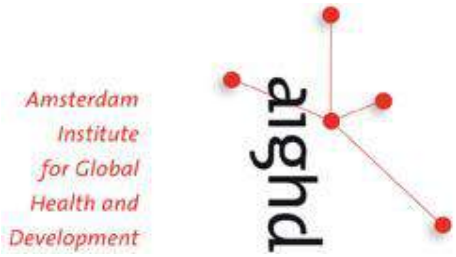

A SHORT-TERM IMPACT EVALUATION OF THE HEALTH INSURANCE FUND PROGRAM IN CENTRAL KWARA STATE, NIGERIA

FINAL DRAFT (MARCH, 2013)

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

This report presents the findings of the first rigorous impact evaluation of the health programs funded by the Health Insurance Fund (HIF) and implemented by the PharmAccess Foundation (PharmAccess) in Africa. This research is part of a multi-year operational research program on subsidized low-cost private health insurance and clinic-upgrades in several countries in Sub-Saharan Africa (SSA) led by the Amsterdam Institute for International Development (AIID) and the Amsterdam Institute for Global Health and Development (AIGHD).[1] The report evaluates the basic short-term impact of the Hygeia Community Health Care (HCHC) program in Central Kwara State, Nigeria, based on two (of three) population-based household surveys in Kwara Central: a baseline survey in 2009 and a follow-up survey in 2011. The focus is on the impact of the HCHC among households in the program area on three main outcomes: (1) access and utilization of health care, (2) financial protection, and (3) health status. The report does not cover impacts of the program beyond the household such as impacts on providers or on the health system overall.

The first part of the report highlights the importance of impact evaluation at a time where both a large disease burden and constrained budgets weigh heavily on governments and donor institutions. Policymakers and researchers have realized the imperative of distinguishing between programs with positive impact and programs with little or no (or even negative) impact. This has resulted in an increase in a demand for such evaluations and more evidence-based research. The Health Insurance Fund should be credited for recognizing this early on and for investing in rigorous impact evaluations of their programs from the beginning.

Part 2 of the report describes the context within which we measure the impact of the program. In this section, the health landscape before HCHC was introduced and in the control community, where the program has yet to be introduced, is examined. In addition, this section describes in detail the benefits of the health insurance program including the premium and subsidy levels. Currently, individuals are responsible for about 7 percent of the premium, while the remaining 93% is covered by the subsidy. In the long run, the plan is to gradually decrease the subsidy. On the supply-side, health clinics were upgraded to provide better access and higher quality care to members of the target communities.

The third part of the report reviews the health insurance impact evaluation literature as well as the willingness-to-pay for health insurance literature. This section divides the impact evaluation literature into the three main outcomes also evaluated in this report. While the findings are generally positive with respect to the impact of health insurance, there are some mixed results across the outcomes. Of the nine studies reviewed, seven of them find a positive impact of health insurance on health care utilization.[2] Within these, some differential impacts are found across age groups and socioeconomic status. There are fewer

[1] Currently, research programs are being conducted in another part of Kwara State, Nigeria; Lagos, Nigeria, Tanzania, and Kenya.

[2] The studies are chosen based on a rigorous systematic review of the health insurance impact evaluation literature by Giedion and Diaz (2010).

rigorous studies of the impact of health insurance on financial protection. Of the five studies reviewed, only one finds a significant positive impact on financial protection. The other studies find either no impact or an increase in spending on health. However, if health spending increases because care is sought that otherwise might not have been sought, there are still potential welfare gains. This highlights the importance of careful interpretation of program impact. Seven studies from developing countries are reviewed for the impact of health insurance on health status using various differing outcomes as proxies. Two of these studies find improvements in health, one for the elderly and one for young children, while the remaining studies find no impact. The third section of the report also discusses the challenges with measuring the impact of health insurance. Various methodologies are presented to address these challenges. Finally, we review the literature on willingness to pay for health insurance. These studies point towards a tremendous potential demand for health insurance, the first step in ensuring the success of such a health financing model.

The fourth part of the report describes the two-time-period household panel data utilized for the impact evaluation and presents descriptive statistics of the treatment (program community) and control groups (non-program community). The data show the two groups to differ in some characteristics in both the baseline and follow-up surveys. In particular it is noted that the control group appears to utilize more health care and demonstrate poorer health status in terms of objective measures than the treatment group in the baseline year. Health care utilization increases from the baseline to follow-up for the treatment group while utilization declines for the control group. The treatment group is also more likely to use modern health care providers and private health care facilities than the control group in the second year of the survey. The descriptive data also show that the treatment group shows a significant decline in health expenditures. An impressive 30% of the treatment group reported having enrolled in HCHC insurance two years after the introduction of the program with some groups being more likely to enroll than others.

The methodology used to estimate the impact of health insurance on our chosen outcomes is presented in part five. We use two methods that are used to address selection bias -the main challenge discussed in the previous section. The first method is difference-in-differences which compares outcome changes over time between the treatment and control communities overall. In this method, we are not concerned with whether or not individuals in the treatment group chose to buy insurance or not. Instead we examine the entire group capturing potential "spillover effects" on the uninsured in the treatment group that can also be beneficial such as access to upgraded participating HCHC clinics.

The second method is propensity score matching which constructs a statistical comparison group that is based on a model of the probability of participating in the intervention (HCHC) using observable characteristics of the individuals. The latter method measures the impact of the program on those who enrolled in the program relative to if they had not been offered the HCHC program.

Part 6 of the report presents the impact of HCHC. The results are presented in three sections for the three sets of outcomes: (1) access to and utilization of health care, (2) financial protection, and (3) health status. In each section both the impact on the treatment community (difference-in-difference) and the impact on those enrolled (the propensity score

matching) are discussed. The results demonstrate first, that as a result of HCHC, use of health care has increased on average by over 15 percentage points. From an average of 22.5 % of the population in the treatment group that used health care at baseline, this represents an over 70 percent increase. In addition, the program has increased utilization of quality health care as measured by an increase in use of modern health care providers and private health facilities. Non-modern health care provider use has declined. Second, the findings show HCHC to have significantly decreased out-of-pocket health care expenditures. On average, these expenditures have declined by about 1000 Naira per person per year (which represents a 40% reduction in health expenditures when including the cost of the insurance premium). Subsequent analysis shows that, when controlling for additional variables, the increase in health care utilization due to HCHC may be as high as 90 percent and the reduction of out-of-pocket expenditures as high as 50 percent.[3] Third, it appears that the program has increased awareness about health status. Self-reported health status declined for two of the measures with significant results. It is quite possible that increased access to health care has increased self-knowledge about health leading to a short run decline in self-reported health. Whilst we did not find an impact of the HCHC program on blood pressure control or anemia in the target population as a whole, preliminary subgroup analyses of respondents with hypertension at baseline suggest a decrease in blood pressure in the treatment communities.[4] Long-term expectations are that increased access to preventive care will improve health status. Overall, after two years since the introduction of the HCHC, considerable positive impact can be attributed to the program. Given such a strong impact in the short-run, it would be valuable to continue to follow the progress of the program and to measure its long-term impact.[5]

[3] See Gustafsson-Wright, E., Z. Tanović, J. van der Gaag (forthcoming) *The impact of private subsidized health insurance and clinic upgrades on health care utilization and financial protection in rural Nigeria*.

[4] See Hendriks, M., F. Wit, T. Akande, B. Kramer, G.K. Osagbemi, Z.Tanović, E. Gustafsson-Wright, L.M. Brewster, J. van der Gaag, J. Lange, C. Schultsz (forthcoming) *The impact of subsidized health insurance on hypertension in rural Nigeria: a population-based study.*

[5] This research is ongoing and includes the following forthcoming technical papers: Gustafsson-Wright, E., Z. Tanović, J. van der Gaag (forthcoming) *The impact of private subsidized health insurance and clinic upgrades on health care utilization and financial protection in rural Nigeria*; Hendriks, M., F. Wit, T. Akande, B. Kramer, G.K. Osagbemi, Z.Tanović, E. Gustafsson-Wright, L.M. Brewster, J. van der Gaag, J. Lange, C. Schultsz (forthcoming) *The impact of subsidized health insurance on hypertension in rural Nigeria: a population-based study*; Brals, D. (forthcoming) *Home versus clinic deliveries: the impact of subsidized private health insurance and clinic upgrades in Central Kwara State, Nigeria*; Janssens, W., J. Goedecke, G. de Bree, S. Aderibigbe, A. Mesnard, T.M. Akande (forthcoming) *Does Socio-Economic Status of Rural Dwellers in Nigeria Affect Out-of-Pocket and Transportation Expenditures for Acute and Chronic Diseases? The role of Geography versus Poverty*; Cavatorta E., W. Janssens, A. Mesnard (forthcoming) *Quality, Accessibility and the Demand for Health Care in Nigeria*; Kramer, B. (forthcoming) *Adverse selection and intra-household allocations of micro health insurance.*

INTRODUCTION

Today we find ourselves at a crossroads where the burden of disease is greater than ever before, especially in low-income countries. Moreover, multi- and bi-lateral donors have increasingly limited resources. The number of individuals living with HIV/AIDS alone (only one of the many health burdens faced today) is over 33 million and the funds necessary to provide treatment for those individuals well-exceed foreign assistance budgets, not to mention local budgets.[6] We cannot afford anymore to squander valuable resources on programs for which we do not have positive evidence of their impact. Development policymakers across the world are beginning to understand this and impact evaluation research has become a major tool to inform the policy dialogue.[7] Such evaluations lead to crucial decisions to scale-up programs, alter them or replace them with alternative mechanisms.[8] As policymakers and researchers in the field, it is our responsibility to ensure that these evaluations take place, that they are done using the most robust methods possible and that the findings be applied to the real world.

Currently, our knowledge is limited with respect to the impact of health insurance in Africa due in part to the fact that health insurance has historically been limited to the wealthy elite in this part of the world. Findings from other regions are mixed but mostly positive (Giedion and Diaz, 2008). To the best of our knowledge, this impact evaluation is the first rigorous impact study of subsidized low-cost private health insurance and clinic-upgrade programs in Africa, funded by the Health Insurance Fund (HIF) and implemented by the PharmAccess Foundation (PharmAccess). The impact evaluation represents the culmination of a multi-year operational research program on these initiatives led by the Amsterdam Institute for International Development (AIID) and the Amsterdam Institute for Global Health and Development (AIGHD) in several countries.[9] The report evaluates the short-term impact of Hygeia Community Health Care (HCHC) on treatment communities (communities receiving the intervention) in Central Kwara State, Nigeria. The research is based on two population-based household surveys in Kwara Central: a baseline survey in 2009, and a follow-up survey in 2011. An end line survey is planned for 2013, to measure the longer term impact of the program on the well-being of the households in the target populations.[10]

The baseline and follow-up surveys are utilized to examine some of the initial basic impact of the HCHC related to health. Our focus is on the three main health-related outcomes from health insurance interventions seen in the literature (a review of which is presented in

[6] Over (2011)

[7] See Banerjee and Duflo (2011), Clemens and Demombynes (2011), Ravallion (2001) for a general discussion on impact evaluation for development interventions.

[8] The most influential case study of impact evaluation is the PROGRESA (now Oportunidades) program in Mexico. Numerous evaluations were done to investigate the impact of this program having a big influence on development work -see Gertler (2004), Behrman, Parker and Todd (2009), Skoufias and di Maro (2007), Schultz (2004), Todd and Wolpin, (2006), Behrman and Hoddinott (2005) and Hoddinott and Skoufias (2004).

[9] Currently, research programs are being conducted in another part of Kwara State, Nigeria; Lagos, Nigeria, Tanzania, and Eldoret, Kenya.

[10] The AIID and AIGHD have worked closely with the University of Ilorin Teaching Hospital in Nigeria to collect and analyze these data.

section 3). These three outcomes are: (1) access and utilization of health care, (2) financial protection, and (3) health status. The basic set of questions that we have decided to prioritize in this report, are presented in Box 1.[11] Note that this impact evaluation does not attempt to measure impacts or externalities of the program beyond the household.[12]

BOX 1: The Research Questions

- **What is the rate of insurance uptake** in program communities and how is uptake distributed across the population in terms of age, gender, socioeconomic status, household size and composition, and location

- **What is the impact of HCHC on**
  1. ***Health Care Access and Utilization***
     a. quantity of health care used
     b. quality of health care used - type of provider
  2. ***Financial Protection***
     a. out-of-pocket health expenditures
  3. ***Health Status***
     a. self-reported health outcomes
     b. objective health outcomes (anemia and uncontrolled blood pressure)

The evaluation methodology used to examine these questions is a quasi-experimental design based on a comparison with what would be seen in the absence of the program. This required collecting data from before and after program implementation in the target population (the treatment group) as well as gathering the same information from a population group that is not (yet) eligible for participating in the insurance scheme (the control group). Note that in the treatment group some households will participate, and others will choose not to participate, since enrollment is voluntary. Section 2 describes the background of the program area before program implementation, as well as the insurance scheme. The literature is reviewed in Section 3, including a discussion of the difficulties in measuring the impact of health insurance, as well as the tools used to address the issue of potential bias. The data are described in Section 4 of the report. Rigorous analytical methods are used to estimate program impact, using specific techniques to address potential bias in estimation. These methods are described in detail in Section 5 of the report. Section 6 presents the findings of the impact evaluation and Section 7 concludes and discusses policy implications.

[11] Numerous other research questions will be analyzed at a future date.

[12] For such analysis, see for example Gaag, van der and Stimac (2012).

BACKGROUND

THE COUNTERFACTUAL

An impact evaluation measures the impact of a program relative to the outcomes that would be seen in the absence of that program. What would be seen in absence of the program, we call the counterfactual. In Central Kwara State, where HCHC was introduced, the counterfactual is a health care delivery and financing system that is a mixture of public and private care where access is limited and where the quality is generally very low. Figure 1 shows one example of a low quality private delivery center in the Asa Local Government Area. Despite the presence of the National Health Insurance Scheme (NHIS), a federally funded social health insurance scheme, less than one percent of households in the treatment group and less than two percent of households in the control group had any type of health insurance before the introduction of the program.[13]

Figure 1: Private midwife clinic/delivery center in the Asa Local Government Area

Generally, in Nigeria, the patterns of health status mirror those of many other Sub-Saharan African nations, but they are worse than would be expected given the country's GDP per capita. The sheer numbers are astounding due to the country's size - one million Nigerian children under five die annually.[14] The main causes of death in children under five are attributed primarily to neonatal causes with Malaria and Pneumonia being among the top causes as well. Diarrheal diseases also contribute to a large proportion of child mortality –up to 300,000 deaths annually. While the country as a whole has seen some improvements over

[13] Kwara II Baseline Survey.
[14] 2006, National Bureau of Statistics –MICS.

the last years, the country-wide statistics hide regional differences. Kwara State is ranked the fourth poorest state out of 36 states (plus the Federal Capital Territory) in a ranking based on consumption data. Health Statistics in the state are also poor. Self-reported health measures from household surveys in program areas before program implementation show little evidence of extremely poor health. However when compared with objective measures, it is evident that lack of knowledge about own health status is prevalent. Approximately 86% of children were found to be underweight and over 5% were found to be overweight. On the other hand, among adults, obesity and being over overweight appear problematic. Among the elderly, nearly 40% were classified as having mild or severe hypertension.

HYGEIA COMMUNITY HEALTH CARE

In the summer of 2009, the Health Insurance Fund (HIF) launched Hygeia Community Health Care (HCHC) in the Asa Local Government Area in Central Kwara State, Nigeria. The program was launched in collaboration with the PharmAccess Foundation and the Nigerian HMO Hygeia. Under this arrangement, the Kwara State Government would increasingly take up the subsidy that makes the initial insurance premiums affordable, while the contributions of the Dutch Health Insurance Fund will diminish gradually over the life span of the scheme. Hygeia, the largest Health Maintenance Organization (HMO) in Nigeria, has a network of over 200 clinics and hospitals throughout Nigeria and around 200,000 paying members. Hygeia has 20 years of experience in health care in Nigeria and is one of the HMOs executing Nigeria's NHIS. It was selected as local implementing partner based on a medical, administrative and financial assessment process, including a due diligence carried out by PricewaterhouseCoopers. As part of the program the Health Insurance Fund provides support to Hygeia to improve its administrative capacity. In addition to the health insurance component, the financing mechanism provides regular cash flow directly to the program hospitals to cover the overhead costs of salaries, drugs, consumables, power supply, and facility maintenance among other things. The insurance program covers primary and limited secondary health care services, including malaria (see Box 2 for a description of services covered).[15] Beneficiaries are enrolled on an annual basis; the co-premium of insurance is 300 NAIRA per person per year.[16] Table 1 shows the premium, co-premium and subsidy levels of the program. Currently, individuals are responsible for about 7 percent of the premium, while the remaining 93% is covered by the subsidy. In the long run, the plan is to gradually decrease the subsidy.

[15] Treatment of HIV/AIDS and tuberculosis is covered by government health programs.

[16] The 300 Naira co-premium represents approximately 5 percent of the monthly per capita consumption of treatment group individuals in 2009. For treatment group individuals in the poorest (richest) consumption quintile the co-premium represents 13 (2) percent of monthly per capita consumption in 2009.

BOX 2: Primary and Secondary Care Services Covered by HCHC

- Inpatient care
- Outpatient care
- Hospital care and admissions (unlimited number)
- Specialist consultation
- Provision of prescribed drugs and pharmaceutical care
- Laboratory investigations and diagnostic tests
- Radiological investigations
- Screening for and treatment of diseases including malaria
- Minor and intermediate surgeries
- Antenatal care and delivery
- Neonatal care
- Preventive care including immunization
- Eye examination and care
- Screening for and treatment of sexually transmitted diseases
- Annual check-ups
- Health education

Table 1: Premium, Co-Premium and Subsidy Levels of HCHC Program in Kwara Central

	2009-2010	%	2011	%
Premium	4,000	100	4,400	100
Co-premium	300	7.5	300	6.8
Subsidy	3,700	92.5	4,100	93.2

Now in its fifth year in Kwara State since the inception of the first program in Northern Kwara State, the community health insurance schemes have benefitted over 125,035 in all of Kwara State since inception and to date 56,830 Kwarans have enrolled in total. The target group in Central Kwara State is a rural community in which to date 24,763 individuals have enrolled.[17] According to program data, individuals in Kwara State have made over 200,000 visits to the participating hospitals and clinics to receive health care services for a variety of medical conditions. The beneficiaries of the scheme do not incur out-of-pocket costs for these services since the hospitals and clinics are paid directly through financing received from the insurance scheme. The visits since the start of the program (2007-2011) were largely for malaria (24%), antenatal care (14%), hypertension (11%), upper respiratory tract infections (11%) and myalgia (8%). Seventy percent of these visits were made by women and children. The conditions for which the individuals were seen would likely previously have been paid for out-of-pocket and in some instances, without appropriate health care intervention, these conditions may have led to significant morbidity or mortality.

[17] At the time of publication of this report.

LITERATURE REVIEW

THE IMPACT OF HEALTH INSURANCE

The only way to know whether an approach such as HCHC, which addresses both the demand and the supply side, is a better model than a purely supply-side or direct delivery model, is to conduct a rigorous impact evaluation of the HCHC intervention.[18] Demand-side interventions can take many forms and have various names such as community-based health insurance (CBHI), social health insurance, micro-insurance, and subsidized private voluntary health insurance. To date, the findings in the literature for such insurance-based approaches are mostly promising; for instance, Giedion and Diaz in Escobar et al. 2010 conclude: "The positive effect of health insurance on medical care and use has been widely demonstrated and generally accepted" But what is meant by positive effect? What exactly has been evaluated to date? How robust are the findings? In this section we will summarize the main findings from the literature on the impact of health insurance on a variety of health and non-health outcomes in developing countries. We will examine impact by outcome variable, cover several geographic regions in the developing world, and will discuss some of the methodological issues faced in an impact evaluation of health insurance.

When evaluating the impact of health insurance, it is important to be precise about the key questions that we want to be answered. We would argue that at the end of the day, we are aiming for better health of the target population. The underlying assumption is that better health is achieved by receiving timely and quality preventive and curative health care. (It is also achieved by having access to water, sanitation, food and shelter, among other factors that are beyond the scope of this study.) Access to quality health care for all can only become a reality when quality health facilities are present and when the care is affordable. Affordable health insurance combined with a quality upgrade of the participating clinics and hospitals are likely to bring this goal closer to reality. In addition, the insurance component of such an intervention in the health care system will protect households from hardship due to unexpected financial shocks resulting from illness or premature death. The literature examines three main outcomes from health insurance interventions. The first is the impact on access and utilization of health care; the second focuses on financial protection; and the third looks at health status. These outcomes are measured using a variety of variables, which are discussed below.

Before examining the literature, it important to first discuss some of the key methodological issues faced when estimating the impact of health insurance.[19] Various techniques are used to address these issues, some more robust than others. It is important to keep in mind that real world constraints often prevent researchers from applying the most rigorous methods

[18] For more on impact evaluation see Khandker et al. (2010), Blundell and Dias (2000), Duflo et al. (2008) and Ravallion (2008).
[19] See Khandker et al. (2010).

possible. The main issue is that participation in a voluntary health insurance scheme is almost always nonrandom. Therefore, it is possible that those who choose to buy insurance do so because they have some innate characteristics that make insurance particularly beneficial for them. For example, if an individual has a predisposition to illness, he or she will most likely have higher out-of-pocket health expenditures than somebody who doesn't have that. The former individual is more likely to take up insurance. So when comparing these two individuals, we may find that the insured individual still has higher out-of-pocket expenditures than the uninsured individual, because the insured one may need more or higher levels of care than the healthier, uninsured, individual.

There are numerous methods to address this kind of selection bias. These methods are described in detail in Box 3. In this literature review, we focus on the studies that used the most robust methods. We also review the handful of studies where randomization of the health insurance schemes eliminates the issue of selection bias (see Box 3 for a description of randomized controlled trial (RCT)). One final consideration when examining the impact of health insurance that is related to applicability of findings across contexts is summed up in the following quote.

> *…health insurance is not a homogenous good and an in-depth familiarity with the specificities of the health insurance scheme that is being evaluated is key to adequately interpret results and avoid making generalizations across different countries and even across different settings within the same country.*
>
> *(Gideon and Diaz, 2008)*

ACCESS TO AND UTILIZATION OF HEALTH CARE

A priori, we expect health insurance to increase access and utilization because it lowers the price of health care. Individuals will have better health if they are utilizing preventive and curative health care when needed and in a timely manner. The literature shows generally positive impact of health insurance in low- and middle-income countries on access and utilization. As mentioned, we concentrate our review on the studies with the most robust evidence of the impact of health insurance (based in part on the literature review of Giedion and Diaz, in Escobar et al. 2010). The potential for moral hazard or the overuse of medical care is a view that opponents of subsidized health insurance often hold. In our view however, given the lack of access and other constraints that poor vulnerable households face, the likelihood of demand-side moral hazard seems unlikely. To date, evidence is weak on the matter, however, so it is not possible to prove one way or the other.

The impact of the *subsidized* regime component of a national health insurance program in Colombia is examined by Trujillo et al. (2005). Using propensity score matching (PSM) techniques (see Box 3) to address the selection issues discussed above, the authors find the intervention to greatly increase utilization of medical care among poor and uninsured individuals. Giedion et al. (2007) measure the impact of the *contributory* regime component of the same Colombian insurance scheme. After a thorough review of potential methodologies to address the issues of selection bias, the authors conclude that using an instrumental variables (IV) approach (Box 3) is the most appropriate, given the constraints faced in the study context. They find that for most of their access and use indicators, health insurance has a positive causal impact on access. It is noteworthy that the authors highlight the importance of examining heterogeneous effects by examining differential impacts among individuals with different types of employment.

Chen et al. (2007) find Taiwan's National Health Insurance scheme to increase utilization of inpatient and outpatient care among the elderly, with more pronounced effects among the low and middle-income groups. These authors, using the econometric technique of difference-in-differences (DD) to address issues of endogeneity (see Box 3), find that one year after the establishment of the health insurance scheme, previously uninsured elderly people increased their use of outpatient care by nearly 28% and that previously insured elderly people increased their use by over 13%. The difference-in-difference change therefore is an increase of nearly 15%, which can be solely attributed to the National Health Insurance scheme.

Wagstaff et al. (2007) estimate the impact of a national rural health insurance scheme in China and find that the scheme increased utilization of both inpatient and outpatient care by 20-30% but that the scheme had no impact on utilization among the poor. Yip et al. (2008) use a combination of DD and PSM to find that the China health insurance program increased utilization by 70%.

In a different region, Wagstaff and Moreno-Serra (2007) investigate the impact of the introduction of social health insurance in 14 countries in Central and Eastern Europe and Central Asia and find an increase in acute in-patient admissions. Taking advantage of a "natural experiment" given explicit policy changes in the region, but with a lack of randomization of the intervention, the authors use the best possible econometric techniques to address the issue of selection bias.

There are few impact evaluations of health insurance in African countries and those that do exist, demonstrate a weaker methodology than the articles reviewed above. One example is Smith and Sulzbach (2008) which examines the impact of health insurance in three African countries. The authors find a correlation between health insurance and use of maternal health services but highlight that the inclusion of maternal health care in the benefits package of the insurance is key. Another example is Jutting, 2003 in which the author finds, in a study of mutual health organizations (community-based health insurance) in Senegal, an increase utilization of hospitalization services but a failure of the program to address the needs of the poorest of the poor.

In a recent study, King et al. (2009) examine the impact of the randomly assigned Mexican universal health insurance program Seguro Popular. As discussed above, randomized health insurance is rare. The phased rollout of the program provides an experimental design for a study of a program aimed at reaching 50 million uninsured Mexicans. The study shows the Seguro Popular program to have no significant impact on the use of medical services, while on the other hand, they do find strong financial protection impact (discussed below).

An additional potential impact of health insurance is increased utilization among non-participants members because, in some case when insurance is made available, participating facilities are upgraded. We might also expect individuals to have better health if the quality of the health care they receive is improved. Since it is difficult to measure the impact of improvements in quality per se, and because few insurance interventions explicitly address the supply-side, the literature is unclear about the separate impact of quality improvements of the supply of care versus making health insurance available and affordable.

FINANCIAL PROTECTION

Health insurance is expected to provide financial protection because it reduces the financial risk associated with falling ill. Financial risk in the absence of health insurance is equal to the out-of-pocket expenditures because of illness. Additional financial risk includes lost income due to the inability to work. There is little rigorous empirical evidence measuring the impact of health insurance in its ability to provide financial protection. The existing literature examines the impact of health insurance on out-of-pocket expenditures for health care measured in either absolute or in terms relative to income (expenditures are labeled catastrophic if they exceed a certain threshold).

The above mentioned Wagstaff and Moreno-Serra (2007) study of Central and Eastern Europe and Central Asia finds an increase in government spending per capita on health but

not in private health spending, while a switch to fee-for-service does increase private health spending. They find negative effects of social health insurance on overall employment levels but positive effects on average gross wages in the informal sector.

Wagstaff et al. (2007) in their study of the rural health insurance program in China, find no impact on out-of-pocket health expenditures which contrasts with Wagstaff and Yu (2007) who find reduced out-of-pocket payments, lower incidence of catastrophic spending and less impoverishment due to health expenditures. By contrast, in a later study, Wagstaff and Lindelow (2008), find health insurance to increase the risk of high and catastrophic spending in China. The authors define high spending as spending that exceeds a threshold of local average income and catastrophic spending is defined as exceeding a certain percentage of the household's own per capita income. This finding contradicts the hypothesis that health insurance always will reduce financial risk.[20] The authors question whether or not this finding implicitly indicates a reduction in welfare due to health insurance. If the mechanism by which spending increases is that individuals are seeking care when they fall sick that they wouldn't have sought otherwise, then in terms of health status, there are welfare gains. Another notable finding includes heterogeneous impact across income groups, highlighting the importance of distributional analysis.

King et al. (2009), in their study of the randomly assigned Mexican universal health insurance program Seguro Popular, find reductions in the proportion of households that suffer from catastrophic expenditures and a reduction in out-of-pocket expenditures for in- and out-patient medical care (though no effect on spending for medication and medical devices). Some additional studies which examine the relationship between health insurance and financial protection include Trivedi (2003), Wagstaff and Pradhan (2005), Asfaw and Jutting (2007).

HEALTH STATUS

The third main outcome measure used to assess the impact of health insurance is health status. Several variables, including mortality rates and self-perceived health status have been used as measures of health status. Some of the earlier studies examining the impact on health status, including those of Franks et al. (1993) and Card et al. (2004) who show that health insurance has a positive impact on health outcomes. However, many of the early studies were unable to produce rigorous proof of causality in the relationship between health insurance and health status (Levy and Meltzer, 2001; Hadley, 2003). Some exceptions include a study by Dow and Schmeer (2003) and one by Dow et al. (2003) where the authors examine the impact of health insurance on child mortality in Costa Rica. Both studies, using different methodologies, find limited impact of health insurance on child mortality.

However, the more recent literature includes studies that are based on either a quasi-experimental design or on randomized controlled trials, yielding more robust findings. The

[20] The authors are certain, based on the rigorousness of their econometric techniques, that these findings are not due to the endogeneity of health insurance i.e. that those who chose to be insured are not those who were more likely to spend more on health care due to some innate predisposition to illness.

Wagstaff and Moreno-Serra (2007) study of Central and Eastern Europe and Central Asia finds that while government health spending and gross salaries in the informal sector increase, health outcomes, as measured by several mortality and morbidity indicators, do not improve as a result of social health insurance. Wang et al. (2009) evaluate the impact of a community-based health insurance scheme in rural China (this scheme is also reviewed in Wagstaff et al. 2007, above) on health status using a 5-point Categorical Rating Scale of self-perceived health and the EQ-5D instruments.[21] This study finds, using appropriate econometric techniques given the quasi-experimental design of the intervention, that mobility and usual activities for individuals over the age of 55 is increased and that pain/discomfort and anxiety/depression of the general population are reduced as a result of the health insurance intervention. This intervention, similar to the HIF intervention, included both a demand-side risk pooling component and a supply-side efficiency and quality component resulting in findings that demonstrate an inseparable joint impact of the interventions. This contrasts with an earlier study of Wagstaff and Yu (2007) where they find mixed results in China. On the one hand they find that health insurance reduces sick days and on the other, they find no impact on other health indicators. Chen et al. (2007) also do not find evidence of a positive impact of insurance on health status in their examination of the impact of Taiwan's National Health Insurance. In their evaluation they examine both one-year mortality rate and self-perceived health status and find statistically insignificant results for both. Giedion et al. (2007) also do not find a significant impact of health insurance on health status in Colombia using low-birth weight, child mortality, and self-perceived health status as outcomes. Possible explanations for the lack of findings in the studies above are that the types of medical care that are induced by the health insurance do not impact the outcomes measured. Or alternatively, the quality of care received is not sufficient to improve health outcomes. Wagstaff and Pradhan (2005) on the other hand, with some methodological caveats, find improvements in height and weight measures among young children and in body mass index among adults in Vietnam.

WILLINGNESS TO PAY FOR HEALTH INSURANCE

The success of health insurance depends first and foremost on the effective and sustained demand for the insurance scheme. The growing literature on willingness to pay (WTP) for health insurance attempts to address this question. In the absence of real world experience, economists gauge WTP for health insurance by means of the so-called contingent valuation approach. This approach elicits directly what an individual would be willing to pay for a potential non-market or public good.

[21] EQ-5D is a standardized instrument for use as a measure of health outcome. Applicable to a wide range of health conditions and treatments, it provides a simple descriptive profile and a single index value for health status (EuroQol Group, 1990).

Barnighausen et al. (2007) examined WTP among informal sector workers in Wuhan, China, and find that these workers were willing to pay about US$4.00 per member per month, an amount that is higher than expected out-of-pocket spending based on past experience. Another study in India, (Dror et al., 2007) found WTP to be between US$15.00 and US$20.00 per year. Asgary et al. ((2004) found WTP in rural Iran to be about US$33.00 per year on average. Asfaw and von Braun (2005) estimated the WTP for a community based health insurance scheme in Ethiopia to be US$0.60 per month, pointing out that although this amount seems small: "if universal coverage of insurance is assumed it is possible to generate around 631 million Birr (US$75 million) per annum… (An) amount much higher than the maximum amount of money used as a recurrent budget by the health sector of the country".

Gustafsson-Wright et al. (2009) estimate the potential size of the health insurance market in Namibia. The authors found that 87 percent of the survey participants were willing to buy a hypothetical basic insurance package presented to them and an average respondent was willing to co-insure 3.2 household members (around 90 percent of the average family size in the sample). Finally, Velenyi (2012) using WTP data from a survey among market women in Lagos, Nigeria, finds that individuals are willing to pay about 300 Naira (about US$2.00) per month per person and that a little more than half of eligible respondents in the sample would be willing to enrol in the proposed insurance package. These results point towards a tremendous potential demand for health insurance, the first step in ensuring the success of such a health financing model.

In sum, while most of the rigorous studies of the impact of health insurance show positive effects on access and utilization, the results on out-of pocket expenditures are mixed, and not all studies show a positive impact on health outcomes. Moreover, most studies investigate interventions that only include the insurance component, paying scant attention to necessary quality interventions on the supply side. In addition, it is important to realize that the impact of any type of intervention in the health care system is highly context specific, making it difficult, if not impossible, to generalize from one country to another, let alone across continents. Still, given the available literature, we do expect to find a significant impact of the combined insurance/supply intervention, on access and utilization of health care, and on financial protection. The expected impact on various health outcome measures is more ambiguous.

BOX 3: ESTIMATING PROGRAM IMPACTS: METHODOLOGIES FOR ADDRESSING SELECTION BIAS

Randomization (RCT): Many view the 'gold standard' for measuring the impacts of a program to be the use of randomization or a randomized control trial (RCT). In this methodology, the program itself is provided to a randomly selected group. Data are then collected for that participant group (treatment group) as well as another comparable randomly selected non-participant group (control group) before the program has been implemented. Then data are collected on both groups some time after the program has been implemented. Careful selection of the treatment and control groups to ensure their comparability is necessary to ensure unbiased estimates with this methodology. Challenges include ethical issues related to selection of target groups, selective attrition from the program, spillover effects, and ensuring heterogeneity in participation.

Propensity-Score-Matching (PSM): In this method a statistical comparison group is constructed based on a model of the probability of participating in the treatment (program) using *observed* characteristics. Participants are then matched on the basis of this probability (propensity score) to non-participants in the control group. The average difference in outcomes between these two groups measures the average treatment (program) effect. For PSM to be valid, there must be sufficient overlap in propensity scores across treatment and control groups and unobserved factors cannot affect participation. However, when combined with DD (described below), unobserved factors are allowed for but only if they do not vary over time.

Difference-in-Differences (DD): This method compares treatment with control groups before and after program implementation. Unlike PSM (on its own), unobserved differences between the treatment and control group are allowed for with the assumption that these differences are time-invariant. This allows for these differences to be cancelled out essentially. The changes in outcome for the control group therefore reveal the counterfactual outcome changes.

Instrumental Variables (IV): The IV methodology involves finding a variable that is strongly correlated with the participation in the program but that is not correlated with the unobserved characteristics that could be affecting the outcomes. Some examples of instruments include a variable measuring a program design component such as some exogenous rules for eligibility or randomized assignment of the program (see RCT above). Instruments must be selected carefully. This methodology allows for time-varying selection bias and addresses attenuation bias.

Regression Discontinuity (RD): This method uses eligibility rules to exogenously identify participants and non-participants. Comparability is based on a sample of participants and non-participants falling within a range of the eligibility threshold. If eligibility rules are not adhered to then bias will result.

Pipeline Comparison (PC): In this method variation in the timing of the program is exploited using as a comparison group eligible non-targeted observations that have yet to receive the program. This method can be combined with DD or PSM to address unobserved and observed heterogeneity respectively.

Source: Summarized from Khandker et al. (2010)

DATA AND DESCRIPTIVE STATISTICS

The source of data for this impact evaluation is a panel dataset comprised of data from two household surveys conducted in Kwara Central, Nigeria. The surveys include information on the characteristics of the surveyed individuals, including demographics, employment information, education, income, consumption, living conditions, health perceptions, anthropometric and biomedical measurements. In addition to this, respondents were asked about their current insurance status, willingness-to-join, and willingness-to-pay for health insurance.

First a baseline survey was conducted before the start of HCHC. Two years later a follow-up survey was implemented in order to gather information about the impact of the program. Two groups were surveyed in each year. The first group called the 'treatment group' was sampled from the Asa Local Government Area (Afon and Aboto Oja), where the HCHC program had been introduced. This sample included 884 households. The control group was sampled from the Ilefodun Local Government Area (Ajasse Ipo), in which 566 households were interviewed. In total, 1450 households were interviewed for the baseline survey including 3636 individuals in the treatment group and 2358 individuals in the control group.

Due to migration (and death) the number of observations decreased between the baseline and the follow-up. Although many of the migrants were tracked and interviewed, not all migrants were found. Table 2 shows the number of observations in each of the surveys. Note that the total number of people that were interviewed increases between 2009 and 2011. This is possible because the sampling was based on households as opposed to individuals, i.e. new members to the household were also included in the follow-up survey.

The descriptive statistics and impact analysis presented in this report are based on the balanced panel dataset (Table 2, columns 7-9). The balanced panel includes only observations for which a subset of important variables are non-missing either in the baseline or the follow-up.[22] The balanced panel therefore contains 72% of the individuals interviewed at baseline.[23]

[22] Migrants were excluded from the analysis even if they were tracked down and found because they were deemed fundamentally different than the general sample.

[23] Given the rural setting and the socioeconomic status of the sample, this result is considered within range of acceptable for this type of study. But as with any survey analysis, bias may always be introduced with attrition. Note that the results discussed below are raw results, not controlling for any observable variables.

Table 2: Number of observations

	Baseline 2009			*Follow-up 2011*			*Balanced Panel*		
	Total (1)	*Control (2)*	*Treat (3)*	*Total (4)*	*Control (5)*	*Treat (6)*	*Total (7)*	*Control (8)*	*Treat (9)*
Number of respondents	5994	2358	3636	6716	2633	4083	4315	1567	2748

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

The following tables describe statistics related to health care utilization, health status and basic household and individual characteristics for the treatment and the control groups at baseline and at follow-up.

In Table 3, in the baseline year, the control group is shown to utilize more health care overall and is more likely to consult a modern health care provider than the treatment group. In the follow-up survey however, the treatment group is more likely to use any type of health provider and more likely to consult a modern health care provider but only the latter is statistically significant.[24] The treatment and control group spend about the same on out-of-pocket health costs at baseline. At the time of the follow-up survey however, the control group is shown to spend about twice what is spent by the treatment group on average (excluding the health insurance premium).

Also in Table 3, statistics on self-reported and objective health measures are presented. For the first two self-reported measures, respondents indicate how well they can do their daily activities and how their health is compared to one year ago. At baseline, an individual in the control group is more likely to report being able to do daily activities without difficulty relative to the treatment group. On the other hand, the control group shows higher shares of respondents that report having an acute illness and that have anemia and/or uncontrolled blood pressure as measured by biomedical tests in the base year.[25] Furthermore, the control group is less likely to report better health compared to one year ago. At follow-up, the control group reports better health than the treatment group in all categories except for the objective measure of uncontrolled blood pressure. Uncontrolled blood pressure is significantly more prevalent among the control group compared to the treatment group both at the time of the baseline and at the time of the follow-up survey.

Concluding, the descriptive statistics do show significant changes over time in health care utilization, health care expenditure and health status. Whether these changes can be attributed to the program will be discussed in section 6.

[24] Where modern includes hospital, clinic, (primary) health centre, or private doctor/nurse/midwife/paramedic. Non-modern includes a traditional healer, pharmacist, patent medicine vendor, alternative medicine provider, or religious person.

[25] See the impact section of the report for a more detailed description of the objective measures of health.

Table 3: Health care utilization and health status

Panel A: Baseline (2009)	*Min* (1)	*Max* (2)	*Mean Control* (3)	*Mean Treat* (4)	*p-value* (5)
Health care utilization					
Individual consulted a health care provider	0	1	0.351	0.225	0.001***
Modern health care provider	0	1	0.346	0.209	0.001***
Non-modern health care provider	0	1	0.067	0.057	0.546
Private hospital/clinic	0	1	0.094	0.102	0.734
Financial protection					
Health expenditures (naira)[1]	0	39.781	1.521	1.525	0.983
Health status - self reported					
Can do daily activities without difficulty	0	1	0.946	0.887	0.000***
Health better compared to one year ago	0	1	0.853	0.923	0.015*
Individual has chronic disease	0	1	0.073	0.064	0.431
Individual had acute illness/injury	0	1	0.253	0.161	0.002**
Health status - objective measures					
Anemia	0	1	0.370	0.305	0.047*
Uncontrolled blood pressure	0	1	0.259	0.194	0.008**
Panel B: Follow-up (2011)	*Min* (1)	*Max* (2)	*Mean Control* (3)	*Mean Treat* (4)	*p-value* (5)
Health care utilization					
Individual consulted a health care provider	0	1	0.323	0.354	0.389
Modern health care provider	0	1	0.210	0.264	0.021*
Non-modern health care provider	0	1	0.116	0.090	0.201
Private hospital/clinic	0	1	0.047	0.203	0.000***
Financial protection					
Health expenditures (naira)[1]	0	45.553	1.883	0.921	0.000***
Health status - self reported					
Can do daily activities without difficulty	0	1	0.962	0.902	0.000***
Health better compared to one year ago	0	1	0.953	0.910	0.003**
Individual has chronic disease	0	1	0.082	0.112	0.014*
Individual had acute illness/injury	0	1	0.272	0.282	0.797
Health status - objective measures					
Anemia	0	1	0.155	0.160	0.857
Uncontrolled blood pressure	0	1	0.280	0.226	0.030*

[1] Per capita annual health expenditures, excl. health care premium, inflation corrected, divided by 1000

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

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

Table 4 describes basic individual and household characteristics of the treatment and control populations. The table shows that in both the baseline (panel A) and the follow-up (panel B) the control group has better access to basic utility services such as good quality sanitation and drinking water. [26]

Table 4: Individual and household characteristics of the treatment and control populations

Panel A: Baseline (2009)	*Min* (1)	*Max* (2)	*Mean Control* (3)	*Mean Treat* (4)	*p-value* (5)
Age	0	100	25.479	29.161	0.000***
Female	0	1	0.520	0.514	0.674
Female household head	0	1	0.226	0.121	0.001***
Household size	1	16	5.620	5.701	0.742
Married	0	1	0.369	0.429	0.000***
Work	0	1	0.410	0.478	0.000***
Consumption[1]	17.45	1321.41	113.620	102.070	0.228
Wealth indicator	-1.487	6.898	0.331	0.248	0.483
Urban	0	1	0.533	0.491	0.714
Distance to nearest clinic (km)	0.013	4.645	1.210	1.221	0.967
Good quality toilet	0	1	0.179	0.021	0.000***
Good quality drinking water	0	1	0.907	0.786	0.007**
Panel B: Follow-up (2011)	*Min* (1)	*Max* (2)	*Mean Control* (3)	*Mean Treat* (4)	*p-value* (5)
Age	1	102	27.479	31.160	0.000***
Female	0	1	0.520	0.514	0.658
Female household head	0	1	0.243	0.144	0.001**
Household size	1	17	5.745	5.844	0.693
Married	0	1	0.376	0.433	0.000***
Work	0	1	0.436	0.551	0.000***
Consumption[1]	20.72	1243.99	104.870	94.910	0.240
Wealth indicator	-1.544	7.144	0.725	0.589	0.298
Urban	0	1	0.533	0.491	0.708
Distance to nearest clinic (km)	0.015	61.138	1.222	1.260	0.914
Good quality toilet	0	1	0.190	0.028	0.000***
Good quality drinking water	0	1	0.915	0.803	0.006**

[1] Aggregate yearly per capita consumption, excl. health consumption, inflation corrected, divided by 1000

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

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

Table 5 shows the take up of HCHC insurance in the treatment group at the time of the follow-up survey. Two years after the introduction of HCHC insurance about 30% of the treatment group had enrolled in the scheme. Some groups were more likely to enroll than others. The sub-treatment group of Aboto Oja shows higher enrollment at 36% relative to Afon at 26%. Overall, adults were more likely to be enrolled than children. More disaggregated analysis in other studies shows the highest take-up of the insurance for women aged 18 to 29.[27] The poorest half of the population was less likely to enroll (27%) than the richest half (34%). Thirty nine percent of urban dwellers were enrolled

[26] Appendix 1 provides differences by more household characteristics.

[27] *Quality, Accessibility and the Demand for Health Care in Nigeria*; Kramer, B. (forthcoming) *Adverse selection and intra-household allocations of micro health insurance.*

compared to 22% of rural dwellers. Individuals whose household head had some education at baseline relative to none, were more likely to enroll.

Table 5: Percentage of insured individuals in the treatment group, at the time of the follow-up survey, by subgroup

		% Insured
	Total	**30.43**
Treatment group split	Afon	25.63
	Aboto Oja	36.01
Age	Child (age < 18) at baseline	26.82
	Adult (age ≥ 18) at baseline	33.56
Gender	Males	28.41
	Females	32.34
Poverty	Poorest half (< $1.54 a day) at baseline	27.47
	Richest half (≥ $1.54 a day) at baseline	33.58
Urban/ Rural	Urban	39.07
	Rural	22.10
Education of the household head	No education at baseline	27.01
	Some education at baseline	33.33

Source: Calculations based on Kwara Central, Nigeria Surveys 2009 and 2011.

METHODOLOGY

This evaluation focuses specifically on the quantitative measurement of the impact of the HCHC program in the short-run and follows the approach of an *ex post* quantitative impact evaluation. We use two methods of estimation as to obtain the most robust results possible: difference-in-differences and propensity score matching.[28]

DIFFERENCE-IN-DIFFERENCES

The first method employed for evaluating the impact of the HCHC program (since the program was not provided to a randomly selected group of individuals) is difference-in-differences (also described in Box 3 above). This method compares outcome changes over time between the treatment and the control group. This approach has the advantage that it eliminates unobserved time-invariant differences between the treatment and the control group. The evaluation utilizes the so-called "Intention-to-Treat" (ITT) methodology in which all eligible individuals in the program group are compared with all eligible individuals in the control group. That is, the evaluation includes *all* individuals who are living in the program community, regardless of whether they decide to enroll in the health insurance or not. This standard approach in quantitative evaluations ensures that no bias is introduced in the impact estimates due to self-selection into (or out of) the program, as discussed above. This type of analysis is useful to donors who might be interested in program effects on an entire area which includes spillover effects.

To estimate the impact we start with the following equation:

$$Y_t^i = \alpha + \beta T^i + \gamma (T^i * R2) + \delta R2 + \theta X_t^i + \eta_t^i$$

Where:

- Y_t^i measures the outcome *Y* for individual *i* at time *t* (with *t* = 0 for the baseline in 2009 and *t* = 1 for the follow-up round in 2011).

- T^i is a dummy variable equal to 1 if individual *i* lives in a treatment village and 0 if the individual lives in a control village. The coefficient β captures any baseline differences between the treatment and the control group.

- $R2$ is a dummy variable equal to 0 for the baseline survey round and equal to 1 for the follow-up survey round. This variable is called "time period" in the tables. The coefficient δ captures any time trends in outcomes and environmental factors that are common for the treatment and the control group.

- The term $T^i * R2$ measures treatment after the baseline survey. It is equal to 0 for all individuals in 2009 as well as for control individuals in 2011; and equal to 1 for individuals

[28] The description of the methodology is sourced primarily from Khandker et al. (2010).

living in treatment villages in 2011. In other words, **the coefficient γ will capture the impact of the HCHC program** on individuals living in a village where the program was introduced after the baseline. This term is called "Treatment x time" in the tables. The coefficient γ is an "Intention-to-Treat" (ITT) impact estimator. It measures the effect of living in an HCHC village regardless of whether the individual actually enrolled in the program or not. Therefore it is a lower bound of the "Average Treatment Effect on the Treated" (ATET, or the impact of the HCHC on only the individuals who actually enrolled in the program). The ITT measures a combination of implementation effectiveness and efficiency because it includes all target individuals of the program.

- X_t^i is a vector of explanatory variables that measure individual, household and community characteristics for individual *i* at time *t*. The coefficient θ measures the impact of those characteristics on the outcome.

- η_t^i is an unobserved component for individual *i* at time *t*. It summarizes the individual, household and community factors that are unobserved to the researcher but that do influence the developmental outcomes of the individual. In the report we will focus on the results based on the assumption that $\eta_t^i = \mu^i + \varepsilon_t^i$, i.e. that it consists of a fixed component μ^i that captures individual-specific effects that do not vary over time (such as predisposition to illness) and a random term ε_t^i. This is the individual fixed-effects model. It yields the pure differences-in-differences estimator.

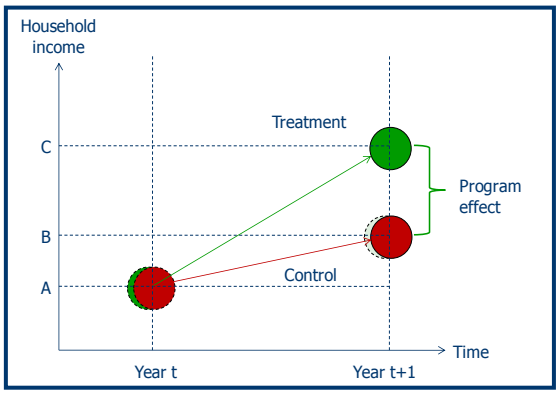

Figure 2: Graphical representation of difference-in-differences

PROPENSITY SCORE MATCHING

The second method used in this impact evaluation is propensity score matching (PSM). As described in Box 3, this method constructs a statistical comparison group (from the control area) that is based on a model of the probability of participating in the treatment (in this case HCHC) using observable characteristics. Rather than the ITT effect as estimated for the DD method, for PSM the "Average Treatment Effect on the Treated" (ATET) is calculated as the mean difference in the outcomes across the two comparable groups. In other words, this method calculates the impact of HCHC only on the individuals who actually enrolled in the program. The two conditions that must be fulfilled are that; (a) unobservable factors do not affect participation and (b) there be enough overlap in propensity scores across the participant and nonparticipant samples. There are different approaches used to match program participants and non-participants on the basis of the propensity score.[29] These methods include for example caliper, radius caliper, kernel matching, and nearest-neighbor matching with and without replacement. Each of these methods has advantages and disadvantages related to efficiency and bias. We conduct PSM using five different matching methods but focus on the findings from the nearest-neighbor matching without replacement.[30] This method matches each individual in the treatment group to a "very similar" comparison individual in the control group. Matching without replacement means that once we match one non-participant with a participant, the same non-participant cannot be used as a match for other participants.

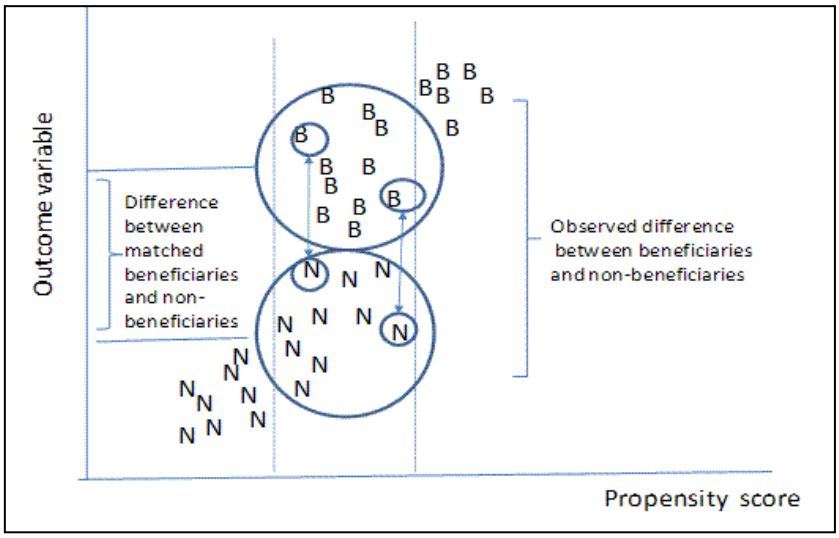

Figure 3: Graphical representation of propensity score matching

[29] See Dehejia and Wahba (2002) for a discussion on propensity score matching methods.
[30] As will be clear from the next section, the different propensity score matching methods produce very similar estimates and standard errors. Thus we choose to concentrate on one matching method in the text, and present all matching methods in the appendix.

IMPACT OF THE PROGRAM

In this section we present the findings of the impact of HCHC health insurance and clinic-upgrade program on the three main outcomes identified; (1) health care access and utilization, (2) financial protection and , (3) health status. As discussed earlier in the report, these outcomes are a reduced set of a number of questions that can be answered through an impact evaluation of the program. These outcomes are directly linked to the stated Performance Measurement Areas (PMA's) of the HIF seen in Table 6. Specifically, this evaluation addresses PMA's 1-3. The findings at this time only represent impact in the *short-term*.

The results below represent the impact of HCHC relative to the counterfactual. Discussed in detail in Section 2, the counterfactual is largely represented by a fragmented health care system providing poor access and poor quality. The potential financial and health impact of health shocks in this system are large. We hypothesize that the program should increase utilization of health care since the price of seeking care is reduced and the supply and quality of health care is increased. We also expect that out-of-pocket expenditures be reduced as individuals receive the benefits associated with the insurance scheme. In the short-term, we may expect to observe an increase in self-reported illness given the improved access to health care and knowledge. In the long-run however, we would expect that self-reported and objective health outcomes will improve because routine and preventive care will have been utilized. [31]

As described in the methodology section, we estimate impact using two different methods. The first estimation measures the intention-to-treat effect (ITT) or the impact on *all* individuals in the treatment community using a difference-in-differences estimation. The second estimation measures the average treatment effect on the treated (ATET) using propensity score matching. With this method the impact of HCHC on *insured* individuals in the treatment community can be estimated.

[31] Unless knowledge of one's true health status was so low at the time of the baseline survey that it cannot be any lower.

Table 6: Health Insurance Fund Performance Measurement Areas (PMAs)

Client / community	Provider		Policy maker/regulator	-	-
Family	Health care provider	Insurer/TPA/HMO	Government	Donor	(Investor)
PMA 1: Reduced financial risks of health care expenditures (e.g. OOP, socio-economic)	**PMA 5a:** Reduced financial risks for health care provider	**PMA 5b:** Reduced financial risks for insurer/TPA/HMO	**PMA 9:** Increased total resources for health / crowding in of private resources (e.g. private co-payment)	**PMA 13a:** Improved aid effectiveness /crowding in of public and private resources (e.g. increased transparency, accountability)	**PMA13b:** Improved investment climate/increased 'trust 'for investors
PMA 2: Improved health (e.g. MDGs, bio-medical status, health care seeking behaviour,)	**PMA 6a**: Increased (private) investment in health care providers	**PMA 6b**: Increased (private) investment in insurer/ TPA/HMO	**PMA 10a:** Extended coverage/ improved access for low and middle income communities	**PMA 10b:** Extended coverage/ improved access for low and middle income communities	**PMA 6c** Increased (private) investment in private health sector
PMA 3: Improved access to affordable quality health care	**PMA 7a:** Improved quality of health care services and outreach programs (e.g. access, perceived quality, trust)	**PMA 7b:** Improved quality of insurer/ HMO/TPA (e.g. access, perceived quality, trust)	**PMA 11a:** Improved (government) support for voluntary private health insurance	**PMA 11b:** Improved (donor) support for voluntary private health insurance	
PMA 4: Empowered clients and communities (target group organizations) (e.g. knowledge, attitudes, trust, WTP)	**PMA 8a:** Improved efficiency and cost effectiveness of health care provider (e.g. affordability)	**PMA 8b:** Improved efficiency and cost effectiveness of insurer/TPA/HMO	**PMA 12a:** Improved regulatory and legal environment to increase "trust" for investors	**PMA 14:** Increased donor investment in private health sector (e.g. insights into health care costs)	

ACCESS TO AND UTILIZATION OF HEALTH CARE

In this section we present the results from the estimations of the impact of the HCHC on health care access and utilization. Access and utilization is measured in terms of both quantity and quality. We measure quantity of health care sought as consulting a health care provider unconditional on whether an individual has reported an illness or not. Quality of health care is measured three ways; (1) utilizing a modern health care provider when having sought care, (2) the reverse of this measure -using non-modern health care providers, and (3) using a private health care facility.[32]

Table 7 shows the intention-to-treat effects from the difference-in-differences estimations. The first two variables 'Treatment group' and 'Time period' (rows 1 and 2) pick up the effects of being targeted versus not being targeted and any separate mean effects of time. The third variable (row 3) represents the difference-in-differences estimate, or the ITT **Impact of HCHC** on the outcome. Column (a) shows the impact on consulting any health care provider. The coefficient of the impact variable (row 3) is positive and statistically significant indicating that HCHC, in a period of two years, increased health care utilization by about 15 percentage points. We should recall that this estimation considers all visits, regardless of having reported an illness so it may include both preventive and curative care. Because the ITT considers all individuals in the treatment community, these results may even underestimate the true impact of the program on individuals with health insurance. In other words, the increase in health care utilization, as measured by this model is AT LEAST 15 percentage points. **From an average of 22.5 % of the population in the treatment group that used health care at baseline, this represents an over 70% increase in use of healthcare.** Subsequent research shows that, when adding additional control variables, health care utilization may have increased up to 90% on average.[33]

Column (b) demonstrates the impact on use of a modern health care provider. Again the impact of the program is positive and statistically significant indicating that **HCHC has increased the use of modern health care providers** by nearly 20 percentage points in the treatment community which **means that the percentage of individuals using modern health care doubled from 20% to 40%**. Column (c) shows a negative but insignificant impact of HCHC on use of non-modern health care providers. Column (d) demonstrates positive impact of HCHC on the use of private hospitals and clinics or an **increase in use of private health care facilities of nearly 15 percentage points in the treatment community which is equivalent to a 150% increase**.[34] To the extent that the measures we use for "quality health care" are indeed appropriate measures, the findings demonstrate that **individuals in HCHC communities as a result of HCHC are receiving higher quality health care.**

[32] Where modern includes hospital, clinic, (primary) health centre, or private doctor/nurse/midwife/paramedic. Non-modern includes a traditional healer, pharmacist, patent medicine vendor, alternative medicine provider, or religious person.

[33] See Gustafsson-Wright, E., Z. Tanović, J. van der Gaag (forthcoming) *The impact of private subsidized health insurance and clinic upgrades on health care utilization and financial protection in rural Nigeria*

[34] "Private" includes HCHC clinics in 2011.

Table 7: The Impact of HCHC on Health Care Access and Utilization (Difference-in-Differences)

	Consulted a health care provider	Modern health care provider	Non-modern health care provider	Private hospital / clinic
	(a)	(b)	(c)	(d)
Treatment group	-0.155*** (0.036)	-0.161*** (0.039)	-0.013 (0.018)	0.000 (0.022)
Time period (0 in baseline, 1 in follow-up)	-0.040 (0.048)	-0.139*** (0.040)	0.044 (0.029)	-0.057* (0.023)
Treatment x Time (ITT Impact of HCHC)	**0.158**** **(0.051)**	**0.188***** **(0.044)**	**-0.014 (0.030)**	**0.145***** **(0.027)**

Source: Calculations based on Kwara Central, Nigeria Surveys 2009 and 2011.
Coefficients from regression with control variables, see Appendix B
Standard errors in parentheses, corrected for clustering on Enumeration Area level
* p<0.05, ** p<0.01, *** p<0.001

Figure 4: Upgraded Ilera Layo health clinic

Table 8 demonstrates the average treatment effects on the treated (ATET) for health care access and utilization. Here we utilize propensity score matching (nearest neighbor matching without replacement). Findings of all five methods of matching mentioned in the methodology section are presented in Appendix B. The estimates are quite similar across

matching methods which demonstrates the robustness of the calculations. The results are consistent with the intention-to-treat effects– **HCHC increases utilization of health care and increases the use of quality health care for individuals who are enrolled in the program**. In this estimation, we find a negative and significant coefficient on use of non-modern health care where it was insignificant in the intention-to-treat estimation meaning that individuals who are enrolled are less likely to use low quality facilities or seek self-treatment than those who are not enrolled.

Table 8: The Impact of HCHC on Health Care Access and Utilization (Propensity Score Matching)

	Consulted any health care provider	Modern health care provider	Non-modern health care provider	Private hospital / clinic
Average Treatment Effect on the Treated	0.147***	0.180***	-0.066**	0.311***

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011.

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

FINANCIAL PROTECTION

In this section we present the findings of the impact of HCHC on financial protection. We measure financial protection as the amount of health expenditures out-of-pocket (including travel costs and excluding the health insurance premium) per person per year. Table 9 shows the intention-to-treat effect of the program. Rows 1 and 2 represent average differences between being targeted and not and mean differences over time. Row 3 shows the impact of HCHC on out-of-pocket expenditures. The coefficient is negative and statistically significant which means that **as a result of HCHC, out-of-pocket expenditures on health have decreased on average by about 1050 Naira per person per year in the treatment community**.[35] Since the control group spent on average about 1880 naira in 2011 on out-of-pocket health expenditures (Table 4, panel B), this translates into a rough average reduction in health expenditures by 40% for the treatment group if the cost of the co-premium is counted.[36] However, since the measurement represents an average impact on the treatment group, whether receiving insurance or not, the amount itself should be interpreted with caution but there is a clear positive impact of the program on financial protection.

Table 9: The Impact of HCHC on Financial Protection (Difference-in-Differences)

	Pc annual health exp. excl. premium / 1000 (naira)
Treatment group	0.041 (0.223)
Time period (0 in baseline, 1 in follow-up)	0.443 (0.330)
Treatment x Time (ITT Impact of HCHC)	**-1.052**** **(0.347)**

Source: Calculations based on Kwara Central, Nigeria Surveys 2009 and 2011.
Coefficients from regression with control variables, see Appendix B
Standard errors in parentheses, corrected for clustering on Enumeration Area level
* p<0.05, ** p<0.01, *** p<0.001

[35] Note that this excludes the health insurance premium of 300 Naira per person per year.
[36] When adding additional control variables in subsequent research, results show that the reduction in out-of-pocket expenditures could reach up to 50% on average. See Gustafsson-Wright, E., Z. Tanović, J. van der Gaag (forthcoming) *The impact of private subsidized health insurance and clinic upgrades on health care utilization and financial protection in rural Nigeria*

Table 10 demonstrates the findings for the second impact estimation for financial protection -propensity score matching (nearest neighbor matching without replacement). Consistent with the DD findings, the PSM calculation demonstrates that HCHC decreases out-of-pocket health expenditures by about 1000 Naira for those enrolled in HCHC. While one might expect this reduction to be lower for the insured than for an average treatment group individual, it should be noted that the descriptive evidence points to the fact that more urban individuals are likely to be insured and to use health facilities (before and after the program).[37] The evidence from both estimations provides strong evidence that the HCHC is fulfilling the desired outcome stated in PMA 1 of providing financial protection in the form of reducing out-of-pocket payments on health.

Table 10: The Impact of HCHC on Financial Protection (Propensity Score Matching)

	Health expenditures[1]
Average Treatment Effect on the Treated	-0.954**

[1] Per capita annual health expenditures, excl. health care premium, inflation corrected, divided by 1000 (naira)

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

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

HEALTH STATUS

In this section we present the findings of the impact of HCHC on health status. Health status is measured using four outcomes for self-reported health status and two outcomes for objective health status. The four self-reported measures are (1) ability (no difficulty) to execute daily activities, (2) perception of health today relative to the previous year, (3) having had a chronic disease, and (4) having had an acute illness or injury in the past year.

For the objective measures of health status we chose to analyze two of the most frequently occurring illnesses, for which it could reasonably be expected that in the relatively short time period of two years (the time between the baseline and follow-up surveys) the program could provide effective treatment for that particular condition. We therefore chose to measure, in this initial impact evaluation, uncontrolled blood pressure and anemia. For uncontrolled blood pressure, the blood pressure of each present and consenting household member aged 12 years and older was objectively measured during both the baseline and follow-up surveys. Each time 3 consecutive measurements were conducted, in a resting state, a few minutes apart. A person 18 years or older was considered to have uncontrolled blood pressure (high blood pressure) if the mean of the second and third measurement was

[37] See Impact Evaluation of HIF-Supported Insurance Projects in Nigeria: Follow-up Report Kwara Central. Amsterdam Institute for International Development (2011).

140/90 mmHg or higher. This definition excludes anyone with controlled blood pressure due to antihypertensive medication. Because the results of these measurements are immediately known to the interviewer, each person for whom uncontrolled blood pressure was observed, was notified about his/her condition and was recommended to seek medical attention. Anemia is measured by hemoglobin (Hb) levels obtained through a blood test and is defined as Hb < 8.1 mmol/L in adult males and as Hb < 7.4 mmol/L in adult non-pregnant females. Participants interested in knowing their hemoglobin levels could later contact a counselor to learn their blood test results, which in practice was only pursued by a small number of subjects.[38]

Table 11 presents the ITT impact of HCHC on health status estimated using difference-in-differences. Column (a) shows the results for the self-reported measure of difficulty to execute daily activities. The estimate for the HCHC impact variable is very small and insignificant. Column (b) shows the results for self-reported health status relative to last year. The coefficient is negative and significant indicating that HCHC has decreased the self-perceived health status of individuals in the treatment community. The following column shows that HCHC has increased the reporting of chronic disease and column (d) shows an increase (though insignificant) of acute illness as a result of HCHC. These findings demonstrate that **HCHC appears to have increased the reporting of poor health in the treatment community**. This finding is not surprising. We predicted that in the short run individuals would have increased access to health care and therefore increased knowledge about their health. It is likely that individuals were less aware of their health status before having increased access to health care.

The two final measures (columns e and f) however, while positive, **do not demonstrate a significant change in uncontrolled blood pressure or anemia as measured by the biomedical tests** (blood pressure and blood test). As discussed earlier, objective measures of health status may take longer to demonstrate impact. Moreover, these findings may be more telling when broken down by age group, gender, socioeconomic- and risk group. In addition, the impact of the insurance is mainly expected in the population with hypertension and anemia. Therefore, it is possible that no impact is found in the total population that includes respondents with uncontrolled blood pressure and those with controlled blood pressure.

[38] This means that most subjects in which anemia (low blood hemoglobin levels) was diagnosed remained unaware of their condition.

Table 11: The Impact of HCHC on Health Status (Difference-in-Differences)

	Self-reported Measures of Health				Objective Measures of Health	
	Daily activities no difficulty	**Health better than last year**	**Chronic disease**	**Acute illness / injury last year**	**Uncontrolled blood pressure (age ≥ 18)**	**Anemia (age ≥ 12)**
	(a)	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**
Treatment group	-0.052**	0.079**	-0.022	-0.096**	-0.095***	-0.044
	(0.016)	(0.028)	(0.013)	(0.030)	(0.023)	(0.034)
Time period (0 in baseline, 1 in follow-up)	0.023*	0.101**	0.005	0.014	0.010	-0.211***
	(0.010)	(0.031)	(0.012)	(0.041)	(0.016)	(0.036)
Treatment x Time (ITT Impact of HCHC)	**0.003**	**-0.117*** **	**0.036** **	**0.089**	**0.011**	**0.060**
	(0.017)	**(0.034)**	**(0.014)**	**(0.046)**	**(0.020)**	**(0.045)**

Source: Calculations based on Kwara Central, Nigeria Surveys 2009 and 2011.
Coefficients from regression with control variables, see Appendix B

Standard errors in parentheses, corrected for clustering on Enumeration Area level
* p<0.05, ** p<0.01, *** p<0.001

Table 12 gives the impact on the treated (insured) individuals based on the propensity score matching calculations for health status. Uncontrolled blood pressure is not included in the propensity score matching in this initial analysis as the data suggested that individuals with better health literacy and more health seeking behavior may be more likely to enroll in the insurance program. In addition, these individuals may be more likely to start antihypertensive treatment (in case of uncontrolled blood pressure) and have controlled blood pressure, independent of their insurance status. Our data support this hypothesis. Namely, the proportion of respondents with high blood pressure who take antihypertensive medication of the insured in the treatment area was higher compared to the control area (25% versus 11.4%). On the other hand, the proportion of respondents with high blood pressure taking antihypertensive medication in the uninsured population in the target area was lower compared to the (equally uninsured) control area (4.9% versus 11.4%). Propensity score matching was attempted but did not result in matched populations adequately balanced for both relevant socio-economic and biomedical parameters. Consequently, in this particular case, propensity score matching is not adequate to estimate the impact on blood pressure control. Therefore, an additional difference-in-differences analysis was performed in the subgroup of individuals who were observed with hypertension during the baseline survey. Preliminary analyses indicated that both systolic and diastolic blood pressure decreased significantly in both groups but the effect on systolic blood pressure was

significantly stronger in the sub-group of hypertensive subjects in the treatment area (5.1 mmHg greater reduction compared to the control area [95% CI: 0.52-9.69, p = 0.03]).[39]

The impact of HCHC on having no difficulty with daily activities, shown in column (a), is negative and significant indicating that individuals who are insured are more likely to report a decline in health status as measured by this outcome. This differs from the DD estimates which indicated a very small positive but insignificant impact. Column (b) shows a negative but insignificant coefficient on HCHC for health being better now than last year. The magnitude is smaller than the DD estimate which is statistically significant. The estimate of HCHC in column (c) is positive and significant indicating an increase in self-reported chronic disease while in column (d), the coefficient is positive but insignificant for acute illness and injury. Finally, anemia is positive but insignificant as in the DD estimation.

Table 12: The Impact of HCHC on Health Status (Propensity Score Matching)

	SELF REPORTED				OBJECTIVE
	Daily activities no difficulty	**Health better than last year**	**Chronic disease**	**Acute illness / injury last year**	**Anemia (age ≥ 12)**
Average Treatment Effect on the Treated	-0.046**	-0.035	0.053**	0.055	0.073

* p<0.05, ** p<0.01, *** p<0.001
Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

[39] See Hendriks, M., F. Wit, T. Akande, B. Kramer, G.K. Osagbemi, Z.Tanović, E. Gustafsson-Wright, L.M. Brewster, J. van der Gaag, J. Lange, C. Schultsz (forthcoming) *The impact of subsidized health insurance on hypertension in rural Nigeria: a population-based study*

CONCLUSIONS

In this report we have presented the short-term impact of the Health Insurance Fund/PharmAccess Foundation health insurance program in Central Kwara State, Nigeria. Through a multi-year operational research program, we have followed a growing trend to conduct rigorous impact evaluations of development assistance programs. Through this evaluation, we contribute key evidence to the debate on whether or not health insurance is better than the existing system -a largely supply-side financed or direct delivery system. Given the burden of disease and the resource constraints faced in the world today, this type of evaluation is not only useful, it is essential. Specifically, we have sought to evaluate whether or not HCHC had an impact on the three main outcomes identified; (1) access and utilization, (2) financial protection and, (3) health status.[40] These outcomes are directly linked to the Performance Measurement Areas 1-3 of the HIF.

We first examined the situation of health care before the introduction of the program describing a system that was of poor quality and which failed to provide access to many. We then reviewed the literature on the impact of health insurance and we examined the potential difficulties faced in evaluating the impact of health insurance. The literature finds largely positive impact of health insurance on access and utilization, some positive evidence of impact on financial protection and mixed results on health status.

The descriptive data were presented in section 4. These data demonstrate that treatment and control groups differ in some characteristics in both the baseline and follow-up surveys. The control group appears to utilize more health care and demonstrate poorer health status in terms of objective measures than the treatment group in the baseline year. In addition, the data show that two years after the introduction of HCHC insurance, about 30% of the treatment group had enrolled in the scheme. Some individuals were more likely to enroll than others. Those most likely to enroll were individuals living in Afon sub-treatment group, adults, women, the wealthier half of the population and urban dwellers.

In section 5 we describe the methodology used to measure true impact of the HCHC program. The most robust methods are used giving the constraints presented by the data and implementation of the scheme.

Section 6 presented the findings of our estimations of the impact of HCHC on health care access and utilization, financial protection and health status. Access and utilization is measured using four variables (one for quantity of health care used and three for quality of health care used). The evidence shows that HCHC not only increases utilization of health care among the insured by over 70% (as well as in the treatment community overall), but it also significantly increases utilization of *quality* health care. More individuals are likely to use modern health care and private health facilities as a result of the program. Second we find that HCHC enhances financial protection in that it reduces out-of-pocket health expenditures

[40] Note that the report does not attempt to measure impacts of the program on the overall health system or other components thereof.

by on average 1000 Naira per person per year (despite increasing utilization)representing an average reduction of 40%.[41] Our final outcome of interest is health status. As in the literature, the results are mixed. We use six measures to proxy for health status including four subjective measures and two objective measures. Three of the four subjective measures show a significant decline in health. This is likely due to the fact that increased health care utilization has resulted in increased awareness and knowledge of one's true health status. We hypothesize that in the long-run, health status should improve as utilization of both curative and preventive care increase. The two objective measures of health are uncontrolled blood pressure and anemia. We did not find an impact of the HCHC program on blood pressure control or anemia in the target population; however, additional analyses in the target and control population with hypertension are pending. Preliminary data suggest a decrease in blood pressure in the treatment area in this subgroup of respondents with hypertension.[42] Overall, HCHC shows strong positive impacts after only a short period of intervention. Further investigation of the program with additional rounds of data, besides providing long term impacts of the outcomes measured in this report, would allow us to measure other outcomes for instance changes in saving behavior, labor supply and investments in human capital (see Annex 1 for a list of further potential research questions).

In sum, this study fills a gap in the knowledge about interventions that address both the demand and supply side of a health system. It contributes in particular to the weak evidence base of such programs in the Africa region. It is with such knowledge that evidence-based policy can be made and implemented for the purpose of having a true impact on the lives of the poor and vulnerable.[43]

[41] Subsequent research shows that impacts are potentially even larger; up to a 90% increase in health care utilization and a reduction in average out-of-pocket expenditures of about 50%. Gustafsson-Wright, E., Z. Tanović, J. van der Gaag (forthcoming) *The impact of private subsidized health insurance and clinic upgrades on health care utilization and financial protection in rural Nigeria.*

[42] See Hendriks, M., F. Wit, T. Akande, B. Kramer, G.K. Osagbemi, Z.Tanović, E. Gustafsson-Wright, L.M. Brewster, J. van der Gaag, J. Lange, C. Schultsz (forthcoming) *The impact of subsidized health insurance on hypertension in rural Nigeria: a population-based study.*

[43] See Preker et al. (2013) for a discussion on scaling up health insurance programs.

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APPENDIX A

Table A1: Summary Statistics

Panel A: Baseline (2009)	*# Total (1)*	*# Control (2)*	*# Treat (3)*	*Mean (4)*	*Min (5)*	*Max (6)*	*Std. dev. (7)*	*Mean Control (8)*	*Mean Treat (9)*	*p-value (10)*
Age	4315	1567	2748	27.824	0	100	23.557	25.479	29.161	0.000***
Female	4315	1567	2748	0.516	0	1	0.500	0.520	0.514	0.674
Female household head	4315	1567	2748	0.159	0	1	0.366	0.226	0.121	0.001***
Household size	4315	1567	2748	5.671	1	16	2.731	5.620	5.701	0.742
Married	4301	1562	2739	0.407	0	1	0.491	0.369	0.429	0.000***
Work	4315	1567	2748	0.454	0	1	0.498	0.410	0.478	0.000***
Consumption[1]	4315	1567	2748	106.27	17.45	1321.41	85.667	113.620	102.070	0.228
Wealth indicator	4315	1567	2748	0.278	-1.487	6.898	1.116	0.331	0.248	0.483
Urban	4315	1567	2748	0.506	0	1	0.500	0.533	0.491	0.714
Distance to nearest clinic (km)	4313	1565	2748	1.217	0.013	4.645	1.193	1.210	1.221	0.967
Good quality toilet	4315	1567	2748	0.079	0	1	0.269	0.179	0.021	0.000***
Good quality drinking water	4315	1567	2748	0.83	0	1	0.376	0.907	0.786	0.007**
Insured	4315	1567	2748	0.005	0	1	0.070	0.009	0.003	0.193
At least one person in household is insured	4315	1567	2748	0.01	0	1	0.097	0.014	0.007	0.434
Smokes	4190	1551	2639	0.031	0	1	0.173	0.017	0.039	0.000***
Drinks alcohol	4184	1551	2633	0.023	0	1	0.149	0.029	0.019	0.078
Education										
No education	2785	940	1845	0.683	0	1	0.465	0.595	0.728	0.001***
Primary school	2785	940	1845	0.153	0	1	0.360	0.164	0.147	0.418
Secondary school	2785	940	1845	0.109	0	1	0.312	0.147	0.090	0.004**
Tertiary education	2785	940	1845	0.055	0	1	0.228	0.095	0.035	0.036*

Panel A: Baseline (2009)	*# Total (1)*	*# Control (2)*	*# Treat (3)*	*Mean (4)*	*Min (5)*	*Max (6)*	*Std. dev. (7)*	*Mean Control (8)*	*Mean Treat (9)*	*p-value (10)*
(Table A1 continued)										
Education household head										
No education	4162	1549	2613	0.526	0	1	0.499	0.426	0.585	0.010**
Primary school	4162	1549	2613	0.215	0	1	0.411	0.224	0.209	0.704
Secondary school	4162	1549	2613	0.151	0	1	0.358	0.192	0.126	0.033*
Tertiary education	4162	1549	2613	0.109	0	1	0.311	0.158	0.080	0.041*
Religion										
Islam	4314	1566	2748	0.828	0	1	0.377	0.638	0.937	0.000***
Catholic	4314	1566	2748	0.021	0	1	0.144	0.038	0.012	0.057
Other Christian	4314	1566	2748	0.148	0	1	0.355	0.321	0.049	0.000***
Other	4314	1566	2748	0.003	0	1	0.055	0.004	0.003	0.759
Ethnicity										
Yoruba	4313	1565	2748	0.825	0	1	0.380	0.684	0.906	0.000***
Nupe	4313	1565	2748	0.055	0	1	0.227	0.127	0.013	0.001***
Hausa	4313	1565	2748	0.022	0	1	0.148	0.007	0.031	0.113
Fulani	4313	1565	2748	0.01	0	1	0.098	0.013	0.008	0.615
Other	4313	1565	2748	0.088	0	1	0.283	0.169	0.041	0.001***

Panel B: Follow-up (2011)	*# Total (1)*	*# Control (2)*	*# Treat (3)*	*Mean (4)*	*Min (5)*	*Max (6)*	*Std. dev. (7)*	*Mean Control (8)*	*Mean Treat (9)*	*p-value (10)*
(Table A1 continued)										
Age	4315	1567	2748	29.824	1	102	23.558	27.479	31.160	0.000***
Female	4315	1567	2748	0.516	0	1	0.500	0.520	0.514	0.658
Female household head	4293	1556	2737	0.18	0	1	0.384	0.243	0.144	0.001**
Household size	4314	1566	2748	5.808	1	17	2.854	5.745	5.844	0.693
Married	4280	1555	2725	0.412	0	1	0.492	0.376	0.433	0.000***
Work	4283	1552	2731	0.509	0	1	0.500	0.436	0.551	0.000***
Consumption[1]	4314	1566	2748	98.52	20.72	1243.99	86.595	104.870	94.910	0.240
Wealth indicator	4315	1567	2748	0.639	-1.544	7.144	1.247	0.725	0.589	0.298
Urban	4315	1567	2748	0.506	0	1	0.500	0.533	0.491	0.708
Distance to nearest clinic (km)	4312	1567	2745	1.246	0.015	61.138	1.790	1.222	1.260	0.914
Good quality toilet	4315	1567	2748	0.087	0	1	0.281	0.190	0.028	0.000***
Good quality drinking water	4310	1562	2748	0.844	0	1	0.363	0.915	0.803	0.006**
Insured	4303	1556	2747	0.196	0	1	0.397	0.004	0.304	0.000***
At least one person in household is insured	4304	1556	2748	0.286	0	1	0.452	0.004	0.446	0.000***
Smokes	4202	1523	2679	0.034	0	1	0.182	0.017	0.044	0.000***
Drinks alcohol	4200	1522	2678	0.026	0	1	0.159	0.030	0.024	0.416
Education										
No education	4279	1549	2730	0.445	0	1	0.497	0.373	0.485	0.000***
Primary school	4279	1549	2730	0.305	0	1	0.461	0.320	0.297	0.167
Secondary school	4279	1549	2730	0.204	0	1	0.403	0.239	0.185	0.003**
Tertiary education	4279	1549	2730	0.046	0	1	0.209	0.068	0.033	0.072

Panel B: Follow-up (2011)	*# Total (1)*	*# Control (2)*	*# Treat (3)*	*Mean (4)*	*Min (5)*	*Max (6)*	*Std. dev. (7)*	*Mean Control (8)*	*Mean Treat (9)*	*p-value (10)*
(Table A1 continued)										
Education household head										
No education	4239	1530	2709	0.506	0	1	0.500	0.405	0.564	0.009**
Primary school	4239	1530	2709	0.219	0	1	0.414	0.226	0.215	0.776
Secondary school	4239	1530	2709	0.155	0	1	0.361	0.215	0.120	0.002**
Tertiary education	4239	1530	2709	0.12	0	1	0.325	0.154	0.101	0.180
Religion										
Islam	4314	1566	2748	0.828	0	1	0.377	0.638	0.937	0.000***
Catholic	4314	1566	2748	0.021	0	1	0.144	0.038	0.012	0.065
Other Christian	4314	1566	2748	0.148	0	1	0.355	0.321	0.049	0.000***
Other	4314	1566	2748	0.003	0	1	0.055	0.004	0.003	0.760
Ethnicity										
Yoruba	4313	1565	2748	0.825	0	1	0.380	0.684	0.906	0.000***
Nupe	4313	1565	2748	0.055	0	1	0.227	0.127	0.013	0.001***
Hausa	4313	1565	2748	0.022	0	1	0.148	0.007	0.031	0.113
Fulani	4313	1565	2748	0.01	0	1	0.098	0.013	0.008	0.616
Other	4313	1565	2748	0.088	0	1	0.283	0.169	0.041	0.001**

[1] Aggregate yearly per capita consumption, excl. health consumption, inflation corrected, divided by 1000

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

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

Table A2: Health related statistics

Panel A: Baseline (2009)	*# Total (1)*	*# Control (2)*	*# Treat (3)*	*Mean (4)*	*Min (5)*	*Max (6)*	*Std. dev. (7)*	*Mean Control (8)*	*Mean Treat (9)*	*p-value (10)*
Health care utilization										
Individual consulted any health care provider	4138	1543	2595	0.272	0	1	0.445	0.351	0.225	0.001***
Modern health care provider	4137	1543	2594	0.260	0	1	0.439	0.346	0.209	0.001***
Non-modern health care provider	4137	1543	2594	0.061	0	1	0.239	0.067	0.057	0.546
Private hospital/clinic	4135	1542	2593	0.099	0	1	0.299	0.094	0.102	0.734
Financial protection										
Health expenditures (naira)[1]	4315	1567	2748	1.524	0	39.781	3.17	1.521	1.525	0.983
Health status - self reported										
Can do daily activities without difficulty	4158	1552	2606	0.909	0	1	0.288	0.946	0.887	0.000***
Health better compared to one year ago	4130	1543	2587	0.897	0	1	0.304	0.853	0.923	0.015*
Individual has chronic disease	4164	1553	2611	0.067	0	1	0.250	0.073	0.064	0.431
Individual had acute illness/injury	4292	1553	2739	0.194	0	1	0.396	0.253	0.161	0.002**
Health status - objective measures										
Anemia	1007	476	531	0.336	0	1	0.472	0.370	0.305	0.047*
Uncontrolled blood pressure	1856	657	1199	0.217	0	1	0.412	0.259	0.194	0.008**

Panel B: Follow-up (2011)	*# Total (1)*	*# Control (2)*	*# Treat (3)*	*Mean (4)*	*Min (5)*	*Max (6)*	*Std. dev. (7)*	*Mean Control (8)*	*Mean Treat (9)*	*p-value (10)*
(Table A2 continued)										
Health care utilization										
Individual consulted any health care provider	4077	1463	2614	0.343	0	1	0.475	0.323	0.354	0.389
Modern health care provider	4066	1457	2609	0.245	0	1	0.430	0.210	0.264	0.021*
Non-modern health care provider	4066	1457	2609	0.100	0	1	0.300	0.116	0.090	0.201
Private hospital/clinic	4061	1452	2609	0.147	0	1	0.354	0.047	0.203	0.000***
Financial protection										
Health expenditures (naira)[1]	4313	1565	2748	1.27	0	45.553	3.06	1.883	0.921	0.000***
Health status - self reported										
Can do daily activities without difficulty	4192	1516	2676	0.924	0	1	0.265	0.962	0.902	0.000***
Health better compared to one year ago	4193	1519	2674	0.926	0	1	0.262	0.953	0.910	0.003**
Individual has chronic disease	4194	1517	2677	0.101	0	1	0.301	0.082	0.112	0.014*
Individual had acute illness/injury	4187	1511	2676	0.278	0	1	0.448	0.272	0.282	0.797
Health status - objective measures										
Anemia	1007	476	531	0.158	0	1	0.365	0.155	0.160	0.857
Uncontrolled blood pressure	1856	657	1199	0.245	0	1	0.430	0.280	0.226	0.030*

[1] Per capita annual health expenditures, excl. health care premium, inflation corrected, divided by 1000

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

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

APPENDIX B

Table B1: The Impact of HCHC on Health Care Utilization, Financial Protection, and Health Status (with control variables)

Table B1	Health care utilization				Financial protection	Health Status					
						Self reported				Objective	
	Consulted any health care provider	Modern health care	Non-modern health care	Private hospital / clinic	Pc annual health exp. excl. premium / 1000	Daily activities no difficulty	Health better than last year	Chronic disease	Acute illness / injury last year	Uncontrolled blood pressure (age ≥ 18)	Anemia (age ≥ 12)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Treatment group	-0.155***	-0.161***	-0.013	0.000	0.041	-0.052**	0.079**	-0.022	-0.096**	-0.095***	-0.044
	(0.036)	(0.039)	(0.018)	(0.022)	(0.223)	(0.016)	(0.028)	(0.013)	(0.030)	(0.023)	(0.034)
Time period (0 in baseline, 1 in follow-up)	-0.040	-0.139***	0.044	-0.057*	0.443	0.023*	0.101**	0.005	0.014	0.010	-0.211***
	(0.048)	(0.040)	(0.029)	(0.023)	(0.330)	(0.010)	(0.031)	(0.012)	(0.041)	(0.016)	(0.036)
Treatment x Time	0.158**	0.188***	-0.014	0.145***	-1.052**	0.003	-0.117***	0.036**	0.089	0.011	0.060
ITT Impact of HCHC	(0.051)	(0.044)	(0.030)	(0.027)	(0.347)	(0.017)	(0.034)	(0.014)	(0.046)	(0.020)	(0.045)
Female	0.013	0.002	0.005	-0.005	-0.075	-0.007	-0.011	0.012*	0.002	0.068**	-0.050
	(0.012)	(0.011)	(0.007)	(0.008)	(0.061)	(0.005)	(0.006)	(0.005)	(0.011)	(0.023)	(0.029)
Age /10	-0.050**	-0.024	-0.008	0.005	0.062	-0.015	-0.008	0.025*	-0.061***	0.156***	-0.153***
	(0.017)	(0.016)	(0.009)	(0.010)	(0.118)	(0.009)	(0.010)	(0.010)	(0.012)	(0.030)	(0.029)

Table B1	Health care utilization				Financial protection	Health Status					
						Self reported				Objective	
	Consulted any health care provider	Modern health care	Non-modern health care	Private hospital / clinic	Pc annual health exp. excl. premium / 1000	Daily activities no difficulty	Health better than last year	Chronic disease	Acute illness / injury last year	Uncontrolled blood pressure (age ≥ 18)	Anemia (age ≥ 12)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Age /10, squared	0.009***	0.006**	0.002*	0.002	0.002	-0.005***	-0.003*	0.003**	0.008***	-0.008*	0.016***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.013)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)
Household head	-0.059**	-0.023	-0.026*	-0.041**	-0.067	-0.005	0.001	-0.017	-0.027	-0.034	-0.021
	(0.020)	(0.018)	(0.013)	(0.014)	(0.124)	(0.011)	(0.012)	(0.012)	(0.018)	(0.025)	(0.033)
Married	0.102***	0.135***	-0.038*	0.047**	-0.227	0.022	0.010	-0.012	0.047*	-0.010	0.077*
	(0.024)	(0.025)	(0.016)	(0.016)	(0.162)	(0.013)	(0.016)	(0.015)	(0.021)	(0.023)	(0.032)
Work	0.070**	0.024	0.036	-0.005	0.054	0.058***	0.018	-0.019	0.080***	-0.061*	0.048
	(0.021)	(0.017)	(0.019)	(0.014)	(0.160)	(0.012)	(0.015)	(0.015)	(0.021)	(0.026)	(0.033)
Primary school	-0.020	0.000	-0.019	-0.007	0.051	0.009	-0.006	-0.004	-0.020	0.015	-0.008
	(0.024)	(0.022)	(0.011)	(0.017)	(0.218)	(0.009)	(0.013)	(0.009)	(0.022)	(0.020)	(0.029)
Secondary school	0.028	0.072**	-0.029*	0.010	-0.504**	-0.006	-0.033	0.002	0.011	0.023	0.007
	(0.029)	(0.028)	(0.014)	(0.019)	(0.167)	(0.012)	(0.018)	(0.010)	(0.027)	(0.022)	(0.034)
Tertiary education	0.027	0.057	-0.019	-0.015	0.525	0.008	0.008	-0.004	0.044	-0.005	-0.011
	(0.030)	(0.029)	(0.015)	(0.022)	(0.474)	(0.011)	(0.015)	(0.011)	(0.028)	(0.026)	(0.036)
Islam	-0.052	-0.008	-0.028	-0.081	-1.432***	-0.058*	0.015	-0.018	-0.040	-0.060	0.077
	(0.079)	(0.096)	(0.053)	(0.050)	(0.244)	(0.025)	(0.068)	(0.020)	(0.077)	(0.127)	(0.168)

Table B1	Health care utilization				Financial protection	Health Status					
						Self reported				Objective	
	Consulted any health care provider	Modern health care	Non-modern health care	Private hospital / clinic	Pc annual health exp. excl. premium / 1000	Daily activities no difficulty	Health better than last year	Chronic disease	Acute illness / injury last year	Uncontrolled blood pressure (age ≥ 18)	Anemia (age ≥ 12)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Catholic	-0.038	-0.011	-0.005	-0.119	-1.585***	-0.041	0.067	-0.051*	-0.003	-0.130	0.082
	(0.099)	(0.103)	(0.055)	(0.063)	(0.276)	(0.030)	(0.071)	(0.020)	(0.095)	(0.130)	(0.176)
Other Christian	-0.109	-0.070	-0.030	-0.100	-1.511***	-0.048	0.002	-0.026	-0.098	-0.088	0.089
	(0.077)	(0.096)	(0.055)	(0.051)	(0.319)	(0.026)	(0.072)	(0.022)	(0.074)	(0.125)	(0.167)
Nupe	0.023	-0.044	0.056	-0.005	-0.347	0.015	-0.023	-0.050**	-0.002	-0.027	-0.068
	(0.055)	(0.050)	(0.030)	(0.040)	(0.604)	(0.016)	(0.031)	(0.015)	(0.062)	(0.053)	(0.050)
Hausa	-0.028	-0.055	0.013	-0.018	-0.287	0.013	-0.026	-0.040	-0.022	0.101	-0.200*
	(0.061)	(0.050)	(0.034)	(0.034)	(0.550)	(0.031)	(0.033)	(0.026)	(0.048)	(0.056)	(0.080)
Yoruba	-0.007	-0.013	-0.003	-0.030	-0.525	0.041**	-0.012	-0.030*	-0.022	0.046	-0.078
	(0.037)	(0.035)	(0.017)	(0.024)	(0.403)	(0.015)	(0.022)	(0.014)	(0.033)	(0.034)	(0.042)
Fulani	0.078	0.083	0.088	0.143*	-0.867*	0.068**	0.070**	-0.054	0.057	-0.030	-0.222*
	(0.115)	(0.076)	(0.059)	(0.067)	(0.392)	(0.023)	(0.023)	(0.031)	(0.117)	(0.066)	(0.108)
Aboto Oja	0.003**	-0.000	0.003***	-0.001	0.025**	0.001*	-0.000	-0.001	0.004***	-0.000	-0.001
	(0.001)	(0.001)	(0.000)	(0.001)	(0.009)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)

Table B1

	Health care utilization				Financial protection	Health Status					
						Self reported				Objective	
	Consulted any health care provider	Modern health care	Non-modern health care	Private hospital / clinic	Pc annual health exp. excl. premium / 1000	Daily activities no difficulty	Health better than last year	Chronic disease	Acute illness / injury last year	Uncontrolled blood pressure (age ≥ 18)	Anemia (age ≥ 12)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Urban	0.019	0.027	-0.010	0.052**	0.120	0.016	0.019	0.025*	0.006	0.049*	-0.003
	(0.031)	(0.028)	(0.012)	(0.018)	(0.183)	(0.012)	(0.017)	(0.010)	(0.029)	(0.021)	(0.024)
Distance to nearest clinic (km)	-0.009	-0.012*	0.002	-0.009*	0.045	0.005	0.001	-0.005**	-0.008	-0.003	0.002
	(0.006)	(0.006)	(0.004)	(0.004)	(0.049)	(0.003)	(0.003)	(0.002)	(0.006)	(0.004)	(0.005)
Female household head	0.036	0.016	0.010	0.008	-0.102	-0.015	-0.007	0.015	0.025	0.048*	-0.019
	(0.021)	(0.018)	(0.013)	(0.013)	(0.235)	(0.008)	(0.013)	(0.008)	(0.020)	(0.022)	(0.040)
Household size	0.001	-0.003	0.004	-0.001	-0.074*	0.003	-0.005	-0.002	0.003	-0.008	-0.004
	(0.004)	(0.004)	(0.002)	(0.003)	(0.033)	(0.001)	(0.003)	(0.002)	(0.004)	(0.004)	(0.006)
Pc cons. excl. health exp. /100000	0.067***	0.059**	0.023*	0.042*	0.844***	0.002	-0.037*	0.015	0.064***	0.001	-0.031
	(0.019)	(0.018)	(0.009)	(0.016)	(0.190)	(0.010)	(0.018)	(0.012)	(0.017)	(0.015)	(0.026)
Pc cons. excl. health exp. /100000,sq.	-0.008**	-0.005*	-0.004***	-0.004*	-0.064*	0.000	0.003	-0.001	-0.008***	-0.002	-0.000
	(0.003)	(0.003)	(0.001)	(0.002)	(0.032)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Wealth indicator	-0.002	0.008	-0.009	0.012	0.020	-0.001	0.011	-0.006	-0.002	-0.004	0.010
	(0.011)	(0.010)	(0.005)	(0.008)	(0.088)	(0.005)	(0.007)	(0.004)	(0.012)	(0.009)	(0.016)
Good quality toilet	0.013	-0.025	0.014	0.003	-0.242	-0.002	-0.013	0.007	0.023	-0.023	0.054
	(0.046)	(0.039)	(0.020)	(0.023)	(0.389)	(0.016)	(0.025)	(0.014)	(0.043)	(0.034)	(0.033)

Table B1	Health care utilization				Financial protection	Health Status					
						Self reported				Objective	
	Consulted any health care provider	Modern health care	Non-modern health care	Private hospital / clinic	Pc annual health exp. excl. premium / 1000	Daily activities no difficulty	Health better than last year	Chronic disease	Acute illness / injury last year	Uncontrolled blood pressure (age ≥ 18)	Anemia (age ≥ 12)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Good quality drinking water	-0.036	-0.040*	0.006	-0.037*	-0.008	0.004	-0.004	-0.009	-0.022	-0.012	-0.038
	(0.019)	(0.018)	(0.012)	(0.017)	(0.237)	(0.012)	(0.012)	(0.010)	(0.021)	(0.024)	(0.031)
Smokes	-0.109**	-0.133***	0.013	-0.042	-0.284	0.039	0.043*	-0.049*	-0.044	-0.028	-0.050
	(0.034)	(0.032)	(0.020)	(0.024)	(0.195)	(0.025)	(0.022)	(0.023)	(0.034)	(0.030)	(0.054)
Drinks alcohol	0.150**	0.126*	0.009	0.059	-0.025	-0.020	-0.042	0.015	0.108*	0.118**	-0.044
	(0.051)	(0.051)	(0.025)	(0.045)	(0.261)	(0.030)	(0.029)	(0.027)	(0.046)	(0.044)	(0.044)
Constant	0.347***	0.304**	0.060	0.154*	2.939***	1.003***	0.955***	0.030	0.295**	-0.184	0.690***
	(0.100)	(0.112)	(0.058)	(0.068)	(0.476)	(0.034)	(0.080)	(0.031)	(0.091)	(0.147)	(0.165)
Number of observations	7246	7224	7224	7212	7602	7498	7448	7510	7544	3472	1810
Adjusted R squared	0.070	0.083	0.021	0.069	0.051	0.171	0.062	0.149	0.027	0.132	0.061

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

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

Table B2: The Impact of HCHC on Health Care Utilization, Financial Protection, and Health Status (with no control variables)

	Health care utilization				Financial protection	Health Status					
						Self reported				Objective	
	Consulted any health care provider	Modern health care	Non-modern health care	Private hospital / clinic	Pc annual health exp. excl. premium / 1000	Daily activities no difficulty	Health better than last year	Chronic disease	Acute illness / injury last year	Uncontrolled blood pressure (age ≥ 18)	Anemia (age ≥ 12)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Treatment group	-0.131***	-0.133**	-0.014	0.003	0.006	-0.059***	0.071*	-0.011	-0.091**	-0.065**	-0.067*
	(0.035)	(0.039)	(0.017)	(0.024)	(0.227)	(0.016)	(0.029)	(0.012)	(0.029)	(0.024)	(0.032)
Time period (0 in baseline, 1 in follow-up)	-0.032	-0.130**	0.046	-0.052*	0.365	0.017	0.100**	0.008	0.020	0.018	-0.214***
	(0.048)	(0.040)	(0.029)	(0.022)	(0.300)	(0.009)	(0.030)	(0.012)	(0.042)	(0.017)	(0.034)
Treatment x Time	0.153**	0.177***	-0.010	0.145***	-0.976**	0.005	-0.111**	0.035*	0.099*	0.013	0.073
ITT Impact of HCHC	(0.052)	(0.045)	(0.030)	(0.028)	(0.326)	(0.017)	(0.033)	(0.014)	(0.047)	(0.020)	(0.044)
Constant	0.356***	0.341***	0.070***	0.099***	1.521***	0.945***	0.853***	0.074***	0.253***	0.260***	0.370***
	(0.032)	(0.035)	(0.015)	(0.021)	(0.199)	(0.009)	(0.027)	(0.010)	(0.026)	(0.019)	(0.023)
Number of observations	7786	7762	7762	7748	8596	8050	7994	8064	8304	3696	2010
Adjusted R squared	0.014	0.012	0.006	0.027	0.013	0.011	0.012	0.004	0.015	0.005	0.043

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

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

Table B3: The Impact of HCHC on Health Care Utilization, Financial Protection and Health Status (Propensity Score Matching)

Outcome variable in 2011	Matching method	p-value of balancing	ATET	Bootstrap p-value	Bootstrap s.e.	Bootstrap 95% CI	
Health care utilization							
Consulted any health care provider	caliper(0.01)	0.827	0.128	0.004**	0.044	0.042	0.215
	radius caliper(0.01)	0.998	0.113	0.004**	0.039	0.036	0.190
	kernel	0.998	0.115	0.003**	0.039	0.038	0.191
	neighbor(1)	0.843	0.129	0.003**	0.044	0.044	0.215
	neighbor(1) norepl	0.892	0.147	0.000***	0.040	0.069	0.226
Modern health care provider	caliper(0.01)	0.985	0.203	0.000***	0.039	0.126	0.280
	radius caliper(0.01)	0.998	0.182	0.000***	0.031	0.122	0.242
	kernel	0.998	0.182	0.000***	0.031	0.122	0.243
	neighbor(1)	0.982	0.201	0.000***	0.039	0.124	0.278
	neighbor(1) norepl	0.972	0.180	0.000***	0.033	0.116	0.244
Non-modern health care provider	caliper(0.01)	0.985	-0.079	0.004**	0.027	-0.133	-0.025
	radius caliper(0.01)	0.998	-0.066	0.003**	0.022	-0.110	-0.023
	kernel	0.998	-0.069	0.002**	0.022	-0.111	-0.026
	neighbor(1)	0.982	-0.079	0.004**	0.027	-0.132	-0.025
	neighbor(1) norepl	0.972	-0.066	0.003**	0.022	-0.110	-0.022
Private hospital/clinic	caliper(0.01)	0.947	0.303	0.000***	0.032	0.241	0.365
	radius caliper(0.01)	0.997	0.306	0.000***	0.029	0.249	0.363
	kernel	0.998	0.307	0.000***	0.029	0.251	0.364
	neighbor(1)	0.955	0.304	0.000***	0.032	0.242	0.366
	neighbor(1) norepl	0.908	0.311	0.000***	0.029	0.254	0.368
Financial protection							
Health expenditures[1]	caliper(0.01)	0.218	-0.999	0.006**	0.367	-1.717	-0.280
	radius caliper(0.01)	0.998	-0.948	0.003**	0.317	-1.571	-0.326
	kernel	0.997	-0.945	0.003**	0.315	-1.562	-0.328
	neighbor(1)	0.220	-0.997	0.007**	0.369	-1.719	-0.275
	neighbor(1) norepl	0.796	-0.954	0.002**	0.315	-1.570	-0.337

[1] Per capita annual health expenditures, excl. health care premium, inflation corrected, divided by 1000

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

Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

Table B3 continued: Results Propensity Score Matching

Outcome variable in 2011	Matching method	P-value of balancing	ATET	Bootstrap p-value	Bootstrap s.e.	Bootstrap 95% CI	
Health Status – self reported							
Daily activities no difficulty	caliper(0.01)	0.774	-0.030	0.161	0.022	-0.073	0.012
	radius caliper(0.01)	0.998	-0.046	0.013*	0.019	-0.083	-0.010
	kernel	0.998	-0.047	0.007**	0.017	-0.081	-0.013
	neighbor(1)	0.774	-0.030	0.167	0.022	-0.074	0.013
	neighbor(1) norepl	0.953	-0.046	0.009**	0.018	-0.080	-0.011
Health better than last year	caliper(0.01)	0.584	-0.029	0.171	0.021	-0.071	0.013
	radius caliper(0.01)	0.997	-0.041	0.031*	0.019	-0.078	-0.004
	kernel	0.998	-0.041	0.029*	0.019	-0.078	-0.004
	neighbor(1)	0.580	-0.029	0.181	0.022	-0.072	0.013
	neighbor(1) norepl	0.884	-0.035	0.072	0.019	-0.072	0.003
Chronic disease	caliper(0.01)	0.966	0.060	0.014*	0.024	0.012	0.108
	radius caliper(0.01)	0.998	0.040	0.029*	0.018	0.004	0.075
	kernel	0.996	0.041	0.014*	0.017	0.008	0.074
	neighbor(1)	0.957	0.059	0.015*	0.024	0.011	0.106
	neighbor(1) norepl	0.931	0.053	0.003**	0.018	0.018	0.089
Acute illness/injury last year	caliper(0.01)	0.986	0.060	0.195	0.046	-0.031	0.151
	radius caliper(0.01)	0.999	0.051	0.226	0.042	-0.031	0.133
	kernel	0.998	0.049	0.243	0.042	-0.033	0.131
	neighbor(1)	0.986	0.060	0.194	0.046	-0.031	0.151
	neighbor(1) norepl	0.929	0.055	0.204	0.043	-0.030	0.139
Health Status – objective[#]							
Anemia (age ≥ 12)	caliper(0.01)	0.867	0.050	0.345	0.053	-0.054	0.155
	radius caliper(0.01)	1.000	0.065	0.098	0.040	-0.012	0.143
	kernel	1.000	0.071	0.056	0.037	-0.002	0.145
	neighbor(1)	0.806	0.055	0.304	0.053	-0.049	0.159
	neighbor(1) norepl	0.995	0.073	0.086	0.042	-0.010	0.156

* p<0.05, ** p<0.01, *** p<0.001; #uncontrolled blood pressure not included in the analysis
Source: Calculations based on Kwara Central, Nigeria Survey 2009 and 2011

ANNEX 1

Further Potential Research Questions:

1. **What are the determinants of demand for health insurance/uptake?***
   - financial and insurance literacy
   - benefits of enrolling
   - ability to pay –liquidity constraints
   - willingness to pay
   - commitment to save and time preferences
   - risk preferences and perception
   - pre-existing risk sharing networks
   - trust
   - relative importance of health shocks
   - price sensitivity and nudges

2. **What is the impact of HCHC on:**
   - health provider choice by subgroup*
   - health care utilization by subgroup*
   - health status (mother and child health)
   - other measures of financial protection (catastrophic expenditures, foregone earnings, consumption, human capital accumulation behavior, wealth)
   - willingness to pay for insurance*
   - health care utilization, financial protection and health status in the *long term*

3. **What is the impact of disease (chronic) on:**
   - labor productivity
   - income generation
   - human capital accumulation
   - savings behavior

4. **What is the potential for scaling up health insurance with supply-side interventions?**

*Subgroup analysis includes for example age, gender, socioeconomic status, education.