SHORT ARTICLE

Learning healthcare needs when the body speaks: Insights from a 2016 Vietnamese survey on general physical examinations

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Abstract

Background: General health examinations (GHEs) help Vietnamese detect early signs of illness and serve to be an important part of preventive medicine. Having GHEs can help reduce risks of poverty due to prolonged medical treatments in Vietnam, as 70% patients without health insurance face financial burdens caused by expensive treatments. **Aims & Objectives**: Does owning a medicine cabinet or having practical first-aid knowledge and skills have effects on people's attitude towards GHEs? **Materials & Methods**: Analysis is performed on a 2,068-observation dataset, collected from a survey towards GHEs propensity collected in Hanoi and its vicinities. The methods of baseline-categorical logit model and ordinary least square are used to estimate the probabilities. **Results**: (1) There exist differences in the tendency of attending GHEs between those with and without a family medicine cabinet, and knowledge of using basic medical equipment; (2) The factors of age, gender, job and marital status are also proven related to body mass index (BMI). **Conclusion**: People who have common medical tools in the family and medical skills are likely to have GHEs more often. The likelihood of being over-weight is higher when people become older, especially among women.

Keywords

Periodic General Health Examinations; Medicine Cabinet; Medical Tools; BMI; Vietnam; Public Health

Introduction

In Vietnam, 70% of those who are unable to afford insurance would fall into extreme destitution if they get seriously ill (1,2). Therefore, some families have a medicine cabinet, serving as a kind of "medical center" for treatments of minor injuries or common sickness (3). The downside is that this way of using drugs is usually without prescription or advice from health professionals, and habits such as keeping expired medicines may cause side effects. Thus, Having health examinations (GHE) is a safer practice (4-5). In the USA, each year millions of people do health check-ups even without signs of disease (6). The perceived reliability of from doctors' advice determine patients' choice (7-8). People having knowledge about or working in medical sector tend to have GHE more frequently (9-10). Inadequate attention and flawed knowledge on health matters lead to weak awareness of healthcare services; only 6.48% in China (11).

Also, the body mass index (BMI) measure is a helpful indicator that provides early signs of illnesses. BMIs,

to a certain extent, reflect our daily healthcare routines such as eating habits and physical training (12-13). It could also imply some risks related to a range of diseases: obesity, hypertension, diabetes, dyslipidemia, etc. (14-16). Some studies showed that women have a higher risk of obesity than men (17-18), and older women have a higher risk than youngers (19-20). For men, the higher BMI they have, the more likely they have to suffer from such illnesses as heart disease, while obese women are more susceptible to bone illnesses (21). On the other hand, lower BMI increases the risk of osteogenesis (22). There are differences in BMI among different groups of age (23-24). BMI, along with age and sex, are factors that affect body fat percentage (25). In the United States, the average BMI is 25 kg/m^2 for both men and women, and obesity tends to be more often observed in adults (24). In general, white people have higher BMI than Asians but lower proportion of fat (26), whereas regional traditions, custom and habits can be a contributor element to BMI, e.g. in Nigeria, children are given less food than adults in the family (27).

Aims & Objectives

1. Exploring the correlations and the influential propensities between having common medical skills and the likelihood of attending periodic GHE in the near future.
2. Measuring influences of factors affecting BMI in order to better understand Vietnamese current average body figure and health.

Material & Methods

Study Type: Cross-sectional survey.

Study Area/Sample Size: A random sample of 2,068 respondents from Hanoi and its vicinities.

Strategy for Data Collection: The dataset was collected by Vuong & Associates research team during September-November 2016, through a survey in the form of direct interview, conducted with paper records. The survey process was conducted at places such as secondary schools, hospitals, companies, government agencies, and randomly selected households. No specific inclusion/exclusion criteria were applied as the data sample was completely random.

Ethical Approval/Informed Consent: The survey team adhered to the ethical standards based on the license of V&A/07/2016 (September 12, 2016), following which a statement of research ethics was provided to respondents.

Experimental Design: The research is based on a dataset about the tendencies among the respondents, concerning personal health in general and periodic GHE in particular. The project consists of five phases: questionnaire design, direct interviews; quality control for questionnaire answers, data file design and filing, and data exploitation and result composition. Each questionnaire was designed to be completed within 15 minutes. The research design enables next steps of modeling data following the multinomial logistic regression framework for predicting the likelihood of events under different conditions.

Data Analysis/Software: To answer the question (1), we use BCL model as specified in (28). An alternative is log-linear methods (29). data is entered in MS Excel before being converted into CSV. Data treatment and structuring for multi-way contingency tables are performed in R 3.3.1. The general equation of the BCL model is $\ln[\pi_j(\mathbf{x})/\pi_J(\mathbf{x})]=\alpha_j+\beta^T_j\mathbf{x}$, with $j=1,\ldots,J-1$, where $\mathbf{x}$ is the independent variable; $\pi_j(\mathbf{x})=P(Y=j|\mathbf{x})$ its probability.

The estimated coefficients in the model are used to calculate the empirical probabilities (29-31). The statistical significance of predictor variables in the model are determined based on z-value; with P<.05 being the conventional level required for a positive result. Then, the probability of an event is:

$$\pi_j(\mathbf{x}) = \frac{\exp(\boldsymbol{\alpha}_j + \boldsymbol{\beta}_j^{\mathrm{T}}\mathbf{x})}{1 + \sum_{h=1}^{J-1}\exp(\boldsymbol{\alpha}_h + \boldsymbol{\beta}_h^{\mathrm{T}}\mathbf{x})}$$

with $\sum_j\pi_j(\mathbf{x})=1$; n the number of observations in the sample, j the categorical value of an observation i, and h a row in basic matrix X_i.

To deal with the question (2), the method employed is multi-variable linear OLS regression with the general model described as follows:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \cdots + \beta_kX_k$$

in which the condition is that all k independent variables must have the same sample sizes. Y is a continuous variable, while the independent variables of X_i can be categorical or continuous. The data, after being treated in R (3.3.1), will perform the β_i values denoting the linear influence of X_i on Y.

Results

Statistical description: The dataset provided some personal information of the participants, whether or not they possess medicine cabinets and have the skills to use basic medical tools, and the amount of time since the participant's most recent periodic GHE (see Table 1).

During the survey, 1 out of 6 people invited to interview denied to respond. Among those who agreed to participate in the interviews, 64.08% were female and 57.35% were married. Based on the figures in Table 1, it can be seen that the proportion of people having stable jobs account for a high percentage (53.3%), while only 1.79% were already retired. The average age of the respondents was 29.17 (SD=.09; 95%CI=28.74-29.6). More than half of those who responded were under 30 (63.15%), and a majority had BMI from 18.5 to <23 (60.06%), which is a normal figure for Asian people according to WTO (34). With the average BMI=20.848 (SD=2.67; 95%CI=20.73-20.96), it can be said that Vietnamese people tend to have a relatively stable BMI. BMI among men is higher than women. On the other hand, the percentage of overweight people (BMI>=23) is also quite high (20.21%).

Regarding the time since the participant's most recent periodic GHE, approximately 2/3 reported the exact time, of which 51.21% told that they last attended a periodic GHE nearly 12 months ago. This proves that people are gradually becoming more familiar with GHEs and attending annual check-ups for their own sake. In addition, 73.01% of respondents own a medical cabinet in their homes and 66.78% know how to use medical equipment.

Time since the most recent GHE

The BCL model is employed to examine the relationships between the length of time since the respondent's most recent health check and their basic medical skills. The response variable is "RecPerExam" (the time since the respondent's most recent periodic GHE at the time of the survey), divided into 4 categories: less than 12 months ("less12") since the last GHE, between 12 and 24 months ("b1224"), >24 months ("g24"), and the time is forgotten ("unknown"). Two independent variables include: having a medicine cabinet with some basic medicine ("MedCabinet"); and being able to use some common medical tools ("Tooluseskills"). These two predictors have two categories, "yes" and "no".

The results are described as follows. In $\ln(\pi_{b1224}/\pi_{less12})$, the intercept β_0=-.812 (P<.001; z=-5.48), the coefficients of "MedCabinet" and "Tooluseskills" respectively are β_1=-0.575(P<.001; z=-3.42) and β_2=-.547 (P<.001; z=-3.44). In $\ln(\pi_{g24}/\pi_{less12})$, β_0=-.949 (P<.001; z=-6.34), the coefficients of "MedCabinet" and "Tooluseskills" are β_1=-.413 (P<.01; z=-2.59) and β_2=-.126 (z=-.83). And for $\ln(\pi_{unknown}/\pi_{less12})$, intercept β_0=-.021 (z=-.19), the coefficients of "MedCabinet" and "Tooluseskills" are β_1=-.691 (P<.001; z=-5.58) and β_2=-.298 (P<.05; z=-2.51).

With P<.05, 7 out of 9 coefficients are statistically significant. Thus the relationships between these above variable are confirmed. From the above results, regression equations are formed as follows:

$$\ln\left(\frac{\pi_{b1224}}{\pi_{less12}}\right) = -.812 - .575\times yesMedCabinet - .547\times yesTooluseskills \quad \text{(Eq.1a)}$$

$$\ln\left(\frac{\pi_{g24}}{\pi_{less12}}\right) = -.949 - .413\times yesMedCabinet - .126\times yesTooluseskills \quad \text{(Eq.1b)}$$

$$\ln\left(\frac{\pi_{unknown}}{\pi_{less12}}\right) = -.021 - .691\times yesMedCabinet - .298\times yesTooluseskills \quad \text{(Eq.1c)}$$

From equations 1a-c, the probability of a person who owns a medicine cabinet and is able to use common medical equipment having attended a periodic GHE since more than 24 months ago (π_{g24}=.130) is calculated as follows:

$$\frac{e^{-.949-.413-.126}}{1 + e^{-.812-.575-.547} + e^{-.949-.413-.126} + e^{-.021-.691-.298}}$$

Likewise, conditional probabilities of "RecPerExam" against "MedCabinet" and "Tooluseskills" are computed and displayed in Table 2.

Factors affecting BMI

BMI was observed in order to obtain insights on Vietnamese people's average health and body figure. The linear regression model is employed with BMI as the dependent variable. Explanatory variables include: i) Age ("Age"); ii) Biological gender ("Sex"), including: male and female; iii) Marital status ("MaritalStt"), consisting of: "married" – having been already married, and "other" – unmarried or other marital status; iv) Job status ("Job"), classified into 6 categories: pupils or students ("student"), stable

jobs ("stable"), unstable jobs ("unstable"), retirers ("retired"), homemakers ("homemaker"), and other status ("other"). The correlation coefficient between "Age" and BMI is 0.24. The positive value of this figure preliminary suggest that there exists a proportional relationship between these two factors. This can be certainly affirmed based on the regression coefficient of "Age" in the model.

The estimation results are displayed as follows. The intercept β_0=20.52 (P<.001; z=55.72). Coefficients of "Age", "Sex" and "MaritalStt" respectively are β_1=.019 (P<.01; z=2.6), β_2=1.846 (P<.001; z=16.27) and β_3=-.965 (P<.001; z=-6.32); the coefficient of "Job" at "student" is β_4=-.806 (P<.05; z=-2.57), at "stable" is β_5=-.199 (z=-5.72), at "unstable" is β_6=-1.269 (P<.001; z=-3.90), at "retired" is β_7=-.687 (z=-1.35), and at "other" is β_8=-.789 (P<.05; z=-2.24). Multiple R^2=.217 and adj. R^2=.214. Thus, the regression equation (Eq.2) is established:

BMI = 20.521 + 0.019×Age + 1.846×Male - 0.965×otherMaritalStt - 0.806×studentJob - 0.199×stableJob - 1.269×unstableJob - 0.687×retiredJob - 0.789×otherJob (Eq.2)

From (Eq.2), the BMI of a man aged 29, being married and having a stable job would be ≈22.7:

BMI = 20.521 + .19×29 + 1.846×1 - .199×1

Discussion

Observing the regression coefficients in (Eqs.1a-c), it can be seen that in all three equations, the coefficients of "MedCabinet" are larger than "Tooluseskills" (in absolute value). This implies that having a medicine cabinet will have a stronger influence on the respondent's participation in annual physical check-ups than the factor of having the skills using common medical tools. In fact, with the popularity of first-aid education programs, getting able to use basic medical equipment such as thermometer or gauze bandage has become even more popular (30). Or even if these tools are the applications in mobile phones, they also have the same effect (33). Meanwhile, possessing basic medical equipment and skills might indicate the individual's proneness to illness, but more importantly it shows one's medical care knowledge, which increases their willingness to visit doctors or practitioners for some health checks. Especially, having a medicine cabinet in the family implies the habit of taking care the health. It also could mean that that family has someone susceptible of illness or is suffering from certain diseases, so that they need medicine to be available all the time. In other words, due to the higher risk of disease, they care more about their health and tend to trace up their own health status, thus would tend to be willing to spend time and money on regular health check-ups (33-34). These actions not only help calm their anxiety about personal health issues, but also contribute to save future medical costs (2,30-34).

Conclusion

The probabilities calculated in Table 2 show that both factors of having medicine cabinets and having skills to use medical equipment also encourage people to participate in periodic GHEs. This is further illustrated in Figure 1. In Fig.1 (left) and (right), the probability lines of "less12" have a downwards trend while the "g12/unknown" move upwards when moving from "yes. Tooluseskills" to "no. Tooluseskills". In addition, the "less12" line climbs from over 0.5 to nearly 0.58 in Fig.1(left) and from over 0.35 to nearly 0.53 in Fig.1(right), showing the increased propensity of attending periodic GHEs in both situations – having a medicine cabinet and practicable skills of basic medical tools.

When it comes to body mass index, it can be seen in (Eq.2) that the coefficient of "age" is positive (β_1=.019). This means that the average BMI tend to increase when the age increases, each increase of 1 unit in age will boost BMI by 0.019 units. In other words, if all other variables remain constant, a normal person will add 1 unit of BMI after 52.63 years on average. Moreover, β_2=1.846 reveals that mean BMI among men is higher than women. The same remark has been made in such Asian countries as Taiwan, Philippines and Korea (34). For the cohort with BMI<23, females outnumber males, whilst for cohorts with larger BMIs, males exceed females (Fig.2). Furthermore, β_3=-.965 (<0) indicates that those who are unmarried or having other marital status will have a lower BMI than married people. Depending on the real circumstance, there are a few possible explanations for this phenomenon. First, married life usually urges people to be aware of the need to eat proper meals, particularly in Asia. Moreover, being cared by their spouse, people tend to gain weight. On the other hand, older people are less likely to exercise and might gain weight as a result. To add to it, in Vietnam, the mindset of men

being the "strong" genus and women the "pretty" remained widespread, thus making the idea of a man with the same height as a woman but has a more robust physique and greater weight is neither rare nor confusing.

With respect to job status, all of the coefficients of β_4, β_5, β_6, β_7, β_8 in (Eq.2) are negative, showing that on the same conditions of age, sex and marital status, homemakers are more likely to have higher BMI. This may be due to their lower level of dynamism and social interaction; coupled with more stress, it might cause an increasing appetite and finally lead to a larger figure. A recommended solution for homemakers (usually women) is to join gym clubs, where they can lose weight, tone their body, refine their health and even reduce stress through making social relationships

Recommendation

The development of eHealth and related web-based digital health records should become standard practices, together with promotion of the population's awareness of health matters.

Limitation of the study

The study has some limitations. First, it was limited to those who came from within Hanoi and its vicinities. Second, not all coefficients are statistically significant, and the influential differences between the independent variables on the response are not large. Finally, adjusted R^2 in the model considering the effect on BMI is 21.42%, showing that the extent of explanation by the predictors on the response in (Eq.2) is relatively low.

Relevance of the study

The results from Vietnam are directly comparable to the extant literature. Insights serve to be inputs for future promotion of sustainable social health.

Authors Contribution

The authors contribute equally to this article.

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Tables

TABLE 1 STATISTICAL DESCRIPTION FIGURES FOR A FEW VARIABLES

Characteristics	N	Percentage (%)
Gender		
Male	728	35.20
Female	1340	64.80
Age		
<30	1306	63.15
30-49	643	31.09
≥50	119	5.76
Marital status		
Married	1186	57.35
Unmarried	877	42.41
Other	5	0.24
Job status		
Stable	1123	54.30
Unstable	171	8.27
Student	548	26.50
Retired	37	1.79
Homemaker	85	4.11
Other	104	5.03
BMI		
<18.5 (underweight)	408	19.73
18.5-22.99 (normal)	1242	60.06
23-24.99 (pre-obese)	279	13.49
25-29.99 (obese level I)	128	6.19

>=30 (obese level II)	11	0.53
Time since the last GHE		
Less than 12 months	1059	51.21
From 12 to 24 months	218	10.54
More than 24 months	275	13.30
Unknown	516	24.95
Whether or not having cabinet medicine in the family		
Yes	1151	73.07
No	557	26.93
Whether or not having the skills of using common medical tools		
Yes	1381	66.78
No	687	33.22

TABLE 2 PROBABILITIES OF TIME SINCE MOST RECENT PERIODIC GHE

"RecPerExam"		"less12"		"b1224"		"g24"		"unknown"	
"Tooluseskills"		"yes"	"no"	"yes"	"no"	"yes"	"no"	"yes"	"no"
"MedCabinet"	"yes"	0.577	0.501	0.083	0.125	0.130	0.128	0.210	0.246
	"no"	0.429	0.356	0.111	0.158	0.147	0.138	0.313	0.348

Estimation results: ln $\ln(\pi_{b1224}/\pi_{less12})$,the intercept β_0=-0.812 (P<0.0001), the coefficients of "MedCabinet" and "Tooluseskills" respectively are β_1=-0.575 (P<0.001) and β_2=-0.547 (P=5.75×10-4). In $\ln(\pi_{g24}/\pi_{less12})$, β_0=-0.949 (P<0.0001), the coefficients of "MedCabinet" and "Tooluseskills" are β_1=-0.413 (P=0.009) and β_2=-0.126 (P=0.404). And for $\ln(\pi_{unknown}/\pi_{less12})$, β_1=-0.691(P<0.0001) and β_2=-0.298 (P=0.012).

Figures

FIGURE 1 PROBABILITIES OF TIME SINCE THE MOST RECENT GHE BY OTHER FACTORS

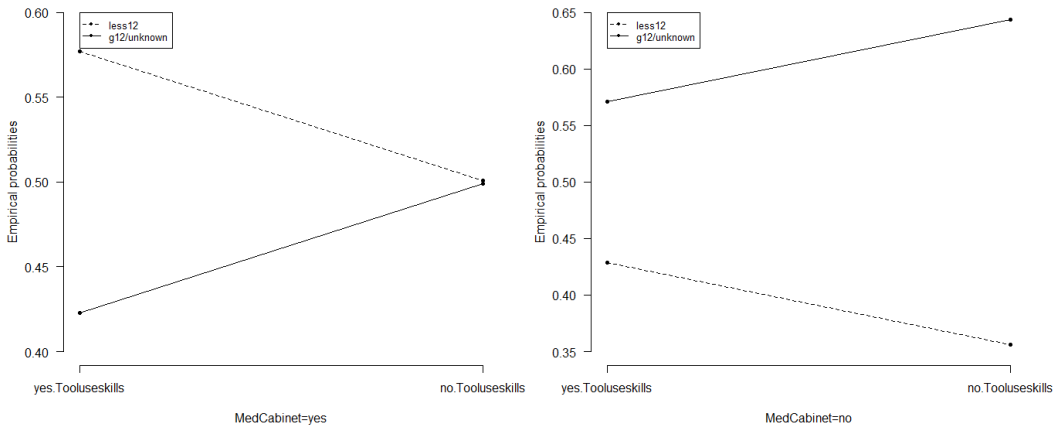

FIGURE 2 BMI DISTRIBUTIONS BY GENDER