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RISK FACTORS, OUTCOMES, NURSING KNOWLEDGE GAPS, AND EDUCATIONAL INTERVENTIONS IN HYPERTENSIVE DISORDERS OF PREGNANCY: A SCOOPING REVIEW

OLOYEDE, Gbeminiyi Tolani
Department of Community/Public Health Nursing,
School of Nursing Science,
Babcock University, Ilishan-Remo, Ogun State

PROF. SOWUNMI, Christiana Olanrewaju
Department of Maternal and Child Health Nursing,
School of Nursing Science,
Babcock University, Ilishan-Remo, Ogun State

Abstract

Hypertensive disorders of pregnancy (HDP) remain a significant global health challenge, contributing to maternal and neonatal morbidity and mortality. This scoping review examines the risk factors, maternal and neonatal outcomes, nursing knowledge gaps, and the effectiveness of educational interventions in managing hypertensive disorders of pregnancy. Specifically, the review identifies predictors of pregnancy-induced hypertension (PIH), assesses associated maternal and neonatal outcomes, evaluates nurses' knowledge and training gaps, and explores the impact of educational interventions on improving self-care practices among pregnant women. Following the PRISMA (2009) guidelines, a systematic literature search was conducted across PubMed, Embase, PsycINFO, CINAHL, Web of Science, and Google Scholar, focusing on studies published between 2019 and 2023. Boolean search strategies incorporating key terms related to hypertensive disorders were applied, and a rigorous selection process ensured the inclusion of relevant studies. Data extraction and synthesis were performed using structured tables and a narrative analysis approach. Findings highlight key risk factors, including maternal age, obesity, genetic predisposition, and pre-existing hypertension. PIH was associated with adverse outcomes such as preterm delivery, stillbirth, and increased caesarean section rates. Knowledge gaps among nurses were evident, underscoring the need for enhanced training. Educational interventions significantly improved self-care knowledge among pregnant women, with diverse teaching media proving effective. In conclusion, structured health education interventions and continuous nurse training are vital for mitigating hypertensive disorders in pregnancy. Future research should prioritise targeted interventions to reduce maternal and neonatal complications.

Keywords: Hypertensive disorders of pregnancy, Pregnancy-induced hypertension, Maternal and neonatal outcomes, Nursing education, Self-care interventions

Introduction

Hypertensive disorders of pregnancy (HDP) are among the leading causes of maternal and neonatal morbidity and mortality globally (Gholami et al., 2022). These disorders, which include gestational hypertension, preeclampsia, and eclampsia, significantly increase the risk of adverse pregnancy

outcomes, including preterm birth, low birth weight, and maternal complications such as stroke and organ failure (Musa et al., 2018; Savitz et al., 2014). Despite advancements in maternal healthcare, HDP remains a critical challenge, particularly in low- and middle-income countries, where healthcare access and awareness are limited (Agbeno et al., 2022). Understanding the risk factors, outcomes, nursing knowledge gaps, and the effectiveness of educational interventions is essential for improving maternal and neonatal health outcomes.

Pregnancy-induced hypertensive disorder (PIHD) is defined as a systolic blood pressure above 140 mmHg or a diastolic pressure of 90 mmHg or more, measured twice at least four hours apart, without proteinuria or end-organ dysfunction (Turbeville & Sasser, 2020). It typically occurs after the 20th week of pregnancy or postpartum and can impair organ function, including the kidneys and liver. Studies have identified positive family history, kidney disease, asthma, and gestational age as key predictors of PIHD (Gudeta et al., 2018). Globally, PIHD accounts for over 70,000 maternal deaths and 500,000 fetal deaths annually, with around four million women affected (WHO, 2011). In Nigeria, approximately 37,000 women suffer from PIHD, with high maternal and perinatal mortality linked to delayed diagnosis and inadequate treatment (Musa et al., 2018). Placental dysfunction has been implicated in preeclampsia development, further highlighting the disorder's complexity (Sandor et al., 2023).

Several risk factors contribute to the development of pregnancy-induced hypertension, including advanced maternal age, obesity, pre-existing hypertension, diabetes, and genetic predisposition (Bune, 2024; Gudeta & Regassa, 2018). Studies indicate that socio-economic status and healthcare accessibility also play a significant role in the prevalence of HDP (Adediran et al., 2013). Identifying these risk factors can aid in early diagnosis and targeted interventions to mitigate adverse outcomes. Additionally, pregnancy-induced hypertension has been associated with long-term health complications for both the mother and child, including an increased risk of cardiovascular diseases and metabolic disorders (Turbeville & Sasser, 2020).

Maternal and neonatal outcomes associated with hypertensive disorders of pregnancy vary in severity. Women with HDP are at a higher risk of developing complications such as placental abruption, hemorrhage, and multi-organ dysfunction (Sandor et al., 2023). Similarly, neonates born to mothers with hypertensive disorders often experience complications such as intrauterine growth restriction, preterm birth, and respiratory distress syndrome (WHO, 2011). These adverse outcomes underscore the necessity of timely intervention and adequate management of HDP to improve maternal and neonatal survival rates. Nurses play a pivotal role in the management of hypertensive disorders in pregnancy; however, studies have revealed gaps in their knowledge and training regarding effective HDP management (Kharbyngar & Lalhmingthang, 2021; Negasa et al., 2022). Deficiencies in understanding HDP pathophysiology, clinical assessment, and management strategies may lead to suboptimal care for affected pregnant women (Alnuaimi et al., 2019). Continuous professional development programs and updated clinical guidelines are necessary to enhance nurses' competencies and improve patient outcomes (Dsilva et al., 2022).

Educational interventions have been identified as a crucial strategy in improving knowledge and self-care practices among pregnant women with HDP (Gholami et al., 2022). Various studies highlight the effectiveness of structured health education programs, self-instructional modules, and digital learning platforms in enhancing awareness and adherence to self-care practices (Afefy & Kamel, 2019; Nguyen et al., 2023). Interventions focusing on lifestyle modifications, blood pressure monitoring, and medication adherence have shown significant improvements in maternal

and neonatal health indicators (Yeh et al., 2022). Consequently, investing in educational programs tailored to both healthcare providers and pregnant women is essential for reducing the burden of hypertensive disorders in pregnancy.

The main objective of this scoping review is to examine the risk factors, maternal and neonatal outcomes, nursing knowledge gaps, and the effectiveness of educational interventions in managing hypertensive disorders of pregnancy. Specifically, the review aims to: (1) identify the risk factors and predictors of pregnancy-induced hypertension, (2) assess maternal and neonatal outcomes associated with hypertensive disorders in pregnancy, (3) evaluate nurses' knowledge and training gaps in managing hypertensive disorders in pregnancy, and (4) determine the effectiveness of educational interventions in enhancing knowledge and self-care practices among pregnant women with hypertensive disorders.

Methodology

This scoping review follows a systematic approach to analysing the risk factors, maternal and neonatal outcomes, nursing knowledge gaps, and educational interventions related to hypertensive disorders of pregnancy over a five-year period (2019–2023). Conducted in line with the PRISMA (2009) protocol, this review follows structured guidelines encompassing background research, methods, findings, and discussion. The data retrieved from each study include the author's details, publication source, participants' demographics, study objectives, methodology, outcomes, and key findings. By evaluating commonalities and disparities among the selected studies, the review aims to provide a comprehensive synthesis of existing research on hypertensive disorders of pregnancy.

A structured data search was conducted to identify relevant literature on the risk factors, maternal and neonatal outcomes, nursing knowledge gaps, and educational interventions for hypertensive disorders in pregnancy. The researcher selected key health and social science databases, including PubMed, Embase, PsycINFO, CINAHL, Web of Science, and Google Scholar, known for their broad repository of maternal and child health studies. To refine the search, a combination of specific keywords related to hypertensive disorders of pregnancy was used. Boolean operations were applied to enhance precision, integrating search terms such as "pregnancy-induced hypertension," "preeclampsia risk factors," "maternal and neonatal outcomes of hypertension," "nursing knowledge gaps in PIH management," and "educational interventions for hypertensive pregnant women." Additionally, grey literature and expert recommendations were consulted to ensure a thorough examination of available studies. The search was restricted by language, with only English-language publications considered, and by timeframe, focusing on studies published within the past five years. A rigorous screening process was employed, first evaluating the relevance of titles and abstracts, followed by full-text reviews of potentially eligible articles. Studies that did not directly address hypertensive disorders of pregnancy or their associated risk factors, outcomes, nursing knowledge gaps, or educational interventions were excluded to maintain the study’s focus on the targeted population.

Following selection, the retrieved studies underwent critical evaluation based on predefined criteria, such as study design, population characteristics, outcome measures, and evidence quality. Extracted data were systematically organised into tables and spreadsheets for structured analysis. Narrative synthesis was then applied to compare findings across studies, identifying trends, similarities, and variations in risk factors, maternal and neonatal outcomes, nursing knowledge gaps, and educational interventions. Throughout the process, careful documentation was

maintained, including search strings, database sources, and modifications to the search strategy, ensuring transparency and replicability. The identified keywords facilitated the retrieval of studies examining preeclampsia risk factors, maternal-fetal health complications, and nursing education gaps in managing hypertensive disorders of pregnancy.

The review also assessed significant research findings related to hypertensive disorders in pregnancy. Tesfaye Abera Gudeta, Tilahun Mekonnen, and Regassa (2018) found that a positive family history of PIH, kidney diseases, asthma, and gestational age were key predictors of the disorder. WHO (2011) reported that globally, PIH contributes to over 70,000 maternal deaths and 500,000 fetal deaths annually, with approximately four million women affected. Sandor et al. (2023) highlighted the role of placental dysfunction in preeclampsia development, while Musa et al. (2018) identified delays in diagnosis and lack of access to adequate therapy as critical factors contributing to high maternal and perinatal mortality in Nigeria. Additionally, studies on nursing knowledge and training gaps emphasised the need for improved education on hypertensive disorder management, while intervention-based studies demonstrated that targeted educational programs significantly enhanced knowledge and self-care practices among pregnant women with hypertension.

To maintain methodological rigor, inclusion and exclusion criteria were carefully defined. The study applied the PICO (Population, Intervention, Comparison, Outcome) framework to guide the selection of relevant research. Primary research articles, including cross-sectional, cohort, case-control, and intervention studies, were included if they provided original data on risk factors, maternal and neonatal outcomes, nursing knowledge gaps, or educational interventions related to hypertensive disorders in pregnancy. The focus was on pregnant women diagnosed with hypertensive disorders, including gestational hypertension, preeclampsia, and eclampsia, as well as studies assessing nursing education and interventions aimed at improving knowledge and self-care practices. Studies assessing hypertensive disorders through validated tools or assessment criteria were prioritised. Additionally, the review targeted diverse populations, including urban, rural, and marginalised communities, ensuring a comprehensive analysis. Only studies published in English between 2019 and 2024 were considered to capture recent trends and practices in hypertensive disorder management.

Studies that did not meet these criteria were excluded from the review. Commentaries, editorials, conference proceedings, and case reports were omitted due to their lack of empirical data. Studies that focused solely on non-hypertensive pregnancy complications or those unrelated to nursing education and interventions were also excluded. Research failing to employ quantitative methodologies or validated tools for assessing hypertensive disorder determinants was not considered. Additionally, studies that did not specifically analyse hypertensive disorders in pregnancy or distinguish them from other medical conditions were omitted. Language restrictions led to the exclusion of non-English studies, and publications dated before 2019 were not considered to maintain relevance to contemporary research on hypertensive disorders of pregnancy. Furthermore, studies lacking full-text accessibility were excluded, as complete data were necessary for a thorough evaluation.

A multi-stage data screening process was implemented to ensure the selection of relevant studies. The process began with title screening, followed by abstract review, and ultimately, full-text evaluation of eligible articles. This step-by-step approach facilitated the identification of high-quality studies that contributed valuable insights into hypertensive disorders of pregnancy. The findings of this scoping review will contribute to understanding the risk factors, maternal and

neonatal outcomes, nursing knowledge gaps, and educational interventions related to hypertensive disorders of pregnancy, informing policy interventions and healthcare strategies to enhance maternal and neonatal health outcomes

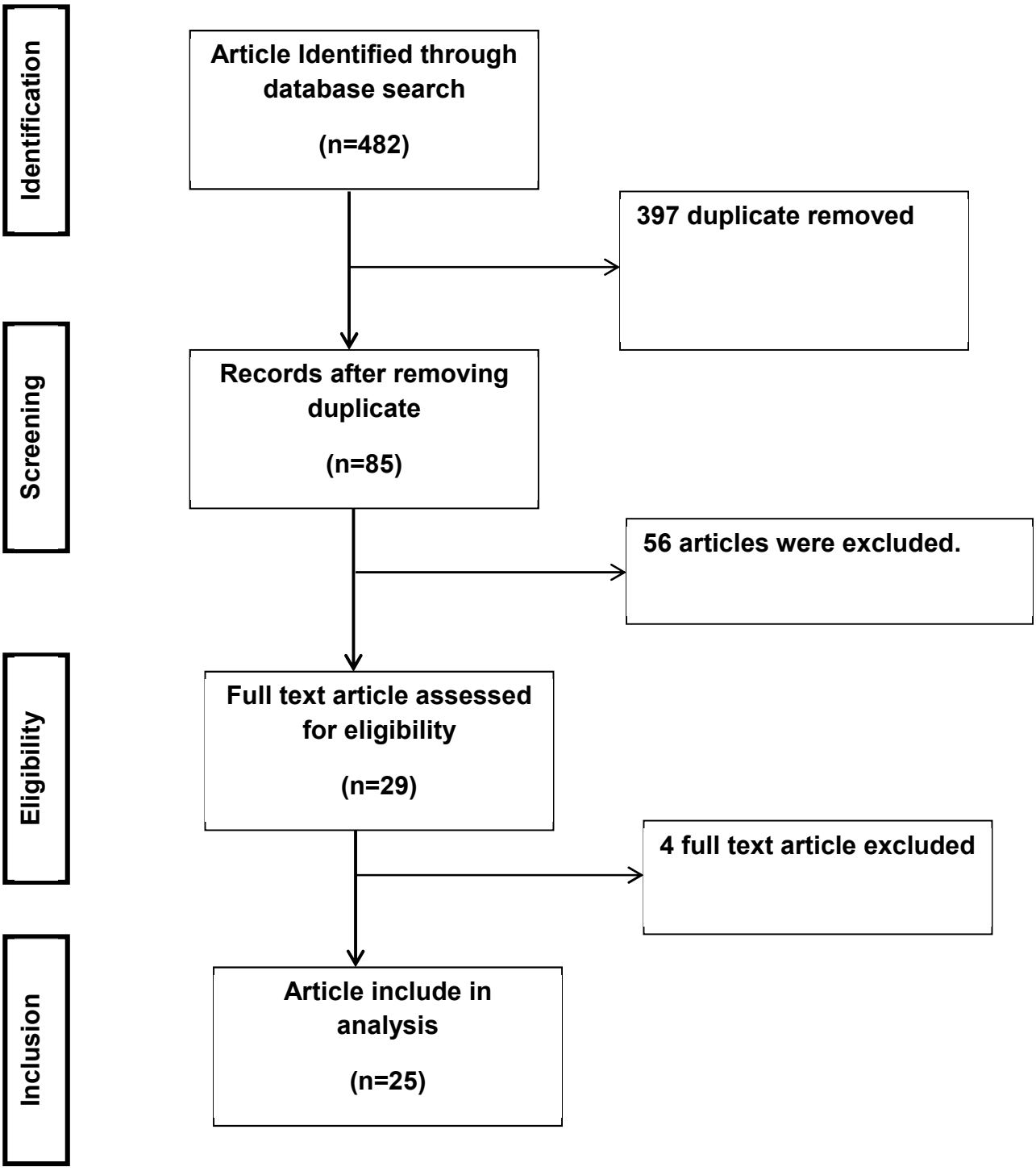

Figure 1 The PRISMA Framework for the Study

Results

Table 1: Summary of literature search in Table

S/N	Title of the article	Author & Year of publication	Objective of the study	Research design	Findings
1	Health education interventions on knowledge and self-care practices for hypertensive disorders during pregnancy: systematic review and meta-analysis protocol	Ulloa-Sabogal, I.M., et al., (2023). 14(1),	The study evaluated the effect of health education interventions on pregnant women's knowledge and self-care practices for hypertensive disorders in pregnancy, compared to standard prenatal care.	Systematic review	This study will contribute to the knowledge of health interventions that are effective in guiding and educating pregnant women about the disease and self-care practices
2	Outcome of a nurse-led educational programme on knowledge of self-care strategies among pregnant women in selected local government areas in Ibadan, Nigeria	Aluko, J.O., Ajani, O., Sowunmi, C.O., Modeste, R.R. (2020) 11(6), 13-18	This study therefore assessed the outcome of a nurse-led educational programme on knowledge of self-care strategies during pregnancy	A non-equivalent control group quasi-experimental design was used	A very low level of knowledge was reported in both the experimental and control group prior to intervention. A geometric rise in the level of knowledge was however noticed in the experimental group post intervention, as most of them were able to demonstrate adequate knowledge of the different domains. Therefore, it is recommended that nurses at all levels must be equipped with this promising intervention to effectively to educate pregnant women on self-care strategies, as these would enhance efforts towards safer pregnancy and safer childbirth.
3	Effectiveness of a nurse led intervention on prevention of pregnancy induced hypertension (PIH) in terms of knowledge and self-care practices among antenatal mothers at risk of pregnancy induced hypertension (PIH)	Negi, P., Bala, K., & George, U.(2020) 9(12)	To assess effectiveness of Nurse Led Intervention on prevention of Pregnancy Induced Hypertension (PIH) in terms of Knowledge and Self-Care Practices among antenatal mothers at risk of Pregnancy Induced Hypertension (PIH).	Quasi-experimental study	The overall mean Post-test Knowledge Score (17.25±2.94) was higher level of than Pre-test level of Knowledge Score (11.03±3.70). The Post-test level of Self Care Practice Score (34.85±3.035) was higher than the Pre-test level of Self Care Practice Score (27.48± 3.70) of Antenatal Mothers which showed that Nurse Led Intervention was effective to enhance the Knowledge and Self Care Practice regarding Prevention of Pregnancy Induced Hypertension (PIH).
4	Assessment of Nurses Knowledge and Practices Regarding The Use of Evidence-based for Pregnant Women with Pre-eclampsia	Dona, E.L., Hasneen, S.A., AbdElmonieum , S.O., et al., (2020)	To assess nurses knowledge and practices regarding the use of evidence-based for pregnant women with pre-eclampsia.	A descriptive design	There were more than one third of studied nurses(41.7%) had average level of total knowledge about EBP and preeclampsia, less than two third of studied nurses (65%) had satisfactory level of total practices regarding preeclampsia and more than half of studied nurses (53.4) had high level of

					awareness about barriers.
5	The Impact of Self-Care Counseling on Quality of Life in Pregnant Women with Gestational Hypertension	Ahmadinejad, G.S., KhadivzadeT (2021).	This study was designed to investigate the effect of self-care counseling on quality of life in pregnant women with hypertension	Descriptive survey design.	There was no significant difference in the mean quality of life score in the intervention and control group (47/33 ± 5/65 vs 49/77 ± 5/55) before intervention. However, after the intervention, there was a significant difference between the two groups.
6	Nurses' Level of Knowledge on Management of Preeclampsia / Eclampsia and the associated factors in Northern Tanzania: An Analytical Cross-Sectional Study	Mkumbo, M.W & Moshi, F.V (2023). 12, (1):49–57. doi: 10.24248/eahrj.v7i1.708	The objective of this study was to assess nurses' level of knowledge and factors influencing nurses' knowledge of managing preeclampsia/Eclampsia in Northern Tanzania.	Cross-sectional study	The study was analytical cross-sectional study design. A total sample of 176 nurses working in the maternity block was enrolled in the study. A census sampling technique was used to get 176 nurses. A closed-ended structured questionnaire was used to collect data. Statistical Package for the Social Sciences (SPSS) version 26 was used for data analysis. Knowledge was categoried into low and high knowledge, two, less than 50% had low knowledge and above 50% had high knowledge. Inferential analysis using a logistic regression model was used to establish factors associated with knowledge
7	Effectiveness of Self-Care Teaching Media for Pregnant Women and Pregnant Women with Hypertension	Rachmawati,I et al., (2024). **DOI:** https://doi.org/10.26630/jk.v15i3.4665	This study aims to determine the effectiveness of teaching media for self-care for pregnant women and pregnant women with hypertension	Narrative review design	The results of the study, the teaching media used in self-care for pregnant women and pregnant women with hypertension are educational modules, power points, booklets, videos, animated videos, pamphlets, m-Health technology, mobile applications, social networks such as WhatsApp, Telegram, and Instagram. In conclusion, self-care teaching media can improve self-care in pregnant women, including pregnant women with hypertension because the teaching media is adjusted to the needs of pregnant women, the material is for self-care, the language is easy to understand, and the media used is interesting.
8	Effect of nursing intervention on women's knowledge about pregnancy problems and utilization of obstetrics care services in Edu,	Jibril, U.N., Sanusi, A.A., Adamu, A.N., Aluko, J. O., et al., (2024) 20, 100706	This study assesses the effect of nursing intervention on the knowledge of women about pregnancy-related problems and utilization of obstetrics care services in Edu,	Quasi experimental design	The findings showed the positive effect of a nursing health education intervention on the knowledge of women about pregnancy problems with pre-intervention on experimental group mean of 63.33, and post-intervention mean of 72.22 with *t*-value of 1.26 less than the table value of

	Kwara State, Nigeria		Nigeria.		1.96. The study further showed a mean score of 35.97 experimental group and 28.33 for the control group with a t-value of 1.64, which shows little effect of intervention on the willingness of women to utilize obstetrics care services in Edu, Nigeria
9	Nursing Intervention for Pregnancy Induced Hypertension Hospitalized and Home Group	Mahmood et al., (2023)	This study aims to evaluate effectiveness of implementing nursing intervention for pregnancy induced hypertension among hospitalized and home group. Design: A quasi-experimental design was utilized. S	A survey research design	There was statistical significant difference improvement on total knowledge and total practices score among pregnant women in hospital group compared to home group at post intervention and follow up phases. The present study reveals that pregnant women in hospitalized group more satisfied than those in home group post intervention and follow up phases. Moreover, there was a highly statistical significant positive correlation between total knowledge score and total practices score regarding pregnancy induced hypertension in both groups at pre intervention, post intervention and follow up phases
10	Nursing intervention for self-management among patients with hypertension	He, Y., & Jiang, F (2021).	To describe nurses' intervention for self-management among patients with hypertension	Literature review	The results of the interventions involved were divided into four parts: health education, monitoring, consultation and assessment, as well as developing a cooperation plan. These nursing interventions can be achieved through face-to-face conversations, meetings, mobile tools such as mobile phones, or home visits.
11	Practices, attitudes and knowledge of midwives and nurses regarding gestational diabetes and pregnancy-induced hypertension	Stan, D., Mazilu, D.C., & Bratila, E. (2023). 16(2),227–234. doi: 10.25122/jml-2023-0021	It aimed to assess the impact of an educational program on the knowledge, attitudes, and practices of 125 midwives and obstetric nurses regarding care for patients with gestational diabetes and pregnancy-induced hypertension	Longitudinal quantitative research study.	There was a significant increase in the level of knowledge, attitudes, and practices of midwives and obstetric nurses following the training module, which was sustained at 3 months after completion compared to pre-training. The comparative analysis of the total scores for every 3 sets of items revealed the positive impact of the educational program on the level of knowledge, attitudes, and practices of midwives and obstetric nurses.
12	Pregnancy induced hypertension pathophysiology and contemporary management strategies: a narrative review	Agarwal, G.S., Agarwal, A.K., Singhal, D., Bawiskar, D., et al., (2024)	To determine the pathophysiology of PIH and its contemporary management strategies	Narrative review	The researchers have noted several predisposing factors to PIH, which include hostories of elevated blood pressure, diabetes, being overweight or obesse, and having a family history of PIH.
13	Self-Care Management Program Utilization	Elbana, H.M., Abd Elhady,	The present study aimed to evaluate the	Quasi-experimental	The analysis of data revealed that more than three quarters (80.6% of pregnant

	among Antenatal Mothers with Pregnancy-Induced Hypertension	R.M., et al., (2022) 5, 103-115	effect of self-care management program utilization among antenatal mothers with pregnancy-induced hypertension (PIH)	design	women) had incorrect knowledge about self-care of PIH and only 37.3 % of pregnant women had adequate knowledge score at pre-intervention that increased to 77.6 % in post-intervention. Additionally, a highly statistically significant difference was revealed between total self-care practices scores related to pregnancy-induced hypertension before and after intervention ($p<0.001$). Also, a highly statistical difference was revealed between total knowledge and practice scores of studied women at pre and post-intervention ($p <0.001$). The utilization of a self-care management program highly improved pregnant participants' knowledge and their self-care practice regarding the management of pregnancy-induced hypertension. The current study suggested that pregnant women be made more aware of pregnancy problems, including pregnancy-induced hypertension and its related impacts on mothers and fetal health, as well as a greater understanding of self-care management
14	Knowledge, Attitude, and Practice towards Prevention of Hypertension among Pregnant Women Attending Antenatal Care Clinic at a District Hospital in Kigali City	Havugimana, D.H., Habtu, M., OgendI, J. (2024)	This study aimed to assess knowledge, attitude, and practice towards preventing hypertension among pregnant women attending antenatal care at Muhima District Hospital in Kigali city.	Descriptive study	The participants' ages ranged from 18 to 45 with a mean of 32.4(SD±.838). Majority were in the age range of 32-38 years. 291 (75.8%) had low knowledge about preventing hypertension, and 226 (58.9%) had negative attitudes toward hypertension prevention among pregnant women. Additionally, 226(58.9%) exhibited low preventive practices. Multivariate logistic regression revealed that higher education (AOR=6.79; 95%CI: 2.02 – 22.93), third wealth category (AOR=3.34: 95%CI: 1.72 – 6.49), and higher knowledge (AOR=2.18: 95 %CI: 1.25 – 3.80) were associated with hypertension prevention practices.
15	Evaluation of pregnancy induced hypertension controls and self-care knowledge's among pregnant mothers in District of Vlore	Lalo, R. (2020)	This study aims to assess self-care knowledge???s and pregnancy induced hypertension controls among pregnant mothers within the District of Vlore so as to stop complications and to supply adequate health education	Descriptive study	The results showed that 70% of participants don't know that lack of physical exertion and drinking alcohol worsens HTA, yet as 60% don't know the impact of high salt diet and stressful situations. Lack of sufficient knowledge about these important risk factors will be translated as an occasional level of self-care and PHI control. Most participants have an interest in doping up to lower TA (80%) but they are doing not understand how to watch fetal movements (90%). The findings of our study showed that knowledge influenced the control of HTA which it's necessary to strengthen them in nursing practice because the main task of qualified midwives especially in

					antenatal clinics. A behavior change within the PIH women are going to be instilled so as to influence change in behaviours of PIH pregnant women. Our aims to look at the factors influencing self-care for the prevention and control of preeclampsia in high-risk women.
16	Nursing Diagnoses and Interventions in Women with Hypertensive Disorders of Pregnancy: A Scoping Review	Neto, J.C.(2022). DOI: 10.5294/aqui.2022.22.3.6	To map the diverse scientific evidence on nursing diagnoses and interventions in women with pregnancy hypertensive disorders under Primary Health Care. M	Scoping review	A total of 2,505 articles were retrieved, of which five were included in the final review. Nine primary diagnoses from the 2009-2011 version of NANDA-I were identified. Each diagnosis was classified according to physical, psychological, behavioral, and environmental characteristics. The interventions were related to controlling pain, anxiety, hemodynamic dysfunctions, self-esteem level, fluid replacement, patient/environment hygiene, and sleep-rest ratio
17	Pregnancy-induced hypertension and its effectson neonatal hemogram	Rind, R., Nisa, K., Taj, A., et al., 30(18), (2023)	To determine the frequency of hematological profile of neonates among women with pregnancy induced hypertension visiting Liaquat National Hospital, Karachi	Descriptive study	The most prevalent hematological profile was thrombocytopenia, followed by neutropenia and polycythemia. Since the sample originated from different parts of Pakistan, it can be generalized
18	Associated risk factors of pregnancy induced hypertension	Salma, U., et al., (2022)25, 291-295	This study identifed the associated risk factors of pregnancy-induced hypertension over a period of January 2020 to December 2020	Retrospective study	Of a total of 261 pregnant women divided into 87 cases, among them, 57 (65%) pre-eclampsia/ eclampsia and 30 (34%) gestational hypertension. The multivariable analysis applied for required multiple logistic regression, and tracing significantly associated risk factors for pregnancy-induced hypertension such as ANC visited (adj. OR= 10.22, 95%CI: 3.66 – 28.50, p<0.001), maternal excessive weight gain period of pregnancy (>13 kg) (adj. OR=7.33, 95%CI: 3.05 -17.68, p<0.001), history of abortion (adj. OR=3.56, 95%CI: 1.32-9.56, p=0.012), in addition, history of diabetes mellitus (adj OR= 2.59, 95%CI: 1.02 – 6.47, p=0.043) Our study determined that pregnancy-induced hypertension women develop a greater risk of adverse pregnancy outcomes as compared to pregnant women without hypertension
19	Hypertension in Pregnancy: Current Challenges and Future Opportunities for Surveillance and Research	Kuklina, E.V., Merritt, R.K., et al., (2024)	This study describes the current challenges and future opportunities for surveillance and research	Retrospective study	Currently, data gaps exist in national health surveillance and health systems to identify and monitor HP. Using multiple data sources, incorporating electronic medical record data algorithms, and standardizing data

20	Pregnancy□Induced Hypertensive Disorders predictors among pregnant and delivery mothers receiving care in public health institutions in Sidama, Ethiopia: a multi-center case control study	Bune, G.T. (2024)	To identify predictors of PIHD among pregnant and delivery women in public hospitals and primary health care units (health centers) in Sidama, Ethiopia	Case-control study	Out of 920 planned participants, 686 were included, resulting in a response rate of 94.35%. Factors associated with PIHD in women included age at first conception (AOR = 1.26), mid (AOR = 6.05) and high (AOR = 5.01) wealth index levels, multigravidity (AOR = 4.34), pregnancy age ≥ 42 weeks (AOR = 3.65), maternal mid-upper arm circumference (MUAC) (AOR = 1.29), hemoglobin levels of 6.5–10.9 g/dL (AOR = 5.59), pre-pregnancy Body Mass Index (BMI) ≥ 25 kg/M2 (AOR = 0.81), preexisting hypertension (AOR = 8.97), family history of diabetes mellitus (AOR = 20.02), former alcohol consumption (AOR = 0.27), and total physical activity during pregnancy (AOR = 0.54).
21	Prevalence of hypertension in pregnancy and its associated sociodemographic factors among mothers aged 15–49 years old in Malaysia	Ratnam *et al. (2024).*	This study aimed to determine the prevalence of HDP and its associated factors among mothers aged 15–49 who recently gave birth within the last two years, throughout Malaysia, informing effective public health and primary care interventions.	Retrospective study	Among 6 335 participants recruited for this study with an estimated population of 782, 550, the prevalence of HDP among Malaysian mothers aged 15–49 years old who recently gave birth within the last two years was 6.5% (95% CI: 5.76, 7.37). Multiple logistic regression showed that maternal age and ethnicity were significantly associated with hypertension. Advanced maternal age had higher odds of hypertension, with an aOR of 2.18 (95% CI = 1.75, 2.71). In addition, Other Bumiputera had higher odds of hypertension (aOR = 2.71, 95% CI = 1.25, 5.87).
22	The hypertensive disorders of pregnancy in Ogun state, Nigeria: Preeclampsia in low and middle in come countiries	Sotusa, J., Sharma, S., Imaralu, J., Lee, T et al., (2016)	To record and report community level prevalence rates of the various hypertensive disorders of pregnancy in Ogun State Nigeria.	Descriptive study	Of the 6709 pregnancies evaluated at gestational age > 20weeks, 10.4% presented with mixed hypertension, whereas 3.3% showed mixed hypertension with evidence of pre-eclampsia

23	Prevalence and materno-fetal outcomes of precelampsi aeclampsia amongst pregnanct women at a teaching hosspitals	Akaaba, G.O., Anyang U I & Ekee b (2021) 27(20)	To identify the prevalence and materno-fetal outcome of PIH in the setting	A retrospective study	Case fatality rate was 3.9% and still birth rate birth rate was 10.7%. majority of the women do have any maternal complication nor unfavorable outcome
24	Clincal characteristics and treatrment patterns of pregnant women with hypertension in primary care on the FCT.	*BMC pregancy and childbirth*	To present result from a cross-sectionala analysis of pregnant women enrolled in hyperetnesion treatment in Nigeria program	Crossesctional study	The pregnant women had a higher rate of newly diagnosed hypertension and lower baswline walk-in treatment. The control rate was numerically lower among pregnant patients but was not statistically significant
25	Hypertensive disorders of pregnancy: A five-year review in Babcock University Teaching Hospital, Ilishan-Remo, Ogun State, Nigeria	Adebawojo, O., Akadri, A., & Imaralu, J.(2020), 3(1), 67-72 https://doi.org/10.38029/bumj.v3i1.35	To determine the prevalence and outcome of hypertensive disorder of pregnancy in Babcock University Teaching Hospital, Ilishan-Remo, Ogun State Nigeria	Retrospective descriptive study	There were 1,118 deliveries during the study period out of which 55 (4.9%) patients had hypertensive disorders in pregnancy. The mean age was 31.5years ±48.1 and mean parity, 1.2± 1.1. The mean systolic and diastolic blood pressures were 180.4 ± 1.88mmHg and 105.1± 1.5mmHg, respectively. Thirty-four (75.5%) of the women had preeclampsia/ eclampsia, while 7 (15.5%) had gestational hypertension. Most women were delivered preterm (22 patients, 48.7%). The majority of them (33, 73.3%) were delivered by cesarean section, out of which 2 (4.4%) were elective cesarean section and 31 patients (68.8%) were emergency cesarean section. The case fatality rate was 1.8%.

Studies have consistently demonstrated the effectiveness of health education interventions in improving pregnant women's knowledge and self-care practices, particularly in managing hypertensive disorders during pregnancy. Ulloa-Sabogal et al. (2023) found that structured educational interventions significantly enhanced disease management among pregnant women. Similarly, Aluko et al. (2020) and Negi et al. (2020) reported that nurse-led programmes led to substantial improvements in self-care knowledge, with increased post-test scores among antenatal mothers. Ahmadinejad and Khadivzadeh (2021) further confirmed the positive impact of self-care counselling on the quality of life of pregnant women with gestational hypertension. Additionally, Rachmawati et al. (2024) highlighted the effectiveness of diverse teaching media, such as booklets, videos, and mobile applications, in enhancing self-care knowledge. The significance of nursing interventions was further reinforced by Jibril et al. (2024), who found that while educational programmes significantly improved women's knowledge of pregnancy-related complications, their

impact on obstetric service utilisation was limited. Mahmood et al. (2023) demonstrated that hospitalised pregnant women benefitted more from nursing interventions than those in home-care settings, while He and Jiang (2021) emphasised the role of structured nursing interventions in fostering self-management among hypertensive patients.

Beyond patient education, studies have examined nurses' knowledge and practices in managing hypertensive disorders during pregnancy, highlighting the necessity for continuous professional training. Dona et al. (2020) found that while 41.7% of nurses had only an average knowledge of evidence-based preeclampsia practices, 65% demonstrated satisfactory practical competence, although awareness of systemic barriers remained high. Similarly, Mkumbo and Moshi (2023) identified knowledge gaps among nurses in Northern Tanzania, with over 50% exhibiting high knowledge levels, while others displayed inadequate awareness, reinforcing the need for ongoing training. Stan et al. (2023) found that midwives and obstetric nurses who underwent specialised training demonstrated significantly improved knowledge, attitudes, and practices related to gestational diabetes and pregnancy-induced hypertension (PIH), with knowledge retention sustained three months post-training. Meanwhile, Agarwal et al. (2024) identified obesity, diabetes, hypertension history, and genetic predisposition as major risk factors for PIH. Additionally, Elbana et al. (2022) demonstrated that self-care management programmes significantly improved knowledge and self-care practices, with post-intervention knowledge scores rising from 37.3% to 77.6%. However, Havugimana et al. (2024) found that 75.8% of pregnant women exhibited low knowledge of hypertension prevention, with negative attitudes (58.9%) and poor preventive practices (58.9%), while Lalo (2020) emphasised the lack of awareness of PIH risk factors, particularly concerning physical inactivity, alcohol consumption, high-salt diets, and stress.

Several studies have examined the prevalence, risk factors, and outcomes associated with hypertensive disorders in pregnancy. Kuklina et al. (2024) highlighted data gaps in national surveillance and called for standardisation in monitoring hypertension during pregnancy. Bune (2024) identified maternal age, pre-existing hypertension, high BMI, and family history of diabetes as predictors of PIH in Ethiopia, while Ratnam et al. (2024) reported a 6.5% prevalence of hypertensive disorders in pregnancy (HDP) in Malaysia, with advanced maternal age and ethnicity as significant risk factors. In Nigeria, Sotusa et al. (2016) found a 10.4% prevalence of mixed hypertension, with 3.3% of cases showing signs of preeclampsia. Further research on maternal and fetal outcomes revealed high-risk scenarios associated with PIH. Akaaba et al. (2021) reported a case fatality rate of 3.9% and a stillbirth rate of 10.7% among affected women, while Adebawojo et al. (2020) observed a 4.9% prevalence of HDP at Babcock University Teaching Hospital, Ogun State, with preeclampsia/eclampsia accounting for 75.5% of cases. High rates of preterm deliveries (48.7%) and caesarean sections (73.3%) were also recorded, with an overall case fatality rate of 1.8%. These findings underscore the urgent need for improved surveillance, targeted risk assessment, and enhanced maternal healthcare interventions to mitigate the adverse outcomes of hypertensive disorders in pregnancy.

Discussions

Four themes emerged from the analysis and synthesis of the data.

Theme 1: Risk Factors and Predictors of Pregnancy-Induced Hypertension

Pregnancy-induced hypertension (PIH) remains a significant maternal health concern, with various studies highlighting its risk factors and predictors. Salma et al. (2022) identified inadequate antenatal care visits, excessive maternal weight gain, history of abortion, and diabetes mellitus as significant predictors of PIH. Similarly, Agarwal et al. (2024) emphasised the role of obesity, diabetes, hypertension history, and genetic predisposition as major contributors to hypertensive disorders in pregnancy. These findings underscore the need for early risk assessment to mitigate PIH-related complications.

Maternal characteristics such as age and pre-existing health conditions have also been recognised as strong predictors. Bune (2024) found that advanced maternal age, pre-existing hypertension, and high BMI significantly increased the likelihood of developing PIH. Ratnam et al. (2024) reported a 6.5% prevalence of hypertensive disorders in pregnancy in Malaysia, with advanced maternal age and ethnicity identified as major risk factors. Similarly, Sotusa et al. (2016) documented a 10.4% prevalence of mixed hypertension in Ogun State, Nigeria, with preeclampsia affecting 3.3% of cases. These findings highlight the geographical and demographic variations in PIH prevalence.

Poor maternal health behaviours, including inadequate knowledge of hypertension prevention, further contribute to PIH risk. Havugimana et al. (2024) found that 75.8% of pregnant women had low knowledge of hypertension prevention, with negative attitudes and poor preventive practices strongly associated with lower socio-economic status. Lalo (2020) reported that 70% of women were unaware of PIH risk factors related to physical inactivity and alcohol consumption, while 60% were uninformed about the effects of high-salt diets and stress. These studies highlight the urgent need for structured health education interventions to improve maternal awareness and self-care practices. Moreover, national surveillance and healthcare data gaps hinder effective monitoring of PIH trends. Kuklina et al. (2024) emphasised the necessity of multiple data sources and standardisation to enhance hypertension surveillance in pregnancy. Collectively, these findings reinforce the critical importance of early screening, lifestyle modification, and robust healthcare interventions in mitigating PIH risks.

Theme 2: Maternal and Neonatal Outcomes Associated with Hypertensive Disorders in Pregnancy

Maternal and neonatal outcomes associated with hypertensive disorders in pregnancy (HDP) present a significant challenge to maternal health worldwide. Studies indicate that hypertensive conditions such as pregnancy-induced hypertension (PIH) and preeclampsia are linked to numerous adverse outcomes for both mothers and neonates. For instance, Akaaba et al. (2021) reported a case fatality rate of 3.9% and a stillbirth rate of 10.7% among women with PIH, despite the absence of severe maternal complications in most cases. This highlights the potential for severe outcomes even when clinical interventions are timely. Additionally, Adebawojo et al. (2020) identified preterm deliveries and high caesarean section rates among women with HDP, with a 4.9% prevalence of hypertensive disorders observed in their study. These figures suggest that the management of hypertensive disorders is a critical factor influencing pregnancy outcomes.

The neonatal outcomes associated with HDP are also concerning. Rind et al. (2023) identified thrombocytopenia as the most common hematological abnormality in neonates born to mothers with PIH, along with other complications such as neutropenia and polycythemia. These

complications can lead to increased neonatal morbidity, requiring close monitoring and specialised care. Furthermore, Salma et al. (2022) highlighted the importance of early antenatal care and risk factor management, noting that factors such as excessive maternal weight gain and a history of diabetes are significant contributors to PIH and its associated complications. The findings underscore the urgent need for comprehensive prenatal care, early identification of risk factors, and improved surveillance systems, as pointed out by Kuklina et al. (2024). Enhanced healthcare education for both pregnant women and healthcare providers, along with better management strategies for PIH, are crucial for improving maternal and neonatal outcomes.

Theme 3: Nurses' Knowledge and Training Gaps in Managing Hypertensive Disorders in Pregnancy

The findings indicate significant gaps in nurses' knowledge and training concerning hypertensive disorders in pregnancy (HDP), highlighting the need for continuous education and structured interventions. While several studies confirm the effectiveness of educational programmes in improving pregnant women's self-care knowledge (Ulloa-Sabogal et al., 2023; Aluko et al., 2020; Negi et al., 2020), the knowledge base and preparedness of nurses remain inconsistent. For instance, Dona et al. (2020) revealed that only 41.7% of nurses demonstrated an average level of knowledge regarding evidence-based practices for preeclampsia, despite 65% having satisfactory practical competence. Similarly, Mkumbo and Moshi (2023) found that although over half of the nurses in Northern Tanzania exhibited high knowledge levels, a significant proportion lacked adequate awareness, underlining the necessity for ongoing training.

The effectiveness of structured educational programmes in enhancing nursing knowledge is evident. Stan et al. (2023) found that midwives and obstetric nurses who received specialised training demonstrated substantial improvements in knowledge, attitudes, and practices regarding gestational diabetes and HDP, with these gains sustained three months post-training. Moreover, Mahmood et al. (2023) demonstrated that nursing interventions significantly improved knowledge and practice among hospitalised pregnant women with PIH compared to those in home care settings. However, the persistent gaps in awareness identified by Kuklina et al. (2024) and Bune (2024) suggest a broader systemic issue in healthcare training and surveillance. Additionally, inadequate nurse training can contribute to adverse maternal and neonatal outcomes. Studies by Akaaba et al. (2021) and Adebawojo et al. (2020) underscore the high prevalence of HDP-related complications, including stillbirths, preterm deliveries, and caesarean sections. Addressing these training gaps through standardised education, continuous professional development, and improved surveillance mechanisms is essential for optimising maternal and neonatal health outcomes.

Theme 4: Effectiveness of Educational Interventions in Enhancing Knowledge and Self-Care Practices

Educational interventions have been widely recognised as effective strategies for improving knowledge and self-care practices, particularly among pregnant women at risk of hypertensive disorders. Several studies highlight the impact of structured health education on maternal health outcomes. Ulloa-Sabogal et al. (2023) found that educational programmes play a crucial role in enhancing pregnant women’s knowledge and self-care practices, particularly in disease management. Similarly, Aluko et al. (2020) and Negi et al. (2020) demonstrated that nurse-led interventions significantly improved self-care knowledge and practice, with notable post-intervention gains among antenatal mothers. Additionally, Ahmadinejad and Khadivzadeh (2021)

reported a significant improvement in the quality of life among pregnant women with gestational hypertension following self-care counselling, reinforcing the importance of structured education in maternal health.

Beyond patient education, research has also explored the role of continuous training for healthcare providers in improving maternal health outcomes. Dona et al. (2020) and Mkumbo and Moshi (2023) identified knowledge gaps among nurses managing preeclampsia and eclampsia, stressing the need for ongoing education to enhance competence. Furthermore, Stan et al. (2023) showed that midwives and obstetric nurses who underwent specialised training exhibited improved knowledge and sustained better attitudes towards managing hypertensive disorders. These findings highlight the necessity of comprehensive, multi-level educational interventions targeting both pregnant women and healthcare providers.

Moreover, the mode of delivering self-care education significantly influences its effectiveness. Rachmawati et al. (2024) found that booklets, videos, and mobile applications were instrumental in improving self-care knowledge, while Jibril et al. (2024) noted that nursing interventions enhanced women's knowledge of pregnancy-related complications. Similarly, Mahmood et al. (2023) demonstrated that hospital-based nursing interventions yielded greater improvements in knowledge and practice compared to home-based care. These findings underscore the importance of innovative educational methods tailored to pregnant women's needs to enhance self-care practices and maternal health outcomes.

Conclusion

In conclusion, the studies reviewed demonstrate the critical role of structured health education interventions in improving both the knowledge and self-care practices of pregnant women, particularly those at risk of pregnancy-induced hypertension (PIH) and other hypertensive disorders. Nurse-led educational programs, as highlighted by various studies, have shown substantial improvements in pregnant women's self-care knowledge, which directly impacts their ability to manage hypertensive risks during pregnancy. The findings emphasize the importance of continuous education for both patients and healthcare providers, as this not only enhances maternal health outcomes but also ensures the effective management of hypertensive conditions. The use of diverse teaching media, including booklets, videos, and mobile applications, further supports the adoption of self-care practices, which are vital in preventing complications such as preeclampsia and gestational hypertension. Furthermore, the sustained improvements in knowledge and attitudes among healthcare providers, such as midwives and nurses, underscore the necessity for ongoing training to enhance their competence in managing hypertensive disorders in pregnancy.

However, significant gaps remain in both the research and healthcare systems that need addressing. Despite the positive outcomes from educational interventions, there are still challenges in the widespread implementation of these programs across different regions, particularly in low- and middle-income countries. Data gaps, as identified by Kuklina et al. (2024), highlight the need for better surveillance and standardisation in monitoring hypertension in pregnancy. Moreover, while healthcare providers show improvements in their knowledge and practices, some studies suggest that awareness of barriers, such as inadequate resources or cultural factors, continues to hinder the effectiveness of these interventions. Further research is required to identify specific cultural and socioeconomic factors that impact the implementation and effectiveness of these educational programs, particularly in resource-poor settings. Additionally, there is a need for more targeted

interventions that not only educate but also address practical barriers in managing hypertensive disorders, ensuring that these interventions lead to sustained improvements in both maternal and fetal health outcomes.

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