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A Study of the Saudi Arabian Emergency Medical Services' performance in both rural and urban locations is influenced by organisational factors

Rakan Hassan Alenazi[1]*, Maha Abdulmohsen Alanazi[2], Saeed Mohammed Alnasim[3], Abdulelah Hulail Almalki[4], Fahad Mohammed Almudara[5]

[1,3,5] Emergency Medical Specialist, King Abdulaziz Air Base - Armed Forces Hospital, Al Dhahran, Saudi Arabia

[2] Dietitian, King Abdulaziz Air Base - Armed Forces Hospital, Al Dhahran, Saudi Arabia

[4] Emergency Medical Technician, King Abdulaziz Air Base - Armed Forces Hospital, Al Dhahran, Saudi Arabia

***Abstract - Background:** This study explores into the investigation of the impact of organisational elements on the performance of Saudi Arabian EMS in various contexts, including rural & urban areas. The current research aims to learn more about the organisational variables that may explain why EMS performance differs in urban or rural areas from the perspectives of frontline personnel. **Method:** Researchers in Saudi Arabia's Riyadh region carried out the study. Participants were required to have worked for the Saudi Red Crescent EMS for at least 5 years and be currently engaged in one of the following roles: technician, paramedic, or EMS station manager. The first participants who responded to the call for participation were interviewed using semi-structured interviews from October 2021 to July 2022. The process proceeded until all data is acquire. We will analyse the data using analysis methodology. **Results:** Forty people from the Saudi Red Crescent EMS are a part of the final sample (20 from rural areas and 20 from urban centres). The data analysis is reveal important organisational characteristics that caused EMS staff to face obstacles & hurdles. There were also some similarities. **Conclusion:** Results showed that EMS performance is negatively affected in both urban & rural locations.*

***Keywords** - EMS, Staff, Saudi Arabia, Organisational Factors*

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INTRODUCTION

In times of crisis, the rapid and life-saving healthcare measures providing by EMS are crucial. Nevertheless, EMS efficacy varies across different geographical contexts, especially in a country like Saudi Arabia, which is both large & diverse. The complexity of the Saudi Arabian emergency medical services is explored in this study, which looks at how organisational issues impact their performance in both urban & rural areas. Despite the remarkable progress in Saudi Arabia's healthcare system in the past few years, emergency medical services continue to encounter numerous obstacles. Rural & urban locations differ in population density, infrastructure, and geographical factors, which makes it difficult to provide pre-hospital treatment that is both quick and effective. To overcome these obstacles, EMS organisational aspects including training protocols, operating plans, communication systems, & resource allocation come into play.

This research is an integral aspect of a larger initiative that is looking into EMS in the Riyadh area of Saudi Arabia. Quantitative data obtained from studies of past patient records kept by the Saudi Red Crescent EMS has been published in the past [12, 15, 16]. This research builds on the insights obtained from that phase of the project and seeks to investigate the factors—such as times of response, base equipment's, & personnel training levels—that contribute to the observed disparities in EMS delivery between urban and rural locations. The current research aims to better understand the disparities between EMS in urban with rural areas by collecting first-hand accounts from frontline workers through in-depth interviews about any organisational aspects influencing their daily work practices. With this data in hand, we can better understand how EMS in Saudi Arabia functions as a whole and offer solutions to the known disparities in0 service delivery between urban and rural regions.

LITERATURE REVIEW

Hanan Al-Ahmadi et al. (2009) This paper's objective is to investigate the elements that have an effect on the efficiency and effectiveness of hospital nurses working in Saudi Arabia's Riyadh Region. The goals were to assess how well employees believed they were doing on the job and to find out if there were any correlations between employee demographics, work satisfaction, on organisational commitment and performance. Fifteen medical facilities were chosen at random. All 1,834 nurses at these facilities were issued the questionnaire, and 923 of them filled it out. The statistical analysis comprised regression analysis, t-test, or correlation. Results show a favourable relationship between organisational commitment, work satisfaction, and performance on the job. Nurses' productivity is highly predictive of their level of work satisfaction & organisational loyalty. There is a favourable correlation between job performance and certain individual characteristics, such as gender, marital status, years of experience, and country of origin. Performance is inversely proportional to education level. All indicators utilised in this study rely on self-reports, which limits their capacity to be applied to a broader population. Other objective measurements of performance may be the focus of future research. Improved monitoring, employee agency, and compensation should all take centre stage. Most Saudi health organisations deal with culturally diverse staff. As a result, they need to implement HR strategies that boost employee engagement and retention, foster an environment where employees feel empowered to make decisions, and recognise the influence of national culture on attitudes or behaviours on the job. Findings from this study fill a vacuum in our understanding of the correlation between nurses' attitudes towards their jobs and their performance on the job in Saudi Arabia. Not only that, but the research emphasises how national culture affects the attitude & performance of nurses in Saudi Arabia and other nations dealing with a multicultural workforce. [26]

Mostafa A Abolfotouh et al. (2017) Aim The objectives of this research were twofold: first, to determine the extent to which patients were satisfied with their care at a Saudi Arabian emergency care centre (ECC) & second, to determine which sociodemographic and healthcare variables were most predictive of that degree of satisfaction. At King Abdulaziz Medical City in Riyadh, Saudi Arabia, 390 adult patients with Canadian triage categories III and IV who saw ECC between July 1, 2011, and the end of September 2011 were included in a prospective cohort research. From the moment they checked in at the ECC front desk until they were examined by a doctor, every patient was interrogated. The two areas of medical information clarity & staff-patient relationships were assessed by a previously validated interview-questionnaire, which was used to quantify patient satisfaction. Overall life satisfaction and patients' perceptions of their health state following the appointment were also assessed. We gathered information on healthcare provider and patient traits. A significance level of $p \leq 0.05$ was utilised for the multiple linear regression analysis. With a mean satisfaction score of 70.36 percent (17.40), indicating moderate satisfaction, 32.8% of patients were very satisfied and 26.7% were not. Following the elimination of any possible confounding factors, there was a significant association between reduced satisfaction with the emergency department visit or male gender ($p<0.001$), extended waiting time ($p=0.032$), and low perceived health status relative to admission status ($p<0.001$). A patient's level of happiness was not significantly related to their level of life satisfaction. In order to enhance healthcare services, particularly in emergency rooms, it is crucial to recognise that waiting time is the sole substantial modifiable risk factor of patient satisfaction. [27]

Talal AlShammari et al. (2016) In order to give a general idea of how EMS have developed over the years in Saudi Arabia, this study aimed to include topics such as the field's history, the various educational approaches that have contributed to it, the field's statistics, and the various service providers & organisations that have provided EMS. Setting the Scene: When people experience a medical emergency, the first person they typically speak with is from the emergency medical services (EMS). Several positive changes have occurred in Saudi Arabia's EMS over the past decade. These include the establishment of specialised degree programmes at various educational institutions, a shift in the profession's evaluation from a post-employment first aid model to a pre-employment bachelor's degree model, increased funding for international student exchanges, and official recognition of EMS as a distinct profession. Nearly 9 years have passed since Saudi Arabia introduced its first EMS bachelor's degree programmes, with some curricula taking their cues from schools in wealthy nations like Australia. Although there have been some positive changes, the present EMS system in Saudi Arabia still faces many educational or organisational challenges. These include a lack of research, community involvement, practitioners' educational status, and inconsistent statistics regarding response time and rate of transfer. With an eye towards illuminating the discrepancy between the educational outcomes & methodologies utilised by Saudi Arabian colleges and universities, this research traces the evolution of EMS in the Kingdom. Methods: The information used to study the Saudi Arabian EMS profession came from a variety of sources, including government reports and statistics, Saudi health journals, Saudi university websites, search engines like Google Scholar & MEDLINE. In summary: In Saudi Arabia, emergency medical services have come a long way in the last decade. The creation of core skills for EMS bachelor's degree holders based on empirical evidence is an area where a lot of room for development remains. In addition, there has to be

more public education about existing services and training options, stronger partnerships between businesses or universities, and more funding for EMS research in Saudi Arabia through the creation of master's or doctoral programmes in the field. In order to help academic institutions and scholars better comprehend the educational & operational history and current state of the EMS service in Saudi Arabia, this article offers the first comprehensive overview of the service. [28]

Lutfiah Abdul-Aziz Qawwas et al. (2022) The term "non-transported call" describes situations in which ambulances are called but no patient is actually sent to a hospital. The amount of these calls & money spent on them should be carefully studied in order to devise a strategy that effectively avoids wasting time & money. The primary goal of this research is to calculate the time and money wasted when resources are overused in non-emergency situations, and then to compare it to the acceptable cost when the right resources are utilised. From 2017 to 2019, EMS resources were lost due to the high number of calls that were not conveyed and the associated financial & time difficulties in Jubail, which were designated as non-urgent. Better EMS operations and resource allocation to curb improper utilisation can result from this data. The methodology used in this study was a cross-sectional review of all EMS calls made in Jubail, Saudi Arabia, that were not considered emergencies. Information for the study was culled from the RCHSP-J key performance indicator (KPI) system, which ran from 2017 to 2019. Sum, mean, or percentage are descriptive statistics that were retrieved, along with methods for comparison. The results show that only 546,037 USD were spent on emergency calls involving the advanced life support ambulance (ALS), whereas 2,051,651 USD were spent on non-emergency calls during the same time period. Conversely, there were 6870 hours (or 78%) of non-emergency calls and just 1769 hours (or 22%) of emergency calls. In summary: From 2017 to 2019, non-emergency calls took more time and cost more than emergency calls in systems with low resources and poor regulation. This could have delayed treatment for more urgent situations. A lot of money would have been better spent if this had been considered when designing the system to save resources. [29]

Dr. Feras H. Abuzeyad et al. (2022) Because of differences in resources, training, design, geography, population size, and cultural diversity, emergency medical services (EMS) systems around the world vary greatly.1 Everyone has the right to receive healthcare services, including EMS, & World Health Organisation (WHO) views EMS integration as an essential component of healthcare. Worldwide, there is a growing need for the EMS system, which can be categorised into the Anglo-American and the German-Franco variants. When it comes to acute myocardial infarction, acute ischemic stroke, and severe sepsis, the EMS becomes an integral aspect of any healthcare system & improves results. Evidence suggested that EMS services might cut trauma-related deaths in poor nations by a quarter.The six member states that make up the Gulf Cooperation Council (GCC)—Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE—share many similarities, including linguistic, cultural, political, & religious norms. The emergency medical services (EMS) in every GCC nation are centralised, run by the government, and either work independently or are part of a certain ministry. They have all followed the Anglo-American model. With a focus on the Kingdom of Bahrain, the State of Kuwait, and KSA, this study aims to further improve our comprehension of the current EMS systems in the GCC countries. To hone in on specific goals, the study will compare various EMS organisations' traits in order to spot trends and identify areas for improvement in healthcare systems. [30]

METHODS

The King Faisal Specialist Hospital City Ethical Committee & Saudi Arabian Ministry of Health's Ethical Committee both gave their stamp of approval to this endeavour. King Faisal gave the land that would later become KFSH&RC in 1970, and King Khalid formally dedicated the facility in 1975. The Hospital Corporation of America (HCA) oversaw the facility from 1973 to 1985. Before the interviews began, all participants reviewed the research details and gave their individual approval.

Study setting

The Riyadh area of Saudi Arabia was the site of the research. Based on population & emergency medical services transportation cases, Macca is the biggest of Saudi Arabia's 12 administrative areas, which is where the survey was initially conducted. Saudi Red Crescent project consultants, however, concluded that data collected in that area would not be indicative of the country as a whole. This is because, unlike other locations, Macca experiences a large amount of emergency medical cases involving transient visitors & non-residents as an outcome of its big yearly religious festivities (pilgrimage). All Saudi citizens mostly rely on the Riyadh region's EMS; hospitals, however, have their own ambulance system run by the Ministry of Health [1]. The current model of EMS in the Riyadh region is built on the American model, which involves transporting patients in need to the emergency departments of community-based hospitals in Saudi Arabia, where they are assisted by clinically trained personnel such as paramedics or emergency technicians. The Dispatch or Call Centre for EMS is located in the Riyadh city Red Crescent. Roughly four hundred and fifty ambulance stations are located in Saudi Arabia, all belonging to King Faisal Specialist Hospital & Research Centre [1].

Participants

The study's participants were selected from a pool of EMS workers residing in the Riyadh region who had already participated in other parts of the bigger research. Their willingness to be questioned later was requested at that point. In order to confirm that they were still available for the follow-up interview, all individuals who had previously consented to it were asked to respond to an expression of interest. At this point, we informed all prospective participants that we would not be using their names in any data reports and would do all in our power to keep them anonymous. Persons with a least of 5 years of experience in the EMS and who are currently employed as technicians (EMTs), paramedics, or station managers were considered for the interviews. It was anticipated that the entire sample would consist of males, since this is in line with the demography [17, 18]. The participants were categorised as either "rural" if they lived outside of Riyadh City or "urban" if they worked in Riyadh City, according to the given geographic classification.

Research strategy and components

The research methodology that guided the study's creation, implementation, & analyses was hermeneutic phenomenology [19]. We consciously selected this method because we believe it will provide the most detailed picture of EMS service in Saudi Arabia's urban & rural areas. Frontline workers' actual experiences were the centre of the reflective evaluations based on hermeneutic phenomenology [20] that underpinned the qualitative dataset used in this investigation. The data gathering method of choice for both urban & rural respondents was the semi-structured individual interview [20]. To make sure that the sample was representative of EMS workers in both urban & rural locations, we employed predefined interview numbers that ranged from 8 to 12 per category (rural worker & urban worker) [21, 22]. We used first-respondents to select interviewees, and we kept going until we got data saturation [21].

Method of data collecting

Over the course of ten months, from October 2021 to July 2022, data was collected in two stages. Participants in Saudi Arabia were interviewed face-to-face in the first stage of data gathering by the principal author, a seasoned male paramedic from Saudi Arabia. The interview was place in a private room at each participant's home EMS base in the Riyadh region. The interviewers introduced themselves and briefly went over the study's goals before diving into the questions from the interview guide; all discussions took place in Arabic. At either the beginning or the end of the interview process, no participants opted out of taking part in the study. After every interview, the primary author would collect field notes. Interviews were word-for-word transcribed and lasted anywhere from thirty minutes to an hour. Following initial transcription, a procedure of content confirmation was carried out with the participants to aid in data validation & trustworthiness [21]. Following receipt of the Arabic transcripts, the participants were requested to confirm their consent with the transcription. Nothing concerning the transcription was uncovered by this procedure. The principal author subsequently translated the interviews from their transcriptions into English. It was necessary to validate the translation by sharing the English versions with contributors who were assured in both Arabic & English, as many of them were able to do so. Participants whose native language was not English were required to undergo independent validation of the translation in order to access their data. Both the participants & certification team did not find any problems with the translation and transcribing procedure.

Prior to the completion of transcription & translation into English, the complete team could not commence the initial analyses of the data (refer to to the detailed explanation of analysis below). As a result, new concerns related to gender emerged, which had not previously been discussed with everyone involved. Because of this, we decided to conduct additional interviews with the same people to delve deeper into these ideas. Because of this, we had to go to the next level of data collection, which included doing follow-up interviews through an online platform (Zoom). Constraints imposed by the COVID-19 pandemic made Zoom use inevitable, and an ethical variance was granted to incorporate this new strategy. Following the same procedure as the first round of in-person interviews, data transcription & translation were carried out for the second round as well.

Evaluation

Forty people were interviewed for the dataset, with an equal number of participants from rural and metropolitan EMS departments (20 each). After conducting nine interviews in rural areas & eight interviews in urban areas, data saturation was deemed to have been achieved. However, participants had already agreed to complete ten interviews in each site, thus the total number of interviews was ten. These last three interviews did not reveal any fresh problems, which validates the decision about data saturation. Each participant was given a unique, anonymous identification code before the analysis began. A person's total years of experience and whether they lived in an urban or rural area were also encoded in this code. Since there were no female participants, a gender identifier was unnecessary. utilising Braun and Clarke's [22] framework, the study team conducted data analysis utilising a theme analysis methodological technique. At first, the three researchers on the team examined the translated interview transcripts in English on their own. The initial goal of the review was to come up with some rough ideas and to get a feel for the data in order to identify any major trends. Following this,

the team got together for a meeting, where they settled on a preliminary code structure. Afterwards, the coding framework was employed by each researcher to individually code the statements inside each transcript. Every member of the team had to think about and record how each participant understood the statements as part of this process. After the first round of coding, two researchers gathered to go over all of the transcripts, talk about what themes came up, and settle on a final coding scheme. Although it was not strictly necessary, the third research team member had been designated to mediate any disputes that proved intractable. The complete team worked together to develop the transcripts into topic groups after the main researcher coded them after final structure confirmation.

RESULTS

The sample included 20 EMTs (12 rural & 8 urban), 7 paramedics (0 rural & 3 urban), 13 managers (6 rural & 7 metropolitan). Variance between the rural & urban samples in terms of fundamental demographic statistics. While those living in cities had a little younger average age of 33.5, those living in rural areas had a somewhat older average age of 37.25. The fact that the rural participants claimed to have more expertise with the EMS is hardly surprising given the small chronological mean age difference. Again, the gap was tiny; EMS workers in urban areas claimed an average of 10 years of experience, while those in rural areas reported 12 years. Three distinct themes were identified from the initial examinations of the complete dataset: organisational factors, EMS personnel problems, & patient factors. Organisational factors are the primary emphasis of this article; a second publication will address EMS personnel issues & patient factors. Transit & response times, service synchronization, the purpose for the call-out, and physical and social resources were some of the sub-themes that emerged from further examinations of the Organisational Factors subject. The next part elaborates on these subthemes by outlining the similarities and differences amongst rural & urban locations. We have provided a few quotes to help you better comprehend the subthemes. All quotations are accompanied by the identity of the appropriate participant, which includes their professional role, location, & years of experience, in order to offer the reader some background.

Variances between rural & urban areas-organizational factors

We inquired as to whether or not there may be organisational disparities amongst rural & urban regions with regard to EMS performance. Responding quickly was one of the primary concerns voiced by employees in both urban & rural regions. The time it took for emergency medical services to arrive at the scene of an accident was sometimes longer in rural regions than in cities. Patients were more likely to experience a worsening of their medical issues when there was a longer response time. "It seems like the main difference is that in rural areas, the ambulance stations are far apart, so we have to travel longer distances," one rural EMT with eight years of experience explained. At one point, our team had to travel forty kilometres to get to the act of an accident; upon arrival, they discovered that three cases were involved; hence, they had to wait forty minutes for backup.

Response times varied throughout the day in rural and urban areas, according to previous research [15]. In rural areas, response times in the morning were shorter than in the afternoon and night, while in urban areas, they were shorter than in the morning and night in the afternoon. Participants' explanations for the discrepancy centred on the idea that "rush hour traffic," contributed to the urban pattern in question. "Sometimes we require more time in the rush hour for instance, we can get to a location in 4 mins at 3 AM but we need more than 20 mins in the rush hours due to traffic," stated a city EMS manager with fifteen years of expertise. Aside from the need for additional EMS stations, no recommendations for organisational changes were made to address this matter. Nevertheless, it was pointed out that rural EMS may have trouble finding locations, especially at night, as a result of insufficient resources and instructions from corporate headquarters. This could result in lengthier response times.

It was also noted that transporting patients to hospitals for additional treatment might be a time-consuming ordeal in rural areas due to the scarcity of hospitals and the distances between them and the sites of accidents or medical emergencies. "We take longer time in the rural area," a rural EMT with eight years of experience said, highlighting one of their main concerns. We often spend 10–15 minutes at the scene after a 40–minute journey. After that, we have an additional forty minutes of travel time to the hospital, adding another hour to our already lengthy journey. While it was acknowledged that the physical distance could be a challenge to overcome in the absence of substantial infrastructure development, it was also recognised that the equipment needed to reach patients in rural locations could impact response times and duration. It is not uncommon for rural EMTs to be sent to faraway places, according to one veteran with six years of experience in the field. Some places require four-wheel drives, while others are in remote areas. He went on to say, "We need dispatchers with good knowledge of each area," stating that in order for dispatch services to get to the correct location fast, a thorough understanding of the surrounding area is essential. For instance, we require a dispatcher who is native to the West Kharj area and is well-versed in the region for the area. Beyond that, a GPS system is required. Concerning the causes of an emergency call, the participants' accounts varied. According to a rural EMT with nine years of experience, "Most of our cases in the rural areas are trauma whereas the

urban cases are medical." This suggests that trauma cases are more prevalent in rural areas. The provision of services and the necessary supplies for rural EMS stations & hospitals are consequently affected by this. Respondents from rural areas were more probable to believe that rural areas are underserved in terms of medical resources (both human & physical) and that there is a noticeable disparity in the allocation of these resources between rural and urban areas. We need new structures for ambulance stations, and our employer isn't paying enough attention, according to a rural EMS manager with fifteen years of experience. Additionally, we require brand-new vehicles because our current fleet is marginally older than that of cities.

Comparative organisational factors amongst rural & urban places

The participants' perceptions of the apparent differences in organisational challenges based on location did not extend to all of them. The interviewees from both urban and rural areas emphasised that various aspects greatly affected their capacity to perform to their expectations. Among these factors were the following: medical equipment coordination, EMS autonomy, disaster preparedness, and the type of EMS model in practice. Patients were delayed in receiving emergency medical aid due to these operational systems, which were perceived as causing undue delay. Liaison with other agencies was specifically mentioned as a source of concern. The lack of cooperation between EMS and the other assisting organisations was pointed up. A rural EMT with 9 years of experience claims that the delay in the arrival of police & fireman assistance is caused by a absence of synchronization between several groups & the ambulance. Additionally, medical services needed to be meticulously coordinated. "We require greater collaboration with the ministry of health ambulances because every healthcare facility has their own ambulances so when their chronic patients need to be transferred to their hospital they can bring him/her," said one employed emergency medical technician (urban, 11 years' experience). The Saudi civilian & heath ambulance models' inability to work together and the attendant worries about service duplication were on full display in this matter.

In addition, we wanted to know how the participants felt about the disproportionately high rates of cases that were not transported after a callout in both urban and rural locations [16]. Due to the possible diversion of limited EMS resources from critical care situations to non-urgent callouts, participants acknowledged this problem as a source of concern. An important problem that the public does not seem to understand about the Red Crescent EMS was one of the main points brought forward. Therefore, it was believed that requesting emergency aid for small health issues frequently led to non-transportation. Everyone should know what the emergency medical services (EMS) are for. In my opinion, this is of the utmost importance," said a rural EMT with nine years of experience when asked for a solution to this problem. We need to make sure that people know when to contact for medical help and not to do it for every little injury, like a cut finger.

DISCUSSION

The interviews for this study were carried out with forty Red Crescent EMS professionals from various parts of the Riyadh region in Saudi Arabia, both urban & rural. Previously recognised service delivery concerns in this region were sought to be better understood by delving into the complex organisational elements at play [12, 15, 16]. By analysing the interview data thematically, we were able to learn about the worries shared by EMS workers & causes of the current gaps between rural & urban areas. Response & transportation time, labour composition, and frontline coordination of support are the three topics covered here.

Transit and response times

According to research, one of the main causes of bad EMS results is the reaction time interval [10]. Addressing reaction times in rural areas is no easy task, according to prior study from around the world [7, 8, 12, 13]. Several factors, such as local topography, staff training, & availability of critical personnel and adequate equipment, play a role in this process. As expected, pre-hospital EMS results are better in urban areas with well-resourced infrastructure [12]. Emergency medical services personnel in the present study's rural areas were aware that it took more time to reach patients & subsequently transfer them from the scene after first care. A lengthier response time could greatly impact the patient's condition and lead to unnecessary medical interventions in the event of a catastrophic accident or critical medical emergency. It would be possible to drastically lower the risk before admitting a patient to a healthcare centre if the reaction time could be reduced. In rural parts of Saudi Arabia, the ability of any emergency medical service to reduce response and transit times will always be limited by the simple issue of physical distance [15]. Participants did, however, note that rural EMS vehicles tended to be older and less reliable than their urban counterparts, and that not all rural communities had access to the specialised vehicles that are necessary for handling challenging terrain, such as those with four-wheel drive. In order to find out where older vehicles may be upgraded to improve response time and, by extension, patient outcomes, a thorough examination in rural regions is necessary.

Global Positioning Systems (GPS) onboard accessibility appeared to differ between regions, and it is not thought to be limited to rural areas alone. On the contrary, it was thought that the vehicle's age might be reflected in its lack of GPS. Nevertheless, it was acknowledged in the Results that older automobiles were more common in rural regions,

which could explain why the problem seemed more severe there. Finding remote places and minimising reaction time may be made easier if all vehicles were equipped with GPS and all workers were taught to use it. People in less populated rural areas with fewer public transit choices may be more prone to calling the emergency medical services (EMS) for noncritical help, though. This could include contacting the nearest hospital for routine checks or for more minor medical concerns. This suggests that health-care assistance access in rural areas should be given more attention.

Workforce composition

A national survey of Saudi Arabian EMS workers found that the proportion of frontline workers with Bachelor, Master's, or PhD degrees was far lower than the proportion with Diploma & lesser levels [18]. On the other hand, the people who took part in this study saw even more of a divide between rural or urban areas, and they thought the problem was more complex than that. They believed that due to a lack of paramedics and an increase in the percentage of EMTs with a lesser degree of education, EMS workers in rural regions frequently did not have the same foundational training as their urban colleagues to manage severe injuries. Trauma, possibly caused by industrial accidents or high-speed collisions, is more common in rural parts of Saudi Arabia, exacerbating this skills gap [12]. Rural areas have greater death rates than metropolitan centres due to a combination of factors, including a lack of resources for on-site care in such situations [9]. To address this workforce mismatch, earlier research [12] suggests a variety of reasons that contribute to the training gap in Saudi Arabia. One possible approach is to offer incentives for rural paramedics and provide them with localised training.

Assistance for frontline staff coordinating

Reports indicated that EMS response times were affected by issues with coordination & information flow during dispatch. It seemed like this was a bigger concern in rural areas, since centralised dispatch agencies in bigger cities obviously don't have a good grasp of rural areas. Due to unclear instructions for the arriving EMS, this was thought to delay getting to the patient quickly. As mentioned before, some rural EMS vehicles do not have GPS, which makes it even more difficult for them to reach patients. A centralised dispatch model has many benefits, such as consistent response, overall operational efficiency, and cost savings, thus this is not a simple problem to solve [23, 24]. The expectation that each dispatch officer be well-versed in every region of Saudi Arabia, whether rural or urban, is also unrealistic. Improving the accuracy of rural location identification could be achieved by equipping all vehicles with dependable GPS systems. However, it is also recommended that dispatch officers spend time in rural areas each year to familiarise themselves with the local atmospheres an& hazards that could hinder their work. [25]

CONCLUSIONS

Our analysis of the project's data allowed us to pinpoint the most pressing issues impacting the efficiency of EMS in both urban & rural ranges of the Riyadh region. Specifically, participants identified a number of issues that were unique to rural areas and contributed to regional service delivery discrepancies. Problems such as inadequate base training or credentials, public confusion over the EMS's function, and frontline employees' inability to work together effectively were among these. Three potential policy or practice shifts that do not necessitate a complete replacement of current systems are proposed to resolve these issues. Therefore, to fill the gap in skills amongst urban & rural workers, it is suggested that EMS professionals stationed in rural areas have access to more specialised training options. To remedy this disparity, it is recommended that financial incentives, particularly scholarships, be explored so that rural residents can pursue paramedicine degrees at universities.

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Corresponding Author

Rakan Hassan Alenazi*

Emergency Medical Specialist, King Abdulaziz Air Base - Armed Forces Hospital, Al Dhahran, Saudi Arabia