Web Based Support for Pregnant Mother

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Abstract— **This paper reports on a work on progress. A web-based system has been developed to ensure pregnant mothers be notified regarding their pregnancy progress. The design and development of the system which is named Pregnancy Progress System (PregProSyst) are outlined. In addition, an initial test with potential users including pregnant mothers and healthcare practitioners is also discussed. It is found that potential users agree that PregProSyst is good for them and they are happy to use the system.**

Keywords— **Pregnancy, SMS, web-based system.**

I. INTRODUCTION

Computer systems have been developed to serve the needs of various situations. Systems supporting the purposes of education [5], entertainment [2], commercialization [4], business transaction [1], manufacturing [21], and healthcare [10] can easily be found. Literatures have reported the progress of computer in healthcare vastly [7], [15], [17].

In healthcare, computer scientists have developed various systems for different reasons. In fact, Liddell [9] found that there are more than 50 cancer-related web sites developed in the USA. As an illustration [14], developed a system that diagnoses diseases, in which in contrast, Yu-Chu & Huei-Lih [20] designed and developed a system for use among cancer communities. Besides, a system that follows-up with patients has been proposed by García, Trigo, Alesanco, Serrano, Mateo, and Istepanian [3]. Another situation that makes people visit the healthcare practitioners is pregnancy. However, literatures show very few works have been done on pregnancy.

In current practice, information about pregnancy is disseminated through posters in clinics and other healthcare services outlets. Also, websites have been developed to disseminate important information, such as Liao [8], McDermott [12], and Jane [6]. However, when asked to a group of pregnant mothers in a preliminary study at clinics in Malaysia, this study found that their knowledge about their pregnancy is too little. Generally, less than 10% of 53 mothers know about the development of the fetus they were carrying.

Not only that, the pregnant mothers do not know what good and bad things they should do and avoid during pregnancy. This is particularly lack among the first time pregnant mothers. In Malaysia, pregnant mothers go to healthcare centre every week to check the pregnancy and their health. During the check-up, healthcare practitioners check mothers' blood pressure, sugar, urine, pregnancy heartbeat, and other physical development such as mothers' height and weight as well as fetus's measurement.

If mothers do not go and see the practitioner, this information will not be known. In addition, mothers do not know also about the fetus's development. Moreover, mothers from developing areas have lack access to the Internet. In the same preliminary study, this study found that less than 10% pregnant mothers have Internet at home. In addition, among mothers who have internet access at home, the motivation to access for information is very low. It was found that mothers do not search for information about pregnancy.

This study argues that there is an alternative way to help pregnant mothers be aware of their pregnancy development. The issue to tackle is communication, which should be very personal. In current age, the short message services (SMS) technology could be used.

Literatures show that SMS technology has been utilized for many purposes. Mohd Hairol, Mohd Helmy, Noraisah, and Ariffin [14] developed a SMS-based system for assisting students and lecturers accessing academic materials. Another, Tretiakov and Kinshuk [18] develop a pervasive system for testing in education.

Unfortunately, there is not much information found on integrating web-based application and SMS for pregnancy communication purposes. Most studies look into the use of mobile phones as ways to communicate with pregnant mothers. Other methods for taking care of the developing fetus are stated below:

- The use of a mobile phone based pregnancy support system [11].
- The use of maternity acupressure or labor acupressure which are methods of inducing childbirth naturally.
- Cognitive behavioral therapy used to treat depression in Pakistan pregnancy [16].
- Use of the deep issue massage for pregnant women [19].

Referring to the implementation of SMS technology in the works as discussed above, this study is confident that such system could be utilized in informing and communication with pregnant mothers.

The main idea of the study is to make pregnant mothers have as much information as possible concerning their pregnancy through the use of a web based application that sends information to mobile phone in the form of SMS. Relevant information concerning the growth of the fetus during pregnancy will be SMSed to pregnant mothers. In addition, time for medical check-up will be notified through SMS earlier before the due date. Also, reminders will be sent. For matured pregnancy, mothers will also receive regular SMSes regarding the date of delivery.

Suggestions for basic diet that should be taken for healthy fetus development will always be reminded with this SMS-based communicating system. Additionally, after birth information will help new mothers to prepare themselves.

Based on the discussions in previous paragraphs, this study aims at developing a SMS-based communication system from healthcare centre to pregnant mothers. The system could be used to notify pregnant mothers with issues concerning the development of their fetus and after birth care through SMS generated from a web based system.

This paper reports on the design and development of the system, which is named Pregnancy Progress System (PregProSyst). In addition, feedbacks from pregnant mothers and healthcare practitioners are briefly gathered and discussed.

This paper consists of four sections. It starts with this section that discusses the issues bringing to the initiation of PregProSyst. The coming section elaborates on the design and development of PregProSyst. It is followed with a brief implementation of PregProSyst including a brief discussion on initial feedbacks from potential users. Finally, a concluding remark section follows consisting also works to be done and recommendations for future research.

II. DESIGN AND DEVELOPMENT

Having gathered the requirement for PregProSyst in terms of information to be communicated to mothers, the system was ready to develop. This study has no intention to discuss about the requirement in detail, but to focus more on its design and development. Both design and development of the system are discussed in the following subsections.

A. Design

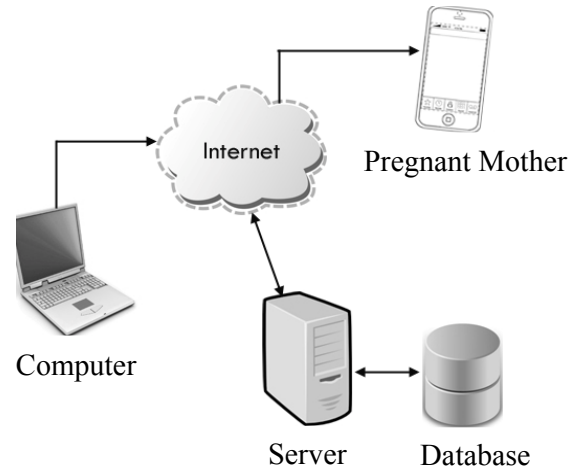PregProSyst works on architecture as shown in Fig. 1.

Fig. 1 PregProSyst architecture

Fig. 1 explains that the healthcare practitioners will use a computer to register pregnant mothers into PregProSyst. Details of the pregnant mothers including their mobile phone numbers and start date of pregnancy will be sent through the Internet to the server. The details are then kept in the database. When PregProSyst operates, mothers will get messages on their mobile phones in the form SMS.

Authentication is necessary in PregProSyst to make sure mothers receive correct information. In PregProSyst, information is very personal. The server will send appropriate information based on the start date of pregnancy to each mother.

B. Development

This study has developed the PregProSyst successfully on the web. Works on integrating the SMS is still in progress. Fig. 2 to Fig. 4 depicts the snapshots of PregProSyst.

Fig. 2 Logging in page for mothers

The page in Fig. 3 is the one that mothers will use when registering their pregnancy so that they would start to receive necessary information during pregnancy and after birth of the baby.
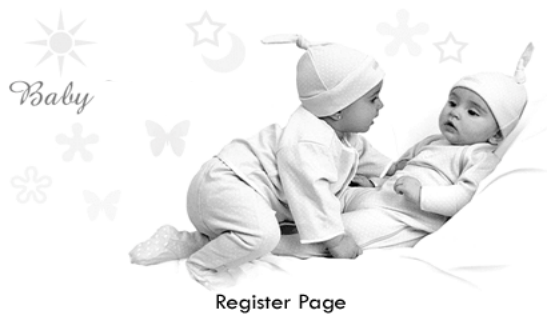
Fig. 3 Mother registration page

The page as shown in Fig. 4 lists all relevant information that will be sent to mother's mobile phones. This information will be converted to SMS so that it can be delivered to mothers' mobile phones.

WEEK	DESCRIPTION
1	Week1 week one begins with the first day of your menstrual period.Conception hasn't yet occurred, but you already get to start counting.
2	Week2 Nothing yet! Your body doesn't change anything yet.
3	Week3 Baby's gender is determined from sex chromosomes.You may experience some spotting/bleeding at the time the blastocyst implants into your uterus.

Fig. 4 Information that mother will be sent every week during pregnancy

When the PregProSyst is integrated with SMS technology, the messages displayed on mobile phones will be displayed in text form as depicted in Fig. 5. System controls on mobile phones are similar to normal operations.

Fig. 5 Message display on a mobile phone

The PregProSyst has been shown to potential users, particularly pregnant mothers and healthcare practitioners for their feedbacks. Details of the evaluation are discussed in the following section.

III. IMPLEMENTATION

The PregProSyst has been tested on the web. It was found that the system work as intended. All links were made sure working. The implementation of PregProSyst was also intended to make sure that all functions work correctly. In short, the implementation was intended to check:

- Links among pages
- Functionality
- Database integration
- Installation

During the implementation, this study found that all tested aspects were in good conditions. Then, the PregProSyst were presented to potential users, and asked for their feedback.

IV. EVALUATION

The initial evaluation of PregProSyst was carried out to determine whether potential users find the system will help them. First, they were briefed about the integration with SMS technology, in which mothers will receive messages updating their pregnancy progress weekly including their fetus growth and suitable diet and exercise.

When both mothers and practitioners understood that, they were further asked on their feedback. Overall 20 mothers and five healthcare practitioners were asked. The results are as shown in Fig. 6 and Fig. 7.

Fig. 6 The PregProSyst is good for mothers and healthcare practitioners

Fig. 6 explains that 76% of mothers believe that PregProSyst will be good in updating them regarding the fetus development and their pregnancy progress.
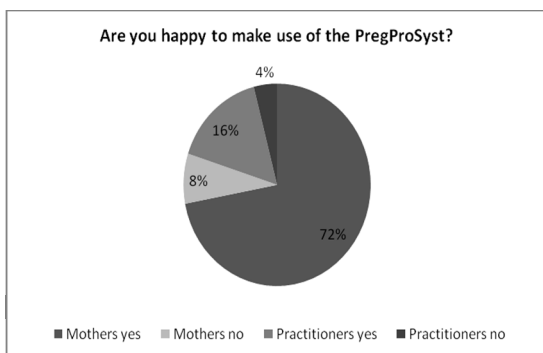

Fig. 7 Mothers and healthcare practitioners are happy to use the PregProSyst

When asked whether they are happy to use the system, most of them agree that they are happy based on the chart in Fig. 7.

V. CONCLUSIONS

PregProSyst is designed to help pregnant mothers to update their pregnancy wherever they are. Also, the system could alert mothers with suitable diets and exercise for mothers personally because the system updates mothers according to the pregnancy maturity. The maturity is measured based on the first date of pregnancy.

When tested with potential users, both mothers and healthcare practitioners agree that the system is good for them. In addition, they are happy to use the system.

This study argues that this kind of system helps the community very much, in terms of information dissemination and social services. This system also compliments the existing web sites that contain information on similar topics.

This study will continue with the integration of SMS technology in the PregProSyst. Further, another user tests should be carried out. It is also recommended that researchers put more emphasis on assisting pregnant mothers with similar technologies.

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