RESEARCH ARTICLE

REVISED **Perspectives on public health interventions in the management of the COVID-19 pandemic in Thailand** [version 3; peer review: 2 approved]

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Abstract

Background: Any government needs to react quickly to a pandemic and make decisions on healthcare interventions locally and internationally with little information regarding the perceptions of people and the reactions they may receive during the implementation of restrictions.

Methods: We report an anonymous online survey in Thailand conducted in May 2020 to assess public perceptions of three interventions in the Thai context: isolation, quarantine and social distancing. A total of 1,020 participants, of whom 52% were women, responded to the survey.

Results: Loss of income was the main concern among respondents (>80% for all provinces in Thailand). Traditional media and social media were important channels for communication during the pandemic. A total of 92% of respondents reported that they changed their social behaviour even before the implementation of government policy with 94% reporting they performed social distancing, 97% reported using personal protective equipment such as masks and 95% reported using sanitizer products.

Conclusions: This study showed a high level of compliance from individuals with government enforced or voluntarily controls such as quarantine, isolation and social distancing in Thailand. The findings

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from this study can be used to inform future government measures to control the pandemic and to shape communication strategies.

Keywords

social, ethical, behavioural, COVID-19, pandemic, social distancing, quarantine, isolation, Thailand, survey, public health

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Any reports and responses or comments on the article can be found at the end of the article.

This article is included in the Mahidol Oxford Tropical Medicine Research Unit (MORU) gateway.

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Introduction

There is a lack of data on the social, ethical and behavioural aspects of public health interventions used globally to control the coronavirus disease 2019 (COVID-19) pandemic especially from Southeast Asia. This information is important for policy makers to inform future plans to deal with the situation that is changing quickly. This paper reports the findings of a survey conducted in Thailand during the recovery period of first wave of COVID-19, i.e. the entire month of May 2020. We sought to understand the perceptions of the people on the disease and public health interventions to curb the pandemic. These findings could be useful when planning and making decisions about subsequent waves of the COVID-19 pandemic or future outbreaks. This study is a part of an ongoing multinational, mixed-methods research involving Malaysia, Thailand, Italy, Slovenia, and United Kingdom (UK)[1].

COVID-19 situation between January and May 2020 in Thailand

An outbreak of COVID-19 started in December 2019 when the health authorities in China reported the first case of a novel coronavirus (severe acute respiratory syndrome coronavirus (SARS-CoV-2)) in Wuhan city of Hubei province in China. Since then, a number of confirmed cases were subsequently reported across the globe. On March 11, 2020, the World Health Organisation (WHO) declared COVID-19 a pandemic. Numbers of confirmed cases have rapidly been growing, and deaths were observed with a mortality rate of 4.6%. According to WHO, as of September 25, 2020, the confirmed cases around the globe reached 32 million cases with 979,212 deaths. The top three regions that reported the highest number of confirmed cases are the Americas (16m), South-East Asia (6.5m), and Europe (5.5m)[2].

Since January 3, 2020, Thailand started to implement a surveillance protocol by fever screening of travelers arriving from Wuhan, at the Suvarnabhumi, Don Mueang, Phuket, and Chiang Mai international airports. On January 13, 2020, a person traveling from Wuhan to Thailand tested positive for COVID-19, which was confirmed to be the first case in Thailand and also the first case outside China. On the same day, Thailand identified one more confirmed case, a 74-year-old female Chinese tourist. By the end of January, there were 19 confirmed cases in Thailand. All cases were travelers from abroad, except a Thai taxi driver, which was the first case in Thailand with no recent history of travel to China[3].

The turning point for Thailand's COVID-19 situation was on March 12 and 13, 2020, when two big clusters of the disease were reported, one from a nightlife spot and one from a boxing stadium in Bangkok. The number of cases in Thailand rose rapidly after those two clusters were found. More than 100 cases were confirmed by the end of that week[4].

On March 21, 2020, the Governors of Bangkok, five neighboring provinces and Chiang Mai imposed urgent measures to ensure social distancing, including closing a range of retail businesses. Because of these urgent measures, workers from retail businesses in Bangkok traveled back to their hometowns. This increased the number of confirmed cases in provinces outside of Bangkok from 59 cases on March 19 to 236 cases on March 22. On March 26, 2020, the National Emergency Decree was issued. This decree authorizes government agencies to effect or enforce specific actions necessary to reduce transmission of the virus and bring the epidemic under control. The initial restrictions included prohibiting travelers from entering the Kingdom of Thailand except for Thai citizens, shippers, diplomats or representatives of international bodies who have to work in Thailand. The public was requested to remain inside their homes and to strictly limit all social contacts. On April 3, 2020, the government announced a nationwide curfew. All residents were instructed to remain inside their homes between the hours of 10 pm to 4 am. The government requested that everyone wore a cloth mask when outside their home. After April 9, the number of cases decreased to below 100 cases per day. A month later, on May 3, the government approved the first phase of relaxed measures. Since then, the other phases of relaxed measures have followed. As of July 1, the government approved the fifth phase of relaxed measures but still extended the enforcement of the emergency decree. Thai schools were allowed to reopen, and some high-risk businesses were allowed to resume their operations but under strict precautionary measures, including pubs, bars, karaoke bars, massage parlors, bouncy castles, ball play areas for children, bull fighting, cock fighting, fish fighting and similar activities. To accommodate journeys across provinces, all public transport (buses, vans, trains, ferries, airplanes) had to provide breaks during the journey, spacing between seats and must limit the number of passengers. On August 13, the cabinet approved the resumption of another three key activities back to normal operations. All educational institutions and schools were allowed to open with their regular schedule, public transport were allowed to resume normal service in terms of passenger numbers, and the public was allowed to join or watch any outdoor sport activities, although numbers were limited.

Up to September 25, the Ministry of Health, Thailand reported that there had been no new locally transmitted cases in the country. The only positive cases were those returning residents from different countries. They were quarantined in the government-provided facilities[5].

Methods
Study design
We conducted an online anonymous survey in Thailand of people's opinions and perspective on the public health intervention implementation in Thailand in response to the COVID-19 pandemic. Full details of the wider study protocol of which this is a part of have been reported previously[1]. Briefly, the "Social, ethical and behavioural aspects of COVID-19 (SEBCOV)" study consisted of an online survey and qualitative

interviews in Southeast Asia (Thailand and Malaysia) and Europe (United Kingdom, Italy and Slovenia).

The survey was developed in English by the SEBCOV study team, and then translated to Thai and consisted of five domains (*Extended* data[6]): demographics (7 questions); income, occupation status and the economic impacts of COVID-19 and government restrictions (8 questions); COVID-19 communication that respondents had received, what they would prefer, what information had been perceived as unclear or confusing, and the occurrence of 'fake news'(5 questions); self-reported level of understanding of COVID-19 and related restrictions, level of acceptance of these restrictions and behaviour changes, concerns relating to restrictions, and coping strategies (14 questions). The 5-point Likert-scale, ranged from strongly agree to strongly disagree, was used for opinions on statements reflecting the opinions on the government restrictions. The survey was set up using the JISC Online surveys' platform[7].

The survey questions were pilot-tested with 25 people at the five participating countries prior to rollout, and revised to improve their clarity. In addition to pilot testing, selected questions were tested using an adapted cognitive testing technique using the "thinking out loud" approach[8], with the Bangkok Health Research Ethics Interest Group, a public involvement group set up by the Mahidol Oxford Tropical Medicine Research Unit (MORU) in August 2019. The members gave feedback on the content and phrasing of the questions, as well as on the study in general.

Study participants and recruitment

Recruitment of respondents was done using probability sampling method of list-based sampling frame which conducted via e-mail addresses and social media accounts, including non-probability sampling methods with unrestricted self-selected surveys by posting invitations to participate via recruitment posters[9]. Our survey was not designed to be nationally representative, but sought to compare population segments, e.g. men versus women; younger versus older people; those with higher versus lower levels of education. However, we made every effort to have geographical representation within Thailand. A polling company, SUPER POLL was engaged to help with survey dissemination. Stratification by area was applied to guarantee that respondents from all regions across the country were included in the survey: north, central, northeast or "Isan", south, and Bangkok areas.

A total of 1,020 participants responded to the online survey in the month of May 2020. Informed consent was obtained from the participants online prior to starting the survey. Inclusion criteria were adults (18 years old and above) residing in Thailand who were able to use a computer or a smart phone. Exclusion criteria were those individuals who were illiterate since the data collection was online and the survey was self-administered.

Sample size

A sample of 1,020 individuals responded to the survey. This exceeded the recommended rule of thumb sample size for a mixed methods study (between 40 and 200 respondents per study are recommended)[10] and also exceeded the calculated sample size of at least 780 based on preparedness measures of LMICs to respond to COVID-19 between 52 – 68% among the population[11,12] with a precision of 3.5%. The sample size was calculated using the formula $N = (Z^2 * P(1 - P)) / e^2$, where Z = value from standard normal distribution corresponding to desired confidence level ($Z = 1.96$ for 95% CI), P = expected true proportion, and e = desired precision.

Data collection

Data were collected from 1st May 2020 to 31st May 2020 (*Underlying data*[13]). This represents the period in which the number of reported cases in the country was decreasing after the extensive restrictions by the government under the state of emergency announced at the end of April 2020.

Ethical approval

Ethical approval for this study was received from the Ethics Committee of the Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand (TMEC 20-016) and Oxford Tropical Research Ethics Committee (OxTREC reference number 520-20). Informed consent was provided by participants online prior to completing the survey.

Statistical analyses

The quantitative data was analysed using Stata 15.0 software. Frequency counts and percentages were used to summarise categorical data. Median and interquartile range (IQR) were used to describe the continuous data. Associations between categorical variables were assessed using the Chi squared test or Fisher's exact tests as appropriate. A Z-test for trend has been used to assess association been binary and ordinal categorical variables. Tests of significance will be performed at 5% significance level.

Results
Characteristics of survey respondents

Table 1 shows the key characteristics of our respondents by region. The responses were well distributed geographically, with the smallest number of responses coming from the Eastern and Western regions. The breakdown of respondents by region is as follows: Central (28%), Northeastern (27%), Southern (19%), Northern (19%) and Eastern/Western (7%). Overall, there was a ratio of 52:47:1 female:male:other/prefer not to say respondents. The majority of the respondents were aged between 35 and 54 years old in all regions, accounting for 59% of the total respondents. Respondents from the North and Northeast regions had a relatively lower level of education compared to the rest of the country. The survey consisted of approximately 80% general population and 20% healthcare workers (HCWs). In general, HCWs were defined as people who reported working full time in the health sector (5%), while local HCWs are people who work as health volunteer staff (13%), rather than full-time. Healthcare workers have been given more in-depth health education compared to the general public and are expected to provide basic health information to local residents, and coordinate doctors' visits during the pandemic. Finally, the testing of COVID-19 was highest in the Southern region.

Table 1. Demographics of online survey participants in the COVID-19 study, Thailand.

Regions	Northern	Northeastern	Central	Southern	Eastern/Western	Total
	N=191 (%)	N=277 (%)	N=286 (%)	N=194 (%)	N=72 (%)	N=1,020 (%)
Gender						
Female	98 (51)	116 (42)	189 (66)	89 (46)	41 (57)	533 (52)
Male	93 (49)	161 (58)	94 (33)	104 (54)	29 (40)	481 (47)
Other/Prefer not to say	0 (0)	0 (0)	3 (1)	1 (1)	2 (3)	6 (1)
Age (years)						
18–24	2 (1)	8 (3)	32 (11)	13 (7)	3 (4)	58 (6)
25–34	16 (8)	13 (5)	58 (20)	10 (5)	10 (14)	107 (10)
35–44	51 (27)	96 (35)	82 (29)	36 (19)	18 (25)	283 (28)
45–54	65 (34)	92 (33)	59 (21)	88 (45)	17 (24)	321 (31)
55–64	49 (26)	48 (17)	37 (13)	37 (19)	18 (25)	189 (19)
65–84	8 (4)	20 (7)	18 (6)	10 (5)	6 (8)	62 (6)
Education level						
Primary school or lower	34 (18)	65 (23)	11 (4)	52 (27)	11 (15)	173 (17)
Secondary/High school/Vocational school	112 (59)	169 (61)	60 (21)	73 (38)	21 (29)	435 (43)
Bachelor degree or higher	45 (24)	43 (16)	215 (75)	69 (36)	40 (56)	412 (40)
Living arrangements						
Living alone	12 (6)	15 (5)	71 (25)	10 (5)	8 (11)	116 (11)
Living with partner	27 (14)	23 (8)	38 (13)	25 (13)	13 (18)	126 (12)
Living with partner and children/ others	152 (80)	239 (86)	177 (62)	159 (82)	51 (71)	778 (76)
Household size, median (IQR)	4 (3, 4)	4 (3, 5)	4 (2, 5)	4 (3, 5)	3 (2, 4)	4 (3, 5)
Having the following groups in household						
Children (below 18 years)	92 (48)	185 (67)	72 (25)	97 (50)	14 (19)	460 (45)
Persons aged 70 or older	34 (18)	141 (51)	68 (24)	39 (20)	11 (15)	293 (29)
Pregnant woman	2 (1)	17 (6)	7 (2)	3 (2)	1 (1)	30 (3)
People with serious health conditions	8 (4)	27 (10)	14 (5)	13 (7)	0 (0)	62 (6)
Being a healthcare provider/ worker						
HCW	55 (29)	24 (9)	42 (15)	57 (29)	13 (18)	1919)
- General HCW	15 (8)	13 (5)	0 (0)	25 (13)	2 (3)	55 5)
- Local HCW (Agricultural, forestry and fishery workers)	40 (21)	11 (4)	42 (15)	32 (16)	11 (15)	136 (13)
Non-HCW[1]	136 (71)	253 (91)	244 (85)	137 (71)	59 (82)	829 (81)
Type of income						
Fixed income	79 (41)	121 (44)	160 (56)	31 (16)	23 (32)	414 (41)
Unfixed income	112 (59)	156 (56)	126 (44)	163 (84)	49 (68)	606 (59)
Occupation						
Agricultural, forestry and fishery workers	96 (50)	118 (43)	4 (1)	94 (48)	35 (49)	347 (34)
Others	95 (50)	159 (57)	282 (99)	100 (52)	37 (51)	673 (66)
Tested for COVID-19	17 (9)	16 (6)	11 (4)	51 (26)	1 (1)	96 (9)

[1] Included respondents who were not working

Impacts of COVID-19

Table 2 summarises the economic impacts of COVID-19 and related government interventions. A total of 87% of respondents were working (paid and unpaid work) before the COVID-19 pandemic. Of those who were working, over 80% of them lost some earnings due to the pandemic. Almost 50% had their work hours reduced and experienced temporary closure of their workplace. Approximately 14% had to isolate themselves due to exposure and about 20% had to stop working during the pandemic. A switch to a "new normal" of working from home was reported by 18% of respondents. Among those who have experience working from home, 45% found it convenient and voted to continue working this way even when the pandemic is over. This was especially true among respondents in the Central region.

In Table 3, the majority of the survey participants reported that they lived with an extended family including a partner and children or relatives (76%). The highest concern among people who live with others was financial (over 80%). Those who live with an extended family were also concerned about their increased responsibilities in caring for others, and health issues related to the pandemic. On the contrary, those who live alone tended to be concerned about the impact on their social life, their mental health and wellbeing (64%).

Communication, information and rumours

Table 4 shows the channels Thai residents rely on for information on COVID-19. The patterns of information acquisition on COVID-19 were similar across regions, except for the central region, where face-to-face meetings with healthcare

Table 2. Economic impacts of COVID-19 in each region.

	Northern	Northeastern	Central	Southern	Eastern/ Western	Total
	N=191 (%)	N=277 (%)	N=286 (%)	N=194 (%)	N=72 (%)	N=1,020 (%)
Work status (yes/no) before COVID-19?	165 (86)	246 (89)	229 (80)	183 (94)	65 (90)	888 (87)
Any inconvenience caused by COVID-19						
Loss of earnings	N=163 (%) 143 (88)	N=245 (%) 222 (91)	N=227 (%) 138 (61)	N=182 (%) 168 (92)	N=65 (%) 50 (77)	N=882 (%) 721 (82)
Reduction of working hours	N=164 (%) 79 (48)	N=234 (%) 145 (62)	N=218 (%) 90 (41)	N=178 (%) 45 (25)	N=64 (%) 39 (61)	N=858 (%) 398 (46)
Closure of workplace (temporarily or indefinitely)	N=164 (%) 49 (30)	N=223 (%) 134 (60)	N=222 (%) 85 (38)	N=179 (%) 57 (32)	N=64 (%) 40 (63)	N=852 (%) 365 (43)
Heavier charge of work due to the emergency	N=163 (%) 37 (23)	N=241 (%) 87 (36)	N=221 (%) 55 (25)	N=179 (%) 42 (23)	N=64 (%) 42 (66)	N=868 (%) 263 (30)
Loss of job	N=163 (%) 47 (29)	N=221(%) 52 (24)	N=215 (%) 30 (14)	N=177 (%) 54 (31)	N=64 (%) 10 (16)	N=840 (%) 193 (23)
Temporarily isolated due to exposure	N=162 (%) 28 (17)	N=225 (%) 25 (11)	N=216 (%) 21 (10)	N=178 (%) 13 (7)	N=64 (%) 33 (52)	N=845 (%) 120 (14)
Work during COVID-19						
No	23 (14)	75 (30)	31 (14)	53 (29)	7 (11)	189 (21)
Yes, implementing smart-working/work from home	25 (15)	26 (11)	92 (40)	8 (4)	7 (11)	158 (18)
Yes, working as usual	117 (71)	145 (59)	106 (46)	122 (67)	51 (78)	541 (61)
Prefer continuing smart-working/work from home after COVID-19	N=25 (%)	N=26 (%)	N=92 (%)	N=8 (%)	N=7 (%)	N=158 (%)
Don't know	1 (4)	13 (50)	10 (11)	2 (25)	1 (14)	27 (17)
No	13 (52)	7 (27)	34 (37)	3 (38)	3 (43)	60 (38)
Yes	11 (44)	6 (23)	48 (52)	3 (38)	3 (43)	71 (45)

Table 3. Self-perceptions and concerns on the pandemic stratified by living arrangements.

	Living alone	Living only with partner/non-relatives	Living with partner and children/relatives	Total	P-value
	N=116 (%)	N=126 (%)	N=778 (%)	N=1,020 (%)	
Concerns when no physical contact/not allowed to go out/allowed to go out only for essential needs					
Financial (e.g. loss of income, loss of job)	N=114 (%) 71 (62)	N=124 (%) 103 (83)	N=773 (%) 659 (85)	N=1,011 (%) 833 (82)	<0.001
Physical health (e.g. not being able to attend doctor appointments, medication supply for illnesses, lack of exercise)	N=115 (%) 79 (69)	N=124 (%) 79 (64)	N=765 (%) 541 (71)	N=1,004 (%) 699 (70)	0.28
Caring responsibilities (e.g. childcare, caring for elderly parents, not having access to care)	N=114 (%) 70 (61)	N=124 (%) 75 (60)	N=762 (%) 527 (69)	N=1,000 (%) 672 (67)	0.061
Mental health and wellbeing (e.g. boredom, loneliness, anxiety, depression)	N=112 (%) 72 (64)	N=124 (%) 66 (53)	N=740 (%) 446 (60)	N=976 (%) 584 (60)	0.20
Social (e.g. not being able to see friends or attend social or family events)	N=112 (%) 72 (64)	N=124 (%) 70 (56)	N=753 (%) 430 (57)	N=989 (%) 572 (58)	0.34
Infrastructure (e.g. access to transport, network services, internet access)	N=111 (%) 53 (48)	N=123 (%) 62 (50)	N=726 (%) 370 (51)	N=960 (%) 485 (51)	0.82
Living arrangements (e.g. not enough living space, passing on illness to family members, domestic abuse)	N=111 (%) 49 (44)	N=123 (%) 57 (46)	N=734 (%) 382 (52)	N=968 (%) 488 (50)	0.19
Religious and spiritual (e.g. not being able to go to church, mosque, temple etc.)	N=110 (%) 46 (42)	N=123 (%) 61 (50)	N=753 (%) 349 (46)	N=986 (%) 456 (46)	0.49
Professional/career progression	N=111 (%) 58 (52)	N=122 (%) 66 (54)	N=729 (%) 313 (43)	N=962 (%) 437 (45)	0.022
Sports (e.g. participating in competitive or professional sports activities)	N=112 (%) 58 (52)	N=123 (%) 58 (47)	N=724 (%) 314 (43)	N=959 (%) 430 (45)	0.21
Recreational (e.g. not being able to access recreational facilities like cinemas or restaurants, cancelled sports or cultural events)	N=112 (%) 66 (59)	N=123 (%) 61 (50)	N=740 (%) 306 (41)	N=975 (%) 433 (44)	0.001

professionals seemed to be limited. Traditional media, such as television, radio and newspapers, were the most common channels of communications. The government had made an effort to broadcast updates on the situations both on the national and global levels daily at midday, right from the beginning of the pandemic. A large proportion of Thai residents use mobile chat applications such as LINE, WhatsApp and Facebook messenger. This was reflected in the survey, with 88% of respondents indicating that they received information on social media or messenger apps. When it came to sharing information about COVID-19, 40% shared COVID-related information 1 to 3 times per month, less than 10% shared the information "very often", whereas 16% reported that they did not share any information.

People in all regions, except the Southern region, prefer to receive news from traditional media (92%), social media (87%) and government webpages (85%). More than 80% of the survey participants in all regions also prefer face-to-face communication, except for the central region where only 58% selected this option. University web pages, the WHO web page and scientific journals were not popular channels for COVID-19 information among Thai residents (less than 50%). When comparing the respondents' received and preferred channels of information, traditional media, social media and government/institution's web page remained the three most popular channels of information. There was a small increase in preferred channel of information received among face-to-face, print materials, online and government/institution's web page compared with what have been received. There was a larger increase in preferred channel of information received among the academic sectors such as universities, WHO and scientific journals compared with how they did receive.

Table 5 summarised that many people had received unclear or conflicting information, especially about government support

Table 4. Communication, information and rumours.

	Northern	Northeastern	Central	Southern	Eastern/Western	Total
	N=191 (%)	N=277 (%)	N=286 (%)	N=194 (%)	N=72 (%)	N=1,020
How do/did you receive information about COVID-19?						
Traditional media (TV, radio, newspapers)	188 (98)	272 (98)	275 (96)	160 (82)	71 (99)	966 (95)
Social media and messenger apps	169 (88)	248 (90)	266 (93)	163 (84)	54 (75)	900 (88)
Government/institution's web page	158 (83)	239 (86)	226 (79)	130 (67)	65 (90)	818 (80)
Online (websites, email)	128 (67)	208 (75)	242 (85)	132 (68)	49 (68)	759 (74)
Face-to-face (e.g. doctors or health workers)	165 (86)	256 (92)	103 (36)	149 (77)	54 (75)	727 (71)
Print materials (leaflets, brochures)	121 (63)	182 (66)	95 (33)	78 (40)	52 (72)	528 (52)
WHO (World Health Organisation) web page	53 (28)	46 (17)	106 (37)	42 (22)	24 (33)	271 (27)
Scientific journals	50 (26)	39 (14)	112 (39)	38 (20)	20 (28)	259 (25)
University web pages	51 (27)	43 (16)	86 (30)	46 (24)	11 (15)	237 (23)
How often do/did you share information about COVID-19 in the last month?						
Not at all	19 (10)	57 (21)	22 (8)	56 (29)	8 (11)	162 (16)
A little (1–3 per month)	91 (48)	118 (43)	122 (43)	59 (30)	23 (32)	413 (40)
Some (4–6 per month)	36 (19)	66 (24)	80 (28)	41 (21)	25 (35)	248 (24)
Often (7–9 per month)	28 (15)	20 (7)	35 (12)	22 (11)	10 (14)	115 (11)
Very often (10 or over per month)	17 (9)	16 (6)	27 (9)	16 (8)	6 (8)	82 (8)
How would you prefer to receive information about COVID-19?						
Media (TV, radio, newspapers)	182 (95)	264 (95)	265 (93)	161 (83)	67 (93)	939 (92)
Social media and messenger apps	166 (87)	240 (87)	256 (90)	166 (86)	55 (76)	883 (87)
Government/institution's web page	170 (89)	238 (86)	248 (87)	144 (74)	66 (92)	866 (85)
Face-to-face (e.g. doctors or health workers)	168 (88)	264 (95)	165 (58)	164 (85)	58 (81)	819 (80)
Online (websites, email)	133 (70)	207 (75)	244 (85)	141 (73)	56 (78)	781 (77)
Print materials (leaflets, brochures)	123 (64)	195 (70)	130 (45)	103 (53)	48 (67)	599 (59)
WHO (World Health Organisation) web page	76 (40)	81 (29)	167 (58)	73 (38)	57 (79)	454 (45)
Scientific journals	72 (38)	69 (25)	152 (53)	75 (39)	53 (74)	421 (41)
University web page	74 (39)	72 (26)	125 (44)	80 (41)	48 (67)	399 (39)

Table 5. Unclear or conflicting information about COVID-19 and level of understanding.

	Northern	Northeastern	Central	Southern	Eastern/ Western	Total	P-value
	N=191 (%)	N=277 (%)	N=286 (%)	N=194 (%)	N=72 (%)	N=1,020	
Have you seen any unclear or conflicting information about COVID-19 in the last month?							
Government support schemes (e.g. financial)	94 (49)	139 (50)	191 (67)	114 (59)	59 (82)	597 (59)	<0.001
Penalties if disobey restrictions	59 (31)	122 (44)	166 (58)	66 (34)	59 (82)	472 (46)	<0.001
Ways to avoid the infection	53 (28)	104 (38)	156 (55)	116 (60)	22 (31)	451 (44)	<0.001
Numbers of coronavirus cases/deaths related to COVID-19	57 (30)	107 (39)	156 (55)	89 (46)	26 (36)	435 (43)	<0.001
Symptoms	55 (29)	100 (36)	167 (58)	97 (50)	23 (32)	442 (43)	<0.001
Quarantine/isolation	57 (30)	97 (35)	149 (52)	82 (42)	29 (40)	414 (41)	<0.001
Travel restrictions (e.g. curfew, restricted hours of movement)	53 (28)	105 (38)	153 (53)	64 (33)	29 (40)	404 (40)	<0.001
Risks in case of infection	45 (24)	109 (39)	164 (57)	63 (32)	19 (26)	400 (39)	<0.001
Testing	67 (35)	98 (35)	153 (53)	60 (31)	19 (26)	397 (39)	<0.001
What to do in case of symptoms	49 (26)	95 (34)	149 (52)	74 (38)	19 (26)	386 (38)	<0.001
Social distancing guidance	53 (28)	96 (35)	132 (46)	76 (39)	22 (31)	379 (37)	<0.001
How confident do you feel that you can recognize fake news about COVID-19?							<0.001
Not at all	8 (4)	5 (2)	26 (9)	7 (4)	0 (0)	46 (5)	
A little	2 (1)	18 (6)	43 (15)	50 (26)	6 (8)	119 (12)	
Some	90 (47)	119 (43)	110 (38)	64 (33)	29 (40)	412 (40)	
A lot	82 (43)	113 (41)	96 (34)	66 (34)	35 (49)	392 (38)	
Very high/expert level	9 (5)	22 (8)	11 (4)	7 (4)	2 (3)	51 (5)	
How would you rate your level of understanding of COVID-19?							<0.001
Not at all	0 (0)	0 (0)	0 (0)	2 (1)	0 (0)	2 (0)	
A little	4 (2)	4 (1)	7 (2)	8 (4)	1 (1)	24 (2)	
Some	91 (48)	106 (38)	89 (31)	49 (25)	12 (17)	347 (34)	
A lot	88 (46)	140 (51)	175 (61)	123 (63)	54 (75)	580 (57)	
Very high/expert level	8 (4)	27 (10)	15 (5)	12 (6)	5 (7)	67 (7)	

schemes (59%) and penalties for disobeying government restrictions (46%). These two topics were particularly highlighted in the Eastern and Western regions (82%). The percentage of unclear and conflicting information was highest among people from the Central region, i.e. above 50% in almost all topics except social distancing guidance (46%). The respondents felt that information related to the detection and control including social distancing guideline, dealing with symptoms, testing and risks from infection was the least conflicting information among all others, i.e. less than 40% in general. When asked about the ability to recognise fake news, around 5% admitted that they could not recognise fake news at all, while

another 5% said they were very confident at recognising fake news. Almost 60% of respondents rated their level of understanding about COVID-19 as high, and 7% rated their level of understanding as 'expert level'. Very few respondents (0.2%) indicated that they knew nothing about COVID-19 in our survey.

Coping and compliance with public health measures

From Table 6, over 92% of respondents reported that they changed their social behavior even before the implementation of government mandated strategies. A total of 94% reported socially distancing themselves from others, and 85% avoided physical contact with the older people and those with serious underlying conditions. A total 97% used personal protective equipment (e.g. masks) and 95% used sanitizer products even before government advice. Less than 50% moved from home to stay with parents/relatives. There was little variation in the reactions among the HCW and non-HCW group in coping and compliance indicators.

Around 35% reported that they could stay at home beyond 14 days without seeing family and friends outside their home, 45% would be able to manage beyond 14 days at home, assuming that they have sufficient supplies of food and essential items, and 44% could manage beyond 14 days when allowed to go out for essential items or work only. Local HCWs were most able to keep social distancing longer than other groups. Of local HCWs, 35% said that they would be willing to be home quarantined for 29 days or longer, while the responses from the general HCW and non-HCW were only 5 and 19%, respectively. The most acceptable length of time for self-quarantine among all groups was between 8 and 14 days in most circumstances.

From Table 7, on average 90% of the respondents across the regions answered that they would comply with government enforced or voluntary quarantine/isolation/social distancing. In all regions, over 90% (99% in some regions) of respondents agreed that the restrictions were necessary to control COVID-19. The majority seemed to be able to find ways to cope with the restrictions: More than 80% reported using social media for communication, engaging in self-care and exercising, and watching movies.

Discussion

Our survey suggests that good understanding of disease, interventions and the positive perceptions towards government interventions may have contributed to the success of the disease control we see for Thailand during the first outbreak of COVID-19. Positive perception of and level of tolerance for the enforced interventions were high. In general, respondents tended to cope well with the government implementation of control interventions including quarantine/isolation/social distancing, and found activities such as being connected using social media and self-caring exercises to be necessary.

A large proportion of the population in Bangkok and other cities have already been wearing masks to protect themselves from PM2.5 air pollutants since the end of 2019[14]. The biggest

impacts felt by Thai residents during the first wave of the pandemic were loss of income, concerns of physical health and increased caring responsibilities. This particularly applied to those who live with extended family, which is common in the country. People who live alone tended to be concerned about mental health and their social life.

The impacts on the Thai economy have been significant, because the country has been an important trade and tourism hub. The COVID-19 pandemic hit a significant number of local small and medium-sized enterprises (SMEs) hard, with these having generated 43% of Thailand's GDP in 2019. Prior to COVID-19, the unemployment rate was approximately 1% in 2019 and now a survey suggested that the figure could reach 10%[15]. A decline of the Thai economy by 5% in 2020 is projected to be the sharpest in the East Asia and Pacific Regions[16]. The tourism sector in the country accounts for approximately 15% of the GDP. China is Thailand's biggest source of foreign tourists, accounting for 28 percent of the 39.8 million visitors last year[17]. This was reflected in our survey results, as a very high number of respondents reported loss of earnings.

Good communication during the pandemic is essential to keep people informed on the national and global situation, and to remind people to comply with the government strategies. A previous study reported a significant increase in the level of anxiety among Thai residents, especially among the younger generation[18] and healthcare workers[19]. Anxiety was said to be motivating both desirable and undesirable behaviours during pandemic outbreaks. Effective and targeted communication by trusted sources is needed to motivate preventive actions[18]. The daily briefings of Thailand's Centre for COVID-19 Situation Administration (CCSA) on a national and global scale have been broadcast early since January on the Government's website and others. Public messaging and social media should support public health responses by teaming up with the Government in providing consistent, simple and clear messaging, since either positive or negative messages can influence the public[20].

This study showed a high level of cooperation by people to the government-enforced or voluntarily controls such as quarantine, isolation and social distancing regardless of geographical regions. There was a high level of cooperation by people to the government-enforced or voluntarily controls such as quarantine, isolation and social distancing regardless of geographical regions or being HCW, almost 18% of all respondents. In addition, local HCWs indicated the highest tolerance for longer self-quarantine in all circumstances, possibly due to the nature of their work of non-business type with fixed income. Further studies on perspectives of healthcare workers would be useful for confirming this. Similar level of coping and compliance during the pandemic among people indicated that the population in general had received good information about COVID-19, government strategies and good health practices.

There has been a lot of public health messaging on face mask wearing and hand hygiene on Thai mass media channels

Table 6. Perceptions and compliance towards interventions among healthcare and general population.

	general HCW	local HCW	Non-HCW	Total
	N=55 (%)	N=125 (%)	N=764 (%)	N=1,020
Changing social behaviour before the implementation of government	50 (91)	125 (92)	764 (92)	939 (92)
If 'yes' how social behaviour changed before the implementation of government restrictions?				
Use of personal protection equipment (e.g. masks and gloves)	N=49 (%) 48 (98)	N=123 (%) 110 (89)	N=758 (%) 741 (98)	N=930 (%) 899 (97)
Use of sanitizer products and alcohol	N=48 (%) 47 (98)	N=121 (%) 109 (90)	N=737 (%) 709 (96)	N=906 (%) 865 (95)
No physical contact with anyone	N=49 (%) 48 (98)	N=124 (%) 117 (94)	N=758 (%) 711 (94)	N=931 (%) 876 (94)
No physical contact only with elderly and those with serious underlying conditions	N=48 (%) 45 (94)	N=122 (%) 102 (84)	N=715 (%) 606 (85)	N=885 (%) 753 (85)
Going out only for essential needs/work	N=49 (%) 45 (92)	N=121 (%) 104 (86)	N=753 (%) 705 (94)	N=923 (%) 854 (93)
Moving from home to stay with parents/relatives	N=48 (%) 24 (50)	N=122 (%) 55 (45)	N=715 (%) 356 (50)	N=885 (%) 435 (49)
Maximum number of days you think you could cope without seeing anyone except the household members				
1	2 (4)	4 (3)	62 (7)	68 (7)
2–7	24 (44)	29 (21)	231 (28)	284 (28)
8–14	22 (40)	33 (24)	255 (31)	310 (30)
15–21	2 (4)	15 (11)	75 (9)	92 (9)
22–28	2 (4)	8 (6)	48 (6)	58 (6)
more than 28 days	3 (5)	47 (35)	158 (19)	208 (20)
Maximum number of days you think you could cope with not going out in public, assuming that you have sufficient supplies of food, medicines and other essential items				
1	3 (5)	3 (2)	39 (5)	45 (4)
2–7	11 (20)	25 (18)	199 (24)	235 (23)
8–14	18 (33)	23 (17)	238 (29)	279 (27)
15–21	8 (15)	10 (7)	71 (9)	89 (9)
22–28	5 (9)	13 (10)	78 (9)	96 (9)
more than 28 days	10 (18)	62 (46)	204 (25)	276 (27)
Maximum number of days you think you could cope with going out only for essential needs/work				
1	2 (4)	3 (2)	37 (4)	42 (4)
2–7	18 (33)	24 (18)	200 (24)	242 (24)
8–14	19 (35)	29 (21)	238 (29)	286 (28)
15–21	9 (16)	15 (11)	72 (9)	96 (9)
22–28	5 (9)	8 (6)	74 (9)	87 (9)
more than 28 days	2 (4)	57 (42)	208 (25)	267 (26)

Table 7. Opinions and methods for coping with government enforced or voluntary quarantine/isolation/social distancing.

	Northern	Northeastern	Central	Southern	Eastern/Western	Total	p-value
	N=191 (%)	N=277 (%)	N=286 (%)	N=194 (%)	N=72 (%)	N=1,020	
Statement							
I would comply with government enforced quarantine/isolation/social distancing							<0.001
Strongly disagree	2 (1)	1 (0)	9 (3)	7 (4)	0 (0)	19 (2)	
Slightly disagree	1 (1)	3 (1)	6 (2)	7 (4)	0 (0)	17 (2)	
Neither agree nor disagree	0 (0)	7 (3)	17 (6)	43 (22)	5 (7)	72 (7)	
Slightly agree	70 (37)	136 (49)	117 (41)	97 (50)	46 (64)	466 (46)	
Strongly agree	118 (62)	130 (47)	137 (48)	40 (21)	21 (29)	446 (44)	
I would enter voluntary quarantine/isolation/ social distancing for social distancing							<0.001
Strongly disagree	2 (1)	1 (0)	6 (2)	4 (2)	0 (0)	13 (1)	
Slightly disagree	0 (0)	2 (1)	1 (0)	4 (2)	0 (0)	7 (1)	
Neither agree nor disagree	6 (3)	14 (5)	32 (11)	20 (10)	4 (6)	76 (7)	
Slightly agree	93 (49)	161 (58)	126 (44)	117 (60)	45 (63)	542 (53)	
Strongly agree	90 (47)	99 (36)	121 (42)	49 (25)	23 (32)	382 (37)	
Agreement with quarantine/ isolation/social distancing (Yes/No)							
I have been/would be able to participate in my work life.	189 (99)	272 (98)	278 (97)	188 (97)	70 (97)	997 (98)	0.63
I have been/would be able to participate in my private life.	189 (99)	272 (98)	279 (98)	183 (94)	70 (97)	993 (97)	0.048
It is a necessary strategy to help control COVID-19.	190 (99)	275 (99)	281 (98)	176 (91)	71 (99)	993 (97)	<0.001
Methods for coping with quarantine/isolation/social distancing							
Connecting with others (e.g. via phone, online or social media)	185 (97)	263 (95)	276 (97)	184 (95)	72 (100)	980 (96)	0.28
Self-care (e.g. exercise, healthy eating, meditation)	168 (88)	254 (92)	251 (88)	164 (85)	64 (89)	901 (88)	0.21
Engage in hobbies or learn new skills	156 (82)	254 (92)	251 (88)	119 (61)	55 (76)	835 (82)	<0.001
Watching movies or series (e.g. TV, Netflix)	159 (83)	227 (82)	250 (87)	123 (63)	59 (82)	818 (80)	<0.001
Finding alternative ways for things I enjoy doing (e.g. online classes or meetings)	148 (77)	212 (77)	245 (86)	118 (61)	60 (83)	783 (77)	<0.001

and healthcare networks. A recent study among COVID-19 patients and their contacts in Thailand showed that wearing masks, washing hands and social distancing were strongly associated with lower risk of COVID-19 infections[21]. The evidence that mask wearing can help protect people from the infection has become more obvious, and this has resulted in updates of international guidelines related to mask wearing[22,23]. The level of compliance of mask wearing is high in public areas. In addition, people had a sense of social responsibility to help the country get through this crisis by not letting their guard down, keeping social distance, wearing a face mask/cloth mask, and frequently washing hands[24].

This study is one of a few studies that assessed the impact and perceptions of COVID-19 and its public health measures on the general population in Thailand. Others focused on healthcare worker or on mental health issues[19,25]. Our online survey provided real-time responses for monitoring the public perception over time while the situation and policy decisions were very dynamic.

However, one limitation of online survey was limited access to smartphone and digital technology in some settings such as rural areas of Thailand. This was unavoidable as we could not have feasibly conducted a paper-based survey during a pandemic. Our recruitment strategy was non-purposive thus the survey cohort are not nationally representative. We have tried to minimize this bias by using a professional polling service with a wide network of contacts. The findings from this study can be incorporated into government planning to control the pandemic and improve communications with the general public in the future.

Data availability

Underlying data
Zenodo: Dataset for: Perspectives on public health interventions in the management of the COVID-19 pandemic in Thailand, http://doi.org/10.5281/zenodo.4030513[13].

This project contains the following underlying data:

- Dataset - Online survey Social, ethical and behavioural aspects of COVID-19 (SEBCOV)_Thailand.xlsx (Survey responses)

Extended data
Zenodo: Online survey questions: Social, ethical and behavioural aspects of COVID-19, http://doi.org/10.5281/zenodo.4049821[6].

This project contains the following extended data:

- SEBCOV_Survey_AllVersions_V1.0_24Apr2020.pdf (Survey questions)

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

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Open Peer Review

Current Peer Review Status: ✓ ✓

Version 3

Reviewer Report 15 July 2021

https://doi.org/10.21956/wellcomeopenres.18846.r44984

✓ **Robin Goodwin** [ID]

Department of Psychology, University of Warwick, Coventry, UK

Juthatip Wiwattanapantuwong [ID]

Department of Psychology, Chulalongkorn University, Bangkok, Thailand

Thank you the authors for the revision. We are happy with this version of the manuscript.

Competing Interests: No competing interests were disclosed.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 15 July 2021

https://doi.org/10.21956/wellcomeopenres.18846.r44983

✓ **Pilasinee Wongnuch**

School of Health Sciences, Mae Fah Luang University, Chiang Rai, Thailand

Thank you for the opportunity to review this interesting paper on this really important topic. This revision has better balance and response to all reviewer comments, I have no further comments to make.

I look forward to hearing this paper has been indexed, the content including the recommendations will reach those who need it.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Medical anthropology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 2

Reviewer Report 29 June 2021

https://doi.org/10.21956/wellcomeopenres.18119.r44572

?

Pilasinee Wongnuch

School of Health Sciences, Mae Fah Luang University, Chiang Rai, Thailand

This study highlights the impacts and perceptions of COVID-19 and its public health measures on the general population in Thailand which collecting the data through online survey. 1,020 participants from all regions were recruited. The results have shown the economic impacts of COVID-19 and related government interventions especially trade and tourism hub. While the cooperation by people to the government-enforced or voluntarily controls was a high level. It is indeed a timely and interesting piece of research. May I please make the following suggestions to your manuscript? Thank you.

1. The Method section:
Study participants and recruitment
In case of sampling technique, if you could please consider revising this section with probability method by using a list-based sampling frame which conducted via e-mail addresses and social media accounts, including non-probability sampling methods with unrestricted self-selected surveys by posting invitations to participate via recruitment posters. (I highly recommended the article of Ronald D. Fricker. (2008). Sampling Methods for Online Surveys, https://study.sagepub.com/sites/default/files/Fricker.pdf). Perhaps you would give some citations to support that method. This would add to the strength of the academic foundation of your manuscript.

Sample size
1,020 participants provide enough support for your finding credibility, if you could please consider revising this section to focus more on the sample size calculation by using the prevalence of preparedness or health behavior for COVID-19 prevention from a previous study in a familiar population. I think it would support the academic merit for your paper.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Medical anthropology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 08 December 2020

https://doi.org/10.21956/wellcomeopenres.18119.r41705

✔ **Robin Goodwin** [iD]
Department of Psychology, University of Warwick, Coventry, UK
Juthatip Wiwattanapantuwong [iD]
Department of Psychology, Chulalongkorn University, Bangkok, Thailand

We have now looked at the revised paper and are very grateful for the amendments made by the author. We thank them for their hard work and pleased to provide our approval of the revision.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 23 October 2020

https://doi.org/10.21956/wellcomeopenres.17903.r41002

? **Juthatip Wiwattanapantuwong** [ID]
Department of Psychology, Chulalongkorn University, Bangkok, Thailand
Robin Goodwin [ID]
Department of Psychology, University of Warwick, Coventry, UK

Studying behavioural adaptation to COVID-19 and subsequent preventive behaviour is an important topic for research, and as the first country to experience cases of this novel coronavirus outside of Thailand this is an important nation for analysis. Bangkok is the world's most visited city and therefore the implications of potential spread were indeed far reaching. As of late October 2020 Thailand has dealt very well with the outbreak, with relatively low numbers of cases and small rates of morbidity, thus helping provide a possible model for rapid and successful intervention early on in an outbreak.

The submitted manuscript is well written and structured, with generally clear information about the process of participant recruitment and the data analysis. The authors conducted an online survey in Thailand during May 2020 using snowball sampling and a reasonably-large sample

(N=1020). (Purely by coincidence our team at Chulalongkorn/Warwick Universities were conducting a similar sized nationally representative face-to-face survey at the very same time, funded by a small GCRF grant awarded to Warwick and working with a national Thai survey company). The team at the Mahidol-Oxford Tropical Medicine Research Unit piloted their questionnaire in five different countries. Despite the online method the team managed to obtain a reasonable number of older respondents, often difficult to gather through the methods they employed.

Respondents' greatest concern was over the economic impact of the coronavirus, no doubt reflecting the profound impact of the virus on the tourist industry as well as other sectors. Respondents had a clear preference for information on traditional media (something we also found in our cotemporaneous national survey); they also reported high levels of preference for social media, although this may partly reflect the online nature of the study. The respondents report high levels of anticipatory compliance (even before government enforcement). This may reflect the considerable number of community activities that actively encouraged this, even within more remote settings. The authors rightly conclude that carefully targeted information is vital; to be most efficacious this is likely to stress both personal health and economic benefits of preventive action plus the wider societal gains from such action.

The work is interesting and important, but we have some suggestions for minor improvements that could further strengthen the paper.

1. It would be useful to provide detail of the number of respondents per region (e.g. were most in Bangkok?). This should be in the main text rather than the underlying datasets.

2. More information on the scales used would be useful (e.g. are they allowing multiple answers, what were scale end points)?

3. We note that, on p.4, the authors discuss occurrence of fake news items and self-reported understanding of COVID-19 but we could not see these discussed in any further detail later in the article.

4. For Table 2 'inconvenience caused by COVID-19' , and Table 5 'how social behaviour changed before the implementation of government restrictions?', please mention the reason why the N for each column differed from others in the same column.

5. Table 3, please confirm that when the authors mention examples in the categories; such as, financial (e.g. loss of income, loss of job), were these asked as separate items?

6. For all tables, we suggest the authors arrange items in the same topic by frequency order.

7. When the authors mentioned % of the way participants 'receive' and 'prefer to receive' the information, It would be helpful if the authors consider the ways there are differences in scores between those these two. While 'traditional media' are mostly mentioned for both questions, they preferred to receive them 'less' than they already received (not clear if this is statistically significant or not). In contrast, the number of participants who preferred to receive information about COVID-19 via the university website, WHO, and scientific journals are clearly higher than those who mentioned they received such information.

8. Having 17.65% of participants as health care workers, and participants from every area in Thailand, it would be helpful if the authors could provide more implications of their findings related to these occupational/regional variables.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Partly

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Psychology (social psychology, health psychology).

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Author Response 17 Nov 2020
Wirichada Pan-ngum, Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand

Dear Dr. Juthatip Wiwattanapantuwong, Prof. Robin Goodwin, and Editor

Thank you for the constructive comments, suggestions and critiques. We have responded point-by-point below in *Italic* and some points involved revising the manuscript which we are submitting.

Yours sincerely,

Wirichada Pan-ngum (corresponding author)

##
Studying behavioural adaptation to COVID-19 and subsequent preventive behaviour is an important topic for research, and as the first country to experience cases of this novel

coronavirus outside of Thailand this is an important nation for analysis. Bangkok is the world's most visited city and therefore the implications of potential spread were indeed far reaching. As of late October 2020 Thailand has dealt very well with the outbreak, with relatively low numbers of cases and small rates of morbidity, thus helping provide a possible model for rapid and successful intervention early on in an outbreak.

Thank you for the great introduction and couldn't agree more.

The submitted manuscript is well written and structured, with generally clear information about the process of participant recruitment and the data analysis. The authors conducted an online survey in Thailand during May 2020 using snowball sampling and a reasonably-large sample (N=1020). (Purely by coincidence our team at Chulalongkorn/Warwick Universities were conducting a similar sized nationally representative face-to-face survey at the very same time, funded by a small GCRF grant awarded to Warwick and working with a national Thai survey company). The team at the Mahidol-Oxford Tropical Medicine Research Unit piloted their questionnaire in five different countries. Despite the online method the team managed to obtain a reasonable number of older respondents, often difficult to gather through the methods they employed.

Despite limited use of smartphones and computers among the elderly in general, we were able to recruit 6% (62/1020) from population aged 65 and more through the online survey. There was a similar proportion of population from this group from different regions of Thailand.

Respondents' greatest concern was over the economic impact of the coronavirus, no doubt reflecting the profound impact of the virus on the tourist industry as well as other sectors. Respondents had a clear preference for information on traditional media (something we also found in our cotemporaneous national survey); they also reported high levels of preference for social media, although this may partly reflect the online nature of the study. The respondents report high levels of anticipatory compliance (even before government enforcement). This may reflect the considerable number of community activities that actively encouraged this, even within more remote settings. The authors rightly conclude that carefully targeted information is vital; to be most efficacious this is likely to stress both personal health and economic benefits of preventive action plus the wider societal gains from such action.

The work is interesting and important, but we have some suggestions for minor improvements that could further strengthen the paper.
It would be useful to provide detail of the number of respondents per region (e.g. were most in Bangkok?). This should be in the main text rather than the underlying datasets.

The number of respondents per region was provided in the Table 1. We have added to the main text the description to say "The breakdown of respondents by region is as follows: Central (28%), Northeastern (27%), Southern (19%), Northern (19%) and Eastern/Western (7%)."

More information on the scales used would be useful (e.g. are they allowing multiple answers, what were scale end points)?

We have added to the method section in the study design "The 5-point Likert-scale, ranged from strongly agree to strongly disagree, was used for opinions on statements reflecting the opinions on the government restrictions".

We note that, on p.4, the authors discuss occurrence of fake news items and self-reported understanding of COVID-19 but we could not see these discussed in any further detail later in the article.

We have followed the advice from the reviewers and added an extra table (Table 5) to discuss the possible topics of fake news, level of confidence among the respondents in recognizing this, and self-reported understanding of COVID-19.

Extra text to describe the conflicting information and confidence about recognition of fake news goes in the end of section 3.3

"In summary, many people had received unclear or conflicting information, especially about government support schemes (59%) and penalties for disobeying government restrictions (46%). These two topics were particularly highlighted in the Eastern and Western regions (82%). The percentage of unclear and conflicting information was highest among people from the Central region, i.e. above 50% in almost all topics except social distancing guidance (46%). The respondents felt that information related to the detection and control including social distancing guideline, dealing with symptoms, testing and risks from infection was the least conflicting information among all others, i.e. less than 40% in general. When asked about the ability to recognise fake news, around 5% admitted that they could not recognise fake news at all, while another 5% said they were very confident at recognising fake news. Almost 60% of respondents rated their level of understanding about COVID-19 as high, and 7% rated their level of understanding as 'expert level'. Very few respondents (0.2%) indicated that they knew nothing about COVID-19 in our survey. "

For Table 2 'inconvenience caused by COVID-19', and Table 5 'how social behaviour changed before the implementation of government restrictions?', please mention the reason why the N for each column differed from others in the same column.

In Table 2, 3 and 5 we specified the number of those who responded to each question and used this number as the denominator instead of the total number of respondents in the main column headings. Basically, the missing responses were not taken into the calculations.

Table 3, please confirm that when the authors mention examples in the categories; such as, financial (e.g. loss of income, loss of job), were these asked as separate items?

In Table 3, 'loss of income' and 'loss of job' were combined under one question about 'financial concerns'.

For all tables, we suggest the authors arrange items in the same topic by frequency order.

We have followed the reviewer's suggestion and make appropriate corrections in
*Table 2: **Any inconvenience caused by COVID-19***

Table 3: **Concerns when no physical contact/not allowed to go out/allowed to go out only for essential needs**
Table 4: **How do/did you receive information about COVID-19?**
And **How would you prefer to receive information about COVID-19?**
New Table 5 : **Have you seen any unclear or conflicting information about COVID-19 in the last month?**
New Table 6: **If 'yes' how social behaviour changed before the implementation of government restrictions?**
New Table 7: **Methods for coping with quarantine/isolation/social distancing**

When the authors mentioned % of the way participants 'receive' and 'prefer to receive' the information, It would be helpful if the authors consider the ways there are differences in scores between those these two. While 'traditional media' are mostly mentioned for both questions, they preferred to receive them 'less' than they already received (not clear if this is statistically significant or not). In contrast, the number of participants who preferred to receive information about COVID-19 via the university website, WHO, and scientific journals are clearly higher than those who mentioned they received such information.

We added to the text
"In Table 4 when comparing the respondents' received and preferred channels of information, traditional media, social media and government/institution's web page remained the three most popular channels of information. There was a small increase in preferred channel of information received among face-to-face, print materials, online and government/institution's web page compared with what have been received. There was a larger increase in preferred channel of information received among the academic sectors such as universities, WHO and scientific journals compared with how they did receive. "

Having 17.65% of participants as health care workers, and participants from every area in Thailand, it would be helpful if the authors could provide more implications of their findings related to these occupational/regional variables.

In our study, around 18% of the respondents were in healthcare sectors, both fulltime (5%) and health volunteer staff or local HCW (13%). The fact that similar level of coping and compliance during the pandemic was obtained between HCW and non-HCW, indicated that the Thai population in general had received good information about COVID-19, government strategies and good health practices. Local HCWs indicated the highest tolerance for longer self-quarantine in all circumstances, possibly due to the nature of their work of non-business type with fixed income. Further studies on perspectives of healthcare workers would be useful for confirming this.

We have adjusted the discussion to include this point in the revised version.
"This study showed a high level of cooperation by people to the government-enforced or voluntarily controls such as quarantine, isolation and social distancing regardless of geographical regions or being HCW, almost 18% of all respondents. In addition, local HCWs indicated the highest tolerance for longer self-quarantine in all circumstances, possibly due to the nature of their work of non-business type with fixed income. Further studies on perspectives of healthcare workers would be useful for confirming this.

Similar level of coping and compliance during the pandemic among people indicated that the the population in general had received good information about COVID-19, government strategies and good health practices."

Competing Interests: No competing interests were disclosed.