

WHERE WE STAND: ANALYSIS OF AMBULANCE SERVICES OF KARACHI.

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ABSTRACT:

Around 20 ambulance services operated in Karachi; however, the network of Edhi, Chhipa and Aman ambulance services provides the bulk of patient transport. The study aims to compare the quality of ambulance service delivery with international standards. With a mix-method approach, 357 patients/attendants and key stakeholders participated in the study. The results revealed a wide range of differences in service quality. Aman services delivery quality is rated 72% compliant, but it constitutes less than 20% of the share of inpatient transportation due to limited ambulances while Edhi and Chhipa contribute 80% of patient transportation, but their service delivery quality is rated only 13%. In the subset of monitoring, infection control, and medicine, Edhi & Chhipa services meet 0% standards. The thematic analysis revealed that the primary reasons for the poor quality are lack of legislation & minimum standards, Poor or no monitoring, financial constraints, and lack of awareness. In conclusion, the ambulances services operating in the city lacks minimum service quality standards, thus pose a constant threat to patient life using these services.

INTRODUCTION:

Traumatic injuries became a significant concern in recent years around the globe. The estimated number of 75.33 million peoples experience mortality or morbidity due to road traffic injuries (Roser and Ritchie, 2016). In Pakistan, the leading cause of death is ischemic heart disease, while road traffic accidents are the fifth leading cause of death, accumulating a 51% increase in the incidents between 2007 -2017 ("Pakistan," 2015). 62% of deaths due to coronary heart diseases are preventable through effective emergency medical service (E.M.S.) (Crampton et al., 1974). Numerous South Asian nations, including India and Pakistan, are among those L.M.I.C.s where frameworks of E.M.S. are ungraceful and of low quality (Acerra et al., 2009; Hyder and Razzak, 2013; Karmacharya et al., 2008; Sharma and Brandler, 2014).

In Pakistan, a spread of public, for-profit, and non-profit E.M.S. suppliers deliver pre-hospital care, with the landscape of actors contrasting by province (Baqir and Ejaz, 2011; Hyder and Razzak, 2013; Razzak et al., 2001). Karachi alone fuses at least three private and altruistic associations, covering most patients shifting to hospitals. However, most work in patient transportation and not evaluated for impact (Hyder and Razzak, 2013). The significant difficulties of these nations are accessibility, affordability, and top-notch frameworks of E.M.S.; despite these, E.M.S. models are present in India and Pakistan throughout the total population and individual areas (Nishtar et al., 2013).

Globally, the ambulance service has a significant impact on the survival rate, while in Pakistan, it is yet to be determined (Babiarz et al., 2016; Christensen et al., 2017; Haugland et al., 2017; Mawani et al., 2018, 2016; Nichol et al., 1996). The studies on the outcome are available in the literature, but none highlight or identify service delivery deficiencies (Chandran et al., 2014; Johns Hopkins University, 2020; Khan et al., 2010; Zia et al., 2015). Internationally, especially in Australia, New Zealand, and Papua New Guinea, the ambulance services are analyzed for patient satisfaction on the ground of service delivery (“Patient Experience Survey | Council Of Ambulance Authorities,” n.d.).

Historically, researchers have treated service quality as hard to characterize and gauge because of the innate elusive nature of services, which are frequently subjective (Grönroos, 1991). David A. Garvin (1988), in his book “Managing Quality: The Strategic and Competitive Edge,” proposed seven significant categories of quality definition. “*Quality a condition of excellence*” (Tuchman, 1980) – Transcendent Quality. “*Quality is the internal and external requirement conformance*” (Crosby, 1979)– Manufacture-based Quality. “*durability or long product life*” (Schmalensee, 1970; Swan, 1970), “*reliability & serviceability*” (Feigenbaum, 2004), “*performance & features*” (Garvin, 1984) – Product-based quality. “*fitness for use*” (Juran, 1951), “*Customer Satisfaction.*” (Edwards, 1968; ISHIKAWA, 1985) – User-based perspective, “*combination of fitness for use with the acceptable price*” (Broh, 1982; ISHIKAWA, 1985) – Value-based quality, “*Product that differentiated from a competitor*” (Porter, 1980) and “*enhanced customer perception regarding product*” (Deming, 1986) – Strategic quality, “*performance, reliability, feature, durability, conformance, aesthetic, serviceability, and perceived quality*” (Garvin, 1984) – Multidimensional quality.

The earliest endeavour to struggle with the service quality idea originated from the Nordic School. In this methodology, service quality was taking as two essential elements: (Steenkamp, 1990) Technical quality: What the customer received due to the communications with the provider of the service (for example, supper in a café, a bed in a lodging) Functional Quality: How the client gets the services; the expressive type of the facility rendered. (For example, graciousness, mindfulness, speediness). The tangibility, reliability, responsiveness, empathy, and assurance as service delivery dimensions (Parasuraman et al., 1991).

STATEMENT OF PROBLEM:

Globally, the ambulance service has a significant impact on the survival rate while in Pakistan it is yet to be established (Babiarz et al., 2016; Christensen et al., 2017; Haugland et al., 2020; Mawani et al., 2016, 2018; Nichol et al., 1996). Most of the studies to date conducted on the topic are focusing on the outcome or response time variables. (Chandran et al., 2013; Johns Hopkins University, 2020; Khan et al., 2010; Zia et al., 2015). The reason for not matching the global trend could be a service delivery variable that is not identified or explore in any study to the best of my knowledge. In this study, we try to explore the service delivery aspect and try to identify the impact of this variable.

OBJECTIVES:

The objectives of my study are:

- a. **Compare** the patient experience of ambulance services in Karachi in phase 1.
- b. **Identify** the difference in standards of ambulance services of Karachi with international standards designed for ambulances in Phase 2.
- c. **Explore** and understand the in-depth perspectives of stakeholders about the ambulance service of international standards in Phase 3.

METHOD:

Study design

The author planned to use a mixed-method approach because this research can be possible by using different techniques. The first & second part of the research design is descriptive because this study intends to compare the attributes of service quality provided by the ambulance services. The cross-section approach within the descriptive design is employed (Kabir, 2016). The third part's strategy is semi-structured interviews as a primary source of data gathering, field notes taken during these interviews, and the review of relevant national and international literature as part of the secondary tool for data collection ("The SAGE Encyclopedia of Qualitative Research Methods," 2021).

Data

The duration of the study is from January till March 2021, and the data is collected over three months in two public sectors and one private sector hospital for the first phase of the study.

PHASE 1 - CUSTOMER SATISFACTION OF AMBULANCE SERVICES:

In this chapter, we gauged customer satisfaction through an adopted questionnaire that focused on the service quality of ambulances. Service quality is the output delivery of any service industry, and it is also linked with customer satisfaction and referred to as perception of the customer (Bhargava, 2019).

Theory

To assess the service quality of the ambulance services, we took the model of SERVPERF introduced in the critiques of the ServQual model (Cronin and Taylor, 1992). They took the idea that perceived quality is lead to satisfaction. Thus, it is called the modification of the ServQual model and uses the same five factors to assess service quality.

Conceptual Framework

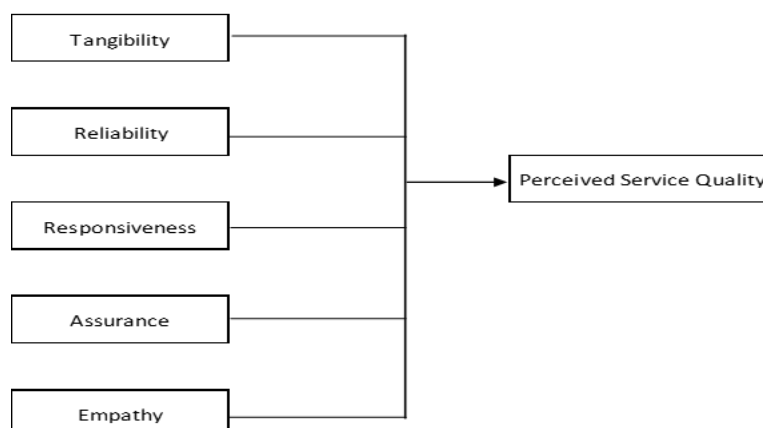


Figure: 01 – Conceptual Framework

Hypothesis

H₁: There is no difference in the perceived quality of service among the ambulance services operated in Karachi.

H₂: There is no difference in the perceived service quality of ambulance services among genders.

H₃: There is no difference in the perceived quality of service of different age groups.

Variable

The SERVPERF model variables tangibility, reliability, responsiveness, assurance, and empathy are employed by many researchers to assess the service quality of the healthcare facility and its links with customer satisfaction. (Table 1.). The conceptual definition of each variable drives by reviewing literature and theories. In the last column of the table, the operational use of illustrations is for the reader's understanding.

Table 01: Conceptual and Operational Definitions of Variables

S no	Variables	Conceptual definition	Operational definition
1	Tangibility	“Physical facilities, devices and looks of personnel.”	The physical appearance of staff, ambulance ambience, and availability of equipment and medicines
2	Reliability	“Capability to render the promised service reliably	Accurate documentation and service delivery

		and precisely.”	
3	Responsiveness	“Readiness to help clients and deliver timely service.”	Prompt response
4	Assurance	“Knowledge and courtesy of employees and their ability to persuade faith and confidence.”	Politeness and attitude of staff to serve
5	Empathy	“Compassionate, personalized focus on the company offers to its client.”	understand and adopt the need of customer needs

(Rasyida et al., 2016)

Inclusion criteria

Respondents of the study were patient/ attendant that experience the ride of emergency medical service/ambulance service. There is no limit about disease suffered, age, or ethnicity. All patients/attendants available and willing to fill the survey form becomes the study participant.

Sample & sampling technique

The sample size for this phase is 385; however, the collected sample is 357. The technique of sample estimation is an online sample calculator (“Sample Size Calculator,” n.d.) with 95% of the confidence interval and probability of Type I Error (α) = 0.05 with the unknown population for the study. The approach for sample collection is purposive sampling.

Statistical Technique

The demographic profile is run and reflected through frequency table, reliability check through Cronbach alpha, the descriptive and inferential analysis conducted to compare the quality of ambulance services using analysis of variance (ANOVA) at a 5% level of significance one-tailed hypothesis (Stewart, 2002) by using S.P.S.S. package v21.

Results***Demographic Profile***

35.9% of respondents are 26-35 years of age while 26.9%, 27.2% & 10.1% are 18-25, 26-55, and 56 and above age group, respectively. 51.5% (184) are females, and 48.5% (173) are males. Most of the respondents are single 185 (51.8%), 147 (41.2%) respondents are married, while 25 (7%) of the respondents have separated status in life. Out of 357 respondents of the study, 141 (39.5%) respondents utilized the Edhi ambulance service, 110 (30.8%) used Chhipa ambulance service, while 106 (29.7%) availed the services of Aman foundation – Currently known as Sindh rescue and medical service (Table. 2).

Table 02: Demographic profile

Characteristics	Group	Frequency	Percent	Valid Percent	Cumulative Percent
Age	<=18-25	96	26.9	26.9	26.9
	26-35	128	35.9	35.9	62.7
	36-55	97	27.2	27.2	89.9
	56 and above	36	10.1	10.1	100
Gender	Female	184	51.5	51.5	51.5
	Male	173	48.5	48.5	100
Marital Status	Married	147	41.2	41.2	41.2
	Single	185	51.8	51.8	93
	Separated	25	7	7	100
Service utilised	Edhi	141	39.5	39.5	39.5
	Chhipa	110	30.8	30.8	70.3
	Aman	106	29.7	29.7	100

Reliability Analysis

The value of each construct is more significant than 0.60, and it ranges from the highest value of 0.934 to the lowest value of 0.884; hence the value shows that the constructs are incredibly dependable (Table. 3).

Table 03: Reliability Statistics

Construct Name	Cronbach's Alpha	N of Items
Tangibility	0.934	6
Reliability	0.846	3
Responsiveness	0.921	4
Assurance	0.922	3
Empathy	0.884	4

Descriptive Analysis

The minimum and maximum values of all five variable are 1 and 5, respectively, while the mean value (S.D.) of tangibility is 3.38(1.233), reliability is 3.46(1.194), responsiveness is 3.54(1.203), assurance is 3.55(1.262), and empathy is 3.49(1.183).

Table 04: Descriptive Analysis

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Tangible	357	1	5	3.38	1.233	-.416	.129	-1.068	.257
Reliability	357	1	5	3.46	1.194	-.451	.129	-.949	.257
Responsive ness	357	1	5	3.54	1.203	-.591	.129	-.832	.257
Assurance	357	1	5	3.55	1.262	-.598	.129	-.815	.257
Empathy	357	1	5	3.49	1.183	-.503	.129	-.820	.257

Inferential Analysis

The inferential analysis conducted through “Analysis of variance” (ANOVA) analyzes the variance and spread within and between the group.

H₁ There is no difference in the perceived quality of service among the ambulance services operated in Karachi.

Table 5 shows that the sig value between the group is less than alpha (α) 0.05 against each variable. It indicates the there is a substantial statistical difference among the means of analyzed three ambulance services.

Table 05: One way ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Tangible	Between Groups	67.289	2	33.644	25.139	.000
	Within Groups	473.774	354	1.338		
	Total	541.062	356			
Reliability	Between Groups	47.361	2	23.681	18.216	.000
	Within Groups	460.205	354	1.300		
	Total	507.566	356			
Responsiveness	Between Groups	50.684	2	25.342	19.327	.000
	Within Groups	464.183	354	1.311		
	Total	514.868	356			
Assurance	Between Groups	49.687	2	24.843	16.997	.000
	Within Groups	517.420	354	1.462		
	Total	567.107	356			
Empathy	Between Groups	57.174	2	28.587	22.960	.000
	Within Groups	440.755	354	1.245		
	Total	497.930	356			

However, to analyze the mean difference between the groups, we employed the Tuckey test to determine the difference (Table 06). The results interpret that Aman ambulance has a statistically significant difference with other services while the other two services are the insignificant difference between them at the confidence interval of 95%.

Table 06: Multiple mean comparison of services

“Tukey HSD”							
Dependent Variable	(I) Service	(J) Service	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tangible	Edhi	Chhipa	.113	.147	.724	-.23	.46
		Aman	-.895*	.149	.000	-1.25	-.55
	Chhipa	Edhi	-.113	.147	.724	-.46	.23
		Aman	-1.008*	.157	.000	-1.38	-.64
	Aman	Edhi	.895*	.149	.000	.55	1.25
		Chhipa	1.008*	.157	.000	.64	1.38

Reliability	Edhi	Chhipa	.096	.145	.784	-.24	.44
		Aman	-.750*	.147	.000	-1.10	-.41
	Chhipa	Edhi	-.096	.145	.784	-.44	.24
		Aman	-.847*	.155	.000	-1.21	-.48
	Aman	Edhi	.750*	.147	.000	.41	1.10
		Chhipa	.847*	.155	.000	.48	1.21
Responsiveness	Edhi	Chhipa	.060	.146	.910	-.28	.40
		Aman	-.796*	.147	.000	-1.14	-.45
	Chhipa	Edhi	-.060	.146	.910	-.40	.28
		Aman	-.857*	.156	.000	-1.22	-.49
	Aman	Edhi	.796*	.147	.000	.45	1.14
		Chhipa	.857*	.156	.000	.49	1.22
Assurance	Edhi	Chhipa	-.046	.154	.952	-.41	.32
		Aman	-.836*	.155	.000	-1.20	-.47
	Chhipa	Edhi	.046	.154	.952	-.32	.41
		Aman	-.790*	.165	.000	-1.18	-.40
	Aman	Edhi	.836*	.155	.000	.47	1.20
		Chhipa	.790*	.165	.000	.40	1.18
Empathy	Edhi	Chhipa	-.034	.142	.968	-.37	.30
		Aman	-.890*	.143	.000	-1.23	-.55
	Chhipa	Edhi	.034	.142	.968	-.30	.37
		Aman	-.856*	.152	.000	-1.21	-.50
	Aman	Edhi	.890*	.143	.000	.55	1.23
		Chhipa	.856*	.152	.000	.50	1.21

*The mean difference is significant at the 0.05 level.

The homogenous subsets of groups are shown in the tables below:

Tukey HSD ^{a, b}			
Service	N	Subset for alpha = 0.05	
		1	2
Chhipa	110	3.04	
Edhi	141	3.15	
Aman	106		4.04
Sig.		.736	1.000

Tukey HSD ^{a, b}			
Service	N	Subset for alpha = 0.05	
		1	2
Chhipa	110	3.17	
Edhi	141	3.27	
Aman	106		4.02
Sig.		.794	1.000

Tukey HSD ^{a, b}			
Service	N	Subset for alpha = 0.05	
		1	2
Chhipa	110	3.27	
Edhi	141	3.33	
Aman	106		4.12
Sig.		.914	1.000

Tukey HSD ^{a, b}			
Service	N	Subset for alpha = 0.05	
		1	2
Edhi	141	3.29	
Chhipa	110	3.34	
Aman	106		4.13
Sig.		.954	1.000

Table 10: Homogenous subset Empathy

Tukey HSD ^{a, b}			
Service	N	Subset for alpha = 0.05	
		1	2
Edhi	141	3.21	
Chhipa	110	3.25	
Aman	106		4.10
Sig.		.970	1.000

a. uses harmonic Mean Sample size = 117.109.

b. The group sizes are unequal. The harmonic mean of the group size is used. Type I error level are not guaranteed.

H₂ There is no difference in the perceived service quality of ambulance services among genders.

The service quality is also tested based on the perceived service quality gender-wise through an independent T-test by grouping the gender against the variables. The sig value of both groups is higher than alpha (α) 0.05 against each variable; it indicates no significant statistical difference among both genders' view of service quality.

Table 12: Gender Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Tangible	Female	184	3.39	1.295	.096
	Male	173	3.37	1.166	.089
Reliability	Female	184	3.52	1.226	.090
	Male	173	3.40	1.160	.088
Responsiveness	Female	184	3.63	1.225	.090
	Male	173	3.45	1.175	.089
Assurance	Female	184	3.62	1.309	.096
	Male	173	3.48	1.210	.092
Empathy	Female	184	3.60	1.198	.088
	Male	173	3.37	1.158	.088

H₃ There is no difference in the perceived quality of service of different age groups.

(Table. 13) shows that the sig value between the group is less than alpha (α) 0.05 against each variable. It shows the significant statistical difference among the mean value of different age groups.

Table 13: Group statistics for age group

		Sum of Squares	Df	Mean Square	F	Sig.
Tangible	Between Groups	36.126	3	12.042	8.419	.000
	Within Groups	504.936	353	1.430		
	Total	541.062	356			
Reliability	Between Groups	29.625	3	9.875	7.293	.000
	Within Groups	477.942	353	1.354		
	Total	507.566	356			
Responsiveness	Between Groups	41.624	3	13.875	10.349	.000
	Within Groups	473.243	353	1.341		
	Total	514.868	356			
Assurance	Between Groups	32.647	3	10.882	7.188	.000
	Within Groups	534.459	353	1.514		
	Total	567.107	356			

Empathy	Between Groups	26.726	3	8.909	6.674	.000
	Within Groups	471.204	353	1.335		
	Total	497.930	356			

However, to analyze the mean difference between the groups, we employed the Tuckey test to determine the difference. The table of multiple mean comparisons (Table. 14) between groups shows the sig value compared to alpha (α) 0.05.

Table 14: Multiple comparisons mean of age group.

Tukey HSD							
Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tangible	<=18-25	26-35	.807*	.161	.000	.39	1.22
		36-55	.388	.172	.111	-.06	.83
		56 and above	.424	.234	.269	-.18	1.03
	26-35	<=18-25	-.807*	.161	.000	-1.22	-.39
		36-55	-.419*	.161	.047	-.84	.00
		56 and above	-.384	.226	.325	-.97	.20
	36-55	<=18-25	-.388	.172	.111	-.83	.06
		26-35	.419*	.161	.047	.00	.84
		56 and above	.036	.233	.999	-.57	.64
	56 and above	<=18-25	-.424	.234	.269	-1.03	.18
		26-35	.384	.226	.325	-.20	.97
		36-55	-.036	.233	.999	-.64	.57
Reliability	<=18-25	26-35	.716*	.157	.000	.31	1.12
		36-55	.290	.168	.309	-.14	.72
		56 and above	.249	.227	.692	-.34	.84
	26-35	<=18-25	-.716*	.157	.000	-1.12	-.31
		36-55	-.426*	.157	.034	-.83	-.02
		56 and above	-.467	.220	.146	-1.03	.10
	36-55	<=18-25	-.290	.168	.309	-.72	.14
		26-35	.426*	.157	.034	.02	.83
		56 and above	-.041	.227	.998	-.63	.55
	56 and above	<=18-25	-.249	.227	.692	-.84	.34
		26-35	.467	.220	.146	-.10	1.03
		36-55	.041	.227	.998	-.55	.63
Responsiveness	<=18-25	26-35	.857*	.156	.000	.45	1.26
		36-55	.627*	.167	.001	.20	1.06
		56 and above	.557	.226	.068	-.03	1.14
	26-35	<=18-25	-.857*	.156	.000	-1.26	-.45
		36-55	-.230	.156	.452	-.63	.17
		56 and above	-.300	.218	.517	-.86	.26
	36-55	<=18-25	-.627*	.167	.001	-1.06	-.20
		26-35	.230	.156	.452	-.17	.63
		56 and above	-.070	.226	.990	-.65	.51
	56 and above	<=18-25	-.557	.226	.068	-1.14	.03
		26-35	.300	.218	.517	-.26	.86
		36-55	.070	.226	.990	-.51	.65
Assurance	<=18-25	26-35	.771*	.166	.000	.34	1.20
		36-55	.436	.177	.068	-.02	.89
		56 and above	.447	.240	.248	-.17	1.07
	26-35	<=18-25	-.771*	.166	.000	-1.20	-.34

Empathy	36-55	36-55	-0.336	.166	.181	-.76	.09
		56 and above	-.324	.232	.502	-.92	.27
	36-55	<=18-25	-.436	.177	.068	-.89	.02
		26-35	.336	.166	.181	-.09	.76
	56 and above	56 and above	.011	.240	1.000	-.61	.63
		<=18-25	-.447	.240	.248	-1.07	.17
	56 and above	26-35	.324	.232	.502	-.27	.92
		36-55	-.011	.240	1.000	-.63	.61
	<=18-25	26-35	.696*	.156	.000	.29	1.10
		36-55	.362	.166	.132	-.07	.79
	26-35	56 and above	.433	.226	.222	-.15	1.02
		<=18-25	-.696*	.156	.000	-1.10	-.29
	36-55	36-55	-.334	.156	.141	-.74	.07
		56 and above	-.263	.218	.624	-.83	.30
56 and above	<=18-25	-.362	.166	.132	-.79	.07	
	26-35	.334	.156	.141	-.07	.74	
56 and above	56 and above	.071	.225	.989	-.51	.65	
	<=18-25	-.433	.226	.222	-1.02	.15	
56 and above	26-35	.263	.218	.624	-.30	.83	
	36-55	-.071	.225	.989	-.65	.51	

*. The mean difference is significant at the 0.05 level.

The homogenous subsets of groups shown in table 15, 16, 17, 18 & 19 interpret the difference among different age groups.

Tukey HSD ^{a, b}			
Age	N	Subset for alpha = 0.05	
		1	2
26-35	128	3.01	
56 and above	36	3.39	3.39
36-55	97	3.43	3.43
<=18-25	96		3.82
Sig.		.158	.151

Tukey HSD ^{a, b}			
Age	N	Subset for alpha = 0.05	
		1	2
26-35	128	3.11	
36-55	97	3.53	3.53
56 and above	36	3.57	3.57
<=18-25	96		3.82
Sig.		.080	.447

Table 17: Responsiveness homogenous subset age group

Tukey HSD ^{a, b}			
Age	N	Subset for alpha = 0.05	
		1	2
26-35	128	3.22	
36-55	97	3.45	
56 and above	36	3.52	
<=18-25	96		4.08
Sig.		.412	1.000

Table 18: Assurance homogenous subset age group

Tukey HSD ^{a, b}			
Age	N	Subset for alpha = 0.05	
		1	2
26-35	128	3.22	
56 and above	36	3.55	3.55
36-55	97	3.56	3.56
<=18-25	96		3.99
Sig.		.366	.135

Table 19: Empathy homogenous subset age group

Tukey HSD ^{a, b}			
Age	N	Subset for alpha = 0.05	
		1	2
26-35	128	3.18	
56 and above	36	3.44	3.44
36-55	97	3.52	3.52
<=18-25	96		3.88
Sig.		.314	.116

a. uses harmonic Mean Sample size = 117.109.

b. The group sizes are unequal. The harmonic mean of the group size is used. Type I error level are not guaranteed.

Hypotheses Assessment Summary

Hypotheses Statement	Reason	Decision
H ₁ There is no difference in the perceived quality of service among the ambulance services operated in Karachi	In multiple comparisons mean the sig value of Edhi & Chhipa is more significant than alpha while the sig value of Aman is less than alpha 0.05	Rejected
H ₂ There is no difference in the perceived service quality of ambulance services among genders.	The paired sample t-test shows the sig. (2-tailed) value is more significant than alpha 0.05	Accepted
H ₃ There is no difference in the perceived quality of service of different age groups.	In multiple comparisons means the sig value of two groups is more significant than alpha while the sig value of one group is less than alpha 0.05	Rejected

Phase 2 - Comparison of Karachi's ambulance Service with International Standards for ambulances

This chapter compares the local ambulance services with the international standards designed for the ambulance services. There are different standards for ambulances like safety and manufacturing, comprehensive covering management, leadership, patient's rights and clinical markers, service delivery standards covering the equipment required to deliver the service.

The standard follows for the comparison is designed by the group of committees like the American college of surgeons committee on trauma, the American College of Emergency Physicians, National Association of E.M.S. Physicians, paediatric equipment guideline committee – E.M.S.C. and American academy of paediatrics". The justification for using this standard is because we are looking for service delivery to patients and the availability of life-saving equipment and medicines are the essential aspect of service delivery.

Variables

The variables are telecom (telecom & telecom plan) and equipment (ventilation and airways, monitoring and defibrillation, immobilization devices, bandages, miscellaneous, infection

control, injury prevention, and medicines). These sub-variables are further breakdown into item levels.

Sample & sampling technique

The sample is collected through google form and by visiting the ambulances physically. The purposive sampling technique approach is followed for this study because we have to visit specific organizations.

Results

The comparison results stated that the Aman foundation meets 54% of the standard in the telecommunication variable, while Edhi and Chhipa are at 25%, while at sub variable of telecommunication for Aman, Edhi and Chhipa are telecommunication (75%,50%,50%), telecom plan (33%,0%,0%).

In the equipment variable, the percentages are 76%, 10%, and 10% for Aman, Edhi & Chhipa, respectively. The sub variable of equipment are ventilation & airways (100%,33%,33%), monitoring & defibrillation (100%,0%,0%), immobilisation devices (75%,0%,0%), bandages (83%,0%,0%), miscellaneous (90%,10%,10%), infection control (80%,10%,10%), injury protection equipment (25%,25%,25%), and medicines (56%,0%,0%) for each service (Aman,Edhi,Chhipa). Item level analysis is presented in table 20.

Table 20: Comparison item level of ambulance service

Variable	Sub Variable	Items	AMAN	Edhi	Chhipa
Telecommunication	Telecom	Two-way Communication device	100%	100%	100%
		EMSS Radio Service Coverage	100%	100%	100%
		Emergency Medical Dispatch System	100%	0%	0%
	Telecom Plan	Resource for Medical coordination / Direction	0%	0%	0%
		Integrated Communication & plan for EMS Incidents (man-made and natural)	0%	0%	0%
		Training of Emergency Medical Technician	100%	0%	0%
		communications entailing a patient radio (phone) report to a receiving medical facility	0%	0%	0%
Equipment	Ventilation & Airway	Suction Machine	100%	0%	0%
		Portable Oxygen System	100%	100%	100%
		Fixed oxygen System	100%	0%	0%
		Oxygen administration equipment (mask, tube)	100%	100%	100%
		Bag-Valve mask	100%	0%	0%
		Airways	100%	0%	0%
		+Pulse Oximeter	100%	0%	0%
	Monitoring & Defibrillation	AED (Automated Electronic Device)	100%	0%	0%
		Glucometer	100%	0%	0%
		Patient/Cardiac Monitor	100%	0%	0%
	Immobilization Devices	Cervical Collar	100%	0%	0%
		Head Immobilizers	100%	0%	0%
		Extremity traction Device (Splints)	0%	0%	0%
		Back board	100%	0%	0%
		Bandages	triangular	100%	0%

Table 20: Comparison item level of ambulance service

Variable	Sub Variable	Items	AMAN	Edhi	Chhipa	
		Dressing	100%	0%	0%	
		Burn Sheet	0%	0%	0%	
		Gauze rolls	100%	0%	0%	
		Adhesive tap	100%	0%	0%	
		Tourniquet	100%	0%	0%	
	Miscellaneous	Obstetric Kit	100%	0%	0%	
		Sphygmomanometer	100%	0%	0%	
		Stethoscope	100%	0%	0%	
		Thermometer	100%	0%	0%	
		Scissor	100%	0%	0%	
		Blanket	100%	0%	0%	
		Disposable Emesis bag	100%	0%	0%	
		Folding Stretcher	100%	100%	100%	
		Satir Chair	0%	0%	0%	
		Patient Report	100%	0%	0%	
		Infection Control	Eye Protection	0%	0%	0%
			Face Masks	100%	100%	100%
			Gloves	100%	0%	0%
	Gown		100%	0%	0%	
	Shoe Cover		100%	0%	0%	
	Hand Cleanser		100%	0%	0%	
	Disinfection Solution for Equipment		100%	0%	0%	
	Sharp container		100%	0%	0%	
	Disposable trash		100%	0%	0%	
	N95		0%	0%	0%	
	Injury prevention Equipment		Helmet	0%	0%	0%
		reference guide for hazardous material	0%	0%	0%	
		traffic signaling device	0%	0%	0%	
		reflective safety wear	100%	100%	100%	
	Medicines	Epinephrine	100%	0%	0%	
		Atropine	100%	0%	0%	
		Adenosine	0%	0%	0%	
		Amiodarone	0%	0%	0%	
		Calcium Channel Blocker	0%	0%	0%	
		Nitroglycerin	100%	0%	0%	
		vasopressor	0%	0%	0%	
		Ipratropium bromide	0%	0%	0%	
		Furosemide	100%	0%	0%	
		Albuterol	0%	0%	0%	
		50% dextrose Solution	100%	0%	0%	
		25% dextrose Solution	100%	0%	0%	
		Analgesic narcotics	100%	0%	0%	
Analgesic non-narcotics		100%	0%	0%		
Antiepileptic		100%	0%	0%		
Sodium bicarbonate		0%	0%	0%		
magnesium sulphate		0%	0%	0%		
Naloxone	100%	0%	0%			

Phase 3 - In-depth perspectives of stakeholders about the ambulance service

In this chapter, we sought to explore the view of key stakeholders about the ambulance service, its operational challenges, international standards, and how to overcome these challenges.

Sampling and Recruitment

The targeted population for the research is the people working in ambulance services, experts or associated with the emergency department of the public and private sector hospital, non-government organizations, or not-for-profit organizations predominantly working for the healthcare sector in decision making role. The data is collected from the respondent of Karachi city only. The recruitment of respondents is through a non-probabilistic purposive technique till the attainment of data saturation. The study's participation is entirely voluntary.

Data Generation

The interviews lasted on average 44.8 minutes. The medium of discussions was the participants' preferred language along with the agreement of participation.

Data handling and analysis

All interviews were recorded with participants' permission, and took field notes afterwards verbatim was transcribed. The analysis of transcribed data was performed through the Microsoft office tool (office 365). Data were continuously analyzed and scrutinized to develop categories and convergence into the themes—both inductive and deductive approaches for thematic analysis (Akhlaq et al., 2020).

Results

With the scope of Karachi only, we approached 12 stakeholders, and seven (58.3%) participated in this study.

The following central themes and sub-themes emerged from transcribed verbatim.

Table 21: Summary of Thematic Analysis

S no	Theme	Subtheme
1	Model/ level of E.M.S.	
2	The shortcoming and reasons for noncompliance	<i>Management & monitoring</i>
		<i>Standard protocols</i>
		<i>Financial Constraints</i>
3	Future/way forward	

- i. Model/Levels of E.M.S.** – Worldwide ambulance services are differentiated either based on models they are working with or at the level of services. The transport Carrier model is to help people, and they transport the patient from site to the hospital.

We transport the patient to the emergency, and it is the hospital that is responsible for providing treatment to the patient, not us.

Similarly, another way to operate the ambulance service is based on service delivery and categorized their services based on level.

We have both B.L.S. and A.L.S. ambulances, and so and so we also have ACLS ambulance that dispatched in cardiac emergencies.

The participant of ambulance service is justified their operating model while the participant of the emergency departments or associated with the emergency department believes that the ambulances should have the essential equipment.

I believe the ambulance staff should get training in B.L.S. skill.

The ambulance aims to reduce needless mortality and long-term morbidity, but if you are not well equipped in terms of staffing and skill set, how can you achieve this.

ii. The shortcoming & reasons for noncompliance – This issue is addressed and discussed by almost all participants, and multiple sub-themes evolved from it.

Management & monitoring– the participants, believe that in government does not have the expertise of E.M.S.

There is no single legislative document in Sindh that can define the criteria to run an ambulance service in the province. If someone wants to run an ambulance, they just put a light on top of the van, and it became an ambulance.

Standard protocols – The participants have also believed ambulance service operation is free from standard KPIs because the government did not attempt to design the ambulance service standards or do not have the technical expertise to develop them.

The emergency room of any hospital has its protocols, standards, and KPIs, but for an ambulance, primarily working as an Emergency Medical Services (E.M.S.), there is nothing like it in the country, not even 1122.

We are talking about the standards; these are for people with a medical background, but accessibility is the primary concern for ordinary people. They do not know where to call; all ambulance service has their own calling numbers 115, 1021, 1020, and many more.

Financial Constraints– The participants believe the ambulance operations are costly, and it is running through donations, zakat, and other forms of charity.

The Constitution of Pakistan guarantees that necessities of life, including education and health, shall be provided by the state, not by charitable organizations.

We hardly cover the maintenance and fuelling cost of vehicles; how can we go the extra mile, yes if government funds us, we can follow and maintain the international standards.

iii. Future/way forward– The participants have the view that if we want to uplift the system, the government must play its role in terms of financial support, design legislation for ambulance services, and best establish a state-own ambulance service and central control room.

The only way is that the government establish a state-own ambulance network and a unified number for calling an ambulance; every ambulance service has its numbers.

Public-Private Partnership could be one solution; State can provide the funding and monitoring of the deliverable while the private partner can run the show because the expertise is with the private sector.

Discussion

Statement of Principal Investigator

The Constitution of Pakistan 1973, which guarantees the promotion of social and economic wellbeing, necessities of life, including education and health, shall be provided by the state (*The Constitution of the Islamic Republic of Pakistan*, 2018). There are 648 hospitals, 2996 dispensaries, and 227 maternal and child health centres are available in the province of Sindh (*Health Profile of Sindh by District*, 2017). However, no public ambulance service available throughout the province till the Government of Sindh signed an agreement through Public-Private Partnership with Aman Foundation in 2019 and renamed that service name Sindh Rescue and Medical Service (S.R.M.S.), with the limited scope to Karachi only (“Sindh Rescue and Medical Services,” n.d.). The results of all phases of the studies have a similar conclusion, the more equipped the ambulance, the more is the satisfaction with the service, the patient/attendant satisfaction is more favourable towards service Aman because that meet the standards higher than service Edhi and Chhipa. The qualitative part of the study emphasizes the need and standards of the ambulance, but the constraint shared by the ambulance operator is related to their financial conditions. In contrast, the participant of the emergency department believes that ambulance service with international standards can play a significant difference in the outcome of patient survival.

The studied ambulances are different in terms of service delivery. Aman carries a minimum of 02 resources onboard driver and technician, along with the necessary equipment. While both services Edhi and Chhipa operated with a single staff driver in their ambulances, they segregated their ambulance with oxygen and without oxygen and dispatched it according to the need. The author is unable to find any government legislation that defines the standards of ambulances. The role of the government is very critical to streamlining these issues like multiple numbers for help, standards for ambulance services.

Comparison of results with other studies

The qualitative study on Scottish emergency service supports ServQual model application on ambulance service with an additional dimension of resourcing and wellbeing (Bruce et al., 2019). In the thesis on metropolitan ambulance service (M.A.S.), the researcher uses similar items to SERVPERF and analyzes the customer satisfaction of the users of M.A.S. and the subscription and un-subscription considered as customer satisfaction and applied the ANOVA and t-test between and within-group (Stewart, 2002). The study on service quality of healthcare centres using the SERVPERF model endorsed that the service quality factors positively influence the perceived service quality (Kumaraswamy, 2012).

Karachi’s emergency medical service until the Aman foundation came into picture 2009, the only human resource in an ambulance is a driver (Baqir and Ejaz, 2011). Aman foundation brought the concept of E.M.S. and equipped the ambulances according to the international standards with all necessary equipment and medicine in ambulances (“Sindh Rescue and Medical Services,” n.d.). According to one study, the patient uses taxi(58%), followed by a private car(23%), and only 16% of real emergencies were transferring to hospitals through ambulance service, and out of these majority of transport done by Edhi, Chhipa, and S.R.M.S. (Aman ambulance) (Razzak et al., 2001). The past studies link survival with the

ambulance response time, and the patient reached within 60 minutes to the emergency department had a better outcome (Baqir and Ejaz, 2011). Similarly, the study conducted in Belfast concludes that the early intervention in the pre-hospital setting had significantly low mortality after admission (Mathew et al., 2003). Karachi, the metropolitan city of Pakistan, has ambulances that barely provide a comfortable journey with oxygen supply arrangements. People perceive that ambulances are only a transport service with sirens and not considered emergency medical service (Razzak et al., 2001).

A study on military transportation revealed that the customer's perception is always lower than expectation (Bahadori et al., 2013). The survey of hospital settings also revealed that the expectations are always higher than the perception (Kumaraswamy, 2012). The study conducted in Malaysia suggests a 58% patient satisfaction variance between expectation and perception (Tan et al., 2019).

Conclusion

The study concludes that linkage of customer satisfaction with the quality of service delivery. The highest meeting standard service is the preferred choice of masses.

In comparing local ambulance services with international standards, Aman meets overall 72%, but it constitutes less than 20% of patient transport due to limited ambulances, while Edhi & Chhipa is at 13% and provides the bulk of patient transportation. In sub variable monitoring & defibrillation, immobilization devices, infection control & medicines, the Edhi & Chhipa meets 0% standards while Aman is 100% in monitoring & defibrillation, 75% in immobilization devices, 80% in infection control, and 56% in medicines. None of the service providers has a resource for medical direction, neither any mechanism to transfer patient information to receiving facility, and less than 30% in protective equipment.

The thematic analysis of the qualitative part revealed reasons for the poor quality of service delivery: lack of legislation & minimum standards, Poor or no monitoring, financial constraints, and the awareness about the role of ambulances.

The participants believe most of the ambulances are operated through not-for-profit organizations, so the role and control of the government over these organizations is almost negligible.

Recommendation

Based on the results, there is a need for an integrated emergency medical services that encapsulate the at-site patient management & en-route monitoring of the patient through ambulance service and a well-established emergency department. It is also evident that the government should pass the legislation through the legislative body and establish an E.M.S. framework and minimum ambulance service standards in line with international standards. Government can also adopt the model of Public-Private partnership in E.M.S. where funding and monitoring will be the government's responsibility while the implementation and execution of service are the private sector's responsibility.

There has been a great scope of research and investigation in Pakistan into the health policy aspect, issues of public health in general. However, this study does not explore these issues in-depth but instead focuses on the fundamental point to establish the essential foundation for future research in this area.

Strength and Limitation

This study covers both patient and stakeholder perspective, provided the patient's viewpoint about the ambulance service, Identified the deficiencies, and discussed the reason for these

deficiencies or noncompliance. Similarly, customer satisfaction with the quality service is subjective and change with time, so the findings of this study can be generalized to a specified time in a predefined market. The study is confined to the Pakistani scenario and, specifically, Karachi-focused. The geo-demographic conditions have a significant impact and influence on the customer satisfaction of quality service. Furthermore, the lack of human resources, budgetary limitation, and non-cooperation of the target population has been identified as a potential limitation for the study if this has to be carried out on a larger scale.

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