

# FACTORS PREDICTING INDIVIDUAL HEALTH BEHAVIORS DURING COVID-19 PANDEMIC

## FACTORES QUE PREDICEN LOS COMPORTAMIENTOS DE SALUD INDIVIDUALES DURANTE LA PANDEMIA DE COVID-19

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### Cómo citar:

Huynh Van Chan; Nguyen Thi Mai Lan; Vu Dung; Le Minh Thuan; Vu Thu Trang; Nguyen Thi Thanh Nga ; Nguyen Nhan Ai; Ngo Thuy Hao; Dao Thi Dieu Linh; Nguyen Xuan Long; Le Thanh Ha; Le Minh Nguyet ; Ngo Xuan Hieu; Dau Minh Long; Vu Ha Le. (2021). Factors predicting individual health behaviors during COVID-19 pandemic. *Revista de Investigaciones Universidad del Quindío*, 33(1), 58-72. <https://doi.org/10.33975/riuvq.vol33n1.461>

Información del artículo:  
Recibido: 7 abril 2021; Aceptado: 19 abril 2021

Revista de Investigaciones Universidad del Quindío,  
33(1), 58-72; 2021.

ISSN: 1794-631X e-ISSN: 2500-5782

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## ABSTRACT

**Background:** Covid - 19 is a global pandemic, affecting all areas of social life in every country. In the current conditions of the Covid-19 pandemic, individual health behaviors are of primary importance. Each citizen consciously implements their health behaviors not only to prevent them from being infected, but also to help the country's prevention of Covid-19 effective. The study of factors predicting people's health behaviors in the community will help managers come up with appropriate measures to improve public health and to quickly repel the pandemic.

**Objectives:** The research analyzes factors predicting personal health behaviors during the Covid-19 pandemic in Vietnam, including: pandemic awareness, self-assessment of the possibility of becoming infected, fear of disease, quality of life, and mental health (anxiety).

**Methods:** This was a cross-sectional quantitative study. Data were collected from a convenient sample of 572 people in Vietnam (118 males, 451 females;  $M$  age =27.0 ( $sd$  = 10.0)) by a means of an online questionnaire survey. The questionnaire was constructed based on the YouGov Behavior Change questionnaire; the Fear of Coronavirus-19 Scale (FCV-19), WHOQOL-BREF, the Moral Foundation Questionnaire, and Knowledge of Covid-19. This study performed multivariate regression analysis to explore effects of moral, quality of life, knowledge and fear of Coronavirus-19 on health behaviors of participants.

**Result:** The result showed that fear and sex factors explain 4% ( $R^2$ -adj = 4%) of health behavior change in the Covid-19 pandemic. In addition, there is a significant relationship between health behaviors and fear, age, gender, and occupation.

**Conclusion:** People's health behaviors are particularly concerned during the Covid-19 pandemic. Community healthcare activities for the people should be tailored to suit different population groups such as gender, age or emotional experiences. More in-depth studies are needed to find out the causes of these differences, thereby proposing practical solutions to help people practice more effective health behaviors, contributing to preventing and combating the outbreak.

**Keywords:** Covid – 19; predictors; health behaviors; people in the community.

## RESUMEN

**Antecedentes:** Covid - 19 es una pandemia mundial que afecta a todas las áreas de la vida social en todos los países. En las condiciones actuales de la pandemia de Covid-19, los comportamientos de salud individuales son de primordial importancia. Cada ciudadano implementa conscientemente sus comportamientos de salud no solo para evitar que se infecten, sino también para ayudar a que la prevención del Covid-19 en el país sea efectiva. El estudio de los factores que predicen los comportamientos de salud de las personas en la comunidad ayudará a los administradores a idear las medidas adecuadas para mejorar la salud pública y repeler rápidamente la pandemia.

**Objetivos:** La investigación analiza los factores que predicen los comportamientos de salud personal durante la pandemia Covid-19 en Vietnam, que incluyen: conciencia pandémica, autoevaluación de la posibilidad de infectarse, miedo a la enfermedad, calidad de vida y salud mental (ansiedad).

**Métodos:** estudio cuantitativo transversal. Los datos se recopilaron de una muestra conveniente de 572 personas en Vietnam (118 hombres, 451 mujeres; M edad = 27,0 (dt = 10,0)) mediante un cuestionario en línea. El cuestionario se construyó en base al cuestionario de cambio de comportamiento de YouGov; la Escala del Miedo al Coronavirus-19 (FCV-19), el WHOQOL-BREF, el Cuestionario de la Fundación Moral y el Conocimiento del Covid-19. Este estudio realizó un análisis de regresión multivariante para explorar los efectos de la moral, la calidad de vida, el conocimiento y el miedo al Coronavirus-19 en los comportamientos de salud de los participantes.

**Resultado:** El resultado mostró que el miedo y los factores sexuales explican el 4% ( $R^2\text{-adj} = 4\%$ ) del cambio de comportamiento de salud en la pandemia de Covid-19. Además, existe una relación significativa entre los comportamientos de salud y el miedo, la edad, el género y la ocupación.

**Conclusión:** los comportamientos de salud de las personas están particularmente preocupados durante la pandemia de Covid-19. Las actividades de salud comunitaria para las personas deben adaptarse a los diferentes grupos de población, como el género, la edad o las experiencias emocionales. Se necesitan estudios más profundos para conocer las causas de estas diferencias, proponiendo así soluciones prácticas que ayuden a las personas a practicar conductas de salud más efectivas, contribuyendo a prevenir y combatir el brote.

**Palabras clave:** Covid - 19; predictores; comportamientos de salud; personas de la comunidad.

## 1. INTRODUCTION

The World Health Organization (WHO) officially declared the Covid-19 outbreak a global pandemic on March 11, 2020 (WHO, 2020a). Infected people have common symptoms for 2–14 days including fever, fatigue, dry cough, muscle pain and shortness of breath (Wang et al. 2020). However, current COVID-19 treatment worldwide is primarily focused on infection control and vaccine development (Dong et al. 2020; Wang et al. the. 2020). The occurrence of this pandemic has affected the whole world. As of September 3, 2020, the number of Covid 19 cases was 26,242,192, and the number of deaths was 868,472 in more than 200 countries throughout the world (Vietnam’s Ministry of Health, 2020).

In Vietnam, the number of infections was 1046, with 35 deaths (Vietnam’s Ministry of Health, 2020). Covid-19 has affected not only the public health, but also the global socio-economic development (Y. Luo et al., 2020). Up to now, the pandemic has remained complicated and not under control in Europe, America and many Asian countries, resulting in negative impacts on all socio-economic activities globally and in Vietnam. Almost all economic sectors and fields are negatively affected (C. V. Luc et al, 2020). The 2003 SARS outbreak, which infected around 8,000 people with 774 deaths, caused roughly \$50 billion damage to the global economy. Meanwhile, the 2015 MERS outbreak in South Korea left 200 people infected and 38 dead, and the estimated damage was about \$8.5 billion.

The Covid-19 pandemic has had a much greater economic impact than previous pandemics. Wall Street has joined the global sell-off; the S&P 500 index of US companies fell 11.5% in the 4<sup>th</sup> week of February 2020, the worst week since the 2008 crisis. China has truly fallen into the economic stalemate within one month of the Lunar New Year, and the effects on global production are evident (S. John, 2020). In a more specific assessment, the agro-forestry-fishery sector had great difficulty in exporting goods and importing agricultural auxiliary product. Many agricultural commodities had difficulty in the first quarter of 2020 because of the Covid-19 pandemic. Both domestically and internationally, the service sector was strongly influenced by the decline in aggregate demand. Accordingly, the travel sector's share price plummeted up to -33.2% ... (C.V. Luc et al, 2020). Not only does it affect the socio-economic sector, the pandemic has greatly affected people's mental health (Y. Luo et al., 2020) Common consequences of an outbreak include anxiety and panic, depression (M. Bults, et al., 2015; Y. Hao, C. Jian-Hua, X. Yi-Feng, 2020), anger, uncertainty, and financial stress. From 25% to 33% of the communities experienced anxiety and high levels of anxiety during a pandemic (Bults, M., et al., 2015).

In response to the Covid-19 pandemic, each country has its own strategies to combat the pandemic. According to WHO's global strategy in response to Covid-19, in order to overcome the Covid-19 pandemic, we need an approach of solidarity for the common goal of all individuals and communities; there should be a combination of all organizations and societies (WHO, 2020c). During COVID-19 pandemic, countries such as China, Taiwan, South Korea, Vietnam, ... which have implemented strict social distancing, visa restriction, school closures, etc have effectively controlled the outbreak, with the number of new cases falling day by day (S. Baker, 2020). These countries all responded in a timely manner by taking specific actions to prevent the pandemic, and especially the people performed good health behaviors to protect their health and their

communities.

Many studies have shown that human health behaviors can significantly influence the course of the Covid-19 pandemic (G. Pascal, 2020). Sweden is one of the countries with a different approach and response to the Covid-19 pandemic compared to other European countries. This country believes that its people will voluntarily abide by the agreements. The Swedes stay at home, follow social distancing, and wash their hands to slow the spread of the virus - without any mandatory commands. And to a certain extent, Sweden appears to have been as successful example in controlling the virus (A. Jenny, 2020; E. Thomas and A. Christina, 2020). In the fight against the Covid-19 pandemic, Vietnam is one of the typical countries of success in pandemic control. As a result, the rate of people infected and dying in Vietnam is much lower than in countries such as China, Italy, Korea, the UK and the United States (L. V. Phuong et al., 2020). At the national level, the government has taken urgent measures in all areas of the social life such as: School closures (M. Ha, 2020); no crowded gatherings; religious organizations are required to stop mass gatherings (An, N., 2020); Prohibit organizing cultural, sports and recreational activities in public places; social isolation when needed; stop international commercial flights to Vietnam; restrict domestic travel; Compulsory mask-wearing; wash hands regularly with soap and antibacterial water; encourage using electronic health declaration system (Vietnamnet. COVID-19, 2020); create a Hanoi Smart City application to provide a risk assessment and consultation tool on preventive measures, contact reports and live updates for Hanoi Citizens (Vietnam Television, 2020). The quick and effective measures taken by the Vietnamese government so far have been highly appreciated by international organizations (Dung, T., 2020). At the individual level, thanks to the great belief in government regulation during the pandemic, people have taken many actions to support the government's disease prevention. People are willing to donate money and donate products such as medical masks;

staple food (rice, meat, vegetables, ...) for the poor in isolated areas. Many people are willing to spend money and time cooking free meals serving doctors to prevent disease and the poor (eMagazine. COVID 19, 2020). Thus, it can be said that Vietnam's success in the prevention of the COVID-19 pandemic is a combination of political readiness, timely communications and scientific journalism, and most importantly the timely actions of the government as well as the health behaviors of people throughout Vietnam.

In the broadest meaning, health behavior refers to the actions of individuals, groups, and organizations, as well as their determinants, correlates, and consequences, including social change, policy development and implementation, improved coping skills, and enhanced quality of life (G. Parkerson, 1993). This is similar to the working definition of health behavior that Gochman proposed (though his definition emphasized individuals): it includes not only observable, overt actions but also the mental events and feeling states that can be reported and measured. He defined health behavior as "*those personal attributes such as beliefs, expectations, motives, values, perceptions, and other cognitive elements; personality characteristics, including affective and emotional states and traits; and overt behavior patterns, actions, and habits that relate to health maintenance, to health restoration, and to health improvement*" (D. S. Gochman, 1997; D. S. Gochman, 1982). Gochman's definition is consistent with and embraces the definitions of specific categories of overt health behavior proposed by Kasl and Cobb in their seminal articles (S. V. Kasl, 1966a; S. V. Kasl, 1966b). Kasl and Cobb define three categories of health behavior:

- (1) *Preventive health behavior*: any activity undertaken by an individual who believes himself (or herself) to be healthy, for the purpose of preventing or detecting illness in an asymptomatic state.
- (2) *Illness behavior*: any activity undertaken by an individual who perceives himself to be

ill, to define the state of health, and to discover a suitable remedy (Kasl and Cobb, 1966a).

- (3) *Sick-role behavior*: any activity undertaken by an individual who considers himself to be ill, for the purpose of getting well. It includes receiving treatment from medical providers, generally involves a whole range of dependent behaviors, and leads to some degree of exemption from one's usual responsibilities (Kasl and Cobb, 1966b).

During COVID-19 pandemic, people uphold protective behaviors to protect themselves from health risk factor by social distancing (J. Brurg et al, 2008, Y. Ibuka et al, 2010) and when an individual perceives a health risk factor, they react to the risk by attempting to find ways to avoid it (M. Abdelrahman, 2020). These solutions represent avoidance behavior that is adopted to survive an infectious disease.

There are many factors influencing individual health behaviors during the Covid-19 pandemic, namely pandemic awareness, self-assessment the possibility of becoming infected, fear of disease, quality of life, and mental health (anxiety); bifemoral foundation, ....

Y. Luo et al (2020) perform an online survey with 2449 participants via wechat and Tencent QQ in China. The results showed that 39.9% of the participants were aware of how stress affects their health. Research also confirmed health behavior is positively correlated with a positive perception of intervention measures but negatively correlated with health risk stress (Y. Luo et al, 2020). To ensure successful pandemic control, everyone needs to follow control measures. In this regard, people are most influenced by their knowledge, attitude and practice (KAP) toward Covid-19 (Shereen MA, Khan S, Kazmi A, Bashir N, Siddique R, 2020). A review of previous studies on the SARS pandemic-2003 showed that there is a certain relationship between knowledge, attitudes towards infectious diseases and negative emotions such as anxiety and fear, which has an effect on stopping the spread of disease (Person

B, Sy F, Holton K, Govert B, Liang A, 2004; Tao N., 2003). Another study also showed that people with good Covid-19 knowledge tend to have an optimistic attitude and appropriate disease response skills (Z. B. Liang et al., 2020). Individuals who maintain a high level of awareness of the danger and maintain a moderate level of stress are the most likely to adopt appropriate health behaviors (G. M. Leung et al., 2003). A fourth (24.6%) of participants were “very worried” about getting the coronavirus. Nearly a third could not correctly identify symptoms (28.3%) or ways to prevent infection (30.2%). One in 4 adults (24.6%) believed that they were “not at all likely” to get the virus, and 21.9% reported that COVID-19 had little or no effect on their daily routine (S. W. Michael, S. Marina, O. Lauren et al, 2020)

Besides awareness, the fear of disease is also one of the factors, which has been pointed out by previous studies, as one of the factors that predict individual health behaviors during the Covid-19 outbreak. The fear is directly related to the rate of transmission as well as its morbidity and mortality rates. This leads to other psychosocial challenges including stigmatization, discrimination, and loss (Pappas et al. 2009). With a high level of fear, individuals may not be able to think clearly and properly in response to COVID-19. Other studies have shown that negative effects of psychological responses such as hypochondriasis and anxiety affect individuals’ health and well-being during an infectious disease crisis (Duncan et al. 2009; Pappas et al. 2009; Ropeik 2004). The only predictor of prevention behaviors for Covid-19 pandemic (eg, social distancing, hand washing) is due to the fear of Covid-19. In other words, the negative emotions of coping with the pandemic predict public health adaptive behaviors or individual health behaviors, which does not affect the variables related to politics (Craig A. Harper<sup>1</sup> & Liam P. Satchell<sup>2</sup> & Dean Fido<sup>3</sup> & Robert D. Latzman, 2020).

Quality of life and mental health also predict personal health behaviors during the Covid

-19 outbreak. People with a history of anxiety disorders, health-related over anxiety, fear of illness or other mental disorders (depression and post-traumatic stress) are at higher risk of anxiety during the COVID-19 outbreak and may require more mental health services or support (Black Dog Institute, 2020). Mental disorders can even make people with Covid-19 more susceptible to infections, including pneumonia (O. O. Seminog and M.J. Goldacre, 2013). Job insecurity is also a factor leading to financial and mental stress, poorer health and can also increase rates of depression and anxiety (A.L. Lau et al., 2012). In this pandemic situation, children may particularly be at risk. Children’s habits or everyday life are now getting blown to bits. Children are at risk for “double diseases”, that is, they both get infected and get scared by the same disease at the same time (K. Jeffrey, 2020). Clearly, the Covid-19 pandemic means that we must stay at home, reduce physical activities and social interactions. This has a negative impact on the physical and mental health of each individual, so the World Health Organization has given advice for a healthy life (such as physical exercise, mental care, healthy parenting and healthy eating (WHO, 2020b).

The moral foundation is also the factor that is believed to influence health behaviors during the Covid-19 pandemic. The ethical foundation theory asserts that individuals make social and political judgments based on ethical areas (Haidt and Joseph 2004). Ethical foundation may play a certain role in the decisions to comply with Covid-19’s advice (Craig A. Harper<sup>1</sup> & Liam P. Satchell<sup>2</sup> & Dean Fido<sup>3</sup> & Robert D. Latzman, 2020).

Previous studies have found that health risk stress is negatively related to health behaviors, which showed that excessive stress is not conducive to positive health behaviors, and that nervousness and being out of control can lead to negative coping styles (Y. Luo et al., 2020). Individuals who maintain a high level of awareness of the danger and maintain a moderate level of stress are the most likely to adopt appropriate health

behaviors (G. M. Leung et al., 2003). A fourth (24.6%) of participants were “very worried” about getting the coronavirus. Nearly a third could not correctly identify symptoms (28.3%) or ways to prevent infection (30.2%). One in 4 adults (24.6%) believed that they were “not at all likely” to get the virus, and 21.9% reported that COVID-19 had little or no effect on their daily routine (S. W. Michael, S. Marina, O. Lauren et al, 2020)

Health behaviors are also influenced by two factors, which are biological characteristics of the brain and personal connections with others. In this regard, L. H. Sarah and M. W. Leanne (2020) argue that the mental health consequences of Covid-19 are determined partly by the interactions between brain configurations and threat to our need for human connection. Besides, belief is also confirmed as a predictor for the health behaviors of people during the pandemic. The success of Vietnam’s Covid-19 prevention is the result of the Vietnamese people believing in the government’s response to Covid-19 (Research, D. Global Study about COVID-19, 2020).

As such, there are many factors that can predict individual health behaviors during the Covid -19 pandemic. However, in this paper, we analyze factors that predict personal health behaviors during Covid-19 pandemic in Vietnam, including: pandemic awareness, self-assessment the possibility of becoming infected, fear of disease, quality of life, and mental health (anxiety).

## 2. METHODS

### 2.1. Participants

The study was conducted online. Participants were recruited through multiple social media platforms. A total of 572 persons filled the questionnaire. The majority of participants were female (79.3%) and less than 30 years old (69.3%).

### 2.2. Measures

Health behaviors were measured by an adaptation of the YouGov Behavior Change questionnaire (YGBC, YouGov Blue 2020). The original YGBC questionnaire evaluated people’s response to the COVID-19 pandemic by measuring the change in health protection behaviors (i.e. washing hands, avoiding crowded places, working from home, refraining from touching surfaces in public areas, etc.). In this study, to measure frequency of the health behaviors, we kept 8 behaviors proposed by YGBC and changed the rating format from perceived behavior change to frequency of conduction: 1-never to 4-always.

Fear of Coronavirus-19 was measured by the Fear of Coronavirus-19 Scale (FCV-19, Ahorsu et al, 2020). Participants rated 7 items on a 5-point scale, from 1-strongly disagree to 5-strongly agree.

Quality of life was measured by WHOQOL-BREF (World Health Organization 2004). The scale measured 4 domains of quality of life: physical health, psychological domain, social relationships and environment. The scale has 26 items. WHOQOL-BREF scores were converted to scores on a scale of 100 according to WHO’s 2004 guidelines. Higher scores indicated better quality of life.

Moral foundations were measured by the Moral Foundation Questionnaire (MFQ-20, Graham et al 2008). The scale measured 5 moral foundations: care/harm, fairness/cheating, loyalty/betrayal, authority/subversion, sanctity/degradation. The scale consisted of 22 items, divided into two sections: section 1 about moral decision and section 2 about moral proposition. All both sections, participants rated on a scale of 1-not at all relevant/strongly disagree to 5-extremely relevant/strongly agree. Low score indicated lower endorsement of a moral domain.

Knowledge of COVID-19 was measured by

12 items developed by Zhong et al 2020). The questionnaire has 4 items about clinical symptoms of Coronavirus-19, 3 items about transmission routes, and 5 items about prevention and control.

Fear of Coronavirus-19, Scale reliability coefficient = 0.84; YGBC = 0.72, QoL = 0.94, MFQ = 0.89. All the scales in this study were translated from English to Vietnamese using back-to-back translation.

### 3. RESULTS

#### 3.1. Characteristics of sample and scales

Table 1. Characteristics of Sample

Variable	Frequency	Percent
<b>Age group</b>		
≤ 30 years old	393	69.3
> 30 years old	174	30.7
<b>Gender</b>		
Men	118	20.7
Women	451	79.3
<b>Career</b>		
Healthcare staff	36	6.4
Others	524	93.6

Source: Summarized from survey data of the thesis in 2020

In our study, 570 participants answered online, including 118 men (20.7%), and 451 females (79.3%). The group aged over 30 include

174 people (30.7%), the group aged 30 and under include 393 people (69.3%). People with healthcare-related jobs include 36 people (6.4%), other occupations (psychology, teaching, officials, workers, students) include 524 people (93.6%).

Table 2. Mean score of Knowledge, Fear covid19, Moral foundations questionnaire, Quality of Life

Measure	Obs	Mean	SD
<b>Behavior Change</b>	515	2.99	0.44
Knowledge	549	1.23	0.18
Fear covid19	561	2.83	0.88
<b>Moral foundations</b>			
Harm	533	4.00	0.64
Fairness	531	4.10	0.68
Ingroup	535	3.86	0.67
Authority	535	4.00	0.67
Purity	523	4.01	0.77
MFQ1	530	1.77	0.31
MFQ2	533	1.82	0.40
<b>Total (MFQ-20)</b>	500	3.99	0.62
<b>Quality of Life</b>			
Physical	554	70.20	13.4
Psychological	547	63.93	17.7
Social	508	59.32	16.1
Environment	542	59.16	16.7
QoL (total)	466	62.79	13.7

Source: Summarized from survey data of the thesis in 2020

#### 3.2. Factors related to behavior change

Table 3. Relationship between Knowledge, Moral Foundations with Age, Gender and Career

Variable	Obs	Knowledge		P- value*	Obs	Moral FQ		P- value*
		Mean	SD			Mean	SD	
<b>Age group</b>								
≤ 30 years old	385	1.23	0.18	0.232	346	3.98	0.65	0.417
> 30 years old	161	1.25	0.18		152	4.03	0.53	
<b>Gender</b>								
Men	110	1.25	0.21	0.247	106	3.93	0.61	0.201
Women	438	1.23	0.17		393	4.01	0.62	
<b>Career</b>								



Healthcare staff	35	1.28	0.09	0.157	29	3.96	0.54	0.757
Others	505	1.23	0.18		463	3.99	0.63	

\* Two-sample t test with equal variances

Source: Summarized from survey data of the thesis in 2020

There is no statistically significant change between knowledge with age ( $p = 0.232$ ), gender ( $p = 0.247$ ), career ( $p = 0.157$ ). Similarly, there was no statistically significant change between moral foundations and age ( $p = 0.417$ ), gender ( $p = 0.201$ ), career ( $p = 0.757$ ).

Table 4. Relationship between Behavior Change, Fear covid19 with Age, Gender and Career

Variable	Obs	Fear covid19		P - value*	Obs	Behavior Change		P- value*
		Mean	SD			Mean	SD	
<b>Age group</b>								
≤ 30 years old	387	2.91	0.87	0.001	348	3.00	0.47	0.142
> 30 years old	171	2.66	0.87		164	2.94	0.38	
<b>Gender</b>								
Men	115	2.75	0.96	0.234	109	2.88	0.43	0.003
Women	445	2.86	0.86		405	3.02	0.44	
<b>Career</b>								
Healthcare staff	36	2.56	0.99	0.077	31	2.83	0.36	0.043
Others	515	2.84	0.87		475	3.00	0.45	

\*Two-sample t test with equal variances

Source: Summarized from survey data of the thesis in 2020

The average score of people over 30 years old (mean = 2.66; SD = 0.87) was significantly lower than that of people under 30 years old (mean = 2.91; SD = 0.87). People under 30 are more scared than people over 30. There is no difference in sex ( $p = 0.234$ ) or occupation (0.077) among different age groups (Table 4).

Regarding behavior change, women (mean = 3.02; SD = 0.44) have more changes in the behavior than men (mean = 2.88; SD = 0.43), this difference was statistically significant ( $p = 0.003$ ). Similarly, people who do not work in health sector (mean = 3.0; SD = 0.45) changed more significantly than those in the health sector (mean = 2.83; SD = 0.36) ( $p = 0.043$ ).

Table 5. Relationship between quality of life with age, gender and career

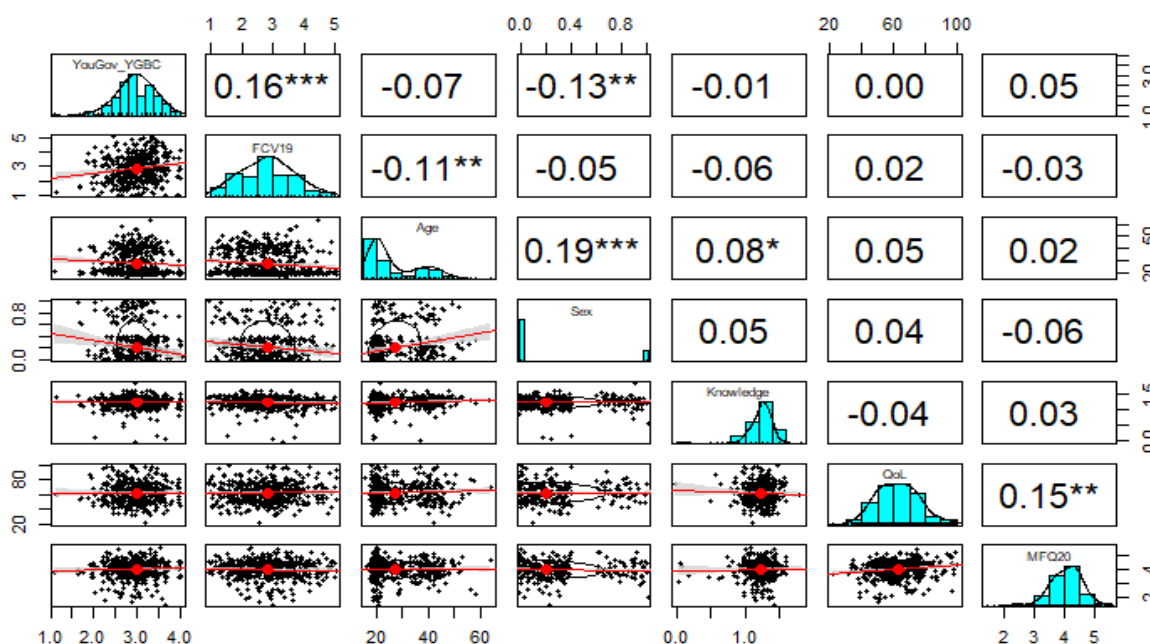
Variable	Obs	Quality of Life		P- value*
		Mean	SD	
<b>Age group</b>				
≤ 30 years old	309	62.28	13.57	0.263
> 30 years old	155	63.79	14.01	
<b>Gender</b>				
Men	97	63.79	14.34	0.410
Women	368	62.50	13.54	
<b>Career</b>				

Healthcare staff	34	65.01	13.40	0.318
Others	423	62.55	13.81	

\*Two-sample t test with equal variances

Source: Summarized from survey data of the thesis in 2020

There is no statistically significant difference among age groups ( $p = 0.263$ ), genders ( $p = 0.41$ ), careers ( $p = 0.318$ ) in terms of quality of life



Note: (\*) pvalue <0.05; (\*\*) p value <0.01; (\*\*\*) p <0.001

Figure 1: Correlation between health behaviors with Fear Covid-19, Age, Sex, Knowledge, Quality of Life

Source: Summarized from survey data of the thesis in 2020

Health Behavior is positively correlated with Fear  $r = 0.16$ ,  $p < 0.001$ ; and Sex  $r = -0.13$ ,  $p < 0.01$ ; and there is no correlation between Health Behavior with Age  $r = -0.07$  ( $p > 0.05$ ), Perception  $r = -0.01$  ( $p > 0.05$ ), and Quality of Life ( $p > 0.05$ ), Moral Foundation ( $p > 0.05$ ).

We found that health behavior has a positive correlation with Fear ( $r = 0.16$ ,  $p < .001$ ) and negative with Gender ( $r = -0.13$ ,  $p < .01$ ). There is no statistic significant between Heath Behavior and Age, Cognitive, Quality of Life, Moral Foundation ( $p > .05$ ).

Table 6: Multiple regression of Behavior Change with Fear and Gender

Health Behavior	Estimate	Std.Error	P_value	R <sup>2</sup> adj
Intercept	2.790	0.070	<0.0001	
FCV19	0.079	0.022	0.0004	4%
Gender (Men)	-0.142	0.048	0.003	

Source: Summarized from survey data of the thesis in 2020

Linear regression analysis for multiple variables affecting individual health behavior showed that

Health Behavior = 2.79 + 0.079 \* Fearcovid19 - 0.142 \* Sex (men). Fear and Sex factors explained the 4% ( $R^2_{-adj} = 4\%$ ) of individual behavioral changes during the Covid-19 pandemic, which is showed in figure 2.

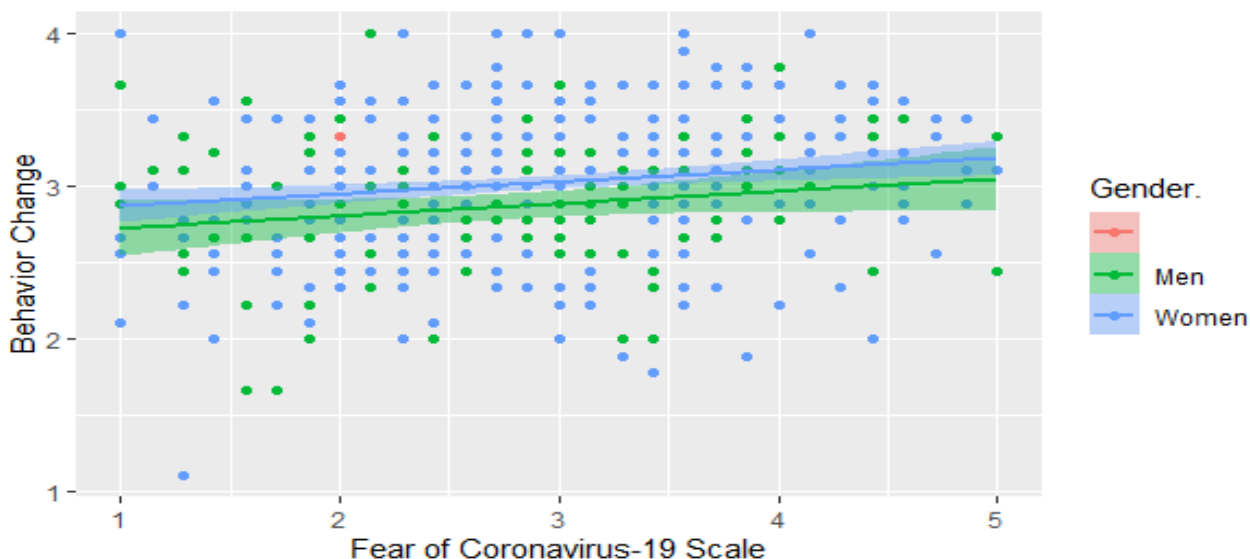


Figure 2. Correlation between Behavior change and Fear Gender (note Red value: missing value; blue: Men; green: Women)

Source: Summarized from survey data of the thesis in 2020

## 4. DISCUSSION

### 4.1. Main findings

In this study, we investigate five factors, including: pandemic awareness, self-assessment the possibility of becoming infected, fear of disease, quality of life, and mental health (anxiety) that predict individual health behaviors. The key findings of the study are as follows:

Fear is one factor that predicts personal health behaviors during the Covid-19 pandemic in Vietnam. In this study, in the context of Covid-19, negative emotions (fear) seem to have the function of stimulating behavior changes in order to improve the health of individuals and communities. This is also reflected in the positive correlation between personal behavior and fear. Several previous studies have discovered a relationship between behavior change and the FCV-19S scale for measures of anxiety and depression based on DSM, and self-awareness of the risk of viral infection. The results of these studies also show that emotional influences,

namely the symptoms of fear and anxiety, are predictors of public health behaviors (e.g., wash hands regularly and keep social distancing). For most individuals, the anxiety and fear responses assessed by the FCV-19 scale can be understood as a normal response and adaptation to an existing and real hazard that one cannot fight or avoid (eg, Covid-19 pandemic). However, the authors also state that a high level of fear may prevent individuals from thinking clearly and rationally in response to the Covid-19 pandemic (Ahorsu et al. 2020; Craig A. Harper et al., 2020).

The second factor capable of predicting individual health behaviors during the Covid-19 pandemic in Vietnam is the gender factor. Our findings are consistent with many other scientific papers. Specifically, the survey of 21,649 people in eight OECD countries conducted in March and April 2020 explained gender differences in beliefs and attitudes towards the Covid-19 pandemic as follows: Women tended to consider Covid-19 a very serious health problem (59.0% of women surveyed consider Covid-19 a very serious health problem, compared to 48.7% of men ( $M = 0.590$

vs. 0.487,  $M_{diff} = 0.14$ , 95% CI [0.086; 0.121]). Women are more cautious, willing to comply with WHO rules on disease control, and women are often less hesitant to have a health check once the first symptoms appear. Women can easily accept behavior changes such as wearing a mask, keeping distance in public, limit gathering in crowded places, ... (Vincenzo Galasso et al., 2020). This evidence may also allow us to use it to explain the predictability of an individual's behavior change during the Covid-19 pandemic in Vietnam. Such comfort (Bouchard & Loehlin, 2001) and more disciplined compliance of women (Title, 1980; Torgler, 2007) are not only explained in perceptions, attitudes and behaviors during a pandemic, but also in other fields.

This study also found a link between the fear and age. Specifically, people under 30 have a higher degree of fear than people over 30 ( $p = 0.001$ ). Vietnam is in the second wave of the Covid-19 pandemic. Statistics on the first wave of the Covid-19 pandemic in Vietnam showed that the elderly and those with underlying medical conditions have a higher risk of infection than young people and children. The Ministry of Health and Communication also had specific recommendations for this high-risk group. This is also confirmed by the statistics on morbidity and mortality rates published worldwide. We speculate that, in Vietnam, the older group of people, due to special recommendations, is already mentally prepared with knowledge about disease prevention. This has reduced their fears during the second Covid-19 outbreak.

Awareness, quality of life and ethical foundation factors have no correlation with behavior changes in Covid-19 pandemic in Vietnam. This finding appears to be different from many previous studies highlighting the important role of awareness, especially risk perception, in promoting protective behaviors (Floyd, Prentice-Dunn, and Rogers 2000), low or exaggerated risk perception can both undermine the adoption of protective behaviors (Leppin and Aro 2009) especially during pandemic times (Bish and

Michie 2010; Rudisill 2013; van der Weerd et al. 2011; Wise et al. 2020). In addition, a number of other studies conclude that people appear to be following the recommendations in Covid-19 pandemic for fear of pathogens, and the ethical values associated with care for others. In a study of 10 countries in Europe, Asia, the Americas ( $N = 6,991$ ) on risk perception Covid-19 worldwide, there are several explanations for the correlation between awareness, moral foundation and health behaviors. Direct personal experiences with viruses, personal and social values, trust in government, science, and health professionals, knowledge on Government's strategy...are all important predictors of risk perception. It is noteworthy that survey participants in that study reported that they were tested positive for the virus or suspected of being infected and coded by the researcher as having direct experience with the Covid-19 (Sarah Dryhurst et al., 2020). This can be the reason for the difference between our study and the conclusions of that study, since Vietnam is a country with low rates of infection and mortality, survey participants were not reported to have direct experience with Covid-19.

#### 4.2. Meaning of the results

In the context of the current uncontrollable Covid-19 pandemic, research on factors influencing people's health behaviors during a pandemic is essential to help managers come up with appropriate measures to improve the physical and mental health of the people. Like many other studies in the world, this study once again confirms that gender and mental health (anxiety) affect how people perform different health behaviors (how often people wear masks, wash hands, restrict to public places, ...). These two factors can partly predict individual health behaviors during the pandemic. On the other hand, there is a statistically significant difference between different age groups in the degree of experience of fear during a pandemic. Young people (under 30 years old) tend to be more scared than the older age group. The war against Covid-19 is a war that needs to be conducted

synchronously in all groups/ divisions in each country. Therefore, the research results in this report need to be reviewed by managers, psychologists, and social workers in order to have mentoring and mental health care programs suitable for different groups of residents. The propaganda about the pandemic in Vietnam needs to be maintained and further strengthened so that people realize that the pandemic can break out at any time so that people are not subjective and are more proactive in implementing personal health behaviors to protect health and limit outbreaks of pandemics.

#### 4.3. The strengths of the study

This is one of the first studies in Vietnam on people's health behaviors during the Covid-19 pandemic. Research considered the correlation with factors such as pandemic awareness, self-assessment the possibility of becoming infected, fear of disease, quality of life, and mental health (anxiety). The survey is designed based on the integration and adaptation of highly reliable scales such as: the YouGov Behavior Change questionnaire (YGBC, YouGov Blue 2020), the Fear of Coronavirus-19 Scale (FCV-19, Ahorsu et al, 2020), WHOQOL-BREF (World Health Organization 2004), the Moral Foundation Questionnaire (MFQ-20, Graham et al 2008), and Knowledge of COVID-19 (Zhong et al 2020). Like some other studies (Vincenzo Galasso et al, 2020; Title, 1980; Torgler, 2007), this study once again confirms there is a difference between different genders in health behaviors. In addition, the strength of this study is the differences between those working and not working in the field of medicine, and differences between different age groups in experiencing fear and the degree of change behaviors during the pandemic. Accordingly, young people (30 or under the age of 30) often experience more fear, while those over 30, with their more maturity and experience, often experience less fear during the Covid-19 pandemic. At the same time, the research results indicate that gender and fear may be predictors of

changes in individual health behaviors during the Covid 19 pandemic.

#### 4.4. Limitations of the study

There are some limitations in this study. Firstly, this is a cross-sectional study so it is impossible to explain which variable is the cause and which variable is the consequence. However, in the assumptions based on behavioral theory, the change in the awareness makes the behavior change. We therefore use the outcome variable, health behavior to explain the above multivariate model. Secondly, the convenience sampling technique used may lead to potential selection bias and could affect the generalizability of the research findings. Secondly, online study samples did not collect the residence area. Individuals who live in epidemic zones and outside epidemic zones will have varying degrees of fear and health behavior due to the strict requirements in epidemic area management. Thirdly, the study was done while Vietnam was in its second outbreak and has also passed its peak, which may leave people's experiences of fear and anxiety not as high as it did during the pandemic. This may affect research results. In addition, the information of participants is self-reported, thus, recall bias could have occurred during the interview process. To minimize this bias, more intervals of interviews should have been performed and we should collect more information on demographic variables

#### 5. CONCLUSION

In summary, we have demonstrated that each individual's health behaviors are particularly important during a pandemic. This behavior is influenced by a number of factors such as gender, one's experience of fear during the pandemic, and the experience of fear also shows quite a significant difference in other age groups. These are certain valuable results in mental health care measures for the community.

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