

# Household financial burden associated with health care for older people in Viet Nam: A cross-sectional survey

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## Research Article

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1 **Household financial burden associated with health care for older people in Viet Nam: A**  
2 **cross-sectional survey**

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8

9 **Abstract**

10 **Background**

11 Population ageing and the associated increase in the health care needs of older people are  
12 putting pressure on the health care system in Viet Nam. The country prioritizes health care for  
13 older people and has developed financial protection policies to mitigate financial hardship due  
14 to out-of-pocket health expenditures (OOPHEs) borne by their households. This study examines  
15 the level and determinants of the financial burden of OOPHE among households with people  
16 aged  $\geq 60$  years in Viet Nam.

17 **Methods**

18 A cross-sectional household survey was conducted among a sample of 1536 older people living  
19 in 1477 households in three provinces representing the North, Central and South regions of Viet  
20 Nam during 2019–2020. The financial outcomes were catastrophic health expenditure (CHE),

21 using the World Health Organization's definition, and financial distress due to OOPHE.  
22 Multivariate binary logistic regression analysis was employed to determine the factors associated  
23 with these outcomes.

## 24 **Results**

25 OOPHE for older household members accounted for 86.3% of total household health  
26 expenditure. Of households with older people, 8.6% (127) faced CHE, and 12.2% (181)  
27 experienced financial distress due to OOPHE. Households were at a higher risk of incurring  
28 financial burdens related to health expenditures if they had fewer household members; included  
29 only older people; were in rural or remote, mountainous areas; and had older members with  
30 noncommunicable diseases. There was no significant association between health insurance  
31 coverage and financial burden. However, when older people sought tertiary care or private care,  
32 the possibility of a household facing CHE increased. Regardless of the type and level of care,  
33 health service utilization by older people results in a higher likelihood of a household  
34 encountering financial distress.

## 35 **Conclusions**

36 This study reveals that OOPHE for older people can impose substantial financial burdens on  
37 households, leading them to face CHE and financial distress. This study provides evidence to  
38 justify reforming financial protection policies and introducing policy interventions targeted at  
39 better protecting older people and their households from the financial consequences of OOPHE.  
40 There is also the need to strengthen the grassroots health facilities to provide primary care closer  
41 to home at lower costs, particularly for the management of noncommunicable diseases.

42 **Keywords:** Financial burden, catastrophic health expenditure, financial distress, out-of-pocket

43 health expenditure, older households, Viet Nam

44

## 45 **Background**

49 According to United Nations estimates, the number of people aged  $\geq 60$  years will soar from  
50 901 million in 2015 to 2.1 billion (or 21% of the world's population) by 2050 [1]. While increases  
51 in life expectancy are a positive population outcome, population ageing generates many  
52 challenges to productivity and economic growth and may threaten social security systems [2].  
53 For health systems, an increasing population of older adults might negatively affect progress  
54 towards providing universal health coverage — that is, ensuring people's access to essential  
55 health services and protecting them from financial hardship [3]. If health service coverage and  
56 financial assistance are inadequate, older persons are at a higher risk of being exposed to  
57 catastrophic and impoverishing health expenditures. Because older people have greater and  
58 more diverse health care needs, they suffer the dual burden of deteriorating earnings and  
59 multiplying out-of-pocket health expenditures (OOPHEs) [4].

60 Viet Nam is a lower-middle-income country experiencing rapid population ageing. The  
61 percentage of older people, who are  $\geq 60$  years, in the population will rise from 12.3% in 2020 to  
62 26% in 2050 [5], which will also bring about an increase in health care needs for the older  
63 population. A national study showed that about 70% of older people reported that they had poor  
64 health status, and more than one third (37.4%) reported having had an acute illness or injury  
65 during the past year [6]. The study also found that a high proportion of older persons reported  
66 having a chronic noncommunicable disease (NCD), and on average, each older person suffered  
67 from three conditions [6]. Moreover, older people account for 88% of the burden of NCDs in Viet  
68 Nam[7]. Such statistics indicate that the older population has high health care needs, especially

69 for comorbidities and chronic NCDs requiring long-term treatment, thus resulting in high costs  
70 for individuals, families and society.

71 To address the care needs of its ageing population, the government of Viet Nam prioritizes health  
72 care for older people through various laws and regulations. The health sector has implemented  
73 initiatives to improve their access to services and protect people, including older adults, from  
74 financial hardship due to health care costs. According to the Health Insurance Law, all people  
75 aged  $\geq 80$  years are entitled to a 100% subsidy of their health insurance premium. Health  
76 insurance coverage is also fully subsidized for those aged 60–79 years who live in poor  
77 households or belong to ethnic minority groups, while those living in near-poor households are  
78 entitled to a 70% discount on their health insurance premium. Pensioners who worked in the  
79 formal sector) and retired at 60 years of age are entitled to free health insurance enrolment as  
80 part of their retirement benefits.

81 Viet Nam has successfully expanded health insurance coverage to more than 90% of its  
82 population, including, by 2018, to nearly 95% of all older persons [8]. Despite this progress,  
83 OOPHE remains high, accounting for nearly 50% of total health expenditure in 2017 [9]. The high  
84 OOPHE is both a financial barrier, hampering people's access to health care, and the reason for  
85 the financial consequences faced by their households. In 2011, the Viet Nam National Ageing  
86 Survey found that about half of older persons with illness did not receive any treatment [6]. The  
87 most common reason given was the lack of money to pay for services [6].

88 Although some research has been conducted to determine the financial burden of health  
89 spending, there has been no detailed investigation in Viet Nam of the financial burden of health  
90 expenditure among households that include older people. A study using data from the Viet Nam

91 Household Living Standards Survey, conducted every 2 years, from 2002 to 2010 revealed that  
92 the proportion of households suffering from catastrophic health expenditures (CHEs) and  
93 impoverishment due to health care costs, respectively, ranged from 3.9% to 5.7% and from 2.5%  
94 to 4.1% [10]. Despite the availability of these data, these indicators have not been assessed in  
95 relation to households with older persons, nor there has been an analysis of the extent to which  
96 older persons contribute to a high household burden of OOPHE and which types of services they  
97 received. Another study of older Vietnamese adults living in a rural area showed that older people  
98 with chronic conditions spent significantly more on health care than those without these diseases  
99 [11]. However, this study was carried out on a small scale and at the individual level. Furthermore,  
100 previous studies have not considered detailed components of out-of-pocket spending to try to  
101 understand how much older people have to pay for various health care services and the extent  
102 to which they have to rely on financial coping strategies, such as borrowing money from relatives  
103 or friends. To fill such gaps in the literature, this study aims to assess the level of financial burden  
104 and identify factors associated with financial outcomes due to health care spending among  
105 households in Viet Nam that include older people.

106

## 107 **Methods**

### 108 **Household survey**

109 This cross-sectional household survey was conducted from November 2019 to August 2020 in  
110 three provinces representing Viet Nam's North, Central and South regions, namely Yen Bai, Thanh  
111 Hoa and Tien Giang.

112 A total of 1536 older people aged  $\geq 60$  years was selected using multistage cluster sampling. The  
113 study first divided districts into urban and rural strata in each province and then randomly chose  
114 one district from each stratum. In each district, two communes were randomly selected as  
115 sampling clusters; therefore, 12 communes were chosen in total. After the communes were  
116 determined, the lists of older people residing in each commune were gathered from the local  
117 Provincial Population Centres (12 lists). From the list for each commune, older people were  
118 divided into three age groups (60–69, 70–79 and  $\geq 80$  years), which formed three separate  
119 sampling frames. As the predefined cluster size was 128 per commune, the number of  
120 participants selected in each age group within a cluster was randomly selected using  
121 proportionate random sampling. This means the distribution of age groups in each cluster was  
122 identical to the actual age distribution in the corresponding commune.

123 As the sampling units are older people and randomly selected, there was a case where more than  
124 one eligible respondent lived in the same household. No selected participants refused to take  
125 part in the study; however, 182 people were ineligible for inclusion because they were deaf or  
126 mute or had impaired cognitive function, based on responses to the Mini-Cog tool (a score of  $\leq 4$   
127 points) [12]. In these cases, new participants were chosen randomly from the list of unselected  
128 older persons to represent the same sex and age group. Therefore, the final sample was 1536  
129 older people living in their own homes in 1477 households in the study sites during the survey.

### 130 **Data collection**

131 Face-to-face interviews using a structured questionnaire were undertaken among the study  
132 participants. The research team developed the questionnaire, comprising mainly questions to  
133 elicit information about health status, health care utilization and corresponding spending on

134 health. In addition, the survey tool collected information about other household members'  
135 demographic and socioeconomic characteristics, their health service use, associated health  
136 payments, and household assets and housing conditions.

137 Local commune-based health workers were recruited to conduct the interviews. All interviewers  
138 attended a 2-day training workshop that included information about the questionnaire,  
139 interviewing skills and data confidentiality; the trainees also conducted some pilot interviews  
140 before the actual survey.

141 At the home visit, interviewers met directly with the eligible older people. Moreover, one adult  
142 household member was nominated as the most knowledgeable individual regarding the  
143 household's general information and health care issues; in some cases, the older person also  
144 provided the general household information. To ensure the quality of the data, members of the  
145 study team acted as field supervisors. The supervisors directly observed some of the first  
146 interviews and provided feedback. Random and unannounced spot-check visits were also  
147 undertaken.

#### 148 **Health care setting**

149 Viet Nam's health service delivery system uses a public–private mix in which the public sector  
150 takes the dominant role in service provision, especially for specialist and inpatient care. The  
151 health system is divided into four levels that correspond to the country's administrative divisions:  
152 commune, district, provincial and central. In each province, there are a provincial-level general  
153 hospital and several specialist hospitals. At the district and commune levels, a district hospital  
154 and commune health stations (one per commune) provide primary health care services for the

155 population in their catchment areas. At the community level, private health providers are well  
156 established, including polyclinics and specialist clinics, which provide outpatient services for local  
157 people. Local pharmacies are also readily available in the community, allowing people to  
158 purchase a broad range of medications, from over-the-counter to prescription medicines,  
159 including vitamins, painkillers, antibiotics and medications for chronic diseases, such as  
160 hypertension and diabetes.

161 Yen Bai is a mountainous province located in northwest Viet Nam, with a population of 0.82  
162 million, of whom nearly 60% are ethnic minorities [13]. The province has only one private hospital  
163 [14]. The second site, Thanh Hoa, has approximately 3.7 million residents, with 76% living in rural  
164 areas [13]. Eleven provincial public hospitals serve this north–central province, and health care  
165 in the private sector is well developed and includes 12 private hospitals [14]. Tien Giang province  
166 is situated in the Mekong Delta region of southwest Viet Nam. There are approximately 1.7  
167 million people, with 77% of the population living in rural areas [13]. Only one private hospital  
168 serves this province [14].

## 169 **Variables**

### 170 ***Outcome variables***

171 The study outcomes were the financial burden linked to OOPHE borne by households that include  
172 at least one person aged  $\geq 60$  years. The household-level financial outcomes were constructed  
173 using two indicators: CHE and financial distress. These measurements have been widely used to  
174 reflect the financial consequences of OOPHE by households [15-18].

175 In this study, household OOPHE was defined as direct spending on health care made by  
176 individuals and households, including an individual's health expenses incurred at the time of  
177 service, such as health insurance co-payments, direct medical expenses (e.g. medications,  
178 laboratory tests, consultation fees), direct non-medical expenses associated with accessing  
179 health services (e.g. food, transportation and accommodation) and other non-medical expenses  
180 (e.g. informal gifts for health providers). OOPHE also encompasses home care for older members  
181 that is paid for by households, self-medication and the purchase of medical devices. However, it  
182 does not include any prepayments for health services, for example, in the form of taxes or specific  
183 insurance premiums or contributions and, where possible, it is net of any reimbursements to  
184 individuals who made the payments.

185 CHE is defined as OOPHE for care that exceeds a certain threshold of household resources during  
186 a given period [19]. In this study, the World Health Organization's approach was used to  
187 calculate CHE, which determines that a household is facing CHE when its total OOPHE is  $\geq 40\%$  of  
188 its capacity to pay [20]. The household's capacity to pay was calculated by subtracting food  
189 expenditure from total household expenditures. Additionally, to ensure comparability with  
190 recent studies employing the financial protection outcomes of the Sustainable Develop Goals  
191 (Indicator 3.8.2), we estimated the proportion of households with catastrophic spending on  
192 health care as a share of total household expenditure at 10% and 25% thresholds [21].

193 Financial distress due to spending on health was defined as financial activities or coping strategies  
194 employed by households to finance the cost of inpatient and outpatient services, for example,  
195 by borrowing money from friends or relatives, taking out loans from banks or other lenders, or

196 selling assets. A binary outcome indicator was used for financial distress to indicate which  
197 households employed coping strategies to finance spending on health.

### 198 ***Covariates***

199 Covariates were selected based on a review of the relevant literature and the availability of data.  
200 The independent variables were constructed as household-level data. Such variables included  
201 the characteristics of the head of household (i.e. being aged  $\geq 60$  years, sex, ethnicity, educational  
202 level and occupational status) and the household (i.e. household size, the number of older people  
203 in the household, the presence of at least one child younger than 6 years), the composition of  
204 the household (i.e. a household with only older people versus a household with more than one  
205 generation), living in a rural area versus an urban area, and the province of residence.

206 The variable of household health insurance status was also created with two categories: fully  
207 insured (i.e. all households members have health insurance) and not fully insured (at least one  
208 member does not have health insurance).

209 In this study, a wealth index was used as a proxy indicator of the household's living standards.  
210 Following Filmer and Pritchett [22], principal component analysis was undertaken to construct  
211 an asset score for each household according to household assets and durable products, the  
212 materials used for housing construction, the water source, type of toilet facility and ownership  
213 of agricultural land. Furthermore, the index was adjusted to reflect the relationship between  
214 living standards and properties in urban and rural areas [23]. The wealth index was categorised  
215 into quintiles (Q1, Q2, Q3, Q4, and Q5). The poorest quintile (Q1) represents the 20% of  
216 households lowest on the wealth index, and the fifth quintile represents the 20% that were

217 highest on the wealth index. To reflect the existence of NCDs among the population, households  
218 were divided into three categories based on the number of comorbidities affecting the key older  
219 respondent (No NCD, 1 NCD,  $\geq 2$  NCDs).

220 To account for the association between health spending and the level and type of care, we  
221 generated variables related to health service utilization by older people. The use of such variables  
222 is justified by prior studies in low- and middle-income countries that indicated certain types of  
223 care were significant predictors of health-related financial outcomes [24-27]. These were created  
224 as continuous variables distinguished by type of care (outpatient versus inpatient, public versus  
225 private), type of health facility (using commune- or district-level care as primary health care and  
226 including tertiary care and private care). The variables were: (i) outpatient care, defined as the  
227 total number of outpatient visits made by the older household member during the past 12  
228 months divided by the number of older household members; and (ii) inpatient care, defined as  
229 the total number of inpatient admissions for the older household member during the past 12  
230 months divided by the number of older household members interviewed.

### 231 **Statistical analysis**

232 The unit of analysis was households with older adults. We used descriptive analytics for the  
233 socioeconomic characteristics of the households, health care utilization by older household  
234 members, the breakdown of OOPHE for older household members and the household financial  
235 hardships experienced due to these expenditures. We analysed differences in CHE and financial  
236 coping strategies by household characteristic using the *t*-test,  $\chi^2$  test and analysis of variance for  
237 statistical significance. We also used a multivariate logistic regression model for binary variables  
238 to explore determinant effects on CHE and the financial distress of households. Backwards

239 elimination was employed to identify the best set of predictors, as shown by descriptive analytics.  
240 The goodness-of-fit for the models was examined using a likelihood–ratio test, the Akaike  
241 information criterion and the Bayesian information criterion. The variance inflation factor was  
242 used to check multicollinearity, and a factor of <10 was considered acceptable. All analyses were  
243 performed by using Stata 13 statistical software (StataCorp, College Station, Texas, USA).

#### 244 **Ethical approval**

245 The scientific and ethical aspects of the study were reviewed and approved by the Institutional  
246 Scientific Research Committee of the Health Strategy and Policy Institute, Hanoi. Ethical approval  
247 was also obtained from the Research Ethics Review Committee of the World Health Organization  
248 (protocol no. ERC.0003085). Local health authorities issued permission to conduct the field  
249 survey in their respective districts and provinces. All respondents were enrolled voluntarily and  
250 provided both verbal and written informed consent.

251

## 252 **Results**

### 253 **Characteristics of the study households**

254 Among the 1477 sampled households, there was a balanced distribution of urban and rural  
255 populations. The average household size was 3.2 persons, with 15.6% (231) of households  
256 including children younger than 6 years and 56.5% (835) including more than one person aged  
257  $\geq 60$  years. In 42.2% (624) of households, people aged  $\geq 60$  years lived alone or only with their  
258 spouse. Moreover, 92.6% (1367) of heads of household were aged  $\geq 60$  years, 53.1% (784) were

259 men and 98.7% (1449) were members of the Kinh ethnic group. One third of heads of household  
260 had completed at least high school, and two thirds were not currently working.

261 In terms of health care, 79.4% (1173) of households had at least one older person who had one  
262 or more NCDs. The mean number of monthly outpatient visits per older person at grassroots  
263 health facilities was 0.46, at tertiary facilities was 0.36 and at private health facilities was 0.13.  
264 During the previous 12 months, the mean number of inpatient admissions per older person per  
265 household was higher at tertiary hospitals (0.19 visits) than at district hospitals (0.09) and private  
266 health providers (0.02) (Table 1).

267

#### 268 **Incidence of catastrophic health expenditure and financial distress**

269 Table 2 shows the estimates of OOPHE borne by households that included at least one older  
270 person. On average, each household spent nearly 8 million Vietnamese dong (~US\$ 350) on  
271 health care during the previous 12 months. OOPHE for older household members contributed  
272 most to total household health expenditure, accounting for 86.3%. Significantly, 8.6% (127) of  
273 households had OOPHE that exceeded 40% of their capacity to pay. When health spending for  
274 older household members was removed from total household health expenditures, the  
275 corresponding figure was only 1.96% (29). Using definitions of CHE found in the Sustainable  
276 Development Goals, the percentages of households with OOPHE exceeding 10% of total  
277 household expenditure was 7.5%; and 1.8% exceeded 25% of total household expenditure.

278 The proportion of households suffering financial distress due to OOPHE was 12.3% (181).

279 Households used different coping strategies to finance spending on health care for older

280 household members. Of those experiencing financial distress, 31% (56/181) of households had  
281 to borrow money from relatives or friends; 25% (45) got a loan from other individuals or agents,  
282 such as moneylenders; and 4% (7) sold property. More than one third of households used their  
283 savings to pay for health care (data not shown).

#### 284 **Descriptive statistics**

285 Table 3 shows the numbers and percentages of households experiencing CHE, according to the  
286 two different standards, and financial distress, as measured by household-level covariates.

287 Using the CHE threshold of 40% of non-food expenditure, the highest incidence of CHE was seen  
288 among the households in Yen Bai province (16.6%; 82 households), followed by those in Thanh  
289 Hoa (7%; 35 households) and Tien Giang (1.9%; 9 households). CHE was more prevalent among  
290 households with fewer members ( $P < 0.001$ ); without a child younger than 6 years; with only  
291 older people (18.9% versus 0.9% for others); with older members suffering from an NCD (8.9%  
292 for 1 NCD and 11.1% for  $\geq 2$  NCDs versus 2.6% of households without an older person with an  
293 NCD;  $P < 0.001$ ); with heads aged  $\geq 60$  years who had completed at least secondary school (11.5%  
294 for secondary school and 9.5% for high school or higher;  $P = 0.002$ ) or who were pensioners  
295 (11.1%;  $P = 0.037$ ). Surprisingly, the incidence of CHE was higher in fully insured households than  
296 in households that were not fully insured (9.4% versus 2.3%;  $P = 0.002$ ). Regarding health service  
297 utilization, households that incurred CHE had older members with higher numbers of outpatient  
298 visits at private health facilities and inpatient admissions to tertiary hospitals than households  
299 not incurring CHE.

300 When CHE at a 10% threshold of total household expenditure was assessed, we observed the  
301 same patterns of bivariate associations as when the World Health Organization's definition was  
302 used, except for health care service utilization by older household members. Compared with  
303 households not facing CHE, those experiencing CHE had older adults with significantly higher  
304 numbers of outpatient visits and inpatient admissions at all levels of care, except for outpatient  
305 visits to primary health care services.

306 In terms of coping with financial difficulties related to spending on health care, 15.2% of  
307 households reported financial distress in Yen Bai, 11.4% in Tien Giang and 10.2% in Thanh Hoa.  
308 The incidence of financial distress was significantly higher among those in the lower wealth  
309 quintiles (Q1: 14.9%; Q2: 14.9%; Q3: 13.5%) than among those in the better-off groups (Q4: 8.5%;  
310 Q5: 9.5%). Notably, households that had older members with NCDs had higher rates of financial  
311 distress (1 NCD: 11.9% and >NCDs: 17.5%) than those without older members with NCDs (2%).  
312 Moreover, financial distress was significantly associated with higher utilization of most types of  
313 care, except for inpatient admission to private health facilities.

#### 314 **Determinants of financial burden due to health expenditure**

315 Table 4 presents the results of the multivariate logistic regression models identifying the  
316 determinants of CHE and financial distress. The models indicate that household size, the presence  
317 of older members with NCDs, the province of residence and utilization of outpatient and  
318 inpatient services were significantly associated with CHE and financial distress resulting from  
319 OOPHE.

320 The results show that larger households were less likely to suffer CHE (odds ratio [OR] = 0.18) and  
321 financial distress (OR = 0.89) compared with smaller households. Households in which older  
322 people had at least one NCD were much more likely to experience CHE and financial distress than  
323 households in which older people did not have an NCD (ORs ranging from 4.72 to 7.05).  
324 Furthermore, households residing in the mountainous province (Yen Bai) had a higher risk of  
325 facing financial catastrophe and distress due to health expenditure than their counterparts in  
326 Tien Giang. Households in Thanh Hoa also had a higher likelihood of having CHE than those in  
327 Tien Giang. Households headed by pensioners were less likely to suffer financial distress than  
328 households in which the head was currently unemployed. Surprisingly, households in the higher  
329 wealth quintiles were more likely to face CHE than those in the lowest quintiles (ORs ranging  
330 from 2.84 to 7.89). Additionally, rural households were twice as likely to experience CHE as their  
331 urban counterparts.

332 Older people's health service utilization was strongly correlated with the household's financial  
333 burden resulting from OOHE. Households in which older adults had more frequent outpatient  
334 visits at private health facilities had a higher risk of CHE. In addition, households with older  
335 members who were hospitalized at a provincial or central hospital had a higher risk of facing CHE.  
336 Furthermore, all of the variables related to health service utilization were significantly associated  
337 with financial distress. These results indicate that regardless of the type and level of care, the  
338 more frequently that older household members use health services, the higher the risk that  
339 households will encounter financial distress due to health spending.

340

## 341 Discussion

342 To the best of our knowledge, this is the first study to examine the magnitude and determinants  
343 of financial burdens linked to OOPHE borne by households that include older adults in Viet Nam.  
344 The study shows that households that include older people faced CHE and financial distress as  
345 economic consequences of OOPHE made to provide care for their older members. Furthermore,  
346 the demographic and socioeconomic characteristics of households and health service utilization  
347 by older people were significant predictors of the financial hardship suffered in this study. The  
348 results of this study can contribute towards gaining a better understanding of whether current  
349 financial protection policies for older people work and which older populations are more  
350 financially vulnerable and should be targeted for help by future policy interventions.

351 The study revealed that a considerable proportion of households with older people suffer from  
352 CHE. Using the 40% threshold of non-food household expenditure, the incidence of CHE was 8.6%  
353 among households with older people, which was higher than corresponding figures for the  
354 general population reported in prior studies in Viet Nam [10, 15]. Furthermore, older people,  
355 especially those with chronic NCDs, require regular health care and, consequently, must  
356 repeatedly pay for this care. In a previous study analysing national data collected from 2002 to  
357 2010, the rates of CHE ranged from 3.9% to 5.7% [10]. Notably, the present study found that the  
358 health spending for older household members accounted for most of a household's total  
359 expenditure on health, at 86.3%. Such findings imply that having older people in a household  
360 predispose it to financial catastrophe. This contention is widely supported by evidence from  
361 previous studies in Viet Nam [10, 24, 28] and low- and middle-income countries [29-32]. Using  
362 data from the Viet Nam Household Living Standards Survey, two studies concluded that the

363 presence of older adults in a household was significantly correlated with higher rates of CHE [10,  
364 28].

365 Another important finding is that 12.2% of the households facing financial distress due to health  
366 expenditures to provide care for older people exceeded their family's resources. The households  
367 that could not pay for services using cash on hand employed coping strategies to finance  
368 health care costs for their older members, such as borrowing money from others, borrowing from  
369 moneylenders or agents [33], and even selling assets [34]. Evidence of such coping mechanisms  
370 undertaken by Vietnamese households to deal with unaffordable health care costs has been  
371 identified in previous studies, and it includes options such as taking out high-interest loans, selling  
372 assets, reducing daily consumption of foods and other necessities and even forgoing expenses  
373 for children's education [24, 33, 35, 36]. Similar to the findings in this study, previous studies in  
374 low- and middle-income countries have demonstrated that households with older members and  
375 with members who have chronic conditions are more likely to use coping strategies to ensure  
376 their welfare following the use of health services [37-39]. This study is consistent with other  
377 studies that showed borrowing from family or friends and taking out loans are the most common  
378 forms of distress financing [16, 34, 40]. In Viet Nam, older people are well connected with their  
379 family, friends, and communities [32]; thus, social networks seem to be important sources of  
380 financial support [41, 42].

381 Households with older people seem to bear multiple financial burdens associated with their use  
382 of health care services. First, using a significant proportion of a household's resources on health  
383 care for older people may lead households to reduce the family's consumption of food and other  
384 daily necessities, and even to a deterioration in living standards [33, 43]. Most older Vietnamese

385 people have not participated in the formal labour force and, consequently, receive limited social  
386 welfare benefits [6]. In our study, only one third of older people currently received retirement  
387 benefits. Additionally, because of physical limitations due to ageing, they have less ability to  
388 generate income and contribute to the family's resources [44].

389 Studies consistently have indicated that, by using these coping strategies to finance their OOPHE,  
390 households may successfully address their short-term financial hardship but possibly increase  
391 their economic susceptibility in the long run [16, 37, 38, 45]. A previous study by Thuy and  
392 colleagues found that Vietnamese households often take out loans to repay current medical  
393 debts and this exacerbates their existing financial constraints, which become harder to escape  
394 [33]. Similarly, Wagstaff and colleagues found that many households in China take on new debt  
395 while already in debt for medical care [46]. Moreover, since many older people are not able to  
396 care for themselves or independently attend health facilities, other family members have to take  
397 time off work to be with them. Consequently, households may bear noticeable indirect costs  
398 related to the loss of productivity and income by caregivers through work missed while caring for  
399 older household members [11, 33].

400 In this study, 96.8% of all older adults had health insurance, and in 88.2% of households, everyone  
401 had health insurance. One of the crucial objectives of having a health insurance policy is to  
402 mitigate the financial consequences of OOPHE, particularly among disadvantaged and vulnerable  
403 populations, such as older people, the poor and rural residents [47, 48]. Despite the households  
404 sampled having proportionally higher coverage of health insurance than households nationally,  
405 the incidence of CHE among households with older people was more significant than that among  
406 the general population. Further, the study did not find a significant association between health

407 insurance coverage and financial outcomes for either CHE or financial distress. These findings  
408 complement those of earlier studies in Viet Nam, showing that the current health insurance  
409 system does not effectively protect households from the financial burden of health care spending  
410 [10, 24, 49, 50]. As highlighted in a recent study of the population with NCDs, although having  
411 health insurance is associated with greater health service utilization, health insurance was not a  
412 determinant of CHE and financial distress [24].

413 These results are in agreement with those observed in prior studies in other countries where  
414 health insurance schemes are not well designed and do not protect their beneficiaries from  
415 economic hardship [32, 51, 52]. For example, studies have shown that Chinese health insurance  
416 programmes had undesirable outcomes and did not protect the insured from financial  
417 catastrophic and medical impoverishment, especially the older population [30, 53] and those with  
418 NCDs [54, 55]. There are several possible explanations for these findings. First, studies have  
419 shown that co-payments for health insurance, even those that are only a small part of the total  
420 treatment cost, can cause financial difficulty for patients, particularly those who are in low-  
421 income groups [56, 57]. In some cases, insured patients decided not to use their insurance  
422 because of the costs of co-payment or because medicines covered by their health insurance were  
423 not available at the time of service [24]. Second, as argued by Yip and Hsiao, the design of China's  
424 health insurance scheme ignores the type of disease, and the health spending pattern results in  
425 a negligible protective effect against CHE [51]. Du and colleagues contended that unfavourable  
426 outcomes associated with health insurance schemes may be caused by the high burden of  
427 chronic conditions among the older population and their associated health expenditure patterns  
428 [58]. Third, limitations on benefit packages that fail to consider the health needs of financially

429 vulnerable groups could partially explain the weak performance of insurance systems [59]. This  
430 points to the need to redesign health insurance systems to better protect populations from the  
431 economic burden of health expenditures, particularly older populations and disadvantaged  
432 groups.

433 One interesting finding is that health service utilization at tertiary health facilities and private  
434 health providers led to higher odds of households with older people suffering CHE. These results  
435 reflect those of our earlier observations among Vietnamese households with members who had  
436 NCDs [24]. In Viet Nam, although the same medical procedures or services are provided in both  
437 district and provincial hospitals, the fees for services delivered in higher-level facilities are higher  
438 than those for the same services offered at the lower levels, and the insured also has higher co-  
439 payments for services at higher-level facilities. Recent studies have highlighted gaps in the  
440 capacities of primary care health facilities, particularly commune health stations, to provide  
441 essential health services for the community owing to factors such as inappropriate financial  
442 mechanisms, poor quality and quantity of medicines, lack of equipment and health care staff,  
443 and a weak health information system [60-63]. These constraints lead to the underutilization of  
444 health services at primary care facilities where insured patients are less likely to incur co-  
445 payments and additional out-of-pocket spending. Weraphong and colleagues suggested that  
446 bypassing or underusing designated primary care facilities can lead insured patients to utilize  
447 private care and public providers outside their local areas, which increases their non-medical and  
448 indirect costs and may potentially push households into financial catastrophe and  
449 impoverishment [64]. Moreover, the current study found that, regardless of the type or level of  
450 care, health service utilization by older household members resulted in a higher possibility of a

451 household encountering financial distress related to spending on health care. Given that almost  
452 all older people in our sample were insured, this association is notable but not surprising because  
453 the weak financial protection function of Viet Nam's health insurance system has been broadly  
454 discussed [10, 24, 49, 50].

455 Multivariate regression analyses showed significant associations between key household  
456 characteristics and the financial burden of health expenditures. This study indicates that smaller  
457 households are more likely to suffer CHE and financial distress than households with more  
458 members. A possible explanation for this might be that households of only older people and with  
459 fewer members had fewer people to contribute income and, consequently, had limited financial  
460 resources; thus, they may be at a higher risk of financial hardship [31]. Notably, nearly half of  
461 households in this study consisted of only older people living on their own or with their spouse.  
462 This finding aligns with those observed in China, Nigeria [31, 65, 66] and also in Viet Nam [10,  
463 67]. In China, several studies consistently found that empty-nest households consisting of older  
464 people living alone had greater odds of incurring CHE than those in which an older person lived  
465 with a spouse or in a multigenerational household [65, 66]. These findings might further suggest  
466 the need to implement a financial protection policy that can lower the risk of financial burden for  
467 households with only older people.

468 This study confirms the high prevalence of NCDs among the older population, as found in  
469 previous studies in Viet Nam [6, 11]. The presence of older people with NCDs in a household was  
470 a strong predictor of CHE and financial distress. Furthermore, households where older people  
471 had NCDs were seven times more likely to incur CHE compared with households in which older  
472 people had no NCDs. These findings broadly support the work of other studies and emphasize

473 the economic burden of NCDs for households [39, 68] and particularly among older households  
474 [11, 30, 69]. Patients with chronic NCDs require more frequent health services; therefore, they  
475 are more likely to repeatedly incur OOPHE than those without NCDs [11, 24, 70]. In a multicountry  
476 study, Lee and colleagues demonstrated that NCD multimorbidity is highly correlated with a more  
477 regular use of health services and a higher economic burden for the population [70]. As suggested  
478 in the literature, households in which older members with NCDs seek regular care also incur more  
479 direct non-medical costs (e.g. transportation, food and accommodation for patients and  
480 caregivers) [71-73] and indirect costs (e.g. income loss as caregivers take time off from work) [11,  
481 33]. The findings of this study strengthen the evidence for the poor performance of the existing  
482 health financing system in protecting households from the negative economic impact of NCDs,  
483 particularly those households with older people.

484 The current study also found that older households residing in rural areas or in Yen Bai (a remote,  
485 mountainous province) have a higher likelihood of incurring CHE than those living in urban and  
486 lowland areas (i.e. Tien Giang). These results are in keeping with those of Minh and colleagues  
487 who found, through a secondary analysis of 10 years of national data, that living in a rural area is  
488 linked with a higher risk of CHE [10]. Similar findings have also been reported from other  
489 countries [74], such as China [53] and India [68]. This implies that households that include older  
490 people living in low-resource settings are more financially vulnerable than their counterparts  
491 residing in more socioeconomically advantaged areas. This further highlights the need for policies  
492 that are better targeted towards households with older people who are living in rural and remote,  
493 mountainous areas because these households are at greater risk of suffering financial  
494 catastrophe as a result of health care use.

495 It is somewhat surprising that older households in the higher wealth quintiles are more likely to  
496 face CHE than those in the lowest quintile. This is contrary to the findings of prior studies in other  
497 countries that found low-income households with older people have a higher risk of financial  
498 hardship due to health expenditure than higher-income households [30, 31, 53]. Several factors  
499 could explain this observation. First, poor households may not spend much out of pocket due to  
500 their limited resources, while better-off households spend more on health services. Likewise,  
501 other studies have reported that wealthier households incur more OOPHE than poorer  
502 households [32, 75]. Second, there is evidence that poor people, even those with health  
503 insurance, simply do not access institutional care because of the health insurance co-payment,  
504 associated non-medical costs and indirect costs. Instead, they may resort to self-medication or  
505 forgo treatment because of the expected costs; however, this may cause more severe health  
506 complications and lead to further financial difficulties in the future [16, 76]. The data from our  
507 study show that poor households used self-medication more often and less outpatient and  
508 inpatient care compared with higher-quintile households. Therefore, further qualitative  
509 investigation is needed to understand the health care-seeking behaviour of older people and  
510 coping mechanisms used in response to the need to pay for health care.

511 Finally, several important limitations of this study need to be acknowledged. First, this study used  
512 self-reported data on health service use, OOPHE and NCDs; thus, the data are subject to recall  
513 bias. Second, the findings are limited by the cross-sectional design, making it impossible for us to  
514 draw causal interpretations of the associations. Given that Viet Nam has plans to improve  
515 financial protection for its population, further longitudinal studies may help assess the causal  
516 impact of such policy interventions on health service utilization and financial outcomes among

517 the targeted populations. Finally, the study collected information about OOPHE using  
518 disaggregated items by illness episode, while aggregated items about OOPHE were used to collect  
519 data about health spending for other family members. Evidence has indicated that a lower degree  
520 of disaggregation of out-of-pocket items results in an underestimate of the mean OOPHE [77].

521

## 522 **Conclusions**

523 In response to the increased need for health care among older people, the government of Viet  
524 Nam has been gradually developing policies that aim to improve older people's access to  
525 health care services and protect them from financial consequences linked to health service  
526 utilization. Although the limited impact of existing financial protection policies in Viet Nam has  
527 been widely discussed in the literature, the current study appears to be the first to investigate  
528 the financial burden of OOPHE on the older population and their households. The findings  
529 provide critical confirmation that Vietnamese households are more likely to experience CHE and  
530 financial distress as a result of paying for health care for older household members.

531 The results of the regression analyses identified certain factors that make these households more  
532 financially vulnerable than others. In particular, households are at a higher risk of incurring  
533 financial burdens related to health expenditures if they are smaller; include only older people;  
534 are in rural or remote, mountainous areas; and have older household members with NCDs.  
535 Consistent with prior studies in Viet Nam, this study did not find a meaningful relationship  
536 between having health insurance and financial burden. Furthermore, having older household  
537 members who sought care at private providers and more-specialized hospitals increased the

538 possibility of a household facing CHE. Regardless of the type and level of care, health service  
539 utilization by older people results in a higher likelihood that a household will experience financial  
540 distress related to spending on health. Our findings show that the current social health insurance  
541 scheme, which aims to protect beneficiaries against financial difficulties, seems not to have  
542 achieved its policy objective, particularly for older people.

543 The findings of this study have a number of important implications for policy development.  
544 International experience suggests that the implementation of health insurance alone will not  
545 directly decrease OOPHE: reform also needs to be undertaken of the health financing  
546 mechanisms linked to the health insurance system [78]. Redesigning benefit packages to target  
547 and prioritize the needs of older people is recommended, particularly aiming to help those with  
548 chronic NCDs and those in disadvantaged groups, such as poor people and those living in rural  
549 and remote areas. For example, the health insurance programme might consider waiving co-  
550 payments for older adults with chronic conditions who require long-term treatment with  
551 medicines. Further research could examine the distribution patterns of the costs of health  
552 services for older people as an initial step towards developing a comprehensive and financially  
553 protective service package for older adults. Moreover, another strategy could be to reform  
554 provider payment mechanisms to control overprescribing and service abuse while enhancing the  
555 use of primary health care services and discouraging more-expensive hospital-based care. Finally,  
556 it is also strongly recommended that primary health care facilities be strengthened so that care  
557 can be provided closer to home at lower costs, particularly for the management of NCDs.

## 558 **List of abbreviations**

559 OOPHE: out-of-pocket health expenditure

560 CHE: catastrophic health expenditure

561 NCD: noncommunicable disease

562 OR: odds ratio

563

## 564 **Declarations**

565 **Ethics approval and consent to participate** The scientific and ethical aspects of the study were  
566 reviewed and approved by the Institutional Scientific Research Committee of the Health  
567 Strategy and Policy Institute, Hanoi. Ethical approval was also obtained from the Research  
568 Ethics Review Committee of the World Health Organization (Protocol No. ERC.0003085). Local  
569 health authorities issued permission to conduct the field survey in their respective districts and  
570 provinces. All respondents were enrolled voluntarily and provided both verbal and written  
571 informed consent.

572 **Consent for publication** Not applicable

573 **Availability of data and materials** The data that support the findings of this study are available  
574 from the Health Strategy and Policy Institute, but restrictions apply to the availability of these  
575 data, which were used under license for the current study, and so they are not publicly available.  
576 However, data are available from the authors upon reasonable request and with permission of  
577 the Health Strategy and Policy Institute.

578 **Competing interests** The authors declare that they have no competing interests.

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584 **Authors' contributions** GN (Nguyen Hoang Giang) and VN (Nguyen The Vinh) were responsible  
585 for analysing the data. The first draft of the paper was written by GN, VN, Nguyen Thi Thang and  
586 Hoang Thi Phuong and reviewed and edited by Tran Thi Mai Oanh. GN is the guarantor of the  
587 paper. All authors read and approved the final manuscript.

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**Table 1. Descriptive characteristics of households that included at least one member  $\geq 60$  years, Viet Nam**

Variables	Total ( <i>N</i> = 1477)	
	<i>n</i>	% or mean (SD)
<b>Household features</b>		
Urban versus rural		
Urban	720	48.7%
Rural	757	51.3%
Province		
Thanh Hoa	498	33.7%
Tien Giang	484	32.8%
Yen Bai	495	33.5%
No. of people in households (household size)	1477	3.2 (1.8)
Children <6 years in the household		
No	1246	84.4%
Yes	231	15.6%
No. of people aged $\geq 60$ years in the household		
1 person	642	43.5%
$\geq 2$ persons	835	56.5%
Household composition		
Multigenerational	853	57.8%
Only older generation	624	42.2%
Health insurance status		
Not fully insured	174	11.8%
Fully insured	1303	88.2%
Wealth level (quintile)		
Poorest	296	20.0%
Poor	295	20.0%
Middle	296	20.0%
Rich	295	20.0%
Richest	295	20.0%
<b>Head of household</b>		
Aged $\geq 60$ years		
No	110	7.4%
Yes	1367	92.6%
Sex		
Male	784	53.1%
Female	693	46.9%
Ethnicity		
Kinh	1449	98.7%
Ethnic minority	19	1.3%
Educational level		
Elementary or less	543	36.8%

Variables	Total (N = 1477)	
	<i>n</i>	% or mean (SD)
Secondary school	419	28.4%
High school or higher	514	34.8%
Current occupational status		
Employed	490	33.3%
Pensioner	479	32.6%
Unemployed	502	34.1%
<b>Health care for older members</b>		
Comorbidities		
No NCD	304	20.6%
1 NCD	551	37.3%
≥2 NCDs	622	42.1%
Mean (SD) no. monthly outpatient visits		
Primary health care facilities	1477	0.46 (0.86)
Tertiary health facilities	1477	0.36 (0.84)
Private health facilities	1477	0.13 (0.51)
Mean (SD) no. inpatient admissions (previous 12 months)		
District hospitals	1477	0.09 (0.43)
Tertiary hospitals	1477	0.19 (0.70)
Private hospitals	1477	0.02 (0.18)

NCD: noncommunicable disease; SD: standard deviation.

**Table 2. Financial burden borne by households that included people aged ≥60 years, Viet Nam**

<b>Out-of-pocket health expenditure</b>	<b>Total (N = 1477)</b>
Mean (minimum–maximum) total household health expenditure in 1000 Vietnamese Dong	7 989 (0–108 280)
Mean (minimum–maximum) total household health expenditure for older people in 1000 Vietnamese Dong	7 378 (0 – 106 910)
% total household health expenditure spent on older people	86.3
% (no.) of households with health expenditure exceeding 40% of capacity to pay	8.6 (127)
% (no.) of households with health expenditure exceeding 40% of capacity to pay when health spending for older members is excluded	1.96 (29)
% (no.) of households with health expenditure exceeding 10% of total household expenditure	7.5 (111)
% (no.) of households with health expenditure exceeding 25% of total household expenditure	1.8 (26)
% (no.) of households facing financial distress due to spending for outpatient services	8.3 (122)
% (no.) of households facing financial distress due to spending for inpatient services	5.4 (79)
% (no.) of households facing financial distress due to spending for health services	12.3 (181)

**Table 3. Households that include people ≥60 years with catastrophic health expenditure and financial distress, by household covariates, Viet Nam<sup>a</sup>**

Variable	Catastrophic health expenditure definition <sup>b</sup>				Financial distress	
	World Health Organization		Sustainable Development Goals		Yes	No
	Yes (n = 126)	No (n = 1351)	Yes (n = 111)	No (n = 1366)	(n = 181)	(n = 1296)
<b>Household features</b>						
Urban versus rural						
Urban	54 (7.5)	666 (92.5)	46 (6.4)	674 (93.6)	80 (11.1)	640 (88.9)
Rural	72 (9.5)	685 (90.5)	65 (8.6)	692 (91.4)	101 (13.3)	656 (86.7)
Province	***		***		*	
Thanh Hoa	35 (7.0)	463 (93.0)	38 (7.6)	460 (92.4)	51 (10.2)	447 (89.8)
Tien Giang	9 (1.9)	475 (98.1)	8 (1.7)	476 (98.3)	55 (11.4)	429 (88.6)
Yen Bai	82 (16.6)	413 (83.4)	65 (13.1)	430 (86.9)	75 (15.2)	420 (84.8)
Mean (SD) no. of people in household	1.6 (0.5)***	3.4 (1.9)	2.0 (1.1)***	3.3 (1.9)	3.0 (1.8)*	3.3 (1.9)
Children <6 years	***		***			
No	126 (10.1)	1120 (89.9)	106 (8.5)	1140 (91.5)	157 (12.6)	1089 (87.4)
Yes	0 (0.0)	231 (100.0)	5 (2.2)	226 (97.8)	24 (10.4)	207 (89.6)
People aged ≥60 years in the household						
1 person	57 (8.9)	585 (91.1)	52 (8.1)	590 (91.9)	84 (13.1)	558 (86.9)
2+ persons	69 (8.3)	766 (91.7)	59 (7.1)	776 (92.9)	97 (11.6)	738 (88.4)
Household composition	***		***		*	
Multigenerational	8 (0.9)	845 (99.1)	25 (2.9)	828 (97.1)	92 (10.8)	761 (89.2)
Only older generation	118 (18.9)	506 (81.1)	86 (13.8)	538 (86.2)	89 (14.3)	535 (85.7)
Health insurance status	***		***			
Not fully insured	4 (2.3)	170 (97.7)	3 (1.7)	171 (98.3)	19 (10.9)	155 (89.1)
Fully insured	122 (9.4)	1181 (90.6)	108 (8.3)	1195 (91.7)	162 (12.4)	1141 (87.6)
Wealth level (quintile)					*	
Poorest	22 (7.4)	274 (92.6)	14 (4.7)	282 (95.3)	44 (14.9)	252 (85.1)
Poor	29 (9.8)	266 (90.2)	25 (8.5)	270 (91.5)	44 (14.9)	251 (85.1)
Middle	36 (12.2)	260 (87.8)	32 (10.8)	264 (89.2)	40 (13.5)	256 (86.5)
Rich	18 (6.1)	277 (93.9)	19 (6.4)	276 (93.6)	25 (8.5)	270 (91.5)
Richest	21 (7.1)	274 (92.9)	21 (7.1)	274 (92.9)	28 (9.5)	267 (90.5)
<b>Head of household</b>						
Aged ≥60 years	*					
No	3 (2.7)	107 (97.3)	9 (8.2)	101 (91.8)	11 (10.0)	99 (90.0)
Yes	123 (9.0)	1,244 (91.0)	102 (7.5)	1,265 (92.5)	170 (12.4)	1,197 (87.6)
Sex						
Male	69 (8.8)	715 (91.2)	63 (8.0)	721 (92.0)	93 (11.9)	691 (88.1)
Female	57 (8.2)	636 (91.8)	48 (6.9)	645 (93.1)	88 (12.7)	605 (87.3)
Ethnicity			*			
Kinh	124 (8.6)	1,325 (91.4)	107 (7.4)	1,342 (92.6)	176 (12.1)	1,273 (87.9)

Variable	Catastrophic health expenditure definition <sup>b</sup>					
	World Health Organization		Sustainable Development Goals		Financial distress	
	Yes (n = 126)	No (n = 1351)	Yes (n = 111)	No (n = 1366)	Yes (n = 181)	No (n = 1296)
Ethnic minority	2 (10.5)	17 (89.5)	4 (21.1)	15 (78.9)	5 (26.3)	14 (73.7)
Educational level	**		***		*	
Elementary or less	29 (5.3)	514 (94.7)	17 (3.1)	526 (96.9)	76 (14.0)	467 (86.0)
Secondary school	48 (11.5)	371 (88.5)	50 (11.9)	369 (88.1)	59 (14.1)	360 (85.9)
High school or higher	49 (9.5)	465 (90.5)	44 (8.6)	470 (91.4)	46 (8.9)	468 (91.1)
Current occupational status	*		*		***	
Employed	33 (6.7)	457 (93.3)	34 (6.9)	456 (93.1)	51 (10.4)	439 (89.6)
Pensioner	53 (11.1)	426 (88.9)	47 (9.8)	432 (90.2)	39 (8.1)	440 (91.9)
Unemployed	38 (7.6)	464 (92.4)	28 (5.6)	474 (94.4)	88 (17.5)	414 (82.5)
<b>Health care for older members</b>						
Comorbidities	***		***		***	
No NCD	8 (2.6)	296 (97.4)	6 (2.0)	298 (98.0)	6 (2.0)	298 (98.0)
1 NCD	49 (8.9)	502 (91.1)	36 (6.5)	515 (93.5)	66 (12.0)	485 (88.0)
≥2 NCDs	69 (11.1)	553 (88.9)	69 (11.1)	553 (88.9)	109 (17.5)	513 (82.5)
Mean (SD) no. monthly outpatient visits						
Primary health care facilities	0.50 (0.80)	0.46 (0.86)	0.58 (1.17)	0.45 (0.82)	0.82 (1.06)***	0.41 (0.81)
Tertiary facilities	0.47 (0.98)	0.35 (0.83)	0.54 (1.06)*	0.35 (0.82)	0.54 (1.04)**	0.34 (0.81)
Private health facilities	0.23 (0.67)*	0.13 (0.49)	0.23 (0.68)*	0.13 (0.49)	0.23 (0.65)**	0.12 (0.48)
Mean (SD) no. inpatient admissions (previous 12 months)						
District hospitals	0.14 (0.41)	0.09 (0.43)	0.19 (0.56)*	0.08 (0.41)	0.26 (0.62)***	0.07 (0.39)
Tertiary hospitals	0.34 (0.70)*	0.17 (0.70)	0.37 (0.78)**	0.17 (0.69)	0.48 (0.97)***	0.15 (0.64)
Private hospitals	0.04 (0.23)	0.02 (0.18)	0.07 (0.29)**	0.02 (0.17)	0.04 (0.19)	0.02 (0.18)

NCD: noncommunicable disease; SD: standard deviation; \*:  $P < 0.05$ ; \*\*:  $P < 0.01$ ; \*\*\*:  $P < 0.001$ .

<sup>a</sup> Values are number (%) unless otherwise indicated.

<sup>b</sup> The World Health Organization defines catastrophic health expenditure at a threshold of 40% of non-food spending for a household, whereas Sustainable Development Goal indicator 3.8.2 defines it at a 10% threshold of total household expenditure.

**Table 4. Logistic regression models predicting the determinants of catastrophic health expenditure and financial distress among households with people ≥60 years, Viet Nam**

Variable	Catastrophic health expenditure (World Health Organization's definition)		Financial distress	
	Adjusted odds ratio (95% CI)	P	Adjusted odds ratio (95% CI)	P
Household size	0.18 (0.12 to 0.27)	0.000	0.89 (0.81 to 0.99)	0.024
Head of household's occupational status				
Unemployed	NA	NA	–	
Employed			0.70 (0.47 to 1.04)	0.079
Pensioner			0.27 (0.17 to 0.44)	0.000
Wealth level (quintile)				
Poorest	–	–		
Poor	3.79 (1.86 to 7.70)	0.000	NA	NA
Middle	7.89 (3.79 to 16.4)	0.000		
Rich	2.11 (0.92 to 4.86)	0.070		
Richest	2.84 (1.27 to 6.30)	0.010		
Older household members' comorbidities				
No NCD	–	–	–	–
1 NCD	5.16 (2.27 to 11.7)	0.000	4.75 (2.00 to 11.3)	0.000
≥2 NCDs	7.05 (3.11 to 16.0)	0.000	4.72 (1.92 to 11.6)	0.001
Mean no. monthly outpatient visits by older household members				
Primary health care facilities	NA	NA	1.55 (1.26 to 1.89)	0.000
Tertiary health facilities	NA	NA	1.39 (1.13 to 1.70)	0.002
Private health facilities	2.13 (1.44 - 3.18)	0.000	1.47 (1.09 to 1.98)	0.012
Mean no. inpatient admissions for older household members (previous 12 months)				
District hospitals	NA	NA	1.72 (1.27 to 2.34)	0.000
Tertiary hospitals	1.34 (1.06 to 1.70)	0.015	1.54 (1.27 to 1.87)	0.000
Urban versus rural				
Urban	–	–	NA	NA
Rural	2.06 (1.27 to 3.39)	0.004		
Province				
Tien Giang	–	–	–	–
Thanh Hoa	5.05 (2.10 to 12.2)	0.000	1.51 (0.95 to 2.41)	0.085
Yen Bai	13.7 (5.77 to 32.4)	0.000	2.00 (1.27 to 3.17)	0.003

– indicates the reference group.

CI: confidence interval; NA: not applicable; NCD: noncommunicable disease.