

A WEB based Information System for Pregnancy Women

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Abstract--- *This paper proposes Pregnancy knowledge management system website platform in which it to be controlled by gynaecology organizations. This enables the organizations to allocate and collect data of pregnant patients and their activities within the website. The main purposes of this website is to provide authenticated and certified health information within its' search tool with collaboration of Health on the Net Foundation besides providing information like doctors posted researches, pregnancy workouts, appointments calendar, to-do list, hospital bag, provides a web-based platform for mothers and doctors to be able to interact as direct online consultation within the system. This website may be widely used by the pregnant mothers since smart phones/laptops have become common and affordable for all. Based on the user acceptance tests which were conducted, the system can be evaluated as a success. This is because the pregnancy website knowledge management system managed to fulfil the approval of mainstream users.*

Keywords--- *E-Health, Health, Informatics, Pregnancy, Knowledge Management.*

I. INTRODUCTION

Challenges that new mothers are facing whenever they start their pregnancy phase until their childbirth, lacking of collective data into one source is one and the uncertainty of the data given by the publisher whether it's certified due to the access of any person upon posting random myths and fact around pregnancy into internet is two "A Google search was completed for the five different topics and the first 10 results for each question were examined.

Four independent, expert reviewers evaluated the 50 web pages based on practice bulletins from American College of Obstetricians and Gynaecologists (ACOG). A study found that most information found online was fairly accurate but not uniformly accurate", which means that at least one website for every question that was examined, or at least 10% of the sites examined, had inaccurate information.

This assertion is challenging because providers have no way of knowing which sites their patients are using and if they are accessing the websites with inaccurate information"^[1]Therefore, these two are a concern in the life of new moms when searching for information to help during their pregnancy time and after; usually mothers who search for a certain information nowadays they rely on videos on YouTube mommy channels, blogs, relatives or friends

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experiences or get them from their health care providers or mothers do search and read through plenty of websites to get the information needed and then authenticate whether the information delivered is certified and accurate to follow in which it consumes more time and effort causing apathetic behaviour in mothers for seeking knowledge towards their own health and their babies but not all pregnant mothers are in the state of power to do all those searches. Such performance decreased the number of mothers trusting knowledge spread and increased the number of woman apprehensiveness whether they are on the right track of nutrition, well-being and understanding of every situation they are in or not, and as an alternative of having newly pregnant mothers enjoying their pregnancy they fall into anxiety of **trying not** to fail this little journey of their life. Additionally, new mothers who lack experience and knowledge towards their pregnancy or their personal health care during pregnancy or even at childbirth aren't knowledgeable on what to search for to improve their knowledge in their pregnancy phases and beyond whether their need for exercise as cardio or aerobic or yoga, how to avoid stress, pregnancy back pain, home remedies to solve wakefulness nights, lists they need for mommy and baby essentials, important information upon improving their health and etc. of on-going knowledge around pregnancy and health.

II. LITERATURE SURVEY

2.1. E-Health

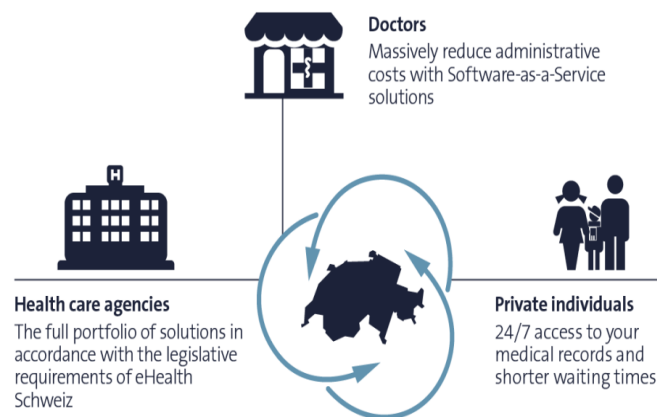


Figure 1: E-Health Targeted Users [2]

Information Technology has pervaded literally every field for instance online education system, airlines systems, accommodations systems, bookstore systems and personal devices. However, through technology making a great impact upon quality issues of health care systems while the improvement of scientific researches and resolutions by doctors and public health [3], this made E-health a revolutionary approach in the intersection of medical informatics and public health where it enhance the quality of data mining, predicting and data classification as well as equipment monitoring where information technologists, artificial intelligence engineers and data analysts are able to control, build and enhance robots performance in health fields, where e-health combines technology and innovation with hospitals, clinics, patients, diseases, doctors and whomever within the intersection of public health and medicine and out of that e-health is on high demand. [4] whether through building applications, websites or robots that are used in surgeries and more to the aim of reaching a better health care system to patients, diagnosing

and overcoming diseases in health and medicine fields. E-health is proven to improve the effectiveness and cost-effectiveness of patients and e-health interferences. [5]

According to a search made by Joseph Kaos Jr, journalist in the Online star, Malaysian ministry of health is launching health data warehouse, where data from all hospitals and health organisations whether public or private will be collected for the aim of better health data analysis in which expected to qualify Malaysian health care systems to enhance towards e-health innovations for better health care. [7]

2.2. E-Health, Pregnancy and Web Systems

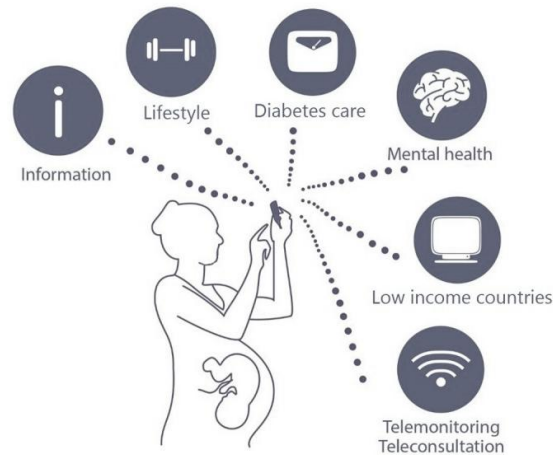


Figure 2: E-Health Solutions in 6 Domains of Perinatal Care [8]

E Health extraordinarily supports enhancement of patients' knowledge about their health, their self-management potential and their quality of their own life, where acceptance and implementation of knowledge supported by health managers on internet are generally high. [3] Moreover, living in a preparative era where women are common users for internet, social media applications and websites on internet has paved the way for e-Health web and mobile applications to perform a significant role to expedite women whom are under pregnancy period to use the services e-Health could offer to avoid any complicated cases that would be caused with lack of knowledge several pregnant women would have. [9]

“The pregnant mothers do not know what the good and bad things are they should do and avoid during pregnancy. There should be away to help expectant mothers be aware of their pregnancy development. They should be able to access pregnancy-related customized information and useful tips regarding each stage of their pregnancy at their finger tips and should be connected to healthcare providers whenever and where ever they want.” [9] According to the study provided by [9] enough websites whether in Microsoft, Google Play and Apple stores has launched pregnancy-related web and mobile applications but none of them has afforded pregnant mothers opportunities to enhance their knowledge around pregnancy nor connect pregnant mothers with healthcare providers. [9]

In 2015 out of 100,000 mothers 140 lost their lives in South Africa where infant and maternal mortality is in high rate due to the lack of mother's awareness towards the process of pregnancy. [10] However, a new system called Mom Connect is designed and launched in which it supports mother with enriched health information on general

health, infant health, mother's health and on pregnancy itself as well as appointments and check-ups via SMS. SMS's are continued to be sent to mothers even after labour until the infant reach the 1 year of age. [10]

2.3. Knowledge Management System

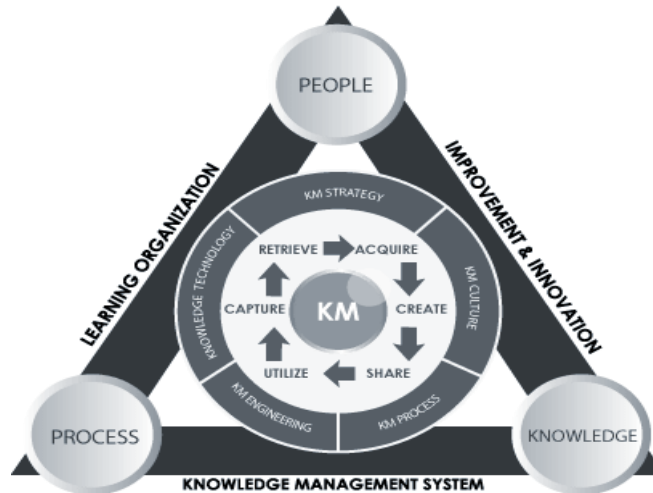


Figure 3: Knowledge Management System Life Cycle [11]

The general use of knowledge management, business procedures, methodological involvement, and implementation of the planned website in rapprochement with the existing pregnancy website. All the required information is collected and analysed to advance the limitation from previous research. Therefore, the researcher can come out with new ideas to solve the problems.

Knowledge is created where people regulate new ways of doing things or develop methods in which they instruct other people in the know-how where knowledge management system is a process that serves a project where data is identified, selected collected, organized, disseminated and exchanged in form of indispensable data in which it enables the aimed objective to be served to the end-user in a form of effective data, solving the problem occurring or making jobs done easily and more accurately increasing advanced learning.

Knowledge management systems undergoes cycles in which it elucidates how it works where knowledge is captured, identified as a valuable data to be reserved and represented in the way that serves the objective, then it undergoes the coding process in which the translation of valuable knowledge from tacit to explicit form is called codification of knowledge in which it permits knowledge to be gathered and specified to be communicated widely with less cost than it would have been if it wasn't gathered or specified. After capturing, collecting and coding of knowledgeable data, knowledge then is published to meet the deliverables assigned.

Based on the research conducted by Miss. Kalyani U. Sapre and Prof. S.W. Ahmad on web-based knowledge management system, the researchers stated the benefits of knowledge management system in which it assists the sharing of integrated knowledge inside the organization in well organised pattern, increasing the satisfaction of the end-user and quality of services obtained giving more opportunities for possible support into the system enhancement throughout advanced technologies.

According to the base of knowledge management system end-users can search and find all the information needed, where all data are set to be up-to date with accordance to technology updates designing a website in the form of knowledge management system will allow healthcare centres, ministry of health or health organizations to be able classify the collected data of all users that undergo the health system therefore enhancing communication between patients and health care systems, data quality increases, and enhance personalized patients care. [12]

2.4. Health on the Net (HON)

In a document made by Celia Boyer the executive director of Health on the Net Foundation, $\frac{3}{4}$ of patients don't check the authentication of health information found online on the internet or the source of the data given no the date of when it was published. [13] HON is a non-profit organization founded in 1996 through collective decisions by health specialists where was guided by the late Professor Jean-Raoul Scherrer, and under the impetus of former Geneva State Councillor Guy-Olivier Segond in Geneva, Switzerland HON since grown to become widely applied for health/medical websites. [14] Health on the net foundation focuses on supporting internet users by "comprehensible, relevant and trustworthy sources of online health and medical information". [13]

HON has initiated a set of standards, called HON code of conduct where that all health websites should fall under; for the website to be verified and certified as a health website after being compared and reviewed assuring that the website meets the criteria of privacy, transparency, attribution, and authority later after the website will be classified with a credential and HON logo to assure the website certification of meeting the criteria. [15]

III. PROPOSED SYSTEM

The proposed system delivers an online website that connects pregnant mothers with Malaysian obstetricians and gynaecologists through questions and posted articles by medicals, the systems allows the health organizations to collect pregnant mothers and doctor's data. The online pregnancy KMS is a web-based system built provide a system that highlights general documents, information and knowledge required for healthy pregnancy and improve the quality management of pregnant mothers' decision making when searching for information by supporting them with a reliable and secure information. Mothers can create an account on the system whereby only the name of the mother is revealed as the user.

Every information of the registered user/mother is stored into a database at the back end of the website. Information, health news regarding pregnancy and new feeds is updated to the website as a time saving for busy pregnant mothers by speeding up access to the information instead of internet surfing into many websites in search for one single information needed.

This would ensure mothers are constantly accessed to recent information and knowledge to enhance their education around their beautiful journey. It enables low income pregnant mothers to be able to gain information without risking their income in buying books or going more frequently to hospital for gaining knowledge from obstetricians.

IV. SYSTEM ARCHITECTURE

The pregnancy website knowledge management system is targeted towards healthcare organisations to ensure the education of Malaysian mothers around pregnancy and health and correspondingly with their interaction with Malaysian obstetricians. The proposed system allows three modules to access the system who are as below:

1. Mothers
2. Admin
3. For Doctors

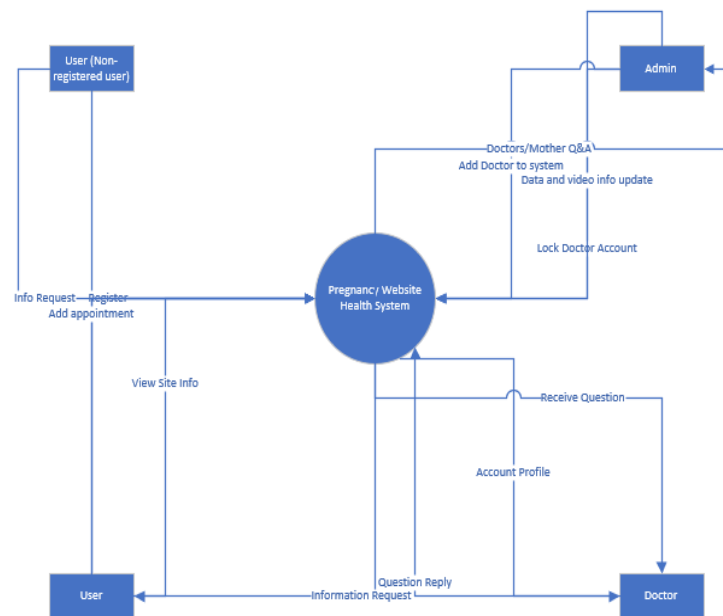


Figure 4: System Data Flow Diagram

Figure above shows the general function of the system with all the three targeted modules within sharing the main function of the system for searching for the authenticated sources of health information in Health on the Net search engine that is directly linked by the website system.

It includes publications of real doctors' articles and researches. Users can register to the system, login to the system and request for a password reset in case password is forgotten.

V. MODULE DESCRIPTION

5.1 Mother

Pregnant mothers hold the privilege to add their medical appointments to the system. Mothers can view their appointments after, can edit, change, save or delete as well as the ability to mark the appointment cancelled or done. Pregnant mothers can post questions for doctors to view and reply. Mothers can have Exercises videos per each trimester to follow during the pregnancy.

Pregnant Mothers can open their own to do lists in the website per month of her pregnancy accordingly, to follow up on the requirements of pregnancy she needs to fulfil in each month of her pregnancy. Mothers can have a

hospital bag list in which it's divided into Partner bag, Mothers' bag and baby bag. Mother then can select after completing packing what's required to pick in their hospital bags, for the reason of not missing any documentations or essentials to the pregnant mother way to the hospital. Figure below shows the data flow diagram for a mother account.

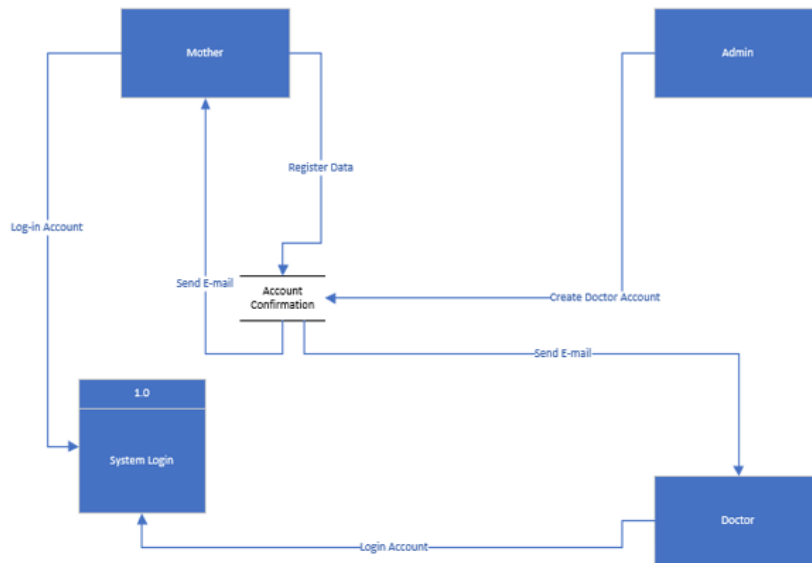


Figure 5: Mother Account Data Flow Diagram

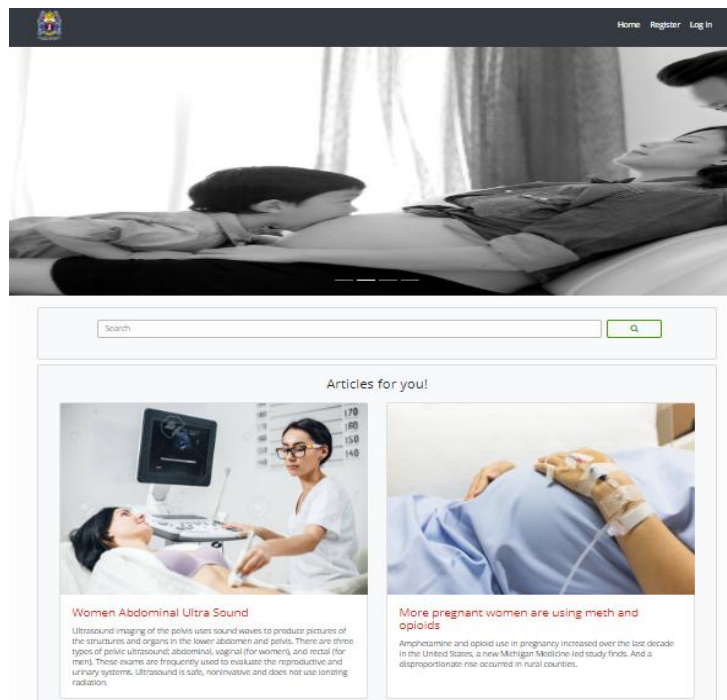


Figure 6: Website Homepage

The screenshot shows a web interface for adding a new appointment. At the top, there is a navigation bar with links: Home, Appointments, My Questions, To-do List, Exercise, Hospital Bag, Questions, Manage, and Log. Below the navigation bar, a form titled 'Add New Appointment' is displayed. The form contains several input fields: 'Name of the Doctor*' (text input), 'Name of the Hospital/Clinic' (text input), 'Address' (text input), 'Appointment Description' (text area), 'Appointment Date*' (text input with a date format 'dd/mm/yyyy'), and 'Appointment Time*' (two dropdown menus for 'Hours' and 'Minutes'). A green button labeled 'Add Appointment' is located at the bottom right of the form.

Figure 7: Add Appointment Functionality in Mothers Account

5.2 Admin

In the admin account, admin add doctors to the system by then the system will send an email to the doctor account with the password for the doctor to be able to login to the system. Admin holds the privilege of locking and unlocking the doctors from accessing the system. Admin can the doctor information to system manually. Admin is the only one authorized to post videos per each trimester. Admin views the mother questions and doctor reply on them.

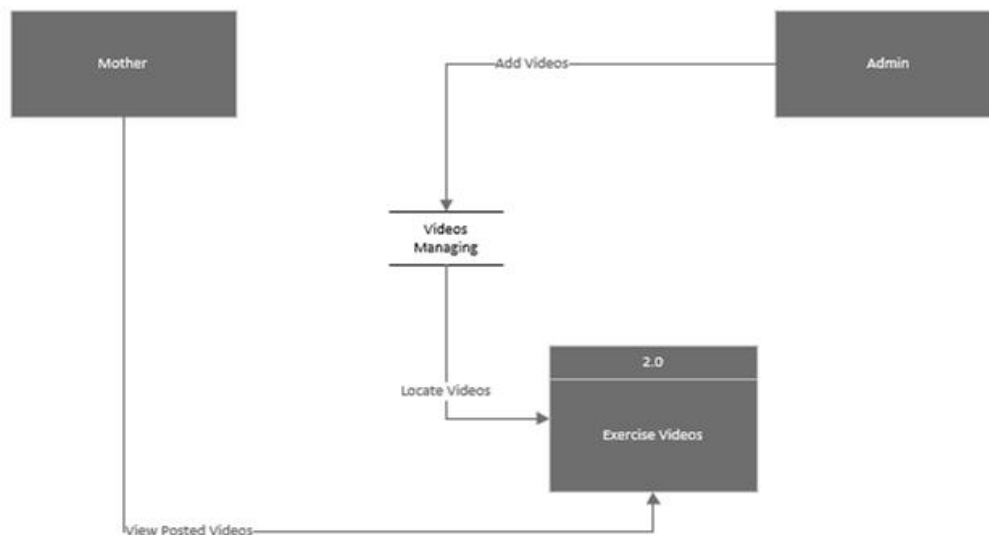


Figure 8: Admin Authority in the System Data Flow

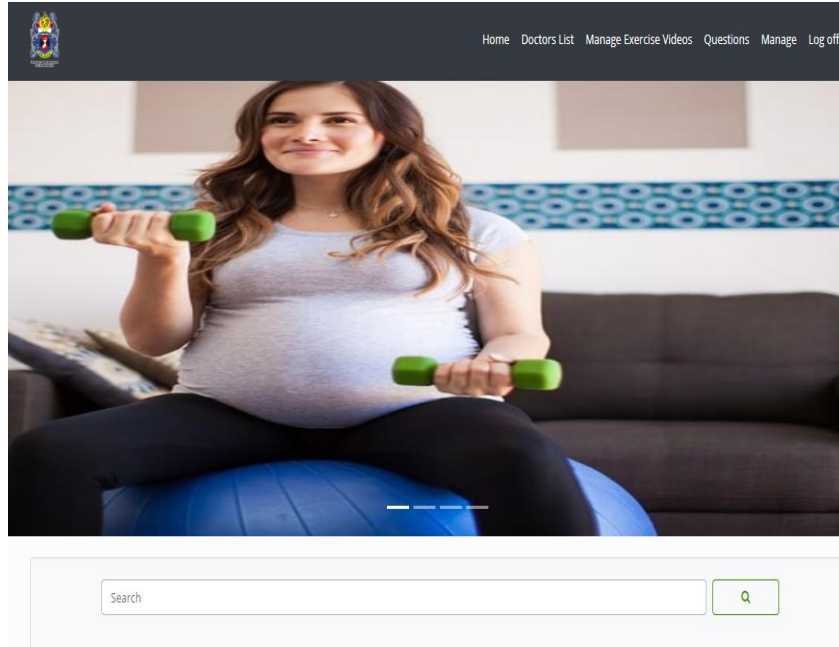


Figure 9: Admin Homepage

5.3 Doctors

In the doctor's account, doctor views articles, questions and doctors' own answers. Doctors view their own replies of mothers' question, edit and browse for other questions posted by mothers and answers posted by the other doctors in the system.

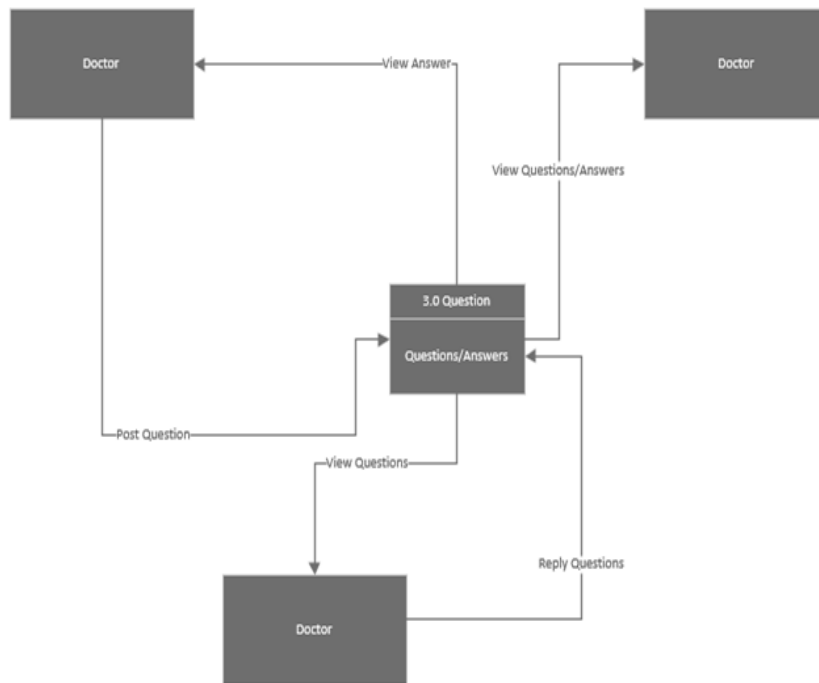


Figure 10: Doctor Authority in the System Data Flow Diagram

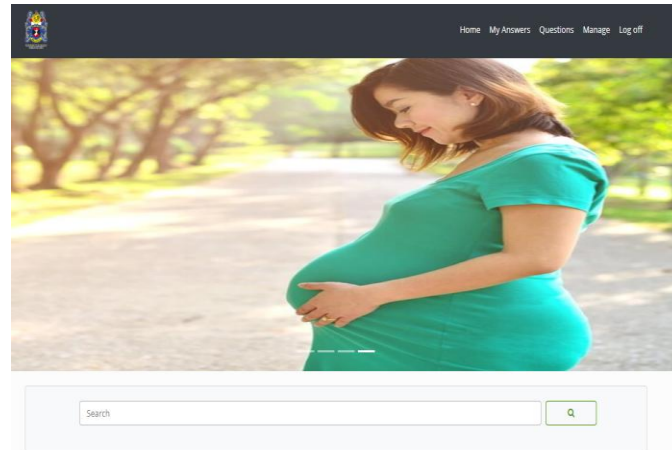


Figure 11: Doctor Account Homepage

VI. FUTURE ENHANCEMENTS

The pregnancy website knowledge management system has limitation, where based on the suggestions from the respondents which is gathered from the interview, questionnaire and the user acceptance testing. Crucial improvement that can be implemented into the system is by implementing connection with hospital appointments databases for users to automatically book their appointment at the doctor clinic as well as implementing full profile of obstetricians' history data that would further increase user trust in knowing the obstetrician they are interacting with deeply. Above and beyond that, another crucial implementation which would have increase the integrity of the system is authorizing admin to classify data stored of all users for further studies easily instead of going back to the back-end of the system database.

VII. CONCLUSIONS

The performance of the pregnancy website knowledge management system is measured by checking data entry of users through the system that would show the user behaviour in the database. Moreover, the user interface of the system is user friendliness and the usability is well defined. The flow of steps in multistep interfaces which is known as the navigation menu of the system will allow the user to choose the menu item that they want to go for next, the workflow of the system is in suitable stream where the user uses the system professionally. However, it means that the pregnancy website knowledge management system user interface has design for leading the user to able to use the system comfortably and allow the system capability of extending the features.

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