

QUALITY OF LIFE OF STUDENTS AT HANOI NATIONAL UNIVERSITY OF EDUCATION DURING COVID-19 PANDEMIC IN 2022 AND SOME RISK FACTORS

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Abstract. The COVID-19 pandemic has become a global threat and is a pressing concern for community health. This research using the SF-36 questionnaire aimed to assess the current state of quality of life among 542 students at Hanoi National University of Education. The study results showed that the majority of students' quality of life was at medium level (43%), meanwhile, at low level and high level is 28.6% and 27.5%, respectively, and lastly, at very low level is a minor percentage, only 0.9%. Most students had both physical and mental component summaries at medium to high levels (55.2%). However, it was concerning that nearly 19.9% of students with low to very low levels of physical and mental component summary. The research results showed the associations between some demographic characteristics such as age, ethnicity, nutrition status, years of study, living area, cohabitant, having a chronic disease, being infected with COVID-19, complications after COVID-19, night sleep time to the physical component summary, mental component summary, and quality of life.

Keywords: quality of life, mental component summary, physical component summary, demographic characteristics, student.

1. Introduction

The COVID-19 pandemic caused by the SARS-CoV-2 virus has evolved into a global threat and a community health emergency. As of August 27, 2023, there have been over 770 million confirmed cases and over 6.9 million deaths reported worldwide [1]. In Vietnam, as of September 11, 2023, there have been more than 11.6 million infections

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and over 43 thousand deaths (ranking 13th out of 231 countries and territories) due to four waves of the pandemic, with the 4th wave having severe consequences on both lives and public health [2]. Due to the risk of transmission of the SARS-CoV-2 virus, governments all around the world, including Vietnam, have taken drastic solutions to minimize direct contact between people including students. Quality of life (QOL) is an important component in assessing people's health. Changes in daily lifestyle such as social distancing, online learning, financial difficulties, health deterioration, and restrictions on physical activities and social relationships... during the COVID-19 pandemic have a negative impact on students' quality of life, consisting of physical and mental health, across the country. Research on Malaysian medical students showed that mental health scores during the pandemic were significantly lower than before the COVID-19 pandemic, while physical health scores were similar [3]. Along with that, there was a difference in mental health between male and female students, females expressed significantly higher levels of distress than males, especially the feeling of ambiguity about the purpose of life [4]. Many factors such as gender, university environment, years of study, sleep duration, body mass index (BMI), physical activity in leisure time, and chronic diseases have been identified as predictive factors for QOL [5]. Moreover, numerous studies indicated that social distancing during the COVID-19 pandemic adversely affected the QOL of students worldwide due to changes in dietary habits, reduced physical activity, limited participation in social activities, as well as feelings of boredom, and prolonged stress from staying at home for a long time [6]. More than ever, during the COVID-19 period, it is crucial to assess the QOL of the population, especially students, to measure the incidence of physical and mental health problems related to levels of perceived stress, anxiety, depression, as well as suicidal behavior [7]. Simultaneously, research should also focus on a deeper understanding of the potential impact of factors such as education, learning environment, finances, and social relationships and provide timely support to ensure the best possible QOL for students, because a decline in QOL may contribute to reducing student academic performance [8], as well as all aspects of students' lives and their futures.

Most studies have primarily focused on assessing the QOL of patients, healthcare-related students, and staff, while the QOL of other students has not received adequate attention [9, 10]. Therefore, the present study based on the 36-item short form survey (SF-36) QOL questionnaire on students at Hanoi National University of Education (HNUE) aims to assess the current state of QOL issues among students and to find out the demographic risk factors which would cause a decline in QOL of students during the covid-19 pandemic, as well as to enable educational institutions and universities to develop more effective strategies and approaches in addressing issues related to students' QOL during the pandemic.

2. Content

2.1. Participants and research methods

*** *Participants***

The research focused on students at Hanoi University of Education, aged 18 and above, representing diverse demographic variables such as gender and academic majors

to ensure the study's comprehensiveness. Students who participated in the research were provided with information about the purpose and benefits of their participation and their consent was obtained. The information provided by the students was kept confidential and used solely for research purposes. Exclusion criteria included not being a student at HNUE and a lack of cognitive and decision-making capacity.

*** *Location and duration of the study***

The research was conducted at Hanoi University of Education, lasting from February 2022 to December 2022.

*** *Research design***

The research consisted of two stages:

Stage 1: A cross-sectional research was conducted to evaluate the current state of QOL among students at HNUE, with a sample size of 542 students representing all HNUE students, including faculties and majors. and different study programs [11].

Stage 2: A case-control study was carried out with a control group consisting of students with average and high QOL scores, and a case group consisting of students with very low and low QOL scores to identify demographic risk factors associated with the QOL of students at HNUE.

*** *Data collection***

The research used the SF-36 questionnaire which consists of 36 questions and covers two main health domains: physical component summary (PCS) and mental component summary (MCS). Additionally, demographic information about the study participants, including ethnicity, gender, nutritional status, years of study at the university, living area, cohabitants, students' chronic illnesses and COVID-19 status, night sleep time, as well as complications after COVID-19, COVID-19 vaccination were collected.

To maximize the response rate, the questionnaire was sent to students during school time or after class time in the form of face-to-face (disseminating survey purposes, introducing the questionnaire) and online (for students to fill out).

*** *Method of QOL's assessment based on the SF-36 questionnaire***

The scores of the SF-36 questions were presented from the previous [11]. The status of PCS, MCS, and QOL was categorized into four levels based on the median scores: very low (score ≤ 25), low ($25 < \text{score} \leq 50$), medium ($50 < \text{score} \leq 75$), and high (> 75) [9].

*** *Data Analysis***

Survey data were encoded and analyzed using SPSS 20.0 software. Qualitative variables (ethnicity, gender, nutritional status, years of study at the university, living area, cohabitants, students' chronic illness, and COVID-19 status) were presented as frequencies (n) and percentages (%). Continuous variables (such as age, height, weight, BMI, PCS, MCS, QOL) were checked for normal distribution; if a variable did not follow a normal distribution, it was presented as median (25th - 75th percentile). T-tests and the Kruskal-Wallis Test were used to compare the QOL scores between different groups. The reliability of the measurement scale was assessed using Cronbach's Alpha, with a Cronbach's Alpha coefficient of ≥ 0.7 considered reliable. The correlation between PCS, MCS, and QOL was determined using the Spearman correlation coefficient (r_s) for non-normally distributed variables, with levels of correlation defined as weak ($r_s < 0.5$),

moderate ($0.5 \leq r_s \leq 0.707$), strong ($r_s > 0.707$) [12]. The association between some demographic characteristics and PCS, MCS, and QOL was analyzed using univariate logistic regression, expressed as OR (95% CI). When the P value ≤ 0.05 on both sides, the value was considered statistically significant.

2.2. Results and discussions

2.2.1. Characteristics of research subjects

Characteristics of research subjects are presented in Table 1.

Table 1. Characteristics of research subjects

Characteristics	Female students (n = 461)	Male students (n = 81)	Total (n = 542)	P value
Age (years)	19.3 (18.7 - 20.3)	19.5 (18.8 - 20.4)	19.3 (18.8 - 20.3)	0.351
Weight (kg)	48.0 (44.0 - 52.0)	63.0 (55.0 - 71.5)	49.0 (45.0 - 55.0)	< 0.0001
Height (cm)	158.0 (153.0 - 160.5)	171.0 (168.0 - 174.5)	158.0 (155.0 - 164.0)	< 0.0001
BMI (kg/m ²)	19.2 (18.0 - 20.4)	21.5 (19.0 - 23.6)	19.5 (18.0 - 21.1)	< 0.0001

Data were expressed as median (25th - 75th percentile).

P values were obtained from the Mann-Whitney U Test (for 2 groups)

The median age of students at HNUE was 19.3 years old. There are differences in physical characteristics between male and female HNUE students in weight, height, and BMI. Specifically, in females, the median weight was 48 kg, height was 158 cm and BMI was 19.2 kg/m²; meanwhile, in males, the median weight was 63.0 kg; height was 171 cm and BMI was 21.5 kg/m².

2.2.2. Distribution of QOL scores among students at Hanoi National University of Education during the COVID-19 pandemic in 2022

Scores for each area of students' QOL at HNUE in 2022 are shown in Table 2.

Table 2. Distribution of QOL scores among students at Hanoi National University of Education during the COVID-19 pandemic in 2022

Characteristics	Quantity (%)	PCS	MCS	QOL	
Total	542 (100)	67.5 (52.5 – 82.5) ^a	54 (41.1 – 71.1) ^b	60.1 (47.1 – 82.5) ^c	
Ethnicity	Kinh	502 (92.6)	68.8 (53.0 – 83.3)	54.7 (41.4 – 71.3)	60.4 (48.2 – 76.8)
	Others	40 (7.4)	56.6 (47.0 – 71.4)	44.9 (36.1 – 67.1)	51.2 (41.9 – 65.4)
	<i>P</i> value		0.013	0.03	0.015
Gender	Male	81 (14.9)	80.0 (61.6 – 88.8)	66.1 (41.7 – 73.7)	69.3 (50.6 – 79.8)
	Female	461 (85.1)	65.6 (41.1 – 69.8)	52.7 (41.1 – 69.8)	58.6 (46.8 – 74.5)
	<i>P</i> value		< 0.0001	0.063	0.003
Nutritional status	Normal	294 (54.2)	72.5 (53.8 – 86.3)	58.0 (41.8 – 72.9)	63.6 (48.8 – 78.7)
	Undernutrition	185 (34.2)	62.5 (50.9 – 77.2)	50.1 (39.6 – 68.3)	55.3 (43.3 – 72.5)
	Overnutrition	63 (11.6)	67.5 (49.4 – 84.4)	54.6 (38.8 – 69.3)	58.7 (44.9 – 75.6)
	<i>P</i> value		0.002	0.002	0.12
1 st year student	297 (54.8)	65.0 (51.9 – 81.3)	51.2 (39.9 – 68.5)	57.1 (45.9 – 73.1)	

Characteristics		Quantity (%)	PCS	MCS	QOL
Year of study	2nd-year student	124 (22.9)	66.3 (50.8 – 78.4)	52.4 (38.1 – 68.0)	58.5 (46.7 – 72.3)
	3rd-year student	97 (17.9)	78.8 (55.6 – 88.8)	69.8 (47.9 – 75.6)	75.4 (53.3 – 82.1)
	4th-year student	24 (4.4)	74.4 (52.8 – 87.2)	61.0 (45.9 – 71.8)	66.3 (51.7 – 80.1)
	<i>P</i> value			0.001	< 0.0001
Living area	Urban	262 (48.3)	73.8 (56.7 – 86.3)	61.3 (42.1 – 72.8)	67.4 (50.6 – 78.5)
	Rural	280 (51.7)	61.6 (49.4 – 79.2)	50.6 (39.7 – 68.1)	55.4 (44.9 – 72.4)
	<i>P</i> value			< 0.0001	< 0.0001
Cohabitants	Family	271 (50.0)	71.3 (53.1 – 85.0)	55.3 (42.0 – 73.5)	63.1 (48.9 – 78.5)
	Friends	222 (41.0)	71.3 (53.1 – 85.0)	55.3 (42.0 – 73.5)	59.5 (46.8 – 74.7)
	None	49 (9.0)	60.6 (40.6 – 76.6)	46.3 (37.6 – 66.7)	53.5 (41.5 – 70.4)
	<i>P</i> value			0.004	0.065
Having chronic disease	No	512 (94.5)	68.4 (53.1 – 83.1)	54.6 (41.1 – 71.3)	60.7 (48.2 – 76.7)
	Yes	30 (5.5)	50.6 (41.3 – 68.8)	46.0 (35.1 – 64.1)	46.8 (39.2 – 64.9)
	<i>P</i> value			0.002	0.001
Infected with COVID-19	No	202 (37.3)	77.5 (60.6 – 88.8)	63.0 (44.3 – 75.5)	71.2 (53.3 – 81.6)
	Yes	310 (57.2)	61.6 (49.4 – 77.5)	50.3 (39.0 – 67.6)	55.9 (44.7 – 73.4)
	Unknown	30 (5.5)	63.8 (48.4 – 72.8)	53.3 (37.9 – 65.0)	57.9 (44.7 – 71.4)
	<i>P</i> value			< 0.0001	< 0.001

Data were represented in the median (25th – 75th percentile). The *P* values were obtained from the Mann-Whitney *U* Test (for 2 groups) and the Kruskal-Wallis Test (for 3 or more groups).

The letters (a, b, c) indicated *P* value < 0.05 and different *P* values when comparing PCS, MCS, and QOL.

Research results indicated that the median scores of PCS, MCS, and QOL of students at HNUE in 2022 were 67.5 points, 54 points, and 60.1 points, respectively. Notably, the PCS score was significantly higher than the QOL's one and the lowest score, which was observed for MCS ($P < 0.0001$). Furthermore, the PCS, MCS, and QOL median scores of students at HNUE differed by ethnicity, gender, living area, cohabitants, chronic illness, and COVID-19 status ($P < 0.05$). Specifically, PCS, MCS, and QOL scores were higher among students of the Kinh ethnic group compared to other ethnicities and male students had higher scores than female students. Students with normal nutritional status scored higher than those who were overweight obese, or underweight, with the lowest scores found in the undernutrition group. Students living in urban areas had higher scores than those in rural areas. Additionally, 3rd students had higher scores than 4th, 2nd, and 1st students while students living with family or friends scored higher than those living alone. Students without chronic illnesses had better scores than those with chronic illnesses, and students without COVID-19 history scored higher than those with uncertain COVID-19 status or a history of contracting the virus. In all categories, the median QOL score was consistently higher than MCS and lower than PCS.

Results of Table 3 showed the correlation among PCS, MCS, and QOL of students at HNUE during the COVID-19 pandemic in 2022.

Table 3. The correlation among the domains of PCS, MCS, and QOL of students at HNUE during the COVID-19 pandemic in 2022

	PCS	MCS	QOL
PCS	1	0.745*	0.938*
MCS		1	0.926*
QOL			1

*: The p-value obtained using the Spearman correlation coefficient is < 0.0001.

Strong correlations existed among the general health domains, namely PCS, MCS, and QOL, with correlation values of 0.745 (PCS and MCS), 0.938 (PCS and QOL), and 0.926 (MCS and QOL) (Table 4). This indicated that indices with strong correlations tended to collectively influence QOL.

2.2.3. Current status of QOL of students at Hanoi National University of Education during the COVID-19 pandemic in 2022

The current status of PCS, MCS, and QOL of students at HNUE in 2022 based on the SF-36 questionnaire is shown in Figure 1, Table 4.

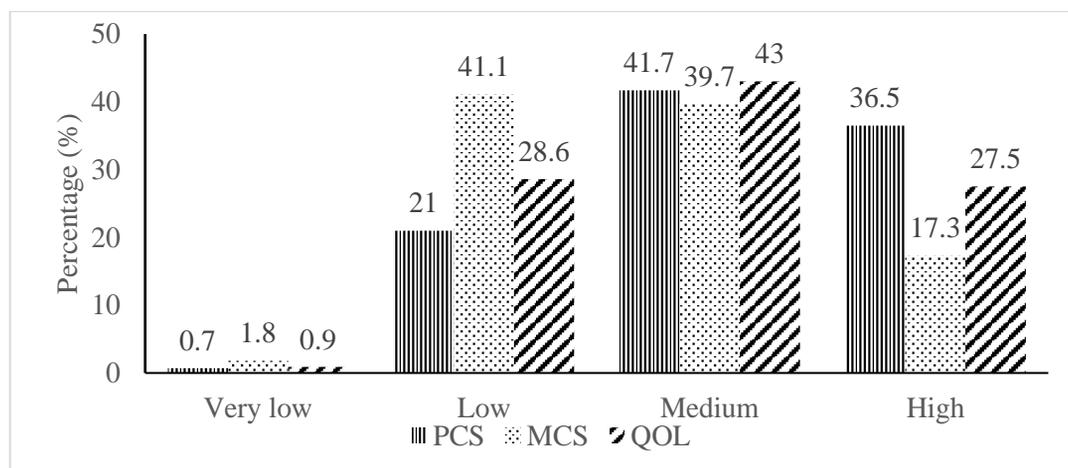


Figure 1. Current status of QOL of students at Hanoi National University of Education during the COVID-19 pandemic in 2022

Pedagogical students mainly had medium (accounting for 41.7%) and high (accounting for 36.5%) for PCS. However, the proportion of MCS among students with the medium level (accounting for 39.7%) and the high level (accounting for 17.3%) was lower than that of PCS. Research results of students at HNUE showed that the majority of QOL was at the medium level (43%), followed by the low level (28.6%), the high level (27.5%), and the very low level only accounts for a very small, almost insignificant proportion (0.9%).

Most of the participants in this study had medium and high levels of PCS and MCS (accounting for 55.2%). Out of the total study participants, there were 108 people (accounting for 19.9%) with both low and very low rates of MCS and PCS. Notably, among people with low and very low PCS (118 people), up to 108 people (accounting for 91.5%) also had low and very low MCS. Conversely, among those with low to very low MCS scores (233 individuals), there were 108 people (accounting for 46.4%) with low and very low PCS.

Table 4. The distribution of MCS and PCS rates of students at Hanoi National University of Education during the COVID-19 pandemic in 2022

Distribution		MCS			P value
		Low and very low	Medium and high	Total	
PCS	Low and very low	108 (19.9%)	10 (1.8%)	118 (21.8%)	< 0.0001
	Medium and high	125 (23.1%)	299 (55.2%)	424 (78.2%)	
	Total	233 (43%)	309 (57%)	542 (100%)	

Data are displayed as n (%). P value was obtained from the Chi-Square Test.

2.2.4. The association between some demographic factors and PCS, MCS, and QOL of HNUE students

The association between some demographic factors and PCS, MCS, and QOL of HNUE students was presented in Table 5.

Table 5. The association between some demographic characteristics and PCS, MCS, and QOL of students at Hanoi University of Education in 2022

Demographic characteristics		OR (95%CI)		
		PCS	MCS	QOL
Age		0.90 (0.73 – 1.12)*	0.78 (0.65 – 0.93)*	0.80 (0.66 – 0.98)
Ethnicity	Kinh	1	1	1
	Others	1.40 (0.68 – 2.90)	2.10 (1.09 – 4.06)*	2.07 (1.08 – 3.98)
Gender	Male	1	1	1
	Female	1.39 (0.75 – 2.58)	1.34 (0.82 – 2.18)	1.44 (0.83 – 2.49)
Nutritional status	Normal	1	1	1
	Undernutrition	1.26 (0.81 – 1.96)	1.62 (1.11 – 2.34)*	1.44 (0.96 – 2.16)
	Overweight	1.71 (0.80 – 3.67)	1.53 (0.77 – 3.04)	2.22 (1.10 – 4.47)
	Obesity	0.95 (0.35 – 2.67)	1.01 (0.44 – 2.30)	1.07 (0.43 – 2.65)
Years of study	1 st year student	1	1	1
	2 nd -year student	1.10 (0.67 – 1.79)	1.05 (0.69 – 1.59)	1.03 (0.66 – 1.61)
	3 rd -year student	0.73 (0.40 – 1.32)	0.49 (0.30 – 0.80)*	0.63 (0.37 – 1.08)
	4 th -year student	0.69 (0.23 – 2.08)	0.47 (0.19 – 1.18)	0.43 (0.14 – 1.30)

Demographic characteristics		OR (95%CI)		
		PCS	MCS	QOL
Living area	Rural	1	1	1
	Urban	1.95 (1.28 – 2.98)*	1.66 (1.18 – 2.34)*	1.61 (1.1 – 2.35)*
Cohabitants	Family	1	1	1
	Friend	1.08 (0.70 – 1.67)	0.94 (0.66 – 1.35)	1.17 (0.79 – 1.73)
	Alone	2.14 (1.10 – 4.13)*	2.0 (1.08 – 3.71)*	2.25 (1.21 – 4.2)*
Family with COVID-19	No	1	1	1
	Yes	1.51 (0.80 – 2.85)	0.90 (0.56 – 1.46)	1.82 (1.01 – 3.26)*
	Unknown	0.56 (0.07 – 4.84)	0.30 (0.06 – 1.50)	0.44 (0.05 – 3.71)
Have a chronic disease	No	1	1	1
	Yes	3.43 (1.62 – 7.26)*	2.41 (1.12 – 5.16)*	2.92 (1.39 – 6.14)*
Infected with COVID-19	No	1	1	1
	Yes	2.80 (1.71 – 4.60)*	1.89 (1.31 – 2.74)*	2.36 (1.56 – 3.60)*
	Unknown	3.18 (1.31 – 7.73)*	1.51 (0.69 – 3.28)	1.79 (0.76 – 4.21)
Complication after COVID-19	No	1	1	1
	1 – 2	1.98 (1.14 – 3.43)*	1.38 (0.91 – 2.10)	1.71 (1.05 – 2.78)
	≥ 3	6.07 (3.66 – 10.1)*	3.98 (2.55 – 6.20)*	6.10 (3.82 – 9.72)
Night sleep time	6 – 8 hours	1	1	1
	< 6 hours	2.44 (0.92 – 6.49)	2.37 (0.90 – 6.23)	2.15 (0.83 – 5.60)
	> 8 hours	1.17 (0.70 – 1.95)	1.66 (1.08 – 2.56)	1.57 (1.0 – 2.48)
COVID-19 vaccination	No	1	1	1
	1 injection	0.80 (0.40 – 8.20)	2.0 (0.13 – 31.98)	0.80 (0.04 – 17.19)
	≥ 2 injections	1.12 (0.5 – 7.54)	3.06 (0.34 – 27.53)	1.69 (0.19 – 15.27)

Data are presented as OR (95%CI). *: P value obtained from univariate logistic regression analysis was less than 0.05.

The research showed that there were associations between some demographic characteristics to PCS, MCS, and QOL ($P < 0.05$). Factors that reduced PCS included: age (OR = 0.9), living in a rural area (OR = 1.95), living alone (OR = 2.14), having a chronic disease (OR = 3.43), being infected with COVID-19 (OR = 2.8) or unknown (OR = 3.18), having 1 - 2 complications (OR = 1.98) or 3 complications (OR = 6.07). Some factors that reduced MCS included: age (OR = 0.78), ethnicity (OR = 2.1), undernutrition (OR = 1.62), 3rd-year student (OR = 0.49), living urban (OR = 1.66), living alone (OR = 2.0), having a chronic disease (OR = 2.41), infected with COVID-19 (OR = 1.89), having 3 complications (OR = 3.98), over 8 hour sleep time (OR = 1.66). Some factors that reduced QOL included: age (OR = 0.8), ethnicity (OR = 2.07), overweight (OR = 2.2), living urban (OR = 1.61), living alone (OR = 1.82), having a chronic disease (OR = 2.92), infected with COVID-19 (OR = 2.36), having 1 – 2 complications (OR = 1.71) and 3 complications (OR = 6.10), over 8 hour sleep time (OR = 1.57). The results didn't find any association between gender, COVID-19 vaccination, and PCS, MCS, or QOL.

2.2.3. Discussion

Measuring QOL provides a comprehensive assessment of physical and mental health, which is a broader assessment than detecting a specific condition or disorder in a study population. In addition, measuring QOL helps to provide an overview of the nature of the diseases encountered by research subjects.

Research results on 542 students at HNUE using the SF-36 questionnaire showed that the median scores for QOL are as follows: PCS was 67.5 points, MCS was 54 points, and QOL was 60.1 points. Compared to research on patients with chronic heart failure, the scores for physical health are significantly higher (compared to 41.14 points), and QOL was also higher (compared to 50.40 points). However, the MCS score was notably lower (compared to 59.66 points) [13]. The results also indicated that the current state of QOL among students at HNUE is lower compared to students at Thang Long University in 2018, with QOL scores of 67.5 points for the 1st year and 62.3 points for the 4th year [14, 15]. The research results were consistent with previously reported studies indicating that males have higher QOL scores than females, and individuals with chronic illnesses have lower QOL scores compared to those without chronic illnesses [14]. Nguyen Hoang Long's study on first-year students at the Vietnam National University, Hanoi in 2013 -2014 showed that the QOL of students was generally high, the main health problem was mostly mental health and female students had lower QOL than male students [16].

The research also indicates that individuals with low and very low PCS scores were likely to have low and very low MCS scores as well (accounting for 91.5%). This explained why patients with low PCS scores typically had low MCS scores. However, most students had average and high PCS (accounting for 78.2%), so the determining factor for their QOL is primarily MCS. This aligns with many studies that have reported the significance of students' mental health, while physical health is considered less important [10, 17].

The QOL of students at HNUE during the COVID-19 pandemic period was predominantly medium to high, accounting for 70.5%. The results indicated that the percentage of students with medium to high QOL at HNUE was lower compared to students at Thang Long University before the COVID-19 pandemic (84.2% in the 1st year and 74.1% in the 4th year). The study also identified differences based on gender, years of study, and living area ($P < 0.05$). Specifically, the proportion of male students with medium to high QOL was higher than that of female students; urban students had a higher proportion than rural students; fourth-year students had the highest proportion, followed by first-year students, and third-year students, and the lowest proportion was second-year students. These results are consistent with the research of Nguyen Ngoc Nhu Khue and colleagues [9, 13]. Many studies showed that the COVID-19 pandemic had caused declines in MCS and QOL, while PCS scores are roughly equivalent to pre-pandemic levels [3]. However, according to research by Le Ba Khanh, MCS and QOL were higher in female students than male students [18]. Differences in the QOL status in various studies might be attributed to several factors. The duration of the research (before or during the COVID-19 pandemic) played a crucial role in determining the QOL of students. All research results demonstrated a decline in PCS, MCS, and QOL of students during the COVID-19 pandemic, which was an inevitable result of the negative impact of the

pandemic on all economic and social aspects, especially in the field of education. Additionally, differences in the study participants (pedagogical students, medical students, students from other fields, and patients with illnesses) greatly affect the research results. Medical students, for example, were assessed to have more pressures in life and face risks leading to poorer QOL compared to other majors. However, pedagogical students as well as students from other fields also face considerable pressure from online learning, tuition fees, sleep disorders, concentration issues, and unclear information about COVID-19 [4]. A decrease in the QOL would have unpredictable consequences on the physical and mental health of students as well as society.

The research results showed that there were associations between some demographic characteristics such as age, ethnicity, nutrition status, years of study, living area, cohabitant, having a chronic disease, being infected with COVID-19, complications after COVID-19, night sleep time to PCS, MCS, and QOL, but there wasn't any association between gender, COVID-19 vaccination and PCS, MCS, QOL. This result was also relatively consistent with previously reported research: chronic disease (heart, stomach,...) increased the risk of reduced QOL by 1.92 to 7.54 times [14]. This was due to chronic diseases that could affect both PCS and MCS, thereby affecting QOL. Many studies showed that QOL was greatly affected by age, anxiety, and the risk of infection with the SAR-CoV-2 virus: older people often had good QOL and better psychology than younger people [19]. During the COVID-19 pandemic, people living alone tended to have lower QOL possibly due to limited contact, causing people living alone to be more affected by negative psychology [20]. Many studies have demonstrated that a high BMI significantly reduces the PCS, MCS, and QOL of adults [21, 22], This study further revealed that malnutrition also diminishes various aspects of QOL among students, emphasizing the negative impact of poor nutritional status on students' QOL. Overweight and obese individuals often faced issues related to physical activity, pain, and chronic diseases, whereas malnourished individuals tended to have concerns about disease resistance and depression [16]. Therefore, one of the key areas to enhance student QOL is improving their nutritional status.

This is the first study on students at HNUE with specific information about scores and the status of PCS, MCS, QOL, and some risk demographic factors associated with PCS, MCS, and QOL, thereby helping us better understand the impact of the COVID-19 pandemic on pedagogical students, as long as to determine the risk factors which associated with pedagogical students' QOL. However, the study has some limitations, such as only focusing on students at HNUE as study subjects, and further research is needed to investigate the effects of various factors during the COVID-19 pandemic on the QOL of students.

3. Conclusions

In conclusion, the study results identified that the current status of QOL of students at HNUE is mainly average (accounting for 43%), low level (accounting for 28.6%), and high level (accounting for 27.5%). Among them, the majority of students have PCS and MCS at average and high levels (accounting for 55.2%), however, up to 19.9% of students have PCS and MCS at both low and very low levels. There were associations between

some demographic characteristics such as age, ethnicity, nutrition status, years of study, living area, cohabitant, having a chronic disease, being infected with COVID-19, complications after COVID-19, night sleep time to PCS, MCS, and QOL. Further research is needed to evaluate the direct impact of risk factors on the decline in the QOL of students at HNUE. Additionally, developing predictive models for the risk of decreased QOL in students could help implement timely interventions to enhance the QOL of students.

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