

Access To WASH, Knowledge, Practice, and Protective Motivation Behaviour Towards COVID-19 Pandemic of Urban Marginalized Peoples

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Research

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Abstract

Background

Urban marginalized people are most vulnerable to the Covid-19 pandemic because of their poor water and hygiene conditions and high-density populated environment. However, there lack WASH facilities and theory-guided behavioural health intervention programs towards the Covid-19 pandemic in these fragile communities.

Methods

This study used the combined Knowledge- Practice -Theory (KAP) and Protection Motivation Theory (PMT) to predict the protective motivation behaviours of urban marginalized people against Covid-19. The phenomenological approach was applied to examine the slum communities' lived experiences during the COVID-19 pandemic. Data was collected through 105 semi-structured interviews and 453 questionnaires in two slum communities in Bangkok, Thailand.

Results

Results showed that most Thai slum people tended to have better access WASH and healthcare services and protection behaviours towards Covid-19 than other foreign migrant slum people. Structural Equation Modelling results illustrated that knowledge directly drove marginalized peoples' perceived vulnerability and practices, while practices influenced their perceived severity, self, and response efficacy which directly associated with their behavioural intentions.

Conclusions

Future pandemic prevention intervention programs should focus on vulnerability and severity through providing adequate WASH facilities and self-efficacy and response efficacy of protection motivation through enhancing community sensitization and awareness of COVID-19 protection.

1. Introduction

The coronavirus (COVID-19) pandemic is the most serious global health crisis we have faced since World War II. Since first being recorded in late 2019 in China, the Covid-19 coronavirus has spread to more than 200 countries around the world, caused 2.5 million deaths and 113 million infections (Johns Hopkins University, 2021). In this greatest challenge of the global health crisis, WASH (Water, Sanitation and Hygiene) and health facilities have become vital contributions to coronavirus disease prevention and response. However, one-third of people worldwide still lack access to WASH and health facilities, particularly marginalized and vulnerable people who live in the urban slum of many developing countries

(WHO, 2020). Those people cannot fulfil the basic COVID-19 guidelines because of their poor housing quality, insecure residential status, and inadequate access to basic services and vital infrastructures such as water, sanitation, and hygiene.

Furthermore, because of unsafe water, inadequate sanitation, and poor hygiene, most people in the vulnerable communities often suffer from water-borne diseases such as diarrhoea, acute respiratory infection, and skin infections (Pati, 2014). Admittedly, slum communities are most vulnerable and exposed to the infection during the crisis due to poverty shocks, limited access to healthcare facilities and basic WASH services, and adequate housing (Konteh, 2009; WHO, 2020; U.N., 2020). Marginalized people also have low awareness and knowledge related to disease and WASH practice which can cause poor health conditions and unsafe protective practices (Hsan et al., 2019).

Many international development organizations (e.g., WHO, 2020; UNICEF, 2020; UNESCO, 2020) have promoted WASH projects as measures against COVID-19 in fragile countries. However, sustainable strategies and tactics for implementing the WASH response require understanding public knowledge, perception, and practices in preventing and protecting from Covid-19. Understanding public WASH and health protection knowledge, perception, and practice can help to identify factors influencing people's health behaviours in adopting responsive practices towards the COVID-19 pandemic (Podder et al., 2019). Knowledge enhancing and education interventions are probably self-protective measures in tackling pandemics for marginalized people (Al-Hanawi et al., 2020). Protecting marginalized groups contributes to protecting their risks, and the whole society as a COVID-19 infectious agent could quickly spread out within and among the community.

Through a case study of urban slum communities in Bangkok, Thailand, this study aimed to examine (i) the causal relationship between WASH facilities and marginalized people's vulnerability and severity toward Covid -19 pandemic, (ii) how their protective behaviours are shaped by their vulnerability, severity, knowledge, and attitude. We combine Knowledge – Attitude – Practice Theory (KAP) and Protection Motivation Theory (PMT), to predict people's intentional behaviours towards protecting infectious pandemics.

2. Conceptual Model

2.1. Knowledge, Attitude, and Practice Theory (KAP)

Knowledge, attitude, and practice (KAP) theory is commonly applied in public health research and practice. It is widely used in health studies emphasizing knowledge, attitudes, and practices in reducing the risk of communicable diseases caused by poor hygiene practices and inadequate sanitary conditions (Demberere, 2015, Montoute and Cashman, 2015, Mubarak et al., 2016). Many studies showed the poor status regarding knowledge, attitudes, and practices (KAP) of hygiene in many developing countries such as Ethiopia (Goodwin et al., 2015), Bangladesh (Islam et al., 2020). If an individual knows, learns, and follows WASH and health protection guidelines, it helps them mitigate the risk of communicable diseases

(Barnard et al., 2013; Berhe et al., 2020). Some scholars have demonstrated the link between knowledge and practice and between attitudes and practices (e.g., Pratkanis et al., 1989, Westaway et al, 2000; Nguyen et al., 2019). Thus, previous studies in the field revealed that people with good WASH and health protection knowledge and correct attitudes would follow safety practices towards hygiene and self-protection (Özdemir et al., 2011).

2.2. Protection Motivation Theory (PMT)

Protection Motivation Theory (PMT) is developed by Roger (1975) which is widely used to predict health intention and practice in diverse studies' contexts such as water management, disaster, waste management, infection diseases (Nelson et al., 2012; Xiao et al., 2016; Janmaimool, 2017; Tang and Feng, 2016). PMT proposes the framework to understand how individuals are motivated to react to threats, explain why people engage in unhealthy practices and suggest how to change behaviours through education and awareness-raising (Bockarjova and Steg, 2014; Westcott et al., 2017). The PMT has two major distinct cognitive processes, including threat appraisal and coping appraisal. The threat appraisal component is used to evaluate people's perception of the severity and vulnerability of certain behaviours. In contrast, the coping appraisal is used to evaluate people's ability to cope and respond to threats and remove barriers from specific actions consisting of response-efficacy and self-efficacy. Many previous studies related to the health sector showed that response-efficacy and self-efficacy are associated with health-protective behaviours intention (e.g., Westcott et al., 2017; Mortada et al., 2020; Hernandez-Padilla et al., 2020). Some studies (e.g., Xiao et al., 2014; Bashirian et al., 2020) revealed that both threat appraisal and coping appraisal have a higher ability to predict protective intentions. In addition, there is an external factor such as knowledge which is linked to threat perception and intention, thus influencing behaviours changes (Pham et al., 2012; Chamroonsawasdi et al., 2017). Tang and Feng (2018) found that intention was a mediator variable between PMT elements and actual behaviours. The perception of risk and benefit of actions encourage higher intention and transform into actual practice (Fishbein et al., 2001).

Knowledge and Current Practice are associated with cognitive processes such as information, knowledge, actual behaviours. These components can influence people's perceived risk, vulnerability, and severity (Eppright et al., 1994) and help to predict protective behaviours in the future resulted from threat appraisal and coping appraisal (Xiao et al., 2014; Tang, 2018; Fishbein et al., 2001; Tang and Feng, 2018) Therefore, a combined theoretical framework included Knowledge-Practice and PMT in this study aimed to explore factors motivated or restrained protective motivation behaviours of marginalized urban people during the crisis and shaped protective practices towards COVID-19 protection.

3. Methodology

3.1 Selection of the study area

Khlong Toei slum communities, Bangkok, Thailand, are selected purposely for this study (Fig. 1). Khlong Toei slum communities are the largest slum in Thailand, with 49,225 households and more than 100,000

populations in which the majority are vulnerable and at risk. They are seasonal workers in Khlong Toei port and the largest fresh and retail markets in Bangkok, severely impacted during the COVID-19 crisis. Their WASH condition is likely poor because there are no inadequate facilities and public goods

Lock 1-2-3 and Ban Guay sub-community were selected as case study areas by considering the characters between two sub-communities: environment, living condition, location, and sensitive issues inside the community. Lock 1-2-3 sub-community located near Art Narong Road with a high density of household cluster while Ban Guay sub-community located along the canal and under troll way road. Low-quality drinking water with a high level of bacteria inside water tanks in vending machines was captured in the selected areas (Goodwin et al, 2015).

3.2. Research design

The research was designed following a phenomenological approach that highlights slum communities' lived experiences of the COVID-19 pandemic (Creswell, 2018). Data collection was conducted with integrated methods, including semi-structured interviews and questionnaire surveys.

3.2.1 Semi-structured interviews:

Semi-structured interviews were carried out with 105 representative people from communities and nine staff from 7 organizations who work with marginalized groups. Each interview lasted 30 mins. Most questions are open-ended to explore their experiences with the COVID-19 pandemic and challenges regarding inadequate WASH facilities, knowledge, attitude, and protective behaviours towards COVID -19 protection.

3.2.2. Questionnaire survey

The questionnaire survey was conducted with 385 people in the Lock 1-2-3 sub-communities and 68 people in Ban Guay sub-communities, making 453 respondents. The main criteria of selecting respondents from these two communities are "access WASH and health facility" and "non-access WASH and health facility". Respondents were randomly selected from two selected sub-communities by using Slovin's Formula and snowball sampling method. Methods are suitable for hidden populations, particularly in slum communities with little information or unknown and anonymous population census data (Baltar and Brunet, 2012). Thus, 349 respondents with access WASH and health facilities and 104 non-access WASH and health facilities were selected for the survey sample. To cover different socio-economic, ethnic, and cultural characteristics of the whole slum community population, some other criteria have been made for the sampling, including ethnicity, age range, gender, health condition, and disabilities. The population list of Khlong Toei slum communities was obtained from the National Statistical Office of Thailand (2019) and Duang Prateep Foundation's suggestion.

The questionnaire sheet is attached in Appendix A

The questionnaire survey was administered in the Thai language by eleven trained field assistants with three staff members from the Duang Prateep Foundation. They have intensive experience in working with these slum communities. All field assistants were trained to seriously consider the ethical consideration, privacy, and integrity in the social survey.

3.4 Data analysis

This study used mixed qualitative and quantitative data analysis methods. Data from the interview and questionnaire survey were treated as anonymous. In the qualitative data analysis method, the phenomenology research approach was deployed to discover and describe urban marginalized people's experiences and behaviours towards the COVID-19 phenomenon and find the key factors contributing to their perceptions, attitudes, and responses. The authors generated themes for analysing significant statements based on PMT components and developed clusters of meaning from interviewing. This task aimed to describe significant statements and communicate the understanding of the essence of a phenomenon in terms of conditions, situation, or context (Creswell, 2018).

In quantitative data analysis, statistics tools were applied for the analysis of questionnaire survey data. Descriptive statistics were used to describe the level of respondents' knowledge, practices, attitudes, and behaviours. Fisher's exact test was applied to test the difference in socio-demographic and cultural characteristics from the two respondent groups of access to health facility and non-access health facility. T-test was used to compare respondents' knowledge, practices, attitudes, and behaviours among socio-demographic, ethnic, and cultural groups. All statistical analyses were conducted in IBM SPSS Statistics 26 with a significant level of less than 5%.

Partial least square structural equation modelling (PLS-SEM) was performed via two vital stages: the measurement/outer and structural/inner models (Hair et al., 2017). Accordingly, seven constructs were modelled by formative measurements to evaluate the causal relationships between the latent constructs calculated by 22 items through the path model analysis. Since all constructs are modelled based on a formative measurement model, two criteria are used to assess the inner model, including collinearity issues and the significance and relevance of the formative indicators (Hair et al., 2017). Regarding the assessment of the level of collinearity, the variance inflation factor (VIF) was computed. Sll indicator's tolerance (VIF) was below the threshold value of 5. The values of the outer weights and the corresponding items' loading were estimated to interpret the formative indicators' absolute and relative contributions. The values of external loadings of variables used in the model were higher than 0.5

4. Results

4.1. Socio-Demographic characteristics of the Respondents

Table 1 showed demographic profiles of two slum community groups: access WASH/health facility and non-access WASH/health facility. There was no difference in numbers between the two groups in terms of age, gender, ethnicity, and house occupancy.

Table 1

Comparisons among two respondent groups of access and non-access WASH and health facility.

Variable	Frequency (%)	Access WASH & health facility	Non-access WASH & health facility	p-value ¹
Total number of respondents	453	349	104	
Age (Years)				
15-17	42 (9.3%)	37 (10.6%)	5 (4.8%)	0.066
18-35	168 (37.1%)	136 (39%)	32 (30.8%)	
36-59	136 (30%)	98 (28.1%)	38 (36.5%)	
60-90	107 (23.6%)	78 (22.3%)	29 (27.9%)	
Gender				
Male	220 (48.6%)	168 (48.1%)	52 (50%)	0.866
Female	232 (51.2%)	180 (51.6%)	52 (50%)	
Transgender	1 (0.2%)	1 (0.3%)	-	
Ethnicity				
Thai	401 (88.5%)	311 (89.1%)	90 (86.5%)	0.208
Myanmar	28 (6.2%)	20 (5.7%)	8 (7.7%)	
Laos	8 (1.8%)	8 (2.3%)	-	
Cambodia	12 (2.6%)	8 (2.3%)	4 (3.9%)	
Rohingya	4 (0.9%)	2 (0.6%)	2 (1.9%)	
Legal marital status				
Single	205 (45.2%)	158 (45.3%)	47 (45.2%)	0.004*
Married	195 (43.1%)	146 (41.8%)	49 (47.1%)	
Separated	13 (2.9%)	11 (3.2%)	2 (1.9%)	
Cohabitation	15 (3.3%)	15 (4.3%)	-	
Widow(er)	25 (5.5%)	19 (5.4%)	6 (5.8%)	

Variable	Frequency (%)	Access WASH & health facility	Non-access WASH & health facility	p-value ¹	
State of residential occupancy					
Owner occupied	54 (11.9%)	51 (14.6%)	3 (2.9%)	<0.001*	
Squatter	216 (47.7%)	171 (49%)	45 (43.3%)		
Tenant	106 (23.4%)	79 (22.6%)	27 (26%)		
Living with a host family	21 (4.6%)	14 (4%)	7 (6.7%)		
Others	56 (12.4%)	34 (9.8%)	22 (21.1%)		
Educational level					
None	79 (17.4%)	44 (12.6%)	35 (33.7%)	<0.001*	
Primary	92 (20.3%)	81 (23.2%)	11 (10.6%)		
Secondary	112 (24.7%)	84 (24.1%)	28 (26.9%)		
Tertiary	145 (32%)	121 (34.7%)	24 (23.1%)		
Others	25 (5.6%)	19 (5.4%)	6 (5.7%)		
Occupation					
Trader	65 (14.3%)	52 (14.9%)	13 (12.5%)	0.022*	
Daily wage-earner	153 (33.8%)	124 (35.5%)	29 (27.9%)		
Public Servant	1 (0.2%)	1 (0.1%)	-		
Unemployed	101 (22.3%)	67 (19.2%)	34 (32.7%)		
Student	81 (17.9%)	64 (18.3%)	17 (16.3%)		
Private employee	23 (5.1%)	21 (6.1%)	2 (1.9%)		
Others	29 (6.4%)	20 (5.9%)	9 (8.7%)		
¹ Fisher's exact test - Significant level at p<0.05*					

The majority of respondents from WASH access group were adult group between 18-35 years than the non-access group. Around 27.9% of respondents with non-WASH access had over 60 years old. The majority of Thai people can access WASH and healthcare services, while few of ethnic migrants had access these services during the COVID-19 crisis. 49 % of respondents who are squatter occupied can access those healthcare services but around 43% of them are non-access WASH & health facility ($p < 0.001$). Respondents with WASH access tended to have a higher education level ($p < 0.001$) and are single ($p = 0.004$). Most of daily wage-earner can access WASH and healthcare services while around 32.7 % of unemployed cannot access the healthcare services ($p < 0.001$).

4.2. WASH conditions of slum communities during COVID-19 pandemic

Figure 2 depicts respondents' statements about their living conditions and their access to WASH facilities.

Access to clean water

The majority of respondents have access to tap water, while around 100 households cannot access clean water. Residents who can afford clean drinking water have in-home water filters for domestic washing. Those who cannot afford a tap water system in their house have to use water from the canal for domestic washing and buy water from the vending machine for drinking. Some people having no access to tap water pay a monthly water meter rental from their neighbourhood. Moreover, during the crisis, residents in the Khlong Toei slum communities cannot pay water bills due to the loss of jobs, making their living conditions poorer. They live with clean drinking water and food from donations. The majority of people having no access to clean water are mostly foreign workers, homeless, and families living in non-standard houses such as under the toll-way and the railroad. However, the evidence showed that the water quality of water vending machines located in the community is undrinkable due to the high level of pathogens (Goodwin et al., 2015). Furthermore, the water quality of the Khlong Toei canal, where these people collect and storage for domestic use, has a Biochemical Oxygen Demand (BOD) value higher than the average acceptable value. The canal water is polluted because of solid and organic waste released directly to the water from markets and domestic houses.

Sanitation

Most households had their private toilet but with a very small size and lack of sanitation standards. Some residents lived under the toll-way bridge, which did not have a private toilet. In individual houses, there was no waste separation. However, community staff keeps garbage bags in front of the residents' homes and separate garbage in the community centre. Many types of garbage, including plastic bags, water bottles, food scraps, are directly thrown into the roads and canals.

Hygiene

Since COVID-19 rises, marginalized people's hygiene practice has changed. They wore medical masks to protect against infection in public places and frequently washed their hands with clean water and sanitiser gel. Community leaders provided masks and hygiene products at the handwashing station in the community centre. However, their living condition was not suitable for social distancing. Most respondents also expressed that they cannot afford alcohol gel and medical masks for everyday use. In the post-lockdown period, most slum people did not wear masks and less washing hands because of the reasons mentioned above.

4.3 Slum communities' KAP and protective motivations towards COVID-19

Figure 3 depicts statements of different socio-demographic groups of interviewed marginalized people about their perceptions of threats and risks and coping benefits and barriers, and protective intentions. They considered themselves and their family members vulnerable because of their exiting health and hygiene conditions such as chronic disease, poor housing, population density, and lack of WASH facilities. They perceived the severity of the situation as their seasonal jobs do not allow them to practice COVID-19 protection practices. They feared hunger and poverty rather than COVID-19 infection. At the same time, they were anxious and worried about death and sickness caused by the coronavirus. However, they perceived self-efficacy in coping with the pandemic. They were confident in disease and protection awareness and practice, their trust in community cooperation, and the government's information in combating the pandemic. Interviewees believed their practices towards COVID-19 prevention, including wearing masks, social distancing, and washing hands would help them to reduce risks. However, they also perceived coping barriers because of the high cost of medical masks that they cannot afford, their nature of work in crowded markets and ports where they do not allow them to practice social distancing, and their social status non-access to WASH, public healthcare, and online information.

Table 2 reports respondents' KAP and perceived threats/risks and coping benefits and barriers towards COVID-19. In general, the survey showed respondents have good knowledge, practice, and strong perceptions of vulnerability, severity, self-efficacy, response efficacy, and protective behavioural intention towards COVID-19. There are no differences in knowledge, practice, vulnerability, perceived self-efficacy, response efficacy, and response cost among the two groups. However, respondents with access WASH and health facilities perceived the COVID-19 more severe ($t = -3.807, p < 0.001; df = 451$) and had higher protective intention ($t = -3.947, p < 0.001; df = 431$) than their counterparts.

Table 2

Surveyed comparison of respondents' KAP and protective motivation towards COVID 19 protection.

Constructs	Mean	Median	Std.	Access WASH & health facility	Non- access WASH & health facility	t-test	df	p-value
Knowledge	3.894	3.85	0.622	3.851	3.939	-1.496	451	0.135
Practice	3.809	3.80	0.691	3.871	3.749	-1.885	451	0.060
Perceived Vulnerability	3.378	3.40	0.838	3.378	3.377	-0.006	449	0.995
Perceived Severity	3.872	4.00	0.746	4.007	3.744	-3.807	451	<0.001
Perceived self-efficacy	3.723	3.75	0.855	3.767	3.681	-1.067	451	0.286
Response efficacy	4.173	4.00	0.631	4.228	4.120	-1.838	451	0.067
Protective intention	4.204	5.00	0.658	4.326	4.088	-3.947	431	<0.001

4.4 Prediction of intentional protective behaviours from the structural equation modelling (SEM) analysis

Figure 4 shows the relationship among knowledge, perceived threats/risks, and coping barriers, protective motivation behaviours and practice. The root means square residual SRMS was <0.08, NFI was >0.09, and Chi-square was >200 meant that the data fit the hypothesized model well; NFI = 0.905, SRMS = 0.047, Chi-square/df = 403.699, $p < 0.01$ and $p < 0.05$. Thus, the model can predict protective motivation behaviours.

The model results show that knowledge strongly influences current practice ($\beta = 0.456$, $p < 0.001$) and perceived vulnerability ($\beta = 0.180$, $p < 0.001$), while perceived vulnerability influences current practices ($\beta = 0.163$, $p = 0.002$). At the same time, current practice influences perception of self-efficacy ($\beta = 0.314$, $p < 0.001$), response efficacy ($\beta = 0.557$, $p < 0.001$), and severity ($\beta = 0.198$, $p = 0.003$). The model results also confirmed that perceived severity influences protective behaviour intention ($\beta = 0.102$, $p = 0.043$). If people tend to have high awareness about health and disease consequences, they will have the motivation to adopt protective behaviours. And people with high individual's self-efficacy tend to perceive themselves to be able to cope with the disease, leading to high preventive motivation as perceived self-efficacy influences protective motivation behaviours ($\beta = 0.293$, $p < 0.001$).

Perceived response efficacy is also confirmed to influence protective motivation behaviours ($\beta = 0.417$, $p < 0.001$). Response efficacy was a variable supporting self-efficacy by enhancing a high level of self-

protection. Both self-efficacy and response efficacy were found as effective variables to predict people's protective behaviours.

5. Discussion

5.1. Role of WASH and health facility and knowledge in urban marginalized people's threat and coping appraisal

Although WASH has a vital role in combating COVID-19 in the developing world (Ezbakhe et al., 2019, UN,2020; UNICEF, 2020), the findings of this study showed that urban marginalized people have inequalities access to clean water, poor sanitation, shortages of personal protective equipment and public healthcare services. The situation of urban marginalized people in Thailand is similar to many developing countries such as Kenya, Africa, Pakistan, India, where poor people and low-skilled worker migrants struggle to access healthcare services and unaffordable protective equipment (Zulu et al., 2011; UNESCO, 2020).

The findings revealed that the marginalized urban people tended to have basic knowledge of COVID-19, WASH practices, and a high perception of threat and coping appraisal and protective intention. People who can access WASH and health care tended to have higher protection intention against COVID-19, and as a result, perceive the pandemic more severe than people having no access to WASH and healthcare. Most Thai respondents tended to have better access these public services and have higher education (nearly 50% of respondents had tertiary education) than non-Thai migrant groups. The barriers to WASH and healthcare services are due to unemployment, hidden social status, expensive health insurance, low health literacy, language barrier, and social stigma decrease the protective motivation awareness of marginalized people (Essendi et al., 2011; George et al.,2018) which may constraint their protection intentions toward Covid-19.

5.3 Predicting protective motivation behaviours towards health infection.

This study developed a conceptual framework based on Protective Motivation Theory (PMT) and Knowledge, Attitude, and Practice (KAP) to predict WASH protective behaviours intention against COVID-19. PMT is a social cognitive process with information, knowledge, and attitude (Milne et al., 2000), and many researchers widely used PMT in predicting 'intention' behaviours. Therefore, it can be an alternative theory for KAP to investigate people's knowledge and experiences relevant health behaviours (Xiao et al., 2014), and PMT components should be considered in KAP because it provides a strong predictor and fills the gap of the prediction results (Nabizadeh et al., 2014).

In this study, a part of PMT plays a role in the 'attitude' component in the KAP model, including perceived severity, self-efficacy, and response efficacy. The combination of PMT and KAP helps researchers to understand knowledge significantly affects current practices and vulnerability due to knowledge linked to

people's awareness, motivation, and competence to understand, appraise, assess health risk or vulnerability situations leading people to judge and form accurate decisions by maintaining or improving their health practices regarding disease prevention and health protection (He et al., 2016). The model results showed that knowledge was a vital factor that had a greater influence on practice (Allan et al. 2013) and behaviour intention through threat appraisal and coping appraisal (Rogers,1983; Renner et al. 2008). It also can shape people's risk perception, which helps to decrease people's perceived severity and vulnerability beliefs (Eppright et al., 1994). Vulnerability can help to predict intentional behaviours as it is significantly associated with people's knowledge and emotions. These emotions such as fear, anxiety are roots of people's survival favouring the prediction of health preventive behaviours (Stangier et al., 2021).

The results also showed that current practices could influence the perception of coping appraisal and threat appraisal. If people have good current practices, it can reduce or prevent the severity of harmful events and increase the perception of self-efficacy and response efficacy regarding disease prevention benefits. Poor health practices or negative bias on health practices can undermine protective behavioural intention (Nguyen et al., 2019a; Park et al., 2020). Current practices can influence people's health behavioural intention (Fishbein et al., 2001; Chamroonsawasdi et al., 2017).

The model also confirmed that perceived severity, self-efficacy, response efficacy are all three variables influencing protective motivation behaviours. People with high awareness of health and disease severity will have high motivation to adopt protective behaviours (Tazval et al.,2016; Ezati et al., 2021). Whereas perceived self-efficacy is the strongest factor among PMT constructs, many studies found (e.g., Hernandez-Padilla et al., 2020; Janmaimool, 2020). People with high efficacy tend to cope with the disease, leading them to have higher preventive motivation (Leigh et al., 2020). Furthermore, perceived response efficacy is found as a variable supporting self-efficacy (Rippetoe et al.,1987; Milne et al., 2000; Leigh et al., 2020). Response efficacy can enhance self-efficacy on self-protection. Protective motivation behaviours have resulted from threat appraisal and coping appraisal (Fishbein et al., 2001; Tang and Feng, 2018). Thus, the model results revealed that the field data in this case study fits well the conceptual model by combining KAP and PMT to predict urban marginalized people's protective motivation behaviours towards Covid-19.

6. Conclusions And Implications

Despite the great effort of international development organizations and governments in the urban WASH program, many marginalized communities still live in poor urban environments across the world. This study depicted a rich picture of the real-life of the marginalized people who live in slums. Many impoverished urban settlements are being deprived of their right to water and sanitation, with severe implications on their prevention and survival from both epidemic and pandemic.

The study also showed that knowledge plays a key role in marginalized people's perceived vulnerability and current practices, while current practice strongly influences severity, self-efficacy, and response efficacy. Furthermore, protective motivation behaviours are associated with severity, self-efficacy, and

response efficacy. Although the findings showed that the marginalized in this study had a high level of protective behaviours intention and protective practices, they were unable to practice the basic Covid -19 prevention exercises due to no access to clean water, poor sanitation infrastructure, unaffordable protective equipment. Protecting a community from a communicable disease means protecting the whole society from the pandemic. This study appeals to the urgent intervention and special assistance from development organizations, the government, and the society in enhancing the needs of marginalized communities by ensuring their access to clean water, sanitation, and health care services. Any WASH and health programs in responding to epidemics or pandemics in the future must integrate the socio-cognitive behaviours intervention aiming at improving their knowledge, practice, and perception of threat appraisal and coping strategies to the infectious disease.

Finally, the study applied a social cognitive conceptual model by combining KAP and PMT in predicting health behaviours, aiming at devising intervention programs and policies for purposeful behaviours change. Although KAP and PMT have been widely used in psychological research to predict health behaviours, this is the first study to investigate the applicability of the combined KAP and PMT in understanding the Covid-19 protective behaviours among marginalized communities in Thailand. The field data fit the hypothesized model well, and the model also has adequate validity because the motivation intention was associated with PMT constructs used in the study.

7. List Of Abbreviations

KAP: Knowledge, Attitude and Practices

PMT: Protective Motivation Theory

SEM: Structural Equation Modelling

WASH: Water, Sanitation and Hygiene

Declarations

Ethics approval and consent to participate

The interview and questionnaire survey protocol were approved by the research ethics review committee (RERC) at the Asian Institute of Technology (AIT), Thailand. The written consent was obtained from all participants who took part in the study. During the interview and questionnaire survey, interviewers and interviewees always wore medical masks and maintained social distance for preventing COVID-19 transmission and following regulations that applied during the COVID-19 situation in Thailand.

Consent for publication

The manuscript contains no individual person's data in any form (including any individual details, images or videos), all data obtained interview and questionnaire survey were treated as anonymous. Interviews

and questionnaires with teenagers from 15-17 were made under the observation of their parents.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

SP: Methodology; Investigation, Formal analysis, Visualization, Writing - original draft; TPLN: Conceptualization, Methodology, Validation; Writing - original draft; Review & editing; Supervision.

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Appendix

Appendix A is not available with this version.

Figures

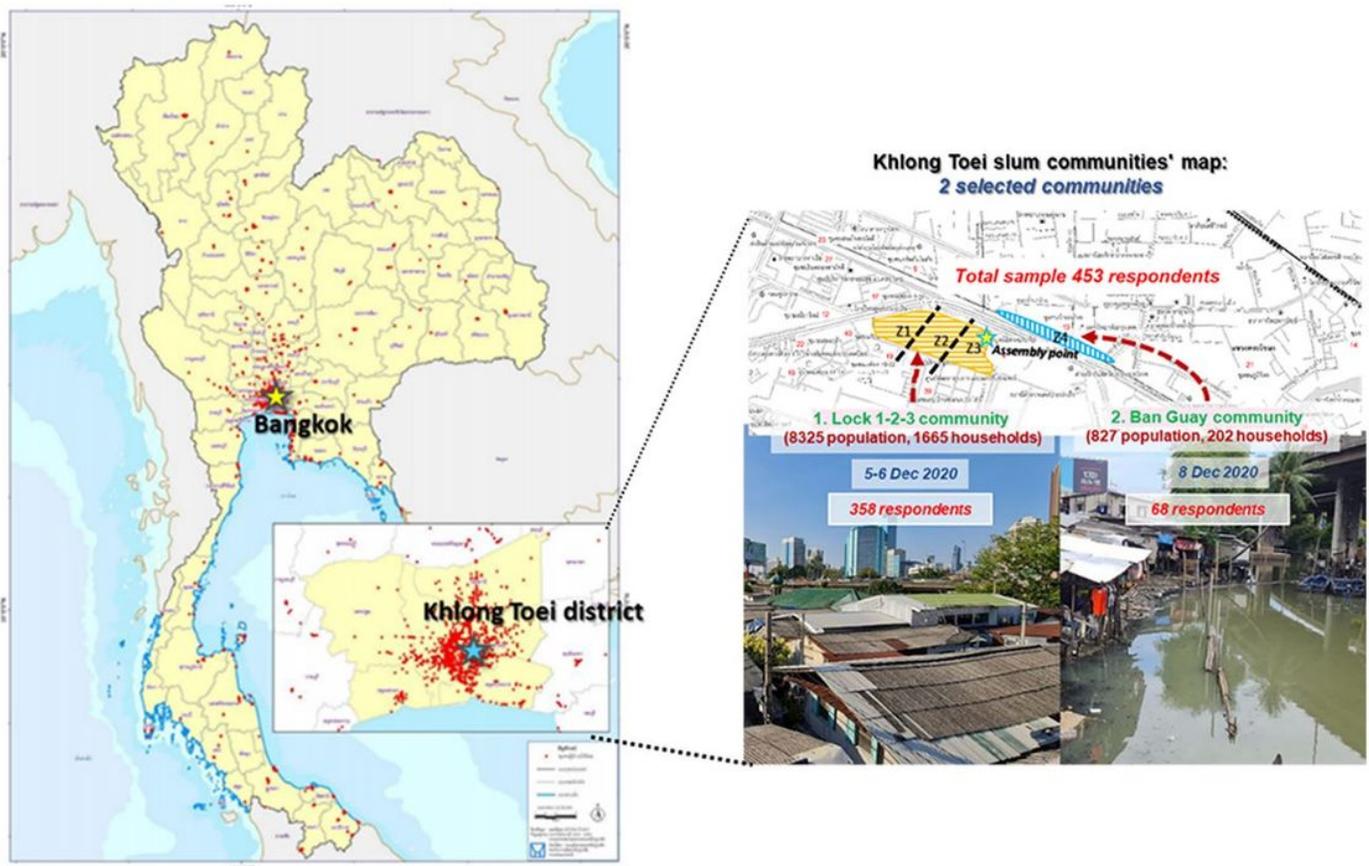


Figure 1

Lock 1-2-3 sub-communities and Ban Guay sub-communities, Khlong Toei slum communities in Khlong Toei district (Bangkok, Thailand)



Figure 2

Interviewees' statements about their WASH conditions during the COVID-19 pandemic

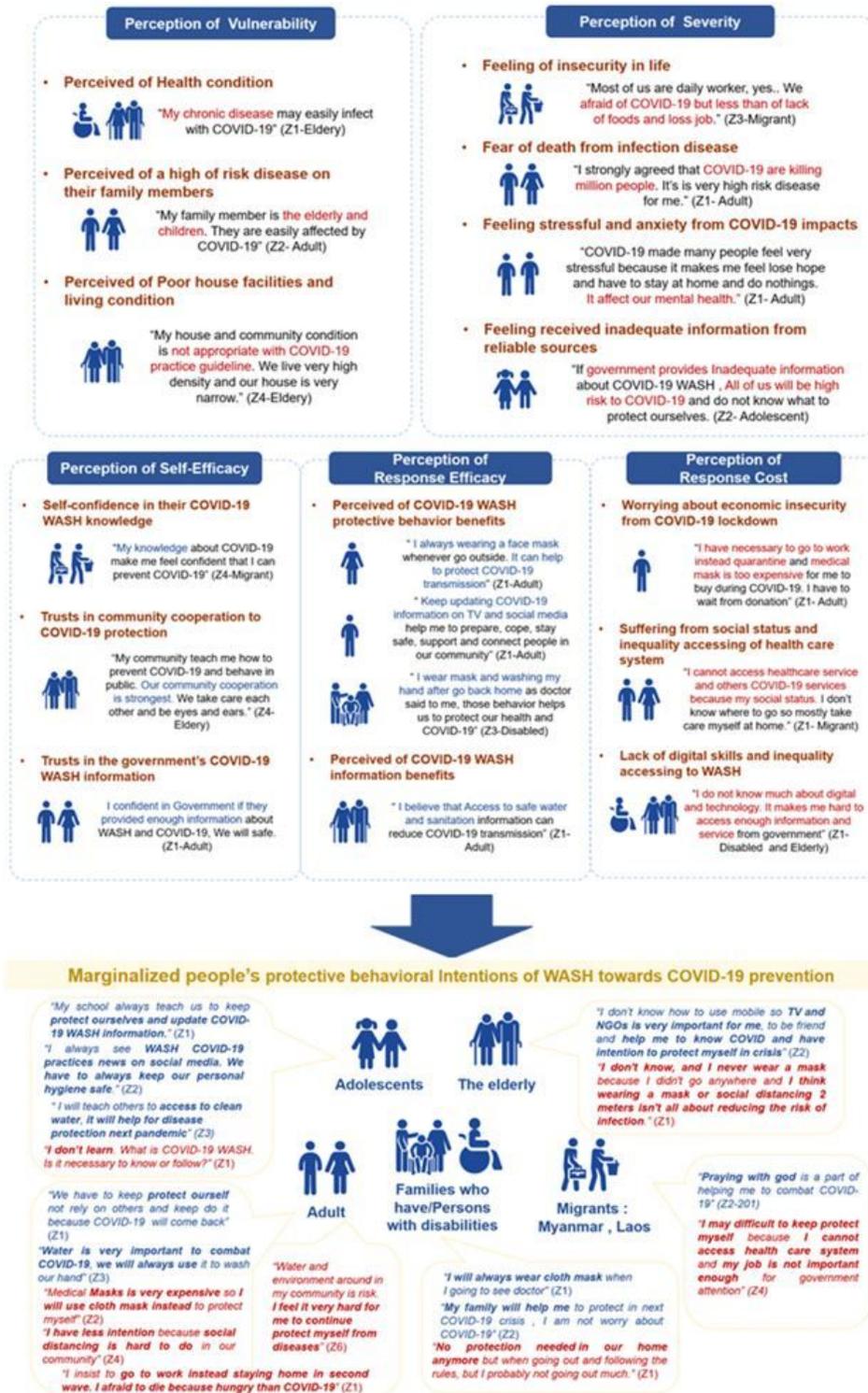


Figure 3

Marginalized people in slum communities' statements regarding COVID-19 prevention and, WASH facilities

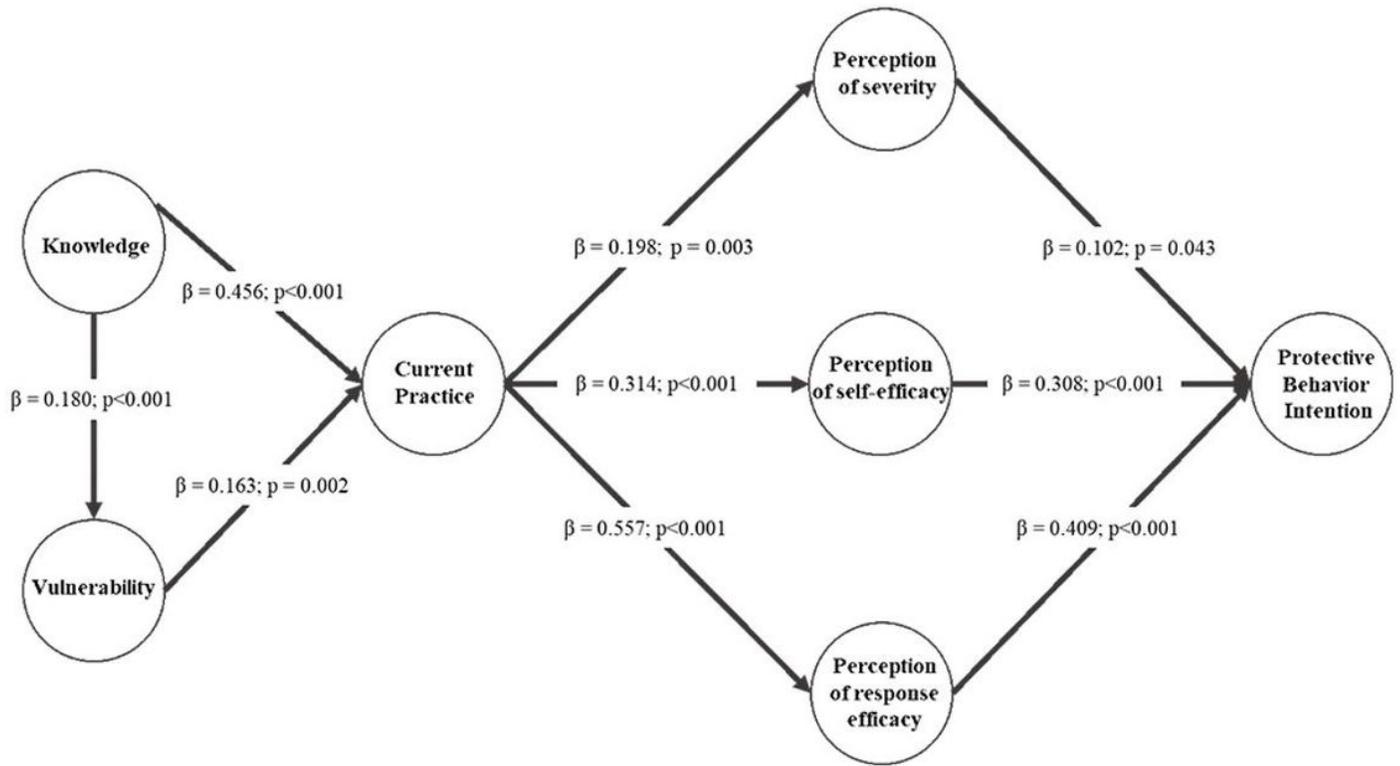


Figure 4

Structural equation modelling of Covid 19 related KAP- PMT constructs, and behaviours intention.