Social connections and primary health care: Evidence from Kenya

Josephine Gakii*
University of Gothenburg

May 15, 2017

Abstract

Access and utilization of health services remains low in developing countries despite the documented benefits to health. This paper analyses the local political economy of the health sector which has so far gained very little attention. Particularly, I examine whether social connections between households and locally instituted health care providers affects the number of health care visits and access to essential antimalarial drugs. I also examine how access to health care and social connections affect household health seeking behaviour. I find that households that have strong social connections to the local health care providers within a community get more health care visits and are more likely to receive health commodities for free. The results further suggest that households that get more visits have better health seeking behavior in terms of testing for malaria and complying with the antimalarial treatment regime. However, kin are less likely to comply with the treatment regime compared to non-kin. Evidence suggests that local health care providers fair behavior is influenced by the amount of compensation they get.

Keywords: social connections, visits, bribe, health seeking behavior
JEL Codes: I11,I18

*E-mail address:josephine.gakii@economics.gu.se

1 Introduction

Access to adequate health care is recognized as a fundamental human right in Article 25 of the universal Declaration of Human rights. Yet, health service delivery in Africa and other developing countries has often remained poor or nonexistent. Poor health and corruption in the health sector coupled with a growing disease burden have persisted (see Sachs (2001)). The bulk of research has focused on identifying the effect of price, liquidity constraints and information on access to primary health care and health seeking behavior (see Banerjee et al. (2004); Ashraf et al. (2010); Cohen and Dupas (2010); Cutler and Lleras-Muney (2010)). Few studies have analyzed the effect of social connections on delivery of health care and how they affect peoples' health seeking behavior. In this paper, I assess the role of social connections in provision of primary health care, where locally instituted people have the power to provide primary health care services, in kenya.

Alesina and La Ferrara (2000) show that an homogenous population (defined as being of the same race/ethnicity and very low levels of income inequality) has a higher level of social interactions which leads to more social capital. In addition, evidence shows that communities and individuals in a community work together for the benefit of their community (see Caria et al. (2014)). This insights provide support for economists (e.g. Sen and Ostrom) who argument for a more bottom-up and deliberative vision of development that allows the "common sense" and "social capital" of communities to play a central part in decisions that affect them (Mansuri and Rao (2012). The premise is that community based development relies on communities to use their social capital to organize themselves and participate in development process. Yet, little has been done in this area regarding the direct effects of social connections on public service provision in an homogenous setting. The extent to which social connections can influence service provision in such a setting, moreso in a developing country context is far from obvious.

Decentralisation in health care by empowering local communities to take charge of primary health service provision has received growing attention from international organizations, donor governments and many developing countries as part of a broad and global program to improve service delivery (see WHO et al. (2006)). In the present paper, I focus on the social connections between Community Health Workers (CHWs) and members of the community in a decentralised health care system, and how these connections affect health service provision. CHWs are lay members of the community, who get training on preventive and curative health care from professional health personnel, which they then offer to the

community[1] [2]. In such a community setting, social connections can be defined as being a relative, close friend, acquaintance or simply someone with no relation to the CHW. Being a relative or close friend constitutes a strong social tie while acquaintances and those with no close relation constitutes a weak tie.[3]. Health service provision is measured by access to health care measured by number of health care visits, and access to health products. Whether the existing social connections within the community will influence provision of health services provided by CHWs is an open question.

To evaluate the effect of social connections on household access to primary health care, I use cross section data from a field survey on randomly selected households, and data from a field survey on CHWs in rural Kenya. I estimate the effect of social connections on delivery of health care by looking at health care visits made to households by the CHW and access to antimalarial drugs by households. I also present estimates of household health seeking behavior. To assess health seeking behavior, I specifically look at health behavior related to malaria treatment. This is because malaria accounts for a high burden of disease globally and moreso in sub saharan Africa[4]. Treatment of malaria is therefore central to limiting the spread of malaria.

Evidence on how existing social connections within the community contribute to different outcomes is still scarce. To the best of my knowledge, there is no existing empirical study that investigates the effects of social connections in an homogenous setting (herein defined by ethnicity) and its effect on public service provision and I seek to contribute to such literature. Additionally, I look at both the supply (provision of primary health care) and demand (health seeking behavior) side of health care which has not been previously explored. I also contribute to the ongoing debate on treatment of malaria where consumption of antimalarial drugs creates a tradeoff between targeting (ensuring only true malaria cases get treated with antimalarial drugs) and effectiveness(ability of antimalarial drugs to cure malaria)[5], where I examine the effect of CHWs on household health seeking behavior towards malaria

[1]The World Health Organisations view of CHWs is that:"Community health workers should be members of the communities where they work, should be selected by the communities, should be answerable to the communities for their activities, should be supported by the health system but not necessarily a part of its organization, and have shorter training than professional health workers".

[2]CHWs are present in many developing countries (For example Kenya, Ethiopia, Mozambique, Uganda, Rwanda, Burkina Faso and Tanzania.)

[3]See Granovetter (1973) for a distinction between strong and weak ties.

[4]The global incidence of malaria is estimated at 350 to 500 million clinical cases anually, resulting to 1.5 to 2.7 million deaths each year in sub-saharan Africa and parts of Asia (WHO et al. (2000)). In Kenya, malaria is the leading cause of morbidity and accounts for 19% of hospital admissions and between 30-50 % of outpatient cases in public health institutions (Kioko et al. (2013))

[5]See, for example, Cohen and Dupas (2010).

treatment. Finally, although many developing countries including Sub-Saharan Africa have embraced CHWs as a mode of health care provision, there is a dearth of evidence in regard to their nature of interaction with members of the community. This paper also sheds light on this issue.

Results show that, after controlling for all important household characteristics and for village fixed effects, households that are relatives with the CHW on average get 2 more visits than non-relative households. On the other hand, households related to a CHW are 12 percentage points more likely to receive the essential antimalarial drugs for free compared to non-relative households. Further investigation on visits seem to confirm that households that get one more health care visits are 3 percentage points more likely to test for malaria and 8 percentage points more likely to complete the antimalarial treatment regime compared to those who get less visits. In addition, health seeking behavior of relatives and non-relatives does not differ in testing for malaria, but differs in completing the dosage, where non-relatives are more likely than relatives to complete the recommended dosage.

The remainder of the paper is organized as follows. Section 2 gives a brief discussion on social connections. Section 3 explains the Community Health Worker Intervention. Section 4 discusses the data and variables. Section 5 discusses the empirical and identification strategy used to identify the effects of social connections on access to health; and the health seeking behavior of households. Section 6 discusses the results.Section 7 discusses robustness tests and Section 8 concludes.

2 Social connections literature

My work links a large literature on access to health care with a growing literature on the role of social connections in economics. The literature on social connections has identified two opposing arguments. One argument in favor of social connections states that social connections are associated with positive outcomes. With real world settings being characterised by imperfect information,social ties can provide an individual or institution with useful information about opportunities and rights otherwise not available.In the first strand of literature, social ties can affect outcomes through their role in information transmission. In a study on the labour market, Myers and Shultz (1976) interview textile workers and asked how they had heard about their jobs. They find that 62 percent had found out about and applied to their first job through a social contact, in contrast with only 23 percent who applied by direct application, and the remaining 15 percent who found their job through an agency, advertisement, or other means. Economists have argued that connections are important in the labor

market because of market imperfections, such as firms' difficulties in screening applicants Montgomery (1991). Similarly, Lin (2002) shows that in real labour markets, employers and employees prefer to learn about one another from personal source whose information they trust. Social relationships can also serve as important vectors through which individuals learn about, and adopt, new technologies.

Other evidence from security markets indicates that connections between mutual funds managers and corporate board members through shared educational backgrounds leads to better decision making. For example, Cohen et al. (2008) study trading decisions of mutual fund portfolio managers in firms that have senior officials who share a common education background and those that do not. They find that fund managers make more investments in companies where they have connections through an education network and perform significantly better on these connected positions than unconnected positions. This happens because mutual fund managers are able to tap superior investment information that is privy to senior officials when they are connected.

Furthermore, Devillanova (2008) using data on undocumented immigrants in Italy, shows that immigrants who rely on a strong social tie (relative or friend) to get information on the existence of primary health care services visits take a shorter time to visit the primary health care compared to those who get information from weaker social ties (acquaintances). In contrast, Granovetter (2005) shows that more novel information flows to individuals through weak than through strong social ties. The reason being close friends tend to have complete information which is similar to all of them, and acquaintaces on the other hand have other friends who are not in the close friends circles, and thus are more likely to receive more novel information.

Imperfections in the credit markets due to the absence of or limitations in insurance markets as well as imperfect enforcement may deter people from taking up loans due to the risk of high default costs. Social ties can act as an insurance mechanism for potential borrowers where they offer each other collateral for their savings. Using data from participants in a village banking lending from 1998 to 2000 in Peru, Karlan (2007) examines the link between socially connected[6] individuals' amount of savings and loan repayments rates. The study finds that individuals with stronger social connections to their fellow groups have higher repayment and savings. At the macroeconomic level, Burchardi and Hassan (2013) show that personal relationships which are formed between individuals for noneconomic reasons can be important for economic reasons such as regional economic growth. Using household-

[6]Defines social connections as living closer or being of a similar culture

level data, the study shows that households in West Germany that had close social ties with households in East Germany before the fall of berlin wall in 1989 experienced a significant increase in the growth rate of their personal income after the fall of the Berlin wall.

Another argument which is closely related to our study points to social connections as generating favoritism that leads to unequal outcomes for individuals and institutions.[7] Tarp and Markussen (2014), examine the potential effect of family ties between farmers and local government officials on investment in agricultural land improvements. Using panel data from rural areas in vietnam, they find that households with connections increase their investment in land improvement compared to those with no connections. Closest to our work is a study by Bandiera et al. (2009) who explore how the relationship between managers and workers may affect the productivity levels of individuals and firms. They use data from a firm in UK to examine the social connections between workers and managers and the effect of these relationship on individual productivity and the firms overall performance. In their study, a manager and a worker are social connected if they share the same nationality or are neighbors or arrived at the firm at a similar time. They find that when managers are paid fixed wages, the productivity of a given worker is 9 percentage points higher when he is socially connected to his manager,relative to when he is not. They also find that when managers are paid bonuses that are tied to the average productivity of workers they manage, being socially connected to a manager has no effect on workers' productivity.

Similarly, Colussi (2015) using difference in difference method measures the causal effect of connections between authors and editors on articles' selection in economic journals and their quality. He describes and author and an editor as being connected if they ever worked in the same institution; if they received their PhD from the same university in the same years;if the editor was one of the PhD advisors of the author; and if the author has ever co-authored at least one paper with the editor. The author looks at the academic histories of all scholars that published at least one article, or served as editor,in the top four general interest journals in economics between 2000 and 2006. The author finds that the existence of a social tie with an editor positively affects scholars' publication outcomes in that editors tend to publish papers of scholars working in the same institution and former graduate students.

Although there is a large literature on social connections, there is a paucity of work that provides explanations of how social connections affects public service delivery. Most of the economic literature on social relations is at the firm level with very little addressing the social relations between households and the local leaders. I add to this list by exploring social

[7] Becker (1971) describes favoritism as being driven by a 'taste of discrimination'.

ties between households and locally elected health workers, and in doing so, I identify how social connections between health workers and households affects the health workers decision to provide health care to households in an homogenous setting. In this paper, homogenous refers to a community with same ethnicity and of a similar culture. Directly exploring the role of social connections and its influence in health care is relatively a new development in the health literature.

3 Community Health Worker Policy in Kenya

In 2005, the National Health Sector Strategic Plan in Kenya (NHSSP II-2005-2010) introduced a health reform that defined the delivery of health care services.This reform was known as the Kenya Essential Package for Health (KEPH). At this time, health care delivery was delivered in 5 levels: the tertiary hospitals; secondary hospitals; primary hospitals; health centers, maternities, nursing homes; and dispensaries/clinics. The tertiary hospitals represented the highest level (5) which include the national and referral hospitals while the lowest level (1) were the dispensaries/clinics. The reform introduced the community (villages/Households) as the new level in the health care delivery. This meant that the the health system would now have 6 levels, with the community being the lowest level (1). The primary aim of the reform was to enhance community access to health care by providing affordable, equitable and effective health care by empowering households and communities to take charge of improving their own health.

For the community level to be functional, it required the introduction of Community Health Workers (CHWs). CHWs are lay members of the community who offer health care services to the local population and act as an interface between the community and the dispensary/clinic[8] (level 2). The eligibility criteria for one to become a CHW in the community is that they should be able to read and write in English or Kiswahili,[9] and willing to work as volunteers.The steps for becoming a CHW are as follows: first, one or more potential CHWs express their interest to serve the community; second, the local administrative leaders (chiefs) in conjuction with the link dispensary/ clinic recommend these potential candidates to the community and third, the community decides whether they want to be served by

[8]Referred to as the link dispensary/facility

[9]These are the official languages in Kenya.

those candidates through a voting process[10,11,12]. Once a CHW gets elected in the village, the local administrative leaders together with the link dispensary allocate households within that village to the CHW. Ideally, the community (village) is divided into sections and all households in a particular section are under the responsibility of one CHW. It may be possible that a CHW can influence the allocation of households but it would be difficult since the sub divisions of households in a village continues upto a point where they have an optimal number of CHWs per village.Thereby making it difficult for the CHW to keep changing the selection of household. For example, if there are four CHWs in a village, the village is divided into 4 sections using boundaries and each CHW is allocated to a given section. Since the aim of the CHW policy is to have each CHW serving 10 households, the process of reallocation continues upto a point where this is achieved. Therefore whether to increase or decrease the number of households served by a particular CHW is at the discretion of the local administrative leaders and link dispensary representatives. When a CHW ceases to being a CHW, either voluntarily or involuntarily, their place is filled by another village member through an election or appointment. Although CHWs volunteer to offer services to the community, some of them receive compensation but this depends on the availability of funds at the link dispensary.

CHWs provide preventive/ promotive health care but some provide curative services as well. The duties performed by CHWs are; a) treatment of malaria and Provision of Long Lasting Insecticide Treated Nets (LLITNs) b) provision of information on Water and sanitation hygiene, c) advise on maternal and child health, d)provide Family planning commodities, e)growth monitoring for children under 5 years, f) deworming of children, g) management of diarrhea, injuries, wounds, jiggers and other minor illnesses, h)provision of Information, Education & Communication (IEC) materials, i) defaulter tracing (ART, TB and Immunization), j) referrals to health facilities and k)first Aid Services[13]. For CHWs to perform their tasks, they receive health care training from health care professionals and get re-training from time to time. A CHW is required to make at least one mandatory visit per month to each of the households allocated and offer the health care services. CHWs in the same village

[10]From discussions held with the local administrative leaders, the decision on whether or not a candidate has been voted or not follows the majority rule. However, there is no clear cut threshold of what defines the majority.

[11]Election by villagers does not always happen. For example,during the survey, I learnt that CHWs are sometimes appointed by the local leaders in conjuction with the link dispensary instead of being elected by the local community.

[12]The link health facility informs local administrative leaders of when they can make an announcement calling for volunteer CHWs.This announcement is usually informed by the scheduled training programmes for CHWs. The announcements cease being made once the village has attained the targeted number of CHWs

[13](www.hsrs.health.go.ke).

focus on their assigned households and work independently of each other. Each CHW has the discretion of choosing which households to visit in a given day and the number of times to visit these households in a month[14].

Essentially the introduction of CHWs is expected to lower the cost of primary health care, increase access to health care and health knowledge of households. First, distance travelled to get primary health care is reduced because people do not have to make any travel, instead CHWs make visits to the households and provide the necessary health care services. This saves both travel cost and waiting time that would otherwise have been incurred if CHWs were not present. Second, some essential drugs such as antimalarial drugs are freely given to those suffering ill health from malaria. This means that households do not have to incur user fees for treatment hence a decrease in cost of primary health care. Finally, provision of primary health care by CHWs through direct motivation of behavior change is expected to improve the overall health knowledge possessed by households in addition to a change in health seeking behavior. Due to this change in relative costs and a supply driven intervention, one would expect provision of primary health care to increase for all households due to reduced barriers to access to health care. The success of the CHW intervention will therefore depend on the quantity and quality of health care services a CHW decides to offer to households.

4 Data

4.1 *Setting*

The data for this study are drawn from a cross section survey conducted in Kisumu and Kericho counties in Kenya between February and March 2016. Kisumu and Kericho are in Nyanza and Rift valley regions of Kenya respectively. Each of these regions has a distinct malaria pattern and ethnicity. In Kisumu, malaria transmission occurs all year round (endemic) while in Kericho, malaria does not occur all year (epidemic). Kisumu county has a 47.6 percent rural population while Kericho county has 61.3 percent compared to a national average of about 67.7 percent (Data (2014)). The poverty incidence in Kisumu is 39.9 percent while that of Kericho is 39.3 percent compared to a national average of 45

[14] A separate group of individuals, called Community Health Extension Workers (CHEWs) who are medical personnel, and are attached to the link dispensary are responsible for monitoring the CHWs activities. They do not themselves perform the CHWs duties. Discussions with the CHEWs revealed that the monitoring is weak due to the poor institution structures. This is also confirmed by CHWs where about 98% reported that the are not actively monitored in the field. Instead, the link facilities rely on the monthly quarterly reports which they present and no verification is done thereafter.

percent. The dependency ratio of kisumu and kericho are both 0.9 compared to the national average of 0.87[15] (see Njonjo (2013)). I then chose 2 divisions from each of these counties-Nyando division in Kisumu and SOIN division in Kericho which are close to one another by boundary as our study population. A total of 38 villages were randomly selected from the two divisions. Details on the sampling strategy (Table A.1) and a map of the study area (Figure A.1) are given in Appendix A.

The data used for this study comes from 2 original surveys designed by the author; a household survey, containing data on malaria and CHW activities; and a CHW survey, containing data on CHW activities. A list of households from each of the sampled villages was got from the chiefs (local leaders) and 20 households were randomly selected from each village list. A total of 767 households from 38 villages were interviewed. If for some reason a randomly selected household was not eligible for participation in the survey (e.g. a household has only children who are supported by relatives) replacement of that household with the immediate next household was done. In the study, one such case was encountered. For the purpose of this study I sought to interview household/spouse who are more involved in the health issues of their households and are therefore best placed to respond to a health related questionnaire. In most cases these people are women and thus in our sample only 27% of the respondents are male.

All CHWs in the sampled villages in both regions were eligible for interviews. In the epidemic region, of the 128 eligible CHWs, only 122 were interviewed (95% response rate) while in the endemic region, of the 158 eligible CHWs, only 144 were interviewed (91% response rate). I then match the household survey to the CHW survey by matching each household with the CHW responsible for their health care needs. In the end, 722 (94%) of the households were matched with 249 (93%) CHWs. The unmatched households (45) were served by some of the CHWs that were not interviewed. In addition, 17 CHWs were not matched because none of the households they serve was sampled. A team of thirteen trained enumerators asked households a number of detailed questions in Kipsigis and Dholuo (the local languages). All interviewers underwent a 3 day training, including multiple group sessions to ensure consistency in asking questions and interpretation of responses.

4.2 *Variables*

I use two variables as my principal measure of access to primary health care. The first is a measure of physical access that measures the number of visits (*VISITS*) a CHW makes to

[15] Number of people below 15 and above 64 divided by the number of people between 15 and 64.

a household to provide primary health care. VISITS have previously been used in economic literature on health service demand (see Deri (2005) Hollard and Sene (2016)). In contrast to these literature which looks at visits to a health care provider (demand), this study instead looks at visits made by a health care provider (supply) as the main outcome variable. In the data, three types of visits are measured: those initiated by the CHW (*SUPPLY VISITS*) and those initiated by the household (*DEMAND VISITS*) and social visits between the CHW and the household. Central to this analysis are the SUPPLY VISITS, which are visits that a CHW is expected to make to each of the allocated household[16]. The question asked "*How many health care visits did (name) make to your household the last 3 months without you requesting for the visit*?" DEMAND VISITS are the visits requested by households when need arises. For example, a household may experience ill health and would require the services of a CHW. Both the demand and social visits questions were asked to enable the respondent reflect and give a more accurate response to each question. The health care visits provided by the CHWs are freely provided.

In the treatment of malaria, antimalarial drugs are meant to be freely provided by CHWs as part of the Government policy on free provision of antimalarial drugs. Therefore, the second measure of access is meant to capture the likelihood that a household will get antimalarial drugs for free. In the data, not all households report to have received the antimalarial drugs for free. Therefore, any form of payment by households to CHWs for health services received is a form of corruption[17]. This form of corruption is petty since the sums of money involved are small[18]. This outcome variable (*FREE_ACCESS*), measuring corruption was asked in the middle of the interview when the enumerator(s) had presumably established credibility and trust from the households. In addition, enumerators were trained on how to ask the question without raising suspicion from the households. Households were well aware that the antimalarial drugs should be freely provided and they generally disliked that they had to pay for the drugs.

Social relationships in a community setting are very hard to measure since a community is referred to as some sort of social capital (see Durlauf and Fafchamps (2004)). In order to identify the role of social connections in influencing household access to health care, I exploit

[16]CHWs are expected to make at least one mandatory monthly visit to each alloctaed household.

[17]Svensson (2005) defines corruption as "the misuse of public office for private gain" while Shleifer and Vishny (1993) define corruption as "the sale by government officials of government property for personal gain".

[18]Petty corruption involves relatively small sums of money or exchanges betwen street-level bureaucrats and ordinary citizens (see Jancsics (2013)).In the study area a complete treatment regime of antimalarial drug sells between $ 0.40 and $ 1 (1 Kenya shilling= 99 USD). The sales figures reported were got from households during the interviews.

a specific question from the household survey that asks the respondent to indicate the social relationship they had with the CHW, before the CHW began serving the community. This social relation could either be a relative, close friend, acquaintance or someone with no close relations other than being in the same village. The use of demographic characteristics to proxy for social closeness is not new and has previously been used in economic literature (see Devillanova (2008) Breza (2015)).

Households were classified into these different categories as follows: first, a household is classified as being a relative if they have a kin relationship with the CHW; second, a household is classified as having close friendship with a CHW if; i) they report that they used to risk share with the CHW. The question was phrased as "*If you required a loan of Kshs 200 (USD 2) would you borrow it from the CHW (before he became a CHW)?*" and ii) they report that they used to make social calls/visits with the CHW. The question was phrased as "*Did you make social phone calls and visits to each other before (name) became a CHW?*"[19]; third, a household is classified as being acquaintances with the CHW if it reports to being friends with the CHW but they are not close and they do not fit the eligibility criteria of close friends, and fourth, a household is classified as having no relation if they do not have any of the three relations above. The strength of the connection can be considered as being strong (strong-ties) if a household is a relative or close friend with the CHW and weak (weak-ties) if a household is an acquaintance or has no relation with the CHW[20].The social connection variable is referred to as (*SOCIAL_TIE*) in this analysis.

The physical distance between a CHWs household and that of a household may be an important factor in determining household access to health care because travel time is reduced when individuals live close to one another. In this study, distance between a CHWs household and that of household was measured by classifying all the four categories of social ties as being either a neighbor or non neighbor to the CHW. Households were regarded as neighbors if they reported to live within a kilometer (about 15 minutes' walk) from the CHWs home and non neighbors if they lived more than a kilometer away[21].

To measure household health seeking behavior, I use 2 main dependent variables, TEST and COMPLETE DOSAGE. The choice of these two variables as earlier mentioned, is motivated by the fact that, consumption of antimalarial drugs creates a tradeoff between targeting (ensuring only true malaria cases get treated with antimalarial drugs) and effectiveness

[19]These two criteria were obtained from a pilot study conducted a few months prior to the actual field work.

[20]See Granovetter (1973) for a distinction between strong and weak ties.

[21]A village is about 25 km^2.

(ability of antimalarial drugs to cure malaria). This is because over-consumption (presumptive treatment) and under-consumption (taking less dosage) of antimalarial drugs produces negative spillovers since they contribute to antimalarial drug resistance. Furthermore, the recommended antimalarial drugs (Artemisinin-based therapies) now constitute the only effective class of antimalarial drugs in Africa, where the malaria parasite has developed resistance to earlier generations of antimalarials[22].Therefore, how to increase access while maintaining effectiveness of this class of antimalarial drugs is at the centre of an on going debate in the international community[23]. The first measure *TEST*, is a binary variable measuring if a household reports that, in the past six months any of its members took antimalarial drugs without taking a test. This variable captures presumptive treatment of antimalarial drugs by households. The second measure *COMPLETE DOSAGE* is a binary variable measuring if a household reports that, in the past six months any of its members failed to complete the recommended malaria dosage conditional on having antimalarial drugs. This variable captures under-consumption of antimalarial drugs by households.

5 Empirical strategy

The main empirical specification for access to primary health care is represented in Equation 1. Y is the outcome measure (for example, *VISITS,FREE_ACCESS*). SOCIAL_TIE is a measure of social connection between CHW and the household, and X is a vector of household socioeconomic, demographic, and health controls, where ij denotes household i in village j,γ_v is the village fixed effect which capture village specific factors that may affect visits such as village size, leadership and ϵ is the error term.

$$Y_{ij} = \beta_0 + \beta_1 SOCIAL_T IE_{ij} + \beta_2 X_{ij} + \gamma_v + \epsilon_{ij} \tag{1}$$

The empirical specification for household health seeking behaviour is represented in **??**.Y is the outcome measure (for example, *TEST, COMPLETE DOSAGE*). *VISITS* is the total number of visits (both demand and supply) made by a CHW to a household, SOCIAL_TIE is a measure of social connection between CHW and the household,and X is a vector of household socioeconomic, demographic, and health controls, where ij denotes household i in village j,γ_v is the village fixed effect ϵ is the error term.

[22]see Shretta et al. (2000)
[23]see Cohen et al. (2015)

$$Y_{ij} = \beta_0 + \beta_1 VISIT_{ij} + \beta_2 SOCIAL\_TIE_{ij} + \beta_3 X_{ij} + \gamma_v + \epsilon_{ij} \quad (2)$$

5.1 Identification

The identification strategy exploits the fact that CHWs do not self select themselves to offer services to the households they are responsible for, instead they are elected or appointed. In addition, when a CHW volunteers and is up for election, they do not know if they will get elected. This implies that CHWs do not choose people that they provide services to in their village ex-ante.The connection between households and CHWs can be explained in three different ways. First, one or more household members may themselves be CHWs. Second, a household may have relatives living outside the household who are CHWs. Third, friends or other non family relations of the household may be CHWs. Our dataset has all these three relations but we focus on the second and third relationships [24].

These existing relationships in the communities pose an empirical issue: there may be reverse causality between social ties and access to health care. People may form strategic friendships with CHWs before the CHW has been elected or being visited may form friendships between the CHW and households. The data allows me to divide the households relationship with each CHW into two categories: those who belong to potentially endogenous groups (close friends and acquaintances) and those that belong to groups that are formed exogenously (relatives). Endogenous group formation can bias the coefficients for close friends and acquaintances and this study mitigates this by asking the form of friendship that existed between the CHW and a household prior to the CHW working in the community. In addition, since CHWs are not certain about being elected, it is not possible for households to form strategic friendships prior to the CHW being elected. Being a relative outside the household is therefore arguably the most exogenous social tie. In addition it is observable and can also be accurately measured, making it simpler to formulate and present policy recommendations. Some unobserved household characteristics, say extroversion, might determine both the probability of having strong social ties with the CHW as well as the probability of being visited.I do not expect these unobserved chracteristics to be influencing visits since the nature of visits considered are mandatory visits irrespective of household observed and unobserved characteristics. The potential bias of coefficients is further reduced because, visits and free access to drugs are exogenous to households. I further use CHW fixed effects to control for time-invariant unobserved characteristics of a CHW, i.e. the group of households connected to a particular CHW.

[24] Households that have one or more members being a CHW are not included in the analysis

5.2 Summary statistics

I begin by explaining the characteristics of CHWs in the sample as shown in Table 1. 38% of the CHWs are male and have on average, 10 years of schooling which is equivalent to high school level education. There are no CHWs with no education due to the eligibility criteria that requires a CHW to have the ability to read and write. As mentioned earlier, the CHW policy requires CHWs to be elected by the village members. However, data shows that only 64% of the CHWs were elected by the villagers. The remaining 36% are appointed by link dispensary/ clinic in conjunction with the local administrative leaders (chiefs) without going through the election process. The differences between the observable characteristics of elected and appointed CHWs as shown in Table A.2 in Appendix A, show that there are systematic differences in terms of sex and education between CHWs that are elected and those that are appointed. This is an indication of selection which I address in the analysis. CHWs were also asked what motivated them to volunteer their services, and 46% reported that they wanted to help the community. The remainder reported to be motivated by prospects of earning some income or gaining respect in the community which attracts some benefits[25]. Of the elected CHWs, none of them reported a failed application to become a CHW. This implies that they all got elected in the first attempt.

Each CHW on average is allocated 12 households and 36% of CHWs are allocated households whose composition has 25 % or more being relatives. Since CHWs are volunteers,they are not required to work on a fulltime basis[26]. In the sample, 18% of CHWs have fulltime employment outside the CHW duties and a CHW works for about 10 hours a week. Although the work effort by CHWs is meant to monitored, not all CHWs are monitored with the average being 6 visits in a year. 67% of CHWs have one member of their household in a leadership position[27]. When a CHW offers to work for the village, they do so as volunteers and therefore do not get compensation for services offered. However, the data shows that 46% of CHWs in the endemic region received 4 months of compensation in the past one year with the average yearly compensation being $6. Similarly, 53% have received some form of material benefit[28] in the past year. The compensation is offered by the link health facilities when surplus funds are available and therefore, compensation is not dependent on

[25]Some of the benefits mentioned are for example: if a project/ study is about to be launched in the community and they require services of a community member, being a CHW increases the probability of you being selected to participate since you are known and respected in the community which also brings the possibility of earning an income.

[26]They are required to work at least 8 hours per week.

[27]The leadership position could for example be working in the Government, belonging to a religious group, village development committee, political party and self help group, et cetera.

[28]Some of the materail benefits were;bicycles, certificates, training allowance, bags, t-shirts and benchmarking trips.

CHW performance. By matching the household data with the CHW data, I find that 73% of CHWs in the endemic region have received a bribe in exchange for antimalarial drugs which should be freely distributed to those in need[29].

[29]The study was not able to test for bribes for other health commodities.

Table 1: *CHWs summary statistics*

Variable	variable definition	Mean	std deviation	Min	Max	N
Socioeconomic variables						
Male	1 if CHW is male	0.38	0.49	0.00	1.00	266
Age	Age of CHW	41.32	10.01	21	73	266
Education	Respondent years of schooling	9.58	2.54	1.00	16.00	266
Catholic	1 if religion is Catholic	0.18	0.38	0.00	1.00	266
Seventh Day Adventist	1 if religion is Seventh Day Adventist	0.13	0.34	0.00	1.00	266
Traditional/ No religion	1 if religion is traditional/No religion	0.05	0.22	0.00	1.00	266
Protestant	1 if religion is protestant	0.64	0.48	0.00	1.00	266
Years in village	# of years lived in the village	27.99	13.08	1	66	266
Wealth (usd)	Total value of CHW household assets	9175	14794	205.56	141227	266
Material benefit	1 if CHW received any materail benefit in the past 1 year	0.53	0.50	0	1	266
Compensation (usd)	Annual compensation for CHW activities	75.49	111.64	0	727.27	144
# of months compensation	# of months CHW received compensation in the past 1 year	3.69	4.92	0	12	144
CHW work related characteristics						
Motivation	1 if CHW volunteered so as to help the community	0.46	0.50	0.00	1.00	266
Elected	1 if CHW was elected	0.64	0.48	0.00	1.00	266
# Allocated	Number of households allocated to CHW	12.15	5.22	7	52	266
Leadership	1 if one or more members in a CHW hhold is in a leadership position	0.67	0.47	0.00	1.00	266
Independence	1 if CHW is independent in their work	0.57	0.50	0.00	1.00	266
Trust	1 if Hholds trust CHWs	0.59	0.49	0.00	1.00	266

Continues

Table 1 – *Continued*

Variable	variable definition	Mean	std deviation	Min	Max	N
Years worked	# of years worked as a CHW	3.73	2.13	1.00	10.00	266
Full time job	Whether a CHW has a fulltime job	0.18	0.39	0	1	266
# of hours worked	Number of hours worked in a week	10.22	8.95	1	56	266
# of supportive visits	Number of supportive visits in the past 1 year	6.10	7.94	0	36	266
# of Village meetings	Number of village meetings in the past 1 year	5.74	9.95	0	52	266
Satisfaction	1 if CHW has high satisfaction for his work	0.21	0.41	0.00	1.00	266
Sociable	1 if CHW is highly sociable	0.50	0.50	0.00	1.00	266
Resistance concern	1 if Concerned about antimalarial drug resistance	0.30	0.46	0.00	1.00	266
Relatives	1 if 25% or more of hholds allocated to a CHW are relatives	0.36	0.48	0.00	1.00	266
Sell drugs	1 if CHW sells antimalarial drugs	0.73	0.44	0	1	131

Exc rate: 1USD= 99Kshs. Only 144 CHWs received compensation in the past one year. Since not all households could be matched to CHWs the sale of drugs has only 131 observations.

Table 2 presents summary statistics of household variables used in the econometric model(s). I show results for the full sample in column (1) and column (2) while columns (3)-(7) compare different household characteristics across social ties. and thus in our sample only Column (1) shows 27% of our respondents were male. This is because, for purposes of this study, we sought to interview household members who are more involved in the health issues of their households and are in a better position to respond to a health related questionnaire, and in most cases these people are female. A typical sample household is protestant and has five members. The household head is around 42 years and has completed seven years of education. Average household wealth calculated as the sum of the value of assets [30] is 9602 USD. The average number of visits made by a CHW to a household are 2.7 visits, with relatives getting 2 more visits compared to non-relatives on average. Whenever a household experiences malaria symptoms, 71% report to test for malaria with relatives being more likely to test than non-relatives. Additionally, 46% of households do not freely access antimalarial drugs, with relatives being more likely to access the drugs for free compared to non relatives[31]. Conditional on getting antimalarial drugs, 65% of the households report to adhere to the prescribed antimalarial treatment and there seems to be no difference between relatives and non-relatives. 44% of households were observed to have stored antimalarial drugs in their homes, and non relatives are more likely to store than relatives[32]. From the sampled households, 29% are neighbors with CHWs and relatives are not more of neighbors than non-relatives. The risk aversion variable shows that most of the respondents are risk-loving[33].

About 85% of household members reported to have got malaria once in their lifetime and an average of 3 members of the household getting malaria in the past six months prior to the interview. On average, each of the interviewed households has a child who is below

[30] They include:land,mobilephone,bicycle,cart,radio,televison,motorbike,house,motorvehicle,solarpanel,poultry, donkey and livestock.

[31] We have 387 observations because only CHWs in the endemic region can distribute antimalarial drugs

[32] If a household reported to having antimalarial drugs in their home, they were asked to produce the drug package with the drugs and the enumerator recorded the name of the drug. The enumerator proceeded by asking if there was a household member who was currently ill from malaria and was taking the antimalarial drugs. If this was the case, then the household was recorded as not having stored drugs. However, we had those households that had a sick member at the time of the interview, and apart from the drugs that they were currently consuming, they had other antimalarial drugs. Such a household was recorded as having drugs and the drug name was recorded

[33] The risk aversion of the respondent was got from an incentivised experiment where individuals completed a series of 20 ordered choices between playing a lottery with 50% chance of winning (risk) or taking a sure amount. If an individual chose the lottery, they could win a constant amount of money (ksh 200) by betting on the colour of a ball that is blindly drawn from a bag containing 10 balls. An individual could opt for the sure amount of money at any point in the seriess of choices. The gamble amount was kept constant, while the sure amount increased monotonically from Kshs.10 to kshs 200.

5 years of age. Households were asked if they were concerned with the current antimalarial drugs developing resistance and only 26% responded that it was of great concern to them. 54% of the households reported to have trust for the CHW providing health care services. Households on average live within 3 kms from the nearest health facility. Relatives and non relatives do not have similar characteristics for the outcome variables and this difference is statistically significant. For example, the access to health care variables show that, relatives receive more supply visits and get more access to free antimalrial drugs compared to non relatives. Similarly, relatives are more likely than non relatives to test and complete the antimalarial drugs condinditional on getting malaria. Except for age of respondent, and education level of respondent, socioeconomic and demographic characteristics do not differ between relatives and non relatives, though the difference is not systematic for either group. Non relatives report significantly higher malaria in the last six months compared to relatives, yet, they get less visits from the CHWs. Whether these differences between relatives and non relatives that we observe in outcome variables will persist after controlling for other important variables is tested in the regressions.

Table 2: *Household summary statistics of variables used in the econometric model*

		Full sample		Non-relative	Relative			
Variable	**Variable definition**	**Mean**	**SD**	**Mean**	**Mean**	**Difference**	**p-value**	**N**
Outcome variables								
Supply Visits	Number of health visits by CHW to a household in the last 3 months	2.74	3.94	2.15	4.47	-2.33	0.00	767
Demand visits	Number of health visits requested by a household in the last 3 months	0.56	1.48	0.54	0.62	-0.08	0.52	767
Access drugs for free	1 if household gets free drugs	0.54	0.50	0.49	0.71	-0.22	0.00	387
Test for malaria	1 if household members test for malaria	0.71	0.45	0.68	0.81	-0.13	0.00	767
Complete dosage	1 if household members complete antimalarial dosage	0.65	0.48	0.65	0.64	0.01	0.87	767
Socioeconomic variables								
Age	Age of the respondent in years	42.38	15.61	41.60	44.69	-3.09	0.02	767
Male	1 if respondent is male	0.27	0.44	0.26	0.28	-0.02	0.65	767
Education	Respondent years of schooling	6.71	3.46	6.85	6.31	0.54	0.06	767
Household size	Number of household members	5.38	2.16	5.32	5.40	0.08	0.67	767
Catholic	1 if religion is Catholic	0.15	0.35	0.15	0.15	-0.01	0.83	767
Protestant	1 if religion is protestant	0.60	0.49	0.61	0.58	0.03	0.44	767
Seventh Day Adventist	1 if religion is Seventh Day Adventist	0.09	0.29	0.09	0.10	-0.01	0.65	767
Traditional/ No religion	1 if religion is traditional/No religion	0.16	0.37	0.16	0.17	-0.01	0.63	767
Wealth (USD)	Total value of household assets	9602	21227	9339.62	10380.87	-1041.24	0.56	767
Community variables								
# of village meetings	Number of village meetings the past 6 months	0.61	1.41	0.56	0.77	-0.21	0.08	767

Continues

Table 2 – *Continued*

		Full sample		Non-relative	Relative			
Variable	**Variable definition**	**Mean**	**SD**	**Mean**	**Mean**	**Difference**	**p-value**	**N**
Neighbor	1 if neighbor to CHW	0.29	0.45	0.50	0.54	-0.04	0.35	767
Voted for CHW	1 if household voted for CHW	0.16	0.37	0.15	0.21	-0.06	0.05	767
Distance (kms)	Distance to health facility in kilometers	2.82	1.61	2.77	2.93	-0.16	0.23	767
Region	1 if endemic region	0.50	0.50	0.53	0.44	0.09	0.03	767
Health variables								
Ever had malaria	1 if respondent has ever got malaria	0.85	0.36	0.85	0.84	0.01	0.84	767
Vulnerable	# Number of house hold members 5yrs and under + those over 55 yrs	1.40	0.99	1.39	1.44	-0.05	0.52	767
# with malaria	Number of house hold members with malaria in the past 6 months	3.03	2.23	3.11	2.79	0.31	0.09	767
# with chronic illness	Number of house hold members with chronic illness	0.27	0.54	0.28	0.24	0.04	0.37	767
# under 5yrs	Number of children in the household with 5 years or under	0.96	0.93	0.97	0.92	0.05	0.51	767
Behavioral variables								
Trust	1 if high trust for CHW	0.54	0.50	0.48	0.73	-0.25	0.00	767
Storage	1 if antimalarial drugs stored at home	0.44	0.50	0.48	0.31	0.17	0.00	767
Resistance concern	1 if Concerned about antimalarial drug resistance	0.27	0.44	0.24	0.34	-0.09	0.01	767
Risk Aversion	$\theta < 0.5$ -risk loving, $\theta > 0.5$- risk aversion and $\theta = 0.5$-risk neutral	0.47	0.23	0.48	0.45	0.03	0.11	767

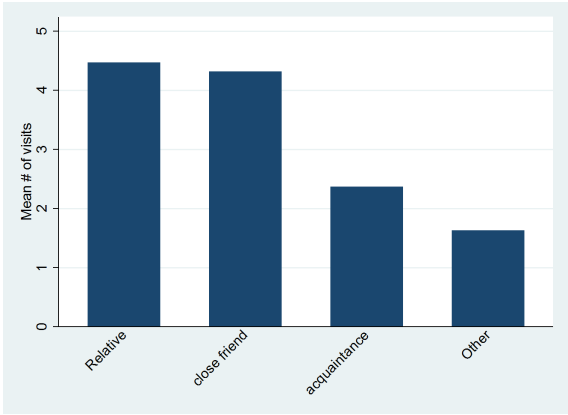
Exc rate: 1USD= 99Kshs. The access to free drugs variable has 387 observations because only one region receives antimalarial drugs from CHWs.

6 Results

6.1 *CHW household visits*

Although interest lies in identifying the effect of visits on relatives since the coefficients have least bias, I also look at other relationship categories as they are far from being uninformative and provide a full picture on the interaction between CHWs and households. I look at the distribution of each social connection category to get the general view of how visits vary with strength of social ties. In the data, relatives account for 25%, close friends 10%, acquaintances 14% and other relation 51%. Figure 1 depicts the mean number of visits by each of these four categories. As indicated, mean visits decline as the strength of social connection gets weaker. Mean visits of relatives (4.5) and close friends (4.3) are similar, while those of acquaintances (2.3) and those with no relation (1.6) are much less.

Figure 1: Relationship between visits and Social connection



The first set of regression results examines the effect of social connections on CHW health care visits. The outcome variable is visits, which is count data. Count data are made up of non-negative integers that represent the number of occurences during a fixed time period. The variance of the count data increases with the expected number of visits. Results in count data are often characterised by overdispersion[34]. Overdispersion can be corrected for by modifying poisson models using Negative binomial models[35]. The reported estimates are marginal effects from negative binomial regressions with robust standard errors.The

[34]In the dataset, the variance (13) of the outcome variable is quite large relative to the mean (2).

[35]The data has a significant amount of zero visits which necessiates the use of a zero inflated model. However, after testing based on AIC and BIC, the standard negative binomial model showed to be a significant improvement over zero-inflated negative binomial model.

estimated coefficients of interest are as shown on Table 3, and indicate the effect of soical ties on the likelihood of being visited.

Column (1) includes only the relative category with no village fixed effects and indicates that in three months, relatives get 2.3 more visits compared to non-relatives. Column (2) includes different relationship categories with no village fixed effects and indicates that in three months, relatives get 2.9 more visits compared to those with no relation to a CHW. Columns (3) and (4) includes village fixed effects and show that the general pattern is repeated[36]. The coefficient estimates in column (3) imply that relatives get 2 more visits compared to the category that has no relations with CHW. Given that we expect 3 mandatory visits, this effect is large and may partly be due to the fact that there are about 28% of observations in our sample who get zero visits. We address this issue in the robustness section. Column (4) shows that compared to those with no relation to the CHW, relatives and close friends get 2.6 and 2.7 more visits respectively. The observed behavior has in the literature been described as being indicative of nepotism[37].It could be that relatives get more visits because they live close to the CHW. But if this were the case, after controlling for whether one is a neighbor, the coefficient estimate on relatives should not show any significance. However, the estimates still follow the observed pattern implying that distance does not seem to be the main driver of visits. The estimates show that neighbors get one more visit relative to non neighbors. This is because the travel time for CHWs is reduced making it more convinient to attend to neighbors compared to non neighbors. The results remain the same even after including the relevant socioeconomic control variables. Households that have children below 5 years and those with members having chronic illness are more likely to get visits from the CHW. Although the variable on household members that had malaria in the past 3 months has the expected positive sign, it is insignificant. Inclusion of CHW fixed effects as shown in Table A.3 of the Appendix A does not alter the results.

As shown in the summary statistics, CHWs that are appointed systematically differ from those that are elected by sex and education. If CHW placement brought in more qualified CHWs, then visits may be biased upwards. Although unobservable characteristics may also be determining selection, I argue that in this context observable characteristics play a crucial role than unobservable characteristics since people elect or appoint CHWs based on certain characteristics which are most probably observable. Inclusion of CHW characteristics does not change the signs and significance of the social ties variables as shown in Table A.4

[36]We do not cluster the standard errors at the CHW level because, even if we have enough clusters (247), there are few observations per cluster

[37]Nepotism is defined as "discriminatin in favor" of a group member relative to the population (see Becker (1971); Fershtman et al. (2005) for a detailed discussion)

of the Appendix A. This implies selection is not infuencing the results. Although the visits question from the CHW survey is not directly comparable to the visits question from the household survey, Table A.5 of the Appendix A provides some insights to drivers of CHW visits.Looking at incentives, an additional dollar in compensation increases the likelihood of CHW visits by 1.5 visits but non monetary benefits have no effect on visits.

TABLE 3: *Marginal effects of the Effect of Social connection on Visits*

Dependent variable: # of visits in the past 3 months (supply)

VARIABLES	(1)	(2)	(3)	(4)
Base: close friends, acquaintance and others				
Relative	2.320***		2.050***	
	(0.350)		(0.308)	
Base: others				
Relative		2.856***		2.577***
		(0.351)		(0.305)
Close friend		2.572***		2.745***
		(0.427)		(0.456)
Aquaintance		0.807***		0.866***
		(0.239)		(0.265)
Neighbor	1.066***	1.116***	0.940***	0.949***
	(0.231)	(0.226)	(0.211)	(0.209)
# of hholds allocated to CHW	-0.0255	-0.0407**	-0.0138	-0.0265
	(0.0204)	(0.0197)	(0.0216)	(0.0209)
# of children under 5yrs	0.456***	0.375**	0.411***	0.341**
	(0.163)	(0.159)	(0.145)	(0.144)
# of Hhold members with malaria	0.0713	0.0642	0.0237	0.0213
	(0.0553)	(0.0552)	(0.0600)	(0.0611)
# of Hhold members with chronic illness	0.971***	1.049***	0.880***	0.930***
	(0.239)	(0.248)	(0.221)	(0.223)
Distance to health facility (kms)	-0.0696	-0.0667	0.0657	0.0991
	(0.0719)	(0.0691)	(0.154)	(0.156)
Socioeconomic controls	YES	YES	YES	YES
Community controls	YES	YES	YES	YES
Village fixed effects	NO	NO	YES	YES
Observations	714	714	714	714

Robust standard errors in parentheses, and p values are *** p<0.01, ** p<0.05, * p<0.1.

6.2 *Access to free drugs*

In the event of ill health, households should freely access essential drugs from CHWs. In the data, only CHWs serving the endemic region[38] can treat malaria and can therefore give antimalarial drugs to households who experience ill health. In the endemic region, not all households report that they access the antimalarial drugs freely. 54% of the households freely got the drugs while the remaining 46% had to make a payment for the same drugs. I propose an explanation for these pattern based on the strength of social connection. Figure 2 depicts the probability of households freely accessing antimalarial drugs by social connection. One striking feature is that none of the social connection categories reports to being fully able to access the drugs. Relatives have a 0.7 chance while close friends have a higher chance of 0.81. However, relatives and close friends have a higher likelihood of accessing drugs freely compared to acquaintances and others with no relation to the CHW.

Figure 2: Access to free drugs

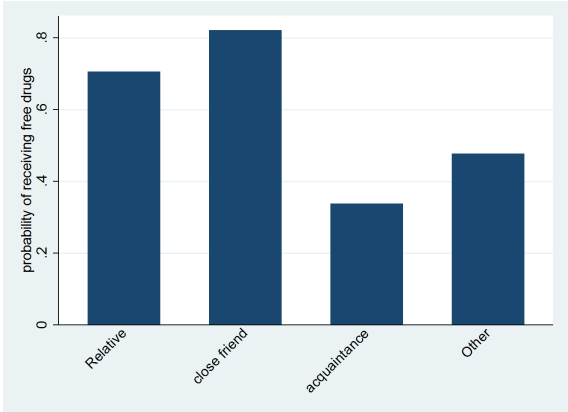


Table 4 reports probit results of access to free drugs, corresponding to Equation 1. Our focus is on interpreting the estimated coefficients on relatives since they are the most exogenous. Without including fixed effects, columns (1) and (2) report marginal effects that indicate relatives are 23 percentage points more likely to access free drugs compared to other social relations and 25 percentage points more than those with no relations to CHWs. Column (3) and (4) which include village fixed effects provide suggestive evidence of nepotism in the access of drugs by rural households. Relatives are 18 percentage points more likely to access free drugs compared to non-relatives and are 21 percentage points more likely to get free drugs compared to those whom they do not have a relationship with. Interestingly, the

[38]Having malaria all year round.

Table 4: *Marginal effects of the effect of social connection on access to drugs*

Dependent variable: Access to free drugs (1=Yes)

VARIABLES	(1)	(2)	(3)	(4)
Base: close friends, acquaintance and others				
Relative	0.233***		0.187***	
	(0.057)		(0.055)	
Base: Others				
Relative		0.251***		0.210***
		(0.061)		(0.059)
Close friend		0.356***		0.378***
		(0.068)		(0.059)
Acquiantance		-0.116*		-0.105
		(0.069)		(0.066)
logwealth	-0.014	-0.017	0.014	0.011
	(0.025)	(0.025)	(0.025)	(0.024)
Household size	0.001	0.005	0.022	0.024*
	(0.013)	(0.013)	(0.014)	(0.013)
# of Hhold members with malaria	0.015	0.012	0.000	-0.001
	(0.013)	(0.013)	(0.013)	(0.013)
# of Hhold members with chronic illness	0.032	0.042	-0.002	0.003
	(0.039)	(0.037)	(0.038)	(0.035)
Distance to health facility (kms)	-0.025*	-0.026*	0.0017	0.001
	(0.014)	(0.014)	(0.037)	(0.037)
Socioeconomic controls	YES	YES	YES	YES
Village fixed effects	NO	NO	YES	YES
Observations	385	385	385	385

Robust standard errors in parentheses, and p values are *** p<0.01, ** p<0.05, * p<0.1.
We have 385 observations because we only consider the endemic region.

number of household members with malaria is not significant. One possible explanation for this finding is that people do not purchase these drugs during periods of ill health, instead, they buy as insurance against sickness. Since trust was measured ex post, I exclude it from the regression [39] A discussion with households in my sample who pay bribes revealed that they do so because it saves households in terms of travel time and costs and in addition, CHWs are willing to offer the drugs on credit to households.

[39]Including trust in the regression decreases the magnitude and not significance of the coefficients. The results show that more trusting households are more willing to pay bribes than less trusting ones. In the literature, studies on social norms and corruption are ambiguous as regards trust and corruption. For example, Lee and Guven (2013) show that an increase in trust lowers corruption while Dong et al. (2012), show no correlation between trust and corruption. A potential explanation to this result is:if households

6.3 *How do social ties and visits affect health related behavior?*

The previous section suggets that CHWs make more visits to relatives and close friends compared to other social relations. The question is then whether these health visits translate to good health care practices by the households and if being socially connected translates to better health behavior.

To examine this issue I exploit additional questions available in the household survey. The two main questions used in the analysis ask: *"When a member of your household got malaria symptoms, were they able to test for malaria parasites before taking antimalarial drugs?"* and "*When a member of your household got malaria and was given treatment for malaria, were they able to complete the dosage*?" All these questions were asked for the last 6 months. The visits question was asked over a three months period while that of health beavior was asked over a 6 months period. I did this for two reasons: first, to ensure all households had at aleast one member of the household suffering from malaria, I included 6 months which cover both malarious and non malarious months. second, I believe that visits in the last three months are indicative of pattern of visits over a period of time. Even if the visits and health behavior period covered differ, the results provide useful insights on households health seeking behavior. I estimate Equation 2, which looks at the relationship between visits, social ties and the decision to test for malaria.

Table 5 presents the results of estimating Equation 2 for the entire sample in both regions and all specificatons include village fixed effects. Column (1) presents marginal effects after probit[40] estimates of the effect of total visits on a dummy for whether all household members test for malaria following malaria symptoms. To determine whether there exists an heterogeneous effect of visists on testing for malaria for relatives and non relatives. To examine this effect, I estimate the same model as that of columns (1), but include interaction terms between the relative dummy and total visits. Column (2) presents probit estimates of the interacted model. The results in column (1) suggest that one more visit increases the likelihood of household members testing for malaria by 3 percentage points.The coefficent estimate on relative is negative and insignificant which implies that a persons health seeking behavior will not improve even if you are a relative to the CHW; Unless you get visited and are provided with the necessary health information. Column (2) shows that the interaction term is insignificant suggesting that the effect of visits on testing for malaria is not different

believe that bribing a CHW is beneficial, they will be willing to engage in the corrupt exchange. But, with the possibility of sanctions if caught engaging in corrupt behavior, CHWs will be ready to engage with households where mutual trust exists.

[40]Using OLS regression produces similar results

for relatives and non relatives. The lack of a differential effect for relatives and non-relatives may possibly be explained by the fact that once a household gets visited, they get educated on why they should go and test when they get malaria symptoms. And this education is common to all because it involves a single action. That is, the decision on whether to test. The estimated coefficient on distance to the health facilities shows if a household is one more kilometer from a health facility, the likelihood of testing for malaria reduces by 7 percentage points. In the literature, geographic access has been cited as an important part of accessing health care in low and middle income countries. An inverse relationship between distance or travel time to health facilities and use of health services has been demonstrated as an important barrier to access (see Hjortsberg (2003)). A household that has high trust for the CHW is more likely to test for malaria. This implies that giving health messages to households is more likely to influence household health seeking behavior if households trust the source of information. Similarly, households that are concerned about antimalarial drugs developing resistance are 6 percentage points more likely to test for malaria.

Table 5: *Effect of visits and social ties on testing for malaria*

Dependent variable: Dummy variable for test for malaria (1=Yes)

VARIABLES	(1) PROBIT	(2) PROBIT
Total visits	0.027***	0.028***
	(0.005)	(0.007)
Relative	-0.001	0.009
	(0.038)	(0.055)
Relative*Total visits		-0.003
		(0.012)
# under 5 yrs	-0.007	-0.007
	(0.021)	(0.021)
# of Hhold members with malaria	0.003	0.003
	(0.009)	(0.009)
# of Hhold members with chronic illness	0.031	0.030
	(0.028)	(0.028)
Trust dummy	0.053*	0.052*
	(0.031)	(0.031)
storage_drugs	-0.151***	-0.151***
	(0.034)	(0.034)
Concern for drug resistance	0.061*	0.061*
	(0.034)	(0.034)
Risk aversion	0.008	0.008
	(0.065)	(0.065)
Distance to health facilities (kms)	-0.072***	-0.072***
	(0.025)	(0.025)
Socioeconomic controls	YES	YES
Village fixed effects	YES	YES
Observations	759	759
R-squared	0.214	0.215

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In the second regression, I examine whether conditional on getting malaria and getting the antimalarial drugs, all household members are able to complete the recommended dosage. The outcome variable is a dummy for completing dosage.

Table 6: *Effects of visits and social ties on treatment of malaria*

Dependent variable: Dummy variable for Complete dosage (1=Yes)

VARIABLES	(1) PROBIT	(2) PROBIT
Total visits	0.056***	0.080***
	(0.007)	(0.009)
Relative	-0.188***	-0.045
	(0.036)	(0.053)
Relative*Total visits		-0.048***
		(0.013)
# under 5yrs	-0.031	-0.032
	(0.020)	(0.020)
# of Hhold members with malaria	0.012	0.014*
	(0.009)	(0.008)
# of Hhold members with chronic illness	-0.003	-0.013
	(0.027)	(0.028)
Trust dummy	0.060*	0.050
	(0.031)	(0.032)
storage_drugs	-0.086**	-0.075**
	(0.037)	(0.036)
Concern for drug resistance	0.129***	0.134***
	(0.034)	(0.034)
Risk averse	0.134**	0.132**
	(0.067)	(0.066)
Distance to health facility (kms)	0.037	0.036
	(0.023)	(0.023)
Socioeconomic controls	YES	YES
Village fixed effects	YES	YES
Observations	759	759
R-squared	0.259	0.263

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6 shows estimates of covariates that determine if household members complete the antimalarial drug dosage. We focus on visits and social connection variables. Column (1) and (2) report marginal effects after probit results. Column (1) results show that one extra visits

increases the likelihood of completing a dosage by 6 percentage points. Interestingly, being a relative to the CHW reduces the probability of completing the dosage by 19 percentage points. The interaction effect in column (2) further confirms that indeed there is a differential effect of visits on completing the dosage between relatives and non-relatives. This result may seem puzzling as we would expect relatives to comply more or for the difference between the two groups to be insignificant. But this result could be explained by the fact that unlike in testing where the decision to test is a one time action, consuming antimalarial drugs is a process. The drugs have to be taken for a couple of days and people respond to the treatment at different times. What this means is that some people could start feeling better on the third day while others may feel better on the fourth or fifth day. Therefore, if relatives feel better, they may not complete the dosage because they do not attract any punishment from non-compliance from the CHW, and they continue getting their visits. But for the non relatives, there may be concern that if they are visited and the CHW finds that they do not comply with the recommended treatment regime,then their may be consequences such as discontinuation of visits, which are currently scarce.

6.4 *Why are drugs not freely distributed*

The previous results show that CHWs engage in petty corruption through sale of antimalarial drugs, which otherwise should be given freely to households in need. The act of receiving a bribe is illegal. This implies that if CHWs were to be asked if they sell drugs, the results to this question would be grossly undereported. To deal with this, we match household data to the CHW data, where, if any of the households served by a CHW report to have bought antimalarial drugs,that CHW is identified as one who receives bribes in the data. The sample size for this regression reduces to 131 observations because of matching and that only CHWs in the endemic region can offer treatment for malaria.

Table 7 presents estimated coefficients of sale of drugs. Column (1) presents marginal effect estimates from probit regression. Column (1) results show that if a CHW has one or more household members in leadership position, they are 24 percentage points more likely to extract bribes from households relative to those without kin in leadership positions. Being a leader, moreso in the rural areas is a sign of status and power. Even if households may not be willing to pay bribes, CHWs may ride on the status of his household by controlling households and influencing them to comply with the CHWs desire of receiving bribes. A CHW whose husehold allocation consists of 25% or more relatives is 20 percentatge points less likely to engage in receiving bribes in exchange for drugs. Additionally, for each dollar a CHW earns in compensation annually, the likelihood to extract bribes decreases by 0.1

percentage points. With an annual mean compensation of $ 75.49, this effect is small.

Households reported to have paid between $0.4 and $1 for a single dosage of antimalrial drugs from a CHW. Putting this into perspective, if a CHW for example serves 7 households and sells drugs to 3 of those households at $0.7 per dosage, he makes total of $2.1. This is almost the wage rate for unskilled wages or agricultural labor in the rural areas. This implies that the sums of money involved may seem petty but that may not be the case from a rural perspective since they are able to generate funds which are equivalent to the going wage rate or more. The results further suggest that CHWs who serve more of their relatives are less likely to engage in extracting bribes from the households.

Table 7: *Marginal effects of bribe acceptance by CHWs*

	Dependent variable: Sell drugs (1=Yes)
VARIABLES	PROBIT
Male	-0.086
	(0.095)
Elected	0.028
	(0.088)
Leadership	0.237**
	(0.097)
Independence of work	0.066
	(0.082)
Trust by hholds	0.068
	(0.085)
Years worked	-0.021
	(0.017)
Relative	-0.195**
	(0.091)
Compensation (usd)	-0.001***
	(0.000)
Socioeconomic controls	YES
Village fixed effects	YES
Observations	131
R-squared	0.351

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7 Robustness tests

7.1 *Is there a compensating effect on visits*

The results on visits presented thus far assume that households did not make any requests for health visits from CHWs. But if they did, then it is possible that the 2 extra visits relatives get can be partly attributed to a compensating effect for relatives. That is if non-relatives request for health visits, CHWs will not be observed making mandatory visits to non-relatives, instead we observe CHWs visiting relatives because they have not been previously visited. We examine if this assumption holds by exploring the demand visits and estimate Equation 1 using the Negative binomial model. Table 8 columns (1) through (4) are marginal effects assessing the demand visits by households. Column (3) and (4) which include fixed effects show that neither relatives nor non-relatives are more likely to request for health care services from a CHW. This results imply that CHWs are not making more visits to relatives because relatives tend to request less visits, instead the evidence points more to nepotism from CHWs. We also observe the absence of nepotism from households when it comes to requesting for health care visits.

Table 8: *Marginal effects of the effect of social ties*

Dependent variable: Demand visits

VARIABLES	(1)	(2)	(3)	(4)
Base: close friend and aquaintance and other				
Relative	0.096		0.113	
	(0.145)		(0.132)	
Base: no relation				
Relative		0.136		0.144
		(0.147)		(0.135)
Close friend		0.067		0.004
		(0.188)		(0.136)
Acquaintance		0.207		0.212
		(0.184)		(0.178)
Neighbor	0.128	0.142	0.131	0.149
	(0.112)	(0.110)	(0.104)	(0.106)
# of children under 5yrs	0.059	0.057	0.046	0.048
	(0.072)	(0.072)	(0.060)	(0.061)
# of hhold members with malaria	-0.006	-0.009	-0.070**	-0.074**
	(0.029)	(0.029)	(0.030)	(0.031)
# of hhold members with chronic illness	0.089	0.083	-0.029	-0.038
	(0.086)	(0.088)	(0.079)	(0.081)
Distance to health facility (kms)	-0.002	-0.000	0.154	0.164
	(0.033)	(0.033)	(0.100)	(0.104)
Socioeconomic controls	YES	YES	YES	YES
Health controls	YES	YES	YES	YES
Village fixed effects	NO	NO	YES	YES
Observations	714	714	714	714

Robust standard errors in parentheses, and p values are *** p<0.01, ** p<0.05, * p<0.1.

7.2 *Sensitivity of visits*

First, we assess the sensitivity of our visits findings to an alternative specification where we estimate Equation 1 using visits dummy rather than using visits as count data. Column (1) of Table 9 presents the marginal effects after probit, with the full set of controls and village fixed effects. We see that the results are robust to the specification. Second, from our initial results in Table 3, we see that the magnitude of the coefficient estimate on relative is high given that the visits cover a three months period. This result may be driven by the zero visits in the data. We assess this by retricting the analyis to positive visits and

estimating Equation 1.The overall significance and point estimate of the soical tie effect remains unchanged (see column (2) and column (3)).

Table 9: *Effect of social connections on visits*

Dependent variable: Supply visits

	1 if visits>=1	visits>1	
VARIABLES	PROBIT	OLS	NBREG
Base: close friend and aquaintance and other			
Relative	0.118***	1.998***	2.089***
	(0.033)	(0.347)	(0.322)
# of children Under 5yrs	-0.021	0.583***	0.627***
	(0.021)	(0.201)	(0.164)
# of Hhold members with malaria	-0.005	0.038	0.053
	(0.009)	(0.089)	(0.068)
# of Hhold members with chronic illness	-0.022	1.550***	1.388***
	(0.029)	(0.378)	(0.254)
Neighbor	0.142***	0.446	0.395*
	(0.031)	(0.271)	(0.231)
Log of wealth	0.016	-0.341**	-0.327**
	(0.016)	(0.157)	(0.135)
Distance to health facility (kms)	-0.001	0.166	0.104
	(0.024)	(0.214)	(0.174)
Constant		4.148**	
		(1.930)	
Socioeconomic controls	YES	YES	YES
Observations	714	518	518
R-squared		0.254	

Robust standard errors in parentheses, and p values are *** p<0.01, ** p<0.05, * p<0.1.

8 Conclusion

Individuals in poor countries tend to have less access to health services than those in better-off countries, and within poor countries, the poor have less access to health services. Provision of health services at the community level is crucial both for increasing access to health care and for reducing future burden of disease through change in health seeking behavior. Despite these significant benefits of health provision at a decentralised level, there has been little empirical research conducted to help policy makers understand the effect of decentralising health services. Specifically,I estimate the role played by social connections in primary health care. I further estimate the effect of health care visits on health seeking behavior. I find that strong social connections to CHWs, lead to more access to health care through increased vivits and access to free drugs. I also show that health care visits have an effect on household health seeking behavior and strong social connections may tend to follow less on better health seeking behavior practices. This results suggest that homogeneity of a group moreso in the devloping country context does not always translate to improved outcomes and this may vary according to the good/ service being provided.

As such, I believe that this work complements the previous literature on social connections by showing that local leaders have monetary and non monetary incentives in providing public service at the local level. One feature that differentiates my work from others is that I look at the supply side of health care as opposed to the demand side of health care. The results here also have the potential to provide policy guidance. So far, I have provided suggestive evidence of nepotism in provision of health care. But, although nepotism exists, evidence on its effect on health behavior change is mixed. As Caria et al. (2014) acknowledge, policy makers that want to promote human cooperation should pay attention to the behavior of central individuals in networks. A closer look at the behavior of CHWs shows giving CHWs monetary incentives will deter them from engaging in the petty bribery in exchange for drugs. Lastly, while this study was caried out in only two regions in Kenya, the nature of work carried out by CHWs and the treatment seeking environment in our study is very similar to many countries in sub saharan Africa and this study can provide useful insights.

References

Alesina, A. and La Ferrara, E. (2000). Participation in heterogeneous communities. *The Quarterly Journal of Economics*, 115(3):847–904.

Ashraf, N., Berry, J., and Shapiro, J. M. (2010). Can higher prices stimulate product use? evidence from a field experiment in zambia. *The American economic review*, 100(5):2383–2413.

Bandiera, O., Barankay, I., and Rasul, I. (2009). Social connections and incentives in the workplace: Evidence from personnel data. *Econometrica*, 77(4):1047–1094.

Banerjee, A., Deaton, A., and Duflo, E. (2004). Health care delivery in rural rajasthan. *Economic and Political Weekly*, pages 944–949.

Becker, G. S. (1971). 77ie economics of discrimination.

Breza, E. (2015). *Field experiments, social networks, and development*. Oxford University Press.

Burchardi, K. B. and Hassan, T. A. (2013). The economic impact of social ties: Evidence from german reunification*. *The Quarterly Journal of Economics*, 128(3):1219–1271.

Caria, S., Fafchamps, M., et al. (2014). Cooperation and expectations in networks: Evidence from a network public good experiment in rural india. Technical report, Centre for the Study of African Economies, University of Oxford.

Cohen, J. and Dupas, P. (2010). Free distribution or cost-sharing? evidence from a randomized malaria prevention experiment. *The Quarterly Journal of Economics*, 125(1):1–45.

Cohen, J., Dupas, P., and Schaner, S. (2015). Price subsidies, diagnostic tests, and targeting of malaria treatment: evidence from a randomized controlled trial. *The American Economic Review*, 105(2):609–645.

Cohen, L., Frazzini, A., and Malloy, C. (2008). The small world of investing: Board connections and mutual fund returns. *Journal of Political Economy*, 116(5):951–979.

Colussi, T. (2015). Social ties in academia: A friend is a treasure. *Review of Economics and Statistics*, (0).

Cutler, D. M. and Lleras-Muney, A. (2010). Understanding differences in health behaviors by education. *Journal of health economics*, 29(1):1–28.

Data, K. O. (2014). Poverty rate by district. kenya open data survey 2014.

Deri, C. (2005). Social networks and health service utilization. *Journal of Health Economics*, 24(6):1076–1107.

Devillanova, C. (2008). Social networks, information and health care utilization: evidence from undocumented immigrants in milan. *Journal of Health Economics*, 27(2):265–286.

Dong, B., Dulleck, U., and Torgler, B. (2012). Conditional corruption. *Journal of Economic*

Psychology, 33(3):609–627.

Durlauf, S. and Fafchamps, M. (2004). Social capital, the centre for the study of african economies. Technical report, Working Paper Series.

Fershtman, C., Gneezy, U., and Verboven, F. (2005). Discrimination and nepotism: the efficiency of the anonymity rule. *The Journal of Legal Studies*, 34(2):371–396.

Granovetter, M. (2005). The impact of social structure on economic outcomes. *The Journal of economic perspectives*, 19(1):33–50.

Granovetter, M. S. (1973). The strength of weak ties. *American journal of sociology*, pages 1360–1380.

Hjortsberg, C. (2003). Why do the sick not utilise health care? the case of zambia. *Health economics*, 12(9):755–770.

Hollard, G. and Sene, O. (2016). Social capital and access to primary health care in developing countries: Evidence from sub-saharan africa. *Journal of health economics*, 45:1–11.

Jancsics, D. (2013). Petty corruption in central and eastern europe: the client's perspective. *Crime, law and social change*, 60(3):319–341.

Karlan, D. S. (2007). Social connections and group banking. *The Economic Journal*, 117(517):F52–F84.

Kioko, U. M., Mwabu, G., and Kimuyu, P. (2013). The economic impact of malaria on wage earnings in kenya: a household level investigation. *Int J Educ Res*, 1(4).

Lee, W.-S. and Guven, C. (2013). Engaging in corruption: The influence of cultural values and contagion effects at the microlevel. *Journal of Economic Psychology*, 39:287–300.

Lin, N. (2002). *Social capital: A theory of social structure and action*, volume 19. Cambridge university press.

Mansuri, G. and Rao, V. (2012). *Localizing development: does participation work?* World Bank Publications.

Montgomery, J. D. (1991). Social networks and labor-market outcomes: Toward an economic analysis. *The American economic review*, 81(5):1408–1418.

Myers, C. A. and Shultz, G. P. (1976). *The dynamics of a labor market*. Greenwood Press.

Njonjo, K. (2013). Exploring kenya's inequality: Pulling apart of pooling together. *Abriged Report*.

Sachs, J. D. (2001). Macroeconomics and health: Investing in health for economic development: Report.

Shleifer, A. and Vishny, R. W. (1993). Corruption. *The Quarterly Journal of Economics*, 108(3):599–617.

Shretta, R., Omumbo, J., Rapuoda, B., and Snow, R. (2000). Using evidence to change

antimalarial drug policy in kenya. *Tropical Medicine & International Health*, 5(11):755–764.

Svensson, J. (2005). Eight questions about corruption. *The Journal of Economic Perspectives*, 19(3):19–42.

Tarp, F. and Markussen, T. (2014). Political connections and land-related investment in rural vietnam. *Journal of Development Economics, DOI*, 10.

WHO et al. (2000). The african summit on roll back malaria. *Abuja, Nigeria*, 25.

WHO et al. (2006). The world health report: 2006: working together for health.

A Appendix

A.1 *Sampling*

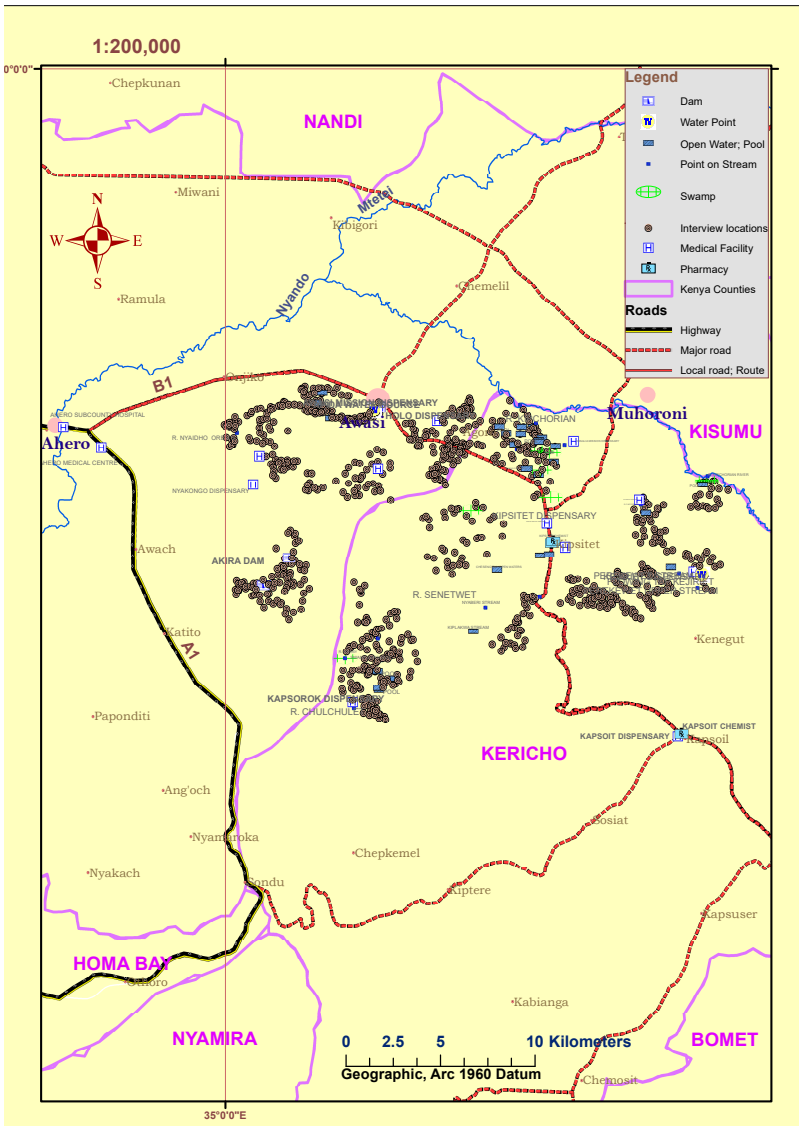
The selected divisions (Nyando and Soin) had a total of 127 villages. Villages in urban areas were excluded leaving a total of 109 villages in the rural areas (47-Nyando and 61-SOIN). The mean number of households in Nyando was 100 with a standard deviation of 27.8 and a minimum of 53 and maximum of 186 households; while the mean number of households in Soin was 77.4 with a standard deviation of 50.1 and a minimum of 42 and maximum of 435 households. Outliers were removed before computing the standard deviation. I then include the villages with number of households within one standard deviation from the mean so as to avoid over or under representation of villages. Therefore in Nyando, villages with less than 72 households and those with more than 128 were excluded from the sample of our study population while in SOIN, villages with less than 27 households and with more than 127 households were excluded from the sample of our study population. In the end we had a total of 84 villages from the two divisions. We then randomly sampled 19 villages were from each division. Table 9 below provides a summary.

Table A.1: *Sampling*

	Nyando	*Soin*
Total no. of villages	47	61
Mean number of hholds	100	71.5
Std. deviation	27.8	19.8
Villages included	100 ±27.8	71.5 ±19.8
Total villages before sampling	38	46
Villages sampled	19	19

A.2 *Map of Study Area*

Figure A.1: Map of Study Area



A.3 *CHW Summary statistics*

Table A.2: *Characteristics of elected versus appointed CHWs*

	Appointed					Elected					
Variable	**mean**	**sd**	**min**	**max**	**N**	**mean**	**sd**	**min**	**max**	**N**	**Diff**
Age	42.53	10.04	23	66	95	40.65	10.05	21	73	171	−1.87
Sex	0.28	0.45	0	1	95	0.43	0.50	0	1	171	0.15**
Education in years	8.87	2.48	1	15	95	9.97	2.49	3	16	171	1.09***
Years lived in village	27.04	12.63	6	60	95	28.51	13.34	1	66	171	1.47
Years worked as a CHW	3.87	1.91	1	9	95	3.65	2.24	1	10	171	−0.22
Leadership	0.67	0.47	0	1	95	0.67	0.47	0	1	171	0.00
Allocated households	12.23	6.07	7	52	95	12.11	4.70	7	37	171	−0.13
Full time job	0.16	0.37	0	1	95	0.19	0.40	0	1	171	0.035
Hours worked	10.34	9.55	1	56	95	10.15	8.62	1	42	171	−0.19
Household visits	6.94	4.71	1	35	95	7.41	4.66	1	25	171	0.47
Relatives	0.40	0.49	0	1	95	0.33	0.47	0	1	171	−0.07
Salary	0.24	0.43	0	1	95	0.26	0.44	0	1	171	0.02
Benefits	0.52	0.50	0	1	95	0.54	0.50	0	1	171	0.02
Wealth (usd)	10 418	19 256	206	141 227	95	8485	11 610	263	106 823	171	−1932

Exc rate: 1USD= 103Kshs.

Table A.3: *Marginal effects of the effect of social connections on visits*

Dependent variable: Supply visits in the last 3 months

VARIABLES	(1) y1	(2) y1
Base: close friends, acquaintance and others		
Relative	2.270***	
	(0.351)	
Base:others		
Relative		2.897***
		(0.356)
Close friend		2.606***
		(0.455)
Aquaintance		1.020***
		(0.293)
Neighbor	1.063***	1.034***
	(0.217)	(0.205)
# of hhold allocated to CHW	-0.820*	-0.961**
	(0.421)	(0.394)
# of children under 5yrs	0.372**	0.309**
	(0.159)	(0.152)
# of Hhold members with malaria	-0.0878	-0.0779
	(0.0599)	(0.0587)
# of Hhold members with chronic illness	0.443**	0.592***
	(0.213)	(0.210)
Distance to health facility (kms)	0.125	0.252
	(0.187)	(0.188)
Socioeconomic controls	YES	YES
Health controls	YES	YES
CHW fixed effects	YES	YES
Observations	714	714

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A.4: *Selection*

Dependent variable:Supply visits with CHW characteristics included

VARIABLES	(1) y1	(2) y1	(3) y1	(4) y1
Base: close friends, acquaintance and others				
Relative	2.327***		2.046***	
	(0.350)		(0.306)	
Base: others				
Relative		2.851***		2.574***
		(0.350)		(0.303)
Close friend		2.626***		2.817***
		(0.439)		(0.469)
Aquiantance		0.796***		0.878***
		(0.239)		(0.266)
Neighbor	1.067***	1.106***	0.932***	0.931***
	(0.232)	(0.226)	(0.210)	(0.208)
# of hholds allocated to CHW	-0.029	-0.044**	-0.016	-0.028
	(0.021)	(0.020)	(0.022)	(0.021)
Sex (CHW)	-0.209	-0.225	-0.254	-0.286
	(0.238)	(0.226)	(0.259)	(0.241)
Educ in yrs (CHW)	0.007	-0.030	0.003	-0.045
	(0.041)	(0.042)	(0.042)	(0.041)
Socioeconomic controls	YES	YES	YES	YES
Health controls	YES	YES	YES	YES
Village fixed effects	NO	NO	YES	YES
Observations	714	714	714	714

Robust standard errors in parentheses, and p values are *** p<0.01, ** p<0.05, * p<0.1.

Table A.5: *Determinants of CHW Visits to households*

Dependent variable: Average # of monthly visits

VARIABLES	PROBIT
Age	0.020
	(0.023)
Sex	-0.234
	(0.535)
Education in years	0.087
	(0.111)
Elected	0.377
	(0.472)
Years worked	0.372**
	(0.145)
Leadership	0.137
	(0.481)
Allocated hholds	0.109**
	(0.045)
Hours worked	0.026
	(0.029)
Relative	0.207
	(0.451)
Benefits	0.567
	(0.449)
Salary	1.478**
	(0.682)
Maritalstatus	-1.264**
	(0.605)
Supportive visits	0.079***
	(0.031)
Independence	0.136
	(0.459)
# of village meetings	0.026
	(0.025)
Log of wealth (usd)	29.322
	(20.994)
Village fixed effects	YES
Observations	266

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1