Impact Evaluation of HIF-supported Health Insurance Projects in Tanzania:

Baseline Report KNCU Health Plan

December 2013

Amsterdam Institute for Global Health and Development

aighd

AIID

AMSTERDAM INSTITUTE FOR INTERNATIONAL DEVELOPMENT

AIID, AIGHD (December 2013)

Impact Evaluation of HIF-supported Health Insurance Projects in Tanzania:

Baseline Report KNCU Health Plan

December 2013

Amsterdam Institute for Global Health and Development

AIID
AMSTERDAM INSTITUTE FOR INTERNATIONAL DEVELOPMENT

Executive summary

Background

The Health Insurance Fund and its implementing partner PharmAccess Foundation aim to facilitate access to comprehensive health care by providing subsidized low–cost community based health insurance schemes in four countries in sub-Saharan Africa (Kenya, Namibia, Nigeria, and Tanzania), combined with improving the quality of health facilities. The programs aim to build better and more sustainable health care infrastructures to contribute to a healthier and more productive population.

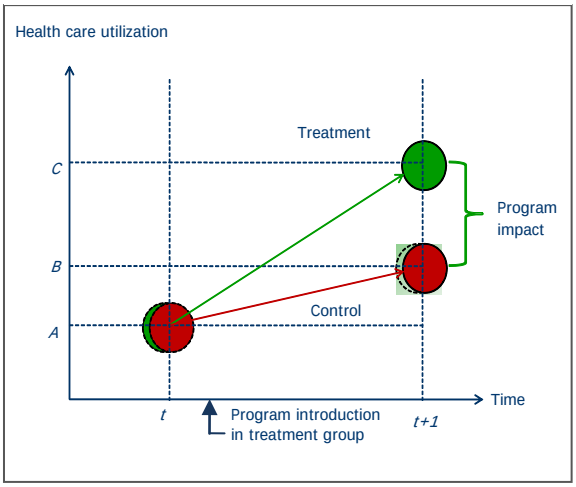
In April 2011 the Health Insurance Fund launched the KNCU Health Plan in the Kilimanjaro region in Tanzania. The KNCU Health Plan offers subsidized health care insurance to KNCU coffee farmers and their households. KNCU (Kilimanjaro Native Cooperative Union) is Africa's oldest cooperative and represents small scale coffee farmers, organized in so-called Primary Societies, most of which sell their coffee through KNCU. The insurance is offered at the household level, at a subsidized price and covers comprehensive primary and limited basic secondary health care services. Also, a list of registered and approved medications is included in the insurance benefit package. The KNCU Health Plan is being gradually expanded by increasingly adding Primary Societies into the insurance scheme.

As part of the Health Insurance Fund program, the Amsterdam Institute for International Development and the Amsterdam Institute for Global Health and Development will perform an *Impact Evaluation* of the KNCU Health Plan. The goal of the Impact Evaluation is to estimate the impact of the KNCU Health Plan on outcomes such as subjective and objective measures of health status of KNCU farmers and their households, their health care utilization, and their out-of-pocket health expenditures.

Research design

In order to control for possible influences that cannot be attributed to the KNCU Health Plan, the Difference-in-Differences method will be applied.[1] This method requires a baseline and a follow-up survey, and so-called treatment and control groups, which are similar at the time of the baseline survey. At baseline neither the treatment nor the control group has access to the program. Furthermore, there are no spillover effects of the KNCU Health Plan already implemented in other nearby areas at the time of the baseline survey. Shortly after the baseline survey the KNCU Health Plan will be introduced in the treatment area. A follow-up survey will be conducted in both the treatment and the control group some time after the program has been introduced in the treatment group.

Figure 1: Difference-in-Differences



After the follow-up survey has been conducted, changes over time in the outcome variables between the treatment and the control group will be analyzed. Assuming a common trend in the treatment and control group in the outcome variables of interest, their difference in changes over time can be attributed to the program, i.e. this is the program impact. See Figure 1 for a graphical representation of the research design.

The treatment and control group for the KNCU Health Plan Impact Evaluation have been selected such that they have similar observed characteristics. They consist of five and four KNCU Primary Societies, located in

[1] For more information see Khandker, S.R., G.B. Koolwal, and H.A. Samad. *Handbook on impact evaluation: Quantitative methods and practices.* The World Bank, 2010. This method has been successfully applied to the impact evaluation of the Health Insurance Fund program Hygeia Community Health Care in Kwara state, Nigeria, see Gustafsson-Wright, E., *et al.*, *A short-term impact evaluation of the Health Insurance Fund program in central Kwara state, Nigeria*. Amsterdam Institute for International Development and the Amsterdam Institute for Global Health and Development, 2013.

the Kilimanjaro region districts Hai, Moshi Rural, and Rombo. A representative sample of 1500 KNCU farmer households has been randomly selected for the baseline survey, half of which are in the treatment group.

The *baseline survey* among these selected KNCU households of the treatment and control group was conducted in January-March of 2013 by trained interviewers of Economic Development Initiatives, the local survey partner. Individuals of the sampled households were interviewed on socio-economic and biomedical characteristics using a specialized computer-based questionnaire. Furthermore, anthropometric measurements, as well as blood pressure and lung function measurements have been collected.

Main findings of the KNCU baseline survey

The treatment and control group were found to be similar on most observed characteristics at the time of the baseline survey. Furthermore the spillover effect of the KNCU Health Plan from nearby areas where the program has already been implemented was small, thus the treatment and control group are well chosen.

The per capita annual consumption is on average TZS 788,372 (≈ USD 495), [2] with a median of TZS 702,350 (≈ USD 440). Thus more than half of the individuals in the population live on less than 1.5 USD a day.

The employment rate in the sample was found to be low; fewer than one in four adults has worked other than in family farming in the past year. The low employment rate is in line with the low share of individuals between 20 and 60 years old in the sample, namely only one in three individuals belong to this age group. On the other hand a high 90% of adults are engaged in family farming. Furthermore a high share of households sells all their coffee to KNCU, namely almost 90%.

The scarcity of working age individuals in the sampled households seems to be the result of migration out of the area. Namely four out of five household heads report to have a spouse or children living elsewhere, out of which almost three quarters live outside the district. In the past year, almost three quarters of these households received gifts or loans of at least TZS 10,000 from a spouse or child of the household head living elsewhere, averaging TZS 285,258 (≈ USD 180). Almost forty percent of households that received these gifts or loans used them -fully or partially- for medical expenses.

One third of households have reported to have had health shocks within the household in the past year that had financial consequences. These households lost on average a staggering 13% of their annual consumption as a result of health shocks within the household, half of which lost TZS 200,000 (≈ USD 125) or more, see Table 1. The most reported coping strategies for these shocks were to use savings, ask for a gift/loan from a relative or friend, and to sell land, animals or other assets.

Table 1: Financial health shocks within the household (past 12 months)

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Share of households that experienced health shock (N=1500)	0.35	0.48	0.38	0.33	0.107
Total value lost due to health shock, TZS (N=523)[†]	420,561	813,710	479,939	361,942	0.106
Value lost due to health shock as share of annual aggregate consumption (N=523)	0.13	0.26	0.15	0.12	0.101

[†] The corresponding median is TZS 200,000 (Treatment: TZS 250,000; Contol: TZS 200,000); Note: TZS 1,600 ≈ USD 1

* p<0.05, ** p<0.01, *** p<0.001

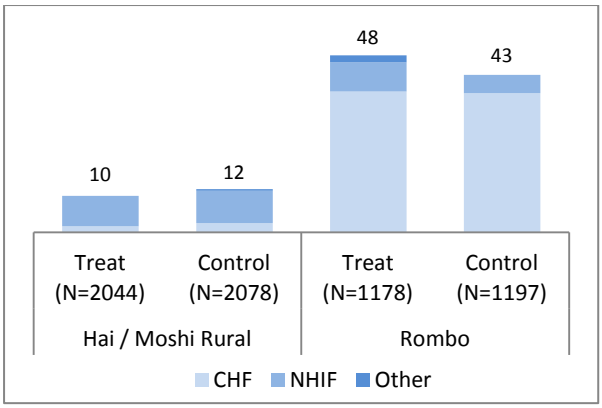
Out-of-pocket health costs were reported at an individual level over the past 30 days. Almost one in five respondents had out-of-pocket health costs in the past 30 days, averaging TZS 10,065 (≈ USD 6). This amount corresponds to a high 15% of the average per capita monthly consumption.

The health insurance rate was found to be almost 20% at the time of the baseline survey. This is mainly due to the high health insurance rate in the district Rombo, which was almost 50%. On the other hand, the health

[2] TZS 1,600 ≈ USD 1, see www.oanda.com/currency/converter.

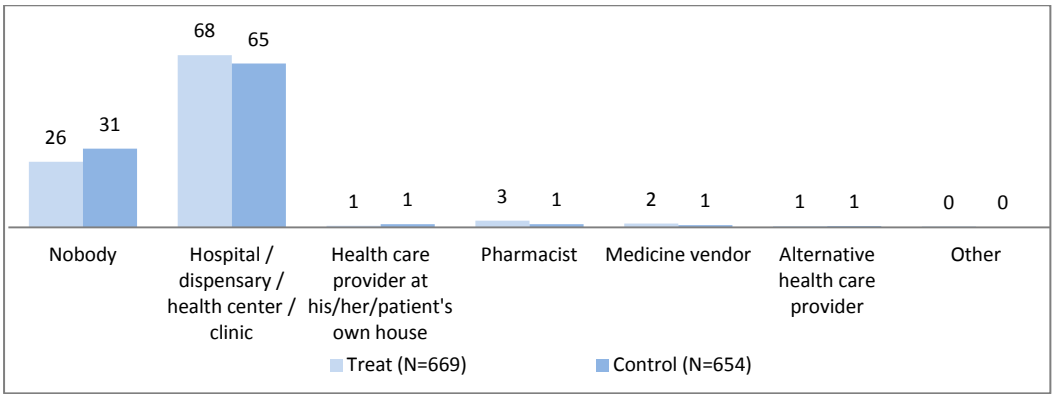
insurance rate in the districts Hai/Moshi Rural is only 10%, as shown in Figure 2. In Rombo most individuals are enrolled in the Community Health Fund (CHF), while most individuals in Hai/Moshi Rural are enrolled in the National Health Insurance Fund (NHIF).

Figure 2: Health insurance rate by district and insurance policy (%)



Almost one in four individuals reported having a chronic disease, with hypertension and rheumatism/arthritis being the most prevalent. Two out of three of these individuals mainly visit a health facility such as a hospital, health centre, dispensary or clinic, for their chronic disease, while more than a quarter does not consult any health care provider, see Figure 3. Other health care providers are not often visited for chronic disease.

Figure 3: Health care utilization, chronic disease (%)



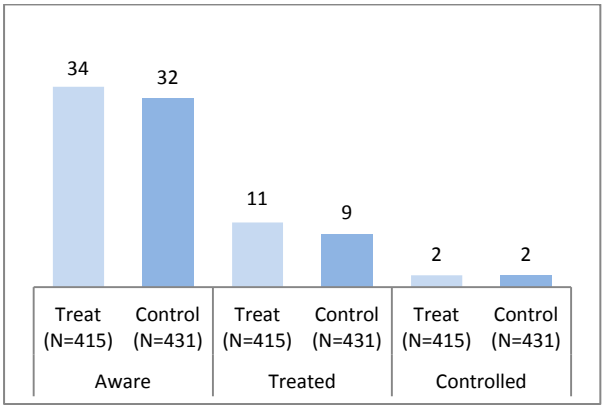
Two out of five individuals reported having had an acute illness or injury in the past year. Three out of four of these individuals had visited a health facility, one in six visited a pharmacy or medicine vendor, and only five percent of individuals did not visit any health care provider for acute illness or injury. Furthermore, five percent of individuals had been hospitalized for an illness or injury in the past year.

Health care utilization among pregnant women was found to be high, as more than 80% of women who were pregnant at the time of the baseline survey, or had delivered a child in the past year, had antenatal care visits, with more than two visits on average. A high 97% of these women visited a health facility for antenatal care, and almost all women who had delivered a child in the past year had delivered in a hospital.

Furthermore, approximately 20% of individuals visited a health care provider for family planning, medical check-up, screening for a particular disease or immunization in the past 12 months. For almost all of these visits a health facility -hospital / health centre / dispensary / clinic- was consulted.

Hypertension -high blood pressure- was diagnosed in 33% of adults. Two out of three hypertensive individuals were not aware of their hypertensive status, and only one in ten was receiving treatment for hypertension, see Figure 4. Only 2% of hypertensive individuals had controlled blood pressure, i.e. normal blood pressure due to medication use or lifestyle measures.

Figure 4: Hypertension: Awareness, treatment and blood pressure control (hypertensive population) (%)



Not much is known about health issues caused by the utilization of pesticides in the Kilimanjaro area. A potential health issue that could be caused by pesticide use is a lung disease called obstructive pulmonary disease (OPD). To investigate this, lung function measurements were conducted in individuals aged 12 to 59 years. A prevalence of OPD of 5% was found in the measured individuals.

To provide an overview of the nutritional status of the respondents, anthropometric measurements were conducted on all respondents. We observed a slightly higher proportion of underfed children under the age of six years (compared to the WHO international reference population), which seems to be the result of acute malnutrition. Children aged 6 to 17 years are found to be notably more underfed compared to the WHO reference population, which seems to be the result of both acute and chronic malnutrition.

Finally, information was collected on time and risk preferences, and on trust levels in the community as well as in KNCU. It is expected that these measures have predictive power over future enrollment in the KNCU Health Plan. Trust levels and time and risk preferences are highly heterogeneous in the population. Approximately 60% of individuals have more trust than distrust in people of the community. Trust in KNCU is higher than trust in the community as approximately 70% of individuals have more trust than distrust in KNCU.

Conclusion and suggestions for further research

The KNCU farmers and their households are poor, and highly dependent on family farming, and on their informal financial network. They suffer from large financial health shocks, have a high health care utilization rate, and they mostly visit health facilities for their health care.

As the population already makes substantive use of health facilities for their health care, it is expected that, even in the short term, better *quality* of health care, better health insurance *coverage*, and better *awareness* of (chronic) illness may largely benefit the KNCU farmer population, both financially and in terms of health.

The introduction of the KNCU Health Plan may bridge the gap in these areas. The Impact Evaluation of the KNCU Health Plan -which will be conducted after revisiting the treatment and control group some time after the KNCU Health Plan has been rolled out in the treatment group- will provide quantitative results on the effect of the KNCU Health Plan on health care utilization, health care costs, and health status of KNCU farmers and their households.

Furthermore, as the KNCU farmers and their families may be financially constrained to enroll in health insurance, one way to bridge this financial gap may be to involve relatives who live elsewhere in the roll out of the KNCU Health Plan, e.g. through mobile payment of the insurance premium. This can be a topic for further research. Other areas of research could include investigating bargaining power within the household in relation to insurance uptake, the effect of trust on health insurance uptake, the relation between pesticide use and lung disease, and the effect of notifying individuals of their measured health status during a survey on future health insurance uptake.

Research Team:

Amsterdam Institute for International Development (AIID):

Jacques van der Gaag, Prof Dr	Principal Investigator
Zlata Tanović, MSc	Project coordinator
Anne Duynhouwer, MSc	Project manager

Amsterdam Institute for Global Health and Development (AIGHD):

Joep Lange, MD Prof Dr	Principal Investigator
Constance Schultsz, MD	Principal Investigator
Marleen Hendriks, MD	Project supervisor
Alexander Boers, MSc	Financial manager
Aziza Magram, MD	Project manager
Marijke Roos, PhD	Technical advisor
Ferdinand Wit, MD	Medical advisor
Daniëlla Brals	Research assistant
Michiel Heidenrijk, BSc	Managing Director AIID / AIGHD

Team Local Survey Partner:

Economic Development Initiatives (EDI Ltd.):

Joachim de Weerdt, Dr	Research Director
Respichius D. Mitti	Research Manager
Andreas Kutka	Data Processing Coordinator
Boniphace Jullu, Dr	Health Specialist

This report is written by Anne Duynhouwer, Daniëlla Brals, and Zlata Tanović (*corresponding author,* z.tanovic@aiid.org), with contributions from Aziza Magram.

AIID and AIGHD would like to thank Economic Development Initiatives (EDI Ltd.) for their excellent collaboration in preparing and conducting the KNCU baseline household survey. Furthermore, we thank the Health Insurance Fund, PharmAccess Foundation, Kilimanjaro Native Cooperative Union (KNCU), and MicroEnsure for their ample assistance with the preparation of the survey.

Table of contents

Acronyms

#:	Number (of)
AIID:	Amsterdam Institute for International Development
AIGHD:	Amsterdam Institute for Global Health and Development
ANC:	Antenatal care
CG:	Control Group
CHF:	Community Health Fund
DD:	Difference-in-Differences
EDI Ltd.:	Economic Development Initiatives
HIF:	Health Insurance Fund
HH:	Household
IE:	Impact Evaluation
KNCU:	Kilimanjaro Native Cooperative Union
KNCU HP:	KNCU Health Plan
MED:	Median
NHIF:	National Health Insurance Fund
OOP:	Out-of-pocket health care expenditures
OPD:	Obstructive pulmonary disease
PAF:	PharmAccess Foundation
PS:	Primary Society
ROSCA:	Rotating Savings and Credit Association
SACCO:	Savings And Credit Co-Operative
Std. dev.:	Standard Deviation
TG:	Treatment Group
TZS:	Tanzanian Shilling

1. Introduction

The Health Insurance Fund (HIF) and its implementing partner PharmAccess Foundation (PAF) aim to facilitate access to comprehensive health care by providing subsidized low–cost community based health insurance schemes in four countries in sub-Saharan Africa (Kenya, Namibia, Nigeria, and Tanzania). In their programs it is recognized that all elements of the health care system – patients, hospitals and clinics, administrative systems, financing, and laws and regulations – must be in place to enable the delivery of quality health care. Therefore, in addition to providing health care insurance, HIF aims to improve access to quality health care by refurbishing and training selected health care facilities in the locality of the target populations to internationally recognized standards, so that these can provide the services covered by the insurance. Ultimately, the programs aim to build better and more sustainable health care infrastructures, which will contribute to a healthier and more productive population. HIF is sponsored among others by the Dutch government.

In April 2011 HIF launched the KNCU Health Plan (KNCU HP), together with PAF and their local partners MicroEnsure and the Kilimanjaro Native Cooperative Union (KNCU), in the Kilimanjaro region in Tanzania. The KNCU HP offers subsidized health care insurance to KNCU coffee farmers and their households. Established in 1929, KNCU is Africa's oldest cooperative and represents small scale coffee farmers in 92 Primary Societies (PSs), of which 68 sell their coffee through KNCU. The KNCU HP is being gradually expanded by increasingly adding PSs into the insurance scheme. The insurance is offered at the household level, at a subsidized price and covers comprehensive primary and limited basic secondary health care services. Also, a list of registered and approved medications is included in the insurance benefit package. Beneficiaries are enrolled at an annual basis, and the cost of insurance depends on the size of the household.

As part of the HIF program, the Amsterdam Institute for International Development (AIID) and the Amsterdam Institute for Global Health and Development (AIGHD) will perform an Impact Evaluation (IE) of the KNCU HP. The IE consists of so-called baseline and follow-up household surveys, which include socio-economic and biomedical questionnaires, and basic biomedical measurements.

This report concerns the KNCU baseline survey that was conducted in January-March 2013. The data that will be presented has been collected by AIID's and AIGHD's local survey partner Economic Development Initiatives (EDI Ltd.).

The report is structured as follows. The next section discusses research design and sampling strategy, followed by a section on data collection. Subsequently, the collected data is presented which includes descriptive results on socio-demographic characteristics, health status, health insurance, health care utilization and health expenditures. The final section presents some suggestions for further research and concludes.

2. Research Design & Sampling

2.1. Research design

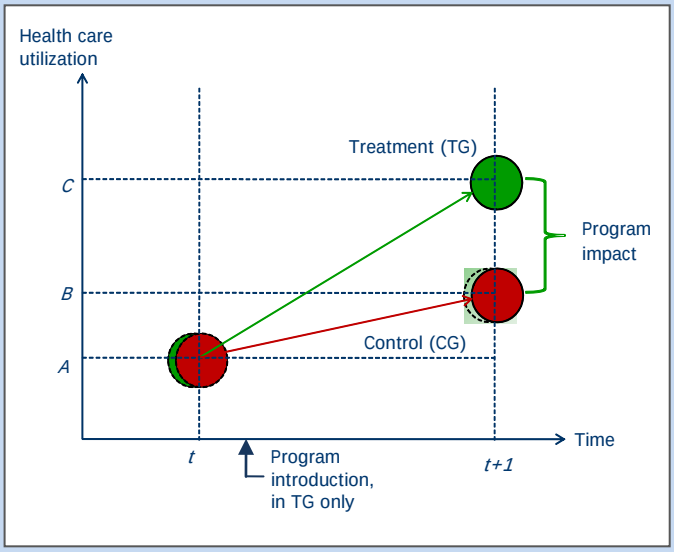
The objective of the operational research in HIF's programs is to evaluate the program's impact on various outcome measures, to understand why particular outcomes are observed, and to provide feedback to support the implementation of the project. The main goal of the IE is to measure whether the inputs and outputs lead to the envisaged outcomes. Using a quasi-experimental method, the impact of the KNCU HP will be estimated on outcomes such as health status, health care utilization, and out-of-pocket health costs.

In order to control for possible changes that cannot be attributed to the KNCU HP program, the "Difference-in-Differences" (DD) method will be applied.[1] This method requires a baseline and a follow-up survey, and so-called treatment and control groups, which are similar at the time of the baseline survey. At baseline neither the treatment nor the control group has access to the program. Furthermore, there are no spillover effects of the KNCU Health Plan already implemented in other nearby areas at the time of the baseline survey.[2] Shortly after the baseline survey the KNCU HP will be introduced in the treatment area only, and a follow-up survey will be conducted in both the treatment and the control group some time after the treatment group has been introduced to the program.[3] After the follow-up survey has been conducted, changes over time in the outcome variables between the treatment and the control group will be analyzed. Assuming a common trend in the treatment and control group in the outcome variables of interest, their difference in changes over time can be attributed to the program, i.e. this is the program impact. See Box 1 for a graphic explanation of DD.

Box 1 - Difference-in-Differences

The figure below illustrates the DD method, using an example of a program's impact on health care utilization (the variable on the y-axis) over one time period. Time *t* refers to a time before the start of the program and *t+1* to some time after program implementation. The baseline survey is conducted at time *t*, and the follow-up survey at time *t+1*.

At time *t* health care utilization is measured for both the control group (red) and the treatment group (green), and is found to be equal to *A*. The health care utilization is measured again for both groups at time *t+1.* In this example health care utilization is equal to *B* for the control group and *C* for the treatment group at time *t+1*. In other words, between times *t* and *t+1* household income increased by *AC* in the treatment group. However, the impact of the program is *BC*, not *AC*. Namely, the increase *AB* in household income would also have taken place without the program.



[1] For more information on DD, see Khandker et al. (2010). This method has been successfully applied to the impact evaluation of the HIF program Hygeia Community Health Care in Kwara state, Nigeria (Gustafsson-Wright et al. , 2013).

[2] These spillover effects include whether the treatment and control group individuals have heard about KNCU HP, and whether at the time of the baseline survey they often visit health facilities that have been substantially refurbished in the scope of the KNCU HP.

[3] Note that at the time of the follow-up survey the control group is not (yet) included in the program.

The treatment group consists of five PSs that were selected from the program area. The control group was constructed by *matching* the treatment group to four PSs outside the program area, based on a number of observed characteristics such as distance to the city, altitude, type of coffee grown, access to health facilities, and district. For the DD it is important that the treatment and control group have comparable characteristics at the time of the baseline survey.[4]

Furthermore, to prevent spillover effects, the treatment and control group have been selected such that health facilities that have already been (substantially) upgraded in the scope of KNCU HP, in other areas where the KNCU HP has already been rolled out, are not frequently visited by individuals in the treatment and control group at the time of the baseline survey. Table 2.1a shows the selected PSs, by treatment and control group, and by district.

Table 2.1a – Primary Societies

	District	Primary Society
Treatment group	Hai	Isuki
		Lemira Mroma
	Moshi Rural	Umbwe Ndoo
		Kombo
	Rombo	Shimbi
Control group	Hai	Machame Nkuu
		Masama Saawe
		Narumu[1]
	Rombo	Mkuu Masaseni[2]

[1] Narumu is located at the border of districts Hai and Moshi Rural.

[2] Mkuu Masaseni is a G32 Primary Society, i.e. it does not sell its coffee to KNCU, even though it is a KNCU Primary Society.

2.2. Sampling

For the survey 1500 KNCU households were sampled. The sample size was calculated using power calculations and assuming an attrition of 5% between the baseline and follow-up survey. The sample was first stratified by treatment status and district (see Table 2.2a). The number of sampled households in the treatment and control group is equal (TG: 750; CG: 750), and each of the three sampled districts represents approximately one third of the sample.

Table 2.2a– Sample size (number of households)

	Hai/Moshi Rural	Rombo	Total
Treatment group	500	250	750
Control group	500	250	750
Total	1000	500	1500

[4]Note that the treatment and control group have not been randomly assigned, but are matched based on observed characteristics. Unobservable characteristics are thus not controlled for. Due to anticipated logistical complications with the roll-out of the KNCU Health Plan, randomization of the PSs into treatment and control group was not feasible for this impact evaluation. Matching on observed characteristics is the next best method.

The sample was then stratified by sub-village, the smallest administrative level in Tanzania. Households were sampled from 90 sub-villages in total (TG: 47; CG: 43). Because the sampling was not conducted proportionally to the population size of the sub-village, the selected households are given sample weights per sub-village. These sample weights indicate how many households in the sub-village are represented by each sampled household. The total sample, in combination with the sample weights, is representative of the total population of the treatment and control area.

Replacement households were sampled in case a household from the original sample could not participate, or refused to participate in the survey. In total, 84 households were replaced (TG: 42; CG: 42).

3. Data collection

3.1. Training

During a three-week training, 29 interviewers, 7 supervisors and 7 health officers were trained to conduct the baseline survey. The training was provided by EDI Ltd. with technical assistance from AIGHD and AIID.

The training started with a general introduction on the project, interviewing skills and the data entry program SurveyBe.[5] Subsequently, all the sections of the questionnaire were discussed. Each question was addressed and the performance of the interviewers was assessed by role-plays and tests. The health officers were trained in taking the biomedical measurements, and also attended the training for the questionnaire. The field team practiced in two field tests that were held in Shimbwe Chini and Shimbwe Juu, two villages served by the PS Uru Shimbwe, which is not included in the study area. After each field test feedback sessions were held where additional training was given if needed. The duration of the full training was three weeks and full-time participation was obligatory. Participants received a certificate of training.

3.2. Fieldwork

The fieldwork was conducted by EDI Ltd. and took place between January 25th and March 6th 2013. Six teams, each consisting of four interviewers, one health officer and one supervisor, visited the selected villages. Local village leaders and guides assisted in locating the selected households. On average, the interviewers performed two interviews per day by means of the computer-based questionnaire. The health officers visited seven to eight households per day to perform the biomedical measurements. These results were recorded using pen and paper and entered in SurveyBe by the interviewers while still in the field. At the end of each day the supervisors checked the collected data and sent it to the data manager of EDI Ltd, who performed data checks.

Bi-weekly EDI Ltd. shared an up-to-date (anonymous) database with AIID-AIGHD. To ensure high data quality, AIID, AIGHD, and EDI Ltd. together performed extensive data checks during the survey. All inconsistencies were promptly reported back to the field for corrections.

In many cases, not all household members were available at the time of the interview. To ensure that the information collected for each household was as complete as possible, revisits took place. In the second week of the survey, a seventh (trained) health officer joined the team to assist in these revisits and to help to reach the target of seven to eight households per health officer per day.

3.3. Questionnaires

The baseline survey questionnaires were developed by AIID and AIGHD and adapted to the local context by EDI Ltd., and includes both biomedical and a socio-economic components. Each household was interviewed on the following topics:

- Socio-economic status including education, employment, housing, assets, and consumption,
- Health status, such as prevalence of respiratory problems, chronic disease, reproductive health and cardiovascular disease risk,

[5] SurveyBe is a specialized software, designed for high quality computer assisted data collection. For more information see www.surveybe.com.

- Health-related behavior, including health knowledge, health care utilization, out-of-pocket health costs, drug use, maternal care and child immunization,
- Trust levels in the community and in KNCU.

Furthermore, 50% of the households in the sample were also interviewed on the following:

- Time and risk preferences,
- Financial networks, including spouses and children of the household head living elsewhere.

An important input for the development of the baseline survey questionnaire was a so-called community questionnaire, which was conducted in all villages of the treatment and control group prior to the baseline survey. It served as an inventory of sub-villages, schools, health facilities, infrastructure, community organizations and agricultural activity in the village. The community questionnaire was conducted among individuals with specific knowledge of the community, such as community leaders, head teachers, and health workers.

3.4. Biomedical measurements

To obtain objective data on respondents' health status, the survey includes biomedical measurements. For all respondents, weight and height were measured. Waist and hip circumference was measured for all (non-pregnant) respondents of 12 years and older. Upper arm circumference was measured for children aged six months to five years. Blood pressure was measured for respondents aged 18 years and older. The pulmonary function was measured for non-pregnant respondents aged 12-59 years, by means of spirometry.

After completing the measurements, all households were given information leaflets with specific information on health related issues such as hypertension, overweight, smoking, and respiratory diseases (see Figure 3.4a). For respondents with abnormal results for blood pressure and/or lung function, specific sections in the leaflet were emphasized.

To be able to investigate whether emphasizing abnormal blood pressure or lung function substantially affects insurance uptake, the measurement of blood pressure and pulmonary function was conducted in a random sample of 80% of all households, instead of all households.

Figure 3.4a– Information leaflet

3.5. Ethical considerations

Ethical clearance for this study was obtained from the Tanzanian National Institute for Medical Research (NIMR). General research clearance was given by the Tanzania Commission for Science and Technology (COSTECH). The study was conducted in compliance with protocol and international and national regulations.

The data was collected by an impartial party, EDI Ltd., which also ensured that the study subjects fully understood the nature and purpose of the household survey. Two months prior to the household survey the communities were sensitized by means of informing community leaders about the study and distributing flyers.

All the respondents participated voluntarily in this baseline survey. Only household members aged 15 years and older were personally interviewed. For all respondents aged 18 years and older written informed consent for the biomedical questions and measurements was obtained before the start of the interview. For participants aged 12 to 17 years, permission of the parent or legal guardian was asked by means of written informed consent. A copy of the signed informed consent form was given to the participant. For adults who were not present at the time of the interview and thus could not give consent, the biomedical questions could not be asked. However, the socio-economic questions on individual level could be answered by another household member.

The data obtained from the questionnaires and biomedical measurement forms was anonymized before data analysis. The personal identification information that will be used to revisit the participants for follow-up studies has been stored by the local partner EDI Ltd. and an independent data manager of AIID-AIGHD. Only the latter can link the personal identification information to the database. The AIID-AIGHD researchers do not have access to the personal information database.

4. Descriptive results

4.1. The dataset

Table 4.1a shows that the sample includes 6,497 individuals (TG: 3,222; CG: 3,275). Of these individuals, approximately 90% gave consent for the biomedical part of the interview (see Figure 4.1a).

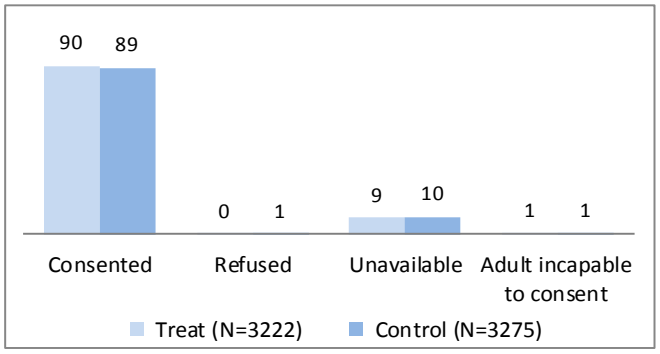
Table 4.1a – Count

	Total	Treat	Control
Individuals (all)			
Sampled	6,497	3,222	3,275
Consented	5,808	2,901	2,907
Individuals (≥ 18 years)			
Sampled	3,902	1,935	1,967
Consented	3,310	1,658	1,652

Figure 4.1a shows that the majority of individuals who did not give consent were *unavailable*, i.e. they were not present at the time of the interview nor at the time of the revisit. Appendix A provides an overview of the socio-demographic characteristics of the individuals who did not give consent, as well as the differences in socio-demographic characteristics between the individuals who consented and those who did not.[6]

Note that in the remaining sections of the report all statistics (except N) have been given sample weights as discussed in subsection 2.2, and are clustered at the household level.

Figure 4.1a – Individual Consent (%)



[6] Note that for the individuals who did not give informed consent because of unavailability, the individual socio-economic questions could be answered by another household member.

4.2. Socio-demographics

Table 4.2a provides an overview of the socio-demographic characteristics of the sample. With the exception of household size and highest completed education level less than primary school, all variables show a statistically insignificant difference between the treatment and control group. In other words, the treatment and control group are highly similar in terms of socio-demographic characteristics.

The table shows that in both the treatment and the control group approximately one-third of the respondents of 18 years and older either never went to school or did not complete primary school. More than half of the respondents reported primary school as their highest completed level of education (TG: 52%; CG: 54%). The table also shows that approximately one in five respondents of 18 years and older reported having worked other than in family farming in the past 7 days. Less than one in four respondents worked in the past 12 months. As family (coffee) farming is not considered as work in these two statistics, the low employment rate may be explained in part by the fact that 90% of the respondents aged 18 years and older were engaged in family farming and/or domestic chores in the past 12 months (TG: 90%; CG: 89%).[7]

The table furthermore shows similar consumption levels for the treatment and control group. The per capita annual consumption is on average TZS 788,372 (≈USD 495), (TG: TZS 788,637; CG: TZS 788,152).[8] The corresponding median in TZS 702,350 (≈USD 440), (TG: TZS 704,638; CG: TZS 694,500). Thus more than half of the individuals in the sample, in both the treatment and the control group, live on less than 1.5 USD a day.[9] Comparing the mean of the annual consumption to its median shows that, as is to be expected, the distribution is skewed to the left, both at individual and at household level.[10] Lastly, a large share of household heads reported having a spouse or child living elsewhere (TG: 81%; CG: 76%).

Figure 4.2a shows that the age structure in the treatment and control group is also highly similar. Both population pyramids show a heterogenic population in terms of age. However, the share of respondents in the working-age (20-59 years) is relatively low (TG: 34%; CG: 35%). A possible explanation is that people in this age category migrate out of the households for employment/educational reasons. This explanation is in line with the high share of household heads who reported having a spouse or child living elsewhere (see Table 4.2a), 72% of which live outside the district (TG: 73%; CG: 72%).

[7] Note that family farming is considered to be a domestic chore in the Kilimanjaro region.
[8] The Tanzanian Shilling (TZS) is the Tanzanian currency. TZS 1,600 ≈ EUR 1, see www.oanda.com/currency/converter.
[9] USD 440 / 365 days < USD 1.5 per day.
[10] The median aggregate annual consumption at the household level is TZS 2,844,400 (TG: TZS 2,785,000; CG: TZS 2,907,068).

Table 4.2a – Socio-demographics

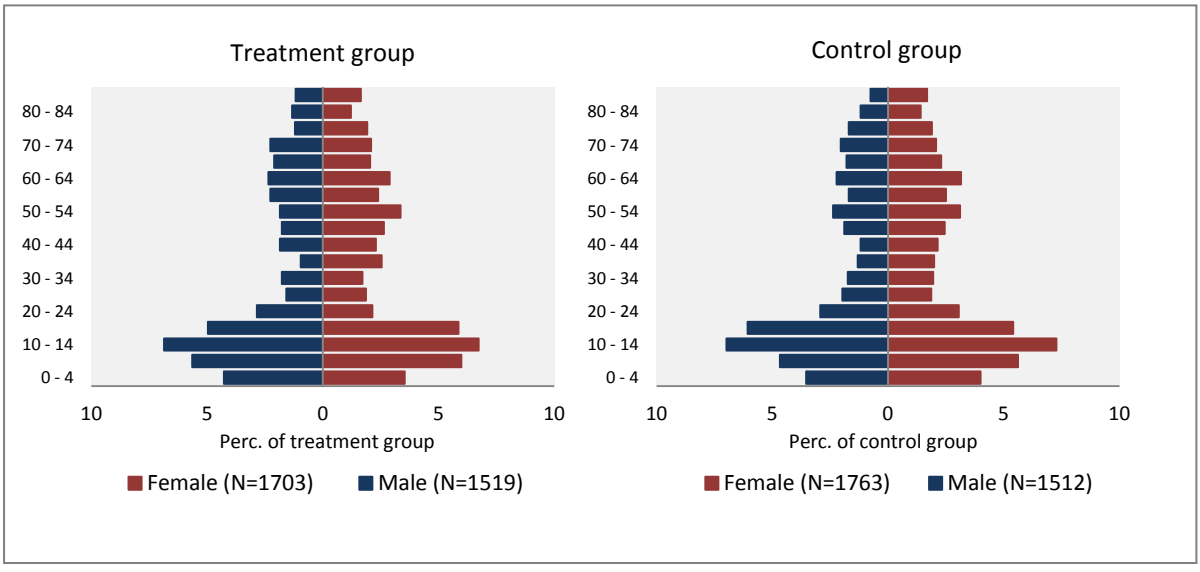
	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
All individuals (N=6497)					
Age	34.34	25.81	34.77	33.99	0.201
Female	0.53	0.50	0.53	0.54	0.163
Aggregate annual PC consumption, TZS	788,372	366,920	788,637	788,152	0.977
Individuals ≥ 18 years (N=3902)					
Married[1]	0.57	0.49	0.59	0.56	0.107
Employed - past 7 days	0.20	0.40	0.20	0.20	0.711
Employed - past 12 months	0.23	0.42	0.23	0.23	1.000
Engaged in family farming/domestic chores	0.90	0.30	0.90	0.89	0.189
Highest completed educational level					
None	0.11	0.31	0.12	0.11	0.223
Less than primary school	0.24	0.43	0.26	0.23	0.027*
Primary school	0.53	0.50	0.52	0.54	0.145
Secondary school - junior	0.10	0.30	0.10	0.11	0.168
Secondary school - senior	0.01	0.11	0.01	0.01	0.201
Higher education	0.00	0.06	0.00	0.00	0.087
Households (N=1500)					
HH size	4.20	2.00	4.10	4.30	0.037*
Female HH head	0.27	0.45	0.26	0.29	0.209
Aggregate annual HH consumption, TZS	3,202,056	1,729,197	3,126,759	3,267,407	0.095
HH head has spouse/child living elsewhere[2] (N=752)	0.78	0.41	0.81	0.76	0.064

[1] Married includes monogamous and polygamous marriages.

[2] Asked for 50% of the sample. It only includes spouses/children living elsewhere that are 18 years and older. 72% of these spouses/children live outside the district (TG: 73%; CG: 72%).

* p<0.05, ** p<0.01, *** p<0.001

Figure 4.2a – Population pyramids



Summary Section 4.2:

- **TG** and **CG** are **highly similar** in terms of **socio-demographic** characteristics.
- The **education level** is relatively **low**.
- **More than half** of the individuals live on **less than 1.5 USD a day**.
- **Employment rate** (excl. family farming) is relatively **low**.
- **90%** of the **individuals aged 18 years and older** is engaged in **family farming/domestic chores.**
- **78%** of the household heads reported a **spouse/child living elsewhere** (50% of the sample), **72%** of which live outside the district.
- Only **one third** of individuals are **between 20 and 59 years of age**.

4.3. Wealth and wealth indicators

A wealth index has been constructed, measuring the *relative asset based wealth* of households within the sample. It is constructed as the first principal component of 11 housing characteristics and 22 assets, similarly to Filmer and Pritchett (2001). It is a relative wealth measure within the dataset, and specific for this sample. For example, if household *A* has a higher wealth index than a household *B*, then *A* has relatively more (valuable) assets or better housing characteristics than household *B*. Finally, the index is normalized to have mean zero, and standard deviation one.[11]

Table 4.3a shows that the control group has a higher wealth index than the treatment group on average, but the difference is not statistically significant. Furthermore, the distribution of the wealth index is skewed to the left and highly similar for the treatment and control group (see Figure 4.3a).

Table 4.3a also shows that most households in the sample have access to a good quality toilet facility and good quality drinking water. In the control group more households have access to a good quality toilet facility (TG: 86%; CG: 91%), while in the treatment group more households have access to good quality drinking water (TG: 91%; CG: 84%). These differences are statistically significant. In the control group, more households reported electricity as main source for lighting compared to the treatment group (TG: 26%; CG: 30%), and this difference is significant as well. In both the treatment and the control group the majority of the households reported kerosene, paraffin, gas or oil lamp as main source of energy used for lighting (TG: 65%; CG: 59%). Most households reported firewood as main source of energy for cooking is (TG: 99%; CG: 98%), while only 1% of the sample reported electricity/gas. Lastly, almost all the households own land and livestock.

[11] The rule of thumb is in this case that the range -1 to 1 contains approximately two-thirds of the sample.

Table 4.3a – Wealth index and wealth indicators (N=1500)

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Wealth index	0.00	1.00	-0.05	0.04	0.053
Housing characteristics					
Good quality toilet[1]	0.89	0.32	0.86	0.91	0.005**
Good quality drinking water[2]	0.88	0.33	0.91	0.84	0.000***
Main source of energy for lighting: electricity[3]	0.28	0.45	0.26	0.30	0.044*
Main source of energy for cooking: electricity/gas	0.01	0.07	0.00	0.01	0.070
Land ownership					
HH owns land	1.00	0.06	1.00	0.99	0.202
# acres HH owns	2.38	1.93	2.32	2.43	0.251
Livestock ownership					
HH owns livestock	0.95	0.21	0.95	0.95	0.966
# cattle HH owns	1.57	1.53	1.57	1.56	0.874
# goats/sheep HH owns	2.12	2.71	1.95	2.27	0.004**
# chicken HH owns	5.69	7.61	5.92	5.49	0.288
# other animals HH owns	0.58	1.93	0.54	0.61	0.362

[1] Good quality toilet facilities include flush toilets, improved pits and covered pits, that are not shared with other households.

[2] Good quality drinking water includes water from pipe inside, pipe outside, protected dug well, bottled, tube/well/borehole, protected spring, tanker truck/water vendor.

[3] Electricity includes public electricity, private generator and house generator.

* p<0.05, ** p<0.01, *** p<0.001

Figure 4.3a– Histogram of the wealth index

Summary Section 4.3:

- The **difference** in the **wealth index** between **TG** and **CG** is statistically **insignificant**.
- **Nine out of ten** households have access to a **good quality toilet facility** and **good quality drinking water**.
- Almost **all** households own **land** and **livestock**.

4.4. Coffee farming

Given the target population of the KNCU HP, the questionnaire also includes a section on (family) coffee farming. Table 4.4a presents these results. Most households have grown coffee in the past 12 months (TG: 93%; CG: 90%). In both the treatment and the control group almost all coffee farmers sold all their coffee to KNCU (TG: 89%; CG: 86%). Figure 4.4a shows that Hai/Moshi Rural and Rombo are similar in the share of total coffee production that the households sold to KNCU.

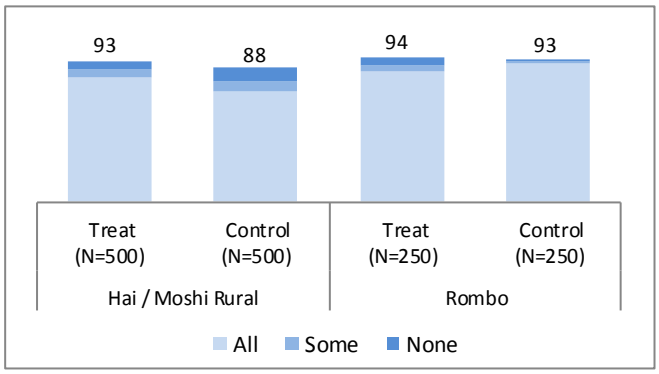
Table 4.4a – Coffee farming (past 12 months)

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
All households (N=1500)					
Household grows coffee	0.91	0.28	0.93	0.90	0.007**
Households that grow coffee (N=1379)					
Coffee yield in the past year (kg)†	39.1	76.8	44.3	34.4	0.001***
All coffee sold to PS	0.87	0.33	0.89	0.86	0.170
Coffee partly sold to PS	0.06	0.24	0.06	0.06	0.992
Coffee not sold to PS	0.07	0.25	0.05	0.08	0.066

* p<0.05, ** p<0.01, *** p<0.001

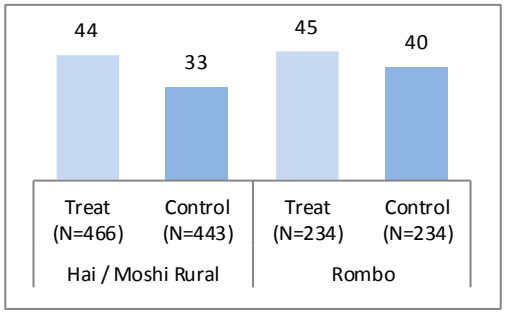
† Excluding two outliers of 50,000 kg from the treatment group.

Figure 4.4a – Share of coffee sold to KNCU by district (%)



The coffee yield in the past year is significantly higher in the treatment group (TG: 44kg; CG: 34kg), see Table 4.4a, excluding two outliers of 50,000 kg from the treatment group. Comparing the mean to the median (MED) shows that the distribution of the coffee yield is skewed to the left (MED TG: 22 kg; MED CG: 17 kg). Figure 4.4b shows that the coffee yield is higher in the treatment group both in Hai / Moshi Rural and in Rombo (the two outliers of 50,000 kg are excluded).

Figure 4.4b – Coffee yield by district for households that grew coffee in the past year[1] (kg)



[1]Excluding two outliers of 50,000 kg.

Summary Section 4.4:

- **Nine out of ten households** have grown **coffee** in the past 12 months.
- **Almost ninety percent of the households** that grew coffee sold **all** the coffee they produced to **KNCU**.
- The **coffee yield** is significantly **larger** in **TG**, also when outliers are excluded (TG: 44 kg; CG: 34 kg).

4.5. Health insurance

Table 4.5a presents the health insurance status both at the individual and at the household level. A household is said to be insured when at least one household member has health insurance. The table shows that almost one in four individuals ever had health insurance, and 19% currently have health insurance (TG: 19%; CG: 20%). Nearly one-third of the households reported at least one currently insured household member (TG: 28%; CG: 29%). The differences between the treatment and control group in insurance status are not statistically significant.

The bottom two statistics of table 4.5a show the extent of KNCU HP spillovers from nearby areas, in terms of whether the household head has heard of the KNCU HP and whether he or she knows someone who uses KNCU HP.[12] Almost none of the households reported knowing someone who uses KNCU HP, and only 6% have reported to have heard of KNCU HP at the time of the baseline survey (TG: 8%; CG: 4%). Thus there is no reason to believe that there has been a large spillover effect of the KNCU HP from nearby areas to the treatment and control group at the time of the baseline survey.

[12] The questions that asked were "Which health insurance have you heard of?", and "And which health insurance is used by people you know?", respectively. The respondent could give four answers to both questions, and was not prompted.

Table 4.5a – Health insurance

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Individuals (N=6497)					
Ever had health insurance	0.24	0.43	0.23	0.25	0.144
Currently has health insurance	0.19	0.40	0.19	0.20	0.362
Households (N=1500)					
Ever had health insurance[1]	0.34	0.47	0.32	0.35	0.117
Currently has health insurance[1]	0.29	0.45	0.28	0.29	0.615
Household heads (N=1500)					
Household head has heard of the KNCU HP [†]	0.06	0.23	0.08	0.04	0.002**
Household head knows someone who uses KNCU HP [‡]	0.00	0.07	0.01	0.00	0.546

[1] Households with atleast one household member with health insurance

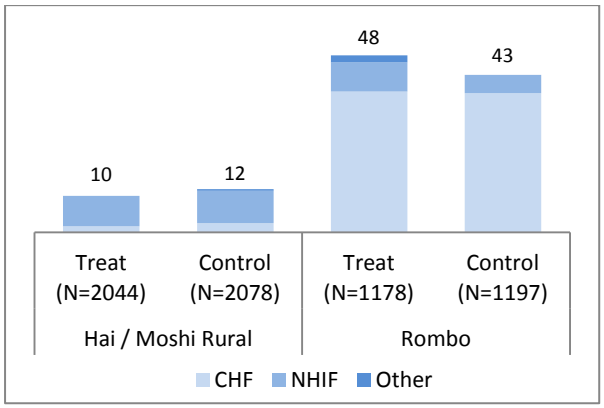
[†] The question asked was: "Which health insurance have you heard of?"

[‡] The question asked was: "And which health insurance is used by people you know?"

* p<0.05, ** p<0.01, *** p<0.001

Figure 4.5a shows that the relatively high share of respondents who currently have health insurance can, to a large extent, be attributed to the high insurance rate in the district Rombo (TG: 48%; CG: 43%). Most of the insured respondents in Rombo are enrolled in the Community Health Fund (CHF) (TG: 80%; CG: 88%). In Hai/Moshi Rural the largest share of the insured are enrolled in the National Health Insurance Fund (NHIF) (TG: 83%; CG: 75%).

Figure 4.5a – Health insurance status by district and insurance policy (%)



Summary Section 4.5:

- The **difference** in health insurance status between **TG** and **CG** is statistically **insignificant**.
- **19%** of the respondents currently have **health insurance**.
- The relatively high share of insured respondents in the sample can be attributed to the **high CHF insurance rate** in the district **Rombo**.
- **Spillover effect** of KNCU HP from nearby areas is **small: almost** none of the households heads know someone who uses KNCU HP, and only **6%** of households **have heard of the KNCU HP** (TG: 8%; CG: 4%).

4.6. Health status

By providing better access to health insurance and improving health care, the health status of the population is expected to improve over time. This section discusses the health status of the sample at baseline. Besides providing an overview of the objective biomedical measurements, the self-reported data is also presented. The self-reported data reflect the awareness and perception of the respondents of their own health status, which could also be affected by their access to health care.

4.6.1. Self-reported health status

The respondents were asked to characterize their current health status. The results, which are very similar for the treatment and control group, are presented in the figure below. In both samples 65% of the respondents reported to have 'good' health and only 6% reported that their health was 'not good'.

Figure 4.6.1a – Self-reported health status (%)

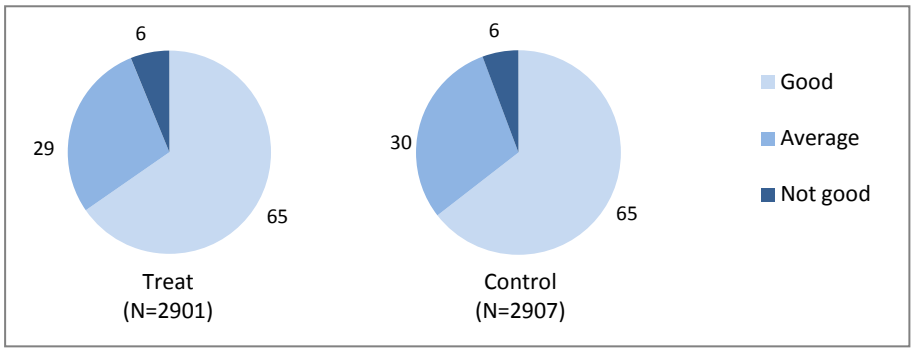


Table 4.6.1a shows that both in the treatment and the control group more than 20% of the respondents reported having a chronic disease (TG: 24%; CG: 22%). The treatment group has a significantly smaller share of respondents who reported being acutely ill or injured in the past 12 months, compared to the control group (TG: 37%; CG: 44%). Lastly, the table shows that 5% of individuals were hospitalized in the past 12 months (TG: 6%; CG: 4%).[13]

Table 4.6.1a – Self-reported prevalence of chronic disease and acute illness/injury

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Chronic disease (N=5808)	0.23	0.42	0.24	0.22	0.123
Acute illness/injury[1] (N=5793)	0.41	0.49	0.37	0.44	0.000***
Hospitalized[1] (N=5812)	0.05	0.21	0.06	0.04	0.046*

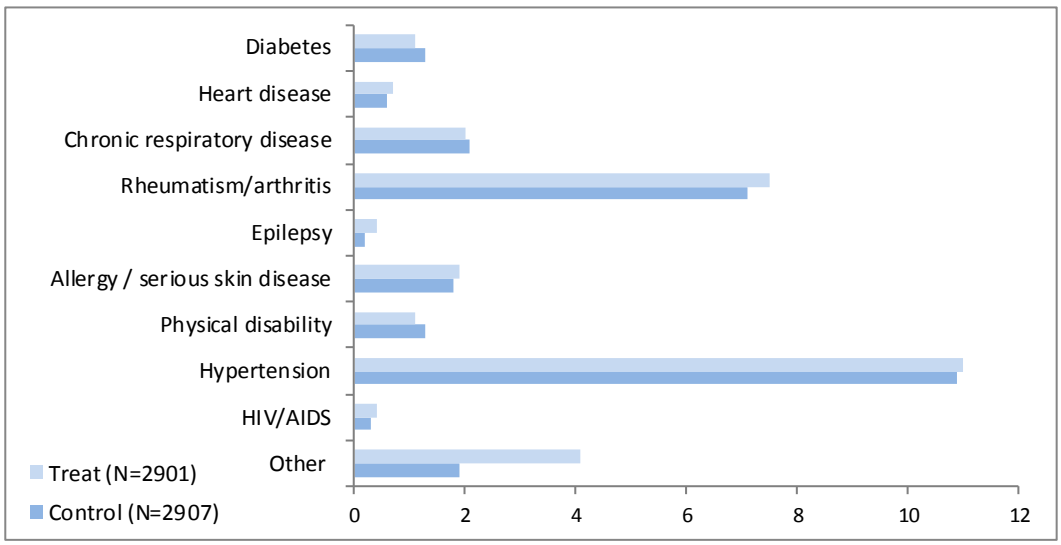
[1] In the past 12 months.

* p<0.05, ** p<0.01, *** p<0.001

Figure 4.6.1b shows a breakdown of the prevalence of self-reported chronic diseases, showing high similarity between the treatment and control group. In both the treatment and control group hypertension shows the highest prevalence (TG: 11%; CG: 11%), followed by rheumatism/arthritis (TG: 8%; CG: 7%).

[13] Hospitalized is defined as having spent at least one night in a hospital.

Figure 4.6.1b – Self-reported prevalence of chronic diseases (%)



Summary Section 4.6.1:

- **65%** of the respondents characterize their health as **'good'**.
- **TG** and **CG** are **similar** in terms of **self-reported chronic disease prevalence.**
- **23%** of respondents reported having a **chronic disease (TG: 24%; CG: 22%)**.
- **Hypertension** and **rheumatism/arthritis** are the most commonly **self-reported chronic diseases**.
- In terms of **self-reported acute illness/injury** and **hospitalization TG** and **CG** show statistically **significant differences**.
- In **TG 37%** of the respondents had an **acute illness/injury** in the past 12 months, versus **44%** in **CG**.
- **5%** of the respondents were **hospitalized** in the past 12 months (TG: 6%; CG: 4%).

4.6.2. Medication cabinet

The medication cabinet questions were asked to all household members aged 18 years and older who gave their consent. The respondents were asked to show or describe any medication –prescribed by a doctor or other health care professional– they had been using in the last seven days. Table 4.6.2a shows information on medication use. Of all respondents, 20% (TG: 21%; CG: 19%) indicated to have been using medication in the last seven days, with on average 1.67 (TG: 1.67; CG: 1.66) different observed medications per person.[14] Most of these medications were used to treat pain (TG: 33%; CG: 35%), hypertension (TG: 17%; CG: 18%), fever/an infectious disease (TG: 10%; CG: 8%) or malaria (TG: 11%; CG: 5%). There are no significant differences between the treatment and control group.

[14] Of the 669 respondents who indicated to have been using medication in the last seven days, 145 respondents were not able to show or describe this medication and are thus excluded in the calculation of the average number of different observed medications per person.

Table 4.6.2a – Medication cabinet[1]

Panel A	Total[2] n	Total[2] %	Treat %	Control %	p-value
Used medication in past 7 days (N=3309)	669	20.1	21.1	19.2	0.175
Medication used for (N=879)[3]					
Allergy	17	2.1	0.9	3.3	0.061
Asthma/respiratory disease	75	7.6	8.1	7.1	0.666
Diabetes	34	3.5	3.4	3.5	0.980
Diarrhea	11	1.0	1.4	0.6	0.302
Fever/infectious disease	68	8.7	9.5	8.0	0.601
Heart	17	1.9	1.2	2.5	0.422
HIV/AIDS	17	2.7	2.5	2.8	0.891
Hypertension	176	17.4	16.7	18.0	0.732
Injury	5	0.4	0.5	0.3	0.587
Malaria	57	8.1	11.2	5.2	0.056
Pain	301	34.1	32.8	35.3	0.558
Other	90	11.0	11.5	10.5	0.740
Don't know	11	1.6	0.3	2.9	0.045*

Panel B	Total Mean	Total Std. dev.	Treat Mean	Control Mean	p-value
Number of observed medications per respondent (N=524)	1.67	0.96	1.67	1.66	0.894

[1] Only includes respondents of 18 years and older

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not exactly equal to n/N*100%

[3] The 524 respondents had been using 879 medications in the last seven days in total

* p<0.05, ** p<0.01, *** p<0.001

Summary Section 4.6.2:

- **20%** (TG: **21%**; CG: **19%**) of the respondents indicated to **have been using medication in the last seven days**.
- Most of these medications were used to treat **pain** (TG: **33%**; CG: **35%**), **hypertension** (TG: **17%**; CG: **18%**), **fever/infectious disease** (TG: **10%**; CG: **8%**) or **malaria** (TG: **11%**; CG: **5%**).
- **No significant differences** between **TG** and **CG**.

4.6.3. Blood pressure

This section combines objective blood pressure measurements with self-reported hypertension and medication cabinet questions to provide an overview of hypertension prevalence and hypertension treatment in the adult population. Technical details for blood pressure measurements are described in Box 2.

Blood pressure measurements have been conducted on 2535 adults. Table 4.6.3a shows information on blood pressure and knowledge of hypertension. Around 80% (TG: 81%; CG: 77%) of adults know what hypertension is, and almost 50% (TG: 45%; CG: 51%) had their blood pressure checked at least once sometime in the past. Almost 33% of the individuals had measured hypertension (TG: 31%; CG: 33%). Namely, 17% had grade 1 hypertension (TG: 16%; CG: 19%), 9% (TG: 10%; CG: 9%) had grade 2 hypertension, and 6% (TG: 6%; CG: 6%) had grade 3 hypertension.

Combining measured blood pressure with information on antihypertensive medication use[15], 0.9% had non-measured hypertension (controlled blood pressure) and over 33% (TG: 32%; CG: 34%) of the respondents had hypertension (measured or controlled).

Most outcomes do not differ significantly between the treatment and control group. However, the treatment group is more aware of hypertension, although their blood pressure is significantly less checked, and the measured grade 1 hypertension prevalence is significantly lower in the treatment group.

Box 2 – Blood pressure measurements

A random subsample of 80% of all households was selected for blood pressure measurements. Within these selected households, blood pressure measurements were conducted for all household members aged 18 years or older who gave their consent. Respondents without blood pressure measurements are not included in the data description.

During each heartbeat, blood pressure varies between a maximum (systolic) and a minimum (diastolic) pressure. Systolic and diastolic blood pressure were measured in millimeters of mercury (mmHg) using a digital blood pressure device (OMRON M6 Comfort, see picture). Blood pressure was measured on the upper left arm, in a sitting position. Respondents were instructed not to speak during the measurement. For each respondent the blood pressure was measured three times and the calculated mean of the second and third measurement is used in the data description. See table B1 of appendix B for the systolic and diastolic blood pressure measurements.

The following definitions are used:

- **Normal blood pressure**: systolic pressure <140 mmHg and diastolic pressure <90 mmHg.
- **Measured hypertension**: systolic pressure ≥140 mmHg or diastolic pressure ≥90 mmHg.
  - **Grade 1**: systolic pressure 140-159 mmHg or diastolic pressure 90-99 mmHg.
  - **Grade 2**: systolic pressure 160-179 mmHg or diastolic pressure 100-109 mmHg.
  - **Grade 3**: systolic pressure ≥180 mmHg or diastolic pressure ≥110 mmHg.
- **Non-measured hypertension** (**controlled blood pressure)**: measured normal blood pressure together with antihypertensive medication use.[16]
- **Hypertension:** measured hypertension or controlled blood pressure.

Note that in this survey blood pressure was measured during one occasion (a single visit). In clinical practice, a diagnosis of hypertension is made if a patient has measured hypertension on 2 different occasions. However, in epidemiological surveys this is usually not feasible and a single measurement is used to diagnose hypertension.

In case of measured hypertension, the respondent was notified about his/her condition, advised to consult a doctor, and received a hypertension information leaflet.

[15] These are respondents who self-reported to have used antihypertensive drug treatment in the last seven days or respondents who reported antihypertensive medication in their medication cabinet.

[16] Note that hypertension can be either measured or non-measured. Measured normal blood pressure in combination with anti-hypertensive medication usage is classified as hypertension, as well. These individuals would have measured high blood pressure if they would not take treatment for their hypertension.

Table 4.6.3a – Blood pressure (N=2535)[1]

	Total[2] n	Total[2] %	Treat %	Control %	p-value
Awareness					
Knows what hypertension is	2016	78.8	80.7	77.2	0.042*
Ever blood pressure checked	1199	48.0	44.8	50.7	0.005**
Blood pressure					
Normal blood pressure	1714	67.6	68.7	66.7	0.292
Measured hypertension	821	32.4	31.3	33.3	0.292
Grade 1	433	17.3	15.5	18.8	0.034*
Grade 2	234	9.1	9.9	8.5	0.233
Grade 3	154	6.0	5.9	6.1	0.887
Controlled blood pressure	25	0.9	0.7	1.1	0.311
Hypertension (measured or controlled blood pressure)	846	33.3	32.1	34.4	0.221

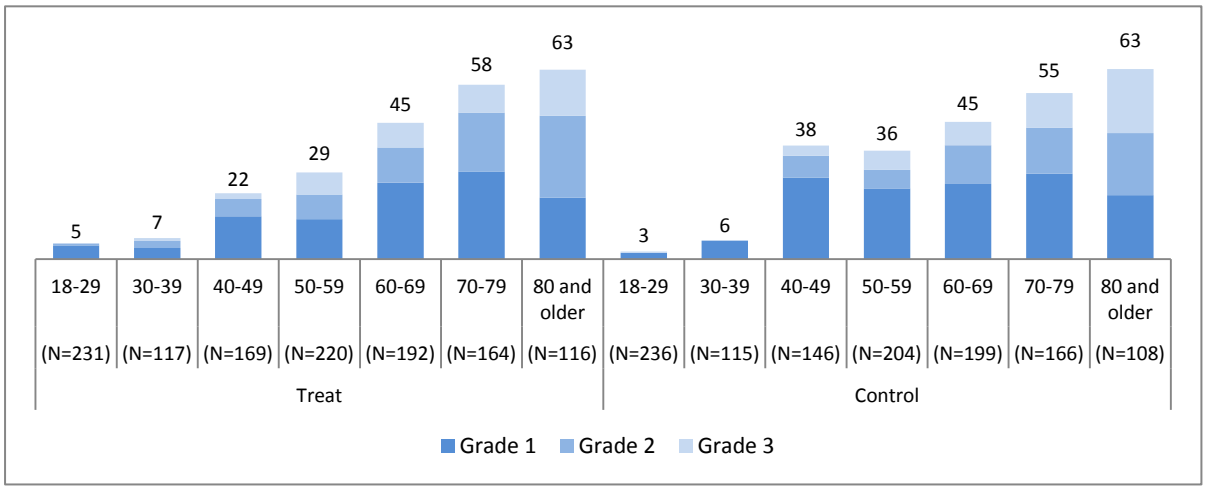
[1] Only includes respondents of 18 years and older with

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not exactly equal to n/N*100%

* p<0.05, ** p<0.01, *** p<0.001

Figure 4.6.3a shows that in the treatment and control group the prevalence of hypertension increases with age, as expected. The higher prevalence in the older age-groups is mainly driven by an increase in grade 2 and grade 3 hypertension. There is furthermore an atypical increase in hypertension prevalence between the age-groups 30-39 and 40-49 in the control group.

Figure 4.6.3a – Hypertension (grade) prevalence by age-group (%)



Subgroup with hypertension

There are 846 adults with (measured or controlled) hypertension, see Table 4.6.3a. The remaining part of this section gives information on this subset of respondents with hypertension. Figure 4.6.3b shows that awareness of having hypertension is low (TG: 34%; CG: 32%), treatment of hypertension is very low (TG: 11%; CG: 9%), and only 2% has controlled blood pressure (TG: 2%; CG: 2%).

Figure 4.6.3b – Awareness, treatment and blood pressure control (%)

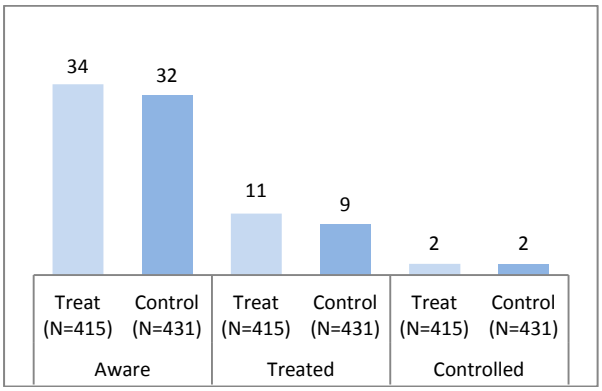


Table 4.6.3b and Figure 4.6.3c show information on health care utilization related to hypertension. Approximately a quarter of all hypertensive individuals visited a health care professional in the last 12 months (TG: 30%; CG: 24%) with a mean of 5 visits (TG: 5; CG: 5). The mean of the annual out-of-pocket health care expenditures for hypertension was TZS 18,886 (TG: TZS 20,838; CG: TZS 17,451) and the mean of the annual travel costs to visit a health care professional for hypertension was TZS 8,862 (TG: TZS 10,888; CG: TZS 7,380). During these consultations the most frequently given advice by the health care professional was: avoid or reduce salt intake (TG: 18%; CG: 14%), take up and maintain a healthy diet (TG: 9%; CG: 10%), avoid excessive alcohol use (TG: 8%; CG: 9%), and reduce stress (TG: 9%; CG: 8%).

Table 4.6.3b – Health care utilization related to hypertension (N=846)[1]

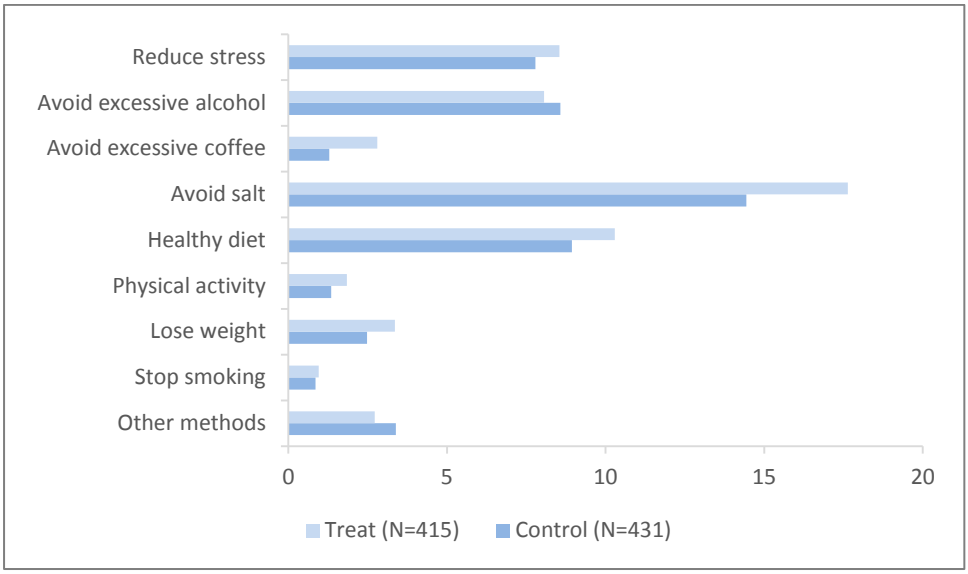
Panel A	Total[2] n	Total[2] %	Treat %	Control %	p-value
Consulted health care professional past 12 months	238	26.9	30.0	24.4	0.105
Panel B	**Total Mean**	**Total Std. dev.**	**Treat Mean**	**Control Mean**	**p-value**
Number of times visited health care professional past 12 months	5.14	7.62	5.09	5.18	0.928
Costs made related to hypertension past 12 months (TZS)					
Out-of-pocket expenditures	18,885.78	93,643.98	20,837.67	17,451.41	0.759
Travel cost to visits health care professional	8,861.88	41,481.67	10,887.64	7,380.40	0.414

[1] Only includes respondents of 18 years and older with hypertension.

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not exactly equal to n/N*100%

* p<0.05, ** p<0.01, *** p<0.001

Figure 4.6.3c –Advice received from health care professional (%)



Summary Section 4.6.3:

- **Hypertension (measured or controlled) prevalence** is **high** among adults (TG: **32%**; CG: **34%**).
- **Awareness** of having hypertension among respondents with hypertension is **low** (TG: **34%**; CG: **32%**).
- **Treatment** of respondents with hypertension is **very low** (TG: **11%**; CG: **9%**).
- **Only 2%** (TG: **2%**; CG: **2%**) of the hypertensive population has **controlled blood pressure**.
- **Most outcomes do not differ significantly between TG** and **CG**.

4.6.4. Lung function

In this household survey a new indicator of individual health was introduced. Coffee farmers mainly work with inorganic fertilizers –to provide their crops with nutrients– and pesticides, to protect their crops. Not much is known on health issues caused by the utilization of pesticides in the Kilimanjaro area. A potential health issue that could be caused by pesticide use is obstructive pulmonary disease (OPD), a lung disease. OPD is generally characterized by inflamed and easily collapsible airways and obstruction of lung airflow that interferes with normal breathing. Types of OPD include asthma, bronchiectasis, and chronic obstructive pulmonary disease (which includes emphysema and chronic bronchitis).

To possibly link OPD to chronic exposure to pesticides, this section combines self-reported questions on lung disease and pesticide exposure with lung function measurements. As OPD is associated with smoking and airway pollution, questions on smoking habit and indoor cooking –on charcoal and wood– are included as well. If pesticide utilization is a considerable health risk for lung function in this target group, this could be a topic of interest for future health plans or preventive programs.

Table 4.6.4a shows information on smoking, cooking source, pesticide exposure and lung disease symptoms. Smoking rates are low, as only 7% (TG: 8%; CG: 7%) of respondents are currently smoking and 8% (TG: 8%; CG: 7%) have smoked in the past. On the other hand, almost all respondents cook indoors on charcoal or wood (TG: 97%; CG: 97%). Of all respondents, 27% (TG: 25%; CG: 28%) are currently using pesticide without wearing protection, and 10% (TG: 10%; CG: 9%) indicate to have used pesticide without wearing protection in the past.

10% (TG: 10%; CG: 10%) of the respondents reported symptoms of OPD, including difficulty with breathing when waking up or an increased cough that lasted for three weeks or more in the past 12 months. There are no significant differences between the treatment and control group in terms of OPD risk factors.

Note that almost all respondents cook indoors on charcoal or wood. Indoor cooking is an important confounding risk factor for OPD. Therefore, confounding factors such as indoor cooking on charcoal or wood should certainly be included in further research to disentangle the link between OPD and chronic exposure to pesticides and indoor cooking on charcoal or wood.

Table 4.6.4a – OPD risk factors and symptoms, self-reported[1]

	Total[2]		Treat	Control	p-value
	n	%	%	%	
Risk factors					
Smoking, currently (N=636)[3]	51	7.2	7.7	6.9	0.691
Smoked, past (N=636)	44	7.8	8.3	7.4	0.733
Indoor cooking with firewood / coal / charcoal (N=842)	818	96.9	97.3	96.6	0.696
Unprotected pesticide use, currently (N=842)	201	26.9	25.1	28.1	0.479
Unprotected pesticide use, past (N=842)	90	9.7	10.1	9.4	0.736
Symptoms (N=842)					
Increased cough lasting three weeks or more	38	5.0	5.0	5.0	0.988
Difficulty breathing at wake up	39	4.9	5.0	4.8	0.925

[1] Only includes respondents between 12 and 59 years old with lung function measurements

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not exactly equal to n/N*100%

[3] Smoking is only asked for respondents aged 15 years or older

* p<0.05, ** p<0.01, *** p<0.001

Lung function measurements have been conducted on 842 respondents. Technical details for lung function measurements are described in Box 3. Table 4.6.4b shows information on the measured prevalence of OPD. Approximately 5% (TG: 5%; CG: 6%) of the respondents have measured OPD. There is no significant difference between the treatment and control group. A complication arises for this prevalence estimate for 12 to 59 year olds, since measurements could not be obtained for a large number of individuals (see Box 3), while possibly the prevalence of OPD in these excluded individuals differs from 5%.

As a high number of individuals were not eligible for the lung function measurements due to breathing difficulties, this estimate is expected to be a lower bound. In addition, most of the excluded individuals could be divided in two groups: (A) individuals who failed the test, because they were not able to breathe out hard and fast enough into the spirometer (N=811), and (B) individuals who were excluded beforehand based on the following exclusion criteria: currently coughing, having difficulty breathing, pain in the throat, having the flu, or had abdominal surgery in the past 4 weeks (N=443). A comparison of exposure to pesticides between group A and the measured group showed that there was no difference in unprotected pesticide use at the time of the interview (p=0.545) and in the past (p=0.187) between the two groups. Comparing group B with the measured group showed that there was no difference in unprotected pesticide use at the time of the interview (p=0.808) and unprotected pesticide use in the past (p=0.894) between the two groups. Thus individuals who failed the test are not significantly more exposed to pesticide (currently/past), i.e. there is no indication that a higher exposure to pesticide resulted in lung disease which in turn resulted in failing the test. There is thus no reason to believe that this will cause a problem in analyzing the link between OPD and exposure to pesticide.

Table 4.6.4b – Measured OPD (N=842)[1]

	n	Total[2] %	Treat %	Control %	p-value
OPD	36	5.2	4.6	5.6	0.573

[1] Only includes respondents between 12 and 59 years old with lung function measurements

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not exactly equal to n/N*100%

* p<0.05, ** p<0.01, *** p<0.001

Box 3 – Lung function measurements

An OPD diagnosis is confirmed by a test called spirometry, which measures how deeply a person can breathe and how fast air can move into and out of the lungs.

A random subsample of 80% of all households was selected for spirometry tests –the same subsample as selected for blood pressure measurements. Within these selected households, spirometry tests were conducted for all household members between 12 and 59 years old who gave their consent. Exclusion criteria were: currently pregnant, currently coughing, having difficulty breathing, pain in the throat, having the flu or had abdominal surgery in the past 4 weeks, which resulted in excluding 472 respondents. Finally, 945 respondents were excluded because they either refused to do the spirometry test (N=134) or were not able to breathe out hard and fast enough into the spirometer, which resulted in the test to fail (N=811). After 5 failing tests the nurses did not continue with further measurements. Following this procedure, measurements were obtained for 842 individuals. For 1,417 individuals measurements could not be obtained.

Using a validated portable spirometer (Spirobank G, see picture), the following was measured:

- Forced Vital Capacity (FVC), the maximum amount of air a person can expel from the lungs after a maximum inhalation
- Forced Expiratory Volume in 1 second (FEV1), the maximum amount of air a person can expel from the lungs in one second

Both measurements were given as a percentage of the expected value given the age, gender, height and weight of the respondent.

For each respondent lung function was measured two times. If the FVC was lower than 80% or the FEV1/FVC ratio was lower than 0.70 the test was performed a third time. The calculated mean of the first, second and –if applicable– third measurement were used in the data description. Table B2 in the appendix gives detailed information on lung function measurements.

Respondents with a **mean FEV1/FVC ratio lower than 0.70** are classified as potentially having OPD. An additional test at a later point in time would be necessary for definitive confirmation.

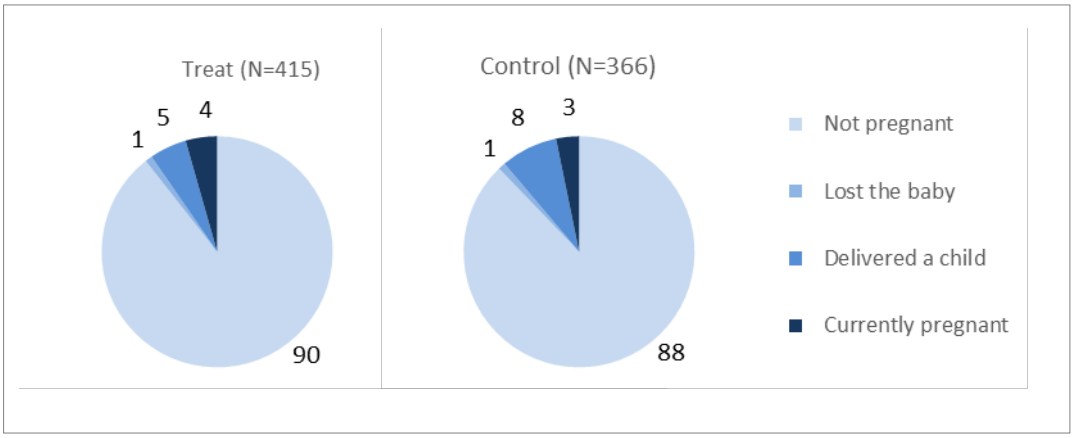
Summary Section 4.6.4:

- **Low** prevalence of **OPD** (TG: **5%**; CG: **6%**) among 12 to 59 year olds. It is difficult to know whether this is the correct OPD prevalence among this age group, as a large number of individuals could not be included in the analysis.
- Almost all respondents **cook indoors on charcoal or wood** (TG**: 97%**; CG**: 97%), 27%** (TG**: 25%;** CG**: 28%)** are **currently using pesticide without wearing protection,** and **7%** (TG**: 8%**; CG**: 7%**) of respondents **smoke**.

4.6.5. Pregnancy

Questions about pregnancy and child delivery in the past 12 months were asked to women aged 15 to 45 years old. Figure 4.6.5a shows that 10% of these women (TG: 9%; CG: 11%) gave birth in the last 12 months or were pregnant at the time of the interview. Of all 93 pregnancies, 2 women reported to have lost their baby (during pregnancy or at birth). There are no significant differences between the treatment and control group.

Figure 4.6.5a – Pregnancy, female respondents between 15 and 45 years old (%)



For the subgroup of women who delivered a child in the last 12 months or were pregnant at the time of the interview, Table 4.6.5a shows that 81% (TG: 75%; CG: 86%) of these women attended antenatal care visits, of which a high 97% (TG: 97%; CG: 97%) visited a health facility. Namely 89% visited a hospital, dispensary or health centre (TG: 88%; CG: 90%) and 8% visited a clinic (TG: 9%; CG: 7%).

PharmAccess had already upgraded several of the visited health facilities in the scope of the KNCU HP at the time of the baseline survey, see Appendix C. In the treatment group 6% of women visited Machame Hospital (minor upgraded), and 6% visited Masama GOV Health Centre for antenatal care (majorly upgraded). In the control group 3% of women visited Kibosho hospital (minor upgraded) for antenatal care. Thus the spillover effect of KNCU HP from surrounding areas is small in terms of antenatal care visits.

Antenatal care should start as early as possible in pregnancy, preferably in the first trimester. However, most of these women started antenatal care in their second (TG: 53%; CG: 44%) or third (TG: 38%; CG: 40%) trimester, and only 13% (TG: 9%; CG: 16%) started in their first trimester. Moreover, 82% was tested for HIV (TG: 78%; CG: 93%) and 87% (TG: 84%; CG: 81%) was tested for syphilis. None of these women smoked during pregnancy, but 25% (TG: 18%; CG: 31%) were drinking alcohol during pregnancy –ranging from one glass in two weeks to two glasses per day. None of the outcomes differs significantly between the treatment and control group.

Figure 4.6.5b shows that during these antenatal care visits 35-50% of these women were informed on the following danger signs: lot of fluid coming from the vagina, bleeding from the vagina, severe pain in the belly, severe headache/blurry vision, sudden swelling of the hands/face, no fetal movement and early contractions .

Table 4.6.5b – Antenatal care[1]

Panel A	Total[2] n	Total[2] %	Treat %	Control %	p-value
Attended ANC visits (N=91)	75	81.0	75.0	85.8	0.263
Trimester first ANC visit (N=54)					
First (0-12 weeks)	6	13.2	8.8	15.9	0.493
Second (12-24 weeks)	27	47.4	52.9	44.1	0.593
Third (24-40+ weeks)	21	39.4	38.3	40.1	0.914
Health care provider mainly consulted ANC visits (N=91)					
Hospital / Dispensary / Health Centre	67	89.0	87.5	90.1	0.763
Clinic	6	7.8	8.5	7.3	0.865
Private nurse	2	3.2	4.0	2.6	0.780
Tested for STD during ANC visits (N=91)					
Syphilis	63	82.1	84.2	80.7	0.737
HIV	67	86.7	78.3	92.7	0.178
Alcohol use during pregnancy (N=91)	25	25.2	18.1	31.0	0.182
Smoking during pregnancy (N=91)	0	0.0	0.0	0.0	n/a

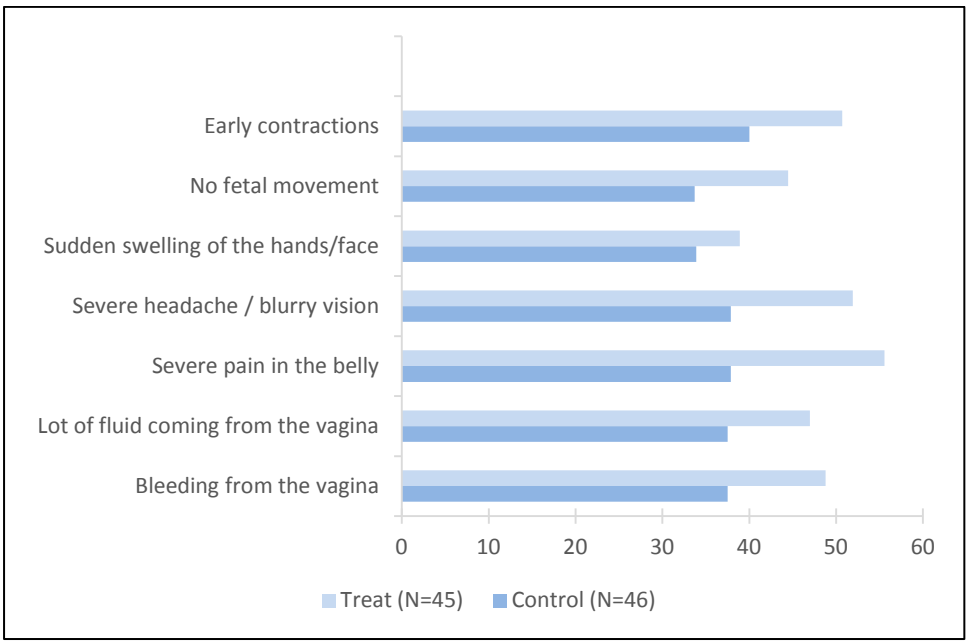
Panel B	Total Mean	Total Std. dev.	Treat Mean	Control Mean	p-value
Number of ANC visits (N=91)					
When deliverd a child	3.61	1.51	4.00	3.38	0.166
When currently pregnant	2.15	1.08	2.00	2.31	0.548

[1] Only includes respondents who delivered a child or are currently pregnant

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not precisely equal to n/N*100%

* p<0.05, ** p<0.01, *** p<0.001

Figure 4.6.5b – Informed on danger signs during ANC visits (%)



For the subgroup of women who delivered a baby in the last 12 months, Table 4.3.5b shows that 96% (TG: 100%; CG 94%) delivered their baby in a hospital.[17] In the treatment group 12% of women delivered in Kibosho Hospital (minor upgraded). In the control group 10% of women delivered in Machame hospital (minor upgraded). Thus the spillover effect of KNCU HP from surrounding areas is small in terms of deliveries.

Around 17% of all deliveries were complicated deliveries, complications occurred either with the baby (TG: 20%; CG: 9%) or with the mother (TG: 2%; CG 5%). The mean birth weight was 3 kg (TG: 3 kg; CG: 3 kg), which is within the range of a normal birth weight (2.7 – 4.6 kg). Only 2 babies (4%) were underweight, i.e. birth weight below 2.5 kg, both of them in the control group.

Table 4.6.5b – Child delivery

Panel A	Total[2] n	Total[2] %	Treat %	Control %	p-value
Hospital delivery (N=57)	55	96.3	100.0	94.0	n/a
Complications during delivery (N=57)					
Mother	3	3.7	2.3	4.5	0.607
Baby	6	13.2	20.2	8.9	0.356
Birth weight (N=34)[3]					
Normal	32	95.8	100.0	94.0	n/a
Underweight	2	4.2	0.0	6.1	n/a
Breastfed the baby	57	100.0	100.0	100.0	n/a
Panel B	**Total Mean**	**Total Std. dev.**	**Treat Mean**	**Control Mean**	**p-value**
Birth weight (g) (N=34)	3147	487	3285	3086	0.314

[1] Only includes respondents that delivered a child

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not precisely equal to n/N*100%

[3] N=34 instead of 57 due to missing information on birth weight.

* p<0.05, ** p<0.01, *** p<0.001

Summary Section 4.6.5:

- **High share** of pregnant women who had **antenatal care visits** (TG: **75%**; CG: **86%**), with a mean of **3 visits per woman** (TG: **4**; CG: **3**).
- **97%** of women who had antenatal care visits consulted a **health facility** for these visits.
- Timing of ANC can improve, only **50%** of women **started** antenatal care in their **first** or **second trimester**.
- Women **do not smoke**, but do **drink alcohol** (TG: **18%**; CG: **31%**) during pregnancy –ranging from one glass in two weeks to two glasses in one day.
- **Almost all women delivered** their baby in a **hospital**.
- **No significant difference** between TG and CG.
- **Small spillover effect** of KNCU HP from nearby areas to **both TG and CG**.

[17] The two women who did not deliver in a hospital were on their way to the hospital, but the baby came too early.

4.6.6. Anthropometric measurements

This section gives an overview of the anthropometric measurements, which include weight, height, waist, hip and arm circumference. Anthropometric measurements provide insight in the nutritional status of the respondents. Technical details for anthropometric measurements are described in Box 4.

Box 4 – Anthropometric measurements

The bodyweight of infants and children under the age of 2 years was measured on a baby weighing scale (SECA 354), with minimal clothing on. Bodyweight of children aged 2 years and older as well as adults was measured on a digital scale, without shoes and with light clothes on only. The exact value in kilograms was recorded.

For children under the age of 2 years their length -rather than height, as the child was laying down- was measured by using an infant measuring mat (SECA 210). For children aged 2 years and older as well as for adults height was measured by using a portable stadiometer, with the respondent standing upright barefoot. The exact value in centimeters was recorded.

The mid-upper arm circumference (MUAC) was measured for children between 6 months and 5 years old by using a non-stretchable measurement tape and MUAC tape. The exact value in millimeters was recorded.

The waist and hip circumference was measured for children aged 12 years and older as well as for adults by using a non-stretchable measurement tape. Waist circumference was measured at the level of the umbilicus in standing position with the hands by the side and the feet together, at the end of a normal expiration. Hip circumference was measured around the highest portion of the hips or buttocks in standing position with the hands by the side and the feet together, at the end of a normal expiration. The exact value in centimeters was recorded.

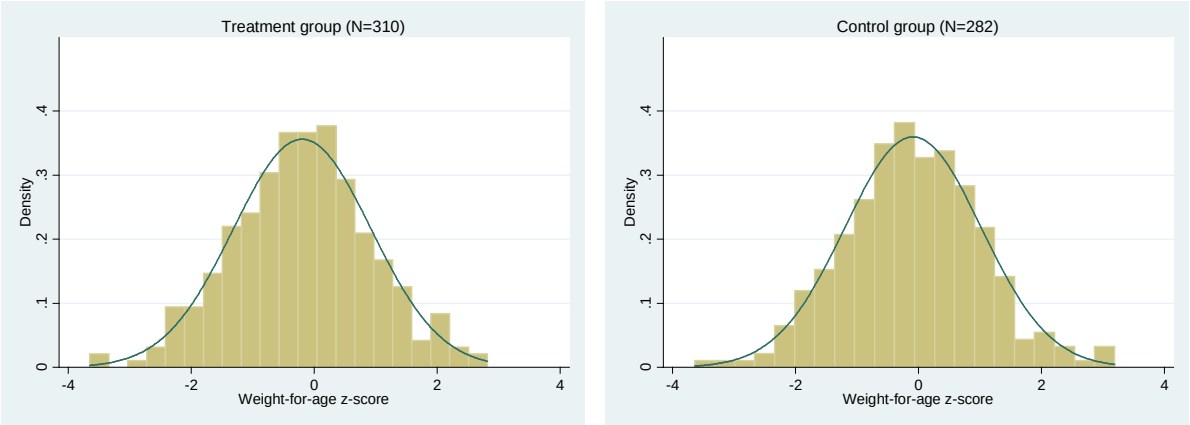
For children younger than 18 years old, the anthropometric measurements were used to construct z-scores for *weight-for-age*, *height-for-age* and *weight-for-height*, the three most commonly used anthropometric indicators to assess the nutritional status of children. The z-score expresses how many standard deviations the measured anthropometric value of a child deviates from the reference mean value of children of his/her age, as determined by the WHO. The z-scores were calculated by making use of the WHO Anthro software (version 3.2.2, January 2011), where the WHO international reference population has mean zero.

For adults (aged 18-49 years), and the elderly (aged 50 years or older) the *Body Mass Index (BMI)* was constructed in the standard way, namely as the ratio of their weight (in kilogram) and their height (in meters) squared.

See table B3, B4, B5, and B6 of Appendix B for detailed information on anthropometric measurements and nutritional status of children aged 0 to 5 years old, children aged 6 to 17 years old, adults, and elderly, respectively.

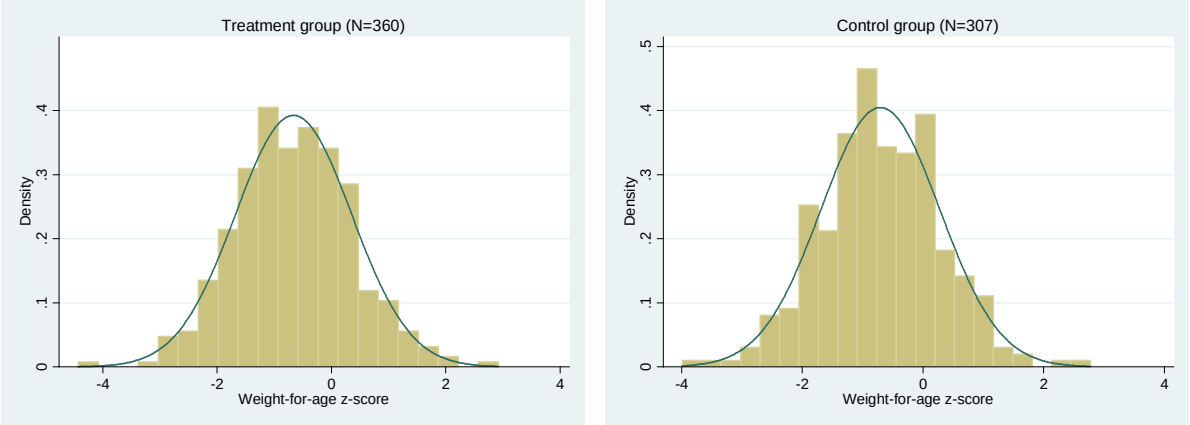
Figure 4.6.6a and Figure 4.6.6b show the distribution of weight-for-age, in the treatment and control group, for children aged 0 to 5 years old, as well as for children aged 6 to 17 years old. A shifted to the left distribution implies that the respective group of children is more underfed than normal (compared to the WHO international reference population). The null hypothesis of mean zero, against the alternative hypothesis of mean smaller than zero (a shifted to the left distribution), is not rejected for the under six year olds in the control group (mean=-0.07, p=0.226), but is rejected for the under six year olds in the treatment group (mean=-0.15, p=0.034), though not very strongly. The null hypothesis of mean zero is strongly rejected for children aged 6 to 17 years old in the treatment (mean=-0.68, p<0.001) and in the control group (mean=-0.72, p<0.001).

Figure 4.6.6a – Distribution[1] of weight-for-age for children aged 0 to 5 years old



[1] Both distributions follow a normal distribution.

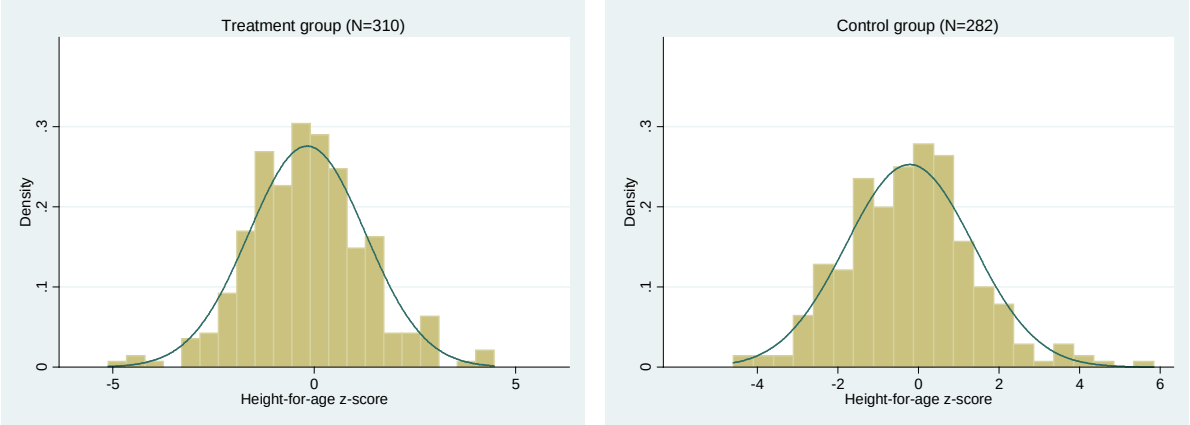
Figure 4.6.6b – Distribution[1] of weight-for-age for children aged 6 to 17 years old



[1] Both distributions follow a normal distribution.

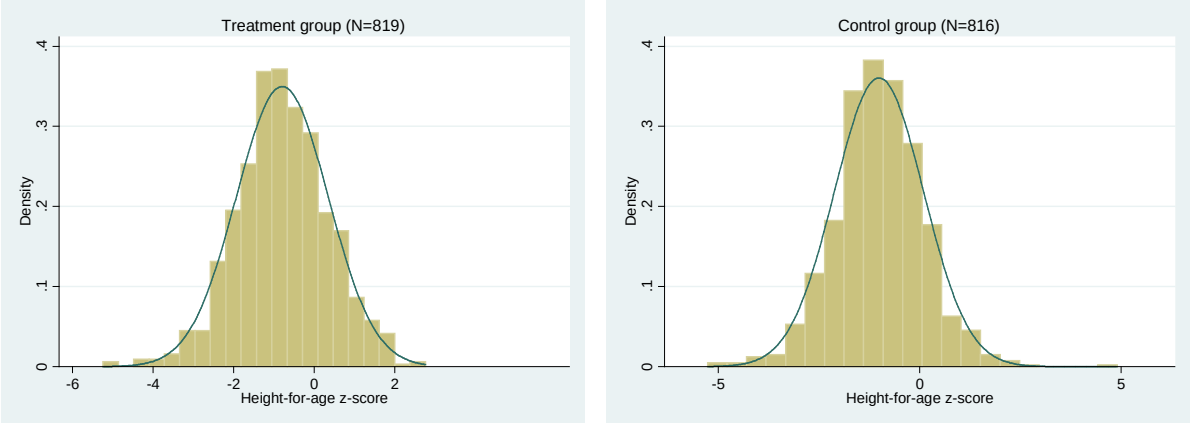
Stunting, or low height-for-age, is caused by long-term insufficient nutrient intake and frequent infections. The effects of stunting include impaired cognitive function, delayed motor development and poor school performance. Figure 4.6.6c and Figure 4.6.6d show the distribution of height-for-age, in the treatment and control group, for children aged 0 to 5 years old, as well as for children aged 6 to 17 years old. A shifted to the left distribution implies that the respective group of children is more stunted than normal (compared to the WHO international reference population). The null hypothesis of mean zero, against the alternative hypothesis of mean smaller than zero (a shifted to the left distribution), is not rejected for the under six year olds in the treatment group (mean=-0.04, p=0.334), but is just rejected for the under six year olds in the control group (mean=-0.20, p=0.024), and is strongly rejected for the children aged 6 to 17 years old in the treatment (mean=-0.74, p<0.001) and in the control group (mean=-0.96, p<0.001).

Figure 4.6.6c – Distribution[1] of height-for-age for children 0 to 5 years old



[1] Both distributions follow a normal distribution.

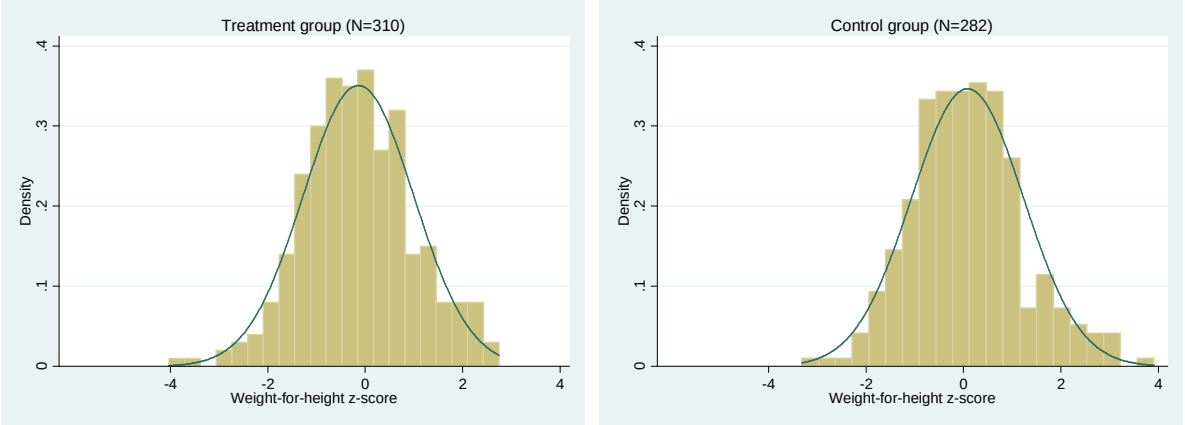
Figure 4.6.6d – Distribution[1] of height-for-age for children 6 to 17 years old



[1] Both distributions follow a normal distribution.

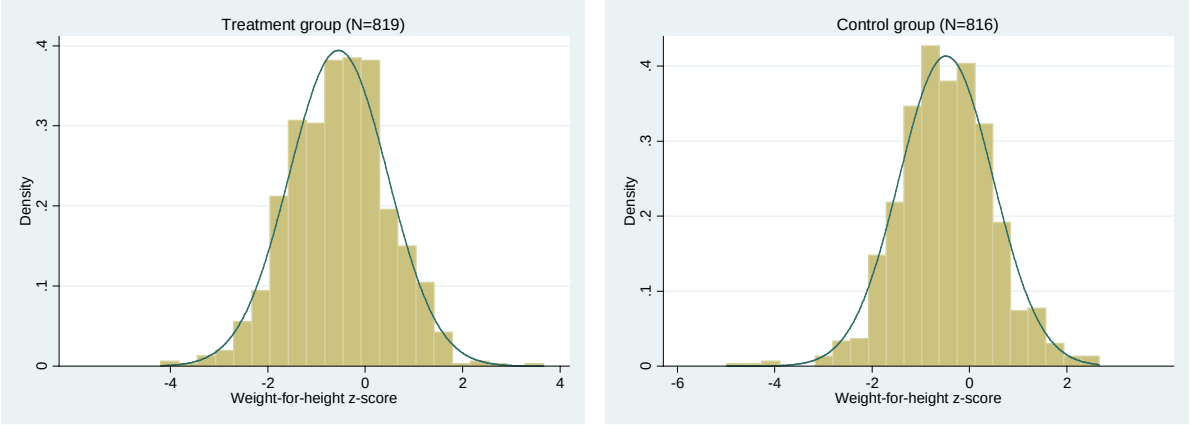
Wasting, or low weight for height, is a strong predictor of mortality among children below the age of 5 years old. Wasting is usually the result of acute malnutrition and/or disease. Figure 4.6.6e and Figure 4.6.6f show the distribution of weight-for-height, in the treatment and control group, for children aged 0 to 5 years old, as well as for children aged 6 to 17 years old. A shifted to the left distribution implies that the respective group of children is more wasted than normal (compared to the WHO international reference population). The null hypothesis of mean zero, against the alternative hypothesis of mean smaller than zero (a shifted to the left distribution), is not rejected for the under six year olds in the control group (mean=0.10, p=0.136), but is just rejected for the under six year olds in the treatment group (mean=-0.19, p=0.012), and is strongly rejected for the children aged 6 to 17 years old in the treatment (mean=-0.64, p<0.001) and in the control group (mean=-0.50, p<0.001).

Figure 4.6.6e – Distribution[1] of weight-for-height for children 0 to 5 years old



[1] Both distributions follow a normal distribution.

Figure 4.6.6f – Distribution[1] of weight-for-height for children 6 to 17 years old



[1] Both distributions follow a normal distribution.

Table 4.6.6a shows information on the nutritional status of adults aged 18 to 49 years. Roughly 18% (TG: 17%; CG: 18%) are overweight, and 7% (TG: 9%; CG 6%) are obese. Almost 8% (TG: 9%, CG: 7%) are underweight, and 3% (TG: 3%; CG: 2%) are cachectic (BMI <17). Most outcomes do not significantly differ between the treatment and control group, although the prevalence of obese adults is significantly higher in the treatment group (TG: 9%; CG: 6%).

Table 4.6.6a –Anthropometrics adults (N=1320)[1]

	n	Total[2] %	Treat %	Control %	p-value
Nutritional status adults					
Cachectic: BMI <17	38	2.5	2.9	2.1	0.343
Under nutrition: BMI 17-18.5	97	7.6	8.9	6.5	0.159
Too thin: BMI 18.5-20	212	17.6	16.7	18.3	0.526
Normal weight: BMI 20-25	654	47.4	44.9	49.4	0.141
Overweight: BMI 25-30	228	17.7	17.4	18.0	0.791
Obese: BMI >30	91	7.3	9.2	5.7	0.046*

[1] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not precisely equal to n/N*100%

[2] Only includes respondents between 18 and 49 years

* p<0.05, ** p<0.01, *** p<0.001

Table 4.6.6b shows information on the nutritional status of adults aged 50 years and older. Roughly 20% (TG: 22%; CG: 19%) are overweight, and 7% (TG: 6%; CG: 8%) are obese. Almost 9% (TG: 8%; CG: 9%) are underweight, and 5% (TG: 5%; CG: 5%) are cachectic (BMI <17). There were no significant differences between the treatment and control group.

Table 4.6.6b –Anthropometrics elderly (N=1769)[1]

	n	Total[2] %	Treat %	Control %	p-value
Nutritional status elderly					
Cachectic: BMI <17	91	4.6	4.6	4.6	0.995
Under nutrition: BMI 17-18.5	159	8.7	8.3	9.0	0.622
Too thin: BMI 18.5-20	250	14.4	14.7	14.2	0.756
Normal weight: BMI 20-25	775	45.2	44.5	45.8	0.561
Overweight: BMI 25-30	354	20.1	21.8	18.5	0.077
Obese: BMI >30	140	7.1	6.1	8.0	0.065

[1] Only includes respondents of 50 years and older

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not precisely equal to n/N*100%

* p<0.05, ** p<0.01, *** p<0.001

Summary Section 4.6.6:

- In the **TG**, **children under the age of six** are ***slightly*** more **underfed** than normal (compared to the WHO international reference population)**,** which seems to be the result of **acute malnutrition** (wasting).
- In the **CG**, **children under the age of six** are ***not*** more **underfed** than normal**.**
- In the **TG** and **CG**, **children aged 6 to 17 years old** are **notably** more **underfed** than normal, which seems to be the result of both **acute malnutrition** and **chronic malnutrition** (stunting).
- About **3%** (TG: **3%**; CG: **2%**) of **adults** and **5%** (TG: **5%**; CG: **5%**) of the **elderly** are **cachectic**.
- About **7%** (TG: **9%**; CG **6%**) of **adults** and **7%** (TG: **6%**; CG: **8%**) of the **elderly** are **obese**.

4.7. Health care utilization

This section discusses health care utilization disaggregated by different kinds of health care needs: chronic disease, acute illness/injury and other health consultations. Other health consultations include family planning, medical check-up, screening for a particular disease, and immunization. Because the nature and the costs of care differ across these different needs, it is important to distinguish between them.

Note that the respondents were asked which health care provider they *mainly* consult for their chronic disease, and who they *also* consult. For acute illness/injury and other consultations, the respondents were asked who they consulted *first*, and who they *also* consulted. The results presented in this section only include the first health care provider choice, i.e. who the respondents *mainly* consult for their chronic disease and who they consulted *first* for their acute illness/injury and other consultations. The data does not show large differences between the first and second health care provider choice.

Figure 4.7a shows that two thirds of respondents who report having a chronic disease consult a health facility, such as a hospital, health centre, dispensary or clinic, for their chronic disease (TG: 68%; CG: 65%). On the other hand, more than one in four individuals who report having a chronic disease did not consult any health care provider for this disease in the past year.

Figure 4.7a – Health care utilization: chronic disease (%)

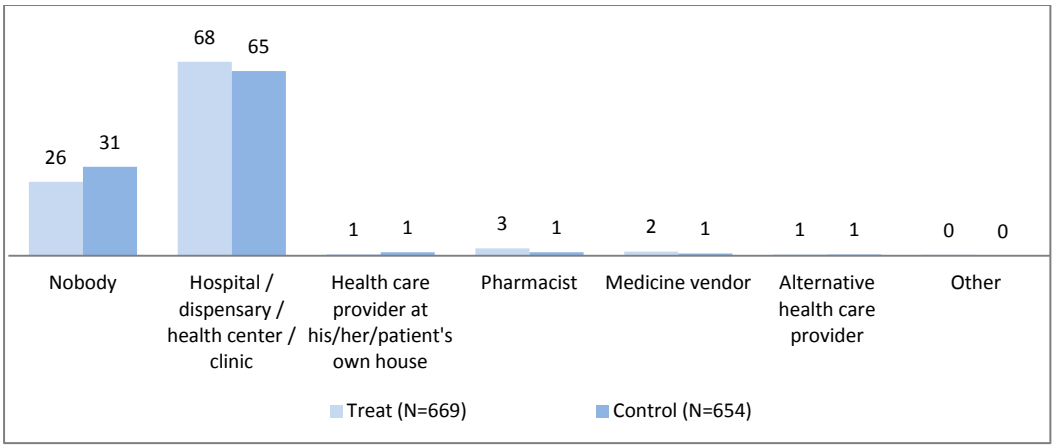
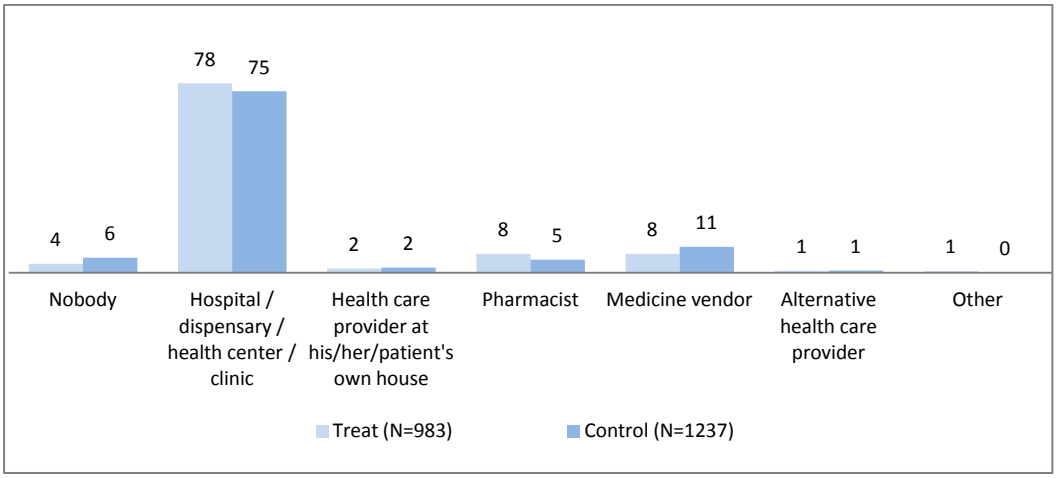


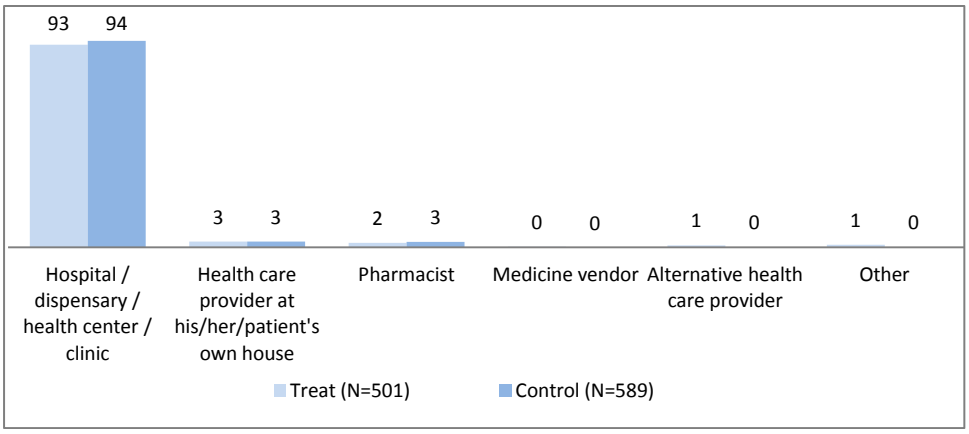
Figure 4.7b shows that for an acute illness or injury most respondents consulted a health facility (TG: 78%; CG: 75%). Only 4% of treatment group individuals and 6% of the control group who had an acute illness/injury in the past 12 months did not consult any health care provider. And approximately 16% of individuals visited a pharmacist or medicine vendor for their acute illness or injury (TG: 16%; CG: 16%).

Figure 4.7b – Health care utilization: acute illness/injury (%)



Approximately one in five respondents reported that they consulted a health care provider for family planning, medical check-up, screening for a particular disease or immunization in the past 12 months (TG: 19%; CG: 22%). Figure 4.7c shows that, in both the treatment and the control group, almost all of the respondents visited a hospital, dispensary, health center, or clinic for these other consultations (TG: 93%; CG: 94%).

Figure 4.7c – Health care utilization: other consultations (%)



Appendix C provides an overview of the health facilities which respondents *mainly* consult for their chronic disease, and those they consulted *first* for their acute illnesses/injuries and/or other consultations. From the appendix it can be seen that at the time of the baseline survey approximately 7 to 9 percent of TG individuals and 13 to 19 percent of CG individuals visit health facilities that have had *minor* upgrading, and approximately 3 percent of both TG and CG individuals visit health facilities that have had *major* upgrading in the scope of the KNCU HP, for chronic illness, acute illness and other consultations. Thus there is a small spillover effect of the KNCU HP from surrounding areas into both the treatment and control group.

Summary Section 4.7:

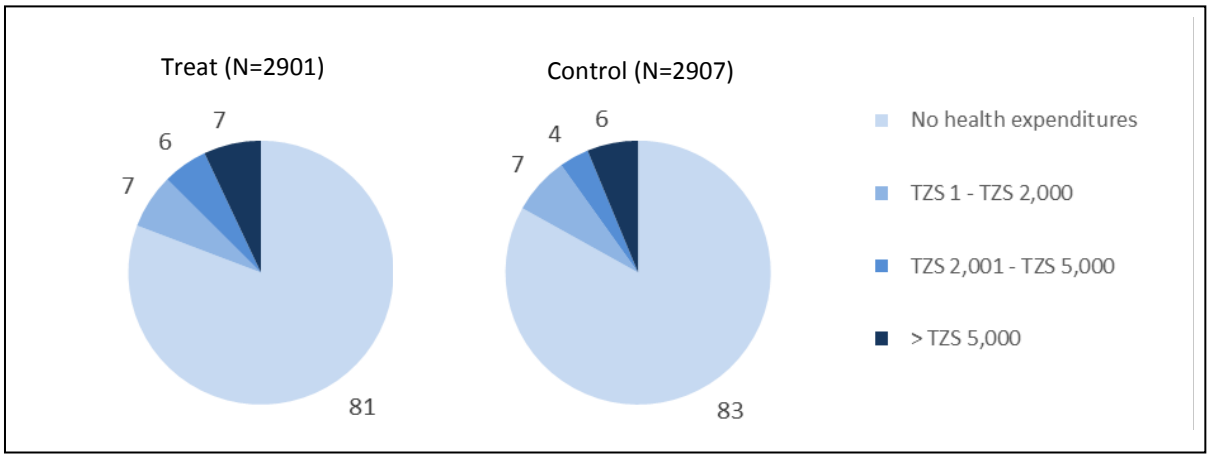
- For chronic disease, acute illness/injury and other consultations **most respondents** visited **a hospital, dispensary, health center or clinic**.
- A relatively **high** share of respondents do **not** consult a **health care provider** for their **chronic disease** (**TG: 26%; CG: 31%**).
- **Health care utilization** is **high** for **acute illness/injury**.
- **One in five** respondents consulted a health care provider for **family planning, medical check-up, screening for a particular disease or immunization** in the past 12 months.
- **TG** and **CG** are **similar** in terms of **health care utilization**.
- **Small spillover effect** of KNCU HP from nearby areas to **both TG and CG.**

4.8. Out-of-pocket health care expenditures

The respondents have also been asked, at an individual level, about their out-of-pocket health care expenditures (OOP)[18] in the past 30 days. Almost one in five respondents had OOP in the past 30 days (TG: 19%; CG: 17%). For the individuals who had OOP in the past 30 days the average OOP is TZS 10,065 (TG: TZS 9,993; CG: TZS 10,131). This amount corresponds to a high 15% (TG: 15%; CG: 15%) of the monthly per capita consumption.[19] See figure 4.8a for the OOP distribution.

Furthermore travel costs to visit health care providers were also collected at individual level in the past 30 days. Only 4% (TG: 5% CG: 4%) of individuals had travel costs for health care in the past 30 days, averaging TZS 7,674 (TG: TZS 7,530; CG: TZS 7,827).

Figure 4.8a –OOP in the past 30 days (%)



[18] By definition of OOP, travel costs are excluded.
[19] The average annual per capita consumption is TZS 788,372 (TG: TZS 788,637; CG: TZS 788,152), see Table 4.2a. Thus the corresponding monthly value is TZS 65,698 (TG: TZS 65,720; CG: TZS 65,679).

Summary Section 4.8:

- Almost **one in five** respondents had OOP in the past 30 days (TG: 19%; CG: 17%).
- For the individuals who had OOP in the past 30 days the **average OOP is TZS 10,065** (TG: TZS 9,993; CG: TZS 10,131), corresponding to **15%** (TG: 15%; CG: 15%) of the **average monthly per capita consumption.**
- Only **4%** (TG: 5% CG: 4%) of individuals **had travel costs for health care in the past 30 days**, **averaging TZS 7,674** (TG: TZS 7,530; CG: TZS 7,827).

4.9. Financial health shocks

Table 4.9a shows that, in the past 12 months, 35% of households experienced a health shock within the household that had financial consequences (TG: 38%; CG: 33%). This share is higher in the treatment group than in the control group, but the difference is statistically insignificant. Compared to the control group, the estimated value that was lost due to the health shock in terms of income and expenditures is larger among the households in the treatment group (TG: TZS 479,939; CG: TZS 361,942), but the difference is not statistically significant. Comparing the mean value lost to the median shows that the distribution is skewed to the left for both the treatment and the control group (MED TG: TZS 250,000; MED CG: TZS 200,000).The table below also shows that, on average, the value lost due to the health shock corresponds to 13% of the average annual aggregate household consumption (TG: 15%; CG: 12%). The distribution of the value lost as share of annual consumption is also skewed to the left (MED TG: 8%; MED CG: 6%).

Table 4.9a – Financial health shocks

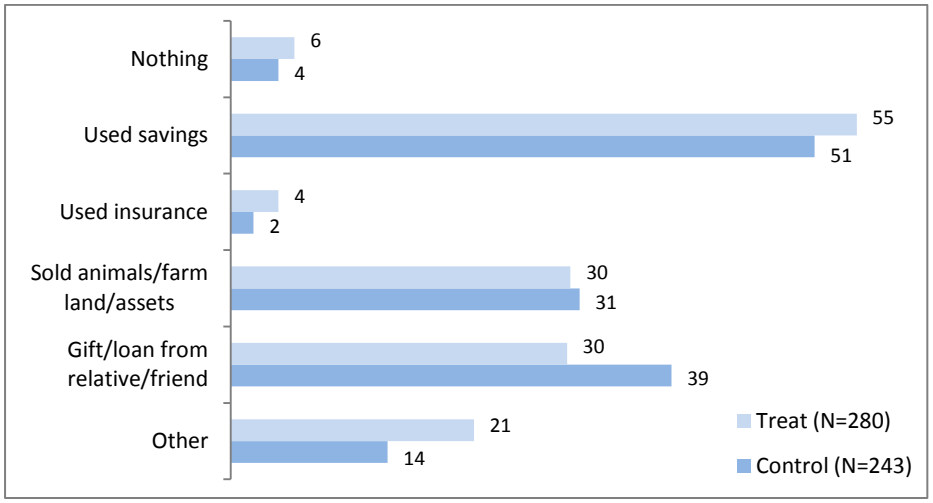
	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Share of HHs that experienced health shock (N=1500)	0.35	0.48	0.38	0.33	0.107
Total value lost due to health shock, TZS (N=523)	420,561	813,710	479,939	361,942	0.106
Value lost due to health shock as share of annual aggregate consumption (N=523)	0.13	0.26	0.15	0.12	0.101

* p<0.05, ** p<0.01, *** p<0.001

Respondents were also asked to report up to three strategies they adopted to cope financially with the health shock. These three answers are aggregated in the figure below.[20] Figure 4.9a shows that in both the treatment and control group more than half of the sample used savings (TG: 55%; CG: 51%). Approximately one-third of households sold animals, farm land or other assets to cope with the health shock (TG: 30%; CG: 31%). The third most common coping strategy in both the treatment and control group was to ask a friend or relative for a gift or a loan (TG: 30%; CG: 39%).

[20]Because the three answers are aggregated the total percentage of both the control and treatment group exceeds 100%.

Figure 4.9a – Financial coping strategies (%)



Summary Section 4.9:

- In the past 12 months, **35%** of households experienced a **health shock** within the household that had financial consequences (TG: 38%; CG: 33%).
- The average **value lost** due to the shock is **TZS 420,561**, only including households that experienced a shock. The **median** is **TZS 200,000**.
- On average, the **value lost** corresponds to **13%** of **annual aggregate household consumption**.
- The most reported **coping strategies** are to **use savings**, **ask for a gift/loan from a relative or friend**, and **selling assets, land or animals**.
- TG and CG are **similar** in terms of **health shocks with financial consequences** that occurred within in households.

4.10. Gifts and loans

This section provides insight into the various financial networks and the extent to which households rely on them for income. Respondents were asked whether, in the past 12 months, they received a loan from a loan provider of at least TZS 10,000. Loan providers include banks, KNCU or other cooperatives, microcredit institutes, SACCOs, ROSCAs, and informal savings groups. Given the high migration rate (see Table 4.2a), this section also includes questions on received and given gifts/loans of at least TZS 10,000 from and to spouses and children of the household head living elsewhere. Lastly, respondents were asked to report gifts/loans of at least TZS 10,000 they received from anyone else in the past 12 months. Note that this section was asked on a household level for 50% of the sample.

4.10.1. Received gifts and loans

Table 4.10.1a shows that 74% of households reported having *received* a gift and/or a loan of at least TZS 10,000 in the past 12 months (TG: 72%; CG: 76%). The table furthermore shows that in the control group 8% of the households received a loan from a loan provider, versus 13% in the treatment group. This difference is statistically significant at a five percent level. More than 70% of the households who reported a spouse or children of the household head living elsewhere, also reported having received a loan and/or a gift from

him/her/them. Note that in the treatment group 81%, and in the control group 76% of the household heads reported having a spouse/child living elsewhere (see Table 4.2a). Table 4.10.1a also shows the average amount households received as a gift/loan in the past 12 months, only including households that received a gift/loan. On average, the loans from loan providers were the highest (TG: TZS 499,598; CG: TZS 583,599), followed by gifts/loans from spouses children of the household head living elsewhere (TG: TZS 306,000; CG: TZS 266,659), and lastly by gifts/loans from other individuals (TG: TZS 97,143; CG: TZS 105,738).

Table 4.10.1a – Received gifts and loans of at least TZS 10,000 in the past 12 months

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Total					
Share of HHs (N=751)	0.74	0.44	0.72	0.76	0.297
Average amount, TZS (N=562)†	328,478	642,850	369,347	294,750	0.200
Loan providers					
Share of HHs (N=752)	0.10	0.30	0.13	0.08	0.023*
Average amount, TZS (N=80)†	533,075	1,007,214	499,598	583,599	0.668
Spouses/children living elsewhere					
Share of HHs (N=606)	0.72	0.45	0.71	0.74	0.502
Average amount, TZS (N=444)†	285,258	519,458	306,000	266,659	0.505
Other individuals					
Share of HHs (N=752)	0.27	0.44	0.24	0.29	0.244
Average amount, TZS (N=191)†	102,097	216,567	97,143	105,738	0.772

* p<0.05, ** p<0.01, *** p<0.001

†Note that only amounts of TZS 10,000 or more are included in the calculation of the average.

Table 4.10.1b shows that 38% of the households that received a gift/loan of at least TZS 10,000 in the past 12 months used it (partly or entirely) to cover medical expenses (TG: 35%; CG: 41%). 39% of the households that reported having received a gift/loan from a spouse/child living elsewhere, used it (partly or entirely) to pay for medical expenses. The average amount received from spouses/children living elsewhere that was used for medical expenses is higher among the households in the control group, but this difference is not statistically significant.

Table 4.10.1b – Received gifts and loans used for medical expenses in the past 12 months [1]

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Total					
Share of HHs (N=562)	0.38	0.49	0.35	0.41	0.165
Average amount, TZS (N=226)	107,537	194,406	101,939	111,434	0.722
Loan providers					
Share of HHs (N=80)	0.33	0.47	0.31	0.36	0.666
Average amount, TZS (N=26)	201,474	390,123	219,006	178,872	0.742
Spouses/children living elsewhere					
Share of HHs (N=444)	0.39	0.49	0.35	0.43	0.138
Average amount, TZS (N=179)	88,675	135,075	68,795	103,229	0.132
Other individuals					
Share of HHs (N=191)	0.22	0.42	0.20	0.24	0.587
Average amount, TZS (N=46)	65,989	107,576	51,821	74,842	0.531

* p<0.05, ** p<0.01, *** p<0.001

[1] As a share of the respondents who received a gift/loan from, respectively, loan providers, spouses/children living elsewhere and other individuals

4.10.2. Given gifts and loans

Table 4.10.2a shows that 36% of households *gave* a gift and/or a loan of at least TZS 10,000 in the past 12 months (TG: 35%; CG: 37%). Of all the households with a spouse/child of the households head living elsewhere, 33% gave a loan/gift to him/her/them of at least TZS 10,000 (TG: 31%; CG: 35%). The table furthermore shows that the average *given* gift/loan was higher in the treatment group (TG: TZS 290,684; CG: TZS 200,567). Gifts/loans given to other individuals are much smaller (TG: TZS 60,587; CG: TZS 60, 617). The differences between the treatment and control group are not statistically significant.

Table 4.10.2a – Given gifts and loans of at least TZS 10,000 in the past 12 months

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Total					
Share of HHs (N=750)	0.36	0.48	0.35	0.37	0.623
Average amount, TZS (N=265)†	198,964	499,059	236,489	168,124	0.275
Spouses/children living elsewhere					
Share of HHs (N=606)	0.33	0.47	0.31	0.35	0.438
Average amount, TZS (N=196)†	241,731	557,805	290,684	200,567	0.275
Other individuals					
Share of HHs (N=752)	0.15	0.35	0.14	0.15	0.709
Average amount, TZS (N=103)†	60,604	146,495	60,587	60,617	0.999

* p<0.05, ** p<0.01, *** p<0.001

†Note that only amounts of TZS 10,000 or more are included in the calculation of the average.

Summary Section 4.10:
(50% of the sample)

Received gifts/loans (≥ TZS 10,000):

- In total, **74%** of the households **received** a **gift/loan** of at least TZS 10,000 in the past 12 months. On average, households received **TZS 328,478**.
- **38%** of the households that received a gift/loan used it (partly or entirely) for **medical expenses**, with an average amount of **TZS 107,537**.
- The share of households that received a loan from a **loan provider** in the past year is relatively **small** (TG: 13%; CG: 8%).
- Of the households that reported a **spouse/child of the household head living elsewhere**, **72%** received a **gift/loan** from him/her/them. On average, households received **TZS 285,258** from spouses/children living elsewhere**.**
- **39%** of the households that reported having received a gift/loan from a **spouse/child living elsewhere**, used it (partly or entirely) to pay for **medical expenses**, with an average amount of **TZS 88,675**.

Given gifts/loans (≥ TZS 10,000):

- **36%** of the households **gave** a **gift/loan** of at least TZS 10,000 in the past 12 months.

4.11. Time and risk preferences

Time and risk preferences of the population provide insight into the willingness to enroll in the KNCU HP. Enrolling in health insurance is coupled with payment of a premium. By paying this premium today, lower out-of-pocket health expenditures, and ultimately better health, are expected in the future. Whether someone enrolls in the program is dependent on whether the person is willing to pay money today to (possibly) gain financially and health-wise in the future. If someone is willing to risk the financial consequences of a possible health shock, they would be less likely to enroll in the program. As such, both *time* and *risk* preferences are important predictors of the enrolment rate in KNCU HP.

The time and risk preferences sections were conducted for one individual per household, for 50% of the sampled households. For a randomly selected subsample of 80% of these households the household head was pre-selected to answer these sections. For the remaining 20%, the spouse of the household head was pre-selected, in case that the household head was married. If the pre-selected household member was not available at the time of the interview, the sections were answered by another household member. Both sections were always answered by the same household member. This random 80/20 split between household head and his/her spouse can be used for future research related to bargaining power.

Whether someone will enroll in insurance is in essence a consumer choice that can be modeled quantitatively with a so-called *utility function*. Time and risk preferences are important building blocks of the utility function. See for example Varian (2010) for more details. As the household head and their spouse are key in decision making that concerns the household, their time and risk preferences are expected to be important predictors of future enrollment of the household into KNCU HP.

4.11.1. Time preferences

Time preferences assess how respondents value certain gain *over time*. The less a person values their future compared to the present, the more they are said to *discount* the future.

All respondents were asked two questions to elicit their time preferences, such that the second question was dependent on the answer to the first. Namely, respondents were first asked whether they preferred to receive TZS 7,500 tomorrow or TZS 8,500 in one month. Respondents who preferred to receive TZS 7,500 tomorrow were asked whether they would prefer TZS 11,250 in one month instead of TZS 7,500 tomorrow. And respondents who preferred to receive TZS 8,500 in one month in the first question were asked whether they would prefer TZS 8,000 in one month, or TZS 7,500 tomorrow. With the answers to these questions the interval is obtained for the critical amount (*C*), such that the respondent would prefer to obtain *C* in one month instead of TZS 7,500 tomorrow. See figure 4.11a for a graphic representation.

Respondents with a higher amount *C* are more impatient to receive money, and thus discount their future more. In terms of enrolment for the KNCU Health Plan, respondents with a low *C* are more patient, and are thus expected to be more likely to enroll in the program.

Figure 4.11a – Time preferences questions

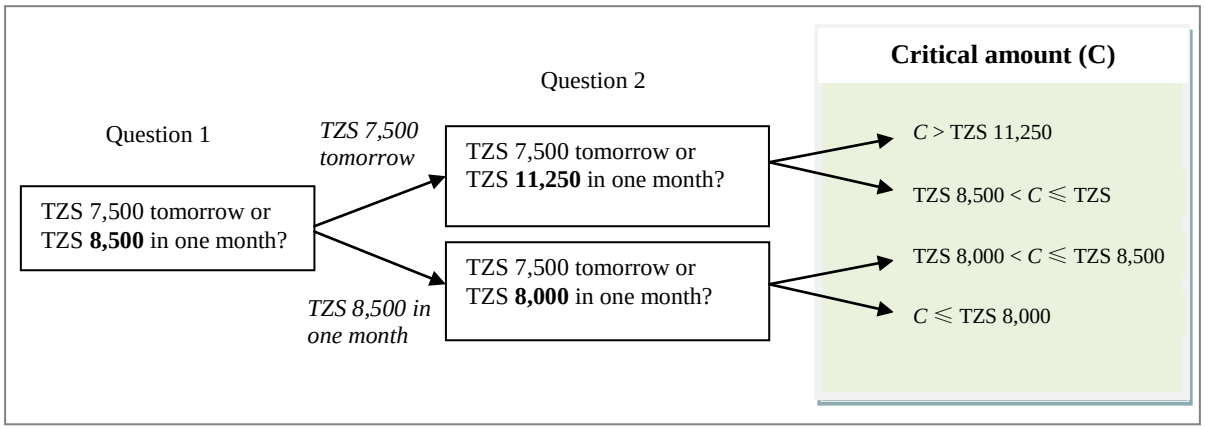
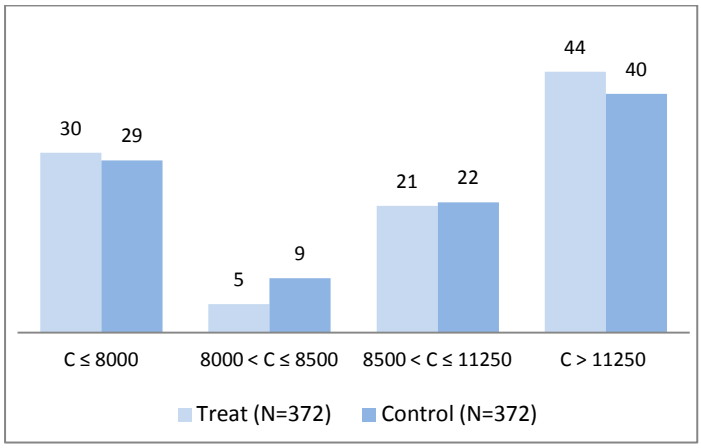


Figure 4.11b shows that the time preferences are similar between the treatment and the control group, and that they are heterogeneous. A high share of respondents is relatively impatient, with critical amount (*C*) larger than TZS 11,250 (TG: 44%; CG: 40%). Approximately one-third of the respondents is relatively very patient, with *C* lower than or equal to TZS 8,000 (TG: 30%; CG: 29%). The more patient a respondent is, the more likely he or she is to purchase health insurance. The figure shows furthermore that the treatment and control group are similar in terms of time preferences.

Figure 4.11b – Time preferences (%)



The time preferences of the population can be further quantified by estimating the so-called *discount rate*, a measure of time preference that is a direct parameter of a utility function. See for example Varian (2010) and Mas-Colell et al. (1995). However, to establish the discount rate, strong assumptions have to be made about the utility function of the population. To correctly choose the utility function, more extensive analysis is needed, which is beyond the scope of this report.

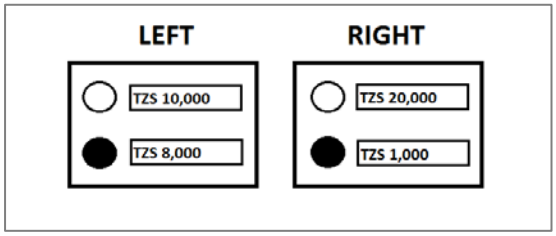
4.11.2. Risk preferences

By letting respondents play a so-called risk lottery, their risk preferences have been measured. The risk lottery assesses whether the respondent is risk averse, risk neutral, or risk loving.

Respondents were asked whether they would like to participate in a game where they could win money. The amount of money won would depend on their game strategy. After consent from the respondent, he or she was given extensive training to understand how the risk lottery game works.

During the training exercise, the interviewer[21] blindly picks a marble from a bowl containing five marbles, some black and some white. Before picking a marble, but *after* the respondent sees how many black and white marbles there are in the bowl, the respondent chooses between two lotteries, depicted in figure 4.11c.

Figure 4.11c – Pay-out risk lotteries



Choosing the lottery on the left (right) side would win the respondent TZS 10,000 (TZS 20,000) if a white marble is picked, and TZS 8,000 (TZS 1,000) if a black marble is picked. The lottery on the left side is *safe:* winning at least TZS 8,000 is assured, but the highest amount is only slightly larger, TZS 10,000. Choosing the lottery on the right side is *risky*: the lowest amount that can be won is only TZS 1,000, but the high amount is twice larger than that of the lottery on the left, namely TZS 20,000. Note that during the training, these winnings are hypothetical. After the training the actual risk lottery game is played, as explained in Box 5.

The data shows that a substantial share of respondents (TG: 12%, CG: 11%) did not play the risk lottery game rationally, i.e. their choices were illogical or inconsistent. Because is it highly likely that these respondents did not fully understand the risk lottery game, they are excluded from further analysis.

[21] The interviewer, rather than the respondent, picks a marble during the training rounds. This is to minimize the probability that the respondent learns of any difference in feeling between the black and white marbles. Note that all marbles have been selected such that they feel equal.

Box 5 – The risk lottery game

The respondent is asked to choose five times between the two lotteries shown in figure 4.11c, such that the distribution of black and white marbles changes as depicted in the second column of the table below. It is explained to the respondent that, rather than picking a marble every time the game is played, the computer chooses one of the five questions at random after all questions have been answered. That particular game is fully played out: the respondent blindly picks a marble, and is paid the amount corresponding to the lottery he or she had previously chosen.

In this way the respondent has an incentive to carefully contemplate their game strategy when choosing a lottery in the five questions. Note that the payment is done by the supervisor, rather than by the interviewer, to prevent fraudulent interviewer practice.

In the first round (5 black marbles), all (rational) respondents will choose the lottery on the left side, because they will have a guaranteed pay-out of TZS 8,000, instead of a guaranteed TZS 1,000.

Question	Distribution of marbles	Probability of black marble	Expected payoff		
			Left	Right	L - R
1	5 black	100%	8,000	1,000	7,000
2	4 black, 1 white	80%	8,400	4,800	3,600
3	3 black, 2 white	60%	8,800	8,600	200
4	2 black, 3 white	40%	9,200	12,400	-3,200
5	1 black, 4 white	20%	9,600	16,200	-6,600

Risk-loving respondents will switch to the option on the right in the second round (very risk-loving) or in the third round (risk-loving), despite the fact that the lottery on the left side has a higher expected payoff (see table above). In other words, these respondents are willing to take a risk to win TZS 20,000.

Risk-neutral respondents would switch to the lottery on the right in the fourth round, as this is the moment that the lottery on the right side has a higher expected payoff than the lottery on the left.

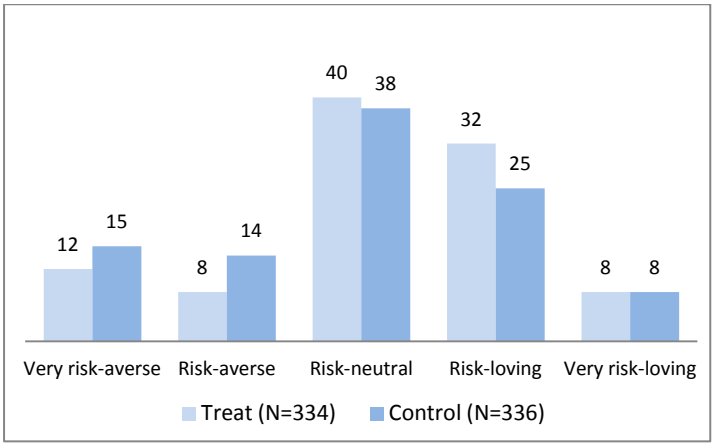
Risk-averse respondents will switch to the option on the right in the last round (risk-averse) or not at all (very risk-averse), because they are less or not willing to risk winning only TZS 1,000 instead of a guaranteed TZS 8,000.

Note that any *rational* respondent who switches to the lottery on the right side at a certain question, would keep choosing the lottery on the right in the following questions. Namely, switching *back* to the lottery on the left side would be inconsistent, as the probability to win the high amount of TZS 20,000 only increases in the further duration of the game.

Figure 4.11d presents the share of risk-loving, -averse and -neutral respondents in the treatment and control group. The figure shows that risk preferences are similar between the treatment and the control group, and that they are heterogeneous. In both the treatment and the control group a large share of the respondents is risk-neutral (TG: 40%, CG: 38%). Approximately one in four respondents is risk-averse (TG: 20%, CG: 29%). The risk-averse individuals are expected to be most likely to enroll in health insurance.

Just as with time preferences, the risk preferences of respondents can be further quantified to estimate their utility function. However, as is the case with time preferences, to quantify the level of risk-aversion in the population, a choice must be made for the functional form of the utility function. To correctly make this choice, more extensive analysis is needed, which is outside the scope of this report.

Figure 4.11d – Risk preferences (%)



Summary Section 4.11:
(50% of households)

- A relatively **large share** of respondents is **impatient** in terms of financial gain (TG: 44%; CG: 40%), although there is a **substantial share** of **very patient** respondents as well (TG: 30%; CG: 29%).
- A **large share** of respondents is **risk-neutral** (TG: 40%, CG: 38%). Approximately **one in four** respondents is **risk-averse** (TG: 20%, CG: 29%).
- The measured time and risk preferences are **heterogeneous**.
- **TG** and **CG** are similar in terms of time and risk preferences.

4.12. Trust

Trust in the community and trust in KNCU may be important determinants of the demand for KNCU HP. Respondents were therefore asked four questions to determine these trust levels depicted in the two figures below. Note that this section was asked to one household member per household only, namely the household head if available.

Figure 4.12a shows that the trust in the community is heterogeneous between the respondents. In both the treatment and the control group more than half of the respondents reported a 6 or higher on the scale of 1 to 10 (TG: 59%; CG: 56%) when asked whether people in the community can be trusted. The answers to the question whether someone from the community would try to take advantage or be fair, show a similar pattern. Also at this question, more than half of the respondents reported a 6 or higher on the scale of 1 to 10 (TG: 57%; CG: 51%).

Figure 4.12a – Trust in the community

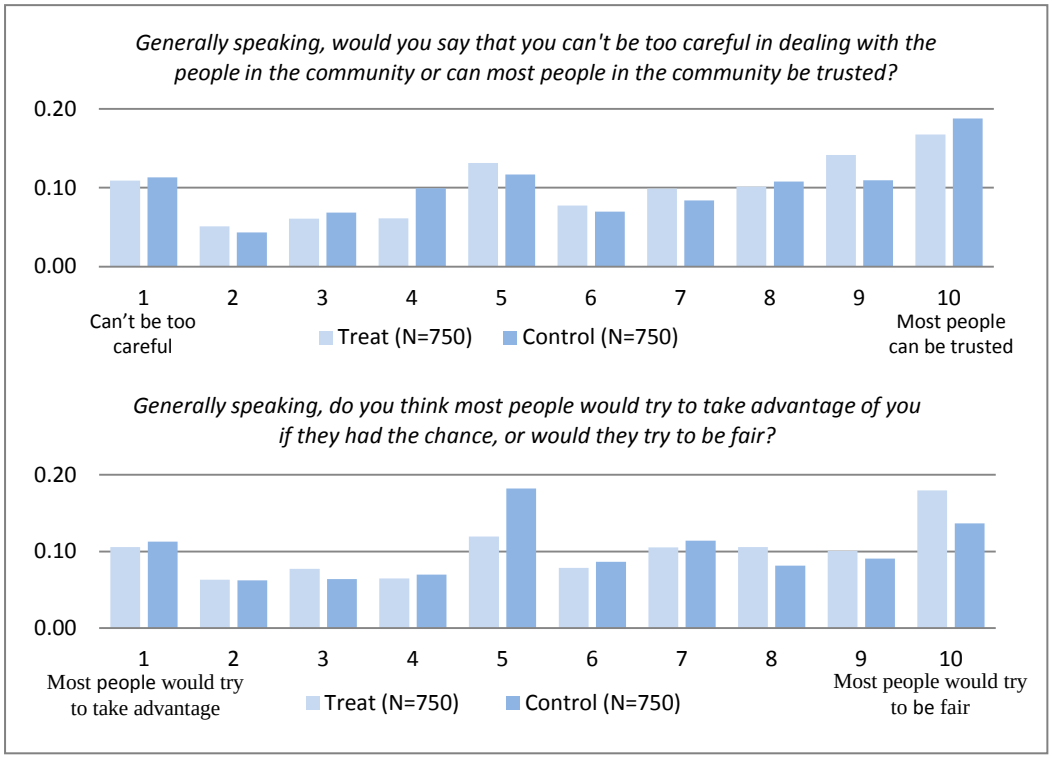


Figure 4.12b shows that trust in KNCU is high. In both the treatment and the control group more than 30% of the respondents reported that KNCU can be trusted (10). On the scale of 1 to 10 more than 70% of the respondents rated their trust in KNCU to be a 6 or higher (TG: 70%; CG: 72%). More than 30% of respondents also reported that KNCU would try to be fair if it had the chance to take advantage (10). Also at this question, more than two-thirds of the respondents reported a 6 or higher on the scale of 1 to 10 (TG: 69%; CG: 70%).

Figure 4.12b – Trust in KNCU

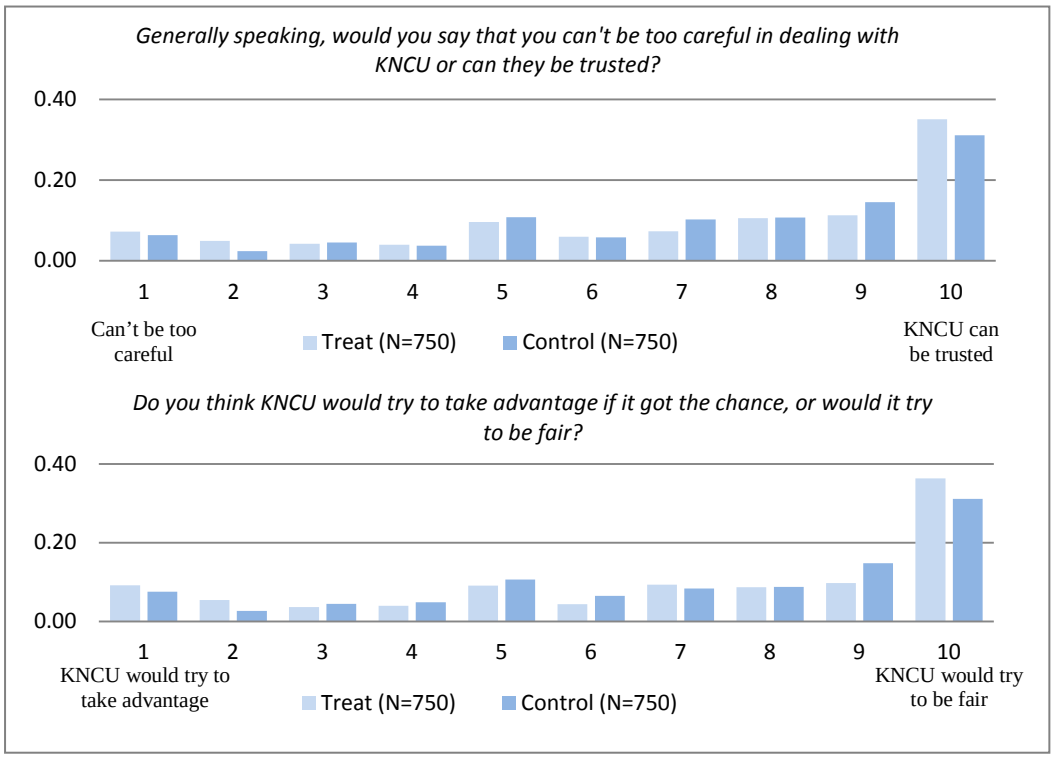
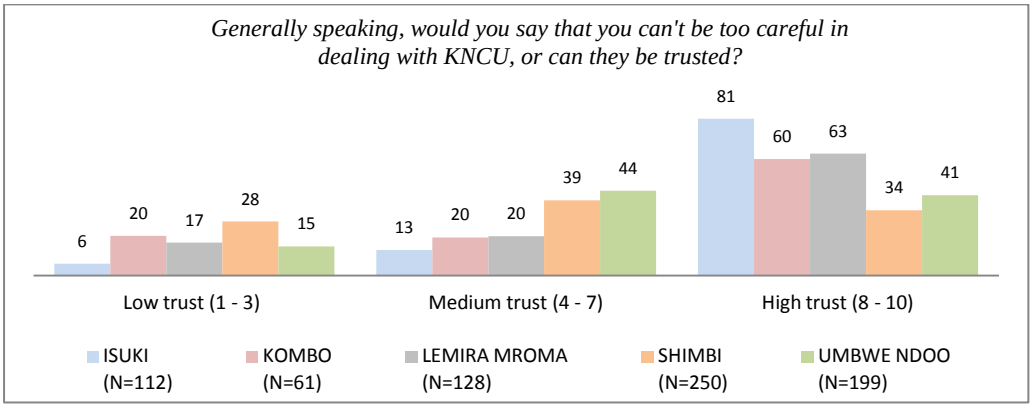


Figure 4.12c shows that the extent to which respondents in the treatment group trust KNCU varies across the PSs. All the respondents who reported 8, 9 or 10 are considered to have 'high trust'. All respondents who reported a 1, 2 or 3 are categorized as having 'low trust'. Trust in KNCU is highest in Isuki, while respondents in Shimbi and Umbwe Ndoo report relatively more medium trust. Note that Shimbi is situated in Rombo district, where 48% of individuals in the treatment group are already enrolled in health insurance (see Section 4.5).

Figure 4.12c – Trust levels KNCU by Primary Society in the treatment group (%)



Summary Section 4.12:

- Trust in the **community** is highly **heterogeneous.** Approximately **60%** of individuals have more trust than distrust in people of the community.
- **Trust in KNCU** is higher than trust in the community as approximately **70%** of individuals have more trust than distrust in KNCU.
- In **TG trust** levels in **KNCU** vary across PSs. **Isuki** shows that highest share of respondents who **highly trust KNCU**, namely **81%**.

5. Conclusion and suggestions for further research

The treatment and control group are found to be similar on most observed characteristics. Furthermore the spillover effect of the KNCU Health Plan from nearby areas where the program has already been implemented is small, implying that the treatment and control group are well chosen.

The KNCU farmers and their households are found to be poor, and highly dependent on family farming, and on their informal financial network. They suffer from large financial health shocks, have a high health care utilization rate, and they mostly visit health facilities for their health.

As the population already makes substantive use of health facilities for health care, it is expected that, even in the short term, better *quality* of health care, better health insurance *coverage*, and better *awareness* of (chronic) illness may largely benefit the KNCU farmer population, both financially and health wise.

The introduction of the KNCU Health Plan may bridge the gap in these areas. The Impact Evaluation of the KNCU Health Plan -which will be conducted after revisiting the treatment and control group some time after the KNCU Health Plan has been rolled out in the treatment group- will provide quantitative results on the impact of the KNCU Health Plan on health care utilization, health care costs, and health status of KNCU farmers and their households.

Furthermore, as the KNCU farmers and their families may be financially constrained to enroll in health insurance, one way to bridge this financial gap may be to involve relatives who live elsewhere in the roll out of the KNCU Health Plan, by offering them the opportunity to pay the insurance premium of their family with mobile money. This can be a topic for further research.

Other possible research topics include:

- Bargaining power within the household in relation to insurance uptake. Namely, investigating the role of the household head and his/her spouse in enrolling the household in health insurance.

- The effect of trust on health insurance uptake, as trust in KNCU and in the community may have large predictive power over enrolment in KNCU HP.

- The relation between pesticide use and lung disease, as this may be an important health problem in the area and not much is yet known about this issue.

- The effect of notifying individuals of their measured health status during a survey on future health insurance uptake. Namely, taking blood pressure and lung function measurements in the scope of the baseline survey, and informing the individuals who are found to have abnormal blood pressure or abnormal lung function values about this finding, may entice these individuals to take up health insurance. Thus the act of surveying may increase insurance uptake. As a random subsample of households was selected for blood pressure and lung function measurements in the baseline survey, these can be compared to the households who did not receive these measurements, after the KNCU HP is rolled out in the treatment group.

References

Filmer, D., and L.H. Pritchett. Estimating wealth effects without expenditure data-or Tears: An application to educational enrollments in states of India. *Demography*, 38(1): 115-132, 2001.

Gustafsson-Wright, E., *et al.*, *A short-term impact evaluation of the Health Insurance Fund program in central Kwara state, Nigeria*. Amsterdam Institute for International Development and the Amsterdam Institute for Global Health and Development, 2013.

Khandker, S.R., G.B. Koolwal, and H.A. Samad. *Handbook on impact evaluation: Quantitative methods and practices.* The World Bank, 2010.

Mas-Colell, A., M.D. Whinston, and J.R. Green. *Microeconomic theory,* New York: Oxford university press, 1995.

Varian, H. R., and Repcheck, J. *Intermediate microeconomics: A modern approach*, W. W. Norton & Co., 2010.

Appendix A: Informed Consent

Table A1 shows that, in terms of socio-economic characteristics, the individuals who did not give consent are similar between the treatment and control group.

Table A1 – Socio demographics of individuals who did not give consent for the interview

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Individuals (all) (N=685)					
Age	37.83	23.52	38.60	37.27	0.541
Female	0.46	0.50	0.44	0.48	0.430
Aggregate annual consumption - PC (TZS)	800,398	374,494	809,808	793,526	0.674
Individuals (≥18 years) (N=589)					
Married[1]	0.42	0.49	0.44	0.39	0.286
Employed - past 7 days	0.33	0.47	0.32	0.34	0.553
Employed - past 12 months	0.36	0.48	0.36	0.36	0.986
Highest completed educational level					
None	0.09	0.28	0.10	0.08	0.329
Less than primary school	0.14	0.35	0.17	0.12	0.103
Primary school	0.52	0.50	0.46	0.57	0.015*
Secondary school - junior	0.21	0.41	0.24	0.19	0.289
Secondary school - senior	0.03	0.17	0.02	0.04	0.304
Higher education	0.01	0.08	0.01	0.01	0.704

[1] Married includes monogamous and polygamous marriages.

* p<0.05, ** p<0.01, *** p<0.001

Table A2 shows that there are significant socio-economic differences between individuals who did consent compared to individuals who did not consent. Namely individuals who did not consent are on average older, less likely to be female, less likely to be married, more likely to be employed, and less likely to have a low education level.

Table A2 – Comparison individuals who consented and who did not consent

	Total		Consent	No consent	p-value
	Mean	Std. dev.	Mean	Mean	
Individuals (all) (N=6497)					
Age	34.34	25.81	33.92	37.83	0.000***
Female	0.53	0.50	0.54	0.46	0.000***
Aggregate annual consumption - PC (TZS)	788,372	366,920	786,932	800,398	0.367
Individuals (≥ 18 years) (N=3902)					
Married[1]	0.57	0.49	0.60	0.42	0.000***
Employed - past 7 days	0.20	0.40	0.18	0.33	0.000***
Employed - past 12 months	0.23	0.42	0.21	0.36	0.000***
Highest completed educational level					
None	0.11	0.31	0.11	0.09	0.028*
Less than primary school	0.24	0.43	0.26	0.14	0.000***
Primary school	0.53	0.50	0.53	0.52	0.696
Secondary school - junior	0.10	0.30	0.08	0.21	0.000***
Secondary school - senior	0.01	0.11	0.01	0.03	0.002**
Higher education	0.00	0.06	0.00	0.01	0.206

[1] Married includes monogamous and polygamous marriages.

* p<0.05, ** p<0.01, *** p<0.001

Appendix B: Biomedical Measurements

Table B1 – Blood pressure measurements (N=2535)[1]

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Measurements					
Systolic blood pressure	129.57	24.68	129.96	129.25	0.486
Diastolic blood pressure	81.86	13.12	81.99	81.75	0.662

[1] Only includes respondents of 18 years and older.

* p<0.05, ** p<0.01, *** p<0.001

Table B2 – Lung function measurements (N=842)[1]

	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Measurements					
FVC[2]	103.81	19.02	102.07	105.05	0.059
FEV1/FVC	0.82	0.08	0.83	0.82	0.040*

[1] Only includes respondents between 12 and 59 years old

[2] As percentage of expected value given age, gender, height and weight

* p<0.05, ** p<0.01, *** p<0.001

Table B3 –Anthropometrics of children aged 0 to 5 years old[1]

Wasted: -3 ≤ z < -2	10	1.5	2.8	0.2	0.016*
Normal: z ≥ -2	545	98.5	97.2	99.8	0.016*

Panel B	Total		Treat	Control	p-value
	Mean	Std. dev.	Mean	Mean	
Z-scores					
Weight-for-age (N=592)	-0.10	1.10	-0.15	-0.07	0.471
Height-for-age (N=592)	-0.12	1.47	-0.04	-0.20	0.273
Weight-for-height (N=592)	-0.04	1.16	-0.19	0.10	0.020*
Arm circumference-for-age (N=555)	-0.19	0.93	-0.27	-0.12	0.104

[1] Only includes respondents between 0 and 5 years old

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not precisely equal to n/N*100%

[3] Arm circumference was not measured for children younger than 6 months

* p<0.05, ** p<0.01, *** p<0.001

Table B4 – Anthropometrics of children aged 6 to 17 years old[1]

Panel A	Total[2] n	Total[2] %	Treat %	Control %	p-value
Weight-for-age z-score (N=667)[3]					
Severely underweight: z < -3	5	0.7	0.9	0.5	0.598
Underweight: -3 ≤ z < -2	53	7.6	7.6	7.5	0.955
Normal: z ≥ -2	609	91.7	91.5	92.0	0.821
Height-for-age z-score (N=1635)					
Severely stunted: z < -3	54	3.0	3.5	2.6	0.283
Stunted: -3 ≤ z < -2	176	10.8	8.9	12.2	0.034*
Normal: z ≥ -2	1405	86.3	87.6	85.2	0.172
BMI-for-age z-score (N=1635)					
Severely wasted: z < -3	13	0.7	0.9	0.5	0.226
Wasted: -3 ≤ z < -2	75	4.9	6.7	3.5	0.006**
Normal: z ≥ -2	1547	94.4	92.4	96.0	0.003**

Panel B	Total Mean	Total Std. dev.	Treat Mean	Control Mean	p-value
Z-scores					
Weight-for-age (N=667)	-0.70	0.98	-0.68	-0.72	0.646
Height-for-age (N=1635)	-0.86	1.14	-0.74	-0.96	0.000***
Weight-for-height (N=1635)	-0.56	0.97	-0.64	-0.50	0.004**

[1] Only includes respondents between 6 and 17 years old

[2] The percentages are calculated by using the sample weights so that they represent population percentages. This implies that the percentages are not precisely equal to n/N*100%

[3] Due to missing height tables for children older than 11 years in the WHO program

* p<0.05, ** p<0.01, *** p<0.001

Table B5 – Anthropometric measurements adults (N=1320)[1]

	Total Mean	Total Std. dev.	Treat Mean	Control Mean	p-value
Anthropometric measurements adults					
Weight (kg)	60	11	61	60	0.112
Height (cm)	162	8	163	162	0.042*
BMI	23	4	23	23	0.544
Waist (cm)	79	11	80	79	0.281
Hip (cm)	94	10	95	94	0.124

[1] Only includes respondents between 18 and 49 years

* p<0.05, ** p<0.01, *** p<0.001

Table B6– Anthropometric measurements elderly (N=1769)[1]

	Total Mean	Total Std. dev.	Treat Mean	Control Mean	p-value
Anthropometric measurements elderly					
Weight (kg)	58	12	59	58	0.486
Height (cm)	160	8	160	159	0.110
BMI	23	4	23	23	0.953
Waist (cm)	84	11	84	84	0.453
Hip (cm)	94	10	94	94	0.580

[1] Only includes respondents of 50 years and older

* p<0.05, ** p<0.01, *** p<0.001

Appendix C: Health Facilities

Table C1 provides an overview of the health facilities that respondents *mainly* consult for their chronic disease, and who they consulted *first* for their acute illnesses/injuries and/or other consultations in the past year. For each type of health care need the five most frequently visited health facilities are highlighted, separately for the treatment and control group.

Note that Kibosho DDH Hospital, Machame Mission Hospital, and Marangu Mission Hospital have had minor refurbishments in the scope of the KNCU HP. Furthermore Masama Gov Health Centre and Masama Lutheran Health Centre have had major refurbishment in the scope of the KNCU HP (source: PharmAccess). Thus, at the time of the baseline survey approximately 7-9% of the treatment group and 13-19% of the control group visit health facilities that have had minor upgrading, and approximately 3 percent of both the treatment and the control group visit health facilities that have had major upgrading in the scope of KNCU HP, for chronic illness, acute illness and other consultations.

Table C1– Utilized Health Facilities

Health Facilities	Chronic disease		Acute illness/injury		Other consultations	
	Treat (N=451)	Control (N=416)	Treat (N=764)	Control (N=896)	Treat (N=444)	Control (N=537)
Huruma Hospital	0.129	0.182	0.079	0.193	0.080	0.168
Ibukoni Gov Dispensary	0.000	0.004	0.000	0.008	0.000	0.003
Ikuini Gov Dispensary	0.000	0.008	0.000	0.009	0.000	0.002
Keni Gov Health Centre	0.003	0.000	0.008		0.014	0.000
Kibon'goto Gov Hospital	0.049	0.006	0.043	0.009	0.029	0.006
Kibosho DDH Hospital†	0.045	0.022	0.033	0.011	0.040	0.006
Kifuni Dispensary	0.012	0.000	0.005		0.000	0.000
Kilimanjaro Christian Medical Centre	0.131	0.067	0.047	0.032	0.056	0.034
Kilimanjaro Hospital	0.004	0.003	0.002	0.001	0.002	0.000
Kirokomu Gov Dispensary	0.005	0.003	0.005	0.002	0.006	0.000
Kiromo Gov Dispensary	0.001	0.000	0.001		0.000	0.000
Kisiki Gov Health Centre	0.000	0.007	0.000	0.004	0.000	0.011
Lemira Lutheran Dispensary	0.152	0.000	0.224		0.151	0.000
Lyamungo Gov Health Centre	0.031	0.010	0.047	0.005	0.040	0.014
Machame Mission Hospital†	0.040	0.168	0.039	0.124	0.041	0.121
Manushi Gov dispensary	0.004	0.000	0.002	0.002	0.023	0.000
Marangu Mission Hospital†	0.000	0.001	0.001	0.001	0.000	0.000
Masama Gov Health Centre‡	0.015	0.006	0.015	0.004	0.031	0.010
Masama Lutheran Health Centre‡	0.014	0.020	0.008	0.019	0.010	0.021
Mashami Gov Dispensary	0.005	0.000	0.010	0.002	0.001	0.000
Mawenzi Regional Hospital	0.027	0.037	0.017	0.023	0.026	0.034
Mkuu Dispensary	0.006	0.004	0.008	0.014	0.006	0.007
Mokala Gov Dispensary	0.000	0.030	0.000	0.023	0.000	0.040
Mwika Msae Gov Health Centre	0.000	0.000	0.000	0.001	0.000	0.000
Narumu Gov Dispensary	0.000	0.085	0.000	0.118	0.000	0.093
Narumu Mission Dispensary	0.000	0.043	0.000	0.048	0.004	0.027
Ndekioo Dispensary	0.000	0.023	0.000	0.034	0.000	0.019
Ngoyoni Mission Hospital	0.003	0.004	0.009	0.001	0.008	0.001
Nkwansira Gov Health Centre	0.057	0.000	0.126		0.109	0.000
Nkweshoo Gov Dispensary	0.000	0.041	0.000	0.075	0.003	0.069
Saawe Gov Dispensary	0.000	0.122	0.000	0.141	0.000	0.220
Shimbi Gov Dispensary	0.028	0.000	0.045	0.001	0.054	0.000
Siha District Gov Hospital	0.000	0.000	0.002	0.001	0.000	0.000
Sonu COGI Dispensary	0.000	0.000	0.010		0.000	0.000
St. Joseph Hospital	0.003	0.002	0.004	0.001	0.003	0.002
Umbwe Gov Health Centre	0.041	0.000	0.053		0.054	0.000
Umbwe Parish Dispensary	0.037	0.000	0.022		0.029	0.000
Ushiri Gov Dispensary	0.000	0.003	0.001	0.006	0.001	0.005
Other	0.160	0.101	0.139	0.089	0.181	0.091

5 most frequently visited hospitals, dispensaries and health centers

† Kibosho DDH Hospital, Machame Mission Hospital, and Marangu Mission Hospital have had minor refurbishment in the scope of KNCU HP.

‡ Masama Gov Health Centre and Masama Lutheran Health Centre have had major refurbishment in the scope of KNCU HP.