



# Impact of Health Education on Knowledge and Preventive Behaviour for Pregnancy Related Issues in Saudi Arabia: A Systematic Review

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## Abstract

Healthcare during pregnancy, which includes prenatal and preconception care, is very crucial for pregnant women in terms of minimising the effects of different complications and issues during pregnancy. Health education is vital to increase self-knowledge and preventive behaviour among pregnant women regarding preconception related complications. One of the main purposes of health education for pregnant women is to promote self-care behaviour during the prenatal period, and this may lead to a decreased morbidity and mortality rate, improve the quality of life of pregnant women and reduce healthcare costs. A few studies have focused on the health management of pregnant women in Saudi Arabia; however, they have not especially focused on the impact of health education in terms of improving awareness of a healthy lifestyle and minimising the risk factors and complications related to pregnancy. Therefore, this study aims to review the existing literature to understand the impact of health education for pregnant women in Saudi Arabia in relation to promoting a healthy lifestyle during the preconception period as well as reducing the associated risks and complications which are common throughout pregnancy.

In order to perform a systematic literature search for a comprehensive literature review, numerous sources were identified, which were obtained from methodical searches of bibliographical records. Additional resources were obtained by hand searching the bibliographies of review articles, peer-reviewed journals and primary studies to gather information on clinical trials in relation to pregnancy related health education among Saudi women aimed at reducing risks and complications through prenatal care.

Although pregnancy related health education strategies have been implemented in Saudi Arabia for more than two decades, only a small population is well-informed about pregnancy-related health information. Therefore, proper pregnancy-related health educational strategies need to be undertaken by healthcare professionals and physicians at the prenatal health care centres in Saudi Arabia to guide and educate pregnant women in relation to different psychological issues and clinical complications related to their pregnancy. This will ultimately help them to increase their self-awareness and preventive behaviour throughout the course of their pregnancy as well as during the prenatal and perinatal periods. In conclusion, organized prenatal health education and training may greatly affect the adequacy of health education during pregnancy, the wellbeing of pregnant women and, in the long run, the overall health of the female population of Saudi Arabia.

**Keywords:** Pregnancy; health education; self-efficacy; self-monitoring behaviour; Saudi Arabia

## Introduction

For a woman, pregnancy is a perfectly normal stage of life, though it is a matter of serious concern because of its inherent

risks and complications. Ignorance of health and lifestyle during pregnancy may have irreversible health consequences for pregnant women as well as unborn children. Although technological and

scientific advances have been made to improve care during pregnancy in order to reduce pregnancy-related complications, maternal mortality is a major cause of death in some countries due to a lack of awareness and proper care [1]. From 1990 to 2017, the global maternal mortality rate reduced by 44% according to a World Health Organization report. Every day, more than 830 women die because of preventable problems pertaining to childbirth and pregnancy [2]. According to a 2015 estimate, the mortality rate in Saudi Arabia at that time was 12 deaths out of 100,000 live births, representing a significant decrease since 1996 when the maternal mortality rate was 30 deaths per 100,000 live births [3]. However, the current mortality rate is still high and unacceptable. A number of risks and complications give rise to this high mortality rate during the period of pregnancy and childbirth. Several high-risk factors that develop during the period of pregnancy and can be present before pregnancy have been identified, and these have a significant impact upon the health of the mother and the new-born child. Hypertensive disease of pregnancy is considered to be one of the major causes of morbidity and mortality related to pregnancy, especially in developing countries around the world, and this risk factor accounts for more than 10-15% of pregnancy-related deaths [4]. Another major cause of morbidity and mortality during pregnancy is diabetes mellitus, which accounts for nearly 3-5% of pregnancy-related mortality [5].

Healthcare during pregnancy, which includes prenatal and preconception care, is crucial for pregnant women in order to minimise the effects of different complications and issues during pregnancy [6]. Care during the prenatal period is considered essential. However, limited research has been conducted regarding health care and preventive behaviour throughout the period of pregnancy in the context of Saudi Arabia. Moreover, health education is vital to increase self-knowledge and preventive behaviour among pregnant women regarding preconception related complications [7]. Health education can be easily defined by any activity that focuses on achieving better health and wellbeing and includes providing necessary health instruction and interventions to an individual so as to enable them to monitor and control their health and adopt a healthy lifestyle [8]. Health education also involves disease prevention as well as risk management.

One of the main purposes of health education for pregnant women is to promote self-care behaviour among them during the prenatal period, and this may lead to a decreased morbidity and mortality rate, improved quality of life for pregnant women and a reduction in healthcare costs. Theories play a significant role in promoting health education, and healthcare professionals can follow various theories and concepts when deciding upon prescriptions or intervention techniques. At present, self-efficacy theory is one of the major and most widely used theories for promoting health education [9]. Self-efficacy theory, which was developed by Bandura, has been widely implemented in numerous areas of health promotion and health education, such as cessation of smoking, modifying lifestyles and eating habits, pain control, adherence to treatments and cardiac rehabilitation [10]. According

to this theory, self-efficacy determines an individual's confidence in his/her ability to perform a particular activity effectively [11]. Self-efficacy acts as a connecting bridge between the behaviour, attitude and knowledge of an individual in relation to their ability to perform a certain task [12]. Zhianian [13], in their study, evaluated the impact of self-efficacy theory on enhancing self-care behaviour among pregnant women in Saudi Arabia. One of the most crucial parts of health education related to antenatal care is to enhance knowledge and understanding of the risks associated with pregnancy and improve self-efficacy to increase self-care attitudes and behaviours among pregnant women.

This will help to motivate them to be involved with self-care and develop a positive attitude towards self-care behaviour. Different methods can be adopted to stimulate self-efficacy in terms of improving self-care attitudes and behaviours among pregnant women, such as focus group discussion, individual counselling, presentations and lectures at which they can learn about hypertension control, blood glucose level control and the importance of physical activity and certain practices during pregnancy. The outcome of this study suggested that the use of health education based on self-efficacy theory significantly enhanced self-monitoring behaviour and knowledge of the prenatal condition among the pregnant women who participated in the study. Therefore, health education incorporating self-efficacy theory may improve the preventive behaviour and attitudes of pregnant women to reduce pregnancy-related risks and complications.

The purpose of health education among pregnant women in Saudi Arabia is to disseminate information on pregnancy and other associated matters so as to improve the knowledge of pregnant women [14]. Health education is designed to enable pregnant women to improve their attitude, skills and knowledge to promote a healthy pregnancy and childbirth. Because of the risk factors and complications associated with pregnancy, women should be well-informed and knowledgeable so that they can take care of their pregnancy through self-monitoring, such as checking their blood pressure [15] reported that self-monitoring of blood pressure during pregnancy is very effective and feasible and has been proven to be successful in terms of detecting gestational hypertensive disorders. Moreover, through self-monitoring of blood pressure, the risk of pre-eclampsia can be reduced significantly. However, it has been suggested that women monitoring their blood pressure during pregnancy need to be supported through training and health education from healthcare professionals.

In many countries, health education related to pregnancy is promoted through the mass media, for example, television and written articles [16]. In other countries, healthcare providers ensure that pregnant women get adequate training on and a good understanding of pregnancy to increase their awareness of good self-care. In the case of Saudi Arabia, studies [17,18], have found that many pregnant women have little knowledge about various health risks related to pregnancy [19]. In their study, reported the presence of high-level awareness among Saudi women of the importance of folic acid during pregnancy. Therefore, this

study concluded that there was a lower number of deformities and pregnancy-related complications due to the use of folic acid supplements, which can be attributed to health education during pregnancy. Various health education strategies and primary healthcare programs have been implemented in Saudi Arabia through various initiatives from the government sector as well as the private sector [20]. However, currently there is no established strategy in terms of delivery methods and the relevant content of antenatal education interventions to provide appropriate knowledge in order to develop a preventive-based attitude among pregnant women [21].

Studies and clinical research conducted to understand the impact of health education during pregnancy to improve the knowledge and increase the preventive behaviour of pregnant women in Saudi Arabia are very scant [22]. Although a few studies have been carried out on the health management of pregnant women in Saudi Arabia, these have not especially focused on the impact of health education on improving self-awareness, understanding about a healthy lifestyle and minimising the risks and complications related to pregnancy. Therefore, this study aims to review the existing literature to understand the impact of health education for pregnant women in Saudi Arabia in relation to promoting a healthy lifestyle during the preconception period as well as reducing the associated risks and complications which are common throughout pregnancy.

## Aim and Objectives

The main purpose of this study is to review the existing and most recent literature to evaluate what impact (if any) health education strategies have had on creating awareness of health issues associated with pregnancy and to determine if these strategies have altered preventive health-related behaviours in women.

In order to fulfil the research aim, the following objectives will be addressed throughout the study.

1. To understand the current status of pregnancy related health issues in Saudi Arabia
2. To understand the impact of health education in preventing complications among pregnant women
3. To explore current practices in promoting health awareness among pregnant women in Saudi Arabia
4. To suggest potential methods/strategies for communicating health education and pregnancy-related knowledge

## Materials and Methods

### Literature Search strategy for systematic review

After finalising the research title, a preliminary literature search was conducted using the "Medical Literature Analysis and Retrieval System Online (MEDLINE) database". The main purpose of this literature search was to identify relevant articles and research studies related to different sorts of pregnancy related

complications and health issues, the impact of health education in preventing complications among pregnant women and current practices for promoting health awareness among pregnant women in Saudi Arabia. From the database search for relevant literature it was found that much research related to clinical interventions aimed at reducing particular risks during pregnancy has been carried out; however, literature pertaining to understanding and analysing the impact of health education on reducing pregnancy-related risks and complications among Saudi Women by raising their awareness and enhancing their self-monitoring behaviour is not abundant. As a result, this research project will focus mainly on the impact of health education to reduce pregnancy-related risks and complications among Saudi Women. During the database search for relevant literature, important keywords or subject headings were identified which were later used in the formal, systematic search of the literature for the literary review of this study.

### Literature searching methods and database

In order to perform a systematic literature review, numerous sources were identified via methodical searches of bibliographical records, such as the British Medical Journal (BMJ), The Cochrane Library, the Web of Science and the Medical Literature Analysis and Retrieval System Online (MEDLINE). The search was conducted using the following key terms: "Prenatal care" OR "Antenatal care" OR "Preconception care" AND "Pregnancy" OR "Pregnant Women" AND "Pregnancy-related complications" AND "Pregnancy-related knowledge" OR "Health behaviour" AND "Clinical Studies" OR "Randomized Trial" AND "Saudi Arabia". Moreover, other electronic sources, such as the World Health Organization-WHO database and the ProQuest theses database, were searched in order to obtain background literature to understand the issues related to the pregnancy related complications faced by Saudi women and the current status of health education for women that was included in the prefatory part of the research.

Additional resources were obtained through hand searching the bibliographies of reviewed articles, peer-reviewed journals and primary studies. Moreover, websites were searched to gather information on any unpublished data from clinical trials in relation to the pregnancy related health education of Saudi Women aimed at reducing risks and complications through prenatal care. After collecting all the articles, specific articles were selected by grouping titles, keywords and abstracts, and finally those articles whose full text actually satisfied the inclusion criteria were selected for critical evaluation.

### Inclusion and exclusion criteria

After identifying the literature from an electronic database, it was screened using the eligibility criteria. The following Table 1 shows the inclusion and exclusion criteria used to select the literature for this systematic review.

After screening the selected articles based on the eligibility criteria, they were grouped based on the key issues pertaining to the research, that is, knowledge about pregnancy and pregnancy

related complications and risks, understanding of breastfeeding, nutrition and dietary intake, psychological changes during prenatal period, proper knowledge and awareness of the importance of folic acid in reducing pregnancy related complications and knowledge regarding various prenatal procedures, etc. The selected studies

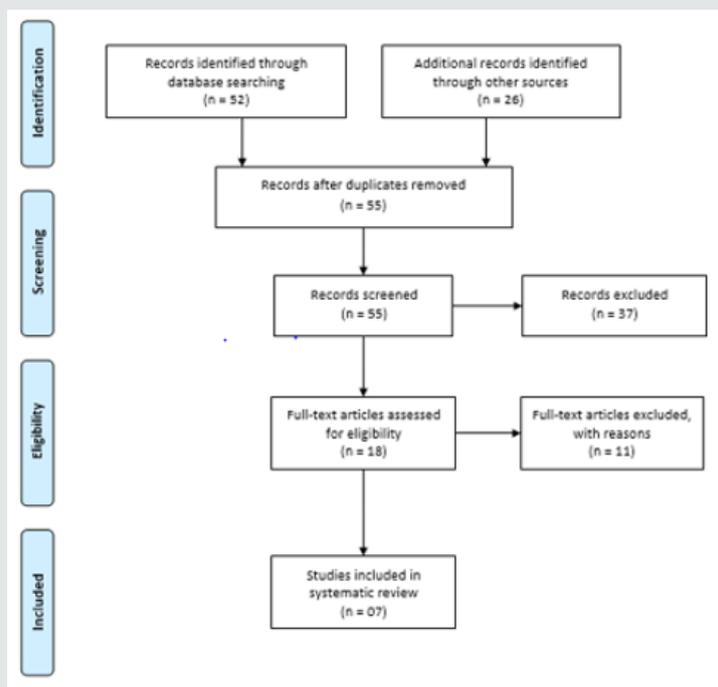
were summarised in a table, with information on the study design, aim of the research, study setting, participants' characteristics, key outcomes and limitations. After that, qualitative synthesis of these selected articles was conducted for this systematic literature review.

**Table 1:** Inclusion and exclusion criteria for literature selection for systematic review.

Inclusion Criteria		Exclusion Criteria	
i.	No period constraint was applied during the formal literature search as the number of studies were not abundant as per the aim and objectives of this study.	i.	Studies that were not based on the impact of health education to reduce the pregnancy-related risks and complications among Saudi women.
ii.	Studies that focused on investigating the impact of health education to reduce the pregnancy-related risks and complications among Saudi women were included.	ii.	Research articles and journal papers which were written and published in a language other than English were removed from the literature selection
iii.	Literature that focused only on pregnant women's health education was considered.	iii.	Some of the literature was discarded as it was not available in full, only the abstract being available. In order to save time and costs, this literature was excluded.
iv.	Literature was included if the key outcome of the research was focused on clinical interventions related to pregnancy related health education.	iv.	Some of the literature was discarded as the key outcomes of the research were focused on issues other than clinical interventions or humanistic findings.
v.	Research articles and journal papers which were written and published in English were included.		
vi.	Literature with the full-text available which were focused on the impact of health education to reduce pregnancy-related risks and complications among Saudi women were found to be limited and were included.		
vii.	For grey literature, reports, theses or dissertations that were completed before November 2018 were also included.		

## Data Collection and Analysis

### Literature selection method



**Figure1:** Flowchart of including papers/articles for systematic literature review according to PRISMA guidelines.

During the literature identification stage, a total of 52 research articles were found using the MEDLINE database and another 26 articles were identified from other sources. Among the 78 identified literature sources, 23 articles were removed as they were identified as duplicates using Endnote software. Then, the remaining 55 articles were screened using the eligibility criteria, and 37 articles were discarded as they did not meet the inclusion criteria for this systematic literature review. Some of the literature was discarded as it was not available in full, only the abstract being available. In order to save time and costs, this literature was excluded. Some of the literature was discarded as the key outcomes of the research were focused on issues other than clinical interventions or humanistic findings. In total, 18 full-text articles were screened, and after discarding 11 articles, seven articles were finally chosen for this systematic literature review.

The overall process of literature identification, screening using inclusion and exclusion criteria and final selection is shown in the

## Findings

**Table 2:** Summary of the key findings from systematic literature review.

Author(s), year	Study Design	Aim of the study	Setting and participants	Results and findings	Research limitations
Rasheed and Al-Sowielem [23]	Cross-sectional study; questionnaire-based survey	Understanding the level of health awareness related to pregnancy among pregnant women.	n= 581; Study Location: Primary Health Care Centres in Al-Khobar, Saudi Arabia.	Participants were well-informed about: physical activity during pregnancy (83.6%); risks of smoking during pregnancy (99.3%); necessary food intake of dairy products (74.7%); protein rich foods (71.4%); required amount of sleep (81.9%); rubella infection during pregnancy (43%); importance of prenatal care (97.2%); need for prenatal visits and follow-up (91.9%); and need for immunisation during pregnancy (46.3%).	Health complications during pregnancy were not thoroughly studied. No interventions related to health education in terms of improving preventive behaviour among pregnant women in Saudi Arabia are discussed.
Habib et al. [24]	Cross-sectional study; questionnaire-based survey	Evaluating the type of consultations about the antenatal health issues of pregnant women in health care centres.	n= 394; Study Location: seven different prenatal health care centres in Medina, Saudi Arabia.	Participant's perceptions of pregnancy related health education provided by antenatal care centres, such as nutrition advice (63.7%), necessary daily rests during pregnancy (43.1%), importance of hygiene in reducing complications (15.5%), psychosocial support (2%) and counselling regarding risks and complications during pregnancy (39.8%), was positive.	This study focuses on the efficiency of consultations at health care centres, rather than on the impact of health education in improving knowledge and preventive behaviour among pregnant women.
Otaiby et al. [21]	Cross-sectional study; questionnaire-based survey	Examining the level of pregnancy related health knowledge among pregnant women and assessing the need for health education to enhance preventive behaviour among pregnant women.	n= 468; Study Location: different primary health-care centres in Riyadh, Saudi Arabia.	Knowledge about risks and complications related to pregnancy was found to be quite low (34.8 out of 100); participants supported the need for health education, and they preferred health education strategies in a written format (37.8%), one-to-one counselling (18.8%) and audio-visual training-based health education (14.3%).	Lacks proper evaluation of the need for health education among pregnant women in relation to reducing risks and complications during pregnancy and improving preventive behaviour among pregnant women.

following PRISMA flow chart for this systematic literature review (Figure 1).

## Generalising collected data

After screening the selected articles based on the eligibility criteria, they were grouped based on the key issues pertaining to the research, that is, knowledge about pregnancy and pregnancy related complications and risks, understanding of breastfeeding, nutrition and dietary intake, psychological changes during prenatal period, proper knowledge and awareness of the importance of folic acid in reducing pregnancy related complications and knowledge regarding various prenatal procedures, etc. The selected studies were summarised in a table, with information on the study design, aim of the research, study setting, participants' characteristics, key outcomes and limitations. After that, qualitative synthesis of these selected articles was conducted for this systematic literature review.

Al Ateeq et al. [26]	Descriptive Study; questionnaire-based survey	Evaluating the impact and effectiveness of health education related to pregnancy-related issues among pregnant women, especially reducing complications during the preconception period.	n= 300; Study Location: two healthcare centres in Riyadh, Saudi Arabia.	80% of the participants were satisfied with the health education provided. The main themes of health education were related to breast feeding (83%), baby care (74.7%) and signs of labour (75.3%)	This study is based on the responses of the participants (pregnant women) and suggests the need for health education from their perspective only rather than including the thoughts of healthcare professionals.
Al Hazmi [27]	Cross-sectional study; questionnaire-based survey	Assessing the awareness of prenatal care among pregnant women in Saudi Arabia	n= 1,617; Study Location: two hospitals in Medina, Saudi Arabia.	The majority of the participants (89.7%) reported the need for health education while 89% of the participants suggested contemporary supplements and health education was needed to reduce the risks during pregnancy.	This study does not emphasize the impact of health education in terms of improving knowledge and preventive behaviour among pregnant women. Moreover, this study does not include expert's opinions on the mode of pregnancy related education.
Al-Rahi et al. [28]	Cross-sectional study; questionnaire-based survey	Assessing the knowledge of the importance of frequent practice of physical activity during the preconception phase among pregnant women in Saudi Arabia.	n= 388; Study Location: three different regions of Saudi Arabia.	Knowledge about risks and complications related to pregnancy was found to be quite low ( $13.7 \pm 3.6$ ), and this is associated with level of education ( $p=0.009$ ).	This research focuses only on the physical activity related to education and awareness among pregnant women, whereas other factors relating to pregnancy are absent in this study.
Ramisetty-Mikler, et al. [29]	Clinic-based study; questionnaire-based survey	Evaluating the impact of health education on pregnancy-related health behaviour among pregnant women and the sources of pregnancy related knowledge.	n= 258; Study Location: two prenatal health care centres in Riyadh, Saudi Arabia.	The majority of the participants (90%) reported that they were well-informed about the need for folic acid, though younger women (odds ratio, OR=0.43; 95% CI= 0.19, 0.98; $p < 0.05$ ) and less educated women (OR=0.36; 95% CI= 0.15, 0.89; $p < 0.05$ ) were less informed about complications associated with pregnancy.	This study focuses mainly on the consumption of folic acid and its importance in reducing pregnancy related risks; however, other risk factors are not discussed.

The Following Table 2 exhibits the key findings of the selected articles used for systematic literature review.

[23] conducted a cross-sectional study with a sample of 581 pregnant women, who were interviewed using questionnaires in order to understand the level of health awareness among pregnant women related to pregnancy. In this study, the participants were randomly selected from Primary Health Care Centres in Al-Khobar, Saudi Arabia. The study findings suggested that a large percentage of pregnant women are well-informed about their nutrition and diet during the prenatal stage and knowledgeable regarding prenatal care issues, for example, physical exercise (83.6%), required resting hours per day (81.9%) and protein containing foods (71.4%). However, most of the pregnant women (55.1%) reported that they did not know about eating fibre-rich foods during pregnancy. Another major finding of this study was that healthcare professionals and nurses in the prenatal healthcare centres in Saudi Arabia do not provide pregnancy-related health

information to pregnant women. From the study, it was found that a large number of participants reported a high level of awareness and knowledge regarding health-related issues during pregnancy that is provided by healthcare professionals; a large proportion of pregnant women were ill-informed regarding dietary intake and healthy lifestyle during the preconception period; there is a lack of knowledge regarding various prenatal procedures and poor knowledge dissemination by health care professionals. Moreover, Rasheed and Al-Sowielem (2003) reported that there is a need for reformation of health education for pregnant women to improve their knowledge base through health care centres and the mass media.

Habib [24] conducted a cross-sectional study with 394 pregnant women from seven different prenatal health care centres in Medina, Saudi Arabia. A questionnaire-based survey was delivered to the participants in order to evaluate and understand the nature of consultations on the antenatal health issues of pregnant women

in health care centres. From this study, it was found that most of the healthcare centres are effective at communicating different health promotion activities to pregnant women, such as lifestyle and nutritional knowledge, breastfeeding counselling and care provision. However, Habib [24] suggest that more healthcare centres are needed to carry out the important work of providing health education to pregnant women.

Otaiby [25] in their cross-sectional study, conducted a questionnaire-based survey among 468 pregnant women from different primary healthcare centres in Riyadh, Saudi Arabia in order to evaluate the level of pregnancy related health knowledge among pregnant women and assess the need for health education to enhance preventive behaviour among pregnant women. The study findings indicated a lower level of prenatal knowledge (38.8%) among pregnant women; however, the participants (pregnant women) highlighted the need for effective means of disseminating health education, such as pregnancy-related communication in a written format (39.8%) and one-to-one education (19%). Otaiby et al. (2013) report that most of the participants had a low level of knowledge related to pregnancy and pregnancy related complications and risks and argue that there is a need for specific content to be covered in health education and counselling at different stages of pregnancy. Moreover, they claim that there is a need to adopt different formats for disseminating information, such as group discussion, one-to-one counselling, leaflets, etc. to offer guidance, increase motivation and foster a problem-solving approach so that pregnant women can reduce pregnancy related risks and complications.

A descriptive research study was conducted [26] among 300 pregnant women who used to visit two healthcare centres in Riyadh, Saudi Arabia. They used questionnaire-based survey aimed at evaluating the impact and effectiveness of health education related to pregnancy-related issues among pregnant women, specifically to reducing complications during the preconception period. The study findings showed that nearly 80% of the participants were satisfied with the health education provided by the prenatal healthcare centres. Al-Ateeq [26] identified various topics covered by prenatal health education, such as breastfeeding, nutrition and dietary intake, psychological changes during the prenatal period, labour signs, etc., and evaluated the efficacy of health education during the preconception period.

Al Hazmi [27] in their cross-sectional study, conducted a questionnaire-based survey among 1,617 pregnant women at two hospitals in Medina, Saudi Arabia in order to assess the awareness of prenatal care among pregnant women in Saudi Arabia. The study findings indicated that 90% of the pregnant women who responded to the survey believed that pregnancy-related health education can significantly reduce and prevent pregnancy-related health problems and risks.

In their cross-sectional study, conducted a questionnaire-based survey among 388 pregnant women from three different regions of Saudi Arabia to evaluate the knowledge and frequency of practice of

physical activity during the preconception phase among pregnant women in Saudi Arabia. The findings of the study indicated that a high level of prenatal knowledge (69.5%) among pregnant women in Saudi Arabia, and they report that physical activity (42.5%) during pregnancy significantly reduces preconception complications. The majority of the participants had adequate knowledge regarding the need for physical activity during pregnancy; however, they conclude that more health education is required to reinforce the importance of physical activity during the prenatal period. Again, identify the need for a more structured program in prenatal healthcare centres in Saudi Arabia [28].

Finally [29], conducted a clinic-based study through a questionnaire-based survey among 258 pregnant women from two prenatal health care centres in Riyadh, Saudi Arabia to evaluate the impact of health education on pregnancy-related health behaviour among pregnant women and the sources of pregnancy related knowledge. Usually, in Saudi Arabia, pregnant women get offered folic acid supplements by their healthcare professionals as a part of their standard antenatal care, and it was found that the majority of the participants were well-informed about the importance of different factors related to folic acid, while nearly half of the participant did not take a supplement to meet their folic acid requirement during pregnancy. Another important finding of the study was that pregnant women who are less educated are less likely to have knowledge about the importance of folic acid in relation to reducing pregnancy related complications.

## Discussion

Rasheed [30] in their cross-sectional study, identify the need for health education for pregnant women and mediums for disseminating information to improve knowledge among pregnant women. However, on analysing the study, it was found that health complications during pregnancy were not thoroughly investigated. Moreover, there were no interventions related to health education aimed at improving preventive behaviour among pregnant women in Saudi Arabia [31]. discuss the role and efficacy of prenatal health care centres in terms of consulting and communicating with pregnant women regarding different pregnancy related issues. However, their study focused mainly on the efficiency of consultations at the health care centres in their research rather than on the impact of health education in terms of improving knowledge and preventive behaviour among pregnant women, which can be considered to be a limitation of the study in view of the aim of this systematic review [32]. In their study, clearly identify the need for health education among pregnant women and thus recommend various formats, sources, strategies and channels to provide health education. However, this study lacks proper evaluation of the need for health education among pregnant women in relation to reducing risks and complications during pregnancy and improving preventive behaviour.

Al Ateeq [33] illustrate the benefits of health education for pregnant women during and after pregnancy; however, this study was concluded based on the responses of the participants

(pregnant women), and the suggested need for health education is based on their perspective only rather than the thoughts of healthcare professionals [34]. Investigated the most common and frequent complications and diseases among pregnant women during pregnancy, but this study does not emphasize the impact of health education on improving knowledge and preventive behaviour among pregnant women. Moreover, this study does not include expert opinion on the mode of pregnancy related education [35]. discuss the key aspects of physical activity during pregnancy and its effectiveness in terms of improving women's health during pregnancy, but their research focused only on physical activity related education and awareness raising among pregnant women while other factors relating to pregnancy were absent. Again, [36] in their study, focused mainly on the consumption of folic acid and its importance in reducing pregnancy related risks; however, other risk factors were not addressed.

From the systematic literature review, a dearth of cross-sectional studies and clinical research was found on the antenatal period of pregnant women in Saudi Arabia. Most studies have shown that pregnancy-related health education disseminated during pregnancy has a positive impact as it leads to enhanced obstetric results among pregnant women [37]. However, none of the cited studies show the statistical significance of the impact of educational interventions during the pregnancy period. Therefore, these studies lack relevant statistical significance when it comes to pregnancy-related health education and improving preventive behaviour among pregnant women in Saudi Arabia. In addition to this, these studies do not report any significant improvement in terms of reducing pregnancy-related risks and complications due to health education among pregnant women. Although this systematic review has only considered the impact of pregnancy-related health education during prenatal care, it is important to point out that the analysed birth outcomes involve multiple factors of risk. Birth weight and prematurity are the major risk factors associated with young or advanced maternal age, while inadequate lifestyle habits and clinical complications, such as anaemia, urinary tract infection and gestational weight gain deficit [38], are more difficult to modify [39]. It is noteworthy that prenatal care should not be restricted to the clinical-traditional model, which is between patient-healthcare professionals only, but comprehensively include health education actions in routine care, which should be known by professionals providing care to pregnant women, seeking to understand them in the context in which they live, act and react [40].

## Potential Methods for Communicating Health Education and Pregnancy-Related Knowledge

Recognising the need for organized prenatal health education and training may greatly affect the adequacy of health education during pregnancy, the wellbeing of pregnant women and, in the long run, the overall health of the female population in Saudi Arabia [41]. Identifying the most favourable instructive arrangement, channel, timing and substance for health education and training to suit this populace may affect the quality and outcomes of

antenatal training programs in Saudi Arabia. Traditional methods of information dissemination, for example handouts and broad communications, are not so successful in delivering the ideal conduct changes in people. The strategy of providing more comprehensive health education during pregnancy has been put forward to enable individuals to learn to rehearse desired practices using their favoured method of learning. In spite of the inclination of a contemporary society to acquire health information by means of the Internet, radio and TV, most pregnant women are not excited about learning about antenatal matters or health via these channels. Furthermore, whilst these channels are viewed as especially cost-effective since they can cover a tremendous number of recipients and spread the information efficiently and rapidly, considering the sensitivity of pregnancy-related health education, this may not be feasible [42].

Some of the potential methods for communicating health education and pregnancy-related knowledge among the pregnant women in Saudi Arabia are outlined below:

- a. Social marketing can be considered to be a potential strategy for providing health information related to pregnancy and its associated complications. Moreover, it can be effective in terms of changing the behaviour and attitudes of pregnant women and may improve their self-monitoring behaviour;
- b. In order to promote the importance of physical activities during pregnancy, an individually adapted behavioural change program can be implemented, and such programs need to be custom-made based on the preferences, particular interests and willingness to adopt them of pregnant women in Saudi Arabia;
- c. Providing smartphone-based health education and communication for pregnant women in Saudi Arabia. This will help to provide health education to a large female population individually as per their convenience;
- d. Pregnancy related health education can also be disseminated through the use of social media and television, including the national TV station of Saudi Arabia. Health care professionals should make an effort to ensure that women are well-informed and knowledgeable about pregnancy related health issues and complications.

## Conclusion

In an attempt to reduce the maternal mortality and morbidity rate worldwide, health education for pregnant women needs to be focused on improving pregnant women's self-care and self-monitoring behaviours in relation to various risk factors and complications during the pregnancy period. From the systematic literature review, it can be observed that intervention strategies for health education to improve pregnancy-related health behaviour and knowledge among pregnant women in Saudi Arabia are not adequate. In order to emphasize the need for health education for pregnant women in Saudi Arabia, a nation-wide program named 'Plan of Action' was developed to guide the activities of health care

professionals during prenatal care. This strategic plan is revised every year and emphasizes that health education should contain information regarding prenatal care and other related matters and needs to be communicated among the female population to enhance their understanding, attitudes, knowledge and skills to ensure a healthy and safe pregnancy. Pregnancy related health education can also be disseminated through the use of social media, television, including the national TV of Saudi Arabia. Health care professionals should make an effort to ensure that women are well-aware of and knowledgeable about pregnancy related health issues and complications. Although pregnancy related health education strategies have been implemented in Saudi Arabia for more than last two decades, a small sector of the female population is well-informed about pregnancy-related health issues. Therefore, proper pregnancy-related health educational strategies need to be undertaken by healthcare professionals and physicians at the prenatal health care centres in Saudi Arabia to guide and educate pregnant women regarding different psychological issues and clinical complications related to their pregnancy.

This will ultimately help them to increase their self-awareness and preventive behaviour throughout the course of their pregnancy as well as during prenatal and perinatal periods. It is evident that studies and clinical research conducted to understand the impact of health education during pregnancy to improve the knowledge and preventive behaviour of pregnant women in Saudi Arabia is very limited. Therefore, further research needs to be conducted in this area that can be focused on the content and delivery mode of health education for pregnant women in Saudi Arabia.

## Appendix

CASP checklist for systematic review [Appendix](#).

## References

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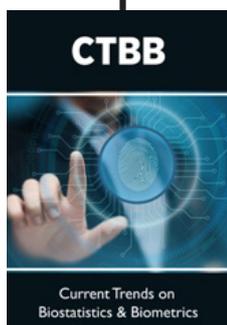


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