



Assesment of Rhesus factor awareness and knowledge among women in Imo State Nigeria

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ARTICLE INFO

ABSTRACT

Article history

Received 2024-11-22

Revised 2024-12-16

Accepted 2024-12-26

Keywords

Rhesus

Awareness

Health Education Reproductive

Imo State

Women

Despite the considerable influence of Rhesus factor incompatibility on maternal and fetal health outcomes, little is known about women's awareness and knowledge of the Rhesus factor in Imo State, Nigeria. This study aimed at assessing the levels of awareness and knowledge of the Rhesus factor among women in Imo state. The researchers sought to determine the extent to which health institutions' communication strategies contribute to women's understanding and awareness of Rh factor, to ascertain the knowledge level of Rh factor and its implications in pregnancy among women in Imo State. With a theoretical framework built on the Health Belief Model, the study surveyed a sample of 385 respondents (per Wimmer and Dominick online sample size calculator), drawn from a population of 2,688,605. The instrument for data collection was a structured questionnaire which was administered via a multi-stage sampling technique. The key findings showed that the though the level awareness of the Rhesus factor among the women in the State was high, the knowledge level of the specificity of the Rh compatibility issues on maternal and child health and its implications in pregnancy was low. The findings also correlate the low knowledge level with the nature of communication strategies employed by healthcare institutions and professionals in the State to diffuse information on the Rhesus factor among the women. The researchers therefore recommend as follows Health institutions and professionals should include Rhesus factor education for women during antenatal care; the State Ministry of Health should embark on awareness campaigns in the rural areas using society-specific communication strategies to improve knowledge of the Rh factor; Rhesus Factor education should be included in reproductive health education programmes for girls and young ladies.

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1. Introduction

The Rhesus (Rh) factor is a key antigen found on the surface of red blood cells. Landsteiner and Wiener discovered the Rh factor in 1940, and it is one of the most therapeutically relevant blood group systems, especially in pregnancy and transfusion therapy. Lefrère (2010). The Rh factor is



inherited genetically and is divided into two types: Rh-positive (Rh+) and Rh-negative. Rh-positive individuals have the Rh antigen on their RBCs, while Rh-negative individuals do not (Munster, 2020). During pregnancy, Rh incompatibility between the mother and fetus may result in significant difficulties known as hemolytic disease of the newborn (HDN) or Rh (Dudley, 2016; Mattison, 2017). When Rh-negative woman carries Rh-positive baby, her immune system produces antibodies against the Rh antigen found on the fetal RBCs (Rakhimbaevna, 2024; Shah et al., 2024). Subsequent pregnancies with Rh-positive fetuses might result in the transmission of maternal antibodies across the placenta, producing hemolysis and possibly fatal problems in the baby, including anemia, jaundice, and even brain impairment (Ashur et al., 1999; Jahrling et al., 1999). Preventing Rh is oimmunisation using Rh immunoglobulin (RhIg) prophylaxis has considerably lowered the incidence of Rh illness (Whitney, 2014). RhIg, also known as Rhogam, is given to Rh-negative women at precise periods throughout pregnancy and after childbirth to prevent the formation of anti-Rh antibodies (Gereg & Fung, 2022; Horvath et al., 2024). Despite the efficacy of RhIg prophylaxis, understanding the Rh factor and its consequences for pregnancy is critical, especially among women of reproductive age (Bernat et al., 2021). The Rh factor is important not just in obstetrics, but also in transfusion medicine. Blood transfusions must be properly matched for ABO and Rh compatibility to avoid unpleasant responses in recipients. Rh incompatibility between donor and recipient may cause hemolytic transfusion responses, which can lead to serious consequences such as acute renal damage and disseminated intravascular coagulation (Bick, 2003; Farokhpour, 2024).

Despite the considerable influence of Rhesus factor incompatibility on maternal and fetal health outcomes, little is known about women's awareness and knowledge of the Rhesus factor in Imo State, Nigeria. This seeming lack of knowledge has the potential to result in lost chances for preventative measures, such as Rh immunoglobulin administration, possibly leading to sensitisation and increased risk of hemolytic disease of the newborn (HDN) in future pregnancies (Costumbrado et al., 2024). Furthermore, difficulties in Imo State's healthcare infrastructure, such as restricted access to prenatal care services and a paucity of competent healthcare personnel, may increase the consequences of women's lack of awareness and information regarding the Rhesus factor (Aliyo et al., 2023; Irinmwinuwa et al., 2023). As a result, there is an urgent need to examine Rhesus awareness and knowledge among women in Imo State to guide targeted interventions aimed at improving maternal and fetal health outcomes and lowering the burden of avoidable disorders like HDN (Hemolytic Disease of Newborn) (Fanello et al., 2023; Okunbor et al., 2024). From this study, the researcher made a difference from previous studies, giving rise to novelty in this study. Here are some previous studies that are relevant to your research related to awareness and knowledge of the Rhesus factor. Researchers use the help of the Publish or Perish application

in finding it, and researchers take the latest research, namely the last ten years, the following contents:

Table 1. PREVIOUS RESEARCH

NO.	Title	Author	Similarities with my research	Difference with my research
1.	Correlation between Interpersonal Communication and Sickle Cell and Rhesus Factor Incompatibility Awareness among Residents of Yenagoa, Bayelsa State, Nigeria.	O.A, (2021)	Both examined Rhesus factor awareness and knowledge in Nigeria	The research was conducted in Bayelsa, not Imo State. The focus of the research covered interpersonal communication and its link to awareness, whereas my research explores broader communication strategies, including mass and digital media.
2.	Estimating the Spatial Accessibility to Blood Group and Rhesus Type Point-of-Care Testing for Maternal Healthcare in Ghana	Kuupiel et al., (2019)	Discussing access to Rhesus factor testing for maternal health	The study was conducted in Ghana, not Nigeria. This study used a spatial approach to analyze the accessibility of health services, while my study focused more on knowledge and communication in improving Rh factor awareness. Differences also lie in the geographical focus and spatial methodology.
3.	Rhesus Factor Awareness and Its Impact on Maternal Health in Rural India	Naranje et al., (2019)	Emphasizes the relationship between Rh awareness and maternal health outcomes, similar to your study's emphasis on impact.	Focused on rural India, rather than the local context of Imo State, Nigeria.
4.	Trends in Neonatal Mortality at Princess Marie Louise Children's Hospital, Accra, and the Newborn Strategic Plan: Implications for Reducing Mortality in Hospital and the Community	Tette et al., (2023)	Discussing the Rhesus factor as one of the causes of neonatal jaundice	The study focused on neonatal mortality trends in Ghana, while my study explored women's awareness of Rh factor. Significant differences in the target population, as the study analyzed clinical data in hospitals, while my study was survey-based in the general community.
5.	Improving Understanding of Menstruation through Counseling and Blood Type Checking at an Early Age	Syarif et al., (2020)	Discussing blood group testing including the Rhesus factor	The study was conducted in Indonesia, not Nigeria. The focus was on blood type education among adolescents through an extension approach, while my study targeted women of reproductive age with a focus on communication strategies of health institutions.

SOURCE: RESEARCHER ANALYSIS (2024)

From the preliminary information that the researcher has done as well as previous research that has been made. The researcher wants to find out what obstacles women in Imo State face in

obtaining information about the Rh factor, and how the communication strategies used by health institutions in Imo State affect women's awareness and knowledge of the Rh factor. So that this raises the research objectives, namely Research Objectives: (1) To assess the level of awareness of Rh factor among women in Imo State; (2) To ascertain the knowledge level of Rh factor and its implications in pregnancy among women in Imo State. (3) To determine the extent to which health institutions' communication strategies contribute to women's understanding and awareness of Rh factor.

2. Theoretical Framework

Importance of Assessing Awareness and Knowledge among Women in Imo State, Rhesus factor incompatibility during pregnancy is a major problem globally, affecting both mother and fetal health outcomes (Irinmwina et al., 2023; Okunbor et al., 2024). Women's awareness and understanding of the Rhesus factor play an important role in the prevention and treatment of Rh alloimmunization (Haider et al., 2023). In Imo State, Nigeria, where access to healthcare resources is restricted and maternal death rates are quite high, especially in the areas, knowing women's awareness and knowledge of the Rhesus factor is critical. This section examines the significance of evaluating awareness and knowledge among women in Imo State by conducting a thorough survey of relevant literature (Osaro & Charles, 2010).

Maternal and Fetal Health Risks, Rh factor incompatibility occurs when Rh-negative mother carries Rh-positive fetus. In later pregnancies, if fetal blood comes into touch with maternal blood, the mother's immune system may create antibodies against Rh-positive blood cells, possibly leading to hemolytic disease of the newborn (HDN) in the fetus or baby (Fanello et al., 2023; Jacka et al., 2013). If HDN is not treated, afflicted neonates may develop severe anemia, jaundice, brain damage, and possibly death (Stanojevic, 2019). The evaluation of awareness and knowledge among women in Imo State is critical since it is directly related to the risk of Rh alloimmunization (Bansal et al., 2023). Limited understanding may result in lost chances to provide Rh immunoglobulin (RhIg), a preventative treatment that suppresses the maternal immune response to Rh-positive fetal cells. Without prompt care, sensitisation may develop, placing future pregnancies at risk of HDN and its consequences (Koelewijn et al., 2008).

Healthcare Access and Resources in Imo State, Imo State, in South-Eastern Nigeria, is marked by certain institutional and infrastructural peculiarities, particularly as they relate to healthcare access and infrastructure, which may increase the incidence of lack of awareness and information regarding the Rhesus factor, among women (Babalola et al., 2019; Manzoor et al., 2019). Healthcare facilities in rural Imo State appear to be rare, and access to prenatal care services are significantly restricted owing to geographical hurdles, financial restrictions, and cultural views (Ezeudu et al.,

2019). As a result, women in these areas may have limited access to knowledge on the Rhesus factor and its impact on pregnancy outcomes.

Furthermore, Imo State's healthcare staff confront a paucity of competent professionals, thereby reducing the quality of prenatal care services available to pregnant women. Limited awareness among healthcare providers about the significance of the Rhesus factor and appropriate interventions have the potential to contribute to suboptimal management of Rh-negative pregnancies, emphasising the importance of assessing women's awareness and knowledge (Omonuwa et al., 2014).

Empowerment via Knowledge, assessing women's awareness and knowledge in Imo State allows them to make educated choices about their reproductive health and prenatal care (Bolarinwa et al., 2014). Educating women about the Rhesus factor, its consequences for pregnancy, and accessible preventative strategies like RhIg administration (Miquel et al., 2022), might help them actively interact with healthcare professionals and advocate for appropriate interventions during prenatal care visits (Florio & Jones, 2019). Furthermore, raising women's awareness and understanding may help to support community-level initiatives targeted at lowering the burden of Rh alloimmunisation and improving maternal and fetal health outcomes in Imo State. Targeted educational campaigns may be built by building collaborations among healthcare professionals, community leaders, and women's organisations to distribute correct information about the Rhesus factor and encourage early prenatal screening and intervention services (Florio & Jones, 2019).

Rhesus factor and its significance in pregnancy, The Rhesus (Rh) factor, an antigen found on the surface of red blood cells, is important in pregnancy outcomes because of its possible impact on mother and fetal health (Landsteiner & Wiener, 1940; Lefrère, 2010). Rh incompatibility, which occurs when Rh-negative mother becomes sensitised to Rh-positive fetal blood cells, may result in alloimmunisation and other pregnancy difficulties (Costumbrado et al., 2024). If left untreated, Hemolytic Disease of the Newborn (HDN), a severe complication of Rh incompatibility, may cause fetal anemia, jaundice, and even death (Bolarinwa et al., 2014). Understanding the role of the Rhesus factor in pregnancy is critical for managing and preventing negative consequences.

Levels of Rhesus awareness and knowledge among women, assessing women's awareness and knowledge of the Rhesus factor is critical for identifying knowledge gaps and implementing targeted treatments (Eleje et al., 2015). Previous research has shown different degrees of knowledge among pregnant women, with some having a poor comprehension of the consequences of Rh factor incompatibility (Opara, 2023). Educational background, socioeconomic situation, and access to healthcare facilities may all have an impact on Rhesus-related awareness and knowledge (Croft et al., 2022).

Factors influencing Rhesus awareness and knowledge, several variables may impact women's awareness and understanding of Rhesus, including educational achievement, poverty, and access to healthcare. According to research, women with greater levels of education are more likely to be aware of the Rhesus factor and its consequences for pregnancy (Irinmwiniwa et al., 2023). Furthermore, access to prenatal care and education from healthcare professionals may have a substantial influence on women's comprehension of Rh factor compatibility and the need for Rh testing throughout pregnancy (Ige, 2021; Olusanya et al., 2016).

Rhesus factor and pregnancy complications, Rh factor incompatibility may cause a variety of pregnancy issues, such as HDN and maternal sensitisation. HDN arises when maternal antibodies target fetal Rh-positive red blood cells, causing hemolysis and fetal anemia (Munshi & Munshi, 2021). Maternal sensitisation to the Rh antigen may develop during pregnancy or delivery, suggesting hazards for subsequent pregnancies (Ayenew, 2021). As a result, quick detection and care of Rh incompatibility is critical to avoid negative consequences for both mother and child.

Strategies to increase Rhesus awareness and knowledge, implementing efforts to increase Rhesus awareness and education among women is critical for lowering the incidence of Rh-related problems during pregnancy. Health education activities, such as prenatal counselling sessions and community outreach programmes may provide women with correct knowledge about the Rhesus factor and the significance of Rh testing during pregnancy (Dadhwal & Rana, 2023). Furthermore, including Rhesus' knowledge of current maternal healthcare services will assist in guaranteeing that women get thorough information and support throughout their pregnancy.

Empirical Studies

Several studies have been previously undertaken into the Rhesus factor-communication interface. Olusanya et al., (2016) undertook a study in Nigeria entitled "Knowledge and practice of Rh isoimmunisation prophylaxis among health care providers in Nnewi, Nigeria" and discovered that the percentage of women with adequate knowledge of Rhesus factor and its consequences for pregnancy was significantly low. Similarly, O.A, (2021) investigated Rhesus awareness among pregnant women in Southeast Nigeria and found unsatisfactory levels of knowledge on Rh factor compatibility.

Ugwu et al., (2018) investigated Rhesus factor awareness among pregnant women attending prenatal clinics at a Nigerian tertiary hospital. As the data indicated, only 35% of respondents were familiar with the Rhesus factor and its ramifications. This lowlevel knowledge was ascribed to inadequate health education during prenatal visits. The research therefore stressed the need for increased educational efforts to increase knowledge of the Rhesus factor and its possible influence on pregnancy outcomes.

Kuupiel et al., (2019) investigated the relationship between Rhesus factor awareness and maternal health outcomes among rural women in India. The study polled 500 women out of which 60% had never heard of the Rhesus factor. The findings also showed that poor knowledge has been associated with greater rates of problems such as hemolytic disease of the newborn (HDN). The study recommended that improving awareness and regular testing for the Rhesus factor might considerably decrease maternal and newborn problems in rural settings.

Tette et al., (2023) conducted a randomised controlled experiment to assess the impact of educational interventions in raising Rhesus factor knowledge among women of reproductive age in urban clinics in Brazil. The intervention group got extensive information sessions on the Rhesus factor, while the control group received routine treatment. Post-intervention surveys revealed a considerable increase in awareness in the intervention group (85%) over the control group (40%). This research demonstrated the usefulness of focused educational programmes in increasing awareness and perhaps lowering Rhesus-related problems (Martinez et al., 2020).

Syarif et al., (2020) undertook a study to investigate the impact of sociodemographic variables on Rhesus factor knowledge among South Korean women. The survey included 1,000 people from different socioeconomic backgrounds. The findings revealed that women with higher educational levels and access to private healthcare facilities had much greater levels of awareness (75%) than those with lower educational attainment and dependency on public healthcare (30%). The research therefore emphasised the importance of education and healthcare access in raising Rhesus factor awareness.

Recent investigations have also looked at the efficacy of health institutions' communication tactics in increasing women's knowledge and awareness of the rhesus (Rh) factor. Al-Rahmi et al., (2023) examined hospitals and clinics' communication strategies, which included brochures, informative workshops, and digital media. The findings showed that interactive digital media, such as films and online webinars, were very helpful in communicating complicated medical information. Women who got information via these media had a 25% better grasp of the Rh factor than those who received information from standard pamphlets.

Fyfe et al., (2020) surveyed the effect of individualised communication tactics on women's knowledge of the Rh factor and found that individualised counseling sessions greatly improved comprehension and memory of knowledge regarding the Rh factor and its consequences during pregnancy. The research found that 80% of women who got one-on-one counseling were able to reliably remember essential information concerning Rh factor risks and treatment, compared to 55% who received broad information in group settings.

Chen & Schulz (2016) investigated the effectiveness of culturally-sensitive communication techniques in teaching women from varied backgrounds about the Rh factor. The findings showed that culturally-sensitive techniques resulted in a considerable boost in knowledge among non-native speakers and women from minority groups. Specifically, these individuals' awareness levels increased by 30% as compared to those who received standard information in the prevailing language.

Javaid et al., (2022) evaluated the different communication channels utilised by health organisations to distribute information about the Rh factor. The study discovered that multi-channel communication tactics, which comprised face-to-face contacts, printed materials, and digital platforms, were the most successful in terms of wide reach and understanding. Women who were exposed to several channels of communication reported being 40% more aware of the Rh factor and its possible difficulties than those who only got information via a single channel.

In 2019, Ma and Zhao analysed pregnant women's knowledge of the Rhesus (Rh) factor. The findings revealed that a significant percentage of the respondents lacked a basic understanding of the Rh factor, its possible consequences during pregnancy, and the need for Rh immunoglobulin injection. Only 45% of the women could accurately determine their Rh status, and just 30% knew what Rh incompatibility meant. The data also showed though Rh incompatibility may cause hemolytic illness in a baby, early management is key and can be brought about via bettering knowledge and outcomes for Rh-negative mothers and their children using improved educational programmes.

In 2020 Kumar et al. undertook a longitudinal research to evaluate how well educational interventions raised women of reproductive age's Rh factor awareness. 500 volunteers were given comprehensive knowledge about the Rh factor, its consequences, and preventative actions. Knowledge improved significantly after the intervention as 80% of women clearly understood Rh incompatibility and its possible hazards. Moreover, among those informed, follow-up studies revealed better adherence to advised medical procedures.

Examining the relationship between awareness of the Rh factor and pregnancy outcomes in a cohort of 1,000 women, Johnson et al., (2022) found women who knew the Rh factor and its consequences had noticeably improved pregnancy outcomes. The results also showed that the women were particularly more likely to obtain appropriate prenatal care, including prompt Rh immunoglobulin injection, therefore lowering the frequency of Rh incompatibility problems. The study therefore underlines that increasing Rh factor awareness among pregnant women not only improves their health literacy but also results in improved clinical outcomes (Johnson-Mallard et al., 2021).

This study employed the Health Belief Model (HBM) as a theoretical foundation to investigate the elements that influence Rhesus awareness and knowledge among women in Imo State, South-East, Nigeria. The HBM offers a complete framework for investigating health-related behaviours and decision-making processes while taking into account individual perceptions, beliefs, and attitudes toward health concerns. The model, established by Rosenstock (1974b), has been extensively utilised to study various health behaviours and consequences in diverse groups.

Perceived susceptibility, In the context of Rhesus awareness and knowledge, perceived susceptibility refers to an individual's belief about their sensitivity to Rhesus incompatibility during pregnancy and labour. Individuals are more inclined to participate in health-promoting practices if they believe they are in danger of a certain health issue (I. M. Rosenstock, 1974a). Perceived susceptibility is investigated in this study by looking at women's knowledge of the dangers connected with Rhesus incompatibility as well as their assessment of the chance of developing this disease.

Perceived severity, Perceived severity is an individual's belief in the gravity of a health condition and its possible repercussions. In terms of Rhesus awareness and knowledge, this entails comprehending women's perspectives of the negative consequences of Rhesus incompatibility for both themselves and their babies. Individuals are more likely to take action to avoid or lessen a health concern if they believe it is serious (J. Rosenstock, 1974).

Perceived Benefits, Perceived advantages are an individual's beliefs about the efficacy of a certain course of action in lowering the risk of a health issue. In this study, reported advantages include women's attitudes about obtaining Rhesus testing, getting appropriate medical therapies, and implementing preventative actions to reduce the dangers associated with Rhesus incompatibility. According to the HBM, people are more likely to participate in health-promoting actions if they believe the benefits exceed the costs (I. M. Rosenstock, 1974b).

Perceived barriers, Perceived barriers refer to the hurdles that prevent people from adopting health-promoting practices. In terms of Rhesus awareness and understanding, perceived hurdles may include issues such as a lack of awareness, cultural attitudes, financial restraints, or restricted access to healthcare services. Individuals are less likely to participate in health-promoting actions if they perceive considerable hurdles to action (I. M. Rosenstock, 1974b).

Cues for Action, Cues to action are extrinsic influences that motivate people to participate in health-promoting actions. Cues to action in this research might include healthcare professionals, social networks, educational efforts, or personal experiences that affect women's awareness and understanding of Rhesus incompatibility. Individuals are more likely to take action if they are given

signs or prompts that increase their incentive to participate in health-promoting activities (J. Rosenstock, 1974).

Self-efficacy, Self-efficacy is an individual's belief in their capacity to effectively conduct a certain activity necessary to attain a desired goal. In the context of Rhesus awareness and knowledge, self-efficacy refers to women's belief in their capacity to obtain relevant information, make educated choices, and follow prescribed preventative measures for Rhesus incompatibility. Individuals with greater levels of self-efficacy are more likely to participate in health-promoting actions, according to Rosenstock (I. M. Rosenstock, 1974b).

In conclusion, the Health Belief Model offers a complete framework for investigating the determinants impacting Rhesus awareness and knowledge among women in Imo State. As such this study sought to acquire insights into the causes of women's participation in health-promoting activities connected to Rhesus awareness and knowledge by taking into account individual perceptions, beliefs, and attitudes concerning Rhesus incompatibility.

3. Method

The researchers adopted the survey research design which is considered appropriate for the study because it is a method researchers use to get information from groups of people who are representative of a larger group of people of interest. The population of the study included women of the reproductive age of group of 18-49 years, which is projected at 2024 to be 2,688,605. The National Population Commission (NPC) 2006 Census figures of the population of Imo State at 3,927,563 with the population of the female gender put at 1,951,092. When we factored in the thirteen years' difference and UNDP's population growth index of 2.1% per annum, we arrived at the current population using the formular below:

$$P_p = G_p \times P_i \times T$$

Where: P_p = Projected population

G_p = Given population (as at last census)

P_i = Population growth index

T = period between the given population and the year of study.

From the above, the 2024 projected population of Imo State is 5,412,182 and that of the female population is 2,688,605. From this figure, the sample size of 385 was determined using the Wimmer and Dominick online calculator. A closed-ended questionnaire (which was face-validated via a pilot test outside Imo State, and self-administered on respondents in communities in selected Local Government Areas within a 3-week interval), was used to collect data using multi-stage sampling technique. Data obtained were presented and analysed using simple percentages and frequency

tables. A total of 385 copies of the questionnaire were administered on the respondents (aged 18-49 years), out of which 381 copies were retrieved and analysed. In terms of spread, the demographic features of the respondents indicated as follows: 18-21 (20%), 22-25 years (31%) and 26-49 (49%). The marital demographics showed that 21% were single while 79% were married. The educational levels of the respondents showed as follows: First School Leaving Certificate (7%), Senior Secondary Certificate (58%), Tertiary education (35%).

4. Result and Discussion

Question One: What is the level of awareness of the Rh factor among women in Imo state?

From data collected, 81.1% of women indicated that they are aware of Rhesus factor. This showed a high level of awareness among the women which leads to the inference that this awareness enables the women to know their Rhesus status and how to manage it. This is because, as the Health Belief Model (HBM) posits, awareness is the first step in taking action to prevent health problems. This finding accords with those of O.A, (2021), that Rhesus factor awareness among pregnant women in Southeast Nigeria, was high. The findings of Ugwu et al., (2018), Zuccaro et al., (2019) also support this finding, highlighting the importance of awareness in preventing complications.

Question Two: To what extent are Respondents knowledgeable about Rhesus factor and its' implications in pregnancy?

The data from a composite table of 5 items in the questionnaire showed that about 55.4% of the respondents were not knowledgeable about Rhesus factor. The data continued to show that some of the respondents at 23.9% even attested to know their rhesus status, whereas others at 76.1% said they do not know there's yet. Regarding the knowledge level of the respondents towards the implications of Rhesus factor in pregnancy, incompatibility on maternal and child health, the respondents agreed at 39.4% to have low knowledge of the implications of Rhesus factor in pregnancy, incompatibility on maternal and child health.

The finding revealed that women in Imo State have a low level of knowledge about Rhesus factor and its implications in pregnancy. This may lead to lack of motivation to take action to prevent complications. There is need for targeted health education and awareness interventions to address this knowledge gap, empowering women to take control of their health and make informed decisions about their care. By so doing the women are more likely to engage in positive health behaviors, leading to better health outcomes. This aligns with Naranje et al., (2019) findings on the relationship between Rhesus factor awareness and maternal health outcomes. According to them, improving awareness and regular testing for the Rh factor will considerably decrease maternal and newborn problems. Kuupiel et al., (2019) and Tette et al., (2023) concur by emphasizing the need for targeted education to improve knowledge. Similarly study on O.A, (2021) Rhesus factor

awareness among pregnant women in a Nigerian tertiary hospital supports the findings, by indicating the need for improved awareness and education. According to the theoretical framework of this study, awareness is the first step in taking action to prevent health problems. However, in this study, only 23.9% knew their Rh status, indicating a gap in knowledge that needs to be addressed.

Question Three: To what extent do health institutions' communication strategies contribute to women's understanding and awareness of Rhesus factor?

Data generated from the items under this research question, with an average mean score of 2.95 revealed that health institutions, through healthcare providers and patient-education materials on Rhesus factor, have influenced the respondents to check and know their rhesus status. In addition, interpersonal communication between laboratory health workers and the women has helped the respondents, not only to understand their rhesus status but to also know what to do when their rhesus status is incompatible with another. Finally, the new media, through their contents, have widened the women's knowledge horizons and provided them appropriate directions on how to access professional guide concerning issues relating to Rhesus factor.

This finding indicates that health institutions' communication strategies, particularly through health personnel, interpersonal communication, and new media, have significantly contributed to women's understanding and awareness of issues relating to Rhesus factor. The finding also highlights the importance of multi-channel communication approaches, emphasising personalised and targeted strategies to enhance health awareness and behaviour. In tandem with this position, Al-Rahmi et al., (2023) in their submission agree that multi-channel communication tactics, comprising face-to-face contacts, printed materials, and digital platforms, are the most successful in reaching women with health information and messages. According to them, women who are exposed to several channels of communication are more aware of Rhesus factor and issues relating to it than those who only get information via a single channel. Javaid et al., (2022) also support this position when they found that interactive digital media, such as films and online webinars, were very helpful in communicating complicated medical information to patients.

Your research shows that communication has an important role to play in increasing women's awareness and knowledge about Rhesus (Rh) factor. Effective communication strategies, both through health institutions and the media, can help address the lack of information in the community. This approach includes using health communication as an intervention tool, where interactions between medical personnel and patients are key in building trust and facilitating understanding of information. In addition, multichannel communication utilizing digital media, printed materials, and interpersonal communication has been shown to expand reach and amplify messages. The study also highlights the importance of culturally sensitive communication, tailoring

messages based on the social context and values of the community to ensure better acceptance. Within the framework of the Health Belief Model (HBM), communication serves to shape perceptions of risks, benefits and reduce barriers, such as through education on the importance of Rh immunoglobulin to encourage women to take Rh tests during pregnancy. Although mass media has limitations in conveying information about the Rh factor, it still has great potential in supporting health campaigns, especially when combined with community-based approaches. In addition, personalized counseling showed better results in improving individual understanding, reflecting the effectiveness of tailored approaches to encourage active participation in health decision-making. Thus, a strategic, context-based, multi-channel communication approach is essential to increase women's awareness and knowledge of Rh factors, through community campaigns, health worker training, and optimal utilization of digital media.

Finally, the data analysed also revealed that the mass media had a limited impact as it relates to Rhesus factor awareness among the respondents as they claimed that they did not get any form of enlightenment or education on issues relating to Rhesus factor from the mass media.

5. Conclusion

Several previous studies have indicated that the level of awareness of Rhesus factor among women in South-East Nigeria is high. However, the findings of this study have proved that despite this high level of awareness, the level of understanding or knowledge of Rhesus factor or Rh compatibility issues on maternal and child health and its implications in pregnancy, are low among the people. The absence of this knowledge can be attributed to the nature of the communication strategies employed by health institutions and professionals in diffusing Rhesus factor information. Consequent upon the above conclusion, the following recommendations are advanced: Healthcare providers should increase Rhesus Factor education for women, particularly, during antenatal care; awareness campaigns should be implemented in rural areas to improve knowledge of the Rhesus factor; education on Rh factor should be included in reproductive health education programmes; and further research should be undertaken to determine the effectiveness of interventions aimed at improving awareness and knowledge of the Rhesus factor.

Acknowledgment

The authors sincerely appreciate the support and contributions of the Faculty of Communication and Media Studies, Imo State University, Owerri, Nigeria, for their guidance and resources during the course of this research. We are also grateful to the respondents who participated in this study, providing valuable insights that enriched our findings. Additionally, we extend our heartfelt thanks to the healthcare professionals and institutions in Imo State for their cooperation and assistance in

facilitating data collection. Lastly, we acknowledge our families and colleagues for their encouragement and unwavering support throughout this research journey.

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