



Submitted: Jan 27th, 2021

Accepted: March 03rd, 2021

Pregnant Women Utilization of Internet and Social Media for Health Education In Saudi Arabia: A Thematic Analysis.

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Abstract

Introduction: Today, with wide internet use, there is unlimited access to maternity information. Pregnant women use the Internet, social media, and smartphone applications to look for health-related information on obstetrics and pediatrics. Access to reliable health care information is vital for pregnant women and their fetuses. Hence, careful consideration should be given to the legitimacy and reliability of online health care information.

Objectives: The study aims to explore pregnant women's utilization of the Internet and web-based sources related to health care education and self-care in Saudi Arabia.

Method: An exploratory qualitative study was conducted through an electronic survey, where invitations were sent online to potential participants in Saudi Arabia.

Results: After analyzing 312 responses, pregnant women preferred looking up information on the Internet via search engines, as mentioned 175 times. Two hundred sixty-seven participants (85.6%) used social media websites/applications to look for information during their pregnancy. A total of 234 participants had used pregnancy apps (74.7%). Only 42 (13.5%) purchased dietary supplements from websites.

Conclusion: Utilizing social media and pregnancy-related applications for health care information is a growing trend nowadays. Healthcare professionals should have active roles in employing these apps as educational tools to provide trustworthy information to childbearing women. Further, launching an official website for pregnancy-related topics is recommended for future progress.

Keywords: Pregnancy; Saudi Arabia; Online; Internet; Health-education; Social media; Mobile application; Online medication.

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1. Introduction

1.1.Pregnant Women and Health Literacy

Pregnancy is a natural life stage that should be handled carefully to avoid risks and complications for pregnant women and their fetuses [1, 2]. Inadequate health literacy in pregnancy is associated with poor pregnancy outcomes [3]. Health literacy is defined as "the ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health" [4]. Two Saudi studies have indicated that almost half of participants have health literacy issues. [5, 6]. Health literacy has a direct relationship with women's health and an inverse correlation with maternal and infant mortality [7]. Some studies have reported that women reduced their physical activity during pregnancy [8-10], although exercising during pregnancy has been shown to decrease the risk of gestational diabetes, hypertensive disorders, and cesarean delivery rate [11].

Limited health literacy may amplify medication non-adherence [12]. According to one study, almost 30% of pregnant Saudi participants avoid prescribed medications and herbal supplements, mainly due to safety concerns [13]. However, two studies have reported high usage of herbal medicines among pregnant Saudi women without consulting the healthcare provider, and about 10% of herbal supplements were recommended by healthcare providers [14, 15]. Unfortunately, a systemic literature review has revealed that the strategies employed in raising pregnancy awareness and health-related behavior in Saudi Arabia are insufficient [1].

1.2.Internet as a Source of Information on Pregnancy

Web searching for health-related information has been increasing substantially in Saudi Arabia [16-18]. According to a local study, the most commonly used tools to obtain medical information were Google Search followed by Twitter [19]. Traditionally, healthcare providers used to be the primary source of information alongside other sources such as social services, books, family members, and other pregnant women. Today, the use of the Internet for health-related information has been growing rapidly for pregnant women [20, 21]. The pursuit of further insights into pregnancy was the main reason for searching the web by childbearing women [22]. Several studies have shown that pregnant women used the Internet to help make decisions [8, 23-25], for example, making decisions related to physical activity [8].

Some studies reported that pregnant women believed that web-based information is reliable and trustworthy; however, online narratives' credibility has come into question recently [8, 22, 23, 25]. Googling health-related information can have undesirable outcomes. One study has reported that fear and anxiety were the most common ensuing problems when looking for online health information [26].

Another study has also stated that pregnant women can easily retrieve information from the Internet but were often gripped by fear [27]. Moreover, one study has revealed that the majority of pregnant women felt anxious after reading health-related information over the Internet [24].

1.3.Purchasing medications & supplements from websites.

In recent years, purchasing medication online has become accepted due to low prices, convenience, and privacy. While online shopping for health supplements is not widely adopted, it is undoubtedly on the rise [28]. One study has reported that most women retrieved medication safety information from the Internet and that almost half of the participants of a higher level of education considered buying online medication as safe. Nevertheless, only 5% of participants purchased online medication [29]. Consumers who use the Internet more frequently are more likely to buy online medication. The risk of purchasing from illegal sites is high, with the Internet's increased use [30].

1.4.Social Media and Mobile Health (M-Health) Applications

The use of social media and mobile apps has become enormously popular among pregnant women as a source of health-related information [31-33]. Social media has the advantage of enabling interaction and discussion with healthcare providers [33, 34]. One study has reported that the majority of women used social media for pregnancy-related inquiries or recommendations and striking up friendships with their childbearing peers for emotional support. Many women asserted the use of apps to access various health care topics such as pregnancy, childbirth, and newborn care [35]. A growing body of systematic reviews asserts that M-Health apps for pregnancy are mostly developed to promote healthy lifestyles such as eating healthy diets, reducing gestational weight gain, and providing healthcare support for asthma management [36].

2. Subjects and Methods

2.1 Study Area/setting

An exploratory qualitative study was conducted through electronic surveys. An online invitation to participate was sent to potential female participants in the kingdom of Saudi Arabia.

2.2. Study Subjects:

Target population: Saudi ladies between the ages of 18 and 44 years.

Inclusion criteria:

- Women who are currently pregnant.
- Gave birth in the past 12 months.

Exclusion criteria:

- Women who are not currently pregnant or
- delivered their last child over a year ago.

2.3. Study Design:

This study follows an exploratory qualitative design, with no intervention used.

2.4. Sample Size:

Given the qualitative theme-based nature of the study, the aim is to have at least twenty responses.

2.5. Sampling Technique:

Convenience sampling approach: online open-ended survey questions, where anyone who agrees to participate and fulfills the inclusion criteria was included.

2.6. Data Collection methods, instruments, and measurements.

The online survey included a description of the study purpose and asked the potential participants to indicate their consent by selecting to agree to participate in the consent section. After consent is obtained, the survey starts with demographic information, including age, region/area of residence, pregnancy status, and English proficiency level. We added the English proficiency factor because most of the prominent international websites that provide health education generally use the English language. It is important to understand English to understand the information provided and prevent misunderstandings or avoid the website altogether. The survey questions were built to evaluate three concepts: (1) selecting the source of information, (2) Interaction on social media and mobile app, and (3) buying medication over the Internet. The survey was translated to Arabic and was posted in English and Arabic languages to allow the participant to select their preferred language.

2.7. Data Management and Analysis Strategies:

To analyze instances of information seeking and sharing behaviors, thematic analysis of the transcript was conducted using Braun & Clarke's six-phase framework, which included (1) familiarization with the data, (2) generation of initial codes, (3) searching for codes, (4) reviewing themes, (5) defining and naming themes, and (6) writing the results.

The Theme-based analysis is performed by an investigator and reviewed by the other investigator to ensure the analysis's reliability.

2.8. Statistical Analysis

As an exploratory qualitative design, only descriptive analysis was applicable in this study.

2.9. Ethical Approval

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of King Abdullah International Medical Research Center (KAIMRC), with reference number: SP20/244/R. Survey participation was completely voluntary, and the participants were given the agreement statement (Click here or select agree) in the consent form provided by the researcher before answering the questions. The questions did not include any sensitive or identifiable information that might cause harm or discomfort to the participants.

3. Results

3.1 Descriptive statistics

The study yielded a total number of 424 responses; 80 were excluded from the analysis due to validity issues. Almost half of the women were pregnant 159 (46%), while 153 (44.5%) were up to 12 months postpartum; and the remaining 32 participants (9.3%)—neither currently pregnant nor gave birth in the past year—were excluded. A total of 312 participants were analyzed in the study. Participant Characteristics are shown in table 1.

Table (1) Participant Characteristics

Participant Characteristics	n(%)
Pregnancy status	
Pregnant at present	159(46.2)
Pregnant within the last 12 months	153(44.5)
Other	32(9.3)
Age (yr)	
• 18-25 years old.	86(27.6)
• 26-34 years old.	176(56.4)
• 35-44 years old	50(16)
Provinces in Saudi	
<input type="checkbox"/> Central Province	25 (8)
<input type="checkbox"/> Eastern Province	254(81.4)
<input type="checkbox"/> Southern Province	3 (1)
<input type="checkbox"/> Western Province	20 (6.4)
<input type="checkbox"/> Northern Province	10 (3.2)
ability to read and understand English	
<input type="checkbox"/> Understanding English very well.	69 (22.1)
<input type="checkbox"/> Know only basic terms, using a dictionary for the English website.	120(38.5)
<input type="checkbox"/> Access Arabic websites only.	123(39.4)

3.2 Qualitative analysis

Section1: selecting the source of information

Overall, search engines were mentioned 157 times. Google was mentioned 54 times and no mention of any other search engine was made. Fifteen responses referred to searching using search engine by asking questions. Instagram was mentioned 35 times. Using applications were mentioned 21 times. only 48 (15.4%) could not find answers on the Internet. Further results are illustrated in Table 2.

Table (2) Selecting the source of information

Questions	Coding (n)	Themes (n)
How do you search for information? e.g., (by using search engines, healthcare professional advice, friends)? Could you describe the process?	Search engine (175) Instagram (35) Applications (21) reliable websites (21) medical websites (17) Wikipedia (1) Social Media (4) A. Instagram (10) B. YouTube (13) C. Snapchat (4) D. Telegram (4) E. What's up (1) F. Twitter (2) G. Forms (2)	Search engine (175) Instagram (35)
Do you normally find what you are looking for? If not, why?	Not enough answers (14) Conflicting answers (8) It should be referred to doctor (5) Not reliable information (5) Not specific to my case (3) No Arabic language resources (2) Difficulty searching (2) Require registration (1) No official website for pregnancy (1) Scary information (1) No scientific topic Can't explain symptoms (1) Very old topic (1)	Not enough answers (14) Conflicting answers (8)
What do you do if you face difficulties when searching for information?	Consultation of specialists (33) Asking experienced (family or friends) (13) Continue searching (5) Reading books and publications (1)	Consultation of specialists (33) Asking experienced (family or friends) (13)

Section 2: Social Media and M-Health Applications

Two hundred sixty-seven participants (85.6%) used social media websites/applications (see figure1). One hundred twenty-four of the participants preferred reading the information, while 108

preferred exchanging information over social media platforms/posts. A total of 234 participants (74.7%) had used the pregnancy application. Most of the mHealth applications have Arabic names only, and no English equivalent was provided by the developer; thus, the App names were translated into English in this article (see Table 3).

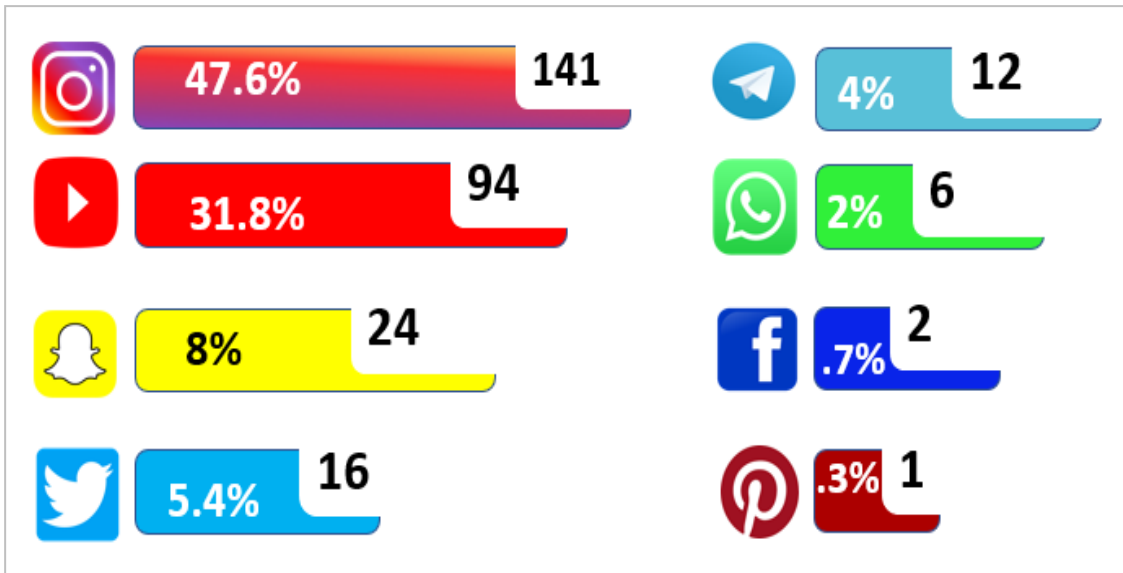


Figure (1) All mentioned social media platforms with number of mentioned times and percentages.

Table (3) Social Media and M-Health Apps

Questions(Q)	Coding (n)	Themes
Instagram	<ul style="list-style-type: none"> More helpful accounts for pregnancy (18) Specialists accounts (11) Easy (7) Favorite (4) More communication (4) More visualized + video (3) Brief answers (1) Saved information (1) 	<ul style="list-style-type: none"> More helpful accounts for pregnancy (18) Specialists accounts (11)
YouTube	<ul style="list-style-type: none"> Detailed information and experiences (9) Trusted information from doctor and specialists (7) Audio and visual explanation (7) Easy search (5) Saved information (2) Specific program (1) 	<ul style="list-style-type: none"> detailed information and experiences (9) Audio and visual explanation (7) trusted information from doctor and specialists (7)

	Favorite (1) Relevant video suggestion (1)	
Snapchat	Helpful accounts (1) Verified accounts (1) Doctors' accounts (1)	Helpful accounts (1) Verified accounts (1) Doctors' accounts (1)
Telegram	Experienced group (2)	Experienced group (2)
What's up	Groups (3) experience (2)	Groups (3) experience (2)
twitter	Verified accounts (1) Doctors' accounts (2)	Verified accounts (1) Doctors' accounts (2)
Facebook	Doctor accounts (1)	Doctor accounts (1)
Pinterest	Contain posters (1)	Contain poster (1)
Q2-Do you connect with others and exchange questions and answers, or do you just view the content? and why? 2A- reasons for preferring exchange Q& information	Share experience and knowledge (31) Make sure of understanding information (8) Get desired answers (5) To help people (2)	Share experience and knowledge (31) Make sure of understanding information (8)
2B- reasons for preferring Just view-read	Every experience is different (8) Looking for scientific information (7) To avoid being afraid (3) Do not prefer (3) To avoid answering wrongly (2) It is enough (2) I have nothing to say (2) I Don't have time (1) I don't have good communication (1)	Every experience is different (8) Looking for scientific information (7)
Q3 What are the common topics that you search for in Social media platforms?	Pregnancy developments and symptoms (67) Childbirth (45) Maintain health (26) Nutrition (21) Fetus movement (20) Exercise (18) Breastfeeding (12) BayCare (9) pregnancy craving (6) Baby gender (6) Medication and supplements (5)	Pregnancy developments and symptoms (67) Childbirth (45)

	Gestational diabetes (5) Cesarian section (4)	
Q4 Have you ever used any mobile app that helped you during pregnancy? If yes: what is it? Can you describe the benefit for you? Total 234 pregnancy users (74.7%) of all participants	Pregnancy calculator (translated) (86) Baby center (19) 9 months (15) You and pregnancy (translated) (13) Teb baby (10) My baby's life (translated) (9) Pregnancy + (8) Pregnancy guide (translated) (5) What to expect (4) Flo (4) We care about your pregnancy(translated) (3) The Queen (translated) (3) Super Mom (2) My health (translated) (2) Contraction timing (translated) (2) I period, My pregnancy, hi mummy, my baby, life, pregnancy now, care (translated) (1) Alamosa hospital special app (1) My calendar (1)	Pregnancy calculator (86) Baby center (19)
Q4 A Describe the benefit for you? (Pregnancy calculator)	Pregnancy and fetus developments (27) Due date (6) Baby size (3) Communications, sharing experience (2) weekly advice (1) Week calculations (1) pain expectation (1) Month calculation (1)	Pregnancy and fetus developments (27) Due date (6)
Q4 b describe the benefit for you? (baby center)	Pregnancy and fetus developments (8) Consultation (2) Due date (2) Healthy recipes, (1) pregnancy problems (1) How to deal with pregnancy changes (1)	Pregnancy and fetus developments (8) Consultation (2) Due date (2)

Section 3: buying medication over the Internet

Two hundred seventy-one participants did not buy supplements or medication over the Internet. However, findings show that participants mainly opted for online shopping to purchase multivitamins and omega-3 supplements due to lower costs compared to their retail prices. Another reason is that these products are sometimes not available in pharmacies. In total, Iherb.com was the most frequently visited website by the participants and was often recommended by friends and acquaintances (see Table 4).

Table (4) Buying medication over the Internet

Questions	Coding	Themes
Q1 Have you ever buy supplements or medication over the Internet?	Yes 42 (13.5%)	No 271(86.5%)
Q2 If yes, what kind of supplements/ medication?	multivitamins (17) Omega3 (8) Iron (3) Calcium (3) Probiotics (2) Folic acid (2) Vitamin D (2) Magnesium (1) Vitamin C (1) Vitamin B (1) Homeopathic supplements (1)	As one theme: they bought mainly multivitamins and omega3.
Q3 Why do you choose to buy it over the Internet?	Cheaper (18) Not available (15) Convenient (6) Quarantine (2) Better options (4) Better quality (3)	Cheaper (18) Not available (15)
Q4-which websites do you use to buy?	Iherb (30) The Pharmacy (3) Amazon (2) Noon (1)	Iherb (30) The Pharmacy (3)
Q 4-b Did someone recommend it to you, e.g. (Doctor or a friend)?	No one advises me (5) Friend (6) Doctor (4) Relatives (1)	No one advises me (5) Friend (6)

After analyzing the survey questions in section 1, 2 and 3, three themes were extracted:

- Theme one: Search engines are the tools of choice for locating specific information.
- Theme two: Dominance of social media applications.
- Theme three: Favoring traditional sources for buying medications and supplements.

4. Discussion

The study explores pregnant women's use of the Internet for health-related inquiries. Collectively, the participants were in favor of utilizing social media platforms. All valid responses were included to draw out major themes. However, the *sample size guidelines set a range between 20 and 30 interviews is considered enough [37]*. Although more than half of the respondents are between 26-34 years old, only a few (22%) can understand English well. Concerning the spatial distribution of the population, most participants were from the Eastern region as it garnered an enormous number of responses to the online survey.

4.1 Theme one: Search engines are the tools of choice for locating specific information.

In the literature, general search engines take precedence over other means of looking up information [8, 22, 24]. In this study, responses to the question: "How do you look for information over the internet?" were condensed into short answers drawn from a set of examples that accompanied the question. It is worth noting that it might have yielded different answers if the question was introduced in a face-to-face interview.

Most participants had no difficulty finding information, but those who had were mainly due to conflicting answers across the web and lack of satisfactory answers. One commented, "there is no official integrated website made for pregnancy." Another commented, "there are no trusted blogs or articles written by doctors with the answers we are looking for, especially Arab doctors. Respondents were looking for particular details about conditions such as pregnancy-associated nausea and stretch marks and could not find it on the websites. Unfortunately, Arab care providers who can answer the questions and address the patient's concerns do not usually engage in blogs and digital writing. This issue is clearly expressed by a participant who wrote, "Not enough Arabic sources." This complaint is shared by mothers who are English proficient and the other group who are not, as 25% of participants who could not find answers to their inquiries have a proper English proficiency level.

4.2 Theme two: Dominance of social media applications

In our study, the two most popular social media platforms among participants are Instagram (47.6%) and YouTube (31.8%). As one woman stated: "Instagram is my go-to app for browsing. These finding highlights Instagram and YouTube's distinguishing features, where users can follow a countless number of helpful pregnancy-related accounts and watch informative videos on maternity and childbirth care. In short, both are easy to use and have visualized properties. However, a Saudi study has reported the prevalence of online medication information access. Instagram was not commonly used 11.4% (n=553) nor YouTube 1.3% (n=65) to access online medication information [19]. Instagram helps patient education, especially for the visual disciplines, and has an interactive and collaborative nature. However, Instagram remains uncommon among active healthcare professionals [38]. Healthcare providers should always be informed on the most popular media sources to provide authentic, trust-worthy knowledge and curb exposure to unofficial or commercial media outlets.

About half of the participants prefer to exchange information on social media platforms to gain experience and knowledge. One study found that almost 90% of respondents ask questions and get advice on social media [35], which is higher than our findings. When analyzing the reasons for participants who only like to read and view information, the fear of giving wrong responses and their sole intent to explore online scientific material were the leading causes for evading any user interaction. Other reasons involved privacy concerns, such as personal data retention. The most frequently searched topics were pregnancy developments, symptoms, and childbirth, which concur with the KAVLAK findings [39].

"Pregnancy Calculator" was the most widely used application (49%) to track pregnancy and fetus developments and due date. Similarly, one study has reported that pregnant women used apps to retrieve medical information about pregnancy, childbirth, and newborn care [35]. A systemic review has noted that pregnant women mainly use mHealth apps to promote a healthy lifestyle, such as following healthy diets and reducing gestational weight gain [36]. However, none of our respondents suggested a pregnancy app for maintaining a healthy lifestyle, which indicates a lack of education in that area and a potential topic that health providers could focus on in the educational sessions.

4.3 Theme three: favoring traditional sources for buying medications and supplements

In our study, buying medication over the Internet by pregnant women remains uncommon (13.5%), which supports a 2017 study reporting only 5% of online purchase activity [29]. Recently, the presence of COVID-19 and quarantine restrictions has played a role in increasing online shopping activities. Participants mostly purchased multivitamins and omega3 supplements from iherb.com due to its

competitive price value and product availability. Similar reasons were discussed in Sinclair et al., [29]. Further, the participants attempted to purchase supplements on their own or by a friend's recommendation. Some comments suggested other dosage forms like gummies, which can facilitate the use of medicine during pregnancy.

Overall, the respondents favored iherb.com, "it is a medically trusted website," one stated. "I have searched and found that it is the best to buy supplements." These statements, however, are quite problematic and lead to the misconception that a single channel is capable of delivering proper and effective medicine or supplements to consumers without the advice of healthcare professionals. One study has reviewed a total of 753 dietary supplements over a five-year period and found that less than 3.6% of the products examined were third-party tested by any of the three popular third-party evaluations [40]. Last, it is important to mention that these supplements purchased online are not registered or tested by the Saudi Food and Drug Authority (SFDA). Hence drug company evaluation is now more vital than ever. There is also a pressing need to inform and educate pregnant women on the danger of buying non-prescribed medication, particularly prior to pregnancy [29].

5. Conclusion

The advent of the Internet has transformed the user's experience in looking up, retrieving, and disseminating a limitless amount of information. This study aimed to evaluate the use of the Internet by pregnant women for self-education purposes. Overall, searching for health information on social media and pregnancy-related apps is popular, while Google is the most preferred search engine among pregnant women when looking for quick answers.

Bearing that in mind, we stress the importance of the role of health providers and information management professionals in educating and guiding the patients in where to go and how to locate the trusted information when needed in the vast and expanding cyberspace and the numerous health applications available.

5.1 Recommendations

Health providers always work on improving their skills in treating patients. That is good, but they need to improve their educational tools. Patients are getting more tech-savvy, and many are looking for answers in the cellphone, which includes many applications and websites. Our role as health providers and health informaticians is to prepare channels, websites, or applications that are intuitive to use and serve patients' needs. Also, the providers must review the standard health educational websites and be

ready to educate the patients on how and where to go to find the trusted information.

Using the Instagram platform to create official educational accounts could be a good start, provided its growing popularity. Finally, consumers should be more aware of online purchases because they are not SFDA tested, and healthcare professionals should keep that in mind before recommending online sources for medications or supplements.

5.2 Limitation

The online survey questions were designed to examine internet utilization among pregnant women closely. To this end, some of the answers were excluded due to lack of clarity or substance and could also be misunderstood by the researcher, leading to improper analysis. This survey was conducted online, which may have limited the responses of the participants. Such surveys, when conducted in face to face setting, may have provided more information.

5.3 Future Direction

Building on the quantitative analysis derived from this study is an option. Another suggestion is conducting a narrative qualitative study, for example, targeting healthcare professionals' methodology for pregnancy education and their proposed tools, the proper use of Instagram and YouTube as a source of education or online medication prescription and assessment of drug companies.

6. Declarations

6.1 Conflict of Interest Statement

The authors has no conflict of interests to declare.

6.2 Funding Disclosure

No funding agencies needed to support this research.

6.3 Author's contributions

Fatimah Alamer, Health Informatics master student at the College of Public Health & Health Informatics, King Saud bin Abdulaziz University for Health Sciences.

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Acknowledgement:

Special thanks to Ms. Baidaa Alrumaih for her language assistance and copy editing.

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