

RESILIENCE CAPACITY OF PRE-HOSPITAL EMERGENCY MEDICAL SERVICE (EMS) PROVIDERS AND THE FUTURE AGENDA FOR SUSTAINABLE DEVELOPMENT OF A RESILIENT EMS SYSTEM IN THAILAND

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ABSTRACT

In the current scenario, demand for emergency care is rising due to the shift in disease patterns all around the world, from growing burden of non-communicable diseases to the pre-existing communicable diseases. The principle aim of an emergency medical service (EMS) system is to prevent premature mortality, reduce pain and prevent long term disability. EMS workers serve on the front lines of emergency medical care, which is one of the most important components in an EMS system of any country. Since the latest pandemic has caused increased burn out and stress among the service providers with long term mental and physical effect which is yet to be researched in Thailand, and no study in particular have addressed to evaluate the resilience capacities of the front-line EMS workforce and identify components that influence their performance and response to emergencies.

This study aims to measure the resilience capacity of pre-hospital EMS providers of Thailand along with providing recommendations to policy makers regarding EMS service provider future agendas and standard methods for proper workforce development in order to tackle future public health emergency situations. The respondents were EMTs, ENPs, paramedics, frontline rescuers working in the provinces as an EMS service provider under the ministry of public health (MOPH), National Institute of Emergency Medicine (NIEM), Thailand. Total 500 participated in the survey from 32 different provinces.

Resilience capacity was divided into high, moderate and low components and factors were developed through literature review and grouping was done. With a total of 41 questions: Safety, Competencies, Wellness and Behavioral Health. Open ended questions reflected the perception and experiences of the EMS service providers regarding the strength and improvement areas of the EMS system in Thailand.

The result from the survey shows that the EMS service providers have moderate resilience in terms of Behavioral Health which is related to their psychometric properties and main components to measure the resiliency scales. Similarly, in terms of Safety, Wellness and Competencies components the EMS services have shown moderate level of resilience capacity as a front-line worker in the emergency medical service system to prepare for the future public health emergencies.

The findings of the research present the perception and opinions of various EMS providers working in different provinces of Thailand. This study explores the present status/situation of front-line workers of the EMS system in Thailand. The findings provide crucial recommendations to health policy makers for developing resilient EMS system and their workforce in

Thailand focusing on pre-hospital care setting. This research suggests measurement tools and plans focusing on the EMS future agenda 2050.

KEYWORDS

emergency medical services; EMS; pre-hospital system; EMS workforce; health system resilience; personal resilience

BACKGROUND

An EMS system is a comprehensive health care system and the crucial element of the health system including universal health coverage. It is a system of coordinated response and timely emergency medical care with the involvement of various agencies, stakeholders and communities [1]. The principle aim of EMS system is to prevent pre-mature mortality, to reduce pain and prevent long term disability. EMS system focus on delivering timely and quality care to victims of sudden and life-threatening emergencies for the motive of preventing needless deaths [2]. Pre-hospital care includes the care provided from the scene of injury, home, school, or accident area until the patient/ sick person arrives at a formal health care facility for the specific treatments from the health experts (2). The pre-hospital care is provided by emergency physicians, emergency medical technicians, paramedics, nurses and different volunteers [3, 4].

The pre-hospital EMS of Thailand is based on the combination of Anglo-American Model (Scoop and Run) and The Criteria Based Dispatch (CBD) [5]. Thailand also follows the similar model of Service d'Aide Médicale Urgente (SAMU) from France and the service providers are trained using the Australian education system, while the division and classification of healthcare facilities are based on the American College of Surgeons model [6].

Resilience is defined as one's ability to get back to the normal life and be mentally stable after facing unforeseen circumstances. It is the characteristics that provide positive adaptation to the stressors and crisis situation. In the past decade, the international health systems have emphasized on the importance of resilience among the service providers. EMS service providers serve on the front lines of emergency medical care, which is one of the most important components in an EMS system of any country. They are a critical part of the nation's emergency response system and the front line of medical responses [7, 8]. EMS service providers as health care providers, play an

important role in preventing and containing the spread of diseases infections, delivering proper pre-hospital care to the patients and are important for overall response and service delivery. However, there is evidence to suggesting that solely education and training are insufficient in preparing prehospital providers to respond to PHEs. Undoubtedly, mental health of first responders is a compelling concern, especially in pandemic conditions and mass casualty events concerning their coping level and mechanism [9, 10]. Paramedics, emergency medical technicians, ambulance drivers, nurses and others who are the workforce of the EMS system are a high risk working group for having adverse mental health impacts [11]. To address the behavioral and mental health issues and various challenges faced by EMS workforce, there has been increasing attention to support their resilience, as a process of recovery following adverse events which involve behavioral, cognitive and affective responses which in turn supports positive adaptation of psychological well-being and functioning. Workforce resilience is positively correlated with life and job satisfaction, coping self-efficacy and self-esteem [12].

There still exists the knowledge gaps in the existing theories and framework relevant to the personal resilience capacities of EMS workforce to properly respond during mass casualty events like emerging and re-emerging diseases outbreaks and others. Resilience is important as it will help to adapt in unseen circumstances, utilize the resources available, properly mobilize the emergency service providers and ensure the safety and wellbeing of frontline workers [13].

In conclusion, mental and physical well-being and positive coping mechanism among the emergency frontline workers are an important aspect in order to prepare well and withstand the future public health emergencies and support the well-functioning of the large EMS system in the country. Therefore, this study focuses on emergency health system resilience specifically in relation to the EMS service providers. This study aims to explore the resilience capacities of the EMS providers of Thailand along with providing recommendations to policy makers regarding

service provider's future agenda and creating a resilient Thai EMS workforce which is most crucial since the global pandemic. This research also explores the role of behavioral health, safety, wellness and competencies of EMS service providers in the pre-hospital EMS system.

METHODS

A cross sectional study was conducted in 32 provinces of Thailand among the 500 EMS providers registered in the national system with at least a year of work experience as an EMS workforce. A nation-wide voluntary, anonymous online survey was started from January to May 2023. Survey tool was used for questionnaire collection through the sampling process among EMS service providers and ambulance team which included paramedics and emergency medical technicians (EMTs) (frontline emergency service providers in Thailand). Questionnaires were sent out via online mode in coordination with MOPH. The samples were Thai EMS service providers registered with National Institute for Emergency Medicine (NIEM), EMIT using inclusion and exclusion criteria. The study area was defined by the total 29 "dark-red zone" provinces, and a request letter was sent to all priority provinces to provincial public health directors to distribute the survey questionnaire to the eligible EMS service providers. Convenient sampling was used to select EMS service providers (FR, EMTs, ENPs and paramedics) from provinces that were distributed in all 13 health districts of Thailand and total 76 provinces. All red zones were included in the study and the Provincial Health Office directors were approached and requested for responses.

The research instrument in this study utilized a standard validated questionnaire with survey tools to interview the EMS service providers and professionals. The items were finalized from the literature review, theories and models of personal/ psychological resilience. Questionnaires in Thai language were structured based on the components of the EMS workforce in order to measure their resilience level and factors influencing their adaptive capacity in emergency situations. The research tools all were aligned to the overall research objectives of this project and based on intensive literature review and resilience theories. There were 4 major factors and total 41 items in the questionnaire. All participants were informed about the purpose, objectives and outcomes of this study and about the confidentiality for the respondent's information. Consent

was obtained before the surveys' which was included in the introduction part in the questionnaires.

The four resilience components and the items were designed from the desktop reviews. The questionnaire was pre-tested among 38 respondents before the actual data collection. After the ethical clearance from the Mahidol Ethical Review Board, validation of the survey questionnaire was done by calculating the IOC score method for content validity, which were validated by 3 experts (from Mahidol University and MOPH), questions were added, adjusted and changed according to the scores and comments. Then, it was followed by pre-test before the start of actual data collection. Cronbach Alpha was used to check the reliability score among 38 respondents. The individual scoring for safety wellness and competence questions were 0.68, 0.79, 0.80 respectively, with combined score of 0.88, and for the RS-25 questions it was 0.90.

The first part of questionnaire contains 15 questions on demographic information followed by Part 2 on the themes extracted for the resiliency of EMS service provider' and checklist to understand the resiliency level of them. The final part included additional questions on service providers benefit, opinions and suggestions.

The components of EMS workforce resilience are based on the SAQ questionnaire developed by Sexton, J.B. et.al. including six factor analytically derived scales of teamwork climate; safety climate; job satisfaction; perceptions of management; working conditions; and stress recognition. [14]. For this research 16 items self-rated questionnaires are scored on 5- point scale from 1= strongly disagree to 5= strongly agree, to measure the resilience level in the domain of safety, wellness and competencies of EMS workforce in context of Thailand. Mean scores were calculated to categorize into high, moderate and low resilience in context of safety wellness and competent factors associated with the EMS service providers. For the behavioral health measurement, the modified RS-25 questionnaire was used which has been validated internationally and has complete psychometric properties with Cronbach alpha for the total scale of 0.93. The sub-scale of the RS-25 are personal competence (17 items) and acceptance of self and life (8 items) [15].

Proposal was reviewed by the Ethical Review Board Committee of Mahidol University. Protocol number MU-CIRB 2022/247.1409 approved on 3rd November 2022. With

renewed copy valid until 2025. Permission was obtained from the MOPH NIEM Thailand, Provincial Public Health Offices and respective hospitals and EMS organizations in the form of an approved letter.

The SPSS version 22 software was used for data analysis for the descriptive analysis. description of socio-demographic characteristics: mean, median, SD and percentage of all variables were presented. Information was summarized

using frequency tables and cross tabulations. For the open-ended questions and key informant interviews, NVivo-14 software was used for thematic analysis. The questionnaires were labeled and coded by the researcher. The data generated from the questionnaire was reviewed and coded individually by the researcher.

RESULTS AND DISCUSSION

TABLE 1 NUMBER OF SOCIO-DEMOGRAPHIC CHARACTERISTICS OF STUDY POPULATION

Characteristics	n=500	Frequency (n=500)	Percen (%)
Age of EMS service providers			
Early working age 15-24 years		73	14.6%
Prime working age 25-54 years		404	80.8%
Mature working age 55-64 years		23	4.6%
(Mean= 35 years; SD= 10.5; Min= 16; Max= 64)			
Gender			
Male		206	41.2%
Female		294	58.8%
Marital status			
Single		280	56.0%
Married		186	37.2%
Divorced/ separated		34	6.8%
Monthly income			
≤20,000 TBH		235	47.0%
>20,000 TBH		265	53.0%
Educational level			
Elementary/ high school		127	25.4%
Undergraduate degree		277	55.4%
Postgraduate degree		29	5.8%
Vocational certificate		67	13.4%
Current position as an EMS provider			
EMR		124	24.8%
Frontline rescuer		63	12.6%
EMT BLS provider		41	8.2%
EMT intermediate		45	9.0%
Advanced EMT Paramedic		70	14.0%
ENP		140	28.0%
Head of ERs		17	3.4%
Years of experience as EMS provider			
1 year		19	3.8%
1-2 years		85	17.0%

3-5 years	125	25.0%
5-10 years	89	17.8%
>10 years	182	36.4%
Expect years to retain as EMS workforce		
<5 year	102	20.4%
5-10 years	126	25.2%
10-15 years	42	8.4%
15-20 years	31	6.2%
Until retirement	199	39.8%
Highest training attained		
First responders training	77	15.4%
Basic level training	137	27.4%
Intermediate level training	7	1.4%
Advanced level training	265	53.0%
Other related trainings	14	2.8%
Work hours (per week)		
< 10 hours	106	21.2%
10–20 hours	91	18.2%
21–30 hours	50	10.0%
31–39 hours	66	13.2%
≥40 hours	187	37.4%
Change in work schedule after Covid-19		
Yes, prolonged	289	57.8%
Yes, reduced	26	5.2%
No changes	185	37.0%
Risky events or incident during work time		
Never	268	53.6%
Yes, unsafe condition	93	18.6%
Yes, near miss events	65	13.0%
Yes, accident with minor injuries	38	7.6%
Yes, accident with need of hospitalization	36	7.2%

TABLE 2. TOTAL RESILIENCE CAPACITIES

Resilience components	TBH	TS	TC	TW
n=500				
Mean	139.8	19.4	19.2	23.5
Median	143.0	20.0	19.0	24.0
Std. Deviation	19.8	2.9	3.2	3.8
Minimum	78	9	8	10
Maximum	175	25	25	30

TBH= Total Behavioral Health (25 items): 7-point Likert scale

TS= Total Safety (5 items): 5-point Likert scale

TC= Total Competence (5 items): 5-point Likert scale

TW= Total Wellness (6 items): 5-point Likert scale

TABLE 3. RESILIENCE CAPACITY OF THAI EMS SERVICE PROVIDERS

Resilience levels n=500	Frequency	Percent %
High resilience	127	25.4
Moderate resilience	248	49.6
Low resilience	125	25.0

As show in Table 3, we can see about half of the service providers (49.6%) in Thailand have moderate level of resilience as an EMS workforce, while about 25% of them show high resilience and 25% have low resilience capacity. To conclude, the result from the measurement of resilience capacity among all 500 service provider's data suggests that while the majority of EMS providers feel resilient in terms of their competencies, safety, wellness and also their behavioral health, there's room for improvement, especially for the percentage of respondents with low resilience. Continued professional development, training programs, and support systems from the EMS agencies could help boost competency-related resilience. Efforts to enhance safety protocols, improve safety communication, and address specific safety concerns could help improve the safety climate resilience. Regular training, refresher's programs, focusing on the teamwork and collaboration could be beneficial strategies to consider. Understanding the characteristics, perception and experiences of those service providers with low resilience could inform support

strategies for further improving the overall resilience of the EMS workforce in Thailand.

CONTENT ANALYSIS OF OPEN-ENDED QUESTIONS WITH EMS SERVICE PROVIDERS

Deductive approach for codes and themes developed were used, for the resilient EMS system. The answers were coded, categorized, and sorted under five main themes on the perspective of EMS service providers regarding the EMS system of Thailand. The two open ended questions were asked about the perception and opinions of the frontline workers on the key strength and improvement areas necessary in the EMS system of Thailand focusing on strengthening their health workforce. The organizational system's resilience theory was followed to identify and discuss on key dimension in this study. Which are: health system performance and resiliency framework, health system resilience analysis framework, CAS framework [16-19].

TABLE 4: THEMES GENERATED FOR STRENGTH OF EMS SYSTEM AND IMPROVEMENT AREAS IN EMS OF THAILAND FROM WORKFORCE PERCEPTION AND EXPERIENCE

S. N	Themes (n=5)	Sub-themes (n=15)
1	Communication	1. communication technology 2. notification and dispatch
2	Coordination	1.collaboration and coordination 2.patient involvement and satisfaction 3.referral mechanism 4.teamwork
3	Leadership	1.accessibility of EMS services, coverage and responsiveness 2.safe system 3.rapid response
4	Competency	1.competent workers 2.trained workforce
5	Structure	1.equipment and resources 2.funding 3.risk compensation 4.adequacy of workforce

We classified the approaches to organizational resilience into five thematic areas based on the system thinking approach: (1) Communication system; (2) coordination; (3) Leadership; (4) Competencies; and (5) Structure. The approaches were summarized within these thematic areas .

CONCLUSION

The results from the study presented the EMS service provider's resilience capacities in terms of the dimensions of psychological resilience, wellness, safety and competencies. Their resilience capacity was measured by checking the mean scores and the cut off points as stated in the methodology section. The finding shows that the EMS service providers have moderate level of resilience.

The study reveals that focus is much needed to be provided for psychological coping mechanism of the service providers, program specific for mental health checkup, counseling, risk benefits, compensation and incentives to frontline workers which are the assets of the system and the main pillar for the sustainable development of the emergency care services. Interventions to improve the coping and adaptive capacities for the service providers must include mindful self-care and resiliency interventions, promote stress reduction activities in the organization, and Thailand should focus on the organizational resources that could be used to enhance the resilience and better preparedness of staffs for future emerging and re-emerging infectious diseases situation.

The results from this study may help EMS agencies and administrators to create new initiatives and support networks for the frontline workers, focusing on all pre-hospital staffs to focus on their wellness, safety, retain qualified and skilled workforce and prepare a resilient team to tackle any emergencies in Thailand.

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