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Extending the Theory of Planned Behaviour: A SmartPLS Analysis of Postpartum Depression Awareness and Help-Seeking Behaviour in Niger State, Nigeria

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Abstract: ***Background:*** *Postpartum depression (PPD) is a persistent but under-diagnosed maternal mental health issue which contributes to emotional and physical stress in women. Hence, there is a need for interventions that can improve health and well-being for at-risk mothers.* ***Objective:*** *The aim is to examine how different sources of information impact PPD knowledge and help-seeking behaviour among women in Niger State.* ***Methods:*** *A cross-sectional survey was conducted, and Kobo Toolbox was utilised for data collection from 384 women. SmartPLS-SEM was used to test relationships among variables.* ***Findings:*** *reveal that interpersonal and electronic information sources significantly predict PPD awareness and help-seeking behaviour, while print media had a negligible effect. Conclusion: Multi-source, culturally sensitive strategies are critical in promoting PPD awareness ($\beta = .55$, $p < .001$) and help-seeking behaviour ($\beta = .47$, $p < .001$).* ***Recommendation:*** *The study underscores the need for culturally grounded communication strategies to improve maternal mental health literacy.* ***Policy implications:*** *Policymakers should integrate credible interpersonal and digital channels into maternal healthcare delivery to enhance awareness and reduce stigma.*

Keywords: *Help-seeking behaviour, Information source credibility, Postpartum depression, Interpersonal communication, Misinformation.*

1. INTRODUCTION

Battling diseases, including postpartum depression (PPD), demands more than medicine or psychotherapeutic intervention; it requires the power of effective communication. This is because communication is the foundation on which health-related conditions can be managed (Burgener, 2020; Finset et al., 2020). It entails suitable communication techniques and, more importantly, suitable information sources to help inform, educate, and support patients to improve health outcomes. It can also be used to sensitise the public about disease prevention and control. One of the core functions of communicating health risks is to create awareness by educating people and influencing health behaviours, as demonstrated by Loitz, Arinde, Olaoye, Pilon, and Johansen (2024), Albarracin, Oyserman, and Schwarz (2024), and Nowak, Bradshaw, and Head (2024).

In relation to this study, communication is relevant for women to know about postpartum depression, understand and recognise it, be free from stigma, and seek help when necessary; they need to have access to accurate and reliable information about postpartum depression (O'hara & McCabe, 2013). Sadly, in many low-income countries (LICs), such as Northern Nigeria, there is limited empirical evidence to validate the reliability of information sources available to women about PPD (Omale, Ifeoma, Dagaci, & Oluwasegun, 2024). Therefore, inadequate information and the lack of the right information sources might affect their understanding of PPD, their inability to identify the signs and

symptoms, as well as the health risks associated with PPD. This may delay timely access to professional care. Furthermore, information sources can be formal or informal. For instance, healthcare professionals are one of the main sources of formal information regarding PPD, which is mostly accessible to women who visit antenatal clinics and postnatal check-ups.

Regarding formal information sources, Omale and Asemah (2024) posit that women who are provided with adequate information about PPD by healthcare professionals are more likely to realise the symptoms and go for the right kind of care. Unfortunately, there is limited access to medical professionals who are custodians of the right information source about PPD, particularly in rural areas where most women reside and do not have access to medical personnel to educate them about PPD (Mekuria, Beyene, Lajore, Melkamu, & Ejajo, 2023; Obioha, Balogun, Olubodun, & Okafor, 2021). What becomes of these mothers who are not privileged to access such information about PPD risks?

Women who lack access to structured health systems often rely on informal networks such as family members, community leaders, or religious advisers, which may perpetuate misconceptions about PPD (Omale & Asemah, 2024). Although these sources offer emotional support, they may perpetuate misconceptions of PPD, thereby portraying it as a spiritual or supernatural condition. For instance, Adegboyega (2022) found that women in Southwest Nigeria, particularly Ogun State, Nigeria, attribute signs and symptoms of PPD to witchcraft known as ‘Aje' or evil spirits, and thus encourage women to seek spiritual remedies instead of medical treatment. This reliance on traditional healers, cultural beliefs, and superstitious beliefs can delay appropriate care and reinforce stigma, as women may not recognise their symptoms as treatable. Similarly, women from Northern Nigeria, specifically Bauchi, Adamawa, hold similar beliefs; they attribute PPD to evil spirits such as ‘Iscar’ or ‘Jinn' (Jaiyeola & Abdulrazaq, 2022).

It is, therefore, critical to understand what information sources women rely on for information and how effective these sources can be in creating awareness and sensitising women about certain risks related to PPD. The product of the information gathered in identifying their major information sources will help in designing appropriate targeted interventions for better health outcomes. This is a critical gap that this study sought to fill in health communication regarding PPD. Hence, this study centres on information sources and their influence on two main outcomes: postpartum depression knowledge (PDK), and Help-seeking behaviour (HSB). The findings will determine if targeted interventions using multiple information sources, such as health care providers, NGOS, and digital platforms, are needed to deliver accurate and culturally sensitive information about PPD to women or not. Findings will also determine suitable information sources that can be modified or greatly improved upon, that will resonate with the people and subjective norms for improved PPD health awareness and outcomes.

1.1. Research Gap and Questions

Despite the fact that there is increasing global awareness of postpartum depression (PPD), little understanding exists regarding the extent to which information sources impact awareness and help-seeking behaviour of postpartum women in Northern Nigeria, specifically from a psychosocial perspective of social expectation and self-perceived control over behaviour. This is a big gap that this study sought to fill. Bearing this in mind, therefore, the authors addressed these questions:

1. What are the most frequently used information sources on maternal mental health among postpartum women in Northern Nigeria?
2. How do different information sources influence postpartum depression (PPD) awareness among women?
3. What is the relationship between postpartum depression awareness and women’s help-seeking behaviour?
4. How significantly do social expectations and perceived control over one's actions influence the connection between PPD awareness and help-seeking intentions?
5. How does the accessibility of information sources affect the likelihood of help-seeking behaviour among postpartum women?

2. RESEARCH HYPOTHESIS

Based on the research questions, the study posits a mediation hypothesis, suggesting that PPD awareness influenced by information sources predicts help-seeking intentions, with subjective norms and perceived behavioural control acting as mediators.

H_{01}: Information sources significantly influence postpartum depression awareness.

H_{a2}: Postpartum depression awareness significantly predicts help-seeking behaviour.

H_{a3}: Subjective norms and perceived behavioural control mediate the relationship between PPD awareness and help-seeking behaviour.

2.1. Conceptual Framework

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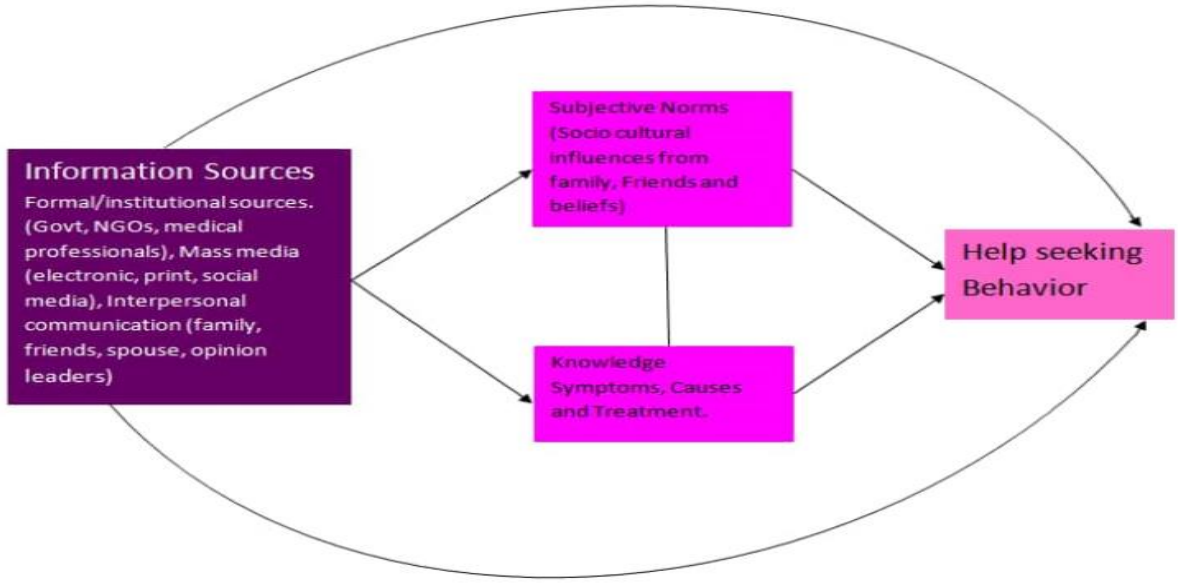

Figure 1 *presents the contextual framework of the study*

Source: *Authors (2025)*

2.2. Interpretation of Conceptual Framework

The model assumes mediation through subjective norms and perceived behavioural control between PPD awareness and help-seeking behaviour. It depicts a model of mediation built on the Theory of Planned Behaviour. It postulates that interpersonal, electronic and print media information sources play the role of influencing the knowledge on postpartum depression (PDK), which in turn affects help-seeking behaviour (HSB). This connection is mediated by two psychosocial constructs. Subjective Norms (Social pressure to seek help), and Perceived Behavioural Control (Self-efficacy of accessing Care).The framework explains direct (e.g., information sources → PDK → HSB) and indirect links (e.g., PDK → subjective norms/perceived control → HSB) between factors, confirming TPB's presumption that intention and behaviour result from knowledge, norms, and perceived capacity to act. This model places behavioural outcomes within a socio-cultural reality of Northern Nigeria.

3. LITERATURE REVIEW

3.1. Knowledge of Postnatal Depression Among Northern Nigerian Women

Postpartum depression is a crucial and important public health problem affecting women all over the world and has serious implications for maternal and child well-being (Abazie and Usoro, 2021). Although PPD is common, knowledge about PPD is found to be limited, particularly in low-income countries (Ackerman, Afzal, Lautarescu, Wilson, & Nadkarni, 2024; Bolton et al., 2023; Dixon & Dantas, 2017). Lack of this awareness commonly ends in underdiagnosis and undertreatment, which exacerbates the effect of the condition on maternal and infant health (O'hara & McCabe, 2013)However,

for Nigerian women, where cultural beliefs and lack of access to healthcare are complicating factors, understanding the contextual factors that influence a woman's knowledge of PPD is most important in the development of suitable interventions, including suitable communication strategies.Furthermore, misconceptions and cultural beliefs regarding PPD awareness stem from the belief that mental health problems such as PPD are spiritual or supernatural in nature rather than medical (Jaiyeola & Abdulrazaq, 2022). For example, many Nigerian women believe that PPD symptoms are due to witchcraft or evil spirits, and as a result, they turn to traditional healers as opposed to medical professionals (Adegboyega, 2022). Furthermore, this PPD cultural lens not only confines knowledge of PPD itself but also reinforces stigma, perpetuating that women should not consult with appropriate care (O'hara & McCabe, 2013). Furthermore, studies have demonstrated that the level of education influences women's opinions of PPD. Women who have more education tend to be able to identify PPD symptoms and seek help, while young mothers are most ignorant about PPD (Obioha et al., 2021). Prabhu et al. (2025) confirm this in their study, as results from their study showed that a psychosocial education program on postnatal depression, which is more like an awareness programme about PPD, helps in reducing PPD among women in South India. Similarly, findings from Shimpuku et al. (2022)'s randomised controlled trial study showed that antenatal education (awareness) programs effectively diminished postpartum depressive symptoms and boosted maternal confidence levels. All these are a pointer to the fact that knowledge about PPD is key in enhancing health outcomes, and this can be done through educating women about PPD and its associated risk, also awareness and education lies in the ability to deliver suitable communication to the target, moreover such communication may be futile if it does not pass through the right (suitable) channels which is the information sources women rely on, hence the importance of this study. In addition, subjective norms cannot be excluded from the shaping of women's knowledge about PPD. Societal expectations and stigma around PPD, particularly in Northern Nigeria, make it challenging for mothers to obtain care for their mental health (Abdulmalik, Kola, & Gureje, 2016). This may most likely occur particularly in places like Niger State, where cultural norms often subscribe to family reputation rather than an individual's well-being (Omale et al., 2024). This means that a great number of women endure in silence, not knowing that their symptoms are curable, let more of where and how to seek professional help. To address these barriers, culturally sensitive interventions focusing on sensitising women about PPD, awareness that discourages stigma, and tailored information that resonates with their societal norms, must be in place (Omale & Asemah, 2024).

3.1. Theoretical Framework

The theoretical underpinning for the study is the theory of planned behaviour, propounded by Ajzen (1985). The theory demonstrates how subjective norms that are deep-rooted in social and cultural influence women's behavioural intention to seek help for postpartum depression. The primary reason why this behavioural theory is relevant to the study is that it provides grounds on which to extrapolate health behaviour based on beliefs, attitudes, as well as social influence. There is a dearth of studies that have theoretically applied TPB in postpartum depression in Northern Nigeria's socio-cultural context and from a communication point of view, especially in Niger State. Hence, this study provides a valuable platform to assess the empirical test of the Theory of Planned Behaviour within a non-Western sociocultural context. It aims to either corroborate the core assumptions of the TPB or identify potential areas for theoretical refinement in relation to postpartum depression communication. By situating the theory within the unique cultural dynamics of Northern Nigeria, the study contributes to an expanded understanding of how behavioural intentions are shaped outside Western contexts. The implications of the theory's application are further discussed in the analysis and discussion sections of this paper.

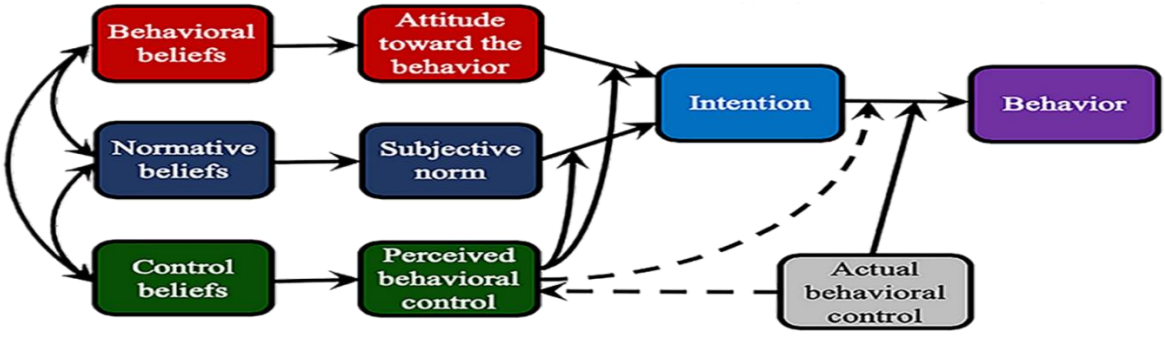

Figure 2 *showcases the TPB*

Source: *Ajzen (1985)*

4. Materials and Methods

4.1. Research Design

The study is basically a cross-sectional survey among women in Niger State, North Central, Nigeria.

4.2. Population of the Study

Nigeria is characterised by a persistently high total fertility rate. It is regarded as the seventh largest in the world in terms of population and estimated to be the fourth largest by 2050 (Oladosun, Akanbi, Fasina, & Samuel, 2019). In Nigeria, the Northern region has the highest total fertility rate (TFR) of 7.6 (Nigeria Population Commission, 2019). Interestingly, Niger state falls within this region. The implication of this is that women within this region are more exposed to PPD risk and therefore vulnerable due to repeated multiple childbirths at short intervals, thereby increasing their physical, emotional, and financial stress. For this study, the respondents comprise women of childbearing age (WCBA), (18-49 years). Specifically, in Bosso LGA, the population of WCBA is 260,151, while that of Chanchaga LGA is 355,608, making a total of 615,759 women of childbearing age (Six hundred and fifteen thousand, seven hundred and fifty-nine). (NPC, 2019).

Table 1. *Population of Women of Childbearing Age (18-49)*

Niger State	Population of Women	%
Bosso	260151	42.24
Chanchaga	355,608	57.76
Total	**615,759**	**100**

Source: (*NPC, 2019)*

4.3. Sample Size and Techniques

A multi-stage sampling approach was used, while a total of 384 respondents were selected proportionally across Bosso and Chanchaga LGAs, which were distributed across four wards, two wards from each local government area (LGA). The sample size estimation was derived using Krejcie and Morgan (1970)'s statistical tables, yielding a target sample of 384 (α=0.05, CI=95%). Reliability was confirmed through Cronbach's alpha values above 0.70 for all constructs

Table 2. *Sample Size and Proportional Distribution of Women of Childbearing Age (WCBA) in Bosso and Chanchaga, LGA of Niger State*

State	LGAs/Wards	Sample Size	Proportional Distribution (%)
Niger	**Bosso**		
	Beji	65	16.9
	Bosso Central 1	44	11.5
	Chanchaga		
	Minna Central	154	40.1
	Sabon Gari	121	31.5
Total	**188,252**	**384**	**100**

Source: ***Omale et al (****2025)*

Furthermore, a sequential multistage sampling procedure involving five distinct stages was employed to ensure representativeness across Niger State. The process began with a stratified random selection of the Niger East Senatorial District from the three existing senatorial zones. Within this district, Local Government Areas (LGAs) were stratified, and Bosso and Chanchaga were randomly selected using a simple random technique. Each selected LGA was further stratified into wards and streets, from which participants were drawn through a lottery method, ensuring every eligible woman had an equal chance of inclusion.

5. Method of Data Collection and Analysis

The research team collected data using a field data collection tool known as Kobo Toolbox. While the Smart-SEM were utilised to analyse quantitative data.

5.1. Pilot Test

The reliability of the questionnaire was established by running both the results of the pilot test with Split-Half and Cronbach's Alpha.

Table 3. *Internal Consistency Statistics*

Cronbach's Alpha			
	Part 1	Value	0.775
		N of Items	39[a]
	Part 2	Value	0.773
		N of Items	39[b]
	Total N of Items		78
Correlation Between Forms			0.621
Spearman- Brown Coefficient	Equal Length		0.766
	Unequal Length		0.766
Guttman Split-Half Coefficient			0.764

Another way to show that this questionnaire has internal consistency is with the split-half coefficient of .764 and a Cronbach's Alpha coefficient of .775. Then, the generally accepted reliability test, Cronbach's alpha, is used in the study, and the thesis trajectory is considered to be satisfactory.

5.2. Presentation of Results

This paper answers research question one through the data presented in Table 3, which is all about sources of information on maternal mental health. This is because Table 3 contains data on the frequency and ranking of different information sources employed (e.g. health workers, family, social media, etc.). To answer research question two, Table 4 deals with the Structural Model (PLS-SEM results), path coefficients between information sources and awareness answer research question two. Data from the table revealed the relationship between information sources and awareness of PPD and their strength and significance. In addition, Table 4 also deals with the Structural Model, which addresses research question three. This is because the path coefficient between PPD awareness and help-seeking behaviour demonstrates this relationship and its statistical significance. Furthermore, Table 4 takes care of Mediation Analysis (PLS-SEM Indirect Effects), which answers research question four. the table provides data on the mediating effects of subjective norms and how perceived control affects the relationship between awareness and intention to seek help. And finally, Table 3 on the Structural Model answers research question five. In other words, the path coefficient from information sources to help-seeking behaviour, directly or indirectly (through awareness), supports the analysis.

Table 4. *Demographic Characteristics of Respondents in Bosso and Chanchaga LGAs, Minna, Niger State (N = 382)*

Variable	Category	Bosso	Chanchaga	Total	Bosso %	Chanchaga %	Total %
Age Range	18–25	23	33	56	6.0%	8.6%	14.7%
	26–33	67	64	131	17.5%	16.8%	34.3%
	34–41	70	53	123	18.3%	13.9%	32.2%
	42–49	36	36	72	9.4%	9.4%	18.8%
Highest Educational Qualification	No formal education	40	43	81	10.5%	11.2%	21.2%
	Primary certificate	92	102	194	24.1%	26.7%	50.8%
	SSCE	6	6	12	1.6%	1.6%	3.1%
	OND	5	8	13	1.3%	2.1%	3.4%
	HND	11	6	17	2.9%	1.6%	4.5%
	B.Sc/B.Ed/B.Tech	35	13	48	9.2%	3.4%	12.6%
	M.A/M.Sc/M.Ed/Ph.D	7	8	15	1.8%	2.1%	3.9%
Employment Status	Entrepreneur	48	52	100	12.6%	13.7%	26.2%
	Artisan	35	37	72	9.2%	9.7%	18.8%
	White collar job	21	15	36	5.5%	3.9%	9.4%

	Student	6	8	14	1.6%	2.1%	3.7%
	Unemployed	65	68	133	17.0%	17.8%	34.8%
	Self-employed	21	6	27	5.5%	1.6%	7.1%
Marital Status	Single	87	100	187	22.8%	26.2%	49.0%
	Married	77	72	149	20.2%	18.9%	39.0%
	Divorced	17	6	23	4.5%	1.6%	6.0%
	Widowed	15	8	23	3.9%	2.1%	6.0%
Religion	Christianity	22	17	39	4.4%	4.4%	8.8%
	Islam	171	164	335	44.8%	43.0%	87.7%
	Traditional	3	5	8	0.8%	1.3%	2.1%
Number of Children	0	78	97	175	20.4%	25.4%	45.8%
	1–5	97	75	172	25.4%	19.6%	45.0%
	6–10	19	13	32	5.0%	3.4%	8.4%
	11 and above	2	1	3	0.5%	0.3%	0.8%
Age of Children	0 to 1 year	65	10	75	17.0%	2.6%	19.6%
	2 to 20 years	128	174	302	33.5%	45.5%	79.1%
	21 years and above	3	2	5	0.8%	0.6%	1.3%

Source: *Authors (2025)*

The importance of the demographic characteristics in the table will help to understand why help-seeking behaviour for postpartum depression varies among different cultures, and access to information and social support, as highlighted in the discussion section. 384 women between the ages of 18 and 49 took part in the survey. Out of which 40.6% were 25-34 years old and 32.8% were 35-49 years old. The majority of them were married (85.4%) and had an education up to secondary level (66.7%). Among these women, 38.5% do not have jobs, and 55.2% live in urban settlements. 77.6% had three or more children, which suggests they are likely to face PPD risks due to multiple births

Table 5. *Confirmatory Factor Analysis for Measurement Model Construct*

	Loading	**VIF- for Specific Items**
Constructs	**≥ 0.7**	
Interpersonal Information Sources		
Healthcare Officials	0.890	2.188
Friends	0.886	1.583
Family Members	0.807	1.586
Electronic Media		
Radio	0.891	2.263
Television	0.879	2.079
Social media	0.854	1.877
Print Media		
Magazines	0.890	1.509
Newspaper	0.888	1.508
Postpartum Depression Knowledge (PDK)		
PDK1	0.724	1.435
PDK2	0.784	1.641
PDK3	0.872	2.305
PDK4	0.853	2.9188
Help Seeking Behaviour (HSB)		
HSB1	0.753	1.660
HSB2	0.786	1.727
HSB3	0.851	1.780
HSB4	0.804	1.624

Confirmatory Factor Analysis (CFA) of this study is depicted in Table 5, with attention paid to factor loadings and Variance Inflation Factor (VIF) values for various constructs. The effectiveness of specific items in measuring the intended structures is confirmed using CFA. The factor loadings show how strongly each item and its corresponding construct are related; values greater than 0.7 indicate good

construct validity. The VIF values were used to quantify the degree of multicollinearity between the measurement instruments employed to assess study variables. Friends, family, and medical professionals, the three components of the Interpersonal Information Sources construct, demonstrate a robust representation with factor loadings ranging from 0.807 to 0.890. Despite their relationship, these items do not show significant redundancy, according to the VIF values (1.583-2.188), which show moderate multicollinearity.

Furthermore, the Electronic Media construct, which includes social media, television, and radio, shows substantial factor loadings (0.854-0.891), indicating its legitimacy. The VIF values (1.877-2.263) for this category indicate a respectable level of multicollinearity. The Print Media construct, which includes newspapers and magazines, also shows strong factor loadings (0.888-0.890), indicating that both items measure the construct well. The low VIF values (1.508-1.509) suggest that newspapers and magazines make distinct but connected contributions to assessing print media as a source of information, enlightening us about their unique roles in information dissemination.

The factor loadings for Postpartum Depression Knowledge (PDK) span from (α = 0.724-0.872), demonstrating that the items successfully represent the construct. PDK4 has the highest VIF value (2.9188), which would signal overlap or duplication in the measurement due to a more significant correlation with other PDK items. The four items in the Help-Seeking Behaviour (HSB) construct also demonstrate strong construct validity, with factor loadings ranging from 0.753 to 0.851. Even though the VIF values (1.624-1.780) show substantial collinearity, the strong construct validity of the items provides reliable insights into how people seek assistance.

Table 6. *Convergent Validity, Composite Reliability, Internal Consistency of Latent Constructs, and Cronbach's Alpha.*

Latent Variables	Average Variance Extracted ≥0.5	Composite Reliability ≥ 0.8	Cronbach's Alpha > 0.7
Electronic Media	0.765	0.907	0846
Help Seeking Behaviour	0.624	0.869	0.800
Interpersonal Information Sources	0.743	0.896	0.826
Postpartum Depression Knowledge	0.657	0.884	0.824
Print Media	0.790	0.883	0.735

Key indices of validity and reliability for various latent variables, such as Cronbach's Alpha (α), Composite Reliability (CR), and Average Variance Extracted (AVE), are shown in Table 6. These measures are crucial for evaluating a research instrument's construct validity and internal consistency dependability. They aid in verifying the measured constructs' reliability and statistical validity for additional investigation.

The percentage of variance in the observed variables that the underlying construct can account for is measured by Average Variance Extracted (AVE). Good convergent validity is defined as a number larger than 0.5, meaning that the concept constitutes over 50% of the variation in the linked indicators. All of the constructions in this table have AVE values greater than 0.5, with the most significant values seen in Print Media (0.790) and Electronic Media (0.765). This shows that the assessment items for these constructions effectively encapsulate their intended notions. Although their AVE values are comparatively lower, the Help-Seeking Behaviour (0.624) and Postpartum Depression Knowledge (0.657) constructs also satisfy the criteria, suggesting they may have a bit of measurement error even if they demonstrate enough convergent validity. Composite Reliability (CR), comparable to Cronbach's Alpha but frequently seen as more reliable in structural equation modelling, assesses a construct's internal consistency. Reliability is strong when the CR value is more than 0.8. Interpersonal Information Sources (0.896), Postpartum Depression Knowledge (0.884), and Electronic Media (0.907) have the most excellent CR values above 0.8. This indicates that all the measurement items consistently reflect their corresponding elements. Cronbach's Alpha (α) is also used to measure internal consistency with a threshold of 0.7 and above. The reliability of interpersonal information sources (0.826) and electronic media (0.846) is exceptionally high. Despite having the lowest Cronbach's Alpha of all the constructions (0.735), Print Media is still within an acceptable range, indicating moderate but adequate reliability.

The findings of this research provide strong evidence of the reliability and validity of the measuring model. The high AVE values demonstrate good convergent validity, while Cronbach's Alpha verifies the appropriate reliability of all constructions. The high CR values further confirm the excellent internal consistency of our constructs.

Table 7. *Discriminant Validity Matrix Based on Square Root of AVE and Inter-Construct Correlations*

	EM	HSB	IIS	PDK	PM
EM					
HSB	0.504 [0.476; 0.648]				
IIS	0.549 [0.490; 0.661]	0.584 [0.492; 0.677]			
PDK	0.406 [0.311; 0.502]	0.573 [0.480; 0.654]	0.478 [0.371; 0.551]		
PM	0.500 [0.473; 0.637]	0.556 [0.496; 0.660]	0.534 [0.446; 0.671]	0.444 [0.311; 0.512]	

EM: Electronic Media, **HSB:** Help Seeking Behaviour**, IIS:** Interpersonal Information Sources, **PDK**: Postpartum Depression Knowledge, **PM:** Print Media

To determine whether each construct in the study differs from the others, Table 7 shows discriminant validity. The off-diagonal values in this table show the correlations between the constructs, with confidence intervals shown in parentheses. The diagonal values in this table represent each construct's square root of the Average Variance Extracted (AVE). Discriminant validity ensures that each construct in the model maintains a stronger relationship with its indicators than with other constructs, particularly when the diagonal values of each construct's square root of AVE surpass the off-diagonal values, which represent the construct's correlation with other constructs. All diagonal values in the table are higher than their equivalent off-diagonal values, indicating strong discriminant validity.

Effect size (f^2) and Redundancy (Q^2)

Deals with the Measurement Model (Outer Loadings, AVE, CR, etc.). It tests the validity and reliability of constructs used in the model (i.e. information sources, awareness, subjective norms, perceived behavioural control, help-seeking behaviour). This shows that the measurement items in the study are statistically sound, a prerequisite for interpreting the structural model. Although the table is not tied to any specific research question, it validates the tools used to answer all research questions. This makes the constructs measured (for example, awareness, intention, norms) valid and reliable, thereby giving credibility to all findings.

Table 8. *Effect size (f^2), Collinearity (VIF) and Predictive Relevance (Q^2) of the Structural Model*

	Effect size (f2)	Decision	Lateral Collinearity Test (VIF)	Redundancy (Q2)
Electronic Media	0.388	Large Effect	1.731	-
Interpersonal Information	0.422	Large Effect	1.844	-
Print Media	0.310	Large Effect	1.792	-
Help Seeking Behaviour	-	-	-	0.554
Postpartum Depression Knowledge	-	-	-	0.471

To ascertain the weight of the relationship between variables, the existence of collinearity, and the predictive usefulness of the model, Table 8 provides the Effect Size (f2), Lateral Collinearity Test (VIF), and Redundancy (Q2). The Effect Size (f^2) indicates the degree to which an independent variable affects a dependent variable. In this study, the research adopted Cohen's (1988) recommendations, where values of 0.02, 0.15, and 0.35 denote modest, medium, and high effects, respectively. Print media (0.310), electronic media (0.388), and interpersonal information sources (0.422) all show big effect sizes in this table, suggesting that they have a significant impact on the dependent variable, which in this case is Help-Seeking Behaviour and Postpartum Depression Knowledge.

Values greater than 5 indicate problematic collinearity between predictors in the Lateral Collinearity Test (VIF), which evaluates multicollinearity. The VIF values for Print Media (1.792), Electronic Media (1.731), and Interpersonal Information Sources (1.844) are all far below the cutoff, indicating that

collinearity is not an issue in this research. The Redundancy (Q2) values assess the predictive relevance of the model. Meanwhile, values greater than 0 suggest that the model has predictive power. Help-seeking behaviour has 0.554, and Postpartum Depression Knowledge has 0.471 Q2 values, demonstrating its robust predictive potential. These findings not only underscore the model's predictive power and statistical strength but also instil confidence in its applicability to real-world scenarios.

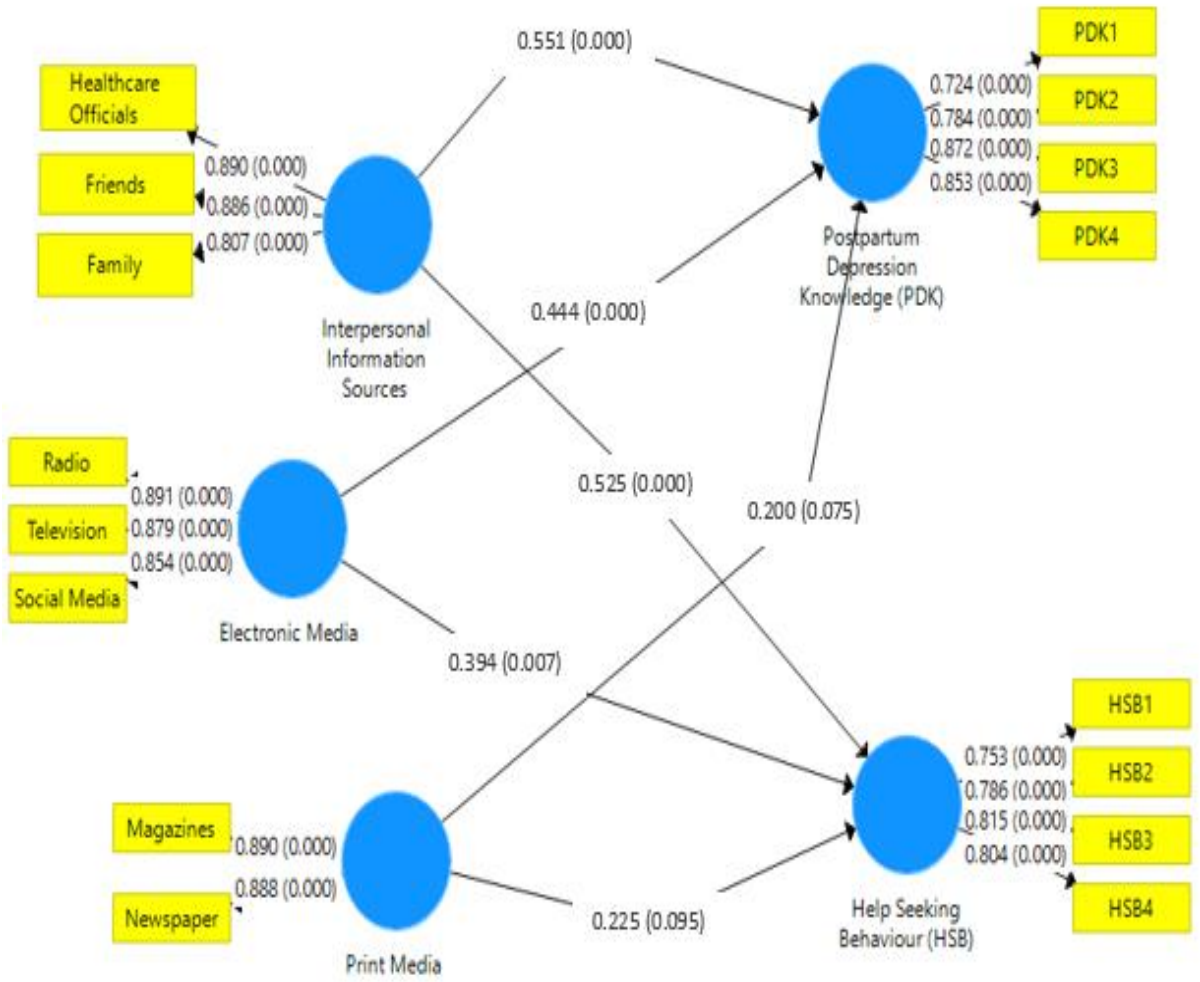

Figure 3. *PLS-SEM Bootstrapping Model: Standardised Path Coefficients (β), R^2 Values, and Significance Indicators for Structural Relationships*

Source: Omale et al (2025)

The R-squared values and PLS Bootstrapping Model with β and P values were utilised to verify the extent of correlation between the observed variables (path coefficients) and significant values. The PLS Bootstrapping Model with PLS Bootstrapping differences (expressed in units of standard error) and β and T-statistics were also calculated for the differences at the same time. 500 is often Smart PLS's default bootstrapping value. However, as suggested by Ramayah, Cheah, Jacky, Chuah, Francis, Ting, Hiram, and Memon (2018), the subsamples of 500 were extended to 5000 to improve the final output.

Path Coefficients

The overall fit and adequacy of the PLS SEM model are shown in Table 5 using indices such as SRMR, NFI, etc. It shows if the theoretical model represents the data. Further, confirms that the tested relationships between variables are statistically acceptable and modelled well. It verifies the robustness of all conclusions drawn from the model, as it does Table 9, which supports the entire model, rather than addressing a single research question.

Table 9. *Path Coefficients, R-Squared Values, and Statistical Significance of Hypothesised Relationships*

Variables	Path Co-Efficient	R^2	Standard Deviation	T Statistics	P Values
EM → HSB	0.394	0.155	0.167	2.708	0.007
EM → PDK	0.444	0.197	0.145	3.554	0.000
IIS → HSB	0.525	0.276	0.141	3.543	0.000
IIS → PDK	0.551	0.304	0.146	3.907	0.000
PM → HSB	0.200	0.040	0.112	1.780	0.075
PM → PDK	0.225	0.051	0.117	1.791	0.095

The path coefficient between interpersonal information sources and PPD knowledge (β = 0.551, p < .001) indicates a strong, significant relationship. Similarly, electronic media had a moderate but significant effect (β = 0.444, p < .001). Print media effects were weak and non-significant (p > .05). However, the Path Coefficients do show the significance and strength of the relationships between the variables in the model. As shown in Table 8, the coefficients display the impact of Electronic Media, Interpersonal Information Sources, and Print Media on Help-Seeking behaviour and Postpartum Depression Knowledge. Also, the R2 values, standard deviation, t-statistics, and the results of this study were interpreted based on p-values. The path coefficients (β) serve as a measure of the correlation between independent and dependent variables. In our study, the most significant path coefficients are IIS → PDK (0.551) and IIS → HSB (0.525), indicating the strong influence of interpersonal information sources on postpartum depression knowledge and help-seeking behaviour. The significant correlations between EM and PDK, which is 0.444, and EM → HSB, which is 0.394, highlight the substantial role of electronic media in shaping behaviour and knowledge. In addition, the path coefficient values for PM and PDK, which are 0.225 and for PM and HSB, which is 0.200, had the lowest route coefficients, suggesting a less significant influence of print media. The R2 values explained the percentage of the variance of the dependent variable on the independent variable (Gordon, 2023). With the most excellent R2 value of 0.304 (IIS → PDK), interpersonal information sources account for 30.4% of the variation in postpartum depression knowledge. The lowest R2 value, on the other hand, is 0.040 (PM → HSB), suggesting that Print Media cannot explain Help-Seeking Behaviour.

The p-values and t-statistics show how significant each relationship is statistically. A p-value of less than 0.05 and a t-statistic greater than 1.96 attest to a substantial effect. According to the findings, every path, including interpersonal information sources and electronic media, is statistically significant (p < 0.05). There is no statistically significant correlation between Print Media and Help-Seeking Behaviour (p = 0.075) or Postpartum Depression Knowledge (p = 0.095), indicating that Print Media has no discernible effect on these outcomes. The results of this study underscore the practical implications for interventions aimed at raising awareness of postpartum depression and help-seeking. While print media has a minor and statistically negligible influence, interpersonal information sources and electronic media emerge as the most important predictors of both help-seeking behaviour and postpartum depression knowledge. This suggests that in designing interventions, the focus should be on leveraging the influence of interpersonal relationships and electronic media, rather than print-based sources.

6. Discussion of Findings

This study examined the influence of information sources on postpartum depression knowledge and help-seeking behaviour among mothers. It underscores the significant relationships of friends, family, and medical experts as elements of interpersonal information sources in raising awareness and making mental health decisions, particularly among mothers in Northern Nigeria. Existing studies consistently show that interpersonal sources and social support are crucial factors that influence mental health awareness and outcomes (Olabisi, Faronbi, Adedeji, Ademuyiwa, Gambari, & Lasisi, 2023; Wright, 2016). Social ties often serve as reliable information sources, increasing the likelihood that people will act on the guidance and information they receive. While interpersonal information sources promote help-seeking behaviour, they also come with risks. This could be connected to false information, cultural norms, and social stigma that are linked to mental health concerns can all impact information gathered from non-expert sources, such as family and associates (Hoare & Vythilingum, 2023; Kelly & Ostovar-Kermani, 2024; Laato, Islam, Islam, & Whelan, 2020; Nguyen, Birnbaum, & De Choudhury, 2023). Despite this, people are stigmatised mentally, it is rampant among low-income nations, and could hinder mothers from seeking care (Lassi, Middleton, Bhutta, & Crowther, 2019).

Digital platforms like social media, radio, and television hold great influence for increasing awareness among large groups, particularly mothers in this context (Nguyen, Birnbaum, & De Choudhury, 2023). Electronic media not only disseminate information but also provide real-time support. This could significantly increase public awareness of postpartum depression and encourage mothers to seek professional help as it relates to postpartum depression (Daehn et al., 2023; Progga, Senthil Kumar, & Rubya, 2023). However, electronic media also present particular challenges.

Spreading false information has become a serious issue as people depend more on social media as their primary information source. In the digital age, the need for accurate and reliable information is more crucial. This is because social media is less regulated; thus, inaccurate or misleading content can be spread all over the platforms (Tandoc Jr, Lim, & Ling, 2020). This position is further buttressed by (Oyesomi, Salawu, & Olorunyomi, 2017) in their study on online information seeking behaviour and quality healthcare. They posit that trustworthiness is particularly critical due to the potential negative consequences of decision-making based on unreliable information sources. Furthermore, other existing studies have noted that inaccurate information related to health on social media can lead to misconceptions about postpartum depression education, among other related health issues. This may influence people's behaviour when seeking treatment (Liu-Zarzuela, Mallya, Munoz, & Grayson, 2023; Progga, Senthil Kumar, & Rubya, 2023). To this end, healthcare professionals should concentrate on spreading reliable information to solve this issue. This approach will assist in guaranteeing that knowledge about postpartum depression is accurate, approachable, and interesting, thereby promoting trust in the accuracy of the data offered.

The results from the findings indicate that the least influence on postpartum depression and help-seeking behaviour comes from print media. Electronic media and face-to-face communication seem more important than newspapers and magazines when reaching and influencing women about PPD. As more people rely on digital platforms for information, this is consistent with the global reduction in the consumption of print media (Alzubi, 2023; Widen, 2024). Print media may have less impact because of its lower accessibility and engagement levels, especially in rural areas. While interactive and real-time communication technology can attract attention and inspire people to act, printed materials can only offer fixed information (Sawesi, Rashrash, Phalakornkule, Carpenter, & Jones, 2016). In light of these findings, public health campaigns should give digital and interpersonal communication strategies precedence over print-based awareness campaigns. This could help in improving responsiveness and participation.

6.1. Further Discussion on Theoretical Implications from Findings in the Study

TPB by Ajzen (1985), was the key theoretical base for the investigation. The theory states that behavioural intentions are determined by attitude, subjective norms and perceived behavioural control. In the context of postpartum depression (PPD) among women in Northern Nigeria, the application of TPB provides strong empirical support and numerous important theoretical cues from this study.

Specifically, most of the findings correspond to TPB's assumptions. Mediating the relation between awareness of postpartum depression (PPD) and help-seeking behaviour (HSB) are subjective norms that are influenced by friends, family and cultural expectations (see Tables 2 and 3). This aligns with one of the tenets of the theory that social pressures are important in influencing behavioural intention.

Also, based on findings, perceived behavioural control was also a mediating factor. Those women who felt they had some ability to access care, presumably from understanding correct information from reliable sources, were more likely to have the intention to seek help. These fit with TPB's core assumptions and show the measure's predictive abilities in a non-Western, culturally explicit setting, thereby confirming cross-cultural validity and relevance of the theory.

In terms of empirical confirmation of pathways from the data presentation, The SmartPLS-SEM analysis showed that: Interpersonal information sources such as (family, healthcare workers) had great impact on PPD knowledge and HSB (IIS → PDK = 0.551; IIS → HSB = 0.525), Electronic media also had significant effects (EM → PDK = 0.444; EM → HSB = 0.394), As opposed to print media, it demonstrated weak and statistically insignificant effects on both variables (PM → PDK = 0.225, p = 0.095; PM → HSB = 0.200, p = 0.075). These findings reinforce TPB's arguments that attitudes towards behaviour are influenced by the nature and quality of information sources, which in turn will determine whether people will act on the information.

6.2. Theoretical Contributions to Knowledge

Theoretically, this study extends the Theory of Planned Behaviour (TPB) by situating it within a Northern Nigerian sociocultural framework. While the TPB assumes that attitudes, subjective norms, and perceived behavioural control jointly predict intention and behaviour, this study demonstrates that the credibility of information sources and cultural stigma significantly moderate those relationships.

In other words, the study expands the explanatory reach of TPB by showing that in collectivist and high-context cultures, such as those in Northern Nigeria, social credibility and cultural interpretation of illness serve as additional determinants of behavioural intention. This contextual modification offers a more inclusive and realistic application of TPB beyond Western-centric assumptions.

Moreover, by empirically validating that social expectations and perceived control mediate the relationship between PPD awareness and help-seeking, the study provides a theoretical bridge between health communication and behavioural psychology. It thus contributes to refining TPB's predictive capacity within health behaviour research, particularly in understanding how women negotiate between cultural norms, stigma, and professional care when confronted with postpartum depression. This is in contrast to the settings of the West, where institutional or expert-driven media usually control behavioural influence (Ozohu-Suleiman, 2010). The effectiveness of misinformation, especially from informal interpersonal and unregulated digital media sources, implies inclusion of message credibility and information accuracy as possible mediators or extensions of the TPB framework.

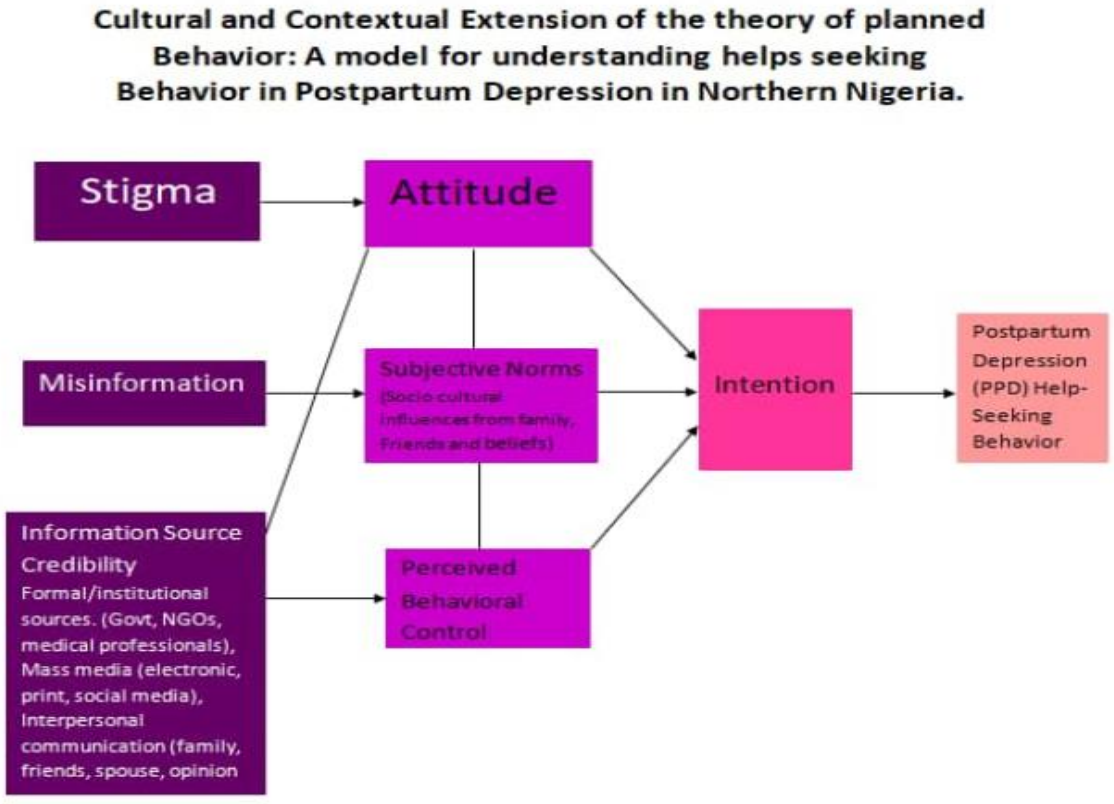

Figure 4 *presents a Modified TPB Schema: Cultural and Contextual Extension*

Source: Omale et al (2025).

The findings suggest that in Northern Nigeria, behavioural intentions are shaped primarily through interpersonal influence and credibility of information rather than attitudinal factors alone. Thus, the model extends TPB by incorporating information credibility and stigma as contextual mediators.

6.3. Empirical Implications

The empirical outcomes of this study demonstrate, with statistical evidence from SmartPLS-SEM analysis, that interpersonal information sources and electronic media significantly influence postpartum depression knowledge and help-seeking behaviour among women in Niger State. These findings

advance understanding of how communication channels operate in a low-resource and culturally complex environment. They show that face-to-face networks, particularly interactions with healthcare professionals, friends, and family, remain the most trusted and behaviour-shaping information sources.

Furthermore, the data empirically confirm that the quality and accessibility of information are directly related to women's readiness to seek professional help. In contrast, the negligible effect of print media reflects a declining reliance on static communication platforms in shaping health decisions. This finding carries practical implications for health communication strategy and policy. It suggests that interventions on maternal mental health should emphasise community-based communication and digital engagement models over traditional print campaigns. Hence, the empirical value of this study lies in identifying which information sources are most effective in influencing behaviour within a culturally specific maternal health context.

6.4. Implications for the Application of the Theory of Planned Behaviour.

Based on findings from this study, the following are the implications for TPB adaptation:

1. Affirmation: The TPB is a valid explanatory model for maternal mental health help-seeking behaviour in Northern Nigeria, empirically endorsed.
2. Adaptation: Incorporating the information source credibility and cultural stigma may improve the accuracy of the model's predictions in low-resource and culturally complex environments.
3. Application: The model can be applied not only in understanding behaviour, but also to inform the design of communication interventions (e.g., focus on interpersonal and digital channels, deemphasise print media).

6.5. Interpretation of Hypothesis Test Results

The findings, shown in Tables 2 and 3, are consistent with the hypothesis in this study. They proposed that awareness of postpartum depression, influenced by a reliable information source, significantly predicts women's intention to seek help, which effect is mediated by subjective norms and perceived behavioural control. As shown in Table 2, information sources have a strong positive impact on PPD awareness, which in turn significantly impacts the help-seeking behaviour. Moreover, the awareness affects both subjective norms and perceived behavioural control, and they contribute to raising the help-seeking intention. In addition, as shown in Table 3, these relationships are confirmed with significant indirect effects showing that subjective norms and perceived behavioural control indeed mediate the relationship of PPD awareness and the help-seeking behaviour.

In essence, the hypothesis is accepted because the results provide empirical evidence to support the theoretical model grounded in the TPB, which also supports the proposed hypothesis as well as important implications of awareness and psychosocial mediators in helping-seeking behaviour for helping postpartum depression.

6.6. Implications for Policy and Practice

Public health policymakers, medical experts, and media strategists have a lot to benefit from this study. This study has addressed gaps in how people seek help and disseminate information, calling for a multipronged strategy that uses efficient avenues of communication. It is crucial to strengthen peer support groups, community-based activities, and direct medical consultations to raise awareness of postpartum depression. In this study, in-person contact with peer groups and healthcare professionals can promote trust, enhance memory retention, and motivate people to seek prompt assistance (Adeyemo, Oluwole, Kanma-Okafor, Izuka, & Odeyemi, 2020). In addition, people can obtain accurate information and essential support through incorporating postpartum depression education into regular maternal healthcare services and community outreach programmes.

Digital platforms, such as radio, television, and social media, are optimal for spreading focused, fact-based awareness campaigns. According to studies, digital media is a vital tool for interacting with various audiences since it shapes attitudes and behaviours related to health (Tandoc Jr, Lim, & Ling, 2020). Public health campaigns should aim to produce widely disseminable, engaging, culturally appropriate, and scientifically sound content that helps debunk myths and encourages proactive help-seeking behaviours. Traditional print materials like newspapers and magazines are less successful at promoting behavioural change because of their limited engagement and static character.

7. Conclusion

The findings reinforce the need for multi-channel communication approaches that integrate interpersonal and digital sources into Nigeria's maternal health policy (SDG 3.4). The study enriches the Theory of Planned Behaviour by contextualising it within African sociocultural realities and provides evidence for designing targeted communication interventions against postpartum depression. Future studies should examine the ways in which information quality and demographic traits affect how well these channels of communication work to modify behaviour.

8. Declarations

Wright, K. (2016). Social networks, interpersonal social support, and health outcomes: A health communication perspective. *Frontiers in Communication, 1*, 10.

9. Limitations and Future Research

This investigation is limited to a cross-sectional survey. Further studies could examine the longitudinal impact of culturally sensitive risk communication strategies and compare their impact across several regions in Nigeria to determine what constitutes the most effective method for handling PPD.

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Our Ref: CUCMC/OGE/1129/25 **Date: 29 May 2025**
Your Ref:
NOTICE OF APPROVAL OF PROTOCOL

RE: RISK COMMUNICATION, INFORMATION SOURCES, KNOWLEDGE, ATTITUDES AND POSTPARTUM DEPRESSION PRACTICES AMONG WOMEN IN SELECTED STATES IN NORTHERN NIGERIA

US DEPT. OF HEALTH & HUMAN SERVICES	**IORG0010037**
CHREC NHREC REG. NUMBER	**NHREC/CU-HREC/1/01/2025**
HREC Protocol Assigned Number	**CHREC/1129/2025**
Name of Principal Investigator	**OMALE GLORIA ENEH**
Date of Receipt of Valid Application:	**24 February 2025**
The Approval Date from:	**29 May 2025 to 28 May 2026**

We write to inform you that the Research described in your submitted protocol, consent form, questionnaire and other related documents has undergone a positive review and given approval following the outcome of the review by the Covenant Health Research Ethics Committee (CHREC).

In a multi-year research, endeavor to submit your annual report to the CHREC early in order to obtain renewal of your approval and avoid disruption of your research.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules, and regulations and with the tenets of the Code, including ensuring that all adverse events are reported promptly to the CHREC. No changes are permitted in the research without prior approval by the CHREC except in circumstances outlined in the Code. The CHREC reserves the right to conduct a compliance visit to your research site without previous notification.

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Chairman

Kehinde Osagbemi
Desk Officer - CHREC

Vice-Chancellor: Professor Timothy A. Anake
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