

# Gender issues and psycho-cultural factors in general health examinations in Vietnam

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## Abstract

Whether or not periodic general health examinations (GHEs) should be maintained is a controversial issue. This study mainly focuses on the influence of gender and psychological factors on periodic GHEs. To clarify the relationship between the factors mentioned above, a survey has been carried out in Hanoi and surrounding areas, collecting 2,068 valid observations; the dataset was then analyzed using the baseline category logit model. Results show that most people are afraid of discovering diseases through general health examinations (76.64%), and among them the psychological fear of illness detection appears to be stronger for females than for males ( $\beta_{1(\text{male})}=-0.409$ ,  $P < 0.001$ ). People whose friends/relatives have experienced prolonged treatment tend to show more hesitation in taking physical check-ups ( $\beta_2=0.221$ ,  $P < 0.05$ ). In addition, more than 90% of participants believe that periodic health screenings should be performed once or twice a year. Also, the fear of disease detection as well as health check-up habits as shown in the time gap since the patient's most recent GHE together contribute to an increase in the likelihood of attending periodic GHEs.

**Keywords:** Periodic general health examination, psychological fear, gender, Vietnam.

## Introduction

The periodic general health examination (GHE) is expected to be an effective method of helping people to improve their health [1,2]. Dobell is the initiator of periodic health examination in 1861 as a method of following up on the health status of tuberculosis patients [3]. From the 1920s until the 1970s, many medical institutions in the U.S systematically encouraged and advised citizen to take periodic health checkups [4,5]. In earlier surveys, over 90% of participants thought they should check their blood pressure, heart, lungs and stomach regularly [6]. Periodic GHEs not only help to reduce the actual mortality rate but also encourage people to use health care resources more efficiently [7-10,1].

Although there are opinions that cast doubts over the relationship between gender and periodic health examination [11], numerous reports provide evidence that women have more healthy habits and use health services more often than men do [12-19]. In the U.S, several previous survey results have concluded that men have higher mortality rates [20-22], despite overestimating their own health status [23]. Another example of this overestimation: the majority of male university students in Canada rated their health status at a “very good” level while female students admitted their health to be just “good”, or lower [24]. This can be explained by several reasons, among which the biological differences in genders represent a particularly important one [25,11,13]. Women may be more sensitive and able to perceive more subtle signals from their own body [26]. With a positive attitude towards health care and diseases prevention, women tend to detect health problems early on, while men mostly perform medical examinations for work purposes or during the process of acquiring an insurance – basically, only when they are obliged to [27,28]. Besides, in traditional views, men tend to (falsely) think of themselves as being stronger, tougher, and thus unlikely to be affected by injuries or illness [29,23]. This mentality may be explained by the traditional gender roles that still prevailed to this day in quite a few societies: A man is the family’s breadwinner and usually accepts a higher risk at work while a woman has a higher priority for health matters of the family, which includes that of her own [30,24]. Psychological factors play a very important role in deciding some issues related to family health and children education [31,32]. Several reports also confirm that some family members may be capable of influencing the decisions of attending periodic health examinations by other members [33]. Other studies provide evidence showing that women tend to spend less money on GHE than men and will ponder upon GHE fees before making a decision [34-39]. But if a family member is seriously sick or dying, their anxiety over health status will significantly increase and affect the decisions of health care [40].

Furthermore, people may also worry about finding out illness through periodic health examination, due partly to their medical costs concerns, especially if they have experience or knowledge about other

seriously ill patients that have gone through long-term and costly medical treatments. However for those with a relatively good health conditions, taking medical examinations and receiving advice from health experts about diseases prevention tend to improve their health status, helping to reduce the number of visits to health professionals [41]. In addition, as periodic general health examinations only perform a number of standard tests for early symptoms, they should not cause a build-up of psychological hesitations [42,43,11].

By analyzing two regression models, using a new cross-section dataset, this study will demonstrate the relationship between genders and health statuses of relatives/friends to people's hesitation to take health checkup because of illness worries, and provide some evidence on the impact of time - from latest health checkups - and the fear of health problems being unveiled on the propensity of attending and/or making priority for GHEs.

## **Materials and Methods**

The dataset of the study was collected in various clinics, hospitals, companies, schools and households in Hanoi and its surrounding areas. It was conducted by Vuong & Associates research team during the last quarter of 2016, under the ethical standards and institutional approval numbered V&A/07/2016 (September 12, 2016), following which a statement of research ethics is provided at the end of each questionnaire. The survey's subjects were chosen randomly, there was no particular inclusion / exclusion criteria.

Raw data are entered in MS Excel then converted into CSV. Data treatment and categorical structuring for multi-way contingency data tables are performed in R 3.3.1. The actual estimating of statistical coefficients, and computing relevant test statistics, employs the baseline-categorical logit (BCL) model, enabling the exploring of possible relationships between concerning variables through different specifications depending upon choices of response and predictor variables [44].

The general equation of the baseline-categorical logit model is:

$$\ln(\pi_j(\mathbf{x})/\pi_J(\mathbf{x}))=\alpha_j+\boldsymbol{\beta}_j' \mathbf{x}, \quad j=1,\dots, J-1. \quad (\text{Eq.7})$$

in which  $\mathbf{x}$  is the independent variable; and  $\pi_j(\mathbf{x})=P(Y=j|\mathbf{x})$  its probability. Thus  $\pi_j=P(Y_{ij}=1)$  with  $Y$  being the dependent variable.

The estimated coefficients in multivariable logistic models are used to calculate the empirical probabilities. The statistical significance of predictor variables in the model are determined based on z-value and p-value ( $p$ ); with  $p<0.05$  being the conventional level of statistical significance required for a positive result.

In the logit model, the probability of an event, among a distribution  $\{\pi_j(\mathbf{x})\}$ , is computed as:

$$\pi_j(\mathbf{x})= \exp(\alpha_j+\boldsymbol{\beta}_j' \mathbf{x})/(1+\sum_{(h=1)}^{J-1} \exp(\alpha_h+\boldsymbol{\beta}_h' \mathbf{x})) \quad (\text{Eq.8})$$

with  $\sum_j \pi_j(\mathbf{x})=1$ ;  $\alpha_J=0$  và  $\boldsymbol{\beta}_J=0$ ; in which  $n$  is the number of observations in the sample,  $j$  the categorical values of an observation  $i$ , and  $h$  a row in basic matrix  $\mathbf{X}_i$ . Estimated probabilities can be used to predict the possibilities of  $Y$  in different conditions of  $\mathbf{X}_i$  [45-47]. Specifically in this article, this is probability of a person hesitating towards periodic general health examinations in particular conditions of age and their friends/relatives' health status; or probability of perceivably appropriate periodic GHE frequency (6 months, 12 months,  $\geq 18$  months) against the time since their last visit to a doctor and the psychological fear of diseases detection.

## Analysis

According to the results of the survey, there is an average one in six people invited to join the interviews who refused to answer. The time for each interview was 10-15 minutes/questionnaire.

Among 2,068 respondents, the percentage of young people ( $<30$  years old) accounted for the majority (63.15%), the proportion of respondents aged 50 or more ( $\geq 50$  years) was very small, only about

5.67% (Table 1). In the survey, women appear to have accepted interviews more often than men, accounting for 64.08%.

**Table 1. Descriptive Statistics**

<b>Characteristics</b>	<b>N</b>	<b>Percentage (%)</b>
<b>Age</b>		
<30	1306	63.15
30-49	643	31.09
≥50	119	5.76
<b>Sex</b>		
Male	728	35.20
Female	1340	64.80
<b>Hesitation due to possible discovery of diseases</b>		
Yes	483	23.36
No	1585	76.64
<b>Time since the most recent visit to doctor</b>		
Less than 12 months	1373	66.39
From 12 to 24 months	200	9.67
Above 24 months	125	6.05
Unknown	370	17.89
<b>Having friends under multi-day treatments</b>		
Yes	917	44.34
Never	1151	55.66
<b>Perceivably suitable periodic GHE frequency</b>		
Every 6 months	1238	59.86
Every 12 months	638	30.85

>=18 months	192	9.28
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More than 3/4 of the survey respondents said they were not afraid of periodic GHEs due to possible disease detection but maybe due to other causes: time-consuming (51.69%), financially costly (37.23%), low confidence in the quality of service (26.78%), or feeling of non-urgency and unimportance (51.89%). Notably, about 2/3 of the respondents had the most recent check-up less than 12 months ago (66.39%) with the main reasons being early symptoms of a health problem (35.30%) and at the request of the employer (35.11%). The remaining reasons are due to public rumors or unofficial information about some epidemic or disease outbreaks (4.74%), and self-perceived needs of health checkups (24.85%). Concerning health status of relatives/friends of the participants, 44.34% had friends or relatives who had been or were currently under long-term treatment, while the remaining have relatives/friends being in good health, never received long-term treatment. In addition, over 90% of those interviewed said that if they had enough time and money, GHEs should be taken once or twice a year. Still 9.28% thought that attending GHEs should take place every 18 months or even longer. The hesitation toward GHE due to possible discovery of diseases in relation to the appropriate examination time is described in Figure 1.

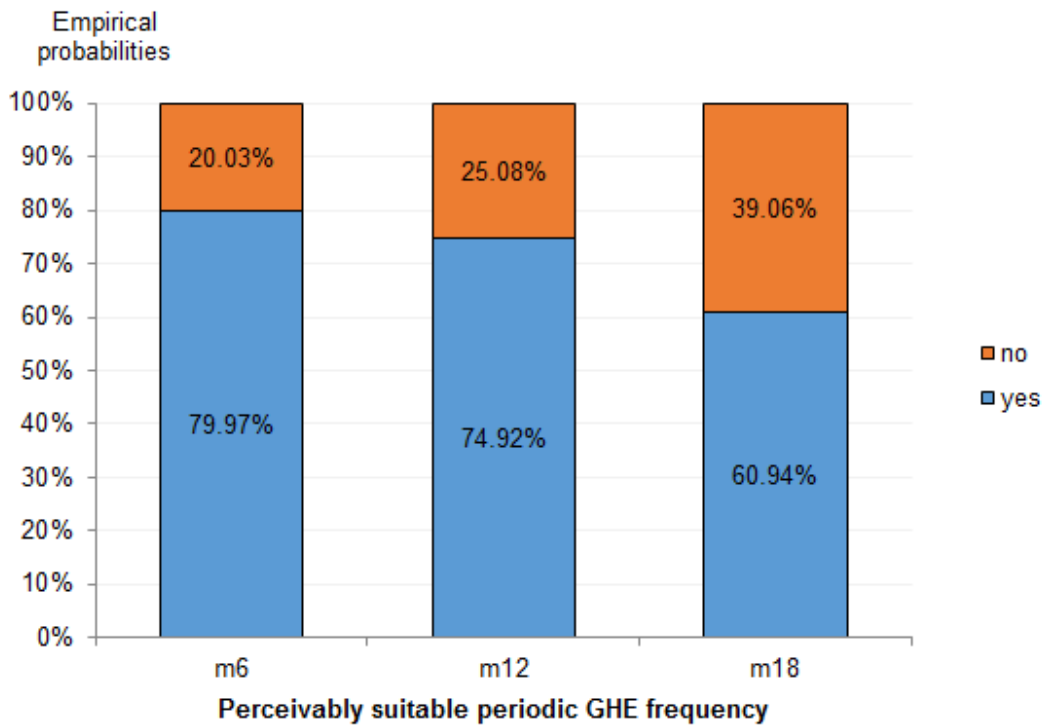


Figure 1. Relationship between fear of illness detection and perceivably suitable GHE frequency

In Fig.1, it can be seen that the proportion of people afraid of detecting illnesses through periodic GHE (“yes”) at appropriate time of 6 months (“6m”) is the highest, and this percentage decreases as the time gap since the participant’s most recent GHE increases.

## Results

### Psychological factor of diseases detection in GHE decisions

The relationship between hesitation towards GHE due to disease identification affected by gender and health status of friends/relatives BCL is to be examined using a BCL logit regression model. The dependent variable is “DiscDisease” (hesitation due to possible disease detection) with two categories “Yes” and “No”. The dependent variables are “Sex”, having values of “Male” and “Female”; and “AcqTrmt” (the status of the respondents having friends/relatives undertaking a prolonged medical



treatment), which can be true (“Yes”) or false (“Never”). The results give statistically significant ( $p < 0.0001$ ) coefficients which help to establish an empirical relationship as provided in Table 2.

**Table 2. Estimation results**

	Intercept		“Sex”		“AcqTrmt”	
			“Male”		“Yes”	
	$\beta_0$		$\beta_1$		$\beta_2$	
logit(yes no)	-1.155*** [-14.573]		-0.409*** [-3.602]		0.221* [2.110]	
Significance codes: 0 ‘***’, 0.001 ‘**’, 0.01 ‘*’; z-value in square brackets; baseline category for: “Sex”=“Female”; and “AcqTrmt”=“Never”. Log-likelihood: -12.89 on 1 degree of freedom (d.f.). Residual deviance: 0.68 on 1 d.f.						

From the results above, the regression equation (Eq.1) is derived.

$$\ln(\pi_{\text{yes}}/\pi_{\text{no}}) = -1.155 - 0.409 \times \text{male.Sex} + 0.221 \times \text{yes.AcqTrmt} \quad (\text{Eq.1})$$

According to Eq.1, in order to calculate the probability of a man being afraid of GHE and having friends/relatives experiencing long-term treatment, the following formula is employed:

$$\pi_{\text{yes}} = e^{-1.155-0.409+0.221} / (1 + e^{-1.155-0.409+0.221}) = 0.207$$

Other conditional probabilities are computed likewise, with the empirical results being reported in Table 3.

**Table 3. Probability of hesitation toward GHE due to disease detection as influenced by gender and health status of friends/relatives**

“DiscDisease”	“Yes”		“No”	
	“Male”	“Female”	“Male”	“Female”
“AcqTrmt” “Sex”				
“Yes”	0.207	0.282	0.793	0.718

“Never”	0.173	0.240	0.827	0.760
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## Impact of fear of detecting diseases on periodic GHE behaviors

Next, periodic GHE behaviors are assessed through the perceivably suitable frequencies of GHE (“SuitFreq”): every 6 months (“m6”), every 12 months (“m12”), and every 18 months or more (“m18”). The first factor that is supposed to have an impact on the people’s behavior is the fear of diseases, represented by the variable of “DiscDisease”, having one of the two categorical values: “Yes” and “No”. In addition, while considering signs of illness, the time since a respondent’s most recent medical examination (“RecExam”) is also taken into account and divided into four categories: <12 months (“less12”), 12-24 months (“b1224”), more than 24 months (“g24”), and forgotten/never attending (“unknown”). Actual estimations for logistic regression models report that almost all estimate coefficients are highly significant with  $p < 0.01$ . Detailed results are presented in Table 4.

**Table 4. Estimating the response “SuitFreq” against the predictor “RecExam” and “DiscDisease”**

	Intercept	“RecExam”			“DiscDisease”
		“less12”	“g24”	“unknown”	“Yes”
	$\beta_0$	$\beta_1$	$\beta_2$	$\beta_3$	$\beta_4$
logit(m6 m18)	2.026*** [7.495]	0.854** [2.937]	-0.588 [-1.620]	-1.085*** [-3.741]	-0.838*** [-4.862]
logit(m12 m18)	1.793*** [6.540]	0.277 [0.937]	-0.865* [-2.307]	-1.553*** [-5.170]	-0.594** [-3.276]

Significance codes: 0 ‘\*\*\*’, 0.001 ‘\*\*’, 0.01 ‘\*’, 0.05 ‘.’, 0.1 ‘.’, 1; z-value in square brackets; baseline category for: “RecExam”=“b1224”; and “DiscDisease”=“No”. Log-likelihood: -44.58 on 6 d.f. Residual deviance: 10.73 on 6 d.f.

The equations of (Eq.2) and (Eq.3) below help to quantify the influence of the time since the participant's most recent doctor visit and psychological concerns to diseases on perceivably appropriate GHE frequency.

$$\ln(\pi_{m6}/\pi_{m18}) = 2.026 + 0.854 \times \text{less12.RecExam} - 0.588 \times \text{g24.RecExam} - 1.085 \times \text{unknown.RecExam} - 0.838 \times \text{yes.DiscDisease} \quad (\text{Eq.2})$$

$$\ln(\pi_{m12}/\pi_{m18}) = 1.793 + 0.277 \times \text{less12.RecExam} - 0.865 \times \text{g24.RecExam} - 1.553 \times \text{unknown.RecExam} - 0.594 \times \text{yes.DiscDisease} \quad (\text{Eq.3})$$

Modifying (Eq.2) and (Eq.3), we can obtain  $\pi_{m6}$  on the conditions of "RecExam"="less12" and "DiscDisease"="Yes" according to the following formula:

$$\pi_{m6} = e^{2.026 + 0.854 - 0.838} / (1 + e^{2.026 + 0.854 - 0.838} + e^{1.793 + 0.277 - 0.594}) = 0.589$$

Table 5 below shows the probability of selecting appropriate periodic GHE frequencies in all different conditions of the most recent doctor visits and the fear of detecting diseases through check-ups.

**Table 5. Probabilities of periodic GHE frequencies perceived as suitable based on time since the participant's most recent doctor visits and fear of detecting disease through check-ups**

"SuitFreq"	"m6"			
"DiscDisease" "RecExam"	"less12"	"b1224"	"g24"	"unknown"
"yes"	0.589	0.432	0.432	0.394
"no"	0.666	0.520	0.544	0.530
"SuitFreq"	"m12"			
"DiscDisease" "RecExam"	"less12"	"b1224"	"g24"	"unknown"

“yes”	0.334	0.437	0.331	0.250
“no”	0.296	0.412	0.327	0.263
“SuitFreq”	“m18”			
“DiscDisease”  “RecExam”	“less12”	“b1224”	“g24”	“unknown”
“yes”	0.077	0.131	0.237	0.356
“no”	0.038	0.068	0.129	0.207

## Discussion

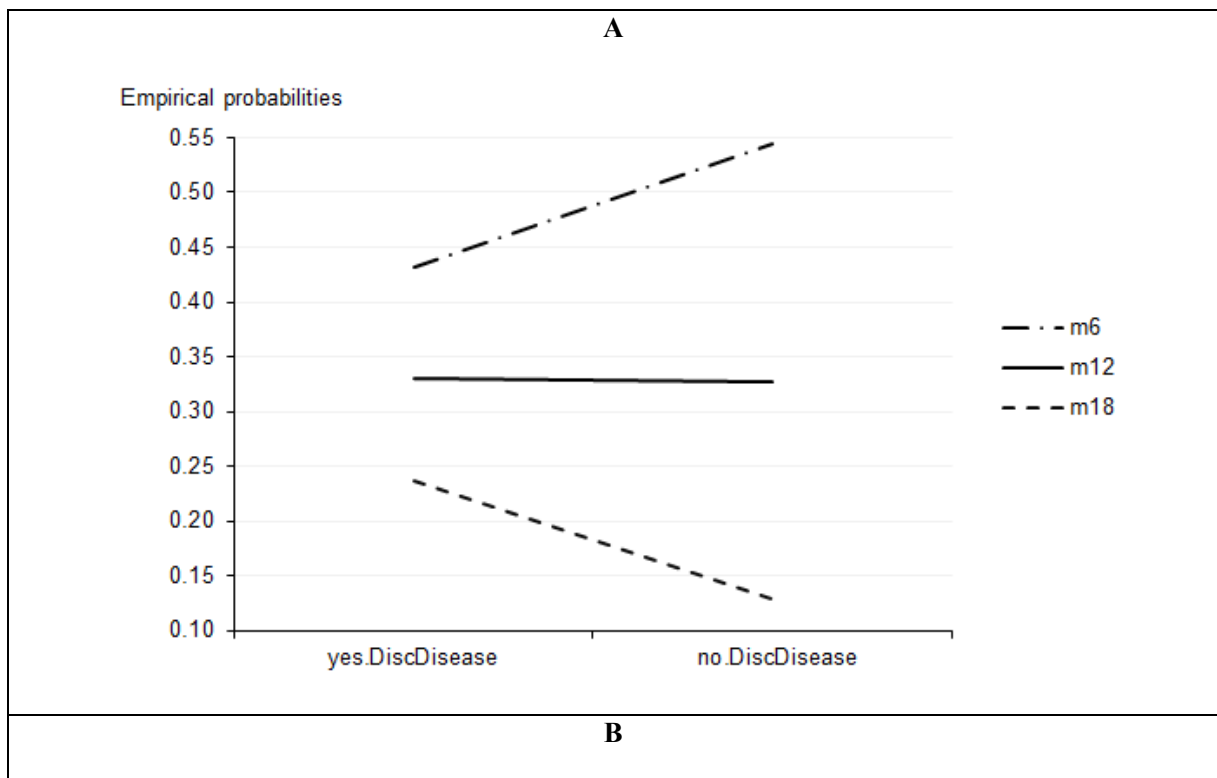
It is of interest to observe the calculated coefficients as they evaluate the extent to which psychological factors affect participants’ hesitation toward periodic GHE (Eq.1). Notably, the coefficient of the variable “Sex” at “male” is negative ( $\beta_1=-0.409$  with  $p<0.001$ ), meaning that  $\pi_{yes}$  of male participants is smaller than that of females. This is also confirmed by the probabilities in Table 3. However, this difference between men and women is not too large.

Table 3 also reveals that those who have friends/relatives who used to suffer from long-time treatment are more likely to have fear of disease detection as a reason to their hesitation towards periodic GHE. For example, if a woman has relatives or friends who have experienced long-time therapy, the probability of her hesitating to take periodic GHE is 28.2%, but this figure will drop to 24% if her friends/relatives have a good health. On the other hand, it is worth noting that patients are significantly more likely to be unafraid of disease detection:  $\pi_{no}$  is larger than 70% in all conditions and the largest can reach nearly 83%.

When it comes to people’s behaviors towards periodic GHEs, from (Eq.2) and (Eq.3) it can be seen that apart from intercepts, the coefficient at “unknown” of “RecExam” has the largest absolute value ( $\beta_3= -1.085$  with  $p\text{-value}<0.001$  at (Eq.2) and  $\beta_3=-1.553$  with  $p\text{-value}<0.001$  at (Eq.3)). Thus, out of all

the time values since the patient's most recent doctor visit, it is in reality the unidentified value that has a significant impact on the likelihood of people believing that periodic GHE should be taken every 6 or 12 months. Fig.2 depicts the impact tendencies of "RecExam" and "DiscDisease" on participants' perception of suitable GHE frequencies.

**Figure 2. Changes in probability of periodic GHE frequencies perceived as suitable based on time since patient's most recent doctor visit and hesitation due to fear of possible disease detection**



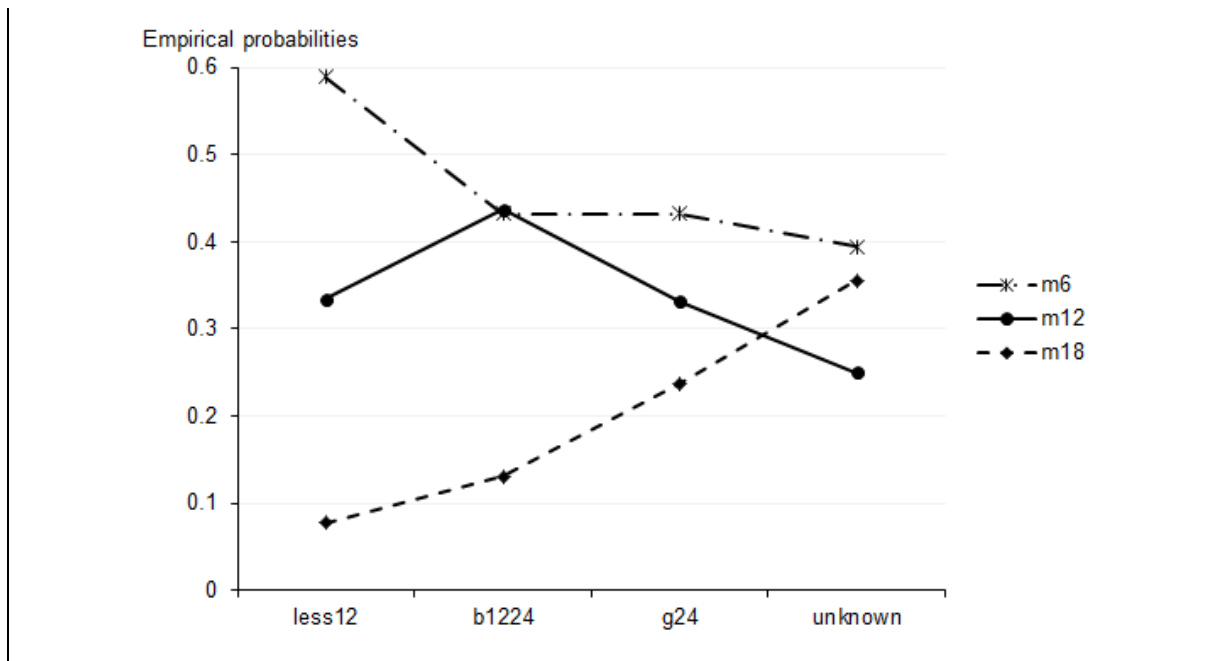


Fig.2A depicts changes in preferred periodic GHE frequencies of those who last visited doctors 2 years ago. It can be easily observed that the line of “m6” goes upward and “m18” downward as they moved from “yes.DiscDisease” (afraid of detecting disease) to “no.DiscDisease” (not afraid). The line “m12” lays nearly horizontal, showing that both ready patients and hesitating patients have nearly the same propensity to take periodic GHE every 12 months. Thereby, it is possible to confirm that not hesitating due to fear of detecting illnesses will improve the likelihood of attending GHE.

Fig.2B presents the changes in suitable periodic GHE frequencies as perceived by those who are afraid of figuring out diseases through periodic GHEs. It can be remarked that when moving from the point “less12” to “unknown”, the probability line of “m6” goes downward from nearly 60% to almost 40% whereas the “m18” has an opposite slope from 7.7% to nearly 36%. Particularly, “m12” line is broken at the point “b1224” but then continues going down. In summary, the longer the time since people’s most recent doctor visit, the less likely they are to accept attending periodic GHE every 6 or 12 months.

## Conclusion

Not only due to time or money are people not ready for regular health checks [48], but psychological factors, for instance the fear of disease detection, also contribute to a lot of people's perpetual delay regarding GHE. The analysis shows that women are inclined to be more afraid of diseases than men despite being more willing to attend periodic GHE in general [49,10]. This situation can be explained by the fact that women are often more psychologically vulnerable than men, and therefore more likely to be afraid to face illnesses. Another reason, more applicable to societies on which traditional gender roles remain heavily imposed, would be that since women are generally expected to take care of family members and be responsible for their health, she must not let herself fall ill—and if she happens to be ill, she would rather hide the fact than becoming a burden (this is especially true for housewives who make no income). This mentality of self-sacrifice is most widely observed in more conservative societies, such as rural Vietnam.

Those whose friends/relatives used to suffer from long-term treatment also show more hesitation towards periodic GHE due to fear of disease detection. This psychological phenomenon is understandable, especially considering the fact that people's thoughts and actions are affected by their surroundings. Witnessing their kindred coping with disease might cause them trauma, resulting in a subconscious fear of facing similar circumstances, and even to avoid GHEs, further aggravating the situation. On the other hand, if the sick person is a member of their family, it might be financial constraints—stemming from the costly treatment—that hamper her to have access to medical services, GHE included [49-51,6,10].

Although people are much likely to not be afraid of detecting diseases, the 30% probability is already worrying, as neglecting GHE would equal to losing opportunities to prevent, detect and, in case of disease, receive early treatment. The coefficient  $\beta_4 = -0.838$  in (Eq.2),  $\beta_4 = -0.594$  in (Eq.3) and the

numbers in Table 5 have proved that people who are afraid of finding out illnesses will be less inclined to participate in periodic GHE. The reason for that might be due to their belief that GHE would always detect diseases; they therefore refuse to have their health checked until there are obvious signs of health problem, just because they do not want to live in fear or confusion. This is problematic because usually, when the signs have become obvious, the illness would have already progressed considerably, resulting in not only a greater threat to their health but also possibly a much higher treatment cost. The vicious cycle then leads to a psychological trauma on family members and/or financially constrain them from accessing health care services.

Those who have encountered health problems and have received medical examination at hospitals or clinics seem to be more concerned about their health, especially when their last medical examination took place recently. This might just be because they are still under monitor by professional health care personnel, either in treatment or post-treatment recovery. But their higher level of concerns over health matters can also be due to their past experience with being ill: they pay more attention to health care because they understand the importance of having check-ups regularly. In other words, they have “learned their lesson”, and are much more willing to take GHE on a regular basis.

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## **Supporting Information**

S1 Table: Distribution of patients against psychological hesitation towards periodic GHE due to diseases discovering and perceivably suitable periodic GHE frequency (Data used for Fig.1).



“DiscDisease”	“SuitFreq”		
	“m6”	“m12”	“m18”
“yes”	990	478	117
“no”	248	160	75

S2 Table: Changes in probability of perceivably suitable periodic GHE frequency of those having the last doctor visit 2 years ago (Data used for Fig.2A)

“DiscDisease”	“SuitFreq”		
	“m6”	“m12”	“m18”
“yes”	0.43	0.33	0.24
“no”	0.54	0.33	0.13

S3 Table: Changes in probability of perceivably suitable periodic GHE frequency of those who have hesitation towards GHE due to disease identification (Data used for Fig.2B).

“SuitFreq”	“RecExam”			
	“less12”	“b1224”	“g24”	“unknown”
“m6”	0.589	0.432	0.432	0.394
“m12”	0.334	0.437	0.331	0.250
“m18”	0.077	0.131	0.237	0.356

Related data and insights can be found in [52-54].

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