# Developing a Platform for Chronic Diseases Awareness

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## ABSTRACT

The increasing chronic disease's epidemic is due to alcohol, smoking, lack of physical activity, obesity and unhealthy diet causing common diseases such as hypertension, osteoporosis, stroke, myocardial infarction renal insufficiency and diabetes. Preventive action against such diseases could be to improve health awareness through the use of health awareness platforms supporting behavior change and self-observation. Policy-makers play a vital role in decreasing the burden and risk of chronic diseases through implementing programs and policies that improve access to healthcare and provide a healthy environment. An official planning framework and national policy are crucial to give chronic diseases proper priority and to arrange resources properly. This work aims to design and develop a platform for chronic disease awareness. The proposed system was developed using the Unified Modeling Language (UML), ASP.NET, HTML and CSS.

**Keywords :** Health, Chronic Diseases, Platform, Unified Modeling Language.

## I. INTRODUCTION

Throughout the last years, many mobile and web applications have been developed aiming to support self-care and improve health awareness. Most of them were proposed to be used by patients with chronic diseases, another goal is to motivate their users to a healthier and better lifestyle which can also be applied to young, healthy persons. These applications used various technologies ranged from web applications and web services using RIA (rich internet application) approaches to client-side technologies such as native client device applications and the Java2 Micro Edition (J2ME) [1-4].

Personal Health Applications (PHAs) enable the user to store and manage their personal health information, thus helping patients and assisting the information flow between patients and health care providers. Besides the personal data of the users, the application is able to store a variety of data related to health like laboratory test results, medical conditions, allergies, and medications. these applications include LifeSensor, Microsoft HealthVault, or Google Health. Microsoft's solution makes an effort on connecting to external health devices such as pedometers, glucometers and blood pressure monitors. The key strengths of Google Health are its capability of connecting to external health providers such as hospitals as well as the ability for external applications for accessing functions of Google Health by the Health Data API [1-4].

The Internet is being used as a source of health and medical information on a large scale by millions of people around the world. A recent scientific study in

Saudi Arabia showed that only a small number of Arab health sites achieve international quality standards for health sites. This means that Arab users of the internet will not always succeed in finding reliable health information in Arabic, and maybe victims of misinformation presented in forums and social networking sites [5]. Moreover; most of the available web and mobile health-supporting applications do not aim to support healthy persons in their daily healthy activities and only support people recovering from certain illnesses and people with chronic diseases. Regardless of the different goals such as patient motivation and empowerment and target groups, are largely the same [1-4]. This work aims to design and develop a platform for chronic disease awareness.

## II.  Related Works

King Abdullah Arabic Health Encyclopedia (KAAHE) aims to be the first website to provide reliable health information in Arabic. The KAAHE provide reliable health information to the Arab reader in an easy and simple way to increase health awareness and support the efforts of various health facilities in promoting the health of citizens. Figure 1 shows the main interface for KAAHE website.



**Figure 1 :** The main interface for KAAHE website.

WebTeb works to provide trusted medical and health information to arabic readers wherever they are. We believe in everyone's right to knowledge and easy access to trusted information. WebTeb, through its website, social media portals and applications, aims to be a comprehensive platform for communication between arab citizens and health care providers, such as doctors, clinics, hospitals, pharmacies, pharmaceutical and insurance companies, medical associations and organizations working in health education and awareness, and any other entity working to improve the health of Arabic speaking citizens within the ethical and professional standards of WebTeb. Figure 2 shows the main interface for WebTeb website.



**Figure 2 :** The main interface for WebTeb website.

World Health Organization (WHO) aims to build a healthier, better future for the public around the world. WHO Works with 194 countries, across six regions, and has near 150 offices, WHO staff are committed to achieving improved health for everybody, everywhere. WHO works to strive to combat diseases – infectious diseases like HIV and influenza, and non-infectious diseases like heart disease and cancer. They help children and mothers to survive so they live healthier for old age. Figure 3 shows the main interface for the WHO website and figure 4 shows the WHO Regional websites.

**Figure 3 :** The main interface for WHO website.



**Figure 4 :** WHO Regional websites.

The technological revolution influenced everything [6-83], even the methods that aim to improve the community culture and knowledge by developing tools for chronic diseases awareness within the community through a free electronic application. Today, the use of Artificial Intelligence (AI) algorithms is expansive, particularly in providing solutions to challenging problems including image segmentation [7], image classification and retrieval of information [53], as well as Healthcare Monitoring system [46, 57]. Accordingly, many researchers have used AI as an effective tool for developing applications for chronic diseases awareness [84, 85].

### III. METHODOLOGY

The process systems analysis includes gathering and interpreting evidence, problems identifying and decomposing the system into its elements.

Unified Modeling Language (UML), is a standardized modeling language containing a set of diagrams that are integrated, established for helping software and system developers for specifying, constructing, visualizing, and documenting the software artifacts, in addition to other non-software systems and business modeling. The UML depicts the best engineering practices which are demonstrated successful modeling of complex and large systems. UML is a key component of the object-oriented software development process. The UML utilizes graphical notations for expressing the software design [86-90]. The Use-case diagram and the Context diagram are addressed below.

### 3.1 Use Case Diagram

In UML, the use case diagram is a behavior or dynamic diagram. Use case diagrams model the system's functionality using use cases and actors. Use cases are a set of functions, services, and actions that the system has to perform. In this context, a "system" is something being operated or developed, for example, a web site [19, 67, 89, 91, 92]. The entities or people operating under specified roles within the system are the actors. Figure 5 demonstrates the proposed system's use case diagram.
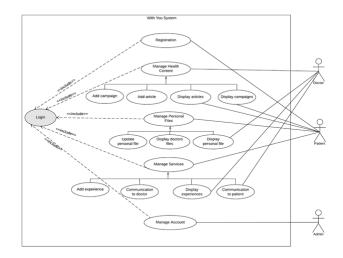


Figure 5: Use case diagram for the proposed system.

## 3.2 Context Diagram

Context Diagram (CD) is a model that demonstrates the product interaction with outside people, systems, and/or organizations. The context diagram assists in identifying the interfaces needed to account, identifying the potential stakeholders, identifying the scope, and understanding the context in which you are working in a better way[93]. Figure 6 shows the Context Diagram for the proposed system.
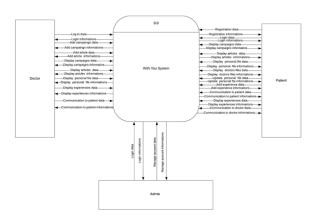


Figure 6 : The Context Diagram for the proposed system.

## 3.3 Entity Relationship (ER) Diagram

The ER Diagram is a flowchart shows the way that entities such as people, objects, or concepts are related to each other within a system. ER Diagrams are usually used to design or debug relational databases in research and education, software engineering and business information systems [94 ,55 ,54 ,45 ,44]. ER diagrams are related to Data Structure Diagrams (DSDs), which focusses on within entities elements' relationships rather than the relationships among entities themselves. Also, ER diagrams are usually utilized with data flow diagrams (DFDs), which describe the flow of information for processes or systems. Figure 7 illustrates the proposed system's ER diagram.
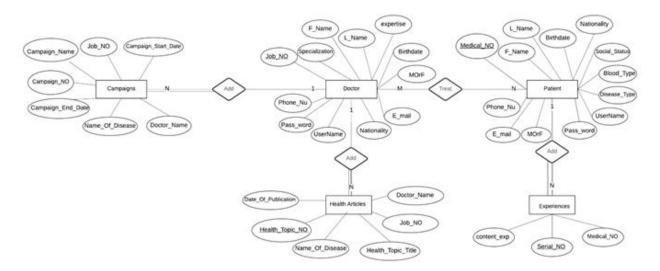


Figure 7 : ER diagram for the proposed system.

## 3.4 Interface Design

The design of the user interface (UI) is the process of creating interfaces in computerized devices or software while focusing on style or looks. Software designers aim to make pleasurable and easy to use designs. UI design mainly denotes the graphical interfaces, it also comprises others, such as voice-controlled interfaces. ASP.NET is the programming language that was utilized in this work. The user starts in the proposed system with the registration; then the user has to fill a login form with the information required. If the entered information, by the system search in the database, was found correct the system homepage will be shown to the user and allows him to use the proposed system. if it's not

correct, the system will redirect the user to the login page. The figures below show examples of the interfaces that were designed and implemented.
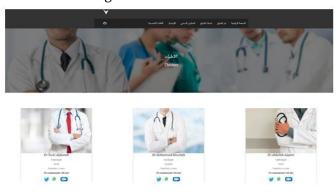


Figure 8: Main interface.



Figure 9: Participant doctors interface

## IV. DISCUSSION

The proposed system's usability is highlighted in this step. The system is evaluated during this stage while the satisfaction of the user is ensured. The proposed system was tested by running it on Internet Explorer and Mozilla Firefox using the localhost server. To evaluate the system, 20 students from the Imam Abdurrahman Bin Faisal University (IAU), College of Applied Studies and Community Service were invited

to use the prototype. The students were first briefed on the usage of the user interface and the prototype. Then, the students tried the system and answered the 10 items questionnaire formulated to asses the level of user satisfaction. Also, the proposed system's usability was determined. Figure 10 illustrates the level of usability of the system according to the 20 students' feedback. As can be seen in the result, a high percentage of users agree that the system is useful, practical and fulfill the primary objective of the project.
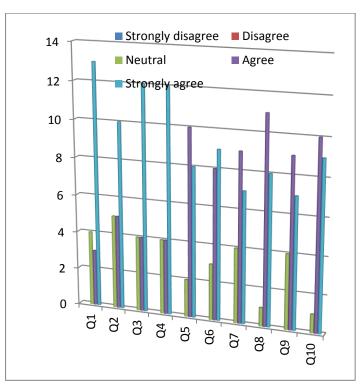


Figure 10: collected data results from the 20 students.

## V. CONCLUSION

This paper highlights the best practices in designing and building a web platform for chronic diseases awareness. The platform aims to provide preventive action against such diseases which could improve health awareness through the use of health awareness platforms supporting behavior change and self-observation. Policy-makers play a vital role in decreasing the burden and risk of chronic diseases

through implementing programs and policies that improve access to healthcare and provide a healthy environment. The proposed system was developed using Unified Modeling Language (UML), ASP.NET, HTML and CSS.Arduino

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