Analysis of Variables Affecting the Performance of Motorbike Ambulance Service 1122 in Punjab, Pakistan

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Abstract

The focus of this study is performance evaluation of Motorbike Ambulance Service (MAS) of Rescue 1122, Punjab and to analyze the variables effecting it by measuring the public experiences in perspective of efficient response due to increasing emergencies with rapid urbanization, congestion of roads at places where ambulance vehicle cannot reach. The research design has been followed to explore the structural equation modeling of variables including Motorbike ambulance treatment services (MBTS), Call operator efficiency (COE), Victim experience & feedback (VEF) and Performance of Motor Bike Ambulance Service. The data is collected from 3 metropolitan cities Lahore, Rawalpindi and Multan (one city each from central, northern and southern Punjab). The sample was N = 222 victims who received the services of MAS, taken from three districts.

The research has suggested that motorbike treatment service, call operator efficiency and victim experience and feedback has direct impact on performance of the MAS and suggested that people need more precautionary measures to avoid accidents, need to depute motorbike in lower middle class areas, citizen awareness and to replicate the motorbike ambulance in all districts of the Punjab.

Keywords: Rescue 1122, Motorbike Ambulance Service, Victim Feedback, Performance.

Introduction

Emergency medical service (EMS) access to any emergency by motorcycle ambulance service (MAS) is a relatively new area of research. Motorcycle Ambulance Service is well equipped in delivering basic lifesaving and paramedic facilities to any emergency site. Hundreds of qualified personnel possess skillful training to briefly evaluate and manage victims timely, and to rule out possible risky consequences of multiple types of life intimidating incidents.

Punjab Emergency Service (PES) took initiative to serve humanity in 2004 as a pilot project from Lahore. No one could be certain about the successful implementation of this project by considering the failure of recurrent efforts to rejuvenate and updating of the current emergency services. In the context of this bashing susceptibility due to unavailability of well-trained emergency workers or emergency training institutions, even in teaching hospitals' emergency departments of Pakistan, the foundation of this service was a huge dare and requirement of dedicated time (PES, 2004). Punjab Emergency Service (Rescue, 1122) has initiated Motorbike Ambulance Service (MAS) for timely and efficient provision of Emergency Medical Services to public at large which result in reduction of Response time and early intervention keeping in view the congestion, populated and rush hours. MAS has substantially improved overall emergency response of the Punjab Emergency Service through efficient and faster response in road traffic accidents and medical emergencies as well. Motorbike First Responders have boosted effective competence of Rescue 1122 and cope up with urban challenges in emergency response by delivering proficient quick & professional first aid treatment to emergency victims and significantly enhanced the sense of safety for citizens (PES, 2017). Past research studies suggested that Ambulance services must send a vehicle/bike to the site as soon as possible due to life threatening emergencies. Non-availability of the ambulance and long waiting time affects the service quality as well as death rate (Hans, Francis & Rein, 2001).

It is appropriate to refer here that squads the Motorbike Ambulance Service were initially launched at divisional headquarters of Punjab such as Lahore, Sahiwal, Multan, DG Khan, Bahawalpur, Faisalabad, Gujranwala, Sargodha and Rawalpindi with 900 Motorbike Ambulances & Emergency Medical Technicians, on October 10, 2017 (PES, 2017).

Motor Bike Ambulance has responded 32, 2616 emergencies all over the Punjab till 30th June 2019. There are 16,5692 traffic crashes, 12,4688 medical tragedies, 6471 incidents of fall from height, 9,597 work-related traumas, 6,865 mishaps of electric injuries, 83 drowning cases, 5169 emergencies

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related to crime, 3860 fire destructions, 142 building collapse instances and 49 cases of cylinder blasts (PES, 2019).

On an estimation, Motorbike Ambulance Service operationalizing with fabricated bikes, professional emergency medical facility, vital sign monitoring equipment such as Blood Pressure & Sugar Monitoring devices, Pulse Oximeter, trauma managing accessories such as Cervical Collar, Airway & Burn Kit, Trauma Kit, Splints, Life Saving Medicines and Portable Oxygen Cylinders, is managing average 550 emergencies per day in Punjab. The competent managers and personnel has brought up this service as a marker of probable safety for state citizens by utilizing resources effectively. The high standard of service has been obtained by being capable to deal onsite Emergency and enhancing survival rate, reliability, adaptability & simple maintenance in less cost. Furthermore, achieving remarkable milestones, MAS equipment retains frequent approach in constrained streets and clogged areas (PES, 1122).

Literature Review

The reduced response time in any critical situation has paramount importance in the modern standards of living to save the precious life of the victim. It is as admitted fact that quicker emergency response time increased the chances of patients' survival in a lethal emergency conditions which leads communities to set standard response time value (Hans, Francis & Rein, 2001). Over the years, traffic congestion and rapid urbanization threatens ambulance response time. The small size and swift speed of the motorcycle make it perfectly suitable to reach out patients rapidly in emergency situation especially in confined and massive populated or congested areas and during traffic jam or crowd hours. The use of traditional emergency ambulance services may jeopardize the objective of achieving efficient and rapid medical care due to increase in usual traffic congestion in colossal cities. Response time is very critical factor while dealing with emergency life situations e.g. situation like cardiac arrest, where every passing second is vital for saving the life of the victim (Soares, Egipto, Costa & Cunha, 2007).

Frequent use of Motorbike Ambulances can be observed all over the world, which carry updated medical facilities like intubations device, pulse oximeter, 1-liter oxygen gauge, sphygmomanometer, stethoscope, splints, bandage to control bleeding, serums sets, glucometer and ECG monitor. These modern standard bikes not only providing the first aid on war footing but also, they communicate with the Command & Control Room through latest communication system, GPS base headsets, at the same time to keep them up to date regarding the current situation of any emergency (Peyravi, Tubaei & Pourmohammadi, 2009).

The response and arrival time of paramedics to the location of call for emergency has become an indicator for checking quality of services offered by EMS. For at least 90% of emergency responses the suggested response time is ≤ 8 minutes and it has evolved into the guidelines of EMS providers' operating agreements (Pons. et al., 2005). The responding time of paramedics are more imperative special in critical medical emergencies like myocardial infarction, cardiac arrest, severe respiratory disease and poly trauma in which the fastest mean of transportation for hospitalization always help to save life. It has been observed that a car ambulance takes too much long time to reach at any urban site. While, a motorbike can reach very fast at any congested place not only avoid traffic congestion but also reducing the response time as a study by Lin and co-workers in Taiwan for the quality provision of Emergency Medical Services (Nakstad, Bjelland & Sandberg, 2009).

In pre-hospital care, Motorbike Ambulances is facilitating in narrow and crowded zones especially in premium hours due to its flexibility, speed, and easy movement which make it suitable for rapid access to victims and capable to possess all necessary advance life support accessories (Pols, Mencl & Vos, 2011). Motorcycle ambulances are responding to the following scenarios:

1. Life-threatening situations, e.g., when CPR is essential; 2. Highway accidents causing multiple injuries (for screening the injured patients); 3. Unavailability of vehicle ambulance and 4. When control room operator cannot identify exact location of incident (Peyravi et al., 2009).

Motorbike Ambulance accommodates in-time patient assessment and management and mitigates the possible risks in life threatening situations. Paramedics on motorbike ambulance can take lifesaving measures such as hemorrhaged control, artificial defibrillation, or chest compressions in the

meantime of waiting for vehicle ambulance(s) through which additional resources and transport facility would be provided to victim to the hospital after that the prior mentioned ambulance is freed to deal another emergency. MAS also meets standard response time for any sort of emergency time defined by government. (Pons. et al., 2005).

A rare literature is existed about MAS as motorcycle ambulances are not operationalized widely. It was affirmed that due to Motor bike ambulance Service the early patient handling and quick response was established. MAS is not only evaluating the victims more efficiently and minimizing the unnecessary burden on vehicle ambulance but also optimizing operational cost of emergency services (Nakstad, Bjelland & Sandberg, 2009).

In order to ensure effective management and proper resources allocations, the effectiveness and performance of the MAS should be determined by satisfaction of the service receiver and to ensure that quality management system is ensured. Up to our knowledge, there are very scarce literature and studies on performance measuring and satisfaction but it's done through analyzing the complaints of the service receivers.

Rationale of the Study

Punjab Emergency Service Rescue 1122 took new initiative of Motor Bike Ambulance for timely and efficient provision of EMS services to public at large resulting in reduction in response time and early intervention keeping in view the congestion, populated and rush hours. An improved culture of responsibility, proficient operational activities, performance evaluation and continuum of improvement procedure has been encouraged to meet the needs of service beneficiaries as well for good reputation of mentioned department. This study aims to explore the factors which may enhance victims' satisfaction level towards motorbike ambulance service (1122), to evaluate the performance level of service personnel and to identify needs for improvement to provide more proficient and most professional updates services to victims.

Research Problem Statement

The analysis of factors affecting performance of motorbike ambulance service (1122) in Punjab, Pakistan through discovering public experiences.

Research Questions / Objectives

Following research questions / objectives had been addressed in current study:

Recognize factors related motorbike ambulance service performance

- Identification of the bike service elements that public point out as poor
- Exploration of elements those satisfy the public through motorbike service
- Pinpoint the significant markers of motorbike service which are needed to improve

Method

The Punjab Emergency Service Rescue 1122 is responding in a wide geographical area of approximately 205,344 square miles of province Punjab, Pakistan for all kind of emergencies related to human life risks and resources as well. The under-consideration population is from North, South and Central cities of Punjab i.e. Lahore, Multan and Rawalpindi having populations of 12 million,1.9 million and 2 million respectively (Population Stat,2019). Sampling has been done by using Purposive /Judgment Sampling Technique and the size of sample size is selected through Morgan Table. (Krejcie, Morgan & D.W, 1970; Kanupriya, 2012). Due to versatility in estimating multiple and interrelated dependence in a single analysis, Structural Equation Model is casted for structural results analysis (Anderson & Gerbin, 1988; Bentler & Chou,1987)).

This quantitative study was aimed to discover the influence of certain facets; calculating performance of motorbike service 1122. Self-report measure provided best operationalization of the study variables according to theoretical background. This measure will be fruitful for current study in purposive sampling strategy, sample of service receivers / public who avail the Service will be obtained.

This research was carried in largest Emergency Service of Pakistan between 2018 and 2019. Ethical approval was obtained from a local research ethics review committee of the Punjab Emergency service. The study contained following variables:

Endogenous Variable

The performance of the motorbike service was endogenous variable of this study.

Exogenous Variables

The study had two exogenous variables which include call operator efficiency (COE), motorbike ambulance treatment services (MBTS) and victim experience and feedback (VEF).

The detail is as under:

Call operator efficiency (COE)	
COE 1	Timely receive emergency call
COE 2	Location identification
COE 3	Early identification of the incident site
COE 4	Call operator listen carefully
Motorbike ambulance treatment services (*MBTS*)	
MBTS 1	Proper medication to the victim
MBTS 2	Communication with attendant/ victim
MBTS 3	Fulfillment of patient needs
Victim experience and feedback (VEF)	
VEF1	Experienced ambulance service.
VEF2	Behavior of motorbike ambulance staff.
VEF3	Satisfaction of the services provided by MAS

Research Design

The existing research is an effort to examine the service standard of motorbike ambulances 1122 in province Punjab, Pakistan and discovering experiences of the public for. Survey research method has been followed for this study.

Performance measuring Motorbike ambulance service survey Performa was prepared and to establish reliability and validity before implementation it is proof read by two experts for reliability testing. The survey questionnaire is consisting of 27 item scale with score rating from 1 to 7 expressing strongly disagree to strongly agree. The higher the score on scale the stronger the commitment and vice versa.

Procedure

By following ethical consideration of research, proper permission was obtained from Authority after briefing all instructions which were keenly delivered to the participants of this study. The anonymity and confidentiality of participants' information and identity were assured. Questionnaires were collected after administration from the participants. The participants were given ethical right to willingly participate in study and assured to withdraw at any point where they would like. The participants were given complete security regarding any psychological or physical harm during data collection. It was ensured to participants of study that their information would be utilized purely for research purpose only.

Sampling

A sample of 260 victims, comprising of Private Employees, Students, and Govt. Employees, from all three districts i.e. Lahore, Multan and Rawalpindi was assembled by using Morgan's table (Cresswell, 2003). Out of 260 questionnaires distributed among participants, 230 were returned by individuals. Eight responses were consisted of more than 50% missing values and excluded. The rest 222 valid responses were analyzed. The district wise responses are 112, 52 and 58 from Lahore, Rawalpindi and Multan respectively.

As purposive sampling is assumed as most appropriate for the selection of small samples often from a limited geographic area or from a restricted population. (Michael, 2011; Henry, 1990; Peyravi et al., 2009)

Inclusion Criteria/ Exclusion Criteria

Inclusion criteria were:

a) Proper form filling
b) Victim who received motorbike services from Lahore, Rawalpindi, Multan

Exclusion criteria were:

a) Improper Filling of Forms.
b) Incomplete Information's

Hypothesis of the Study

Based on the model of study, a total of 4 hypotheses were proposed to be tested which are given below:

H1: Awareness of people with bike ambulance service has direct impact on bike ambulance performance.
H2: Improvement of poor elements has direct relationship with bike ambulance performance.
H3: Satisfaction/ dissatisfaction level has direct relationship with bike ambulance performance.
H4: All the three independent variable has direct relationship with bike ambulance performance.

Results and Discussion

Table 1 shows total number of participants were 222 and Lahore has 50.5% frequency of the respondent while Multan and Rawalpindi both have almost half frequency of respondents than Lahore which are 23.4% and 26.1% respectively. Lahore has more respondents than the other two cities of Punjab because of colossal population of Lahore is more than other two. Larger population have more chances of emergencies so data from Lahore is statistically more significant than the other two.

Table 2 reflects that the people from age group of 26-35 are more victimized to incidents, which is 39.6%, than the people of other age groups. People with age ranges from 36 to 50 are on the second number with 26.6%, while the below 25 are on the third having 22.5%. The remaining two age groups which are 51 to 70 and above 70, with 9.9% and 1.4% respectively, are comparatively less than the top most.

Table 1: Respondents in different districts

District Name	Respondents	Percentage Frequency
Lahore	112	50.5%
Multan	52	23.4%
Rawalpindi	58	26.1%
Total	222	100%

Table 2: Number of incidents in different age groups

Age	No of Incidents	Percentage
Below 25	50	22.5%
26-35	88	39.6%
36-50	59	26.6%
51-70	22	9.9%
Above 70	3	1.4%

From overall survey of 222 participants, it is clearly reflected in Table 3 that males are more prone to incidents than females. As statistics shows that 83.3% victims are males which are much higher than females, which are just 16.7%. The female victim percentage are not even near half of the male victims. By comparing data from table 2 and table 3 it is clear that people from age group 26-35, which are usually working professionals, and having gender male have more percentage of accidents.

Table 3: Gender of the victim

Gender	No. of Victims	Percentage
Male	185	83.3%
Female	37	16.7%

Table 4 shows Return to Clinic (RTC) has the highest percentage, amid all emergency calls, which is 68.9%. Although the second highest is medical emergency with 22.1% and other are 5.4%. Minor Trauma has 3 calls while chest pain and breathing difficulties have 2 calls each respectively.

Table 4: Reason for call/Nature of Emergency

Nature of Emergency	No. of Calls	Percentage
Chest Pain	2	0.9%
Breathing difficulties	2	0.9%
Return to clinic (RTC)	153	68.9%
Medical Emergencies	49	22.1%
Arrhythmia	1	0.5%
Minor Trauma	3	1.4%
Other	12	5.4%

Table 5 shows the versatile and dispersed professionals. According to profession, highest number of victims are private employees having 32.4% and then the laborer came to the second

number with 21.2%. Students and house wife also have substantial percentages which are 14.0% and 12.2% respectively. Government employees and Businessmen have the least percentages among the victims which is only 7.7% and for latter it is 8.1% respectively.

Table 5: Profession of Victim

Profession of Victim	No. of Victim	Percentage
Student	31	14.0%
Laborer	47	21.2%
House Wife	27	12.2%
Private Employee	72	32.4%
Business man/Self employed	18	8.1%
Un-Employed	9	4.1%
Govt. Employee	17	7.7%

Statistics in Table 6 shows that 41% victims have salary range of 15,000 to 30,000 which is the highest percentage. 33.8% victims have below 15,000 monthly income and are the second highest. If we sort the data percentage wise, then the victim with a salary of 30,000 to 70,000 are at the third number. While the fourth and least percentage of victims have the monthly income of above 70,000.

Table 6: Monthly income of the victim

Monthly Income	No. of Persons	Percentage
Below Rs. 15000	75	33.8%
Rs. 15000 to 30000	91	41%
Rs. 30000 to 70000	36	16.2%
Above Rs. 70000	6	2.7%

By inspecting the statistics of Table 7, the maximum calls have been made by the attendants in case of emergency which is 34.2%. The second highest percentage, which is 28.8%, of calls is by victim himself to 1122. Road passenger also has significant percentage, 26.1%, of making calls.

Table 7: Who made a phone call for Motorbike Ambulance

Caller	No. of Calls	Percentage
Victim	64	28.8%
Attendant	76	34.2%
Road Passenger	58	26.1%
Other	24	10.9%

Table 8 shows the feedback from the people who calls the Rescue 1122 in case of emergency situation and 94.2% respondents gives positive feedback regarding timely call receiving and addressing queries. Some 5.8% of respondents did not agree with 94.2% because they did not get response on time.

Table 8: Did Operator Receive call timely

Call Receiving Response	No. of Respondents	Percentage
Yes	194	94.2%
No	12	5.8%

In Schreiber et al. (2006) journal on reporting structural equation modeling and confirmatory factor analysis results, cutoff criteria for several fit indexes, the study shows sufficient evidence for acceptance of the above data values. All values lie in the acceptance levels. Table 9 compares the study values with general rule of acceptable fit.

Table 9: Cutoff Values for acceptance of Results

Indexes	Shorthand	General rule for acceptable fit	Study results
Chi-square	χ^2	Ratio of $\chi 2$ to df $\leq$ 2 or 3	χ^2=71.831
Comparative fit index	CFI	CFI $\geq$ 0.95	CFI=0.956
Goodness-of-fit index	GFI	GFI $\geq$ 0.95	GFI=0.939
Root mean square error of approximation	RMSEA	.06 <RMSEA< 0.08	RMSEA=0.075

Table 10 shows Bike ambulance attended most of the cases with 99.1% which are 220 cases out 222 and vehicle ambulance only attended 2 cases which has a percentage of 0.9%. Bike ambulance is more efficient and faster as compared to vehicle ambulance.

Table 10: When you have called the ambulance who has attended first

Emergency Vehicle Type	No of Cases Attended	Percentage
Bike Ambulance	220	99.1%
Vehicle Ambulance	02	0.9%

The percentage for the arrival of motorbike ambulance (Table 11) at place of incident within 4 minutes is 63.1% and this the highest arrival time. But in some cases, it will take 5-6 minutes which has 27.5%. 7-8 minutes and 9-10 minutes have comparatively less percentages of arrivals. The least percentage is 2.7% which is for the more than 10 minutes.

Most of the times, in 91% cases (Table 12), paramedics came with motorbike ambulance for helping the victims but sometime technician also came when its needed but that was just 2.7% and same is with assistant which 3.2%. But sometimes only driver came for help and that was just 0.9%.

Table 11: What was the approximate arrival time of Motorbike Ambulance

Approx. arrival time	No. of Arrivals	Percentage
1-4 minutes	140	63.1%
5-6 minutes	61	27.5%
7-8 minutes	8	3.6%
9-10 minutes	7	3.2%
Above 10 minutes	6	2.7%

Table 12: Help with Motorbike Ambulance

Help with Motorbike Ambulance	No. of Times	Percentage
Paramedics	202	91%
Technician	6	2.7%
Assistant	7	3.2%
Driver	2	0.9%

The percentage of respondents (Table 13) which calls the rescue 1122 in case of road traffic accidents is 46.4% while 20.3% is for medical emergency and 24.3% is for life threating incidents. Least percentage 3.6% are those people who respond to minor injuries.

Table 13: In which condition might you call for the Motorbike Ambulance

Emergency Type	No. of Times	Percentage
Life threatening	54	24.3%
Medical Emergency	45	20.3%
Road Traffic Accident	103	46.4%
Minor Injuries	8	3.6%

The people who believe that some people call the ambulance when they even do not need it have a percentage of 49.5% (Table 14). While some 22.1 % respondents believe people did not call the ambulance when they don't need it.

Table 14: Do you think some people call ambulance when they don't need to

Feedback	No. of Responses	Percentages
Yes	110	49.5%
No	49	22.1%
Don't know	52	24.6%

Statistics shows that 58.6% (Table 15) of the respondents came to know about the rescue 1122 from friend, 24.3% came to know through social media, 12.6% and 4.5% came to know through TV and Poster respectively.

Table 15: How do you come to know about Rescue 1122

Medium	No. of Responses	Percentage
Friend	130	58.6%
Social media	54	24.3%
T.V Radio	28	12.6%
Poster	10	4.5%

Implication of the Study

Present study could be helpful for further expansion of motorbike ambulance service in remaining districts and to identify the satisfied elements for better provision of service to public at large.

Delimitations of Study

The present research study mainly focuses on *Call operator efficiency (COE), Motorbike ambulance treatment services (MBTS) and Victim experience and feedback (VEF)* to assess the performance of Motorbike Ambulance Service. However, there are many other factors involved that affect the performance of MAS which include training, equipment and protocols which have not been the focus of this study and can be a topic of research in future.

Limitation of the study

Regarding its generalizability of the findings, there are few limitations of the present study. The samples have only been collected from three district only (one each from Southern, Northern and Central Punjab) due to time and financial limits. Therefore, it is recommended that in future studies may focus on samples from more districts which could help to increase the generalizability of the findings.

Conclusion

The analysis shows that Motorbike service encompassing all over the Punjab is facilitating Lahore more than any other major city owing to massively populated region. Victims being served widely are ranged in between 26 to 35 years of age. Amid all emergencies, including medical & trauma victims, the percentage of Return to Clinic victims is highest whereas medical emergencies take 2nd uppermost rank in responding. Maintaining trust on service reliability, wide range of victims are facilitated by a single call of attendants. A major portion of beneficiaries of this service entail of low income persons which summons the endowment of this service without any distinction. Feedback analysis explores that motorbike ambulance response is quicker than vehicle ambulance due to its feasibility even in confined areas. The average response time identified by broad spectrum of victims and attendants is 4 minutes in which mostly trained and professional paramedic and technicians deliver proficient services to sufferers. The awareness of people has direct impact on bike ambulance performance, Improvement of poor elements has positive relationship with bike ambulance performance, satisfaction/ dissatisfaction level has significant direct relationship with bike ambulance performance and all mentioned independent variables directly relate with bike ambulance performance.

Recommendations

The policy recommendations for improving Motorbike Ambulance Service of Punjab are mentioned below.

- Table 2 suggested that 66% victims belongs to age bracket of 26-50 years. These stats suggested that these people need more care and precautionary measures so that less no of incidents may occur.
- Table 6 stats guide us that almost 75% people who are benefited belongs to lower middle class having monthly income up to Rs. 30,000. So it is needed to depute the motor bike ambulance in these locations.
- Table 12 suggested that 46 % victims belong to the road accident. So in view of this there is dire need of implementation of road rules and regulations in true sense with provision of education and awareness regarding traffic sense to the citizens.
- Due to high attendance rate of motorbike service, it is recommended that motorbike emergency service must be replicated in remaining districts, other than only in divisional headquarters.

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