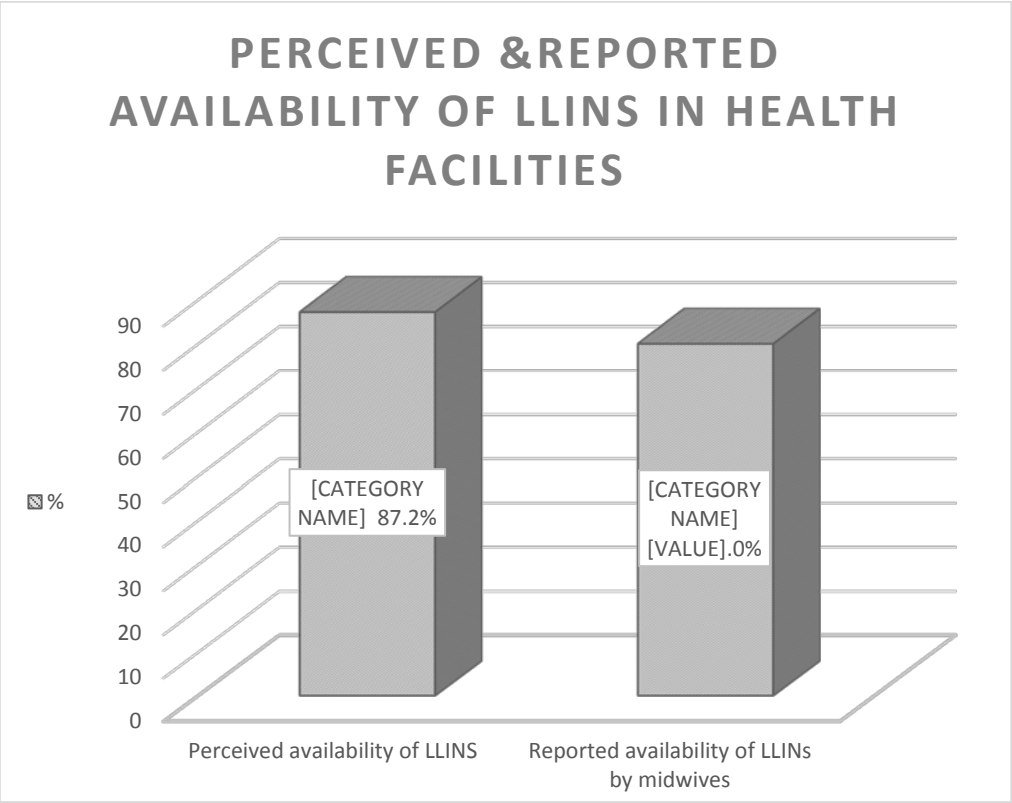


Figure 6.3 Pregnant women's (N=400) perceived and midwives'

(N=40) reported availability of long lasting insecticide-treated nets (LLINs) at antenatal care (ANC) clinics

With regard to distances from health facilities, it was found that out of 365 respondents who lived within five kilometres of a health facility, 74.8% (f=273) used LLINs as compared to 25.2% (f=92) of those living more than five kilometres from health facilities as Pearson's correlation coefficient was -0.420 ($p < 0.05$). That implied that the shorter distance pregnant women lived from health facilities was related to their increased utilisation of LLINs. This item did not apply to the midwives who lived at or near to the ANC clinics.

LLIN utilisation among pregnant women, who were satisfied with health services offered at health facilities, was 97.6% (n=364) and Pearson's correlation coefficient was 0.421 ($p=0.010$). As such, pregnant women, who were satisfied with the services offered at the health facilities, were moderately more likely to utilise LLINs, than those who were not satisfied with these services. This item was not tested for midwives.

In the current study, there was a moderate positive correlation between the reported level of cooperation between midwives with VHTs and the provision of IPT. Pearson's correlation was 0.387, ($p<0.05$). According to the MOH (2010a:20-24), VHTs are considered as basic village health centres without structures (see section 1.3.5). It is therefore essential that there should be cooperation between midwives and VHTs thus linking healthcare facilities to communities. This aspect was not tested in phase 1 of the current study.

6.3.4 Conclusions and recommendations related to objective 2

Table 6.3 presents the current study's conclusions and corresponding recommendations, relevant to objective 2 of the study.

Table 6.3: Conclusions and recommendations related to objective 2

Conclusions related to objective 2 of	Recommendations related to

the current study	objective 2
• Pregnant women who lived within five kilometres from a health facility were more likely to use IPT services. • There was a high utilisation rate (77.9%; IPT2) of IPT services in the Buikwe district, almost reaching the IPT utilisation target rate of 80.0%. **CONCLUSIONS** • Most women and all midwives said LLINs were distributed free of charge to pregnant women. • Respondents who were satisfied with ANC services, were more likely to use anti-malaria services. • Available IPT drugs was associated with good IPT services and with pregnant women's use thereof. • Midwives did not cooperate with VHTs in their areas.	• Mobile clinic services and better cooperation with VHTs could assist more pregnant women to use ANC services. • All pregnant women should be informed about and offered IPT services. **RECOMMENDATIONS** • Free distribution of LLINs at ANC clinics should be sustained. • Reasons for women's dissatisfaction with ANC services must be identified and addressed to enhance the utilisation of these services. • Midwives should ensure that no 'stock-outs' of anti-malaria drugs occur at their ANC clinics. • Midwives should work with VHTs to enhance community participation and increase IPT utilisation

6.3.5 Findings related to objective 3: to identify personal cognitive

characteristics that might influence pregnant women's utilisation of and midwives' provision of anti-malaria services

The personal cognitive characteristics of pregnant women are presented in relation to their association with the utilisation of IPT and LLIN .

6.3.5.1 Key comparative findings on IPT utilisation related to objective 3

Out of 400 pregnant women, 85.3% (*f*=341) knew that malaria is transmitted by mosquitoes. There was a moderate positive correlation between knowledge, about mosquitoes as transmitters of malaria parasites, and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.490 ($p<0.05$). That meant that there was a moderately greater likelihood of using IPT drugs among pregnant women who knew that mosquitoes transmit malaria parasites. Thus health education among pregnant women could be an important factor for increasing IPT utilisation. The midwives' malaria-related knowledge was not tested in phase 2 of the study.

There was a weak positive correlation between knowledge about IRS of houses for preventing malaria and IPT utilisation among pregnant women as Pearson's correlation coefficient was 0.127 ($p<0.05$). This meant that there was a slightly greater likelihood of using IPT among pregnant women, who knew about IRS of houses for preventing malaria, than among those who lacked such knowledge. That implied that knowledge about other malaria prevention services is likely to improve IPT utilisation. This aspect was not tested in phase 2 of the study.

Furthermore, there was a strong positive correlation between knowledge about IPT doses and IPT utilisation among pregnant women. Pearson's correlation coefficient between knowledge about doses of IPT drugs and IPT utilisation among pregnant women was 0.544 ($p<0.05$). This meant that there was a greater likelihood of IPT utilisation among pregnant women who knew about the doses of IPT drugs than among those without that information.

Out of 400 respondents, 39.3% (f=157) knew that they were supposed to attend ANC clinics at least four times during each pregnancy. There was a strong positive

correlation between respondents' knowledge that pregnant women should attend ANC clinics at least four times during each pregnancy and IPT utilisation as Pearson's correlation coefficient was 0.769 ($p<0.05$). That implied that pregnant women who knew about the recommended four ANC visits per pregnancy were significantly more likely to visit the ANC clinic four times during each pregnancy, which would enhance their chances of IPT utilisation. This implies that, pregnant women without such knowledge were unlikely to attend ANC clinics for the recommended four times during each pregnancy, thereby not giving themselves an opportunity of utilising the recommended IPT services.

Out of 400 respondents, 63.5% (*f*=254) were aware that COARTEM was the recommended first line treatment for malaria. There was a strong positive correlation between respondents' knowledge about COARTEM (MOH 2012a:92-93), as the first-line treatment for malaria, and IPT utilisation as Pearson's correlation coefficient was 0.645 ($p<0.05$). That meant that IPT utilisation was higher among pregnant women who knew about COARTEM as the first line treatment for malaria than among those without such knowledge.

In mentioned in section 4.3.5.1 of this thesis, most (74.5%; *f*=298) respondents said malaria-related messages for pregnant women were provided by midwives/health workers. Out of 40 midwives, 72.5% (*f*=29) indicated that health education was always offered to pregnant women during their ANC visits. There was a positive correlation between the reported frequency of offering health education to pregnant women and the proper IPT provision by midwives as Pearson's correlation coefficient was 0.324, ($p<0.05$). That implied that the more often the midwives offered health education to pregnant women, the more likely they were to provide good IPT services to pregnant women.

6.3.5.2 Key comparative findings on the utilisation of LLINs related to objective 3

In this study, there was a moderate positive correlation between knowledge that malaria could be prevented by avoiding mosquito bites and LLIN utilisation among pregnant women. Pearson's correlation coefficient was 0.422 ($p<0.05$). That meant

that pregnant women, who knew that malaria can be prevented by avoiding mosquito bites, were more likely to use LLINs than women without this knowledge. That meant that the utilisation of LLINs could be increased by health education about the role of mosquito bites in transmitting malaria.

Furthermore, there was a positive correlation between respondents' knowledge about the importance of preventing the breeding of mosquitoes to prevent malaria and LLIN utilisation. Pearson's correlation coefficient was 0.531 ($p<0.05$). That meant that LLIN utilisation was higher among respondents, with knowledge about the importance of preventing the breeding of mosquitoes to prevent malaria, than among their counterparts without this knowledge.

6.3.6 Conclusions and recommendations related to objective 3

The third objective was to study personal cognitive characteristics of pregnant women, like knowledge about malaria during pregnancy and sources of malaria-related information, that might influence their utilisation of anti-malaria services. These conclusions and corresponding recommendations are presented in table 6.4.

Table 6.4: Conclusions and recommendations related to objective 3

Conclusions related to objective 3	Recommendations related to objective 3
• Pregnant women who knew about anti-malaria services (IPT, LLINs, IRS and COARTEM) were more likely to use these services. • Some pregnant women did not know that they should	• Health educators must inform pregnant women about IPT, LLINs, IRS and COARTEM to increase IPT utilisation. • Pregnant women should attend ANC clinics at least four times during each

attend ANC clinics at least four times during each pregnancy. • Midwives who provided frequent health education to pregnant women, were more likely to provide good IPT services to pregnant women	pregnancy so that all recommended ANC and anti-malaria services can be provided, including IPT services. • Midwives should frequently offer health education to pregnant women as women with more knowledge were more likely to use IPT and other anti-malaria services effectively.

6.3.7 Comparisons of findings related to objective 4: to identify behaviour/health practices of pregnant women related to their utilisation and to midwives' provision of anti-malaria services

The fourth objective was to identify the behaviour and health care practices of pregnant women and the provision of anti-malaria services by midwives. These characteristics are presented in relation to their association with anti-malaria services including IPT and LLIN utilisation. This objective dealt with health-seeking practices of the pregnant women during phase 1 and with the provision of anti-malaria services by midwives in phase 2 (based on pregnant women's available ANC records). Consequently, the findings obtained in relation to objective 4 presented a more realistic opportunity to compare the health seeking practices of pregnant women and the midwives' recorded information about the utilisation of anti-malaria services.

6.3.7.1 Key comparative findings on intermittent preventive treatment (IPT) utilisation related to objective 4

Out of 400 respondents, 90.0% (*f*=360) of those who slept under mosquito nets also used IPT drugs. There was a significant relationship between pregnant women's sleeping under LLINs and their utilisation of IPT services as Pearson's correlation coefficient was 0.840 ($p<0.05$). This implies that the implementation of one type of anti-malaria action was likely to be associated with the utilisation of other types of anti-malaria actions among pregnant women (refer to section 4.3.7.12 of this thesis).

Out of 400 pregnant women, 65.8% (*f*=263) had at least one child prior to their current pregnancies. There was a moderate positive correlation between respondents' history of having at least one child and their IPT utilisation as Pearson's correlation coefficient was 0.421 ($p<0.05$). This implied a higher IPT utilisation among pregnant women who had at least a child prior to their current pregnancies than among women without children. That could have been an indication of better health practices of pregnant women through experience gained during previous pregnancies (see section 4.3.7.1 of this thesis).

Furthermore, there was a moderate positive correlation between respondents' history of babies born in hospitals/health facilities and their IPT utilisation. Pearson's correlation coefficient was 0.405 ($p<0.05$). That meant that pregnant women who had previously given birth in hospitals/health care centres were moderately more likely to use IPT than pregnant women who had never done so (refer to section 4.3.7.2 of this thesis). A similar item for midwives was not addressed.

There was a strong positive correlation between respondents' reported number of IPT doses taken during their previous pregnancies and their IPT utilisation during their current pregnancies as Pearson's correlation coefficient was 0.716 ($p<0.05$). That meant that, pregnant women who took IPT during their previous pregnancies were significantly more likely to continue with the practice during their subsequent pregnancies (refer to section 4.3.7.4 of this thesis).

Of the current study's respondents, 44.5% (*f*=178) planned to attend ANC clinics the recommended four times (MOH 2012a:92-93). There was a moderate positive

correlation between respondents' number of planned ANC visits during their current pregnancies and their IPT utilisation. Pearson's correlation coefficient was 0.464 ($p<0.05$). Just like for LLIN utilisation, pregnant women who planned four or more ANC visits were more likely to use IPT compared to respondents who planned fewer than four ANC visits (refer to section 4.3.7.6 of this thesis). In phase 2 of the study, 40.0% (*f*=16) of all midwives who participated in the study indicated that their ANC clinics' clients visited the ANC clinics at least four times during each pregnancy (refer to section 5.3.7.3 of this thesis). Further analysis of phase 2's findings indicated that there was a weak positive correlation between the percentage of pregnant women with at least four ANC visits and provision of good IPT services at these ANC clinics, as Pearson's correlation coefficient was 0.245, ($p<0.05$). That meant that at ANC clinics that offered proper IPT services, women were slightly more likely to visit the ANC clinic at least four times during each pregnancy than at other ANC clinics.

There was a moderate positive correlation between the reported intactness of respondents' LLINs and IPT utilisation as Pearson's correlation coefficient was 0.318 ($p<0.05$). This meant that respondents who had intact mosquito nets were moderately more likely to use IPT drugs. This was an indication of good health care practices among such pregnant women (refer to section 4.3.7.9 of this thesis).

6.3.7.2 Key comparative findings on the utilisation of long lasting insecticide-treated nets (LLINs) related to objective 4

There was a moderate positive correlation between respondents' history of having at least one child and their LLIN utilisation. Pearson's correlation coefficient was 0.401 ($p<0.05$). This meant a higher LLIN utilisation rate among pregnant women who had at least one child prior to their current pregnancies. A similar trend was seen for IPT utilisation in pregnant women who had at least one child prior to their current pregnancies. This is an indication of better health practices of pregnant women probably through experience (see section 4.3.8.2 of this thesis), which might have been influenced by exposure to health education sessions during their previous pregnancies.

There was a strong positive correlation between respondents' IPT utilisation and LLIN utilisation as Pearson's correlation coefficient was 0.651 ($p<0.05$). Pregnant women who used one type of malaria preventive method were more likely to use another type of malaria preventive method. This was also seen in phase 2 of the study where there was a moderate positive correlation between recorded pregnant women who had received anti-malaria treatment and those who had used IPT services (see section 5.1). Pearson's correlation coefficient between recorded pregnant women who had received anti-malaria treatment and the provision of good IPT services was 0.486 ($p<0.05$).

There was a moderate positive correlation between the reported average monthly number of pregnant women who attended specific ANC clinics and the provision of IPT as Pearson's correlation coefficient was 0.424, ($p<0.05$). The implication is that midwives tended to provide good IPT services to pregnant women at ANC clinics attended by larger numbers of pregnant women (refer to section 5.3.7.1 of this thesis).

Furthermore, there was a strong positive correlation between respondents' number of planned ANC visits during their current pregnancies and their LLIN utilisation. Pearson's correlation coefficient was 0.689 ($p<0.05$). Similar to IPT utilisation, respondents who planned four or more ANC visits were more likely to use LLINs compared to respondents who planned fewer than four ANC visits (see section 4.3.8.2).

6.3.8 Conclusions and recommendations related to objective 4

Table 6.5 presents the study's conclusions and corresponding recommendations relevant to objective 4.

Table 6.5: Conclusions and recommendations related to objective 4

Conclusions related to objective 4	Recommendations related to objective 4

• Pregnant women, who used one type of malaria preventive action, (like IPT) were more likely to use other types of malaria preventive actions (such as using LLINs). • There was a higher IPT and LLIN utilisation among pregnant women who had at least one child prior to their current pregnancies and among those who had used IPT previously. • Pregnant women who had previously given birth in hospitals/health care centres were more likely to use IPT than those who had never done so • Pregnant women who planned at least four ANC visits were more likely to use IPT and LLINs compared to those who planned fewer ANC visits. • Midwives working in ANC clinics attended by large numbers of pregnant women were more likely to provide the recommended IPT services than midwives working in ANC clinics attended by fewer pregnant women	• Midwives should encourage pregnant women to start using one type of malaria preventive action and then implement other actions later on. • Health education, including IPT, should be provided throughout every pregnancy • Pregnant women should always be encouraged to give birth in hospitals/health centres for health and safety reasons • At least four ANC visits per pregnancy must be encouraged for increased utilisation of IPT, LLINs and other anti-malaria services • All midwives, including those working at smaller ANC clinics, should receive regular malaria-related in-service training and their records should be audited regularly to ensure that all pregnant women receive proper anti-malaria services and health education.

6.4 CONTRIBUTIONS OF THE STUDY

The findings of the current study could contribute to the understanding of personal and environment factors that could influence pregnant women's utilisation of anti-malaria services and midwives provision of these services in the Buikwe district of Uganda. Findings from this study could provide more insight to policy makers about pregnant women's practices in the Buikwe district. Opportunities for further research have been identified.

6.5 IMPLICATIONS OF STUDY FINDINGS FOR THE ROLL BACK MALARIA (RBM) AND MALARIA CONTROL PROGRAMME (MCP) OF THE MINISTRY OF HEALTH (MOH)

The roll back malaria (RBM) programme partnership was formed by the WHO, UNICEF, the UNDP, and the World Bank. It includes governments, development agencies civil society organisations, professional associations, commercial organisations, research groups and the media that aim to reduce the world's malaria burden. The Malaria Control Programme (MCP) is a programme of Uganda's MOH, responsible for the control of malaria which is one of the of the country's leading causes of morbidity and mortality (refer to section 1.3.9.2).

This study could directly or indirectly contribute to the understanding of factors that influence pregnant women's utilisation of anti-malaria services in the Buikwe district. Directly, the district may adapt some of the recommendations of the study. Indirectly, suggestions for further research have been made so that other studies could be conducted which might contribute to the control of malaria. That will be in line with the RBM programme and to the MCP of Uganda's MOH.

6.6 LIMITATIONS OF THE STUDY

This study was conducted in Buikwe district, one of the 112 districts in Uganda. This limited the generalisability of the research findings to one district only.

Respondents were interviewed using structured interview schedules. This meant that there were limited opportunities for respondents to offer information about their

unique experiences which could have provided more in-depth knowledge about the subject. Focused group discussions with pregnant women, midwives, community health workers, members of VHTs, and community leaders could have yielded richer data about the utilisation of IPT and other anti-malaria services.

Due to ethical requirements, only pregnant women aged 21 and older could be interviewed. This meant that teenage pregnant women were excluded from the current study. This might have imposed a possible limitation as pregnant teenagers' views were not obtained.

About 5.0% of all Ugandan pregnant women do not access ANC services (UDHS 2011:105). Thus, only women who used ANC services during the data collection phase of the research could participate in the study, as pregnant women who did not attend ANC clinics, could not be traced. This imposed a possible limitation on the generalisability of the study's findings, as it cannot be assumed that pregnant women who did not attend ANC clinics had the same perceptions about utilising anti-malaria services as women who attended ANC clinics.

Phase 2 of the study focussed on midwives' provision of IPT. Consequently no questions were asked during the structured interviews about the midwives' own anti-malaria actions/behaviours. It might have been worthwhile to know whether these midwives themselves used LLINs, IRS, clearing of bushes and draining of stagnant water and implemented other actions to reduce the risk of malaria. Midwives who had children should have been asked whether or not they used IPT during their pregnancies. If the midwives implemented relevant anti-malaria practices themselves, then they practised what they preached. If some midwives failed to implement malaria preventive actions, then the reasons should have been determined and addressed. If the midwives were unable to implement some of the malaria preventive actions, they advocated during health education sessions, then the community members might also be unable to implement these actions.

The current study focussed only on IPT during pregnancy and did not address malaria during the postnatal period. After giving birth, these women remain more susceptible to malaria than women who had not recently been pregnant.

Millennium Development Goals (MDGs) were considered during this study as they were implemented till 31 December 2015 while the study was conducted, but Sustainable Development Goals (SGBs) came into effect on 1 January 2016. The SGBs comprise "… 17 goals with 169 targets that the 191 UN member states have agreed to try to achieve by 2030. Health has a central place in SDG3 'Ensure healthy lives and promoting well-being for all at all ages' underpinned by 13 targets that cover a wide spectrum of the WHO's work" (WHO 2015a: [1]). During December 2015, the WHO published a report entitled "Health in 2015: from MDGs to SGBs" (WHO 2015b: [1]), claiming that the "…17 SGBs are broader and more ambitious than the MDGs, presenting an agenda that is relevant to all people in all countries to ensure that 'no one is left behind'. The new agenda requires that all 3 dimensions of sustainable development – economic, social and environmental – are addressed in an integrated manner".

Although the current study focussed on MDGs, it addressed the three dimensions (economic, social and environmental) of sustainable development emphasised by the SGBs. These three dimensions were integrated into the Social Cognitive Theory adopted for contextualising the current study's findings, as explained in section 1.9.2 of this thesis.

6.7 SUGGESTIONS FOR FUTURE RESEARCH

This study was conducted in the Buikwe district, one of the 112 districts in Uganda. For findings to be generalisable for the whole country, similar studies should be conducted in randomly selected districts from various regions of the country to identify factors that could influence pregnant women's utilisation of anti-malaria services in Uganda.

Comparative studies could be done between districts with high and low malaria morbidity/mortality rates so that region-specific recommendations can be developed to diagnose, treat and prevent malaria in specific areas during specific seasons of the year.

Future studies should also evaluate midwives' anti-malaria knowledge and actions, and those of other groups of health care workers. Identified shortcomings should be investigated and addressed to enable midwives and health care workers to implement malaria preventive actions effectively.

More research should be done on the therapeutic values of identified herbs used by communities to treat and control malaria. Records should be kept of pregnant women who used these herbs during their pregnancies, indicating the type and amount of herbs taken and the health-related outcomes.

Research should investigate why some communities' members do not consult a health care worker, village health worker, or a village health team member in case someone suffers from fever, but rather use herbs or buy medicines from drug dealers. The actions of health care workers when they themselves and/or their family members experience fever attacks should also be investigated. Identified shortcomings should be addressed during in-service education sessions.

Future studies should identify ways to establish and sustain the training and involvement of VHT members by midwives and other health care workers. In this way collaboration between health care workers and VHTs can be strengthened enabling the formal health care sector to "…increase its reach into often underserved rural or marginalized communities" (Okeibunor et al 2011:[9]).

Researchers should determine the effective life of LLINs in Uganda. If LLINs only retain 10% of their initial effectiveness after 24 months of use (Green et al 2013:[1]), then re-treatment might provide a cheaper option than replacement. However, this decision should be based on scientific facts and SSA countries should be informed about the relevant research findings.

Investigations should be done to identify feasible ways of administering IPT drugs as DOT at ANC clinics and to ensure that at least 80% of all pregnant women who attend ANC clinics take the prescribed two doses of IPT during their pregnancies.

Registers should be kept of women who developed malaria within six weeks after the birth of their babies. These statistics should be analysed as to the times of the year, the geographic areas and the type of malaria from which postnatal women and/or her new born infant suffered. Such information could help to ensure that efforts are made "…to detect and radically cure malaria during pregnancy so that women do not enter the postpartum period with residual parasites" (Boel, Rijken, Brabin, Nosten & McGready 2012:114).

Relevant SGBs should guide future similar studies.

6.8 CONCLUDING REMARKS

Ideally, immunisation against malaria could prevent malaria in pregnant women, but there is no such immunisation despite many research efforts. As pregnant women's immune system is suppressed to prevent rejection of the foreign protein of the foetus, pregnant women are more susceptible to malaria infection than the rest of the population. (Children younger than five years of age are also more susceptible to malaria infections than the general population, because their immune systems have not yet been fully developed).

The current study's data, collected during 2014, indicated that 79.9% of the interviewed 400 pregnant Ugandan women had used IPT and 84.2% of those who had received free LLINs slept under them (see sections 4.3.6.1-4.3.6.3 of this thesis). These seem to be major malaria control accomplishments because UBOS (2012:170-175) reported that 48% of pregnant women took their first IPT dose while merely 27% took the second IPT dose and 47% used LLITNs during 2011. These statistics have serious implications as malaria complicates 80% of all pregnancies in Uganda (MOH 2012e:363). Despite these major accomplishments, further improvements are required to protect pregnant women and their infants from the potentially devastating consequences of malaria during pregnancy. Using IPT and sleeping under LLINs can help prevent malaria during pregnancy, but women should also strive to implement other relevant preventive measures such as wearing protective clothing, staying indoors at dusk and dawn, and using gauze screens in front of windows and doors.

Timely access to free anti-malaria services and effective malaria treatment for all Ugandans, but especially for pregnant women and children up to five years of age, will save many lives in the country. The outcomes of anti-malaria services depend on efficient health-care providers and demands from clients. Community sensitisation should be intensified so that pregnant women attend ANC clinics at least four times during each pregnancy and commence their ANC clinic visits during the first three months of pregnancy. This will enable them to use the available IPT and other anti-malaria services effectively.

Regular training of midwives on the prevention and management of malaria during pregnancy is important to offer effective ANC services, including IPT, and to ensure that pregnant women are satisfied with these services. The resultant improved services will encourage more pregnant women to attend ANC clinics and increase their utilisation of the available anti-malaria services. "For effective implementation of IPT policy and treatment of malaria during pregnancy, health care providers must be well educated, mentored and supervised to ensure rational use of antimalarial drugs especially in pregnant women. Strategies should be devised to ensure constant availability of malaria diagnostic tools and antimalarial drugs at the health facilities" (Ritah, Appolinary & Siriel 2014:1).

"Malaria control has benefited from substantial financial investment and political commitment in the last decade, and impressive progress is being made in some settings. However, plasmodium falciparum infection continues to cause hundreds of millions of clinical episodes, and hundreds of thousands of deaths every year" (Armstrong Schellenberg et al 2011:[1]). The impact of malaria could be addressed more effectively if the principles underlying Bandura's Social Learning Theory are incorporated in malaria prevention and control programmes.

This study's findings have shown that personal factors, behaviour and environmental factors are interdependent and interrelated, or in Bandura's terminology "reciprocally determined" (as shown in figure 6.1) concerning the utilisation of anti-malaria services. The important identified personal factors included that better educated pregnant women were more likely to use IPT and LLINs, and they were less likely to

experience malaria episodes, than pregnant women with no or only primary school education. Better educated and more experienced midwives were also more likely to provide effective IPT services than less experienced midwives who were less well educated.

The behaviour-related findings indicated that pregnant women who had implemented one type of malaria-preventive behaviour were likely to implement other types of such behaviour as well. Pregnant women who had used IPT during previous pregnancies, and those whose babies had been born in hospitals/clinics, were more likely to use IPT during their current pregnancies.

Midwives who offered regular health education sessions about malaria-related issues were more likely to provide effective IPT services. One aspect that deserves greater attention related to the finding that only 44.5% of the pregnant women interviewed during the current study, intended visiting ANC clinics at least four times during their current pregnancies. Visiting the ANC clinics fewer than four times during any pregnancy, and commencing ANC visits after the first trimester of pregnancy, could impact negatively on these women's utilisation of malaria-preventive services.

The important environmental factors that impacted on pregnant women's utilisation of anti-malaria services, included that those living within five kilometres from clinics were more likely to use IPT and LLINs than those living further away from clinics. Pregnant women who were satisfied with the ANC clinic's services were also more likely to implement malaria-preventive services than those who were dissatisfied with these services. Most ANC clinics had regular supplies of free IPT drugs and free LLINs which enhanced the utilisation of these two important malaria-preventive behaviours. Midwives working at clinics without safe drinking water could not administer IPT as DOT, which might impact negatively on the malaria-related outcomes.

The current study's findings thus indicate that malaria control and prevention efforts need to recognise that personal factors, behaviour and environmental factors interact to determine the outcomes of malaria-related programmes and services. Personal

factors are influenced by environmental factors to perform specific behaviours. However, these behaviours influence the environment and are actually part of the environment and, in turn, the environment influences people's behaviours (Christensen 2013:2-3). By addressing all three interrelated aspects, malaria-related programmes might achieve better outcomes in future.

Outcomes of health programmes, including the RBM programme, should be regularly evaluated and improved in order that the community can get maximum benefits out of them and to ensure that internationally donated money has been wisely spent, otherwise a malaria programme could land in a crisis situation. "The weight of evidence leads us to conclude that a crisis exists, characterised by institutional inadequacies that result in good policies for malaria control not being fulfilled. Although the inadequacies are easily rectified, a risk exists that … rich governments will lose confidence and cease funding. That would deal a tragic blow not only to malaria treatment, but also to the spectrum of efforts against malaria, tuberculosis and AIDS, which require and deserve billions of dollars wisely spent" (Attaran, Barnes, Curtis, D'Alessandro, Fanello, Galinski, Kowaro, Looareesuwan, Makanga, Mutabingwa, Talisuna, Trape & Watkins 2004:239).

The current study's findings indicate that better outcomes might be achieved if efforts and programmes and services to control and prevent malaria during pregnancy, focus on these efforts as being "reciprocally determined" by recognising and addressing the interactions between personal factors, behaviour and environmental factors. By adopting this focus, the serious issue that malaria complicates 80% of pregnancies in Uganda (M)H 2012e:363), could be addressed more comprehensively ensuring better health-related outcomes for pregnant women and their babies. Not only would this save health expenditures, but the quality of lives of pregnant women, new born babies, and entire families could be enhanced by reducing the impact of malaria on pregnant women.

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