

**Public knowledge, perception and communication behavior surrounding COVID-19 in Malaysia**

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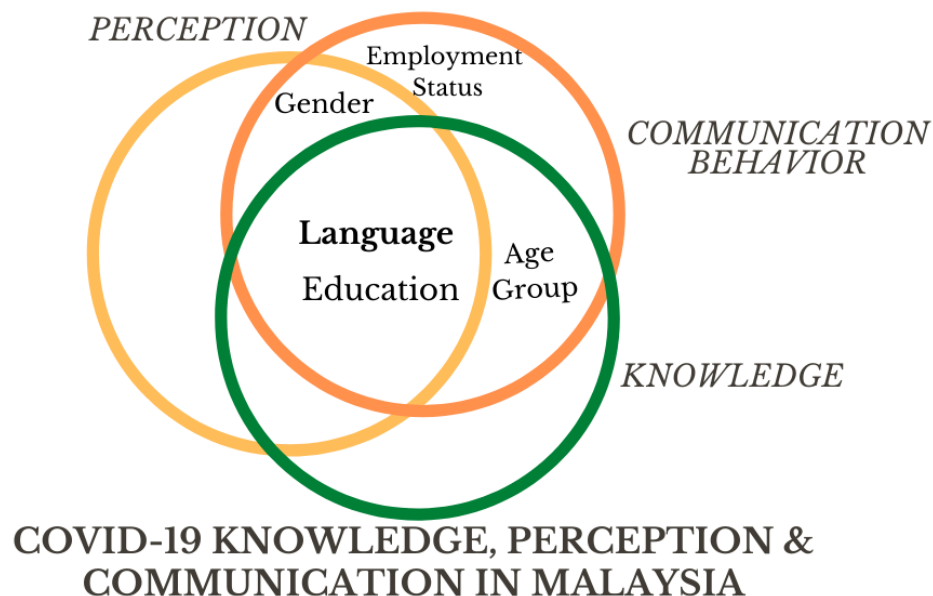
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## Abstract

The COVID-19 pandemic is the first to occur in an age of hyperconnectivity. With unprecedented disruption to the daily activities of billions of people globally, the pandemic has also reinforced the importance of communication in eliciting appropriate public response in order to successfully implement public health interventions to contain the outbreak. This paper presents results from an online anonymous survey conducted in Malay, English and Chinese, during the first week of the Movement Control Order in Malaysia (n=1075), which aimed to examine public knowledge, perception and communication behavior in the Malaysian society in the face of a sudden outbreak and extreme social distancing measures. Although the level of public knowledge, risk perception and positive communication behavior surrounding COVID-19 was high, a majority of respondents reported receiving a lot of questionable information. Multinomial logistic regression further identified that responses varied significantly across respondent survey language, gender, age, education level and employment status.

**Keywords:** COVID-19; online survey; public knowledge; science communication



Graphical Abstract

## 1. Introduction

Coronavirus disease 2019 (COVID-19) caused by the Severe Acute Respiratory Syndrome (SARS)-CoV-2 is the first disease caused by a coronavirus to be declared pandemic by the World Health Organization (WHO) [He et. al., 2020]. Malaysia and neighboring Southeast Asian countries, such as Thailand and Singapore, were among the first few countries to report COVID-19 cases outside of China. The COVID-19 epidemic in Malaysia occurred in two waves, the first wave between 24<sup>th</sup> January to 15<sup>th</sup> February amounted to 22 cases, consisting mainly of infected individuals arriving from China and, while the second wave began on 27<sup>th</sup> February, establishing community transmission of COVID-19 [Ministry of Health, 2020]. Following the rapid rise in active cases of the second wave, the Malaysian government ordered a Movement Control Order (MCO) beginning 18<sup>th</sup> March 2020, at which 790 active cases were reported [Prime Minister's Office, 2020]. Besides restrictions on international travel, the MCO instated immediate closure of schools, universities, places of worship, and was progressively implemented with the aid of armed forces to restrict movement of individuals who were not employed in listed essential services [Prime Minister's Office, 2020].

The unprecedented public health interventions to contain COVID-19 ranging from self-regulated social distancing to military-enforced lockdown have caused sudden massive disruptions in global travel, economy, education and daily life for billions of people worldwide [Deng et. al., 2020]. COVID-19 is also the first pandemic to occur in the age of hyperconnectivity, whereby 76% of people living in advanced economies report owning a smartphone and 67% report using social media [Pew Research, 2019]. In contrast to the swine flu/H1N1 pandemic in 2009, during which less than 14% of Malaysians owned a smartphone, currently Malaysia is ranked 29<sup>th</sup> globally, with approximately 66.4% of Malaysians using a smartphone, 24.6 million Malaysians using social networking platforms, and 27.8 million using communication apps, mainly Facebook and Whatsapp, respectively [Malaysian Multimedia and Communications Commission, 2018].

The sudden lockdown in civilian life has widespread implications, but most markedly by moving activities online, including the use of communication platforms such as Skype, Microsoft Teams, Webex and Whatsapp that enable virtual connectivity [Orta-Castañon et. al., 2017]. These platforms enabled not only sustained essential communications across otherwise physically separated groups, but social sharing of information pertaining to the developments of COVID-19, including science communication of basic concepts such as the cause and symptoms of COVID-19, reducing risk of transmission, and the importance of

public health interventions such as social distancing. Even before the MCO, Malaysia, like many countries, has battled the spread of false information, including the brief introduction of an anti-fake news law. But since the MCO, social communication channels have become increasingly flooded with misinformation, such as false reports of infected individuals in various locations and unverified remedies to cure the infection, fueling instances of fear, panic, and false hope.

Motivated by a unique opportunity to assess the state of COVID-19 related science literacies among the Malaysian public, and the communication behavior surrounding the disease and outbreak, we present findings of a rapid anonymous online survey circulated in the first week of the MCO (18<sup>th</sup> March – 25<sup>th</sup> March 2020) in Bahasa Malaysia (Malay), English and Chinese (n=1075 respondents) to estimate the state of knowledge, perception and communication behaviour surrounding COVID-19 in the Malaysian context.

## **2. Methodology**

### **2.1 Online Survey**

An online survey on Survey Monkey consisting 30 items was originally drafted in English then translated to Malay and Chinese by bilingual native speakers. Demographic questions were based on standard categories, while Knowledge, Perception and Communication items based on level of agreement on 5-point Likert Scale.

### **2.2 Data collection**

Responses were collected between March 18<sup>th</sup> to March 25<sup>th</sup>. Links to the survey were distributed via social media, primarily Whatsapp social groups, LinkedIn, and partner websites largely covering urban areas such as Penang, Kuala Lumpur and Selangor. There were no ages or criteria for inclusion set, however the survey was aimed to obtain responses primarily from the 18 years and above age group due to prevalence of smartphone use. The survey collected fully anonymous responses; with recognition of IP address to setting to prevents double entries.

### **2.3 Data Analysis**

Select demographic variables were re-categorized and Likert Scale responses were converted to 3-point scale during analysis. Data were managed in Microsoft Excel, while statistical analysis was conducted in Stata v.10. Items were analysed and discussed by sections: 1)

Knowledge 2) Perception 3) Communication, and by demographic variables. Pearson Chi square test was done for univariate analysis followed by multinomial logistic regression for multivariate analysis. Significance alpha value set to 0.01, but associations for variables of interest that appear significant without reaching statistical significance were also analysed further and discussed. Thematic analysis was conducted on the open-ended responses at the end of the survey. Although 258 open-ended responses were received, only 71 of them appeared meaningful, and therefore analysis was done manually.

### 3. Results

A total of 1075 individuals responded to the survey with average completion time of 5 minutes and 90% completion rate (96-99% for Demographic items, 92% for Knowledge & Perception items, and 89% for Communication items).

#### 3.1 Demographics

A majority of respondents were between 18-24 years of age (29.6%), female (63.8%), Malaysian (97.7%), employed full time (43.8%), holding Bachelor's degree (37.0%), with education as a their professional background (26.2%), belonging to household of 3-6 people (69.2%) and annual household income of less than RM20,000 (26.9%) (Table 1).

Cross tabulation of demographic variables using Pearson Chi square indicate a number of significant associations. Of note are the following: 1) higher proportion of Chinese-survey respondents are 24 years and below (52.9%,  $p = 0.001$ ), in IT & Media (25.6%,  $p < 0.001$ ) and lower proportion in Education field (14.5%,  $p < 0.001$ ); 2) relatively higher proportion of English-survey respondents with Postgraduate/Professional degree (29.4%,  $p < 0.001$ ), and with two or less people in household (23.5%,  $p < 0.001$ ); 3) relatively higher proportion of respondents with less than RM20,000 annual household income were Malay-survey respondents (31.6%,  $p = 0.005$ ); 4) a majority of respondents 24 years and below are students (86.0%,  $p < 0.001$ ), with lowest proportion with Postgraduate/Professional degree (1.5%,  $p < 0.001$ ), and highest proportion with less than RM20,000 annual household income (46.4%,  $p < 0.001$ ); and 5) in general, Education and Household Income were positively associated ( $p < 0.001$ ).

**Table 1. Demographics of Online Survey Respondents (n=1075)**

Characteristic	Category	Frequency (n)	Proportion (%)
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Age (Years) n= 1072	<i>24 years &amp; below</i>	395	36.9
	<i>25-44 years</i>	475	44.3
	<i>45 years &amp; above</i>	202	18.8
Gender n= 1068	<i>Female</i>	672	62.9
	<i>Male</i>	396	37.1
Nationality n=1068	<i>Malaysia</i>	1045	97.9
	<i>Other</i>	23	2.1
Employment Status n=1069	<i>Employed</i>	564	52.8
	<i>Unemployed/Retired</i>	80	7.5
	<i>Student</i>	384	35.9
	<i>Homemaker &amp; Other</i>	41	3.9
(Highest) Education Level n=1067	<i>School (Primary &amp; Secondary) certificate</i>	190	17.8
	<i>Diploma/Undergraduate degree</i>	625	58.6
	<i>Postgraduate/Professional degree</i>	252	23.6
(Professional/ Educational) Field* n=1032	<i>Education</i>	264	25.6
	<i>STEM</i>	72	7
	<i>Production, Utilities, Transport</i>	165	16
	<i>Business</i>	104	10
	<i>Key services (includes medical, social &amp; civil)</i>	222	21.5
	<i>IT &amp; Media</i>	125	12.1
	<i>Other services</i>	80	7.8
Household Size n=1068	<i>2 people or less</i>	168	15.7
	<i>3 - 6 people</i>	744	69.7
	<i>7 people or more</i>	156	14.6
(Annual) Household Income** n=1063	<i>Less than RM20,000</i>	286	26.9
	<i>RM20,000 to RM49,999</i>	230	21.6
	<i>Over RM 50,000</i>	312	29.4
	<i>Prefer not to say</i>	235	22.1
Survey Language n=1075	<i>Malay</i>	487	45.3
	<i>English</i>	465	43.3
	<i>Chinese</i>	123	11.4

\*Professional/Educational field: Production, Utilities, Transport include agriculture, forestry, fishing, mining, manufacturing, utilities, construction, transportation and storage; Business includes online business, finance and insurance, real estate; Key Services include health and social work, civil service and public administration, arts, entertainment and recreation.

\*\*Household income of less than RM20,000 driven largely by numbers of respondents who report to be Students.

### 3.2 Descriptive Analysis

Table 2 details overall responses to Knowledge, Perception and Communication items.

In general, a majority of respondents correctly answered knowledge-based items: 1) COVID-19 is a contagious respiratory disease (98.9% agree); 2) COVID-19 is caused by a bacteria called SARS-CoV-2 and can be treated with antibiotics (64.7% disagree); 3) COVID-19 is a zoonotic disease (70.2% agree); 4) COVID-19 is a pandemic disease (68.5% agree); and 5) There is currently no approved vaccine to prevent COVID-19 (93.5% agree).

A majority of respondents perceived COVID-19 risks and impacts seriously; with 79% agreeing that COVID-19 is a very deadly disease; 96.3% worried about themselves and loved ones getting sick with COVID-19; 94.4% worried about spreading COVID-19 to others, and 96.1% worried about the impact of COVID-19 on their work, livelihood and the economy. A total of 99.1% respondents agreed they could reduce their risk of getting COVID-19 by avoiding crowded public areas, keeping their hands clean and not touching their face; while only 16.4% agreed that closure of areas of congregations such as schools and places of worship are an extreme and unnecessary measure to control the spread of COVID-19.

Regarding COVID-19-related communications, 91.9% of respondents indicated they obtained information from direct official sources, while 66.8% obtained information from friends and family through social media. A minority of respondents felt they did not understand details about COVID-19 because it is too technical or complicated (11.6%), and 43.0% reported being more likely to understand and prefer receiving information through video rather than articles or infographics. Interestingly, 77.3% of respondents agreed receiving quality information on COVID-19, and similarly 77.9% agreed receiving a lot of questionable information or “fake news”. Finally, 79.8% of respondents agreed being eager to share information they received, 87.9% agreed that they verified the information they received on social media before sharing, and 94.5% agreed that the information they received strongly

influenced how they perceived the disease and what they do to protect themselves, their loved ones and community.



Table 2. Overall survey responses

<b>Item No.</b>	<b>Item Description</b>	<b>Agree (%)</b>	<b>Neither (%)</b>	<b>Disagree (%)</b>	<b>n (% Total Respondents)</b>
K1	COVID-19 is a contagious disease that causes symptoms in lungs and airways like coughing, sore throat and difficulty breathing. (True)	986 (98.9)	8 (0.8)	3 (0.3)	997 (93.0)
K2	COVID-19 is caused by a bacteria called SARS-CoV-2 and can be treated with antibiotics. (False)	170 (17.1)	181 (18.2)	643 (64.7)	994 (92.5)
K3	COVID-19 is a disease caused by a virus that previously only infected animals but now infects humans. (True)	698 (70.2)	140 (14.1)	156 (15.7)	994 (92.5)
K4	COVID-19 is a pandemic disease which means it was not making people sick previously, but now has spread all over the world. (True)	682 (68.5)	120 (12.1)	194 (19.5)	996 (92.7)
K5	There is currently no approved vaccine to prevent COVID-19. (True)	932 (93.5)	40 (4.0)	25 (2.5)	997 (92.7)
P1	I believe COVID-19 is a very deadly disease.	784 (79.0)	115 (11.6)	93 (9.4)	992 (92.2)
P2	I am worried about me and my loved ones getting sick with COVID-19	951 (96.3)	27 (2.8)	10 (1.0)	988 (91.9)
P3	I am worried about spreading COVID-19 to others.	934 (94.4)	36 (3.6)	20 (2.0)	990 (92.1)
P4	I am worried about the impact of COVID-19 on my work, livelihood and the economy.	953 (96.1)	27 (2.7)	12 (1.2)	992 (92.3)
P5	I am able to reduce my risk of getting COVID-19 by avoiding crowded public areas, keeping my hands clean, and not touching my face.	981 (99.1)	5 (0.5)	4 (0.4)	990 (92.1)
P6	The closures of areas of congregations such as schools and places of worship are an extreme and unnecessary measure to control the spread of COVID-19.	162 (16.4)	85 (8.6)	744 (75.1)	991 (92.2)

C2	I obtain most of my information on COVID-19 from friends, family and social groups on social media (Whatsapp, Facebook, IG, Twitter, TikTok).	641 (66.8)	145 (15.1)	173 (18.0)	959 (89.2)
C3	I do not understand details about COVID-19 because they are too technical and complicated.	111 (11.6)	200 (20.9)	649 (67.6)	960 (89.3)
C4	I am more likely to understand and prefer to receive info about COVID-19 on video rather than articles or static visuals/infographics.	412 (43.0)	321 (33.5)	225 (23.5)	958 (89.1)
C5	I have received a lot of quality information on COVID-19 on social media.	740 (77.3)	143 (14.9)	74 (7.7)	957 (89.0)
C6	I have received a lot of questionable information/fakenews on COVID-19 on social media.	746 (77.9)	133 (13.9)	79 (8.3)	958 (89.1)
C7	I am eager to share information that I think can help us reduce the risk and spread of COVID-19.	765 (79.8)	146 (15.2)	48 (5.0)	959 (89.2)
C8	I check information I receive on social media with sources such as health & government agency websites and science news outlets before sharing/forwarding to others.	842 (87.9)	94 (9.8)	22 (2.3)	958 (89.1)
C9	The communication I have received about COVID-19 has strongly influenced how I think about the disease and what I do to protect myself, my loved ones, and my community.	906 (94.5)	45 (4.7)	8 (0.8)	959 (89.2)

### 3.3 Univariate Analysis

Response to items were analyzed by demographic variables using Pearson Chi square test, with p value of <0.01 considered significant.

#### 3.3.1 *Knowledge*

Survey Language appeared to be the most frequent demographic variable having significant association with response to knowledge items (K2-K4). Specifically, 1) relatively higher proportion of Malay-survey respondent (incorrectly) agree (24.5%), higher proportion of Chinese-survey respondent neither agree/disagree (31.2%), and higher proportion of English-survey respondent correctly disagree (74.5%) to item K2; 2) relatively higher proportion of Chinese-survey respondents neither agree/disagree (30%, Chi2 p <0.001) to K3; and 3) relatively higher proportion of English-survey respondent (incorrectly) disagree (25.7%, Chi2, p <0.001) to K4.

Additionally, item K2 had the most variability in response, whereby 1) relatively higher proportion of respondents age 24 years and below (incorrectly) agree (20.5%) or neither agree/disagree (26.1%) (p<0.001); 2) relatively higher proportion of Students agree (19.9%) or neither agree/disagree (25.3%, p<0.001); 3) relatively higher proportion of respondents with School as highest level of education agree (32.0%, p<0.001); and 4) relatively higher proportion of respondents in STEM (76.5%) and Key Services, which includes healthcare providers, (71.0%) disagree, while higher proportion of respondents in Production/Utilities (24.7%) & Other services (21.6%) agree (p<0.001).

None of the responses to the Knowledge items were significantly associated with Gender or Household Size.

#### 3.3.2 *Perception*

Survey Language was associated with response to P1 and P6, whereby a higher proportion of Malay-survey (95.2%) compared to English-survey (66.3%) or Chinese-survey respondents (61.85%) (p <0.001) agree to P1, and higher proportion of respondents to Malay-survey

respond neither agree/disagree (14.1%) compared to English-survey (4.2%) or Chinese-survey respondents (2.8%) ( $p < 0.001$ ) to P6.

Gender was associated with response to P1, whereby higher proportion of females agree (81.2%) and higher proportion of males disagree (13%) ( $p = 0.007$ ).

Education Level, Field, and Household Size were associated with response to P6.

A relatively higher proportion of respondents with School level and Postgraduate/Professional agree (21.0%) and disagree (82.4%), respectively ( $p = 0.002$ ), and a relatively higher proportion of respondents in STEM and Other Services disagree (91.2%) and agree (23.0%), respectively ( $p = 0.020$ ). A relatively higher proportion of people with household size 2 people or less, agree (20.9%,  $p = 0.009$ ).

Finally, Employment Status was associated with response to P4, whereby relatively lower proportion of Homemaker/Other agree they were worried about impact on work, livelihood and economy (84.6%,  $p = 0.005$ ).

None of the responses to Perception items were significantly associated with Age Group or Household Income.

### 3.3.3 *Communication*

Survey Language had significant association with all communication items. Relatively higher proportions of Chinese-survey respondents answered neither agree/disagree to C1 (10.3%,  $p < 0.001$ ), C3 (32.7%,  $p < 0.001$ ), C4 (58.9%,  $p < 0.001$ ), C5 (26.4%,  $p < 0.001$ ), C6 (22.4%,  $p < 0.001$ ), C7 (87.5%,  $p < 0.001$ ), C8 (17.8%,  $p < 0.001$ ) and C9 (14.0%,  $p < 0.001$ ). Relatively higher proportions of Malay-survey respondents agree to C2 (79.5%,  $p < 0.001$ ), C5 (86.1%,  $p < 0.001$ ), C7 (87.5%,  $p < 0.001$ ) and disagree to C6 (11.8%,  $p < 0.001$ ). While, relatively higher proportions of English-survey disagree (74.5%,  $p < 0.001$ ) to C3 and C4 (28.5%,  $p < 0.001$ ).

Other demographic factors also influence response to C2, C3, C4, C6, and C7.

A relatively lower proportion of respondents with School level education disagree (53.8%) compared to Postgraduate/Professional degree holders (79.5%) ( $p < 0.001$ ), with level of education generally inversely proportional to agreement with C3. A higher proportion of

STEM field (74.2%) & Key services (includes health professionals) (75.3%) respondents disagreed, while relatively higher proportion of Production/Utilities/Transport (16.3%), Business (16.8%), and Other Services (19.7%) agreed ( $p=0.001$ ) to C3. A higher proportion of 45 years and above also disagreed (74.2%,  $p < 0.001$ ) to C3.

For C6, a higher proportion of males agree they received a lot of fake news (82.9%) compared to females (74.8%) ( $p < 0.001$ ), while a higher proportion of Homemaker/Other (23.5%) and Unemployed/Retired (15.5%) disagree they receive a lot of fake news; whereas Employed respondents had highest proportion agreeing (80.4%) ( $p=0.002$ ).

For C7, a higher proportion of females agree they are eager to share information (83.1%) compared to males (74.2%) ( $p < 0.001$ ); and a relatively lower proportion of respondents in IT & Media agree eager to share (67.3%) compared to Education (84.9%), Key Services (83.7%) and Other services (85.9%) ( $p=0.005$ ).

Finally, a higher proportion of respondents with School level education agree they prefer to receive information on video (56.7%,  $p=0.001$ ) (C4) and a higher proportion of people Unemployed/Retired respond neither (24.3%,  $p = 0.002$ ) to C2.

None of the responses to communication items were significantly associated with Household Size or Household Income.

### 3.4 Multivariate Analysis

Multivariate analysis of statistically significant demographic variables was conducted using a multinomial logistic regression to estimate likelihood or relative risk (RR) of response, controlled for other demographic factors (Table 3).

English/Chinese-survey respondents had 40% lower likelihood than Malay-survey respondents of agreeing rather than disagreeing to K2. Higher education level reduces likelihood of agreeing by 57%, while older age group has 49% reduced likelihood of responding neither agree/disagree, rather than disagree with item K2.

Compared to Malay-survey respondents, English/Chinese-survey respondents have 3.2 times higher likelihood of responding neither agree/disagree over agree; 3.8 times higher likelihood of disagree over agree to item P1, and 68% lower likelihood of responding neither

agree/disagree over disagree to item P6. Compared to males, females have 48% lower likelihood of disagree over agree with item P1, while higher education level respondents have 34% lower likelihood of agreeing over disagree with item P6.

Compared to Malay-survey respondents, English/Chinese-survey respondents have 1.9 times and 1.8 times higher likelihood of responding disagree to items C2, and C4, respectively; 2.1 times higher likelihood of responding neither agree/disagree over agree to C7, and 47% reduced likelihood of responding disagree to C6.

Respondents with higher level of education have 56% lower likelihood of responding agree over to disagree to C3, and 1.6 times higher likelihood of responding neither agree/disagree over agree to C4.

Female respondents have 3.2 times higher likelihood of disagree over agree to C6, and 69% reduced likelihood of disagree over agree to C7.

Respondents of older Age Groups have 40% lower risk of neither compared to disagreeing to C3, and along with unemployed (including Homemaker, Retired, or Student) have 1.6 times and 1.5 times higher likelihood of disagree over agree to C6, respectively.

Table 3. Multivariate analysis using Multinomial Logistic Regression

Item	Variables in Model	Chi Square p value	Pseudo R square	Significant Variable (s)	p value	Relative Risk	95% CI	Response/Base
K2	Survey Language, Age Group, Gender, Field, Education Level	<0.001	0.0509	Survey Language	<0.001	0.60	0.45 - 0.78	Agree/Disagree
				Education Level	<0.001	0.43	0.32 - 0.58	Agree/Disagree
				Age Group	<0.001	0.51	0.38 - 0.67	Agree/Disagree
P1	Survey Language, Age Group, Gender, Field, Employment Status, Education Level, Household Size	<0.001	0.1034	Survey Language	<0.001	3.19	2.33 - 4.36	Disagree/Agree
				Gender	0.006	0.52	0.32 - 0.83	Disagree/Agree
P6		<0.001	0.0429	Survey Language	<0.001	0.33	0.20 - 0.52	Agree/Disagree
				Education Level	0.007	0.66	0.48 - 0.89	Agree/Disagree
C2	Survey Language, Age Group, Gender, Field, Employment Status, Education Level	<0.001	0.0396	Survey Language	<0.001	1.9	1.46 - 2.47	Disagree/Agree
C3		<0.001	0.0332	Education Level	<0.001	0.44	0.31 - 0.64	Agree/Disagree
				Age Group	0.002	0.61	0.44 - 0.83	Agree/Disagree
C4		<0.001	0.037	Survey Language	<0.001	2.24	1.76 - 2.84	Neither/Agree
				Education Level	<0.001	1.81	1.39 - 2.35	Disagree/Agree
C6		<0.001	0.0434	Survey Language	0.004	0.53	0.35 - 0.81	Disagree/Agree
				Age Group	0.007	1.64	1.15 - 2.36	Disagree/Agree
				Gender	0.001	3.24	1.66 - 6.34	Disagree/Agree

### 3.5 Qualitative analysis

A total of 268 respondents answered the question “Are there any comments that you want to share about the communications surrounding the COVID-19?”. However, after verifying content of comments, only 71 respondent comments were used for further analysis.

Based on thematic analysis, major themes of communication that the respondents are referring to can be further categorized under (i) the MCO communication and implementation and (ii) COVID-19 awareness and misinformation.

#### 3.5.1 MCO communication and implementation

The comments suggest room for improvement in communication by various authorities. Apart from the use of infographics and other mediums, respondents highlighted the need for differentiated forms and mediums of communication for different target audience, such as elderly, teenagers and children, and other minority groups, as well as different language and dialect groups.

*“ The Malaysian government and our ministers could do better to communicate clearly on what can or cannot be done, especially with the Movement Control Order. The Ministry of Health, especially the Director General of Health, is doing a good job, but the other ministers need to also do their jobs and be the leaders they say they are. ...We Malaysians want to know what the government is doing to address these issues, especially [the] ones involving the marginalised and vulnerable. It should not be "every man for himself" (Respondent 717117, 19 March 2020)*

*“Keep it [communication] concise and straightforward. In terms of approaches taken, provide reasonings behind them and delineate why it is important. Also, if some patients or frontliners are willing, have them share the reality of facing the pandemic. Often, putting a name and a face to a story served as a powerful persuasion tool to stress the urgency of the situation we are facing as a community. Consider also providing information in other languages for Orang Asli, and refugees/migrant communities in Malaysia” (Respondent 11436839657, 22 March 2020).*

In the midst of crisis, consistency and accuracy of information from authorities is crucial to avoid uncertainty that can give room for fake or inaccurate news. However, the sentiment



about consistency and accuracy of information is more closely related to the announcements about the MCO, and less about COVID-19.

*“Authorities in Malaysia need to communicate more frequently and wisely [and] consider the impact of certain measures before announcing them” (Respondent 740049, 19 March 2020)*

*“Governments’ role [is] to strategise direction and communication is important. [A] lot of mixed up instruction that [is] causing confusion ([such as] students having to vacate their space [rooms in universities] (or not)?; people have to wear mask (or not?))” (Respondent 776559, 25 March 2020).*

### 3.5.2 COVID-19 awareness and misinformation

The comments suggest that many rely on information communicated through different channels to cope with the epidemic. However, there is also frustration about the prevalence of fake news and the possible consequences of such news. Respondents raised questions about the lack of clear mechanism and avenue to verify news and information, and the role of technology to filter and block unverified news.

*“[Translated from Malay: The information I received from the communication system provides me with the knowledge about COVID-19 and ways to protect me from being infected] (Respondent 204009, 19 March 2020)*

*“I got a lot of fake news and nonsense information about COVID-19 whether if it is about the disease itself or about the lockdown status and so on. I do not understand why there are people out there who have so much time [to] create all of these fake news that are meant to threatened other people, especially Malaysians who easily believe all of these fake information. I wish that we could stop all of the fake news” (Respondent 319371, 20 March 2020).*

*“Too many people are spamming my WhatsApp with [the] same video or article circulating round and round. Wish my WhatsApp has a filter to only receive what I have not received before” (Respondent 158654, 20 March 2020).*

Lastly, a fundamental implicated issue is the role of education in creating general awareness among the public.

*“The awareness of people on the outbreak were still low until it became pandemic and affect their country.... For future preparation, health agencies/bodies may organize a talk regarding infectious disease to the public so it will raise their awareness. A country may not fall because of an idiotic leader, but its idiotic people. May this be a lesson for all of us”*  
(Respondent 11429524947, 19 March 2020).

#### **4. Discussion**

Science communication is predominantly viewed as an effort to effectively disseminate information about science from scientific experts to the public, either through formal education or informal reinforcements such as media [Kappel, 2019]. This “knowledge deficit model” that assumes communicating information would increase awareness and influence behavior has been challenged in recent literature [Simis, 2016], for instance in communication of complex issues such as climate change, where attitudes appear to be more significantly influenced by cultural identity rather than scientific knowledge [Kahan, 2015].

However, the rapid and unprecedented spread of the COVID-19 pandemic has shown a massive spike in communication regarding the disease and its associated implications on official and social communication channels. Strikingly, there appears to be active public participation in both creation and dissemination of content, in the form of videos and social media posts, rather than sole dissemination from traditional authorities and experts, who are also using multiple channels such as social media and live streaming. Thus, we wanted to assess whether the increased communication on this particular disease, reflecting combined efforts of traditional authorities and public participation, has influenced public knowledge, whether it is associated with risk perception, and additionally, communication behavior of the Malaysian public, who are among the highest users of social media in the world [Pew Research, 2019].

Encouragingly, the survey finds a very high majority of respondents appear to take the risk of COVID-19 very seriously (on themselves, their community and livelihood) and are aware of ways to reduce risk such as handwashing, hygiene and avoiding crowded places. This suggests that the basic information on COVID-19 has been effectively communicated to the vast majority of the Malaysian public.

The proportion answering correctly to item K2 is also higher than what was reported in a national science literacy survey, whereby only 19% of Malaysians responded correctly to the

statement antibiotics kill viruses as well as bacteria [MASTIC, 2016] and a previous study on outpatients reporting 67.2% believed antibiotics can be used to treat viral infections [Oh, 2011]. However, the fact that 35.3% of respondents are unsure, do not know or incorrectly understand that COVID-19 is caused by a virus and hence cannot be treated with antibiotics is quite concerning and opens potential for harmful practice, such as self-medication [Pavyde, 2016]. Additionally, Malay-survey, younger age group and those without post-secondary education respondents were more likely to (incorrectly) agree that COVID-19 is bacterial and can be treated with antibiotics. Education has been previously reported to be a significant demographic determinant [Pavyde, 2016], and impact of age is arguably associated to both education and life experience. Unexpectedly, however, is the influence of Survey Language not only on knowledge, but also on several perception and communication items, even when controlled for other factors on multivariate analysis.

Malay-survey respondents were more likely to agree that COVID-19 is deadly, while English-survey and Chinese-survey respondents and those who with post-secondary education were more likely to disagree that closure of areas of congregation are extreme and unnecessary. These results imply two things; one, that enforcement of social distancing measures such as the MCO may rely on the perceived cost of the disease versus the perceived benefit of the intervention, and two; there may be cultural bias in perception for both the former and the latter.

Additionally, Female respondents were also more likely to agree that COVID-19 is deadly, which is in line with previous studies reporting higher perceived infectability and risk among women towards infectious diseases such as influenza [Diaz, 2016; Duncan, 2009; O. de Zwart, 2008]. Low-income households also reportedly have higher risk perception [Di Giuseppe, 2008; Jacobs, 2010], but Household Income was not significantly associated with perception of risk in this study.

For communication behavior, Malay-survey respondents were more likely to obtain information from social groups, preferred to receive information on video, and were less likely to perceive receiving a lot of fake news. Conversely, English/Chinese-survey respondents were less likely to agree they are eager to share information. Females, older respondents, and unemployed respondents were also less likely to perceive receiving a lot of fake news, while females were more likely to agree they were eager to share information to reduce the risk and spread of COVID-19. Other findings include 1) respondents with post-secondary education were less likely to agree the details are too technical to understand and less likely to agree they prefer information on video.

Besides education, previous studies in the US and Germany have found varying, but largely insignificant, influence of demographic factors such as gender on perception of fake news, but this may reflect different geographic and local context [Reuter et. al., 2019; Plotnick, 2018; Belhadjali et. al., 2017]. There is less literature on gender and perception of fake news in Southeast Asia, however, we find it striking that females were less likely to perceive receiving fake news but have higher (well-intentioned) propensity to share what they perceive to be useful information. This raises the question of whether the amount of fake news received by both genders is dissimilar, or whether it reflects the tendency to discriminate true and false information. Arguably, the idea and perception of fake news and the influence of Survey Language, Age Group, Gender, and Employment (but interestingly, not Education) indicate trust and conversely, skepticism of different people towards different types and sources of information [Wagner et.al., 2019]. Additionally, although 87.9% of the respondents reported verifying information with official sources before sharing with others, a large analysis of Twitter stories highlighting that false news are more readily disseminated than true news [Vosoughi et.al., 2018], implies that the ability and initiative to verify information may not be accurately reported by respondents.

Although we did not ask respondents to identify ethnicity due to sensitivity, preferred language can be regarded as a proxy for cultural inclinations [Laesser, 2014]. In a multiethnic and multilingual country with a colonial past such as Malaysia, the increasing use of English has been suggested to impact identities. There appears to be perceived empowerment of English speakers and resentment among Malay and Chinese-language speakers, who view use of English as an elitist colonial relic [Kim, 2010]. Preference of communication/receiving information through video rather than reading/infographics, and difficulty in understanding details related to Survey Language and Education, respectively, highlights the importance of more nuanced information dissemination to reach different cultural inclinations, and perhaps prioritizing specific mediums for specific demographics.

Based on thematic analysis, respondents mainly shared comments concerning information/misinformation of COVID-19 and the MCO. Some comments indicate doubt in competency of authorities while others appeared frustrated with the spread of misinformation. The latter, arguably, may have arisen in conjunction with the former, as the spread of misinformation in times of conflict and uncertainty has been previously observed such as during the 2018 Malaysian General Election [Hussain et al., 2019]. The analysis further highlights the role of education and communication in building awareness, not just about a specific disease, but also in attitudes towards communication, such as recognising the

importance and ways of verifying information. Although official fact verifying websites such as [Sebenarnya.my](http://Sebenarnya.my) under the Malaysian Multimedia and Communications Commission exist, public awareness needs to be cultivated before a crisis such as a pandemic occurs and continuously expanded as part of formal and informal education in society, in order for these efforts to translate into successful control of misinformation.

The findings of this study have a number of strengths and limitations. The strengths include the fact that the survey achieved a reasonable sample size while capturing respondents at a timely period during the first week of the MCO, and the fact that the age structure and education level distribution were reasonably representative of the Malaysian population.

In terms of limitations, Chinese-survey respondents make the smallest proportion of respondents 123 (11.4%); the survey was self-report/applied and may carry issues of item interpretation; there was slight overrepresentation by females respondents with education as professional background; and the responses reflect social network distribution in urban areas of Malaysia.

## **5. Conclusion**

The global indiscriminate speed of transmission and impact of COVID-19 and the increased communication surrounding the spread of this disease on social communication channels has captivated the public and increased general awareness on the disease. However, the sheer amount of information and misinformation communicated by various parties challenges efforts to use science communication and implement necessary behavioral-reliant public health interventions such as social distancing and MCO. That 95% of Malaysian respondents agree the information they receive strongly influences their behavior suggests opportunity for effective public health action through effective communication, while conversely highlighting the dangers of unmitigated spread of potentially harmful false information. Ultimately, as one respondent commented, this survey indicates that the battle against COVID-19 is one that needs to be fought by all the people. The speed of science in developing necessary tools for containment, will only be successful with strong communication strategies that both advance prudent consistent messages while curtailing any other messages that distract or confuse public attention, energy and resources.

## **Author Contributions**

KMH designed study, collected data, conducted quantitative analysis and drafted/revised manuscript. WCD collected data, conducted qualitative analysis and revised manuscript.

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### **Conflicts of Interest**

The authors have no conflicts of interest to declare.

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