STRESS OF THAI DENTISTS DURING COVID-19 PANDEMIC IN THAILAND

Mr. Athikhun Praditpapha

A Thesis Submitted in Partial Fulfillment of the Requirements

for the Degree of Master of Science in Oral and Maxillofacial Surgery

Department of Oral and Maxillofacial Surgery

FACULTY OF DENTISTRY

Chulalongkorn University

Academic Year 2020

ความเครียดของทันตแพทย์ไทยในช่วงโควิด 19 ระบาดในประเทศไทย

นายอธิคุณ ประดิษฐ์ปภา

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาศัลยศาสตร์ช่องปากและแม็กซิลโลเฟเชียล ภาควิชาศัลยศาสตร์
คณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2563

Thesis Title	STRESS OF THAI DENTISTS DURING COVID-19 PANDEMIC IN THAILAND
By	Mr. Athikhun Praditpapha
Field of Study	Oral and Maxillofacial Surgery
Thesis Advisor	Associate Professor Keskanya Subbalekha, D.D.S., Ph.D.
Thesis Co Advisor	Associate Professor Pagaporn Pantuwadee Pisarnturakit, D.D.S., M.Sc., Ph.D.

Accepted by the FACULTY OF DENTISTRY, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Science

```
--------------------------------------  Dean of the FACULTY OF
                                         DENTISTRY
(Associate Professor Pornchai Jansisyanont, D.D.S., M.S.,
Ph.D.)
```

THESIS COMMITTEE

```
--------------------------------------  Chairman
(Associate Professor ATIPHAN PIMKHAOKHAM, D.D.S.,
M.P.A., Ph.D.)

--------------------------------------  Thesis Advisor
(Associate Professor Keskanya Subbalekha, D.D.S., Ph.D.)

--------------------------------------  Thesis Co-Advisor
(Associate Professor Pagaporn Pantuwadee Pisarnturakit,
D.D.S., M.Sc., Ph.D.)

--------------------------------------  External Examiner
(Associate Professor Sirichai Kiattavorncharoen, D.D.S.,
M.D., Dr.med)
```

อธิคุณ ประดิษฐ์ปภา : ความเครียดของทันตแพทย์ไทยในช่วงโควิด 19 ระบาดในประเทศไทย. (STRESS OF THAI DENTISTS DURING COVID-19 PANDEMIC IN THAILAND) อ.ที่ปรึกษาหลัก : รศ. ทญ. ดร.เกศกัญญา สัพพะเลข, อ.ที่ปรึกษาร่วม : รศ. ทญ. ดร.ผกาภรณ์ พันธุวดี พิศาลธุรกิจ

บทนำ: การแพร่ระบาดของโรคโควิด 19 ได้กลายเป็นปัญหาใหญ่ทางด้านสาธารณสุขระดับนานาชาติที่ก่อให้เกิดความเดือดร้อนในหลายประเทศรวมทั้งประเทศไทย เนื่องด้วยลักษณะของการทำงาน ทันตแพทย์นับว่าเป็นอาชีพที่มีความเสี่ยงสูงต่อการติดโรคอุบัติใหม่ชนิดนี้ ถึงแม้ว่าจะมีการศึกษาถึงผลกระทบทางด้านจิตวิทยาของการแพร่ระบาดในกลุ่มบุคคลทั่วไป กลุ่มบุคคลากรสาธารณสุข รวมทั้งกลุ่มทันตแพทย์อยู่บ้าง แต่ยังไม่มีการศึกษาถึงผลกระทบของการแพร่ระบาดรวมทั้งปัจจัยที่เกี่ยวข้องต่อสุขภาพจิตของทันตแพทย์ในประเทศไทย

วัตถุประสงค์การวิจัย: การศึกษาครั้งนี้มีเป้าหมายหลักเพื่อศึกษาความชุกและระดับความเครียดของทันตแพทย์ที่ทำงานในประเทศไทย รวมทั้งปัจจัยเสี่ยงหรือปัจจัยป้องกัน และมีเป้าหมายรองเพื่อศึกษาผลกระทบจากสถานการณ์การแพร่ระบาดในแง่ต่าง ๆ ต่อความเครียดของทันตแพทย์ไทยในช่วงที่มีการแพร่ระบาด

วิธีดำเนินการวิจัย: ผู้วิจัยเก็บข้อมูลจากทันตแพทย์ที่ปฏิบัติงานในประเทศไทย โดยแจกแบบสอบถามออนไลน์ผ่านทางสื่อโซเชียลระหว่างวันที่ 24 เมษายน ถึงวันที่ 5 พฤษภาคม 2563 ซึ่งอยู่ในช่วงของการแพร่ระบาดและการดำเนินมาตรการล็อคดาวน์รอบแรกในประเทศไทย โดยเก็บรวบรวมข้อมูลด้านภูมิประชากรศาสตร์ การทำงาน การเงินและเศรษฐานะ และทำการประเมินระดับความเครียดด้วยแบบสอบถามการประเมินความเครียดด้วยตนเองจำนวน 20 ข้อของกรมสุขภาพจิต รวมทั้งสอบถามเรื่องผลกระทบของการแพร่ระบาดของโรคโควิด 19 ต่อความเครียด

ผลการวิจัย: จากผู้ตอบแบบสอบถาม 622 ราย มีเพียง 520 รายที่มีคุณสมบัติตรงตามเกณฑ์คัดเข้าและตอบแบบสอบถามครบถ้วนและข้อมูลถูกนำเข้าสู่การวิเคราะห์ พบว่าความชุกของทันตแพทย์ไทยที่มีความเครียดในช่วงที่มีการล็อคดาวน์รอบแรกเท่ากับร้อยละ 20.52 ทันตแพทย์ร้อยละ 49.31 มีความเครียดอยู่ในเกณฑ์ปกติ และร้อยละ 30.17 มีความเครียดอยู่ในระดับต่ำกว่าปกติ การแพร่ระบาดส่งผลกระทบต่อความรู้สึกเครียดในด้านต่างๆ ในระดับที่มีค่ามัธยฐานของคะแนน 5.00-8.00 (ช่วงคะแนน 0-10 คะแนน) ปัจจัยเสี่ยงต่อความเครียดที่พบได้แก่ การนับถือศาสนาคริสต์ การรับผู้ป่วยเร่งด่วนหรือฉุกเฉิน การมีรายจ่ายเพิ่มขึ้น และการมีกระแสเงินสดติดลบระหว่างการแพร่ระบาด ในทางกลับกัน ปัจจัยป้องกันต่อความเครียดได้แก่ การมีอายุที่มากขึ้น การทำงานในสาขาเฉพาะทางบางสาขา และการมีกระแสเงินสดเป็นบวก

บทสรุป: ทันตแพทย์ไทยส่วนใหญ่ไม่เครียด หรือมีความเครียดเพียงเล็กน้อยในช่วงที่มีการแพร่ระบาดของโรคโควิด 19 โดยการแพร่ระบาดนี้มีผลกระทบความเครียดในระดับปานกลางค่อนข้างสูง ปัจจัยที่เกี่ยวข้องกับความเครียด คือ อายุ ศาสนา สาขาวิชา สถานะการทำงาน รายจ่ายที่เปลี่ยนแปลงไป และกระแสเงินสดระหว่างการแพร่ระบาด

สาขาวิชา	ศัลยศาสตร์ช่องปากและแม็กซิลโลเฟเชียล	ลายมือชื่อนิสิต ....
ปีการศึกษา	2563	ลายมือชื่อ อ.ที่ปรึกษาหลัก ....
		ลายมือชื่อ อ.ที่ปรึกษาร่วม ....

6270022632 : MAJOR ORAL AND MAXILLOFACIAL SURGERY

KEYWORD: COVID-19, SARS-CoV-2, infectious disease, dentists, psychological distress, psychological factors

Athikhun Praditpapha : STRESS OF THAI DENTISTS DURING COVID-19 PANDEMIC IN THAILAND. Advisor: Assoc. Prof. Keskanya Subbalekha, D.D.S., Ph.D. Co-advisor: Assoc. Prof. Pagaporn Pantuwadee Pisarnturakit, D.D.S., M.Sc., Ph.D.

Background: COVID-19 pandemic is a public health emergency of international concern with many countries affected including Thai. Due to the nature of the work, dental practitioner is a high-risk professional to contract the disease. Many studies were conducted to study the impact of the situation on mental health of both general population and health care personnel. However, there are scant data about the stress of Thai dental practitioner caused by COVID-19 and the associated factors.

Objectives: The primary aims of this study were to investigate the prevalence and level of stress, along with its risk/protective factors. The secondary aim was to investigate the impact of COVID-19 pandemic consequences on the stress of Thai dentists during the COVID-19 pandemic.

Materials and methods: In this cross-sectional study, a questionnaire was developed and distributed via social media from April 24 to May 5, 2020. Demographic, work-related, and financial and socioeconomic status were collected as predictors of stress. Self-administered Stress Evaluation Form-20 (SASEF-20) was used to capture the level of stress. Also, specific questions about COVID-19 were asked to help explore the pandemic's impact on dentists' stress.

Results: Of 622 responses, 580 were included in the final analysis. Stress level and prevalence were relatively low (hypo-stress=30.17%, normal stress=49.31%). However, the impact of COVID-19 related issues on stress demonstrated a median score of 5.00-8.00 out of 10. The main factors associated with higher stress levels were being a Christian, accepting emergencies during the pandemic, facing increased living expenses, and having a negative cash flow. In contrast, factors associated with lower stress levels were older age, working within certain specialist domains, and having a positive cash flow.

Conclusion: This study revealed low stress prevalence and level among Thai dentists during COVID-19 lockdown. Age, religion, specialty, working status, and change in expenses and cash flow during the COVID-19 pandemic were identified as stress predictors.

Field of Study:	Oral and Maxillofacial Surgery	Student's Signature ....
Academic Year:	2020	Advisor's Signature ....
		Co-advisor's Signature ....

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

Chapter I

Introduction

1.1 Background and rationale

At the end of the year 2019, there were cases of pneumonia with unknown pathological cause in Wuhan, China. The cause of the pneumonia was later identified as a new strain of coronavirus in beta genus and was named as the 2019 novel coronavirus (2019-nCoV). Just one month after first reported (January 20, 2020), the number of 2019 coronavirus disease (COVID-19) case has reached over 200 [1]. Despite the fact that World Health Organization (WHO) has finally declared the global COVID-19 epidemic a public health emergency of international concern on January 30, 2020, the number has continued to exponentially grow [2]. And as of March 2, 2020 the number has dramatically increased to reach over 80,000 cases, about 400 times in just 6 weeks [3]. While these numbers indicated only the cases in China only, the virus has also spread throughout the globe, causing over 3 million infected people around the world at the end of April 2020 [4]. In Thailand, the first confirmed case was reported on January 13, 2020. While the average number of the new case per day remain under 1 person for the first 50 days [5], the number has then increased rapidly since March 10, 2020, to hit over 100 cases per day in just about 10 days later [6].

The 2019-nCoV may be considered as one of the 21st century highly pathogenic human coronavirus (HCoV) following severe acute respiratory syndrome corona virus (SARS-CoV) and Middle East respiratory syndrome virus (MERS-CoV) which caused pandemics in 2002 and 2012 respectively [7]. It was also designated as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses because of its similar genomic features to SARS-CoV [8]. It was estimated that the effective reproduction number (R) of COVID-19 is about 4.08, which mean an individual with COVID-19 can cause up to 4 new case on average, exceeding

that of SARS (R = 2.76-3.01) [9]. Although fatality rate of the disease seems to be low (0.3-7.2%)[10-12] compare to those of SARS and MERS (about 10% and 30% respectively)[13, 14], the total number of death worldwide in a period of just less than six month (over 200,000 confirmed dead as of March 28, 2020) exceeded 100 times higher than all-time cumulative dead cases of SARS and MERS added together (less than 2,000) [4, 15], highlighting the enormous impact of the pandemic on human history of the 21st century.

To limit the spread of virus, social distancing is an important measure. Most of the public areas including department stores, fitness centers, movies theatres, nightclubs are closed. Transportations are limited both in and between countries. People need to stay safely in their accommodations, normal daily activities are interrupted. The overwhelm news including fake and real, the obscure explanation from the government or national healthcare organization, the unsecured feeling, and the rapidly infection and mortality rates increases anxiety and stress of people all over the world.

Dentists are one among many careers which were inevitably affected from COVID-19. As dental procedures are always involve contacting either directly or indirectly with patient's intra-oral and respiratory secretions, it is unarguable that, without proper management, their works are very risky at getting the new infectious disease. Whether it is a high speed cutting instrument or an ultrasonic scaler, they both are capable of creating huge amount of aerosols and droplets through the treatment processes; thus elevating the potential of the virus to spread through the air until they can enter a new host or settle down on a surface, waiting for other patients or health care workers (HCW) to touch them [16]. There is a report that describe the infectious potency of aerosols and droplets from oral and nasal routes of a patient with infected respiratory tract. These aerosols and droplets can suspend long and travel far in the air [17]. As of the first outbreak in Thailand (April 2020), the epidemic spreads throughout the

country and hundreds of new infectious cases were reported everyday [18]. Due to the course of disease, it is hardly to identify the person carrying the virus [16]. Many dental treatment guidelines recommend that dental procedures during the outbreak should be postponed, only emergency and urgency conditions that expect neither to produce aerosols nor droplets could be performed under the proper personal protective equipment (PPE) [18-20]. However, the availability of PPE, safety environment, the prevalence of disease in each area, and the policy of each working place were varied. Therefore, many workplaces were closed while some were still partial or fully open. These situations affect many dentists in many aspects, obviously the decreased income, the drawbacks of incomplete dental treatments, the fear of being infected or a virus carrier. Other sources of stress of Thai dentists were shrinkage of the national economic status, falling of stock prices, uncertainty of government policies against the epidemic, nighttime curfew, etc.

From all unpleasant impacts of COVID-19 said above, Thai dentists might have some stress, which can then lower quality of life and pleasure. Thereby, we investigated the effect of COVID-19 to the stress of Thai dentists.

1.2 Research questions

1.What was the prevalence and level of stress of Thai dentist during COVID-19 epidemic?

2.Did consequences from COVID-19 epidemic cause stress to Thai dentist?

3.Which factors contributed to stress of Thai dentists during COVID-19 pandemic?

1.3 Research hypothesis

1. Thai dentists might have some stress during COVID-19 pandemic.

2. Consequences of COVID-19 pandemic might have some impacts on Thai
dentists' stress.

1.4 Research objectives

1.To investigate the prevalence and level of stress of Thai dentists during COVID-19 pandemic.

2.To investigate the impact of COVID-19 consequences on Thai dentist stress.

3.To identify associated factors on stress level of Thai dentist during COVID-19 epidemic.

1.5 Research design

Descriptive cross-sectional study

1.6 Expected benefits

1.To provide basic psychological data of dental professional in Thailand during CIVID-19 epidemic

2.To provide data needed to be used for mental health promotion and prevention of Thai dental professional in the future

1.7 Operational definition

Corona virus: A virus family that cause illness in human and animals. This virus can cause of respiratory tract infection that range from common cold to serious illnesses like MERS, SARS, and COVID-19. Symptoms of COVID-19 patient include, but not limited to, fever, couch, dyspnea, myalgia, headache, diarrhea etc.

Thai dentist: Dental professionals who were currently practicing dental procedure in Thailand before April 2020.

Stress: A state of mental or emotional strain or tension resulting from adverse internal or external stimulus.

Social media: Internet-based platform used to communicate between users such as Facebook, Instagram, and Line.

1.8 Limitation

The first limitation of this study was its design. Because this study was a cross-sectional study, the result cannot be used to create causal effect between the COVID-19 epidemic and stress level of Thai dentists. It could only tell us how much of the stress presents at the time of the epidemic.

The second limitation was the tool used. The stress evaluation form used in this study was developed and used in Thailand only. Thus, the stress evaluated in this study might not be comparable to study conducted in other country. The pitfalls of self-reported questionnaire were that a respondent might not truthfully answer or misunderstood some questions. Interpreting the result from the acquired data should be done cautiously.

The last limitation was the sampling method. This study used convenient method by mean of online survey. There might be some dentists who do not prefer doing online questionnaire or not accessible to the questionnaire provided via Line groups and Facebook page in the first place. Thus, the sample we got might not accurately represent "Thai dentist" as we targeted.

Chapter II

Literature review

2.1 COVID-19

2.1.1 The virus and its family

COVID-19 or 2019 coronavirus disease is a disease caused by SARS-CoV 2, a novel virus that belong to *Orthocoronavirinae* subfamily [1]. This viral subfamily belongs to the family of *Coronaviridae,* of the order *Nidovirales* [16]. Viruses in this subfamily are classified into four genera (Figure 1): *Alphacoronavirus* (purple), *Betacoronavirus* (orange), *Gammacoronavirus* (green), and *Deltacoronavirus* (blue). *Alpha-* and *Betacoronavirus* are known to infect human [1, 7]. *Betacoronavirus* are further divided into 4 classic subgroup clusters, labelled as 2a-2d, which contain the following: avian infectious bronchitis virus (AIBV), Middle East respiratory syndrome coronavirus (MERS-CoV), mouse hepatitis virus (MHV), porcine enteric diarrhea virus (PEDV), severe acute respiratory syndrome coronavirus (SARS-CoV), SARS-related coronavirus (SARSr-CoV), and Human coronavirus (HCoV). There are three distinct identified strains of SARS-CoV 2, labelled with red stars, all were placed in *Betacoronavirus* 2b [1]. According to the structure of the virus, Xu et al. [22] suggested that the virus might be able to transmit from person to person via the S-protein-ACE2 binding pathway like SARS-CoV.

2.1.2 The fatality rate and the impact on global health

The fatality rate of COVID-19 varies among country to country from as low as 0.3% in Japan to as high as 7.6% in Italy [11, 12]. A meta-analysis from studies in China showed an average of 5% mortality rate with highest fatality rate of 14.6% in one study [10]. While data as of May 24, 2020, from WHO website showed about 6.6% of global mortality rate [4]. These rates seemed to be lower than SARS and MERS which were also caused by viruses in the same family. As SARS and MERS appeared to have fatality rate of 9.6% and 34.4% respectively. Despite this fact, COVID-19 caused more dead around the globe in just four months over 100 times more than SARS and MERS had done

together so far [15, 23]. This was because the disease was more successful in escaping any early protective protocol of most country. It could rapidly spread to new areas without detection, thus was capable creating enormous number of infections. By the end of April 2020, there were more than 3 million confirmed cases in 213 countries while SARS and MERS can only infected about 10,000 people in the past two decades [4, 15]. It was noted that death was most observed in elderly male patients. Old age (70 years old or higher) was associated with shorter period between the first developed symptom and death (11.5 days vs 20 days in younger patients) with the median number across all ages equal to 14 days [24].

Figure 1. Phylogenetic relationships between the genomes of the new types of Betacoronavirus and other Orthocoronavirinae genomes [1].

2.1.3 The incubation period and the reproduction number

One difficulty in stopping the infection was the fact that an asymptomatic infected individual can spread the virus [25], and one who infected might stay normal for up to about 24 days [16]. A study that used the travel history and symptom onset of 88 confirmed cases, who were detected outside Wuhan in the early outbreak phase, has estimate the mean incubation period to be 6.4 days (95% credible interval: 5.6–7.7), ranging from 2.1 to 11.1 days (2.5th to 97.5th percent-tile) [26]. Another study with 181 confirmed cases has estimated the median incubation period to be 5.1 days (4.5 to 5.8 days) of infection using 95% confidence interval (CI), and 11.5 days (8.2 to 15.6 days) of infection using 97.5% CI. They also estimated that about 9,900 out of every 10,000 cases will develop symptoms before the 14th day of active monitoring or quarantine [27].

The study by Cao et al. [9] revealed that effective reproduction number (R) of COVID-19 was 4.08. This number was higher compared to the 2003 SARS epidemic in Beijing and Guangzhou, which were 2.76 and 3.01 respectively. The basic reproduction number (R_0, generally lower than R) of the disease varied. WHO estimate the R_0 to be as low as 1.4-2.5 while Read et al.[28] expect the number to be 3.8 (95% confidence interval, 3.6 and 4.0). Zhou et al. [29] estimated that the mean R_0 ranges from 2.24 (95%CI: 1.96–2.55) to 3.58 (95%CI: 2.89–4.39). Wu JT et al. [30] used the same calculating method and estimated the R_0 to be 2.68 (95% credible interval (CrI) 2·47–2·86) with the epidemic doubling time of 6.4 days (95% CrI 5.8–7.1 days).

2.1.4 Signs and symptoms

In a pooled study of 278 patients, the most observed symptom of the patients, who were diagnosed with COVID-19, was fever (92.8%; n = 258), followed by cough (69.8%; n = 194), dyspnea (34.5%; n = 96), myalgia (27.7%; n = 77), headache (7.2%; n = 20) and diarrhea (6.1%; n = 17). Of these patients, 25.9% (n=72) required ICU admission, 20.1% (n=56) developed acute respiratory distress syndrome, 8.3% (n=23) required invasive mechanical ventilation, and 3.2% (n=9) required extracorporeal

membrane oxygenation for refractory hypoxemia. Shock was observed in 6.8% (n=19), acute kidney injury in 4.0% (n=11) and continuous renal replacement therapy was required in 5.0% (n=14) of the patients [24]. Another study of 99 patients also found that rhinorrhea was observed in only 4.0% (n=4) and sore throat in 5.1% (n=5) of the patients [31]. One study of 41 SARS-CoV 2 associated pneumonia patients found abnormal chest CT in 100% of the patient [32]. Deaths were most observed in elderly male patients.

2.2 Stress

2.2.1 Early concepts and later development

Claude Bernard had stated that keeping the internal environment (milieu interieur) stable and constant is the key that make adaptation of an organism to a changing environment possible. This idea was later adopted by Walter B. Cannon, who was the first to present the concept of homeostasis as a basic mechanism of response to stress. Cannon was also the one who gave birth to the Fight or Flight model of the stress response and proposed some detailed concepts of possible biological mechanisms involving emergency hormones for the first time [33, 34].

In 1936, Selye, a pioneer Hungarian-Canadian endocrinologist, described the concept of "general adaptation syndrome" (GAS), later renamed as "stress response". He observed a similar physiological responses triads pattern in many long-term exposures to various kinds of stressors; enlarged adrenal glands, atrophic lymph nodes and thymus, and gastroduodenal erosions/ulcers. The response was described in three stages as follow [35, 36]:

1. Alarm reaction (AR Stage): This stage occurs 6-48 hours after initial injury. It involves rapid secretion of adrenaline which is activated by autonomic sympathetic nervous system.

2. Stage of resistance (SR Stage): This stage begins 48 hours after the injury. It involves slower body response to nocuous stimuli such as increasing levels of cortisol and other corticosteroids that change the body metabolism.

3. Stage of exhaustion (SE Stage): Long-term exposure to injury that persist for one to three months will finally lead to SE stage, in which many body systems such as the immune, digestive, or kidney systems eventually damaged.

In conclusion, Selye had proposed two important ideas of stress: (i) basically, stress is a physiological response of the body and (ii) stress is a non-specific response of the body to any threat or nocuous stimuli [37].

However, the concept of GAS was argued by some psychologists such as John Wayne Mason, who expertise his research in the field of relation between emotions and the endocrine. Mason insisted that there are many different responses that vary from person to person and also from time to time in the same person to a given stressor [38, 39]. Another psychologist, Susan R. Burchfield, also argued GAS concept of Selye in one of her article that failure of adaptation to a stressor was because of psychological rather than physiological exhaustion [40].

In the year 1989, Reznick [41] proposed his own hypothesis that integrate both psychological and physiological aspects of stress known as the cycle of stress. He described this cycle as a circular event in life, consisting of four phases (Figure 2):

1. Resting ground phase
2. Tension phase
3. Response phase
4. Relief phase

```
                    The resting ground state

                                              Stressors
                                              Psychological
                                              Physiological
Psychological                                              Negative
                                                           tension
         The relief              The tension and strain
         phase                   phase
                                 (arousal or activation)
Physiological                    state
                                                           Positive
                                                           tension

Coping
mechanisms                                    Defense
                                              mechanisms

                    The response phase

         Active              Passive
         Extreme             Extreme
         Moderate            Moderate
```
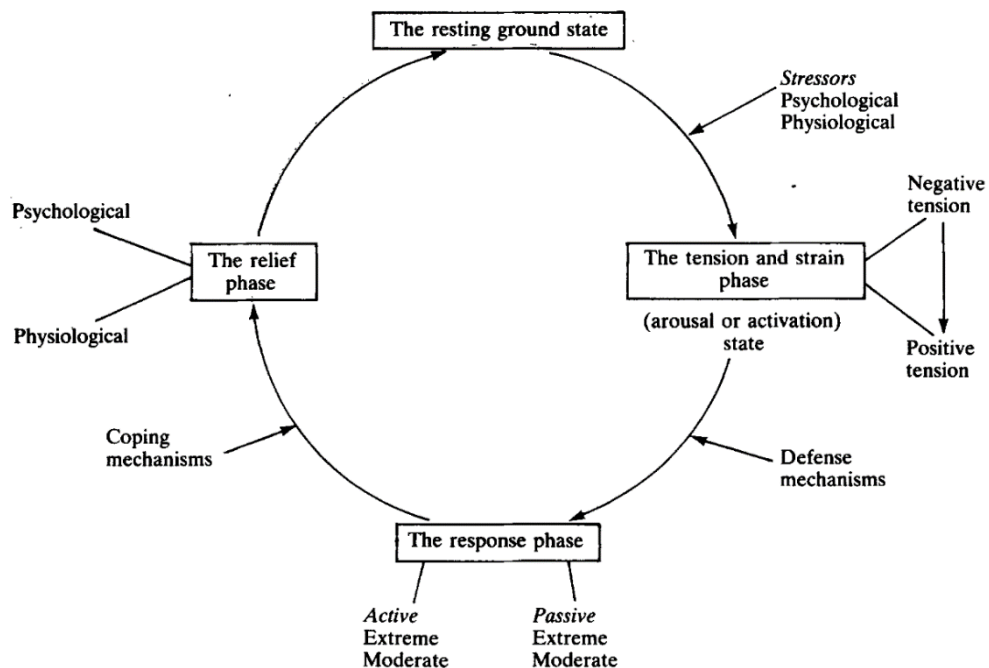
Figure 2. The cycle of stress proposed by A. Z. Reznick

2.2.2 Types of stress

Despite the similar neuroendocrine effect, stress may be not always followed by negative consequence. Instead, it was noted that there were "positive" and "negative" stresses. Selye named these two types of stress as "distress" and "eustress" according to whether their initial response by the body was associated by unpleasant, negative emotion or positive emotion respectively [36].

Eustress, or positive stress, is associated with positive emotion such as excitement, feeling of hope, love. Example of this kind of stress include; working on a challenging job task, playing sport games, marriage, etc. This stressor can facilitate better stress response that lead to improved performance.

In contrast, **distress**, is a kind of negative stress that involve negative emotion such as anxiety, feeling of hopelessness, fear. This kind of stress may induce bad response and leads to decreased performance. Example of distress include; divorce, illness, loss of close person, etc.

One may think of eustress and distress as a different level of stress as illustrated in the stress response curve according to Nixon P: Practitioner 1979, Yerkes RM, Dodson JD. This curve showed that at low level of stress (hypostress), the physical and mental activity was also low, and the person could have feelings of frustration, boredom, and dissatisfaction. With optimal stress level or eustress, the activities increased. Creativity, progress, positive changes, and satisfaction emerge at this level. However, when too much stress was put on against an individual, his activities began to drop down again, turning into the stage of fatigue and exhaustion. Anxiety, anger, violence, low self-esteem can be observed. If the stress keep going on, health problems and burnout can be anticipated in the person (Figure 3).
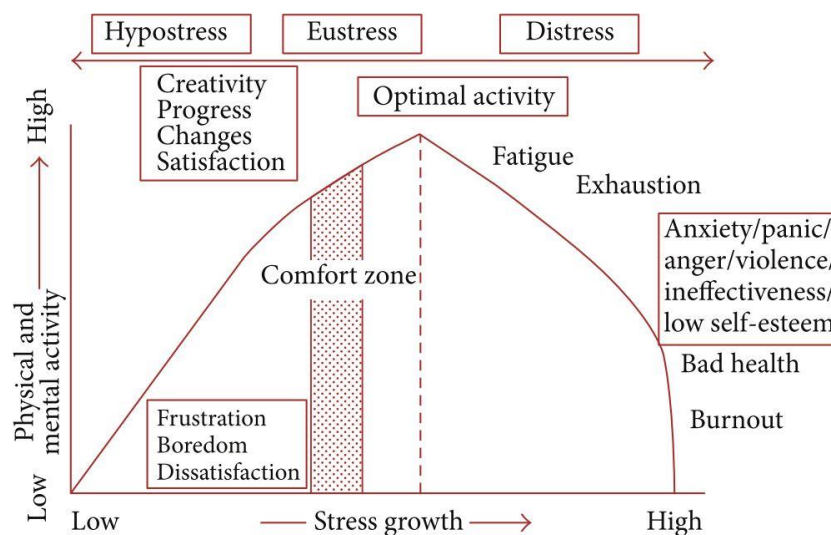
Figure 3. Stress response curve [42]

2.2.3 Stress management

When it comes to stress management, there are some modern theory that discuss about these approaches. One famous experiment about stress management was The Norwegian Experiment by Ursin et al. The experiment showed that an individual could reduce his stress toward a situation by continually repeat it for a period of time [43]. Lazarus et al. [44] had proposed The Dichotomy Model of Lazarus to demonstrate a possible practical way in coping with stress. This model explained that when an

individual encounter with a stressful situation, the person has a chance to conceive this situation in two different ways:

    A. As a threat

    B. As a challenge

If a person conceives the situation as a threat, then he will get stuck in a strong emotional response for a long time before eventually overcome it and get to the next logical response stage. This path will make one to have lesser chance of creating a positive "psychobiological gate" in his brain. In contrast, if the same person conceives the situation as a challenge, he will have a relatively short and mild emotional response stage, while having much longer logical response stage instead; thus, making it much easier for the brain to create a positive psychobiological gate (Figure 4).
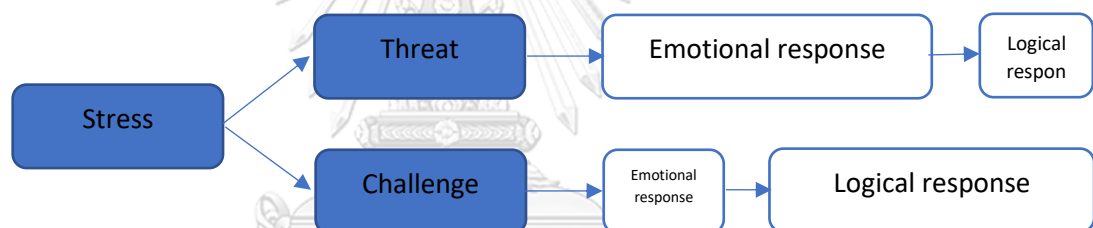
Figure 4. Dichotomy scheme of Lazarus

2.2.4 Measurement of stress

They are many ways to measure or evaluate stress of a person. We may categorize measurement tools of stress into two categories: objective measurement, and subjective measurement.

Objective measurement composed of variety of tools. Because these tools are not or less affected by individual's perception, they are generally more reliable than subjective measurement tools. However, these tools usually require expensive equipment and, sometimes, need trained expertise to read the result. Example of these tools are Rorschach test, Thematic Apperception test (TAT), electromyography (EMG),

peripheral skin temperature, skin conductance, heart rate, blood volume pulse, and respiration rate.

Subjective measurement tools, in contrast, are usually easier to use, cost less, and need no special equipment or trained specialist to interpret the result. These tools are generally in the form of self-reports, which can be affected by several factors, thus making them less reliable than objective measurement. Example of these self-reports are:

- Health opinion survey (HOS)
- Symptom checklist 90 revised (SCL-90-R)
- General health questionnaire (GHQ)
- Minnesota Multiphasic Personality Inventory (MMPI)
- State-Trait Anxiety Inventory (STAI)
- Beck Depression Inventory (BDI)

In Thailand, they are many translated and originally developed in Thai-language self-reports such as:

- Thai General Health Questionnaire (Thai GHQ): 60, 30, 28, 12 items
- Thai Mental Health Questionnaire (TMHQ): 70 items
- Suanprung Stress Test (SPST): 60, 20, 5 items
- Self-administered Stress Evaluation form 20 items (SASEF-20)

2.3 COVID-19 and dental practice

From current situation that COVID-19 had gone pandemic around the world, data form WHO website indicated that, as of April 30, 2020, the number of infections and death in 213 countries had already reached over 3 million and 200,000 respectively [4]. And data from website of Ministry of Public Health of Thailand showed that, until May 1, 2020, there were 2,960 confirmed cases and 54 dead in Thailand [18].

Thai citizen at all age are in danger from COVID-19. This inevitably causes stress, which could consecutively cause negative effects to health and quality of life if one did not have an appropriate stress management, especially in dentist. Working as a dental professional means inevitably contacting with saliva, blood, and oral secretion. Aerosols generated from high-speed cutting instruments and ultrasonic scaler can also hardly to be avoided. Thus, dental practice is at high risk in spreading infection to HCWs and patients both directly and indirectly [16].

Xian Peng (Feb 2020) [16] said that there were many transmission routes of COVID-19 in dental practice (Figure 5):

1. **Talking directly with infected patient**: There were reports indicating that patient capable of spreading viable infectious virus may not show any symptom during the incubation period, which may be as long as 14 days. These viruses can abundantly be found in patient's respiratory tract and can easily enter new host trough endothelial cell of salivary duct.

2. **Aerosols or droplets**: Although SARS-CoV-2 cannot spread by airborne itself[45], it is capable of infecting new host via aerosols and droplets generated by high-speed cutting instrument and ultrasonic scaler. These aerosols and droplets mixed with saliva or blood of an infected patient can be a good source of infection, especially aerosols, which can suspend in the air for a long time and travel far throughout the clinic that has no proper infection control.

3. **Contact spread**: Dental professionals have risk of both directly and indirectly contact with patient's body fluid. Examples of direct contact include contacting with blood, saliva, nasal discharge, contacting with contaminated instruments or surfaces, or getting cut by infected sharp instruments. Furthermore, dentists may indirectly contact with aerosols suspended in the dental room.

4. **Contaminated surfaces spread**: HCoV including SARS-CoV and MERS-CoV can stay alive on surfaces such as iron, glass, or plastic for 2-3 days. In addition, it can stay in room temperature from 2 hours to 9 days. In dental clinic that generates aerosols and droplets, the virus can travel along with those aerosols and droplets before they land on a surface, which can be a dental unit, a table, a wall etc. Cleaning these surfaces often can decrease the chance of infection.
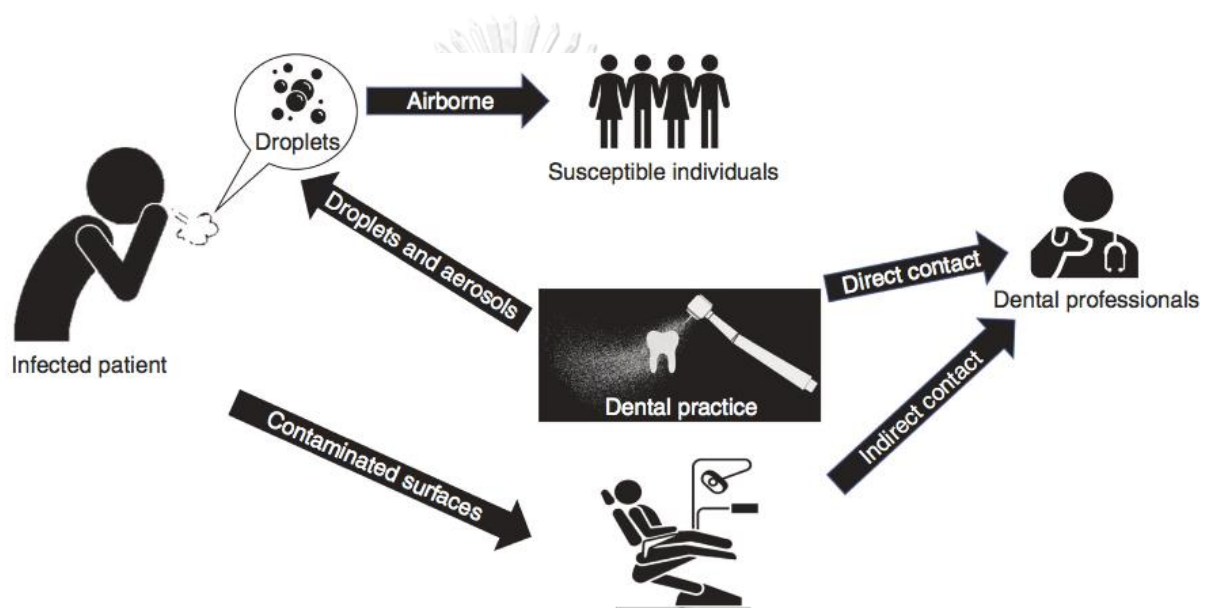
Figure 5. Transmission routes of COVID-19 in dental clinic [16].

An experiment conducted by National Institutes of Health, Centers for Disease Control and Prevention, UCLA and Princeton University found that SARS-CoV-2 can stay alive in aerosols for 3 hours, despite the fact that these aerosols cannot stay longer than 30 minutes in the real setting [46].

Many organization had declared special guidelines for dentist in the react to COVID-19 epidemic, for example, on March 16 2020, the American Dental Association (ADA) suggested American dentist to postpone elective dental procedures and focus more on dental emergency cases [47]. Center of Disease Control (CDC) announced on April 8, 2020 in concordance with the ADA that the dentists should postpone elective

procedures, surgeries, and non-urgent dental visits, and prioritize urgent and emergency visits and procedures [20].

In Thailand, Department of Medical Services, Ministry of Public Health, Thailand [19], announced "Dental Treatment Guideline in The Situation of COVID-19 Epidemic" on March 30, 2020, that

1. Treat only emergency and urgency case while putting utmost concern on facilities' potential and safety of their dental care workers
2. Postpone any elective case
3. When treatment is necessary, consider following details in this guideline
4. When it is necessary to use operation room, consider following the guideline for using operation room proposed by Department of Medical Services

In this guideline, dental works were classified into three levels according to their urgency as follow:

1. Emergency case: situation that can be life threatening and requires immediate treatment
   - Uncontrol bleeding in oral cavity
   - Cellulitis or a diffuse tissue bacterial infection with intra-oral or extra-oral swelling that potentially compromise the patient's airway
   - Trauma involving facial bones, potentially compromising the patient's airway
2. Urgent case: patients that should be taken care of promptly according to minimal invasive principle
   - Severe dental pain from pulpal inflammation
   - Pericoronitis or third-molar pain
   - Surgical post-operative osteitis, dry socket dressing changes

- Abscess, or localized bacterial infection resulting in localized pain and swelling

- Tooth fracture resulting in pain or causing soft tissue trauma

- Dental trauma with avulsion/luxation

- Final crown/bridge cementation if the temporary restoration is lost, broken, or causing gingival irritation

- Extensive dental caries causing pain

- Denture adjustment or repairs when function impeded

- Dental treatment required prior to critical medical procedures e.g. radiotherapy, chemotherapy, transplantation

- Dislodged temporary filling during endodontic treatment that cause leakage into root canal

- Snipping or adjustment of an orthodontic wire or appliances piercing or ulcerating the oral mucosa

3. Elective case: any treatment that can be wait

- Charting and treatment planning of a new patient

- Continue treatment that has no urgency

- Recall patient

- Regular cleaning e.g. scaling and polishing

- Preventive treatment

- Orthodontic treatment

- Every operative works including filling a small cavity without symptom

- Tooth extraction without symptom

- Esthetic purposes e.g. tooth whitening

- Implant treatment

- Prosthetic treatment not involve pain or urgency

The guideline also gave specific advices according to each filed of specialty

1. Oral and maxillofacial surgery

    a. Giving only emergency treatment in bleeding case that require intervention

    b. In case wound suture is required, consider using resorbable suture to avoid another appointment to take off suture

    c. Considering mainly examination and drug prescription followed by recall in case of pain and swelling of other cause

    d. Use operation room in emergency case only, urgent case may be selected according to the situation and the facility's manager's judgement

2. Endodontics

    a. Treat only emergency case that involve swelling caused by intra root canal or periapical tissue according to emergency endodontic treatment protocol, required rubber dam throughout the operation, avoid procedure that generate aerosol, consider using extra-oral instead of intra-oral x-ray whenever possible to avoid couch triggering

3. Periodontics

    a. In emergency swelling case, use hand instrument to scale and root plane only in the necessary area, cannot complete full mouth cleaning, emphasize person oral hygiene practicing

4. Operative dentistry

    a. Consider treat only emergency case that require short operative time and generate no aerosol e.g. temporary filling in case of dislodged filling

5. Prosthodontics

  a. Consider treat only emergency case that require short operative time and generate no aerosol e.g. fixing dislodged temporary crown

6. Orthodontics

  a. Consider treat only emergency case e.g. snipping or adjustment of an orthodontic wire or appliances piercing or ulcerating the oral mucosa

7. Pediatrics

  a. Consider only emergency treatment in case of swelling infection from deciduous tooth, broken/ cracked tooth, avulsed/luxated tooth that cause pain or soft tissue trauma, avoid treatment that generate aerosol

General treatment protocol includes [16, 19]

1. Screen every patient before giving any treatment via thorough history taking and measure body temperature

2. Begin treatment in isolation room or negative pressure room (if available) or treat suspicious/confirmed COVID-19 infected patient as last case of the day

3. For any treatment that generate aerosol, suite dentist, dental assistant, and any other involved personnel with Maximum PPE (Personal Protective Equipment):

  a. Disposable hair cap

  b. Disposable water-resistant gown

  c. Eye goggles

  d. N-95 mask (medical grade)

  e. Face shield

  f. Nitrile gloves

  g. Shoe cover

4. Wash hand thoroughly and use antiseptic agent

5. Room preparation

    a. Cover every touchable surface with disposable cover material

    b. Avoid using any instruments that cause water split or aerosol e.g. triple syringe, airotor, ultrasonic scaler

6. Use 0.2% povidone iodine as antiseptic mouth rinse for 1 minute, in patient with history of thyroid disease, allergy to iodine, kidney disease, pregnancy, lactation period, and child under 6 years old before doing any dental procedure consider using one of these antiseptic mouth rinse instead

    a. 1% hydrogen peroxide, use with precautious because of its high irritating property; avoid using in elderly patient, patient with xerostomia, oral ulcer, or extraction wound

    b. 0.12% chlorhexidine (C-20 mouth wash), use with precautious of irritation in case of uncontrollable deglutition e.g. pediatric and geriatric patient, use gauze or cotton roll drip in the solution and rub over oral cavity

7. Use rubber dam to reduce contaminated aerosols

8. Use anti-retraction handpiece to reduce backflow of pathogens in the hand piece

9. Surface and environmental care

    a. Regularly disinfect all common-use surfaces such as doorknob, working desk, dental chair with proper disinfectant, use enough concentration and contacting time

    b. In case of continue treating consecutive patients, open the room air or leave the room free for 30 minutes before beginning treatment to new patient

    c. In case aerosol is inevitable, clean the room according to operation room standard

10. Strictly following infectious waste disposal guideline

11. Apply social distancing in managing patient, such as having only one patient waiting at the lobby, do not appoint many patients at the same time, having patients wait in their car etc.

12. Manage consultant service via telephone or social media

Considering the 6 sources of stress by Miller, Smith, and Larry [48], dental professionals were affected by all 6 sources as follow:

1. **Work**: Because of COVID-19 epidemic, all dental treatments had chances of getting or spreading the virus. Dentist must consider postponing all of their elective cases without any clue about how long until the situation will become normal again. Apart from this, emergency and urgency cases that need to be done, but could generate aerosols and droplets, such as surgical removal of infected impacted tooth, filling in deep, painful case, could put dentist under stressful circumstance of getting infected without adequate PPE.

2. **Personal life**: The epidemic of COVID-19 might cause anxiety to a person. Receiving a lot of news could also cause distress and stress. Furthermore, the government of Thailand had also declared protocols to stop the infection including self-quarantine, prohibition of social events that require people to get together, night curfew, prohibition of traveling across province, etc. These restrictions limited many daily-life activities and could cause stress to Thai dentists and general citizen.

3. **Family**: Family is one of the most important social support that help a person to cope with stress effectively. However, it is also the main cause of stress at the same time. Having family members infected, being at risk of getting infected with COVID-19, or afraid that the dentists themselves might bring the disease to their family could also put them into stress.

4. **Social**: Social stress could emerge from environmental change or being apart from social. The government's policy of self-quarantine and prohibition of social activities could cause an individual to adapt to new situation, thus causing stress.

5. **Finance**: Financial issue is the primary source of stress for people in every social classes. The situation of COVID-19 epidemic forced many dentists to stop practicing, thus losing their income.

6. **Environment**: This include, but not limited to, political conflicts, unclear and reckless government policies and measures to cope with COVID-19, shrinkage of national economic status, falling of stock prices, closing of leisure places such as department stores and amusement places, closing of fitness, etc.

Besides, there were other factors emerging in the period of COVID-19 epidemic that can cause Thai dentists to be stress such as shortage of surgical mask and PPE, cancelation of academic conferences and some training courses, being alert when using public stuffs all the time such as pushing a button in an elevator or holding a doorknob, being continually fed with news in social media. These were just some examples of things causing stress that a dentist needed to handle in the present of COVID-19 epidemic

From all unpleasant consecutives of COVID-19 said above, it was suspected that Thai dental professionals might have an increased level of stress, which can then lower quality of life and pleasure. Until now, there was no study to confirm this hypothesis. In addition, there were many differences within Thai dentist such as severity of the epidemic in working area that can cause unequal safety between dentists who were working in the area with high and low infection rate. The field of specialty that make the working nature vary among dentists and might cause them to have different stress levels. Thereby, the researchers of this study wanted to study the effect of COVID-19 to

stress level of Thai dentists and the associated factors that might cause different level of stress among them to this new infectious disease.

Conceptual framework
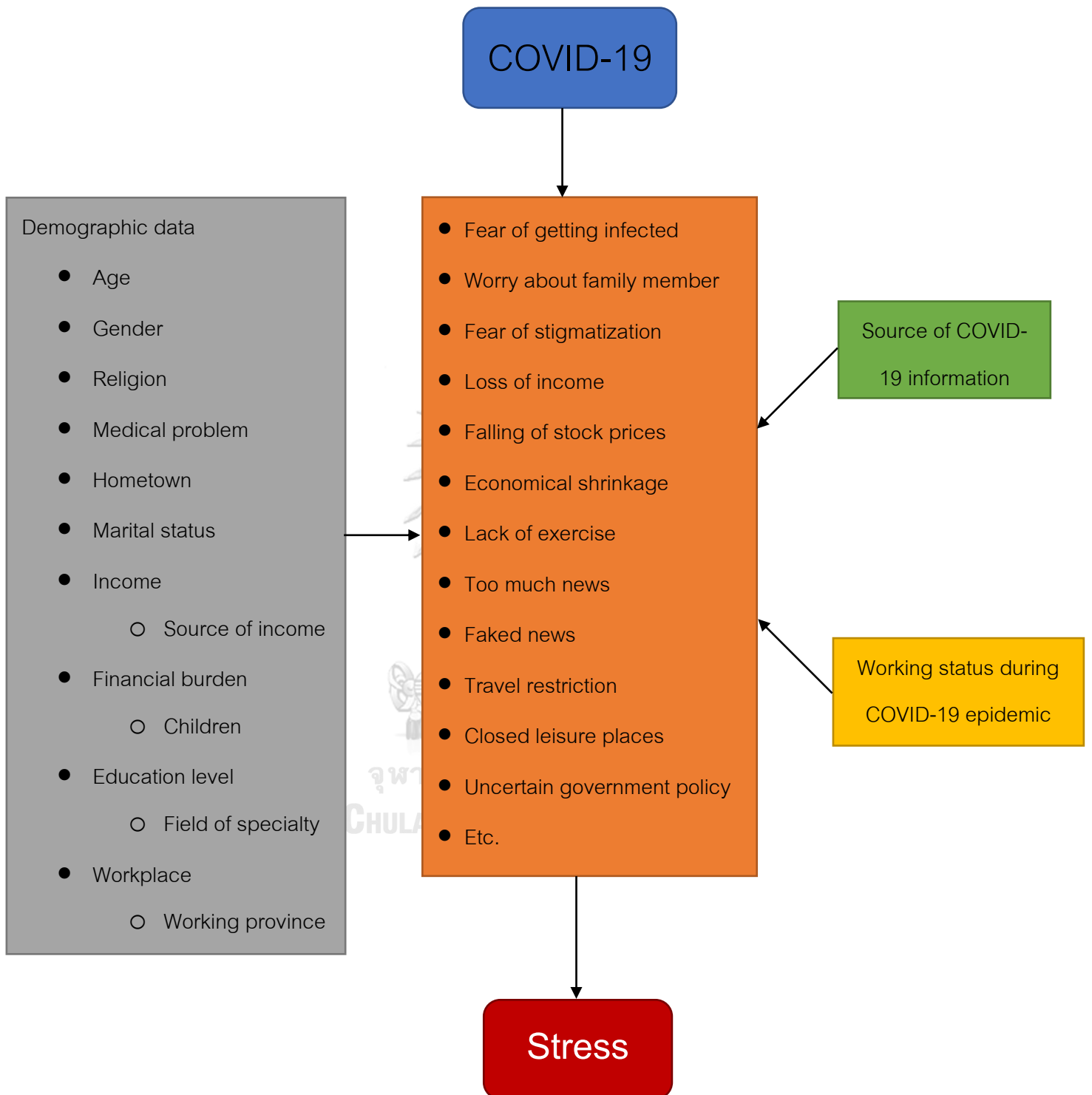
Chapter III

Materials and methods

3.1 Study design

This study was a cross-sectional descriptive study, questionnaire based.

3.2 Study population and sample size

3.1.1 Study population

Thai dentists who are actively practicing in Thailand at the time before COVID-19 pandemic in Thailand (before April 2020).

3.1.2 Sample size

Sample size is calculated based on the formula $n=Z^2pq/d^2$ [49]

When   n = sample size

Z = critical value acquired from table of normal distribution at the confidence level of 95%, in this context, Z was equal to 1.96

p = prevalence of stress in dentists, referred from Collin V. et al.[50], p equal to 0.549

q = 1-p

= 1-0.549 = 0.451

d = a maximum tolerated error, determined here as 0.05 (5%)

The number of sample size calculated from this formula is 381 participants

3.1.3 Sample selection

Inclusion criteria

- Thai dentists who are actively doing dental practice in Thailand before the pandemic time point (before April 2020).

- Thai dentists who can read, write, and communicate in Thai language fluently.

Exclusion criteria

- Response from non-dentist respondent

- Incompletely filled questionnaire.

- Duplicated response.

3.3 Data collection

A custom questionnaire was designed for this study. The questionnaire was distributed online, and data was collected from April 24–May 5, 2020 (which was in Thailand's first pandemic and lockdown period) using a Google Form (Google Inc., USA). The target population was dentists practicing in Thailand before the COVID-19 pandemic. The participants were invited to enroll in the study through an announcement and short explanation about the study, posted in private social media groups, including Facebook (Facebook Inc., USA) and Line (Line Corp., Japan). The Thai Dentist Fight Against COVID-19 Facebook group had around 11 thousand members, who self-reported to be dentists upon admission in the group. The announcement was also posted in Line groups whose members were exclusively dentists. Participation was motivated with a lucky draw with the chance to win one of twenty 500 THB (16 USD) Starbucks gift cards. This kind of intensive has been proved to be effective in improving the response rate by 73%[51].

To confirm that the respondent was a dentist, two screening questions were placed at the beginning of the questionnaire (Appendix data 1). Forms that had wrong responses to the screening questions were excluded from the analysis. Participant who wants to participate the lucky draw were requested to fill their mobile phone numbers at the end of the questionnaire, and they would be brought to another link they could fill their full name and dentist registration number. These private data was not linked to the questionnaire's response; thus, the identification of corresponding responses and respondents was unable. The participants were emphasized that everyone could send only one response which was checked by their submitted phone number.

3.4 The questionnaire

3.4.1 Questionnaire construction

The questionnaire comprised three sections: 1) 18 items covering the subjects' demographics, work-related, and financial and socio-economic characteristics, 2) SASEF-20 developed by the Department of Mental Health, Ministry of Public Health, Thailand, and 3) Specific questions investigating COVID-19-related issues (Appendix data 1).

Section 1: Demographic, work-related, and financial and socio-economic characteristic of the respondent

Question in this section includes age, gender, religion, medical problem, marital status, number of independent children, level of education, field of specialty, working status during COVID-19 epidemic, primary workplace, secondary workplace, primary working province, place of birth, primary source of income, amount of income before the epidemic of COVID-19, amount of income during the epidemic of COVID-19, living cost per month before the epidemic of COVID-19, and living cost per month during the epidemic of COVID-19. These items were considered as independent variables for stress.

Section 2: SASEF-20

SASEF-20 or Self-administered Stress Evaluation Form developed by Department of Mental Health, Ministry of Public Health, Thailand, was used to assess the stress level of the respondents. The form consisted of 20 items. The respondents must choose how often did he/she encounter with the situation in each item in the past 2 months. The frequency will be transformed into scores ranging from

0 = Never

1 = Sometimes

2 = Often

3 = Regularly

Stress can be classified into 5 levels according to the summary of the score

0-5   = Hypo-stress

6-17   = Normal stress level

18-25 = Mild stress above normal level

26-29 = Moderate stress above normal level

30-60 = Sever stress above normal level

Section 3: Specific questions investigating COVID-19-related issues

This section consisted of 18 specific questions relating to the COVID-19 pandemic, which were divided into two sub-sections. The first subsection investigated the impact of 14 parameters of the pandemic on the self-perceived stress level, using 14 questions responded to a score ranging from 0–10. Because SASEF-20 itself alone cannot tell whether the stress level found among Thai dentists is the result from the pandemic or not, data from this subsection will help elucidate this point.

The second part comprised four questions investigating the source of information about COVID-19, thing that causes stress the most during the pandemic, opinion about the pandemic, and the way to relief stress during the pandemic.

3.4.2 Selection of the stress evaluation form

There were three screening criteria used to select the tool for stress evaluation

- Use subjective measurement or self-report instead of objective measurement: Both objective and subjective measurement have different advantages and weak points. Because the researcher needs to collect numbers of data (at least 381 sample) in a short period of time with low cost. Subjective measurement in the form of self-report was considered more appropriate than objective measurement which was, if being used to collect such the amount of data, going to need much time and high cost with much more difficulty.

- Use Thai language form instead of English form: Many self-report forms are available in both Thai and English language. The researcher decided to use Thai language-based form to suit with the study population who were Thai citizens.

- Use form that consisted of less than 30 items: Thai stress evaluation forms have variable number of questions ranging from as low as 5 questions to as many as 70 questions. The researcher decided to use questionnaire that has no more than 30 questions to promote the number of respondent and prevent unreliable responses from respondents who would have been hurried to finish the form if it had been too long.

After considering aforementioned criteria, there were three main form left as follow:

- Thai GHQ 12, 28, 30: These Thai GHQs were developed from the original GHQ in English of Goldberg (1972). The instruments have sensitivity ranged from 78.1-81.8%, specificity ranged from 85.3-89.7%, and reliability using Cronbach's alpha coefficient ranged from 0.84-0.92 which were very good[52]. However, Thai GHQs are tools that evaluate stress related to general health of the patients. It might not

match with the purpose of this study which evaluated stress in term of overall daily life, not just the aspect of health.

- SPST 5, 20: These tools were developed by Department of Mental Health, Ministry of Health, Thailand. They possess valid objective to this study which is stress in general context of daily life. SPST 20 has Cronbach's alpha equal to 0.82[53] but lack of data about sensitivity and specificity. Data about sensitivity, specificity, and reliability of SPST 5 are also missing.

- SASEF-20: This form was also developed by Department of Mental Health, Ministry of Health, Thailand. It has been widely used to screen mental problem among Thai citizen for decades. The Cronbach's alpha coefficient was 0.86, sensitivity was 70.4%, and specificity was 64.6% which were good and acceptable [54]. Also, the measurement objective of this tool is in concordance with the purpose of this study.

Finally, the researchers decided to use SASEF-20 as a tool for evaluate stress among Thai dentists in this study.

3.4.3 Reliability, validity, and consistency of the questionnaire

Items in section 2 have been used and accepted nationally for stress evaluation. When considering 17 points as cut point, sensitivity, specificity, and reliability of the test were 70.4%, 64.6%, and 0.86 respectively [54]. Items in section 1 and 3 were tested for content validity by two experts in oral and maxillofacial surgery and epidemiology; subsequently its clarity was tested using a focus group of ten dentists.

3.5 Research protocol

```
┌─────────────────────────────┐
│  Construction and validation │
│     of the questionnaire     │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│      Data gathering by       │
│     online questionnaire     │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   Exclude contaminated data  │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│        Data analysis         │
└─────────────────────────────┘
         ╱           ╲
        ╱             ╲
┌──────────────┐   ┌──────────────┐
│  Descriptive │   │  Analytical  │
└──────────────┘   └──────────────┘
```
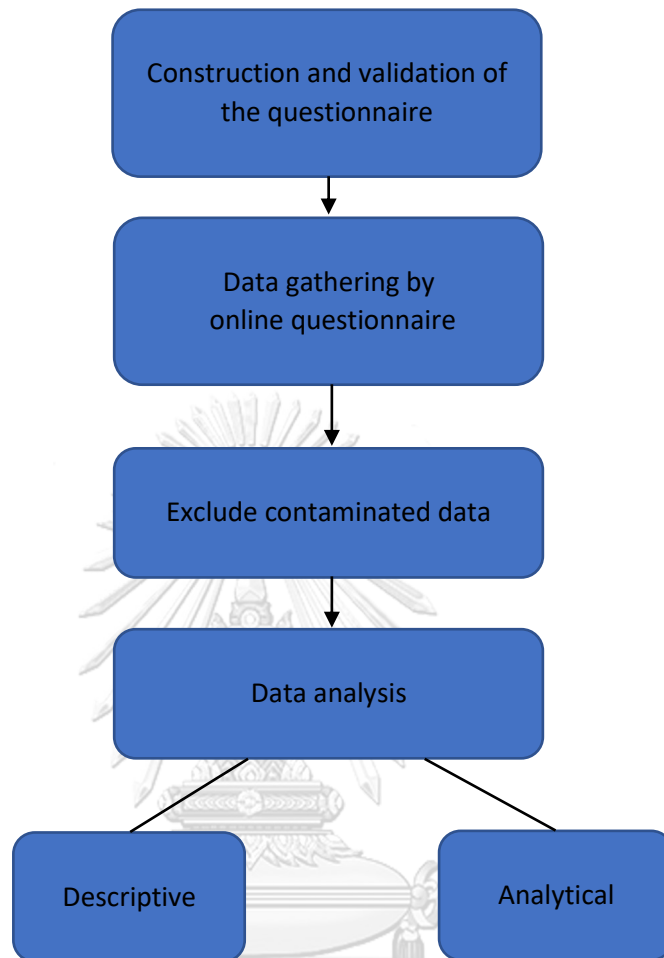
3.6 Statistical analysis

All descriptive data will be analyzed using descriptive statistic (frequency, percentage, mean and standard deviation) and Chi-square test will be used to analyze the association between demographic data and stress level. Data analysis will be performed by IBM SPSS (SPSS, Inc., USA) version 22. All data is considered significant when p-value is less than 0.05.

3.7 Ethical approval

This study was approved by the ethic committee in human research of the Faculty of Dentistry, Chulalongkorn University (project number HREC-DCU 2020-027, approval number 029/2020).

3.8 Time Scope

Activities	Month							
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Literature review and proposal preparation	▓	▓						
Proposal defend	▓							
Ethical committee approval		▓						
Data collection			▓					
Data analysis				▓	▓			
Conclusion and discussion						▓	▓	
Preparation of final report							▓	▓

3.9 Budget

1. Winning prize for 20 lucky draw winners   10,000 Baht

2.Mailing cost of the prizes   400   Baht

3.Document   3,000   Baht

                                      Total   13,400 Baht

Chapter IV

Results

Data was collected from April 24 to May 5, 2020, which was in the middle of the lockdown period of the first outbreak in Thailand. There were 622 respondents answered the questionnaire. Of these responses, 5 did not pass inclusion criteria as they failed to deliver correct answers to screening questions and could not be identified as dentists. Of 617 responses left, 5 were duplicated answers, which might occur due to error of the internet or limitation of the Google Form system, and 32 were not completely filled; thus, 37 responses were excluded from the result. There were 580 responses left for data analysis.

4.1 Demographic data

Details of demographic data are presented in table 1. Of all respondents, 442 (76.2%) were female with the median (inter quartile range [IQR]) of age being 37 (30-46) years, mean (SD)=38.39 (10.22), and mode=30 (n=36). The oldest and youngest respondents were 71 and 23 years old, respectively. Most respondents were Buddhist (n=552, 95.2%); had no medical condition (n=483, 83.3%); were single (n=358, 61.7%); and had no children (n=427, 73.6%).

Table 1 Demographic data

Demographics	N (total=580)	%
Gender		
Male	138	23.8
Female	442	76.2
Age		
≤30	180	24.8
31-40	182	33.1

41-50	144	25.5
51-60	64	14.3
>60	10	2.2
Religions		
Buddhists	552	95.2
Christians	16	2.8
Muslim	2	0.3
Sikhism	1	0.2
No religion	9	1.6
Medical condition		
Healthy	483	83.3
Have medical condition	97	16.7
Marital status		
Single	358	61.7
Married	205	35.3
Divorced	13	2.2
Widowed	1	0.2
Separated	3	0.5
Number of children that need financial support		
0	427	73.6

1	64	11.0
2	76	13.1
$\geq$3	13	2.2

4.2 Working and socio-economic status

Most of the respondents were holders of a higher than bachelor's degree (n=326, 56.2%); were working as specialists (n=333, 57.4%); and performed only emergency or urgent care patients during COVID-19 epidemic (during the lockdown, from March 27, 2020, until the day of response) (n=321, 55.3%). While most dentists were primarily working in Bangkok (n=313, 54%), many originated from other provinces (n=320, 55.2%). There were up to 56.72% whose primary working province was the same as their hometown. Most frequently reported primary and secondary working place were government's hospital (n=235, 40.5%) and freelance in private dental clinic (n=232, 40%) respectively. It is noted that nearly half of the dentists working primarily in a state hospital were also working as a freelance in private dental clinic (104 out of 235, 44.3%). With regards to the source of income, about 38.6% (n= 224) of the dentists depended primarily on income from patient fees, while a similar number (n=219, 37.8%) received a fixed salary from the government.

Before the epidemic, most dentists (n=480, 82.8%) earned over 50,000 baht per month. However, about 70.3% reportedly earned less than 50,000 per month after the epidemic begun. Interestingly, nearly two thirds (n=366, 63.1%) had already spent less than 50,000 per month prior to arrival of the disease and this number increased to 72.1% (n=418) after COVID-19 spread out.   Most dentist reported decreased income (n=473, 81.55%) but same expenses as before (n=405, 69.83%) during COVID-19. Before the epidemic, as high as 84.83% (n=492) had positive cash flow. This number

dramatically decreased to 35.17% (n=204) during the epidemic. However, 34.48% (n=200) reported they could at least still balance income and expenses.

It is noted that the different between primary working location and hometown, income change, expense change, and cashflow were not asked directly in the questionnaire. The data of these variables were generated from the primary data acquired from the questionnaire. The different between primary working location and hometown were generated by comparing primary working location and hometown of each respondent. Income change and expense change were calculated using income/expense after the pandemic minus before the pandemic of each individual. Cashflow before and during the pandemic were calculated using income minus expense before and during the pandemic, respectively.

Table 2 Working and socio-economic status

Characteristic	N (total=580)	%
Education level		
Bachelor's degree	254	43.8
Higher than bachelor's degree	326	56.2
Main working field		
General practice	247	42.6
Operative dentist	20	3.5
Endodontist	46	7.9
Periodontist	26	4.5
Prosthodontist	61	10.5
Orthodontist	44	7.6
Oral surgery	74	12.8
Pediatric dentist	37	6.4
Others (e.g. oral radiologist, oral pathologist, geriatric dentist)	25	4.3
Working status during COVID-19 pandemic		

Working as usual	12	2.1
Accept only emergency and urgent case	321	55.3
Not working	247	42.6
Primary workplace		
Private dental clinic owner	64	11.0
Private hospital	53	9.1
Government's hospital	235	40.5
Dental school	115	19.8
Freelance	113	19.5
Secondary workplace		
Private dental clinic owner	44	7.6
Private hospital	52	9.0
Government's hospital	20	3.5
Dental school	36	6.2
Freelance	232	40.0
No secondary working place	196	33.8
Primary working location		
Bangkok	267	46.0
Outside Bangkok	313	54.0
Hometown		
Bangkok	320	55.2
Outside Bangkok	260	44.8
Are primary working location and hometown the same place?		
Yes	329	56.7
No	251	43.3
Main source of income		
Salary from government	219	37.8

Salary from private hospital/clinic	119	20.5
Dental fee from case treatment	224	38.6
Other	18	3.1
Income per month before COVID-19 pandemic		
Less than 30,000 THB	24	4.1
30,000-50,000 THB	76	13.1
50,000-80,000 THB	133	22.9
80,000-120,000 THB	147	25.3
120,000-200,000 THB	119	20.5
More than 200,000 THB	81	14.0
Income per month during COVID-19 pandemic		
Less than 30,000 THB	267	46.0
30,000-50,000 THB	141	24.3
50,000-80,000 THB	114	19.7
80,000-120,000 THB	42	7.2
120,000-200,000 THB	13	2.2
More than 200,000 THB	3	0.5
Expenses per month before COVID-19 pandemic		
Less than 30,000 THB	192	33.1
30,000-50,000 THB	174	30.0
50,000-80,000 THB	119	20.5
80,000-120,000 THB	49	8.4
120,000-200,000 THB	33	5.7
More than 200,000 THB	13	2.2
Expenses per month during COVID-19 pandemic		
Less than 30,000 THB	253	43.6
30,000-50,000 THB	165	28.4

50,000-80,000 THB	91	15.7
80,000-120,000 THB	43	7.4
120,000-200,000 THB	20	3.4
More than 200,000 THB	8	1.4
Income change		
No change	107	18.5
Decreased	473	81.6
Increased	0	0.0
Expense change		
No change	405	69.8
Decreased	156	26.9
Increased	19	3.3
Cash flow before COVID-19 pandemic		
Neutral cash flow	78	13.5
Positive cash flow	492	84.8
Negative cash flow	10	1.2
Cash flow during COVID-19 pandemic		
Neutral cash flow	200	34.5
Positive cash flow	204	35.2
Negative cash flow	176	30.3

4.3 Stress evaluation test

Overall, the stress evaluation instrument showed the stress of Thai dentists to be quite low. The median (IQR) of the total score were 10.0 (4.3-16.0) with lowest score of 0 and highest score of 45 out of 60 maximum points. The mode of the total score was 0 (6.4%, n=37) while the mean (standard deviation [SD]) was 11.29 (9.04). As high as 30.2% (n=175) of the dentists were in hypo-stress level, about half (n=286, 49.3%) were

in normal stress level, 13.3% (n=77) were having mild stress, 2.9% (n=17) moderate stress, and only 4.3% (n=25) severe stress. When using the threshold of 17, the total number of stressed dentists (mild to severe stress above normal level) was 119 (20.5%).

4.4 COVID-19 related questions

Of the 14 questions, the three highest concerns of the respondents were getting infected from treating a patient (median [IQR]=7.0 [5.0-9.0]), spreading COVID-19 to their family members (median [IQR]=8.0 [5.0-9.0]), and worrying that family member will get infected from COVID-19, while the lowest concerns were about deteriorating health due to lack of exercise and receiving fake news (median [IQR] score was 5.0 [2.0-7.0] for both aspects). Overall, Thai dentists reported moderate self-perceived stress level about COVID-19, as its median (IQR) was recorded to be 6.0 (4.25-8.0) on a scale of 10 (**Error! Reference source not found.**).

Table 3 Scores of the 14-scale rated questions

No.	Question	Median (IQR)	Mode (n, %)	Min	Max	Mean (SD)
1	You are worried that you will get infected from COVID-19 from daily activities such as buying food/goods or traveling to work	5.0 (3.0-7.0)	7 (85, 14.7)	0	10	5.15 (2.65)
2	You are worried that you will get infected with COVID-19 from performing dental treatment	7.0 (5.0-9.0)	8 (108, 18.6)	0	10	6.80 (2.58)
3	You are worried that you will spread COVID-19 to your family members	8.0 (5.0-9.0)	10 (131, 22.6)	0	10	6.94 (2.86)
4	You are worried that you will spread COVID-19 to other people	6.0 (4.0-8.0)	7 (77, 13.3)	0	10	5.90 (3.00)
5	You are worried that your family member will get infected with	7.0 (4.0-9.0)	10 (102, 17.6)	0	10	6.31 (2.97)

	COVID-19					
6	You feel stressed about the decreasing of your income during COVID-19 epidemic	5.5 (3.0-8.0)	5 (82, 14.1)	0	10	5.43 (3.11)
7	You feel stressed about falling stock price/bad economy	5.0 (3.0-8.0)	5 (83, 14.3)	0	10	5.08 (3.02)
8	You are worried that your health will get worse because of lacking exercise	5.0 (2.0-7.0)	0 (99, 17.1)	0	10	4.42 (3.11)
9	You feel stressed from overwhelming of COVID-19 news	6.0 (3.0-8.0)	8 (91, 15.7)	0	10	5.46 (2.86)
10	You feel worried that you might receive fake news	5.0 (2.0-7.0)	5 (86, 14.8)	0	10	4.78 (2.87)
11	You feel stressed because you are not able to travel like in normal situation	6.0 (3.0-8.0)	8 (89, 15.3)	0	10	5.51 (2.84)
12	You feel frustrated that recreation places such as supermarket, fitness, cinema, pub, bar not open like in normal situation	6.0 (3.0-8.0)	8 (78, 13.4)	0	10	5.42 (3.02)
13	You are worried about the government's COVID-19 defensive measures	6.0 (3.0-8.0)	10 (92, 15.9)	0	10	5.92 (3.07)
14	Overall, how stressed you are about COVID-19 situation	6.0 (4.3-8.0)	7 (113, 19.5)	0	10	5.93 (2.44)

4.5 The thing that made Thai dentists unhappy the most

For the question "what is the thing that make you unhappy the most?", the most frequent answer were income, finance, and economy (issued 114 times). Many dentists had reduced income, and some receive no income at all. Some dentists mentioned about insufficient income compared to expense or loan, and some even informed that their expense were increased. One dentist also thought that his colleagues were worried too much about their income. Some dentists worried about income of dental assistant or people with low socio-economic profile. One told that he doesn't know how to pay his employee.

The next issue that were also frequently mentioned were working and further studying (mentioned 68 times). Most answers were that they are stress because they can't go to work. Some dentists were stress due to working system e.g. "don't know how to change working system to match with the situation", "worried because working system has been changed too much". Some dentists explained that being idle caused them to feel useless. Some dentists told that they were stress because they can't do what they should normally do. One dentist clearly stated that stop working for long time make him bored. There were also issues like: conflicting opinion in workplace about how to cope with COVID-19 situation, lack of support from chief, lack of protective equipment, lack of clear working protocol. Some dentists had to give their treatment unwillingly. Furthermore, many dentists had problems due to closing of education institutes such as interrupting in research and learning process etc.

The third issue was about infection and spread of the disease. Sixty dentists quoted about this point. Most were afraid of getting infected whether from their patients or their colleagues. Some dentists worried about spreading infection to others, especially their family member. Some dentists worried about spreading infection to their patients or cross-infection between them. Some dentists got stressed because they felt that their colleague worried too much about infection.

Travel restriction and shutting down of places were also mentioned a lot, 41 times to be exact. This issue was also associated with other issues such as: can't go study, can't visit family that was living in a different province, can't go out for exercise, can't go to restaurant etc.

Family was also another frequently mentioned issue. This topic included lack of meeting between family member and worry about family member. One dentist mentioned about conflict between family member's opinion. One dentist said that staying home too much caused quarrel between family members to be more frequent.

Other issues that were quoted were lack of vacation, lack of pleasure from eating, worry about problem solving of the government or the government itself, worry about information accuracy of news, fake news, or information concealment, lack of exercise, can't predict the end of the situation, worry about future, uncertainty, life-style changing. Many dentists mentioned about inability to live a normal life, feeling pity of others who were in trouble.

4.6 Opinion about COVID-19

One-hundred and ninety-nine dentists reported "no opinion" about COVID-19. Of all 381 remaining, most reported neutral opinion or feeling, such as understanding the nature of the situation or suggesting a rationale management, rather than totally positive or negative aspect. Many dentists had positive attitude, shown encouragement, and anticipated the situation to get better soon, while considerably the same number had totally negative attitude toward the situation, feeling frustrated, expressed negative feelings such as anger, fear, anxiety, or anticipated the situation to get worse. Thirty-three dentists reported that they wish the situation to go back to normal as soon as possible, while 35 thought the pandemic will continue for a long time. Twenty-one practitioner hope there will be a vaccine or treatment very soon. Thirty-two criticized the

failure of or doubted the government's or related organization's management toward the pandemic.

4.7 How Thai dentists relief their stress during COVID-19 situation

The dentists reported different ways for stress relief during COVID-19 pandemic, the three most popular being watching movies/series, using social media, and exercise. Table 4 shows list and popularity of activities that Thai dentists do to relief their stress.

Table 4 Activities to relief stress

No.	Activities	n	%
1.	Watching movies/series	370	63.8
2.	Using social medias	303	52.2
3.	Exercise	269	46.4
4.	Making bakeries	241	41.6
5.	Talking with friends/family members	241	41.6
6.	Listening to music/playing music instruments/singing	206	35.5
7.	Sleeping	199	34.3
8.	Finishing remaining works	180	31.0
9.	Playing games	151	26.0
10.	Reading novels/cartoons	130	22.4
11.	Playing with pets	101	17.4
12.	Praying/meditation	83	14.3
13.	Others	62	10.7

Other activities include:

- Spending time with family, playing or foster with their children or niece/nephew

- Learning online course, other language, gaining more knowledge to prepare working

- Gardening, growing vegetables, planting trees, making home, making clinic, doing housework, clearing old stuffs for sale

- Eating

- Doing hobbies such as drawing, painting, making mask, making fancy soap, connecting jigsaws etc.

- Reading the Bible, listening to sermons, reading good books

- Going out for breathing fresh air

The three most popular sources of information were Facebook (397 answers), Internet (348 answers), and radio or television (338 answers).

4.8 Stress levels and associated factors

4.8.1 Multiple logistic regression

Multiple logistic regression with Wald methods and checking collinearity identified 6 variables as significant predictors of stress (Table 5). Older age appeared to associate with lower risk of being stressed (OR=0.96, P=0.001). Christian religion was associated with higher stress levels as compared to Buddhism (OR=4.28, P=0.009). Compared to periodontists, many specialists including endodontists (OR=0.13, P=0.003), prosthodontists (OR=0.18, P=0.004), orthodontists (OR=0.17, P=0.007), oral surgeons (OR=0.25, P=0.013), and specialists in less common fields e.g. oral radiologist, oral pathologist, geriatric dental practitioner (OR=0.13, P=0.02) reported significantly lower stress levels. At the same time, operative dental practitioners (OR=0.26, P=0.09) and pediatric dentist (OR=0.3, P=0.06) were associated with lower stress levels which was close to the level of significance when compared to periodontist. Accepting emergency/urgent cases was associated with higher stress levels compared to "not working" during the lockdown (OR=1.66, P=0.049). Increased expenses compared to no change of expenses during COVID-19 pandemic was also associated with higher risk of being stressed (OR=2.68, P=0.049). Ability to retain positive cash flow during COVID-19 pandemic was associated with lower risk of being stressed (OR=0.51, P=0.023), while negative cash flow during COVID-19 pandemic was associated with higher risk of being stressed (OR=1.85, P=0.024) compared to neutral cash flow.

Table 5 Multiple logistic regression model

Variables	B	S.E.	Sig.	Exp(B)	95% C.I.for EXP(B)	
					Lower	Upper
Age	-0.04	0.01	0.001*	0.96	0.93	0.98
Religion (Ref. Buddhism)						
- Christian	1.46	0.56	0.009*	4.28	1.43	12.83
- Other	-0.33	0.72	0.652	0.72	0.18	2.98
Field of specialty (Ref. Periodontist)						
- Operative dentistry	-1.34	0.79	0.090	0.26	0.06	1.23
- Endodontist	-2.06	0.70	0.003*	0.13	0.03	0.50
- General practitioner	-0.77	0.48	0.111	0.46	0.18	1.19
- Prosthodontist	-1.72	0.61	0.004*	0.18	0.06	0.59
- Orthodontist	-1.78	0.66	0.007*	0.17	0.05	0.62
- Oral surgery	-1.39	0.56	0.013*	0.25	0.08	0.74
- Pediatric dentist	-1.21	0.64	0.060	0.30	0.09	1.05
- Others (e.g. oral radiologist, oral pathologist, geriatric dentist)	-2.03	0.87	0.020	0.13	0.02	0.73
Working status (Ref. Not working)						
- Accept only emergency/urgent case	0.51	0.26	0.049*	1.66	1.00	2.74
- Working as usual	0.88	0.87	0.310	2.41	0.44	13.15
Expense change (Ref. No change)						
- Decrease	-0.03	0.27	0.915	0.97	0.58	1.63
- Increase	1.05	0.53	0.049*	2.86	1.00	8.15
Cash flow during COVID-19 pandemic (Ref. 0)						
- Positive	-0.68	0.30	0.023*	0.51	0.28	0.91
- Negative	0.61	0.27	0.024*	1.85	1.08	3.15

Constant	1.01	0.72	0.161	2.74

* Significant variables at *P*<0.05

4.8.2 Correlation between age and stress

The stress score had a significant negative correlation with age, while it showed a significant positive correlation with all of the 14 scale rated questions in the third part (spearman's rho ranged from 0.207 to 0.508, *P*<0.001). At the same time age, had negative correlation with the 14 questions (spearman's rho ranged from -0.498 to -0.124, *P*<0.004) (Table 6).

Table 6 Correlation between age/financial status and stress score/14 scale rated questions

		Age	Stress Score
Age	Spearman's rho	1.000	-0.204
	P		<0.001*
Q1	Spearman's rho	-0.217	0.256
	P	<0.001*	<0.001*
Q2	Spearman's rho	-0.182	0.207
	P	<0.001*	<0.001*
Q3	Spearman's rho	-0.271	0.231
	P	<0.001*	<0.001*
Q4	Spearman's rho	-0.299	0.225
	P	<0.001*	<0.001*
Q5	Spearman's rho	-0.228	0.241
	P	<0.001*	<0.001*
Q6	Spearman's rho	-0.172	0.391
	P	<0.001*	<0.001*
Q7	Spearman's rho	-0.139	0.372
	P	0.001*	<0.001*
Q8	Spearman's rho	-0.140	0.260
	P	0.001*	<0.001*
Q9	Spearman's rho	-0.124	0.373
	P	0.003*	<0.001*
Q10	Spearman's rho	-0.186	0.307
	P	<0.001*	<0.001*
Q11	Spearman's rho	-0.268	0.409
	P	<0.001*	<0.001*

Q12	Spearman's rho	-0.315	0.331
	P	<0.001*	<0.001*
Q13	Spearman's rho	-0.498	0.318
	P	<0.001*	<0.001*
Q14	Spearman's rho	-0.318	0.508
	P	<0.001*	<0.001*

* Significant variables at P<0.05

Chapter V

Discussions

Stress prevalence and level

Our study revealed that stress prevalence among dentists in Thailand during the pandemic was 20.52%, which was relatively low compared to most studies. Marzo et al.[55] studied prevalence of distress in general population during the pandemic across different 13 countries. They found that the prevalence in general population in Thailand was 28.1%, which was in the 11th place among other countries. The 10th place through the first place were having 35.9% to 94.5% of distress. Wang et al.[56] found stress prevalence among Chinese population during the early phase of the pandemic to be 32.1%, using Depressive, Anxiety, Stress Scale (DASS-21). Lai et al.[57] found even higher prevalence of anxiety among Chinese HCWs, which was 44.6%. This number even increased to 57.3% when Consolo et al.[58] studied the same parameter in Italian dentists. However, Shacham et al.[59] found only 11.5% of dentists in Israel having increased psychological distress during the pandemic, using Kessler's K6 as a measurement tool.

As we aimed to address the prevalence and levels of stress among dentists in Thailand, this study revealed that it was overall not high, at least as assessed by the validated instrument utilized. There might be many reasons for this result. One possible reason could be the financial status. Although being the first place to be blamed as the thing that cause unhappiness the most during the pandemic, the fact that most dentists (69.66%) could preserve a positive, or at least, balanced cash flow during the early stages of the pandemic might have contributed to the low levels of stress found in this study. In addition, the result of the regression analysis that these two cashflow statuses were associated with lower stress could also support this finding. It is possible that although financial issue was one of the most impact on stress, most Thai dentists could still manage this problem very well, thus, result in low stress prevalence revealed.

Another factor that could contribute to the low stress levels reported could be the fact that about 40% of the dentists in this study opted to halt their practice during the period under discussion. As our analysis showed that dentists who were not working possessed a lower risk of being stressed when compared to dentists who continued working accepting emergencies/urgencies, this could be the reason why stress level was not high.

One weak point of using self-administered questionnaire is that the respondent might not answer the truth, this possibility could add up to the reason why stress level in our study was low. As mentioned in the development of the SASEF-20 book[60], it is suspected that any respondents who get hypo-stress level might have not answered the questionnaire truthfully. Also, they might just misunderstand the questions and get too less stress score as what they should get. The prevalence of hypo-stress dentist in our study was 30.17%, which was suspected to be too high in this situation. And they were as much as 35 dentists or 6.4% who got zero score. These dentists might just "drop down" the choice.

Finally, a possible influence might be the sampling of the study, as the survey was distributed through a social media group. One could hypothesize that dentists under high levels of pressure and stress might be less likely to attend social media, but then again, some studies in college students have suggested increased use of social media in conditions of stress [61]. Research with regards to the use of social media during times of psychological distress or individuals under pressure is at a very early stage at present and inconclusive [62].

The sensitivity of the instrument utilized to objectively investigate the stress levels of the dentists is also to be considered. The SASEF-20 is a validated instrument which has been used in many studies in Thai populations in the past, but there is no previously reported use on a population of dentists, in particular under conditions of a

major external disturbance. Furthermore, without any previous record of such data, the extrapolation of the stress levels recorded might be difficult.

Factors associated with stress

Age

As we searched for risk and protective factors of stress of dentist in Thailand during the pandemic, age appeared to a strong protective factor in this study. It had negative correlation with stress score and score from all of the 14 scale rated questions. One possible reason for this might be career stage and work conditions, with older professionals being more established and settled after years of practice, than those at their first career and professional steps. It could also be that older dentists might generally have lower stress level baseline than younger dentists due to longer experienced with both working and life management. However, the relation between age and stress was found to be conflicting in the literature, as many confounders could play their roles through age. The complexity of how the aging process is affecting the way one perceives stress has not been clearly understood [63]. Our study seems to be the only one to establish relation between these two parameters. Although a study result in Israel [59] was found a similar association, no other studies have shown consistent result or have omitted to investigate this factor [50, 56-58, 64-66].

Religion

Interestingly, religion was also associated with stress. Being a Christian appeared to have a strong association with higher risk of being stressed. The reasons for such a relation are not clear, one could however hypothesize that the need to attend a weekly Mass in a usually crowded church could lead to concerns of contracting the disease. The publicity around infection clusters related to church attendance might have also contributed to this finding. In February 2020 a case of a super spreader - attendee of the Shincheonji Church in Daegu in South Korea [67] was highly publicized as the first major outbreak out of China.

Field of specialty

There was a clear correlation of the field of specialty with stress levels. This is consistent with a previous study in United Kingdom [50]. In particular, within the environment of practice under the pandemic, whether the daily work was associated with generating aerosol or not might have contributed to this difference. Consequently, the endodontists, prosthodontists, orthodontists, oral surgeons, oral radiologists, oral pathologists and geriatric dental practitioners showed lower risk of being stressed when compared to specialists within fields with higher need of aerosol generating procedures such as the periodontists, GPs and operative dental practitioners.

Working status

It is reasonable to anticipate an increased risk of getting infected for dentists working during the pandemic. Dentists who were accepting emergencies/urgencies during the pandemic showed higher risk of being stressed than dentists who were not working. Surprisingly however, dentists who stated they "were working as usual" did not show significantly higher stress from those who were not working. It is possible that this group of dentists did not fear of getting infected in or understated the risk of workplace infection at first place, thus they chose to continue their practice as usually.

Financial status

Financial status was another predictor of stress. In a previous developing logistic regression model where we had not added income/expense change and cash flow, income and expense during the pandemic were significant predictors of stress (*Table 7*). Higher income and lower expense were associated with lower chance of being stressed. These two predictors dropped out after we added expense change and cash flow during COVID-19 to the model, and the final model gained more Cox & Snell R square (0.079 to 0.095) and sensitivity (5.0% to 6.7%) with the same number of predictor (5 predictors) (Table 8). However, income/expense change and cash flow before/during COVID-19 were not collected directly from the respondents but were calculated from

income/expense before/during the pandemic. This indicated that although income and expense during COVID-19 pandemic were predictors of stress, but using their derivatives variables were more effective in predicting stress. Although previous studies have investigated dentist's mental health during the COVID-19 pandemic, the financial dimensions of stress have never been addressed [58, 59, 68].

58

Table 7 Previously developing multiple logistic regression model

Variables	B	S.E.	Sig.	Exp(B)	95% C.I.for EXP(B)	
					Lower	Upper
Age	-0.04	0.01	0.001*	1.00	0.94	0.99
Religion						
-Christian	1.32	0.56	0.018*	3.75	1.26	11.14
-Other	-0.18	0.70	0.800	0.84	0.21	3.30
Field of specialty[a]						
-Operative dentistry	-0.60	0.66	0.364	0.55	0.15	2.00
-Endodontist	-1.20	0.55	0.029*	0.30	0.10	0.89
-Periodontist	0.83	0.47	0.079	2.30	0.91	5.81
-Prosthodontist	-0.84	0.43	0.048*	0.43	0.19	0.99
-Orthodontist	-0.98	0.49	0.045*	0.37	0.14	0.98
-Oral surgery	-0.49	0.36	0.170	0.61	0.31	1.23
-Pediatric dentist	-0.44	0.49	0.377	0.65	0.25	1.70
-Others (e.g. oral radiologist, oral pathologist, geriatric dentist)	-1.08	0.77	0.157	0.34	0.08	1.52
Income during COVID-19 pandemic	-0.25	0.12	0.030*	0.78	0.62	0.98
Expense during COVID-19 pandemic	0.25	0.10	0.011*	1.28	1.06	1.56
Constant	0.40	0.44	0.366	1.49		

* Significant variables at $P<0.05$

a. General practitioner was used as a reference for field of specialty variable

Table 8 Likelihood and R Square of developing model

Model	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
A[a]	540.782	0.079	0.124
B[b]	535.992	0.087	0.136
C[c]	530.767	0.095	0.149

a. Previously developing multiple logistic regression model

b. After included income and expense change

c. After included cashflow

Impact of stress from COVID-19 consequences

We also wanted to address the impact of different consequences of the COVID-19 pandemic on stress and the psychological health of dentists. Because the cross-sectional design of our study limited us from establishing causal effect of COVID-19 pandemic on stress, the only way to do this was to ask the participants directly about how much of the COVID-19 pandemic do they think impacted to their stress. So, we added the 14 scale-rated questions about the impact of various negative consequences of COVID-19, and the result strongly supported that the causal effect between COVID-19 and stress of dentists do exist.

Limitations

The results of this study should be seen under certain limitations of the methodology. This study used convenient sampling. As the means of distribution were social media groups of professionals, the sample population was not random. The number of returned questionnaires was high, while Thai population has among the highest daily use of social media globally. Nevertheless, using social media to distribute the questionnaire might have skewed the sample which might be not fully representative of the whole population of Thai dentists.

Furthermore, this study used self-reported questionnaire which means there is a possibility that some respondents were not answering the truth, or there might misunderstood some questions. So, it is very important that we are aware of the inaccuracy that come along with the instrument we used.

Lastly, this is a cross-sectional study that gather specific data from a point of time, and there was no baseline data about stress of Thai dentist. So, it is not possible to establish causal effect of some factors like field of specialty to stress. Also, because this was an anonymous survey, it was also not possible to conduct a prospective study based on the data collected.

Chapter VI

Conclusions

Despite the fact that stress among Thai dentists during the first COVID-19 pandemic lockdown in Thailand was not as high as found in many studies, it is not an excuse to abandon the important of promoting the dentist's mental health. Younger dentists who were working in certain field, such as periodontists or general practitioners, and accepting emergency or urgent cases were at high risk that the government and related organizations should pay attention to. In addition, the dentists themselves should be well-prepared about their finance. Although financial management is not taught as a part of DDS. program in Thailand. Yet there is no doubt that keeping a good health of one's currency mean good health of one's mind too. Lastly, it was not clear why some factors found in our study like age or religion were playing roles over stress level, so do they were revealed in our study for the first time among others. These factors were of high interesting and should be taken in the future study to clarify.

Appendix

Appendix data 1. Original questionnaire used in the research

กรุณาตอบคำถามข้างต้นเพื่อตรวจสอบว่าท่านเป็นทันตแพทย์จริง

กรุณาตอบคำถามต่อไปนี้ให้ถูกต้องเพื่อยืนยันว่าท่านเป็นทันตแพทย์จริง เนื่องจากแบบสอบถามนี้เป็น
การแจกแบบสอบถามออนไลน์ ผู้วิจัยจึงต้องทำการคัดกรองผู้ที่เข้ามาทำแบบสอบถามเพื่อให้แน่ใจว่า
ข้อมูลที่ได้นั้นมาจากผู้ที่เป็นทันตแพทย์เท่านั้น

หมายเหตุ: คำตอบในคำถามนี้จะไม่ถูกนำไปรวมกับผลงานวิจัย

สมาคมทันตแพทย์แห่งอเมริกามีชื่อย่อว่า

    A. DFA

    B. ADA

    C. AAPD

    D. FDA

    E. APDA

ข้อใดไม่ใช่ชื่อยาชา

    A. Lidocaine

    B. Articaine

    C. Scandonest

    D. Mepivacaine

    E. Silane

<u>ส่วนที่ 1</u> : ปัจจัยส่วนบุคคล

โปรดแสดงเครื่องหมาย ✓ และตอบคำถามที่ตรงกับท่านมากที่สุด

1. เพศ

    ☐ ชาย

    ☐ หญิง

2. อายุ .... ปี

3. ศาสนา

    ☐ พุทธ

    ☐ คริสต์

☐ อิสลาม

☐ อื่นๆ ....

4. โรคประจำตัว

☐ ไม่มี

☐ มี ....

5. สถานะ

☐ โสด

☐ สมรส

☐ หย่าร้าง

☐ หม้าย

☐ แยกกันอยู่

6. จำนวนบุตรที่ท่านยังต้องดูแลภาระค่าใช้จ่าย .... คน

7. ระดับการศึกษา

☐ ปริญญาตรี

☐ สูงกว่าปริญญาตรี

8. สาขาเฉพาะทางที่ท่านทำงานอยู่

☐ สาขาทันตกรรมทั่วไป

☐ สาขาทันตกรรมหัตถการ

☐ สาขาวิทยาเอ็นโดดอนต์

☐ สาขาปริทันตวิทยา

☐ สาขาทันตกรรมบดเคี้ยว

☐ สาขาทันตกรรมประดิษฐ์

☐ สาขาทันตกรรมจัดฟัน

☐ สาขาศัลยศาสตร์ช่องปาก

☐ สาขาเวชศาสตร์ช่องปาก

☐ สาขาทันตพยาธิวิทยา

☐ สาขาทันตรังสีวิทยา

☐ สาขาทันตกรรมสำหรับเด็ก

9. สถานภาพการปฏิบัติงานช่วง COVID-19 ระบาด (ตั้งแต่ 27 มีนาคม 2563 เป็นต้นไป)

☐ ปฏิบัติงาน

☐ รับเฉพาะผู้ป่วยฉุกเฉิน/เร่งด่วน

☐ ไม่ปฏิบัติงาน

10. สถานที่ทำงานหลัก (อิงจากจำนวนชั่วโมงการทำงานมากกว่า 60% ของชั่วโมงการทำงานทั้งหมด)

☐ โรงพยาบาลรัฐบาล

☐ โรงพยาบาลเอกชน

☐ คณะทันตแพทยศาสตร์

☐ เจ้าของคลินิกเอกชน

☐ มือปืนคลินิกเอกชน

11. สถานที่ทำงานรอง (ถ้ามีหลายที่ให้เลือกที่ที่มีชั่วโมงการทำงานมากที่สุดรองจากสถานที่ทำงานหลัก)

☐ โรงพยาบาลรัฐบาล

☐ โรงพยาบาลเอกชน

☐ คณะทันตแพทยศาสตร์

☐ เจ้าของคลินิกเอกชน

☐ มือปืนคลินิกเอกชน

☐ ไม่มีสถานที่ทำงานรอง

12. จังหวัดที่ทำงานหลัก ....

13. ภูมิลำเนาอยู่จังหวัด ....

14. ที่มาของรายได้ส่วนใหญ่ (ตอบได้เพียง 1 ข้อ)

☐ เงินเดือนประจำจากรัฐบาล

☐ เงินเดือนประจำจากโรงพยาบาล/คลินิกเอกชน

☐ เงินที่ได้จากการรักษาผู้ป่วยตามรายเคส

☐ อื่นๆ โปรดระบุ..

15. รายได้ทั้งหมดของท่านต่อเดือนก่อนมีการระบาดของโรคโควิด 19 ประมาณ (ช่วงก่อนมีการระบาดของโรคโควิด 19 คือก่อน เม.ย. 2563)

☐ น้อยกว่า 30,000 บาท

- ☐ 30,000-50,000 บาท
- ☐ 50,000-80,000 บาท
- ☐ 80,000-120,000 บาท
- ☐ 120,000-200,000 บาท
- ☐ มากกว่า 200,000 บาท

16. ในช่วงโรคโควิด 19 ระบาด ท่านได้เงินต่อเดือนประมาณ (ช่วงโรคโควิด 19 ระบาดคือช่วง เม.ย.-พ.ค. 2563)

- ☐ น้อยกว่า 30,000 บาท
- ☐ 30,000-50,000 บาท
- ☐ 50,000-80,000 บาท
- ☐ 80,000-120,000 บาท
- ☐ 120,000-200,000 บาท
- ☐ มากกว่า 200,000 บาท

17. ภาระค่าใช้จ่ายต่อเดือนของท่านก่อนเกิดการระบาดของโรคโควิด 19 ประมาณ (ช่วงก่อนมีการระบาดของโรคโควิด 19 คือก่อน เม.ย. 2563)

- ☐ น้อยกว่า 30,000 บาท
- ☐ 30,000-50,000 บาท
- ☐ 50,000-80,000 บาท
- ☐ 80,000-120,000 บาท
- ☐ 120,000-200,000 บาท
- ☐ มากกว่า 200,000 บาท

18. ในช่วงโรคโควิด 19 ระบาด ภาระค่าใช้จ่ายต่อเดือนของท่านประมาณ (ช่วงโรคโควิด 19 ระบาดคือช่วง เม.ย.-พ.ค. 2563)

- ☐ น้อยกว่า 30,000 บาท
- ☐ 30,000-50,000 บาท
- ☐ 50,000-80,000 บาท
- ☐ 80,000-120,000 บาท
- ☐ 120,000-200,000 บาท

☐ มากกว่า 200,000 บาท

<u>ส่วนที่ 2</u> : แบบประเมินและวิเคราะห์ความเครียดด้วยตนเองของกรมสุขภาพจิตจำนวน 20 ข้อ

ในระยะ 2 เดือนที่ผ่านมานี้ ท่านมีอาการ พฤติกรรม หรือความรู้สึกต่อไปนี้มากน้อยเพียงใด โปรดขีด

เครื่องหมาย √ ลงในช่องแสดงระดับอาการที่เกิดขึ้นกับตัวท่านตามความเป็นจริงมากที่สุด

อาการ พฤติกรรม หรือความรู้สึก	ระดับอาการ			
	ไม่เคยเลย	เป็นครั้งคราว	เป็นบ่อย ๆ	เป็นประจำ
1. นอนไม่หลับเพราะคิดมากหรือกังวลใจ				
2. รู้สึกหงุดหงิด รำคาญใจ				
3. ทำอะไรไม่ได้เลยเพราะประสาทตึงเครียด				
4. มีความวุ่นวายใจ				
5. ไม่อยากพบปะผู้คน				
6. ปวดหัวข้างเดียวหรือปวดบริเวณขมับทั้งสองข้าง				
7. รู้สึกไม่มีความสุขหรือเศร้าหมอง				
8. รู้สึกหมดหวังในชีวิต				
9. รู้สึกว่าชีวิตตนเองไม่มีคุณค่า				
10. กระวนกระวายอยู่ตลอดเวลา				
11. รู้สึกว่าตนเองไม่มีสมาธิ				
12. รู้สึกเพลียจนไม่มีแรงจะทำอะไร				
13. รู้สึกเหนื่อยหน่ายไม่อยากทำอะไร				
14. มีอาการหัวใจเต้นแรง				
15. เสียงสั่น ปากสั่น หรือมือสั่นเวลาไม่พอใจ				
16. รู้สึกกลัวผิดพลาดในการทำสิ่งต่าง ๆ				
17. ปวดและเกร็งกล้ามเนื้อบริเวณท้ายทอย หลังหรือ ไหล่				
18. ตื่นเต้นง่ายกับเหตุการณ์ที่ไม่คุ้นเคย				
19. มึนงงหรือเวียนศีรษะ				
20. ความสุขทางเพศลดลง				

<u>ส่วนที่ 3</u> : ปัจจัยเกี่ยวข้องกับสภาวะโรค COVID-19 ที่ทำให้ท่านเกิดความเครียด

ให้ตอบเป็นคะแนน 0-10 โดย

0 คือ ปัจจัยนั้นไม่ทำให้ท่านเครียด

1 คือ ปัจจัยนั้นทำให้ท่านเครียดน้อย

10 คือ ปัจจัยนั้นทำให้ท่านเครียดมากที่สุด

ข้อ		คะแนน
1	ท่านรู้สึกกังวลว่าตนเองจะได้รับเชื้อ COVID-19 จากการใช้ชีวิตประจำวัน เช่น การซื้ออาหาร สินค้าต่าง ๆ การเดินทาง การมาทำงาน	
2	ท่านรู้สึกกังวลว่าตนเองจะได้รับเชื้อ COVID-19 จากการให้การรักษาทางทันตกรรมแก่ผู้ป่วย	
3	ท่านรู้สึกกังวลว่าตนเองจะเป็นผู้แพร่เชื้อ COVID-19 ให้บุคคลอื่น ๆ ในครอบครัว	
4	ท่านรู้สึกกังวลว่าจะเป็นผู้แพร่เชื้อ COVID-19 ให้บุคคลอื่น ๆ ในสังคม	
5	ท่านรู้สึกกังวลว่าคนในครอบครัวจะป่วยด้วยโรค COVID-19	
6	ท่านรู้สึกเครียดเรื่องรายได้ที่ลดลงในช่วงที่มีการระบาดของโรค COVID-19	
7	ท่านรู้สึกเครียดเรื่องราคาหุ้นตก/เศรษฐกิจไม่ดี	
8	ท่านรู้สึกกังวลว่าจะมีสุขภาพเสื่อมลงจากการไม่ได้ไปออกกำลังกายตามปกติ	
9	ท่านรู้สึกเครียดจากการได้รับข่าวสารมากเกินไป	
10	ท่านรู้สึกกังวลว่าได้รับข่าวสารที่เป็นเท็จ	
11	ท่านรู้สึกเครียดที่ไม่สามารถเดินทางไปไหนมาไหนได้เหมือนในภาวะปกติ	
12	ท่านรู้สึกอึดอัดที่สถานที่พักผ่อนหย่อนใจต่าง ๆ เช่น ห้างสรรพสินค้า ฟิตเนส โรงภาพยนตร์ สถานบันเทิง ฯลฯ ไม่สามารถเปิดให้บริการได้เหมือนปกติ	
13	ท่านรู้สึกกังวลกับมาตรการของรัฐในการควบคุมการแพร่เชื้อ	
14	โดยรวมแล้วขณะนี้ท่านรู้สึกเครียดกับสถานการณ์ COVID-19 มากเพียงใด	

15. แหล่งข่าวที่ท่านใช้หาข่าวสารเกี่ยวกับโรค COCID-19 มากที่สุด 3 อันดับแรก เช่น เพื่อนหรือคน รู้จัก สมาชิกในครอบครัว วิทยุ โทรทัศน์ วารสารวิชาการ internet Facebook Line Twitter Instagram ฯลฯ

    1. ....

    2. ....

    3. ....

16. สิ่งที่ทำให้ท่านเครียดจนกระทั่งไม่มีความสุขในช่วงการระบาดของโรค COVID-19 มากที่สุด (ถ้า หากไม่มีท่านสามารถตอบว่า "ไม่มี" ได้)

....

17. ความคิดเห็นของท่านต่อสถานการณ์การระบาดของโรค COVID-19

....

18. วิธีคลายเครียดของท่านในช่วงการระบาดของโรค COVID-19

....

จุฬาลงกรณ์มหาวิทยาลัย

CHULALONGKORN UNIVERSITY

Appendix data 2. Scores of the 14-scale rated questions

1. You are worried that you will get infected from COVID-19 from daily activities such as buying food/goods or traveling to work

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	18	3.1	3.1	3.1
1.0	32	5.5	5.5	8.6
2.0	58	10.0	10.0	18.6
3.0	76	13.1	13.1	31.7
4.0	55	9.5	9.5	41.2
5.0	83	14.3	14.3	55.5
6.0	47	8.1	8.1	63.6
7.0	85	14.7	14.7	78.3
8.0	63	10.9	10.9	89.1
9.0	33	5.7	5.7	94.8
10.0	30	5.2	5.2	100.0
Total	580	100.0	100.0	
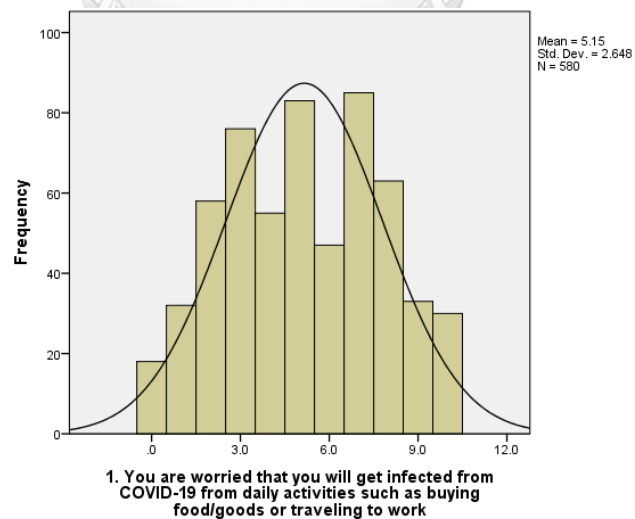
Mean = 5.15
Std. Dev. = 2.648
N = 580

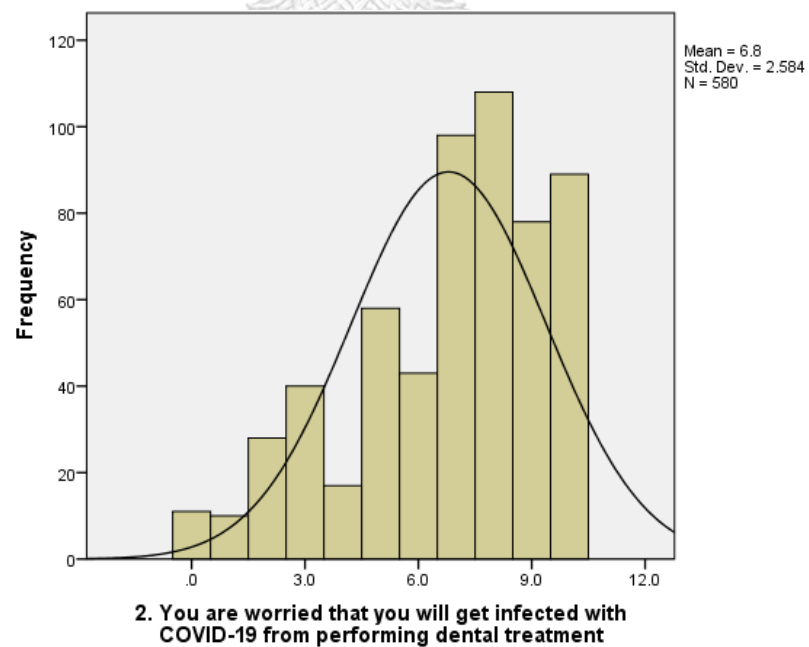1. You are worried that you will get infected from COVID-19 from daily activities such as buying food/goods or traveling to work

2. You are worried that you will get infected with COVID-19 from performing dental treatment

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	11	1.9	1.9	1.9
1.0	10	1.7	1.7	3.6
2.0	28	4.8	4.8	8.4
3.0	40	6.9	6.9	15.3
4.0	17	2.9	2.9	18.3
5.0	58	10.0	10.0	28.3
6.0	43	7.4	7.4	35.7
7.0	98	16.9	16.9	52.6
8.0	108	18.6	18.6	71.2
9.0	78	13.4	13.4	84.7
10.0	89	15.3	15.3	100.0
Total	580	100.0	100.0	

2. You are worried that you will get infected with COVID-19 from performing dental treatment

3. You are worried that you will spread COVID-19 to your family members

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
.0	20	3.4	3.4	3.4
1.0	14	2.4	2.4	5.9
2.0	35	6.0	6.0	11.9
3.0	27	4.7	4.7	16.6
4.0	12	2.1	2.1	18.6
5.0	52	9.0	9.0	27.6
6.0	39	6.7	6.7	34.3
7.0	70	12.1	12.1	46.4
8.0	98	16.9	16.9	63.3
9.0	82	14.1	14.1	77.4
10.0	131	22.6	22.6	100.0
Total	580	100.0	100.0	

3. You are worried that you will spread COVID-19 to your family members
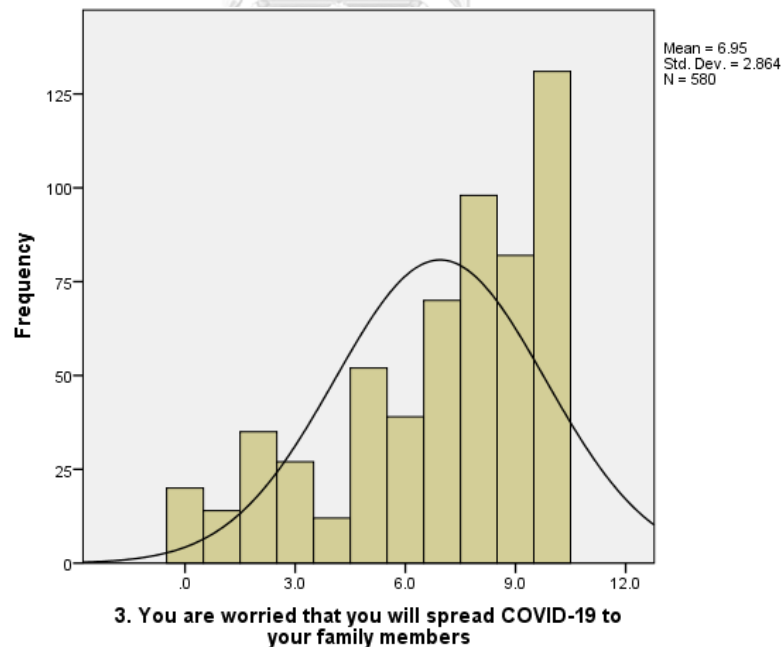
4. You are worried that you will spread COVID-19 to other people

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
.0	34	5.9	5.9	5.9
1.0	28	4.8	4.8	10.7
2.0	43	7.4	7.4	18.1
3.0	37	6.4	6.4	24.5
4.0	31	5.3	5.3	29.8
5.0	70	12.1	12.1	41.9
6.0	50	8.6	8.6	50.5
7.0	77	13.3	13.3	63.8
8.0	73	12.6	12.6	76.4
9.0	68	11.7	11.7	88.1
10.0	69	11.9	11.9	100.0
Total	580	100.0	100.0	
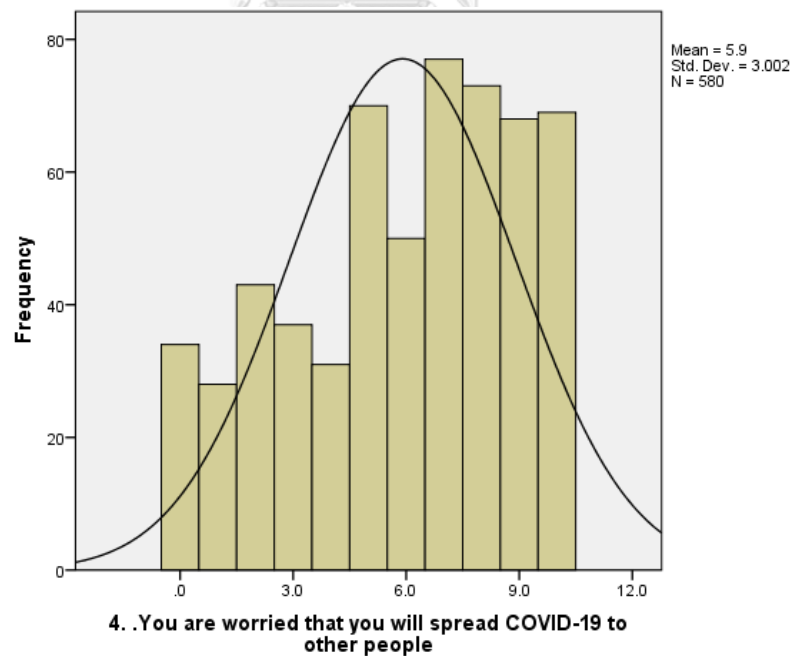
5. You are worried that your family member will get infected with COVID-19

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
.0	21	3.6	3.6	3.6
1.0	33	5.7	5.7	9.3
2.0	30	5.2	5.2	14.5
3.0	36	6.2	6.2	20.7
4.0	28	4.8	4.8	25.5
5.0	68	11.7	11.7	37.2
6.0	54	9.3	9.3	46.6
7.0	62	10.7	10.7	57.2
8.0	84	14.5	14.5	71.7
9.0	62	10.7	10.7	82.4
10.0	102	17.6	17.6	100.0
Total	580	100.0	100.0	

Mean = 6.31
Std. Dev. = 2.967
N = 580

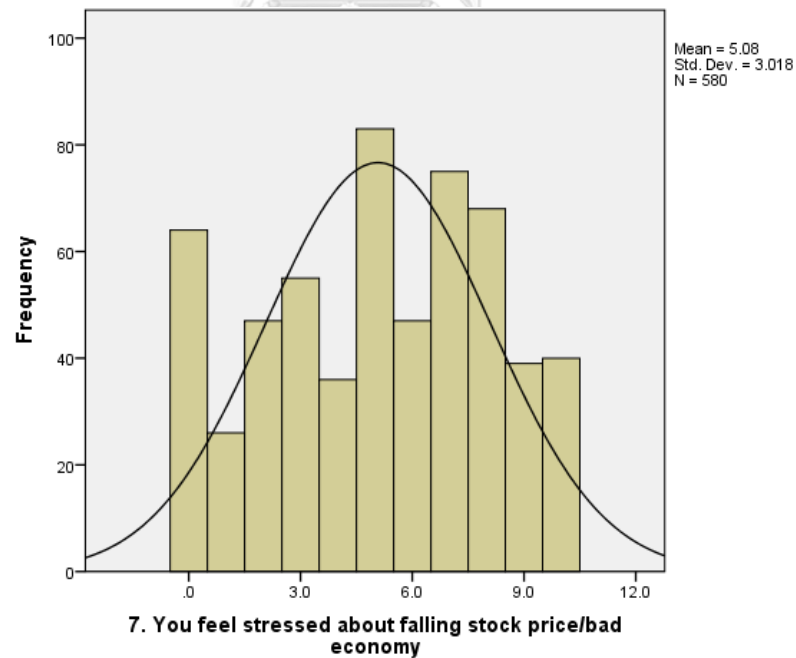5. You are worried that your family member will get infected with COVID-19
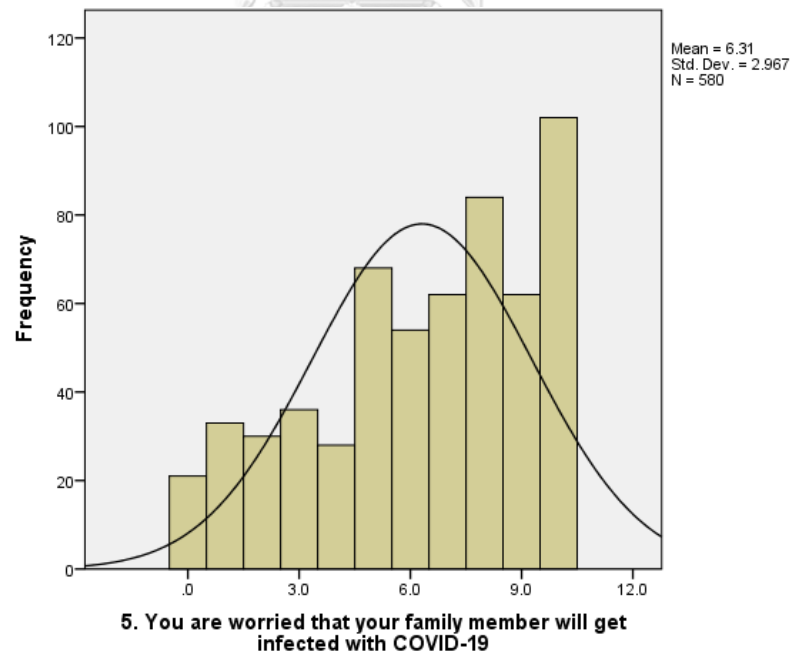
6. You feel stressed about the decreasing of your income during COVID-19 epidemic

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	47	8.1	8.1	8.1
1.0	36	6.2	6.2	14.3
2.0	51	8.8	8.8	23.1
3.0	44	7.6	7.6	30.7
4.0	30	5.2	5.2	35.9
5.0	82	14.1	14.1	50.0
6.0	37	6.4	6.4	56.4
7.0	65	11.2	11.2	67.6
8.0	77	13.3	13.3	80.9
9.0	51	8.8	8.8	89.7
10.0	60	10.3	10.3	100.0
Total	580	100.0	100.0	

Mean = 5.43
Std. Dev. = 3.113
N = 580

6. You feel stressed about the decreasing of your income during COVID-19 epidemic
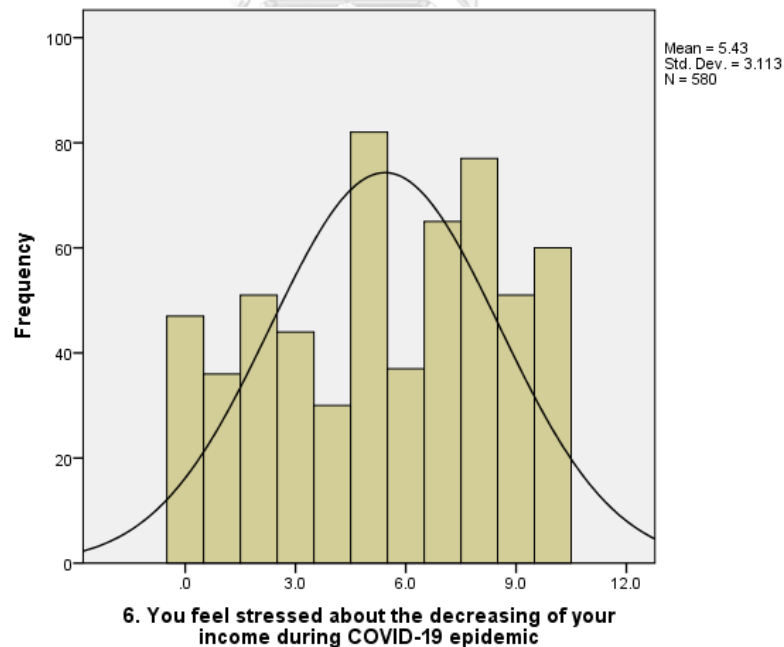
7. You feel stressed about falling stock price/bad economy

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	64	11.0	11.0	11.0
1.0	26	4.5	4.5	15.5
2.0	47	8.1	8.1	23.6
3.0	55	9.5	9.5	33.1
4.0	36	6.2	6.2	39.3
5.0	83	14.3	14.3	53.6
6.0	47	8.1	8.1	61.7
7.0	75	12.9	12.9	74.7
8.0	68	11.7	11.7	86.4
9.0	39	6.7	6.7	93.1
10.0	40	6.9	6.9	100.0
Total	580	100.0	100.0	

Mean = 5.08
Std. Dev. = 3.018
N = 580

7. You feel stressed about falling stock price/bad economy

8. You are worried that your health will get worse because of lacking exercise

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	99	17.1	17.1	17.1
1.0	40	6.9	6.9	24.0
2.0	63	10.9	10.9	34.8
3.0	33	5.7	5.7	40.5
4.0	33	5.7	5.7	46.2
5.0	83	14.3	14.3	60.5
6.0	45	7.8	7.8	68.3
7.0	66	11.4	11.4	79.7
8.0	66	11.4	11.4	91.0
9.0	26	4.5	4.5	95.5
10.0	26	4.5	4.5	100.0
Total	580	100.0	100.0	

Mean = 4.42
Std. Dev. = 3.117
N = 580

8. You are worried that your health will get worse because of lacking exercise
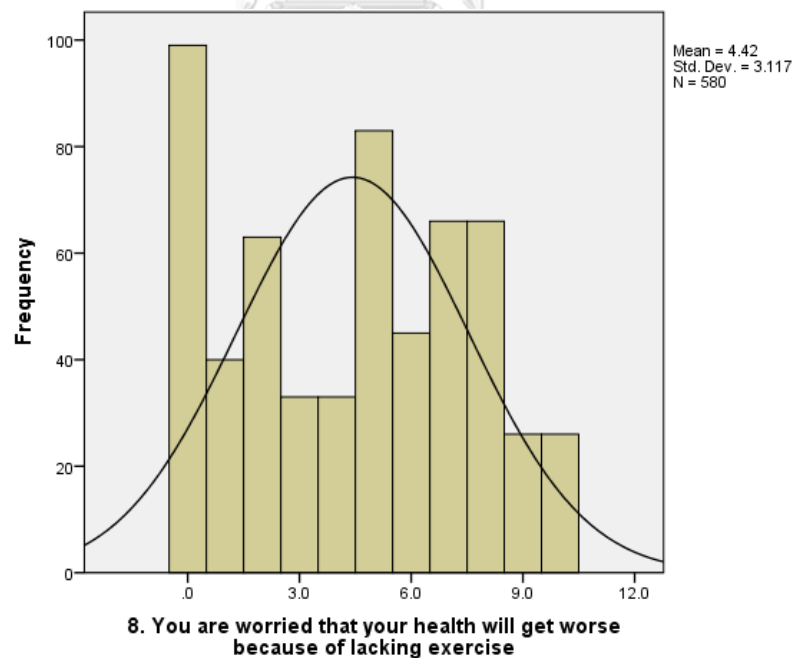
9. You feel stressed from overwhelming of COVID-19 news

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	37	6.4	6.4	6.4
1.0	24	4.1	4.1	10.5
2.0	55	9.5	9.5	20.0
3.0	54	9.3	9.3	29.3
4.0	25	4.3	4.3	33.6
5.0	80	13.8	13.8	47.4
6.0	49	8.4	8.4	55.9
7.0	87	15.0	15.0	70.9
8.0	91	15.7	15.7	86.6
9.0	40	6.9	6.9	93.4
10.0	38	6.6	6.6	100.0
Total	580	100.0	100.0	

9. You feel stressed from overwhelming of COVID-19 news
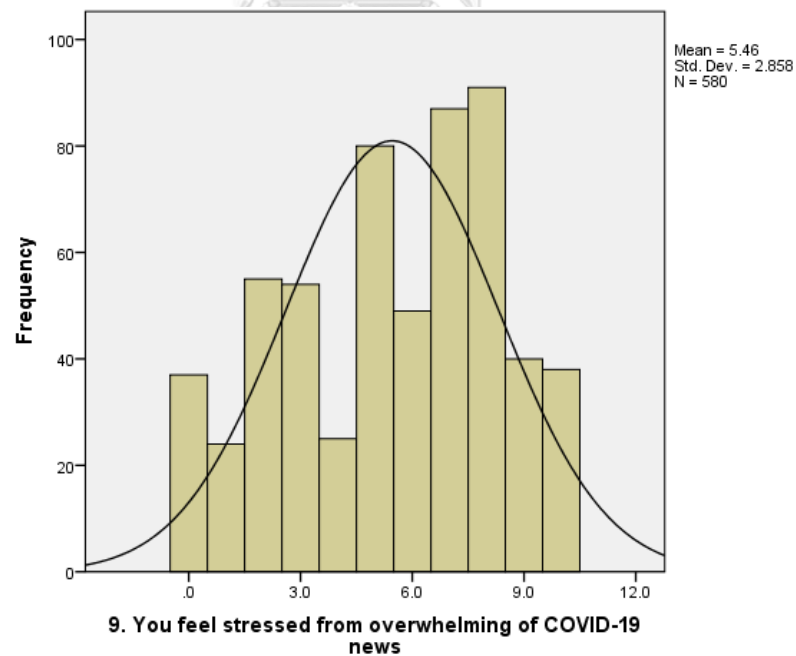
10. You feel worried that you might receive fake news

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	55	9.5	9.5	9.5
1.0	36	6.2	6.2	15.7
2.0	64	11.0	11.0	26.7
3.0	56	9.7	9.7	36.4
4.0	40	6.9	6.9	43.3
5.0	86	14.8	14.8	58.1
6.0	51	8.8	8.8	66.9
7.0	65	11.2	11.2	78.1
8.0	78	13.4	13.4	91.6
9.0	27	4.7	4.7	96.2
10.0	22	3.8	3.8	100.0
Total	580	100.0	100.0	
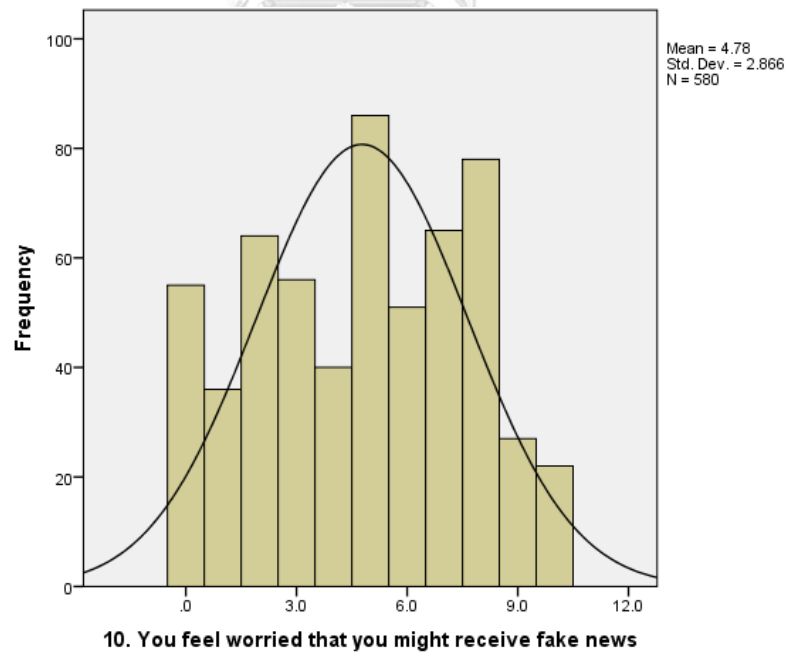
Mean = 4.78
Std. Dev. = 2.866
N = 580

10. You feel worried that you might receive fake news

11. You feel stressed because you are not able to travel like in normal situation

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	30	5.2	5.2	5.2
1.0	30	5.2	5.2	10.3
2.0	50	8.6	8.6	19.0
3.0	49	8.4	8.4	27.4
4.0	43	7.4	7.4	34.8
5.0	65	11.2	11.2	46.0
6.0	70	12.1	12.1	58.1
7.0	72	12.4	12.4	70.5
8.0	89	15.3	15.3	85.9
9.0	36	6.2	6.2	92.1
10.0	46	7.9	7.9	100.0
Total	580	100.0	100.0	
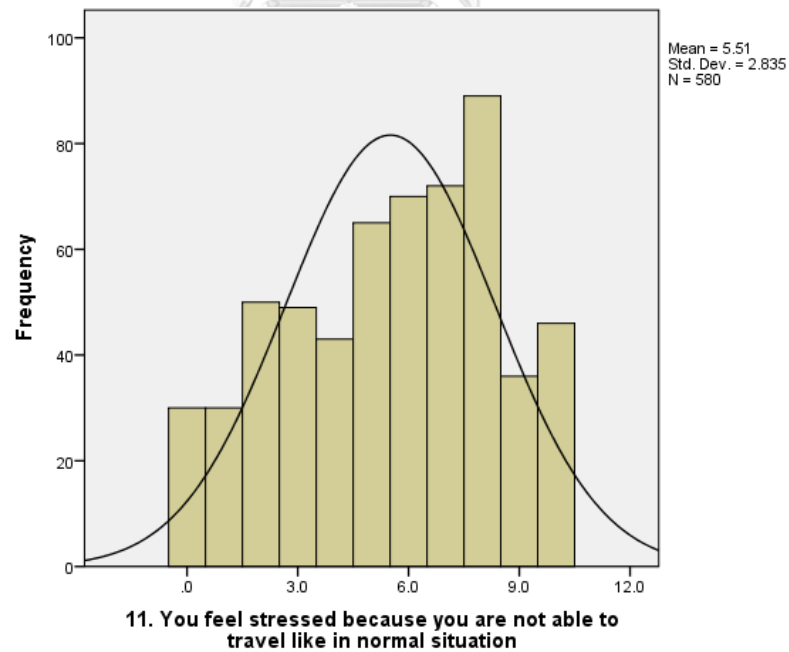
Mean = 5.51
Std. Dev. = 2.835
N = 580

11. You feel stressed because you are not able to travel like in normal situation

12. You feel frustrated that recreation places such as supermarket, fitness, cinema, pub, bar not open like in normal situation

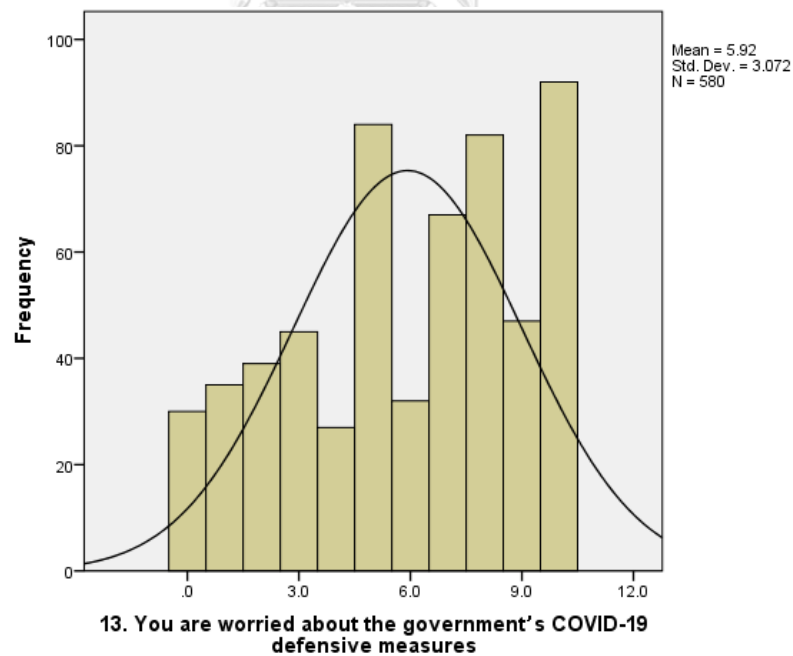| Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	45	7.8	7.8	7.8
1.0	35	6.0	6.0	13.8
2.0	45	7.8	7.8	21.6
3.0	45	7.8	7.8	29.3
4.0	33	5.7	5.7	35.0
5.0	76	13.1	13.1	48.1
6.0	66	11.4	11.4	59.5
7.0	56	9.7	9.7	69.1
8.0	78	13.4	13.4	82.6
9.0	48	8.3	8.3	90.9
10.0	53	9.1	9.1	100.0
Total	580	100.0	100.0	
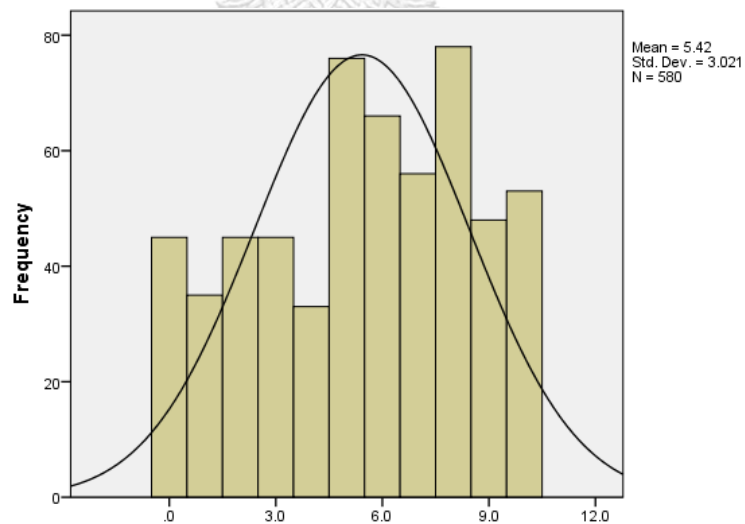
Mean = 5.42
Std. Dev. = 3.021
N = 580

12. You feel frustrated that recreation places such as supermarket, fitness, cinema, pub, bar not open like in normal situation

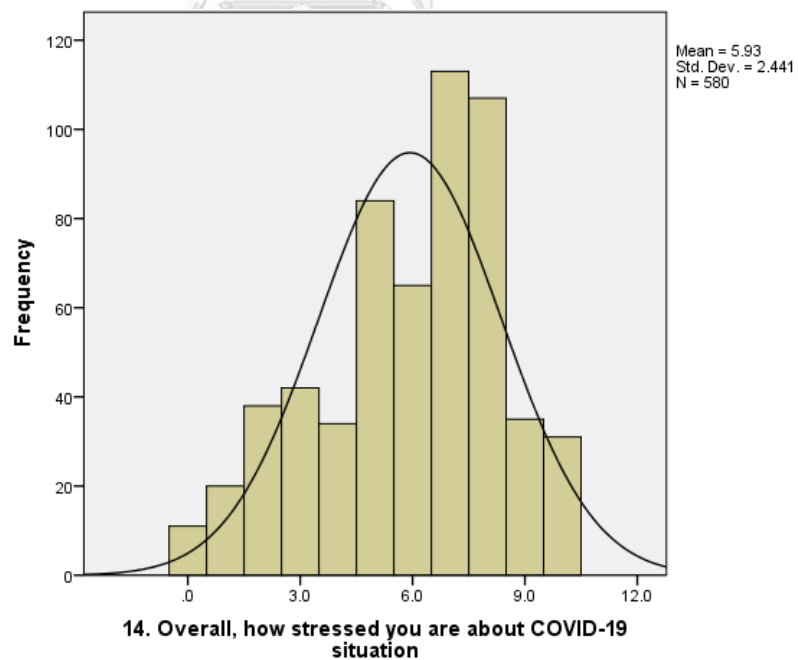13. You are worried about the government's COVID-19 defensive measures

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	30	5.2	5.2	5.2
1.0	35	6.0	6.0	11.2
2.0	39	6.7	6.7	17.9
3.0	45	7.8	7.8	25.7
4.0	27	4.7	4.7	30.3
5.0	84	14.5	14.5	44.8
6.0	32	5.5	5.5	50.3
7.0	67	11.6	11.6	61.9
8.0	82	14.1	14.1	76.0
9.0	47	8.1	8.1	84.1
10.0	92	15.9	15.9	100.0
Total	580	100.0	100.0	

Mean = 5.92
Std. Dev. = 3.072
N = 580

13. You are worried about the government's COVID-19 defensive measures

14. Overall, how stressed you are about COVID-19 situation

Scores	Frequency	Percent	Valid Percent	Cumulative Percent
0.0	11	1.9	1.9	1.9
1.0	20	3.4	3.4	5.3
2.0	38	6.6	6.6	11.9
3.0	42	7.2	7.2	19.1
4.0	34	5.9	5.9	25.0
5.0	84	14.5	14.5	39.5
6.0	65	11.2	11.2	50.7
7.0	113	19.5	19.5	70.2
8.0	107	18.4	18.4	88.6
9.0	35	6.0	6.0	94.7
10.0	31	5.3	5.3	100.0
Total	580	100.0	100.0	

Mean = 5.93
Std. Dev. = 2.441
N = 580

14. Overall, how stressed you are about COVID-19 situation

REFERENCES

1. Tan W, Zhao X, Ma1 X, Wang W, Niu P, Xu W, et al. A novel coronavirus genome identified in a cluster of pneumonia cases - Wuhan, China 2019-2020. Mol Biol Evol. 2013;30:772-80.

2. Mahase E. China coronavirus: WHO declares international emergency as death toll exceeds 200. BMJ. 2020;368:m408.

3. [Propaganda Department] [Internet]. [Beijing]: [National Health Commission] (CN); c2021. [The latest situation of the novel coronavirus pneumonia epidemic as of 24:00 on March 2]; 2020 March 3 [cited 2020 Apr 26]; [about 1 screen]. Available from: http://www.nhc.gov.cn/xcs/yqtb/202003/c588ee20113b4136b27f2a07faa7075b.shtml Chinese.

4. World Health Organization [Internet]. [Geneva]: The Organization (SZ); c2021. Coronavirus disease (COVID-19) pandemic; c2021 [updated 2021 Mar 24; cited 2020 Apr 30]; [about 3 screens]. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019.

5. BBC NEWS [Internet]. [Bangkok]: BBC NEWS Thai; c2021. [Coronavirus: What did Ministry of Public Health tell us about COVID-19 patients found in Thailand in the past 50 days]; 2020 March 2 [cited 2020 Apr 18]; [about 7 pages]. Available from: https://www.bbc.com/thai/thailand-51701394 English, Thai.

6. COVID-19 situation reports [Internet]. [Bangkok]: Ministry of Public Health (TH), Department of Disease Control; c2021 [updated 2021 Mar 24; cited 2020 Apr 22]. English:[Available from: https://covid19.ddc.moph.go.th/.

7. Paules CI, Marston HD, Fauci AS. Coronavirus infections-more than just the common cold. JAMA. 2020;323:707-8.

8. Paudel S, Dangal G, Chalise A, Bhandari TR, Dangal O. The coronavirus pandemic: what does the evidence show? J Nepal Health Res Counc. 2020;18:1-9.

9. Cao Z, Zhang Q, Lu X, Pfeiffer D, Jia Z, Song H, et al. Estimating the effective reproduction number of the 2019-nCoV in China. MedRxiv 2020.01.27.20018952 [Preprint]. : 2020 [cited 2020 Apr 20]: [6 p.]. Available from:

https://www.medrxiv.org/content/medrxiv/early/2020/01/29/2020.01.27.20018952.full.pdf

.

10.   Li LQ, Huang T, Wang YQ, Wang ZP, Liang Y, Huang TB, et al. COVID-19 patients' clinical characteristics, discharge rate, and fatality rate of meta-analysis. J Med Virol. 2020;92:577-83.

11.   Nishiura H, Kobayashi T, Yang Y, Hayashi K, Miyama T, Kinoshita R, et al. The rate of underascertainment of novel coronavirus (2019-nCoV) infection: estimation using japanese passengers data on evacuation flights. J Clin Med. 2020;9:419.

12.   Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. JAMA. 2020:E1-2.

13.   Severe Acute Respiratory Syndrome (SARS) [Internet]. [Atlanta (GA)]: Centers for Disease Control and Prevention (US); c2021. Frequently asked questions about SARS; [updated 2005 May 3; cited 2020 Apr 22]; [about 5 pages]. Available from: https://www.cdc.gov/sars/about/faq.html.

14.   World Health Organization [Internet]. [Geneva]: The Organization (SZ); c2021. Middle East Respiratory Syndrome Coronavirus (MERS-CoV); c2021 [cited 2020 Apr 22]; [about 4 pages]. Available from: https://www.who.int/emergencies/mers-cov/en.

15.   Mahase E. Coronavirus covid-19 has killed more people than SARS and MERS combined, despite lower case fatality rate. BMJ. 2020;368:m641.

16.   Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci. 2020;12:9.

17.   Gerberding JL. Management of occupational exposures to blood-borne viruses. New England Journal of Medicine. 1995;332:444-51.

18.   COVID-19 situation in Thailand [Internet]. [Bangkok]: Ministry of Public Health (TH); c2021 [cited 2020 May 1]. Available from: https://covid19.moph.go.th/#/portal Thai.

19.   [Declaration from Department of Medical Services: dental treatment guideline in the situation of COVID-19 epidemic]. [Bangkok]: Department of Medical Services; 2020 Mar 30. Thai.

20.   Oral Health [Internet]. [Atlanta (GA)]: Centers for Disease Control and Prevention (US); c2021. Summary of CDC COVID-19 Guidance for Dental Services; [updated 2020 Dec 1; cited 2020 Apr 5]; [about 1 page]. Available from: https://www.cdc.gov/oralhealth/infectioncontrol/statement-COVID.html.

21.   Singhaubol A. The prevalence of stress and associated factors among graduate students pursuing master's degree at Faculty of Medicine, Chulalongkorn University [master's thesis]. Bangkok: Chulalongkorn University; 2006.

22.   Xu X, Chen P, Wang J, Feng J, Zhou H, Li X, et al. Evolution of the novel coronavirus from the ongoing Wuhan outbreak and modeling of its spike protein for risk of human transmission. Science China Life Sciences. 2020;63:457-60.

23.   Singh SK. Middle East Respiratory Syndrome virus pathogenesis. Semin Respir Crit Care Med. 2016;37:572-7.

24.   Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): the epidemic and the challenges. Int J Antimicrob Agents. 2020;55:105924.

25.   Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. New England Journal of Medicine. 2020;382:970-1.

26.   Backer JA, Klinkenberg D, Wallinga J. Incubation period of 2019 Novel Coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20-28 January 2020. Euro Surveill. 2020 Feb 06;25.

27.   Lauer SA, Grantz KH, Bi Q, Jones FK, Zheng Q, Meredith HR, et al. The incubation period of Coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. Ann Intern Med. 2020.

28.   Read JM, Bridgen JRE, Cummings DAT, Ho A, Jewell CP. Novel Coronavirus 2019-nCoV: early estimation of epidemiological parameters and epidemic predictions MedRxiv 2020.01.23.20018549 [Preprint]. : 2020 [cited 2020 Apr 25]: [11 p.]. Available from: https://www.medrxiv.org/content/10.1101/2020.01.23.20018549v2.full.pdf.

29.   Zhao S, Lin Q, Ran J, Musa SS, Yang G, Wang W, et al. Preliminary estimation of the basic reproduction number of Novel Coronavirus (2019-nCoV) in China, from 2019 to 2020: a data-driven analysis in the early phase of the outbreak. International Journal of Infectious Diseases. 2020;92:214-7.

30.   Wu JT, Leung K, Leung GM. Nowcasting and forecasting the potential domestic and international spread of the 2019-nCoV outbreak originating in Wuhan, China: a modelling study. The Lancet. 2020;395:689-97.

31.   Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 Novel Coronavirus pneumonia in Wuhan, China: a descriptive study. The Lancet. 2020;395:507-13.

32.   Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The Lancet. 2020;395:497-506.

33.   Rom O, Reznick AZ. The stress reaction: a historical perspective. In: Pokorski M, editor. Respiratory Contagion. Cham: Springer International Publishing; 2016. p. 1-4.

34.   Cannon WB. The wisdom of the body, 2nd ed. Oxford, England: Norton & Co.; 1939.

35.   Selye H. A syndrome produced by diverse nocuous agents. Nature. 1936;138:32.

36.   Szabo S, Tache Y, Somogyi A. The legacy of Hans Selye and the origins of stress research: a retrospective 75 years after his landmark brief "letter" to the editor of Nature. Stress. 2012;15:472-8.

37.   Selye H. Stress without distress. In: Serban G, editor. Psychopathology of Human Adaptation. Boston, MA: Springer US; 1976. p. 137-46.

38.   Mason JW. A historical view of the stress field. Journal of Human Stress. 1975;1:6-12.

39.   Mason JW. A historical view of the stress field. Journal of Human Stress. 1975;1:22-36.

40.   Burchfield SR. The stress response: a new perspective. Psychosomatic Medicine. 1979;41:661-72.

41.	Reznick AZ. The cycle of stress — A circular model for the psychobiological response to strain and stress. Med Hypotheses. 1989;30:217-22.

42.	Rapoliene L, Razbadauskas A, Jurgelenas A. The reduction of distress using therapeutic geothermal water procedures in a randomized controlled clinical trial. Advances in Preventive Medicine. 2015;2015:1-10.

43.	Psychobiology of stress: a study of coping men. In: Ursin H, Baade E, Levine S, editors. Psychobiology of Stress: Academic Press; 1978. p. 229-36.

44.	Lazarus RS, Averill JR, Opton EM. The psychology of coping: Issues of research and assessment. Coping and adaptation. 1974:249-315.

45.	World Health Organization [Internet]. [Geneva]: The Organization (SZ); c2021. Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations; 2020 Mar 29 [updated 2020 Jul 9; cited 2020 Apr 20]. Available from: https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations.

46.	International Business, World News & Global Stock Market Analysis [Internet]. [Englewood Cliffs (NJ)]: CNBC; c2021. Coronavirus lives for hours in air particles and days on surfaces, new US study shows; 2020 Mar 18 [updated 2020 Mar 19; cited 2020 Apr 25]; [about 2 pages]. Available from: https://www.cnbc.com/2020/03/18/coronavirus-lives-for-hours-in-air-particles-and-days-on-surfaces-new-us-study-shows.html.

47.	ADA - American Dental Association®: Amerca's leading advocate for dental health [Internet]. [Chicago (IL)]: American Dental Association (US); c2021. ADA recommending dentists postpone elective procedures; 2020 Mar 16 [cited 2020 Apr 10]; [about 2 pages]. Available from: https://www.ada.org/en/publications/ada-news/2020-archive/march/ada-recommending-dentists-postpone-elective-procedures.

48.	Miller LH, Smith AD, Larry R. The stress solution: an action plan to manage the stress in your life. New York: Simon & Schuster; 1993. 404 p.

49.	Daniel WWC, Chad L. Biostatistic: a foundation of analysis in the health sciences. 11 ed. [New Jersey]: Wiley; 2018. 720 p.

50.   Collin V, Toon M, O'Selmo E, Reynolds L, Whitehead P. A survey of stress, burnout and well-eeing in UK dentists. Br Dent J. 2019;226:40-9.

51.   Edwards PJ, Roberts I, Clarke MJ, DiGuiseppi C, Wentz R, Kwan I, et al. Methods to increase response to postal and electronic questionnaires. [New Jersey]: John Wiley & Sons; 2010.

52.   Nilchaikovit T, Sukying C, Silpakit C. Reliability and validity of the Thai version of the General Health Questionaire. J Psychiatr Assoc Thailand. 1996;41:2-17.

53.   Chaiwong N. Stress and sources of stress among nursing student at Faculty of Nursing Buriram. In: Inwang K, editor. [Developping research, creativity to innovation of Thailand 4.0]. [10th National Conference]; Pathum Thani (TH). [Pathum Thani (TH)]: Western University; 2017 Nov 4-5. p. 123-32. Thai.

54.   Kongsuk T, Charajsingh A, Bualek N, Suriya P, Rujirachakorn S. The 2003 national survey on stress of Thai people. Bangkok: Beyond Publishing; 2003.

55.   Marzo RR, Ismail Z, Nu Htay MN, Bahari R, Ismail R, Villanueva EQ, 3rd, et al. Psychological distress during pandemic Covid-19 among adult general population: result across 13 countries. Clin Epidemiol Glob Health. 2021;10:100708.

56.   Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the Initial stage of the 2019 Coronavirus Disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Health. 2020;17.

57.   Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open. 2020;3:e203976.

58.   Consolo U, Bellini P, Bencivenni D, Iani C, Checchi V. Epidemiological aspects and psychological reactions to COVID-19 of dental practitioners in the northern Italy districts of Modena and Reggio Emilia. Int J Environ Res Public Health. 2020;17:3459.

59.   Shacham M, Hamama-Raz Y, Kolerman R, Mijiritsky O, Ben-Ezra M, Mijiritsky E. COVID-19 factors and psychological factors associated with elevated psychological

distress among dentists and dental hygienists in Israel. Int J Environ Res Public Health. 2020;17:2900.

60.   Jakkrapan S, Chooprayoon L, Chaiyasit W, Pornpipatkul S, Ootsaha S, Thongnguern U, et al. Development of Thai Computerized Self-Analysis Stress Test. Bangkok: Department of Mental Health, Ministry of Public Health; 1995.

61.   Egan KG, Moreno MA. Prevalence of Stress References on College Freshmen Facebook Profiles. CIN: Computers, Informatics, Nursing. 2011;29:586-92.

62.   Kontos EZ, Emmons KM, Puleo E, Viswanath K. Communication Inequalities and Public Health Implications of Adult Social Networking Site Use in the United States. Journal of Health Communication. 2010;15:216-35.

63.   Scott SB, Sliwinski MJ, Blanchard-Fields F. Age differences in emotional responses to daily stress: The role of timing, severity, and global perceived stress. Psychol Aging. 2013;28:1076-87.

64.   Song KW, Kim HK. Job stress and its related factors among Korean dentists: an online survey study. Int Dent J. 2019;69:436-44.

65.   Myers HL, Myers LB. 'It is difficult being a dentist': stress and health in the general dental practitioner. Br Dent J. 2004;197:89-93.

66.   Kay EJ, Lowe JC. A survey of stress levels, self-perceived health and health-related behaviours of UK dental practitioners in 2005. Br Dent J. 2008;204:E19; discussion 622-3.

67.   Lanese N. LIVE SCIENCE [Internet]. New York: Live Science; [cited 2020 Nov 15]. 'Superspreader' in South Korea infects nearly 40 people with coronavirus 23 Feb 2020 [updated 23 Feb 2020; cited 2020 Nov 12]; [about 3 screens]. Available from: https://www.livescience.com/coronavirus-superspreader-south-korea-church.html.

68.   Ahmed MA, Jouhar R, Ahmed N, Adnan S, Aftab M, Zafar MS, et al. Fear and practice modifications among dentists to combat Novel Coronavirus Disease (COVID-19) outbreak. Int J Environ Res Public Health. 2020;17:2821.

VITA

NAME	Athikhun Praditpapha
DATE OF BIRTH	12 June 1992
PLACE OF BIRTH	Bangkok
INSTITUTIONS ATTENDED	Chulalongkorn University
HOME ADDRESS	259 Sukhumvit 21st road, Khlong Toei Nuea, Wattana distric, Bangkok 10110