Leveraging Mobile Technology and Financial Incentives to Increase Non-Communicable Disease Screening Rates in Tanzania

by

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A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Health Policy

in the

Graduate Division

of the

University of California, Berkeley

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Fall 2019

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Abstract

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The epidemiological transition has resulted in an increased burden of non-communicable diseases throughout lower- and middle-income countries (LMICs). As countries adapt to this new environment, they must find cost-effective ways of screening for and treating these diseases. With the proliferation of mobile technology as well as the increased evidence for the effectiveness of cash transfers, a randomized-controlled trial in rural Tanzania was conducted to examine the usage of an SMS-based approach of informing individuals of the dangers of non-communicable diseases and offering financial incentives for hypertension screening. The study originally included 961 participants randomized into two treatment arms and a control arm across three villages. The treatment arms received text messages notifying them of the importance and availability of screening at their local dispensary. One treatment arm also received two thousand Tanzanian shillings if they came in for a visit. The study was rolled out to the three villages over the course of seven weeks. Beyond estimating the overall impact of this program and the utility of negative prices, the study design enabled the measure of spillover to individuals who were not initially enrolled in the experiment. Further, information on social networks was leveraged to estimate the impact of not being treated but knowing someone who was. Without accounting for spillover when analyzing the impact of the intervention, impact is significantly underestimated. The results that lack any control for network or spillover effects show a six to eight percentage point change in screening behavior, whereas accounting for them shows a thirty percentage point impact. This effect is largest for those in the cash arm who knew other people in the same treatment arm. There is also a negative effect on screening for individuals in the cash arm who knew people in the information arm. Therefore, the study suggests both the potential viability of using SMS-based approaches with cash transfers to increase non-communicable disease screening as well as a need to better understand the network effects associated with such a program. Importantly those designing randomized controlled trials should account for the possibility of network interactions when selecting their samples.

To Sydney, Mercer, and my Dad

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Acknowledgments

I would like to thank my dissertation committee: Professors Paul Gertler, William Dow, Lia Fernald, and Alan Hubbard. I would also like to thank Dr. Fredrick Manang and Theophile Rugaimbila, without whom this research would not be possible. I would like to thank Patrick Bradshaw, Zachary Wagner, Drew Cameron, Maria Dieci, Kevin Feeney and the members of the Fernald Research Group for constructive feedback. I would like to thank Barrie Harvey for her help in assembling this final product. I would like to thank the East Africa Social Science Translation Collaborative for funding this project as well as the NICHD and NIA training fellowships that supported me during this time period (NICHD T32-HD007275, NIA T32-AG000246). I would also like to thank access.mobile for providing access to the amHealth messaging platform.

Chapter 1

Introduction

As sub-Saharan Africa (SSA) undergoes an epidemiological transition, the prevalence of non-communicable (NCD) diseases such as hypertension and diabetes has been increasing. In fact, cardiovascular disease has grown to become the third leading cause of death in SSA and the leading cause of death in SSA for those over the age of 50 (Dalal et al., 2011; Prince et al., 2015). Many of these deaths are premature, occurring among adults with important familial and economic roles, thus causing negative spillovers to families and the economy (Bloom et al., 2012). In Tanzania, over the last twenty years, cardiovascular disease has risen from the sixth leading cause of death to the second (IHME, 2019). Because numerous studies have shown that the majority of those in SSA with hypertension and diabetes are unaware of their disease, expanded screening is an important step in combating non-communicable diseases. Despite the 8-10% prevalence of diabetes in Tanzania, fewer than 10% of adults have ever been screened for diabetes and only 2% self-report awareness that they are diabetic. Similarly, of the approximately 20% of individuals with hypertension, only a fifth were aware of their condition (Mayige and Kagaruki, 2013; Vijver et al., 2014; Ploth et al., 2018; Kavishe et al., 2015).

A first step toward controlling these conditions is to ensure that people are aware that they have them. For example, once discovered to be at risk, it is important for patients to follow up with treatment (Bovet et al., 2008), both to improve health and to avert unnecessary illness-induced poverty (Verguet et al., 2015). For this reason, affordable and effective methods of communicating health risks and promoting screening and treatment uptake are needed. To that end, Durao et al. (2015) assessed the systematic review literature and found insufficient evidence for the value of population screening for hypertension and diabetes in low- and middle-income countries. Instead, they point to the benefit of more targeted efforts that focus on identifying high-risk individuals prior to screening. However, many at-risk adults have such health care encounters infrequently, especially at higher risk ages above 40, and there are many missed opportunities due to patients' lack of awareness about the importance of requesting or accepting such screenings.

Many studies on screening programs in developed countries have found significant heterogeneity in the effectiveness of screening programs. Holland et al. (2013), for example, found

that the success of screening programs is situation specific. On the other hand, an expanding literature around the potential of mHealth interventions, including text-message-based programs, has found promising results. These results are limited, however, due to either poor study design or null results (Marcolino et al., 2018). To that end, developing appropriate interventions and messaging related to cardiovascular screening tailored to specific SSA populations is a non-trivial challenge requiring careful research and evaluation.

Even the right screening programs, however, face a cost obstacle since patient costs can present a major barrier to take-up - even where screening fees are zero (as in Tanzanian public facilities), travel costs and the opportunity cost of time can be formidable. Ngalesoni et al. (2016) estimate that the total annual cost for primary prevention of cardiovascular disease in rural Tanzania is $127 USD, higher than the $118 for urban Tanzanians. This is driven, in part, by higher indirect costs. There is little available research indicating how much take-up for cardiovascular screening would increase if travel and time costs were lowered, e.g. via an incentive payment at the clinic.

It may also be that the disutility of screening, and/or simple inertia, still present important additional barriers. For example, there is significant evidence of stigma around HIV in the region, and as such, people may be averse to a screening program if they believe it is related to HIV (Pantelic et al., 2015). Indeed, during our pilot study, we found that people thought our intervention might be related to HIV. To overcome this stigma, slightly larger incentive payments may be effective at substantially increasing take-up, but again little is known about the effectiveness of such incentives in raising demand for screening in SSA.

Thus, to date we know that there is an increased need for NCD screening and that there are barriers in terms of both awareness and cost. Because of these challenges we need to understand if increased awareness coupled with potentially reducing cost barriers addresses this gap. Further, while SMS-based approaches may be affordable, there is not conclusive evidence on whether they are the best mode for an intervention targeting NCDs. Our study addresses this gap by testing the extent to which hypertension and diabetes screening in rural Tanzania can be increased via low cost and scalable text messaging that provides patients with information about the diseases and where to obtain free screening. We also assess the impact of subsidizing the cost of screening via a small cash transfer. Importantly, given the potential for information to spread quickly by word of mouth, our study is designed to measure the magnitude of the spillover from treated individuals to non-treated individuals both in and out of our study.

Chapter 2

Background

2.1 Hypertension Burden

Global Burden

Approximately 30% of all global deaths are related to cardiovascular disease (Cifkova et al., 2016) with hypertension being a leading risk factor for coronary heart disease, stroke, arrhythmia, heart failure, renal disease, and dementia (Blacher et al., 2016). In the 2010 Global Burden of Diseases Study, hypertension was found to be the leading single risk factor for disability-adjusted life years (DALYs) (Bromfield and Muntner, 2013). Importantly, between 1990 and 2015, the burden of disease shifted away from communicable diseases that are more prevalent in younger populations to non-communicable diseases typically associated with older populations (Perkovic et al., 2007). The global burden of disease studies found that hypertension moved from the fourth leading cause of DALYs to the first. Studies now show that the differences in hypertension prevalence between developed and lower- and middle-income countries (LMICs) is shrinking, if not non-existent (Pereira et al., 2009). However, in their meta-analysis, Pereira et al. (2009) found that in low-middle income countries individuals are less likely to be aware of, or have their hypertension under control. More recent work by Cifkova et al. (2016) shows similar trends still present in recent years. They report that reviews show only 27% of individuals in sub-Saharan Africa are even aware of their hypertension, as opposed to awareness rates over 80% in some developed countries. The impact of the lack of awareness is only magnified when comparing disease control rates for aware individuals in LMICs (under 13%) compared to developed countries (over 60%) (Cifkova et al., 2016).

NCDs in Tanzania

Like many countries in sub-Saharan Africa, Tanzania is undergoing an epidemiological transition where the population is now faced with a rising burden of non-communicable diseases alongside diseases like HIV/AIDS. Recent studies have shown that among those over the

age of eighteen, hypertension prevalence is between 16% and 17% with a relatively lower prevalence of diabetes (Kavishe et al., 2015). Studies on those aged 25-64 find that 26% are hypertensive and 9% diabetic (Mayige and Kagaruki, 2013). Importantly, most of those with hypertension in Tanzania are unaware of their condition (Edwards et al., 2000; Njelekela et al., 2001; Kuga et al., 2002).

Though these diseases are easily detectable and amenable to treatment, research consistently shows low treatment and control rates following screening. For example, Bovet et al. (2008) found that in urban Tanzania, while 34% of hypertensives were aware of their condition, only 3% had continued their treatment twelve months after diagnosis. These findings are echoed in other research looking at both urban and rural Tanzania where only 20% of individuals are aware of their condition, 10% sought treatment, and less than 1% actually had their hypertension controlled (Edwards et al., 2000).

With so many Tanzanians unaware of their condition, it is no surprise that nearly half of all deaths, admissions, and hospital days are related to NCDs (Peck et al., 2013). Of these, 33.9% are related to hypertension - mostly in the form of stroke. Moreover, Peck et al. (2013) found that hypertension accounted for 15% of all deaths. It is imperative, therefore, to understand how to effectively screen Tanzanians for non-communicable diseases and ultimately get them treated.

2.2 Hypertension Interventions

Cascade of Care

Hypertension is a disease that can be treated along the cascade of care. It can be prevented through lifestyle changes such as increased exercise or better diet. Hypertension can also be readily treated through fast-acting medications that keep blood pressure down. Hypertension interventions themselves can generally be grouped into four categories: community-based interventions, education interventions, lifestyle interventions, and adherence interventions. These categories are fluid and interventions often fall into several simultaneously.

Community-based interventions can be used along the cascade of care. These interventions typically focus on working with community leaders to increase awareness of hypertension treatment protocols to improve medication adherence. For example, Balcazar et al. (2009) used *promotoras* in Mexican-American communities to deliver six educational modules. They found statistically significant improvements in awareness and understanding of healthy behaviors. Similarly, Kim et al. (2014) found a roughly 6 mm HG improvement in blood pressure due to a community-based intervention.

Community-based interventions are also effective in LMICs. Jafar (2009) demonstrated statistically significant decrease in blood pressure of 11 mm HG by providing community-based home-health interventions alongside general practitioner training. Importantly, the training on its own showed no impact. In many LMICs, a critical pathway for delivering community-based interventions is community health workers. Much like the *promotoras* seen

in Balcazar et al. (2009), Jeet et al. (2017) found evidence for community health workers to reduce the impact of NCDs. In particular, they noted a pooled effect of approximately 4.8 mm HG across the interventions they included. They did note, however, that the quality of the studies they included was relatively low. Yu (2014) shows that a community-based intervention can reduce systolic blood pressure by approximately 11 mm HG. Kikuchi et al. (2018) also found that community-based interventions can be successfully integrated into areas where hypertension plays a prominent role such as maternal, newborn, and child health.

Education campaigns have also been shown to be effective for both patients and physicians. Herbert et al. (2004) used a randomized controlled trial, for example, to show how a physician education program can improve appropriate prescribing by approximately 11 percentage points. Magadza et al. (2009) found that an education-based program in South Africa was able to improve knowledge of hypertension and its management by 25 percentage points. Further, studies have shown that these types of interventions actually lead to improved hypertension control with a systolic blood pressure reduction of 7-8 mm HG (Tobe et al., 2014). Huang et al. (2011) were able to show the pathways through which some of these interventions work. They found their education program reduced salt intake by 14% and fat intake by 23%. Ultimately, these campaigns led to the prevalence of hypertension being 22% lower in the intervention arms.

Lifestyle changes are a key pathway to reducing hypertension prevalence. In their systematic review Baena et al. (2014) assessed the effects of lifestyle interventions that focus on dietary modification, behavioral counseling, physical activity, and a combination of interventions. They found these types of interventions can reduce systolic blood pressure by between 4 and 11 mm HG, with the 11 mm HG reduction coming from interventions emphasizing physical activity. A significant amount of work has also been done focusing on the impact of reducing sodium consumption. He et al. (2013) conducted a Cochrane systematic review of studies evaluating the impact of modest salt reduction on blood pressure. In their pooled analysis, they found that a 4.4 gram reduction in daily salt intake is associated with a 4 mm HG reduction in systolic blood pressure. It is no wonder, then, why education interventions and community-based interventions often focus on salt reduction.

To that end, Cook et al. (2007) analyzed the impact of modest sodium reduction on cardiovascular disease outcomes. By analyzing the long-run effects of a lifestyle focused education campaign, they were able to show that individuals who received the prescribed intervention were 25% less likely to have a cardiovascular event such as a myocardial infarction or stroke. Roberts et al. (2002) were able to show a 14 percentage point decrease in systolic blood pressure through coupling exercise-based campaigns with counseling on the importance of exercise.

It is important to note that not all hypertension can be managed through lifestyle changes. A significant number of interventions focus broadly on improving medication adherence. These interventions are often either focused on improving clinical guidelines through care algorithms (Laurent et al., 2012; Al-Ansary et al., 2013) or motivating adherence at the patient level (Morrissey et al., 2016; Krijnen et al., 2004). Al-Ansary et al. (2013) found that while many advances help improve the clarity of guidelines, significant work is needed

to localize clinical practice guidelines. At the patient level, Morrissey et al. (2016) found in their systematic review that adherence interventions reduce systolic blood pressure by 2-3 mm HG on average, but there is significant heterogeneity. In their review of community-based interventions, Jeet et al. (2017) found little evidence of effectiveness on medication adherence. Adherence-based interventions also face the additional barrier of medication availability. For example, Adinan et al. (2019) identified that only 24% of dispensaries carried the medications listed in national guidelines.

mHealth Interventions

mHealth is defined by the World Health Organization as "the use of mobile and wireless technologies to support the achievement of health objectives" (Kay et al., 2011). Importantly, there are few rigorously studied mHealth interventions in LMICs that focus on NCDs or hypertension. A 2016 systematic review found only 8 randomized controlled trials looking at non-communicable diseases with only one focusing on hypertension (Stephani et al., 2016). The types of mHealth interventions they found varied and they were not able to draw any significant conclusions. It is reasonable, however, to posit that mHealth interventions can be used to supplement or supplant many of the interventions described above. Indeed, the effectiveness of mHealth interventions at improving adherence to HIV medication indicates significant room to bolster hypertension medication adherence. Although several years old, Bärnighausen et al. (2011) found in their systematic review that mobile phone text messages can improve medication adherence.

2.3 Innovating on Interventions

While non-communicable diseases and hypertension can be effectively managed through a variety of different avenues, the increasing burden coupled with low awareness and control rates call for research on innovative approaches to decrease their prevalence. Two key areas with little published research as they relate to hypertension are the use of financial incentives as well as the use of one-way SMS communication. Studies to date, for example, include almost no mention of incentivizing screening or medication adherence. Further, the mHealth studies tend to focus exclusively on medication adherence and the use of mobile applications.

Financial Incentives

There is substantial evidence on the impact of incentives on health behaviors (Dow et al., 2016). However, much of this work is outside of sub-Saharan Africa, and relatively little research has rigorously examined the effect of incentives for adult screening. For example, in their systematic review, Giles et al. (2014) found five studies that focus on incentives for one-time behaviors. The outcomes targeted by these studies include breast and cervical cancer screening, tuberculosis testing, flu vaccination, and hepatitis B vaccination. Study

participants were offered either cash transfers or restricted vouchers. The average relative risk for attending an incentivized event was statistically significant at 1.92. The interventions they studied, however, focused on face-to-face interventions. Similarly, well-known work has demonstrated that HIV test take-up can be increased via incentives (Thornton, 2008). Thornton (2008) used small cash incentives to encourage individuals to pick up their test results in Malawi. She found a 15 percentage point increase in retrieving test results due to the cash transfer.

Research from the U.S. has found that mail-based invitations for cancer screening have a significantly larger yield when accompanied by small cash incentives (Slater et al., 2005), but little is known about such designs in SSA. There is also research literature on the effect of screening incentives within workplace or insurance-based programs, though typically using relatively weak observational designs. For example, Volpp et al. (2011) found a tripling of smoking cessation rates through an employer-based program. Among the few examples in SSA, a South African health-insurance based incentive program found that screening rates for cholesterol and glucose levels increased by 5-9% (Mehrotra et al., 2014), but this was a non-experimental design and not directly generalizable to the non-insured population in lower resource settings elsewhere in SSA.

There is clear evidence for the power of financial incentives in the literature. For example, Gopalan et al. (2014) found that in LMICs financial incentives are almost always successful in achieving their desired goals with few negative or perverse outcomes. However, there is little data for how incentives can affect non-communicable diseases. It is important, then, to examine whether or not demand-side financing can play an effective role in addressing the burden of hypertension and diabetes.

Use of Mobile Technology

As mobile technology spreads throughout the African continent, significant investments have been made in trying to use it for improving health. The academic literature has expanded rapidly over the past five years indicating a desire to study the effectiveness of these tools.

Much of this literature (as in developed countries) has focused on improving treatment adherence or preventive behaviors. Studies show that SMS can be used to increase HIV treatment adherence (KC and Murray, 2016) and help in smoking cessation programs (Rodgers et al., 2005). Indeed, meta-analyses from earlier in the decade suggested that SMS may increase a variety of preventive health behaviors (Fjeldsoe et al., 2009; Cole-Lewis and Kershaw, 2010).

In a more recent systematic review, Hall et al. (2015) found SMSs to be effective in the areas of diabetes self-management, weight loss, physical activity, smoking cessation, and medication adherence for antiretroviral therapy. Sondaal et al. (2016) focused on reproductive, maternal, newborn, and child health (RMNCH) and found increased maternal and neonatal service utilization shown through increased antenatal care attendance, facility-service utilization, skilled attendance at birth, and vaccination rates. Stephani et al. (2016) looked at mHealth randomized controlled trials targeted at NCDs in particular and found

that they focus on health promotion, remote monitoring, and decision support. Ultimately, however, Cheong et al. (2017) looked at interventions targeted for increasing cardio-vascular disease (CVD) screening and concluded that "mobile text messages might be useful as a mode of invitation for screening. However, we did not find any study using this mode as an intervention for CVD risk factors screening."

There is little rigorous evidence on how SMS can be used to affect one-time behavior change, such as for screening take-up, and how its cost-effectiveness may compare to mass media informational campaigns. Furthermore, the use of SMS to engage with communities to deliver an incentive program is only recently being tested (Wakadha et al., 2013). Seth et al. (2018) conducted the only study to date that we can find where an SMS was used to directly notify a recipient of a financial incentive for a one-time behavior change. SMS interventions are easily scalable and can be combined with incentives; our research will demonstrate whether or not this approach has a role in slowing the burden of preventable non-communicable diseases.

Networks and Spillovers

One key aspect of using mobile phones and financial incentives in rural communities like Tanzania is the significant possibility for spillovers. The impact of social networks on behavior has been well studied in LMIC contexts. Benjamin-Chung et al. (2018) found that accounting for spillovers is important to measure the true effect of an intervention where information is likely to be transmitted among participants. Beyond violating the stable unit treatment value assumption (SUTVA), it would result in any estimated treatment effect being a lower bound. This is evident in much economic and health literature where the benefits of an intervention are likely to go beyond study participants.

Miguel and Kremer (2004) found that if they were to just estimate the difference in outcomes between treatment and control groups to assess the success of their intervention, they would drastically underestimate the effectiveness and ultimately cost-effectiveness of de-worming campaigns. Similarly, Banerjee et al. (2010) explicitly designed their study to account for the probability that their intervention would affect the control group as well. Miller and Mobarak (2015) looked at the importance of social networks on the update of new technologies - specifically, stoves. The possibility for spillover is also referenced in SMS-based studies. For example, Hofstetter et al. (2015) found a strong likelihood for spillover of vaccine promoting messages within families. Haug et al. (2013) designed their SMS-based intervention to avoid any possibility for spillover. It is important from an effectiveness standpoint, however, to measure the full effect of a program not by avoiding spillovers, but by attempting to measure their impact.

2.4 Summary

It is clear that there is ample room for research that examines the potential impact of both financial transfers and mHealth interventions on NCDs. In particular, given the resource constraints of many LMICs, mHealth interventions may be more scalable if they are sufficiently effective. However, much of the literature that focuses on education goes beyond what may normally be conveyed in one or several 160 character messages (the standard length of a text message). Therefore, it is important to assess if financial incentives, coupled with mHealth interventions, may prove sufficiently impactful. And, while mobile phones are normally associated with individual owners, we want to ensure we allow for the possibility of spillovers, lest we underestimate the true impact of an intervention that combines mHealth and financial incentives to affect NCD screening. To better conceptualize this, the following chapter builds a simple theoretical framework for understanding how this intervention may affect behavior.

Chapter 3

Theoretical Framework

3.1 Behavioral Hazard

To understand the need for an intervention that provides both information and cash transfers for preventive health behavior such as screening for hypertension and diabetes, we adapt the model of behavioral hazard laid out by Baicker et al. (2015). We simplify their model of the purchase of insurance to the purchase of preventive screening at cost c. For simplicity the cost c includes the initial screening and any subsequent preventive measures needed. An individual with income Y has an exogenous probability q of falling ill where $q \in [0, 1]$. If they fall ill, they will pay p for treatment. If they opt for the preventive screening with cost c, there is a benefit $b(s; \gamma) \in R$ where s denotes disease severity and $\gamma \in R$ allows for heterogeneity in the benefits of the screening. The benefits, b, can be thought of in monetary terms as reducing the price p of an illness in the long run. So, an individual who does not opt for screening will have a utility of

$$(1 - q)U(Y) + qU(Y - p) \tag{3.1}$$

Conversely, an individual who opts for screening, will have a utility of

$$(1 - q)U(Y - c) + qU(Y - c - p + b(s; \gamma)) \tag{3.2}$$

In this simple framework, it is easy to see that an individual should spend c on preventive screening if they believe that $b > p + c$.

In a behavioral hazard model, however, we allow for the fact that an individual might not have a clear understanding of b, and instead see the benefits as $b + \epsilon$ where ϵ can be positive or negative allowing for individuals to over or under-estimate the true benefits from purchasing preventive screening. As such, we have that an individual who does not opt for screening but has some behavioral bias, or tick, will measure their utility through

$$(1 - q))U(Y - c) + qU(Y - c - p + b(s; \gamma) + \epsilon) \tag{3.3}$$

thus purchasing preventive screening only when $b + \epsilon > p + c$

From a societal perspective, therefore, it may be reasonable to raise or lower c to the point that we would encounter moral hazard in a traditional model, but that, in reality, allows for optimal welfare. See Baicker et al. (2015) for a full treatment on moral hazard in this context.

Importantly, the behavioral hazard framework is agnostic to the mechanism through which ϵ is generated. For example Baicker et al. (2015), elaborate on a false beliefs framework, ϵ could be defined as $\hat{b}(s;\gamma,\theta) - b(s;\gamma)$ where $\hat{b}$ is the decision benefit from getting screened. Similar ϵ substitutions can be made for present bias and symptom salience. What is important to note is that ϵ can take on any value that appropriately explains why an individuals' behavior is not aligned with their best interests.

3.2 Information, Cash Incentives, and Social Networks

As it relates to preventive screening in rural Tanzania, our pilot study along with cost-effectiveness analyses has shown that $\epsilon < -b$ as preventive screening for both hypertension and diabetes are vastly underutilized. It follows, therefore, if the price of any treatment were positive, individuals would never purchase screening at a positive cost.

To that end, we define ϵ to be $\epsilon(i_b; i_c; d(i;\rho))$ where $i \in R$ denotes beliefs relating to the cost of screening and benefits of being screened, and $d \in R^+$ denotes people in person i's network whose beliefs about both the cost and the benefits influence them. $\rho \in [-1, 1]$ represents how likely a person is to be influenced by those around him. Conceivably, ρ could be negative to allow for those around a person to influence him to be contrarian and do the opposite of what they do.

In this framework we can expand ϵ to be $\epsilon = d(i_b,\rho)(i_b b) + d(i_c,\rho)(i_c c)$. Plugging this back into the original model, we have that a person's perceived utility function is actually

$$(1-q)U(Y-c) + qU(Y-c-p+b(s;\gamma)+d(i_b,\rho)(i_b b)+d(i_c,\rho)(i_c c)) \tag{3.4}$$

and they will only purchase preventive screening if $b(s;\gamma)+d(i_b,\rho)(i_b b)+d(i_c,\rho)(i_c c) > p+c$.

This framework allows us to see the decision to purchase preventive screening as not just a function of its benefits and costs, but also a function of beliefs (and the beliefs of those around them) about the benefits and costs. In the context of this intervention, it shows how information alone (especially information transmitted through a text message) may not be sufficient to convey benefits that overcome the biases individuals hold. However, if this information affects both individuals and those around them, it may show an impact.

Chapter 4

Experimental Design

4.1 Pre-Testing

Prior to the finalization of the study design, a small pilot was conducted in a village outside of our sampling frame. The pilot was intended to do two things. First, it was designed to help understand whether a pure control group would be necessary. Our prior assumption was that if take-up of the information-only messaging arm was low enough, then no control group would be needed. The second goal was to determine the appropriate cash transfer size for the full intervention. In piloting, we found that not only did individuals who received the information-only arm come in for screening, so did a significant number of individuals not part of our original sample. Further, we found relatively low variation in turn-out associated with the size of the cash transfer. As such, we proceeded to design the intervention in such a way to capture the spillover between intervention groups.

Given the volume of people who came to the clinic unprompted during the pilot, we also wanted to make sure that the lack of cash transfers to those individuals did not create any discomfort among the villagers. During post-pilot focus groups, we made sure to include individuals who were not part of the original pilot sample, but were referred by someone who did receive a cash transfer. None of these individuals expressed any misgivings about not having received a transfer and understood that they were ineligible based on the content of the text message.

Clinical Data

During the pilot, we learned that the clinical staff were not proficient at using manual sphygmomanometers to measure blood pressure. Despite an expected hypertension prevalence of around 20%, only one person out of roughly 100 screened was found to have a blood pressure over 140 mm HG. During focus group sessions with the entire research team, several individuals who were screened during the pilot were re-screened using electronic Omron blood pressure readers alongside manual readings, conducted by the same clinical staff. The clinician only successfully measured two out of the five hypertensive individuals present.

Alarmingly, one individual that was tested mechanically multiple times as having a systolic blood pressure over 200 mm HG was told his systolic blood pressure was 140 mm HG when using a manual device. The clinical recommendations are quite different between these two readings with the former requiring a prompt visit to a local hospital and the latter only requiring lifestyle advice and a new measurement. As a result of these experiences, the study team decided to use only electronic blood pressure devices moving forward.

4.2 Study Setting

This study was conducted in and around three rural villages (Makangwa, Mlodaa, and Mlowa Barabarani) in central Tanzania approximately 26 miles outside of the Tanzanian capital of Dodoma. At the time of the study, the villages consisted of approximately 20,000 individuals living in 4,500 households. The villages consist of 33 hamlets without distinct geographical boundaries. The vast majority of the population in these villages are crop farmers. The relatively recent decision of the Tanzanian government to officially relocate the government to Dododma has resulted in increased urbanization in the area.

4.3 Research Questions

Primary Research Questions

1. How effective is an SMS-based approach at inducing NCD screening?
2. What is the impact of financial incentives on testing for NCDs?
3. To what extent do social networks and spillovers impact the uptake of screening?

4.4 Research Strategy

Our research strategy involves notifying the study population about the risks of hypertension and diabetes, as well as the availability of screen and cash transfers via SMS. Our research team worked with Tanzanian cardiovascular disease screening experts to tailor concise and salient text messages with information on hypertension and diabetes, as well as information on where to obtain free screening. This information was delivered to a population-based sample of adults with access to cell phones who have agreed to enroll in the Chamwino Demographic Surveillance Area (DSA). We randomly assigned study participants into one of three groups, stratified by age, gender, and population density.

A **Control Group** were not given any information and received no text messages. Given the insights from our initial focus groups and interviews with clinicians, hypertension screening rates were near zero.

Treatment group 1 (Health info) were told about availability of specific nearby test centers for diabetes and hypertension, and received a recommendation that they go in for screening. This information included the hours for testing and the fee, which was free in this case. They also were sent a series of text messages providing information on the importance of preventative care as it relates to hypertension.

Treatment group T2 (Health info + Cash Transfer) received the above treatment as well as an offer of a small incentive to offset the cost of the visit. The incentive amount was based on the average cost of travel and lost wages as determined during the baseline survey as well as the pre-test, which we estimated at about $1.00 USD. Our partner clinics had patients' names flagged on paper registers and they received the cash transfer upon completion of their visit. This treatment arm allowed us to assess the marginal benefit of bringing the average cost of a consultation to zero, or negative prices for individuals with lower costs of travel.

In all treatment and control groups, if individuals attended a facility they were be screened by providers for high blood pressure and diabetes based on guidelines provided by our medical partners. We used household surveys to follow up with study participants after the study to understand how the intervention affected treatment-seeking behavior. The study design can be seen in Figure 1. For the schedule of messages in English, see Appendix A.

Implementation and Spillovers

As Benjamin-Chung et al. (2018) identify, there are many ways to measure the magnitude of spillovers in a randomized controlled trial. With enough sample size and budget, treatment intensity can be varied across clusters. With sufficient clusters, as with Haug et al. (2013) you can include clusters with no treatment. Our study focused on estimating spillover in two ways. First, we allowed for spillover into control individuals in treatment villages by rolling the intervention out in two waves, thus maintaining a spillover-control group and a pure control group. The intervention roll out is seen in Figure 2. Second, we mapped the social network of study individuals to capture the most likely avenues for information transmission. While prior studies in this space first mapped a social network, then injected an intervention to assess how important social network centrality is, our study examined the effect of the network after the fact. By estimating the magnitude of spillover, it was possible to show that an SMS-based intervention has the possibility to reach well beyond the groups accessible by the technology.

The first phase saw the intervention rolled out over three weeks in Mlodaa Village, which is demographically similar but geographically distinct from Mlowa Barabarani and Makangwa Villages. This can be seen in Figure 3. The second phase commenced at the conclusion of the first with the intervention being rolled out in Mlowa Barabarani and Makangwa. To account for supply effects, screening was provided at all three villages throughout the study period. No individuals sought out screening in villages where it was not being promoted by our intervention.

4.5 Assignment to Treatment

Randomization was stratified and done by using the *stratified* function from the *splitstackshape* package in **R**. We stratified by age group, gender, sampling population density, and village. Age group and sampling population density were divided into terciles for stratification purposes. More specifically:

- Age Groups - We looked at the terciles of individuals in our sample and divided individuals into three equally sized age groups - [35-43], (43-53], and (53-96]
- Gender - Male and Female
- Sample Population Density - We looked at how many other individuals in the sample lived within 250 meters of each person. As with age, we divided this sample into terciles - [0-4], (4-9], and (9-39]
- Village - Due to our roll-out design, we also stratified by village to ensure balance between villages

4.6 Sampling Frame

We partnered with the Chamwino District Demographic Surveillance Area (DSA) managed by the School of Natural Science of the University of Dodoma (UDOM). The Chamwino District DSA covers a rural area consisting of 33 hamlets in 3 villages, each with its own health clinic.

The sampling frame of the DSA includes 20,697 individuals in 4,527 households. We enrolled all individuals over the age of 35 who were the sole owner of a cellular phone. Being the sole cell phone owner was an important selection criteria as phones are heavily shared in this part of Tanzania. To appropriately randomize at the individual level, it was important for cell phone ownership to be unique. This brought our sample to 961 individuals. Given the disparity in size of the village, Mlodaa had 202 subjects, Makangwa had 456 subjects and Mlowa Barabarani had 303 subjects. As these individuals own cellular phones, they were slightly better off than the general population. This can be seen in Table 1.

Statistical Power

Before starting the intervention, we assumed a relatively low take-up of 10% screening in the control arm, which would have allowed us to detect an eight percentage point change given 321 people in each arm (alpha=.05, power=.8). In a worst-case scenario, if take-up in the control had been 45% then we would still be able to detect an eleven percentage point difference between treatment and control arms. We assumed that the actual Control take-up was likely to be in-between these extremes, and were confident that the budget allowed sufficient data collection for the sample sizes we estimated. Ultimately, given that there was

no take-up in the control arms, statistical power was not an issue for detecting a difference between treatment and control arms. We ultimately were underpowered to detect differences between treatment arms, however.

Sample Frame Issues

Cell Phone Number Quality

Due to issues with data collection, many of the phone numbers provided were over two years old and as a result, were not working. Individuals in the treatment arms with non-working phones were removed from the sample. As we did not message individuals in the control arm, we do not have data on whether or not their phones worked.

Amref Intervention Overlap

During the rollout of the intervention, we were informed that Amref Health Africa was planning on implementing their own intervention to screen for HIV and Hypertension in Makangwa Village during the same week. Their intervention consisted of advertising for their screening program with loud speakers and trucks while also providing staff to do the screening. We delayed our implementation one week to give separation between the two programs, but also included questions in the endline survey to assess the impact of the Amref program.

Table 2 shows that in Makangwa, where the program was based, 73% of individuals in our study had heard of the program. In Mlodaa, however, only 4% were aware of the screening program and in Mlowa Barabarani, only 29% of individuals heard about the program. In all three villages, of those who heard about the program, approximately 30% said they got screened because of it.

Due to the high level of interference from the Amref program in Makangwa, we removed it from our analytical sample. While we kept Mlowa Barabarani in the sample, we also show our results for just Mlodaa, where there was the least interference.

Figure 4 represents the sample selection, assignment, and attrition issues described above.

Analytical Sample and Balance

Table 3 provides summary statistics for the analytical sample used in this research. This sample represents individuals in Mlodaa and Mlowa Barabarani Villages who had working cell phones (or were in the Control Arm). While most attributes are similar across village, it is noteworthy that 63% of the sample population in Mlodaa was male, where as only 44% was male in Mlowa Barabarani. This is not, however, an artifact of attrition as the populations were skewed this way in the original sample. However, it was a result of our selection criteria, as the actual male population represented roughly 44% of the population across each of the three original villages.

Despite these differences, we were most interested in differences in study populations across treatment arms. To ensure appropriate randomization, we assessed differences between treatment arms (together and separately) across key characteristics. These can be seen in Table 4. There was clear balance across treatment arms for almost all criteria. Importantly, balance was found in the social-network related variables *Friends in Cash Arm* and *Friends in Info Arm* which were collected at endline. The one critical variable with both statistical and economic differences was whether or not people had their blood pressure measured before. Here, the control group had significantly fewer people responding in the affirmative. While this may be an indication of imbalance, it was likely due to the question being asked retrospectively at endline.

4.7 Ethical Considerations

This study design was approved by the UC Berkeley Internal Review Board under protocol number 2016-06-8922. It was also reviewed and approved by both the University of Dodoma Institutional Research Review Committee and the Tanzanian Government's National Institute of Medical Research.

Chapter 5

Data Collection

While the intervention itself ran from January 13th, 2019 through March 5th, 2019, baseline data collection began in June 2016 as part of the Chamwino Demographic Surveillance Area.

5.1 Baseline Data Collection

Baseline data collection was done through the Chamwino Demographic Surveillance Area (DSA) and was used as our sampling frame. Baseline data was collected using enumerators hired by the DSA on android tablets using Open Data Kit. The baseline questionnaires can be found in Appendix B. They included two key forms. The first collected information about the individual including basic demographic information, information on education and literacy, and importantly, cell phone contact information. The second collected information at the household level including household composition, data on water and sanitation, residence characteristics, and land ownership. The DSA was also supposed to include modules on various health-related items including histories of alcohol and tobacco use and past experience with screening for chronic conditions such as diabetes and hypertension. In addition to these modules, data was to be regularly updated to ensure that up-to-date phone numbers and location information was maintained.

Ultimately, the DSA did not collect data from the health modules as part of their baseline surveys, nor did they collect this information at any other time between the baseline and the beginning of our intervention. Given the critical nature of these surveys, the endline surveys originally designed for our intervention were expanded to include the relevant health information. Importantly, some questions were revised to include a recall period that began before the screening intervention began. This was necessary in case the intervention changed awareness and use of screening.

5.2 Clinical Data Collection

Data was collected from all individuals who visited the clinics asking for hypertension and diabetes screening during the intervention period. This short survey included questions to be filled out by the doctor on blood pressure and blood glucose measurement results as well as questions on the reason for visit, also seen in Appendix B.

Blood pressure was measured using Omron BP742N 5 Series blood pressure monitors. While the clinical standard would have been to use manual sphygmomanometers, these were replaced with electronic monitors for the accuracy reasons described in the pre-test section. To ensure accurate measurements, the clinician followed local guidelines for blood pressure measurement. This included taking one measurement on each arm and waiting at least ten minutes between each measurement. A person was considered hypertensive or at risk for hypertension if their average systolic blood pressure was over 140 mm HG. To ensure that the Omron monitor stayed accurate, the clinician would take his own reading every morning to ensure there were no major changes over the course of the previous day.

Blood glucose levels were measured using a Contour Blood Glucose Meter and test strips. Every new batch of test strips required a recalibration of the meter and clinicians were trained on how to perform this calibration. When a participant arrived at the facility, a finger stick was used to collect a drop of blood on a test strip that was then fed into the glucose meter. If patients were found to have a blood glucose level over 7.8 mmol/L, they would be told to return at a later date and given instructions for a fasting blood glucose test.

5.3 Endline Data Collection

Endline data was collected in two rounds. The first round focused on collecting social network data and relevant health data not collected at baseline. Data was collected from all individuals in the original study as well as individuals who came into the clinics asking for screening during the study period. The second round was to collect clinical data including blood pressure, blood sugar, height, and weight measurements using the same procedures described above for the intervention. Due to the time gap between the intervention and the endline data collection, we did see some attrition.

5.4 Social Network Data

To collect social network data, we adapted a survey from Banerjee et al. (2013) and asked individuals to identify other individuals that fit into categories specific to their lives (survey found in Appendix B). These categories are:

- Family members living in the hamlet but not in the household
- People whose houses they visit frequently

- Non-relatives they socialize with regularly
- People they get medical advice from
- People they borrow money from
- People they get general advice from
- People they worship with regularly

Every study participant was asked to list individuals in their social networks that fit into each of the above categories. In line with Griffith (2019), who found that censoring social network data could result in attenuated results, we did not limit the number of responses per category that any interviewee was allowed to give. Ultimately, only 5% of individuals listed more than six individuals for any given category.

All data was collected on tablets pre-loaded with the full census of individuals from the baseline to allow for immediate matching of individuals based on name, age, and location. While participants only provided the name of any given member of their social network, if multiple matches were found, age and village were used to further refine the identification. For individuals not matched automatically, an effort was made to manually match individuals. This was done on a rolling basis to allow for follow-up of individuals not matched.

Due to the fact that the census from the DSA was over two years old, a significant proportion of individuals named went unmatched. Importantly, we were able to identify all individuals named by an interviewee who were in the study - critically, those who were in either treatment arm. Since a significant proportion of any individual's social network was categorized as *unknown*, we used an ordinal measure of social network density as it related to our intervention. In other words, we focused on number of individuals in a given social network in a treatment arm as opposed to proportion of a social network in a treatment arm. We did this because we did not know the true denominator for the proportion.

In total, 8,802 network edges were mapped through our survey. Removing duplicate connections (connections where an individual named the same person to be part of their network through two different criteria) resulted in 5,281 unique edges for the 847 individuals covered by the endline survey. To create the appropriate network variables for this study, we identified for each individual i all members of their network N_i that were in one of the treatment arms and summed them up. We also created a separate variable that identified that number as a proportion of total individuals identified in individual I's network. However, because of the large number of unidentified individuals, this proportion is likely underestimated and not used in this analysis. A map of the social networks for those individuals who visited the clinics can be seen in Figure 5.

5.5 Final Clinical Data

The last data collected was clinical data gathered by a registered nurse at the home of all individuals in the study sample as well as those who visited a clinic during the study period.

Data Processing

Data was collected using SurveyCTO on Android tablets. Data was then transferred from the tablets to the cloud where it was retrieved and processed using R. To maintain confidentiality as per the IRB, once all network identification was complete, the analysis data sets were scrubbed of any identifying information including names and phone numbers.

Chapter 6

Empirical Approach

Our empirical analysis is broken into three distinct sections. The first section presents results from the analytical sample looking only at the effect of being randomized into a treatment arm. Given our understanding of peer effects in the context of the intervention, we expect these results to be a lower bound of the true effect as they did not account for any potential spill-over. The second section accounts for the potential diminishing value of the cash transfer due to increased distance. The third section presents results that include an explicit accounting for peer effects through the inclusion of social networks. This approach is registered with the American Economic Association's Social Science Registry as AEARCTR-0002768.

6.1 Core Analytical Variables

Treatment Outcomes

- The primary outcome of interest for this study is whether or not an individual came into the clinic during the study period. This is a dummy variable defined as 1 if an individual came into the clinic during the study period and 0 if they did not. This information is gathered in the Clinic Questionnaire.
- We are also interested to see if any individuals who were screened positive for hypertension at the clinic have their condition controlled at endline. This data is not yet available and will be included in future research.

Controls and Baseline Variables of Interest

We used standard controls throughout the analysis. Importantly, individual information on prior diagnosis of blood pressure, prior diagnosis of diabetes, and smoking history were only collected at endline resulting in a smaller sample for the full model. While we already found

that the prior blood pressure test variable was likely biased, we included it as was specified in the pre-analysis plan. Below, we list the variables that were included in the models:

- **Individual Characteristics**: We used variables for individual's gender, age, prior blood pressure measurement, highest level of education, and whether they were involved in agriculture.
- **Household Characteristics**: We used household level variables including land ownership, livestock ownership, and household size.
- **Opportunity Cost**: We expected the opportunity cost of visiting a clinic to impact the perceived value of the cash transfer. As such, we created two variables related to distance to the clinic to capture this. First, we used GPS data to map the linear distance between an individual's home and the nearest clinic. Second, we created a dummy variable for those above and below the median distance to their respective clinic. The dummy variable was used for the analyses.
- **Social Network**: We also created two social network variables for inclusion in the spillover analysis derived from the endline survey. They included:
  - Total number of people in an individual's social network that were in Treatment Arm 1
  - Total number of people in an individual's social network that were in Treatment Arm 2

  Future analyses will separate the reasons for which individuals are connected in a social network. However, due to relatively low turn-out in each arm, these analyses will have limited power.

6.2 Estimating Equations

Treatment Effects

The core specification for our pooled analysis (where we ignore potential spillovers) is:

$$SCREEN_i = \beta_0 + \beta_1 Info_i + \beta_2 Cash_i + \sum_{j=3}^{n} \beta_j X_i + \epsilon_i \tag{6.1}$$

In this analysis, β_1 represents the difference in screening rates between the information-only treatment arm (T1) and the control arm. β_2 represents the difference between the cash transfer treatment arm (T2) and the control group. $\beta_2 - \beta_1$ represents the additional screening uptake by including cash in addition to information.

Because we stratified our randomization using gender, age, density, and village, β_3 through β_n represent dummies for each of the categories used.

To increase the precision of our results, we also ran two additional specifications that include controls for both household characteristics and the clinical/non-clinical individual level characteristics described above.

Heterogeneous Effects

Financial Incentives

Because we provided uniform financial incentives for all individuals, it was important to assess whether or not the impact of financial incentives differed depending on their relative value. In our case, the opportunity cost of visiting the clinic was significantly higher for those individuals that live further away. The time and financial cost of walking 100 meters to the clinic was significantly different than those who need to take some mechanical transport several kilometers.

We captured these heterogeneous effects by using the following specification that interacts the treatment variables with the distance measures described above.

$$\begin{aligned} SCREEN_i = &\beta_0 + \beta_1 Info_i + \beta_2 Cash_i + \sum_{j=3}^{n} \beta_j X_i + \\ &\beta_{10} MedDist + \beta 11 MedDistXInfo + \beta 12 MedDistXCash + \epsilon_i \end{aligned} \tag{6.2}$$

In particular we expect to see the impact of the cash transfer to be lower the further away an individual is from a clinic.

Spillovers

Our study design was intended to allow us to measure spillover effects in two ways, both of which are specified in the pre-analysis plan:

1. Using study design (phased roll-out)
2. Control for potential network effects

Study Design

The roll-out of our study was in two phases across geographically distinct, but demographically similar villages which allowed us to estimate the difference between control individuals who lived in proximity to treated individuals, and individuals who are unlikely to interact

regularly with treated individuals (both control and treatment arms of Phase 2 villages). By analyzing only the first phase of the intervention in isolation, we could capture this difference.

$$SCREEN_i = \beta_0 + \beta_1 Control + \beta_2 Info_i + \beta_3 Cash_i + \sum_{j=4}^{n} \beta_j X_i + \epsilon_i \tag{6.3}$$

Now, β_1 represents the difference between individuals who did not receive the treatment (but lived in the same village as those who did) and those who did not receive treatment and lived far away from treated individuals. β_2 and β_3 now represent the difference between treatment and those not likely susceptible to spillovers. This specification is important as, if there is a high amount of spillover between treatment and control arms, our naive specification from Section 5.3 was likely to underestimate the true impact of the intervention.

As will be seen in the results section, no control individuals from our intervention sample came in for screening. As such, this analytical approach is redundant and omitted from this study.

Network Controls

Our second way of capturing spillovers was to explicitly include controls for the size of an individual's social network. We have two specifications that were used for each potential network definition:

$$SCREEN_i = \beta_0 + \beta_1 Info_i + \beta_2 Cash_i + \sum_{j=3}^{n} \beta_j X_i + \beta_{10} Network1 + \beta_{11} Network2 + \epsilon_i \tag{6.4}$$

and

$$\begin{aligned} SCREEN_i = &\beta_0 + \beta_1 Info_i + \beta_2 Cash_i + \sum_{j=3}^{n} \beta_j X_i + \beta_{10} Network1 + \\ &\beta 11 Network1 X Info + \beta 12 Network1 X Cash + \epsilon_i \\ &\beta 13 Network2 + \beta 14 Network2 X Info + \beta 15 Network2 X Cash + \epsilon_i \end{aligned} \tag{6.5}$$

In equation 5, $\beta 10$ allows us to assess the overall association of knowing more individuals from T1, and $\beta 11$ represents the overall association of having more individuals from T2 in their network. Equation 6 allows us to see if those effects are compounded by also being in a given treatment arm.

Standard Error Adjustments

Our study was randomized at the individual level with only three villages that were demographically very similar. Standard errors were adjusted for heteroskedasticty by applying robust standard errors.

Chapter 7

Results

The intervention resulted in text messages being sent to 221 individuals in Mlodaa and Mlowa Barabarani. This is fewer than the expected 336 individuals (see 7.1 Attrition from the Sample) due to cell phone numbers no longer being valid. Of the 390 total individuals in the used sample, only 18 visited a clinic to be screened for hypertension and diabetes during the study period. However, when we include individuals not in our original sample, 46 individuals from our sampling frame got screened, more than double in magnitude to what would be found if we restricted our analysis to the original sample (another 6 were screened who were not matched to our sampling frame and excluded from all analyses due to a lack of data). Tables 5 and 6 provide the unadjusted means for screening by treatment arm, as well as treatment arm and village.

In this section, we discuss the overall results of the study focusing on the intervention as conducted in Mlodaa and Mlowa Barabarani villages. First, we discuss attrition from the study. Second, we analyze the base results of the analysis. Third, we assess the impact of being further away from a clinic. Fourth, we allow for the effects of social networks. Fifth, we examine the results in Mlodaa, where there was definitely no interference with Amref. Sixth, we briefly discuss the cost of the intervention. And seventh, we assess how our intervention relates to health.

7.1 Attrition from the Sample

Given the low migration in our sample and non-invasiveness of our intervention, we expected low attrition from the study due to drop-outs or not consenting to endline surveys. However, as a result of the amount of time between when the baseline sample was collected (late 2016) and when the intervention was run, we ultimately experienced 19% attrition which was higher than expected. This was also due to individuals not being home or unavailable for interview because of to the agrarian nature of the population.

Given the transiency of phone numbers as well as the possibility for study participants to leave their phones off for long periods of time, there was a high probability that a significant

proportion of our study population did not receive some or all of the messages being sent. Based on pilot results, we expected this number to be between 20% and 40%. Ultimately, 23% of the phone numbers messaged were unable to receive messages. These were all in the treatment arms as no text messages were sent to the control arms.

To test whether attrition was a concern, we regressed treatment status and relevant controls on a dummy for whether or not an individual attrited from the sample as well as whether their phone numbers were invalid. Table 7 assesses whether either attrition or non-working cell phones were associated with the treatment assignment or other relevant traits. Model 1 used the full intervention sample whereas Model 2 only used the treatment arms as no messages were sent to the control arms. As the table shows, neither form of attrition was associated with treatment assignment.

We found no relationship between assignment to treatment and attrition which provides confidence in the internal validity of our experiment. There was a weak association between endline attrition and gender, high population density, and age groups. All of these are controlled for in our analyses. The 43-54 year old age group was significantly more likely to have a non-working phone than either other age group. We have no clear understanding of why this may be, but age groups are also controlled for in our analyses.

7.2 Core Results

Before presenting the results of the study using only the final analytical sample described in Figure 4, we first assess the impact of the intervention on the full sample as randomized. Table 8 includes all individuals assigned to treatment in Models 1-4, whereas Models 5-8 exclude Makangwa. In these models, we used an increasing number of controls, beginning with no controls, then including stratification variables, household controls, and individual controls respectively. In the full sample model without excluding Makangwa, we saw a roughly five percentage point increase in the probability of visiting a clinic for screening for those in the cash arm, and a four percentage point increase in the probability of visiting a clinic for those in the information arm.

As is to be expected, these results increase when we remove Makangwa Village in Models 5-8. This is a result of the very low turn-out in Makangwa due to the Amref screening program the week prior to implementation there. That said, these results represent a lower bound due to the inclusion of individuals we know did not receive messages.

Table 9, on the other hand, represents the impact of the study accounting for the removal of Makangwa Village as well as those who did not meet the inclusion criteria of having a working cell phone. In the fully unadjusted model, we saw a nine percentage point increase in the probability of being screened for those in the cash arm and a seven percentage point increase for those in the information arm. There is no statistical difference between the two treatment arms. This is relatively consistent across all models. We also found the first evidence for potential spillover in that those in medium and high density areas were four percentage points more likely to come in than those in low density areas.

When including individual controls, we accounted for whether or not an individual had been screened previously for high blood pressure. This variable may be problematic in that the question was asked retrospectively and showed a statistically significant difference between treatment and control arms. While omitted from the displayed results, it represented a forty percentage point increase in the probability of visiting a clinic. This is taken as further evidence of the potential recall bias in that survey question. It is still included as an individual control, however, with minimal impact on the coefficients of interest on the information and cash arms.

7.3 Financial Incentives and Distance Results

While the base results hinted population density is associated with the impact of our intervention, we also want to explicitly examine whether distance to the facility was as well. Thus, in Table 10, we included a dummy variable for median distance to clinic with those living beyond the median distance being assigned 1, and those closer assigned 0. In Models 5-8, we also interact this dummy with the treatment arms.

In Models 1-4, we saw that including the distance dummy has no impact on the results of our treatment arms. We do, however, see a statistically significant decrease of five percentage points in the probability of visiting the clinic for those who live further away from the clinic. This indicates that interventions of this variety are less effective the further from a clinic one lives.

In Models 5-8, we also included the interaction terms with the treatment arms. The interaction terms are not statistically significant, but do have a relatively stable negative value of $-.08$. Further, we saw that when accounting for this interaction, the impact of the cash and information arms increased by approximately four percentage points. Taken jointly, this indicates that the impact of the treatment arms was directly associated with the distance needed to travel to visit a clinic. Given that the financial incentives were the same across all individuals, this likely means that a higher cash transfer would better incentivize individuals to visit clinics if they are further away. In other words, given the opportunity cost of traveling longer distances, the financial incentive likely was not enough to create a negative total cost of being screened.

7.4 Network Effect Results

In both our base results and when examining financial incentives and distance, we saw evidence that both distance and density may play a role in the effectiveness of the intervention. Given the high correlation between these two measures, directly accounting for the social networks of individuals can provide evidence that density is as important as clinic distance.

In Table 11, we ran the same models as Table 9, however now we include ordinal variables indicating the number of people in a network that were in the information arm or the cash arm

(Info Network and Cash Network, respectively). Including the network controls resulted in a slight increase in the cash and information arm coefficients. They were still not statistically distinct from one another.

We found, however, diverging results from the information and cash network coefficients. Knowing an individual in the information arm was associated with a statistically significant three percentage point decrease in the probability of visiting a clinic. Knowing someone in the cash arm was associated with a nine percentage point increase in the probability of visiting the clinic. Both results are consistent with our theoretical model. One reason for this behavior could be that individuals in specific treatment arms were more likely to believe the text messages and act if others got a message that was at least as strong as theirs.

In Table 12, we see just that. By also interacting the network variables with treatment assignment, we found that being in the cash arm and knowing others in the cash arm was associated with a twenty-six percentage point increase in the probability of visiting a clinic. Conversely, being in the cash arm and knowing people in the information arm was associated with a nine percentage point decrease in the probability of coming in. This indicates a strong relationship between the perception of a received text message and whether others in an individuals social network got the same text message. We also found that including a past history of blood pressure measurement in the individual controls specification attenuated the coefficient on both interactions (Model 4). Given the problematic nature of this variable discussed in Section 4.6, we include a fifth specification (Model 5) that omits it.

While 18 individuals from our sample visited the clinic during the intervention, none of them were in the control arm. However, 28 people from the broader population did come in who did not receive text messages. As shown in Table 1, these individuals were systematically different from those in our sample, however, they can still be used to assess the nature of any network effects. In Table 13, we looked only at individuals in the control arms and non-intervention sample that came into the clinic. By regressing clinic visitation on the social network variables, we could assess how knowing individuals in specific treatment arms was associated with actual visitation. Indeed, we found that knowing individuals in the cash arm was associated with a seven to eight percentage point increase in the probability of visiting a clinic whereas there was no association with knowing individuals in the information arm. The magnitudes of these results are likely biased upward as we do not have social network data on individuals who did not visit the clinic; however, the disparity in association between information and cash networks is instructive.

7.5 Mlodaa Village Results

Although Makangwa was easily excluded from the analysis due to the high level of interference from the Amref intervention, our endline survey showed that approximately thirty percent of our sample in Mlowa Barabarani had also heard about the intervention. Indeed, given the proximity seen in Figure 3 between Mlowa Barabarani and Makangwa, this is not surprising. To understand the potential impact of our intervention in the absence of any

interference we also present the results for just Mlodaa Village, where only four percent of our sample had heard of the Amref intervention.

Tables 14-17 replicate the analyses from the prior sections. The main difference in these results is that the magnitude of the impact of the cash arm is higher, and the information arm is actually lower. Despite this, we still find no statistically significant difference between the two arms when using robust standard errors. We also see that the positive and negative impacts of distance, knowing someone in the information arm, and knowing someone in the cash arm are also amplified.

7.6 Cost

To estimate the cost of the intervention for scale-up purposes, we focus on the cost of the messaging, the cash transfer costs, and the cost of the software used to send the messages. Importantly, we did not include the costs of blood pressure monitoring or glucose testing equipment as these were supposed to be in place already.

Each message sent for this intervention cost 0.013 USD with a total of 4,806 messages being sent out. Of the 59 individuals screened from the full sample, 15 were in the cash transfer arm and each received 0.87 USD. This bringing the total cost of the intervention itself to just $75.52, resulting in a cost of $1.28 per person screened.

Two other costs associated with implementing this intervention were data entry costs for ingesting phone numbers and the cost of the messaging software. Assuming 1 day for data entry, the cost for a nurse to upload phone numbers would be $15. While the cost of the messaging software for this trial was free, the market rate would be approximately $100 per month for two months, bringing the total cost per person screened to $4.92. The per person cost from a technology standpoint would only diminish as the monthly fee charged by our partner does not increase with volume.

7.7 Health Outcomes

The intervention was targeted to a general population of individuals over the age of 35 who had access to a cellular phone. According to Mayige and Kagaruki (2013) we might expect to see a hypertensive prevalence as high as 25% in our population of interest. Of the 18 individuals from our intervention sample that were screened only 2 (11%) were hypertensive. Of the 26 individuals that were screened who were not in our intervention sample, 6 (23%) were hypertensive. This matches the overall hypertension prevalence measured at endline of 23%. These results imply that while the individuals incentivized by the intervention to be screened were healthier than the average population, those who came in due to some form of spillover were less healthy. While we are still collecting endline blood pressure measurements from some individuals, it appears that about roughly half the hypertensive individuals now have their blood pressure under control.

As part of the study, we also measured random blood glucose levels to see if there was any indication of diabetes in the population. Based on prior research, we would expect a low prevalence of diabetes. Indeed, of all individuals screened at the facilities, only 3% had a capillary blood glucose level over 8. At endline, the proportion was equally low.

Figure 6 is a density displaying the average systolic blood pressure of the individuals that visited the clinic relative to the average systolic blood pressure of the full sample at endline. This shows the that those who visited the clinic were, on average, healthier than the overall population.

Chapter 8

Discussion

8.1 Contribution to Research and Policy

Cost-effectiveness

The research has shown that an SMS-based intervention can be moderately effective in encouraging hypertension and diabetes screening. By demonstrating a positive impact on screening rates in two rural Tanzanian villages, we provide evidence for another tool for policy-makers to consider when trying to motivate NCD screening in their communities. From a cost-effectiveness perspective, the additional $4.95 per person screened is relatively low additional cost to a hypertension prevention strategy. Rosendaal et al. (2016) looked at a population-based strategy in rural Nigeria and found a per-person cost of between $60 and $100. Similarly, Ngalesoni et al. (2016) found the incremental costs of primary medical prevention of cardiovascular disease in Tanzania to be at least $167 for the most cost-effective options, meaning the additional cost of screening would be relatively low. Gaziano et al. (2015) found strong evidence for the cost-effectiveness of screening programs, however, their work relied on community health workers as opposed to staff already in place, thus increasing costs as scale increases.

While we do not have full details on the Amref study, it is also noteworthy that across all three villages where we ran our intervention, 30% of individuals who had heard of their program got screened because of it. The network effects suggest that at scale, an intervention such as our that focuses on cash transfers could have a similar effect.

Complementary Interventions

Our study indicates that an SMS-based intervention on its own is not likely to be very successful. When comparing the information-only and the cash treatment arms, it is clear that while the difference between the cash and information arms is not statistically significant, the cash arm plays a large role in uptake. By increasing uptake of the screening by two to three times, we have shown both the importance of, and need for, the utilization of cash-

transfers. Whereas transfers have almost exclusively been a tool for education, preventing communicable disease, and improving reproductive, maternal, and child health, this study shows that they can also be used to target mostly older populations for preventive screening services.

Similarly, our research shows the need to improve the training of clinical staff at the dispensary level in rural Tanzania, otherwise interventions such as these are destined to fail. While Rashid (2015) emphasizes in the Health Sector Strategic Plan that dispensaries such as the ones used in our implementation are a critical part of preventive services moving forward in Tanzania, the clinical staff at all facilities had to be trained on basic preventive screening techniques. Further, the lack of training resulted in the intervention relying on, in the case of blood pressure measurement, costly mechanical devices. At scale, an intervention such as this should depend on staff and technology already accessible by facilities.

Network Effects

Most notably, this research provides further evidence for the importance of accounting for network effects when measuring the impact of an intervention. We found the magnitude of the network effect to be both statistically and economically significant within our sample. Accounting for this increased our understanding of the effect we would have measured simply by ignoring the relationship between individuals. From a methodological standpoint, this is a critical insight. As the literature on network effects continues to grow, this research provides another example of how an intervention with a relatively small effect size can be grossly mischaracterized if not analyzed appropriately.

Further, our study provides important evidence for the potential of SMS-based interventions to go beyond those who own cellular phones. While cell phone access continues to grow at tremendous rates, there is still a significant part of the population in LMICs that do not have access to their own phones (Okeleke and Suardi, 2019). This was the case in rural Chamwino where only half of the potential study sample had access to a cellular phone and less than a fifth owned their own phone. Despite this, 61% of the population screened through our intervention did not receive a text message. As researchers and policymakers are considering large-scale interventions, our research demonstrates that SMS-based interventions should not be ignored simply because of low phone ownership rates.

8.2 Implementation and Scale-up Roadblocks

Despite our considerable findings, there were two critical areas that affected the implementation of the intervention: early rain and competing interventions.

Early Rain

The rainy season in the Chamwino District normally begins in late February. In early 2019, however, the rains came nearly two months early. As a result, many study participants started tending to their crops earlier than they otherwise would have. Based on anecdotal information from the field, this increased the opportunity cost of screening beyond what was measured in the pilot study. Our likely underestimation of the opportunity cost would result in lower effectiveness of the cash transfer arm and potentially lower effectiveness of the spillover effect. While little can be done analytically to address this issue, it is important to understand that it likely bounds our results from below.

Intervention Overlap

As discussed previously, one implementation roadblock that does affect our analytical approach was the implementation of a large-scale screening program run by Amref in Makangwa. While initially implementation would occur in Mlodaa Village first, followed by Mlowa Barabarani and Makangwa simultaneously thereafter, the day before the second phase was to begin, our field coordinator was informed about the Amref effort. As a result, we chose to delay the field implementation in Makangwa for one week. In addition, we added a questionnaire to the endline survey to estimate the percentage of study participants who may have heard of or participated in the Amref screening as this had the potential to significantly affect our intervention. 73% of individuals in Makangwa had heard of the Amref screening with over 30% attending screening during that week. This correlates closely with the fact that we did not see any uptake of our intervention in Makangwa.

8.3 Future Research

There are still important questions raised by this research that must be addressed in the future. First, quantitative and qualitative work on this intervention is still being developed. Follow-up blood pressure measurements have yet to be taken for all hypertensive individuals to assess whether or not there is any association between being screened positive for hypertension and controlling that hypertension. Further qualitative surveys of those who were and were not screened are currently being developed and will be rolled out in early 2020.

Second, the importance of social networks in the spillovers observed in this study cannot be understated. A rich data set was created that includes social network attributes that are not currently included in this study. The measures of social network density in this research only include whether or not someone was in a participant's network, not why they were in that network. Initial findings suggest that the current data set is underpowered to find any effects for narrower attributes, but this should be explored further.

Similarly, new techniques in social network analysis should be used to assess the impact of this intervention. Sofrygin et al. (2018) have developed analytical methods and packages

designed specifically to analyze interventions such as ours and could help illustrate the importance of understanding social networks when implementing these types of interventions.

8.4 Conclusion

Our research found that combining text messages with cash transfers was able to increase non-communicable disease screening rates by roughly ten percentage points. We also found both positive and negative feedback loops from knowing other individuals in the cash and information treatment arms, respectively. This research demonstrates the potential for combining SMS-based interventions with financial incentives to increase screening rates for non-communicable diseases in low- and middle-income countries. By directly and indirectly accounting for network effects, our work shows that these types of interventions can reach well beyond their intended targets. Further it points to the need for accounting for the potential of network effects when designing this type of research.

Chapter 9

Research Team

This research was led by Zachary Olson and Fredrick Manang under the supervision of William H. Dow. Fieldwork was coordinated by Theophile Rugaimbila.

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Figures

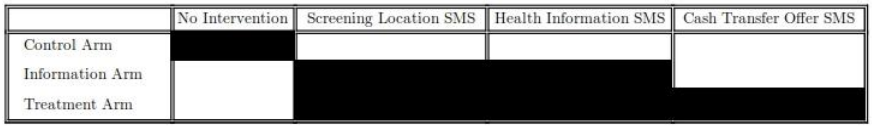

Figure 1: Intervention Structure

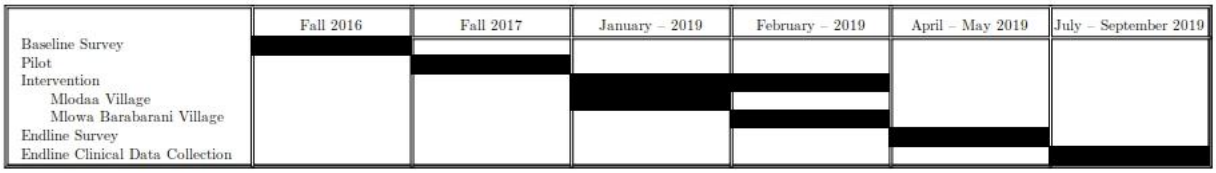

Figure 2: Intervention Timeline

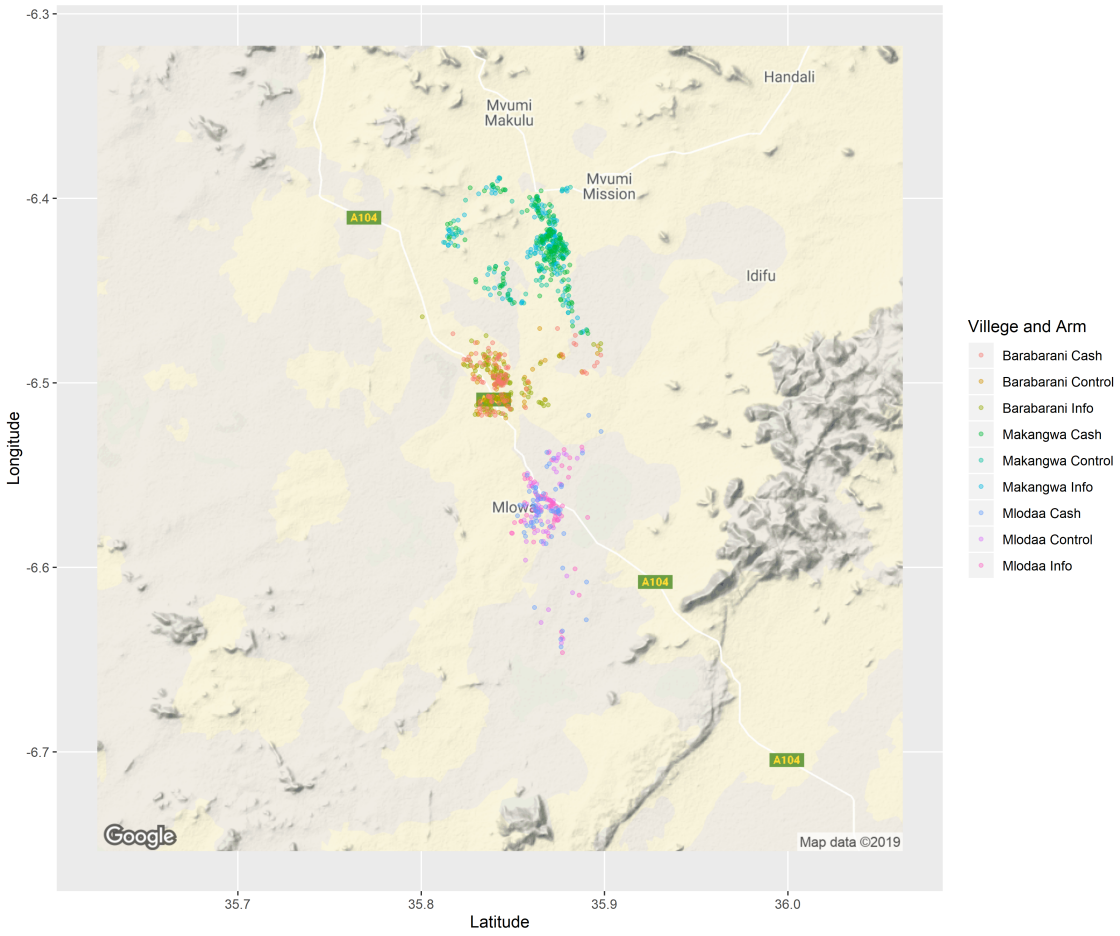

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Figure 3: Intervention Map

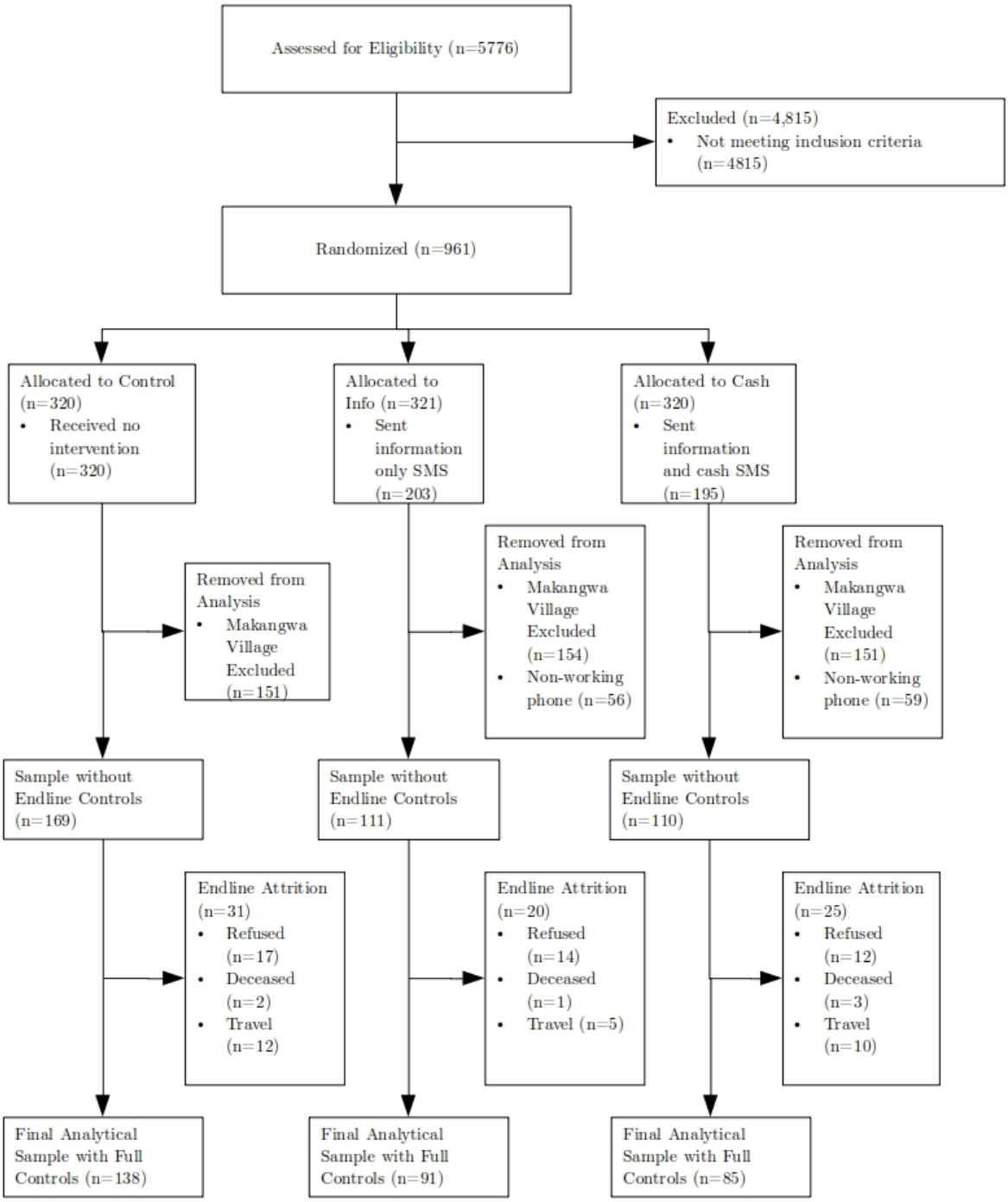

Figure 4: Consort Diagram

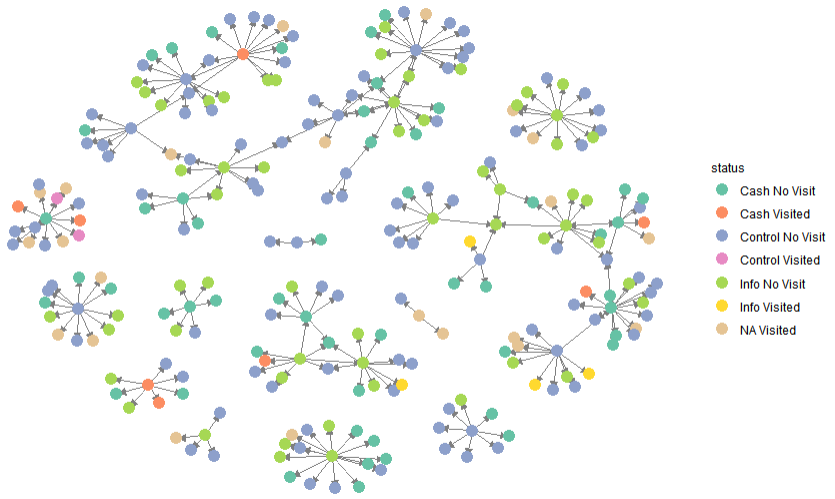

Figure 5: Directed Network Graph

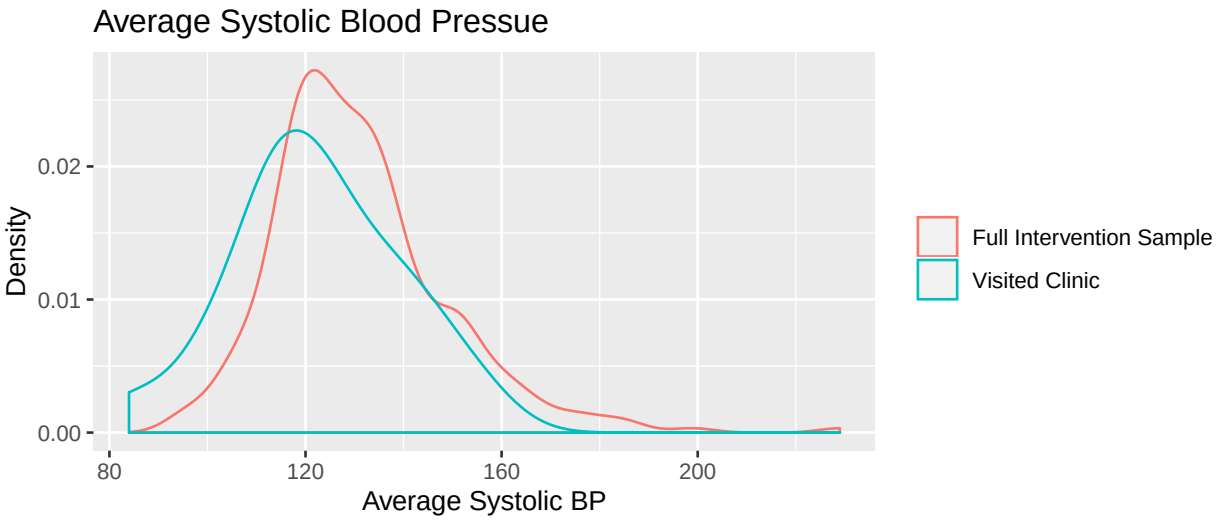

Figure 6: Blood Pressure by Group

Tables

Table 1: Summary Statistics - Analytical Sampling Frame

	Intervention N=505	No Intervention N=3141
Gender:		
Female	246 (48.7%)	1810 (57.6%)
Male	259 (51.3%)	1331 (42.4%)
Age	50.6 (11.4)	55.2 (15.4)
Highest Education:		
Higher	3 (0.79%)	22 (1.22%)
Preschool	0 (0.00%)	2 (0.11%)
Primary School	371 (97.4%)	1739 (96.5%)
Secondary School	7 (1.84%)	40 (2.22%)
Crop Farmer	0.90 (0.30)	0.87 (0.34)
Num. of Rooms	2.57 (1.06)	2.22 (1.03)
Electricity	0.02 (0.13)	0.02 (0.14)
Radio	0.40 (0.49)	0.29 (0.45)
Bike	0.48 (0.50)	0.35 (0.48)

Table 2: Amref Interference - Original Intervention Sample

	Barabarani N=262	Makangwa N=349	Mlodaa N=143
Heard about Amref Program	0.29 (0.45)	0.73 (0.45)	0.04 (0.20)
Proportion of those who heard about Amref that got screened	0.30 (0.46)	0.31 (0.46)	0.33 (0.52)

Table 3: Summary Statistics - Analytical Sample

	Barabarani N=216	Mlodaa N=174
Gender:		
Female	120 (55.6%)	65 (37.4%)
Male	96 (44.4%)	109 (62.6%)
Age	50.3 (11.6)	50.5 (11.4)
Highest Education:		
Higher	3 (1.82%)	0 (0.00%)
Primary School	158 (95.8%)	126 (97.7%)
Secondary School	4 (2.42%)	3 (2.33%)
Crop Farmer	0.87 (0.34)	0.95 (0.22)
Num. of Rooms	2.56 (1.14)	2.61 (0.96)
Electricity	0.04 (0.19)	0.00 (0.00)
Radio	0.39 (0.49)	0.42 (0.49)
Bike	0.52 (0.50)	0.44 (0.50)
Friends in Cash Arm	0.20 (0.48)	0.33 (0.58)
Friends in Info Arm	0.31 (0.56)	0.34 (0.58)
Has had BP Measured	0.12 (0.33)	0.16 (0.36)
Smoker	0.08 (0.28)	0.05 (0.22)

Table 4: Baseline Balance - Analytical Sample

	Control N=169	Info N=111	Cash N=110	p.overall	p.Control vs Info	p.Control vs Cash	p.Info vs Cash
Gender:				0.640	1.000	0.810	0.810
Female	83 (49.1%)	54 (48.6%)	48 (43.6%)				
Male	86 (50.9%)	57 (51.4%)	62 (56.4%)				
Age Groups:				0.237	0.339	0.339	0.811
(0,43.1]	47 (27.8%)	36 (32.4%)	38 (34.5%)				
(43.1,53.7]	69 (40.8%)	32 (28.8%)	34 (30.9%)				
(53.7,100]	53 (31.4%)	43 (38.7%)	38 (34.5%)				
Highest Education:				0.229	0.338	0.338	0.605
Higher	1 (0.77%)	2 (2.33%)	0 (0.00%)				
Primary School	128 (98.5%)	81 (94.2%)	75 (96.2%)				
Secondary School	1 (0.77%)	3 (3.49%)	3 (3.85%)				
Crop Farmer	0.91 (0.29)	0.89 (0.31)	0.91 (0.29)	0.900	0.928	0.994	0.903
Num. of Rooms	2.56 (1.05)	2.56 (1.17)	2.65 (0.95)	0.761	1.000	0.772	0.816
Electricity	0.01 (0.11)	0.02 (0.13)	0.04 (0.19)	0.362	0.932	0.336	0.602
Radio	0.38 (0.49)	0.41 (0.49)	0.44 (0.50)	0.616	0.823	0.605	0.941
Bike	0.54 (0.50)	0.41 (0.49)	0.46 (0.50)	0.091	0.084	0.384	0.744
Friends in Cash Arm	0.22 (0.53)	0.25 (0.49)	0.28 (0.57)	0.727	0.918	0.707	0.926
Friends in Info Arm	0.31 (0.58)	0.38 (0.55)	0.27 (0.56)	0.396	0.607	0.859	0.378
Has had BP Measured	0.08 (0.27)	0.18 (0.38)	0.19 (0.39)	0.032	0.095	0.057	0.969
Smoker	0.08 (0.27)	0.08 (0.27)	0.05 (0.21)	0.623	0.996	0.625	0.720

Table 5: Unadjusted Means by Treatment Arm

	Control N=169	Info N=111	Cash N=110	p.overall
Visited Clinic	0.00 (0.00)	0.07 (0.26)	0.09 (0.29)	0.001

Table 6: Unadjusted Means by Treatment Arm and Village

	Mlodaa				Mlowa Barabarani			
	Control N=67	Info N=53	Cash N=54	p.overall	Control N=102	Info N=58	Cash N=56	p.overall
Visited Clinic	0.00 (0.00)	0.06 (0.23)	0.13 (0.34)	0.009	0.00 (0.00)	0.09 (0.28)	0.05 (0.23)	0.016

Table 7: Attrition

	Dependent variable:	
	Attrition at Endline	Non-working Phone
	OLS	*OLS*
	(1)	(2)
Information	−0.012	
	(0.048)	
Cash	0.025	0.014
	(0.050)	(0.052)
Male	0.078*	−0.070
	(0.040)	(0.052)
Mid Density	−0.031	0.038
	(0.049)	(0.063)
High Density	−0.081*	−0.013
	(0.049)	(0.066)
43-54 Yrs	−0.088*	0.140**
	(0.051)	(0.067)
54+ Years	−0.056	0.055
	(0.054)	(0.065)
Crop Farmer	0.060	−0.058
	(0.061)	(0.091)
Agricultural Land	−0.137	0.027
	(0.141)	(0.114)
Constant	0.310*	0.323**
	(0.160)	(0.151)
Observations	390	336
R^2	0.033	0.022
Adjusted R^2	0.010	−0.002
Residual Std. Error	0.395 (df = 380)	0.476 (df = 327)
F Statistic	1.424 (df = 9; 380)	0.904 (df = 8; 327)
Note:	*p<0.1; **p<0.05; ***p<0.01	
	Robust standard errors in parentheses	
	Mid Density= 4-9 people within 200m	
	High Density=More than 9 people within 200m	

Table 8: Results - All Individuals as Randomized

	Dependent variable:							
	Visited Clinic							
	OLS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Information	0.042***	0.038**	0.037**	0.038**	0.062**	0.058**	0.058**	0.044*
	(0.016)	(0.016)	(0.015)	(0.018)	(0.025)	(0.026)	(0.026)	(0.026)
Cash	0.054***	0.050***	0.048***	0.052***	0.080***	0.077***	0.075***	0.056*
	(0.018)	(0.017)	(0.017)	(0.020)	(0.028)	(0.028)	(0.029)	(0.029)
Male		0.004	0.002	0.015		0.009	0.008	0.023
		(0.010)	(0.011)	(0.013)		(0.017)	(0.017)	(0.017)
Mid Density		0.011	0.011	0.016		0.033	0.032	0.059**
		(0.012)	(0.012)	(0.016)		(0.022)	(0.021)	(0.025)
High Density		0.024*	0.026*	0.024		0.042*	0.044*	0.077***
		(0.014)	(0.014)	(0.016)		(0.025)	(0.024)	(0.027)
43-54 Yrs		−0.003	−0.005	0.012		0.009	0.009	0.031
		(0.013)	(0.013)	(0.016)		(0.022)	(0.022)	(0.024)
54+ Years		−0.001	0.002	0.018		0.006	0.009	0.030
		(0.014)	(0.015)	(0.018)		(0.022)	(0.024)	(0.025)
Makangwa		−0.019*	−0.020*	−0.036***				
		(0.011)	(0.011)	(0.014)				
Mlodaa		0.027	0.026	0.039*		0.026	0.024	0.035
		(0.020)	(0.019)	(0.023)		(0.020)	(0.020)	(0.023)
Constant	0.007**	0.001	0.015	0.031	0.011*	−0.030	0.002	−0.038
	(0.004)	(0.017)	(0.051)	(0.070)	(0.006)	(0.028)	(0.073)	(0.071)
Strat Controls	NO	YES	YES	YES	NO	YES	YES	YES
HH Controls	NO	NO	YES	YES	NO	NO	YES	YES
Ind Controls	NO	NO	NO	YES	NO	NO	NO	YES
Observations	961	961	961	754	505	505	505	405
R^2	0.022	0.036	0.039	0.125	0.032	0.043	0.046	0.314
Adjusted R^2	0.020	0.027	0.027	0.108	0.028	0.028	0.025	0.291

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Mid Density= 4-9 people within 200m
High Density=More than 9 people within 200m
Models 1-4 include all villages with no post-randomization sample removal
Models 5-8 include only Mlodaa and Mlowa Barabarani with no post-randomization sample removal

Table 9: Analytical Sample Results

	Dependent variable:			
	Visited Clinic			
	OLS			
	(1)	(2)	(3)	(4)
Information	0.072***	0.072***	0.071***	0.082***
	(0.025)	(0.025)	(0.025)	(0.030)
Cash	0.091***	0.090***	0.090***	0.081**
	(0.028)	(0.027)	(0.028)	(0.039)
Male		0.017	0.014	0.031
		(0.020)	(0.021)	(0.025)
Mid Density		0.048*	0.049*	0.074*
		(0.027)	(0.027)	(0.040)
High Density		0.038	0.040	0.092**
		(0.027)	(0.026)	(0.040)
43-54 Yrs		0.015	0.013	0.035
		(0.026)	(0.026)	(0.035)
54+ Years		0.012	0.014	0.054
		(0.026)	(0.028)	(0.039)
Mlodaa		0.018	0.019	0.030
		(0.022)	(0.022)	(0.032)
Constant	−0.000	−0.051	−0.074	−0.215**
	(0.000)	(0.031)	(0.073)	(0.098)
Strat Controls	NO	YES	YES	YES
HH Controls	NO	NO	YES	YES
Ind Controls	NO	NO	NO	YES
Observations	390	390	390	240
R^2	0.038	0.052	0.053	0.310
Adjusted R^2	0.033	0.032	0.025	0.263

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Mid Density= 4-9 people within 200m
High Density=More than 9 people within 200m

Table 10: Analytical Sample Results - Distance Effects

	Dependent variable:							
	Visited Clinic							
	OLS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Information	0.072***	0.073***	0.073***	0.082***	0.115***	0.116**	0.117**	0.103**
	(0.025)	(0.025)	(0.025)	(0.030)	(0.045)	(0.046)	(0.047)	(0.050)
Cash	0.086***	0.086***	0.086***	0.079**	0.127***	0.125***	0.125***	0.118**
	(0.027)	(0.027)	(0.027)	(0.038)	(0.042)	(0.041)	(0.042)	(0.055)
Male		0.020	0.017	0.033		0.023	0.020	0.035
		(0.020)	(0.021)	(0.026)		(0.021)	(0.022)	(0.026)
Mlodaa		0.011	0.013	0.028		0.008	0.010	0.023
		(0.022)	(0.022)	(0.032)		(0.022)	(0.022)	(0.032)
Distance	−0.047**	−0.050**	−0.052**	−0.034	0.000	−0.008	−0.009	−0.002
	(0.020)	(0.025)	(0.024)	(0.035)		(0.018)	(0.019)	(0.031)
Info X Distance					−0.081	−0.082	−0.083	−0.041
					(0.051)	(0.051)	(0.052)	(0.065)
Cash X Distance					−0.084	−0.082	−0.081	−0.091
					(0.052)	(0.051)	(0.052)	(0.076)
Constant	0.025**	−0.003	−0.035	−0.195**	−0.000	−0.022	−0.054	−0.197*
	(0.011)	(0.033)	(0.073)	(0.095)		(0.034)	(0.075)	(0.107)
Strat Controls	NO	YES	YES	YES	NO	YES	YES	YES
HH Controls	NO	NO	YES	YES	NO	NO	YES	YES
Ind Controls	NO	NO	NO	YES	NO	NO	NO	YES
Observations	390	390	390	240	390	390	390	240
R^2	0.050	0.059	0.060	0.312	0.060	0.068	0.069	0.317
Adjusted R^2	0.043	0.037	0.030	0.263	0.048	0.041	0.034	0.261

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Distance: Dummy variable equal to 1 if Individual is above median distance to clinic
Median distance to clinic=1.13km

Table 11: Analytical Sample Results - Network Effects

	Dependent variable:			
	Visited Clinic			
	OLS			
	(1)	(2)	(3)	(4)
Information	0.088^{***}	0.086^{***}	0.085^{***}	0.082^{***}
	(0.030)	(0.031)	(0.031)	(0.030)
Cash	0.111^{***}	0.111^{***}	0.110^{***}	0.077^{**}
	(0.032)	(0.032)	(0.032)	(0.037)
Male		0.024	0.019	0.031
		(0.024)	(0.025)	(0.026)
Info Network	-0.033^{*}	-0.035^{**}	-0.035^{**}	-0.035^{*}
	(0.017)	(0.017)	(0.017)	(0.019)
Cash Network	0.096^{***}	0.086^{**}	0.087^{**}	0.066^{**}
	(0.036)	(0.035)	(0.036)	(0.031)
Constant	-0.011	-0.056	-0.052	-0.210^{**}
	(0.008)	(0.036)	(0.098)	(0.104)
Strat Controls	NO	YES	YES	YES
HH Controls	NO	NO	YES	YES
Ind Controls	NO	NO	NO	YES
Observations	314	314	314	240
R^2	0.102	0.114	0.117	0.334
Adjusted R^2	0.090	0.085	0.079	0.283

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Info Network: # of people in social network in the Information Arm
Cash Network: # of people in social network in the Cash Arm

Table 12: Analytical Sample Results - Network Interactions

	Dependent variable:				
	Visited Clinic				
	OLS				
	(1)	(2)	(3)	(4)	(5)
Information	0.077**	0.074**	0.072*	0.066*	0.078*
	(0.036)	(0.038)	(0.038)	(0.039)	(0.041)
Cash	0.068**	0.068**	0.066**	0.036	0.079
	(0.033)	(0.032)	(0.033)	(0.042)	(0.049)
Info Network	0.000	−0.001	−0.002	−0.029	−0.001
	(0.000)	(0.005)	(0.006)	(0.020)	(0.007)
Cash Network	0.000	−0.012	−0.011	0.006	−0.009
	(0.000)	(0.008)	(0.009)	(0.015)	(0.009)
Info X Cash Netowrk	0.046	0.051	0.047	0.040	0.072
	(0.067)	(0.068)	(0.068)	(0.069)	(0.084)
Cash X Cash Network	0.259***	0.261***	0.264***	0.176*	0.273**
	(0.087)	(0.084)	(0.085)	(0.099)	(0.111)
Info X Info Netowrk	−0.003	−0.006	−0.002	0.017	−0.022
	(0.049)	(0.048)	(0.050)	(0.055)	(0.063)
Cash X Info Network	−0.087***	−0.090***	−0.088***	−0.009	−0.081*
	(0.029)	(0.029)	(0.028)	(0.039)	(0.042)
Constant	−0.000	−0.039	−0.050	−0.181*	−0.108
	(0.000)	(0.032)	(0.088)	(0.106)	(0.129)
Strat Controls	NO	YES	YES	YES	YES
HH Controls	NO	NO	YES	YES	YES
Ind Controls	NO	NO	NO	YES	YES
Observations	314	314	314	240	240
R^2	0.176	0.189	0.193	0.359	0.191
Adjusted R^2	0.154	0.151	0.147	0.297	0.122

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Info Network: # of people in social network in the Information Arm
Cash Network: # of people in social network in the Cash Arm
Model 5 omits *Past BP Measurement* individual control

Table 13: Network Effect on Controls and Non-intervention Individuals

	Dependent variable:			
	Visited Clinic			
	OLS			
	(1)	(2)	(3)	(4)
Info Network	−0.016	−0.018	−0.018	−0.019
	(0.019)	(0.020)	(0.020)	(0.020)
Cash Network	0.077**	0.069**	0.070**	0.048**
	(0.031)	(0.029)	(0.029)	(0.024)
Constant	0.037***	0.004	0.093	−0.106
	(0.011)	(0.030)	(0.102)	(0.073)
Strat Controls	NO	YES	YES	YES
HH Controls	NO	NO	YES	YES
Ind Controls	NO	NO	NO	YES
Observations	405	405	405	313
R^2	0.035	0.051	0.061	0.307
Adjusted R^2	0.030	0.035	0.037	0.272

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Info Network: # of people in social network in the Information Arm
Cash Network: # of people in social network in the Cash Arm

Table 14: Mlodaa Village Results

	Dependent variable:			
	Visited Clinic			
	OLS			
	(1)	(2)	(3)	(4)
Information	0.057*	0.055*	0.050*	0.068
	(0.032)	(0.031)	(0.029)	(0.053)
Cash	0.130***	0.131***	0.129***	0.148*
	(0.046)	(0.047)	(0.048)	(0.079)
Male		0.026	0.019	0.023
		(0.031)	(0.031)	(0.041)
Mid Density		0.092**	0.092**	0.105
		(0.044)	(0.044)	(0.070)
High Density		0.065	0.067	0.086
		(0.052)	(0.054)	(0.076)
43-54 Yrs		0.031	0.029	0.044
		(0.032)	(0.039)	(0.042)
54+ Years		0.104**	0.112**	0.150**
		(0.044)	(0.049)	(0.073)
Constant	0.000	−0.102**	−0.120	−0.158
		(0.045)	(0.090)	(0.102)
Strat Controls	NO	YES	YES	YES
HH Controls	NO	NO	YES	YES
Ind Controls	NO	NO	NO	YES
Observations	174	174	174	90
R^2	0.053	0.124	0.127	0.473
Adjusted R^2	0.042	0.087	0.073	0.382

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Mid Density= 4-9 people within 200m
High Density=More than 9 people within 200m

Table 15: Mlodaa Village Results - Distance Effects

	Dependent variable:							
	Visited Clinic							
	OLS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Information	0.053*	0.054*	0.050*	0.063	0.083	0.096	0.090	0.103
	(0.032)	(0.031)	(0.029)	(0.050)	(0.058)	(0.059)	(0.061)	(0.094)
Cash	0.121***	0.130***	0.129***	0.141*	0.207***	0.224***	0.224***	0.225*
	(0.044)	(0.047)	(0.048)	(0.077)	(0.077)	(0.082)	(0.083)	(0.129)
Male		0.026	0.019	0.022		0.033	0.025	0.024
		(0.031)	(0.031)	(0.041)		(0.033)	(0.033)	(0.042)
Distance	−0.068**	−0.006	−0.001	−0.027	0.000	0.071*	0.075*	0.032
	(0.034)	(0.031)	(0.032)	(0.050)		(0.038)	(0.038)	(0.052)
Info X Distance					−0.049	−0.069	−0.066	−0.057
					(0.067)	(0.069)	(0.073)	(0.103)
Cash X Distance					−0.167*	−0.177*	−0.179**	−0.169
					(0.086)	(0.091)	(0.091)	(0.145)
Constant	0.040*	−0.096*	−0.120	−0.138	0.000	−0.148**	−0.180*	−0.147
	(0.021)	(0.051)	(0.096)	(0.089)		(0.064)	(0.103)	(0.109)
Strat Controls	NO	YES	YES	YES	NO	YES	YES	YES
HH Controls	NO	NO	YES	YES	NO	NO	YES	YES
Ind Controls	NO	NO	NO	YES	NO	NO	NO	YES
Observations	174	174	174	90	174	174	174	90
R^2	0.074	0.124	0.127	0.473	0.096	0.147	0.151	0.485
Adjusted R^2	0.058	0.081	0.068	0.375	0.069	0.095	0.082	0.372

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Distance: Dummy variable equal to 1 if Individual is above median distance to clinic
Median distance to clinic=1.13km

Table 16: Mlodaa Village Results - Network Effects

	Dependent variable:			
	Visited Clinic			
	OLS			
	(1)	(2)	(3)	(4)
Information	0.103**	0.097**	0.085**	0.078
	(0.047)	(0.044)	(0.043)	(0.055)
Cash	0.178***	0.181***	0.178***	0.146*
	(0.057)	(0.058)	(0.060)	(0.076)
Male		0.041	0.019	0.008
		(0.040)	(0.040)	(0.041)
Info Network	−0.038	−0.052	−0.053	0.003
	(0.034)	(0.033)	(0.033)	(0.038)
Cash Network	0.159***	0.127**	0.133**	0.088*
	(0.058)	(0.054)	(0.055)	(0.047)
Constant	−0.043**	−0.120**	−0.116	−0.126
	(0.021)	(0.055)	(0.120)	(0.102)
Strat Controls	NO	YES	YES	YES
HH Controls	NO	NO	YES	YES
Ind Controls	NO	NO	NO	YES
Observations	122	122	122	90
R^2	0.198	0.261	0.282	0.502
Adjusted R^2	0.171	0.202	0.203	0.401

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Info Network: # of people in social network in the Information Arm
Cash Network: # of people in social network in the Cash Arm

Table 17: Mlodaa Village Results - Network Interactions

	Dependent variable:				
	Visited Clinic				
	OLS				
	(1)	(2)	(3)	(4)	(5)
Information	0.034	0.038	0.021	0.021	0.034
	(0.053)	(0.052)	(0.048)	(0.046)	(0.082)
Cash	0.077	0.083	0.069	0.073	0.089
	(0.051)	(0.053)	(0.056)	(0.079)	(0.094)
Info Network	0.000	−0.005	−0.015	0.003	−0.014
		(0.018)	(0.023)	(0.024)	(0.073)
Cash Network	−0.000	−0.028	−0.033	−0.015	−0.041
	(0.000)	(0.024)	(0.034)	(0.029)	(0.067)
Info X Cash Netowrk	0.052	0.051	0.058	0.083	0.102
	(0.126)	(0.118)	(0.117)	(0.107)	(0.132)
Cash X Cash Network	0.349***	0.347***	0.372***	0.227	0.352***
	(0.102)	(0.094)	(0.091)	(0.142)	(0.102)
Info X Info Netowrk	0.078	0.050	0.060	0.057	0.016
	(0.093)	(0.084)	(0.090)	(0.085)	(0.132)
Cash X Info Network	−0.123***	−0.138***	−0.119**	−0.060	−0.104
	(0.044)	(0.045)	(0.047)	(0.048)	(0.127)
Constant	−0.000	−0.066	−0.096	−0.108	−0.031
		(0.044)	(0.111)	(0.112)	(0.215)
Strat Controls	NO	YES	YES	YES	YES
HH Controls	NO	NO	YES	YES	YES
Ind Controls	NO	NO	NO	YES	YES
Observations	122	122	122	90	90
R^2	0.346	0.403	0.434	0.550	0.408
Adjusted R^2	0.299	0.331	0.348	0.428	0.268

Note: *p<0.1; **p<0.05; ***p<0.01
Robust standard errors in parentheses
Info Network: # of people in social network in the Information Arm
Cash Network: # of people in social network in the Cash Arm
Model 5 omits *Past BP Measurement* individual control

Appendix A

Message Schedule

Full Messaging Plan

Pure Control – No Messages

Treatment Arm 1 – Information Only

Week 1 – Day 1

Message 1 - We are messaging to inform you of the importance of being screened for hypertension and diabetes. These diseases are preventable and treatable.

Message 2 - Undiagnosed hypertension can lead to a high risk of heart attack, stroke, and other ailments. Undiagnosed diabetes can lead to kidney problems.

Week 1 – Day 2

Message 3 -We are currently offering free screening of hypertension and diabetes from Monday to Friday until March 1st. Please come visit the dispensary from 0900-1700.

Week 2 – Day 1

Message 4 - We remind you that we are currently offering free screening of hypertension and diabetes for the next 2 weeks. Please come visit the dispensary from 0900-1700 M-F.

Week3 – Day 1

Message 5 – We remind you of the importance of being screened for hypertension and diabetes. These diseases are preventable and treatable. Come get screened today.

Week 3 – Day 3

Message 6 - We remind you that there remains with only three days for screening of hypertension and diabetes. From today to Friday 1st March 2019, from 0900-1700.

Treatment Arm 2 – Information + Cash Transfer

Week 1 Day 1

Message 1 - We are messaging to inform you of the importance of being screened for hypertension and diabetes. These diseases are preventable and treatable.

Message 2 - Undiagnosed hypertension can lead to a high risk of heart attack, stroke, and other ailments. Undiagnosed diabetes can lead to kidney problems.

Week 1 – Day 2

Message 3 -We are currently offering free screening of hypertension and diabetes from Monday to Friday until March 1st. Please come visit the dispensary from 0900-1700.

Message 4 - The owner of this phone has been selected to receive 2000TZS at the conclusion of their visit to the dispensary if they are screened by March 1st 2019.

Week 2 – Day 1

Message 4 - We remind you that we are currently offering free screening of hypertension and diabetes for the next 2 weeks. Please come visit the dispensary from 0900-1700 M-F.

Message 5- The owner of this phone has been selected to receive 2000TZS at the conclusion of their visit to the dispensary if they are screened by March 1st 2019.

Week3 – Day 1

Message 5 – We remind you of the importance of being screened for hypertension and diabetes. These diseases are preventable and treatable. Come get screened today.

Week 3 – Day 3

Message 6 - We remind you that we are currently offering free screening of hypertension and diabetes for only one more week. Please come visit the dispensary from 0900-1700 M-F.

Message 7- The owner of this phone has been selected to receive 2000TZS at the conclusion of their visit to the dispensary if they are screened by March 1st 2019.

Appendix B

Questionnaires

Dodoma Cohort Study

DCS **QUESTIONNAIRE FOR ADULT MEN AND WOMEN**

MEN AND WOMEN INFORMATION PANEL	**MW**
MW1. Household ID ___ ___ ___	MW2. Sex of respondent 1-Male 2-Female
MW3. Participant's name: Name_____	MW4. Individual ID number: ___ ___
MW5. Interviewer number: ___ ___	MW6. Day / Month / Year of interview: ___ ___ / ___ ___ / ___ ___ ___ ___

.

MW7. Result of participant's interview	Completed ..... 01 Not at home ..... 02 Refused ..... 03 Partly completed ..... 04 Incapacitated ..... 05 Other (*specify*) _____ 06

MW8. Field supervisor's name and number: Name _____ ___ ___	

MW9. *Record the time.*	Hour and minutes ..... __ __ : __ __	

PARTICIPANT'S BACKGROUND	**B**

Dodoma Cohort Study

B1. IN WHAT MONTH AND YEAR WERE YOU BORN?	Date of birth Month..... __ __ DK month..... 98 Year ..... __ __ __ __ DK year..... 9998	
B2. HOW OLD ARE YOU?	Age (in completed years)..... __ __	
B3. HAVE YOU EVER ATTENDED ANY SCHOOL?	Yes ..... 1 No 2	2⇨B7
B4. WHAT IS THE HIGHEST LEVEL OF SCHOOL YOU ATTENDED?	Preschool..... 0 Primary ..... 1 Secondary ..... 2 Higher 3	0⇨B7
B5. HOW MANY YEARS OF FORMAL EDUCATION DID YOU COMPLETE?	Years of formal education..... __ __	
B6. *Check B4:* ☐ *Secondary or higher. ⇨ Go to Next Module* ☐ *Primary ⇨ Continue with B7*		
B7. NOW I WOULD LIKE YOU TO READ THIS SENTENCE TO ME. *Show sentence on the card to the respondent. If respondent cannot read whole sentence, probe:* CAN YOU READ PART OF THE SENTENCE TO ME?	Cannot read at all ..... 1 Able to read only parts of sentence..... 2 Able to read whole sentence ..... 3 No sentence in required language_____ 4 *(specify language)* Blind / mute, visually / speech impaired 5	

Dodoma Cohort Study

DISEASE HISTORY		**DH**
All questions refer only to selected specific diseases.		
DH1. NOW I WOULD LIKE TO ASK ABOUT ALL THE CURRENT AND PREVIOUS DISEASES YOU HAVE HAD DURING YOUR LIFE. HAVE YOU EVER BECAME CHONICALLY SICK?	Yes ..... 01 No 02	2⇨DH---
HISTORY OF RAISED BLOOD PRESSURE		**BP**
BP 1. Have you ever had your blood pressure measured by a doctor or other health worker?	Yes ..... 01 No 02	2⇨BP3
BP 2.What was the reason for taking a BP measurement?	Part of disease investigation……01 Part of medical examination for employment or school……02 Checking for my health status……03 Other reasons (specify)……04	
BP 3. Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?	Yes.....01 No.....02	2⇨DM1
BP4. How long ago were you told you had raised blood pressure?	Years ago	
BP5. .IF YOU HAVE RAISED BP, ARE YOU CURRENTLY RECEIVING ANY OF THE FOLLOWING TREATMENTS/ADVICE FOR HIGH BLOOD PRESSURE PRESCRIBED BY A DOCTOR OR OTHER HEALTH WORKER?		
BP 5A. Are there drugs (medication) that you are still taking?	Yes.....01 No 02	
BP 5B. Advice to reduce salt intake	Yes.....01 No 02	
BP 5C. Advice to lose weight	Yes.....01 No 02	
BP 5D. Advice to stop smoking	Yes.....01 No 02	
BP 5E. Advice to exercise	Yes.....01 No 02	
BP 6. Have you ever seen a traditional healer for raised blood pressure or hypertension?	Yes.....01 No …… 02	
BP 7. Are you currently taking any herbal or traditional remedy for your raised blood pressure?	Yes.....01 No ……02	

Dodoma Cohort Study

HISTORY OF DIABETES MELLITUS		**DM**
This module is to be administered to all men and women aged 18 years and above		
DM1. HAVE YOU EVER HAD YOUR BLOOD SUGAR MEASURED BY A DOCTOR OR OTHER HEALTH WORKER?	Yes.....01 No.....02	2⇨DM3
DM2. WHAT WAS THE REASON FOR TAKING A BLOOD SUGAR TEST?	Part of disease investigation.....01 Part of medical examination for employment or school.....02 Checking for my health status.....03 Other reasons (specify).....04	
DM3. HAVE YOU EVER BEEN TOLD BY A DOCTOR OR OTHER HEALTH WORKER THAT YOU HAVE RAISED BLOOD SUGAR OR DIABETES?	Yes ..... 01 No 02	2⇨RD1
DM4. HOW LONG AGO WERE YOU TOLD YOU HAD RAISED BLOOD PRESSURE?	Years ago	
DM5. ARE YOU CURRENTLY RECEIVING ANY OF THE FOLLOWING TREATMENTS/ADVICE FOR DIABETES PRESCRIBED BY A DOCTOR OR OTHER HEALTH WORKER?		
DM5A. INSULIN	Yes ..... 01 No 02	
DM5B. ARE THERE DRUGS (MEDICATION) THAT YOU ARE STILL TAKING?	Yes ..... 01 No 02	
DM5C. SPECIAL PRESCRIBED DIET	Yes ..... 01 No 02	
DM5D. ADVICE TO LOSE WEIGHT	Yes ..... 01 No 02	
DM5E. ADVICE TO STOP SMOKING	Yes ..... 01 No 02	
DM5F. ADVICE TO EXERCISE	Yes ..... 01 No 02	
DM6. HAVE YOU EVER SEEN A TRADITIONAL HEALER FOR DIABETES OR RAISED BLOOD SUGAR?	Yes ..... 01 No 02	
DM7. ARE YOU CURRENTLY TAKING ANY HERBAL OR TRADITIONAL REMEDY FOR YOUR DIABETES?	Yes ..... 01 No 02	

Dodoma Cohort Study

HISTORY OF RESPIRATORY DISEASES			**RD**
This module is to be administered to all men and women 18 years and above			
RD1. HAVE YOU HAD ANY OF THE FOLLOWING SYMPTOMS EITHER AT WORK OR AT HOME? (DO NOT INCLUDE ISOLATED COLDS, SORE THROATS OR FLU.)			
RD2. RECURRING SORENESS OF/OR WATERING OF EYES	Yes ..... 01 No 02		
RD3. RECURRING BLOCKED OR RUNNING NOSE	Yes ..... 01 No 02		
RD4. BOUTS OF COUGHING	Yes ..... 01 No 02		
RD5. CHEST TIGHTNESS	Yes ..... 01 No 02		
RD6. WHEEZE	Yes ..... 01 No 02		
RD7. BREATHLESSNESS	Yes ..... 01 No 02		
RD8. WHEN DO YOU BECOME BREATHLESS?	With mild physical activity	01	
	On lying flat	02	
	PND (Paroxysmal nocturnal)	03	
	At rest	04	
RD9. PRODUCTIVE COUGH IN MOST DAYS FOR 2 CONSECUTIVE MONTHS?	Yes ..... 01 No 02		
RD10. FATIGUE	Yes ..... 01 No 02		
RD11. FEVER	Yes ..... 01 No 02		
RD12. CHEST DISCOMFORT	Yes ..... 01 No 02		
RD13. DO YOU PRODUCE SPUTUM WHEN COUGHING?	Yes ..... 01 No 02		
RD14. WHAT IS THE COLOR OF SPUTUM	White	01	
	Yellow	02	
	Greenish	03	
	Pus	04	
RD15. WHAT IS THE AMOUNT OF SPUTUM IN APPROXIMATED TEA SPOONS PER COUGHI?	---- ---- ---- ----tea spoons (1 tea spoon ~5mls)		
RD16. DOES THE SPUTUM FOUL SMELL?	Yes ..... 01 No 02		
RD17. DO YOU COUGH UP BLOOD?	Yes ..... 01 No 02		
RD 19. DO YOU EXPERIENCE ANY CHEST PAIN?	Yes ..... 01 No 02		If NO skip RD. 23
RD 20. WHAT KIND OF CHEST PAIN DO YOU HAVE?	Pleuritic	01	
	Non Pleuritic	02	
	Central, relieved by leaning	03	

	forward		
	Central, not relieved by leaning forward	04	
Past medical history on respiratory diseases		**Year**	
RD 21. Have you ever suffered from measles?	Yes..... 01 No 02		
RD 22. Have you suffered from pneumonia?	Yes..... 01 No 02		
RD 23. Have you ever been treated for TB?	Yes..... 01 No 02		
RD 24. Have you ever been chocked by food regurgitated from the stomach?	Yes..... 01 No 02		
RD 25. Are you on any modern medication for your chest disease?	Yes ..... 01 No 02		
RD26. If Qn RD 25 is Yes, List your modern medications			

Dodoma Cohort Study

HISTORY OF CANCERS			CA
CA1. DO YOU HAVE ANY HISTORY OF ANY TYPE OF CANCER IN YOUR FAMILY?	Yes ..... 01 No 02		
CA2.IF CA1 IS YES PLEASE INDICATE THE TYPE OF CANCER THAT YOUR RELATIVE(S) HAS/ HAD. (SHOW/TELL CARD WITH ALL COMMON CANCERS IN TANZANIA)			
CA3. IF CA1 IS YES INDICATE THE RELATIONSHIP WITH THE PATIENT WITH CANCER IN YOUR FAMILY.	**Maternal**		
	Grandmother/Grandfather	Yes.....01 No 02	
	Mother	Yes.....01 No 02	
	Aunts/Uncles	Yes.....01 No 02	
	Cousin	Yes.....01 No 02	
	Paternal		
	Grandmother/Grandfather	Yes.....01 No 02	
	Father	Yes.....01 No 02	
	Aunts/Uncles	Yes.....01 No 02	
	Cousin	Yes.....01 No 02	
	Siblings		
	Sisters	Yes.....01 No 02	
	Brothers	Yes.....01 No 02	
	Children		
	Daughters	Yes.....01 No 02	
	Sons	Yes.....01 No 02	

Dodoma Cohort Study

TOBACCO USE		**T**
T1. Do you currently smoke any **tobacco products**, such as cigarettes, cigars or pipes? *(USE SHOWCARD)*	Yes .....01 No.....02	02⇨T6
T2. DO YOU CURRENTLY SMOKE TOBACCO PRODUCTS **DAILY**?	Yes .....01 No.....02	02⇨T6
T3. IF YOU DO NOT SMOKE DAILY HOW OFTEN DO YOU SMOKE?	Once every _ _ days	
T4. HOW OLD WERE YOU WHEN YOU **FIRST STARTED** SMOKING?	Age at first smoking (years)…….. Don't know……..08	IF KNOWN⇨ T5
T5A. On average, **how many** of the following do you smoke in a day?	Manufactured cigarettes _ _ Hand-rolled cigarettes _ _ Pipes full of tobacco _ _ Other _ _ Other specify..... DK.....08	
EXPANDED: Tobacco Use		
T6. IF YOU DON'T SMOKE CURRENTLY, DID YOU EVER SMOKE IN THE PAST?	Yes.....01 No.....02	02⇨T8
T7. HOW OLD WERE YOU WHEN YOU **STOPPED** SMOKING?	Age (years) …… Don't know……..08	IF KNOWN⇨ T8
T8. IF YOU DON'T SMOKE CURRENTLY, DO YOU **CURRENTLY USE** ANY **SMOKELESS TOBACCO** SUCH AS *[SNUFF, CHEWING TOBACCO, LIP TOBACCO]*	Yes.....01 No.....02	02⇨T12
T9. DO YOU **CURRENTLY USE SMOKELESS TOBACCO** PRODUCTS **DAILY?**	Yes .....01 No.....02	02⇨T12
T10. ON AVERAGE, HOW MANY **TIMES DURING A DAY** DO YOU USE ….	Snuff, by mouth _ _ Snuff, by nose _ _ Chewing tobacco _ _ Other _ _ Other specify…… Don't know……..08	OTHER⇨ T11 ELSE⇨ T13
T11. IF YOU DON'T CURRENTLY USE SMOKELESS TOBACCO, DID YOU **EVER USE** SMOKELESS TOBACCO SUCH AS *[SNUFF, CHEWING TOBACCO, OR LIP TOBACCO] IN THE PAST*?	Yes .....01 No.....02	
T12. HOW OLD WERE YOU WHEN YOU STARTED USING SMOKELESS TOBACCO?	Age to start (in years) _ _	

T13. WERE YOU USING THE SMOKELESS TOBACCO DAILY?	Yes .....01 No.....02	
T14. HOW OLD WERE YOU WHEN YOU STOPPED USING SMOKELESS TOBACCO?	Age to stop (in years) _ _	
T15. DURING THE PAST 7 DAYS, ON HOW MANY DAYS DID SOMEONE **IN YOUR HOME** SMOKE WHEN YOU WERE PRESENT?	Number of days _ _ DK.....08	
T16. DURING THE PAST 7 DAYS, ON HOW MANY DAYS DID SOMEONE SMOKE IN CLOSED AREAS **IN YOUR WORKPLACE** (IN THE BUILDING, IN A WORK AREA OR A SPECIFIC OFFICE) WHEN YOU WERE PRESENT?	Number of days _ _ DK or don't work in closed area 08	

Dodoma Cohort Study

Alcohol Consumption			**A**
A1	Have you **ever** consumed an alcoholic drink such as beer, wine, spirits or *[add other local examples]?)*	Yes……01 No…… 02 DK……08	
A2	If yes, During the past 12 months, **how frequently** have you had at least one alcoholic drink?	Every after _ _ days (record number of days)	
A3	Have you consumed an alcoholic drink within the **past 30 days**?	Yes……01 No…… 02	02⇨D1
A4	During the past 30 days, on how many **occasions** did you have at least one alcoholic drink?	Number _ _ _ DK……08	
A5	During the past 30 days, when you drank alcohol, **on average**, how many **standard alcoholic drinks** did you have during one drinking occasion?	Number _ _ _ DK……08	
A6	During the past 30 days, what was the **largest number** of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together?	Largest number _ _ _ DK……08	
Diet			**D**
D1	In a typical week, on how many days do you **eat fruit**?	Number of days _ _ _ If Zero days, go to D3 DK……08	
D2	If not zero above, How many **servings** of fruit do you eat on **one** of those days?	Number of servings_ _ _ DK……08	
D3	If not zero above, In a typical week, on how many days do you eat **vegetables**?	Number of days_ _ _ If Zero days, go to D5 DK……08	
D4	How many **servings** of vegetables do you eat on one of those days?	Number of servings_ _ _ DK……08	
Physical Activity			**P**
Work			
P1	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes……01 No…… 02	02⇨P4
P2	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days _ _	
P3	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours_ _ Minutes _ _	
P4	Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously?	Yes……01 No…… 02	02⇨P7

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P5	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days _ _	
P6	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours_ _ Minutes _ _	
P7	For how long have you been having such activities?	Duration in years _ _	
Travel to and from places			
P8	Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?	Yes……01 No…… 02	02⇨P10
P9	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days _ _	
P10	How much time do you spend walking or bicycling for travel on a typical day?	Hours_ _ Minutes _ _	
If Adult woman is pregnant or has delivered a child should also fill questionnaires for pregnancy or pregnancy outcomes respectively			
INSPECTED BY: Field Supervisor: Name…….. …… Sign…… Date……..			

Dodoma Cohort Study

DCS **HOUSEHOLD QUESTIONNAIRE**

HOUSEHOLD INFORMATION PANEL	**HH**
HH1. Cluster number: ___ ___ ___	HH2. Household number: ___ ___ ___
HH3. Interviewer name and number: Name_____ ___ ___	HH4. Supervisor name and number: Name_____ ___ ___
HH5. Day / Month / Year of interview: ___ ___ / ___ ___ / ___ ___ ___ ___	
HH6. Ward:	HH7. Street name:

After all questionnaires for the household have been completed, fill in the following information:	
HH8. Name of head of household: _____	
HH9. Result of household interview: Completed .....01 Not at home .....02 Refused .....03 Household not found / destroyed .....04 Other (*specify*)_____ 06	HH10. Respondent to household questionnaire: Name:_____ Line Number: ___ ___ HH11. Total number of household members: ___ ___
HH12. Number of women age 15-49 years: ___ ___	HH13. Number of woman's questionnaires completed: ___ ___
HH14. Number of children under age 5: ___ ___	HH15. Number of under-5 questionnaires completed: ___ ___

HH16. Questionnaire edited by (Name and number): Name_____ ___ ___	HH17. Data entry clerk (Name and number): Name_____ ___ ___

HH18.
Record the start time:

Hour .....__ __

Minutes .....__ __

HOUSEHOLD LISTING FORM **HL**

FIRST, PLEASE TELL ME THE NAME OF EACH PERSON WHO USUALLY LIVES HERE, STARTING WITH THE HEAD OF THE HOUSEHOLD.
List the head of the household in line 01. List all household members (HL2), their relationship to the household head (HL3), and their sex (HL4)
Then ask: ARE THERE ANY OTHERS WHO LIVE HERE, EVEN IF THEY ARE NOT AT HOME NOW?
If yes, complete listing for questions HL2-HL4. Then, ask questions starting with HL5 for each person at a time.
Use an additional questionnaire if all rows in the household listing form have been used.

							For women age **15-49**	*For children age* **5-14**	*For children under age* **5**	*For all household members*	*For children age* **0-17** *years*			
HL1. *Line number*	HL2. *Name*	HL3. WHAT IS THE RELATION-SHIP OF (*name*) TO THE HEAD OF HOUSE-HOLD?	HL4. IS (*name*) MALE OR FEMALE? 1 Male 2 Female	HL5. WHAT IS (*name*)'S DATE OF BIRTH? 98 DK 9998 DK		HL6. HOW OLD IS (*name*)? *Record in completed years. If age is 95 or above, record '95'*	HL7. *Circle line number if woman is age* **15-49**	HL8. WHO IS THE MOTHER OR PRIMARY CARETAKER OF THIS CHILD? *Record line number of mother/ caretaker*	HL9. WHO IS THE MOTHER OR PRIMARY CARETAKER OF THIS CHILD? *Record line number of mother/ caretaker*	HL10. DID (*name*) STAY HERE LAST NIGHT? 1 Yes 2 No	HL11. IS (*name*)'S NATURAL MOTHER ALIVE? 1 Yes 2 No↘ HL13 8 DK↘ HL13	HL12. DOES (*name*)'S NATURAL MOTHER LIVE IN THIS household? 1 Yes 2 No↘ *If 'yes', record line number of mother or 00 for "No"*	HL13. IS (*name*)'S NATURAL FATHER ALIVE? 1 Yes 2 No↘ Next Line 8 DK↘ Next Line	HL14. DOES (*name*)'S NATURAL FATHER LIVE IN THIS HOUSEHOLD? *Record line number of father or 00 for "No"*
Line	Name	Relation*	M F	Month	Year	Age	15-49	Mother	Mother	Y N	Y N DK	Mother	Y N DK	Father
01		0 1	1 2	__ __	__ __ __ __	__ __	01	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
02		__ __	1 2	__ __	__ __ __ __	__ __	02	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
03		__ __	1 2	__ __	__ __ __ __	__ __	03	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
04		__ __	1 2	__ __	__ __ __ __	__ __	04	__ __	__ __	1 2	1 2 8		1 2 8	__ __
05		__ __	1 2	__ __	__ __ __ __	__ __	05	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
06		__ __	1 2	__ __	__ __ __ __	__ __	06	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
07		__ __	1 2	__ __	__ __ __ __	__ __	07	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
08		__ __	1 2	__ __	__ __ __ __	__ __	08	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
09		__ __	1 2	__ __	__ __ __ __	__ __	09	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __

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HL1. *Line number*	HL2. *Name*	HL3. WHAT IS THE RELATION-SHIP OF (*name*) TO THE HEAD OF HOUSE-HOLD?	HL4. IS (*name*) MALE OR FEMALE? 1 Male 2 Female	HL5. WHAT IS (*name*)'S DATE OF BIRTH? 98 DK 9998 DK		HL6. HOW OLD IS (*name*)? *Record in completed years. If age is 95 or above, record '95'*	HL7. *Circle line number if woman is age* **15-49**	HL8. WHO IS THE MOTHER OR PRIMARY CARETAKER OF THIS CHILD? *Record line number of mother/ caretaker*	HL9. WHO IS THE MOTHER OR PRIMARY CARETAKER OF THIS CHILD? *Record line number of mother/ caretaker*	HL10. DID (*name*) STAY HERE LAST NIGHT? 1 Yes 2 No	HL11. IS (*name*)'S NATURAL MOTHER ALIVE? 1 Yes 2 No→ HL13 8 DK→ HL13	HL12. DOES (*name*)'S NATURAL MOTHER LIVE IN THIS household? 1 Yes 2 No→ *If 'yes', record line number of mother or 00 for "No"*	HL13. IS (*name*)'S NATURAL FATHER ALIVE? 1 Yes 2 No→ Next Line 8 DK→ Next Line	HL14. DOES (*name*)'S NATURAL FATHER LIVE IN THIS HOUSEHOLD? *Record line number of father or 00 for "No"*
Line	Name	Relation*	M F	Month	Year	Age	15-49	Mother	Mother	Y N	Y N DK	Mother	Y N DK	Father
10		__ __	1 2	__ __	__ __ __ __	__ __	10	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
11		__ __	1 2	__ __	__ __ __ __	__ __	11	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
12		__ __	1 2	__ __	__ __ __ __	__ __	12	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
13		__ __	1 2	__ __	__ __ __ __	__ __	13	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
14		__ __	1 2	__ __	__ __ __ __	__ __	14	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __
15		__ __	1 2	__ __	__ __ __ __	__ __	15	__ __	__ __	1 2	1 2 8	__ __	1 2 8	__ __

Tick here if additional questionnaire used ☐

Probe for additional household members.
Probe especially for any infants or small children not listed, and others who may not be members of the family (such as servants, friends) but who usually live in the household.
Insert names of additional members in the household list and complete form accordingly.

Now for each woman age 15-49 years, write her name and line number and other identifying information in the information panel of a separate Individual Women's Questionnaire.
For each child under age 5, write his/her name and line number AND the line number of his/her mother or caretaker in the information panel of a separate Under-5 Questionnaire.
You should now have a separate questionnaire for each eligible woman and each child under five in the household.

** Codes for HL3: Relationship to head of household:*

01 Head	06 Parent	11 Niece / Nephew
02 Wife / Husband	07 Parent-In-Law	12 Other relative

Dodoma Cohort Study

03 Son / Daughter	08 Brother / Sister	13 Adopted / Foster / Stepchild
04 Son-In-Law / Daughter-In-Law	09 Brother-In-Law / Sister-In-Law	14 Not related
05 Grandchild	10 Uncle / Aunt	98 Don't know

DCS 4

EDUCATION **ED**

			For household members age **5 and above**				*For household members age* **5-24** *years*							
ED1. *Line number*	ED2. *Name and age* *Copy from Household Listing Form, HL2 and HL6*		ED3. HAS (*name*) EVER ATTENDED SCHOOL OR PRE-SCHOOL? 1 Yes 2 No ⇘ Next Line	ED4. WHAT IS THE HIGHEST LEVEL OF SCHOOL (*name*) ATTENDED? WHAT IS THE HIGHEST GRADE (*name*) COMPLETED AT THIS LEVEL? Level: 0 Preschool 1 Primary 2 Secondary 3 Higher 8 DK *If level=0, skip to ED5*	ED4. Grade: 98 DK *If less than 1 grade, enter 00.*	ED5. DURING THE (***2010***) SCHOOL YEAR, DOES (*name*) ATTEND SCHOOL OR PRESCHOOL AT ANY TIME? 1 Yes 2 No ⇘ ED7	ED6. DURING THIS/THAT SCHOOL YEAR, WHICH LEVEL AND GRADE IS/WAS (*name*) ATTENDING? Level: 0 Preschool 1 Primary 2 Secondary 3 Higher 8 DK *If level=0, skip to ED7*	ED6. Grade: 98 DK *If less than 1 grade, enter 00.*	ED7. DURING THE PREVIOUS SCHOOL YEAR, THAT IS (***2009***), DID (*name*) ATTEND SCHOOL OR PRESCHOOL AT ANY TIME? 1 Yes 2 No ⇘ Next Line 8 DK ⇘ Next Line	ED8. DURING THAT PREVIOUS SCHOOL YEAR (***2010***), WHICH LEVEL AND GRADE DID (*name*) ATTEND? Level: 0 Preschool 1 Primary 2 Secondary 3 Higher 8 DK *If level=0, go to next person*	ED8. Grade: 98 DK *If less than 1 grade, enter 00.*
Line	Name	Age	Yes No	Level	Grade	Yes No	Level	Grade	Y N DK	Level	Grade			
01		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
02		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
03		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
04		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
05		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
06		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
07		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
08		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
09		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
10		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
11		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
12		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			
13		__ __	1 2	0 1 2 3 8	___ ___	1 2	0 1 2 3 8	___ ___	1 2 8	0 1 2 3 8	___ ___			

14		__ __	1 2	0 1 2 3 8	__ __	1 2	0 1 2 3 8	__ __	1 2 8	0 1 2 3 8	__ __
15		__ __	1 2	0 1 2 3 8	__ __	1 2	0 1 2 3 8	__ __	1 2 8	0 1 2 3 8	__ __

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WATER AND SANITATION		**WS**
WS1. WHAT IS THE **MAIN** SOURCE OF DRINKING WATER FOR MEMBERS OF YOUR HOUSEHOLD?	Piped water Piped into dwelling ..... 11 Piped into compound, yard or plot ..... 12 Piped to neighbour ..... 13 Public tap / standpipe ..... 14 Tube Well, Borehole ..... 21 Dug well Protected well ..... 31 Unprotected well ..... 32 Water from spring Protected spring ..... 41 Unprotected spring ..... 42 Rainwater collection ..... 51 Storage tank ..... 61 Surface water (river, stream, dam, lake, pond, canal, irrigation channel) ..... 71 Bottled water ..... 81 Other (*specify*) _____ 96	11⇨WS6 12⇨WS6 13⇨WS6 WS3 96⇨WS3
WS2. WHAT IS THE **MAIN** SOURCE OF WATER USED BY YOUR HOUSEHOLD FOR OTHER PURPOSES SUCH AS COOKING AND HANDWASHING?	Piped water Piped into dwelling ..... 11 Piped into compound, yard or plot ..... 12 Piped to neighbour ..... 13 Public tap / standpipe ..... 14 Tube Well, Borehole ..... 21 Dug well Protected well ..... 31 Unprotected well ..... 32 Water from spring Protected spring ..... 41 Unprotected spring ..... 42 Rainwater collection ..... 51 Storage tank ..... 61 Cart with small tank / drum ..... 71 Surface water (river, stream, dam, lake, pond, canal, irrigation channel) ..... 81 Other (*specify*) _____ 96	11⇨WS6 12⇨WS6 13⇨WS6
WS3. WHERE IS THAT WATER SOURCE LOCATED?	In own dwelling ..... 01 In own yard / plot ..... 02 Elsewhere 03	1⇨WS6 2⇨WS6
WS4. IF LOCATED ELSEWHERE, HOW LONG DOES IT TAKE TO GO THERE, GET WATER, AND COME BACK?	Number of minutes ..... __ __ __ DK 998	

WS5. IF SOURCE IS LOCATED ELSEWHERE, WHO USUALLY GOES THERE TO COLLECT THE WATER FOR YOUR HOUSEHOLD? *Probe:* IS THIS PERSON UNDER AGE 15? WHAT SEX?	Adult woman (age 15+ years) ..... 01 Adult man (age 15+ years) ..... 02 Female child (under 15)..... 03 Male child (under 15)..... 04 DK..... 08 [More than one answer]	
WS6. DO YOU DO ANYTHING TO THE WATER TO MAKE IT SAFER TO DRINK?	Yes ..... 01 No..... 02 DK..... 08	2⇨WS8 8⇨WS8
WS7. WHAT DO YOU USUALLY DO TO MAKE THE WATER SAFER TO DRINK? [MORE THAN ONE ANSWER] *Probe:* ANYTHING ELSE? *Record all items mentioned.*	Boil..... 01 Add bleach / chlorine..... 02 Strain it through a cloth..... 03 Use water filter (ceramic, sand, etc.)..... 04 Let it stand and settle ..... 05 Other (*specify*) _____ 06 DK..... 07	
WS8. WHAT KIND OF TOILET FACILITY DO MEMBERS OF YOUR HOUSEHOLD USUALLY USE? *If "flush" or "pour flush", probe:* WHERE DOES IT FLUSH TO? *If necessary, ask permission to observe the facility.*	Flush / Pour flush Flush to piped sewer system ..... 11 Flush to septic tank..... 12 Flush to pit (latrine)..... 13 Flush to somewhere else..... 14 Flush to unknown place / Not sure / DK where..... 15 Pit latrine Ventilated Improved Pit latrine (VIP) ... 21 Pit latrine with slab..... 22 Pit latrine without slab / Open pit ..... 23 Composting latrine..... 31 Bucket..... 41 Hanging toilet, Hanging latrine ..... 51 No facility, Bush, Field..... 95 Other (*specify*) _____ 96	95⇨Next Module
WS9. DO YOU SHARE THIS FACILITY WITH OTHERS WHO ARE NOT MEMBERS OF YOUR HOUSEHOLD?	Yes ..... 01 No..... 02	2⇨Next Module
WS10. DO YOU SHARE THIS FACILITY ONLY WITH MEMBERS OF OTHER HOUSEHOLDS THAT YOU KNOW, OR IS THE FACILITY OPEN TO THE USE OF THE GENERAL PUBLIC?	Other households only (not public)..... 01 Public facility..... 02	2⇨Next Module
WS11. HOW MANY HOUSEHOLDS IN TOTAL USE THIS TOILET FACILITY, INCLUDING YOUR OWN HOUSEHOLD?	Number of households ..... __ DK..... 98	

HOUSEHOLD CHARACTERISTICS		**HC**
HC1A. WHAT IS THE RELIGION OF THE HEAD OF THIS HOUSEHOLD?	Christian .....01 Muslim .....02 Other religion (*specify*) _____ 06 No religion 07	
HC1B. TO WHAT ETHNIC GROUP DOES THE HEAD OF THIS HOUSEHOLD BELONG?	Gogo .....01 Masai .....02 Other ethnic group (*specify*) _____ 06	
HC2. HOW MANY ROOMS IN THIS HOUSEHOLD ARE USED FOR SLEEPING?	 Number of rooms for sleeping .....__ __	
HC3. Main material of the dwelling floor. *Record observation.*	Natural floor Earth / Sand .....11 Dung .....12 Rudimentary floor Wood planks .....21 Palm / Bamboo .....22 Finished floor Parquet or polished wood .....31 Vinyl or asphalt strips .....32 Ceramic tiles .....33 Cement .....34 Carpet .....35 Other (*specify*) _____ 96	
HC4. Main material of the roof. *Record observation.*	Natural roofing No Roof .....11 Thatch / Palm leaf .....12 Sod .....13 Rudimentary Roofing Rustic mat .....21 Palm / Bamboo .....22 Wood planks .....23 Cardboard .....24 Finished roofing Metal .....31 Wood .....32 Ceramic tiles .....33 Cement .....34 Roofing shingles .....35 Other (*specify*) _____ 96	

HC5. Main material of the exterior walls. *Record observation.*	Natural walls No walls....11 Cane / Palm / Trunks....12 Dirt....13 Rudimentary walls Bamboo with mud....21 Stone with mud....22 Uncovered adobe....23 Plywood....24 Cardboard....25 Reused wood....26 Finished walls Cement....31 Stone with lime / cement....32 Bricks....33 Cement blocks....34 Covered adobe....35 Wood planks / shingles....36 Other (*specify*) _____ 96	
HC6. WHAT TYPE OF FUEL DOES YOUR HOUSEHOLD **MAINLY** USE FOR COOKING?	Electricity....01 Liquefied Petroleum Gas (LPG)....02 Natural gas....03 Biogas....04 Kerosene....05 Coal / Lignite....06 Charcoal....07 Wood....08 Straw / Shrubs / Grass....09 Animal dung....10 Agricultural crop residue....11 No food cooked in household....95 Other (*specify*) _____ 96	01⇨HC8 02⇨HC8 03⇨HC8 04⇨HC8 05⇨HC8 95⇨HC8
HC7. IS THE COOKING USUALLY DONE IN THE HOUSE, IN A SEPARATE BUILDING, OR OUTDOORS? *If 'In the house', probe*: IS IT DONE IN A SEPARATE ROOM USED AS A KITCHEN?	In the house In a separate room used as kitchen....01 Elsewhere in the house....02 In a separate building....03 Outdoors....04 Other (*specify*) _____ 06	

HC8. DOES YOUR HOUSEHOLD HAVE:		Yes	No	
[A] ELECTRICITY?	Electricity	1	2	
[B] A RADIO?	Radio	1	2	
[C] A TELEVISION?	Television	1	2	
[D] A NON-MOBILE TELEPHONE?	Non-mobile telephone	1	2	
[E] A REFRIGERATOR?	Refrigerator	1	2	
		Yes	No	
[F] A SHOP/KIOSK/BAR	A shop/kiosk/bar	1	2	
[G] A SEWING MACHINE?	A SEWING MACHINE?	1	2	
[H] A SOFA SET?	A SOFA SET?	1	2	
[G] AN ELECTRIC FAN?	AN ELECTRIC FAN?	1	2	
[H] AN ELECTRIC IRON?	AN ELECTRIC IRON?	1	2	
[I] COOKER WITH OVEN (GAS OR ELECTRIC)?	COOKER WITH OVEN (GAS/ ELECTRIC)?	1	2	
[J] COOKER WITHOUT OVEN (GAS OR ELECTRIC)?	COOKER WITHOUT OVEN (GAS/ ELECTRIC)?	1	2	
[K] DINNING TABLE?	DINNING TABLE?	1	2	
[L] CUPBOARD WITH UTENSILS?	CUPBOARD WITH UTENSILS?	1	2	

HC9. DOES ANY MEMBER OF YOUR HOUSEHOLD OWN:		Yes	No	
[A] A WATCH/CLOCK?	Watch/clock If 'yes', how many people …… _____	1	2	
[B] A MOBILE TELEPHONE?	Mobile telephone If 'yes', how many people …… _____	1	2	
[C] A BICYCLE OR TRICYCLE?	Bicycle/tricycle If 'yes', how many people …… _____	1	2	
[D] A MOTORCYCLE OR SCOOTER?	Motorcycle / Scooter If 'yes', how many people …… _____	1	2	
[E] A HUMAN PULLED CART?	A human pulled cart If 'yes', how many people …… _____	1	2	
[F] A CAR OR TRUCK?	Car / Truck If 'yes', how many people …… _____	1	2	
[G] A BOAT WITH A MOTOR?	Boat with a motor If 'yes', how many people …… _____	1	2	

HC10. DO YOU OR SOMEONE LIVING IN THIS HOUSEHOLD OWN THIS DWELLING? *If "No", then ask:* DO YOU RENT THIS DWELLING FROM SOMEONE NOT LIVING IN THIS HOUSEHOLD? *If "Rented from someone else", circle "2". For other responses, circle "3".*	Own .....01 Rent.....02 0 Other (Not owned or rented) 3	
HC11. DOES ANY MEMBER OF THIS HOUSEHOLD OWN ANY LAND THAT CAN BE USED FOR AGRICULTURE?	Yes .....01 No.....02	2⇨HC13
HC12. HOW MANY ACRES OF AGRICULTURAL LAND DO MEMBERS OF THIS HOUSEHOLD OWN? *Record number of acres* *An acre is 70 x 70 steps*	Acres .....___ ___	
HC13. DOES THIS HOUSEHOLD OWN ANY LIVESTOCK, HERDS, OTHER FARM ANIMALS, OR POULTRY?	Yes .....01 No.....02	2⇨Next Module
HC14. HOW MANY OF THE FOLLOWING ANIMALS DOES THIS HOUSEHOLD HAVE? [A] CATTLE, MILK COWS, OR BULLS? [B] HORSES, DONKEYS, OR MULES? [C] GOATS? [D] SHEEP? [E] CHICKENS, DUCKS ETC? [F] PIGS? . *If unknown, record '98'.*	 Cattle, milk cows, or bulls.....___ ___ Horses, donkeys, or mules.....___ ___ Goats.....___ ___ Sheep.....___ ___ Chickens, ducks etc .....___ ___ Pigs .....___ ___	

INSECTICIDE TREATED NETS		**TN**
TN1. DOES YOUR HOUSEHOLD HAVE ANY MOSQUITO NETS THAT CAN BE USED WHILE SLEEPING?	Yes .....01 No.....02	2⇨Next Module
TN2. HOW MANY MOSQUITO NETS DOES YOUR HOUSEHOLD HAVE?	Number of nets.....___ ___	
TN3.HOW MANY MOSQUITO NETS ARE INSECTSIDE TREATED NETS?	Number of treated nets……..____ __	
IF PREGNANT GO TO MATERNAL OR IF CHILDREN GO TO CHILD		

INDOOR RESIDUAL SPRAYING		**IR**
IR1. AT ANY TIME IN THE PAST 12 MONTHS, HAS ANYONE COME INTO YOUR DWELLING TO SPRAY THE INTERIOR WALLS AGAINST MOSQUITOES?	Yes .....01 No.....02 DK 08	 2⇨Next Module 8⇨Next Module
IR2. WHO SPRAYED THE DWELLING? *Circle all that apply.*	Government worker / program .....01 Private company .....02 Non-governmental organization .....03 Ourselves.....04 Other (*specify*) _____ 05 DK 06	

HH20. *Does any eligible adult men/women age above 18 reside in the household?*

Check household listing, column HL7 for any eligible adult man/woman.

☐ *Yes.* ⇨ *Go to QUESTIONNAIRE FOR ADULT MEN/WOMEN to administer the questionnaire to the first eligible adult.*

☐ *No.* ⇨ *Continue.*

HH21. *Does any child under the age of 5 reside in the household?*

Check household listing, column HL9 for any eligible child under age 5.

☐ *Yes.* ⇨ *Go to QUESTIONNAIRE FOR CHILDREN UNDER FIVE to administer the questionnaire to mother or caretaker of the first eligible child.*

☐ *No.* ⇨ *End the interview by thanking the respondent for his/her cooperation. Gather together all questionnaires for this household and complete the relevant information on the cover page.*

INSPECTED BY:

Field Supervisor: Name……..... Sign…… Date…….

Clinic Questionnaire

Clinic visited: _____
Date: _(should be captured automatically by the tablet)_____
Day: _(should be captured automatically by the tablet)_____
Time: _(should be captured automatically by the tablet)_____

Overall Questions

1. First Name: _____
2. Family Name: _____
3. Phone Number: _____
4. Phone Owner: _____

CLINICAL SCREENING		**CS**
CN1. What was your height?	Hight in cm	
CN2. What was your weight	Weight in kg	
CN3. What was your blood pressure	Systolic (1st number) / Diastolic (2nd Number)	
CN4. What was your blood sugar level?	Number	
CN5. How did you hear to come in today?	SMS (1) Refered by Friend (List Friend's Name)	
CN6. Why did you come in for screening today?	Health screening (1) Cash Transfer (2) Both (3) Neither (Enter Reason)	
CN7. Distance Travelled	Hours____ Minutes___	
CN8. Mode of transportation	Foot (1) Boda Boda (2) Dala Dala (3) Bicycle (4) Other _____	
CN9. What was your travel cost?	____ TZS	
CN10. What was your visit cost?	____ TZS	

HISTORY OF RAISED BLOOD PRESSURE		**BP**
BP 1. Have you ever had your blood pressure measured by a doctor or other health worker before today?	Yes .....01 No 02	2⇨BP3
BP 2. What was the reason for taking a BP measurement?	Part of disease investigation……..01 Part of medical examination for employment or school……02 Checking for my health status……03	

	Other reasons (specify)……04	
BP 3. Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension before today?	Yes.....01 No.....02	2⇨DM1
BP4. How long ago were you told you had raised blood pressure?	Years ago	

HISTORY OF DIABETES MELLITUS		**DM**
DM1. HAVE YOU EVER HAD YOUR BLOOD SUGAR MEASURED BY A DOCTOR OR OTHER HEALTH WORKER BEFORE TODAY?	Yes.....01 No.....02	2⇨DM3
DM2. WHAT WAS THE REASON FOR TAKING A BLOOD SUGAR TEST?	Part of disease investigation……01 Part of medical examination for employment or school……02 Checking for my health status……03 Other reasons (specify)……04	
DM3. HAVE YOU EVER BEEN TOLD BY A DOCTOR OR OTHER HEALTH WORKER THAT YOU HAVE RAISED BLOOD SUGAR OR DIABETES BEFORE TODAY?	Yes .....01 No 02	2⇨END
DM4. HOW LONG AGO WERE YOU TOLD YOU HAD RAISED BLOOD PRESSURE?	Years ago	

Endline Survey

ENDLINE – SURVEY

Overall Questions

1. First Name: _____
2. Family Name: _____
3. Phone Number: _____
4. Phone Owner: _____

IF ALREADY COMPLETED CLINIC QUESTIONNAIRE SKIP TO SN1

CLINICAL SCREENING		**CS**
CN1. What was your height?	Height in cm	
CN2. What was your weight	Weight in kg	
CN3. What was your blood pressure	Systolic (1st number) / Diastolic (2nd Number)	
CN4. What was your blood sugar level?	Number	

SOCIAL NETWORKS		SN
SN 1. 1.What are the names of your family members living in the hamlet, but not your household (through blood and marriage).	LIST	
SN2. LIST THE TOP 3 FOR EACH ITEM BELOW		
SN2a. Whose houses do you visit frequently?	LIST	
SN2b. What non-relatives do you socialize with regularly?	LIST	
SN2c. Who gives you medical advice when you need it?	LIST	
SN2d. Who do you borrow money from when you need it?	LIST	
SN2e. Who do you get advice from?	LIST	
SN2f. Who do you go to worship (i.e. church/mosque) with, normally?	LIST	

Endline Survey

HISTORY OF RAISED BLOOD PRESSURE		**BP**
BP 1. Have you ever had your blood pressure measured by a doctor or other health worker before last month?	Yes .....01 No 02	2⇨BP3
BP 2.What was the reason for taking a BP measurement?	Part of disease investigation……01 Part of medical examination for employment or school……02 Checking for my health status……03 Other reasons (specify)……04	
BP 3. Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension before last month?	Yes.....01 No.....02	2⇨DM1
BP4. How long ago were you told you had raised blood pressure?	Years ago	
BP5. .IF YOU HAVE RAISED BP, ARE YOU CURRENTLY RECEIVING ANY OF THE FOLLOWING TREATMENTS/ADVICE FOR HIGH BLOOD PRESSURE PRESCRIBED BY A DOCTOR OR OTHER HEALTH WORKER?		
BP 5A. Are there drugs (medication) that you are still taking?	Yes ..... 01 No..... 02	
BP 5B. Advice to reduce salt intake	Yes ..... 01 No..... 02	
BP 5C. Advice to lose weight	Yes ..... 01 No..... 02	
BP 5D. Advice to stop smoking	Yes ..... 01 No..... 02	
BP 5E. Advice to exercise	Yes ..... 01 No..... 02	
BP 6. Have you ever seen a traditional healer for raised blood pressure or hypertension?	Yes ..... 01 No …… 02	
BP 7. Are you currently taking any herbal or traditional remedy for your raised blood pressure?	Yes.....01 No ……02	

Endline Survey

HISTORY OF DIABETES MELLITUS		**DM**
This module is to be administered to all men and women aged 18 years and above		
DM1. HAVE YOU EVER HAD YOUR BLOOD SUGAR MEASURED BY A DOCTOR OR OTHER HEALTH WORKER BEFORE LAST MONTH?	Yes.....01 No.....02	2⇨DM3
DM2. WHAT WAS THE REASON FOR TAKING A BLOOD SUGAR TEST?	Part of disease investigation……01 Part of medical examination for employment or school……02 Checking for my health status……03 Other reasons (specify)……04	
DM3. HAVE YOU EVER BEEN TOLD BY A DOCTOR OR OTHER HEALTH WORKER THAT YOU HAVE RAISED BLOOD SUGAR OR DIABETES BEFORE LAST MONTH?	Yes .....01 No 02	2⇨RD1
DM4. HOW LONG AGO WERE YOU TOLD YOU HAD RAISED BLOOD PRESSURE?	Years ago	
DM5. ARE YOU CURRENTLY RECEIVING ANY OF THE FOLLOWING TREATMENTS/ADVICE FOR DIABETES PRESCRIBED BY A DOCTOR OR OTHER HEALTH WORKER?		
DM5A. INSULIN	Yes .....01 No 02	
DM5B. ARE THERE DRUGS (MEDICATION) THAT YOU ARE STILL TAKING?	Yes .....01 No 02	
DM5C. SPECIAL PRESCRIBED DIET	Yes .....01 No 02	
DM5D. ADVICE TO LOSE WEIGHT	Yes .....01 No 02	
DM5E. ADVICE TO STOP SMOKING	Yes .....01 No 02	
DM5F. ADVICE TO EXERCISE	Yes .....01 No 02	
DM6. HAVE YOU EVER SEEN A TRADITIONAL HEALER FOR DIABETES OR RAISED BLOOD SUGAR?	Yes .....01 No 02	
DM7. ARE YOU CURRENTLY TAKING ANY HERBAL OR TRADITIONAL REMEDY FOR YOUR DIABETES?	Yes .....01 No 02	

Endline Survey

HISTORY OF RESPIRATORY DISEASES			**RD**
This module is to be administered to all men and women 18 years and above			
RD1. HAVE YOU HAD ANY OF THE FOLLOWING SYMPTOMS EITHER AT WORK OR AT HOME? (DO NOT INCLUDE ISOLATED COLDS, SORE THROATS OR FLU.)			
RD2. RECURRING SORENESS OF/OR WATERING OF EYES	Yes .....01 No 02		
RD3. RECURRING BLOCKED OR RUNNING NOSE	Yes .....01 No 02		
RD4. BOUTS OF COUGHING	Yes .....01 No 02		
RD5. CHEST TIGHTNESS	Yes .....01 No 02		
RD6. WHEEZE	Yes .....01 No 02		
RD7. BREATHLESSNESS	Yes .....01 No 02		
RD8. WHEN DO YOU BECOME BREATHLESS?	With mild physical activity	01	
	On lying flat	02	
	PND (Paroxysmal nocturnal)	03	
	At rest	04	
RD9. PRODUCTIVE COUGH IN MOST DAYS FOR 2 CONSECUTIVE MONTHS?	Yes .....01 No 02		
RD10. FATIGUE	Yes .....01 No 02		
RD11. FEVER	Yes .....01 No 02		
RD12. CHEST DISCOMFORT	Yes .....01 No 02		
RD13. DO YOU PRODUCE SPUTUM WHEN COUGHING?	Yes .....01 No 02		
RD14. WHAT IS THE COLOR OF SPUTUM	White	01	
	Yellow	02	
	Greenish	03	
	Pus	04	
RD15. WHAT IS THE AMOUNT OF SPUTUM IN APPROXIMATED TEA SPOONS PER COUGHI?	---- ---- ---- ----tea spoons (1 tea spoon ~5mls)		
RD16. DOES THE SPUTUM FOUL SMELL?	Yes .....01 No 02		
RD17. DO YOU COUGH UP BLOOD?	Yes .....01 No 02		
RD 19. DO YOU EXPERIENCE ANY CHEST PAIN?	Yes .....01 No 02		If NO skip RD. 23
RD 20. WHAT KIND OF CHEST PAIN DO YOU HAVE?	Pleuritic	01	
	Non Pleuritic	02	

	Central, relieved by leaning forward	03	
	Central, not relieved by leaning forward	04	
Past medical history on respiratory diseases		**Year**	
RD 21. Have you ever suffered from measles?	Yes..... 01 No 02		
RD 22. Have you suffered from pneumonia?	Yes..... 01 No 02		
RD 23. Have you ever been treated for TB?	Yes..... 01 No 02		
RD 24. Have you ever been chocked by food regurgitated from the stomach?	Yes..... 01 No 02		
RD 25. Are you on any modern medication for your chest disease?	Yes ..... 01 No 02		
RD26. If Qn RD 25 is Yes, List your modern medications			

Endline Survey

HISTORY OF CANCERS			CA
CA1. DO YOU HAVE ANY HISTORY OF ANY TYPE OF CANCER IN YOUR FAMILY?	Yes .....01 No.....02		
CA2.IF CA1 IS YES PLEASE INDICATE THE TYPE OF CANCER THAT YOUR RELATIVE(S) HAS/ HAD. (SHOW/TELL CARD WITH ALL COMMON CANCERS IN TANZANIA)			
CA3. IF CA1 IS YES INDICATE THE RELATIONSHIP WITH THE PATIENT WITH CANCER IN YOUR FAMILY.	**Maternal**		
	Grandmother/Grandfather	Yes.....01 No 02	
	Mother	Yes.....01 No 02	
	Aunts/Uncles	Yes.....01 No 02	
	Cousin	Yes.....01 No 02	
	Paternal		
	Grandmother/Grandfather	Yes.....01 No 02	
	Father	Yes.....01 No 02	
	Aunts/Uncles	Yes.....01 No 02	
	Cousin	Yes.....01 No 02	
	Siblings		
	Sisters	Yes.....01 No 02	
	Brothers	Yes.....01 No 02	
	Children		
	Daughters	Yes.....01 No 02	
	Sons	Yes.....01 No 02	

Endline Survey

TOBACCO USE		**T**
T1. Do you currently smoke any **tobacco products**, such as cigarettes, cigars or pipes? *(USE SHOWCARD)*	Yes.....01 No 02	02⇨T6
T2. DO YOU CURRENTLY SMOKE TOBACCO PRODUCTS **DAILY**?	Yes.....01 No 02	02⇨T6
T3. IF YOU DO NOT SMOKE DAILY HOW OFTEN DO YOU SMOKE?	Once every _ _ days	
T4. HOW OLD WERE YOU WHEN YOU **FIRST STARTED** SMOKING?	Age at first smoking (years)…… Don't know……..08	IF KNOWN⇨ T5
T5A. On average, **how many** of the following do you smoke in a day?	Manufactured cigarettes _ _ Hand-rolled cigarettes _ _ Pipes full of tobacco _ _ Other _ _ Other specify..... DK.....08	
EXPANDED: Tobacco Use		
T6. IF YOU DON'T SMOKE CURRENTLY, DID YOU EVER SMOKE IN THE PAST?	Yes.....01 No.....02	02⇨T8
T7. HOW OLD WERE YOU WHEN YOU **STOPPED** SMOKING?	Age (years) …… Don't know……..08	IF KNOWN⇨ T8
T8. IF YOU DON'T SMOKE CURRENTLY, DO YOU **CURRENTLY USE** ANY **SMOKELESS TOBACCO** SUCH AS *[SNUFF, CHEWING TOBACCO, LIP TOBACCO]*	Yes.....01 No.....02	02⇨T12
T9. DO YOU **CURRENTLY USE SMOKELESS TOBACCO** PRODUCTS **DAILY?**	Yes.....01 No 02	02⇨T12
T10. ON AVERAGE, HOW MANY **TIMES DURING A DAY** DO YOU USE ….	Snuff, by mouth _ _ Snuff, by nose _ _ Chewing tobacco _ _ Other _ _ Other specify…… Don't know……..08	OTHER⇨ T11 ELSE⇨ T13
T11. IF YOU DON'T CURRENTLY USE SMOKELESS TOBACCO, DID YOU **EVER USE** SMOKELESS TOBACCO SUCH AS *[SNUFF, CHEWING TOBACCO, OR LIP TOBACCO] IN THE PAST*?	Yes.....01 No 02	
T12. HOW OLD WERE YOU WHEN YOU STARTED USING SMOKELESS TOBACCO?	Age to start (in years) _ _	

T13. WERE YOU USING THE SMOKELESS TOBACCO DAILY?	Yes.....01 No 02	
T14. HOW OLD WERE YOU WHEN YOU STOPPED USING SMOKELESS TOBACCO?	Age to stop (in years) _ _	
T15. DURING THE PAST 7 DAYS, ON HOW MANY DAYS DID SOMEONE **IN YOUR HOME** SMOKE WHEN YOU WERE PRESENT?	Number of days _ _ DK.....08	
T16. DURING THE PAST 7 DAYS, ON HOW MANY DAYS DID SOMEONE SMOKE IN CLOSED AREAS **IN YOUR WORKPLACE** (IN THE BUILDING, IN A WORK AREA OR A SPECIFIC OFFICE) WHEN YOU WERE PRESENT?	Number of days _ _ DK or don't work in closed area.....08	

Alcohol Consumption			**A**
A1	Have you **ever** consumed an alcoholic drink such as beer, wine, spirits or *[add other local examples]?)*	Yes……01 No…… 02 DK……08	
A2	If yes, During the past 12 months, **how frequently** have you had at least one alcoholic drink?	Every after _ _ days (record number of days)	
A3	Have you consumed an alcoholic drink within the **past 30 days**?	Yes……01 No…… 02	02⇨D1
A4	During the past 30 days, on how many **occasions** did you have at least one alcoholic drink?	Number _ _ _ DK……08	
A5	During the past 30 days, when you drank alcohol, **on average**, how many **standard alcoholic drinks** did you have during one drinking occasion?	Number _ _ _ DK……08	
A6	During the past 30 days, what was the **largest number** of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together?	Largest number _ _ _ DK……08	
Diet			**D**
D1	In a typical week, on how many days do you **eat fruit**?	Number of days _ _ _ If Zero days, go to D3 DK……08	
D2	If not zero above, How many **servings** of fruit do you eat on **one** of those days?	Number of servings_ _ _ DK……08	
D3	If not zero above, In a typical week, on how many days do you eat **vegetables**?	Number of days_ _ _ If Zero days, go to D5 DK……08	
D4	How many **servings** of vegetables do you eat on one of those days?	Number of servings_ _ _ DK……08	
Physical Activity **Work**			**P**
P1	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work]* for at least 10 minutes continuously? *[INSERT EXAMPLES] (USE SHOWCARD)*	Yes……01 No…… 02	02⇨P4
P2	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days _ _	
P3	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours_ _ Minutes _ _	
P4	Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking	Yes……01 No…… 02	02⇨P7

	[or carrying light loads] for at least 10 minutes continuously?		
P5	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days _ _	
P6	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours_ _ Minutes _ _	
P7	For how long have you been having such activities?	Duration in years _ _	
Travel to and from places			
P8	Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places?	Yes……01 No…… 02	02⇨P10
P9	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days _ _	
P10	How much time do you spend walking or bicycling for travel on a typical day?	Hours_ _ Minutes _ _	
If Adult woman is pregnant or has delivered a child should also fill questionnaires for pregnancy or pregnancy outcomes respectively			
INSPECTED BY: Field Supervisor: Name…….. …… Sign…… Date……			