

# Improving Knowledge of Pregnancy Danger Signs through an Instructional Program for Primigravida Women

## Abstract

**Background:** The problem of maternal morbidity and mortality is due to mostly preventable causes, and this is an area of major concern for global health. Women who are pregnant for the first time are at greater risk because they have no prior experience of pregnancy, which may result in lack of knowledge and inability to recognize warning signs of complications associated with pregnancy. Late recognition of danger signs increases the likelihood that a woman may not seek prompt, life-saving care.

**Objectives:** The purpose of this study was (1) to assess the knowledge and attitudes about pregnancy dangers at the baseline of primigravida women. (2) The impact of an educational program on the improvement of this knowledge and attitudes. (3) The impact of socio-demographic variables on the learning outcomes.

**Materials and Methods:** An experimental research design was implemented on women who are experiencing their first pregnancy. The data was collected from 98 women at the time of their antenatal visit using a validated questionnaire. This questionnaire assessed the participants' knowledge and attitudes towards 8 different areas (vaginal bleeding, headaches, seizures, severe abdominal pain, fever, swollen legs or feet, less movement of the baby, and excessive nausea). After completing the questionnaire, each participant attended a 1-hour instructional program designed to teach about the named topics through an interactive format. The data was collected immediately following the instructional session. The data would be analyzed using paired t-test with descriptive statistics and regression analysis using SPSS version 25.

**Results:** The instructional program proved to be effective. In this study, the mean knowledge scores improved from Poor to Good – from  $0.37 \pm 0.16$  to  $0.84 \pm 0.07$  ( $p < 0.001$ ). The increases were statistically significant across all eight domains of knowledge ( $p < 0.05$ ). The percentage of participants with a "Good" level of knowledge increased from 0% to 69.4%. The program had very strong (Cohen's  $d=3.8$ ) and strong (Cohen's  $d=1.6$ ) effect sizes for knowledge and attitude, respectively. Of particular importance, the significant pre-test relationship between knowledge and socio-economic status was rendered not significant following the course, thus demonstrating that the program increased access to equal health.

**Conclusion:** A well-designed program of teaching can be an equally effective and more equitable intervention to improve the overall level of knowledge and promote positive attitudes toward the warning signs of pregnancy in the first-time pregnant woman. The integration of this type of evidence-based education into routine antenatal care for all first-time pregnant women is strongly recommended to empower women to seek assistance as needed when confronted with danger signs associated with pregnancy and to reduce the incidence of preventable maternal injury.

Keywords: Primigravida, Signs of Pregnancy, Maternal Health Education, Knowledge, Education Program, Equity in Health.

## **Introduction**

The state of being pregnant is characterized by increased physical stress and demands for energy. The mother's body undergoes many changes as it adapts to support the growing baby and placenta. In order for health care providers to recognize any medical problems that may arise during pregnancy, they must first learn how to identify what is normal for a woman who is expectantly pregnant. By knowing these changes, providers will have an easier time identifying medical problems when they occur (Siad et al. 2025).

Pregnancy results in marked physiological changes in the body's systems that are necessary to promote fetal growth and development. These changes occur in the following systems: circulatory, respiratory, endocrine, and immune (Debrah et al., 2023).

Other physiological changes that occur throughout the entire course of pregnancy, from conception through the postpartum period, affect the mother's anatomy and physiology to meet the mother's changing metabolic and physical needs in order to nourish the growing fetus. In addition to affecting how the fetus grows and develops, some of these changes can also contribute to pregnancy-related complications such as preeclampsia, postpartum cardiomyopathy, and perhaps postpartum depression (Edinoff et al., 2025).

Danger signs during pregnancy indicate that a serious complication has developed either in the mother or the fetus which is at risk of resulting in adverse health effects or even death to the mother or fetus at the time of delivery or within the initial hours after delivery (Hotman et al., 2022). All pregnant women should learn how to identify danger signs and know that many of these symptoms can occur

either during the course of the pregnancy, delivery, or postpartum. They should also share the information that they learn about danger signs with all non-medical professionals who are or may potentially be involved in the health care of the mother and/or fetus (Abu-Shaheen et al., 2020).

Pregnancy, childbirth, and postpartum have many symptoms - the severe vaginal bleeding, swollen hands or faces, blurry vision, severe abdominal pain, leaking fluid from the vagina, cramps, pelvic pressure, backache, nausea, headaches, burning or pain with peeing, decreased fetal movement, a long time in labor, convulsions, a retained placenta (where the placenta stays inside after delivery), being unconscious, and feeling very weak - that a woman and her healthcare provider should know about so they can quickly diagnose any life-threatening issues (Mesele et al 2023).

## **METHODOLOGY**

**Design of the Study:** A quasi-experimental, one-group pre-test/post-test design was used to analyse the effectiveness of an educational programme about danger signs during pregnancy on first-time pregnant women.

**Setting and Period of Study:** The study was conducted from September 2024 to January 2026 and was located at six Primary Health Care Centres (Al-Nasr, Al-Tahadi, Al-Malhaq, Al-Wafaa, Al-Iskan, and Al-Muwazafeen) in the Central Sector of the governorate of Karbala during this same time.

**Sample:** The sample consisted of 98 first time pregnant mothers who participated in the study; these mothers were recruited through non-probability convenience sampling. Inclusion criteria were mothers with a first-time pregnancy, mothers who were receiving antenatal care at the study facilities and mothers who were willing to participate in the study and provide written consent. Six mothers withdrew from the study during the course of the implementation phase.

**Ethical Considerations:** The Research Ethical Committees at the University of Babylon College of Nursing and the Karbala Health Directorate provided approval for the study. Written informed consent was obtained from all mothers prior to participation and confidentiality was maintained for all participants during the study.

**Intervention:** A single structured educational session was delivered to all mothers that focused on identifying pregnancy-related danger signs and how to react if a danger sign was identified.

The Knowledge Assessment Tool is a Validated Questionnaire designed for Self-Administration. It consists of 43 Multiple Choice Questions spread across 8 Important Areas of Health:

Vaginal Bleeding, Headaches, Seizures (Epilepsy), Severe Abdominal Pain, Fever, Edema (Swelling), Low Fetal Movement, Feeling Sick, Tired, or Exhausted

**Knowledge was measured using the following scoring system:**

Knowledge (Total Score out of 43), the highest score possible: The lowest = 0 (no knowledge). The assessment categories for knowledge were:

Poor = <22 (<50%); Moderate = 22 - 32 (50% - <75%);

Good =  $\geq 33$  ( $\geq 75\%$ );

The Content Validity of the Knowledge Assessment Tool was established by having 15 Experts review the questionnaire for Content Validity and acceptability. The Questionnaire's Internal Consistency (Reliability) was confirmed through a Pilot Study involving 10 participants and revealed Excellent Reliability for the Knowledge Scale (Cronbach's Alpha = 0.935).

**The procedure for Data Collection consisted of:**

**Pre-test** - Administration of the Knowledge Assessment Tool prior to the Educational Intervention

**Educational Intervention** - Provision of the Educational Programme to the Participants

**Post-test** - Re-administration of the Knowledge Assessment Tool to all Participants immediately after the Educational Intervention; and

Statistical Analysis was performed on the Data using SPSS Version 27. Descriptive Statistics (Frequencies, Percentages, Means, and Standard Deviations) were computed for Demographic Variables and Knowledge Scores. Paired T-tests were performed to compare the Pre-Test and Post-Test Knowledge Mean Scores for each participant's score. The Relationships of Socio-Demographic Variables to Knowledge Scores were analyzed using Pearson Correlation and Linear Regression methods. A Statistical significance of  $p \leq 0.05$  was set for the study.

**Result:**

Although the questions “4<sup>th</sup>, and 5<sup>th</sup>” have good levels before test, but the results found that all knowledge questions related to vaginal bleeding have mean score  $\geq 0.75$  with a good level after test. As shown in Table 11.

**Table (11): Comparison of mean scores between knowledge questions related to vaginal bleeding pre- and post the test**

<i><b>Vaginal Bleeding Questions</b></i>	<i><b>Pre-test</b></i>		<i><b>Post-test</b></i>	
	<i><b>Mean score</b></i>	<i><b>Ass.</b></i>	<i><b>Mean score</b></i>	<i><b>Ass.</b></i>
<i>1. What is the most common cause of bleeding in the first 3 months of pregnancy?</i>	<i>0.43</i>	<i>Poor</i>	<i>0.8</i>	<i>Good</i>
<i>2. What sign might indicate an ectopic pregnancy and require immediate medical attention?</i>	<i>0.49</i>	<i>Poor</i>	<i>0.86</i>	<i>Good</i>
<i>3. Causes of bleeding in the second half of pregnancy include the following, except:</i>	<i>0.05</i>	<i>Poor</i>	<i>0.88</i>	<i>Good</i>
<i>4. A pregnant woman should seek immediate medical attention if any of the following types of bleeding occur:</i>	<i>0.9</i>	<i>Good</i>	<i>1</i>	<i>Good</i>
<i>5. What test is used to directly determine the position of the fetus and placenta?</i>	<i>0.92</i>	<i>Good</i>	<i>1</i>	<i>Good</i>
<i>6. If the pregnancy is ectopic, what is the most appropriate treatment?</i>	<i>0.46</i>	<i>Poor</i>	<i>0.84</i>	<i>Good</i>
<i>7. Which of these symptoms is NOT a danger sign that requires urgent medical attention?</i>	<i>0.47</i>	<i>Poor</i>	<i>0.94</i>	<i>Good</i>

Mean score: Poor<50% (<0.5 mean score), Moderate 50%-<75% (0.5-<0.75 mean score), and Good  $\geq$ 75% ( $\geq$ 0.75 mean score).

Compared to the pre-test knowledge, the results found that knowledge questions related to headache have high mean score (ranged 0.78-1) after test regarding questions “ 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>”. While only questions after test “1<sup>st</sup> and 6<sup>th</sup>” have moderate mean score (0.35 and 0.56) respectively. As shown in **Table 12**.

**Table (12): Comparison of mean scores between knowledge questions related to headache pre- and post the test**

<i>Headache Questions</i>	<i>Pre-test</i>		<i>Post-test</i>	
	<i>Mean score</i>	<i>Ass.</i>	<i>Mean score</i>	<i>Ass.</i>
<i>1. What is the most common cause of headaches during pregnancy?</i>	<i>0.05</i>	<i>Poor</i>	<i>0.53</i>	<i>Moderate</i>
<i>2. When is a headache dangerous and requires immediate medical attention?</i>	<i>0.92</i>	<i>Good</i>	<i>1</i>	<i>Good</i>
<i>3. Which of these symptoms may indicate preeclampsia and require urgent medical intervention?</i>	<i>0.93</i>	<i>Good</i>	<i>1</i>	<i>Good</i>
<i>4. One of the causes of headaches during pregnancy is dehydration. How can this type of headache be avoided?</i>	<i>0.49</i>	<i>Poor</i>	<i>0.78</i>	<i>Good</i>
<i>5. Which of the following medications is considered relatively safe for treating headaches during pregnancy?</i>	<i>0.53</i>	<i>Moderate</i>	<i>0.86</i>	<i>Good</i>
<i>6. Which of the following recommendations may help reduce the tension of tension headaches during pregnancy?</i>	<i>0.07</i>	<i>Poor</i>	<i>0.56</i>	<i>Moderate</i>

Mean score: Poor<50% (<0.5 mean score), Moderate 50%-<75% (0.5-<0.75 mean score), and Good  $\geq$ 75% ( $\geq$ 0.75 mean score).

In pre-test knowledge, the results found that 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> questions have poor mean score (0.02, 0.07, and 0.44). Furthermore, the findings found that there was a moderate mean score (0.55) before test. In contrast of posttest knowledge questions, the results indicated that all questions have good mean score except for 1<sup>st</sup> question which have moderate mean score (0.68). As shown in **Table 13**.

**Table (13): Comparison of mean scores between knowledge questions related to seizures pre- and post the test**

<i>Seizures (Epilepsy) Questions</i>	<i>Pre-test</i>		<i>Post-test</i>	
	<i>Mean score</i>	<i>Ass.</i>	<i>Mean score</i>	<i>Ass.</i>
<i>1. What is the main cause of pregnancy-related seizures?</i>	<i>0.02</i>	<i>Poor</i>	<i>0.68</i>	<i>moderate</i>
<i>2. Which of the following factors increases the risk of preeclampsia?</i>	<i>0.07</i>	<i>Poor</i>	<i>0.8</i>	<i>Good</i>
<i>3. Which of the following measures is considered part of preventing seizures during pregnancy?</i>	<i>0.44</i>	<i>Poor</i>	<i>0.92</i>	<i>Good</i>
<i>4. What should a woman with epilepsy do before becoming pregnant?</i>	<i>0.55</i>	<i>Moderate</i>	<i>0.93</i>	<i>Good</i>

Mean score: Poor<50% (<0.5 mean score), Moderate 50%-<75% (0.5-<0.75 mean score), and Good  $\geq$ 75% ( $\geq$ 0.75 mean score).

Compared to the pre-test knowledge, the results found that knowledge questions related to severe abdominal pain have high mean score were 0.73 for 1<sup>st</sup> question, 0.94 for 2<sup>nd</sup> question, and 1 for 3<sup>rd</sup> question after test. As shown in **Table 14**.

**Table (14): Comparison of mean scores between knowledge questions related to severe abdominal pain pre- and post the test**

<i>severe abdominal pain Questions</i>	<i>Pre-test</i>	<i>Post-test</i>
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	<i>Mean score</i>	<i>Ass.</i>	<i>Mean score</i>	<i>Ass.</i>
<i>1. What is the common natural cause of severe pain in the side of the abdomen during the second trimester of pregnancy?</i>	<i>0</i>	<i>Poor</i>	<i>0.73</i>	<i>Moderate</i>
<i>2. Which of the following conditions requires immediate surgical treatment during pregnancy?</i>	<i>0.54</i>	<i>Moderate</i>	<i>0.94</i>	<i>Good</i>
<i>3. Which of the following symptoms indicate a urinary tract infection and inflammation when experiencing abdominal pain?</i>	<i>0.93</i>	<i>Good</i>	<i>1</i>	<i>Good</i>

Mean score: Poor < 50% (< 0.5 mean score), Moderate 50% - < 75% (0.5 - < 0.75 mean score), and Good  $\geq$  75% ( $\geq$  0.75 mean score).

In **Table 15**, the results found that knowledge questions related to fever have mean score (1 for 1<sup>st</sup> question, 0.73 for 2<sup>nd</sup> question, 0.95 for 3<sup>rd</sup> question, 0.69 for 4<sup>th</sup> question, 0.83 for 5<sup>th</sup> question, and 0.89 for 6<sup>th</sup> question) were higher when compared to the pre-test knowledge

**Table (15): Comparison of mean scores between knowledge questions related to fever pre- and post the test**

<i>Fever Questions</i>	<i>Pre-test</i>		<i>Post-test</i>	
	<i>Mean score</i>	<i>Ass.</i>	<i>Mean score</i>	<i>Ass.</i>
<i>1. What are the common causes of fever during pregnancy?</i>	<i>0.47</i>	<i>Poor</i>	<i>1</i>	<i>Good</i>
<i>2. Which of the following fever-related conditions may cause complications to the fetus such as birth defects or miscarriage?</i>	<i>0.12</i>	<i>Poor</i>	<i>0.73</i>	<i>Moderate</i>



3. What are the correct home remedies for managing fever during pregnancy?	0.53	Moderate	0.95	Good
4. Which of the following risks may affect the mother due to fever during pregnancy, except?	0	Poor	0.69	Moderate
5. What is an appropriate preventive measure to reduce the risk of infections that cause fever during pregnancy?	0.02	Poor	0.83	Good
6. Pregnant women should consult a doctor if they have a fever:	0.44	Poor	0.89	Good

Mean score: Poor<50% (<0.5 mean score), Moderate 50%-<75% (0.5-<0.75 mean score), and Good  $\geq$ 75% ( $\geq$ 0.75 mean score). In **Table 16**, the results found that knowledge questions related to edema have mean score (0.76 for 1<sup>st</sup> question, 0.82 for 2<sup>nd</sup> question, 0.46 for 3<sup>rd</sup> question, 0.80 for 4<sup>th</sup> question, and 0.63 for 5<sup>th</sup> question) were higher when compared to the pre-test knowledge

**Table (16): Comparison of mean scores between knowledge questions related to edema pre- and post the test**

<i><b>Edema (Swelling) Questions</b></i>	<i><b>Pre-test</b></i>		<i><b>Post-test</b></i>	
	<i><b>Mean score</b></i>	<i><b>Ass.</b></i>	<i><b>Mean score</b></i>	<i><b>Ass.</b></i>
1.What are the normal physiological causes that may lead to edema (fluid retention or swelling) during pregnancy?	0	Poor	0.76	Good
2. Which of the following symptoms is considered a serious warning sign that requires immediate medical attention during pregnancy?	0.32	Poor	0.82	Good
3. Why is swelling in only one leg during pregnancy considered a sign that requires medical concern?	0.01	Poor	0.46	Poor

4. Which of the following actions is not recommended for relieving edema (fluid retention) during pregnancy?	0.01	Poor	0.8	Good
5. What is the accurate description of pitting edema?	0.02	Poor	0.63	Moderate

Mean score: Poor<50% (<0.5 mean score), Moderate 50%-<75% (0.5-<0.75 mean score), and Good  $\geq$ 75% ( $\geq$ 0.75 mean score).

In **Table 17**, the results found that knowledge questions related to low fetal movement have mean score (1 for 1<sup>st</sup> question, 0.93 for 2<sup>nd</sup> question, 1 for 3<sup>rd</sup> question, 0.45 for 4<sup>th</sup> question, 0.83 for 5<sup>th</sup> question, and 0.94 for 6<sup>th</sup> question) were higher when compared to the pre-test knowledge

**Table (17): Comparison of mean scores between knowledge questions related to low fetal movement pre- and post the test**

<i>low fetal movement Questions</i>	<i>Pre-test</i>		<i>Post-test</i>	
	<i>Mean score</i>	<i>Ass.</i>	<i>Mean score</i>	<i>Ass.</i>
1. When do most women start feeling the baby's movements for the first-time during pregnancy?	0.04	Poor	1	Good
2. Which of the following patterns is considered normal regarding fetal movement during pregnancy?	0.45	Poor	0.93	Good
3. Which of the following is a natural cause of decreased fetal movement during pregnancy?	0.91	Good	1	Good
4. Which of the following risks may affect the mother due to fever during pregnancy, except?	0	Poor	0.45	Poor

5. What is the correct way to monitor fetal movement during pregnancy?	0.02	Poor	0.83	Good
6. What is one appropriate method to manage cases of decreased fetal movement during pregnancy?	0.45	Poor	0.94	Good

Mean score: Poor<50% (<0.5 mean score), Moderate 50%-<75% (0.5-<0.75 mean score), and Good  $\geq$ 75% ( $\geq$ 0.75 mean score).

In **Table 18**, the results found that knowledge questions related to feeling sick, tired, and exhausted during pregnancy have mean score (0.68 for 1<sup>st</sup> question, 0.91 for 2<sup>nd</sup> question, 0.62 for 3<sup>rd</sup> question, 0.94 for 4<sup>th</sup> question, 1.0 for 5<sup>th</sup> question, and 1.0 for 6<sup>th</sup> question) were higher when compared to the pre-test knowledge

**Table (18): Comparison of mean scores between knowledge questions related to feeling sick, tired, and exhausted during pregnancy pre- and post the test**

<i>feeling sick, tired, and exhausted during pregnancy Questions</i>	<i>Pre-test</i>		<i>Post-test</i>	
	<i>Mean score</i>	<i>Ass.</i>	<i>Mean score</i>	<i>Ass.</i>
1. What is the main reason behind the natural feeling of fatigue during pregnancy?	0.03	Poor	0.68	Moderate
2. Which of the following conditions is the most common and causes excessive fatigue during pregnancy?	0.45	Poor	0.91	Good
3. What is a sign that indicates the need to seek medical attention due to fatigue during pregnancy?	0.04	Poor	0.62	Moderate
4. When does morning sickness usually occur during pregnancy?	0.52	Moderate	0.94	Good

5. Which of the following is a sign of severe morning sickness (hyperemesis gravidarum) that requires immediate treatment?	0.95	Good	1	Good
6. What is the appropriate advice to help relieve natural fatigue during pregnancy?	0.97	Good	1	Good

Mean score: Poor<50% (<0.5 mean score), Moderate 50%-<75% (0.5-<0.75 mean score), and Good  $\geq$ 75% ( $\geq$ 0.75 mean score).

The results revealed that there were a statistically significant differences between pre- and post-test knowledge (P-value <0.05). This explains that all main domains in post-test have higher mean score compared to pre-test. As illustrated in **Table 19**.

**Table (19): Comparison of mean scores between knowledge domains for pre- and post the test**

<i>Knowledge domains</i>	<i>Pre-test</i>		<i>Post-test</i>		<i>P-value</i>
	<i>Mean <math>\pm</math> SD</i>	<i>Ass.</i>	<i>Mean <math>\pm</math> SD</i>	<i>Ass.</i>	
<i>Vaginal Bleeding Questions</i>	0.53 $\pm$ 0.30	Moderate	0.90 $\pm$ 0.08	Good	<b>0.008</b>
<i>Headache Questions</i>	0.50 $\pm$ 0.39	Moderate	0.79 $\pm$ 0.21	Good	<b>0.012</b>
<i>Seizures (Epilepsy) Questions</i>	0.27 $\pm$ 0.26	Poor	0.83 $\pm$ 0.12	Good	<b>0.006</b>
<i>Severe Abdominal Pain Questions</i>	0.50 $\pm$ 0.35	Moderate	0.90 $\pm$ 0.10	Good	<b>0.049</b>
<i>Fever Questions</i>	0.26 $\pm$ 0.24	Poor	0.85 $\pm$ 0.12	Good	<b>&lt;0.001</b>
<i>Edema (Swelling) Questions</i>	0.07 $\pm$ 0.14	Poor	0.69 $\pm$ 0.15	Moderate	<b>&lt;0.001</b>
<i>Low Fetal Movement Questions</i>	0.31 $\pm$ 0.30	Poor	0.86 $\pm$ 0.21	Good	<b>0.007</b>

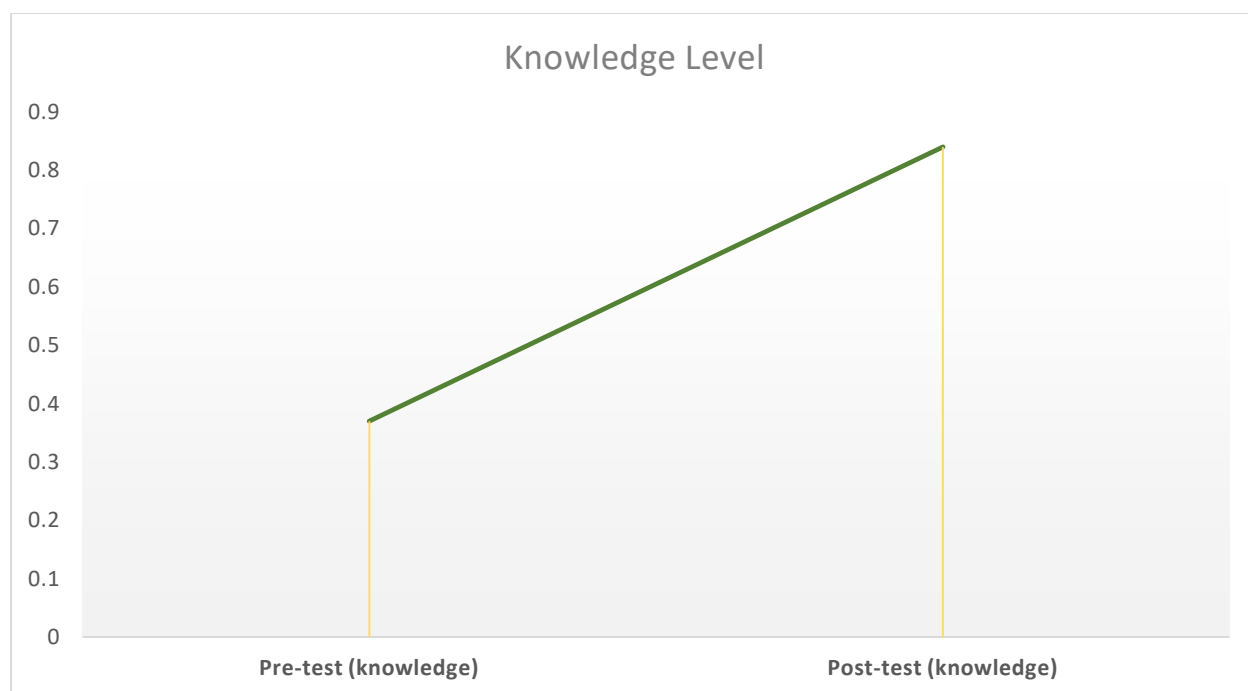
<b><i>Feeling Sick, Tired, and Exhausted during pregnancy Questions</i></b>	<i>0.49±0.41</i>	<i>Poor</i>	<i>0.86±0.17</i>	<i>Good</i>	<b><i>0.020</i></b>
<b><i>Overall Knowledge Questions</i></b>	<i>0.37±0.16</i>	<i>Poor</i>	<i>0.84±0.07</i>	<i>Good</i>	<b><i>&lt;0.001</i></b>

Mean score: Poor<50% (<0.5 mean score), Moderate 50%-<75% (0.5-<0.75 mean score), and Good ≥75% (≥0.75 mean score).

In **Table 21 and figure 1**, the current study found that all participants (100%) have a poor level of knowledge in pre-test stage. While in post-test stage, 69.4% of the primigravida have good knowledge level, and 30.6% of the participants have a moderate knowledge level.

**Table (20): The distribution of the primigravida according to levels of knowledge**

<b><i>Knowledge Level</i></b>	<b><i>Pre-test</i></b>		<b><i>Post-test</i></b>	
	<b><i>No.</i></b>	<b><i>%</i></b>	<b><i>No.</i></b>	<b><i>%</i></b>
<i>Poor (&lt;22 score)</i>	<i>98</i>	<i>100.0</i>	<i>0</i>	<i>0.0</i>
<i>Moderate (22-&lt;33 score)</i>	<i>0</i>	<i>0.0</i>	<i>30</i>	<i>30.6</i>
<i>Good (≥ 33 score)</i>	<i>0</i>	<i>0.0</i>	<i>68</i>	<i>69.4</i>



The results found that there were a statistically significant association between total knowledge score (pre-test stage) and some socio-demographic variables such as level of education, and occupation status, and economic status (P-value <0.05). This explains that the participants have high education, and employed, and high economic status tend to high knowledge levels. As shown in **Table 22**.

**Table (22): Simple Linear regression to identify the association between total knowledge score (pre-test stage) and socio-demographic variables**

<i>Pre-test Knowledge</i>							
<i>Model</i>	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>P-value</i>	<i>95.0% Confidence Interval for B</i>	
	<i>B</i>	<i>SE</i>	<i>Beta</i>			<i>Lower Bound</i>	<i>Upper Bound</i>

<i>Age (Older age)</i>	<i>0.101</i>	<i>0.072</i>	<i>0.140</i>	<i>1.389</i>	<i>0.168</i>	<i>-0.043</i>	<i>0.245</i>
<i>Level of Education (high education)</i>	<i>0.446</i>	<i>0.163</i>	<i>0.269</i>	<i>2.735</i>	<b><i>0.007</i></b>	<i>0.122</i>	<i>0.769</i>
<i>Occupation status (Employed)</i>	<i>1.329</i>	<i>0.317</i>	<i>0.393</i>	<i>4.192</i>	<b><i>&lt;0.001</i></b>	<i>0.700</i>	<i>1.958</i>
<i>Economic Status (high)</i>	<i>1.252</i>	<i>0.430</i>	<i>0.285</i>	<i>2.910</i>	<b><i>0.004</i></b>	<i>0.398</i>	<i>2.107</i>
<i>Residency (Urban)</i>	<i>-0.781</i>	<i>0.565</i>	<i>-0.140</i>	<i>-1.383</i>	<i>0.170</i>	<i>-1.902</i>	<i>0.340</i>
<i>Trimester of Current Pregnancy (third)</i>	<i>-0.637</i>	<i>0.419</i>	<i>-0.153</i>	<i>-1.521</i>	<i>0.132</i>	<i>-1.469</i>	<i>0.195</i>
<i>Do you currently receive regular prenatal care visits</i>	<i>-1.075</i>	<i>1.289</i>	<i>-0.085</i>	<i>-.834</i>	<i>0.406</i>	<i>-3.633</i>	<i>1.483</i>

The results found that there were non-statistically significant association between total knowledge score (post-test stage) and socio-demographic variables (P-value >0.05). As shown in **Table 23**.

**Table (23): Simple Linear regression to identify the association between total knowledge score (post-test stage) and socio-demographic variables**

<i>Post-test Knowledge</i>							
<i>Model</i>	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>P-value</i>	<i>95.0% Confidence Interval for B</i>	
	<i>B</i>	<i>SE</i>	<i>Beta</i>			<i>Lower Bound</i>	<i>Upper Bound</i>
<i>Age (Older age)</i>	<i>0.636</i>	<i>0.533</i>	<i>0.121</i>	<i>1.193</i>	<i>0.236</i>	<i>-0.422</i>	<i>1.694</i>

<i>Level of Education (high education)</i>	<i>0.014</i>	<i>0.274</i>	<i>0.005</i>	<i>0.050</i>	<i>0.960</i>	<i>-0.530</i>	<i>0.558</i>
<i>Occupation status (Employed)</i>	<i>0.009</i>	<i>0.558</i>	<i>0.002</i>	<i>0.016</i>	<i>0.987</i>	<i>-1.099</i>	<i>1.117</i>
<i>Economic Status (high)</i>	<i>-0.050</i>	<i>0.727</i>	<i>-0.007</i>	<i>-0.068</i>	<i>0.946</i>	<i>-1.493</i>	<i>1.393</i>
<i>Residency (Urban)</i>	<i>-0.395</i>	<i>0.923</i>	<i>-0.044</i>	<i>-0.428</i>	<i>0.670</i>	<i>-2.226</i>	<i>1.437</i>
<i>Trimester of Current Pregnancy (third)</i>	<i>0.130</i>	<i>0.687</i>	<i>0.019</i>	<i>0.189</i>	<i>0.850</i>	<i>-1.233</i>	<i>1.493</i>
<i>Do you currently receive regular prenatal care visits</i>	<i>0.340</i>	<i>2.094</i>	<i>0.017</i>	<i>0.162</i>	<i>0.871</i>	<i>-3.817</i>	<i>4.497</i>

## DESCUSSION

An evaluation of the impact of structured educational sessions on knowledge of symptoms that indicate a serious problem during pregnancy received very positive results. Table 19, Table 20, and Figure 1 have compiled the collected data in such a way as to demonstrate clearly the overall success of the structure instructional format. The analysis indicates that the instructional sessions resulted in improvements that were statistically significant ( $p < .05$ ) and clinically meaningful compared to baseline measures prior to participation in the program.

The most notable finding was the dramatic difference from having an absence of knowledge previously to having the vast majority of participants who completed the instructional program leave the program with a knowledge level that is substantially greater than what they had prior to taking part in this research project. Prior to taking



part in this study, all (100%) participants were classified as having "Poor" knowledge levels; this number dropped to nothing after the completion of the instruction. Of the participants completing the program, 69.4% left with a "Good" knowledge level while 30.6% were classified as having a "Moderate" knowledge level. This transfer of knowledge from no knowledge to a very high level of knowledge indicates a great need for education for women who are pregnant for the first time and the ability of a well-organized instructional format to provide that education to them.

**Significance of Increased Knowledge Across All Clinical Domains:** In Table 19, we can see that participants showed improvement in all four specific knowledge domains; However, prior to taking part in this study, primigravida participants demonstrated an overall limited understanding in four areas of concern (Edema, Fever, Seizures/Eclampsia, Fetal Movement). The lowest pretest mean scores were recorded in these four domains (Edema,  $0.07 \pm 0.14$ ; Fever,  $0.26 \pm 0.24$ ; Seizures/Eclampsia,  $0.27 \pm 0.26$ ; Fetal Movement,  $0.31 \pm 0.30$ ).

Following intervention, statistically significant gains in mean domains' score were evidenced by all means (all p values < .05). Areas with the largest initial deficits experienced the most significant improvement. The knowledge score for Edema increased almost tenfold ("Poor" to "Moderate") ( $0.69 \pm 0.15$ ). Knowledge of Fever and Seizures moved from "Poor" to "Good" (0.85 & 0.83 respectively). Vaginal Bleeding and Severe Abdominal Pain reached excellent mean post-test scores (0.90) indicating a mastery level of these two content areas. The overall mean score for knowledge increased from "Poor" (0.37) to "Good" (0.84).

## 5.2. Discussion of the Integrated Results in Comparison with Existing Literature

The universally poor baseline knowledge noted in this research corresponds with a large number of systematic reviews conducted internationally; feedback from authors such as Bolarinwa et al., (2023), frequently highlight the major gaps in knowledge regarding obstetric danger signs experienced by first-time mothers (primigravida) throughout both low-resource and high-resource settings. Our finding of 100% "Poor" knowledge at baseline further emphasizes the challenges faced globally and the heightened risk of complications associated with the first-time mother's lack of experiential learning from her first pregnancy.

The significant increase in mean knowledge post-intervention demonstrated in this research supports the efficacy established in previous research studies, specifically for structured, participatory antenatal education programmes. The findings strongly

reinforce the results of a meta-analysis by Okafor and colleagues (2023) demonstrating that focused education interventions are.

## Conclusion

The educational program was a very successful way to increase understanding of pregnancy danger signs among first time mothers. Knowledge scores averaged improved from 0.37 (Low) to 0.84 (Above Average). The areas where improvements in knowledge were greatest to including seizures/eclampsia, fevers, and movements of the fetus. The educational program also provided a means by which to address the differences in knowledge between the women with educational and economic backgrounds that previously existed.

**Recommendations:** Integrate the educational program as a required component of all routine antenatal visits and make it available to all women with particular emphasis on abnormal signs and symptoms such as seizures/eclampsia; fetal movement monitoring; and pathological swelling of the extremities. Also study the retention of the knowledge gained from this program over time and how that knowledge affects the way women respond to danger signs they may encounter during their pregnancies.

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