

**THE ROLE OF SOCIAL CAPITAL IN
MALARIA CONTROL IN NYABONDO,
WESTERN KENYA**

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**The role of social capital in malaria control in Nyabondo, Western
Kenya**

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Science in Research Methods in the Jomo Kenyatta University of
Agriculture and Technology**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

To the glory of GOD, the creator of heaven and earth, I dedicate this work to my mother for everything she has made me.

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MAY THE ALMIGHTY GOD FLOURISH ALL YOUR HANDIWORKS.

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LIST OF ABBREVIATIONS/ACRONYMS

ACT	Artemisinin-combination therapy or Artemisinin-based therapy
AIFS	Australian Institute of Family Studies
Bti	<i>Bacillus thuringiensis israelensis</i>
CGSS	Canadian General Social Survey
CHW/CHS	Community health workers/ Community health staff
Env-Mgt	Environmental Management
ESS	European Social Survey
ICIPE/icip	International Centre of Insect Physiology and Ecology
IRS	Indoor residual spraying
IVM	Integrated Vector Management
IPT	Intermittent Presumptive Treatment
ITN	Insecticide-treated bed net
KEMRI	Kenyan Medical Research Institute
M/HGLM	Multilevel/Hierarchical Generalised linear model
MOCON	Malaria Control in Nyabondo
NZGSS	New Zealand General Social Survey
OECD	Organisation for Economic Co-operation and Development
PCA	Principal Component Analysis
PRI	Policy Research Institute, Canada
PSCS	Polish Social Cohesion Survey
PTA	Parent-Teacher Association
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
SHC	School Health Club
SOCAT	Social Capital Assessment Tool
SPHS	Swiss Public Health Survey
SSA	sub-Saharan Africa / sub-Saharan African
VDC	Village Development Committee
WHO	World Health Organisation
WVS	World Values Survey

ABSTRACT

By 2015, target 8 of the United Nations Millennium Development Goal number six aimed to have halted and began to reverse the incidence of malaria and other major diseases. One of the strategies through which this target was expected to be achieved is to increase the proportion of the population in malaria risk areas who use effective malaria prevention and treatment measures. Malaria is one of the most common vector-borne diseases widespread in tropical and subtropical regions, including parts of the America, Asia, and Africa. Over half of all malaria cases are known to occur in five African countries, including Kenya. Geographically, 70% of the country is prone to epidemics, putting about 20 million Kenyans at constant risk, and killing an estimated 26,000 children every year. In addition to the human cost, the economic burden of the disease is huge. The force of transmission of malaria infection requires an interaction between a human host, a malaria parasite, an Anopheles vector, and a physical, biological and socioeconomic environment, all of which prevail in Nyabondo. Consequently, the plateau was hit by many serious outbreaks of malaria; in response to which the Swiss BioVision Foundation launched an Integrated Vector Management Malaria Project in 2004. Having achieved active community involvement and participation, and benefitted from the support of the relevant authorities and stakeholders, the outcome of this project, unlike other malaria control implementation efforts, has been touted as highly positive.

Considering its role in fostering trust and social cohesion, which facilitates social participation, cooperation and collective action, it was perceived that social capital might have played a role in the success of the malaria control project in rural Nyabondo. However, it was yet to be proven if social capital did play any significant role in the success achieved and, if yes, the exact mechanisms through which it contributed to the success of the project. It is against this backdrop that this research was undertaken to explore the role played by social capital in malaria case management. Specifically, it sought to: evaluate the influence of social networks on the propensity of individuals to manage malaria cases through the formal health care system; assess the effects of social trust on the choice of malaria treatment services

patronised by malaria treatment seekers; evaluate the influence of social norms on the choice of malaria treatment services utilised to manage malaria cases.

To achieve the study objectives, an amalgamation of cross-sectional, retrospective and exploratory research designs was utilized. A case study approach was employed to take advantage of both quantitative and qualitative research strategies. Quantitatively, the special survey technique for researching social capital was utilized, while the qualitative methodologies embraced document analysis and the application of qualitative methodologies to the statistical survey. The World Bank's Social Capital Assessment Tool, the Position Generator, the Resource Generator and the Name Generator were utilised for measurement in order to take advantage of the complementarities offered by these tools. Field data was analysed using SPSS and R statistical software. A multilevel generalized linear modelling routine was utilized to explore both individual and contextual influences of social capital.

The results of data analysis revealed that: an individual's choice of which health care services to utilise for the management of malaria cases is influenced by members of his/her social networks; social trust plays important roles in the utilisation of formal health services for malaria case management; the motivation to comply with the norms of family and friendship networks also has major influences on how individuals manage malaria cases; generally, the roles played by the different forms of social capital are relative and contingent in nature. This implies that social networks, trust and norms can have both positive and/or negative influences on the use of recommended health services for malaria treatment; depending on their nature.

By these findings, it is recommended that program planners incorporate a social capital dimension in the design of up-scaling strategies for malaria control interventions. This generates a need for awareness to be created among malaria control program implementers on how specific contextual conditions affect the building, harnessing and mobilizing of social capital. It is also important that officials of public health facilities strive to build appropriate social capital with their target clients.

CHAPTER ONE

1.0. INTRODUCTION

1.1. Background

By 2015, target 8 of the United Nations Millennium Development Goal number six (MDG 6) aimed to have halted and began to reverse the incidence of malaria and other major diseases. One of the strategies through which this target was expected to be achieved is to increase the proportion of the population in malaria risk areas who use effective malaria prevention and treatment measures. Malaria is one of the most common vector-borne diseases widespread in the tropical and subtropical regions, including parts of the America, Asia, and Africa (General knowledge). In 2008, 109 countries were reported to be endemic for malaria, 45 of which were within the African region. Over half of all malaria cases are known to occur in five African countries; with Kenya being one of them (Aregawi, 2008). Malaria is a complex disease caused by five species of a protozoan parasite belonging to the genus *Plasmodium* that affect human. These include *P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae* and *P. knowlesi*; among which *P. falciparum*, which is the type that predominates in Kenya and most parts of Africa, is known to cause the most deadly form of the disease. In 2002, an estimated 515 million cases of clinical malaria were reported to have been caused by *P. falciparum* alone (Snow, Guerra, Noor, Myint, & Hay, 2005), and more than two thirds of these cases were in Africa (Beiersmann et al., 2007). The clinical pattern and deleterious consequences of malaria infection vary, depending on the level of acquired malaria immunity of an individual and the pattern of malaria transmission in an area. In highly endemic areas such as Kenya, however, preschool-aged children and pregnant women are at highest risk because of their low anti-malarial immunity levels (Curtis, Maxwell, Magesa, Rwegoshora, & Wilkes, 2006).

This disease rates as one of the major health, socioeconomic and development challenges facing many of the world's poorest countries. In the year 2013, most malaria cases (80%) and deaths (90%) occurred in Africa, and most deaths (77%)

were in children under 5 years of age (Tuschman, 2013). Annually, it has been estimated that the number of deaths due to malaria in African children aged less than 5 years could be between 625000 and 1824000 (Breman, Alilio, & Mills, 2004). In Kenya, it is estimated that 26000 children die from this disease every year (Weber & Laumann, 2010). In addition to its human cost, malaria is estimated to cost African countries more than US\$12 billion every year in direct losses. Consequently, up to 40% of African health budgets are spent on the disease each year and, on average, a malaria-stricken family loses a quarter of its income through loss of earnings and cost of treating and preventing the disease. Geographically, 70% of the country, Kenya, is prone to epidemics, putting about 20 million people at constant risk of malaria (Weber & Laumann, 2010). The force of transmission of malaria infection requires an interaction between a human host, a malaria parasite, an Anopheles vector, and a physical, biological and socioeconomic environment, all of which prevail in Nyabondo and many other parts of the Upper Nyakach Division of the Kisumu County.

This combination of physical, biological, and socio-cultural environments rendered rural Nyabondo prone to malaria epidemics. The most significant factors that contributed to the malaria situation in this area include abundant rainfall and temperatures relatively close to the thermal optimum for biological performance of mosquitoes; high population density of nearly 368 persons per square km; innumerable abandoned brick-making pits, and a number of unused and neglected fish ponds. Consequently, the plateau was hit by many serious outbreaks of malaria in recent years; with 7000 to 8000 cases reported at local Hospitals annually (Official *icipi* document, 2015). In response, the Swiss BioVision Foundation launched an Integrated Vector Management (IVM) Malaria Project in Nyabondo in 2004. This project utilized essential scientific inputs from two local research institutes: the International Centre of Insect Physiology and Ecology (*icipi*) and the Kenyan Medical Research Institute (KEMRI). In addition, the project achieved active community involvement and participation, and benefitted from the support of the relevant authorities and stakeholders, including the local civil society organizations. As a result, the outcome of this project has been relatively highly positive; unlike

other malaria control implementation efforts in Africa that have often failed to achieve their targets. Between 2008 and 2010, for example, substantial reductions in mosquito larval populations were observed while, in 2013, the prevalence of malaria cases effectively dropped by up to 62%.

As evidenced from the foregoing, WHO acknowledges that malaria is entirely preventable and treatable, provided the currently recommended control interventions are effectively implemented. Although the technical efficiency and effectiveness of the current control measures are not in doubt, except for some few practical challenges, they have, generally, failed to meet many malaria control targets. This phenomenon, as opined by some authors, appears to be largely due to socio-cultural factors which, very often, are at variance with the standard control methods. To these, societal and cultural beliefs and practices, poverty and high illiteracy levels, especially among Africans, seem to have constituted a big barrier towards freely accepting the scientifically proven facts about malaria. To ensure continued high coverage of interventions therefore; Mills, Lubell and Hanson (2008) in their review of current challenges to scaling-up malaria control, proposed that effective communication and community engagement is required. In spite of this recognition, studies continue to practically reveal that community participation in malaria control is still generally low in Africa (Chilaka, 2005); an observation which may be attributable to the uncertainty around how best to achieve community engagement (Chilaka, 2005; Rifkin, 1996). As far back as 1984, Jeffery disclosed that aside community engagement, the inability to make efficient use of community resources is also a key challenge to community delivery of malaria chemotherapy. Years later, it was revealed that an empowered community, with highly participative community members, is better able to seek out those health-enhancing resources and structural benefits that are quite essential to its health (Bracht & Tsouros, 1990; Campbell & Jovchelovitch, 2000). Moreover, research has shown that the diffusion of innovations can be facilitated by social capital, through its role in increasing the inter-linkages among individuals (Narayan & Pritchett, 1997).

Research on social capital as the group of a community's non-economic resources that are likely to make cooperation among individuals and institutions possible in a positive and constructive way has received significant contribution in recent times. In examining what the several definitions of social capital have in common, Field (2005) suggested a view of social capital as defined by what it helps to maintain or achieve, conceived as a resource for increasing the capacity to achieve our goals by securing the cooperation of others. Thus, where people hold complementary norms, values and beliefs (defined as forms of social capital) which predispose them to networking, cooperation and mutual assistance, a valuable set of assets can be created by joint action; that may be productive in the present but also in the future (N. Uphoff & Wijayaratra, 2000). This confirms Putnam's (1993) claim that "working together is easier in a community blessed with a substantial stock of social capital"; because social capital includes 'features of social life (i.e. networks, norms and trust) that enable participants to act together more effectively to pursue shared objectives' (Putnam, 1995). Thus, social capital, as conceived as the resources embedded in social relations and structures, which can be mobilised when actors wish to increase the effectiveness of their actions, could be effectively harnessed to scale up malaria control interventions.

1.2. Statement of the Problem

A combination of physical, biological, and socio-cultural environments rendered rural Nyabondo prone to malaria epidemics. Consequently, the plateau was hit by many serious outbreaks of malaria in recent years; with 7000 to 8000 cases reported at local Hospitals annually. In response, the Swiss BioVision Foundation launched an IVM Malaria Project in Nyabondo in 2004. The results of this project, unlike other malaria control implementation efforts in Africa which often fail to achieve their targets, have been relatively highly positive.

Too often, relief agencies become frustrated and angry that a seemingly good and logical proposal and control programme has failed to capture the interests of the at-risk populations for whom it is designed. However, a growing body of empirical evidence suggests that the density of social networks and social institutions, and the

nature of interpersonal interactions that underlie them (i.e. social capital), significantly affect the efficiency and sustainability of development programs (Grootaert & van Bastelaer, 2001). In addition, an empowered community with highly participative community members, it has been revealed, is better able to seek out those health-enhancing resources and structural benefits that are quite essential to its health (Bracht & Tsouros, 1990; Campbell & Jovchelovitch, 2000). Thus, considering the stakeholder support and active community involvement and participation enjoyed by the BioVision Project, it was perceived that social capital might have played a role in its success in Nyabondo. Questions, however, remained as to whether social capital really played any significant role in the success achieved in Nyabondo and, if yes, the exact mechanisms through which it contributed to this success. The research concern/problem, therefore, was to provide a proof as to whether or not social capital plays any role in the effectiveness of malaria control interventions and, if yes, the exact mechanisms through which it contributes to their success.

1.3. The Study Context (The Study Site and the BioVision IVM Malaria Project)

Nyabondo is a plateau area located in the Upper Nyakach Division of the Kisumu County, Western Kenya. This plateau is situated 30km on the North-Eastern part of Lake Victoria, and lies between altitude 1520m and 1670m above sea level. The area is host to an estimated 34000 people with a high population density of nearly 368 persons per square km. Nyabondo shows an equatorial climate modified by the influence of Lake Victoria. The main climatic conditions are high temperatures, high precipitation and absence of dry months. Due to abundant rainfall and temperatures relatively close to the thermal optimum for biological performance of mosquito populations, the area is prone to malaria epidemics. However, though formerly a wetland, this plateau remained malaria-free for a long time due to a well-functioning drainage system. The main livelihood activities are reported to include subsistence crop farming, small scale livestock rearing and brick making which, due to the plateau's ideal heavy clay soil, has become the main source of income for a vast section of the population. As a consequence, innumerable abandoned brick-making pits, in addition to unused and neglected fish ponds in this area have provided ideal

breeding sites for malaria vectors (mosquitoes), which led to many serious outbreaks of malaria in recent years.

Sixteen villages in Nyabondo play host to the rural version of the Swiss BioVision Foundation's environmentally-friendly IVM Malaria Project. Utilizing scientific assistance from *icip*e and KEMRI, and with support from local civil society organisations, this initiative, as reported by Weber and Laumann (2010), recruits and trains local people to become "Mosquito-Scouts" to inform others about the dangers presented by stagnant water pools; organizes public awareness campaigns to provide malaria information; initiates "Mosquito days" to activate the local community for environmental management; and encourages personal protection through the distribution of long-lasting insecticide treated nets. In addition, malaria awareness is incorporated into education in schools and School Health Clubs (SHC) are formed to create awareness on the control and environmental management of malaria through 'learning-by-doing'. Biological agents like *Bacillus thuringiensis israelensis* (Bti), developed by *icip*e, and neem are used to kill mosquitoes at their larval stage. With the full support of the local authorities and stakeholders, and benefiting from active community involvement and participation, the results of the project begun emerging with a substantial reduction in mosquito larval populations being observed between May, 2008 and June, 2010. Subsequently, reductions of up to 80% in mosquito larval numbers have been recorded within the last three years while the prevalence of malaria cases effectively dropped by up to 62% in 2013. This drastic drop in malaria prevalence implies a reduction in the number of infected hosts. Since an infected human host is a critical component in malaria transmission, the drastic drop in prevalence rate could have emanated from access to recommended malaria case management services which could, in turn, be driven by social capital.

1.4. Research Objectives

The purpose of the study was to explore the role of the different forms of social capital in malaria case management.

Specifically, this study sought to:

- to describe the nature of social capital in Nyabondo
- evaluate the influence of social networks on the propensity of individuals to manage malaria cases through the formal health care system
- assess the effects of social trust on the choice of malaria treatment services patronised by the residents of Nyabondo
- evaluate the influence of social norms on the choice of malaria treatment services utilised to manage malaria cases in Nyabondo.

1.5. Research Scope and Assumptions

This study focused on the malaria case management intervention due to the limitation of resources and the importance of this intervention in reducing child mortality and achieving two of the major millennium development goals. It employed a multidimensional view of social capital. Following researchers like Yang, Yang, Shih and Kawachi (2002), Kawachi, Subramanian and Kim (2008), etc. who emphasize the view that both “Bourdieuian” (which considers social capital as a property of the individual) and “Putnamian” (which argues that social capital is an ecological/community resource) social capital should be measured in social capital studies, this study considered the influence of both levels of social capital on malaria case management. In relation to its potential influence, the study explored “positive” but, also, “negative” social capital; which helped to analyse the contextual nature and role of social capital. According to Putnam et al. (1994), the more exhaustive definitions of social capital include two main components: structural and cognitive social capital. This study therefore took a composite view of the influence of social capital by researching both components of social capital. The study did not seek to measure the manifestations of social capital, per se, in the study area. Rather, it was based on the assumption that: substantial stocks of relevant social capital already exist in the study area as a result of inherent social relations, and/or by creation through the implementation strategy of the BioVision Malaria Project. Moreover, the retrospective nature of the study relied on the respondent’s power of memory; based on the assumption that the respondents will accurately memorise past events.

1.6. Definition of Key Terms

The following are the definitions of some key terms as used in this study.

Malaria control: reducing malaria morbidity and mortality to a locally acceptable level through deliberate efforts using the preventive and curative tools available today.

Malaria case management: the curative measures undertaken by a household after recording a suspected case of malaria; which embrace appropriate diagnosis and treatment with effective recommended antimalarial drugs. It is considered a critical component of malaria control.

Social capital: resources embedded in social relationships, social structures and/or social environments which are harnessed by individuals and groups for purposive actions.

Social network: an individual's social relationships which exchange resources such as opinions, knowledge, and care.

Actors: individuals who are connected in a network.

Ego: an individual, representing the household, on whom data is collected.

Alter: an individual that an ego is connected to or shares a tie with.

Tie: relationships among actors or the relationship between an ego and an alter.

1.7. Organisation of the Thesis

This study consists of five chapters as outlined below.

Chapter one, as presented above, introduces the study by presenting the background to the study, disclosing the research problem, putting the study in a context, stating the study objectives, delineating its scope, and defining some key terminologies as used in the study.

Chapter two covers a review of the literature relevant to this study. This is composed of 5 main sections starting with an overview of the concept of social capital.

Following this is a review of the main models of health care utilization. An overview of malaria control strategies, focusing on the malaria case management intervention, is then presented in section three followed by the conceptual framework underpinning the study. The chapter is finally capped with a summary of the literature review.

Chapter three presents the methodology for the study which captures the design/strategy employed for this study; the study populations, sampling procedure and sample size; the instrument used to collect the data; the theoretical and empirical underpinnings of the main variables measured; the data collection procedure; the data management plan; and the empirical approach to data analysis.

Chapter four presents the analysis conducted to achieve the study objectives, the results obtained from these analyses, and the interpretation and discussion of these results.

Chapter five finally concludes the study by summarising the main findings and making some policy recommendations for stakeholders and policy makers. It then presents the main limitations of the study and makes some propositions to be considered for future research. It ultimately ends by outlining the contributions made by this study to research and policy.

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. Overview of the Concept of Social Capital

2.1.1. Background and Definition of Social Capital

The theory of social capital suffers from much criticism for being poorly defined and conceptualized. Thus, a search for the definition of social capital produced well over 40 different, but equally relevant and insightful, descriptions of the concepts. According to the OECD, the concept of social capital became fashionable only relatively recently; though the term has been in use for almost a century, while the ideas behind it go back further still. In Portes (1998) view, however, the first systematic contemporary analysis of social capital was produced by Pierre Bourdieu, who defined the concept as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition” (Bourdieu, 1986). Putnam et al. (1994), however, provided an ecological twist to the term by defining it as those “features of social organization, such as networks of individuals or households, and the associated norms and values that create externalities for the community as a whole”. In providing a functional definition, Coleman referred to social capital as “a variety of entities with two elements in common: they all consist of some aspect of social structures, and they facilitate certain action of actors - whether persons or corporate actors - within the structure” (Coleman, 1990). Similarly, Portes (1998) defined it as “the ability of actors to secure benefits by virtue of memberships in social networks or other social structures”. For Lin (2001), social capital encapsulates the resources embedded in social structures that are accessed and/or mobilized in purposive actions. To utilize this concept, many international agencies have also added to the myriad of its definitions. Institutionally, the World Bank referred to social capital as "...the institutions, relationships, and norms that shape the quality and quantity of a society's social interactions". Similarly, the OECD

proposes that the term be defined as the “networks together with shared norms, values and understandings that facilitate cooperation within or among groups”. Although everyone has their own favourite definition of social capital, as Knowles put it, most researchers would not object too strongly to a definition that incorporate the notions of networks, trust and cooperative norms (Knowles, 2005).

2.1.2. Dimensions and General Roles of Social Capital

Generally, theorists tend to distinguish three main functions of social capital: as providing a source of social control, family support and benefits arising from networks outside the family (Dika & Singh, 2002; Portes, 1998). In Pantoja's (2000) view, however, this construct has a relative and contingent nature. Thus, while emphasizing its positive consequences, some authors have critiqued that the same mechanisms appropriable by individuals and groups as social capital can have other less desirable consequences (Horvat, Weininger, & Lareau, 2003; Ream & Palardy, 2008; Woolcock & Narayan, 2000). Accordingly, more recent studies have identified at least four other “negative” consequences of social capital including: exclusion of outsiders, excess claims on group members, restrictions on individual freedoms, and downward-levelling norms. The roles of social capital in providing network-mediated benefits but, also, restricting individual freedoms and entrenching downward-levelling norms, in particular, could have significant implications for utilization of health services for malaria case management.

According to Blaxter (2004), social capital constructs are multi-dimensional, and not entirely distinct from one another. In this respect, most researchers (e.g. Stone, 2001; Silva, McKenzie, Harpham, & Huttly, 2005; Islam, Merlo, Kawachi, Lindström, & Gerdtham, 2006; Harpham, 2008; Szreter & Woolcock, 2004) investigating social capital, after the publication of Coleman's and Putnam's theories, have often divided the concept into a structural component made up of social networks, social participation, etc., and a cognitive component embracing trust, norms, etc. (Almedom, 2005; Harpham, Grant, & Thomas, 2002; Islam et al., 2006).

2.1.2.1. The Structural Component Forms of Social Capital (Social Networks)

Structural social capital gives an idea of the presence of social capital by documenting the possibilities of access to resources depending on the relational structure within a social network. It describes the interpersonal formation of linkages between individuals or groups, and is seen to reflect the connectedness of individuals within a given community (Favara, 2012). At its most basic level, an important thread of this component is the overall configuration of strong and weak ties. While strong ties refers to intimate bonds between family members or close friends that are maintained regularly and permanently, weak ties are seen as non-intimate bonds between acquaintances (Granovetter, 1973). This taxonomy of social networks is also captured by other scholars who respectively classified strong and weak ties as embeddedness and autonomy (Woolcock, 1998), or bonding and bridging ties (Njuki, Mapila, Zingore, & Delve, 2008). In addition, functional social capital introduces a third type of social network known as “linking”, bracing (Rydin & Holman, 2004; Szreter & Woolcock, 2004), or “institutional” ties (Rothstein & Stolle, 2008; Stolle, 2008); which refers to the vertical relationships between actors with different possessions of power.

The role of social capital in providing network mediated benefits is chiefly realised through its structural component; which is made up of informal social networks and association/group memberships. Social networks, among other things, facilitate communication and the flow of information about others' trustworthiness, develop reputations among members, facilitate informal problem solving and reinforce reciprocity norms (Hendryx, Ahern, Lovrich, & McCurdy, 2002). The effectiveness with which the networks and associations fulfil this role depends upon many aspects of these groups; reflecting their structure, their membership, and the way they function. Thus the different “capabilities” of social capital, as explained by Stone and Hughes (2002), relate to the range of network characteristics which dictate the flow of resources through networks.

The first of these is the size and capacity of a given network. Networks can be anything from limited to extensive in size and capacity, and may involve relations

within the household, at the neighbourhood or local community, to global and virtual relations operating at vast distances. Individuals and families with large numbers of social ties may have access to a large stock of social capital, depending on the nature of those ties. The degree to which networks are dense or closed is also argued to have implications for the quality of the relationships they embody, and their productive output (Coleman, 1988). A dense network is one in which network members overlap and know one another and a closed network is one in which social relations exist between all parties. As Coleman (1988) explains: “closure of social structure is important for the existence of effective norms as well as the trustworthiness of social structures that allows the proliferation of obligations and expectations.” On the other hand, the heterogeneity of group or network membership is said to influence the levels of trust within networks, the extent to which trust of familiars translates into generalised trust of strangers, and the extent to which norms within networks are shared. Heterogeneity of social ties may promote linkages with a diverse range of networks and hence access to a broad range of opportunities or inhibit the development of trusting, reciprocal relations due to differences (Stone & Hughes, 2002).

2.1.2.2. The Cognitive Component Forms of Social Capital

Unlike structural social capital, the cognitive component encapsulates those resources that offer a joint code or a shared paradigm which facilitates a common understanding of collective goals and proper ways of acting in a social system (Ostrom, 2000); even in the absence of specific links and relations between members of a unit. According to Portes and Sensenbrenner (1993), such a common understanding is appropriable by the collectivity as a resource; capturing the essence of what Coleman described as ‘the public good aspect of social capital’. Moreover, this component is believed to inculcate a feeling of a sense of community (Favara, 2012; Esperanza Vera-Toscano, 2013), which encourages normative behaviour based on trust, reciprocity, obligations and expectations (Adler, 2001; Adler & Kwon, 2002). These descriptions align with Uphoff’s characterization of this component as the shared norms, values, trust, attitudes, and beliefs (Uphoff & Wijayaratra, 2000). Accordingly, the key forms of cognitive social capital are seen to include trust and

trustworthiness (Putnam et al., 1994), social cohesion and social norms (Favara, 2012; Nyhan et al., 2007).

Social Trust

Trust is defined as “the expectation of good will in others” (Glanville & Paxton, 2007) and is primarily conceptualized in three ways: generalized trust, personalized or relational (Rousseau, Sitkin, Burt, & Camerer, 1998) trust, and institutional/strategic trust (Smith, 2010). Generalized trust is the conceptualization of trust receiving greatest attention in the social sciences (Nannestad, 2008; Smith, 2010) and has been defined as a belief in the benevolence of human nature in general (Yamagishi & Yamagishi, 1994). As Glanville and Paxton (2007) observed, this type of trust concerns an individual’s evaluation of the trustworthiness of the average person. Unlike generalized trust, personalized/relational trust relates to trust in specific persons, and offer the potential to assess trust of people who are part of one’s “in-group”. It is derived from repeated interactions over time between a truster and a trustee (Rousseau et al., 1998). Heightened levels of trust and reciprocity within a local area are argued to be the aspects of relationships that enable cooperative action for mutual benefits. Moreover, trust is known to motivate informational conformity which, unlike the normative conformity generated by social norms, is based on the desire of individuals to form an accurate interpretation of reality and behave correctly (Deutsch & Gerard, 1955). It is even claimed that the performance of any health-care system is based on institutional trust; which allows patients to trust providers without any personal knowledge of the health workers which represent the health-care system (Russell, 2005).

Social Norms

Generally, social norms have been defined as rules and standards that are understood by members of a group which guide and/or constrain social behaviour without the force of laws. They are, thus, seen to be in keeping with what is commonly accepted and legitimized by the value systems specific to each social group (Alpe, Beitone, Dollo, Lambert, & Parayre, 2013). Norms and customs are known to be the basic rout through which the functioning of social capital as a form of social control is

propagated. Social control refers generally to societal and political mechanisms or processes that regulate individual and group behaviour, leading to conformity and compliance to the rules of a given society or social group. This is achieved through normative conformity; which is a type of social influence involving a change in belief or behaviour in response to real or imagined group pressure to fit in with a group (McLeod, 2007). The social scientific study of norms goes back to the philosophical tradition that defines norms as regularities emerging from reciprocal expectations (Bicchieri, 2005). Reciprocity is, thus, a core part of cognitive social capital (Abbott & Freeth, 2008; Stone, 2001). The norm of reciprocity refers to equal or comparable exchanges of tangible aid, affection, advice or information between individuals or groups. It is a widely accepted social rule that governs the tendency for people to give back when they have received from someone (Sanderson, 2010). By creating a sense of obligations to one another, according to Goulter (1960), reciprocity functions as a “moral cement” to stabilize social relationships. It, therefore, determines how individuals accept and provide social support within a social system. It is also believed to lower transaction costs, facilitate cooperation, restrain opportunism, and balances self-interest and solidarity (Hendryx et al., 2002).

Social Cohesion

In simple terms, social cohesion describes the capacity of societies to peacefully manage collective action problems. For a significant body of the literature, therefore, social cohesion is classified as a property of the social unit and not of individuals (Chan, To, & Chan, 2006; Jenson, 2010). As Moody and White (2003) observed, social cohesion is often partitioned into a relational component: referring to the observed relationships/connections among members of a collectivity, and an ideational component: referring to members' psychological identification within the collectivity. Thus, according to Hogg's social cognitive hypothesis, social cohesion arises when individuals 'identify themselves as members of a particular group and not as members of others (Hogg, 1992). By this, members of any given society are believed to share a social identity; which influences much of the behaviours of the individuals within the social group.

Though the functioning of social capital (through its different component forms) seems to apply to general development outcomes, a closer examination of the models of health care utilization reflects how relevant social capital could be for health care outcomes and general disease control.

2.2. A Review of the Models of Health Care Utilization

An overview of the four main models of health care utilization, as modified from (Rebhan, 2009), is provided below. These include the Suchman's stages of illness and medical care, Young's choice-making model, Rosenstock's health belief model, and Andersen's health behavior model.

Suchman's stages of illness and medical care (Suchman, 1965), one of the first theories of health care utilization, reflects five stages of an individual's decision process in determining whether or not to utilize health care (Appendix 1). At the first stage of this theory, an individual experiences symptom and recognizes this experience as symptomatic of an illness. Next, the individual assumes a sick role: during which he/she also explores his or her lay referrals (i.e. non-professional persons such as family members or friends) to validate the sick role and to explore treatment options. The third stage is medical care contact: where the individual consults a professional health care system. However, the pace at which an individual seeks professional/formal health care is determined by the person's membership within parochial and cosmopolitan social networks. A person belonging to parochial networks will tend to delay medical care contact by continuing the first two stages longer than a person who is a member of a cosmopolitan network. At the fourth stage, the individual assumes a dependent-patient role via acceptance of professional health care treatment. It is possible for this stage to be disrupted if the individual and the professional health care provider have differing opinions of the illness. The final stage reflects the individual's recovery from illness. However, if an illness is not curable, a person may assume a chronically ill role (Rebhan, 2009).

Young's choice-making model (Young, 1986), on the other hand, incorporates four components that are most essential to an individual's choice of health service (Appendix 2). The first category, perceptions of gravity, includes both the individual's perception and their social network's consideration of illness severity. This is based on the assumption that the culture classifies illnesses by level of severity. The second concerns an individual's knowledge of a home treatment. If a person knows of a home remedy that is efficacious, they will be likely to utilize that treatment before utilizing a professional health care system. This, as Young indicated, is based on lay referrals. Third is the individual's faith in remedy. This component incorporates the person's belief of the efficacy of treatment for the present illness. An individual will not utilize the treatment if he/she does not believe the treatment is effective. The final category covers the accessibility of treatment. This incorporates the individuals' evaluation of the cost of health services and the availability of those services.

Similar to Young's model, Rosenstock, Strecher, and Becker (1994) developed a health belief model (Appendix 3) that discussed an individual's actions to treat and prevent disease via a consideration of four central variables. First is the individual's perceived susceptibility to disease: whereby individuals will seek preventive health services if they believe that they are susceptible to the disease. The second is the individual's perception of illness severity: whereby if the individual does not perceive the illness to be serious, he/she will not seek treatment/prevention. This is followed by the individual's rational perception of benefits versus costs. At this point, the individual will not take action unless the treatment or prevention is perceived as having greater benefits than costs. The Young's model finally ends with the individual's cues to action: whereby the media, friends, family, or well-known citizens can provide an impetus for prevention. According to this model, the absence of cues to action will reduce the likelihood of prevention. Thus, the individual's choice to utilize health services is contextually dependent (Rebhan, 2009).

The first of Andersen's health behavior models, which considered three categories of determinants (Appendix 4), was developed in 1968. The first category encompasses

the predisposing characteristics, which represents the proclivity to utilize health care services. According to Andersen (1968), an individual is more or less likely to use health services based on his/her demographics, position within the social structure, and beliefs of health services benefits. An individual who believes health services are useful for treatment will likely utilize those services. The second category concerns enabling characteristics. This includes resources found within the family and the community. Family resources comprise economic status and the location of residence. Community resources incorporate access to health care facilities and the availability of persons for assistance. Following the enabling characteristics is a category capturing the perception of need for health services, which may be individually, socially, or clinically evaluated (Rebhan, 2009). This model was expanded and refined in the 1970's to include the health care system: which includes health policy, resources, and organization, as well as the changes in these over time. In addition, the updated model included the recognition that consumer satisfaction reflects health care use. Furthermore, the model captured the notion that there are several health services available, and both the type of service available (i.e., a hospital, pharmacy, etc.) and the purpose of the health care service will determine the type of service utilized. Thus, according to the revised model, whether or not a specific health care service is utilized depends on characteristics of the population and the health services (Andersen, 1995; Andersen & Newman, 2005). During the 1980's -1990's, the model was further revised to reflect three components with a linear relationship including: primary determinants; health behaviours; and health outcomes (Appendix 5). Primary determinants are noted as the direct cause of health behaviours and include characteristics of the population, the health care system and the external environment (i.e., political, physical, and economic influences of utilization). Health behaviours include personal health practices and the use of health services, while health outcomes include perceived health status, evaluated health status, and consumer satisfaction. Finally, the model explains that health behaviors, which are a direct cause of health outcomes, also determine the health outcomes (Andersen, 1995); portraying a closed loop between health behaviors and health outcomes.

2.2.1. The Place of Social Capital in General Health Care Utilization

In his review of the models of health care utilization, Rebhan (2009) identified three main threads of commonality via three factors which influence the process of health care seeking. These common themes, as highlighted by the author, include: health care access, social networks, and culture. The last two factors, as is apparent from the first part of this literature review, accurately reflect the structural and cognitive dimensions of social capital respectively.

Access, according to Rebhan (2009), describes the ability to utilize health services and incorporates economics, geographic location, abundance of health services, and physical and social resources. The economic costs of health care seeking include not only payment for treatment, but also lost productive time, and the expense of transportation. These may make utilization less likely. Accessibility, as further influenced by physical resources such as geographic location, can become an impediment to the use of health services (LaVela, Smith, Weaver, & Miskevics, 2004). Access can therefore be seen as encompassing the demographic, socio-economic, and institutional factors which may play a role in determining the choice to seek health care and the assessment of which health care options to utilize for prevention and treatment of illness.

Social networks, as Rebhan (2009) observed, can cue an individual to utilize or abstain from health services; and can function in the identification of illness and illness response. In a study in Taiwan, for example, Kleinman (1980) found that families provided social resources, specifically knowledge, of which a lone ill person may not have been aware. In addition, individuals whose families had knowledge of an effective home remedy often attempted that treatment before utilizing professional health care services. Thus, the knowledge and social support available to an individual can affect access to specific health services. On the other hand, it is known that individuals who experience illness often consult their networks in an effort to identify the illness and the best course of treatment depending on the concept of self within the culture. In many western nations, for instance, there are two main conceptions of self, one that is autonomous and one that is heteronomous. While

members of heteronomous cultures are likely to have their course of treatment determined by people within their social networks (Ikels, 2002), cultures that consider individuals as autonomous, are more likely to leave treatment decisions for the individual. Yet, even in cultures that stress autonomy, the individual may consult social networks for illness advice. These indicate how social networks may function to affect illness knowledge and patterns of health care utilization. In Rebhan's (2009) assessment, Suchman's concept of parochial and cosmopolitan networks highlights the role that network/social cohesion can play in disease control. According to Suchman, parochial networks are those that are traditional, close in affiliation, and reluctant to accept new information. Because of their emphasis on tradition, these networks are theoretically likely to utilize home based treatments before scientifically-based health care such as professional biomedicine. Persons belonging to cosmopolitan groups, on the other hand, are more progressive, willing to accept new information, and are more likely to have a scientific approach to illness. As a result, cosmopolitan group members would be more likely to use biomedical health care services.

Interacting with the social networks is the culture of a group or an area which, according Rebhan (2009), may be accountable for the variances in health care utilization. Culture is defined by this author as the values, practices, meanings, and beliefs which are transmitted from one person to another through the process of enculturation. Often considered a barrier to health services utilisation, culture can influence knowledge and beliefs of illness as well as the course of treatment for illness. Conceptual-incompatibility, for instance, is a hypothesis frequently used to explain why members of another culture refuse to utilize health services when it conflicts with their culturally rooted knowledge of illness (Young & Garro, 1982). This shows how social norms, a form of cognitive social capital, can play an essential role in the utilization of health services. Moreover, culture, as Rebhan (2009) puts it, shapes not only illness treatment, but also confidence in the efficacy of specific treatments for specific illnesses. Thus, trust (as influenced by cultural categories of illness) in the form of beliefs in the efficacy of treatment, can shape the use of health care services as well as adherence to prescribed treatments. Though the

models of health care utilization summarised above look more general in their approach and applicability to health care services utilisation and disease control, they are, as well, specifically applicable to the management of malaria cases.

2.3. Overview of Malaria Control Strategies

2.3.1. Introduction

Malaria control is described as the reduction of the malaria disease burden to a level at which it is no longer a public health problem (Aregawi, 2008). Conventionally, WHO recommends a number of control interventions which, according to the organization, can help to entirely prevent and treat malaria provided they are properly implemented. These interventions include: (i) vector control through the use of insecticide treated nets (ITNs), indoor residual spraying (IRS) and, in some specific settings, larval control; (ii) chemoprevention of the most vulnerable populations, particularly pregnant women and infants; (iii) confirmation of malaria diagnosis through microscopy or rapid diagnostic tests (RDTs) for every suspected case; and (iv) timely treatment with appropriate antimalarial medicines (Tuschman, 2013). Fast and appropriate diagnosis and treatment of malaria has been known as being extremely important in reducing child mortality and achieving two of the major millennium development goals (Dunn, 2005). In recognition of the foregoing and the limitations of resources, this study focused on the malaria case management intervention. Provided below, therefore, is an overview of the malaria case management intervention, which is the intervention of interest to the objectives of this study.

2.3.2. The Malaria Case Management Intervention

2.3.2.1. Background

Timely treatment of malaria with appropriate antimalarial medicines is one of the two closely related curative interventions utilised in malaria control. In case of malaria infection, confirmation of malaria prior to treatment is supposed to be the standard procedure. A number of options exist or are in development for diagnosing malaria. However, cost and prevailing conditions typically determine the method

used. As a result, the most common methods of diagnosis are either those based on clinical signs and symptoms alone, or on microscopy. However, newer technologies, especially RTDs, are becoming more widely used as they: are now available in many endemic countries, are easy to use, give fast results and are increasingly affordable. Following diagnoses, prompt treatment of malaria with efficacious and affordable antimalarials is a key component of the Global Malaria Control Strategy (Meremikwu, Ezedinachi, & Ehiri, 2009). Prompt provision of effective therapy, that is capable of preventing the progression of illness from mild to severe, has been estimated to provide as much as a 50-fold reduction in the risk of mortality. In contrast, effective treatment of malaria, once it has progressed to severe illness, has only a 5-fold reduction in the probability of dying (van Vugt et al., 1999). Based on their chemical nature, the currently used antimalarials, as Schlitzer (2008) observed, can be grouped under nine classes: 4-aminoquinolines, 8-aminoquinolines, amino-alcohols, sulfamines and sulfones, biguanides, diaminopyrimidine, sesquiterpenes lactones, naphthoquinones, and antibiotics. As a result of the emergence and spread of malaria parasites resistant to the commonly used affordable antimalarial drugs (like chloroquine and SP), mono-therapies have been strongly discouraged in favour of combination therapies as the gold standards for treating malaria. In this regard, WHO recommended that an ideal drug combination should contain two drugs that are individually effective against the blood stages of the parasite, and that use completely different mechanisms to kill it. Consequently, artemisinin derivatives were seen as extremely potent anti-malarials with a rapid onset of action; and when administered in combination with anti-malarials with slower elimination rates (e.g. lumefantrine), short courses of treatment (3 days) have proven to be highly effective (WHO, 2006).

Although the technical efficiency and effectiveness of the available malaria control measures is not in doubt, except for some few practical challenges, they have generally failed to meet many different malaria control targets. During the past decade, for instance, numerous large-scale initiatives have been undertaken with the goal of reducing/eradicating the burden of malaria in the developing world. Despite these recent massive global efforts, there were still an estimated 207 million cases of

malaria in 2012, accounting for about 627000 malaria deaths worldwide; most (80% and 90% respectively) of which occurred in SSA. Annually, it has been estimated that the number of deaths due to malaria in African children less than 5 years could be between 625000 and 1824000 (Breman et al., 2004). In Kenya, it is estimated that 26000 children die from malaria every year (Weber & Laumann, 2010). With the current trend, the ambitious goals set by programs to reduce the burden of malaria in the near future appear unlikely to be met. A number of factors, some of which are socio-cultural, are known to have contributed to the limited success in malaria control efforts. Provided below is a review of some of the factors that limit successful implementation of the malaria case management intervention strategy.

2.3.2.2. Prior Studies on the Socio-cultural Challenges facing the Malaria Case Management Intervention

Several times during our history, global efforts have been initiated to control malaria, all with less than satisfactory outcomes. Effective management of malaria cases in regions of endemic infection, for instance, is also faced with a variety of challenges. Most diagnoses in these regions, including Africa, are based on clinical symptoms; which are extremely misleading and fraught with inaccuracies. Even worse, unskilled home diagnosis (a common phenomenon in many endemic countries) is likely to be the most inaccurate means of diagnosing malaria; and may lead to high proportions of unnecessary and inappropriate treatments (Shiff, 2002). On the other hand, access to prompt treatment (with effective antimalarial drugs) remains very low in many SSA countries. This phenomenon, according to Meremikwu et al. (2009), is mainly due to weak health systems that are poorly patronized by the populace, and a lack of funds to procure and effectively deliver the expensive ACTs. Shaikh and Hatcher (2005), on their part, identified lack of accessibility, poor socio-economic status, cultural beliefs and perceptions, low literacy level of mothers and large family sizes as the leading causes of poor utilization of primary health care services in these regions. Moreover, studies on malaria treatment-seeking behaviour generally highlight delays in seeking treatment; in terms of the time lapse between onset of symptoms and a person seeking treatment at a formal health care facility (McCombie, 1996). Also, a meta-analysis conducted by Maslove et al. (2009)

revealed significant scepticism around the use of conventional medicines in the treatment of malaria; hence the frequent use of ineffective traditional remedies as first-line treatments for malaria based on traditional practices. This, according to them, may be due to cultural beliefs regarding the cause of malaria which may differ from biomedical explanations; and/or, likely, as a consequence of the role of traditional healers within local cultures. Economically, affordability of ACTs is seen as a major issue affecting their effective deployment in malaria control programs in SSA; as lack of cash is also known to be an important explanation for seeking treatment from traditional healers. Other challenges to effective case management of malaria include misuse of antimalarials through poor adherence to recommended treatment regimens; inadequate dosing and premature discontinuation of active drugs before complete eradication of parasites; use of poor-quality drugs; presumptive treatment; and use of drugs that have a long half-life (Fong, 2013). Unfortunately, however, the poor adherence to treatments also carries a risk of treatment failure (Brieger et al., 2001); which can derail trust in recommended, otherwise, effective drugs and in formal health institutions.

2.3.2.3. The Link between Social Capital and Malaria Control

The challenges reviewed above continue to prevail because, too often, malaria control activities are designed with little understanding and consideration of the social and cultural context within which they are supposed to operate. As a result, relief agency staff become frustrated and angry that a seemingly good and logical proposal has failed to capture the interests of the at-risk populations for whom it is designed. To ensure continued high coverage of malaria control interventions, Mills et al. (2008) for instance, proposed that effective communication and community engagement is required. In spite of this recognition, studies continue to practically reveal that community participation in malaria control is still generally low in Africa (Chilaka, 2005); an observation which may be attributable to the uncertainty around how best to achieve community engagement (Chilaka, 2005; Rifkin, 1996). As far back as 1984, Jeffery disclosed that aside community engagement, the inability to make efficient use of community resources is also a key challenge to community delivery of malaria chemotherapy. Thus social capital, as conceived as the resources

embedded in social structures and relations; and that can be mobilised when actors wish to increase the effectiveness of their actions (Bourdieu, 1986; Burt, 1992; Portes, 1998), could be effectively harnessed to scale up malaria control interventions such as the malaria case management intervention.

2.4. The Conceptual Framework and Research Hypothesis

2.4.1. Potential Role of Social Capital in the Strive to Address Socio-cultural Challenges in Malaria Case Management

The continued persistence of malaria in Africa, as Jombo and Mbaawuaga (2010) opined, appears to be largely due to socio-cultural factors which, very often, are at variance with the standard control methods. To them, societal and cultural beliefs and practices, poverty and high illiteracy levels among Africans, for instance, seem to have constituted a big barrier towards freely accepting the scientifically proven facts about malaria. In addition, it is argued that unless individuals in communities see the merits of preventing the disease, even the best-designed strategies might not be used (Bloland et al., 2002). In examining what its several definitions have in common, however, Field (2005) suggested a view of social capital as defined by what it helps to achieve; conceived as a resource for increasing the capacity to achieve our goals by securing the cooperation of others. This view confirms the claim by Putnam et al., (1994) that “working together is easier in a community blessed with a substantial stock of social capital”. Thus, by its functioning as a source of social control, family support and network-mediated benefits through its role in fostering trust, social cohesion and collective action; social capital could promote the adoption of control interventions such as the prompt treatment of malaria.

In Africa, malaria is largely a disease of rural populations who are often among the poorest of the poor; and whose livelihoods social capital may be an important component (Snow & Omumbo, 2006). Health seeking behavior is known to be an integral part of a person's, a family's or a community's identity, which had evolved from personal, social, cultural and experiential factors (MacKian, 2003). In Kenya, for example, it has been reported that patients more likely commence malaria

treatment with self-medication and wait for some time to observe the progress of the illness before seeking formal health care when home treatment fails. In situations like this, social capital (in the form of norms), as Durlauf and Fafchamps (2004) put it, can function as a form of social control within groups to influence individual treatment-seeking behaviours, by modifying their preferences. Poor adherence to treatment, similarly, carries a risk of treatment failure (Brieger et al., 2001). Numerous studies, however, have found that the norm of reciprocity plays a role in compliance to requests (Cialdini & Goldstein, 2004 cited in Burger, Sanchez, Imberi, & Grande, 2009). Furthermore, failure of Hospital treatments (which may be due to delays in presenting cases to formal treatment centres) has been recognised to derail trust in recommended, otherwise, effective drugs and in formal health institutions. This phenomenon also entrenches cultural beliefs that malaria is caused by witchcraft (Maslove et al., 2009). These, as McCombie (1996) observed, may explain why antimalarials are often obtained outside the formal health care centres. In these regards, linking social capital may harbour the potential to facilitate malaria treatment-seeking in Hospitals; by fostering trust in primary health care services and providers (Szreter & Woolcock, 2004). Moreover, the levels of trust among social groupings, it is argued, vary with the level of social connectedness (Thiede, 2005), signalling the role that social cohesion may play in the utilisation of health care services. On the other hand, social capital could also provide network-mediated benefits (e.g. biomedical knowledge of malaria) which may promote appropriate treatment-seeking behaviours.

Symptoms of malaria such as splenomegaly, anaemia, and, in particular, convulsions are rarely associated with malaria and are frequently thought to be of supernatural or spiritual origin (Ahorlu, Dunyo, Afari, Koram, & Nkrumah, 1997). Given the social interpretation of these symptoms, there is considerable social pressure to include a wider group of people (such as mothers-in-law or elders) in treatment decisions. In the process, the sick individual loses control over the decision-making process (Jones & Williams, 2004), highlighting the important role of social networks in the management of malaria cases. Based on findings of a study on knowledge of malaria control, Jombo and Mbaawuaga (2010) recommended a need to break the

generational chain of transfer of cultural values and beliefs that may have impeded the control of malaria among people. In a study conducted in Ghana by Ayi et al. (2010), however, participatory health education was found to improve malaria knowledge and practices. Fortunately, information is known to be one of the most important resources that flow through networks (Clark, 2006). Moreover, there seem to be a common claim that bridging and linking social capital have positive effects on the diffusion of information (Sabatini, 2009). Taken together, therefore, these observations point to the role that social capital (by its functioning in providing network-mediated benefits) can play in the dissemination of malaria-related information, especially, among illiterate and enculturated populations.

Many cultures exhibit a strong tendency toward conformity to a community norm, and/or to the wills of authority figures. This phenomenon is, especially, much prominent among rural dwellers who as Platteau (2000) observed, often harbour significant pressures to conform to behavioural norms established within the community and to the expressed wishes of persons in positions of authority. While the former effect can serve as a powerful brake on innovative activity to discourage the adoption of innovations, the latter may foster the adoption of innovations when authorities are involved in pushing the new methods, creating an opening for charismatic leadership to exert influence on the process of development at the micro level (Moser & Barrett, 2006). A study in Tanzania, for instance, revealed how elders in Rufiji (who held the lowest knowledge of malaria) could be an important barrier to effective malaria control due to the respect the population devotes to them. Accordingly, these elders may keep alive old traditions and beliefs that could be contradictory to modern biomedical advices (Spjeldnæs, Kitua, & Blomberg, 2014). In such situations, social capital, through its functioning as a form of social control, could produce a form of downward-levelling norm which may reduce households' propensity to seek treatment from formal health institutions. These scenarios signal how norms, beliefs and values can be crucial determinants of utilization of public health facilities for malaria treatment. On the other hand, network-mediated benefits (e.g. biomedical malaria knowledge) could reverse these tendencies. Aside the acts of conformity to community norms, network-mediated control is also believed to

have the potential to generate compliance (Heckathorn & Broadhead, 1999). Different studies, for instance, have generally highlighted how individuals in developing countries take into account the experiences of their social contacts when deciding whether to adopt new technologies, which generates a process of social learning (Conley & Udry, 2010; Munshi, 2004; Kremer & Miguel, 2003). In this respect, social capital, as Narayan and Pritchett (1997) observed, can facilitate the diffusion of innovations by increasing inter-linkages among individuals.

Social ties, even relatively “weak” ties, (such as those that exist between individuals who speak with each other only infrequently) have also been found to have a large impact on behaviour (Kremer & Miguel, 2003). In traditional societies, particularly, the maintenance of community ties is seen to be crucial for the survival of both the household and the larger community. When traditional healers were incorporated into the services offered by health care facilities in the Thai/Cambodian camps in the 1980s, for example, families and community leaders were encouraged to cooperate by the positive recognition of an important element of their culture. Also in Burkina Faso, participation by community representatives in public primary health care clinics increased coverage of key interventions (Mills et al., 2008). These observations point to the role that reciprocal acts within social groups and other network-mediated benefits can play in promoting consultation of friends and traditional healers in the treatment of malaria. They also signal how norms, beliefs and values could be crucial to the success of malaria case management interventions.

Presented below is a diagrammatic representation of the framework presented above; showing the mechanisms through which social capital could potentially contribute to the success of the malaria case management intervention strategy.

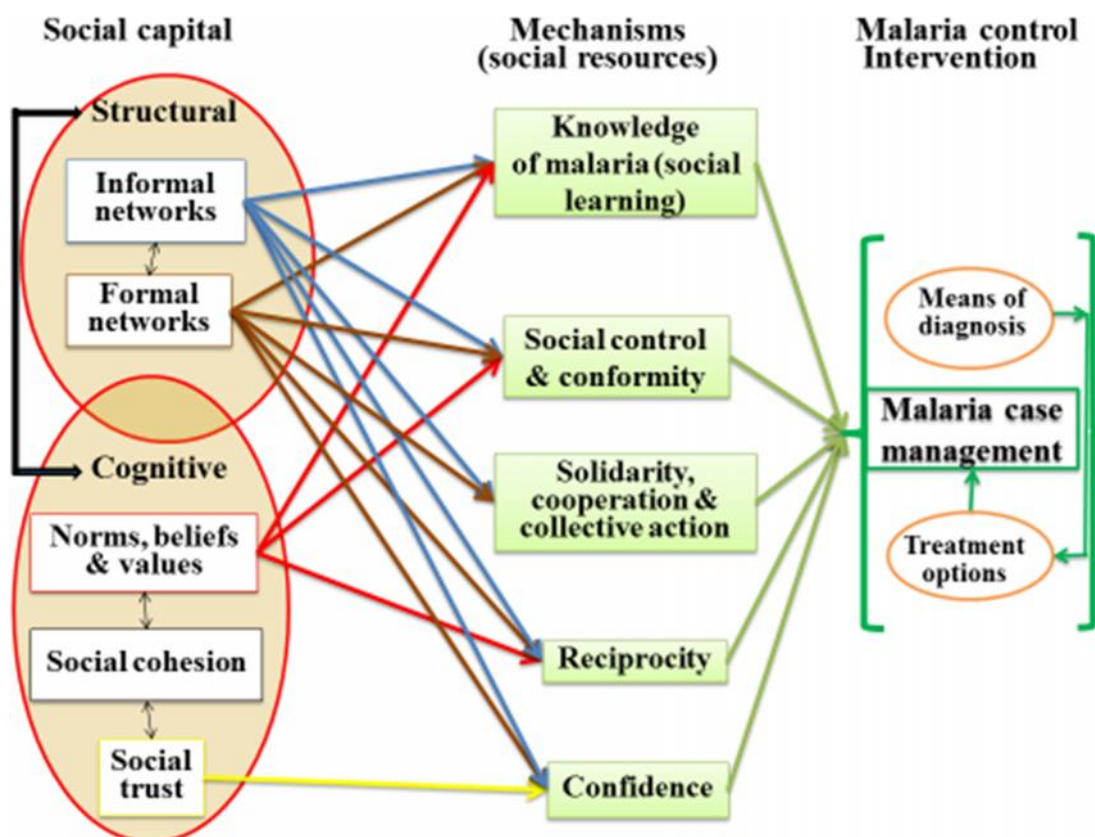


Figure 2.1: Conceptual Framework Diagram Displaying the Mechanisms through which Social Capital can potentially Influence Malaria Case Management

Source: Student's operationalisation and conceptualization

2.4.2. Research Hypotheses

Based on the preceding conceptualisation, therefore, the following implicit research hypotheses will guide the achievement of the specific objectives outlined in this study:

- H₀: A person's social networks do not significantly influence his/her propensity to manage malaria cases through the formal health care system
H₁: A person's social networks have a significant influence on his/her propensity to manage malaria cases through the formal health care system
- H₀: Social trusts do not significantly influence the propensity of individuals to manage malaria cases through the formal health care system
H₁: Social trusts significantly influence the propensity of individuals to manage malaria cases through the formal health care system

- H₀: Social norms do not have any significant influence on the propensity of individuals to seek malaria treatment through the primary health care system
- H₁: Social norms have a significant influence on the propensity of individuals to seek malaria treatment through the formal health care system

It is worth mentioning, however, that the conceptual framework presented above is part of a more complex multi-dimensional multi-level theoretical malaria case management model; which features other community and individual variables such as demographic, socioeconomic and institutional factors.

2.5. Summary of the Literature Review and Criticism of Gaps in the Existing Literature

A close examination of the models of health care utilization, as well as the socio-cultural challenges facing malaria case management all point to the crucial roles that social capital may play in the utilization of health services recommended for effective management of malaria cases. The conceptual framework developed in this study shows how the structural and cognitive components of social capital (in the form of formal and informal social networks, social trust, norms, and cohesion), by their interactive functioning (in providing a source of social control, family support and network-mediated benefits), could potentially act through different pathways and mechanisms to provide both individual and ecological benefits (such as malaria knowledge, conformity, cooperation, etc.) which could influence the malaria control decisions of people living in an area. Indeed, where people hold complementary norms, values, attitudes and beliefs (defined as forms of social capital) which predispose them to networking, cooperation and mutual assistance, a valuable set of assets can be created by joint action that may be productive in the present but, also, into the future (Uphoff & Wijayaratra, 2000).

In spite of these potentialities, however, most of the initial social capital research focused on investigating social capital as a dependent variable (i.e. examining its existence and determinants) (see Franke & Policy Research Initiative, 2005). Of the few studies that treated the concept as an independent variable, the majority (e.g.

Almedom, 2005; Poortinga, 2006; Yip et al., 2007; Folland, 2007; Borgonovi, 2008; Almedom & Glandon, 2008; Rostila, 2007; Giordano & Lindström, 2011; Yamamura, 2011; etc.), concentrated on its role in improving mental and physical health and not on its potential for promoting, or otherwise, the utilization of health care facilities for the control of any specific disease.

Though two of the three groups of factors (threads of commonality) identified by Rebhan (2009) to be influential in the process of health care seeking reflect the structural (social networks) and cognitive (cultural) dimensions of social capital, most studies have not paid adequate attention to the role of social capital in health services utilization. As outlined below, moreover, this author identified some key deficiencies in the models of health care utilization; which this study attempted to fill.

Although the models address the influence of social networks, they fail to consider adequately the variety of these networks which may also have important implications when considering treatment options. The current study filled this gap by considering the potential influence of different types of networks.

In addition, the models do not adequately explain the effect of the individual's prior experience of illness which may influence perception of disease severity. For instance, some people exhibit relatively minor symptoms of malaria, yet others experience painful aches. To the person who has minor symptoms, malaria may not be perceived as severe. Yet, to the individual's networks, malaria may be an unusually severe illness. This issue is addressed in this study by considering the households' malaria health status which captured the household members' prior experience of the disease. This, moreover, captured the household's prior experience of health services which, according to Mazzilli & Davis (2009), may influence their health-seeking behaviour.

Moreover, apart from Young's choice making model and Andersen's revised behavioural model, the models of health services utilization do not adequately consider the kind of health care used. These models tend to focus on use of

professional biomedicine and overlook alternatives such as traditional medicine; which render them not predictive of which health care services are likely to be utilized. This gap is filled in the current study by considering the entirety of health services contextually available to the population.

Finally, people often seek different medical care for different illnesses. As Kleinman (1980) noted, for example, Taiwanese used traditional folk medicine to manage chronic diseases but often resorted to western based biomedicine to treat acute illnesses. Yet, the models do not make sufficient use of the impact of different diseases on health care utilization. By focusing on the particular types of health services utilized to manage a specific disease (i.e. malaria), the current study addresses this issue.

CHAPTER THREE

3.0. METHODOLOGY

3.1. Introduction

As Almedom (2005) rightly observed, social capital is a multidimensional concept with several established indicators requiring various assessment approaches for full examination and understanding. While political scientists, sociologists, and anthropologists, for instance, tend to approach this concept through analysis of norms, networks, and organizations; economists, on the other hand, tend to approach it through the analysis of contacts and social institutions. In Grootaert and van Bastelaer's (2001) view, therefore, giving a meaningful and pragmatic content to the rich notion of social capital in different contexts, and defining and measuring suitable indicators, requires an interdisciplinary approach that attempts to bridge some of the current different disciplinary perspectives on the concept. In this regard, Franke of the Policy Research Institute (PRI) Canada provides a number of the quantitative, as well as qualitative, methodologies being used, or that are potentially useful for the application of the concept of social capital. The quantitative approaches include: the use of statistical data on social capital, the development of social capital indices, the undertaking of special surveys on social capital, the insertion of a standardized social capital module in thematic surveys, and the use of longitudinal surveys that incorporate social capital. The qualitative strategies, on the other hand, involve: applying qualitative methodologies to statistical surveys, conducting social capital case studies, providing meta-analysis of social capital, and creating a social capital observatory.

3.2. The Study Design/Strategy

Following vanDeth (2003) who argued that distinguishing between the different conceptualizations of social capital implies the selection of quite different research strategies; an amalgamation of cross-sectional, retrospective and exploratory research designs was employed in this study. Specifically, a case study approach was utilised to take advantage of both quantitative and qualitative research strategies.

Quantitatively, the special survey technique for researching social capital, which has been used in different studies (e.g. Conley & Udry, 2010; Kremer & Miguel, 2003), was utilized. On the other hand, the qualitative methodologies involved applying qualitative methodologies to the statistical survey. In addition, document(ary) analysis was undertaken to better understand the study area and context. Aside providing a more in-depth understanding of the different components of social capital, case studies are also considered as one of the best approaches for capturing the impact of context-related elements on the functioning of social capital.

3.3. The Study Populations, Sampling Procedure and Sample Size

The study population encapsulated households in all the villages in Nyabondo. The study targeted the 16 villages within the catchment area of the BioVision Malaria Project (which was revealed by official documents to embrace 12 villages where three treatments of four villages each under the BioVision Malaria Projects were implemented, and a control treatment of 4 other villages). Social network studies usually take one of two approaches. The first deals with closed groups, or relatively small networks and are based on censuses. However, the "observations" or scores obtained using this approach are not "independent" samplings from populations (Hanneman & Riddle, 2005). The second strategy, on the other hand, focuses on one person and seeks to understand their egonet. In order to obtain information on the prevalence of various kinds of ego networks in the large population under study and to fully capture the other forms of social capital studied, an egocentric approach was employed in this study. The study subjects were, thus, the egos in the villages. To obtain a random, but representative sample with more statistical precision (Black, 1999), a multistage proportionate stratified random sampling technique was employed, which covered all the 16 villages under the project. Within the villages, households (or household heads; referring to the primary household decision maker with regards to health issues) were randomly selected.

The following formula, as provided by Cochran (1977), was used to compute the final sample size, based on the total population of the area:

$$n_r = \frac{z^2 pq}{d^2} \dots\dots\dots \text{Eq. 1}$$

Where:

n_r = the desired/required sample size

d = the level of statistical significance set (acceptable margin of error for proportion) = .05

z = the standard normal deviation (associated with d above) = 1.96

p = the proportion in the target population estimated to have characteristic being measured; assumed to be = .65 (since the majority of the residents were expected to have utilised Hospitals)

$q = 1 - p = .35$

Therefore,
$$n_r = \frac{1.96^2 \times (0.7 \times 0.3)}{0.05^2} = 356$$

Assuming that the 97 villages (obtained from document analysis) in Nyabondo are equally sized, each village will have a population of 351. Thus, each intervention program area will have a population of 1404 (as each intervention area covered 4 villages). Since the calculated required sample of 356 is greater than 70 (i.e. 5% of 1404), the Cochran's correction formula was used to calculate the corrected sample size, n_c , as presented below:

$$n_c = \frac{n_r}{1 + n_r / \text{population}} \dots\dots\dots \text{Eq.2}$$

$$= \frac{356}{1 + 356 / 1404} = 284 \text{ per intervention area}$$

Pre-test results and field observations revealed that survey response rate is quite high in Nyabondo; as surveys are often perceived by the residents to be associated with

free distribution of ITNs. Assuming a response rate of 90%, therefore, an adjusted sample size, n_a , was calculated as follows:

$$n_a = \frac{n_c}{\text{Expected response rate}} \quad \dots\dots\dots\text{Eq. 3}$$

$$= \frac{284}{0.90} = 316 \text{ per intervention area}$$

Since the target population comprised of 3 intervention areas and a control area, the minimum total adjusted sample size required to adequately cover all the intervention villages was 1264. Based on these calculations, the study targeted a sample size of 1280 from the 16 villages. To reduce overrepresentation and/or underrepresentation of the villages within the total sample, a proportionate stratified sampling strategy was employed to reflect the unequal distribution of the populations between the villages. Table 3-1 provides details of the samples drawn from each of the villages under the experimental programs covered in this study.

Table 3.1: Distribution of the Sample by Villages and Experimental Program Groups

Program	Program description	Villages	Sample size (% of sample)
1	IRS and ITNs	Wahanda	82 (7.3)
		Kajwang	89 (7.9)
		Kadero B	71 (6.3)
		Achingure B	40 (3.6)
2	Education, IRS and ITNs	Kanyango	48 (4.3)
		Kaguda	78 (6.9)
		Kabete	85 (7.6)
		Katombo B	76 (6.8)
3	Bti, IRS and ITNs	Kachieng	81 (7.2)
		Ogoro	61 (5.4)
		Bar	69 (6.1)
		KeyoShamba	65 (5.8)
4	Education, Bti, IRS and ITNs	Kamidega	59 (5.2)
		Kadero C	74 (6.6)
		KeyoNyadundo	66 (5.9)
		Soko	80 (7.1)
Sample		Nyabondo	1124 (100)

3.4. The Study Instrument

In his critical analysis of social capital, Ponthieux of France's Institut National de la Statistique et des Études Économiques stated that the call to develop tools to measure social capital is testament of the inability to validate the concept empirically. In recent years, however, a number of researchers and organizations have embarked on research initiatives on social capital, through which a number of tools have emerged, based on their operationalization of the concept. Nevertheless, researchers like Gaag and Webber (2008) have proposed that any measurement instrument must cover both access to and mobilizing of social capital. In this respect, the methodological report of the PRI provides an overview of the most prominent tools developed by different researchers and agencies for measuring social capital. Some of the most relevant ones include: the World Bank's social capital assessment tool (SOCAT); the Name Generator/interpreter; the Position Generator; the Resources Generator; the McCarty et al. technique; the social capital index developed by Onyx and Bullen; the social capital indicators based on a module of standardized questions proposed by the Siena Group for Social Statistics; the social capital indicators created on the basis of the conceptual model of the Australian Bureau of Statistics; the social capital indicators suggested by the PRI conceptual framework; and the World Bank's Social Capital Impact Assessment tool (Franke, 2005).

The main survey/quantitative measurement instrument utilised in this study was a structured/standardized interview schedule; which was administered face-to face. Structured interviews, as Corbetta (2003) defined, are "... interviews in which all respondents are asked the same questions with the same wording and in the same sequence." The main strength of this instrument is that the researcher has control over the topics and the format of the interview. The main drawback, on the other hand, is that they adhere too closely to the interview guide and may not allow room for probing for relevant information. Following the tools for conducting social capital research outlined above, the development of the study instrument was guided by the SOCAT (Appendix 6), as well as the Position Generator (Appendix 7), the Resource Generator (Appendix 8) and the Name Generator (Appendix 9) tools. This strategy, as Grootaert and van Bastelaer, (2001) asserted, helped to take advantage of

the complementarities offered by the different tools to address the multidimensional conceptualisation of social capital employed in this study. Moreover, these tools were utilised based on their established nature, prominence, popularity/acceptance, adaptability and the potential they offered in helping to obtain the data required for this study. The final data collection instrument comprised seven (7) sections which elicited data on the respondents' social characteristics; general knowledge of malaria; attitudes towards malaria control; social networks; and social trust. The other sections featured questions on social norms, beliefs and values; as well as perceived communitarian social cohesion. The details of this instrument are provided under Appendix 10.

3.4.1. Construct Validation and Reliability of Multi-item Measures

After carefully selecting the content of the interview schedule, as gleaned from the social capital literature to ensure construct validity of the instrument, it was taken through a series of examinations to certify its content and face validities. Typical among these exercises, the instrument was subjected to critical scrutiny and consequent modifications by other researchers to guarantee its content validity. Moreover, the measures featured in the interview schedule were critically examined, pre-tested on some school mates, and appropriately modified prior to going to the field to improve its face validity. To further improve its face validity and reliability, the instrument was pre-tested on the field, prior to data collection on a sample of sixty respondents (as this number was considered adequate to provide enough insight into the instrument and the pre-test data). Based on a close observation of the field pre-test data collection exercise and an analysis of the pre-test data, the instrument was finalized by, as much as practicable, modifying and adapting it to the study context and existing conditions under which it was to be implemented. Following Tuckman (1972) who stressed that coefficient alpha is a useful formula for determining the reliability of an instrument when the respondent's score on each item can take on a range of values, Cronbach's alpha reliability analyses (Cronbach, 1951) were conducted on the pilot data to re-assess the reliability of the instrument. The coefficient alpha value obtained from the analyses of the pilot data on the thirty items was .82, suggesting, on the basis of Nunnally (1978) criterion, that the survey

instrument had a decent internal consistency. To verify this, a final set of reliability analyses was conducted on the scaled social capital survey items. All coefficient alpha values obtained from this analysis were greater than .70, corroborating the results of the pre-test analyses. The Cronbach's α values obtained from these tests are provided under Appendix 11.

3.5. Field Data Collection

Following the pre-testing of the structured interview schedule, the instrument was implemented to collect the data required for this study. The data was collected by a team; made up of a field manager, a data collection and management supervisor (student researcher), three support staff, and ten enumerators. All the enumerators were recruited from the study villages and were able to speak and interpret English (the language with which the instrument was designed), KiSwahili (the Kenyan national language) and Luo (the indigenous language of the study area). In addition to their lingual capabilities, these enumerators were trained before the field pre-test and actual data collection exercises. As part of the training, the enumerators were taken through the nuances of the interview process (to reduce biases stemming from social desirability, conformity, etc.), the study instrument was translated and back-translated and the measures were explained to them in order to enhance their capacity to interpret the questions and administer the instrument competently.

To meet the requirement for informed consent, informal approval of the respondents were sought before being interviewed. As part of this exercise, the study respondents were enlightened on the purpose of the study in the introductory statement of the interview schedule. In addition, they were informed of the potential benefits of the study to their communities and to society in general. Moreover, they were also briefed on what their participation entails and the estimated length of time required to complete the survey. Following this, they were assured of their anonymity and complete confidentiality of any information they provided, after which their passive/implicit consent to participate in the study was finally sought. Depending on the literacy level of the respondent, this information was transmitted to him/her in English and/or the local Luo language.

3.6. Data Management

During the data collection exercise, the completed interview schedules were scrutinised and all identified discrepancies in data collection were presented and discussed with the enumerators to forestall future occurrences of such errors. After the main data collection exercise, the completed interview schedules were further examined and, as follow ups, those that contained seemingly obvious mistakes were sent back to the respondents for clarifications and improvement. The data collected was entered and managed using the MS Excel Software and was later transferred into an MS Access database management tool for storage. Following data entry, the data was checked for inadvertent errors, edited and cleaned prior to analysis. Copies of the data were also stored and archived using external storage devices (to guarantee its safety) pending virtual archiving on a server-based facility. On the other hand, the research documentation, citations and bibliography were managed using the Zotero Reference Manager.

3.7. Empirical/Analytical Approach

3.7.1. Analytical Framework

The analytical tools used to analyse the data obtained from this study were the IBM SPSS Statistics version 21 (IBM Corporation and others, 1989; 2012) and R version 3.2.0 (The R Foundation for Statistical Computing, 2015). In view of the nature of the data collected in this study, a more statistical (rather than mathematical) approach, as discussed by Hanneman & Riddle (2005) was employed in the analysis of the data (including the social network data). Univariate analyses were undertaken to provide summary statistics for all the categories of variables used in the subsequent multivariate models. Furthermore, bivariate analyses were conducted to test for differences and associations between the source of malaria treatment patronised and the independent variables of interest to this study. Following these, multivariate multilevel analyses were conducted to develop models to test the effects of social capital on malaria control (case management). All objectives or implicit hypotheses for this study were tested at an apriori alpha level of .05.

3.7.2. Development of Social Capital Composite Indices

Using the data collated on the different measures of social capital, unit-weighted composite indices were computed for some of the forms of social capital considered in this study. Factor analysis, employing the principal component analysis (PCA) method was the main analytical method used in the computation of these composite scores. Factor analysis is a technique that uses correlations to concurrently manage large sets of variables with unknown interdependencies into groups of variables (Rummel & Rummel, 1970), where each group represents a single hidden factor. For social cohesion, over twenty different survey questions, covering the different indicators of this construct, were used in the analysis. Due to the large data set generated/handled in this research and the theoretical underpinning that the dimensions of social capital are not orthogonal, promax rotation (an oblique rotation technique which assumes correlations between underlying factors) was the method used to rotate the factor solution. To take into account the inter-relationships between the different indicators of social cohesion, therefore, the factor scores (representing social cohesion sub-indices) were generated based on the regression method. Eventually, four composite sub-indices were generated through this analysis which, overall, explained 57.4% of the total variance in social cohesion. These four sub-cohesion scores with eigen values above the commonly used cut-off point (1.00) were reclassified as individually-based, community/village induced, externally-influenced and conflict resolution-related social cohesions. A similar factor analysis, as was implemented in the construction of the social cohesion indices, was undertaken to develop an overall index of generalized trust. Through this, factor scores were generated using the two proxies for generalised trust. Considering the limited number of items involved, however, the factor solution was rotated using the varimax rotation technique (an orthogonal rotation technique which assumes independence of underlying factors). As expected, a single factor, representing generalized trust, was generated; which explained 57.6% of the total variance. On the other hand, attempts to develop a composite index for the norm of reciprocity failed to yield a meaningful solution. As a result, the multivariate regression analysis on the social norms of reciprocity centred on the individual indicators used to measure this

norm. Sensitivity analyses conducted to assess the validity of these sub-measures revealed highly significant associations between each of the sub-scores and the respective individual proxies that constituted them. Details of the results of these analyses, including a table for the pattern and structure matrices, are provide under Appendices 8 and 9 respectively.

3.7.3. Multivariate Regression Model Specification and Development

The main model that was utilised to explore the potential role of social capital in ensuring prompt and effective management of malaria cases was a hierarchical generalised linear model. Multilevel modelling was employed: (a) to reflect the multi-dimensionality and complexity of the concept of social capital which dictates that some of its forms be modelled at a higher level of analysis (Onyx & Bullen, 2000); and (b) to resonate the non-random clustering of respondents within villages (as a results of the sampling scheme) and the fact that the villages constitute social entities which may form ties with the individuals nested within them (Rasbash, Steele, Browne, & Goldstein, 2009; Hanneman & Riddle, 2005). The model utilised the logit link function. This function was adopted due to the fact that the dependent variable (type of health care facility patronised for malaria treatment) was expressed as a binary variable that assumes a binomial distribution. The probability mass function for this distribution is expressed as:

$$f(y; \pi) = \binom{n}{y} \pi^y (1 - \pi)^{n-y} = \exp \left[y \log \left(\frac{\pi}{1-\pi} \right) + n \log(1 - \pi) + \log \binom{n}{y} \right] \dots \text{Eq. 4}$$

Where (for each independent i^{th} observation in the j^{th} village) in the multi-level framework:

$f(y; \pi)$ = the probability mass function for the dependent variable (y)

y = a random variable representing whether or not malaria treatment is sought from a formal public health care facility ($y = 1$) or otherwise ($y = 0$)

π = the probability that $y = 1$; i.e. the probability of patronizing a formal health care facility (Hospital) for malaria treatment

n = number of trials

The logit link function then transforms the dependent categorical variable model into the form:

$$g(\mu_{ij}) = \eta_{ij} \dots\dots\dots \text{Eq. 5}$$

Where:

$g(\mu_{ij}) = g(.) = \log\left(\frac{\pi}{1-\pi}\right)$ = the logit canonical link function that links μ_{ij} to the predicted values of η_{ij}

μ_{ij} = the expected value of the dichotomous outcome variable (type of health care facility patronised) which utilizes the logit link function

η_{ij} = the linear predictor = a variate representing the predicted log odds resulting from the regression equation linked by the logistic transformation, $\log\left(\frac{\pi}{1-\pi}\right)$, of the odds of treating malaria in a Hospital versus treating it outside.

3.7.3.1. The Baseline Regression Model

To provide a basis for the appropriateness of the hierarchical modelling routines in this study and, as well, serve as a benchmark for judging subsequent models, an unconditional model was generated. First, an intercept-only model without any predictors was fitted. This zero model, which provides the between villages variability in random intercepts, β_{0j} , is given by:

$$\log\left(\frac{\pi}{1-\pi}\right) = \eta_{ij} = \beta_{0j} \dots\dots\dots \text{Eq. 6}$$

Since: $\beta_{0j} = \beta_{00} + U_{0j}$, the combined two-level random intercept null model becomes;

$$\log\left(\frac{\pi}{1-\pi}\right) = \eta_{ij} = \beta_{00} + U_{0j} \dots\dots\dots \text{Eq. 7}$$

Where;

β_{0j} = the intercept for the j^{th} group

β_{00} = the level two (village level) intercept

U_{0j} = the variability in level-2 intercepts or deviation from the village level intercepts

All other symbols have the same meaning as Eq. 4 and Eq. 5.

3.7.3.2. Multilevel Modelling of the Role of Social Capital in Malaria Case Management

Having established a basis for a multilevel modelling routine, a series of random intercept models were systematically developed to test the effects of social capital on malaria case management; while controlling for the socio-demographic, economic and institutional factors, and social cohesion and experimental program variables. Specified below is the statistical representation of a combined two-level random intercept model that explores the effects of social capital variables, at level 1, in addition to the level 1 control factors:

$$\log\left(\frac{\pi}{1-\pi}\right) = \eta_{ij} = \beta_{0j} + \beta_{1ij}X_{ij} \dots\dots\dots \text{Eq. 8}$$

Since $\beta_{1ij} = \beta_{10}$; the combined two-level random intercept model with the level 1 socio-demographic and institutional predictors becomes;

$$\log\left(\frac{\pi}{1-\pi}\right) = \eta_{ij} = \beta_{00} + \beta_{10}X_{ij} + U_{0j} \dots\dots\dots \text{Eq. 9}$$

Where;

$\beta_{1ij} = p \times 1$ vector of level 1 fixed effects (fixed slopes)

$\beta_{10} = p \times 1$ vector of level 1 fixed effects (fixed slope) coefficients

$X_{ij} = n \times p$ matrix of level 1 predictors (including social networks, social trust, social norms and/or control factors) associated with the fixed effects, β_{1ij} .

All other symbols have the same meaning as defined under Eq. 4, Eq. 5 and model Eq. 6.

Building on from Eq. 9, a combined two-level random intercept model, which feature the effects of both level 1 and 2 variables as fixed effect predictors, as presented below, was developed and tested.

$$\log\left(\frac{\pi}{1-\pi}\right) = \eta_{ij} = \beta_{0j} + \beta_{1ij}X_{ij} + \beta_{2j}Z_j \dots\dots\dots \text{Eq. 10}$$

Since: $\beta_{2j} = \beta_{20}$, the combined level two random slope model becomes;

$$\log\left(\frac{\pi}{1-\pi}\right) = r_{ij} = \gamma_{0j} + \gamma_{1j}X_{ij} + \gamma_{2j}Z_j = \gamma_{00} + \gamma_{10}X_{ij} + \gamma_{01}Z_j + U_{0j} \dots\dots\dots \text{Eq. 11}$$

Where;

$\gamma_{2j} = q \times 1$ vector of level 2 fixed effects (fixed slopes)

$\gamma_{01} = q \times 1$ vector of level 2 fixed effects (fixed slopes) coefficients

$Z_j = n \times q$ matrix of level 2 predictors (i.e. experimental program and/or level 2 social capital predictors) associated with the fixed effects, γ_{2j} .

All other symbols have the same meaning as defined under model Eq. 6.

Finally, a full social capital model is developed which, in addition to the effects in model Eq. 11 above, further incorporates the likely cross-level interaction effects between the influence of the level 2 and the level 1 social capital variables. Depicted below is the statistical specification of the final full model:

$$\log\left(\frac{\pi}{1-\pi}\right) = r_{ij} = \gamma_{0j} + \gamma_{1j}X_{ij} + \gamma_{2j}Z_j + \gamma_{12}X_{ij}*Z_j \dots\dots\dots \text{Eq. 12}$$

Since: $\gamma_{12} = \gamma_{11}$; the combined two level random intercept model with interaction effects becomes:

$$\log\left(\frac{\pi}{1-\pi}\right) = \gamma_{00} + \gamma_{10}X_{ij} + \gamma_{01}Z_j + \gamma_{11}(X_{ij}*Z_j) + U_{0j} \dots\dots\dots \text{Eq. 13}$$

Where:

$\gamma_{12} = p \times 1$ vector of fixed interaction effects (fixed slopes)

$\gamma_{11} = p \times 1$ vector of fixed interactions effects coefficients associated with the cross-level interactions between the levels 1 and 2 variables

$X_{ij}*Z_j = n \times p$ matrix of fixed interaction effects between the influence of level 1 and 2 social capital variables

All other symbols have the same meaning as defined under model Eq. 6.

Presented below are the theoretical underpinnings of the measures used to capture the main variables on which data was collected for this study; which were utilised in the models specified above.

3.8. Main Measured/Variables Featured

3.8.1. The Dependent Variable/Measure

In view of the fact that health behaviours determine health outcomes (Andersen, 1995), measurement of malaria control centred on how/where households (that recorded malaria cases in the past one year) managed those cases; in terms of where they sought treatment. This outcome measure has been used in other studies as a dependent variable to investigate healthcare utilization patterns (Bakeera et al., 2010) or health-seeking behaviours (Mushtaq, Gull, Shad, & Akram, 2011) among different populations. The measure was later re-classified to reflect patronage and non-patronage of formal public health facilities. “Patronage” refers to instances where malaria cases were reported and treated at a formal health facility; while “non-patronage” refers to instances where other sources of care (such as home-treatment, private drug shop or pharmacy, traditional healer, etc.) were utilised to manage malaria or perceived malaria cases.

3.8.2. The Independent Social Capital Variables/Measures

3.8.2.1. Social Networks

In measuring the structure of social relations, the AIFS uses proxies including family household, family beyond the household, friends and neighbours to represent the informal networks (Stone, 2001). The Families, Social Capital and Citizenship Survey, on the other hand, included nine items measuring whether or not respondents were connected personally to a range of institutions, which together inform on the extent, breadth and diversity of institutional ties (Stone & Hughes, 2002). Following these, the instrument used in this survey utilised a modified version of the Position Generator instrument to assess how many purposeful alters, within a range of relevant institutional settings, and with different endowments of malaria control-related resources, an ego/respondent is connected to. This helped to eliminate the restriction of the Position Generator to resources connected to just the job prestige of network members. Data on the specific ties that the ego has with these alters was also collected. The SC-IQ indicator of network diversity aims to determine the network’s ability to provide resources to its members in case of need (Christiaan Grootaert,

Narayan, Woolcock, & Nyhan-Jones, 2004). Instead of measuring potential resources, however, the instrument developed for this study utilised the Resource Generator to assess actual malaria control-related resources obtained by respondents from their social networks.

Beside the informal social network measures, the most commonly used indicators of structural social capital include membership in associations (World Bank; ESS-2002; CGSS-2008; etc.), social participation (UK ONS) or civic engagement (FRQLS-2013; PSCS-2011; NZGSS-2010; SPHS-2009). Social participation has been covered in many studies using questions about engagement in clubs and voluntary societies, cultural and sports attendance, congregational activity, hobby activity, etc. (Hyypä, Mäki, Impivaara, & Aromaa, 2007). In the same line, the World Bank's indicator of memberships in local associations (as featured in its SC-IQ and ASCAT) elicits information on the density of associations and the incidence of household memberships. Following these, the measures of associational activity employed in this study involved assessing the existence and numbers of various types of associations in the villages, determining household's membership in these associations, and evaluating their rate of meeting attendance. Though an indicator of structural social capital, community associational life has also been utilised to give a picture of the internal cohesiveness of a community; and whether bonding or bridging social capital predominates. This indicator, thus, complemented the measures of social cohesion used in this study. To elicit further data on the influence of social capital on malaria control choices, moreover, self-rated (somewhat qualitative) measures of influence were used to assess the extent to which respondents' membership in formal and informal networks, and the social resources they obtained from them, influenced their malaria control decisions.

3.8.2.2. Social Trust

According to the World Bank, measuring cognitive social capital, in the form of trust, requires asking respondents about their expectations of and experiences with behaviour requiring trust. As such, many social capital surveys (e.g. the WVS-2012; the ESS-2012, etc.) use an indicator of perceived fairness to measure generalised

trust. This measure, which poses the basic question: “Do you think that most people would take advantage of you if they got the chance, or they would try to be fair?” was adopted in the current study. To measure generalised trust relative to specific issues, on the other hand, social capital instruments such as the SC-IQ inquires about the extent to which people generally trust each other in matters of lending, borrowing, etc. (Grootaert et al, 2004). Following this, the current study also measured the extent to which people in the different villages generally trusted one another in matters of malaria treatment. Unlike generalized trust, personalized/relational trust and its measurement concern specified persons, and offer the potential to assess trust of people who are part of one’s “in-group”. To measure personalised trust, Berthelsen, Pejtersen and Söderfeldt (2011), enquired about how employees trust information that come from their management. On the other hand, social capital health research with a strong focus on local communities (e.g. Fujiwara & Kawachi, 2008; Sapag et al., 2010; Moore et al., 2011) often use measures of perceived trust in neighbours. Similar to personalised trust, institutional trust has also been assessed in terms of confidence in specific institutions, and perceived reliability of local institutions. By putting these together, personalised and institutional trusts were measured in the current survey by asking respondents to rank relevant individuals/institutions in terms of the degree of confidence they have in these to provide them with appropriate malaria treatment services.

3.8.2.3. Social Norms

Empirically, the extent of abiding by norms, a sign of solidarity, has been found to have a high factor loading on social capital (Njuki et al., 2008). In view of the fact that social norms exert their influence through individual’s conformity to those norms, the psychological constructs of conformity to social norms was activated to assess the extent to which respondents’ malaria control decisions were based on their quest to conform to perceived standards prescribed by their networks. Thus, the social norm of conformity was measures by assessing the extent to which respondents’ malaria control decisions were based on their quest to conform to perceived norms prescribed within their social networking environments. In the social capital studies that featured measures of reciprocity, on the other hand, there

are a few questions that tend to be commonly used. These include survey items which solicit people's level of agreement with generalized statements such as "Most people in my neighbourhood are willing to help you if you need it (as adapted from the SOCAT-2002); "People in my local area help one another" (as adapted from the ESS-2006); "Have you assisted neighbours or friends? or Have your neighbours or friends assisted you?" (Ziersch, Baum, MacDougall, & Putland, 2005; Abbott, 2009); "In my neighbourhood, most people are willing to help others" (Pollack & von dem Knesebeck, 2004); etc. Following these, the survey questions that were utilised in this study to measure reciprocity centred on whether respondents have helped someone or received malaria-related help from someone, and the extent to which residents feel that people in their villages help one another when managing malaria cases.

3.8.2.4. Social Cohesion

Analytically, most measures of social cohesion in the social capital literature tend to be based on Hogg's social identity hypothesis and appear to encompass any behaviour that could be construed as indicative of a person's attachment to a social category or to other members of the group. Examples of such indicators are featured in the National Identity Survey-2003 (which measure respondents' feeling of closeness to their town, county, etc.), and the EQLS-2012 (which evaluates how respondents feel close to other people in the area they live). Following these measures, this survey asked the residents to rate the extent to which they feel close to their villages or to other people in the village. Moreover, scholars have argued that the presence of conflicts in a community is often indicative of a lack of trust and/or appropriate structural social capital to resolve them (Friedkin, 2004; Njuki et al., 2008). Thus the existence of institutions of conflict resolution, and the level of peace/harmony in an area have prominent places in the measurement of social cohesion. In this respect, the SOCAT, for instance, asks respondent to indicate who they think would primarily help to resolve fairly serious disputes in case two people in their neighbourhood were involved. In addition, both the SOCAT and the SC-IQ seek respondents' opinion on the general peacefulness of their area. In line with these measures, interviewees in this study were asked to rate the level of harmony/peace

they perceive to exist in their villages. Moreover, they were also asked to indicate if there exist conflict resolution institutions in their villages; and also list all such institutions that exist in their respective villages

3.8.2.5. Potential Control/Confounding Variables

Lack of accessibility, poor socio-economic status, cultural beliefs and perceptions, low literacy level of mothers and large family sizes, are identified as leading causes of poor utilization of primary health care services (Shaikh & Hatcher, 2005). Because the main 'exposure' in social capital research is the community, Harpham (2008) also proposes that the length of residence in a community should be considered. In addition, this author provides a minimum list of other obvious potential confounding factors including: gender, ethnicity, socio economic status, age, home ownership, education and employment. Following the above, data on demographic and socio-economic factors such as the length of residence, the respondent's gender, the household's total annual earnings, the respondent's and his/her partner's age, their years of schooling, the respondent's occupation and the ownership status of the household's abode were collected in order to control for them. Family size was also measured; but through a proxy which elicited data on the number of different categories of household members (e.g. partners, children, extended family, etc.) in order to reflect the span of potential social resources available to the households. In addition, institutional factors such as health insurance coverage, and the availability and distance to health care centres were measured.

CHAPTER FOUR

4.0. RESULTS AND DISCUSSION

4.1. Introduction

Presented below are the results of various analyses undertaken to determine the role of the various forms of social capital in malaria control (case management) in Nyabondo. The variables analysed in this study were part of data collected using a structured interview schedule made up of 59 main questions under 7 sub-sections which covered over 400 social capital and other variables. Overall, the study achieved a response rate of 89%.

4.2. The Community and Respondents' Environments and Malaria Case Management

4.2.1. Characterizations of the Study Area and the Respondents

The data used in this analysis was collected from a total sample of 1124 respondents from 16 villages in Nyabondo. These were made up of 12 villages where 3 experimental programs of 4 villages each were implemented, and a control group of 4 other villages. As is evident from Figure 4-1 below, there generally seemed to be a high level of social cohesion within the vicinity of Nyabondo as most (34%) of the people perceived their villages to be extremely harmonious. Similarly, most of the indigenes either felt close (23%), very close (38%) or extremely close (33%) to their respective villages.

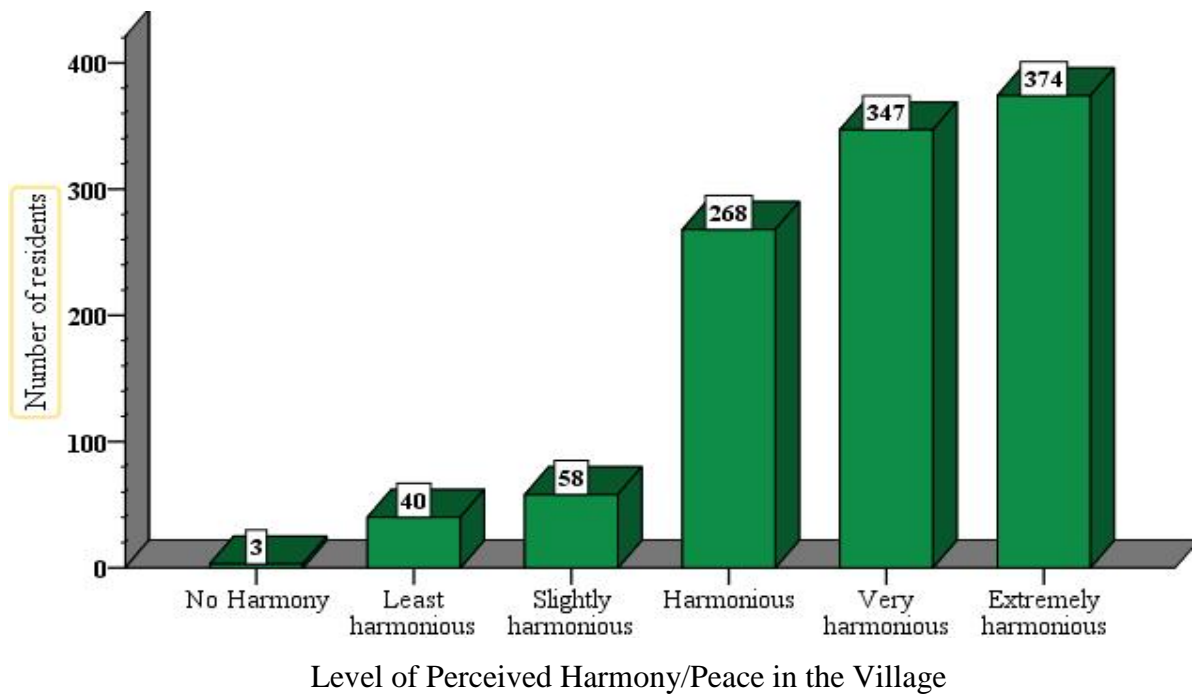


Figure 4.1: Level of Perceived Harmony/Peace in the Village

Moreover, the indicators of social cohesion, as characterized by the existence of different community associations and conflict resolution institutions/agents, also seem to corroborate the above observation. Among the conflict resolution institutions/agents that exist in the communities (Figure 4-2), those most consulted in times of conflicts were community elders and the police. However, a great number (31%) of conflicts were also said to be resolved on a personal level; among the feuding factions involved.

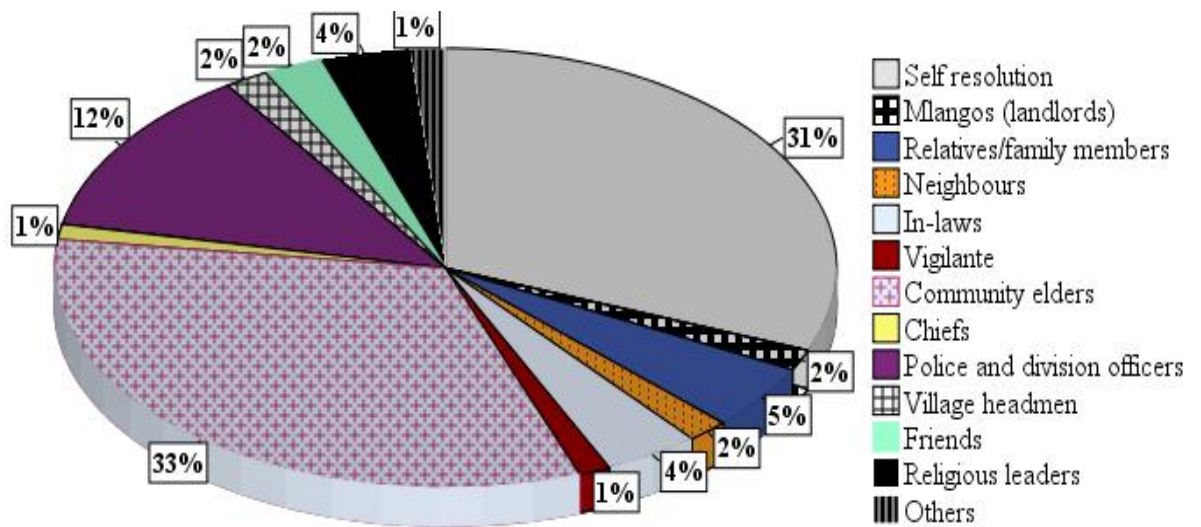


Figure 4.2: Institutions/Agents of Conflict Resolution Existing in Nyabondo

The ages of the respondents ranged between 14 years and 98 years, with an average age of 41 years. While some of these residents have lived in their respective villages for less than a year, others were noted to have lived there throughout their lifetime; as long as 87 years. Tabulated in Table 4.1 below is a summarised description of the demographic, socio-economic and institutional characteristics of the residents and area of Nyabondo.

Table 4.1: Summary Statistics of the Socio-demographic, Economic and Institutional Characteristics of the Residents of Nyabondo

Control Variables		Statistics	Value
Demographic and socio-economic factors:			
Years lived in village		Mean (SD)	25.32 (18.26)
Age		Mean (SD)	41.44 (16.26)
Gender	Female	Frequency (%)	785 (70.1)
	Male		335 (29.9)
Marital status	Married	Frequency (%)	761 (68.7)
	Not married		346 (31.3)
Family size		Mode (range)	4 (1 – 16)
Knowledge score of malaria (from: -4 to 14)		Mean (SD)	6.83 (3.24)
Socio-economic factors:			
Respondent's years of education		Mode (range)	8 (0 – 25)
Partner's years of education		Mode (range)	8 (0 – 30)
Household monthly income (in ,000.00 KSh)		Median (range)	5 (3 - 180)
Main occupation/employment	Farmers	Frequency (%)	621 (56.6)
	Business men/women		154 (14.0)
	Other unsalaried workers		148 (13.5)
	Salaried workers		99 (9.0)
	Brick makers		76 (6.8)
Institutional Factors:			
Distance to the nearest health facility (km)		Mean (SD)	1.91 (1.02)
Nearest health facility	Hospital	Frequency (%)	842(78.0)
	Not Hospital		238 (22.0)
Health insurance coverage	Insured	Frequency (%)	432 (39.6)
	Not insured		660 (60.4)

Though predominantly built of mud, most (97%) of the houses in the area were self-owned and hosted between 1 and 16 members. These were headed by parents who have attained an average of primary education and earn an average monthly income of KeS 5,000.00. Farming (especially crop farming) was found to be the predominant occupation in the area. However, other sources of earnings such as brick-making,

small scale businesses, teaching and artisanal jobs were also identified to play a significant role in the economic lives of the people of Nyabondo. Under the high exposures to malaria infections, the respondents demonstrated a high knowledge of the cause of malaria; with the majority (96%) citing mosquitoes/plasmodium as the main cause of malaria. In the course of the year, about 82% (917) of the sampled households recorded, at least, a case of malaria. Though the majority (75%) of the infected households sought treatment from the formal health facilities, a large number of the remaining households treated their sickness outside the formal public health facilities; a phenomenon that raises a course for concern. In general, about 60% of the respondents and/or other members of their households were under some form of health insurance coverage.

4.2.2. Relationship between the Area and Respondents Attributes and the Source of Malaria Treatment Patronised

The empirical examination of the role of social capital in malaria case management commenced with a chi-square tests of independence conducted to ascertain whether the sources of malaria treatment utilised by the residents is statistically related to the characteristics of the area of Nyabondo; in terms of the respondents location within the various villages and experimental programs. As presented in the contingency table (Table 4.2) below, the results of these tests revealed a statistically significant association between the place of residence and the sources of malaria treatment utilised by the residents. This result signals a potential ecological effect on malaria health care utilization patterns which could be confirming MacKian's (2003) assertion that health seeking behaviour is an integral part of a person's, a family's or a community's identity. It also points to a likely differential effect of the malaria control educational programs implemented in the different communities. If so, this relationship confirms the finding of Feder and Savastano (2006) that the pattern of information flows received and transmitted by individuals in an area is related to their social environment.

Table 4.2: Relationships between Respondents' Place of Residence and Sources of Malaria Treatment Patronised

Place/Area of Residence		Treated Malaria in a Hospital			2 (d.f, N)	Sig.	U.C
		Hospital	Others	Total			
Village	Wahanda	64(9.3)	4(1.7)	68(7.4)	168.66 (15,917)	.00	.17
	Soko	67(9.8)	7(3.0)	74(8.1)			
	Kachieng	69(10.1)	6(2.6)	75(8.2)			
	Kabete	60(8.8)	22(9.5)	82(8.9)			
	Katombo B	63(9.2)	3(1.3)	66(7.2)			
	Kadero C	23(3.4)	32(13.8)	55(6.0)			
	KeyoNyadundo	33(4.8)	13(5.6)	46(5.0)			
	Ogoro	25(3.6)	18(7.8)	43(4.7)			
	Bar	29(4.2)	20(8.6)	49(5.3)			
	Achingure B	36(5.3)	1(.4)	37(4.0)			
	Kanyango	42(6.1)	2(.9)	44(4.8)			
	KeyoShamba	27(3.9)	13(5.6)	40(4.4)			
	Kamidega	34(5.0)	16(6.9)	50(5.5)			
	Kaguda	52(7.6)	9(3.9)	61(6.7)			
	Kajwang	35(5.1)	41(17.7)	76(8.3)			
Kadero B	26(3.8)	25(10.8)	51(5.6)				
Program	IRS and ITN	162(23.6)	71(30.6)	233(25.4)	23.28 (3,917)	.00	.20
	IRS, ITN and Bti	150(21.9)	57(24.6)	207(22.6)			
	IRS, ITN and education	217(31.7)	36(15.5)	253(27.6)			
	IRS, ITN, Bti, education	156(22.8)	68(29.3)	224(24.4)			

U.C. = uncertainty coefficient.

To determine if there is an association between the sources of treatment patronised for malaria control and social cohesion, point-biserial correlation analyses were performed. While no significant relationships were found between the sources of malaria treatment patronized and the individually-based and externally-influenced cohesion indices, a highly significant relationship was found between the sources of malaria treatment patronised and village-induced cohesion, $r_{pb}(884) = .16, p = .00$. In

the same way, a highly significant relationship was also observed between the sources of malaria treatment patronised by the residents of Nyabondo and conflict resolution-related cohesion, $r_{pb}(884) = .11, p = .00$. It is argued, for instance, that the levels of trust (which could be an important determinant of health care utilisation) between societies vary based on their levels of social connectedness (Thiede, 2005). Thus, this result point to a likely contribution of communitarian social capital to the relationship observed between the village of residence and the source of malaria treatment utilized.

In addition to the analysis related to the features of the study villages, different bivariate analyses were also conducted to determine if the socio-demographic, economic and institutional characteristics of the residents have any influence on the sources of malaria treatment they patronised. As presented in Table 4.3 below, the results of chi-square tests of independence conducted on these characteristics showed no significant relationships between the source of treatment patronized and the respondents' or their partner's educational attainment. Similarly, no association was observed between the source of malaria treatment used and the type of health facility easily accessible in terms of distance. On the other hand, highly significant correlations were observed between the source of malaria treatment utilised by the respondents and their gender, marital status and family size. Similarly, being health insured or having other members of the household under some health insurance coverage was found to be significantly associated with the sources of treatment patronized. However, the strongest relationship seem to be between the means through which malaria was diagnosed and the subsequent source of malaria treatment utilised, $\chi^2(3, N = 913) = 365.24, p = .00, UC = .33$.

Table 4.3: Relationships between Residents' Attributes and Sources of Malaria Treatment

Variables		Source of Malaria Treatment			2	Sig.	U.C	
		Hospital	Others	Total				(df.,N)
Gender	Female	504(76.7)	153(23.3)	657(71.9)	4.88	.03	.01	
	Male	179(69.6)	78(30.4)	257(28.1)				(1,914)
Marital status	Not married	178(66.2)	91(33.8)	269(29.8)	13.19	.00	.01	
	Married	492(77.7)	141(22.3)	633(70.2)				(1,902)
Family size	Low	149(21.8)	66(28.4)	215(23.4)	5.96	.00	.01	
	Medium	335(48.9)	113(48.7)	448(48.9)				(2,917)
	High	201(29.3)	53(22.9)	254(27.7)				
Respondent's level of education	Basic	476 (75.8)	152 (24.2)	628 (69.9)	.97	.62	.00	
	Secondary	162 (73.3)	59 (26.7)	221 (24.2)				(2, 912)
	Higher	45(71.4)	18(28.6)	63(6.9)				
Partner's level of education	Basic	334 (75.9)	106 (24.1)	440 (64.3)	3.05	.22	.00	
	Secondary	153 (80.1)	38 (19.1)	191 (27.9)				(2, 684)
	Higher	45(84.9)	8(15.1)	53(7.7)				
Nearest health facility	Hospital	514(74.2)	179(25.8)	693(78.70)	.46	.50	.00	
	Not Hospital	144(76.6)	44(23.4)	188(21.3)				(1,881)
Covered by health insurance	No	374(56.7)	158(68.7)	532(59.8)	10.26	.00	.01	
	Yes	286(43.3)	72(31.3)	358(40.2)				(1,890)

U.C. = uncertainty coefficient.

While an independent-samples *t* test results confirmed the non-significant relationship between respondents' level of education and the source of malaria treatment patronised, that of their partners' level of education was contradicted by the test results. Table 4.4 below provides details of this and other *t* tests conducted to examine if statistical differences exist between Hospital and non-Hospital treatment users in relation to their socio-demographic, economic and institutional characteristics.

Table 4.4: Comparison of Hospitals Treatment Users and Non-users in terms of their Social Characteristics

Variables	Hospital treated		Other sources		test for Equality of Means		
	<i>N</i>	<i>Mean (SD)</i>	<i>N</i>	<i>Mean (SD)</i>	<i>t</i>	<i>d.f</i>	<i>Sig.</i>
Years lived in village	679	25.29(18.44)	230	27.37(17.94)	1.49	907	.14
Age	681	41.31(15.67)	229	44.00(17.61)	2.05	357	.04
Malaria knowledge score	232	7.35(3.19)	232	6.22(2.99)	-4.79	915	.00
Malaria health experience							
Years of education	229	7.90(3.69)	386	7.73(4.00)	-.554	366	.58
Partners' of education	152	8.66(3.75)	532	8.03(3.35)	-1.998	268.72	.05
Log of household income	669	3.69(.43)	230	3.74(.39)	1.58	435	.12
Distance to the nearest health facility	567	1.96(1.07)	187	1.65(.90)	-3.66	752	.00

The result of the preceding bivariate analyses, as presented in Tables 4.3 and 4.4, showed no significant relationship between respondents who patronised Hospital treatments and those who did not; in terms of the number of years they have lived in their respective villages and their household income. While the source of treatment utilized did not also relate to the respondents' level of education, those who sought treatment from Hospitals, on average, possessed a better knowledge of malaria than those who treated their sickness outside Hospitals. Moreover, respondents who patronised Hospital treatments were found to be significantly different from those who sought treatments outside Hospitals with respect to their age, family size, partner's level of education, and the households' health status (expressed as the number of other household members who suffered from malaria within the last year). Specifically, those who sought treatment from public Hospitals, on average, were younger than those who did not. Furthermore, Hospital treatment users were found to be married to partners who were more educated than the partners of those whose households sought treatment outside Hospital. While no significant association was observed between the source of malaria treatment utilised and the nearest available health facility, however, residents who patronised the public health facilities were, on

average, farther away from the nearest available health facility than those who did not.

4.3. Social Networks and Malaria Case Management

4.3.1. Informal Networks

4.3.1.1. General Nature of Informal Networks in Nyabondo

The agents/actors that are most relevant for malaria control in Nyabondo, in terms of their potential to provide malaria-related resources, include children in the SHC, *icipé* staff working on the field in Nyabondo, Malaria Control in Nyabondo (MOCON) members/malaria scouts”, local pharmacist/drug sellers, medical staff of Hospitals/clinics, community health workers (CHW) and traditional healers. Local pharmacist/drug sellers, *icipé* staff on the field, and medical staff of Hospital/clinic were the alters who the residents were most connected to. However, many of the respondents were noted to some relationships with alters who have experienced malaria in the past year. Table 4.5 below provides, among other network features, summarized details of the relevant malaria control actors that the residents of Nyabondo are connected to.

Table 4.5: Summary Statistics of the Respondents' Informal Social Networks

Social network variables		Frequency (%)
Have children in the SHC	No	1002 (89.1)
	Yes	122 (10.9)
Knows <i>icipe</i> staff	No	524 (46.6)
	Yes	600 (53.4)
Knows MOCON members/malaria scouts''	No	701 (62.4)
	Yes	423 (37.6)
Knows pharmacist/drug sellers	No	242 (21.5)
	Yes	882 (78.5)
Knows medical staff of Hospital/clinic	No	528 (47.0)
	Yes	596 (53.0)
Knows CHW	No	1095 (97.4)
	Yes	29 (2.6)
Knows traditional healers	No	1045 (93.0)
	Yes	79 (7.0)
Knows other relevant people	No	1112 (98.9)
	Yes	12 (1.1)
Has personal relationship with the person who offered malaria treatment	No	873 (87.2)
	Yes	128 (12.8)
Knows alter(s) who suffered from malaria in the past year	No	269 (24.2)
	Yes	844 (75.8)
Source of treatment used by the alter(s) who suffered from malaria	Outside hospital	105 (12.6)
	Hospital	728 (87.4)

As can be gleaned from Figure 4.3 below, the main ties that were found to exist among the residents of Nyabondo, and between them and the malaria control agents cited above include family memberships, close friendships, association memberships and acquaintances. Predominantly, however, the dwellers of Nyabondo see most members of their networks as mere acquaintances; who constituted 55% of all malaria-related network relationships, $\chi^2(4, N = 2130) = 1762.78, p = .00$. Illustrated below are the main types of ties that the residents have with their malaria control connections.

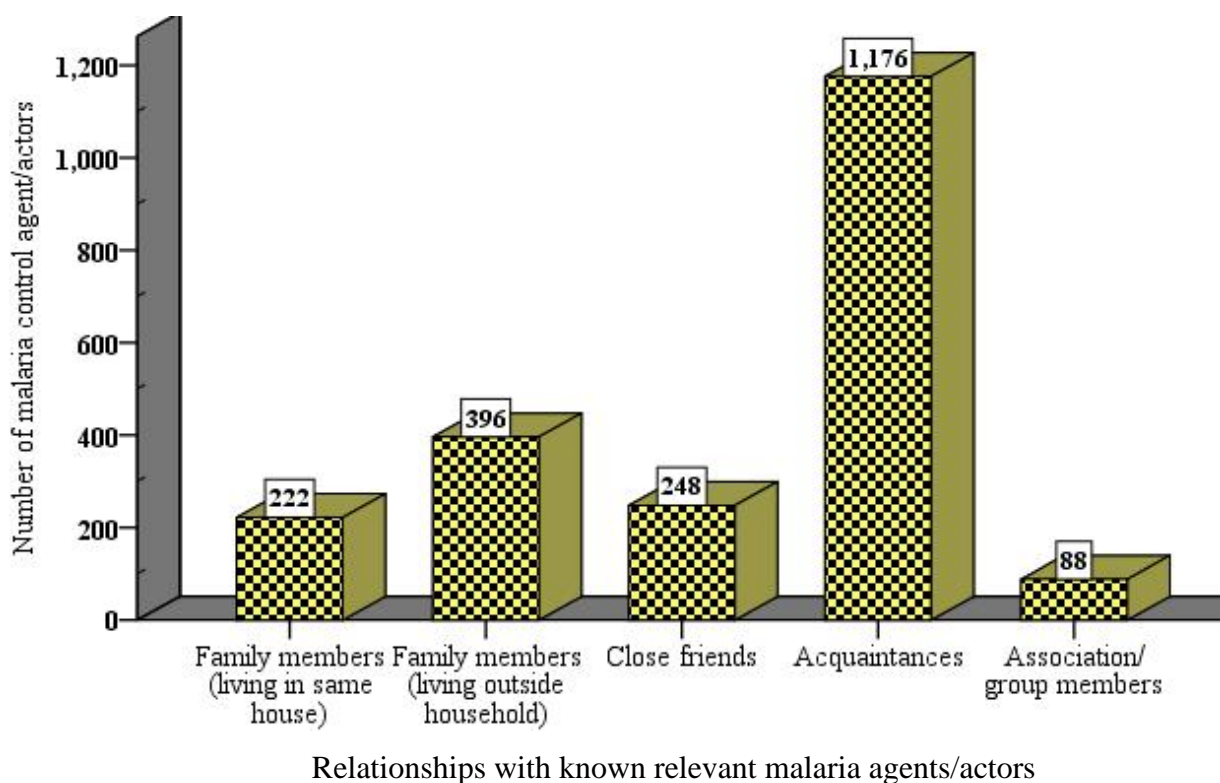


Figure 4.3: Main Ties between Residents and Relevant Malaria Control Actors

4.3.1.2. Relationship between Informal Social Networks and the Source of Malaria Treatment Patronised

In order to ascertain if there are relationships between the sources of treatment patronised by the egos and their informal social networks, separate chi-square test of independence were performed. Table 4.6 below provides details of these analyses.

Table 4.6: Relationships between Informal Networks and Sources of Malaria Treatment Utilised

Social network variables		Source of malaria treatment			2 (df.,N)	Sig .	U. C
		Hospital	Others	Total			
Have children in the SHC	No	203(25.0)	609(75.0)	812(88.5)	.34 (1,917)	.56	.00
	Yes	29(27.6)	76(72.4)	105(11.5)			
Knows <i>icipe</i> staff	No	302(74.6)	103(25.4)	405(44.2)	.01 (1,917)	.94	.00
	Yes	383(74.8)	129(25.2)	512(55.8)			
Knows MOCON members	No	412 (73.3)	150 (26.7)	562 (61.3)	1.49 (1,917)	.22	.00
	Yes	273 (76.9)	82 (9.8)	355 (38.7)			
Knows pharmacist	No	169 (89.4)	20 (10.6)	189 (20.6)	27.29 (1,917)	.00	.03
	Yes	516 (70.9)	212 (29.1)	728 (79.4)			
Knows medical staff of Hospital	No	289(68.3)	134(31.7)	423(46.1)	16.90 (1,917)	.00	.02
	Yes	396(43.2)	98(19.8)	494(53.9)			
Knows CHW	No	674 (75.1)	224 (24.9)	898 (97.9)	2.90 (1,917)	.09	.00
	Yes	11 (57.9)	8 (42.1)	19 (2.1)			
Knows traditional healers	No	636 (75.4)	207(24.6)	843 (91.9)	3.07 (1,917)	.08	.00
	Yes	49 (66.2)	25(33.8)	74 (8.1)			
Has personal tie with the person who offered malaria treatment	No	587 (76.1)	184 (23.9)	771 (85.8)	3.90 (1,899)	.05	.00
	Yes	87 (9.7)	41 (4.6)	128 (14.2)			
Knows alter(s) who suffered from malaria	No	126 (68.5)	58 (31.5)	184 (20.2)	4.77 (1,910)	.03	.00 4
	Yes	554 (73.3)	172 (23.7)	726 (79.8)			
Known alter(s) who suffered from malaria patronised Hospital	No	27 (32.5)	56 (67.5)	83 (11.6)	98.12 (1,716)	.00	.11
	Yes	518 (81.8)	115 (18.2)	633 (88.4)			

U.C. = uncertainty coefficient

As shown in Table 4.6 above, results from the preceding bivariate analyses revealed highly significant associations between the type of health care facility patronised by residents and whether or not they are connected to private drug sellers or medical

staff of Hospitals/clinics. In confirmation of these results, having a tie with someone who treats malaria was significantly associated with the source of treatment patronised. On the contrary, no significant associations were found between the sources of malaria treatment patronized and knowing traditional healers, SHC members, *icipe* staff, MOCON members, or CHW. On the other hand, a highly significant association was observed between the sources of treatment patronised by alters (outsiders) known to have suffered from malaria and the sources patronised by the respondents; with the egos seeming more likely to patronise the same sources of treatment patronised by the alters.

From another angle, reciprocal acts seemed to abound within the social networks in the area. The majority (75%) of the respondents, for instance, helped someone they know to treat malaria; a number which was significantly more than those who did not offer such help, $\chi^2(1, N = 1060) = 275.09, p = .00$. The most common ties among those the respondents helped to treat malaria were observed to be family members who resided outside the respondents' households. Moreover, the flow of information within networks also seems to be a common phenomenon in the study area. From the survey, it was disclosed that the residents of Nyabondo shared/received malaria-related information from members of their informal social networks. Most (34%) of these information, as received from the respondents' informal network members, centred on the treatment of malaria. Aside the malaria cure information, however, information on the causes and symptoms of malaria, use of ITNs and IRS, and the management of the environment for malaria control were also benefitted by the egos from members of their networks. Figure 4.4 below provides details of the main forms of malaria information received by the respondents through their informal social networks.

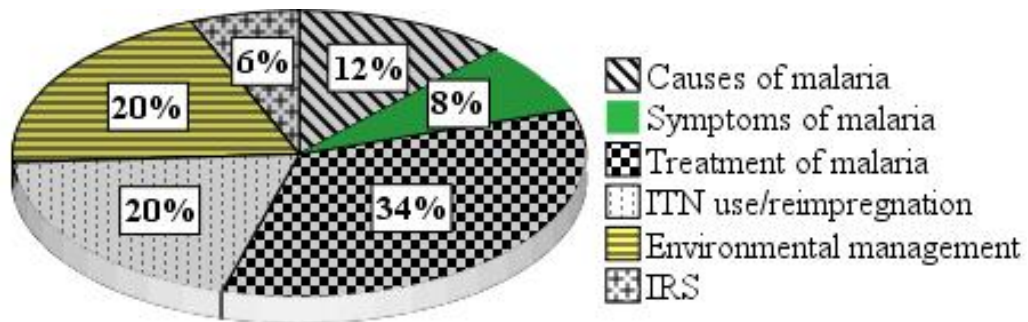


Figure 4.4: Main Type of Information Received by Egos from Known Malaria Control Actors

Following the above, a chi-square test of independence was performed to determine whether households differed in the degree to which their malaria treatment decisions were influenced by the information they received from their network members. This test revealed a highly significant difference in informational influence among the respondents, $\chi^2(5, N = 827) = 34.33, p = .00, \phi = .20$. A confirmatory independent samples *t* test revealed that, on average, respondents who patronised Hospital treatments were significantly more influenced ($M = 3.16, SD = 2.01$) by the malaria information they received from their networks than those who treated malaria outside Hospitals ($M = 2.29, SD = 2.12$), $t(316) = -5.09, p = .00$. This result points to the likely influence of informational conformity within networks. Presented in Figure 4.5 below is a grouped bar chart displaying the pattern of informational conformity within the informal networks in Nyabondo.

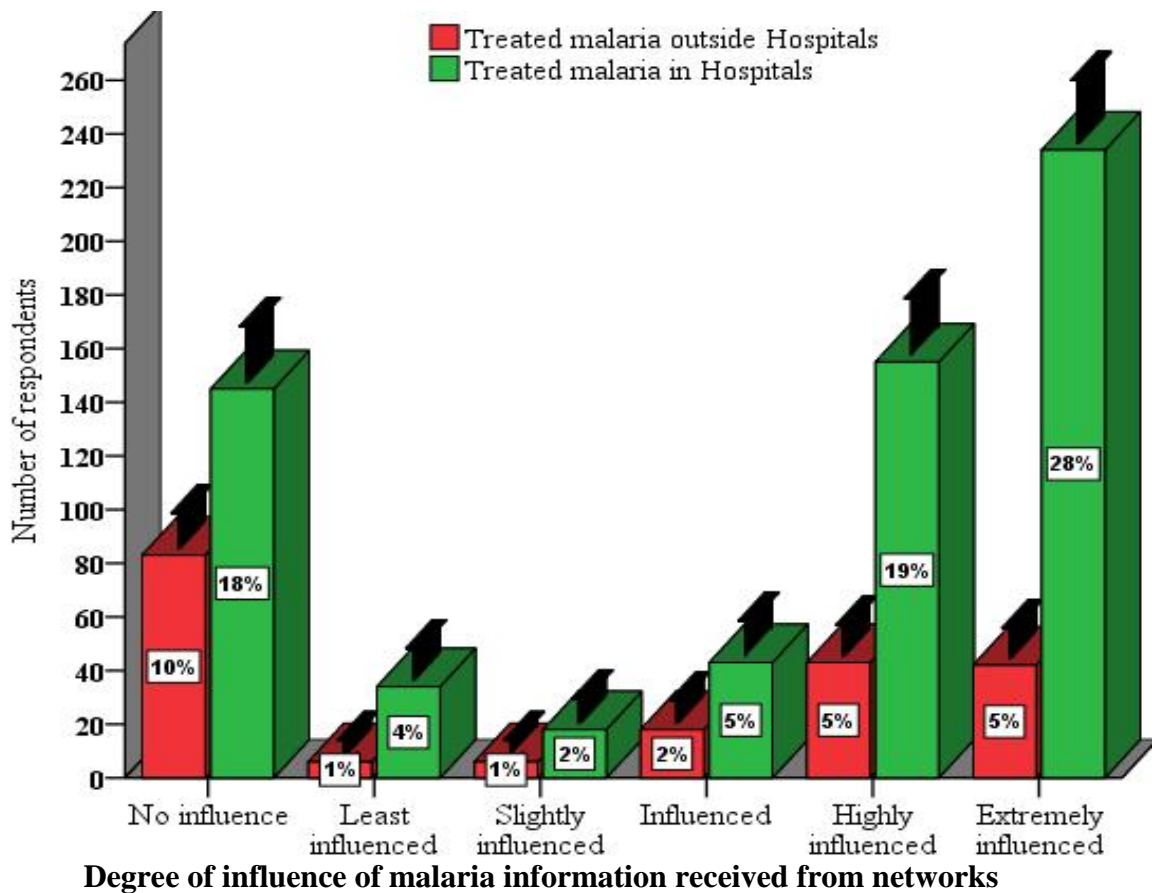
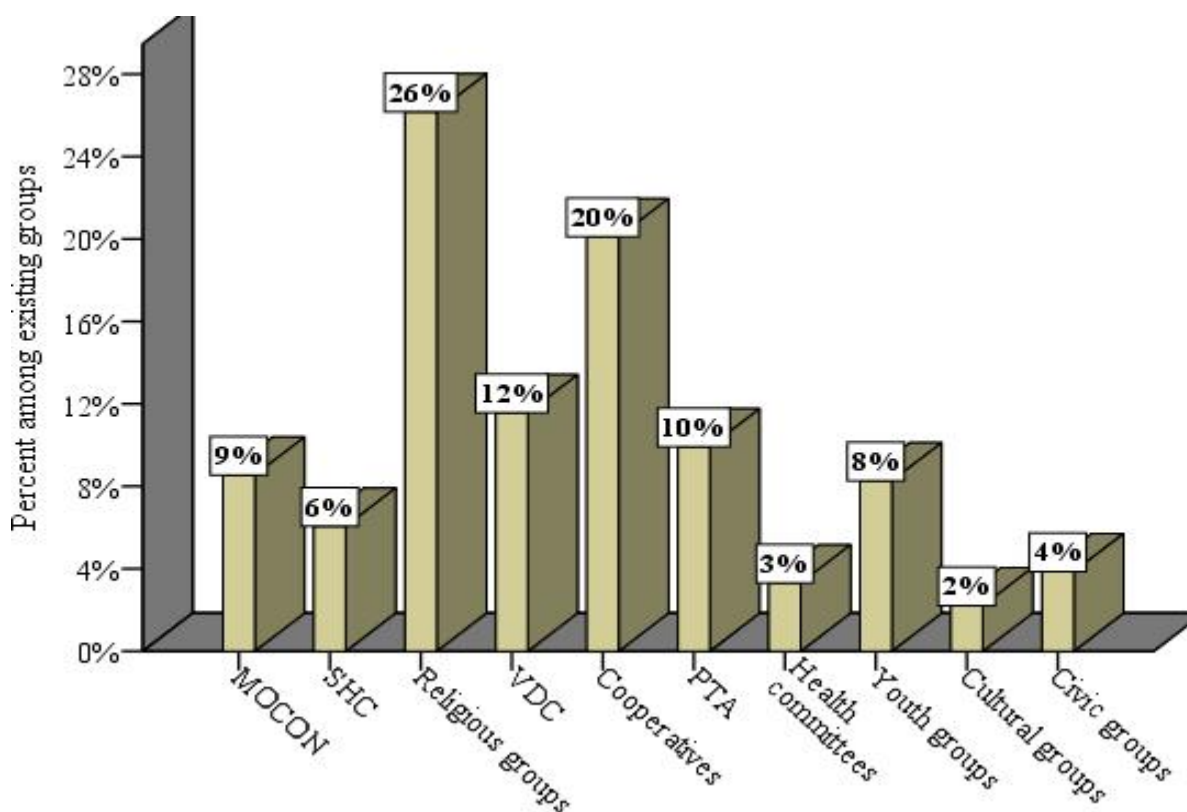


Figure 4.5: Influence of Network Information on Source of Treatment Patronised
 Note: error bars represent 95% CI.

4.3.2. Formal Networks

4.3.2.1. General Nature of Associational/Organizational Life in Nyabondo

The main community organisations that were found to exist in MOCON, SHC, village development committees (VDC), cooperative societies, parent-teacher associations (PTA), health committees, religious groups, youth/sports groups, cultural groups, and civic/political groups. Though religious groups seemed to be the dominant form of association in the villages, the concentration of cooperative societies also looked quite high. Presented in Figure 4.6 below is a diagram displaying the concentration of different types of community associations present in Nyabondo.



Type of community association/organisation

Figure 4.6: Concentration of the Community Associations Operating in Nyabondo

The survey results revealed that many of the respondents belonged to at least one of the community associations listed above. Table 4.7 below summarises the residents' participation in formal networks.

Table 4.7: Summary Statistics of the Respondents' Associational Life

Associational Life Variable		Frequency (%)
Respondent is a member of MOCON	No	1113 (99.0)
	Yes	11 (1.0)
Has children in SHC	No	1002 (89.1)
	Yes	122 (10.9)
Respondent is a member of religious groups	No	137 (12.2)
	Yes	987 (87.8)
Respondent is a member of VDC	No	789 (70.2)
	Yes	335 (29.8)
Respondent is a member of cooperatives	No	553 (49.2)
	Yes	571 (50.8)
Respondent is a Member of PTA	No	978 (87.0)
	Yes	146 (13.0)
Respondent is a member of health committees	No	1088 (96.8)
	Yes	36 (3.2)
Respondent is a member of youth/sports groups	No	1049 (93.3)
	Yes	75 (6.7)
Respondent is a member of cultural groups	No	1051 (93.5)
	Yes	73 (6.5)
Respondent is a member of civic/political groups	No	1093 (97.2)
	Yes	31 (2.8)
Respondent is a member of VLS	No	1113 (99.1)
	Yes	11 (1.0)
Influenced of group membership on households' decisions on malaria treatment	No influence	397 (38.9)
	Least influenced	53 (5.2)
	Slightly influenced	38 (3.7)
	Influenced	86 (8.4)
	Highly influenced	197 (19.3)
	Extremely influenced	250 (24.5)

4.3.2.2. Relationship between Groups Membership and Source of Treatment Utilised

Among the means through which residents who belong to the various community associations were influenced by their membership is through malaria information sharing. Similar to the observations within informal networks, sharing of information seemed to be one of the main benefits obtained by joining the various community associations. The main types of information shared in and among members of the different groups centred on the causes, symptoms and treatment of malaria, as well as environmental management and the use of ITNs. However, most of the malaria-related information shared among group members revolved around the causes of malaria, $\chi^2(5, N = 1804) = 1466.25, p = .00$. This may underlie why the respondents displayed a high knowledge of the cause of malaria. Below is a graph displaying the various types of malaria-related information shared within the formal networks.

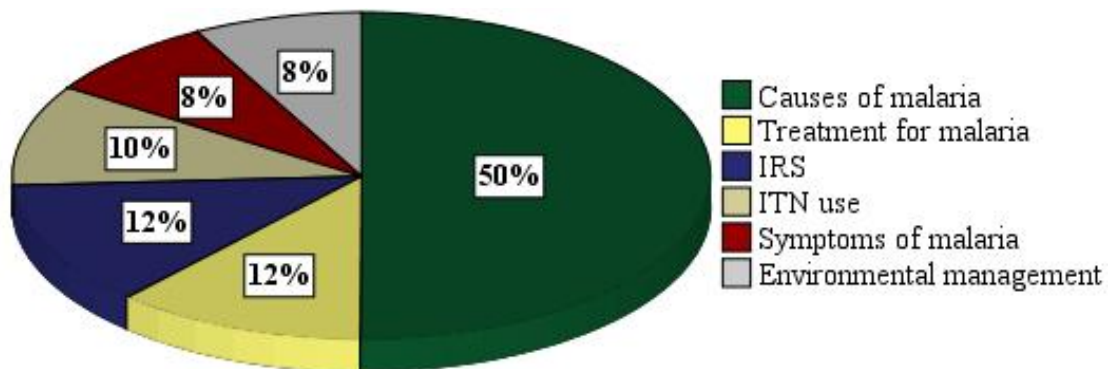


Figure 4.7: Main Types of Malaria Information that flows through Associations

Similar to the analysis conducted on the respondents' informal networks, separate chi-square tests were conducted to ascertain if there are relationships between the household heads' memberships in community groups and the source of malaria treatment patronized by the household. The contingency table presented in Table 4.8 below displays the results of these tests.

Table 4.8: Relationships between Membership in Groups and Source of Treatment Utilised

Associational Life Variables		Source of malaria treatment			2	Sig.	UC
		Outside	Hospital	Total			
Respondent is a member of MOCON	No	231(99.6)	675(98.5)	906(98.8)	1.55	.21 ^E	.00
	Yes	1(.4)	10(1.5)	11(1.2)			
Has children in SHC	No	203(22.1)	609(75.0)	812 (88.5)	.34	.56	.00
	Yes	29(27.6)	76(72.4)	105(11.5)			
Member of religious groups	No	34(14.7)	69(10.1)	103(11.2)	3.65	.06	.00
	Yes	198(85.3)	616(89.9)	814(88.8)			
Member VDC	No	175(75.4)	466(69.0)	641(69.9)	4.51	.03	.00
	Yes	57(24.6)	219(32.0)	276(30.1)			
Member of cooperatives	No	112(48.3)	317(46.3)	429(46.8)	.28	.60	.00
	Yes	120(51.7)	368(53.7)	488(53.2)			
Member of PTA	No	214(92.2)	580(84.7)	794(86.6)	8.55	.00	.01
	Yes	18(7.8)	105(15.3)	123(13.4)			
Member of health committees	No	229(98.7)	655(95.6)	884(96.4)	4.76	.03	.01
	Yes	3(1.3)	30(4.4)	33(3.6)			
Member of youth groups	No	211(90.9)	651(95.0)	862(94.0)	5.14	.02	.01
	Yes	21(9.1)	34(5.0)	55(6.0)			
Member of cultural groups	No	221(95.3)	632(92.3)	853(93.0)	2.40	.12	.00
	Yes	11(4.7)	53(7.7)	64(7.0)			
Member of civic groups	No	224(96.6)	671(98.0)	895(97.6)	1.46	.22	.00
	Yes	8(3.4)	14(2.0)	22(2.4)			
Member of VLS	No	231(99.6)	678(99.0)	909(99.1)	.70	.40	.00
	Yes	1(.4)	7(1.0)	8(.9)			

Note: N = 917 on 1 degree of freedom; ^E = exact significance; U.C. = uncertainty coefficient

The test results, as presented in Table 4.8 above, revealed that the relationships between memberships in community groups and the source of malaria treatment patronized depended on the particular group that the respondent belonged to. While significant associations were observed between the sources of malaria treatment

utilised by the household and the household heads' memberships in VDC, PTA, health committees, and youth clubs, no significant associations were observed between the sources of malaria treatment patronized and memberships in MOCON, SHC, cooperative societies, religious, cultural, civic/political groups and VLS. This result may be due to differentials in the resources, such as malaria information, that flow within the associations; as information is known to be one of the most important resources that flow through networks (Clark, 2006). To follow-up on this, a chi-square test of independence was conducted to ascertain if there is a relationship between malaria information flow within community organizations and the sources of treatment utilized. The results of this test revealed a highly significant relationship between the type of malaria information shared within groups and the sources of treatment patronized by respondents, $\chi^2(4, N = 1335) = 32.29, p = .00, UC = .02$; with organizations which mostly shared information on the causes of malaria appearing to have more of their members patronising Hospital treatments. This result is not surprising as cultural beliefs that malaria is caused by witchcraft has been identified as one of the potential reasons explaining why antimalarials are sometimes obtained outside the formal health care centres (Maslove et al., 2009).

Though membership in associations seemed to have generally exerted some influence on the malaria treatment decisions of the majority (61%) of households, the degree to which belonging to a group influenced these decisions significantly differed among individual households, $\chi^2(5, N = 1021) = 569.01, p = .00$. A further independent samples *t* test revealed that, on average, households that patronised Hospital treatments were influenced more by their group membership ($M = 1.79, SD = 2.10$) than those that sought treatment outside Hospitals ($M = 3.57, SD = 1.99$), $t(878) = -6.895, p = .00$. Similar to the results observed for informal networks, these results are suggestive of a likely effect of informational conformity (Cialdini & Goldstein, 2004) within the community groups. Presented in Figure 4.8 below is a grouped bar chart displaying the patterns of conformity among Hospital service-users and non-users within the formal networks in Nyabondo.

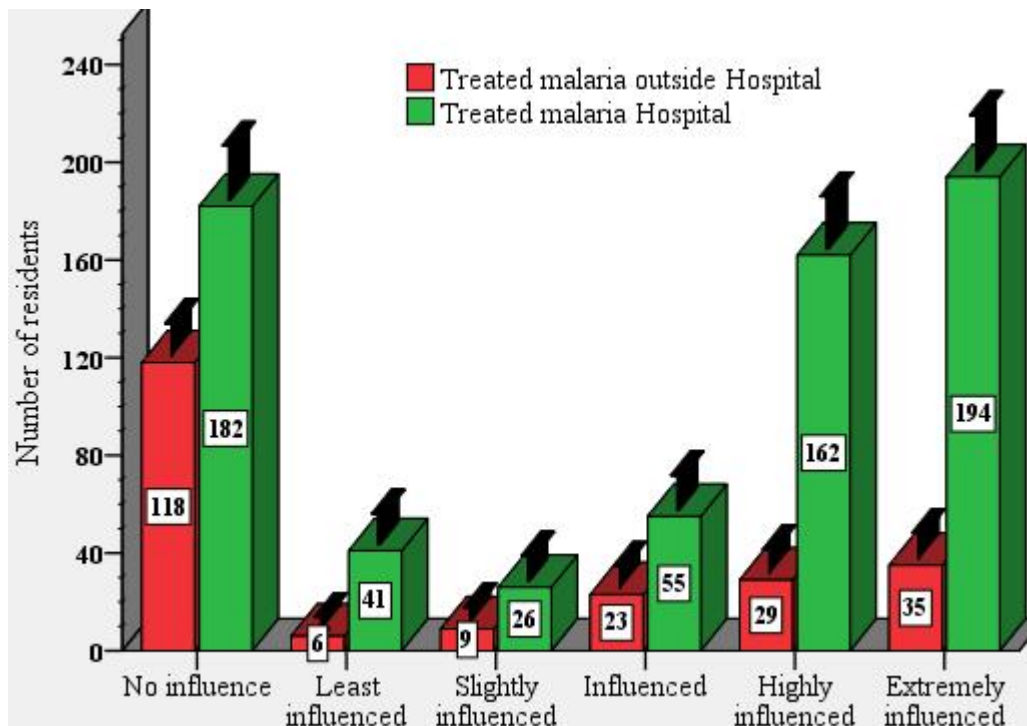


Figure 4.8: Influence of Group Membership on Source of Malaria Treatment Patronised

Note: error bars represent 95% CI.

4.4. Social Trust and Malaria Case Management

4.4.1. General Trusting Behaviours in Nyabondo

Generally, the level of trust respondents expressed in the malaria treatment services offered by the available health care institutional agents or service-providers significantly differed, $\chi^2(5, N = 2437) = 3535.54, p = .00$; with the majority (89%) of them tending to place the highest degree of confidence in medical staffs of Hospitals and in private pharmacists, while expressing very little confidence in other malaria treatment service-providers such as CHW, traditional healers/herbalists, etc. At the community level, on the other hand, there were high levels of generalised trust among the residents of the various communities; as the majority (72%) of the respondents was extremely trusting of the average person. Presented in Table 4.9 below is a summary of the trusting behavior of the residents.

Table 4.9: Trusting Behavior among Residents of Nyabondo

Social Trust Variables	Statistics	Value
Confidence in private pharmacists (rank score: 1 to 8)	Mean (SD)	6.84(1.02)
Confidence in medical staff of Hospitals (rank score: 1 to 8)	Mean (SD)	7.78(.72)
Confidence in community health (rank score: 1 to 8)	Mean (SD)	.36(1.47)
Confidence in traditional healers (rank score: 1 to 8)	Mean (SD)	.26(1.25)
Confidence in NGO IDCCS (rank score: 1 to 8)	Mean (SD)	.35(1.62)
Households' malaria treatment decisions were influenced by their		
No	Frequency (%)	47 (4.5)
Yes		989 (95.5)
Generalised trust		
No trust	Frequency (%)	49(4.4)
Trusting		82(7.4)
Very trusting		179(16.2)
Extremely trusting		798(72.0)

4.4.2. Relationship between Social Trust and Source of Malaria Treatment Patronised

To assess the potential effects of institutionalized and/or personalised trust, independent-samples *t* tests were performed to determine if there are significant differences among the respondents in terms of the level of confidence they expressed in the health care service-providers. These tests revealed that the degree of trust that Hospital treatment users had in some of the malaria treatment institutional agents significantly differed from that expressed by those who treated their sickness outside the formal health facilities. Presented in Table 4.10 below are the details of the results of these tests.

Table 4.10: Comparison between Hospitals Services users and Non-users in terms of the Trust they have in various Malaria Treatment Institutions/Agents

Malaria Control Institutional Agents	Mean Confidence/Trust Score		<i>t</i> test for Equality of Means		
	Hospital treated	Outside Hospital	<i>t</i>	d.f.	Sig.
Private pharmacists	6.81 (.90)	6.98 (1.18)	2.32	915	.02
Medical staff of hospitals/clinics	7.86 (.55)	7.58 (.64)	-5.92	354	.00
Community health workers	.29 (1.31)	.27 (1.38)	-.22	915	.83
Traditional healers	.20 (1.10)	.26 (1.24)	.68	915	.50
NGO IDCCS	.39 (1.71)	.50 (1.93)	.88	915	.38

Note: N = 232 for Outside Hospital and 685 for Hospital treatment users

In a follow-up analysis on the extent to which people's malaria treatment decisions were influenced by their trust in the specific available health care actors or service providers, most (96%) of the respondents reported that their households' malaria treatment decisions were, indeed, influenced by their confidence in those health services-providers. Though weak, this trusting behaviour had a highly significant influence on the source of malaria treatment patronised by respondents, $\chi^2(1, N = 908) = 19.3, p = .00, UC = .02$. This result is consistent with the findings of different studies including Hendryx et al. (2002), Whetten et al. (2006), Wu and Chen (2005) and Bakeera et al. (2010) which also found a positive association between trust and the use of health care services. The bar chart presented in Figure 4.9 below depicts this association.

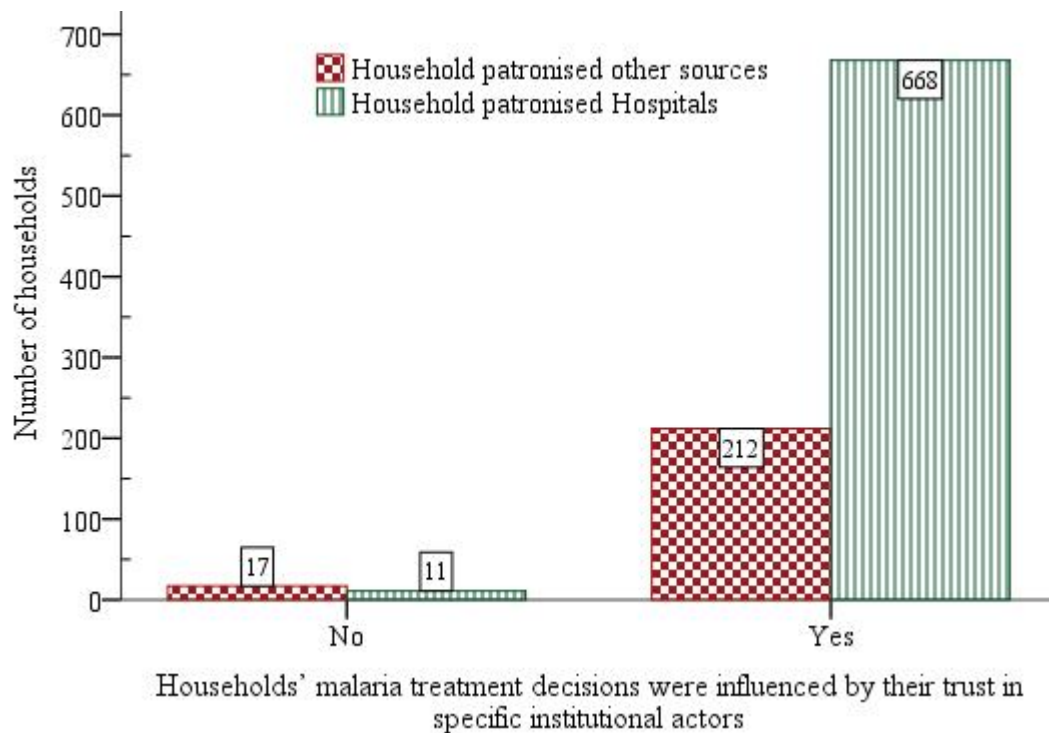


Figure 4.9: Influence of Personalised Trust on the Source of Malaria Treatment Patronised

At the village level, on the other hand, a highly significant association was also found between the sources of malaria treatment patronised by the residents and the high levels of generalised trust reported in Table 4-10, $\chi^2(3, N = 917) = 168.62, p = .00, \phi = .43$. It has been argued that levels of trust vary between societies based on the level of social connectedness within the societies (Thiede, 2005). Thus, the relationship observed may be due to the differential levels of confidence that the residents of the various villages generally have for the health care institutions/agents located within or around their respective communities. This observation aligns with the claim by Woodward (2000) that the community environment determines how practitioners are perceived in the wider community.

4.5. Social Norms and Malaria Case Management

4.5.1. Normative Behaviour in Nyabondo

Aside the network-based acts of reciprocity, analysis of the survey data on generalized social norms at the village level also seems to mirror an abundance of generalized reciprocity in the area. This is evidenced by the fact that the vast majority (82.4%) of the respondents, in one way or the other, helped people with whom they had no personal relationship to treat malaria. Similarly, the villages scored above average on the level of perceived helpfulness of community members; with the majority (30.3%) of the residents perceiving other community members to be very helpful. Contrary to this observation, the respondents were divided on whether neighbours would contribute time for general community projects. With respect to the conforming influence of social norms, the analyses centred on four sub-components including family/household norms, friendship network norms, associational/group norms and general societal norms. Provided in Table 4-12 below are the descriptive statistics that summarise the normative behaviours of the respondents within the vicinity of Nyabondo.

Table 4.11: Summary Statistics of Normative Behaviors among Residents of Nyabondo

Social norms variables		Statistics	Value
Respondent helped someone to treat malaria within the year	No	Frequency (%)	260 (24.5)
	Yes		800 (75.5)
Neighbours would contribute time for general community project	No	Frequency (%)	586 (53.8)
	Yes		503 (46.2)
Aggregate level of perceived helpfulness of community members (scale: 0 (not at all helpful) - 6 (extremely helpful))		Mean (SD)	3.58 (.88)
Level of household's conformity to family norms		Mode (range)	5 (1 – 5)
Level of household's conformity to friendship norms		Mode (range)	4 (1 – 5)
Level of household's conformity to association norms		Mode (range)	3 (1 – 5)
Level of household's conformity to community norms		Mode (range)	3 (1 – 5)

The results of the descriptive statistics, as presented in Table 4.11, showed variations among the respondents; in terms of their level of agreement that their households' conform to the social norms cited above. However, the perceived expectations of specific referent individuals or groups, and an individual's motivation to comply with those expectations, have been known to determine the influence of one's social environment on behavior (Fishbein & Ajzen, 1975). To corroborate the above observation, therefore, a one-way ANOVA test was conducted to determine if the different group norms significantly differed from each other in terms of the degree to which the households' conformed to them. The ANOVA test results generally confirmed that the degree to which the different groups of norms were conformed to by the households' significantly differed, $F(3, 3770) = 383.82, p = .00$; with family norms appearing to exert the greatest influence.

4.5.2. Relationship between Normative Behaviours and Source of Malaria Treatment Patronised

To further assess the potential influence of social norms on households' treatment decisions, different chi-square tests of independence were conducted to determine if the source of malaria treatment patronised by the respondents was associated with the degree to which they agreed to have conformed to the various groups of social norms. Presented in Table 4.12 below are the results of these tests.

Table 4.12: Relationship between Conformity to Social Norms and Source of Malaria Treatment Patronised

Type of social norms conformed to		Source of Malaria Treatment			2 (df.,N)	Sig.
		Hospital	Outside	Total		
Conforms to family norms	Strongly disagree	9(81.8)	2(18.2)	11(1.2)	29.81 (4,900)	.00 ^E .18
	Disagree	6(35.3)	11(64.7)	17(1.9)		
	Neutral	2(25.0)	6(75.0)	8(9)		
	Agree	181(20.1)	42(4.7)	223(24.8)		
	Strongly agree	473(52.6)	168(18.8)	641(71.2)		
Conforms to friendship norms	Strongly disagree	121(54.0)	103(46.0)	224(24.8)	93.79 (4,903)	.00 .32
	Disagree	74(83.1)	15(16.9)	89(9.9)		
	Neutral	48(58.5)	34(41.5)	82(9.1)		
	Agree	265(86.3)	42(13.7)	307(34.0)		
	Strongly agree	166(82.6)	35(17.4)	201(22.3)		
Conforms to group norms	Strongly disagree	121(54.0)	103(46.0)	224(24.8)	92.66 (4,903)	.00 .32
	Disagree	91(10.1)	20(2.2)	111(12.3)		
	Neutral	152(69.7)	66(30.3)	218(24.1)		
	Agree	180(90.0)	20(10.0)	200(22.1)		
	Strongly agree	130(14.4)	20(13.3)	150(16.6)		
Conforms to community norms	Strongly disagree	124(55.1)	101(44.9)	225(24.9)	90.42 (4,904)	.00 .32
	Disagree	93(80.2)	23(19.8)	116(12.8)		
	Neutral	169(69.8)	73(30.2)	242(26.8)		
	Agree	175(89.7)	20(10.3)	195(21.6)		
	Strongly agree	114(90.5)	12(9.5)	126(13.9)		

Note: ^E =Exact Sig.; U.C. = Uncertainty Coefficient.

As shown in Table 4.12 above, the choice of which source of malaria treatment to utilize was significantly related to all the four forms of norms assessed; suggesting a potential influence of group norms on malaria case management. Aside the individual group norms, the relationship between generalized reciprocity at the village level and the source of malaria treatment patronized was also tested using a chi-square test of independence. The results of this test also revealed a highly significant association between the source of malaria treatment patronized and the level of perceived helpfulness of community members, $\chi^2(5, N = 892) = 16.79$, $p = .01$, $U.C. = .14$.

4.6. Regression Analysis on the Role of Social Capital in Malaria Case Management

To quantitatively test the effects of the various forms of social capital, a series of multivariate multilevel random intercept generalized linear regression models were developed. The results of these models are presented in Table 4.13 below.

Table 4.13: Fixed and Random Effects Parameters of an M/HGLM on the Role of Social Capital in Malaria Case Management

Model Parameters	M0 (SE)	Mode M01 (SE)	Model M1 (SE)	Model M2 (SE)	Model M3 (SE)	Model M4 (SE)	Model M5 (SE)	Model M6 (SE)
Fixed effects								
Intercept	1.31 (.30)**	1.04 (.67)**	-5.36 (3.72)**	-3.62 (3.90)**	-7.86 (4.50)**	-3.71 (3.97)**	-4.87 (4.14)**	-7.23 (4.11)**
<i>Control variables:</i>								
Age		-.01 (.01)	.02 (.01)*	.02 (.01)*	.02 (.01)`	.02 (.01)*	.02 (.01)*	.02 (.01)
Years of education		-.01 (.03)	.06 (.05)	.06 (.04)	.05 (.05)	.06 (.04)	.06 (.04)	.06 (.05)
Family size		.04 (.05)	.03 (.07)	.02 (.07)	.04 (.08)	.02 (.07)	.02 (.07)	.02 (.08)
Gender [Female]		.63 (.23)**	.40 (.33)	.42 (.33)	.38 (.34)	.42 (.33)	.41 (.34)	.48 (.35)
Marital status [Not married]		-.52 (.24)*	-.55 (.34)`	-.60 (.34)`	-.54 (.34)	-.59 (.34)`	-.58 (.34)`	-.61 (.35)`
Malaria health status		.00 (.07)	.10 (.10)	.09 (.10)	.06 (.10)	.09 (.10)	.09 (.10)	.06 (.10)
Household income		-.00 (.00)	-.00 (.00)	-.00 (.00)	-.00 (.00)	-.00 (.00)	-.00 (.00)	-.00 (.00)
Distance to nearby health centre		.29 (.12)*	.46 (.17)**	.04 (.17)**	.38 (.17)*	.42 (.17)*	.41 (.17)*	.33 (.18)`
Health insurance [Not insured]		-.58(.22)**	-.50 (.30)`	-.47 (.30)	-.47 (.30)	-.48 (.30)	-.48 (.30)	-.43 (.31)
<i>Social Networks:</i>								
Knows Pharmacists [No]			.98 (.40)*	.93 (.40)*	.95 (.40)*	.93 (.40)*	.97 (.41)*	1.08 (.43)**
Knows medical staff of Hospital [No]			-.65 (.31)*	-.74 (.32)*	-.88 (.33)*	-.74 (.32)*	-.86 (.33)**	-.91 (.34)**
Knows CHW [No]			2.67 (.95)**	2.79 (.95)**	2.85 (.94)**	2.77 (.95)**	3.05(1.01)*	2.83 (.95)**
Knows traditional healers [No]			.87 (.51)`	.88 (.52)`	1.07 (.53)*	.87 (.52)`	1.04 (.53)*	1.17 (.54)*

Number of known sick alters		.03 (.02)	.03 (.02)	.02 (.02)	.03 (.02)	.03 (.02)	.02 (.02)
Treatment source used by known alter [Not Hospital]		-	-	-	-	-	-
Member of VDC [No]		1.77(.39)**	1.70(.38)**	1.67(.39)**	1.70(.38)**	1.72(.39)**	1.64(.40)**
Member of PTA [No]		.12 (.47)	.08 (.47)	.20 (.48)	.09 (.47)	.10 (.48)	.16 (.49)
Member of health committees [No]		-.92 (1.01)	-1.14 (1.03)	-.98 (1.05)	-1.12 (1.05)	-1.11 (1.05)	-1.01 (1.11)
<i>Social Trust:</i>							
Trust in private pharmacists		-.64 (.27)*	-.69 (.28)**	-.60 (.27)*	-.70 (.28)**	-.64 (.28)*	-.56 (.26)*
Trust in medical staff of Hospitals		.88 (.30)**	.74 (.30)*	.82 (.32)**	.74 (.31)*	.83 (.33)**	.65 (.44)
Trust in CHW		-.02 (.11)	.05 (.12)	.07 (.12)	.05 (.12)	.07 (.12)	.09 (.12)
Trust in traditional healers		.04 (.11)	.03 (.11)	.02 (.11)	.03 (.11)	.01 (.11)	.88 (1.86)
<i>Social Norms:</i>							
Conforms to family norms ^m	Strongly disagree	3.74 (2.08)*	4.29 (2.11)*	4.63 (2.15)*	4.33 (2.14)*	4.58 (2.14)*	4.79 (2.22)*
	Disagree	-2.73 (1.09)	-2.71 (1.09)	-2.56 (1.08)	-2.70 (1.09)	-2.53 (1.08)	-2.60 (1.24)
	Neutral	-.45 (1.35)	-.37 (1.33)	-.64 (1.41)	-.37 (1.33)	-.64 (1.43)	.05 (1.86)
	Agree	.34 (.37)	.27 (.38)	.08 (.39)	.27 (.38)	.23 (.38)	.08 (.50)
Conforms to friendship norms ^m	Strongly disagree	-	-	-	-	-7.79 (6.83)	-
	Disagree	-.07 (.85)	-.32 (.86)	-.49 (.86)	-.33 (.87)	-.27 (.87)	-.46 (.94)
	Neutral	-1.00 (.64)	-1.21 (.65)	-1.44 (.67)	-1.21 (.65)	-1.03 (.68)	-1.47 (.72)
	Agree	.59 (.57)	.43 (.57)	.15 (.59)	.44 (.57)	.39 (.58)	.07 (.60)
Conforms to associational norms ^m	Strongly disagree	5.30 (7.67)	6.72 (7.81)	5.38 (7.83)	6.61 (7.85)	6.42 (7.78)	5.92 (9.72)
	Disagree	.63 (1.04)	.67 (1.04)	.55 (1.03)	.67 (1.04)	.59 (1.04)	.58 (1.04)

	Neutral	.12 (.82)	.21 (.81)	.04 (.82)	.20 (.81)	.09 (.82)	.00 (.82)
	Agree	.05 (.77)	.05 (.76)	-.01 (.75)	.04 (.76)	.03 (.76)	-.05 (.75)
Conforms to societal norms ^m	Strongly disagree	-.84 (3.86)	-1.07 (3.91)	-.44 (3.96)	-1.06 (3.91)	-.81 (3.93)	-.58 (4.00)
	Disagree	-1.50 (.95)	-1.38 (.97)	-1.10 (.95)	-1.36 (.99)	-1.32 (.97)	-1.06 (1.01)
	Neutral	-1.17 (.79)	-1.04 (.81)	-.62 (.81)	-1.01 (.83)	-.90 (.82)	-.56 (.86)
	Agree	-1.24 (.75)	-1.20 (.75)	-.82 (.75)	-1.18 (.74)	-1.07 (.75)	-.78 (.78)
Level 2 effects:							
Community-induced cohesion			.13 (.50)	-.13 (.50)	.10 (.55)	-.12 (.54)	-8.27 (8.27)
Externally-induced cohesion			-.54 (.35)	-.36 (.36)	-.54 (.35)	-.58 (.37)	-.38 (.38)
Generalised trust			1.21 (.59)*				
Generalised reciprocity					.04 (.34)		
Program ^{fp}	ITN and IRS					-.29 (.52)	
	Bti, ITN and IRS					-.40 (.51)	
	Education, ITN and IRS					.25 (.50)	
Interaction effects:							
Group membership influence* SC2							.08 (.25)
Trust in medical staff of Hospitals*SC2							1.07 (.93)
Trust in traditional healers*GT							-.31 (.68)
Trust in medical staff of Hospitals*GT							.18 (.09)*
Conforms to family norms*SC2							-.11 (1.05)

Random Effects	Estimate (SE)	Estimate (SE)	Estimate (SE)	Estimate (SE)	Estimate (SE)	Estimate (SE)	Estimate (SE)	Estimate (SE)
$\sigma^2=\text{var}(\text{village})$	1.30(.56)**	1.03(.48)*	.81 (0.46)	1.10 (0.66)	0.91 (0.59)	.62(0.35)	.59 (0.40)	.33 (0.35)
BIC	4409.60	3341.64	2926.25	2882.13	3016.83	2883.25	2919.10	2778.79
Accuracy	76.3%	77.3%	87.3%	86.3%	86.5%	86.3%	86.3%	87.4%

Note: **p .01; *p .05. = coefficient; SE = Standard error of .SC2 =community-induced cohesion SC3 =externally-influenced cohesion; SC4 = conflict-resolution-based cohesion; GT =Generalised trust. ^m =reference category is strongly agree; ^{np} =reference category is Bti, Education, ITN & IRS

4.6.1. Influence of Village and respondent Characteristics on Malaria Case Management

The null/unconditional model (Model M0) revealed a highly significant variation in the average choice of malaria treatment facilities patronised across the villages in Nyabondo; justifying the appropriateness of the hierarchical modelling routine employed in this study. Moreover, this model showed that, all things being equal, the people of Nyabondo are, on average, more likely to patronize public Hospitals for malaria case management than to seek treatment outside these formal public health care facilities. After adding the level 1 demographic, socio-economic and institutional factors to the null model (M01), the size of the village fixed and random effects reduced. Upon further inclusion of the level 1 social capital predictors to the model (Model M1), the village random effect became statistically insignificant while the fixed effect turned negative. This result is an indication that the social capital variables may have likely contributed to some of the higher likelihood of patronizing formal health facilities observed at the village level. Moreover, it also indicates that social capital may be responsible for some of the disparities among the villages in their residents' average propensity to treat malaria cases in public Hospitals. On the other hand, the effects of the level 2 variables included in the subsequent models (Model M2, Model M3, Model M4, Model M5, Model M6) was rather relative, which confirms the position of some authors (e.g. Portes, 1998; Pantoja, 2000) that social capital has a relative and contingent nature. For instance, the size of the village effect reduced after accounting for the effect of social cohesion; increasing the inherent average propensity of the residents to utilise Hospital treatment. According to the US Institute of Medicine, however, higher stocks of social capital/cohesion are associated with an improved ability of communities to exercise informal social control. Thus, the effect of social cohesion could be as a result of traditional norms, values and beliefs which usually become more binding at higher levels of social cohesion (Institute of Medicine (US) Committee on Assessing Interactions Among Social, Behavioral, and Genetic Factors in Health, 2006). On the contrary, the inclusion of the experimental program implemented in the village (Model M5) increased the size of the village effect. Even though this program effect was not

significant by itself, accounting for its effect reduced the inherent average propensity of the residents of the various communities to seek treatment from the formal health facilities available to them.

In the second model (M01), the effect of the respondent's gender and marital status, as well as the distance of the household to the nearest health care facility were observed to be significant. In addition, being under health insurance coverage was also seen to have a highly significant effect on the source of malaria treatment patronized. On the other hand, the effects of the respondents' age and years of education as well as the family size, the household's income and malaria health status were not significant. While the effects of distance to the nearest health care facility remained significant after accounting for the effects of social capital predictors, that of the other demographic, socio-economic and institutional factors became insignificant. However, the addition of the social capital predictors turned the effect of age on the likelihood of patronizing Hospital treatments significant. This result is suggestive that social capital may mediate the effects of some of the demographic, socio-economic and institutional factors. A plausible explanation for the change in the effect of age, for instance, may be that as people grow, they add to their stock of social capital; thereby increasing their possibility of obtaining social and other malaria control resources that flow through their networks and communities. Similarly, it is possible that the initial significance of marital status was mediated by social capital effects. This is in relation to the fact that being married is likely to increase one's stock of social capital as a result of the addition of the partner's social capital. In the bivariate analysis, the partners' educational attainment, for example, was significantly related to the source of malaria treatment patronized. Thus, a married person may obtain social resources such as scientific knowledge of malaria from the partner; which could enhance his/her propensity to patronize formal health facilities for malaria treatment. Through document analysis (confirmed by a key informant interview), it was discovered that Nyabondo is served mainly by two formal health care centres. Considering the fact that these facilities are sited in only two out of the villages in the area, it is highly likely that the residents of the other villages are closer to other sources of treatment than these formal health

facilities. With the high biomedical knowledge of malaria and other resources obtained from their social networks, as reported in the univariate analysis, it is not surprising for them to travel longer distances to seek effective medical care.

4.6.2. Influence of Social Networks on Malaria Case Management

While the effect of knowing traditional healers was found to be important only in some models (M3, M5 and M6), the effect of knowing private pharmacists/drug sellers, medical staff of Hospitals and CHWs remained important across all models in explaining the source of malaria treatment services patronised. These results support the finding reported by Bakeera et al. (2009) that having relationships with health workers help to make their services more receptive. However, unlike knowing medical staff of Hospitals which was found to significantly increase an ego's propensity to utilize formal health facilities, being connected to health workers such as pharmacists, CHWs or traditional healers who work outside the public health facilities was found to increase an ego's likelihood of patronizing sources of treatment outside the public health facilities; most likely, the services provided by these alters. These results corroborate the position of several other authors (e.g. Kleinman, 1980; Ikels, 2002) that social networks can provide an impetus for health care utilization, but may also press an individual to abstain from accessing health services. They, thus, demonstrate that the benefits obtained from social networks differ; depending on the nature/composition of the network; which also confirms the position of Pantoja (2000) that social capital has a relative and contingent nature. According to Gilson (2003), face-to-face encounters with health providers can build or damage personal trust. Since being connected to a health care agent most likely promotes face-to-face encounters, a natural explanation to the effect of these networks may be that; being connected to a health care agent increases an ego's personalized trust in these agents. Moreover, since trust in health-care providers has been claimed to be associated with the clinical or technical competence of the providers (Mechanic & Meyer, 2000; Straten, Friele, & Groenewegen, 2002), this is likely to propel the egos to use the services of providers they are connected to. Thus, having ties with a health care provider may increase trust in the alter which may ultimately propel the egos to patronise the services provided by the alter. This could,

therefore, be the reasoning behind the assertion by Bakeera et al. (2009) that knowing someone at a public health facility could be useful in terms of accessing health care services.

While knowing people who have suffered from malaria in the past was not important in explaining the source of type of health care facility utilised, being aware of the source of treatment patronized by those alters was important in explaining an ego's own choice of which treatment source to utilize. Specifically, being connected with alters who did not utilize formal health care services was found to significantly reduce an ego's propensity to patronize formal health facilities. Different studies have generally highlighted how individuals in developing countries take into account the experiences of their social contacts when deciding whether to adopt new technologies, generating a process of social learning (Conley & Udry, 2010; Munshi, 2004; Kremer & Miguel, 2003). Thus, a plausible cause of this effect is the role of social capital in promoting informational conformity; which can facilitate the diffusion of innovations by increasing inter-linkages among individuals (Narayan & Pritchett, 1997).

In relation to associational memberships, being a member of the VDC was found to significantly reduce one's likelihood of patronizing formal health facilities for the management of malaria cases. One likely foundation of this effect may be the heterogeneity/composition of this group. This antecedent of group belongingness effect will be better explained when the effect of membership in VDC is compared with that of membership in health committees which, though not significant, increased one's propensity to patronize the services of public health facilities. One plausible mechanism that may underlie the effect of group membership is the network-mediated benefits (such as malaria knowledge) obtained from groups; which can facilitate informational conformity. While members of VDC are more likely to transmit/benefit from traditional knowledge of malaria, those of health committees have a higher tendency to transmit biomedical knowledge of the disease. Another plausible explanation may be through normative conformity to the beliefs and values held by and transmitted through the groups. This possibility is confirmed by the

results of an earlier bivariate independent samples *t* test results which revealed that, on average, households that patronised Hospital treatments were influenced more by their group membership than those that sought treatment outside Hospitals. Personal change, according to Bandura (1990), occurs within a network of social influences and depending on their nature, these influences can aid, retard, or undermine efforts at personal change. Thus, while the norms respected by members of a health committee are likely to be more modern and scientific, those upheld by members of VDC are likely to be more traditional and, as described by Portes (1998), downward-levelling.

4.6.3. Effect of Trust on Malaria Case Management

Similar to the reported network effects, personalized trust in private pharmacists/drug sellers and in medical staff of Hospitals were found to be important in explaining the source of malaria treatment services patronised in almost all the models (M1, M2, M3, M4, M5). This corroborates the results of the qualitative data analysis where the majority of the residents tended to place the highest degree of confidence in medical staffs of Hospitals and in private pharmacists, but expressed very little confidence in other malaria treatment service-providers such as CHW, traditional healers/herbalists, etc. Similar positive associations between trust and use of health care services have been reported in other studies (Ayé, Champagne, & Contandriopoulos, 2002; Hendryx et al., 2002; Whetten et al., 2006; Wu & Chen, 2005; Bakeera et al., 2010). While increased personalized trust in private pharmacists was found to have a significantly negative effect on one's propensity to seek malaria care from formal health facilities, higher levels of trust in medical staff of Hospitals was found to enhance one's propensity to patronize public Hospitals treatments. An important factor related to care-seeking behaviour, according to Mohseni and Lindstrom (2007), is trust in the health-care system. Moreover, this institutional trust in the health-care system, according to Russell (2005), is what encourages use of health services. Since interpersonal trust is known to be positively associated with institutional trust (Brehm & Rahn, 1997; Putnam et al., 1994), higher levels of trust in an institutional agent is most likely to enhance one's trust in the institution represented by the agent and, thus, encourage him/her to patronise their services. In a

study conducted by Bakeera et al. (2009), lack of trust in the qualifications of health workers was found to be associated with a lack of confidence in the efficacy of the treatment they provide. If a person lacks confidence in the ability of a healer to treat his/her illness, that person, as Mohseni and Lindstrom (2007) indicated, may be unlikely to visit this healer for treatment. These may explain the effects of personalised trust observed in this study.

On the other hand, it has been argued that the levels of trust in societies vary with their level of social connectedness (Thiede, 2005). This may underlie why, after accounting for the effect of generalized trust, the size of the village effect increased dramatically; reducing the inherent propensity of the residents of the various communities to seek treatment from the formal health facilities available to them. This result aligns with the findings of a study conducted in Uganda by Bakeera et al. (2010), where high levels of trust and medium levels of informational support were found to be positively associated with the utilization of a public health facility. According to Adali et al. (2010), trust regulates how information will flow in a social network (which could be a village-wide network): determining whether nodes will believe information they receive and whether they will transmit this information to other nodes in the network. This may be the reasoning behind Adam and Ron evi 's (2003) conception of social capital as a catalyst for disseminating human and intellectual capital. As indicative of this result, therefore, generalized trust could be responsible for most of the village effect on malaria health services utilization observed in this study.

According to Knack and Keefer (1997), there is substantial direct evidence of aggregate-level correlations between trust and trustworthiness. This is confirmed by the significant interaction effect between personalized trust in medical staff of Hospitals and generalized trust (Model M6). The addition of this interaction term rendered the main effect of personalized trust in medical staff of Hospitals insignificant. Accordingly, the main effect of personalized trust in medical staff of Hospitals may be a result of a mediating effect of the high levels of generalized trust existing in the villages; thereby supporting the claim by Woodward (2000) that the

community environment determines how practitioners are perceived in the wider community.

4.6.4. Influence of Social Norms on Malaria Case Management

The influences of conformity to general societal and associational norms on the sources of malaria treatment utilized were not statistically significant. It is therefore not surprising that membership in only one community association (i.e. VDC) was found to have a significant effect on malaria treatment decisions. On the other hand, the effects of conformity to family and friendship norms were found to be statistically significant. Specifically, conforming to family norms was found to reduce one's propensity to patronize services provided by the formal health facilities. On the contrary, conforming to friendship norms was found to increase the likelihood that one would utilize Hospital treatments to manage malaria cases. Such normative effects may be resulting from the fact that personal action scripts (behaviours/attitudes), as Ewart (1991) put it, are socially intertwined with scripts of family members, friends, etc. in ways that pose significant obstacles to long-term change. Thus persons within cohesive groups such as family and friendship networks may often have their treatment decision influenced by the norms of these groups, especially when these networks are parochial (Andersen, 1995). From another dimension, family and friends have been known to be very supportive and influential in disease prevention and control. The results of normative influence found in this study, in fact, lays credence to the findings by Bandiera and Rasul (2006) that complementarities within family and friendship networks are between 4 to 10 times stronger than those between loosely tied individuals. In this regard, Bakeera et al. (2009), for example, observed that family and friends provide social resources (such as financial support, information on where certain health services are found, etc.) which are very useful in overcoming some of the existing barriers to utilization of health services. Similarly, Ayé et al. (2002) found elsewhere in Africa that once the causes of illness are identified, it is the entire family or group that participates to bring about treatment. In view of these, an individual's drive toward group maintenance or his/her motivation to comply with the expectations of family and friends, as Page and Cole (1984) put it, can be an important determinant of behaviour

(O’Keeffe, Nesselhof-Kendall, & Baum, 1990); in terms of how/where to manage malaria cases.

CHAPTER FIVE

5.0. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary of Main Findings

By 2015, target 8 of the United Nations Millennium Development Goal number six (MDG 6) aimed to have halted and began to reverse the incidence of malaria and other major diseases. One of the strategies through which this target was expected to be achieved is to increase the proportion of the population in malaria risk areas who use effective malaria prevention and treatment measures. It is against this backdrop that this study was conducted to explore the role that the different forms of social capital play in malaria case management. Specifically, it concentrated on exploring the influence of social networks, social trust and social norms on the choice of malaria treatment services utilised to manage malaria cases. It therefore conceptualized social capital as being composed of different component forms; which could play varying roles both at the individual and ecological levels.

To achieve this objective, an amalgamation of methodological approaches and tools were utilized to collect data for the study. This was collected from a sample of 1124 respondents randomly selected from households within the 16 villages under the BioVision project in Nyabondo, Western Kenya. Employing a more statistical approach, both univariate and bivariate analyses were undertaken to provide summary statistics and to test for differences and associations between the source of malaria treatment patronised and the independent variables of interest to this study. In view of the structure of the data collected and the multidimensionality of the constructs investigated, multivariate multilevel/hierarchical models were further developed and utilised to test the effects of social capital on malaria control (case management).

The results of data analysis revealed a highly significant variation in the average choice of malaria treatment facilities patronised across the villages in Nyabondo; indicating that the choice of which health care facility to utilise is influenced by the

village where one resides. Upon accounting for the effects of the level 1 social capital predictors, the village random effect became statistically insignificant while the fixed effect turned negative. On the other hand, the effects of the level 2 variables included was rather relative. The size of the village effect, for instance, reduced after accounting for the effect of social cohesion; increasing the inherent average propensity of the residents to utilise Hospital treatment. On the contrary, the inclusion of the experimental program implemented in the village increased the size of the village effect. Similarly, the respondent's gender and marital status, distance of the household to the nearest health care facility and being under health insurance coverage were observed to have significant effects on the source of malaria treatment patronized. While the effects of distance to the nearest health care facility remained significant after accounting for the effects of social capital predictors, those of the other demographic, socio-economic and institutional factors became insignificant. However, the addition of the social capital predictors turned the effect of age on the likelihood of patronizing Hospital treatments significant.

While the effect of knowing traditional healers was significant only in some models, those of knowing private pharmacists/drug sellers, medical staff of Hospitals and CHWs were found to be significant across all models. However, unlike knowing medical staff of Hospitals which was found to increase an ego's propensity to utilize formal health facilities, being connected to health workers who work outside the public health facilities was found to increase an ego's likelihood of patronizing sources of treatment outside the public health facilities. Similarly, being aware of the source of treatment patronized by alters who suffered from malaria in the past had a highly significant effect on an ego's own choice of which treatment source to utilize. Specifically, being connected with alters who did not utilize formal health care services was found to significantly reduce an ego's propensity to patronize formal health facilities. Moreover, being a member of the VDC was found to significantly reduce one's likelihood of patronizing formal health facilities for the management of malaria cases.

Similar to the reported network effects, personalized trust in private pharmacists/drug sellers and in medical staff of Hospitals were found to have statistically significant effects. While increased personalized trust in private pharmacists was found to have a negative effect on one's propensity to seek malaria care from formal health facilities, higher levels of trust in medical staff of Hospitals was found to enhance one's propensity to patronize public Hospitals treatments. After accounting for the effect of generalized trust, on the other hand, the size of the village effect increased dramatically; reducing the inherent propensity of the residents of the various communities to seek treatment from the formal health facilities available to them. However, the main effect of personalized trust in medical staff of Hospitals was rendered insignificant by the addition of an interaction effect between personalized trust in medical staff of Hospitals and generalized trust.

The influences of conformity to general societal and associational norms on the sources of malaria treatment utilized were not statistically significant. On the other hand, the effects of conformity to family and friendship norms were found to be statistically significant. While conforming to family norms was found to reduce one's propensity to patronize the services provided by the formal health facilities, conforming to friendship norms was found to increase the likelihood that one would utilize Hospital treatments to manage malaria cases.

5.2. Conclusions

From the results, it can be inferred that:

- an individual's choice of which health care services to utilise for the management of malaria cases is influenced by members of his/her social networks. This influence, however, depends on the kind of people an individual is connected to.
- social trust plays important roles in the utilisation of formal health services for malaria case management. Similar to the network influenced, whether trust will have a positive or negative effect on the utilisation of recommended health centres for malaria control depends on which individuals, institutional agents or institutions an individual trusts in.

- the motivation to comply with the norms of family and friendship networks also has major influences on how individuals manage malaria cases. Thus, the individual and collective norms, values and beliefs held by the members of these networks and the conforming influence of these norms play varying roles in people's choice of which health care services to utilise
- generally, the roles played by the different forms of social capital are relative and contingent in nature. This implies that social networks, trust and norms can have both positive and/or negative influences on the use of recommended health services for malaria treatment depending on their nature
- social capital mediates the effect of many of the demographic, socio-economic and institutional factors that are known to influence malaria health care seeking behaviour
- roles played by the various component forms of social capital are, indeed, causally independent but inter-related. This implies that the roles played by each component of social capital in malaria control is directly inter-linked with the functioning of the other component
- in line with the finding that both individual and community level factors are important in explaining disparities in malaria health services utilization, social capital also exerts both individual level and ecological influences.

5.3. Recommendations

Based on the findings of this study, the following actions are recommended.

- Since social capital (in the form of social networks, trust and norms) can have both positive and negative influences, it is important that officials of public health care centres strive to build appropriate social capital (especially social networks and social trust) with their target clients.
- There is a need for program planners to incorporate a social capital dimension in the design of up-scaling strategies for malaria control interventions such as the malaria case management intervention. This will involve, among other things, establishing the forms and compositions of social networks existing in an area, the level of generalised, personalised and institutional trust exhibited in the area, and the nature norms upheld in the area.

- Since social capital has both individual level and ecological/contextual influences, it is also imperative to create awareness among malaria control program implementers on how specific contextual conditions affect the functioning and the building, harnessing and mobilizing of social capital for malaria control.

5.4. Limitations of the Study

- The cross-sectional nature of the study may make it difficult to affirm the directions of causality.
- The retrospective nature of the study relied on the respondent's power of memory, which may be limiting as a result of memory fading/effect.
- This study employed a more quantitative approach. However, some of the forms of social capital, such as the norm of reciprocity, require more qualitative approaches to fully explore.

5.5. Suggestion for Future Studies/Research

The following are proposed for consideration in future studies:

- Participatory research techniques (such as key informant interviews and/or focus group discussions) need to be included in future studies which explore the roles of the cognitive forms of social capital.
- The potential role of social capital in the effectiveness of other malaria control interventions should be investigated.
- In view of the fact that this study was conducted in a rural context, replication of the study under urban settings is warranted; since the influence of social capital is contextual in nature.
- The role of social capital in the control of other diseases should also be considered for future studies.
- Further research on how to harness and/or build appropriate social capital under similar settings for malaria control will be necessary.

5.6. Research Contribution

- Being a pioneering research on the role of social capital in malaria control, this study has helped to unravel and provided suggestive evidence of the contextual role that social capital can play in the implementation success of malaria case management interventions. This understanding of which factors are most important for malaria case management can assist in the creation of effective health campaigns, policies, and promotion programs for malaria control
- This study has also helped to fill the gaps in the theories and models of health services utilisation
- It has also added to the methodological approaches for social capital research.

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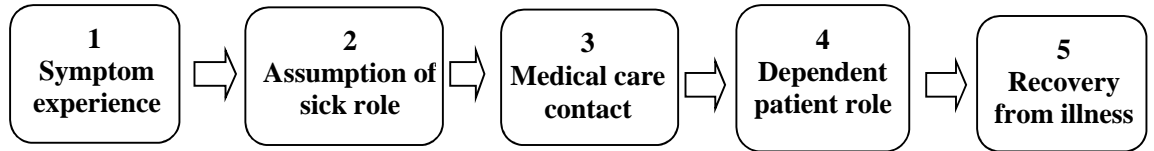
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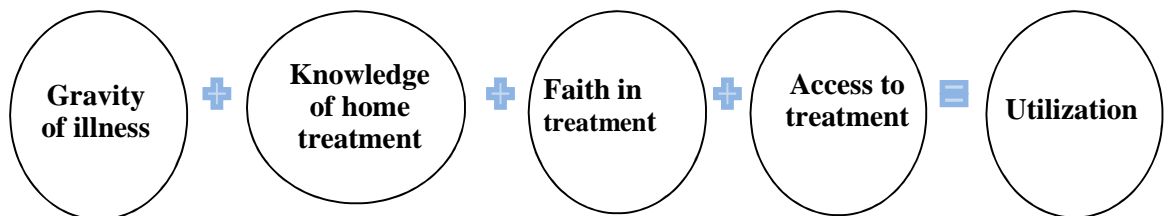
APPENDICES

Appendix 1: Suchman's Stages of Illness and Medical Care (1965)



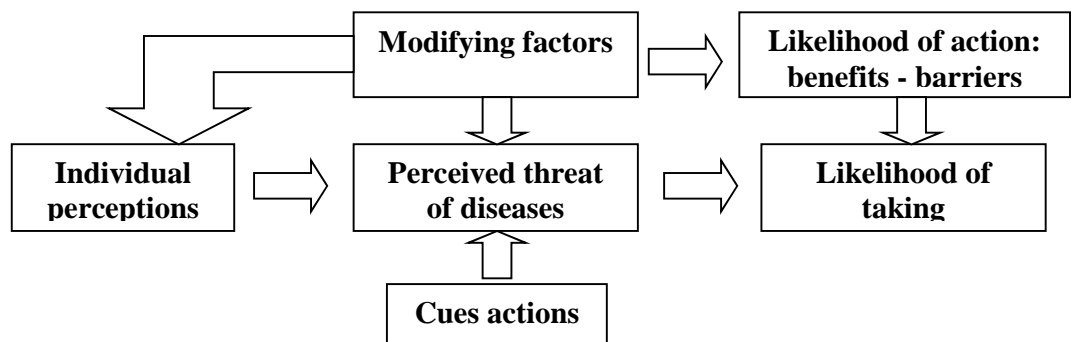
Source: adapted from (Rebhan, 2009)

Appendix 2: Young's Choice-Making Model (Young, 1986)



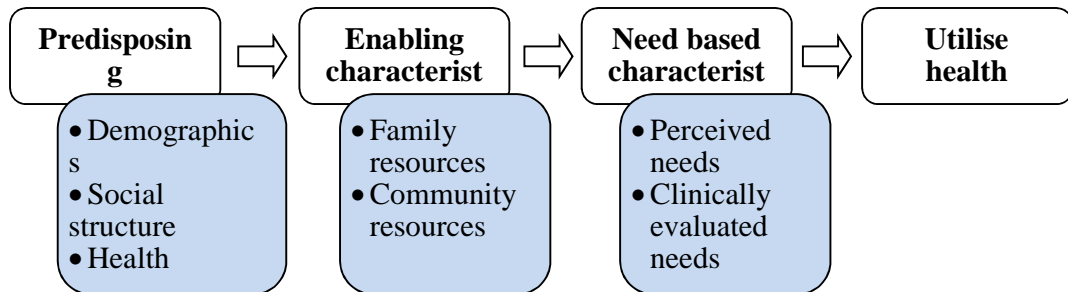
Source: adapted from (Rebhan, 2009)

Appendix 3: Rosenstock's Health Belief Model (1994)



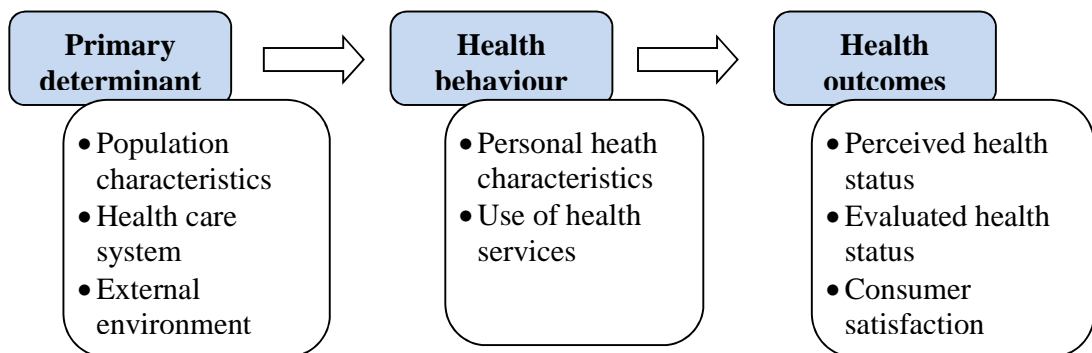
Source: adapted from (Rebhan, 2009)

Appendix 4: Andersen's Behavioral Model of Health Services Utilization



Source: adapted from (Rebhan, 2009)

Appendix 5: Andersen's Phase-3 Model of Health Services Utilization



Source: adapted from (Rebhan, 2009)

Appendix 6: The World Bank Social Capital Assessment Tool (SOCAT)

<p>The SOCAT is a multifaceted instrument composed of various tools designed to collect social capital data at the household, community and organizational levels. It is an integrated quantitative/ qualitative tool. As well, three manuals are available and offer detailed information on the contents of the tools, on implementing them in the field, and on analyzing their results. The components of SOCAT include:</p> <p>1. An interview guide for developing a community profile and mapping community assets: A community profile is elicited through a series of group interviews conducted in a community during the initial days of fieldwork. A community profile allows the research team to become familiar with community characteristics and issues relating to social capital for reference in later phases of data collection. Several participatory methods are used to develop the community profile. In addition to a focus group format, the data collection includes a community mapping exercise followed by an institutional diagramming exercise. The primary data source material generated by these interviewing, mapping, and diagramming exercises are:</p> <ul style="list-style-type: none"> • community maps, indicating location of community assets and services; • observational notes of group process and summary of issues discussed; • list of positive characteristics of community assets and services; • list of negative characteristics of community assets and services; 	<ul style="list-style-type: none"> • list of all formal and informal community institutions; • case study of community collective action; • institutional diagrams (Venn) of relative impact and accessibility; and • institutional diagrams (web) of institutional network relationships. <p>2. A community questionnaire.</p> <p>3. A household questionnaire.</p> <p>4. An interview guide for developing organizational profiles: The overall objective of developing organizational profiles is to delineate the relationships and networks that exist among formal and informal institutions operating in a community, as a measure of structural social capital. Specifically, each profile assesses an organization’s origins and development (historical and community context, longevity, and sustainability); quality of membership (reasons people join, degree of inclusiveness of the organization); institutional capacity (quality of leadership, participation, organizational culture, and organizational capacity); and institutional linkages. Between three and six institutions per community should be profiled. The organizations need to be identified through the community interviews and/or household survey as key organizations or those having the most impact or influence on community development.</p> <p>5. An organizational profile score sheet.</p>
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Source: Adapted from Franke (2005)

Appendix 7: Position Generator – Classic Version Developed by Lin

Here is a list of occupations (present a card with the list). Do you personally know anyone who practises these occupations?

Occupation	1. Do you know anyone who practises this occupation?	2. How many years have you known this person?	3. What is your relationship to this person?	4 What is your degree of intimacy with this person?	5. What is the sex of this person?	6. Person's occupation
Occupat. A						
Occupat. B						
Occupat. C						
etc.						

If you know more than one person, tell us about the one you have known the longest.

Note: list of occupations should be fairly long and open.

Source: Source: Adapted from Franke (2005)

Appendix 8: Resource Generator – Developed in the Netherlands by Snijders and van der Gaag

<p>I have here a list with a number of skills and resources. Does anyone in your family have those skills or resources? And how about your friends? Are there any acquaintances mastering these skills? With “acquaintance” I don’t mean the sales persons you meet when going out shopping, but somebody you would have a conversation with if you met him/her on the street, and whose name you know. I would also like to know if you yourself have these skills, or own these resources.</p> <p>Interviewer: Hand over the chart of “resources.” Begin by asking whether Ego knows a family member owning the resources or mastering the skill. If yes,</p>	<p>move on to the next question. If not, then ask about friends. Only if not, ask about knowing an acquaintance owning the resources or mastering the skill. If Ego says that somebody is both a family member and a friend, he or she should be counted as a family member.</p> <p>1. Do you know anyone who...</p> <ul style="list-style-type: none"> ..can repair a car, bike, etc. ...owns a car ...is handy repairing household equipment ...can speak and write a foreign language ...can work with a PC ...can play an instrument ...has knowledge of literature
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<p>...has an X education ...reads a professional journal ...is active in a political party ...owns shares for at least \$\$\$...works at the town hall ...earns more than \$\$\$ monthly ...own a holiday home abroad ...sometimes hires people ...knows a lot about governmental regulations ...has good contacts with a newspaper, or radio or TV station ...knows about soccer ...has knowledge about financial matters (e.g., taxes, subsidies)</p> <p>2. If you needed someone for one of the following subjects, is there anyone you can easily ask for help? Family, member, friend, acquaintance?</p> <p>a. Finding a holiday job for a family member b. Advice concerning a conflict at work c. Helping when moving house (packing, lifting) d. Helping with small jobs around the house (carpentry, painting) e. Doing your shopping when you (and your household members) are ill f. Giving medical advice when you are dissatisfied with your doctor g. Borrowing a large sum of money h. Providing a place to stay for a week if you have to leave your house temporarily i. Advice concerning a conflict with family members j. Discussing what political party you are going to vote for</p>	<p>k. Giving advice on matters of law (e.g., problems with landlord, boss, municipality) l. Giving a good reference when applying for a job m. Baby-sitting the children</p> <p>Perceptions of the Individual Social Network</p> <p>Note from the authors: The following questions are constructed to be used as personality covariates to explain distributions of social capital measures constructed from any of the preceding measurement instruments. As yet, we have not developed a standard for doing so, and we invite readers to respond with ideas.</p> <p>In our data for the Netherlands, the 18 questions below can be summarized in four principal components (explaining 40.1 percent of the total variance):</p> <ul style="list-style-type: none"> ✧ The desire for more social contacts or, conversely, satisfaction with the present network (items 8, 12, 14, and 15). ✧ Integration of different types of relationships in the network (items 3, 5, 7, and 16). ✧ Expectation and propensity to mobilize social resources (items 6, 9, 10, 11, and 18). ✧ Propensity to make new contacts (items 1, 2, 4, and 13). <p>To what extent do you agree with the following statements? (Strongly, agree, agree, disagree, strongly, disagree)</p> <p>1. Sometimes I do things for others while I</p>
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<p>don't feel like doing it.</p> <p>2. Other people often call on me for help.</p> <p>3. Most of my friends know each other</p> <p>4. On my friends' birthday parties there are many people I hardly know.</p> <p>5. My good friends also know my family members.</p> <p>6. At work I meet completely different people than during leisure time.</p> <p>7. My neighbours come to my birthday parties.</p> <p>8. My colleagues come to my birthday parties.</p> <p>9. I do not easily ask for help when I need it.</p>	<p>10. You can't expect your neighbours to help you with serious problems.</p> <p>11. You can't expect your colleagues to help you with serious problems.</p> <p>12. I would like to have more friends.</p> <p>13. I easily make contact with others.</p> <p>14. I would like to have more contact with my neighbours.</p> <p>15. I would like to have more contact with my colleagues.</p> <p>16. I send my neighbours Christmas and holiday cards.</p> <p>17. I have experienced being disappointed in placing</p> <p>18. Before I trust someone I have to be sure of his/her intentions.</p>
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Source: Adapted from Franke (2005) but can also be originally accessed at <http://gaag.home.xs4all.nl/work/>

Appendix 9: Name Generator/Interpreter – Version Adapted for the US General Social Survey on Social Networks

<p>From time to time, most people discuss important matters with other people. Looking back over the last six months, who are the people with whom you discussed matters important to you? Just tell me their first names or initials.</p> <p>NAME1</p> <p>NAME2</p> <p>NAME3.....</p> <p>BEGIN LOOP</p> <p>130. Please think about the relations between the people you just mentioned. Some of them may be total strangers in the sense that they wouldn't recognize each other if they bumped into each other on the street. Others may be especially close, as close or closer to each other as they are to you.</p> <ul style="list-style-type: none"> • First think about NAME1 and NAME2. a. Are (NAME) and (NAME) total strangers? b. Are they especially close? As close or closer to each other as they are to you. <p>131. (NAME) is male/female? Is that correct?</p> <p>132. Is (NAME) Asian, Black, Hispanic, White or something else?</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 50%;">Spouse</td> <td style="width: 50%;">Parent</td> </tr> <tr> <td>Sibling</td> <td>Child</td> </tr> <tr> <td>Other family</td> <td>Co-worker</td> </tr> <tr> <td>Member of group</td> <td>Neighbour</td> </tr> <tr> <td>Friend</td> <td>Advisor</td> </tr> <tr> <td>Other</td> <td></td> </tr> </table>	Spouse	Parent	Sibling	Child	Other family	Co-worker	Member of group	Neighbour	Friend	Advisor	Other		<p>133. Here is a list of some of the ways in which people are connected to each other. Some people can be connected to you in more than one way. For example, a man could be your brother and he may belong to your church and be your lawyer. When I read you a name, please tell me all of the ways that person is connected to you. How is (NAME) connected to you? What other ways?</p> <p>133a. Do you and (NAME) both belong to one or more of the same groups on this list? 133b. What is/are the group(s) you both belong to? (list)</p> <p>133c. Did you first meet (NAME) in one of these groups, or did you first meet somewhere else? Which one of the groups did you meet (NAME) in?</p> <p>134. How long have you known (NAME)?</p> <p>135. This card lists general levels of education. As far as you know, what is (NAME)'s highest level of education? Your best guess.</p> <p>136. How old is (NAME)? PROBE: Your best guess. 137. What is (NAME)'s religious preference? Is it Protestant, Catholic, Jewish, some other religion, or no religion? What is your best guess?</p>
Spouse	Parent												
Sibling	Child												
Other family	Co-worker												
Member of group	Neighbour												
Friend	Advisor												
Other													

Source: Source: Adapted from Franke (2005)

Appendix 10: Structured Interview Schedule

AN INTERVIEW SCHEDULE ON THE ROLE OF SOCIAL CAPITAL IN MALARIA CONTROL IN NYABONDO

Dear respondent, this questionnaire is meant to collect information that will enable us to investigate the role of social capital in malaria control in Nyabondo. Information generated from this study will be composed into a Masters thesis to be presented to JKUAT. Moreover, the outcome of this study may add to the monitoring and evaluation exercise of the BioVision Malaria Control Project, and may pinpoint intervention areas that need to be strengthened or modified. We will, therefore, be very much appreciative if you could respond to this questionnaire as accurately and truthfully as you can with your candid and frank opinion. You are assured of complete anonymity and confidentiality of any information you provide. This interview will last approximately one (1) hour. Thank you for accepting to respond.

Note: where there are boxes that correspond to a question, please tick or write a code in the appropriate box that corresponds to the choice(s) of answer(s) from the respondent.

Section A: Demographic Characteristics and Social factors

- A.1. Household code: GPS position:.....
- A.2. Respondent's name:
- A.3. How long (*in years*) have you lived in this village?
- A.4. Gender (*interviewer note*): Male [] Female []
- A.5. Marital status: Married [] Single [] Divorced [] Widowed []
- A.6. Your age (*in years*):..... Your partner's age (*in years*):
- A.7. Are you living in: Own house [] Inherited house [] Rented house [] Other.....
- A.8. Do you live with any of these? Partner(s) { } Children { } Extended family { }
Friends { } Others [*please specify*].....
- A.9. Have you heard about the School Health Clubs No(0) [] Yes(1) []
If Yes, are any of your children in School Health Clubs? No(0) [] Yes(1) [] If Yes; how many{ }
- A.10. Could you please indicate the number of years: you have been in school years
your partner has been in schoolyears

A.11. What is the main source of income for this household? Brick making [] Crop farming [] livestock rearing [] Wages/salary [] Pension [] Remittances [] Other[*please specify*]

A.12. Employment/occupation:.....

A.13. What is this household's current monthly income from all income sources (*in KSh*)?

Section B: General Knowledge of Malaria

B.1. Have you heard about/do you know malaria? No(0) [] Yes(1) []

B.1. What do you think is the cause of malaria? Mosquitoes/*plasmodium* [] Diets/foods [] Dirty water [] Spirits [] Environment [] Others [*please specify*]

B.1. Could you provide any symptom(s) of malaria you know?
.....
.....

B.1. Do you think some people are more vulnerable to malaria infection than others:
No(0)[] Yes(1)[] If Yes, who are most vulnerable?
Children below 5 [] Children from 5 to 12 [] Children from 13 to 17 []
Adults from 18 and 65 [] Older people [] Pregnant women [] Others

B.1. How do you generally go about learning new things (e.g. learning about malaria)?
Ask someone I know [] "Hands on"/learn by doing [] Ask an expert [] TV []
Read about it [] Take a class [] Radio [] Others [*please specify*]

Section C: Attitudes towards Malaria Control

C.1. In this village, are community activities such as *filling in and/or draining out stagnant water pools, etc.* organized to control malaria? No(0) [] Yes(1) [] Not aware(2) []

(b) If Yes, have you or other household members participated in such activities in the last 1 year? You: No(0) [] Yes(1) []
Other household member(s): No(0) [] Yes(1) [] How many others: { }

C.2. If the answer to question C1 above is Yes, how many times, in the past 12 months, have you personally joined together with others in this village to undertake such activity(ies){ }

C.3. In the past 12 months, have you or other household members attended any community event(s) in this village (*e.g. Malaria Day celebration*)? You: No(0) [] Yes(1) []
Other household member(s): No(0) [] Yes(1) [] How many others: { }

C.4. If the answer yes to question C6 is Yes, how many times, in the past 1 year, have you attended or helped to organise such community event(s) { }

C.5. Please indicate if you often conduct any of the activities in the table below in this household. Where the activity is implemented, please indicate if someone informed you about the activity; and the relationship(s) you have with such person(s)

Mosquito Control Activity	Is this activity currently implemented in the household to control mosquitoes 1=yes; 0=No	If yes, for how long has this household implemented the activity	How did you know about this intervention (Please apply codes on right)	Information source codes 1=Self 2=Family members (sharing the same house) 3=Family member (living outside household) 4=Close friends or intimates 5= Acquaintances or members of same village 6=member of same group/ association e.g. denomination, club, etc. 7=radio/TV 8=Mosquito scouts from ICIPE IVM project 9=Ministry of health officers 10=school children 11=village elder 12= Others (specify)
Drains gutters around house				
Sprays room with mosquito spray				
Uses plants as repellents				
Screens of windows & doors				
clears bushes				
Dispose containers, bottles, tins, etc. properly				
Use ITNs				
Use IRS				
Others(specify)				

C.6. If you own ITNs in this household, who uses it/them? You [] My partner []
Children under 5 years [] Children above 5 years [] Others [please specify]

- C.7. In the last 12 months (01 year), have you or any member of this household suffered from malaria? You: No(0) [] Yes(1) []
 Other household member(s): No(0) [] Yes(1) [] If Yes; how many others: { }
- C.8. If Yes to C7, how did you know that the disease was malaria? I self-diagnosed []
 My school going child told me [] A “Mosquito Scout”/MOCON told me []
 A pharmacist/drug seller in a private clinic or drug store diagnosed it []
 A doctor/nurse in a public Hospital diagnosed it [] A staff of ICIPE helped me to
 diagnose it [] Other [*please specify*].....
- C.9. Where did you or that member of this household 1st seek treatment from: Self treated []
 Hospital/clinic [] Pharmacy or drug store [] Other.....
- C.10. Did you get well/healed after seeking treatment from the above source? Yes(1) []
 No(0) [] If No, where was the next line of treatment (if any) sought from? Self treated []
 Hospital/clinic [] Pharmacy or drug store [] Other
- C.11. Do members of this household have health insurance? You: No(0) [] Yes(1) []
 Other family member(s): No(0) [] Yes(1) [] How many others are insured: { }
- C.12. Which among these is nearest to your house? Hospital/clinic [] Pharmacy or drug
 store [] Others [*please specify*]
- C.13. What is the distance from your house to the health facility mentioned in C12? m/km

Section D: Social Network Features and their Influence on Malaria Control

D.1. Please indicate if you know any person in the categories listed below; the number you know in each; the type of relationship you have with the individual(s); and the type of malaria-related information, if any, you have received from any of them in the past 1 year

Categories of People	How many	Relatio	Malaria information	<i>Information type code</i> 1= causes of malaria 2= symptoms of malaria 3= treatment of malaria 4=ITN use/reimpregnation 5=environmental management 6=Indoor Residual Spraying (IRS) 7= please specify any others
Member(s) of School Health Club				<i>Relationship type codes</i> 1=Family members (sharing the same house) 2=Family member (living outside household) 3=Close friends 4= Acquaintances or members of same village 5=member of same network/ group/ association e.g. religious denomination, club, etc. 7=others
Staff of ICIPE				
“Malaria Scout” MOCON				
Pharmacist/drug seller				
Medical staff of Hospital/clinic				
Others [maximum 3]				

D.2. On a scale of 0 to 5 (where 0= no influence and 5 = highly influenced) from the table below

Please indicate the extent to which the information you received on malaria from the people/groups cited in D1:	Level of influence/ contribution					
	0	1	2	3	4	5
a) influenced your decision to use, or not to use, ITN						
b) influenced your decision to, or not to, participate in community activities like <i>filling of abandoned clay-making pits, draining of stagnant water pools, etc.</i>						
c) influenced your decision to diagnose the disease through the means you used						
d) influenced your decision to seek treatment from the source(s) stated above						

D.3. Could you name and indicate the relationship between you and any 3 individual(s), if any, who have personally approached you during the last 12 months (01 year) and asked you to join hands to address a common issue like *filling in and/or draining out stagnant water pools, etc. to control malaria?*

Individuals	Surname	Relationship with respondent	<i>Note: Please apply the Relationship codes from Quest. D1 above</i>
1 st person			
2 nd person			
3 rd person			

D.4. Do you have any personal relationship with the person who offered you or the household member(s) the malaria treatment in C9 when you suffered from the disease? No(0) [] Yes(1) [] If Yes, what is/was the relationship between you and that person [*please apply **Relationship codes** in Quest. D1 above*]

D.5. Apart from members of your household, do you know any person(s) who used ITN before you? No(0) [] Yes(1) [] If Yes, how many are they { }; and what relationship do you have with each of them [*please apply **Relationship codes** in Quest.D1above*]

D.6. Apart from members of your household, do you know any person(s) who have suffered from malaria in the past 12 months (01 year)? No(0) [] Yes(1) [] If Yes, how many are they { }
 What relationship do you have with each of these persons [*please apply **Relationship codes** in Quest. D1 above*]
 Where did these person(s) seek treatment from? Self-treated [] Hospital/clinic [] Pharmacy or drug store [] Other.....

Section E: Group Membership, Social Cohesion and their Influence on Malaria Control

E.1. To what extent do you feel close to this village or other people in this village?
 (no closeness) 0 1 2 3 4 5 (extremely close)

E.1. How would you rate the level of harmony/peace in this village or among the people in this village (conflictive or no harmony) 0 1 2 3 4 5 (very harmonious/peaceful)

E.1. In case a conflict developed between you and your neighbor or any member of this village, is there any place(s)/person(s) you could turn to for resolution? No(0) [] Yes(1) []

E.1. If Yes, where/who will you turn to? [*Please name/indicate as many as exist*]

.....

E.1. For each of the community groups below, please indicate in the appropriate column the number of such groups that exist in this village. Where the group exists, show if you or any member of your household are active members; the number who are active members; and whether/not you discuss issues related to malaria as a group and among individual members of the groups. For each group that you belong, also indicate the number of times you attended group meeting within the last 12 months (01 year) (*Please enter: 1= Yes; 0= No, where appropriate*)

Group/Organizations	Number existing	Membership		Malaria information shared	Number of meetings attended in last
		You	household members		
'Malaria scouts' MOCON					
School Health clubs					
Religious					
Village development					
Cooperatives (agriculture, village <i>sacco</i> , brick-making,					
Parent-teacher associations					
Health committees/associations					
Youth/sports groups					
Cultural groups					
Civic/political groups					
All others (<i>specify</i>)					

E.1. On a scale of 0 to 5 (where 0= no influence and 5 = highly influenced) from the table below

Please indicate the extent to which you think that your membership in the groups in E.4. above, in any way:	Level of influence/contrib				
	1	2	3	4	5
a) influenced your decision to use, or not to use, ITN					
b) influenced your decision to, or not to, participate in community activities like <i>filling of abandoned brick-making pits, draining of stagnant water pools, etc.</i>					
c) influenced your decision to diagnose malaria using the aforementioned means of diagnosis					
d) influenced your decision to seek treatment from the source(s) indicated above					
e) influenced your decision to use, or not to use, IRS					

Section F: Norms, Beliefs & Values and Their Influence on Malaria Control

If any member of this household uses an ITN, please answer F.1. If not, please skip to F.2.

F.1. Please tick the extent to which you agree/disagree with each of the following statements
[where: sA=strongly Agree; A=Agree; N= neither Agree nor Disagree; Disagree; strongly Disagree]

Statement: I and/or other member(s) of my household used/uses an ITN because:	Level of Agreement				
	sA	A	N	D	sD
using an ITN is a standard practice in my family/household					
most of my friends also use ITNs					
it is a standard practice in the group/association I belong to					
it is a standard practice in this village					
The aforementioned household member(s) is/are the one(s) who use(s) ITN(s) because:	sA	A	N	D	sD
a) in my family/household, these are believed to be those most entitled to ITNs					
b) in my friends' households, these are the people who often use ITNs					
c) in the group/association I belong to, these are believed to be those most entitled to ITNs					
d) in this village, these are believed to be those most entitled to ITNs					

F.2. Please tick the extent to which you agree/disagree with each of the following statements

Statement: We don't use ITNs in this household because:	Level of Agreement				
	sA	A	N	D	sD
a) using ITN is not a standard practice in my family/household					
b) most of my friends also don't use ITNs					
c) it is not a standard practice in the group/association I belong to					
d) ITN use is not a standard practice in this village					
e) this household does not pay attention to what others do					

If this household uses IRS, please answer F.3. If not, please skip to F.4.

F.3. Please tick the extent to which you agree/disagree with each of the following statements
 [where: sA=strongly Agree; A=Agree; N= neither Agree nor Disagree; D=Disagree;
 strongly Disagree]

Statement: This household uses IRS because:	Level of Agreement				
	sA	A	N	D	sD
a) using IRS is a standard practice in my family/household					
b) most of my friends also use IRS					
c) it is a standard practice in the group/association I belong to					
d) it is a standard practice in this village					

F.4. Please tick the extent to which you agree/disagree with each of the following statements

Statement: We don't use IRS in this household because:	Level of Agreement				
	sA	A	N	D	sD
a) using IRS is not a standard practice in my family/household					
b) most of my friends also don't use IRS					
c) it is not a standard practice in the group/association I belong to					
d) IRS use is not a standard practice in this village					
e) this household does not pay attention to what others do					

F.5. If a community project (*e.g. a project to fill in and/or drain out stagnant water pools, etc. to control malaria*) does not directly benefit your neighbors but has benefits for others in this village, do you think your neighbors would contribute time for this project?

No(0) [] Yes(1) []

F.6. Please indicate the extent to which you feel that people in this village help one another?
 (Not at all) 0 1 2 3 4 5 (to a great deal)

F.7. Please tick the extent to which you agree/disagree with each of the following statements
(refer to C1b)

Statement:	Level of Agreement				
	sA	A	N	D	sD
I participated in the community activities (like filling in abandoned brick-making pits, draining of stagnant water pools, etc.) because:					
a) participation in community activities is a standard					
b) my friends also participate in these community activities					
c) it is a standard practice in the group/association I belong					
d) it is a standard practice in this village					
e) I was given money/food					

F.8. Please tick the extent to which you agree/disagree with each of the following statements
(refer to C8)

Statement:	Level of Agreement				
	sA	A	N	D	sD
I diagnosed malaria through the means cited above because:					
this means of diagnosis is a standard practice in my family/household					
this is the usual means of diagnosis among my friends					
it is the standard means in the group/association I belong to					
it is the standard way of malaria diagnosis in this village					
I sought treatment from the source cited above because:	sA	A	N	D	sD
this is the usual source of treatment in my family/household					
this is the usual source of treatment among my friends					
it is a standard source of treatment in the group/association I belong to					
it is a standard source of treatment in this village					

Section G: Trust and Its Influence on Malaria Control

G.1. Do you think most people in this village would try to take advantage of you if they got a chance, or they would try to be fair? They will take advantage of me [] They will try to be fair []

G.2. Do you think in this village, people generally trust others in matters of malaria treatment and that; they consult one another when trying to treat malaria? No(0) [] Yes(1) []

Appendix 11: Cronbach's Alpha for Scaled Social Capital Items on the Study instrument

Items/Variables	Cronbach's	Number of Items
Social network variables	0.93	8
Social norms variables	0.81	24
Social cohesion variables	0.74	2
All social capital variables	0.83	33

Appendix 12: Pattern Matrix for Principal Components Derived from Social Cohesion Factor Analysis

Social Cohesion Indicators	Origin/ Nomenclature	Component			
		1	2	3	4
People's perceived level of harmony in the village	Individually -based cohesion	0.83	-0.21	0.10	-0.14
Extent to which people feel close to their village		0.78	-0.06	0.10	-0.21
Number of religious groups that exist in the village		0.63	0.21	-0.09	0.26
Number of cooperatives that exist in the village		0.59	0.08	-0.21	0.25
Number of PTA that exist in the village	Village- induced cohesion	0.03	0.75	0.20	-0.19
Number of health committees that exist in the village		0.01	0.72	0.03	-0.04
Number of village development committees that exist		-0.11	0.72	-0.10	0.08
Number of MOCON that exist in the village	Externally- influenced cohesion	-0.02	-0.20	0.72	0.20
Number of civic/political groups that exist		-0.08	0.15	0.68	0.03
Number of SHC that exist in the village		0.16	0.23	0.51	0.08
Existence of institutions of conflict resolution in the village	Conflict resolution- related	-0.03	-0.09	0.19	0.91

Note: Extraction Method: PCA; Rotation Method: Promax with Kaiser Normalization.

Appendix 13: Structure Matrix for Principal Components Derived from Social Cohesion Factor Analysis

Social Cohesion Indicators	Origin/ Nomenclatur	Component			
		1	2	3	4
Level of perceived harmony/peace in the village	Individually- based cohesion	0.81	-0.20	0.06	-0.11
Extent to which people feel close to their village		0.75	-0.06	0.09	-0.18
Number of religious groups that exist in the village		0.66	0.23	-0.18	0.34
Number of cooperatives that exist in the village		0.63	0.10	-0.30	0.35
Number of PTA that exist in the village	Village- induced cohesion	0.01	0.74	0.29	-0.17
Number of health committees that exist in the village		0.01	0.72	0.09	0.02
Number of village development committees that exist		-0.08	0.72	-0.07	0.15
Number of civic/political groups that exist in the village	Externally- influenced cohesion	-0.13	0.20	0.69	-0.12
Number of MOCON that exist in the village		-0.05	-0.14	0.67	0.02
Number of SHC that exist in the village		0.13	0.28	0.50	0.00
Existence of institutions of conflict resolution in the village	conflict resolution- related	0.03	0.01	-0.01	0.86

Note: Extraction Method: PCA; Rotation Method: Promax with Kaiser Normalization.

Appendix 14: A Work Plan/Work Breakdown Structure (WBS) for the Thesis

Stage of Study	Activities	Responsibility	Source of Funding	Time* (days)	Budget (KeS)
Planning for the study	Deciding on a topic & study area	ICIPE	Student	1	500
	Clarifying the research problem & refining the topic	ICIPE & student	Student	1	1,000
	Developing research questions, objectives & hypothesis, defining study scope, assumptions & limitations	Student	Student	2	500
	Information sourcing & literature review	Student	Student	40 & conts.	90,000
	Planning for methodological design & instrumentation, & estimating resources	Student	Student	2	500
	Establishing study & target populations; determining sample size & developing a sampling technique	ICIPE & student	Student	3	1,000
	Proposal writing, presenting, submission	Student	Student	8 + 1	5,000
	Designing of interview schedule and interview guides	Student	Student	12	500
	Designing of data entry & management systems	Student	Student	4	500
	Staffing & training of enumerators	ICIPE & student	ICIPE	4	??
Pilot study	*Pilot data collection & analysis	Student	ICIPE	18	-
	Review & modification of instruments	Student & supervisors	Student	3	1,000
Implementation stage	Sampling & data collection	Data collection team	ICIPE	40	??
	Data entry, management, storage & archiving	Student	Student	80	78,680
	Data analysis & interpretation	Student	Student	15	1,000
Outputs	Drafting of thesis	Student	Student	7	-
	Reviews & comments	Supervisors & School	Student	21 +++	6,000
	Publication	Student & supervisors	Student	60	120,000
	External examination	External examiners	University	??	??
	Packaging & submission of thesis	Student	Student	15	11,000
Miscellaneous	Others	Student	Student	-	10,000
Grand Total		-	-	206 & ??	327,180++

Note: * = Effective time starts from 1st July, 2013 “??” = item is unknown +1 = 2nd proposal presentation at ICIPE

Appendix 15: A GANNT Chart Displaying Activities and Schedules for the Thesis

Activities	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
Planning & literature review	49	Throughout										
Proposal writing & presentation		9										
Designing of data collection & management instruments			1 6									
Staffing & enumerators training			4									
Pilot study				21								
Sampling & data collection				40								
Data entry, management, storage & archiving					40							
Analysis, interpretation & discussion						20						
Drafting of thesis							7					
Supervisors' reviews		21										
Publication								60				
External examination of thesis									??			
Thesis defence & corrections										18		
Packaging & submission of thesis											7	