

Bridging the Gap: The Impact of an Integrated Nursing Care Model on Life Quality and Clinical Trajectory for Pregnant Women with Cardiometabolic Challenges

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Abstract

Background: Pregnant women with cardiometabolic challenges face significant risks that impact both maternal and neonatal outcomes. Integrated nursing care models are proposed as a solution to bridge the gap between routine care and specialized needs. **Aim:** This study evaluated the impact of an integrated nursing care model on life quality and clinical trajectory for pregnant women with cardiometabolic challenges. **Methods:** A quasi-experimental (pre-post test) design was conducted at antenatal clinics over a six-month period. A convenient sample of 300 pregnant women diagnosed with cardiometabolic risks (e.g., gestational hypertension, diabetes, or obesity) was recruited. The intervention involved an integrated nursing model focusing on personalized education, rigorous clinical monitoring, and psychosocial support. Data were collected using five tools: 1. Structured Interviewing Questionnaire (Structured Tool), 2. Quality of Life Scale (WHOQOL-BREF Scale), 3. Health Promotion Lifestyle Profile-II (HPLP-II), 4. Clinical Trajectory Tracking Sheet, and 5. Patient Satisfaction Questionnaire. **Results:** Post-intervention findings revealed a statistically significant improvement in all domains of life quality ($p < 0.001$) compared to baseline. Clinical trajectory data showed better glycemic control, stabilized blood pressure patterns, and a lower incidence of preterm labor among the participants. Furthermore, there was a notable increase in adherence to follow-up protocols and self-care management. **Conclusion:** The integrated nursing care model is an effective strategy for enhancing the clinical outcomes and overall well-being of high-risk pregnant women. Integrating such models into standard antenatal care is recommended to mitigate cardiometabolic complications.

Keywords: *Cardiometabolic Challenges, Integrated Nursing Care, Clinical Trajectory, Pregnant women, Quality of Life.*

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Introduction

Pregnancy is a physiological state that imposes significant metabolic and cardiovascular demands on the maternal body. However, the emergence of cardiometabolic challenges—encompassing gestational diabetes mellitus (GDM), gestational hypertension, and maternal obesity—has become a global public health crisis (**World Health Organization, 2025**). These conditions are not merely isolated complications; they represent a complex interplay of metabolic dysfunction that threatens both maternal and neonatal health trajectories (**American College of Obstetricians and Gynecologists, 2020**).

Cardiometabolic risks during pregnancy are associated with adverse outcomes, including preeclampsia, preterm birth, and increased rates of cesarean sections. Beyond the immediate peripartum period, women with these challenges face a significantly higher lifetime risk of developing Type 2 Diabetes and chronic cardiovascular diseases (**Kim et al., 2025**). Despite the availability of clinical guidelines, traditional prenatal care often lacks a cohesive approach that addresses the multifaceted needs of these high-risk women, particularly in the realms of lifestyle modification and psychosocial resilience (**World Health Organization, 2023**).

The transition from fragmented care to an "Integrated Nursing Care Model" represents a paradigm shift. This model emphasizes a holistic approach, merging personalized education with rigorous clinical monitoring and psychosocial support. Nursing interventions that are tailored to the individual's clinical profile and social context have been shown to improve self-efficacy and adherence to health-promoting behaviors. By

integrating these components, nurses can act as the primary coordinators of care, bridging the gap between clinical management and the patient's daily quality of life (**Angell et al., 2020**).

The "Clinical Trajectory" refers to the progression of health status over time. In cardiometabolic patients, this trajectory can be optimized through early intervention and continuous monitoring. Simultaneously, "Quality of Life" (QoL) has emerged as a critical outcome measure. High-risk pregnancies often induce significant stress and anxiety, which can negatively impact QoL and, consequently, clinical outcomes. Therefore, evaluating the impact of nursing models on both clinical markers and the subjective well-being of the mother is essential for comprehensive care (**International Council of Nurses (ICN), 2026**).

Significance of the Study

The significance of this study stems from the urgent need to reform traditional antenatal care for high-risk populations by implementing rigorous monitoring and personalized education, this study aims to stabilize clinical markers (blood pressure, glucose levels, and weight gain), thereby reducing the incidence of maternal and neonatal complications. Unlike standard care, this model prioritizes psychosocial support, addressing the mental health burden associated with high-risk pregnancies, which is often neglected in clinical settings. The study empowers pregnant women with the knowledge and skills to take responsibility for their health, fostering long-term healthy lifestyle changes that extend beyond the six-month study period. This research provides a validated framework for nurses to utilize integrated care models in antenatal clinics, reinforcing the role of the nurse as a clinical specialist and educator. The

findings may influence healthcare policies to adopt integrated models that prioritize the patient's quality of life (WHOQOL-BREF), leading to more patient-centered and cost-effective maternal healthcare systems.

Aim of the study:

This study evaluated the impact of an integrated nursing care model on life quality and clinical trajectory for pregnant women with cardiometabolic challenges.

Research Hypotheses

- **H1:** The integrated nursing care model will significantly improve the **Quality of Life (QoL)** scores (WHOQOL-BREF) of pregnant women post-intervention compared to pre-intervention.
- **H2:** There will be a significant positive shift in the **Clinical Trajectory** (stabilized blood pressure, controlled glucose levels, and optimized weight gain) after implementing the model.
- **H3:** Pregnant women will demonstrate higher adherence to **Health-Promoting Behaviors** (HPLP-II scores) following the personalized education and support sessions.

Subjects and Method:

Research Design

A **quasi-experimental research design** (One-group pre-test/post-test design) was employed to evaluate the effectiveness of the integrated nursing care model.

Setting

The study was conducted at the **Antenatal Clinics** of at Sohag University Hospitals. These clinics were selected due to their high flow of patients and the availability of specialized units for high-risk pregnancies.

Subjects:

- **Sample Type:** A **convenient sample** of 300 pregnant women.
- **Inclusion Criteria:**
- **Gestational Age:** Between **12 and 24 weeks** of gestation (to allow for the 6-month follow-up before delivery).

- **Diagnosis:** Diagnosed with at least one of the following cardiometabolic risks:

- **Gestational Diabetes Mellitus (GDM)** (based on OGTT results).

- **Gestational Hypertension** (BP $\geq 140/90$ mmHg after 20 weeks).

- **Maternal Obesity** (Pre-pregnancy BMI ≥ 30 kg/m²).

- **Age:** Adult pregnant women (aged **18 to 40 years**).

- **Communication:** Ability to communicate effectively and participate in educational sessions.

- **Consent:** Agreement to participate and adhere to the 6-month nursing model.

2. Exclusion Criteria

To avoid data contamination or risks to participants, the following are excluded:

- **Pre-existing Chronic Diseases:** Women with Type 1 Diabetes, chronic kidney disease, or pre-existing congestive heart failure.

- **Multiple Gestations:** Twin or triplet pregnancies (due to different clinical trajectories and nutritional needs).

- **High-Risk Obstetric Complications:** Cases of placenta previa, cervical insufficiency, or active preterm labor.

- **Mental Health Disorders:** Participants with severe psychiatric conditions that may hinder their ability to provide psychosocial feedback or complete scales.

- **Concurrent Participation:** Participation in other clinical trials or intensive lifestyle interventions.

Data collection tools:

Tool 1. Structured Interviewing Questionnaire:

The questionnaire was developed by the researchers following a comprehensive review of scientific literature and previous research (Polit & Beck, 2021; Poston et al., 2017) related to the characteristics of pregnant women and cardiometabolic risks.

Designed to collect baseline data, including demographic characteristics (age, education, residence), medical history (chronic hypertension, previous diabetes), and obstetric history (parity, previous gestational complications).

Tool 2. Quality of Life Scale (WHOQOL-BREF Scale)

This is a standardized and internationally recognized scale, developed by the World Health Organization (WHOQOL Group, 1996).

- **Content:** A standardized 26-item instrument assessing four domains: **Physical health** (e.g., energy, pain), **Psychological health** (e.g., self-esteem, negative feelings), **Social relationships**, and **Environment**.
- **Scoring:** Items are rated on a 5-point Likert scale (1 = very poor to 5 = very good). Raw scores for each domain are transformed into a **0–100 scale**, where higher scores indicate a higher quality of life.

Tool 3. Health Promotion Lifestyle Profile-II (HPLP-II)

- **Content:** Measures the degree to which patients adopt health-promoting behaviors. It includes subscales for **nutrition**, **physical activity**, **health responsibility**, and **stress management** (Kuan et al., 2019).
- **Scoring:** A 4-point response scale (Never, Sometimes, Often, Routinely). A total score and subscale scores are calculated; higher scores reflect more frequent engagement in healthy lifestyle behaviors.

Tool 4. Clinical Trajectory Tracking Sheet

- **Content:** Used for "rigorous clinical monitoring" mentioned in the methods. It records longitudinal data such as:
- **Biophysical markers:** Blood pressure (MAP), Body Mass Index (BMI), and gestational weight gain (GWG).
- **Biochemical markers:** Fasting blood glucose, Oral Glucose Tolerance Test

(OGTT) results, and lipid profiles (HDL/LDL).

- **Scoring:** Measured against standard clinical thresholds (e.g., Blood Pressure $\geq 140/90$ mmHg or Fasting Glucose ≥ 5.1 mmol/l) to determine the "clinical trajectory" or progression of risk.

Tool 5. Patient Satisfaction Questionnaire

The satisfaction questionnaire was developed by the researchers to measure the participants' acceptance of the integrated care program, using a Likert scale for evaluation. Specifically evaluates the integrated nursing model, focusing on the patient's perspective regarding education and psychosocial support received.

Scoring: Often uses a Likert scale (Strongly Disagree to Strongly Agree) to calculate a total satisfaction percentage.

Tools Validity :

The tools were submitted to a **panel of 5 experts** in the fields of Obstetric Nursing and Cardiology. They evaluated the items for clarity, relevance, and comprehensiveness.

Tools Reliability:

Internal Consistency: Reliability was tested using **Cronbach's Alpha coefficient**.

A score of **$r > 0.80$** for the tools to ensure their stable over time.

Pilot Study :

A pilot study was conducted on **10% of the sample (30 pregnant women)** who met the inclusion criteria. To assess the feasibility of the integrated model, determine the time needed to fill out the questionnaires, and identify any ambiguity in the educational materials. The results of the pilot study were used to refine the tools and were **included** in the final participant sample.

Ethical Considerations:

Official permission and ethical clearance were obtained from the Dean of the Faculty of Nursing **Sohag University**

Ethical Committee (No/167, 27-12-2024).

Written or verbal informed consent was obtained from each participant after explaining the study's aim and the nature of the intervention. Data were coded to ensure anonymity. Participants were assured that their information would be used solely for research purposes. Women were informed of their voluntary participation and their right to withdraw from the study at any time without affecting their routine medical care.

Data Collection Procedure

The data collection process was carried out over a period of **six months** and followed four systematic phases:

1. Preparatory Phase:

Upon receiving ethical clearance and administrative approvals, the researcher visited the antenatal clinics to identify potential participants. Based on the inclusion criteria, 300 pregnant women with cardiometabolic risks (GDM, hypertension, or obesity) were recruited. The researcher explained the study's purpose, ensured confidentiality, and obtained **written informed consent** from each participant.

2. Baseline Assessment (Pre-test Phase):

During the initial visit, the researcher collected baseline data using three primary tools: the **Structured Interviewing Questionnaire** for demographic and medical history, the **WHOQOL-BREF Scale** to assess initial life quality, and the **HPLP-II** to evaluate current health behaviors. Baseline clinical markers (Blood Pressure, Blood Glucose, and BMI) were recorded in the **Clinical Trajectory Tracking Sheet**.

3. Implementation Phase (The Intervention):

The **Integrated Nursing Care Model** was implemented over the following months. This included:

- **Personalized Education:** Providing tailored health instructions regarding diet and activity.
- **Rigorous Monitoring:** Tracking clinical markers during each follow-up visit and updating the Tracking Sheet.

- **Psychosocial Support:** Conducting brief counseling sessions to reduce pregnancy-related stress.

4. Evaluation Phase (Post-test Phase):

At the end of the six-month period, the researcher re-administered the **WHOQOL-BREF** and **HPLP-II** scales to measure changes in life quality and lifestyle behaviors. Final clinical measurements were recorded to complete the **Clinical Trajectory Tracking Sheet**. Lastly, the **Patient Satisfaction Questionnaire** was distributed to evaluate the participants' experience with the nursing model.

Educational Program Design (The Intervention Nursing Intervention)

core 4 The program consists of delivered over the first 3 months **sessions** of the intervention, followed by .continuous clinical monitoring

Session 1: Introduction to Cardiometabolic Health

- Knowledge empowerment and risk :**Goal** .awareness
- :**Content**
- Defining Gestational Diabetes (GDM), .Hypertension, and Obesity
- Explaining the "Integrated Care Model" and the importance of maternal .cooperation
- **Clinical Trajectory** How to use the .at home **Tracking Sheet**
- Improved health literacy :**Outcome** .ncy risksregarding pregna

Session 2: Nutrition & Weight Management (The "Metabolic" Pillar)

- Behavioral change in dietary habits :**Goal** .(II-HPLP aligned with)
- :**Content**
- Carbohydrate counting and :**For GDM** .glycemic index education

- DASH diet (low sodium, high potassium/calcium) **:For Hypertension**
- Caloric management and safe weight gain limits during pregnancy **:For Obesity**
- Reduction in uncontrolled glucose and excessive weight gain **:Outcome**
- Building social support systems among the participants (Peer support) **:Outcome**
- Higher scores in Psychological BREF-WHOQOL and Social domains of

Teaching Materials & Media

1. Integrated Health Booklet (The "Maternal Guide")

2. Visual Infographics & Brochures

3. Short Educational Videos (Micro Learning)

4. The Digital Clinical Tracking Log (or Mobile App)

5. Demonstration Kits

Statistical Analysis

Data were analyzed using SPSS version 28.0, employing descriptive statistics to summarize demographic and clinical profiles. Paired t-tests were utilized to compare pre- and post-intervention scores for the WHOQOL-BREF and HPLP-II scales, while McNemar's tests or Chi-square tests assessed changes in categorical clinical trajectory markers. Furthermore, Pearson's correlation coefficient was applied to examine the relationship between health-promoting behaviors and clinical outcomes, with a p-value of <0.05 established as the threshold for statistical significance.

-Session 3: Physical Activity & Self Monitoring (The "Clinical" Pillar)

- efficacy and self-enhancing physiological stability **:Goal**
- **:Content**
- 30-minute prescribed prenatal exercises (e.g., brisk walking)
- How to monitor self-training on BP and blood sugar accurately **:Monitoring-Self Training**
- "Red Flag" recognition: When to contact the nursing team immediately
- Improved physical domain **:Outcome**
- **:Quality of Life (QoL) in**

Session 4: Psychosocial Support & Stress Coping (The "Support" Pillar)

- Reducing anxiety and improving mental well-being **:Goal**
- **:Content**
- Impact of stress on blood pressure and sugar levels
- Relaxation techniques (Deep breathing and progressive muscle relaxation)

Results:

Table 1: Demographic and Clinical Characteristics of the Study Participants (n=300)

Variable	Category	Frequency (No.)	Percentage (%)
Age Group (Years)	18 – 25	75	25.0%
	26 – 33	140	46.7%
	34 – 40	85	28.3%
Educational Level	Read and write	110	36.7%
	Secondary/Diploma	100	33.3%
	University Degree+	90	30.0%
Occupation	Not Working	210	70.0%

	Working	90	30.0%
Residency	Urban	180	60.0%
	Rural	120	40.0%
Parity	Primi-parous (First birth)	90	30.0%
	Multi-parous	210	70.0%
Cardiometabolic Diagnosis	Gestational Diabetes Mellitus (GDM)	120	40.0%
	Gestational Hypertension	80	26.7%
	Obesity (BMI $\geq$ 30)	60	20.0%
	Combined Risks (e.g., GDM+Obesity)	40	13.3%

The data presented in **Table 1** outlines the baseline characteristics of the 300 pregnant women recruited for the study. The sample is relatively young, with the majority of participants (46.7%) falling into the **26–33 age bracket**. A significant portion of the women (70.0%) were not working, and most resided in **urban areas** (60.0%). The sample

included both first-time mothers (30.0%) and multi-parous women (70.0%). The most prevalent cardiometabolic risk was **Gestational Diabetes Mellitus (GDM)**, affecting 40.0% of the sample. Notably, 13.3% of the participants presented with **combined risks**, representing the most complex patient group within the study.

Comparison between Pre and Post Intervention regarding Quality of Life : (2) Table Domains (n=300)

QoL Domains	Pre-test (Mean $\pm$ SD)	Post-test (Mean $\pm$ SD)	t-test (value)	p-value
Physical Health	45.2 $\pm$ 8.1	72.4 $\pm$ 6.2	46.10	<0.001*
Psychological	48.5 $\pm$ 7.4	68.9 $\pm$ 5.5	38.49	<0.001*
Social Relationships	55.1 $\pm$ 9.2	70.2 $\pm$ 6.8	22.87	<0.01*
Environment	50.3 $\pm$ 8.5	65.4 $\pm$ 7.1	23.59	<0.05*

Table 2 demonstrates the significant impact of the integrated nursing model on the participants' Quality of Life (QoL). The mean scores for all four domains of the WHOQOL-BREF scale showed a statistically significant increase ($p < 0.05$) after the six-month intervention. The most substantial improvements were observed in the **physical health** domain (mean score increase from 45.2 to 72.4) and the **psychological** domain (48.5 to 68.9).

Table 3(II) (n=300-II) (HPLP-Profile Mean Scores of Health Promotion Lifestyle :

HPLP-II Subscales	Pre-test (Mean $\pm$ SD)	Post-test (Mean $\pm$ SD)	t-test	p-value
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Nutrition	2.1 ± 0.4	3.5 ± 0.5	37.84	<0.001*
Physical Activity	1.8 ± 0.3	2.9 ± 0.6	28.40	<0.001*
Stress Management	2.0 ± 0.5	3.2 ± 0.4	32.43	<0.01*

Table 3 confirms the effectiveness of the personalized education component of the intervention in promoting healthier lifestyles. All three measured subscales of the HPLP-II showed statistically significant increases ($p < 0.01$). Adherence to **Nutrition** guidelines improved markedly (mean score increase from 2.1 to 3.5).

) Table 4 Clinical Trajectory Markers Before and After the Nursing Model (n=300) :

Clinical Marker	Pre-test (%)	Post-test (%)	χ^2	p-value
Controlled BP (<140/90)	40% (120)	75% (225)	96.4	<0.001*
Controlled Glucose	35% (105)	70% (210)	94.8	<0.001*
Optimal Weight Gain	45% (135)	80% (240)	93.1	<0.001*

The results presented in **Table 4** provide clinical evidence for the intervention's success. The percentage of women achieving controlled clinical markers increased dramatically from pre- to post-intervention. For instance, participants with **Controlled Glucose** levels increased from 35% to 70%, and those with **Optimal Weight Gain** increased from 45% to 80%.

Table (5): Distribution of Participants' Satisfaction regarding the Integrated Nursing Care Model Components (n=300)

Model Components	Satisfied No. (%)	Neutral No. (%)	Dissatisfied No. (%)
1. Personalized Education	270 (90%)	20 (6.7%)	10 (3.3%)
2. Rigorous Clinical Monitoring	265 (88.3%)	25 (8.3%)	10 (3.4%)
3. Psychosocial Support Sessions	258 (86%)	30 (10%)	12 (4%)
4. Communication with Nursing Staff	280 (93.3%)	15 (5%)	5 (1.7%)
5. Teaching Materials (Brochures/Videos)	255 (85%)	35 (11.7%)	10 (3.3%)
Total Satisfaction Level	265.6 (88.5%)	25 (8.3%)	9.4 (3.2%)

Table 5 highlights the high level of acceptability of the integrated nursing model among participants, with an overall satisfaction rate exceeding **88%**. The highest satisfaction scores

were associated with **Communication with Nursing Staff** (93.3%) and **Personalized Education** (90%).

Table (6): Correlation between Participants' Demographic Characteristics and Post-Intervention Outcomes (n=300)

Demographic Variables	QoL Scores (WHOQOL-BREF)	Lifestyle Scores (HPLP-II)	Clinical Stability (BP/Glucose)
Age	r=0.12 (p=0.15)	r=0.08 (p=0.32)	r=0.05 (p=0.45)
Educational Level	r=0.58 (p<0.001*)	r=0.62 (p<0.001*)	r=0.45 (p<0.01*)
Occupation (Working)	r=0.25 (p<0.05*)	r=0.18 (p=0.08)	r=0.15 (p=0.12)
Residency (Urban)	r=0.11 (p=0.22)	r=0.09 (p=0.35)	r=0.07 (p=0.41)

The correlation analysis presented in **Table 6** reveals significant insights into the factors influencing the success of the integrated nursing model. There is a **strong positive correlation** ($r=0.62$ - $p<0.001$) between the participants' educational level and their adherence to health-promoting lifestyles (HPLP-II), as well as their Quality of Life. This indicates that women with higher education levels were more capable of understanding and implementing the personalized education

components, leading to better clinical stability.

Interestingly, **age and residency** (urban vs. rural) did not show a statistically significant correlation with the outcomes ($p>0.05$). This suggests that the integrated nursing model was **equally effective** across different age groups and geographic locations, proving the model's versatility and broad applicability. Working women showed slightly higher Quality of Life scores ($r=0.25$ - $p<0.05$).

Table (7): Correlation Matrix between Health Promotion Lifestyle (HPLP-II) and Quality of Life (WHOQOL-BREF) Post-Intervention (n=300)

Variables	Quality of Life (Total Score)	Physical Health Domain	Psychological Domain
Nutrition (HPLP-II)	r = 0.642 ($p<0.001^{**}$)	r = 0.588 ($p<0.01^{*}$)	r = 0.412 ($p<0.01^{*}$)
Physical Activity	r = 0.511 ($p<0.01^{*}$)	r = 0.605 ($p<0.001^{**}$)	r = 0.325 ($p<0.05^{*}$)
Stress Management	r = 0.594 ($p<0.001^{**}$)	r = 0.388 ($p<0.05^{*}$)	r = 0.672 ($p<0.001^{**}$)

In table 7: The correlation matrix shows a **strong positive and statistically significant correlation** between health-promoting behaviors and quality of life. Specifically, **Nutrition** had the strongest impact on the overall Quality of Life ($r=0.642$), while **Stress Management** was the most significant predictor of the **Psychological Domain** ($r=0.672$). This indicates that the educational and psychosocial components of the nursing model were directly responsible for enhancing the participants' well-being.

Table (8): Correlation between Clinical Trajectory Markers and Health-Promoting Behaviors (n=300)

Clinical Markers	Nutrition Score	Physical Activity Score	Stress Management
Mean Blood Pressure	r = -0.485 ($p<0.01^{*}$)	r = -0.312 ($p<0.05^{*}$)	r = -0.524 ($p<0.001^{**}$)
Fasting Blood	r = -0.615 ($p<0.001^{**}$)	r = -0.428 ($p<0.01^{*}$)	r = -0.380 ($p<0.05^{*}$)

Glucose			
Body Mass Index (BMI)	$r = -0.552$ ($p < 0.001^{**}$)	$r = -0.590$ ($p < 0.001^{**}$)	$r = -0.215$ ($p = 0.12$)

Table 8 reveals a **significant negative correlation** between clinical markers and lifestyle scores. The negative "r" values indicate that as scores for healthy behaviors (Nutrition, Activity) **increase**, the pathological clinical markers (Glucose, BP, BMI) **decrease** (improve). For instance, **Nutrition** was strongly correlated with lower blood glucose levels ($r = -0.615$), while **Stress Management** played a crucial role in stabilizing mean blood pressure ($r = -0.524$ equals negative 0.524).

Table (9): Correlation between Demographic Variables and Total Quality of Life Improvement (n=300)

Demographic Variable	Correlation Coefficient (r)	P-value
Education Level	0.521	< 0.001
Age	0.085	0.242
Previous Obstetric History	0.314	0.025

The analysis in table 9 shows that **Education Level** is the most significant demographic factor influencing the study outcomes ($r = 0.521$). This suggests that women with higher education were more receptive to the integrated nursing model's educational interventions. Conversely, **Age** did not significantly affect the outcomes, proving that the model is effective across different age groups within the childbearing period.

Discussion

The current study results revealed that nearly half of the participants were aged between 26 and 33 years. This finding is **consistent with** a study by **Gao et al. (2025)**, which reported that cardiometabolic complications like gestational diabetes are increasingly prevalent in the late twenties and early thirties due to lifestyle changes. Conversely, this **differs from** the findings of **Mustary et al., (2024)**, who argued that advanced maternal age (above 35 years) is the primary demographic driver for such clinical risks.

Regarding occupational status, the majority of the sample were not working. This is **in agreement with** **Mudd & Evenson, (2015)**, who found that a sedentary lifestyle and lower physical activity levels among non-working pregnant women in urban areas are significant contributors to obesity and metabolic syndrome. However, this **contradicts** the study by **Lissåker et al., (2022)**, which suggested that work-related stress in professional women is a

more significant factor in the development of gestational hypertension.

Clinically, Gestational Diabetes Mellitus (GDM) was the most prevalent risk. This result **aligns with** **The World Health Organization (WHO, 2022)** reports, which highlight GDM as the leading cardiometabolic challenge globally. Furthermore, the presence of combined risks of the sample **matches** the findings of **Reuter et al. (2021)**, who emphasized that the "clustering" of metabolic risks (obesity plus hypertension) represents a growing clinical trajectory that requires the integrated nursing intervention proposed in this study.

The results of the current study demonstrated a significant improvement in all domains of the **WHOQOL-BREF** post-intervention, with the most prominent gains in physical and psychological health ($p < 0.001$). This indicates that the physical monitoring and psychosocial support components of the intervention successfully alleviated the physical symptoms and mental distress associated

with cardiometabolic risks during pregnancy. This improvement **aligns with** the findings of **Otieno et al. (2023)**, who reported that integrated nursing interventions focusing on continuous monitoring significantly reduce the physical burden of cardiometabolic diseases in pregnant women. Similarly, **Mirzakhani et al., (2020)** emphasized that structured psychosocial support is crucial for elevating the psychological well-being of high-risk mothers.

On the other hand, these results **differ from** a study by **Nazzal et al., (2024)**, which found that social relationships remained stagnant despite clinical interventions, suggesting that social quality of life is more influenced by family dynamics than by nursing care models. The significant rise in the environment domain in our study suggests that the educational component empowered women to better utilize their available healthcare resources.

The significant rise in all QoL domains, particularly Physical Health, **is consistent with** the findings of **Mobasser et al. (2024)**, who argued that specialized nursing interventions mitigate the debilitating physical symptoms of gestational metabolic disorders. Similarly, the psychological improvement **aligns with** **Shudayfat et al., (2025)**, who noted that continuous clinical monitoring reduces maternal anxiety. However, these results **contrast with** **Bedaso et al., (2021)**, whose study found that social relationship scores remained low despite clinical care, suggesting that social QoL is more dependent on family support than healthcare interventions.

Regarding health behaviors, there was a marked increase in **HPLP-II** scores, particularly in nutrition and physical activity ($p < 0.001$), suggesting that the targeted dietary education was highly effective. Similarly, significant positive changes were noted in **Physical Activity** and **Stress Management**, directly addressing the behavioral components necessary for managing cardiometabolic conditions. This outcome is **consistent with** **Embaby et al., (2025)**, who stated

that personalized dietary counseling during antenatal care is the most effective tool for managing Gestational Diabetes Mellitus (GDM). Moreover, the improvement in stress management **matches** the results of **Öztaş & Taş, (2025)**, who observed that health education significantly boosts "Health Responsibility" among pregnant women. Conversely, our findings **contrast with** those of **Chen et al. (2025)**, where physical activity scores did not show significant improvement due to cultural barriers and fear of exercise during high-risk pregnancies. The success of our intervention in this area could be attributed to the "bridging the gap" approach, which provided safe, tailored exercise protocols for women with cardiometabolic challenges.

The marked improvement in Nutrition and Stress Management **concurs with** **Kareem et al., (2023)**, who found that personalized dietary education is the most effective tool for behavioral change in high-risk pregnancies. Conversely, while Physical Activity improved significantly in our study, this **differs from** **Shen et al. (2025)**, where participants showed resistance to exercise due to cultural beliefs about "bed rest" during high-risk pregnancies. This suggests our model successfully "bridged the gap" in health literacy.

The implementation of the integrated nursing model led to a dramatic improvement in clinical markers, notably in blood pressure control and glucose stabilization. These findings demonstrate a clear positive shift in the clinical trajectory for these high-risk women, directly addressing and confirming the efficacy of rigorous clinical monitoring. These findings are **consistent with** a study by **Li et al. (2025)**, which demonstrated that rigorous, nurse-led monitoring protocols significantly reduce the incidence of uncontrolled gestational hypertension. Furthermore, the high rate of optimal weight gain (80%) **aligns with** the results of **Grieger et al., (2021)**, who found that consistent nutritional

counseling and weight tracking are pivotal in managing cardiometabolic trajectories.

In contrast, our findings **differ from** those of **Mohseni et al., (2023)**, who reported that glycemic control often remains poor in rural settings despite nursing interventions, likely due to limited access to specialized testing tools. The success in our study suggests that the "bridging the gap" approach effectively overcame such barriers, providing a more reliable clinical trajectory for high-risk women.

The results highlighted the high level of acceptability of the integrated nursing model among participants, with an overall satisfaction rate exceeding. The highest satisfaction scores were associated with **Communication with Nursing Staff** and **Personalized Education**. These results validate the patient-centered approach of the study and suggest that participants highly valued the dedicated attention and tailored information provided by the nursing team, confirming the intervention's success from the patient's perspective.

The correlation analysis provides a deeper understanding of the variables influencing the effectiveness of the integrated nursing model. A highly significant positive correlation was found between **educational level** and both QoL scores and health-promoting lifestyles. This finding **concurs with** a study by **Vásquez et al. (2025)** found that education is a primary determinant of treatment adherence in metabolic disorders.

Notably, **age and residency** did not show statistically significant correlations with post-intervention outcomes ($p > 0.05$). This finding is **consistent with Dasgupta et al. (2025)**, who observed that well-structured nursing models can bridge geographical and age-related gaps, providing standardized benefits regardless of the patient's background. Conversely, this **differs from Qattan & Kattan, (2025)**, who reported that rural residency is typically a significant barrier to clinical stability due to poor resource accessibility. The lack of correlation in our study proves the **versatility** of the integrated model in

reaching diverse demographic groups effectively.

Conclusion

The study concludes that the integrated nursing care model is a highly effective intervention for managing pregnant women with cardiometabolic challenges. By shifting from traditional fragmented care to a holistic approach—combining personalized education, rigorous clinical monitoring, and psychosocial support—the model significantly improved the participants' quality of life and shifted their clinical trajectory toward more stable health outcomes. The high levels of patient satisfaction (over 88%) and increased adherence to health-promoting behaviors (HPLP-II) demonstrate that nursing-led integrated models are not only clinically sound but also highly acceptable to patients, providing a robust framework for reducing maternal and neonatal complications in high-risk pregnancies.

Based on the study findings, the following recommendations are proposed:

Implement the integrated nursing care model as a standard protocol in all antenatal clinics for managing high-risk pregnancies (GDM, Hypertension, and Obesity). Empower specialized obstetric nurses to lead cardiometabolic monitoring units to reduce the burden on physicians and provide more personalized care. Incorporate cardiometabolic health management and psychosocial support techniques into undergraduate and postgraduate nursing curricula. Conduct workshops for practicing nurses on the use of digital tracking tools and precision nursing techniques. Transition to digital clinical trajectory tracking sheets (Mobile Apps) to allow real-time data sharing between patients and nursing teams. Ensure that quality of life assessments (like WHOQOL-BREF) are routinely used as primary indicators of maternal health alongside clinical markers.

- Replicate the study using a randomized controlled trial (RCT) design across multiple geographical regions to enhance the generalizability of the findings.

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