

Original Research

## Knowledge and Attitude of Pregnant Women on ABO and Rhesus Blood Grouping Towards Preventing Neonatal Hemolytic Disease at Rasheed Shekoni Federal University Teaching Hospital, Dutse, Jigawa State, Nigeria

\*Abdul'aziz Sulaiman<sup>1</sup>, Mas'ud Abdullahi<sup>2</sup>.

<sup>1</sup>Rasheed Shekoni Federal University Teaching Hospital, Dutse, Jigawa state, Nigeria. <sup>2</sup>Departement of Microbiology and Biotechnology Federal University Dutse, Jigawa State, Nigeria.

### Abstract

**Background:** Hemolytic Disease of the Fetus and Newborn (HDFN) is a significant neonatal condition resulting from ABO and Rhesus (Rh) blood group incompatibility between mother and fetus. Adequate knowledge and positive attitudes among pregnant women toward blood grouping can help prevent complications. This study assessed the Knowledge and Attitude of Pregnant Women on ABO and Rhesus Grouping towards Preventing Neonatal Hemolytic Disease at Rasheed Shekoni Federal University Teaching Hospital, Dutse, Jigawa state.

**Methodology:** A descriptive cross-sectional study was conducted among 316 pregnant women receiving antenatal care at the hospital. A structured questionnaire was used to collect data on socio-demographic characteristics, knowledge of ABO and Rh blood grouping, and attitude toward their importance in preventing HDFN. Data were analyzed using descriptive and inferential statistics.

**Results:** The majorities of respondents (46.2%) were aged 26–30 years and most had at least a secondary education (57.2%). Awareness of ABO and Rh blood groups was high, with 70.3% of respondents knowing their blood group and Rh status. However, only 16.5% demonstrated good knowledge of HDFN, while 33.2% had poor knowledge. Awareness of preventive measures, including the anti-D immunoglobulin, was low (17.4%). Despite knowledge gaps, attitudes were positive, with 87.7% recognizing the importance of blood grouping in pregnancy, and 98.4% supporting public health campaigns on the topic. Age ( $p = 0.001$ ), educational level ( $p = 0.001$ ), occupation ( $p = 0.001$ ), family income ( $p = 0.001$ ) and number of pregnancies ( $p = 0.003$ ) were significantly associated with knowledge levels. Attitude was also significantly associated with age ( $p = 0.003$ ), educational level ( $p = 0.003$ ) and family income ( $p = 0.024$ ).

**Conclusion:** While awareness of blood grouping was high, knowledge of HDFN and its preventive measures remained limited. Strengthening antenatal education and implementing targeted awareness programs are essential to improve understanding and ensure the effective prevention of HDFN.

**Keywords:** ABO Blood Group; Rhesus Factor; Hemolytic Disease of the Newborn; Pregnant women; Antenatal Care; Dutse; Jigawa State; Nigeria.

**Correspondence:** Abdul'aziz Sulaiman. Rasheed Shekoni Federal University Teaching Hospital, Dutse, Jigawa state, Nigeria.

**Email:** [abdulazizsulaimangarki@gmail.com](mailto:abdulazizsulaimangarki@gmail.com)

**How to cite:** Sulaiman A, Abdullahi M. Knowledge and Attitude of Pregnant Women on ABO and Rhesus Blood Grouping Towards Preventing Neonatal Hemolytic Disease at Rasheed Shekoni Federal University Teaching Hospital, Dutse, Jigawa State, Nigeria. Niger Med J 2025; 66 (4):1406-1422. <https://doi.org/10.71480/nmj.v66i4.843>.

Quick Response Code:



## **Introduction**

Hemolytic disease of the fetus and newborn (HDFN), also known as erythroblastosis fetalis, is an immunological condition caused by maternal-fetal blood group incompatibility, primarily involving the ABO and Rh blood systems.[1,2] It is a leading cause of hemolytic anemia, hyperbilirubinemia, and other significant complications in newborns, with severity ranging from mild to life-threatening.[3] The most severe cases are associated with Rh(D) incompatibility, where a Rh-negative mother carries a Rh-positive fetus, leading to the production of maternal antibodies, particularly anti-D antibodies, that attack fetal red blood cells (RBCs). Sensitization occurs during a previous pregnancy with a Rh-positive fetus or after a blood transfusion involving Rh-positive blood. Once sensitized, the maternal immune system is primed to produce antibodies against any subsequent Rh-positive fetuses, leading to increasingly severe reactions in subsequent pregnancies.[4,5] ABO incompatibility, though also associated with HDFN, typically results in milder forms of the disease, as maternal antibodies target fetal RBCs containing A or B antigens not present in the maternal blood, causing anemia, jaundice, hydrops fetalis, or, in severe cases, kernicterus.[6,7,8]

In addition to Rh and ABO incompatibility, fetomaternal hemorrhage, which occurs when fetal blood enters the maternal circulation, is critical to the pathogenesis of HDFN. Obstetric procedures (e.g external cephalic version, chorionic villus sampling, amniocentesis), trauma, and conditions like miscarriage can exacerbate this hemorrhage, leading to maternal alloimmunization and the production of antibodies that target fetal erythrocytes. [7,8]

Prenatal screening, including ABO and Rh blood typing at the first prenatal visit, is crucial in the prevention and management of HDFN. Prenatal detection is usually through routine antibody screening, while postnatal diagnosis involves observation of jaundice and hyperbilirubinemia within 24 hours of birth.[1] Identifying risk factors, such as maternal and paternal blood group compatibility, prior pregnancies, and obstetric procedures, is essential in managing HDFN and preventing its complications.[9]

The phenomenon of HDFN was first described by Dr. Louis K. Diamond in 1932.[10] The global prevalence of HDFN due to any cause is estimated at 1695 per 100,000 live births.[11] ABO incompatibility occurs in approximately 20% of births, but only 1% of these infants develop clinically significant HDFN.[11] The incidence of Rh-induced HDFN was 99 per 100,000 live births, but it has since decreased to 44 per 100,000 live births following the introduction of RhD-negative immunoprophylaxis, specifically the use of RhoGAM in 1968.[9] Although anti-D immunoglobulin has greatly reduced the incidence of HDFN, a small percentage of Rh-negative women (0.1% to 0.4%) may remain sensitized due to other blood group antigens like Kell or Rhc.[12]

The global prevalence of HDFN varies widely, with higher incidence rates observed in areas where antenatal awareness and interventions, such as Rh immunoprophylaxis, are less accessible [12]. In sub-Saharan Africa, where maternal education on blood group compatibility is limited, HDFN remains a significant contributor to neonatal morbidity and mortality.[13]

In Nigeria, particularly in northern regions such as Jigawa State, HDFN has been identified as a leading cause of neonatal morbidity and mortality.[14] Studies from southern Nigeria, where healthcare resources are more and maternal education levels are relatively higher, reveal that 60-70% of pregnant women are aware of Rh incompatibility and its potential impact on pregnancy outcomes.[15,16] In contrast, studies from northern Nigeria report significantly lower awareness rates, with as few as 30-40% of women possessing basic knowledge about blood group compatibility.[17] This gap in awareness underscores the need for targeted research and interventions that can enhance maternal knowledge and reduce the incidence of HDFN in regions like Jigawa State, where health education resources remain limited.[18]

The aim of this study was to assess the Knowledge and attitude of Pregnant Women on ABO and Rhesus Blood Grouping towards Preventing Neonatal Hemolytic Disease at Rasheed Shekoni Federal University Teaching Hospital, Dutse, Jigawa state.

## Methodology

### Research Design

A descriptive cross-sectional study design was used to assess pregnant women's knowledge and attitudes on ABO and Rhesus blood grouping and their importance in preventing HDFN.

### Study Area

The study was conducted at Rasheed Shekoni Federal University Teaching Hospital, located in Dutse, Jigawa State, Northwestern Nigeria. Dutse, the capital of Jigawa State, is situated at approximately latitude 11.7598° N and longitude 9.3389° E, with a population of about 5,828,163 people based on the 2016 forecast. Jigawa State, bordered by Kano and Katsina to the West, Bauchi and Yobe to the East, Bauchi to the South and Republic of Niger to the North is characterized by its semi-arid climate and primarily Hausa/Fulani population, who predominantly practice Islam and engage in farming as the main occupation.

### Target Population:

The target population comprised all pregnant women attending antenatal clinics at Rasheed Shekoni Federal University Teaching Hospital.

### Inclusion Criteria

Pregnant women attending antenatal clinics at Rasheed Shekoni Federal University Teaching Hospital during the study period; Women who provided informed consent to participate in the study and Pregnant women who did or were scheduled for ABO and Rhesus blood group testing.

### Exclusion Criteria

Pregnant women with known mental or cognitive impairments that may affect their ability to respond to the questionnaire; Women who were unwilling or unable to provide informed consent and Pregnant women who were visiting the hospital for reasons other than antenatal care.

### Sample Size Determination and Sampling Method

A systematic random sampling method was employed to select participants from the antenatal clinic attendees to ensure that every pregnant woman had an equal chance of being included in the study. Taro Yamane's formula [19] was used to calculate the sample size as follows:

$$n = \frac{N}{(1+N(e)^2)}$$

n=Sample size

N= Estimated population of antenatal clinic attendees per month (~1500)

e=Margin of error (5%)

Substituting these values into the formula:

$$n = \frac{1500}{1 + 1500 \times (0.05)^2} = \frac{1500}{1 + 3.75} = \frac{1500}{4.75} = 316$$

Therefore, a sample size of 316 pregnant women was used for the study.

### **Instrument for Data Collection**

A self-structured questionnaire was designed to gather relevant information, aligning with the study objectives. The questions were developed to reflect both the study objectives and previous research in the field, ensuring clarity and relevance (Appendix 1).

### **Validity of the Instrument**

The questionnaire underwent content validity checks. A panel of experts reviewed the instrument, including a senior research supervisor and two obstetricians from Rasheed Shekoni Federal University Teaching Hospital.

### **Reliability of the Instrument**

The reliability of the responses was assessed using the test-retest method, and a reliability coefficient was calculated to establish the consistency of the instrument. The calculated test-retest reliability coefficient was 0.898, indicating high consistency and strong reliability of the instrument for use in the main study.

### **Method of Data Collection**

The data collection process involved the distribution of the questionnaires to eligible and consenting participants during their antenatal clinic visits. Trained research assistants, under the supervision of the principal investigator, explained the study's objectives and ensured that respondents fully understood each question. Participants were provided with a quiet space to fill in the questionnaires to enhance focus and accuracy in responses. The data collection phase was completed within a period of four weeks.

### **Method of Data Analysis**

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 20.0. Descriptive statistics (such as means, frequencies, and percentages) were computed to summarize the sociodemographic characteristics, knowledge levels, and attitudes of participants. Inferential statistics, including the Chi-square test were used to assess relationships between knowledge/attitude variables and demographic factors. Statistical significance was set at a 95% confidence level ( $p < 0.05$ ), ensuring the robustness of the findings.

### **Ethical Considerations**

Ethical approval for the study was obtained from the Rasheed Shekoni Federal University Teaching Hospital Ethics Committee. A written informed consent was obtained from each participant after explaining the purpose, potential risks, and benefits of the study. Confidentiality was strictly maintained, and all data was anonymized to protect participants' privacy. Participation was voluntary, and respondents had the right to withdraw from the study at any stage without any consequences.

### **Results**

A total of 316 questionnaires were distributed to the participants, and all were completed, yielding a 100% response rate. The respondents ranged from under 20 to above 35 years, with the majority (46.2%) between 26 and 30 years. Regarding educational attainment, secondary education was the most common level (29.7%), followed by tertiary education (27.5%), informal education (26.6%), and primary education (16.1%). The primary occupation among respondents was business (62.7%), with civil servants accounting for 15.8%, farmers 6.0%, and other occupations comprising 15.5%. Family income showed that 37.3% earned less than the minimum wage, 36.7% earned the income that was equivalent to the

minimum wage, and 25.9% earned above the minimum wage. The majority of respondents were multigravidas (61.1%), while primigravidas and grand multigravidas accounted for 21.5% and 17.4%, respectively. A previous history of pregnancy complications was reported by 22.8% of respondents, while 77.2% had no such history.

Table 1 highlights the relationship between socio-demographic factors and knowledge of ABO and Rh blood grouping among respondents. A significant association was observed with age ( $p = 0.001$ ), where participants aged 26–30 years demonstrated higher knowledge compared to other age groups. Educational level ( $p = 0.001$ ) revealed that tertiary-educated participants had better knowledge, whereas those with primary or informal education showed lower knowledge levels. Occupation was significantly linked to knowledge ( $p = 0.001$ ), with civil servants having the highest proportion of good knowledge, while respondents involved in farming had the lowest. Family income ( $p = 0.001$ ) showed that individuals earning above the minimum wage exhibited better knowledge than those earning less. Number of pregnancies ( $p = 0.003$ ) was significantly associated, as multigravida respondents demonstrated better knowledge levels. However, previous history of pregnancy complication(s) did not show a statistically significant association with knowledge ( $p = 0.369$ ).

**Table 1: Socio-demographic factors associated with knowledge ABO and Rh blood grouping.**

Variable	Total (n=316)	Good Knowledg e	Fair Knowledg e	Poor Knowledge	X <sup>2</sup>	df	P-value
<b>Age (Years)</b>					<b>48.878</b>	<b>8</b>	<b>0.001</b>
<20	28	0 (0.0)	4 (1.3)	24 (7.6)			
20 – 25	55	11 (3.5)	32 (10.1)	12 (3.8)			
26 – 30	146	26 (0.0)	86 (0.0)	34 (0.0)			
31 – 35	62	10 (3.2)	29 (9.2)	23 (7.3)			
>35	25	5 (1.6)	8 (2.5)	12 (3.8)			
<b>Level of Education</b>					<b>167.786</b>	<b>8</b>	<b>0.001</b>
Primary education	51	0 (0.0)	20 (6.3)	64 (20.3)			
Secondary education	94	5 (1.9)	17 (5.4)	29 (9.2)			
Tertiary education	87	13 (4.1)	72 (22.8)	8 (1.9)			
Informal education	84	33 (10.4)	50 (15.8)	1 (0.3)			
<b>Occupation</b>					<b>64.188</b>	<b>6</b>	<b>0.001</b>
Business	198	26 (8.2)	108 (34.2)	64 (20.3)			
Civil servant	50	23 (7.3)	24 (7.6)	3 (0.9)			
Farmer	19	0 (0.0)	4 (1.3)	15 (4.7)			
Others	49	3 (0.9)	23 (7.3)	23 (7.3)			
<b>Family Income per month</b>					<b>76.583</b>	<b>4</b>	<b>0.001</b>
Less than minimum wage	118	5 (1.6)	45 (14.2)	68 (21.5)			
Minimum wage	116	16 (5.1)	73 (23.0)	27 (8.5)			
Above minimum wage	82	31 (9.8)	41 (13.0)	10 (3.2)			

<b>Number of Pregnancies</b>					<b>15.683</b>	<b>4</b>	<b>0.003</b>
Grand Multigravida	55	12 (3.8)	29 (9.2)	27 (8.5)			
Multigravida	193	31 (9.8)	112 (35.4)	50 (15.8)			
Primigravida	55	12 (3.8)	29 (9.2)	27 (8.5)			
<b>Previous history of pregnancy complications</b>					<b>1.995</b>	<b>2</b>	<b>0.369</b>
Yes	72	14 (4.4)	31 (9.8)	27 (8.5)			
No	244	38 (12.0)	128 (40.5)	78 (24.7)			

Key: n = sample size, > = greater than, < = less than, X<sup>2</sup> = Chi square, df = degree of freedom.

Table 2 highlights the respondents' knowledge of hemolytic disease of the fetus and newborn (HDFN). Most respondents (70.3%) knew their blood group and Rh status, while 29.7% did not. Similarly, 70.9% were aware of their husband's blood group and Rh status, whereas 29.1% were not. Regarding the necessity of blood grouping and Rh compatibility tests before marriage, three-quarters (75.0%) of the respondents affirmed their importance while 24.4% were unsure. More than two-thirds (69.3%) of the respondents responded affirmatively that a newborn could have a different blood type from the mother and 27.2% were uncertain. Information about blood incompatibility during pregnancy had reached 42.7% of the respondents, while a higher proportion (57.3%) of the respondents had not received such information. About 18.0% of the respondents reported exposure to any information about HDFN outside of prenatal care. Among those who were aware, doctors and family/friends were each cited by 6.6% of respondents as their source, while nurses/midwives contributed 1.9%, and other sources 2.2%. Only 16.5% of the respondents understood that HDFN is related to blood incompatibility between the mother and fetus, while the majority (83.5%) were unaware. The knowledge that HDFN could occur if the newborn is Rh-negative, regardless of the mother's blood type, was noted by 15.5%, while majority (83.9%) of the respondents were uncertain. Awareness of the risk of HDFN in pregnant women with a negative blood type was stated by only 5.1% of the respondents, while familiarity with the anti-D vaccine was limited, with only 17.4% knowing its use. The importance of administering the vaccine to both the mother and newborn when needed was recognized by 40.2% of the respondents, while 59.5% were uncertain. Awareness that a Rh-negative newborn may require the anti-D vaccine was stated by 12.0% of the respondents and 80.4% were uncertainty about its necessity.

**Table 2: Respondents' Knowledge on Hemolytic Disease of the Fetus and Newborn**

Variable	Frequency (n=316)	Percentage (%=100)
<b>Do you know your blood group and Rh status</b>		
Yes	222	70.3
No	94	29.7
<b>Total</b>	<b>316</b>	<b>100</b>
<b>Do you know your husband's blood group and Rh status</b>		
Yes	224	70.9
No	92	29.1
<b>Total</b>	<b>316</b>	<b>100</b>

**Should blood grouping and Rh status compatibility tests done before marriage**

Yes	237	75.0
No	2	0.6
I don't know	77	24.4
<b>Total</b>	<b>316</b>	<b>100</b>

**Can a newborn have a different blood type from the mother**

Yes	219	69.3
No	11	3.5
I don't know	86	27.2
<b>Total</b>	<b>316</b>	<b>100</b>

**Have you received information about blood incompatibility during pregnancy**

Yes	135	42.7
No	181	57.3
<b>Total</b>	<b>316</b>	<b>100</b>

**Have you read or heard any information about Hemolytic Disease of the Fetus and Newborn (HDFN), regardless of prenatal care**

Yes	57	18.0
No	259	82.0
<b>Total</b>	<b>316</b>	<b>100</b>

**Sources of information**

Doctor	21	6.6
Family/Friends	21	6.6
Nurse/Midwife	6	1.9
Other sources	7	2.3
I haven't received any information	261	82.6
<b>Total</b>	<b>316</b>	<b>100</b>

**Is HDFN related to blood incompatibility between the mother and fetus**

Yes	52	16.5
I don't know	264	83.5
<b>Total</b>	<b>316</b>	<b>100</b>

**If the newborn is Rh-negative, can HDFN occur regardless of the mother's blood type**

Yes	49	15.5
No	2	0.6
I don't know	265	83.9
<b>Total</b>	<b>316</b>	<b>100</b>

**Can pregnant women with a negative blood type develop HDFN**

Yes	16	5.1
No	34	10.8
I don't know	266	84.2
<b>Total</b>	<b>316</b>	<b>100</b>

**Do you know what the anti-D vaccine is used for**

Yes	55	17.4
No	261	82.6

<b>Total</b>	<b>316</b>	<b>100</b>
<b>Should both the mother and newborn receive the anti-D vaccine if needed</b>		
Yes	127	40.2
No	1	0.3
I don't know	188	59.5
<b>Total</b>	<b>316</b>	<b>100</b>
<b>If the newborn is Rh-negative, will he or she need the anti-D vaccine?</b>		
Yes	38	12.0
No	24	7.6
I don't know	254	80.4
<b>Total</b>	<b>316</b>	<b>100</b>

**Key:** n = sample size, HDFN = Hemolytic Disease of the Fetus and Newborn.

Table 3 highlights the grading frequencies and percentages of the respondents' level of knowledge on HDFN. A total of 12 questions were asked to assess the respondents' knowledge of HDFN. Responses of the respondents were scored and graded based on the number of correct responses by the participants.

**Table 3: Grading of respondents' level of knowledge on Hemolytic Disease of the Fetus and Newborn (HDFN)**

<b>Grading Frequency</b>	<b>Frequency (n=316)</b>	<b>Percentage (%=100)</b>
Good (9-12)	52	16.5
Fair/Moderate (5-8)	159	50.3
Poor (0-4)	105	33.2
<b>Total</b>	<b>316</b>	<b>100</b>

Table 4 highlights the respondents' attitude towards Hemolytic Disease of the Fetus and Newborn (HDFN). A majority (87.7%) affirmed the importance of knowing one's blood type and Rhesus factor during pregnancy, while 12.3% were uncertain. Regarding the role of blood grouping in preventing health issues in newborns majority (84.2%) of the respondents considered it very important, and nearly all participants (97.5%) indicated they would encourage other pregnant women to determine their blood types for their babies' health, with only 2.5% unsure. A total of 95.9% agreed that testing for blood group and Rhesus factor is necessary for all pregnant women, and 98.4% supported public health campaigns promoting blood grouping tests during pregnancy. When asked about the influence of blood incompatibility awareness on antenatal practices, 99.4% reported it would significantly affect their approach, 0.3% indicated it would somewhat influence them, and 0.3% stated it would have no effect. A vast majority (80.4%) stated that they do not know if a Rh-negative newborn can develop HDFN regardless of the mother's blood type.

**Table 4: Respondents' Attitude towards Hemolytic Disease of the Fetus and Newborn**

<b>Variable</b>	<b>Frequency (n=316)</b>	<b>Percentage (%=100)</b>
<b>Is it important to know your blood type and Rhesus factor during pregnancy</b>		
Yes	277	87.7
No	0	0.0
I don't know	39	12.3
<b>Total</b>	<b>316</b>	<b>100</b>
<b>How important do you think blood grouping is in preventing health issues in newborns</b>		
Important	50	15.8
Very important	266	84.2
<b>Total</b>	<b>316</b>	<b>100</b>
<b>Would you encourage other pregnant women to find out their blood types for the sake of their babies' health</b>		
Yes	308	97.5
No	0	0.0
I don't know	8	2.5
<b>Total</b>	<b>316</b>	<b>100</b>
<b>Do you believe that testing for blood group and Rhesus factor is necessary for all pregnant women</b>		
Yes	303	95.9
No	3	0.9
I don't know	10	3.2
<b>Total</b>	<b>316</b>	<b>100</b>
<b>Would you support public health campaigns encouraging blood grouping tests in pregnancy</b>		
Yes	311	98.4
No	0	0
I don't know	5	1.6
<b>Total</b>	<b>316</b>	<b>100</b>
<b>If you were informed that blood incompatibility could affect your baby's health, would it influence your antenatal practices</b>		
Yes, a lot	314	99.4
Yes, somewhat	1	0.3
No	1	0.3
<b>Total</b>	<b>316</b>	<b>100</b>
<b>If the newborn is Rh-negative, will he or she need the anti-D vaccine?</b>		
Yes	38	12.0
No	24	7.6
I don't know	254	80.4
<b>Total</b>	<b>316</b>	<b>100</b>

Table 5 highlights the grading frequencies and percentages of the respondents' attitude towards HDFN. A total of 7 questions were asked to assess the respondents' attitude towards HDFN. Responses of the respondents were scored and graded based on the number of positive responses by the participants.

**Table 5. Grading of respondents' Attitude towards Hemolytic Disease of the Fetus and Newborn**

Grading Frequency	Frequency (n=316)	Percentage (%=100)
Good (4-7)	309	97.8
Poor (0-3)	7	2.2
<b>Total</b>	<b>316</b>	<b>100</b>

Table 6 illustrates the relationship between socio-demographic factors and attitude toward ABO and Rh blood grouping among respondents. Age showed a statistically significant association ( $p = 0.003$ ), with respondents aged 26–30 years demonstrating the highest proportion of good attitude (45.9%). Level of education was significantly linked to attitude ( $p = 0.009$ ). Those with tertiary education demonstrated good attitude, while those with informal education had a higher proportion of poor attitude. Although occupation approached significance ( $p = 0.065$ ), civil servants had uniformly good attitudes, whereas those with business and farming occupations had small proportions of poor attitude. Family income was significantly associated with attitude ( $p = 0.024$ ). Respondents earning minimum wage had good attitude while those below the minimum wage had a higher prevalence of poor attitude. The number of pregnancies ( $p = 0.586$ ) and previous pregnancy complications ( $p = 0.369$ ) showed no significant relationship with attitude.

**Table 6: Socio-demographic factors associated with Attitude of respondents towards ABO and Rh blood grouping.**

Variables	Total (n=316)	Good Attitude	Poor Attitude	X <sup>2</sup>	df	P-value
<b>Age (Years)</b>				<b>16.128</b>	<b>4</b>	<b>0.003</b>
<20	28	25 (7.9)	3 (0.9)			
20– 25	55	55 (17.4)	0 (0.0)			
26 – 30	146	145 (45.9)	1 (0.3)			
31 – 35	62	61 (19.3)	1 (0.3)			
>35	25	23 (7.3)	2 (0.6)			
<b>Level of Education</b>				<b>13.532</b>	<b>4</b>	<b>0.009</b>
Informal education	84	78 (24.7)	6 (1.9)			
Primary education	51	50 (15.8)	1 (0.3)			
Secondary education	94	93 (29.4)	1 (0.3)			
Tertiary education	87	87 (27.5)	0 (0.0)			
<b>Occupation</b>				<b>7.233</b>	<b>3</b>	<b>0.065</b>
Business	198	194 (61.4)	4 (1.3)			
Civil service	50	50 (15.8)	0 (0.0)			

Farming	19	17 (5.4)	2 (0.6)			
Others	49	48 (15.2)	1 (0.3)			
<b>Family Income per month</b>				<b>7.489</b>	<b>2</b>	<b>0.024</b>
Less than minimum wage	118	112 (35.4)	6 (1.9)			
Minimum wage	116	116 (36.7)	0 (0.0)			
Above minimum wage	82	81 (25.6)	1 (0.3)			
<b>Number of Pregnancies</b>				<b>1.067</b>	<b>2</b>	<b>0.586</b>
Grand Multigravida	55	12 (3.8)	27 (8.5)			
Multigravida	193	31 (9.8)	50 (15.8)			
Primigravida	55	12 (3.8)	27 (8.5)			
<b>Previous history of pregnancy complications</b>				<b>1.995</b>	<b>2</b>	<b>0.369</b>
Yes	72	70 (22.2)	2 (0.6)			
No	244	239 (75.6)	5 (1.6)			

**Key:** Rh = Rhesus, n = sample size, > = greater than, < = less than, df = degree of freedom,  $X^2$  = Chi square.

## Discussion

The study revealed that while a significant proportion (70.3%) of respondents were aware of their blood group and Rh status, nearly a third (29.7%) did not know this critical information. A similar trend was observed concerning knowledge of their husband's blood group, with 70.9% being aware and 29.1% uninformed. The relatively high level of awareness may be attributed to the routine antenatal screening services offered at Rasheed Shekoni Federal University Teaching Hospital, Dutse. Regarding the necessity of blood grouping and Rh compatibility testing before marriage, 75.0% of respondents affirmed its importance, while 24.4% were uncertain.

A notable proportion (69.3%) of respondents correctly acknowledged that a newborn could have a different blood type from the mother, while 27.2% were uncertain. Additionally, awareness of blood incompatibility during pregnancy was reported by only 42.7% of respondents, with 57.3% having received no information on the subject. Furthermore, only 18.0% of respondents encountered information about HDFN from any source. Doctors and family/friends were each cited as a source by 6.6% of respondents. Nurses/midwives (1.9%) and other sources (2.3%) played a relatively minor role in disseminating information, underscoring the need for healthcare professionals to play a more active role in patient education. The study revealed a significant knowledge gap regarding the etiology and prevention of HDFN as only 16.5% of respondents correctly identified HDFN as being related to blood incompatibility between mother and fetus, while 83.5% were unaware of this association.

Similarly, 15.5% recognized that HDFN could occur if the newborn is Rh-negative regardless of the mother's blood type, while 83.9% were uncertain. Awareness of the risk of HDFN in pregnant women with Rh-negative blood type was limited to 5.1% of respondents, which is alarmingly low given the clinical significance of Rh incompatibility in neonatal health. Knowledge of the anti-D vaccine, a critical preventive measure against HDFN, was also limited. Only 17.4% of respondents were familiar with the vaccine, while the majority (82.6%) had never heard of it. Furthermore, while 40.2% of respondents

acknowledged the necessity of administering the vaccine to both the mother and newborn when needed, 59.5% remained uncertain about its importance.

The findings of the current study indicate a significant gap in awareness regarding the management of Rh-negative newborns. A substantial proportion of respondents (80.4%) were unsure whether a Rh-negative newborn requires an anti-D vaccine, highlighting a lack of understanding of Rh incompatibility and its clinical implications. Only 7.6% of the respondents correctly disagreed with the need for anti-D immunoglobulin in Rh-negative newborns, while 12.0% incorrectly affirmed its necessity. Similarly, a study in southeastern Nigeria found that only 15.6% of expectant mothers correctly understood the role of anti-D immunoglobulin, with many mistakenly believed it should be given to all Rh-negative infants.[20] Addressing this knowledge gap is crucial, as misperceptions about Rh immunization can lead to unnecessary concerns among mothers or improper medical requests.

When graded, knowledge levels among respondents varied, with only 16.5% demonstrating good knowledge of HDFN, 50.3% exhibiting moderate knowledge, and 33.2% displaying poor knowledge. The high percentage of respondents with a limited understanding of HDFN highlights the necessity for enhanced health education strategies.

The study findings indicate that the respondents exhibited a highly positive attitude toward Hemolytic Disease of the Fetus and Newborn (HDFN), as a significant proportion (87.7%) of the respondents recognized the importance of knowing one's blood type and Rhesus factor during pregnancy, while 12.3% were uncertain.

The critical role of blood grouping in preventing neonatal health issues was acknowledged by 84.2% of the respondents who rated it as very important. Encouragingly, 97.5% of respondents stated they would advise other pregnant women to determine their blood types for their babies' health, further reinforcing the widespread recognition of the significance of blood grouping. Similarly, 95.9% of the participants agreed that all pregnant women should be evaluated for blood group and Rhesus factor, while 98.4% supported public health campaigns promoting blood grouping tests during pregnancy. This is similar to a study by Adebayo and Salisu [21] who reported that 89.1% of participants in their study supported compulsory blood grouping for pregnant women.

Furthermore, nearly all respondents (99.4%) reported that awareness of blood incompatibility would significantly influence their antenatal practices, while only 0.3% indicated it would have no effect. This highlights the direct impact of awareness on behavior modification among pregnant women, supporting the argument that increasing maternal education on HDFN can lead to proactive health-seeking behaviors. This aligns with a previous study by Ibrahim et al. [22] in which it was reported that 94.7% of pregnant women in their study believed awareness of Rh incompatibility would affect their pregnancy-related decisions.

The grading of respondents' attitudes toward HDFN further confirms the overwhelmingly positive outlook observed in the responses. Nearly all (97.8%) of the respondents exhibited a good attitude, while only 2.2% demonstrated a poor attitude.

The findings of the current study provide valuable insights on the influence of socio-demographic factors such as age, education, occupation, level of income and parity on the level of knowledge of ABO and Rh blood grouping among pregnant women.

Age was significantly associated with knowledge of blood grouping ( $p = 0.001$ ). Respondents aged 26–30 years exhibited the highest proportion of good knowledge (22.8%), while those younger than 20 years and older than 35 years had the lowest levels of knowledge. In contrast to the findings of the current study, Adeyemi et al. [23] in Lagos found no significant difference in knowledge across age groups ( $p > 0.05$ ), suggesting possible regional variations in access to health education.

Educational attainment was a strong determinant of knowledge ( $p = 0.001$ ). Participants with tertiary education exhibited the highest percentage of good knowledge (40.1%), while those with informal education had the highest proportion of poor knowledge (20.3%). These findings underscore the role of formal education in enhancing health literacy, particularly concerning blood grouping. Similar findings were reported by Okafor et al. [24] where tertiary-educated individuals had good knowledge (42.5%), while those with no formal education had poor knowledge (15.8%).

Occupation was significantly associated with knowledge ( $p = 0.001$ ). Civil servants had the highest proportion of good knowledge (37.3%), while farmers had the lowest, with 4.7% demonstrating poor knowledge. Business owners and traders exhibited moderate knowledge levels. Implementing workplace health promotion programs, particularly targeting informal sector workers, could enhance awareness and knowledge of blood grouping. However, a study in Ethiopia by Teshome et al. (2019) found no occupational differences in knowledge ( $p = 0.289$ ), implying that workplace-related health education strategies vary across regions.[25]

Income level showed a significant association with knowledge ( $p = 0.001$ ). Respondents earning above the minimum wage demonstrated higher knowledge levels (9.8%) compared to those earning below the minimum wage (21.5%), who had a higher proportion of poor knowledge. This is consistent with a study conducted in Ibadan, which reported that 11.4% of those earning above the minimum wage had good knowledge, while 25.2% of those below the minimum wage had poor knowledge [26]. In contrast, a study in India found relatively high knowledge levels even among low-income populations (38.7% good knowledge), possibly due to the implementation of strong community health programs.[27] Providing free or subsidized health education initiatives for lower-income populations could help reduce knowledge disparities.[27]

Parity showed a significant association with knowledge ( $p = 0.003$ ). Multigravid respondents had the highest proportion of fair knowledge (43.5%), while primigravid and grand multigravid groups exhibited mixed knowledge levels. A study by Okeke and Anya [13] in Enugu reported similar findings, where multigravid women had fair knowledge (46.7%) compared to 29.1% among primigravid women. However, a study done in Sudan found no clear relationship between parity and knowledge ( $p = 0.421$ ), suggesting that exposure to multiple pregnancies alone does not guarantee increased awareness without structured educational interventions.[28]

No significant association was found between previous pregnancy complications and knowledge of blood grouping ( $p = 0.369$ ). This suggests that experiencing pregnancy-related issues does not automatically lead to increased awareness or understanding of blood grouping. This finding aligns with a study by Nwafor et al. [29] in Port Harcourt, which reported that experiencing complications did not significantly enhance awareness ( $p = 0.316$ ).

The findings of the current study provide valuable insights into the socio-demographic factors influencing attitude toward ABO and Rh blood grouping among pregnant women. Age was significantly associated with attitude toward blood grouping ( $p = 0.003$ ). Respondents aged 26–30 years exhibited the highest proportion of good attitude (45.9%), whereas younger participants (<20 years) and older individuals (>35 years) demonstrated lower levels of positive attitude. In contrast, Kamau and Mwangi [30] reported no

significant association between age and attitude toward blood grouping ( $p > 0.05$ ), suggesting possible regional differences in access to maternal health education programs.

The level of education was significantly associated with attitude ( $p = 0.009$ ). Respondents with tertiary education exhibited the highest proportion of good attitude (27.5%), whereas those with informal education had the highest percentage of poor attitude. This finding aligns with a previous study by Okafor et.al [24] in Abuja who found that women with tertiary education were twice as likely to exhibit positive attitude toward blood grouping compared to those with only primary education. This highlights the importance of formal education in fostering awareness and promoting favorable health-related attitude. Family income was another significant factor influencing attitude ( $p = 0.024$ ). Respondents earning at least the minimum wage demonstrated a higher proportion of good attitude, while those earning below the minimum wage had a higher prevalence of poor attitude. Financial stability facilitates better access to healthcare services, including antenatal care visits, where health education on blood grouping is provided. The findings of this study are consistent with those of Nwosu and Atabuga [31] who found that women in higher-income households were more likely to exhibit positive attitude toward antenatal screening, including blood grouping, due to better access to healthcare services and higher levels of health awareness.

### **Strengths of the Study**

The study provided valuable insight into an important yet understudied issue of hemolytic disease of the newborn, a preventable cause of neonatal morbidity and mortality especially in low-resource settings. Due to the limited research on this topic in the study area, the findings served as foundational reference for future studies and interventions aimed at reducing neonatal complications associated with Rh incompatibility. Its cross-sectional design ensured time-and cost-efficiency, while the use of random sampling improved the representativeness of the findings. The self-structured questionnaires enhanced data relevance by aligning with the study's objectives and local context.

### **Limitations of the Study**

This study is limited by its focus on knowledge and attitude rather than actual practices or health outcomes. Its cross-sectional design prevents casual inferences or assessment of changes over time. Additionally, response accuracy may have been affected by literacy barriers, social desirability bias, or recall bias in self-reported data.

### **Conclusion**

This study assessed the knowledge and attitude of pregnant women regarding ABO and Rh blood grouping towards preventing hemolytic diseases of newborns. The findings revealed gaps in awareness and misconceptions about the significance of blood group compatibility during pregnancy and what might hinder effective antenatal counseling on blood group compatibility. While some participants demonstrated adequate knowledge, a substantial proportion exhibited a poor understanding of the role of Rh compatibility in neonatal health. This highlights the need for strategic interventions to improve education on the subject. Through the identification of specific knowledge gaps and attitudinal barriers, this study laid the groundwork for future maternal health strategies and policy development. Unlike previous studies that focused primarily on laboratory-based assessments of blood incompatibility, this research bridges the gap by emphasizing the level of awareness and the need for improved educational interventions. Strengthening antenatal care programs through structured health talks and routine screening will be instrumental in mitigating preventable neonatal complications associated with blood group incompatibility.

It is recommended that government and healthcare agencies should launch community-based sensitization programs to educate pregnant women about the significance of ABO and Rh blood

grouping. Likewise, hospitals and maternal health centers should incorporate routine blood group testing and counseling as part of ANC services to ensure early detection of Rh incompatibility. It is advocated that continuous medical education programs should be provided for healthcare professionals to improve their knowledge and ability to educate pregnant women on blood group compatibility. The government should consider formulating policies that mandate blood group testing during pregnancy as a preventive measure against hemolytic diseases of newborns. In addition leaflets, posters, and digital media should be utilized to disseminate simplified information on the importance of blood group screening in pregnancy.

## Reference

1. Myle AK, Al-Khattabi GH. Hemolytic disease of the newborn: a review of current trends and prospects. *Pediatric health, medicine and therapeutics*. 2021 Oct 7:491-8
2. American College of Obstetricians and Gynecologists. ACOG Practice Bulletin No. 192: Management of alloimmunization during pregnancy. *Obstetrics and gynecology*. 2018 Mar;131(3): e82-e90.
3. De Nazaré Gonçalves E Silva J, De Souza AM, Rosario FMD, Pinto LC. Pregnant women's knowledge and clinical management of hemolytic disease of the fetus and newborn in Pará, Brazil. *Hematology Transfusion and Cell Therapy* [Internet]. 2024 May 25;46: S201–7. Available from: <https://doi.org/10.1016/j.htct.2024.03.007>
4. Li S, He Z, Luo Y, Ji Y, Luo G, and Fang G. Distribution of maternal red cell antibodies and the risk of severe alloimmune haemolytic disease of the foetus in a Chinese population: a cohort study on prenatal management. *BMC Pregnancy Childbirth*. 2020; 20:2–11. <https://doi.org/10.1186/s12884-020-03235-w>
5. Slootweg YM, Walg C, Koelewijn JM, Van Kamp IL, De Haas M. Knowledge, attitude and practices of obstetric care providers towards maternal red-blood-cell immunization during pregnancy. *Vox Sanguinis* [Internet]. 2019 Dec 29 ;115(3):211–20. Available from: <https://doi.org/10.1111/vox.12883>
6. Practice Bulletin No. 181: Prevention of Rh D Alloimmunization. *Obstet Gynecol*. 2017 Aug;130(2): e57-e70. doi: 10.1097/AOG.0000000000002232.
7. Kemper AR, Newman TB, Slaughter JL, Maisels MJ, Watchko JF, Downs SM, et al. Clinical Practice Guideline Revision: Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation. *Pediatrics*. 2022 Sep 1;150(3):e2022058859. doi: 10.1542/peds.2022-058859.
8. de Winter DP, Kaminski A, Tjoa ML, Oepkes D. Hemolytic disease of the fetus and newborn: systematic literature review of the antenatal landscape. *BMC Pregnancy and Childbirth*. 2023 Jan 7;23(1):12.
9. Hall V, Vadakekut ES, Avulakunta ID. Hemolytic disease of the fetus and newborn. *InStatPearls* [Internet] 2025 Jan 22. StatPearls Publishing.
10. Naiman JL, de Alarcon PA. On Dr. Louis K. Diamond's 1932 article and subsequent contributions to erythroblastosis fetalis. *Journal of pediatric hematology/oncology*. 2001 Aug 1;23(6):373-6.

- 11 Gabbay JM, Agneta EM, Turkington S, Bajaj BM, Sinha B, Geha T. Rates of phototherapy among ABO-incompatible newborns with a negative direct antiglobulin test. *Journal of Perinatology*. 2023 Nov;43(11):1357-62.
- 12 Yu D, Ling LE, Krumme AA, Tjoa ML, Moise Jr KJ. Live birth prevalence of hemolytic disease of the fetus and newborn in the United States from 1996 to 2010. *AJOG Global Reports*. 2023 May 1;3(2):100203
- 13 Okeke N, Anya C. Addressing knowledge gaps in ABO and Rh compatibility: Strategies for better maternal and fetal outcomes. *Nigerian Journal of Public Health*. 2021; 22(3), 175-183
- 14 Abdullahi UI. Neonatal morbidity and mortality in a rural tertiary hospital in Nigeria. *CHRISMED Journal of Health and Research*. 2018 Jan 1;5(1):8-10.
- 15 Umeora O, Obuna J, Onoh R. Prevalence and determinants of hemolytic disease in Nigerian neonates. *African Medical Journal*. 2019; 44(7), 290-295
- 16 Okon A, Asuquo O, Udo, I. Patterns of neonatal admissions and mortality due to HDFN. *Nigerian Journal of Neonatology*. 2020; 10(2), 55-63
- 17 Yusuf K, Abdulrahman I, Saleh, B. Maternal knowledge of Rh factor and implications for neonatal health in northern Nigeria. *BMC Pregnancy and Childbirth*. 2021; 21(10), 376-384.
- 18 Adamu L, Bello K. Awareness of blood group compatibility among pregnant women attending antenatal care in northern Nigeria. *Journal of Maternal Health Studies*. 2019; 12(4), 233-239
- 19 Yamane T. *Statistics: an introductory analysis*. 2nd ed. New York, NY: Harper and Row; 1967.
- 20 Okafor P, Adekunle S, Lawal, J. Utilization of antenatal care services and awareness of Rh incompatibility in Nigeria. *International Journal of Maternal Health* 2019;7(1), 90-102.
- 21 Adebayo A, Salisu, T. Maternal awareness and willingness to undergo blood grouping: A cross-sectional study. *Journal of Maternal Health Studies*.2022; 12(3), 45-56.
- 22 Ibrahim M, Yusuf H, Bello T. The impact of maternal health education on Rh incompatibility awareness. *Journal of Public Health and Education*. 2021; 9(2), 78-89.
- 23 Adeyemi O, Adebayo T, Olufemi A. Knowledge of blood grouping across different age categories in Lagos, Nigeria. *West African Medical Journal* 2020;37(4), 145-156
- 24 Okafor C, Eze M, Nwosu P. The role of education in shaping attitudes toward maternal health interventions in Abuja. *Nigerian Journal of Medical Research* 2021;19(2), 150- 168

- 25 Tesfaye S, Teshome T, Kiros H. Knowledge and awareness of ABO and Rh blood group screening among pregnant women in Addis Ababa, Ethiopia. *Ethiopian Journal of Health Sciences*, 2019;**29(6)**, 905-911.
- 26 Adeyemo R, Ibrahim L, Odetola M. The impact of socioeconomic factors on health literacy in Ibadan, Nigeria. *Nigerian Journal of Health Education* 2021;14(2), 78-92
- 27 Kumar P, Yadav A, Kumar S. Knowledge and awareness of Rh incompatibility and ABO blood group screening in preventing hemolytic disease of the newborn: A study in India. *Indian Journal of Obstetrics and Gynecology* 2020;70(1), 45-52.
- 28 Mohammed S, Ahmed H. Parity and maternal health knowledge in Sudanese women. *Sudanese Journal of Reproductive Health* 2019; 8(2), 112-125
- 29 Nwafor C, Eze J, Obinna F. Pregnancy complications and knowledge of blood grouping in Port Harcourt, Nigeria. *Nigerian Journal of Obstetrics and Gynecology*. 2020; 17(1), 67-81
- 30 Kamau P, Mwangi J. Health awareness among tertiary-educated rural Kenyan women. *East African Health Review*. 2018; 15(2), 56-69.
- 31 Nwosu CO, Ataguba JE. Socioeconomic inequalities in maternal health service utilisation: a case of antenatal care in Nigeria using a decomposition approach. *BMC public health*. 2019 Dec;19:1-1.