

# DOES MICROINSURANCE HELP THE POOR? EVIDENCE FROM THE TARGETED HEALTH MICROINSURANCE PROGRAM IN VIETNAM 2004-2008

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## DOES MICROINSURANCE HELP THE POOR? EVIDENCE FROM THE TARGETED HEALTH MICROINSURANCE PROGRAM IN VIETNAM 2004-2008

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### ABSTRACT

The present study evaluates a targeted health microinsurance program, namely the Health Care Fund for the Poor, which was initiated in Vietnam in 2003. Using the most recent data from the Vietnam Household Living Standard Surveys 2004, 2006 and 2008, the study estimates both the effect of intention-to-treat (ITT) and the effect of treatment-on-treated (TOT) of participation in the HCFP program on a variety of health-related outcomes and financial health risk indicators. The study shows that, participation in the HCFP program reduced the out-of-pocket (OOP) health care expenditure of poor participants, increased the intensity with which the poor sought health care and regular check-ups in public health facilities. The study also reveals that the HCFP helped reduce the incidence of catastrophic spending when dealing with adverse health events. The study addresses the possible selection bias of insurance participation by means of fixed-effects models and an instrument variable (IV) method within fixed-effects.

### 1. INTRODUCTION

The present study evaluates the benefits of the targeted health microinsurance program in Vietnam, using household survey data for the period 2004 - 2008. It is widely acknowledged that the poor in developing countries have difficulty accessing to health care services, as health insurance schemes for the poor are lacking or weak (Whitehead, 2001). In this context, health shocks are likely to pose a great challenge on the livelihoods of the poor, causing a temporary welfare cost in the short run and a persistent poverty in the long run (Dercon and Kirchberge, 2008, Dahlgren, 2002). Thus, among

other poverty alleviation policies, health security is sought as an important instrument to provide health protection for the poor and thereby reduces the impact of financial health risk on poverty.

In literature, the benefits of health insurance programs are found to be associated with improved access to health care, an increase in health care utilization, and a reduction in out-of-pocket (OOP) health expenditure (Dercon and Kirchberge, 2008). Little is known, however, about how health microinsurance programs can contribute to changing/improving other preventive care behaviors such as regular check-ups, or ways of dealing with health shock by the insured.

In Vietnam, the targeted health microinsurance program was introduced in 2003, namely the Health Care for the Poor Program (HCFP). The primary objective of this program was to increase access to health care for the poor including people officially designated as poor, ethnic minority residents of poor communes and from disadvantaged areas. Given the importance of this targeted health insurance program in Vietnam, a number of studies have examined the pursuant impacts and found that the HCFP offered a substantial improvement of health care among the poor though an increase in health care utilization (Wagstaff, 2010, Wagstaff and Pradhan, 2005, Axelson et al., 2009, Nguyen, 2009) and a reduction in health care spending (Jowett et al., 2003, Axelson et al., 2009, Nguyen, 2009). Other potential effects of the program, notably an impact on preventive care and an impact on the financial consequence of coping with adverse health shock, however, remain undiscovered. The present study attempts to contribute to this undiscovered area.

The study empirically examines the benefits of the HCFP along several aspects: 1) whether the program improves health care seeking behavior of the poor with respect to access to health care, out-of-pocket health spending, and preventive care behavior; 2) whether the program reduces the health shock consequence of the poor through lowering the chance of catastrophic spending and/or of resorting to selling off their assets or borrowing when confronted with health shock. The contribution of the study is two fold. First, it provides findings that contribute to the growing evidence of the benefits of health microinsurance programs in developing countries. Second, it addresses an important policy focus by directly linking the financial consequence of dealing with adverse health events to the participation in the targeted health microinsurance program.

Using data from the most recent Vietnam household surveys 2004, 2006, and 2008, we estimate both the

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effect of intention-to-treat (ITT) and the effect of treatment-on-treated (TOT) of the HCFP insurance on various health-related outcomes including the OOP expenditure for health care, the extent of using health services, the intensity of using preventive health care, and the consequence of dealing with health shock. The panel structure of the data allows us to use fixed-effects estimator, and then to incorporate the instrumental variable (IV) method within the fixed effects framework. Coverage of the HCFP at commune level, and its interactions with individual and household characteristics are used as instrument variables for insurance participation. This IV method within fixed-effects enables us to address the possible selection bias of participation in the HCFP by controlling for unobserved heterogeneity that can be time-variant.

The study proceeds as follows. Section 2 lays out the theoretical arguments of the study, reviews the existing evidence of how health microinsurance can benefit the poor, and describes the program of interest for this study - the health care fund for the poor (HCFP, henceforth) in Vietnam. Section 3 discusses the data and variables, followed by a descriptive analysis. Section 4 derives our empirical model and discusses the estimation strategies that will be used. Section 5 presents the empirical results. Finally, section 6 discusses the results and concludes the paper.

## 2. HEALTH MICROINSURANCE AND ACCESS TO HEALTH CARE FOR THE POOR

This section presents various theoretical arguments as to how a health insurance program can benefit poor participants. This section also reviews the existing evidence on the effectiveness of health insurance programs in developing countries and in Vietnam in particular. It concludes with the formulation of the research hypotheses which will subsequently be examined empirically.

In most developing countries, the poor have limited access to health insurance and health care services. Within this context, the poor are likely to bear the burden the out-of-pocket and catastrophic spending for health care. The health expenditures of the poorest households in developing countries are estimated to be equivalent to 19.3 percent of their annual income, compared to the overall average of 8 percent in developed countries (OECD Health Data, 2006). The increasing burden of out-of-pocket expenditures may drive the poor into informal sources of health services, such as unregulated providers and/or to resort to self-medication. Thus, the introduction of a targeted health insurance scheme is expected to improve access to

health care by the poor and contribute to improve health-related outcomes of the poor insured by the program. If these programs reduce the price of health care for the poor, they will remove the financial constraints the poor face and through a price-reduction effect, i.e. inducing higher demand, will thereby increase access to health care and the use of health care services. In addition, although the program does not cover preventive care, participation in the program is expected to raise health awareness among the beneficiaries and thereby encourage more frequent check-ups.

In the empirical health literature, medical consumption, out-of-pocket health expenditures, access to health care services are common indicators used to measure the impact of the health insurance program. A growing number of empirical studies in developing countries present evidence of an increase in inpatient and outpatient care utilization due to the presence of health insurance programs (Hou and Chao, 2008, Smith and Sulzbach, 2008, Pradhan, 2007) and of a reduction in out-of-pocket health expenditures (Jütting, 2004). However, very few studies have evaluated the impact of health insurance on non-medical consumption, nutrition or other dimensions of welfare. One exception (Wagstaff and Pradhan, 2005) finds evidence of an increase in non-medical consumption in the case of Vietnam and of a positive effect of health insurance on health-related outcomes, namely an improvement of height-for-age and weight-for-age of young school children and body mass index among adults. Studies on the impact of health insurance programs on preventive care behaviors are also scarce.

On the other hand, health insurance programs are not always effective or desirable for the poor, especially when considered from the supply side. The poor insured by the program may suffer from price discrimination, as hospitals discriminate against insured patients in favor of user-fee patients (Nguyen, 2009, Knowles et al, 2005). A recent study finds that the adoption of the user-fee health system in Vietnam since early nineties was disadvantageous for the poor, limiting access to health care and leaving more poor people unprotected (Dao et al., 2008). This procedure may discourage the poor from using their participation in the program to visit public health facilities, and therefore increase the out-of-pocket health spending due to visits in uncovered private facilities.

In some circumstances, health insurance may fail even to provide financial protection against the risk of catastrophic payments and increase this risk. Evidence of this adverse impact is found for the case of health insurance in China, where health care providers are paid a fee-for-service, the adverse effect of which is

to give health insurance providers an incentive to induce the insured to use more high-tech care and thereby raise the cost to them (Wagstaff and Lindelow, 2008). A similar finding is reported for the case of Zambia by Ekman (2007), in which the author gives two reasons explaining the failure of the health insurance program. First, since the benefit package of insurance is often limited in scope and in the level of reimbursement, coupled with the increase in the service utilization brought by the program, the insured are more likely to pay accrued treatment costs once participating in the system. Second, as the reimbursement is made by the third party, the service providers often encourage the insured to demand more care and more costly services than would have been otherwise. These examples suggest that the benefits of a health insurance program may be outweighed by the increased cost of health care that the poor covered by the program must bear.

The contribution of a health insurance program goes beyond what it can contribute to increasing access to health care and improving health-related outcomes. Rather, it can be argued that health insurance programs provide a means to deal with financial consequence of adverse health events – a so-called financial health risk. As a matter of fact, financial health risk is greater for the poor who are characterized by malnutrition and poor living conditions. Facing these risks, the poor often develop strategies to deal with them. As an ex-ante risk management strategy, some put aside precautionary savings that reduces their current consumption. Some may give up risky activities for high returns and shift to lower risk ones that have more liquidity. When shocks happen, ex-post strategies are taken. Some sell off their assets and reduce their non-medical consumption to make sufficient payments for treatment as health shocks occur. More often, the poor borrow from informal credit institutions at high interest rates that drive them into indebtedness (Dercon, 2007). The findings of Lieve and Xu (2008) using 2002 – 2003 World Health Survey from 15 African countries, where the health financing system is too weak to protect the poor, point out that borrowing and selling assets are common mechanism to cope with health shocks and that people in low income quintiles are most likely to use these mechanisms. Although these risk-coping mechanisms provide some protection against the risk, they are less than ideal and considerable risks remain (Dercon and Kirchberge, 2008). Clearly, given the limited access to health care by the poor and the absence of health insurance programs, the poor are more vulnerable to health shocks that are likely to pose a challenge to their livelihoods. For this reason, health insurance initiatives may directly benefit the poor in that they offer an ex-post risk-coping instrument that allows the poor to

smooth consumption, to avoid costly informal loans and asset depletion, and to escape from the poverty trap that health shocks can cause. Under this framework, it is therefore relevant to argue that health insurance will raise the poor's affordability of catastrophic health payments, and reduce chance of selling off households' productive assets and of borrowing in informal credit markets.

In Vietnam, the targeted health microinsurance program was introduced in 2003, namely the Health Care Fund for the Poor (HCFP, henceforth). The program has been seen as an important health initiative in the sequence of health sector reforms in the country since the 1990s. The primary objective of this program is to increase access to health care for the poor. The targeted beneficiaries include three groups: households officially designated as poor by their commune authority; all households regardless of their own assessed income living in poor communes (typically known as communes covered by Decision 135); and ethnic minorities living in the provinces of the central highland area and other six provinces in the North known as facing special difficulties. Until 2006, the program has covered 60 percent of the poor, or approximately 20 percent of the population. The committed premium per member per year was 70,000 VND (nearly 5 US\$), and increased to 130,000 VND (nearly 8 US\$) in 2008, of which 75 percent is subsidized by the central government and the rest by the provincial level. As such, HCFP beneficiaries are not supposed to pay either deposits or co-payments at health facilities. The provincial government is in charge of purchasing health insurance cards from Vietnam Social Security (VSS) and implementing the program at the provincial level. The insurance covers the costs of both inpatient and outpatient care, and also pays for drugs used in inpatient treatment, but not nonprescription drugs bought from drug vendors or pharmacies. With the health insurance card, the insured enjoy a broad range of free services at all public hospitals and commune health centers, including medical consultation, diagnosis and treatment, drugs on essential drug list, and even transportation cost in case of referral to higher levels of facilities of the poor, people entitled to social subsidy and workers in remote areas (Ekman et al., 2008). The benefit package, however, provides very limited coverage for preventive interventions, though antenatal care is an exception. Moreover, the HCFP package excludes informal payments made by patients to health service providers, despite this form of payment is known to be not only pervasive, but also very difficult to measure for the health sector in Vietnam. The HCFP covers the costs up to 20 millions VND for each treatment episode which is equivalent to USD 1,240 at the January 1st, 2004 rate. In 2005, an amendment of

health insurance regulations allows the private sector to provide the health insurance benefits, including to HCFP beneficiaries. However, to date, very few private providers have participated in the program.

The identification of the HCFP beneficiaries is carried out at the commune level. That is, a communal authority is in charge of identifying the list of proposed HCFP beneficiaries based on the criteria discussed above and the application from the individuals. This list is then submitted to officials at the district government's labor and social affairs department for revision before it is sent to the provincial department of labor and social affairs for final approval. Although the criteria for the eligibility status for the HCFP insurance is well defined in theory, the identification process may be subject to measurement errors at various administrative levels and to possible bias due to discretion practiced by health insurance officers and manipulation by the applicants.

A number of empirical studies have attempted to assess the impact of health insurance in Vietnam, especially for the case of the HCFP. Most of the studies concluded that there was a substantial increase in access to health care services, in health care utilizations and a reduction of out-of-pocket health expenditures due to the presence of the HCFP (Jowett et al., 2003, Wagstaff and Pradhan, 2005, Axelson et al., 2009, Nguyen, 2009). While the overall benefits of the HCFP program are widely reported, some studies find that the poorest group hardly gains from the program (Sepethri et al., 2006, Wagstaff, 2007). Some contradictory findings have also been documented. Wagstaff (2007) argues that the HCFP does not reduce the out-of-pocket spending because the program has substantially increased the use of inpatient care and the induced a rise in the quantity of services used during the treatment episode which in turn has increased the transport costs and informal payments. Using a different empirical approach based on the three-year panel of household data, Wagstaff (2010) finds, however, no significant effects of the health insurance program on the use of services, but a substantial effect on the reduction in the out-of-pocket spending. So, although successful stories of the HCFP are prevalent, the reported impact of the program remains inconclusive and incomplete. None of the empirical studies thus far have examined the effect of the program on the possible change of health care seeking behaviors, notably preventive care and health awareness of the insured for the case of Vietnam. Likewise, the role of health insurance in limiting the financial consequence of adverse health events facing the poor has not been addressed in the empirical health literature for Vietnam.

In line with the theoretical framework discussed above and in attempt to bridge the empirical gaps concerning the benefits of the targeted health microinsurance program HCFP Vietnam, we examine the following questions: (1) Does the program improve health-related outcomes of the poor with respect to access to health care, out-of-pocket health spending, and preventive care behaviors; (2) Does the program reduce the financial consequence of health shock facing the poor by lowering the chance of catastrophic spending, of assets depletion and of borrowing when confronted by a catastrophic payment.

Whereas the first question concerns direct benefits of the health insurance program, as suggested in the literature, the second question considers the role of the program as a risk coping instrument, by which it can provide a means of financial protection and thus a poverty-reduction mechanism for the poor covered by the program.

### 3. DATA AND VARIABLES

Data for this study are from a series of the Vietnam Households Living Standard Surveys (VHLSS, henceforth) conducted in 2004, 2006 and 2008 by the General Statistical Office of Vietnam (GSO) with technical support from the World Bank. Each round of the VHLSSs covers a sample of 9,189 households, of which some were revisited in the following years on a rotation basis. Following the method of stratified random cluster sampling, the sample is representative at the regional level for both rural and urban areas. The sampling process has been done as follows. First, strata are defined as urban and rural areas of all provinces in Vietnam. Primary sampling unit are communes which are randomly selected in each every stratum. The number of communes per stratum is proportionate to the population proportion of the strata over the total population. Finally, in each commune, about 3 households were selected randomly. Among the households surveyed in the three rounds of data collection, some 4,216 households are linked as a 2004 - 2006 panel, and some 4,088 households as a 2006-2008 panel. The first covers 16,729 people, and the second 16,164 people. At the household level, information is available for income, expenditure, fixed assets, durable goods and other activities. At the individual level, the surveys provide information on basic demographics, employment, education, health behaviors including health insurance participation and a wide range of health-related indicators that can be selected to study the health variables of the targeted program.

Since our aim is to conduct an impact evaluation of the HCFP, we need to disentangle the impact of the HCFP program from that of other health insurance programs, such as schemes for formal sector employees, student scheme for school age students, children insurance scheme for children under 6. We therefore, restrict our study population to include only

those who are unlikely to be covered by other health insurance programs than the HCFP. To this end, we identify our sample to include those who are above 18 years of age, currently not at school, unemployed or working in the informal sector. This results in a panel of 9,189 individuals for 2004-2006, and a panel of 9,172 individuals for 2006-2008.

**Table 1. Distribution of eligibility and participation 2004 - 2008 for the sample of adults aged above 18, unemployed or working in the informal sector**

	2004	2006	2008
Observations	20,558	20,809	20,901
% eligible	25.11	27.75	27.01
% participated	15.58	20.96	19.28
of which those who are eligible (As percentage of the participating sample)	72.22	80.92	81.33

Table 1 presents a distribution of participation and eligibility for the HCFP across the 2004, 2006 and 2008 cross-section samples. The participation eligibility is applied to members of households designated as poor by their commune authority, households of poor communes, and ethnic minority households in disadvantaged communes. The percentage of eligibility remained rather stable across years, with approximately more than a quarter of the sample individuals eligible for the HCFP program in each year. Participation in the HCFP is defined as having the insurance from the HCFP program, or having a free health certificate. Despite the nationwide target of the HCFP program, the actual coverage of the program appears to be relatively low across years. The participation rate improved slightly, from approximately 16 percent for 2004, up to 21 percent in 2006 and dropped to 19 percent in 2008. It is important to note that amongst those who participated in 2004, as many as 30 percent of them were not eligible for the health insurance program for the poor. This ratio dropped to approximately 20 percent for the 2006 and 2008 samples. It is unclear as to how this mistargeting occurred; whether it is due to measurement error of the eligibility status, i.e. some individuals are mistakenly identified as ineligible but still received the insurance; or it reflects the problem of mistargeting health insurance for the poor. Both issues seem to complicate the task of estimating the true impact of the program and imply that estimation results should be interpreted with caution.

In addition to a description of eligibility and participation for each cross-section sample, an analysis of the changes in the insurance status of the sample individuals within the panel setting appears

particularly relevant. In table 2, we list for each panel sample the number of participants for each year. Among 1,477 people who received the insurance in

2004, only did 899 receive again in 2006, indicating a dropout ratio of 39 percent. Meanwhile, 964 new participants entered the program in 2006, accounting for more than 52 percent of the participant group in 2006. Likewise, the dropout ratio and the new participation ratio are 31 percent and 37 percent, respectively for the panel 2006-2008. While these figures typically denote substantial changes in the insurance uptake across time, allowing us to identify the causal impact of the insurance participation, they may be subject to a possible bias if attrition is not a random process.

Table 2. Participation in the HCFP program for panel samples of adults aged above 18, unemployed or working in the informal sector

	Panel 2004-2006 (9,189 individuals)		Panel 2006-2008 (9,072 individuals)	
	2004	2006	2006	2008
Both years	899	899	1175	1175
Participated in the previous year, not in the	578		527	
Not participated in the previous year,		964		682
Total	1477	1863	1702	1,857
Dropout ratio (%)	39		31	
New participation ratio(%)		52		37

From the survey data, health-related outcomes are observed mostly at the individual level, and some at the household level. Data on health-related outcomes and health behaviors are confined to those individuals who reported to have used health care services of any kinds in the previous 12 months, representing the ratio of 36, 43 and 44 percent of those sampled in 2004, 2006 and 2008 samples, respectively. This has an important implication for our empirical analysis of the impact of the HCFP on health-related outcomes of the poor as we exclude from our sample those people who have not used health care services in the past year and information on their health behaviors are not available. We acknowledge that this exclusion may result in a possible bias due to the implied strong assumption that the process of seeking health care is random and independent.

In this study, the intensity of access to health care services and the cost for health care spending are used as indicators of health-related outcomes. Access to health care services include the number of hospital visits in the preceding 12-month period including outpatient care visit, inpatient care visit, visit to a public hospital, and check-up visits. We note that although the HCFP program does not cover preventive care, participation in the program is expected to raise health care awareness among the beneficiaries and thereby encourage more frequent check-ups. We also use a dichotomous dummy variable indicating a check-up visit during the past 12 months prior to the survey year.

In monetary terms, health expenditure outcomes are indicated by out-of-pocket health expenditure on outpatient care, on inpatient care at the individual

level, and per capita health care expenditure calculated as the sum of individual outpatient care and inpatient care and household average value of the costs for self-medication and medical facilities in the preceding 12-month period.

Financial consequence of adverse health events - so-called financial health risk is represented by two dichotomous indicators. The first indicator, catastrophic payment, reflects the incidence of catastrophic health spending at the individual level (a value of one if the individual's out-of-pocket health expenditure exceeds a certain threshold of available resources, i.e. 40 percent of per capita household non-food expenditure, and zero otherwise). The second indicator, health shock consequence, captures a household's response to unaffordability of catastrophic health payments. From the survey data, we construct a variable, health shock consequence, that carries a value of one if the household reported to have resorted to selling off its productive assets (land, property, durable assets), and/or borrowing when its member is confronted with catastrophic health spending. Table A1 in the appendix presents a full description of all the variables used.

Table 3 presented in three panels, compares some key health-related outcomes and selected demographic characteristics of the eligible group with those same characteristics for the non-eligible group along the three cross-section samples. Overall, the eligible group had better performance regarding the intensity of using health care services and incurred lower costs for health care. While the eligible group on average had more access to outpatient care, a higher probability of visiting to a public medical

facility, and a higher propensity for check-up visits than the non-eligible group, they incurred significantly lower costs for outpatient care, self-medication and medical facilities--measured as a household average value--than the non-eligible group. Regarding financial

health risk indicators, the incidence of catastrophic spending and the consequence of dealing with health shock is comparable for the two groups.

**Table 3. Health-related outcomes and individual characteristics: Eligibles vs. Non-eligibles sample for adults aged above 18 working in the informal sector or unemployed**

2004 sample	Eligible		Non-eligible		Diff	Pvalue
	obs	mean	obs	mean		
<i>Health-related outcomes</i>						
Total OOP expenditure (thousands VND)	1983	527.69	6102	929.20	401.51	0.000
Outpatient OOP (thousands VND)	1983	222.43	6102	414.58	192.15	0.000
Inpatient OOP (thousands VND)	1983	247.92	6102	418.39	170.46	0.000
Self-medication cost (thousands VND)	5163	200.54	15395	300.77	100.23	0.000
Medical facilities cost (thousands VND)	5163	5.74	15395	16.26	10.52	0.000
# of outpatient visits	1981	2.81	6093	3.22	0.41	0.000
# of inpatient visits	1978	0.38	6078	0.31	-0.07	0.006
# of visits to public hospitals	1983	1.98	6102	1.80	-0.18	0.013
# of visits to private hospital	1983	0.04	6102	0.02	-0.02	0.115
Check-up visit (0/1 dummy, 1 for Yes)	1983	0.16	6102	0.14	-0.02	0.020
Catastrophic payment (0/1 dummy, 1 for Yes)	1983	0.66	6102	0.72	0.05	0.000
Health shock consequence (0/1 dummy, 1 for Yes)	1983	0.16	6102	0.08	-0.08	0.000
<i>Individual characteristics</i>						
Age	5163	41.88	15395	43.75	1.87	0.000
Marital status (0/1 dummy, 1 for Yes)	5163	0.73	15395	0.74	0.00	0.653
<i>Education dummies</i>						
No degree (0/1 dummy, 1 for Yes)	5163	0.20	15395	0.07	-0.13	0.000
Primary degree (0/1 dummy, 1 for Yes)	5163	0.39	15395	0.31	-0.07	0.000
Lower secondary degree (0/1 dummy, 1 for Yes)	5163	0.33	15395	0.43	0.10	0.000
Upper secondary degree (0/1 dummy, 1 for Yes)	5163	0.09	15395	0.19	0.10	0.000
<i>Household characteristics</i>						
Ethnic minority	5163	0.43	15395	0.09	-0.34	0.000
Size (persons)	5163	5.30	15395	4.79	-0.51	0.000
Per capita expenditure (thousands VND)	5163	2569.16	15395	4146.53	1577.37	0.000
Ratio of females	5163	0.50	15395	0.50	0.00	0.910
Ratio of children	5163	0.29	15395	0.24	-0.06	0.000
Female headed households	5163	0.19	15395	0.22	0.03	0.000
Household head working in the formal sector (0/1)	5163	0.04	15395	0.06	0.02	0.000
<i>Household hygiene conditions</i>						



	5163	0.05	15395	0.19	0.13	0.000
	5163	0.60	15395	0.71	0.11	0.000
	5163	0.27	15395	0.12	-0.16	0.000
		Eligible		Non-eligible	Diff	Pvalue
2006 sample	obs	mean	obs	mean		
<i>Health-related outcomes</i>						
Total OOP expenditure (thousands VND)	2428	639.61	6339	995.87	356.26	0.000
Outpatient OOP (thousands VND)	2428	280.63	6339	467.50	186.88	0.005
Inpatient OOP (thousands VND)	2428	280.13	6339	412.74	132.61	0.006
Self-medication cost (thousands VND)	5775	238.81	15034	354.02	115.21	0.000
Medical facilities cost (thousands VND)	5775	13.11	15034	17.32	4.21	0.029
# of outpatient visits	2428	3.15	6339	3.71	0.56	0.000
# of inpatient visits	2428	0.32	6337	0.26	-0.06	0.001
# of visits to public hospitals	2428	2.53	6339	2.28	-0.24	0.009
# of visits to private hospital	2428	0.02	6339	0.02	0.00	0.573
Check-up visit (O/1 dummy, 1 for Yes)	2428	0.19	6339	0.16	-0.03	0.001
Catastrophic payment (O/1 dummy, 1 for Yes)	2428	0.40	6339	0.39	-0.01	0.303
Health shock consequence (O/1 dummy, 1 for Yes)	2428	0.11	6339	0.06	-0.05	0.000
<i>Individual characteristics</i>						
Age	5775	42.09	15034	44.71	2.62	0.000
Marital status (O/1 dummy, 1 for Yes)	5775	0.15	15034	0.15	0.00	0.679
Education dummies						
No degree (O/1 dummy, 1 for Yes)	5775	0.21	15034	0.07	-0.14	
Primary degree (O/1 dummy, 1 for Yes)	5775	0.36	15034	0.30	-0.05	0.000
Lower secondary degree (O/1 dummy, 1 for Yes)	5775	0.34	15034	0.43	0.09	0.000
Upper secondary degree (O/1 dummy, 1 for Yes)	5775	0.09	15034	0.20	0.11	0.000
<i>Household characteristics</i>						
Ethnic minority	5775	0.44	15034	0.09	-0.36	0.000
Size (persons)	5775	5.13	15034	4.62	-0.51	0.000
Per capita expenditure (thousands VND)	5775	2674.63	15034	4602.32	1927.69	0.000
Ratio of females	5775	0.52	15034	0.51	-0.01	0.000
Ratio of children	5775	0.28	15034	0.21	-0.07	0.000
Female headed households	5775	0.10	15034	0.10	0.00	0.695
Household head working in the formal sector (O/1	5775	0.00	15034	0.00	0.00	0.000
<i>Household hygiene conditions</i>						
Tap water (O/1 dummy, 1 for Yes)	5775	0.07	15034	0.22	0.15	0.000
Clean water (O/1 dummy, 1 for Yes)	5775	0.62	15034	0.66	0.04	0.000
Having no toilet (O/1 dummy, 1 for Yes)	5775	0.24	15034	0.09	-0.15	0.000

2008 sample	Eligible		Non-eligible		Diff	Pvalue
	obs	mean	obs	mean		
<i>Health-related outcomes</i>						
Total OOP expenditure (thousands VND)	2207	1204.42	5953	1599.14	394.72	0.016
Outpatient OOP (thousands VND)	2207	421.59	5953	762.44	340.85	0.000
Inpatient OOP (thousands VND)	2207	672.08	5953	666.68	-5.40	0.971
Self-medication cost (thousands VND)	5646	345.35	15255	506.10	160.74	0.000
Medical facilities cost (thousands VND)	5646	6.64	15255	19.02	12.38	0.000
# of outpatient visits	2207	3.39	5953	3.66	0.27	0.054
# of inpatient visits	2206	0.36	5948	0.27	-0.09	0.000
# of visits to public hospitals	2207	2.61	5953	2.18	-0.44	0.000
# of visits to private hospital	2207	0.01	5953	0.02	0.02	0.011
Check-up visit (0/1 dummy, 1 for Yes)	2207	0.22	5953	0.20	-0.02	0.088
Catastrophic payment (0/1 dummy, 1 for Yes)	2207	0.69	5953	0.66	-0.03	0.004
Health shock consequence (0/1 dummy, 1 for Yes)	2207	0.10	5953	0.04	-0.06	0.000
<i>Individual characteristics</i>						
Age	5646	42.75	15255	45.26	2.51	0.000
Marital status (0/1 dummy, 1 for Yes)	5646	0.73	15255	0.74	0.01	0.142
<i>Education dummies</i>						
No degree (0/1 dummy, 1 for Yes)	5646	0.20	15255	0.06	-0.14	0.000
Primary degree (0/1 dummy, 1 for Yes)	5646	0.35	15255	0.29	-0.06	0.000
Lower secondary degree (0/1 dummy, 1 for Yes)	5646	0.35	15255	0.43	0.08	0.000
Upper secondary degree (0/1 dummy, 1 for Yes)	5646	0.10	15255	0.22	0.12	0.000
<i>Household characteristics</i>						
Ethnic minority	5646	0.44	15255	0.09	-0.35	0.000
Size (persons)	5646	4.95	15255	4.55	-0.40	0.000
Per capita expenditure (thousands VND)	5646	3291.68	15255	5414.55	2122.86	0.000
Ratio of females	5646	0.51	15255	0.50	-0.01	0.000
Ratio of children	5646	0.26	15255	0.20	-0.07	0.000
Female headed households	5646	0.19	15255	0.22	0.03	0.000
Household head working in the formal sector (0/1)	5646	0.04	15255	0.06	0.03	0.000
<i>Household hygiene conditions</i>						
Tap water (0/1 dummy, 1 for Yes)	5646	0.11	15255	0.26	0.15	0.000
Clean water (0/1 dummy, 1 for Yes)	5646	0.63	15255	0.64	0.02	0.026
Having no toilet (0/1 dummy, 1 for Yes)	5646	0.25	15255	0.07	-0.17	0.000

Table 3 also differentiates the eligibility status along important variables. The eligibles come from families that are larger in size, have a considerably lower level of per capita household expenditure, have poorer hygienic conditions and more likely are

minorities. The eligibles also have a poorer educational background, as indicated by the percentage share of having no degrees, or primary school degree, which is significantly higher for the eligible group than for ineligible group. Other

demographic variables such as age, gender, marital status are similar between the two groups.

#### 4. EMPIRICAL STRATEGY

The aim of our analysis is to identify the causal impact of the participation in the HCFP program on individual health-related outcomes and behaviors. In the impact evaluation literature, two common impact measures are distinguished: the intention to treat effect (ITT), and the treatment effect on the treated (TOT). While the latter is clearly relevant to assess the effectiveness of a program in operation, the former provides useful information about the potential effects of the program/policy. Another virtue of the ITT effect is to avoid the non-random dropout among those who have been committed to the program.

In this analysis, we are particularly interested in discerning to what extent having insurance from the HCFP program contributes to the health-related outcomes among the poor - that is to estimate the TOT effect. In addition, we also aim to identify the potential effect of the health insurance program regardless of whether or not an eligible individual received the insurance status. Therefore, we also estimate the ITT effect. This method comes down to comparing the health-related outcomes of eligibles vs. those of non-eligibles for each cross-section sample. Individual "i" is considered receiving the intention to treat if she/he is designated as eligible in the year of interest.

(1)

$$Y_{it} = \alpha_1 + \beta_1 I_{it} + \theta_1 \text{Eligible}_{it} + \varepsilon_{1it}$$

$Y_{it}$  is the health-related outcome and health care seeking behavior of individual  $i$  in year  $t$ ;  $\varepsilon_{1it}$  is the error term;  $I$  refers to a set of individual demographics including age, education, income, employment status, gender and so forth of the individual and relevant household attributes that determine health-related outcomes of the individual. The coefficient  $\theta_1$  captures the intention to treat (ITT) effect among people who are eligible for the HCFP insurance regardless of their insurance participation.

While the ITT effect is interesting, the TOT effect is our main focus since it pragmatically measures the effectiveness of the program in place. To assess the TOT effect of the program, we must isolate the impact of the program from the impact of all observed and unobserved attributes that affect health-related outcomes and health care seeking behaviors. Possible biases arise from several important sources. First, other

health insurance program may confound the estimated impact. To address this, we confined our sample of study to including only those who are likely insured by this HCFP program and not by other programs as explained in the previous section. Second, while individual health propensity is a relevant determinant of health-related outcomes, it remains unobserved to researchers. Health propensity differs across individuals depending upon on their general tendency to be ill, genetic issues, living habits and environment factors, all of which are unobservable but assumed to be time-invariant across years. These time-invariant characteristics, fortunately, can be controlled for by fixed effect methods that are used in our analysis of the TOT effect. Third, given that the HCFP is a non-randomized social support program, although it is not a insurance scheme per se, possible selection bias may exist regarding who received the insurance and those who did not (Nguyen, 2009). It is also possible that individuals may self-select into the program due to their anticipation about adverse health conditions in the future (Haynes et al., 1999). In addition, individuals may choose to leave the program after some time, causing possible attrition bias. So individuals' decision to participate in the health program and their health care behaviors can be endogenous. In all likelihood, participation in the HCFP insurance is not random despite the fact that it does not incur costs to join the program other than an effort that is required to apply and deal with the bureaucrat procedure. Selection bias and attrition bias will be addressed by means of the instrument variable (IV) method within a fixed-effect framework, whereby both time-invariant and time-variant unobserved heterogeneity are controlled for.

In the TOT empirical framework, health-related outcomes and financial health risk indicators are determined at the individual level and are conditional on individual demographics, household characteristics, and health insurance participation. These determinants enter the fixed-effects model as follows.

(2)

$$Y_{it} = \alpha_2 + \beta_2 I_{it} + \theta_2 D_{it} + \lambda_2 \text{Year}_t + \gamma_{2i} + \varepsilon_{2it}$$

Where  $Y_{it}$  is the health-related outcomes/financial health risk indicators of individual  $i$  in year  $t$  as specified earlier.  $I$  refers to a set of individual demographics and relevant household attributes that determine health-related outcomes of the individual.  $\text{Year}_t$  is a dummy that controls for a possible impact of year-specific shocks on health-related outcomes.  $\gamma_{2i}$  is the unobserved individual effect and  $\varepsilon_{2it}$  is the error term. Fixed-effects models do not allow for the

inclusion of time-invariant variables, so we cannot include several individual demographics, such as gender, education or ethnicity, in our fixed-effects model.

In this model,  $D^i$  is a participation dummy indicating whether the individual received the HCFP insurance in the survey year (a dichotomous treatment). Given this specification, estimates of  $\theta^2$  pick up the TOT effect of the program for the participants.

Equation (2) will be estimated using the fixed-effect estimator and the standard errors are corrected for clustered effects at the household level due to the possible interdependencies of error terms across individuals of the same household. Although the fixed-effects estimator controls for unobserved, time-invariant attributes that may affect health-related outcomes, it cannot solve the selection bias of participation in the health insurance program entirely, because unmeasured determinants of participation in the health program at both the individual and household level may vary over time. The fixed-effect model therefore may provide a consistent but biased estimate of the impact of the program.

In order to derive a clean estimate of the effect of the program, it is critical to address selection bias whereby unobserved determinants of an individual's participation in the HCFP insurance also influence health-related outcomes of the individual. To deal with this issue, we use instruments for health insurance participation within fixed-effects. We note that in the context of panel data, the IV application can also correct for the problem of possible attrition bias, whereby an individual's decision to stay or leave the insurance program across years is presumably. In the second stage, the predicted values of the probability of participation from the first stage are regressed on health-related outcomes according to specification (2) to derive an unbiased estimate of the impact of the HCFP insurance.

In this IV framework within fixed-effects several complications arise with respect to estimating the health outcome variables in the discrete form, e.g. the number of medical visits, and the dichotomous form, e.g. financial health risk indicators. Ideally, the application of the IV method in this context requires an estimation of binary/discrete choice with endogenous regressors for panel data. For the time being, we are, however, confined to estimating the discrete variables in linear models within fixed-effects. That is, we estimate OLS models for discrete variables and linear probability models (LPM) for the dichotomous dummy variables. We argue that the above linear models, despite their incorrect assumption of linearity, are an approximation of the discrete/binary choice estimation,

determined by unobserved heterogeneity (Miller and Hollist, 2007). The IV application requires an appropriate choice of instruments, i.e. variables that are highly correlated with the insurance participation, but are not correlated with the health-related outcome variable. One candidate instrument for insurance participation is the eligibility at the individual level. This has been used in the microfinance literature (Aghion and Morduch, 2005, Lensink and Pham, 2011).

In the current framework, we consider that in addition to the eligibility variable, the program coverage measured at the commune level is a good instrument for an individual decision to participate. The program coverage calculated as the proportion of the eligible insured over the total eligible in that commune, represents the popularity of the program and thereby exerts a possible peer effect on one's willingness to participate in the program. To control for the non-linearity of this possible peer effect, we extend our set of instruments to include the interaction between coverage and individual and household characteristics.

In the first stage, a fixed-effects estimate of the linear probability of insurance participation is determined as follows.

$$(3) \quad D_{it} = \alpha_3 + \beta_3 I_{it} + \phi_3 Eligibility + \varphi_3 Coverage_{it} + \chi_3 (Coverage_{it} \times I_{it}) + \lambda_3 Year + \gamma_{3i} + \varepsilon_{3it}$$

and possibly provide consistent estimates of the regressors.

To justify our use of the instrument variable (IV) method within the fixed-effect model, we conduct several tests of the instruments. First, a test of the exogeneity of the regressor indicates whether the IV method is required. Second, we use a weak identification test, with the Kleibergen-Paap F-statistic, to examine the relevance of our instruments and confirm they correlate with our participation variable. A weak identification indicates the weak explanatory power that causes an increased bias in the estimated IV coefficients (Hahn and Hausman, 2002). Third, we use a test of over-identifying restrictions, that is, the Hansen J, to test the validity of our instruments (i.e., if the instruments are orthogonal to the error distribution of individual health-related outcomes).

We note that the empirical result of the ITT effect critically depends on the eligibility rule applied. Furthermore, the variables eligibility and program

coverage are the basis for the instruments used in the IV method within fixed-effects, and thus affect the identification of our fixed-effects model. It is therefore important to explain these two variables in detail.

Our data provide a unique measure of eligibility for the HCFP program. Although some communes may practice discretion in classifying households as eligible, they base their classification on the national poverty standard set by the government, and other criteria (noted in earlier section) in classifying a household as eligible for the health insurance program. Therefore, it seems acceptable to assume exogeneity of the eligibility status of an individual in our empirical framework. Regarding program coverage, this is exogenous to an individual's health outcome whereas it may encourage the individual to participate in the program through peer effects. We recognize that exogeneity of both the eligibility rule and the program coverage is subject to criticism (see e.g. Roodman and Morduch, 2009). With respect to the eligibility rule, for instance, it may be the case that there is endogenous mistargeting: health program officers may decide to grant a health insurance status to people who are not eligible according to the official rule. In the previous section, we have shown to what extent this is the case. Further, households can manipulate and/or bribe health program officers to receive the eligibility title so they can qualify for the program. This mistargeting issue may complicate the task of estimating the true impact of the program but, as Pitt (1999) confirms in his assessment of the impact of a microcredit program, such mistargeting does not necessarily bias the estimated impact of the program. His argument is that less strictly enforced eligibility rules underestimate rather than overestimate the program effect, because better off households are less likely to participate in such poverty reduction targeted programs as microcredit programs or micro health insurance

programs. So incorrectly including them in the control group could lower the program effect.

With regards to coverage of the program, observed and unobserved factors could affect both the program coverage and health-related outcomes of interest, creating endogeneity. To control partially for this concern, we include community characteristics as control variables in our estimates.

## 5. RESULTS

### 5.1 THE EFFECT OF INTENTION TO TREAT OF THE HCFP INSURANCE: THE ITT EFFECT FOR CROSS-SECTION SAMPLES

In this section, we present estimation results regarding the ITT effect of the HCFP program along several health-related outcomes of interest. Since the ITT effect assumes the eligibility status of an individual for the program, not the actual participation, will determine a potential effect of the program. Further, it controls for dynamics in groups of participants and non-participants across years. We can therefore examine the ITT effect for each cross-section set of data. Table 4 presents the estimated coefficients associated with the eligibility variable - the so-called estimated ITT effect, as specified by equation (1). In this table, the first three columns refer to OLS estimates of the ITT effect on out-of-pocket health expenditures, the next three columns are negative binomial estimates of the ITT effect on the number of medical visits including outpatient/inpatient care, the number of visits to a public facility, and the last three columns are logit estimates of the ITT effect on the probability of having a checkup visit, the incidence of catastrophic spending and health shock consequence. Robust standard errors are adjusted for clustered effects.

**Table 4. The ITT effect of the HCFP program: The cross-section estimates of the eligibility status on selected health-related outcomes**

Notes:

(i) Health-related outcomes as dependent variables. OLS estimates for health expenditure, negative binomial estimate for the number of medical visits, logit estimates for binary indicate of checkup visits and risk indicators.

(iii) Robust p-values (adjusted for clustering effects on households) in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

	Logarithm OOP expenditure	Logarithm Outpatient cost	Logarithm Inpatient cost	# of outpatient visits	# of inpatient visits	# of visits to public hospitals	Visit for checkup (0/1)	Catastroph ic payment (0/1)	Health shock consequence (0/1)
2004	-0.2280*** (0.000)	-0.3771*** (0.000)	0.1600** (0.049)	-0.0094 (0.843)	0.2216*** (0.004)	0.1466*** (0.003)	0.0849 (0.366)	-0.1881** (0.015)	0.7015*** (0.000)
2006	-0.3185*** (0.000)	-0.7727*** (0.000)	0.2075*** (0.005)	-0.0353 (0.464)	0.2620*** (0.000)	0.2005*** (0.000)	0.2206*** (0.004)	0.0703 (0.285)	0.5634*** (0.000)
2008	-0.1097** (0.037)	-0.4427*** (0.000)	0.3419*** (0.000)	0.0390 (0.384)	0.3423*** (0.000)	0.2960*** (0.000)	0.1408* (0.075)	-0.1868*** (0.008)	0.7480*** (0.000)

As indicated, the estimated ITT effects are rather consistent across years for most the health-related outcomes of interest. In terms of access to health care services, the intensity of seeking inpatient care is higher when an individual potentially benefits from the insurance scheme. Likewise, the potential to participate in the HCFP insurance scheme also encourages people to seek health care visit at a public facility where the costs are covered. Similarly, the potential effect is also found to affect health preventive care, evident from a higher probability of seeking a check-up visit. On the OOP expenditure for health care, the results suggest that individuals eligible for the HCFP insurance enjoy an ITT effect through a reduction in total OOP expenditures for health care. The reducing effect is observed in the cost for outpatient care, while the opposite is revealed for the cost of inpatient care, which can be explained by an increase in the number of visits for inpatient care.

Regarding measures of financial health risk, the results suggest that when people are more likely to be included in the targeted health insurance program, they tend to suffer less from catastrophic spending, i.e. their propensity of having a catastrophic health payment is *ceteris paribus* lowered by 19 percent. At the same time, however, they tend to rely more on external sources to finance their health catastrophic spending, which may increase a propensity of risk.

## **5.2 THE EFFECT OF TREATMENT ON THE TREATED OF THE HCFP INSURANCE: THE TOT EFFECT IN THE FIXED-EFFECTS FRAMEWORK**

The analysis of the TOT effect employs the panel features of our dataset. Two balanced panels are examined, panel 2004-2006 of 9189 individuals, and panel 2006 - 2008 of 9072 individuals. We acknowledge that while using a three-year panel 2004-2006-2008 would enrich our analysis, in this

context the three-year panel will end up with a substantially smaller sample, throwing out a large number of observations that are not present throughout the three rounds of surveys. We therefore base our analysis on the two-year panels of those individuals who used health services in the 12 months preceding the survey year. We note that our TOT analysis leaves out people who have not used any health care services in the past year and their health-related outcomes are not available accordingly, even though they may be covered by the program. Further, like other existing studies on the field, our TOT analysis provides few implications as to how uninsured individuals would benefit from the program if they were to be insured in the future.

Tables 5 and 6 include the impact of HCFP under the OLS fixed-effect models for all the health-related outcomes, in both continuous and discrete forms. We note that table A2 in the appendix provides similar results when the negative binomial fixed-effects regression is applied for health outcome variables of discrete form, and logit fixed-effects regression applied for binary dummy health outcome variables.

We present the estimates for the entire sample (table 5), as well as for the sample of eligible individuals only (table 6). An exclusive focus on the eligible group is to consider whether the HCFP program indeed benefits the poor, which was the primary mission of the program. In ideal circumstances, as mistargeting is assumed away, the entire group of participants and the group of eligible participants should coincide; and in the absence of measurement errors, e.g. no individuals being wrongly labeled as eligible, any effects found of the program should also be seen as the impact of the program on the poor. Under the condition subject to both mistargeting and measurement error, the analysis on the eligible group of participants is expected to provide a closer estimate of the impact of the program on the poor

Table 5. Estimates of the TOT impact of the HCFP: OLS fixed-effects - The entire sample

Notes:

(i) Health-related outcomes as dependent variables

(iii) Robust p-values (adjusted for clustering effects on households) in parentheses; \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Health-related outcomes	Logarithm OOP expenditure	Logarithm Outpatient cost	Logarithm Inpatient cost	# of outpatient visits	# of inpatient visits	Checkup visit (0/1)	# of visits to public hospitals	Catastrophic payment (0/1)	Health shock consequence (0/1)
Panel 2004-2006									
HCFP insurance	-0.2781*** (0.006)	-0.9487*** (0.000)	0.2267 (0.230)	0.2830 (0.438)	0.0679 (0.173)	0.0518* (0.051)	0.6084** (0.041)	-0.0359 (0.261)	-0.0252 (0.296)
Year 2006	-0.1376*** (0.001)	-0.1594** (0.024)	-0.3260*** (0.000)	0.2659 (0.145)	-0.0520** (0.046)	0.0246** (0.037)	0.4129*** (0.002)	-0.3284*** (0.000)	-0.0438*** (0.000)
Age	0.0513*** (0.007)	0.0261 (0.375)	0.0391 (0.356)	-0.1280* (0.082)	-0.0011 (0.937)	-0.0107* (0.067)	-0.1557*** (0.008)	0.0055 (0.419)	0.0047 (0.284)
Square of	-0.0004** (0.028)	-0.0001 (0.791)	-0.0004 (0.302)	0.0020** (0.016)	0.0000 (0.884)	0.0001* (0.053)	0.0020*** (0.002)	-0.0000 (0.776)	-0.0000 (0.389)
Marital status	0.1880 (0.319)	-0.0924 (0.742)	0.3340 (0.372)	0.5764 (0.469)	0.1856 (0.160)	0.0354 (0.522)	1.0296 (0.153)	0.0514 (0.422)	0.0459 (0.166)
Household	-0.0285 (0.450)	-0.1152* (0.077)	0.0344 (0.639)	-0.0449 (0.769)	0.0388 (0.107)	-0.0145 (0.185)	0.0167 (0.870)	-0.0177 (0.199)	0.0042 (0.562)
Per capita expenditure	0.0107*** (0.000)	0.0049 (0.149)	0.0111*** (0.003)	0.0145 (0.139)	0.0024** (0.038)	0.0005 (0.286)	0.0168** (0.012)	-0.0012** (0.033)	0.0005** (0.040)
Tap water	0.1436 (0.419)	0.2896 (0.303)	0.1038 (0.732)	0.1970 (0.744)	-0.1236 (0.462)	-0.1201*** (0.005)	-0.1557 (0.744)	0.0616 (0.290)	-0.0250 (0.474)
Clean water	0.0359 (0.757)	0.1747 (0.398)	-0.0532 (0.814)	-0.0274 (0.955)	-0.0765 (0.364)	-0.0264 (0.423)	-0.1371 (0.692)	0.0005 (0.990)	-0.0566** (0.043)
Having no toilet	-0.0961 (0.451)	-0.0958 (0.663)	-0.2127 (0.389)	-0.0259 (0.965)	-0.0465 (0.618)	0.0224 (0.507)	-0.0890 (0.866)	0.0770* (0.061)	-0.0317 (0.235)
Constant	3.7738*** (0.000)	3.5129*** (0.000)	-0.1538 (0.884)	3.2267* (0.051)	-0.0301 (0.923)	0.3960*** (0.006)	2.5899** (0.026)	0.5670*** (0.001)	-0.0393 (0.671)
Observations	7,335	7,335	7,335	7,333	7,319	7,335	7,335	7,335	7,335
Number of id	5,276	5,276	5,276	5,275	5,268	5,276	5,276	5,276	5,276

Adjusted R2	0038	0027	0014	0014	0007	0012	0024	0.245	0.020
<b>Panel 2006-2008</b>									
HCFP insurance	-0.4194*** (0.000)	-0.2425 (0.222)	-0.3074 (0.143)	1.1104** (0.043)	0.0096 (0.869)	0.0007 (0.983)	1.6914*** (0.000)	-0.0977** (0.011)	-0.0242 (0.286)
Year 2008	0.4821*** (0.000)	0.6333*** (0.000)	0.0918 (0.306)	-0.2954 (0.156)	-0.0133 (0.545)	0.0378*** (0.002)	-0.1866 (0.217)	0.2635*** (0.000)	-0.0225*** (0.003)
Age	0.0157 (0.496)	0.0264 (0.436)	0.0369 (0.399)	0.0325 (0.801)	0.0100 (0.222)	0.0002 (0.967)	0.0937 (0.139)	-0.0145* (0.079)	-0.0008 (0.742)
Square of age	0.0001 (0.807)	-0.0000 (0.951)	-0.0002 (0.595)	0.0005 (0.677)	-0.0001 (0.412)	-0.0000 (0.905)	-0.0006 (0.403)	0.0002** (0.016)	0.0000 (0.741)
Marital status	0.3575* (0.066)	0.3688 (0.231)	0.0197 (0.955)	0.4587 (0.485)	-0.0257 (0.715)	0.0375 (0.487)	0.8615 (0.151)	0.1267** (0.045)	0.0212 (0.295)
Household size	0.0916* (0.051)	-0.0061 (0.921)	0.1345 (0.102)	0.0575 (0.713)	0.0287 (0.155)	-0.0141 (0.127)	-0.1320 (0.329)	0.0310** (0.032)	0.0060 (0.224)
Per capita expenditure	0.0001*** (0.000)	0.0000** (0.028)	0.0001*** (0.004)	0.0001** (0.013)	0.0000** (0.017)	-0.0000 (0.734)	0.0001 (0.172)	-0.0000 (0.539)	0.0000* (0.055)
Tap water	-0.0417 (0.833)	-0.2044 (0.453)	-0.0666 (0.843)	-0.4340 (0.648)	0.0639 (0.483)	-0.0877* (0.071)	0.0617 (0.895)	-0.0753 (0.175)	-0.0247 (0.391)
Clean water	0.0423 (0.747)	-0.3092 (0.135)	0.3380 (0.171)	0.0209 (0.963)	0.1514* (0.065)	-0.0742** (0.046)	0.2989 (0.327)	-0.0932** (0.027)	-0.0168 (0.449)
Having no toilet	-0.2340 (0.106)	0.1928 (0.348)	-0.5386** (0.042)	-0.0002 (1.000)	-0.0678 (0.380)	-0.0129 (0.755)	-0.0971 (0.801)	-0.0780 (0.106)	-0.0209 (0.382)
Constant	3.6043*** (0.000)	2.6104*** (0.001)	-0.9965 (0.318)	-0.4445 (0.884)	-0.2967 (0.138)	0.2872** (0.030)	-1.3630 (0.302)	0.4330** (0.016)	0.0599 (0.371)
Observations	7,273	7,273	7,273	7,273	7,269	7,273	7,273	7,273	7,273
Number of id	5,179	5,179	5,179	5,179	5,178	5,179	5,179	5,179	5,179
Adjusted R2	0.149	0.074	0.014	0.014	0.008	0.007	0.019	0.181	0.007

For the panel 2004-2006, the OLS fixed-effect estimates show that participation in the HCFP has increased the intensity of check-up visits, encouraged more visits to public hospitals, and considerably reduced health care spending, both the costs for outpatient care and total OOP health expenditure,

while no effects was found on inpatient care. More specifically, all else equal, taking up the HCFP insurance would benefit the insured by lowering the OOP health spending by 25 percent ( $e-0.2781$ ), increasing the willingness for visit a public hospital by



5.2 percent, and raising the frequency of seeking health care at a public facility by 0.6 times.

The effectiveness of the HCFP remains rather stable across years, evident from significant fixed-effects estimates for the panel 2006-2008. Although the reducing effect on the cost of outpatient care is not observed for this sample, total OOP health expenditure decreased by 34 percent ( $e=0.4194$ ), *ceteris paribus*, due to the HCFP insurance participation. Regarding health care seeking behaviors, taking up the HCFP insurance greatly increased the number of visits for outpatient care by 1.11 times and visits to a public hospital by 1.7 times.

Regarding financial health risk, the OLS fixed-effects estimator is only able to pick up the effectiveness of the HCFP insurance on the incidence of catastrophic payment for the panel 2006-2008. By taking up the HCFP insurance, the propensity of having a

catastrophic health payment is *ceteris paribus* lowered by 9.8 percent.

We now examine the impact on HCFP insurance among the eligibles. Results in table 6 suggest that participation in the HCFP program significantly helped the poor to lower their OOP health spending due to the insurance status by 33 and 43 percent, for the panel 2004-2006, and 2006-2008, respectively, and encourage the poor to seek medical visits at a public hospital. Further, the incidence of catastrophic spending is lowered due to the insurance participation, and the propensity of encountering a health shock consequence is also reduced, though this effect is observed only for the latter panel 2006-2008. Presumably, all these are desirable effects of the program. As a result, this evidence suggests that the program works for the advantage of the poor eligibles.

**Table 6. Estimates of the TOT impact of the HCFP: OLS fixed-effects - The eligible group**

Notes:

(i) Health-related outcomes as dependent variables

(iii) Robust p-values (adjusted for clustering effects on households) in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Health-related outcomes	Logarithm OOP expenditure	Logarithm Outpatient cost	Logarithm Inpatient cost	# of outpatient visits	# of inpatient visits	Check-up visit (0/1)	# of visits to public hospitals	Catastrophic payment (0/1)	Health shock consequence (0/1)
<b>Panel 2004-2006</b>									
HCFP insurance	-0.3947** (0.024)	-0.3709 (0.177)	0.1402 (0.620)	0.1573 (0.818)	0.0683 (0.430)	0.0689 (0.165)	0.9289* (0.100)	-0.1144** (0.038)	-0.0453 (0.263)
Year 2006	-0.2900*** (0.004)	-0.6819*** (0.000)	-0.4627** (0.015)	0.4093 (0.379)	-0.1013 (0.108)	0.0328 (0.265)	0.4349 (0.128)	-0.3036*** (0.000)	-0.0571** (0.012)
Age	0.1357*** (0.000)	0.1700*** (0.001)	0.0229 (0.822)	-0.1046 (0.461)	0.0134 (0.572)	0.0084 (0.459)	-0.1526 (0.197)	0.0426*** (0.000)	0.0124 (0.370)
Square of age	-0.0013*** (0.001)	-0.0012** (0.014)	-0.0006 (0.532)	0.0013 (0.297)	-0.0002 (0.421)	-0.0001 (0.651)	0.0018 (0.103)	-0.0004*** (0.001)	-0.0001 (0.521)
Marital status	-0.1814 (0.682)	-1.6487*** (0.002)	0.9911* (0.094)	3.2961 (0.135)	-0.0069 (0.975)	0.0410 (0.777)	2.7585 (0.179)	-0.0237 (0.858)	-0.0039 (0.965)
Household size	-0.0119 (0.905)	-0.0390 (0.792)	0.0874 (0.566)	-0.1183 (0.681)	0.0642 (0.340)	0.0070 (0.790)	0.1030 (0.649)	0.0103 (0.741)	0.0403* (0.056)
Per capita	0.0167*** (0.004)	-0.0061 (0.405)	0.0389*** (0.000)	-0.0256 (0.615)	0.0120*** (0.000)	0.0008 (0.476)	0.0339** (0.016)	-0.0008 (0.699)	0.0005 (0.597)
Tap water	0.3593 (0.546)	0.5340 (0.406)	-0.3850 (0.627)	0.8944 (0.612)	-0.1680 (0.700)	0.0104 (0.905)	-2.3740* (0.093)	0.1618 (0.369)	0.0443 (0.639)
Clean water	0.3228	1.1279***	-0.8028	0.4326	-0.2837**	0.0354	-0.4693	0.0800	-0.0471

	(0.169)	(0.002)	(0.101)	(0.481)	(0.035)	(0.643)	(0.326)	(0.302)	(0.476)
Having no toilet	-0.1867	-0.1518	-0.0949	-0.6036	-0.0334	-0.0302	-0.5846	0.0272	-0.0342
	(0.508)	(0.665)	(0.812)	(0.669)	(0.889)	(0.678)	(0.680)	(0.739)	(0.499)
Constant	1.5854*	-0.2045	0.2113	3.1417	-0.2646	-0.2190	1.4044	-0.3418	-0.3413
	(0.071)	(0.885)	(0.935)	(0.383)	(0.680)	(0.447)	(0.536)	(0.271)	(0.251)
Observations	1,913	1,913	1,913	1,913	1,908	1,913	1,913	1,913	1,913
Number of id	1,514	1,514	1,514	1,514	1,511	1,514	1,514	1,514	1,514
Adjusted R	0.093	0.113	0.069	0.021	0.036	0.018	0.048	0.243	0.037
<b>Panel 2006-2008</b>									
HCFP insurance	-0.5605***	-0.0135	-0.3358	0.0930	0.0758	-0.0076	1.0628*	-0.1757***	-0.0768**
	(0.002)	(0.962)	(0.304)	(0.903)	(0.469)	(0.901)	(0.064)	(0.002)	(0.025)
Year 2008	0.6726***	1.1243***	0.1521	0.0687	0.0200	0.0532*	0.3728	0.2686***	-0.0206
	(0.000)	(0.000)	(0.437)	(0.885)	(0.724)	(0.080)	(0.271)	(0.000)	(0.356)
Age	0.0756***	0.0783*	0.0605	0.4273	0.0040	-0.0186	0.1889	-0.0001	-0.0084
	(0.002)	(0.091)	(0.491)	(0.317)	(0.811)	(0.135)	(0.254)	(0.992)	(0.410)
Square of age	-0.0005**	-0.0005	-0.0004	-0.0018	0.0000	0.0002	-0.0016	0.0000	0.0000
	(0.030)	(0.226)	(0.563)	(0.649)	(0.999)	(0.154)	(0.382)	(0.765)	(0.580)
Marital status	-0.2486	-0.4165	0.5475	-0.1889	0.0262	-0.1950*	2.6038	0.1681	-0.0114
	(0.587)	(0.393)	(0.216)	(0.936)	(0.839)	(0.096)	(0.229)	(0.166)	(0.688)
Household size	0.2376***	0.2174**	0.1149	0.2647	0.0281	0.0017	0.0383	0.0314	0.0292*
	(0.000)	(0.030)	(0.449)	(0.287)	(0.431)	(0.929)	(0.852)	(0.178)	(0.053)
Per capita	0.0002***	0.0001*	0.0003***	0.0002	0.0001**	0.0000	0.0001	-0.0000	0.0000
	(0.000)	(0.099)	(0.009)	(0.154)	(0.028)	(0.336)	(0.354)	(0.473)	(0.699)
Tap water	0.4127	0.6303	-0.7736	-1.7805	-0.0597	-0.3059***	-1.0815	-0.1224	0.0204
	(0.381)	(0.187)	(0.279)	(0.170)	(0.729)	(0.003)	(0.209)	(0.293)	(0.756)
Clean water	-0.0033	-0.2718	0.1699	-0.7207	0.1020	-0.0347	-0.0625	-0.1102*	-0.0408
	(0.988)	(0.429)	(0.669)	(0.181)	(0.514)	(0.572)	(0.906)	(0.072)	(0.358)
Having no toilet	-0.3004	0.6470	-1.1092**	0.6535	-0.1103	0.1148	0.1575	-0.1410*	-0.0463
	(0.312)	(0.110)	(0.029)	(0.478)	(0.479)	(0.198)	(0.843)	(0.094)	(0.246)
Constant	1.3869*	-0.4093	-1.7270	-13.5474	-0.3287	0.7512**	-5.3146	0.3059	0.3319
	(0.082)	(0.746)	(0.480)	(0.226)	(0.509)	(0.017)	(0.174)	(0.424)	(0.210)
Observations	1,929	1,929	1,929	1,929	1,928	1,929	1,929	1,929	1,929
Number of id	1,451	1,451	1,451	1,451	1,450	1,451	1,451	1,451	1,451
Adjusted R	0.274	0.179	0.042	0.092	0.025	0.044	0.031	0.192	0.026

It is necessary to note that results presented above are based on the fixed-effects estimator that disentangles the impact of HCFP program from the observed attributes that affect the health outcome variable and more importantly, it controls for relevant unobserved heterogeneity at both individual and household level

that are time-invariant, i.e. health propensity. Nevertheless, the fixed-effects estimates may be biased due to possible endogeneity problems. Our dataset does not allow us to precisely determine the cause of endogeneity. However, it may be the case that insurance is primarily granted to people who take

additional measures to seek health care. It may also be the case that the commune authority is biased in deciding who may receive the insurance, and it is perhaps due to the presence of the mistargeting problem. Attrition bias can well be another source of the problem. Therefore, we now turn to the fixed-

effects estimates with instruments, hoping to address the possible endogeneity in order to derive unbiased estimates of the effects of the program.

The results of IV estimates within fixed-effects are presented in tables 7 and 8, for the entire sample and the eligible sample, respectively.

**Table 7. Estimates of the TOT impact of the HCFP: instrument variable within fixed-effects estimates - The entire sample**

Notes:

(i) Health-related outcomes as dependent variables

(iii) Robust p-values (adjusted for clustering effects on households) in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(iii) P-values reported for all instrument tests except the Kleibergen-Paap F test

<i>Health-related outcomes</i>	<i>Logarithm OOP expenditure</i>	<i>Logarithm Outpatient cost</i>	<i>Logarithm Inpatient cost</i>	<i># of outpatient visits</i>	<i># of inpatient visits</i>	<i># of visits to public hospitals</i>	<i>Check-up visit (0/1)</i>	<i>Catastrophic payment (0/1)</i>	<i>Health shock consequence (0/1)</i>
<b>Panel 2004-2006</b>									
HCFP insurance	-0.6147*** (0.005)	-0.9461*** (0.008)	-0.4694 (0.225)	-0.0188 (0.978)	0.0303 (0.763)	0.0119 (0.984)	0.0033 (0.950)	-0.0203 (0.761)	0.0212 (0.648)
Year 2006	-0.1240*** (0.004)	-0.1595** (0.023)	-0.2979*** (0.000)	0.2783 (0.135)	-0.0505* (0.055)	0.4370*** (0.001)	0.0266** (0.027)	-0.3290*** (0.000)	-0.0457*** (0.000)
Age	0.0520*** (0.006)	0.0261 (0.374)	0.0406 (0.336)	-0.1274* (0.084)	-0.0010 (0.941)	-0.1544*** (0.009)	-0.0106* (0.068)	0.0055 (0.420)	0.0046 (0.291)
Square of age	-0.0004** (0.025)	-0.0001 (0.791)	-0.0004 (0.286)	0.0020** (0.017)	0.0000 (0.888)	0.0020*** (0.003)	0.0001* (0.053)	-0.0000 (0.780)	-0.0000 (0.396)
Marital status	0.2039 (0.278)	-0.0925 (0.742)	0.3668 (0.325)	0.5907 (0.460)	0.1874 (0.155)	1.0577 (0.145)	0.0377 (0.495)	0.0507 (0.429)	0.0437 (0.186)
Household size	-0.0267 (0.485)	-0.1152* (0.076)	0.0382 (0.606)	-0.0432 (0.778)	0.0390 (0.105)	0.0200 (0.845)	-0.0142 (0.194)	-0.0178 (0.196)	0.0039 (0.587)
Per capita expenditure	0.0105*** (0.000)	0.0049 (0.150)	0.0107*** (0.005)	0.0143 (0.145)	0.0024** (0.040)	0.0165** (0.015)	0.0004 (0.320)	-0.0012** (0.034)	0.0005** (0.032)
Tap water	0.1404 (0.433)	0.2896 (0.303)	0.0972 (0.752)	0.1940 (0.748)	-0.1240 (0.461)	-0.1614 (0.733)	-0.1206*** (0.004)	0.0617 (0.288)	-0.0245 (0.482)
Clean water	0.0496 (0.670)	0.1746 (0.395)	-0.0248 (0.914)	-0.0151 (0.975)	-0.0750 (0.374)	-0.1128 (0.741)	-0.0244 (0.456)	-0.0001 (0.997)	-0.0585** (0.036)

Having toilet	no	-0.0949 (0.461)	-0.0958 (0.662)	-0.2104 (0.404)	-0.0248 (0.967)	-0.0464 (0.620)	-0.0870 (0.870)	0.0225 (0.502)	0.0770* (0.061)	-0.0318 (0.231)
Observations		4,118	4,118	4,118	4,116	4,102	4,118	4,118	4,118	4,118
Number of id		2,059	2,059	2,059	2,058	2,051	2,059	2,059	2,059	2,059
"Difference in Sargan" C test		0.0984	0.8720	0.0867	0.7449	0.8975	0.5409	0.3819	0.5157	0.0327
Hansen J test		0.2295	0.6539	0.0359	0.5919	0.1744	0.4245	0.6141	0.0452	0.4513
Kleibergen-Paap F-test		18.033	18.033	18.033	18.044	17.943	18.033	18.033	18.033	18.033
% maximal IV relative bias		10%	10%	10%	10%	10%	10%	10%	10%	10%
<b>Panel 2006-2008</b>										
HCFP insurance		0.0166 (0.950)	-0.3662 (0.375)	0.6014 (0.149)	0.2063 (0.845)	0.0355 (0.763)	1.8798** (0.026)	-0.0354 (0.604)	-0.0397 (0.614)	0.0165 (0.753)
Year 2008		0.4894*** (0.000)	0.6312*** (0.000)	0.1071 (0.236)	-0.3106 (0.142)	-0.0129 (0.563)	-0.1834 (0.231)	0.0372*** (0.003)	0.2645*** (0.000)	-0.0218*** (0.005)
Age		0.0135 (0.552)	0.0271 (0.426)	0.0322 (0.453)	0.0371 (0.773)	0.0098 (0.230)	0.0927 (0.141)	0.0004 (0.943)	-0.0148* (0.070)	-0.0010 (0.683)
Square of age		0.0001 (0.766)	-0.0000 (0.944)	-0.0002 (0.625)	0.0005 (0.690)	-0.0001 (0.416)	-0.0006 (0.405)	-0.0000 (0.892)	0.0002** (0.014)	0.0000 (0.709)
Marital status		0.3204* (0.100)	0.3793 (0.220)	-0.0577 (0.868)	0.5357 (0.414)	-0.0279 (0.694)	0.8455 (0.159)	0.0406 (0.454)	0.1217* (0.056)	0.0177 (0.392)
Household size		0.0848* (0.072)	-0.0042 (0.946)	0.1203 (0.145)	0.0716 (0.652)	0.0283 (0.162)	-0.1349 (0.322)	-0.0135 (0.147)	0.0301** (0.037)	0.0054 (0.284)
Per capita expenditure		0.0001*** (0.000)	0.0000** (0.029)	0.0001*** (0.004)	0.0001** (0.014)	0.0000** (0.017)	0.0001 (0.169)	-0.0000 (0.724)	-0.0000 (0.549)	0.0000* (0.051)
Tap water		-0.0298 (0.880)	-0.2078 (0.446)	-0.0418 (0.901)	-0.4587 (0.630)	0.0646 (0.475)	0.0668 (0.887)	-0.0886* (0.068)	-0.0737 (0.183)	-0.0236 (0.407)
Clean water		0.0371 (0.778)	-0.3077 (0.137)	0.3271 (0.187)	0.0317 (0.944)	0.1511* (0.066)	0.2967 (0.330)	-0.0738** (0.048)	-0.0939** (0.026)	-0.0173 (0.437)

Having toilet	no	-0.2128	0.1868	-0.4945*	-0.0441	-0.0666	-0.0880	-0.0146	-0.0752	-0.0189
		(0.149)	(0.364)	(0.060)	(0.935)	(0.384)	(0.820)	(0.720)	(0.120)	(0.428)
Observations		4,188	4,188	4,188	4,188	4,182	4,188	4,188	4,188	4,188
Number of id		2,094	2,094	2,094	2,094	2,091	2,094	2,094	2,094	2,094
Difference in Sargan <sup>1</sup> C test		0.2910	0.3440	0.0589	0.1592	0.9778	0.7386	0.6990	0.6615	0.2443
Hansen J test <sup>2</sup>		0.0064	0.0288	0.0447	0.0745	0.1492	0.0439	0.6501	0.4105	0.3831
Kleibergen-Paap F-test <sup>3</sup>		19.455	19.455	19.455	19.455	19.470	19.455	19.455	19.455	19.455
% maximal IV relative bias		10%	10%	10%	10%	10%	10%	10%	10%	10percent

<sup>1</sup>Tests the null hypothesis that the regressor can be treated as exogenous.

<sup>2</sup>Tests for the over-identifying restrictions with a null hypothesis stated as follows: The endogenous regressor is orthogonal to the error term.

<sup>3</sup>Weak identification test of instrument relevance; weak identification causes a bias in the estimated IV coefficients.

For the first panel 2004-2006, the results show that the HCFP significantly lowered the OOP health expenditure for its participants, particular the total OOP expenditure and the expenditure for outpatient care. This confirms the price-reduction effect of the program as has been found in the fixed-effects estimates. No other effects on using health services and financial health risk are identified, though. As we show in table 7, the use of IVs in the estimate of total OOP health expenditure appears appropriate, as all the instrument tests indicate satisfactory results. The "difference in Sargan" C test's result rejects the null hypothesis that the regressor can actually be treated exogenous (Pvalue < 0.1). Given the instrument selected, the Hansen J test of overidentifying restrictions shows that the endogenous regressor is orthogonal to the error term in the OOP health expenditure equation (Pvalue > 0.1), or equivalently our instruments appear to be valid. The Kleibergen-Paap F statistics are well above the Stock-Yogo value at 10percent minimum bias of the IV estimates, suggesting that we have strong instruments for insurance. On the other hand, the "difference in Sargan" C test for the use of IV in the outpatient care expenditure equation suggests that the endogenous regressor - participation in the program, can be treated as exogenous.

For the second panel 2006-2008, our estimation results reveal little evidence for the effectiveness of the HCFP insurance in reducing the OOP health expenditure. We only find evidence for an increase in the incidence of seeking public health care as a

positive effect of the HCFP insurance. Note that the same effect is also found by the fixed-effects estimates. As shown in the last three rows of table 7, the performance of instruments in this panel sample does not seem desirable as the "difference in Sargan" C test in most equations shows that the participation variable can be treated exogenous. In addition, the instruments appear to be invalid, as indicated by the Hansen J test (Pvalue < 0.1) in several equations. By and large, this does not lend strong credence to our IV fixed-effects estimates of the impact of the HCFP for the period 2006-2008.

We move on with studying the TOT effect for the eligible group only, as presented in table 8. From both panels, our IV fixed-effects estimates are unable to uncover any causal effects of the HCFP insurance on the selected health-related outcomes. One exception for the panel 2006-2008, we find evidence of an increase in the incidence of seeking health care from a public facility due to the HCFP insurance participation. We notice that the use of instrument appears to be inappropriate along the estimation for the eligible group for both panel samples. As indicated by table 8, there is not enough evidence from the "difference in Sargan" C test to reject the null hypothesis that the regressor can actually be treated exogenous (Pvalue > 0.1). Therefore, we will use our fixed-effect estimates results, instead of IV fixed-effects estimates, to draw on the impact of HCFP on health-related outcomes of the eligible group, assuming that participation in the HCFP is exogenous to various health-related outcomes equations.

Table 8. Estimates of the TOT impact of the HCFP: instrument variable within fixed-effects estimates - The eligible sample

Notes:

(i) Health-related outcomes as dependent variables

(iii) Robust p-values (adjusted for clustering effects on households) in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(iii) P-values reported for all instrument tests except the Kleibergen-Paap F test

<i>Health-related outcomes</i>	<i>Logarithm OOP expenditure</i>	<i>Logarithm Outpatient cost</i>	<i>Logarithm Inpatient cost</i>	<i># of outpatient visits</i>	<i># of inpatient visits</i>	<i>Visit for checkup (0/1)</i>	<i># of visits to public hospitals</i>	<i>Catastrophic payment ((0/1)</i>	<i>Health shock consequence (0/1)</i>
<i>Variable</i>									
Panel 2004-2006									
HCFP insurance	-0.2712 (0.306)	-0.0944 (0.801)	-0.2658 (0.560)	-0.3899 (0.518)	0.0178 (0.890)	0.0063 (0.929)	0.2937 (0.529)	-0.1070 (0.169)	-0.0044 (0.935)
Year 2006	-0.3029*** (0.003)	-0.7107*** (0.000)	-0.4203** (0.027)	0.4664 (0.312)	-0.0961 (0.112)	0.0393 (0.185)	0.5011* (0.076)	-0.3043*** (0.000)	-0.0613*** (0.007)
Age	0.1356*** (0.000)	0.1697*** (0.002)	0.0233 (0.822)	-0.1040 (0.460)	0.0134 (0.573)	0.0085 (0.446)	-0.1519 (0.197)	0.0426*** (0.000)	0.0124 (0.368)
Square of age	-0.0013*** (0.001)	-0.0012** (0.017)	-0.0006 (0.525)	0.0013 (0.303)	-0.0002 (0.419)	-0.0001 (0.621)	0.0018 (0.107)	-0.0004*** (0.001)	-0.0001 (0.525)
Marital status	-0.2109 (0.634)	-1.7146*** (0.002)	1.0879* (0.070)	3.4266 (0.125)	0.0052 (0.981)	0.0560 (0.698)	2.9100 (0.164)	-0.0255 (0.848)	-0.0137 (0.880)
Household size	-0.0108 (0.912)	-0.0366 (0.803)	0.0839 (0.589)	-0.1230 (0.667)	0.0638 (0.343)	0.0065 (0.804)	0.0976 (0.666)	0.0104 (0.738)	0.0407* (0.055)
Per capita expenditure	0.0172*** (0.003)	-0.0050 (0.505)	0.0374*** (0.000)	-0.0275 (0.586)	0.0118*** (0.000)	0.0006 (0.620)	0.0315** (0.027)	-0.0008 (0.711)	0.0007 (0.496)
Tap water	0.3404 (0.567)	0.4918 (0.446)	-0.3230 (0.684)	0.9780 (0.579)	-0.1602 (0.711)	0.0200 (0.819)	-2.2769 (0.107)	0.1607 (0.371)	0.0381 (0.690)
Clean water	0.3120 (0.191)	1.1037*** (0.002)	-0.7674 (0.114)	0.4803 (0.431)	-0.2793** (0.034)	0.0409 (0.587)	-0.4138 (0.376)	0.0793 (0.304)	-0.0507 (0.448)
Having toilet	no -0.1754	-0.1264	-0.1322	-0.6539	-0.0381	-0.0359	-0.6430	0.0278	-0.0304

	(0.526)	(0.716)	(0.747)	(0.645)	(0.873)	(0.618)	(0.651)	(0.732)	(0.543)
Observations	798	798	798	798	794	798	798	798	798
Number of id	399	399	399	399	397	399	399	399	399
"Difference in Sargan" C test	0.831	0.181	0.245	0.684	0.662	0.018	0.279	0.988	0.109
Hansen J test	0.098	0.495	0.347	0.589	0.358	0.374	0.931	0.436	0.304
Kleibergen-Paap F-test	39.322	39.322	39.322	39.322	39.305	39.322	39.322	39.322	39.322
% maximal IV relative bias	5%	5%	5%	5%	5%	5%	5%	5%	5%
<b>Panel 2006-2008</b>									
HCFP insurance	-0.2185	-0.2706	0.4578	1.2210	0.1388	-0.0729	1.7305**	-0.1180	-0.0573
	(0.410)	(0.526)	(0.357)	(0.236)	(0.326)	(0.377)	(0.040)	(0.172)	(0.349)
Year 2008	0.6850***	1.1149***	0.1809	0.1097	0.0223	0.0508*	0.3971	0.2707***	-0.0199
	(0.000)	(0.000)	(0.359)	(0.820)	(0.700)	(0.096)	(0.247)	(0.000)	(0.374)
Age	0.0693***	0.0830*	0.0459	0.4067	0.0028	-0.0174	0.1766	-0.0012	-0.0087
	(0.006)	(0.067)	(0.581)	(0.340)	(0.864)	(0.152)	(0.279)	(0.935)	(0.384)
Square of age	-0.0005*	-0.0006	-0.0003	-0.0017	0.0000	0.0002	-0.0016	0.0000	0.0001
	(0.052)	(0.189)	(0.642)	(0.675)	(0.955)	(0.167)	(0.401)	(0.720)	(0.556)
Marital status	-0.2474	-0.4174	0.5502	-0.1852	0.0264	-0.1952*	2.6060	0.1682	-0.0113
	(0.586)	(0.403)	(0.246)	(0.938)	(0.844)	(0.099)	(0.227)	(0.167)	(0.675)
Household size	0.2235***	0.2280**	0.0822	0.2183	0.0255	0.0044	0.0108	0.0290	0.0284*
	(0.000)	(0.024)	(0.587)	(0.385)	(0.467)	(0.825)	(0.959)	(0.206)	(0.060)
Per capita expenditure	0.0002***	0.0001	0.0003***	0.0003	0.0001**	0.0000	0.0001	-0.0000	0.0000
	(0.000)	(0.111)	(0.005)	(0.122)	(0.023)	(0.381)	(0.310)	(0.512)	(0.671)
Tap water	0.4240	0.6218	-0.7473	-1.7431	-0.0576	-0.3081***	-1.0593	-0.1205	0.0210
	(0.379)	(0.191)	(0.306)	(0.178)	(0.738)	(0.003)	(0.233)	(0.295)	(0.747)
Clean water	0.0034	-0.2768	0.1854	-0.6987	0.1032	-0.0360	-0.0495	-0.1091*	-0.0404
	(0.988)	(0.421)	(0.642)	(0.187)	(0.505)	(0.561)	(0.925)	(0.073)	(0.362)
Having toilet	-0.2693	0.6237	-1.0370**	0.7561	-0.1045	0.1089	0.2182	-0.1358	-0.0445

	(0.367)	(0.124)	(0.040)	(0.437)	(0.500)	(0.208)	(0.789)	(0.101)	(0.265)
Observations	956	956	956	956	956	956	956	956	956
Number of id	478	478	478	478	478	478	478	478	478
"Difference in Sargan" C test	0.269	0.266	0.019	0.235	0.13	0.353	0.984	0.6	0.385
Hansen J test <sup>1</sup>	0.151	0.504	0.471	0.595	0.267	0.006	0.37	0.148	0.137
Kleibergen-Paap F-test	29.16	29.16	29.16	29.16	29.16	29.16	29.16	29.16	29.16
% maximal IV relative bias	5%	5%	5%	5%	5%	5%	5%	5%	5%

<sup>1</sup> Tests the null hypothesis that the regressor can be treated as exogenous.

<sup>2</sup> Tests for the over-identifying restrictions with a null hypothesis stated as follows: The endogenous regressor is orthogonal to the error term.

<sup>3</sup> Weak identification test of instrument relevance; weak identification causes a bias in the estimated IV coefficients.

In sum, our TOT analysis reveals evidence of a price-reduction effect of the HCFP insurance and of a stimulating effect in access to public health care. The results indicate that the HCFP helped its beneficiaries to lower the total OOP health spending and at the same time improved access to public health care facilities that are covered by the program. While these results hold strongly for both the entire sample of participants and the eligible participants under the fixed-effects model, they are only robust under the IV fixed-effects model when applied for the panel 2004-2006 for the entire sample. In all other estimations under the IV fixed-effects model, the performance of instruments appears to be less desirable. It should be recalled that the same findings are also documented in recent studies by Wagstaff (2010) and Nguyen (2009), in which they use earlier rounds of the VHLSS data. Like Wagstaff (2010), our study finds little evidence of the impact on the use of health care services including outpatient and inpatient care. Following the same author, we argue that this limited impact indicates other non-price constraints facing the insured participants, e.g. inaccessibility to modern facilities, that prevent them from using health services.

Our study also examines impacts of the HCFP program beyond the widely expected impact on health expenditure and access to health services. Theory suggests that health insurance may contribute to improving health preventive behavior, and dealing with adverse health events. In these regards, we find that, albeit the results are not strongly consistent across estimations, the HCFP appears to have improved the probability of visits for a checkup and reduced the propensity of making catastrophic payment. These effects are not revealed by our

estimates using IV within fixed-effects framework, though.

## 6. DISCUSSION AND CONCLUSIONS

The present study looks at the effectiveness of the HCFP program after the five years it has been in place, with participation in the program represented by a dichotomous dummy variable. The empirical analysis distinguishes two groups of beneficiaries: the entire sample of participants, and the group of eligible participants. Since health insurance participation can be a non-random process, the possible endogeneity of insurance participation can bias the estimate of the impact of the program. We therefore distinguish the program effect using both fixed-effects models and IV within fixed-effects model in order to control for observed and unobserved heterogeneity at both individual and household level.

We find that over the period 2004-2008 the program exerted some significant effects among its beneficiaries along various health-related outcomes. The most pronounced effects are a substantial reduction in the overall OOP health care expenditure; and an increase in the intensity of seeking health care from a public facility. We also find some evidence of a positive impact of the HCFP insurance on preventive care behavior and an impact of reducing the incidence of catastrophic health spending, even though the results are not consistent across specifications.

Compared with other studies in the field for Vietnam, our study offers several distinguished features. First, a large updated sample with the panel structure enables us to explore the most recent impact of the program



as well as the dynamics of the impact over time. Second, unlike Nguyen (2009), we use the official status of eligibility to consider the ITT effect and the TOT effect of the program. The eligibility group includes the group of the poor plus the group of people who reside in targeted areas of the program. The focus on only people officially designated as poor, as done in Nguyen(2009), may miss out (a fraction of) the latter group, and thus underestimate the program effect. Third, we assume selection bias and attrition bias on unobserved heterogeneity, and consequently use instruments within fixed-effects to estimate the causal impact of the program. The possible selection bias of participation in the program has been addressed differently in other research. Wagstaff (2007) used data from the VHLSS 2002 and 2004 to study the impact of the program but did not control for selection bias of program participation. In this way, he treated insurance participation as exogenous. In a more recent study, Wagstaff (2010) used the triple differencing method based on 3-year panel 2002-2004-2006 to address unobserved heterogeneity, allowing for unobserved idiosyncratic returns and heterogeneity that grows by the same amount across periods of time. Nguyen (2009) provides the most comparable case to our analysis in that she also used the IV method to address the selection bias problem. Our current choice of instruments is however, more comprehensive than that used by Nguyen (2009). We use the eligibility, the program coverage and the program coverage interacted with other variables at the individual and household level as instrument variables for the health insurance participation. These interaction variables control for the possible non-linear peer effect that insurance coverage at a commune can influence one's decision to take up insurance. We note that the IV application within fixed-effects can address both the problem of possible selection bias caused by non-random participation in the program and the problem of possible attrition bias caused non-random decision to stay or leave the program over time. As a matter of fact, our instrument tests indicate that in many specifications, the HCFP insurance participation can be treated as exogenous. Nevertheless, we acknowledge that health insurance participation is likely to be endogenous by nature and should be addressed as an endogenous variable. A better set of instruments is therefore warranted in future study.

Overall, our findings confirm the two resilient and expected outcomes of the HCFP insurance. First, the program improved health care utilization at public hospitals, diverting the insured away from seeking health care from the private sector, and/or having resorted to self-medication. Second, through a price-reduction effect, the HCFP insurance also saved poor people from the OOP health expenditure. More

interestingly, our study suggests a virtue of the HCFP that has not been revealed by other research, that is the HCFP helped improve health care awareness among its beneficiaries, encouraging check-up visits and limiting the incidence of making catastrophic payment when dealing with adverse health events.

Our study also provides strong evidence of the ITT - the potential effect of the HCFP, irrespective of beneficiary participation. According to the estimated ITT effect, the HCFP would potentially improve health care utilization, especially from public facilities, reduce the OOP expenditure for health care and increase health care awareness among people who qualify for the HCFP. We acknowledge that the ITT effect is not typically the question of interest for the program designers, who are primarily concerned about what they can achieve once the program is implemented. On the other hand, because the effect of ITT basically captures the impact of offering insurance, not requiring insurance, which the HCFP is all about, it can be a relevant consideration for making policy decisions about voluntary programs such as the HCFP.

Further research on the impact of the targeted health microinsurance program in Vietnam and elsewhere should pursue several of the remaining issues that demand attention. First, it would be useful to explore the impact of the health insurance program on health-related outcomes of the poor across different groups of gender, age, region, and quintiles of income. Second, it would be interesting to compare the impact of this voluntary health insurance with that of other compulsory schemes that are currently prevalent in Vietnam. Finally, researchers could attempt to improve our methodology. Our study uses an observational, non-randomized design. As a response to the methodological limitations of observational non-randomized evaluations, impact evaluation studies have recently shifted to randomized approaches. These approaches in principle appear to be the best to control for the possible endogeneity of the participation decision and of sample attrition. However, this type of studies are often practically, and/or ethically not possible, especially for the case of health insurance programs targeted at the poor such as the HCFP. Therefore, observational studies, like ours, will remain important. However, if data availability expands, researchers should use longitudinal data with a longer time span and seek better instruments to improve the IV method within fixed-effects models.

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## APPENDIX

Table A1. Variable Definition and Summary

Variables	Definitions	2004			2006			2008		
		Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Health-related outcomes										
Total OOP expenditure (thousands VND)	Sum of personal Out-of-Pocket expenditure for outpatient care & inpatient care, plus household average value of self-medication cost and medical facilities	8085	830.724	2509.759	8767	897.207	2849.751	8160	1492.379	5639.217
Outpatient OOP (thousands VND)	Personal OOP expenditure for outpatient care	8085	367.450	1141.404	8767	415.747	1897.433	8160	670.251	3141.592
Inpatient OOP (thousands VND)	Personal OOP expenditure for inpatient care	8085	376.577	2112.299	8767	376.012	1959.605	8160	668.139	4447.512
Self-medication cost (thousands VND)	Household OOP expenditure for self-medication	20558	275.599	557.351	20809	322.045	772.613	20901	462.675	1429.182
Medical facilities cost (thousands VND)	Household OOP expenditure for medical facilities	20558	15.788	76.494	20809	21.787	167.892	20901	28.149	173.571
# of outpatient visits	Number of outpatient medical visits of individual	8074	3.121	4.522	8767	3.555	5.449	8160	3.586	5.515
# of inpatient visits	Number of inpatient medical visits of individual	8056	0.326	0.904	8765	0.275	0.739	8154	0.296	0.749
# of visits to public hospitals	Number of visits to public health care facilities of individual	8085	1.845	3.010	8767	2.349	4.074	8160	2.294	3.942
# of visits to private hospital	Number of visits to private health care facilities individual	8085	0.026	0.404	8767	0.018	0.270	8160	0.020	0.268
Check-up visit (0/1 dummy, 1 for Yes)	Whether the individual has any visits for checkup purposes in the past 12 months	8085	0.143	0.350	8767	0.170	0.375	8160	0.205	0.404

Catastrophic payment (0/1 dummy, 1 for Yes)	Whether the personal OOP health expenditure in excess of 40percent of per capita non-food expenditure	8085	0.706	0.456	8767	0.390	0.488	8160	0.668	0.471
Health shock consequence (0/1 dummy, 1 for Yes)	Whether the household had to sell off its productive assets (land, property, durable assets), and/or borrow money when not able to cover OOP cost for health care	8085	0.102	0.302	8767	0.069	0.254	8160	0.056	0.230
Eligible (0/1 dummy, 1 for Yes)	Eligible when being a member of households designated as poor by their commune authority, households of poor communes (known as 135 communes), and ethnic minority households in disadvantaged mountainous communes	20558	0.251	0.434	20809	0.278	0.448	20901	0.270	0.444
HCFP Insurance (0/1 dummy, 1 for Yes)	Dichotomous treatment variable: Whether the individual participated in the program in the survey year	20558	0.156	0.363	20809	0.210	0.407	20901	0.193	0.394
Coverage	To what extent the HCFP is extended at commune level: (total the eligible insured - 1)/Total eligible of the commune	20558	0.155	0.398	20809	0.242	0.491	20901	0.220	0.486
Individual characteristics										
Age (years)	Age of individual	20558	43.283	16.764	20809	43.987	16.732	20901	44.580	16.916
Marital status (0/1 dummy, 1 for Yes)	Marital status of individual	20558	0.736	0.441	20809	0.149	0.356	20901	0.742	0.437
Education dummies										
	Highest degree of education for individual									
No degree (0/1 dummy, 1 for Yes)		20558	0.101	0.301	20809	0.106	0.308	20901	0.098	0.297
Primary degree (0/1 dummy, 1 for Yes)		20558	0.330	0.470	20809	0.317	0.465	20901	0.306	0.461

Lower secondary degree (0/1 dummy, 1 for Yes)		20558	0.404	0.491	20809	0.406	0.491	20901	0.406	0.491
Upper secondary degree (0/1 dummy, 1 for Yes)		20558	0.165	0.371	20809	0.171	0.376	20901	0.190	0.392
Household characteristics										
Ethnic minority	Whether household is from a minority ethnic group	20558	0.175	0.380	20809	0.185	0.388	20901	0.185	0.388
Size (persons)	Size of household	20558	4.920	1.911	20809	4.761	1.875	20901	4.658	1.811
Per capita expenditure (thousands VND)	Per capita expenditure of household	20558	3750.381	2822.337	20809	4067.340	3233.028	20901	4841.097	4272.715
Ratio of females	Percentage of female members in household	20558	0.504	0.178	20809	0.509	0.177	20901	0.507	0.178
Ratio of children	percentage of children under 15 years old in household	20558	0.251	0.206	20809	0.228	0.203	20901	0.214	0.199
Female headed households (0/1 dummy, 1 for Yes)	Whether household head is female	20558	0.208	0.406	20809	0.097	0.296	20901	0.208	0.406
Household head working in the formal sector (0/1 dummy, 1 for Yes)	whether household head working in the formal sector	20558	0.053	0.224	20809	0.000	0.000	20901	0.057	0.232
Household hygiene conditions										
Tap water (0/1 dummy, 1 for Yes)	Whether household meets the following hygiene conditions	20558	0.152	0.359	20809	0.182	0.386	20901	0.221	0.415
Clean water (0/1 dummy, 1 for Yes)		20558	0.680	0.467	20809	0.649	0.477	20901	0.640	0.480
Having no toilet (0/1 dummy, 1 for Yes)		20558	0.157	0.364	20809	0.130	0.336	20901	0.120	0.325

Table A2. Alternative estimates of the TOT impact: negative binomial fixed-effect estimates for discrete health-related outcomes (columns 1 -3); and logit fixed-effect estimates for binary health-related outcomes (columns 4-6)

<i>Health-related outcomes</i>	<i># of outpatient visits</i>	<i># of inpatient visits</i>	<i># of visits to public hospitals</i>	<i>Checkup visit (0/1)</i>	<i>Catastrophic payment (0/1)</i>	<i>Health shock consequence (0/1)</i>
	(1)	(2)	(4)	(3)	(5)	(6)
<b>Panel 2004-2006</b>						
HCFP insurance	-0.0297 (0.626)	0.1975 (0.174)	0.2614*** (0.000)	0.5150** (0.046)	-0.1527 (0.549)	-0.0914 (0.749)
Year 2006	0.1436*** (0.000)	-0.1599** (0.018)	0.1903*** (0.000)	0.2385** (0.023)	-1.9226*** (0.000)	-0.7128*** (0.000)
Age	0.0064 (0.547)	0.0319 (0.291)	-0.0158 (0.227)	-0.0820* (0.096)	0.0324 (0.462)	0.1013 (0.222)
Square of age	-0.0001 (0.448)	-0.0004 (0.229)	0.0002 (0.202)	0.0009* (0.086)	-0.0001 (0.763)	-0.0010 (0.187)
Marital status	0.0087 (0.920)	0.3619 (0.164)	0.2704*** (0.009)	0.4093 (0.365)	0.5011 (0.265)	0.7131 (0.360)
Household size	-0.0006 (0.973)	0.0409 (0.471)	0.0159 (0.482)	-0.1082 (0.280)	-0.0608 (0.546)	0.1437 (0.366)
Per capita expenditure	-0.0006 (0.498)	0.0051** (0.034)	0.0009 (0.473)	0.0040 (0.349)	-0.0050 (0.223)	0.0121 (0.128)
Tap water	-0.0372 (0.687)	-0.0732 (0.800)	-0.0808 (0.494)	-1.3838*** (0.006)	0.2843 (0.499)	-0.2773 (0.670)
Clean water	-0.0568 (0.406)	-0.1193 (0.548)	0.0297 (0.730)	-0.2301 (0.447)	0.1057 (0.728)	-0.9226** (0.024)
Having no toilet	0.0474 (0.508)	-0.1737 (0.416)	-0.0190 (0.834)	0.2001 (0.542)	0.6121* (0.097)	-0.4486 (0.287)
Constant	0.7906*** (0.003)	-0.5683 (0.435)	0.2704 (0.392)			
Observations	4,054	1,408	3,548	912	1,812	512

Number of id	2,027	704	1,774	456	906	256
<b>Panel 2006-2008</b>						
HCFP insurance	0.1852*** (0.003)	0.0543 (0.746)	0.4155*** (0.000)	-0.0034 (0.988)	-0.3357 (0.137)	-0.3093 (0.387)
Year 2008	-0.0319 (0.219)	-0.0286 (0.688)	-0.0381 (0.229)	0.3046*** (0.002)	1.3991*** (0.000)	-0.5525*** (0.002)
Age	0.0269** (0.010)	0.0096 (0.777)	0.0244* (0.056)	0.0138 (0.809)	-0.1282** (0.012)	-0.0503 (0.760)
Square of age	-0.0002** (0.023)	-0.0000 (0.917)	-0.0002* (0.098)	-0.0002 (0.769)	0.0017*** (0.003)	0.0005 (0.778)
Marital status	-0.0739 (0.386)	0.2968 (0.346)	0.0729 (0.492)	0.4137 (0.356)	0.6355 (0.136)	1.2310 (0.353)
Household size	0.0254 (0.148)	0.0893 (0.102)	-0.0249 (0.233)	-0.1521* (0.098)	0.2020** (0.011)	0.1435 (0.443)
Per capita expenditure	0.0000* (0.062)	0.0001*** (0.001)	-0.0000 (0.900)	-0.0000 (0.516)	-0.0000 (0.913)	0.0002** (0.025)
Tap water	-0.0777 (0.359)	-0.1756 (0.531)	0.0598 (0.573)	-0.7373** (0.047)	-0.6451* (0.067)	-0.7488 (0.255)
Clean water	-0.0907 (0.183)	0.3423* (0.071)	0.0855 (0.290)	-0.5697** (0.028)	-0.5467** (0.033)	-0.3944 (0.403)
Having no toilet	-0.0333 (0.633)	-0.3650* (0.089)	0.0053 (0.952)	-0.0805 (0.773)	-0.5016* (0.071)	-0.4890 (0.297)
Constant	0.1522 (0.550)	-0.9948 (0.233)	-0.1687 (0.595)			
Observations	4,126	1,368	3,648	1,086	1,850	394
Number of id	2,063	684	1,824	543	925	197