Long-term effects of health shocks and insurance on rural households' consumption and wealth in Vietnam: evidence from panel data

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ABSTRACT

Evidence of the impact of health coverage on households' financial security in the event of health shocks in Vietnam has been limited by a focus on public insurance and short-term shock experience. Therefore, we examined the impact of public and private insurance coverage, interacted with health shock experience over multiple years, on the consumption and wealth of rural households. Drawing on a representative sample of 1,876 rural households from three provinces in Vietnam, we show that, in the absence of health coverage, health shocks have a positive effect on health expenditures while reducing non-health expenditures and wealth. Public health coverage decreases the probability to incur health expenditures in the event of longer-term health shocks. Among households incurring health expenditures, public health coverage reduces the amount of health expenditures incurred within three years after the onset of an illness. Private health insurance mitigates reductions in non-health expenditures and wealth which can occur more than one year after a health shock. Our findings suggested that Vietnam's public health coverage program needs improvement in terms of expanding the benefit package and/or reducing the proportion of cost sharing to effectively protect rural households from both short-term and longer-term financial risks including a decrease in non-health consumption and wealth associated with health shocks. Private health insurance can be a safeguard from the longer-term financial risks of illness, for those with access to it.

Key words: financial security, health consumption, health insurance, illness, non-health consumption

INTRODUCTION

Universal health coverage has been widely promoted across the globe in recent years, most notably by the World Health Organization[1] and, more recently, by its inclusion in the Sustainable Development Goals[2]. According to the World Health Organization[1], p. ix, universal health coverage refers to a situation in which "all people have access to [health] services and do not suffer financial hardship paying for them". Financial risk protection is a key element of universal health coverage as illnesses, injuries and disabilities, which are often perceived as shocks, pose a serious threat to the financial well-being of affected private households[3]. Households might be pushed into or deeper into poverty as a result of health shocks, a risk which tends to be greatest in rural areas in developing countries, as for poor and near poor households, out-of-pocket payments can be particularly high relative to their income, and, paid sick leave is often unavailable due to the persistence of subsistence farming and informal employment[4].

In Southeast Asia, Vietnam is one of several countries which has made noticeable progress in extending its social health insurance scheme to larger parts of its population while, at the same time, still facing challenges in achieving full universal health coverage. In 2007, approximately US$30 per capita annually was spent on health care, with two-thirds of the expenditure being private spending[5]. Key health outcomes in Vietnam are considered to be at satisfactory levels compared to other developing countries, but there are concerns regarding increasing inequalities. Health, as well as economic disparities including income poverty, are especially concentrated in rural areas and among the ethnic minorities[5].

The health insurance scheme in Vietnam consists of two parts, compulsory health insurance (CHI) and voluntary health insurance (VHI). Under CHI, there is the social health insurance (SHI) scheme for the formally employed, retirees, disabled, meritorious people; and the health care funds for the poor (HCFP) covering the poor and ethnic minorities. All children under six years old are covered by a different program for young children. The VHI targets self-employed, informal sector workers, dependents of CHI-members, students and school children[6]. In 2007, roughly half of the Vietnamese population is covered by one of the Vietnamese insurance systems, with 18% of the population being covered by HCFP. Since that year, the coverage rate steadily increased and, by 2012, about 65% of the Vietnamese population was covered by one of the Vietnamese health insurance schemes[7].

Evidence on the impact of Vietnam's health insurance scheme in terms of providing financial risk protection to private households shows mixed results[8-13]. A major weakness of earlier studies is the missing or incomplete control for health shocks. While some studies merely control for households' public health insurance coverage without any consideration of the actual occurrence of illnesses[7,12,14], others only take into account health problems (or health care seeking as a proxy) of household members which happened within a time period of one year[10,11,15] or two years[16]. Controlling for households' health status when estimating the effect of public health insurance coverage on household expenditures is important, as changes in health expenditures are triggered by illnesses in the first place, while insurance coverage is expected to subsequently mitigate these changes. Furthermore, it is important to control for health shocks which struck households further in the past than only one or two years ago, as medical conditions can

have long-term effects on households' expenditures and wealth.

A further important shortcoming of previous studies is the lack of consideration of the impact of private health insurance. Despite the often promoted key role of public health insurance in reducing health shock-induced financial risk, it has been argued that private insurance can be a valuable additional tool to fill gaps in public health care systems in developing countries[17-19]. Estimating the impact of private health coverage on changes in household consumption and wealth caused by illness can help understand to what extent that claim is true and avoid bias in estimating the impact of public health insurance due to omitting a relevant covariate.

In the light of the inconclusiveness and limitations of earlier research, this study examines the impact of both public and private health coverage on the consumption and wealth of rural households, while taking into account the effects of health shocks over multiple years.

METHODS

Our analysis draws on data from the 2007, 2008, and 2010 waves of the Thailand Vietnam Socio Economic Panel (TVESP – For further information see: https://www.tvsep.de). In our study, we select only Vietnam to explore the impact of health shocks and insurance since Thailand was able to provide more than 90% social health protection coverage by 2003, two years after enacting its policy of universal health coverage[20].

The data were collected from 2,200 rural households using a comprehensive household questionnaire to collect information on the demographic, economic, and social situation of households, as well

as the impact of shocks experienced. The 2007, 2008, and 2010 waves of the TVSEP were based on the same questionnaire, except for some minor adjustments, in order to capture changes in the situation of the same households over time. The questionnaire included questions on general household characteristics (size, composition and dynamics, education, health), shocks experienced during the past five years, perceived risks of shocks for the next five years, land size and ownership status, agricultural activities, natural resource extraction, off-farm employment including wage labor, non-farm self-employment including cottage industries, borrowing, lending, public and other transfers and insurance, household consumption, and household assets. The questionnaire was administered through face-to-face interviews with the head of each household or, alternatively, the most knowledgeable person in the household, by trained Vietnamese speaking interviewers. Respondents were selected based on a 3-stage cluster sampling procedure which ensures that the sample is representative of the population of rural households in the provinces of Dak Lak, Ha Tinh, and Thua Thien Hue. The three provinces Dak Lak, Ha Tinh, and Thua Thien Hue were purposively selected because of their low average per capita income, high reliance on agriculture, remote location along the country's border, and poor infrastructure. In each of these provinces, urban areas around the provincial capital were excluded and the sample was limited to the remaining rural areas. Within these rural areas, communes were randomly selected using population density weights, and within each of the selected communes, two villages were chosen randomly. Finally, in each of the selected villages, ten households were selected at random. Further information

about the questionnaire and sample design can be found in Hardeweg et al.[21].

Three random effects models were estimated. All consumption figures refer to nucleus household members. The nucleus household consists of all individuals who stayed in the household for 180 days per year or longer. The first model is for households' health consumption which was measured based on questions about household expenses for different types of non-durable goods during a reference period of 12 months preceding the interview. Health consumption is the sum of all health-related household expenses such as hospital fees and cost of medicine. As many households did not incur any health expenditures in a given year, applying a linear model on all observations would not yield consistent parameter estimates. Therefore, we used a two-part model where the first part of the model estimates the probability of incurring positive health expenditures, while the second part estimates the level of health expenditures given any positive health expenditures. A logit model was applied for the first part as the dependent variable is a binary outcome with "0" indicating no health consumption and "1" indicating that health consumption was positive (greater than zero). A linear model on the log-transformed values of positive health expenditures was applied for the second part. The values of positive health expenditures were log-transformed, because the original data were skewed due to some outliers. The log-transformed values of positive health expenditures follow a near-normal distribution.

The second and third models are for non-health consumption and level of wealth, which was measured based on questions about asset ownership and housing conditions using principal component analysis, respectively. A linear regression model was applied for both outcomes of interest. For the second model, the dependent variable is the log-transformed, non-health expenditures.

In all models, the experience of health shocks was captured based on a question on whether any household member was affected by illnesses which were perceived as a shock. The health shock variable in our models reflects the number of health shocks that occurred within a given time period (which we varied from one to five years prior to the interview) in order to test the impact of health shocks and health insurance coverage in the longer-run, weighted by a subjective measure of shock severity.

Household health insurance coverage was measured by asking households about both their entitlement to obtain free, government-provided health benefits and their private insurance policies. In our models, the health coverage variables were interacted with the health shock variable to assess whether health coverage mitigates or strengthens the effects of health shocks on health and non-health consumption, as well as on changes in wealth. The models include a set of control variables to capture other factors which may influence health and non-health consumption as well as changes in wealth. Including these control variables helps to avoid biased parameter estimates arising from omitted variables. The control variables were the number of non-health shocks, education of the household head, dependency ratio (share of dependent nucleus household members between 0-14 years of age or over 65 years of age), age of the household head, age of the household head squared, total household consumption per capita, years of data collection, and survey province.

This study was exempted from ethical approval of the Institutional Review Board of the Institute for Population and Social Research (IPSR-IRB) of Mahidol

University, because secondary data analysis was carried out on the dataset which is publicly available (COE. No. 2018/07-207).

RESULTS
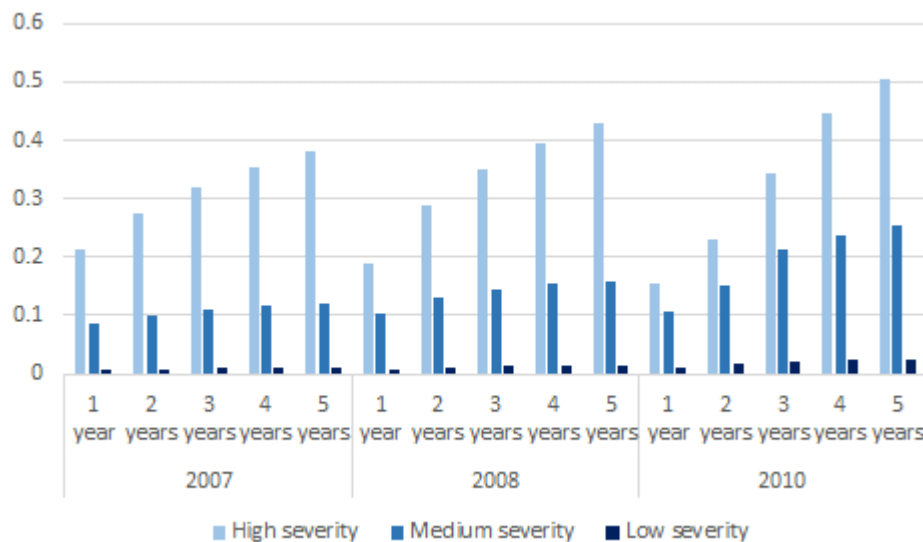
Figure 1 Average number of health shocks experienced by households, by survey wave, and time of occurrence prior to the interview (n=1876)

Figure 1 shows the average number of health shocks that households experienced, disaggregated by the self-perceived subjective severity of those shocks, and the time of occurrence of those shocks. For instance, on average, households experienced about 0.21 health shocks which were perceived as highly severe within one year prior to the survey in 2007, whereas about 0.38 such shocks were experienced within a period of five years. Overall, health shocks which respondents described as highly severe were the most prevalent ones, followed by shocks of medium severity. Very few low severity health shocks were reported by households. As mentioned above, shocks of different levels of severity were aggregated in the regression models, but a higher weight was given to shocks of higher severity. The descriptive statistics of the aggregated and weighted number of health shocks are presented in Tables 1 and 2.

**Table 1** Household characteristics (consumption, wealth and shock experience)

	2007					2008					2010				
	Mean	SE	Min	Max	Median	Mean	SE	Min	Max	Median	Mean	SE	Min	Max	Median
Household health and non health consumption:															
Positive health consumption (1=Yes)	0.94	0.01	0.00	1.00	1.00	0.88	0.01	0.00	1.00	1.00	0.88	0.01	0.00	1.00	1.00
Health consumption per capita per day if any (2005 PPP$)	0.13	0.01	0.00	2.17	0.05	0.14	0.01	0.00	8.29	0.03	0.18	0.02	0.00	16.85	0.04
Non health consumption per capita per day (2005 PPP$)	2.67	0.04	0.33	13.12	2.27	3.42	0.06	0.31	36.08	2.82	3.28	0.05	0.31	27.85	2.77
Household wealth:															
Wealth score	-1.12	0.01	-2.41	4.80	-1.27	-0.97	0.03	-2.52	5.47	-1.28	-0.58	0.03	-2.97	6.02	-0.84
Household shock experience:															
Number of health shocks weighted by severity															
Within 1 year prior to interview	0.82	0.04	0.00	14.00	0.00	0.78	0.03	0.00	11.00	0.00	0.70	0.03	0.00	9.00	0.00
Within 2 years prior to interview	1.04	0.04	0.00	14.00	0.00	1.14	0.04	0.00	14.00	0.00	1.01	0.04	0.00	9.00	0.00
Within 3 years prior to interview	1.19	0.04	0.00	14.00	0.00	1.35	0.05	0.00	14.00	0.00	1.48	0.05	0.00	12.00	0.00
Within 4 years prior to interview	1.30	0.04	0.00	14.00	0.00	1.51	0.05	0.00	14.00	0.00	1.83	0.06	0.00	15.00	0.00
Within 5 years prior to interview	1.39	0.05	0.00	14.00	0.00	1.61	0.05	0.00	14.00	0.00	2.05	0.06	0.00	15.00	2.00

Note: SE=Standard error of the mean. Number of observations n=1876, except for non-health consumption per capita per day (n=1,870 in year 2007) and wealth score (n=1,871 in year 2007, n=1,874 in year 2008, n=1,875 in year 2010) due to missing values. Observations with missing values in any variables were automatically excluded in the regression models. The number of observations of health consumption per capita per day (if any) is smaller than the overall sample, as only non-zero answers were considered (n=1,758 in year 2007, n=1,841 in year 2008, n=1,651 in year 2010).

Table 2 Household characteristics (health insurance and general socio-demographic characteristics)

	2007					2008					2010				
	Mean	SE	Min	Max	Median	Mean	SE	Min	Max	Median	Mean	SE	Min	Max	Median
Household health insurance coverage															
Public health insurance only (1=Yes)	0.42	0.01	0.00	1.00	0	0.52	0.01	0.00	1.00	1.00	0.32	0.01	0.00	1.00	0.00
Private health insurance only (1=Yes)	0.19	0.01	0.00	1.00	0	0.16	0.01	0.00	1.00	0.00	0.34	0.01	0.00	1.00	0.00
Public and private health insurance (1=Yes)	0.15	0.01	0.00	1.00	0	0.1	0.01	0.00	1.00	0.00	0.18	0.01	0.00	1.00	0.00
No health insurance (1=Yes)	0.25	0.01	0.00	1.00	0	0.22	0.01	0.00	1.00	0.00	0.17	0.01	0.00	1.00	0.00
Other household characteristics															
Education of household head (Years)	7.6	0.08	1.00	18.00	7	7.7	0.08	1.00	17.00	7.00	7.7	0.08	1.00	18.00	8.00
Dependency ratio	21.7	0.54	0.00	100.00	16	20.9	0.55	0.00	100.00	16.00	19.5	0.57	0.00	100.00	11.11
Age of household head (Years)	47.4	0.31	21.00	99.00	45	48.5	0.31	22.00	92.00	46.00	50.3	0.3	35.00	0.00	48.00
Consumption per capita per day (2005 PPP$)	2.8	0.04	0.34	13.25	2.39	3.6	0.06	0.31	36.14	2.93	3.5	0.06	0.31	28.16	2.92
Dak Lak province (1=Yes)	0.34	0.01	0.00	1.00	0.00	0.34	0.01	0.00	1.00	0.00	0.34	0.01	0.00	1.00	0.00
Ha Tinh province (1=Yes)	0.36	0.01	0.00	1.00	0.00	0.36	0.01	0.00	1.00	0.00	0.36	0.01	0.00	1.00	0.00
Thua Thien Hue province (1=Yes)	0.30	0.01	0.00	1.00	0.00	0.30	0.01	0.00	1.00	0.00	0.30	0.01	0.00	1.00	0.00

Note: SE=Standard error of the mean. Number of observations n=1876, except for education of household head (n=1,814 in year 2007, n=1,781 in year 2008, n=1,840 in year 2010), dependency ratio (n=1,875 in year 2007, n=1,874 in year 2008), age of household head (n=1,873 in year 2007) and consumption per capita per day (n=1,870 in year 2007) due to missing values. Observations with missing values in any variables were automatically excluded in the regression models.
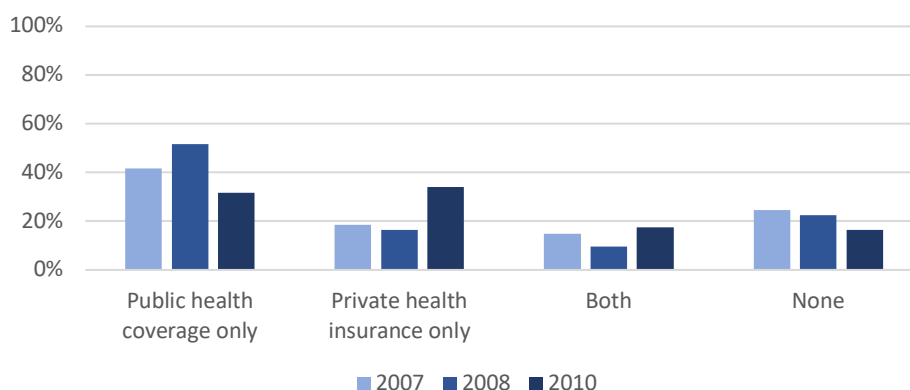
Figure 2 Percentage of households covered by health insurance, by survey wave (n=1876)

Over the three survey waves, roughly 49% to 61% of households reported having household members who were entitled to obtain free, government-provided health care benefits (Table 1, Table 2 and Figure 2). Between 34% and 52% of households maintained private health insurance arrangements, with a considerable increase between 2008 and 2010. Only a small percentage (10% to 18%) of households had both public and private health insurance coverage.

The outcomes of interest in this study are households' health and non-health expenditures, and the level of wealth. In all years of the survey, there were approximately six to 12% of households that did not have any health consumption in that particular year. While for those households with positive health consumption, the expenditures ranged from 0.14 to 0.21 dollars (2005 PPP) per capita per day, with the cost slightly rising from 2007 to 2010. The average non-health consumption per capita, per day, in 2005 PPP\$ increased from 2.67 in 2007 to 3.42 in 2008 and declined to 3.28 in 2010. The wealth score that was calculated based on assets and living conditions improved on average from 2007 to 2010. For independent variables, the household head on average had close to eight years of schooling. The dependency ratio of households declined over the years from 21.67 to 19.52, reflecting lower dependency as there were fewer children. The average age of household head ranged from approximately 47 to 50 years old in the span from 2007 to 2010. On average, households consume 2.8 to 3.6 dollars (2005 PPP) per capita per day.

Table 3 Parameter estimates from the two-part random effects models of health consumption

Length of shock recall period	Logit model of health consumption (1=Yes)					Linear model of positive health consumption (Log PPP$)				
	1 year	2 years	3 years	4 years	5 years	1 year	2 years	3 years	4 years	5 years
Shock experience										
Health shocks	0.306 ***	0.265 ***	0.269 ***	0.269 ***	0.251 ***	0.268 ***	0.229 ***	0.205 ***	0.180 ***	0.171 ***
*Public health coverage	-0.161	-0.165 **	-0.191 ***	-0.202 ***	-0.188 ***	-0.043 **	-0.034 *	-0.032 **	-0.021	-0.016
*Private health insurance	0.002	-0.001	0.022	0.009	0.023	-0.015	-0.011	-0.014	-0.013	-0.007
Other household characteristics										
Education of household head	-0.040 **	-0.039 **	-0.039 **	-0.038 **	-0.039 **	-0.018 ***	-0.018 ***	-0.017 ***	-0.017 ***	-0.017 ***
Dependency ratio	-0.005 *	-0.005 *	-0.005 *	-0.005 *	-0.005 *	0.003 ***	0.003 ***	0.003 ***	0.003 ***	0.003 ***
Age of household head	0.038	0.036	0.038	0.036	0.037	-0.008	-0.009	-0.009	-0.011	-0.010
Age of household head squared	0.000	0.000	0.000	0.000	0.000	0.000 *	0.000 *	0.000 *	0.000 **	0.000 **
Consumption per capita	0.681 ***	0.676 ***	0.665 ***	0.662 ***	0.657 ***	0.995 ***	1.004 ***	1.006 ***	1.013 ***	1.009 ***
Survey wave										
2008	-0.972 ***	-0.982 ***	-0.977 ***	-0.984 ***	-0.984 ***	-0.473 ***	-0.502 ***	-0.511 ***	-0.518 ***	-0.514 ***
2010	-1.029 ***	-1.044 ***	-1.073 ***	-1.099 ***	-1.114 ***	-0.225 ***	-0.249 ***	-0.306 ***	-0.340 ***	-0.358 ***
Province										
Ha Tinh	2.095 ***	2.100 ***	2.106 ***	2.123 ***	2.129 ***	0.372 ***	0.379 ***	0.380 ***	0.392 ***	0.393 ***
Dak Lak	1.721 ***	1.725 ***	1.738 ***	1.747 ***	1.749 ***	0.554 ***	0.556 ***	0.564 ***	0.569 ***	0.570 ***
n (=number of households)	1,876	1,876	1,876	1,876	1,876	1,857	1,857	1,857	1,857	1,857
n (=number of subjects)	5,424	5,424	5,424	5,424	5,424	4,891	4,891	4,891	4,891	4,891
P>chi² (joint significance)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

*Note: *P<0.1, **P<0.05, ***P<0.01.*

Results of the two-part random effects models of health consumption are shown in Table 3. The parameter estimates from the logit models indicate that households who experienced health shocks have a higher probability of incurring health expenditures in the absence of public and private health coverage (as expected). This finding is consistent across model specifications with different lengths of the considered time period during which shocks occurred. Having public health coverage reduces the probability of incurring health shock-induced health expenditures. However, this effect is not statistically significant when only shocks which happened within a time period of one year are taken into account. The effect becomes significant at the 5% level when shocks that were experienced within two years are considered, and highly significant at the 1% level when shocks within three to five years are counted. The interaction effect of private health insurance on the impact of health shocks on health consumption is mostly positive (though non-significant in all model specifications). The control variables show consistent results, with strong, highly significant effects of total household consumption per capita, province and survey wave on health expenditures. Education of household head and dependency ratio are found to decrease the likelihood of incurring health expenditures, though these findings are only statistically significant at the 5% or 1% level, respectively. The age of household head is shown to increase the probability of health consumption, however, this finding is not significant.

In the linear models of positive health consumption, health shocks also have a highly significant, positive effect on health expenditures in the absence of public and private health coverage regardless of the length of the time period of shock occurrence considered. Similar to the logit models, public health coverage decreases the health shock-induced rise in health consumption, however, this effect is only significant when a time period of shock occurrence between one and three years is taken into account. The effect is not statistically significant when health shocks that happened within four or five years are considered. Private health insurance coverage is found to decrease health expenditures in all model specifications, though this effect consistently lacks statistical significance. As in the logit models, the control variables yield consistent results, with strong, highly significant effects of total household consumption per capita, province, and survey wave on health expenditures. Education of household head is found to decrease health consumption at the 1% level of significance, while dependency has a highly significant, positive effect on health expenditures. Age of household head has a non-significant, negative effect on health consumption, while the squared age of household head has a significant, positive effect.

Table 4 Parameter estimates from the random effects models of non-health consumption

	(Log PPP$)				
Length of shock recall period	*1 year*	*2 years*	*3 years*	*4 years*	*5 years*
Shock experience					
Health shocks	-0.018 ***	-0.016 ***	-0.014 ***	-0.012 ***	-0.011 ***
*Public health coverage	0.001	0.001	0.001	0.000	0.000
*Private health insurance	0.003 **	0.003 **	0.003 **	0.003 **	0.002 **
Non-health shocks	-0.001 ***	-0.001 ***	-0.001 **	-0.001 **	-0.001 **
Other household characteristics					
Education of household head	0.002 ***	0.001 ***	0.001 ***	0.001 ***	0.001 ***
Dependency ratio	0.000 ***	0.000 ***	0.000 ***	0.000 ***	0.000 ***
Age of household head	0.001 *	0.001 **	0.001 *	0.002 **	0.002 **
Age of household head squared	0.000 ***	0.000 ***	0.000 ***	0.000 ***	0.000 ***
Consumption per capita	0.978 ***	0.977 ***	0.977 ***	0.977 ***	0.977 ***
Survey wave					
2008	0.019 ***	0.022 ***	0.022 ***	0.022 ***	0.022 ***
2010	0.008 ***	0.011 ***	0.016 ***	0.018 ***	0.020 ***
Province					
Ha Tinh	-0.013 ***	-0.013 ***	-0.013 ***	-0.014 ***	-0.014 ***
Dak Lak	-0.014 ***	-0.014 ***	-0.014 ***	-0.014 ***	-0.014 ***
n (=number of households)	1,876	1,876	1,876	1,876	1,876
n (=number of subjects)	5,424	5,424	5,424	5,424	5,424
P>chi² (Wald — joint significance	0.0000	0.0000	0.0000	0.0000	0.0000

*Note: *P<0.1, **P<0.05, ***P<0.01.*

Table 4 presents the outcome of the linear, random effects models of non-health consumption. Experiencing health shocks significantly decreased non-health consumption in the absence of public and private health coverage. This finding is consistent across model specifications with different lengths of the time period of shock occurrence considered. Public and private health coverage both mitigate this shock-induced reduction of non-health expenditures in all model specifications, however, this interaction effect is only statistically significant for private health insurance. The estimated coefficients of the control variables are consistent across all specifications of the model, indicating significant effects of province and survey wave on non-health expenditures, and significant positive effects of education of household head, dependency ratio, age of household head, and total household consumption per capita on non-health expenditures.

Table 5 Parameter estimates from the random effects models of wealth

Length of shock recall period	(Wealth score)				
	1 year	2 years	3 years	4 years	5 years
Shock experience					
Health shocks	-0.031 **	-0.040 ***	-0.047 ***	-0.043 ***	-0.046 ***
*Public health coverage	-0.002	0.009	0.002	-0.004	-0.004
*Private health insurance	0.021	0.021 **	0.026 **	0.027 ***	0.027 ***
Non-health shocks	-0.014 ***	-0.017 ***	-0.023 ***	-0.021 ***	-0.022 ***
Other household characteristics					
Education of household head	0.098 ***	0.098 ***	0.097 ***	0.097 ***	0.096 ***
Dependency ratio	-0.004 ***	-0.004 ***	-0.004 ***	-0.004 ***	-0.004 ***
Age of household head	0.025 ***	0.025 ***	0.025 ***	0.025 ***	0.026 ***
Age of household head squared	0.000 ***	0.000 ***	0.000 ***	0.000 ***	0.000 ***
Consumption per capita	0.791 ***	0.787 ***	0.779 ***	0.775 ***	0.775 ***
Survey wave					
2008	-0.029	-0.013	0.001	0.007	0.008
2010	0.353 ***	0.369 ***	0.427 ***	0.449 ***	0.465 ***
Province					
Ha Tinh	-0.389 ***	-0.384 ***	-0.361 ***	-0.368 ***	-0.360 ***
Dak Lak	0.222 ***	0.220 ***	0.229 ***	0.235 ***	0.248 ***
n (=number of households)	1,876	1,876	1,876	1,876	1,876
n (=number of subjects)	5,424	5,424	5,424	5,424	5,424
P>chi² (Wald — joint significance	0.0000	0.0000	0.0000	0.0000	0.0000

*Note: *P<0.1, **P<0.05, ***P<0.01.*

The estimates from the linear model of wealth level show that health shocks lead to a significant reduction in wealth in the absence of public and private health coverage (Table 5). Interestingly, the effect of health shocks on the reduction of household wealth is of higher magnitude than the effect of non-health shocks on wealth. As for the effect of health coverage, none of the parameter estimates from the interaction term between health shocks and public health coverage is statistically significant, suggesting that public health coverage does not help in mitigating the reduction in wealth as a result of a health shock. On the contrary, having private health insurance seems to help mitigate the health shock-induced decrease of household wealth. It is also worth noting that the significant effect of having private health insurance becomes apparent for time frames starting from two to five years, but not for health shocks that occurred within the first year. Moreover, the parameter estimates become more significant the longer the time span considered, suggesting that the benefit of having a private health insurance on households' wealth may take time. The coefficient estimates of the control variables are consistent across all specifications of the model, with highly significant positive effects of education of household head, age of household head, age of household head squared, consumption per capita, survey wave year 2010, and

province. The dependency ratio has a highly significant negative effect on wealth.

DISCUSSION

Our findings suggest that public health coverage is effective in mitigating the effect of health shocks on health expenditures, but not on non-health expenditures and wealth in rural households in Vietnam. Coverage by public health insurance did not help households to reduce the likelihood of incurring positive health expenditures within the first year after the health shock, but it was able to do so in subsequent years. For households with positive health consumption, public health coverage successfully reduces the amount of health expenditures after health shocks which happened within a time span of up to three years, but not longer. These findings provide evidence that health shocks can affect a household's medical expenditures up to five years, and that a more refined picture of the short- and longer-term impact of public health insurance is needed. Earlier studies mostly limited their analyses to the short-run impact, concluding that public health coverage reduces medical spending[16,22].

Reducing the amount of health expenditures incurred by households is one of the most important objectives of providing health coverage. In Vietnam, the proportion of households with catastrophic health expenditures has steadily declined in recent years. In 2003, nearly 4% of households had health expenditures exceeding 25% of total household expenditures or income. The catastrophic expenditures were more concentrated among poorer households at 7.8%, compared to the richest households at 3.6%. With the higher rate of health coverage in 2012, this number declined to under 2.7%[23,24]. Moreover, with high out-of-pocket expenditures, households are at risk of becoming impoverished, particularly households that are already poor. In 2008, 7.5% of poor households became impoverished because of high out-of-pocket expenditures, while almost no households in the richest quintile became impoverished. This study provides evidence on the role of public health insurance in decreasing the proportion of households with catastrophic health expenditures and, therefore, becoming impoverished, particularly among poorer households.

With regard to non-health consumption and wealth, our results indicate that households without health coverage experience a decrease in their non-health expenditures and wealth in the event of health shocks, and that finding is consistent with the studies of Wagstaff[22] and Wainwright and Newman[25]. Those studies found that more than half of households reduced consumption as the main risk-coping strategy, while one in four reported increasing borrowing and selling assets[25]. However, other studies found an increase in non-health expenditures in the event of a health shock, as reported by Bales[16] and Mitra et al.[15]. Theoretically, it is possible for households to either experience an increase or decrease in non-health consumption as they may reduce spending on consumption goods such as food but, at the same time, may experience an increase in expenditure for such items as housing and electricity[22]. For Vietnamese rural households, health shocks lead to a reduction in non-health consumption.

Furthermore, our findings suggest that public health insurance is not effective in preventing reductions in non-health consumption and wealth. In fact, our estimation results indicate that public health

coverage reduces some, but not all, of the rise in health expenditures caused by health shocks. Our findings show that rural households in Vietnam, even with public health coverage, are still forced to reduce their non-medical expenditures or sell some of their assets, resulting in a loss of wealth to smooth their overall level of consumption.

We can only speculate about the reasons for the observed, partial lack of effectiveness of Vietnam's public health insurance program. Earlier studies have pointed to (i) a lack of coverage provided by the public health insurance scheme in terms of the types of health care services covered, which means that households might still need to pay for additional medical services[10,11], or (ii) limitations in terms of practical access to free treatment despite theoretical eligibility[8,11,12,14]. Because of these factors, households might use informal or local health providers, the costs of which are not always covered by the public insurance scheme, particularly in their initial response to health shocks and for treating the long-term effects of their medical conditions.

With respect to the effect of private health insurance, we find that it is mostly effective in mitigating health shock-induced decreases in non-health expenditures and wealth. In fact, households with private health insurance, who have to pay for medical treatment upfront, in the end, may obtain a more complete compensation for their medical expenses, thus, not having to reduce their non-health consumption or sell their assets in order to compensate for increased health expenditures. However, with regard to wealth, private health coverage only mitigates health shock-induced reductions if health shocks that occurred in a time period of at least two years are taken into consideration, which further emphasizes

the difficulty of addressing the short-term consequences of health shocks.

The results from this study shed light on the effectiveness of public and private health insurance on Vietnamese rural households' level of health expenditures and ability to smooth consumption in both the short- and longer-run. The strength of our study is that it relies on real-world panel data that were collected in remote, rural parts of Vietnam. As such, it provides important insights into the real situation of particularly vulnerable households, which would be difficult to be gained through model-based research. However, a few limitations need to be addressed. First, the data used for analysis did not provide an objective measure of health shocks but, rather, were based on respondents' self-report-which can lead to recall bias. Second, it is not known which member of the household experienced the health shock, and which member of the household is covered by the health insurance; data were at the household level, and therefore could lead to some errors in estimation.

RECOMMENDATIONS

In moving towards a universal coverage system, Vietnam needs to improve upon all three dimensions of universal health coverage as put forth by the World Health Organization, namely, breadth, depth, and height. Nearly half of households in our study were not covered by public health insurance, and efforts must be made to extend coverage (breadth) particularly to the uninsured as health shocks put households in a vulnerable position. Meanwhile, our study indicates that public health coverage in Vietnam was ineffective in protecting households from having to reduce their non-health expenditures and experiencing a decline in wealth as a result of a health shock,

suggesting that the benefit packages under public health coverage may not include enough services (depth), and/or the proportion of cost sharing is too high (height). The financial burden on households in the event of health shocks must be further scrutinized to effectively expand coverage of the benefit package, bearing in mind that there are also direct non-health costs incurred by households, such as expenses for travel to health service centers. As demonstrated by our study, the effect of health coverage depends on the time of shock occurrence. It is therefore important that future research takes into consideration longer time periods than earlier studies when evaluating the effectiveness of public health insurance programs. Some benefits from being insured, such as protection against wealth reduction, may not be felt in a shorter time span, while other gaps in coverage might exist with regard to the long-term treatment of illness.

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