

Empirical Research on Individual Behaviors and Effective Prevention in COVID-19 Epidemic--Analysis on Risks, Budget, Information and Effective Prevention

Mei Ge^{1,2}, Jiakang Li², Binshi Qi³, Bing Shi^{1*}

1. Shenzhen Polytechnic, Shenzhen 518055, China.

2. City University of Macao, Macao 999078, China.

3. Enoch Medical Centre, Macao 999078, China.

Abstract: After the outbreak of the COVID-19 epidemic, China has actively adopted measures for epidemic control and prevention to block further spreading, and gained favorable effect in epidemic control. However, individual behaviors still may hinder prevention and control to certain degree and may affect psychological states of the surrounding people as well. In accordance with research findings of public emergencies as well as study and analysis on public health events, this paper sets up a model with four factors of information, risk, budget and effective prevention, and puts forward relevant assumptions. The questionnaire with Likert scale is designed in accordance with assumptions and former research findings, and offered to personnel and experts with regard to epidemic prevention and control for interview. This paper collects the questionnaire, applies SPSS25.0 software for statistical analysis, and verifies assumptions based on statistical results to get significant correlation and significant impacts among four factors. Then, corresponding suggestions and countermeasures are proposed in line with the conclusion.

Keywords: COVID-19 Epidemic; Individual Behaviors; Information; Risk; Effective Prevention

1. Introduction

The so-called public health emergencies refer to major infectious disease epidemic, mass unknown diseases, major food and occupational poisoning and other events seriously affecting public health which took place suddenly, caused or might cause severe damage to social public health (Wang Yiniu, Luo Yuejia, 2003). Public health emergencies may cause certain mental stress and emotional problems to people in a large scope. In case of emergencies, the social psychological factors may affect progress of emergencies and control effect more significantly. The emotional problems arising from factors including life, work, disease and social and interpersonal relation under the epidemic are prominent.

After the outbreak of the COVID-19 epidemic, China has adopted a series of active measures including travel restriction, and collective responses of the entire society for control and treatment. However, there is no doubt that the epidemic may affect mental health of the infected patients and nearby people. Thus, effective adjustment and social safety and stability of individual behaviors are also important links of epidemic control and prevention. The economic analysis on infectious diseases in the academic circle has just started, and the analysis mainly focuses on AIDS and SARS. Although some basic models for the prevention and control of infectious diseases, such analysis failed to form a systematic framework.

This study, starting from individual prevention of infectious diseases, respectively discusses three constraints of risk, budget and information, and establishes a comprehensive individual prevention model for infectious diseases from the perspective of economic analysis, and puts forward assumptions. Therefore, this study has certain significance in both theoretical research and practice instruction, and provides reference and suggestion for further study on infectious diseases and government policy formulation.

2. Literature

Xu Jie (2010), from the aspect of legal framework, sorted out development history of large amount laws and regulations on public health emergencies in “Rights, Obligations and Responsibilities of Citizens in Public Health Emergencies in China”, and required to improve and perfect legislation so that rights and obligations of citizens in public health emergencies can be further clarified; Zhou Shandong (2020) proposed in “” to establish connection between self and others for health responsibilities from the perspective of citizens themselves in public health emergencies, rebuild health responsibility system with others priority from the perspective of relation between citizen self and others, and reasonably establish “health community”.

Some scholars studied general information spreading situations of public health events in China. Xie Xuan (2012) analyzed information spreading problems, status in China’s health emergencies and arguments concerned in contingency plan, and proposed suggestions on improvement of emergency information spreading. Wang Wei (2008), from the perspective of informatics theory, studied deeply the operating mechanism and system development of information management for public crisis in China from information spreading control, resource management and system development. Moreover, other scholars emphasized information spreading of public health events from the angle of risk communication. Wang Xinyao (2019) evaluated risk communication effect in health emergencies through questionnaire on current public behaviors and risk recognition. From the perspective of risk communication, Liu Jia (2015) empirically summarized news report about H7N9, brought about strategic suggestion on risk communication for China’s public health events, and established corresponding media emergent report mechanism^[1].

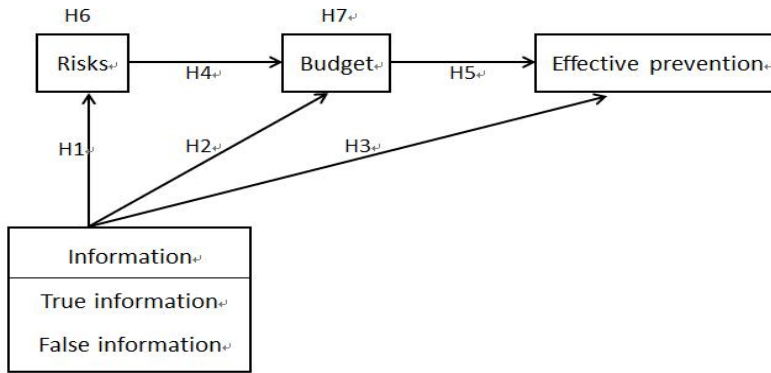
To sum up, the study on public health emergency information and spreading in the academic circle mainly covers two aspects. For study on information system development, scholars concerned introduction of technical means and establishment of information management system. For study on information spreading, scholars not only discussed current status and risk communication but also studied spreading effect and suggestion strategies from three levels including government, media and the public. The latter two are the most concerned two topics. However, on the level of public study, scholars mainly focused on online public opinion. Few papers studied public information spreading behaviors and cognition. There is a large space for exploration in this field due to less in-depth description and analysis on public psychological performance, less direct presentation of public spreading effect, and lack of rich research perspectives and theoretical instruments.

The public health emergencies concern life and health issues of each individual. People who fought against the virus on the front line know the epidemic visually and distinctly; for numerous other people, their cognition about the epidemic is from information. Information is the bridge between the mass public and public health emergencies, which establishes the “pseudo-environment” for people to know emergencies. The way of information release, spreading and cognition concerns the successful public response to public health emergencies. Under this background, this study puts forward the following research problems: what factors affect public information spreading behaviors in public health emergencies? What influences are those factors generated respectively? What characteristics do the public information spreading behaviors present?

3. Research Model and Empirical Finding

This study, starting from individual prevention of infectious diseases, established an individual prevention model with comprehensive characteristics based on discussion on three constraints of risk, budget and information. Thus, this paper proposed the following research model:

Figure1: Structural Model



Data source: The author collected data in this paper.

After basic statistical analysis on questionnaire results is carried out, the validity and reliability of all factors comply with basic requirements. Cronbach's alpha and KMO value are both larger than 0.7. According to factor analysis results, the factor loading is larger than 0.5, and it is unnecessary to revise the original questionnaire or reissue the questionnaire.

On that basis, this paper carried out relevant analysis, and Pearson correlation tests on correlation among factors. Considering that the gender, age, occupation, educational background and income as control variables may affect the research finding, the correlation test was carried out first^[2].

The criteria for correlation test are mainly from two aspects. Firstly, if the significance value $P < 0.05$, the correlation is significant. Secondly, based on Pearson correlation value, positive correlation, negative correlation and weakness of correlation should be judged. This paper studied correlation from overall variables and dimensions of information, risks, budget and effective prevention.

Table 1: Correlation Analysis Results

		Correlation			
		Informatio	Risk	Budget	Effective Prevention
Information	Pearson correlation	1			
	Sig. (Two-tailed)				
Risk	Pearson correlation	-. 893**	1		
	Sig. (Two-tailed)	. 000			
Budget	Pearson correlation	. 925**	. 918**	1	
	Sig. (Two-tailed)	. 000	. 000		
Effective Prevention	Pearson correlation	. 886**	. 892**	. 843**	1
	Sig. (Two-tailed)	. 000	. 000	. 000	
** . The correlation is significant on 0.01 level (two-tailed).					

Data source: The author collected data in this paper.

Aforesaid table shows results of relevant analysis. Based on aforesaid results, information is positively correlated with budget and effective prevention, and negatively correlated with risks; the risk factor is positively correlated with the budget and effective prevention; the budget is positively correlated with the effective prevention. In accordance with statistical analysis requirements of correlation, it is relatively correlated when the value is larger than 0.3; the correlation is strong when

the value is larger than 0.7; the data in the table is larger than 0.7, and it is significantly correlated at 0.01 level.

In accordance with aforesaid correlation analysis, the background factor variable and research variable are related to certain degree, preliminarily proving some assumptions proposed hereof. In order to further study relation between variables, this paper employed multiple linear regression analysis to further explain acting relation between variables.

Table 2:Regression result

Coefficient ^a						
Model		Unstandardized coefficient		Standardized coefficient	t	Significance
		B	Standard error	Beta		
1	(Constant)	1.616E-16	.061		.000	1.000
	Information	-.893	.061	-.893	14.608	.000
a. Dependent variable: Risk						
Coefficient ^a						
Model		Unstandardized coefficient		Standardized coefficient	t	Significance
		B	Standard error	Beta		
1	(Constant)	1.206E-16	.051		.000	1.000
	Information	.925	.052	.925	17.908	.000
a. Dependent variable: Budget						
Coefficient ^a						
Model		Unstandardized coefficient		Standardized coefficient	t	Significance
		B	Standard error	Beta		
1	(Constant)	4.208E-17	.062		.000	1.000
	Information	.886	.063	.886	14.065	.000
a. Dependent variable: Effective Prevention						

Coefficient ^a						
Model		Unstandardized coefficient		Standardized coefficient	t	Significance
		B	Standard error	Beta		
1	(Constant)	-3.649E-17	.053		.000	1.000
	Risk	.918	.054	.918	17.052	.000
a. Dependent variable: Budget						
Coefficient ^a						
Model		Unstandardized coefficient		Standardized coefficient	t	Significance
		B	Standard error	Beta		
1	(Constant)	-6.848E-17	.073		.000	1.000
	Budget	.843	.073	.843	11.506	.000
a. Dependent variable: Effective Prevention						

Data source: The author collected data in this paper.

Results in aforesaid table show the P value of all regression coefficients is smaller than 0.05; according to results, information has significant negative impact on risks, and significant positive influence on budgets and effective prevention; risks have significant positive influence on budgets, and the budget has significant positive influence on effective prevention results.

Table 3: Mediating Effect Analysis for Risks

Data source: The author collected data in this study

Direct effect of X on Y					
Effect	se	t	p	LLCI	ULCI
0.4065	0.061	5.7356	0.0002	0.3747	0.6532

Table 4: Mediating Effect Analysis for Budgets

.Datasource: The author collected data in this study.

Direct effect of X on Y					
Effect	se	t	p	LLCI	ULCI
0.4374	0.058	6.2851	0	0.3926	0.7014

Results in the table show risk as the mediating variable of information affecting the budget has significant mediating effect; the budget as the mediating variable affecting the effective prevention has significant mediating effect.

4. Research Finding and Suggestion

In the new age when globalization closely links the human society, the infectious diseases like COVID-19 threaten the life safety of the entire human society. Under the epidemic, to reach effective prevention and control, individual prevention must follow national administrative management. Only the country can take the responsibility to organize anti-epidemic campaigns. Thus, finding the key affecting effective prevention and studying the problem thoroughly will help the human society better cope with similar risks in the future^[3].

5. Conclusion on individual behavior

According to the survey results, in general, the individual prevention awareness of Chinese citizens is strong; the proportion of those who wore masks outdoors, washed hands after getting home, and reduced unnecessary travel and gathering exceeded 90%; 6.09% residents did well in wearing masks. The overall performance of preventive behaviors is favorable.

The analysis results of this study show individual behaviors of residents have differences in gender. The proportion of females who did well in individual protection is higher than that of males. By aging, the older the respondents are, the better their awareness of prevention is, and the better they can do in individual prevention. From the angle of urban and rural areas, there is an urban-rural difference. Rural residents did worse than urban residents, but did better in reducing unnecessary travel.

By occupations, the medical care personnel as the special group actively participated in anti-epidemic campaigns, and greatly reduced safety loopholes of medical institutions. In the aspect of individual protection behaviors, medical care personnel have a higher implementation rate. They are more directly contacted with patients. Therefore, their concept of infection prevention is stronger than that of non-medical care personnel^[4].

6. Conclusion on consumption budget

Factors affecting consumer behaviors in the sudden COVID-19 epidemic are divided into internal factors and external factors. The former refers to age, income level and psychology (demand, motive and emotion) of consumers; the latter refers to social and economic development status, policies, and social and cultural conventions. The outbreak of COVID-19 epidemic is a major external stimulus. Thus, by comprehensively analyzing changes in psychological factors of consumers, people could better realize the nature of change in consumer behaviors under the epidemic. During the development progress of public health emergencies, the epidemic may affect the psychological status of different groups of people to different degrees. Demand, motive and attitude are all important psychological factors affecting consumer behaviors. They not only decide decision-making behaviors of consumers but also magnify or restrict the effect of external environment stimulus.

7. Conclusion on information

In this survey, according to a cross-sectional study on channels of the public in each province to acquire knowledge about COVID-19, the information sources of the mass are mainly new media, traditional media, community propaganda, hospital education and others' imparting; besides, about 31%-98% of people knew COVID-19 information through new media (WeChat, Weibo, etc.). The survey results show that propaganda approaches based on traditional media are restricted. In the future, public opinion response and propaganda, application of emerging spreading channels shall be emphasized to enhance information release's timeliness, flexibility, coverage and availability for different groups^[5].

This study, with COVID-19 event as the example, discussed crisis information spreading of individuals based on when responding to health emergencies, and drew the following conclusions:

(1) Social media enhances individuals' cognition of crisis

With spreading of information related to the epidemic on social media, the public has gradually established risk cognition for COVID-19 epidemic through use and information acquisition of social media.

(2) Conversion of individuals' roles in crisis spreading

On the one hand, individuals are undoubtedly victims of the crisis, the objects of crisis communication, and meanwhile receivers of crisis information. On the other hand, by virtue of social media, more individuals could know the crisis events through online crisis message spreading and sharing, become spreaders of the event and become potential helpers of others possibly. In the dialogue with family members, individuals could even become crisis communication subjects of the family. During the entire process, individuals show diversified identification characteristics.

(3) Crisis information spreading based on characteristics of interpersonal relation and social media

According to the research finding, people mainly talk with group intensively related to themselves, including family members and friends. Interviews show in crisis information spreading facing family members, people play the role of controller to certain degree, and may choose the information shared consciously. During information spreading, people will pay attention to individual images and take too much into consideration; while on weakly connected social platform such as Weibo, individuals' discourse expression will be freer^[6].

(4) Individuals' psychological changes are linked with decision-making of information spreading

This paper displayed status changes of individuals during the whole crisis development process, proposed staged psychological change model of individuals in crisis evolution, and meanwhile showed periodic variation of information spreading through individuals. As a whole, this paper finds information spreading behaviors through social media in crisis event not only greatly enhanced individuals' sense of presence and participation in crisis event, but also allowed common public to join discussion of relevant events and push crisis event develop forward with the power of the public opinion. In this case, individuals' capacity has been fully exercised for health emergencies in the social media age, gathering vast energy for solution of the crisis event.

8. Suggestions

8.1 Put forward optimization scheme based on individual consumers

(1) Guarantee personal income of residents, and stabilize consumption capacity

The primary precondition to solve insufficient consumption capacity is to guarantee employment and income of residents. The government shall actively implement relevant unemployment guarantee and subsidy for job skill learning, provide corresponding guarantee mechanism to people impacted and difficult to maintain basic life, and stabilize people's livelihood; emphasize such poverty-stricken people due to the epidemic, and realize basic life guarantee for residents through expanding basic living allowance, providing economic subsidy and job opportunities.

(2) Boost consumption confidence, and cultivate consumption potential

According to the survey on changes in residents' consumption habits, the consumption of most residents is restricted due to worries about the future economic trend, and the consumption potential has not been fully motivated. They are not enthusiastic in consumption. The government shall guarantee to rise basic living materials little in price or not rise in price to maintain confidence of residents for daily consumption; in the field of the residents' daily consumption, the government shall actively apply policies to realize and promote benefits^[7].

(3) Guide consumption concept and encourage consumption intention

According to survey on asset allocation habits and consumption intention, facing lower income and higher price, residents intend to adopt some conservative policies. Thus, the banks may adjust interest rate, and encourage residents to invest idle fund in financial services; encourage consumption emotion of residents by launching consumer financial products; properly extend repayment period of consumer credit service; meanwhile, cooperate with relevant merchants to carry out sales promotion activities, and encourage residents to consume.

8.2 Strengthen network management and purify network environment

The public individuals' cognition for diseases may affect self-management and treatment compliance of individuals, and further directly affect anti-epidemic behaviors and public health and safety of social members. At present, the COVID-19 epidemic has not been controlled. China may face the risk of higher COVID-19 import and even local spreading. Based on results of the survey, this paper offers the following suggestions:

In propaganda and education for major emerging or emergent infectious diseases similar to COVID-19, authorized organs or authorized experts shall make decisive statements on themed media, and accurately spread necessary information to the public to avoid arbitrary spreading of false information; the propaganda forms shall be flexible and variable; different forms shall be adopted for different audiences; it is suggested to strengthen network management, purify network environment, fight rumor starting or spreading, and guarantee authenticity and reliability of the information^[8].

8.3 Highlight government administrative management, and comprehensively perfect disease prevention and control system.

(1) Perfect legal guarantee system for public health

It is necessary to perfect existing laws and regulations regarding public health, and revise supporting documents; revise and perfect contingency plan for public health emergencies; perfect work mechanism for linking between law enforcement departments; guarantee smooth work of infectious disease prevention with legal means.

(2) Establish efficient and unified emergency decision command system

The government shall complete emergency decision and command mechanism for public health; improve emergency command information system for the public health; establish public health emergency command information system; establish expert database for major public health safety; establish disease supervision and warning, and emergency command decision information platform; strengthen development of public health information system, and development of supervision and warning system.

(3) Reform and perfect disease prevention and control system

Reform and improvement of disease prevention and control system is the policy for health work based on implementation and prevention, and the key to solidifying public health prevention and control network.

The government shall strengthen development of public health emergency prevention capacity; develop capacities of disease prevention and control talents, inspection and testing, information-orientation, disease supervision and warning, and bring the role of public health emergent service system into full play; improve emergent prevention and control capacity for basic public health; carry out "general basic level" system development, and drive upgrading of basic-level organs^[9].

(4) Reform and improve medical rescue system for major epidemic

Medical institutions are the forward units of major epidemic prevention and control, and the important parts of the public health system. Perfecting medical rescue system for major epidemic disease is the urgent task to improve emergent management capacity of the public health system.

It is necessary to strengthen development of public health talent team, and develop contingency capacity of public health emergencies with traditional Chinese medicine; establish TCM contingency management system and work mechanism for public health emergencies; strengthen mental health services, and enhance psychological rescue and crisis intervention for major public health emergencies; strengthen to improve medical insurance and rescue mechanism for major diseases.

(5) Complete unified emergency supplies guarantee system for major epidemic disease.

The emergency supplies guarantee system is an important content of national emergency management system construction, an important support for accurate deployment and promotion of national emergency management system and capacity modernization, and the materials basic guarantee to cope to and treat public health emergencies. The government shall establish emergency supplies supply, collection and storage system for major epidemic disease, optimize major epidemic emergency supplies allocation system, and develop medical care supplies reserve system for infectious diseases^[10].

(6) Complete the mass prevention and mass treatment system for major epidemic disease

Completing and strengthening the mass prevention and mass treatment system for major epidemic disease is an necessary requirement to stick to and improve the institutional system of “running the country by the people”, and also the key to improving emergency management capacity for the public health. It is necessary to organize and mobilize social force to intensively participate in epidemic prevention and control; enhance collaboration between the government and social forces and the market mechanism; complete the work mode of mass prevention and mass control for patriotic sanitation, and establish and improve city-wide popularization system for public health emergencies.

References

Based on the data as of May 18, 2021 on www.worldometers.info/coronavirus/.

- [1] Wang, YN., Luo, YJ., Specialty of Mood Disorders and Treatment During Emergent Events of Public Health [J]. *Advances in Psychological Science*. 2003, 11 (04): 387-392.
- [2] Wang, XY., Hao, YH., et al. Information Acquirement and Effect Analysis of Risk Communication based on Public View [J]. *China Preventive Medicine*. 2019, 20 (1), 11-16.
- [3] Wang, LE., Probe into the Path of Promoting Citizen's Moral Responsibility in Public Emergencies [J]. *Economic Research Guide* 2020, (20), 3.
- [4] Wang, S., Research on Government Public Relation Strategies for Crisis in Public Health Emergencies in China - Based on SARS and H7N9 [D]. Jilin University, 2014.
- [5] Wang, W., Establishment and Operating Mechanism of Public Crisis Information Management System [D]. Jilin University.
- [6] Fang, D., Responsibility Education in Civic Vision [D]. Nanjing Normal University, 2017.
- [7] Fang, XH., Xin Changmao. Research on Public Health Emergency-based Medical College Library Information Service [J]. *China Medical Equipment*. 2014, (03),74-76.
- [8] Fang, X., Public Health Emergency - MERS and Role of New Media [J]. *Strait Journal of Preventive Medicine*. 2016, (01), 69-71.
- [9] Tian, XY., Baiyun. *Contemporary social responsibility ethics* [M]. People's Publishing House, 2008.
- [10] Li, J., Value and Approach of Civic Moral Responsibility Cultivation in China [D]. Yanbian University , 2016.

* Fund Program: 2021Macao Fund, MF2032, *Empirical Research on Individual Behaviors and Effective Prevention in COVID-19 Epidemic--Analysis on Risks, Budget, Information and Effective Prevention*