

A Smart Application to Enhance Health Society Awareness

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Abstract— Community health plays a pivotal role in establishing and sustaining a thriving society, serving as a vital indicator of a country's development, maturity, and progress. A key factor in advancing community health is fostering awareness among its members. Unfortunately, even in developed countries, there is currently a lack of accredited, reliable, and comprehensive platforms for health awareness. This issue has become increasingly significant in the age of social media, where vast amounts of misinformation are easily disseminated. This research introduces the concept of a platform and a smart application designed to support and enhance health awareness within the community. This paper proposes an application which encompasses various essential health services, including a user-friendly search engine for medication queries, nutritional or exercise programs, and information about health centers. Furthermore, the application acts as a link between health management and community members, facilitating the dissemination of medical advice, news, campaign schedules, and workshop information. The application also provides an avenue for medical consultations and serves as a platform for recording and collecting individuals' daily health data for early warning purposes. The collected data not only presents an opportunity for research and testing but also supports medical decisions based on information and crowd-sourced data. In the current phase, we have developed a demo featuring proposed interfaces for the application in an Android environment, serving as a testing version.

Keywords— *Privacy; Health; Medical; Awareness; Search Engine; Advise, Pandemic, Diseases.*

I. INTRODUCTION

Significant advancements in modern technology bring about numerous changes and a pressing need for the development of various aspects of life. Given the overall importance of the medical field, numerous research initiatives

and projects have been dedicated to remarkably enhancing and providing medical services [1, 2].

Unfortunately, despite the revolution in health services, there is still a widespread prevalence of various diseases in our societies in recent years, along with the emergence of new types of viruses. This can be attributed to limited health knowledge among ordinary users, coupled with the high costs associated with traditional health consultations at healthcare centers or hospitals. Furthermore, the fast-paced nature of the current era leaves many users with little time for frequent internet searches to obtain health and general information. There is a real need for tools that assist users in refreshing and enhancing their knowledge related to health from anywhere, at any time, with ease and minimal effort. Additionally, these tools should provide frequent reminders about the latest health news and notifications [3-5].

The Health Annual Report of Saudi Arabia indicates a growing need for attention and further development to achieve health equity across all regions in the Kingdom. Figure 1 illustrates the structure of the health system in Saudi Arabia, emphasizing the significant proportion of health centers under the Ministry of Health. This underscores the importance of implementing a system, like the proposed one, to maximize the utilization of these centers and ensure equitable service deployment across all regions of the Kingdom. The table below presents statistics from the World Health Organization regarding the number of hospitals and centers in each region. It highlights the shortage of specialized hospitals in certain areas, emphasizing the necessity of addressing these gaps [6-7].

Medical awareness plays a crucial role in enhancing the efficiency of the healthcare sector, and smart devices can significantly contribute to the promotion of medical awareness. Consequently, there is potential for a decrease in the prevalence of diseases within society. The primary goal of this

research is to impart health education to individuals, fostering a healthier society and, consequently, a more robust and resilient community [8-9].

Currently, the Kingdom of Saudi Arabia lacks a comprehensive medical awareness system. While there are occasional individual or governmental initiatives such as

events in malls, television programs, advertisements on social networking sites, and general mobile messages, these methods have proved to be ineffective due to users' limited time and availability. Additionally, many users tend to skip advertisements on social media, emphasizing the urgent need for a new, effective tool in this crucial area [10-11].

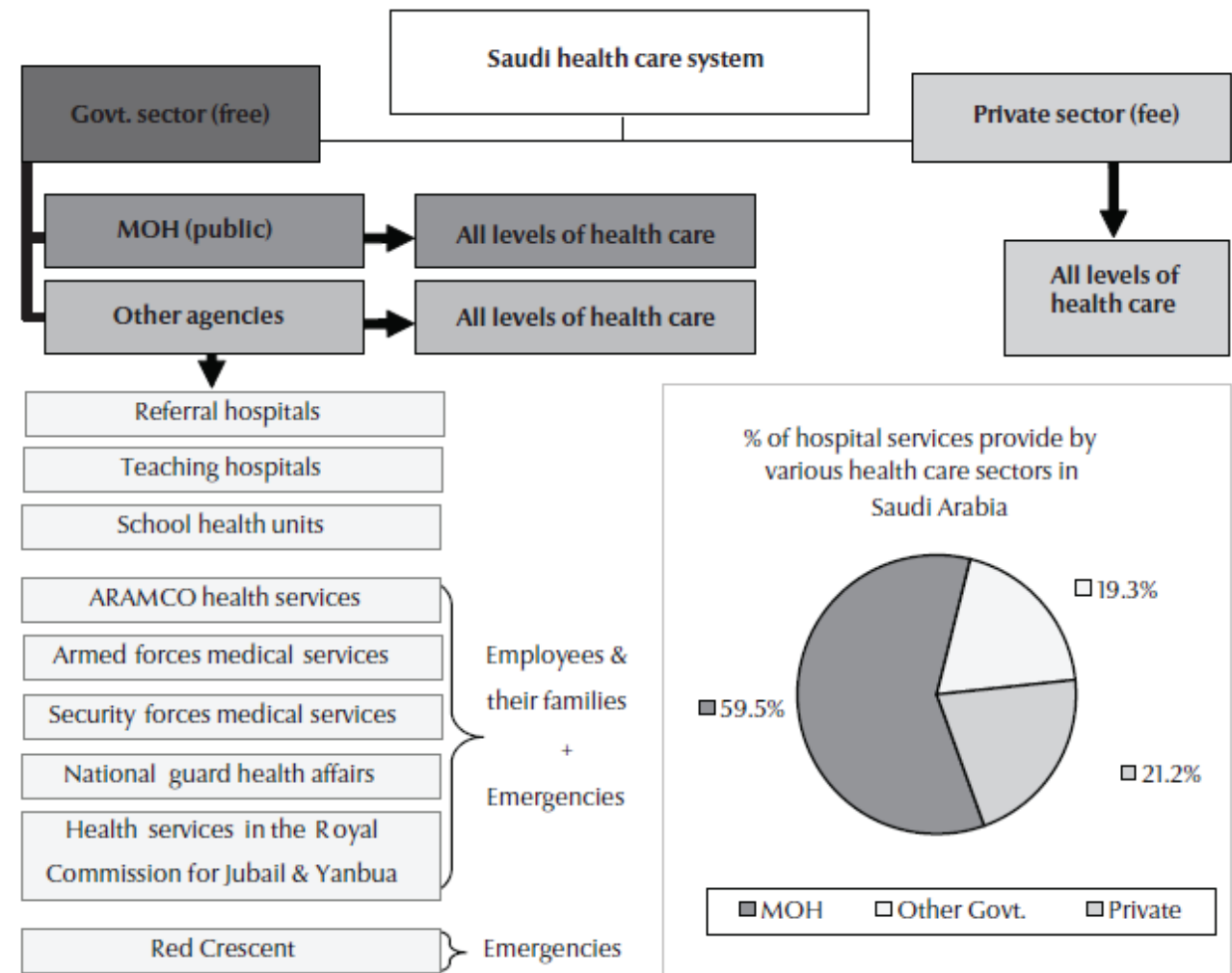


Fig. 1. Saudi Health-Care System

Smartphones have become ubiquitous over the last few years. We use these devices for multi-purpose tasks in our daily lives. It is very important to utilize this device to develop a system that can raise the health awareness of users, where the health sector is one of the most important in any society [12-14].

This research introduces a health platform with a smart application designed to enhance awareness in Saudi Arabia. The contributions of this research include:

- Utilizing the widespread use of smartphones to disseminate knowledge to a wider audience.
- Elevating the overall health and health awareness among the people in the kingdom.
- Establishing an easy and effective communication channel between health experts and citizens.
- Offering a rapid notification tool to alert citizens about any health issues in their area.

- Providing a useful and user-friendly search tool for information on various diseases or medications.

The second section presents a variety of previous applications that offer services in this sector. The third section provides a comprehensive description of the proposed applications and services. The fourth section details the implementation process, followed by the conclusion and future trends.

II. RELATED WORK

The health sector is considered one of the most important means for a functional society, and this is what most researchers have urged to work on further developing and improving, especially with the great development of technology and communication such as with smartphone applications and the Internet of Things (IoT). In [15], the research emphasizes the importance of health awareness through various awareness campaigns in improving the level and quality of healthcare services. It suggests choosing media that aligns with different age groups during awareness campaigns, in addition to focusing on initiatives and community participation. However, these methods face challenges in terms of evaluation [15].

During the COVID-19 pandemic, the international community received daily updates on new information related to the disease, especially given its novelty and rapid spread. People were highly receptive to this information and acted on the advice. Most individuals in the study area dealt with the COVID-19 pandemic similarly, regardless of age, education, or healthcare-related involvement. The community's perceptions were significantly influenced by the government's primary healthcare approach and behavioral changes through awareness [16]. The paper [17] discusses technological changes, which can play a significant role in promoting health by raising health awareness. Health risks among teenagers, including smoking, alcohol consumption, obesity, lack of physical activity, and unhealthy diet, contribute to an increase in chronic diseases. Preventive measures against such diseases and unhealthy habits involve promoting health awareness through web and mobile applications that support self-monitoring and behavior change.

The study [18] shows that individuals with higher education have better health compared to their less-educated peers, which is attributed to differences in health awareness. It also provides a comparison of health disparities between different countries, demonstrating the impact of education and awareness on health levels. Education creates self-awareness towards personal health, which consequently make healthcare more accessible. In [19], the study highlighted the measures and precautions taken by the government of Saudi Arabia during the COVID-19 pandemic to mitigate its impact. The Ministry of Health relied on public awareness regarding virus transmission methods and the importance of quarantine. Despite strict measures such as curfews, people's awareness and practices remain the most critical factor in limiting virus spread [19].

In [20], survey results are presented to assess the level of health awareness in a city in Saudi Arabia regarding viruses. The study showed an average level of awareness associated with education, occupation, and age group. People had general information from various sources, with the Ministry of Health being a prominent one. The research recommended continuous communication between healthcare providers, students, and individuals to help control and prevent the spread of viruses.

Here, we present some applications that tried to increase the level of awareness of users through different ways and aspects:

- What's up

An application that is used to treat user behavior, especially depression. Through the user's answer to more than 100 questions, the program can track the negatives and positives, and then encourage good habits, and send tips to stop negative habits.

- Mood Kit

This application is designed to address user behavior by offering over 200 diverse and beneficial activities to uplift mood. Developed by psychologists, the program aims to assist users in altering their moods and fostering health awareness during emergencies.

- Addiction App (Twenty-for-hours-a-day)

An important application to spread health awareness in the face of addiction, an electronic version of a famous book of the same name, especially helps to recover from addiction to stability and not return to addiction such as smoking and drinking alcohol.

- Talk space online therapy

The application facilitates communication between users and professionals, allowing users to express their feelings and struggles. Users can then receive advice and support from these professionals.

- Recovery Record

This application helps you to track your meals, feelings, behaviors, symptoms, and body condition according to your food to periodically report on what is best for you and your body to remain healthy as a form of health food education.

- LifeSum

This application allows you to identify and achieve your health goals such as the number of steps you need to make each day, healthy food or diet, exercise, and muscle building, as well as drinking water and eating throughout the day to build a better life.

- Health manager

A program to increase health awareness and organize the activities and habits of the user (such as eating, drinking, exercise) to achieve a healthier life and helps the user to create a health file in which weight, height, age, and others to be

consulted later and benefit from them and to monitor the level of progress of the user.

- Eye Exercises

An application to raise awareness about the health of the eye in humans, which provides exercises for the eye muscle in addition to relaxation exercises and useful tips, and provides tests to examine the problems of vision and alert the user faster.

- Stretch fitness

The application focuses on promoting health awareness through the organization of exercises, particularly stretching exercises for both women and men. It provides users with information on 17 different ways to achieve fitness while offering guidance to prevent muscle-related issues, aiming to contribute to the goal of "better health, longer life".

- Health Tab

A useful program for health awareness through the provision of expert medical consultations, but it is a paid app whilst also having responses to consultations through special video tutorials on primary care.

All studies have emphasized the importance of health awareness in assisting governments to provide better and more accessible healthcare, along with achieving greater control over the spread of infectious diseases, including new ones. However, there is a need for an effective and reliable communication tool between healthcare providers and all members of the community, regardless of their educational levels and age groups. This is what this research aims to provide through the proposed application. Unfortunately, even the smart applications that attempted to address the issue of health awareness focused on only one aspect of health and were not comprehensive. This makes it extremely difficult for users to benefit from these applications, as it is not logical to ask users to download dozens of different applications.

III. PROPOSED FRAMEWORK

To elevate health awareness and enhance the overall health level in society, we propose a comprehensive awareness platform. The platform consists of two main parts: a web-based application for the admin side (health experts) and a mobile application for users. On the admin side, health experts can manage various common diseases (e.g., heart disease, diabetes, hypertension, malaria, COVID-19, etc.). Each disease entry includes vital information such as description and definition, symptoms, causes, preventive measures, recommended actions, areas of prevalence, and available treatments, along with illustrative images and videos. Furthermore, the admin can send smart notifications to users in specific areas based on their location. These notifications can include reminders for vaccine schedules, general health advice, or alerts regarding the spread of infections or viruses.

On the user side, the second part of the platform is a mobile application that empowers users to search, receive, and access valuable information about various types of health data stored

in the system (dates, texts, images, and videos). Additionally, users can search for information about a specific drug, receive notifications/alerts as needed, and submit questions or data to health experts for responses. Furthermore, users can explore and view the locations of health centers on the map.

The Health Expert is responsible for managing medical information across various fields such as Healthy Customs, drug search engines, Health Programs, Diets, Surveys, and electronic consultations. On the other hand, the regular user can search and view information, request consultations, receive notifications, and more. Additionally, there is an Admin user tasked with managing all user accounts, health centers, and general notifications.

There are many non-function requirements which this research ensures to be achieved.

- *Performance*: It is characterized by the amount of useful work accomplished by a computer system or computer network compared to the time and resources used. When the number of users increases significantly, many applications experience a decrease in performance. However, in the case of web and mobile applications, the situation is different. The browser on the client's PC or mobile device absorbs some of the load, mitigating potential issues. This implies high response times and minimal utilization of server resources [21].
- *Security and Privacy*: Security and privacy are crucial issues, especially when dealing with important data or financial transactions. The application must prioritize these concerns and implement various measures, including encryption, strong password requirements, and limitations on login attempts, tracking the date of the last login, specifying parameters for processing, determining specific lengths for input data, and utilizing SSL (Secure Sockets Layer) for secure communication [22-31].
- *Reliability*: The application undergoes various types of testing before being released on the app store, ensuring that there are no issues affecting its reliability. Furthermore, any new problems that may arise can be easily addressed, and updated versions of the app can be released promptly. It is important to note that this type of application typically doesn't involve critical data, further mitigating potential risks [32].
- *Availability*: means that the application will stay working 24/7 and that is achieved in the web or mobile app.
- *Usability*: Usability refers to the simplicity of the application, making it easy for different users to learn and navigate. This research achieves this aspect by leveraging the widespread popularity of web applications, which most people are familiar with. Additionally, the application features straightforward interfaces to enhance usability [33].

- **Adaptability:** The application demonstrates adaptability to various environments and potential issues by ensuring flexibility in design, accommodating different screen sizes, resolutions, and memory capacities. Moreover, it is designed to cater to users with varying needs, including those who are visually impaired [34].
- **Portability:** Portability refers to the independence of the application from specific frameworks. In the server-side (web application), it is achieved as there are no specific operating system requirements. On the mobile application (client side), Android systems are required, but the concept of portability also extends to the application's ability to be mobile and easily moved [35].
- **Interoperability:** Interoperability involves facilitating cooperation between different services, providers, technologies, protocols, and devices. The application is designed to promote seamless interaction between various elements within the health awareness ecosystem [36].

IV. IMPLEMENTATION AND RESULTS

To implement a prototype for the proposed application, we used open-source platforms.

- Eclipse with Java for Android to transform all of the diagrams to real functions and virtual interfaces to real mobile interfaces which interact with users.
- Appserv App to convert our PCs to local server for using PHP and MySQL database

Figure 2, 3, 4, 5, and 6 show the main interfaces in the proposed application.

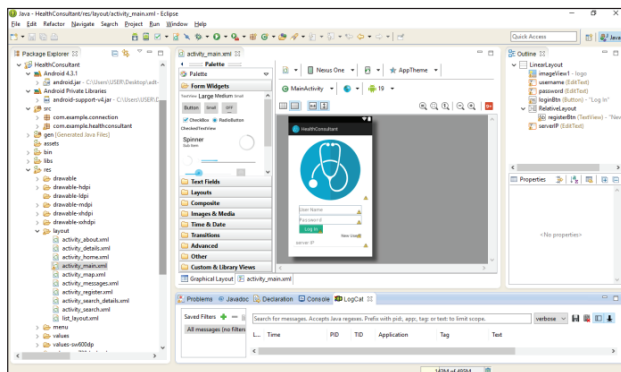


Fig. 2. Login Interface in the Eclipse platform

The actual environment of the Eclipse platform is depicted in Figure 2, showing the login screen executed on the simulator. Figure 3, on the other hand, illustrates the login screen and various notification types (medical tips, alerts and warnings, medical events such as donation campaigns, workshops, vaccination drives, etc.). The figure also displays the main services menu, including the search engine, medical consultations, notifications and news, medical programs, comprehensive medical files, and daily monitoring.



Fig. 3. Consultation Interface

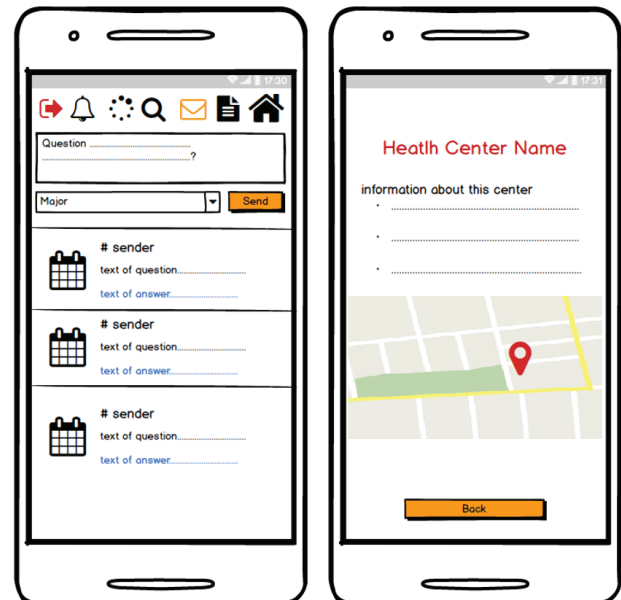


Fig. 4. Search interface

Figure 4 illustrates the information search engine in the proposed application. Users can search for a health center (C) and view its location on the map or search for a specific medication (D) and review details such as uses, contraindications, and usage instructions. Users can also search for a medical article on a specific topic (A) or search for a particular disease, its symptoms, and prevention methods. Figure 5 shows a conceptual representation of the medical

consultations interface and a virtual interface for the data of a medical center and its location on the map.

Finally, Figure 6 depicts the actual implementation on an emulator of the search engine interface after applying it on Eclipse as an Android application.



Fig. 5. Details of consultation interface

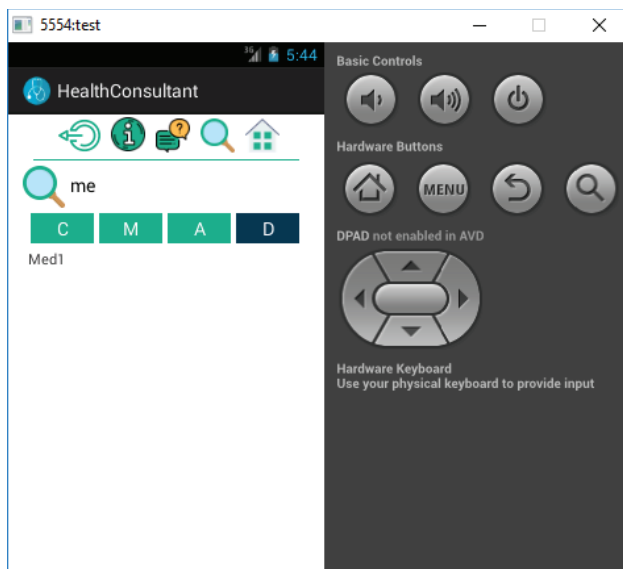


Fig. 6. Search details interface

V. CONCLUSION

This research highlights the significance of health awareness and the necessity of supporting community health to create a better society. Health awareness aids in preventing

numerous health issues. The research introduces the concept of a platform with a smart application used by the government to send notifications to users, such as schedules for blood donation campaigns, vaccinations, medical advice, or warnings for prevention in the case of a new virus outbreak. The application includes an online consultation service when needed, along with a search engine for four important medical topics: information about diseases, their prevention, and symptoms; details about medications, their usage, and contraindications; medical articles and health programs; and finally, health centers and their locations on the map. A preliminary prototype of the application has been achieved in the Android environment.

Future work will focus on further developing the application to realize the central and comprehensive idea, creating a super health application that enables service providers to offer healthcare services through a single application for all users, aiming to facilitate usage and enhance the quality of healthcare services provided in the Kingdom of Saudi Arabia.

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