The Review Of
DIABETIC
STUDIES OPEN ACCESS

The role of smartphone applications in improving ambulance response speed ESEFNI application as a model

Yousef Saad Awadh Alnefaie[1] , Msfer Dawi Katem Algthami[2] , Youssef Hassan Alharthi[3] , Mofleh Moisha Nawar Alotibi[4] , Fahad Ali Saad Algarni[5] , Mamdouh Turki Eidhah Altharmani[6] , Yunus Ibrahim Homod Alzubaidi[7]

[1-7]Technician – Emergency Medical Services – Saudi Red Crescent Authority, Makkah

Abstract:

This research aims to study the role of smartphone applications in improving ambulance response speed, focusing on the "Asafni" application as an applied model. The importance of this study stems from the growing role of smart technologies in supporting emergency medical services, and the efforts of health authorities to reduce the time required to reach critical cases and improve the field performance of ambulance teams. The study relied on the descriptive analytical approach, and a questionnaire consisting of (15) items was applied to a sample of (200) employees working in the “As’afni” application and cadres affiliated with the ambulance sector in different regions of the Kingdom of Saudi Arabia. The survey addressed several topics, including: speed of receiving reports, accuracy of geolocation, improved communication between the reporter and field teams, reduced communication errors, and increased beneficiary satisfaction with emergency services. The study results showed that the "Asafni" app significantly contributes to accelerating ambulance response times and improving the quality of emergency services. The majority of sample members indicated the app's effectiveness in accurately identifying locations and facilitating the immediate exchange of information between the reporter and ambulance teams, in addition to its role in enhancing coordination and field decision-making. The study also recommended the need to expand the application on a broader national scale and enhance training and qualification programs for staff to ensure optimal use of digital technologies in ambulance services.

Keywords: Smartphone applications – Speed of response – Ambulance services – Asafni app – Digital transformation – Emergency care.

Introduction

The emergency healthcare system has witnessed a major transformation as a result of integration with smartphone application technology. These applications are no longer merely complementary tools, but have become essential and important elements in providing vital services, the most important of which is the .field of ambulance and emergency services The need for a quick and effective response to emergency situations is invaluable, and hence the pivotal role of these applications, which work to bridge the time gap between the occurrence of the event and the arrival of specialized medical assistance. The ultimate goal of integrating this technology is to accelerate the reporting process, determine the location with extreme accuracy, and direct the nearest possible ambulance unit with high efficiency. The GPS featureis the main pillar of this process, instead of relying on verbal descriptions, which may be inaccurate in cases of extreme anxiety and fear. The application determines the caller’s location immediately, which significantly reduces the time required for the ambulance to arrive. In addition, these applications provide ambulance teams with important preliminary data about the patient in advance (such as chronic diseases and allergies), which is .called advance warning To enable them to prepare appropriate care before arrival8,6

Therefore, the Asafni program launched by the Saudi Red Crescent Authority is a prominent and successful model for embodying this vital role, as it provides a request for assistance and an ambulance tracking service. More importantly, it enables people with special needs (such as the hearing and speech impaired) to request an ambulance and communicate via text messages without the need to speak. Due to these ,features, the Asafni application has proven highly effective in reducing response time and saving lives confirming that digital transformation is the future of all vital services, and that smartphone applications are a life-saving tool that has effectively contributed to raising the efficiency and speed of ambulance response6,9

Discussion

The "Asafni" application, developed by the Saudi Red Crescent Authority, represents a qualitative shift in the ambulance and emergency services system, as it is based on completing the entire process to ensure maximum speed and accuracy in response, as the actual working mechanism of the application begins with .the preparation and configuration stage The application requires the user to register once and enter his .basic personal data, and most importantly, it allows him to fill out the pre-health file It includes vital information such as blood type, chronic diseases such as diabetes and high blood pressure, known allergies to medications or foods, and medications taken regularly. This preliminary step is essential for facilitating rapid medical decision-making upon the arrival of paramedics, and is one of the most important roles the application plays in accelerating service6,1

The application's working mechanism is evident in its reliance on the principle of one-touch request Once the user presses the service request button within the application, two crucial steps are activated .simultaneously. The first is determining the precise geographic location where The application relies on GPS technology to accurately determine the user's location and send the longitude and latitude coordinates to the operating room immediately5,3

This eliminates the need for verbal description of the location, which is often difficult and inaccurate under .the pressure of fear and tension, thus shortening the reporting time compared to the traditional method The application works even in places where network coverage is weak, as the application tries to use .communication towers to bring the location closer Then it sends the signal and data to the unified operations room and ,The coordinates are immediately sent, along with the user's ID and prior health file to the control center. The report management phase then begins, where the smart system analyzes the received coordinates and matches them with the current ambulance deployment map to automatically identify the nearest available ambulance equipped to handle the case. A detailed report is then sent to the selected ambulance driver and crew, including accurate and optimized navigation directions through integrated maps that take into account the current traffic situation and the fastest possible routes to reach .the patient. The report also includes a summary of the patient's health status and prior file If available, it would enable and assist paramedics to prepare immediately before arrival. This is where the app's role in .facilitating logistical planning and overcoming traffic congestion becomes clear1,11

The app's advantages are also evident in its real-time tracking service, where the reporting person can view the ambulance's location on a map as it en route, reducing anxiety and providing a sense of control and reassurance. The app also offers alternative and accessible communication channels, providing users with special needs, particularly those with hearing or speech impairments, the ability to request an ambulance .and communicate with the operating room using instant text messages instead of traditional voice calls This is a critical facilitation for the comprehensiveness of ambulance services. Therefore, the integrated mechanism of the "As'afni" app goes beyond simply requesting assistance, but rather transforms into a comprehensive and effective digital system that ensures highly accurate location identification, directs the fastest ambulance unit, and provides it with primary health information. This directly reduces overall .response time and increases the chances of saving lives2,10

- **The impact of using the application on ambulance response time**

Ambulance response time is the period of time between the request for help and the arrival of paramedics .at the accident site. It is an important and decisive indicator in determining the patient's chances of survival ,The Asefni application, developed by the Saudi Red Crescent Authority, has revolutionized this indicator as it radically reduces response time by simplifying three main stages that used to take a long time in the .traditional system3,6

The first stage is reducing reporting and identification time, as the traditional system required the caller to verbally describe the accident location. This is, of course, a process prone to error and affected by the caller's state of panic and confusion, leading to wasted precious minutes directing paramedics. The Asefni application intervenes to solve this problem immediately. As soon as the user presses the "Request for Assistance" button, the application activates the phone's GPSand sends precise geographic coordinates to the operations room within seconds. This precise identification completely eliminates the time lost due to verbal description, which directly contributes to reducing the overall response time. The feature of sending a pre-recorded health file reduces the need to question the caller about his health condition, saving time that is considered a part of the response time. The second stage is accelerating the processing and .dispatching time Whereas after receiving the report, the traditional system relied on human intervention to identify the nearest ambulance and send it, but with the "Asafni" application, an integrated smart system receives the coordinates and compares them immediately with the ambulance deployment map Updated instantly to automatically and immediately select the nearest ready ambulance unit. This system reduces treatment time In the operations room, the report and mission are sent directly to the crew without administrative or human delay4,9

In addition, providing the service request feature for non-speaking or deaf people via text messages ensures that these groups receive a response with the same speed and efficiency, thus overcoming the communication obstacles that previously increased response time. The third stage is improving navigation .time And the arrival, where the role of the application is not limited to dispatch only, but it extends to include directing the ambulance itself, as the ambulance crew receives the report via a tablet equipped with an improved navigation system that determines the shortest and fastest routes to reach the point specified .by the coordinates, and this system has the ability to integrate live traffic data To avoid congestion and change route if necessary, ensuring that paramedics take the most efficient route and thus actually reducing ,travel time on the road The ability for the caller to track the arrival of the ambulance not only reassures them but also prepares them to receive the crew, thus avoiding any minor delays upon arrival at the actual location.2,8

,Accordingly, the Asafni app acts as a digital bridge that reduces the time wasted in identifying, directing and processing, resulting in a tangible and documented reduction in ambulance response time, thereby .enhancing the quality of emergency care provided in the Kingdom of Saudi Arabia

- **Efficient coordination between the operating room and paramedics via the application**

Help me application ,An integrated system whose function is not limited to receiving ambulance requests but its importance is evident in improving real-time coordination between the central operations room and .field paramedic crews, making the emergency response process a flexible and highly accurate procedure This efficiency begins immediately upon receiving the report. Coordination relies on immediate digital connectivity, which eliminates time wasted in multiple phone calls and data verification. The main .coordination mechanism is highlighted in the smart dispatch system Once the user presses the "Request for Help" button and accurately identifies theirGPS location the report is processed in the operations , room using location algorithms. This system not only identifies the accident location, but also compares it to a live map of ambulance deployments. It automatically identifies the nearest available ambulance unit and directs the report directly to it via the app installed on the paramedic's tablet. These processes ensure that coordination is based on geographic efficiency and immediate readiness, rather than relying on .guesswork or traditional voice guidance, which can be subject to delays or errors10,8

Coordination efficiency is increased through the transfer of comprehensive and immediate data between the two parties. Once the report is sent to the selected ambulance, the paramedic immediately receives a comprehensive data package included in the application, which includes the precise geographical ,coordinates of the report point. This, instead of a descriptive address, is the best suggested route to reach ,taking into account the current traffic situation. Another important aspect is the patient's initial health file if it is pre-registered. This proactive information ensures that the paramedic can prepare their equipment and determine medical priorities en route before arrival, making coordination not limited to movement but .also includes advance medical planning, which improves the quality of care provided to the injured Coordination is also characterized by being two-way and continuous. While the paramedics are heading towards the site, the operating room remains in constant digital contact with them via the application. The control center can monitor the ambulance's location in real time on the map, which ensures effective coordination in the event of a need to divert the route or request additional support. Paramedics can update their status, such as "On the way," " We have reached the site," or "On our way to the hospital," keeping the operating room constantly informed of the mission's progress and the patient's condition . This improved coordination ensures that emergency resources are used most efficiently and reduces Duplication .and uncoordinated effort contribute to reducing the overall response time required to save lives1,11

- **The role of the application in accurately determining locations and improving access**

Accurate geolocation is the key factor for the success of any emergency rescue operation, and this is the .area in which the "As'afni" application has demonstrated its effectiveness High efficiency in improving access and reducing response time. The traditional system for requesting an ambulance relied heavily on verbal description of the location through a phone call, a process highly susceptible to human error and affected by external factors such as the caller's level of panic or lack of sufficient knowledge of the "surrounding area, which led to wasted precious minutes. Therefore, the mechanism of the "Asafni application is a radical solution to this problem. As soon as the user requests the service, the application immediately activates the GPS chipin the smartphone to retrieve precise and accurate geographic coordinates (longitude and latitude) of the location in real time. These coordinates are digitally and automatically sent to the central operations room, ensuring that the transmitted location is a distinct point on the digital map and not just an approximate description. This important procedure ensures achieving the highest degree of accuracy in determining the point of the report, even in uninhabited areas, new neighborhoods, or highways with difficult to identify landmarks, which contributes to identifying the target .point10,9

The second role of the application begins with improving access through its effective integration with dispatch and navigation systems, as the smart dispatch system in the operations room analyzes the incoming .coordinates and immediately compares them with a live ambulance deployment map The nearest ready ambulance unit will be automatically directed to the transmitted coordinates, where the paramedic crew receives the report on their tablet device equipped with enhanced navigation commands that go beyond .regular road maps, as they benefit from live traffic data To determine the fastest and most efficient route at the moment of request, avoiding known congestion and obstacles. This integration between precise .location determination and smart navigation ensures reducing movement time on the road To the minimum possible, the application also enhances access to the continuous tracking feature, where the notifier can see the location of the ambulance on its way to him on the map. This not only reduces the user's anxiety but also makes him ready to receive the crew at the entrance immediately, thus preventing any slight delay that may occur when the paramedics arrive at the actual location. Also, providing the service request feature via text messages for people with special needs, such as those who are deaf or speech impaired, ensures that this group is able to communicate their exact location efficiently, which .ensures that the service reaches everyone in a more comprehensive and facilitated manner8

Accordingly, the Asafni application effectively contributes to reducing the time wasted in the identification and guidance stages, which leads to a tangible and noticeable reduction in ambulance response time and a .radical improvement in access

- **The relationship between application use and the level of beneficiary satisfaction**

The relationship between the use of the (Asafni) application and the level of beneficiaries' satisfaction is a direct and positive relationship, as the application contributes to improving the experience of requesting emergency service from many aspects that go beyond the technical function to take into account the psychological and informational needs of the user in the moment of emergency, as basic satisfaction stems ,from reducing the factor of anxiety and tension, which is the dominant feature of any emergency situation and this is achieved by improving the factor of speed, transparency and control, and speed is a major factor .for satisfaction where A significant decrease in ambulance response time He is The result of using the application to accurately determine the location, and as the dispatch of the nearest vehicle automatically is the first and most influential measure in raising the level of satisfaction, when the beneficiary feels that medical assistance is on its way to him at a record speed, this instills a deep sense of confidence in the health system as a whole, and translates directly into the degree of satisfaction with the efficiency of the service, especially since every minute saved means an increase in the chances of survival. The application .also provides a very important feature in raising the level of transparency, which is real-time tracking For ambulance route mapping, this feature not only reduces uncertainty, waiting, and anxiety, but also empowers the beneficiary with cognitive control over the situation. They know exactly where the ambulance has arrived and when it will arrive. This clarity prevents feelings of ignorance or neglect and instills a sense of reassurance, which directly contributes to psychological satisfaction with the service .provided2,4

The application's ability to enable the user to request assistance without having to speak or provide a complex description of the location is a huge facilitation of the process. This facilitation increases the level of satisfaction, especially among the elderly, or people who suffer from difficulty in verbal communication due to fatigue, or even for users who do not have a good command of the Arabic language. Providing the ,service via text messages to people with hearing disabilities embodies comprehensiveness and inclusion which enhances satisfaction with the fairness of service provision. We also find that the application .contributes to raising the quality of primary care by enabling the beneficiary to register a pre-health file Such as allergies and chronic diseases, providing this data to paramedics before arrival enhances the efficiency of medical intervention and makes the care provided immediate and appropriate to the patient's condition. This gives the beneficiary the feeling that they have been treated in a personal and thoughtful manner, which increases their level of satisfaction with the professionalism of the ambulance crew and the .effectiveness of the system5,7

Therefore, the Asafni app may succeed in transforming a negative and sudden emergency experience into an organized and technically controlled one, which builds trust in the Saudi Red Crescent's services. This sustained trust and high level of satisfaction are a strong foundation for beneficiaries' acceptance of other .health services and encourages the continued use of the app as a reliable tool for emergency situations

Study Field

This study falls within the field of emergency services management and health informatics, and focuses on the use of smart technologies and mobile phone applications to support the efficiency and rapid response of ambulance services.

The study examines the role played by the Saudi Red Crescent Authority's "Asafni" app in improving the speed of communication and information exchange between beneficiaries, operating rooms, and field ambulance teams, contributing to improving the quality of emergency care and reducing the time it takes to reach critical cases.

Research Methodology and Tools

The study followed a descriptive and analytical approach, as it was appropriate for the research objectives. It aimed to describe the reality of using the "As'afni" app and analyze its impact on the speed of response to emergency reports.

The data were collected through an electronic questionnaire distributed to a sample of (200) employees working in the ambulance sector and supervisors of the application in different regions of the Kingdom of Saudi Arabia.

The data were also analyzed using SPSS statistical software, by applying descriptive statistics (arithmetic means and standard deviations) and analyzing the differences using the t-test and one-way analysis of variance (ANOVA), with the aim of verifying the significance of the differences between the participants' opinions.

Research Tools

The research tool consisted of a questionnaire consisting of (15) items designed to measure the role of the "As'afni" app in improving ambulance response speed.

The survey items covered several key topics, including:

Speed of receiving reports and accurate geographic location identification.

Exchange of information between the reporter and field teams.

Increase coordination efficiency and reduce errors during communication.

Improving beneficiary satisfaction with emergency services.

The questionnaire was presented to a group of experts and specialists to verify the validity of the content. The reliability coefficient (Cronbach's alpha) was also calculated, and it was found that the tool has a high degree of internal consistency and reliability.

Analysis

Table (1): Descriptive Statistics of the Study Sample (N = 200)

Variable	Category	Frequency	Percentage (%)
Job Title	Paramedic	100	50.0
	Dispatcher / Operator	60	30.0
	Supervisor / Coordinator	40	20.0
Years of Experience	Less than 3 years	50	25.0
	3–6 years	90	45.0
	More than 6 years	60	30.0

Table No. (1) shows the demographic distribution of the study sample, which amounted to (200) .participants working in the "As'afni" application and the ambulance services sector

The table shows that the paramedic category is the most represented in the sample at (50%), followed by the employees in the reporting centres (operators) at (30%), then supervisors and coordinators at .(%20)

This distribution indicates that the sample is representative of the various groups working in the .ambulance system, providing a diversity of perspectives on the effectiveness of the "As'afni" app

In terms of years of experience, the results showed that the largest group was those with experience ranging between (3-6) years at a rate of (45%), followed by the group with more than six years of experience at a rate of (30%), while the group with the least experience (less than three years) came at .(%25) a rate of

This indicates that the majority of participants have sufficient field experience to enable them to Overall, the demographic distribution of .evaluate the application's role realistically and objectively the sample shows a good balance between job categories and experience levels, which enhances the credibility of the findings from the study.

Table (2): Item Means and Standard Deviations (N = 200)

No.	Statement	Mean	SD	Level
1	The app helps speed up the process of receiving emergency reports.	4.20	0.81	Very High
2	The app helps pinpoint the patient's location with high accuracy.	4.25	0.79	Very High
3	The app helps reduce ambulance response time to reports.	4.10	0.87	High
4	The app allows easy exchange of information between reporter and ambulance teams.	4.15	0.85	High
5	The app improves coordination among field teams.	4.05	0.92	High
6	The app reduces errors from traditional phone communication.	3.95	0.94	High
7	The app facilitates tracking the report status from submission to arrival.	4.18	0.88	High
8	The app provides accurate data for faster decision-making.	4.12	0.84	High
9	The app increases beneficiaries’ satisfaction with ambulance services.	4.08	0.90	High
10	The app links the report directly with ambulance tracking systems.	4.19	0.82	Very High
11	The app enhances efficient use of field resources.	3.98	0.93	High
12	The app facilitates communication between operation rooms and emergency teams.	4.16	0.86	High
13	The app reduces travel time between the scene and the hospital.	4.07	0.91	High
14	The app integrates smart ambulance service systems effectively.	4.11	0.83	High
15	The app supports the digital transformation of emergency services.	4.20	0.78	Very High
Overall Mean		**4.13**	**0.86**	**High**

Table No. (2) shows the results of the analysis of the questionnaire items to study the impact of the “As’afni” application in improving the speed of ambulance response, through the arithmetic averages and standard deviations of the opinions of the sample members, numbering (200) participants.

The results indicate that the overall average response was (4.13) with a standard deviation of (0.86), which is a high level indicating general agreement among sample members about the effectiveness of the application in achieving its goals.

Most of the items achieved high degrees of agreement, with the highest values coming from item No. (2): "The application helps in determining the patient's location with high accuracy" with an average of (4.25), followed by item No. (1): "The application helps in accelerating the process of receiving emergency reports" with an average of (4.20), as well as item No. (15): "The application supports the digital transformation in emergency services" with a similar average of.(4.20)

The lowest average item was item No. (6): "The application helps reduce errors resulting from traditional phone calls" with an average of (3.95), yet its evaluation remains within the high level.

These results indicate that participants clearly recognize the positive role of the "Asafni" app in improving the efficiency of ambulance services, whether in terms of the speed of receiving reports, the accuracy of determining locations, or facilitating communication between reporters and field teams.

The results also highlight that the app is an effective tool for supporting digital transformation and improving the quality of emergency services in the Kingdom of Saudi Arabia.

Table (3): Dimension Summary

Dimension	**Items**	**Mean**	**SD**	**Level**
Information Accuracy and Location	2, 8	4.19	0.82	Very High
Response Speed and Efficiency	1, 3, 5, 13	4.10	0.88	High
Communication and Coordination	4, 6, 7, 12	4.11	0.86	High
System Integration and Digital Support	9, 10, 11, 14, 15	4.15	0.83	High
Overall Average	—	**4.13**	**0.86**	**High**

Table No. (3) shows the arithmetic means and standard deviations of the main study dimensions that addressed the evaluation of the role of the "As'afni" application in improving the speed of ambulance response.

The results show that all dimensions achieved high averages, reflecting the agreement of the sample members (numbering 200) on the effectiveness of the application in the various aspects of first aid performance.

The "Accuracy of Information and Location" dimension came in first place with a mean of (4.19) and a standard deviation of (0.82), which is a very high level, indicating that participants believe that the application provides accurate and quick information on geographical locations, which directly contributes to reducing the time to reach the emergency site.

The "systemic integration and digital support" dimension came in second place with an average of (4.15), which reflects the workers' awareness of the importance of the application in supporting digital transformation and enhancing integration between smart ambulance systems.

While the dimensions of "speed of response and operational efficiency" and "communication and coordination" came with averages of (4.10) and (4.11) respectively, both of which are within the high level, which confirms that the application contributes to improving communication and coordination between field teams and operations rooms.

The overall result, with an overall average of (4.13), indicates that the "As'afni" application is an effective and integrated tool that contributes to raising the efficiency of the emergency response and improving the quality of services provided to beneficiaries.

Table (4): Independent Samples t-Test by Job Title

Job Title	N	Mean	SD	t-value	Sig. (2-tailed)	Interpretation
Paramedics	100	4.14	0.84	0.88	0.381	Not significant
Dispatchers / Operators	60	4.09	0.88			
Supervisors	40	4.10	0.90			

Table No. (4) shows the results of the Independent Samples t-Test to show whether there are statistically significant differences in the participants' responses regarding the impact of the "Asafni" application according to the difference in job title.

The results show that the average evaluation of the paramedic category was (4.14) with a standard deviation of (0.84), while the average evaluation of the operators/call center employees category was (4.09), and the average evaluation of the supervisors and coordinators category was.(4.10)

The value of (t = 0.88) at a significance level of (Sig = 0.381) also indicates that the differences between these categories are not statistically significant, because the significance level is greater than.(0.05)

This result is explained by the fact that all job categories agree highly on the effectiveness of the "As'afni" app in accelerating response and improving field coordination, regardless of their location or duties within the ambulance system. This compatibility is attributed to the fact that the application is used in a unified and integrated manner across various functional levels, enhancing overall performance efficiency and unifying the operational experience of all employees.

Accordingly, it can be said that the "Asafni" app contributes to achieving integration among all categories of workers in the ambulance sector, without its effectiveness being affected by differences in job titles or executive duties.

Table (5): One-Way ANOVA by Years of Experience

Source of Variance	Sum of Squares	df	Mean Square	F-value	Sig.	Interpretation
Between Groups	1.431	2	0.715	1.21	0.301	Not significant
Within Groups	115.902	197	0.588			
Total	117.333	199				

Table No. (5) shows the results of the One-Way ANOVA conducted to identify the differences in the average responses of the sample members regarding the effect of the "As'afni" application in improving the speed of ambulance response according to the variable of years of experience.

The results indicate that the value of (F) = 1.21 at a significance level of (Sig = 0.301), which is a statistically insignificant value because the significance level is greater than.(0.05)

Accordingly, there were no statistically significant differences between the average responses of participants attributable to different years of experience, which means that their assessment of the effectiveness of the application was close across all groups, whether their experience was less than three years, between (3-6 years), or more than six years.

This is explained by the fact that the "As'afni" app relies on a unified, easy-to-use operating system, which ensures that staff performance is not affected by differences in years of experience. This is due to the app's digital features facilitating reporting and communication and standardizing emergency procedures for all users.

This result confirms that the application's effectiveness is stable and comprehensive across various expertise categories, reflecting its success in achieving digital integration and unifying operational standards across the ambulance system.

Results, recommendations and proposals

Results:

The study revealed positive and tangible results confirming its extreme effectiveness in radically improving and reducing ambulance response times. These results unanimously agreed that the positive impact stems from the application addressing three main time axes that were weaknesses in the traditional system. These :results can be explained as follows

- The results showed that relying on the GPS featurebuilt into the application, which is capable of ,sending precise geographical coordinates immediately after the user presses the service request button led to eliminating approximately 70% of the time spent getting lost or not reaching the location .accurately The time it took the paramedic to determine the location based on verbal descriptions. This digital transformation has helped ensure that the data sent to the operations room is accurate and free of error or personal interpretation. This has reduced the time required to issue a dispatch order to just a few seconds. This acceleration in the initial phase is the first and largest factor contributing to the .overall improvement in response
- Studies have proven that the smart dispatch system in the Asafni app has achieved unparalleled efficiency compared to human intervention. The system instantly analyzes coordinates, identifies the nearest available ambulance, and directs it directly. This procedure has significantly reduced treatment time in the operating room. Some results have indicated that the process of selecting and dispatching an ambulance unit now takes less than half the time it used to. Providing the patient's initial health file through the app is also an important time factor, as it reduces the time required for the ambulance crew .to gather basic information upon arrival, allowing for faster and more appropriate medical intervention
- The results showed that providing ambulance crews with improved navigation routes that take advantage of live traffic data Reducing travel time on the road Instead of adhering to a fixed route, the system updates the directions to avoid traffic jams, ensuring that the ambulance travels on the most efficient and fastest route. The real-time tracking feature provided by the app has also been found to make the reception process more flexible, as the cashier is ready to receive the crew directly at the .entrance, eliminating any minor delays upon arrival that previously accumulated

Conclusion

Accordingly, the results of the studies showed that the Asafni app succeeded in achieving a tangible an noticeable reduction in the overall response time, which directly enhanced the effectiveness and efficiency .of emergency services and their ability to save lives in critical moments

To ensure the sustainability of this efficiency and to maximize the use of technology in the emergency service of the “Asafni” application, the study recommends a set of development and investment measures aimed at raising the level of performance and comprehensiveness of the entire system. These :recommendations can be explained as follows

- The geographical and technological infrastructure must be strengthened by continuous investment .in updating digital road maps and linking them immediately to real-time traffic data This ensures ,that the app's suggested routes to paramedics are consistently the fastest and most efficient .especially in cities experiencing rapid urban expansion
- The Asafni app should be linked to the beneficiaries' national electronic health records(EHRs) systems by issuing strict privacy policies. This integration ensures that paramedics are provided with more comprehensive and accurate information about the patient's medical history immediately upon receiving the report, which will enhance the quality of primary care and reduce

the time required for diagnosis and initial intervention. Furthermore, the prior health record .available through the app should become mandatory

- Awareness campaigns should be intensified to increase the app's download and usage rates, with a focus on highlighting its benefits in saving lives and critical cases, and attracting those most in .need of the app, such as the elderly and people with special needs
- Advanced training should be provided to ambulance and operating room crews on geospatial data analysis and the immediate feedback provided by the application to ensure full use of its .technological capabilities for rapid decision-making
- A continuous evaluation system for the application's performance should be established to accurately measure response time in different geographic areas and during peak times, and to receive feedback from beneficiaries and paramedics to improve the user interface and effectiveness .of the dispatch system
- New communication features should also be developed that increase transparency, such as sending text messages to the reporter with updates on the reason for the delay if it occurs or when the .ambulance arrives
- The application must be ensured to operate efficiently on all smartphone operating systems with minimal data requirements, in addition to providing specialized technical support around the clock .to address any technical issues users may encounter while requesting the service
- The Asafni app must be integrated with other emergency agencies, such as the police and civil defense, to ensure comprehensive and rapid coordination of resources in the event of major .accidents and disasters, transforming the app into a national hub for crisis management

References

1. KV, G. L., Sait, U., Kumar, T., Bhaumik, R., Shivakumar, S., & Bhalla, K. (2020). Design and development of a smartphone-based application to save lives during accidents and emergencies. Procedia Computer Science, 167, 2267-2275.
2. Gabella, J. L., Gualda, I. A. P., Altoé, I. L., Beltrame, M. H. A., da Silva, P. H. A., Costa, D. B., ... & de Andrade, L. (2024). Designing, development and validation of an app to reduce the response time of the emergency medical services. PloS one, 19(3), e0299828.
3. Boutilier, J. J., & Chan, T. C. (2020). Ambulance emergency response optimization in developing countries. Operations Research, 68(5), 1315-1334.
4. Banskota, S., Healy, M., & Goldberg, E. M. (2020). 15 smartphone apps for older adults to use while in isolation during the COVID-19 pandemic. Western Journal of Emergency Medicine, 21(3), 514.
5. Souri, A., Ghafour, M. Y., Ahmed, A. M., Safara, F., Yamini, A., & Hoseyninezhad, M. (2020). A new machine learning-based healthcare monitoring model for student’s condition diagnosis in Internet of Things environment. Soft Computing, 24(22), 17111-17121.
6. Quy, V. K., Hau, N. V., Anh, D. V., & Ngoc, L. A. (2022). Smart healthcare IoT applications based on fog computing: architecture, applications and challenges. Complex & Intelligent Systems, 8(5), 3805-3815.
7. Rane, N., Choudhary, S., & Rane, J. (2024). Artificial intelligence for enhancing resilience. Journal of Applied Artificial Intelligence, 5(2), 1-33.
8. Bokolo, A. J. (2021). Application of telemedicine and eHealth technology for clinical services in response to COVID-19 pandemic. Health and technology, 11(2), 359-366.
9. Javaid, M., & Khan, I. H. (2021). Internet of Things (IoT) enabled healthcare helps to take the challenges of COVID-19 Pandemic. Journal of oral biology and craniofacial research, 11(2), 209-214.
10. Tan, M. L., Prasanna, R., Stock, K., Doyle, E. E., Leonard, G., & Johnston, D. (2020). Usability factors influencing the continuance intention of disaster apps: A mixed-methods study. International Journal of Disaster Risk Reduction, 50, 101874.

11. Ezeamii, V. C., Okobi, O. E., Wambai-Sani, H., Perera, G. S., Zaynieva, S., Okonkwo, C. C., ... & Obiefuna, N. G. (2024). Revolutionizing healthcare: how telemedicine is improving patient outcomes and expanding access to care. Cureus, 16(7).