

## ORIGINAL RESEARCH ARTICLE

# Health literacy of mothers on factors associated to pre-rupture of membranes on perinatal outcomes in Vhembe district, South Africa

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## Abstract

Pre-rupture of membranes prior labour initiation could complicate approximately 5% of pregnancies and could be associated with a high incidence of perinatal morbidity and mortality complications. The major complications could be chorioamnionitis and cord compression resulting in hypoxia. This study aimed to assess the health literacy of mothers on perinatal outcomes following pre-rupture of membranes at Thulamela B clinics of Vhembe district. A quantitative research approach with a cross-sectional descriptive design was used. The study population comprised a total of 210 lactating mothers within 6 weeks following delivery, irrespective of the mode of delivery were purposively selected. Data were collected by the researchers through self-administered questionnaires. The Statistical Package for Social Sciences (SPSS) version 25 was used for data analysis. The results are presented in the form of tables and graphs based on probability allowing judgment to be made on variables. Validity and reliability were ensured. Ethical clearance was obtained from the University of Venda Research Ethics Committee and permission to access health facilities from the Limpopo Province Department of Health. Findings revealed that limited and inadequate health literacy towards pre-rupture of membranes contributes to perinatal morbidity and mortality, with associated factors like poor antenatal care attendance, delayed health seeking, defaulting, and loss of follow-up. Recommendations to emphasise the provision of preconception and antenatal care where health information on risks and danger signs of PROM to perinatal outcomes are given were made. (*Afr J Reprod Health* 2022; 26[7]: 90-101).

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**Keywords:** Health literacy, lactating mothers, perinatal outcomes, pre-rupture of membranes

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## Résumé

La pré-rupture des membranes avant le début du travail pourrait compliquer environ 5 % des grossesses et pourrait être associée à une incidence élevée de complications de morbidité et de mortalité périnatales. Les complications majeures pourraient être une chorioamnionite et une compression du cordon entraînant une hypoxie. Cette étude visait à évaluer la littératie en santé des mères sur les résultats périnataux suite à une pré-rupture des membranes dans les cliniques Thulamela B du district de Vhembe. Une approche de recherche quantitative avec une conception descriptive transversale a été utilisée. La population de l'étude comprenait un total de 210 mères allaitantes dans les 6 semaines suivant l'accouchement, quel que soit le mode d'accouchement, ont été sélectionnées à dessein. Les données ont été recueillies par les chercheurs au moyen de questionnaires auto-administrés. Le package statistique pour les sciences sociales (SPSS) version 25 a été utilisé pour l'analyse des données. Les résultats sont présentés sous forme de tableaux et de graphiques basés sur la probabilité permettant de porter un jugement sur les variables. La validité et la fiabilité ont été assurées. L'autorisation éthique a été obtenue du Comité d'éthique de la recherche de l'Université de Venda et l'autorisation d'accéder aux établissements de santé du Département de la santé de la province du Limpopo. Les résultats ont révélé qu'une littératie en santé limitée et inadéquate concernant la pré-rupture des membranes contribue à la morbidité et à la mortalité périnatales, avec des facteurs associés tels qu'une faible fréquentation des soins prénatals, une recherche de soins retardée, une défaillance et une perte de suivi. Des recommandations visant à mettre l'accent sur la prestation de soins préconceptionnels et prénatals où sont données des informations sanitaires sur les risques et les signes de danger de PROM pour les issues périnatales ont été faites. (*Afr J Reprod Health* 2022; 26[7]: 90-101).

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**Mots-clés:** Littératie en santé, mères allaitantes, issues périnatales, pré-rupture des membranes

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## Introduction

Pre-rupture of membranes (PROM) refers to the disruption of foetal membranes before labour

begins, resulting in spontaneous leakage of amniotic fluid<sup>1</sup>. According to Eslamian and Asadi<sup>2</sup>, patients with PROM present with fluid leakage, vaginal discharge, and pelvic pressure, but do not

have contractions. PROM could lead to poor neonatal outcomes and obstetric emergencies such as umbilical cord prolapses, sepsis, chorioamnionitis, prematurity, respiratory distress syndrome, and perinatal death<sup>3</sup>. It is necessary to empower pregnant women with adequate information on associated factors of pre-ruptured membranes, hence the need for this study to assist in the early diagnosis and prevention of perinatal morbidity and mortality associated with PROM<sup>4</sup>. In the Saving Babies Report Pattinson and Berg *et al*<sup>5</sup>, in 2019, the stillbirth rate was at 15.9% and the neonatal mortality rate was 14 per 1000 live births, the early neonatal death was 7.9 per 1000 live birth, thus indicating the quality of antenatal, intrapartum as well as the postnatal care received. Patient-related contributing factors include late booking, cultural issues as well as delays in seeking health care<sup>6</sup>. The neonatal mortality rate is highly associated with PROM in the 1000-1999-g weight category with asphyxia, prematurity, and infections being the leading causes of deaths<sup>7</sup>. The recommendations include reducing premature birth, asphyxia, and infections and this can be achieved by empowering pregnant women with adequate health literacy on associated factors of PROM on foetal outcomes, hence the need for this study.

Preconception care and early booking are encouraged. Pregnant women may have the belief that one should only go for antenatal booking once the pregnancy is showing and if one experiences rupture of membranes before term, this could contribute to delay in identification of risk factors contributing to poor perinatal outcomes. Verma *et al*<sup>8</sup> stated that the time of onset of life-threatening complication to receiving appropriate treatment encounters 3 delays namely: Failure to recognize the significance of the problem by the pregnant woman and her family; delay in referral system due to distance or difficulty in accessing transport, and delay in initiating treatment, once the woman reached the health care institution. Health literacy includes skills and demands related to reading, writing, speaking, and listening per cultural practices. Low health literacy is associated with poorer physical and mental health, less health care knowledge, reduced use of preventative services, increased hospitalization, and high health care costs<sup>9</sup>. According to the National Institute for Educational Sciences, health literacy is dependent

on culture and culture affects how people communicate and understand health information, how people think and feel about their health and how they respond to recommendations on lifestyle changes and treatment<sup>10</sup>. Findings by Nutbeam<sup>9</sup> imply that lower community/ mother health literacy was a significant independent predictor of poor health. Communities with a lower level of health literacy may place a greater reliance on experience and information obtained from lay networks, for example, experience on pre-ROM with previous pregnancies and traditional healers. When preconception and or early antenatal booking is encouraged, counseling for upscale health literacy should include anticipated maternal, fetal, and neonatal outcomes, potential complications including the plan to prevent or diagnose early, precautions for the patient, and management plan.

PROM is linked with significant perinatal morbidity and mortality which supports the notion that PROM complicates nearly 5% of all pregnancies and its complications are the principal cause of neonatal deaths and immaturity related as the final cause of death<sup>11-13</sup>. Pre-ROM may impair pregnant woman's ability to combat infections, due to the bacteria gaining access to the uterine cavity following PROM leading to an increased risk of combating infections by 56%<sup>14</sup>. The infection will affect the uterine cavity which will then lead to serious infections, including chorioamnionitis, neonatal sepsis, and maternal metritis. Cord compression and cord prolapse leading to foetal distress contributing to a 50% increase caesarean sections rate may also result in the case of PROM. When rupture of membranes occurs before 34 weeks of gestation, it is highly associated with preterm deliveries and its complications of respiratory distress syndrome, intra-ventricular haemorrhage, and necrotizing-enterocolitis, resulting in poor perinatal outcomes.

PROM in HIV-positive pregnant women not on treatment increases the risk of viral transmission contributing to a high rate of perinatal mortality and morbidity. This can also be ascribed to a lack of knowledge about maternal health issues which led to non-participation and increased fear of the unknown by male partners. In general, men are not likely to value the accompaniment of female partners to attend antenatal care nor do they participate during intrapartum or even post-delivery events. For the husbands who have an interest and

attempt to support their partners, diminished knowledge levels appeared to pose an obstacle to positive involvement, knowledge, in general, was limited<sup>15-16</sup>. In another study done in Cameroon by Nana *et al*<sup>17</sup> 59% of their cases had pre-ruptured membranes spontaneously with 59% complicating to birth asphyxia.

A study by Abd-Alaziz<sup>11</sup> in Egypt asserted that premature rupture of membranes complicates almost 5% of all pregnancies, yet accounts for almost one-third of all preterm deliveries. Due to the low standard of health care and poor medical resources in Egypt as one of the developing countries, they recommended an extending time for pregnancy complicated by PROM into 36 weeks. Around 2001 in the UK and South Africa, those who presented with PROM without labour pains were told to come back in 3 days, if not yet in labour, and over the years the waiting time has been reduced from 72 to 48 hours, then 24 to 18 hours and up to 12 hours. The reduction in hours was based on a Cochrane Review, but experience and intuition were also relied on. To date, it is still difficult to comment on the duration of membrane rupture for those who ruptured at home<sup>18</sup>. Culturally, pregnant women believe that PROM is only considered a matter of urgency if it is accompanied by pain and may tend not to seek health care. In the Thulamela district, cultural practices of delayed antenatal booking until pregnancy may also contribute to the poor perinatal outcomes as PROM may occur as early as 16 weeks and by that time it is not yet showing, and the pregnant woman is not yet booked for antenatal care. The belief that when PROM happens before the term is due to bad luck may lead to the pregnant women seeking other solutions with delayed intervals to seeking health. Despite the effectiveness of the Mom-Connect programme (<http://www.health.gov.za/index.php/mom-connect>), prolonged rupture of membranes is still diagnosed on admission<sup>4</sup>.

The Saving Babies Report Pattinson and Rhoda<sup>5</sup> has indicated that although there was a decline in perinatal mortality rate (PNMR) by 3.6% in 2013-2014, the Limpopo Province PNMR is at 27.9% with deaths due to prematurity thought to be preventable. In the maternal meeting held in May 2017 at Tshilidzini Hospital, there was 2 case presentation of PROM that complicated into perinatal mortality in both cases. PROM was found

to have occurred at home and there was a time interval of more than 3 hours from the time of PROM to the time of arrival at the health care centre. In one case, the foetal heart was absent on admission and normal delivery of the stillborn resulted in the second case, the foetal heart was present on admission, the baby was delivered through caesarean section, but died few hours after birth with severe birth asphyxia. If maternal health literacy was adequate on PROM, the pregnant women would have recognized the urgency of PROM and sought health care as soon as they experienced the condition with better perinatal outcomes. Enakpene *et al*<sup>16</sup> indicated that awareness of the risk factors is important for speedy diagnosis, women with adequate maternal literacy are likely to recognize the danger signs during pregnancy and present early for health care. The purpose was to assess the health literacy of lactating mothers regarding the factors associated with pre-ruptured membranes on perinatal outcomes at Thulamela B clinics, Vhembe district.

## Methods

A quantitative research method with a cross-sectional descriptive survey was used in this study. The study was conducted in Thulamela B clinics, Vhembe district. Sampling was done in 2 phases namely: a sampling of health facilities and a sampling of respondents. Thulamela district municipality has 37 clinics in total and 12 clinics were selected, namely; Vhufuli, Tshitereke, Damani, Fondwe, Murangoni, Pfanani, Dzingahe, Sibasa, Magwedzha, Shayandima, and Tshisaulu. Also, at the following Community Health Centers; William Eddie and Thohoyandou. The population comprised of lactating mothers who presented at the health facility within 6 weeks following delivery at these clinics. A total of 210 lactating mothers who gave birth within 6 weeks following delivery, irrespective of the mode of delivery were purposively selected. Ethical standards were ensured by obtaining the ethical clearance (Ref: SHS/18/PDC/20/0911), from the University of Venda Ethics Committee, permission to conduct the study from the Limpopo Provincial Department of Health, the District Manager, and the respondents. Respondents gave verbal and written, informed consent, and were informed of their right to withdraw from the study without any penalty. Ethical principles of fairness, privacy,

confidentiality, anonymity as well as respondents' rights to voluntarily participate in the study were adhered to.

Data collection about the health literacy of lactating mothers on associated factors of pre-ROM on perinatal outcomes were collected employing self-administered questionnaires. Data were collected from January to March 2019 from 12 selected clinics. The questionnaires were developed by researchers based on literature review with the assistance of the statistician. These were compiled in English and translated into the local language. Respondents completed questionnaires on their own, however, the researcher was available when assistance was needed. The Statistical Software Package (SPSS) version 25 was used to analyze data. The facts gathered from questionnaires were translated into numerical data, graphs, and tabular format so that facts would be clear and item scores were added to obtain the results. All data were coded and entered the software programme. Codes were used instead of participants' names and data were checked frequently for missing or incorrect values. Reliability and feasibility of the study tool was ensured by the test-retest method and by pre-testing the instrument at Thohoyandou Health Centre on 21 respondents who had the same characteristics as the study population but did not form part of the study. The results of the pilot were used to modify the tool.

## Results

### *Demographic profile*

Table 1 present the demographic profile of the lactating mothers from different ethnic groups; their ages ranged between 20 and 40 years. Most (64%) of them were moderately literate in primary and secondary schooling whilst those with tertiary schooling were less than 50%. The majority attended antenatal care as never attended were 9% whilst those attending 4-5 were 75% and those who attended 6 times and more was 67%. The majority were delivered at the institution of care, and many had a normal vaginal delivery. Only 6% of respondents received information on fluid leakage/pre-rupture of membranes.

### *Health information access and health literacy*

Table 2 presents the topics or various information and respondents' responses to the

enlisted information. The respondent response was positive with the yes percentages ranging between 40% to 60%. The no response with the highest percentage was on the statement requiring them to have understanding, ability to follow instructions and keeping of check-up dates with 77% and 88% respectively

### *Knowledge regarding fluid leakage*

Table 3 showed that respondents were conversant about who can have fluid leakage, and what to do if they had fluid leakage at 51%. Respondents showed less conversant regarding the complications of fluid leakage at a rate of 16% to 40%. The participant who perceived fluid leakage can cause illness to the mother were 50% whilst those who think the baby will be sick were 67%. Those who perceived that the mother and baby will be affected by fluid leakage were 75% and those who perceived that nothing will happen were 18%.

### *Actions respondents will take in the event of amniotic fluid leakage (N = 210)*

Figure 1 showed that the majority (60%) reported fluid leakage immediately whilst those who responded that they will never report were at 54%

### *Health-seeking pattern and outcome following fluid leakage*

Table 4 showed that the majority (63%) of respondents had heard about fluid leakage whilst less had explained it (37%). The majority (66%) waited long before they report whilst 16% reported on time. The majority (59%) had delivered a term baby but not healthy, some 28% had a preterm birth. About 23% babies did not survive.

## Discussion

### *Demographic profile*

The results showed a high rate of unemployment at 67.1%, and low literacy levels at which is in accord with the findings by Vhembe DHIS indicating Thulamela district has a high rate of unemployment, low literacy, and poverty even though the study did not include the whole of Thulamela. This implied that the findings of this

**Table 1:** Demographic information of the respondents (N = 210)

Characteristics	Frequency (%)
<b>Age (Years)</b>	<b>Number (%)</b>
≤20	32 (15.2%)
21-25	106 (50.5%)
26-30	24 (11.4%)
31-35	18 (8.6%)
36-40	24 (11.4%)
<b>Ethnicity</b>	<b>Number (%)</b>
Pedi	12 (5.7%)
Venda	192 (91.4%)
<b>Marital status</b>	<b>Number (%)</b>
Single	130 (61.9%)
Married	52 (24.8%)
Divorced	28 (18.3%)
<b>Occupation</b>	<b>Number (%)</b>
Student	23 (11.0%)
Employed	16 (7.6%)
Unemployed	141 (67.1%)
<b>Highest Level of Education (Wife)</b>	<b>Number (%)</b>
Primary Level	64 (30.5%)
Secondary Level	64 (30.5%)
Tertiary Level	40 (19.0%)
Postgraduate	3 (1.4%)
Never Attended School	39 (8.6%)
<b>Highest Level of Education (Partner)</b>	<b>Number (%)</b>
Primary Level	12 (5.7%)
Secondary Level	11 (5.2%)
Tertiary Level	15 (7.1%)
Never Attended School	172 (81.9%)
<b>Antenatal care visit</b>	<b>Number (%)</b>
Did not attend at all	9 (4.3%)
1-3 times	59 (28.1%)
4-6 times	75 (35.7%)
Above 6 times	67 (31.9%)
<b>How many times have you been pregnant?</b>	<b>Number (%)</b>
One	82 (39%)
Two	34 (16%)
Three	59 (28%)
Four and above	36 (17%)
<b>How many babies do you have?</b>	<b>Number (%)</b>
One	82 (39%)
Two	90 (43%)
Three	17 (8%)
Four and above	21 (10%)
<b>Gestational Age at Booking</b>	<b>Number (%)</b>
0-3 months	123 (58.6%)
4-6 months	44 (20.9%)
6 months and above	23 (11.0%)
None	20 (9.5%)
<b>Delivery Facility</b>	<b>Number (%)</b>
Hospital	182 (86.7%)
Church	9 (4.3%)
Home	19 (9%)
<b>Mode of Delivery</b>	<b>Number (%)</b>

Vaginal	78 (37.1%)
Caesarean	64 (30.5%)
Aided vaginal delivery	68 (32.4%)
<b>Type of Sickness</b>	<b>Number (%)</b>
None	30 (14.3%)
High blood pressure	144 (68.6%)
Diabetes	23 (11.0%)
Non-respondents	13 (6.2%)
<b>Health subjects to be taught</b>	<b>Number (%)</b>
Wellness of the baby	32 (15.2%)
Diet for pregnancy	70 (33.3%)
How to take care of the baby	25 (11.9%)
What is dangerous during pregnancy	66 (31.4%)
I am shy to ask about anything	17 (8.1%)
<b>Information received during pregnancy</b>	<b>Number (%)</b>
Family Planning	37 (17.6%)
Breastfeeding	18 (8.6%)
Health diet	17 (8.1%)
Danger signs of pregnancy	4 (1.9%)
Fluid leakage	13 (6.2%)

study were in agreement with what is commonly associated with low literacy levels. Sentel *et al*<sup>19</sup>, and Statistics South Africa<sup>20</sup>, have shown that there is a high rate of low adult literacy level and that literacy skills affect health literacy in general, supporting the results of this study that despite the free education in South Africa, the majority of respondents managed to reach primary and secondary education level with only 18.6 % with tertiary level education. This indicates a large number of school dropouts and those who have never attended school contribute to the low rate of adult literacy level which is also in accord with the findings by Vhembe DHIS indicating Limpopo Province to have the lowest adult literacy level.

Yee *et al*<sup>21</sup>, indicated that the limited body of work on health literacy during pregnancy has so far shown inadequate health literacy to be related to lesser knowledge and lesser self-care behaviour amongst pregnant women in the United States. Charoghchian Khorasani *et al*<sup>22</sup>, demonstrated a significant correlation between health literacy and the mother's as well as the partner's educational level, thus supporting the findings of this study as only 18.6% of respondents managed to reach the tertiary level of education with 7.1% of the respondents' partners who managed to reach the tertiary level and, hence, it affects the literacy level in general. In this study, the low literacy level of the respondents and their partners has contributed to

**Table 2:** Health information access and health literacy (N = 210)

Statement	Yes (%)	No (%)
Do you have problems understanding health information that is written or that is being taught?	133 (63%)	77 (36.7%)
Do you find health information important?	181 (86.2%)	29 (13.8%)
Are the health educational materials at your clinic e.g. posters written in a way that you can understand?	99 (47.1%)	111 (52.9%)
Do you find hospital or clinic signs difficult to understand?	35 (16.7%)	175 (83.3%)
Do you keep the following updates for a check-up?	40 (19%)	170 (81%)
Have you ever missed a follow-up or check-update due to a misunderstanding?	197 (93.8%)	13 (6.2%)
Do you clearly understand the instruction on how to take the medication if given any	158 (75.2%)	52 (24.8%)
Did your health care provider [nurse] explain the findings and progress in a way that you would understand?	47 (22.4%)	163 (77.6%)
Are you able to explain to someone at home the things that the nurse told you about your pregnancy?	128 (61%)	82 (39%)
Do you have anyone helping you at home in reading hospital materials such as clinic cards?	182 (86.5%)	28 (13.3%)
Do you often ask the nurse questions about pregnancy and health in general?	104 (49.5%)	106 (50.5%)
Do you seek health advice from any person besides health professionals?	107 (51%)	103 (49%)
Do you have a preference for medical advice?	152 (72.4%)	58 (27.6%)
Have you ever used self-medication while pregnant?	185 (88.1%)	13 (11.6%)

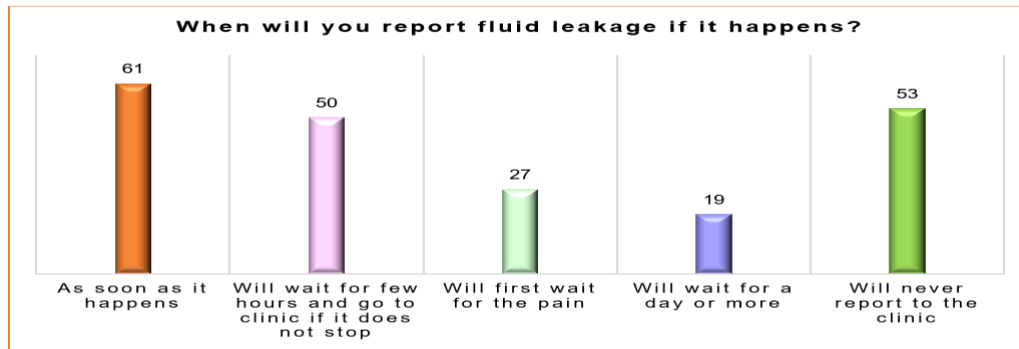
**Table 3:** Knowledge regarding fluid leakage (N = 210)

Items	Frequency
<b>Who can experience fluid leakage?</b>	<b>Number (%)</b>
Anyone	109 (51.9%)
Those omit tradition	39 (18.6%)
No one	62 (29.5%)
<b>What are the signs of fluid leakage</b>	<b>Number (%)</b>
Draining water with or without pain	72 (34.3%)
Draining dirty water	138 (65.7%)
<b>What did you fear during pregnancy before the time of birth</b>	<b>Number (%)</b>
Pains	168 (80%)
Fluid leakage	42 (20%)
<b>Fluid leakage is dangerous to:</b>	<b>Number (%)</b>
The mother	35 (16.7%)
Both the mother and the baby	175 (83.3%)
<b>What happens if fluid leakage before time is not treated</b>	<b>Number (%)</b>
Mother will become sick	50 (23.8%)
The baby will become sick	67 (31.9%)
Both mother and baby will be affected	75 (35.7%)
Nothing serious will happen	18 (8.6%)
<b>What do you do if fluid leakage before time</b>	<b>Number (%)</b>
Will drink a lot of water to replace fluid	83 (39.5%)
Will quickly go to hospital or clinic	27 (12.9%)
I Will sit at home waiting for someone that I will ask	80 (38.1%)
Will quickly go to the traditional healer for medicines to stop leakage	20 (9.5%)
<b>What do you think is the best treatment for fluid leakage</b>	<b>Number (%)</b>
Clinic/hospital	84 (40%)
Water from the pastor	58 (27.1%)
Herbs from a traditional healer	38 (18.1%)
All of above	30 (14.3%)
<b>The effect of before time fluid leakage to the baby</b>	<b>Number (%)</b>
Baby born before time	74 (35.2%)
Sickness	47 (22.4%)
Death	32 (15.2%)
All of the above	32 (15.2%)
None of the above	26 (11.9%)

limited health literacy on pre-ROM which negatively affected the perinatal outcomes.

### **Accessibility to health information and health literacy**

Remshardt's<sup>23</sup> study in America indicated that one in five adults were likely to have an inability in reading basic instructions and that nearly half of adults had difficulty in accessing, understanding, and using the health information which supports the findings of this study. Although it was done at a smaller scale, i.e., 52.9% of respondents have shown difficulty in accessing health information materials and understanding them, this is concerning low adult literacy in general. Studies by Ullah *et al*<sup>24</sup> and Magadzire *et al*<sup>25</sup> showed that the rates of missed appointments may be country- or health system-specific and attributable to a wide assortment of factors, including forgetfulness, feeling better or worse, transport problems, and misunderstanding/confusion about the time of consultation and not only impede appropriate care of acute and chronic health conditions but also burden medical and administrative resources. The findings of the study are in accord with these assertions in that 93.8% of the respondents have indicated to have also missed an appointment during pregnancy due to misunderstanding and, hence, this is reflected in different ways from poor antenatal care attendance to defaulters on antenatal care follow-up. Inadequate access to health information has led to misunderstanding and inability to use the health information resulting in



**Figure 1:** Actions respondents will take in the event of amniotic fluid leakage

**Table 4:** Health-seeking pattern and outcome following fluid leakage (N = 210)

Have you ever experienced or heard of fluid leakage before time?	Number (%)
Have heard of it	133 (63.3%)
Experienced it	779 (37.6%)
Which step did you take when it happened?	Number (%)
Tell someone at home for advice	36 (17.1%)
Rush to the clinic	26 (12.4%)
Consult with the healer	29 (13.8%)
Didn't think it's serious	119 (56.7%)
How long did you wait before going to clinic?	Number (%)
Hours	140 (66.6%)
Days	33 (15.7%)
Didn't know what was happening, did not go to the clinic	37 (17.6%)
How long did the water come out before you give birth?	Number (%)
A week	108 (51.4%)
Days	23 (10.9%)
Hours	26 (12.3%)
Few minutes	24 (11.4%)
Not sure	29 (13.8%)
What happens to the baby after you give birth?	Number (%)
Baby was alive and healthy	28 (13.3%)
Baby was sick and admitted	133 (63.3%)
Baby didn't survive	49 (23.3%)
How was the baby's health after delivery?	Number (%)
Baby born before time	59 (28.1%)
Baby born in a time and healthy	26 (12.4%)
Baby born in time but not healthy	125 (59.5%)

poor antenatal attendance and defaulters making it difficult to entrench maternal literacy on PROM and associated factors, with failure of identifying the respondents who are at risk of PROM when there is no frequent antenatal care attendance which will then affect the perinatal outcomes.

A total of 78.6% of the respondents never received any education during pregnancy which is

another barrier to health literacy level as health information is the key resource for managing a health system and improving health care as indicated by WHO<sup>26</sup>. Feedback on pregnancy progress was also not given to most of the respondents thought it may be hindered by communication skills between professionals and laypersons. Ebijuwa *et al*<sup>27</sup> validated the use of multiple sources of formal and informal health information, even though health care professionals were the preferred source of information, depending on the type of information needed, families and friends were the informal sources they turn to for information. These findings agree with the results of this study which shows that 26.7% of respondents relied on older family members for health care advice, 17% relied on partners, which is in accord with the findings by Nesane *et al*<sup>15</sup> of little, if any, involvement of male partners in health care during pregnancy. Respondents also indicated to have someone at home assisting them in reading health information which is also a challenge as the family member may also not understand health information. However, multiple sources of information may lead to conflicting information, and misinterpretation is also possible. The majority of respondents were found to have sought medical advice from others besides health care professionals and 88.1% have used self-medication which may be due to the findings by Statistics South Africa<sup>20</sup> that individuals with limited health literacy often feel a sense of shame about their skill level and are uncomfortable with being unable to read well, hence, they develop strategies to compensate. With most respondents seeking health advice from others besides health care professionals, the awareness of PROM as a danger sign may not be clearly understood and may be misinterpreted.

### ***Antenatal care attendance and frequency***

The findings of this study supported that women who adequately attend antenatal care have a likelihood to have more information on health information given during the visits. The results showed that those who attended antenatal 4-6 times (75%) care had information on fluid leakage. Enakpene *et al*<sup>16</sup> indicated that women with adequate prenatal care are more likely to be informed about danger signs during pregnancy and are more likely to present early for health care while unbooked cases will try other options, including uncertified traditional birth attendants. The study in Nigeria by Aliyu and Dahiru<sup>27</sup> showed that overall, 27%, 62%, and 12% of women initiated antenatal care in the first, second, and third trimesters, respectively, which is in accord with the findings of this study that 58.5% of respondents had their first antenatal care (ANC) during the first trimester and only 9.5% were not booked. However, the findings of this study revealed the tendency of late booking by 48% of respondents which does not comply with WHO<sup>28</sup> recommendations of first bookings before 20 weeks of gestation. A study in Bangladesh by Islam and Masud<sup>29</sup> has shown only 31% of respondents who received the WHO-recommended ANC of a minimum of 4 visits during antenatal which is different from the findings of this study of 68.6% on those who attended antenatal care 4 times and more. Adequate antenatal care attendance is important in improving the perinatal outcomes as during ANC the health care workers are providing adequate information on signs of PROM and when to report if it occurs. When pregnant women are equipped with adequate information at ANC, perinatal outcomes related to PROM could improve since they will be able to report earlier when it happens.

### ***Health literacy regarding fluid leakage***

The study findings showed that the majority of respondents were aware of the baby growing in the uterus and that there is a pool of water, however, 32.9% of respondents did not know, 76.7% have never heard of fluid leakage and 42.4% were not aware that fluid leakage can happen, even months before the baby is born. These findings corroborate earlier assertions by Nutbeam<sup>10</sup> that limited knowledge about the body and disease causes may impair understanding of health outcomes. The

findings also show a large number of those who were willing to ask questions regarding diet, care, and wellness of the baby, which might be because the main focus on health is on the new baby.

Only 6.2% of the respondents were interested in asking about danger signs during pregnancy as well as fluid leakage which is different from a study done in India by Kamali *et al*<sup>30</sup> which showed most pregnant women to be interested in information about care of the foetus, physical and psychological care, and complications after delivery. The findings of this study have also indicated that most women were aware and understood the signs of fluid leakage even though they were reluctant to seek health care. However, health care institutions were regarded as the best treatment for fluid leakage although waiting to ask someone, drinking a lot of water either naturally or from the pastor to replace the lost fluid were regarded as the intervention. The findings further indicate a sound knowledge and understanding that a health care facility is the best treatment for fluid leakage. Awareness of pregnant women on danger signs, including PROM, was not enough for improved perinatal outcomes as seeking health care was not considered. The health care facility will only provide the best treatment for PROM with good perinatal outcomes when reached by pregnant women. A study in Egypt by Abd-Alaziz<sup>11</sup> indicated that PPRM complicates 5% of all pregnancies and accounted for one-third of preterm deliveries. These findings showed that women only knew of prematurity or a baby born before time as the perinatal outcome, sickness to both the mother and the baby were only regarded by a few, and death was not mentioned as the outcome. However, 12% of perinatal mortality has been associated with PPRM with asphyxia, prematurity and infections remaining the top three in the causes of neonatal deaths. Inadequate literacy on the perinatal outcomes following PROM may have a contribution to the decision to seek health care. Awareness of perinatal outcomes by pregnant regarding PROM can be reached by empowering them with adequate health information to improve the perinatal outcomes.

Akeju *et al*<sup>31</sup>, indicated that women utilize multiple caregivers during pregnancy with a preference for traditional providers. The findings by Harris *et al*<sup>31</sup> was that health literacy is dependent on culture and culture affects how people think and



feel about their health, how they communicate and understand health information when they should seek health care, how people feel and think about their health, when and from whom to seek care, how they respond towards recommendations regarding health care. This is evidenced by delays in seeking health care, hence, the health care facilities still face problems with late antenatal bookings and prolonged rupture of membranes. Many pregnant women were also found to be attending cultural practices in the neighbourhood. A study done in Asia by Withers *et al*<sup>33</sup> has also shown that cultural beliefs influence the woman's use of formal health care services and high prevalence of traditional practices and beliefs during pregnancy, delivery, and postpartum care. The cultural practices and beliefs influence women's understanding of the health information regarding PROM, how they feel, and when they should seek health care following PROM. Delay in seeking health care with cultural practice as the first preference will harm perinatal outcomes.

### ***Perception regarding fluid leakage***

The findings indicated 42.5% of the respondents believed that PROM can only occur to those who omitted tradition and as a large number relies on adult family members, the advice may be that which is believed to be culturally acceptable as supported by Nutbeam's<sup>10</sup> findings that a community with lower health literacy level places greater reliance on experience and information through laypersons. The study findings indicated the belief that fluid leakage is due to curses or omitting traditions as perceived by many respondents with a lesser number due to perception of infection and natural causes. The findings have also shown that PROM is not regarded as an urgent matter if there is no pain or bleeding which is contributing to delays in seeking health care, resorting to the traditional route as the first choice, both of which may endanger the life of the mother and the unborn baby as sicknesses, including endometritis, chorioamnionitis, and complications such as cord prolapse and respiratory distress can occur as a result.

### ***Health-seeking pattern following pre-ruptured membranes***

A study done in Nepal by Pokhrel *et al*<sup>34</sup>, found that poverty, illiteracy, lack of access to health care,

occupation, and type of family impacted the health-seeking behaviour with lack of awareness leading to poor health outcomes. These observations lend support to the findings of this study in that illiteracy, type of family, and lack of awareness affected health-seeking behaviour resulting in delays in seeking health care, hence, the poor perinatal outcomes. However, a study in Nigeria by Akeju *et al*<sup>31</sup> have shown economic factors and trust in traditional medicines contributing to delays in seeking health care during pregnancy. Verma *et al*<sup>5</sup> reported failure to recognize the significance of the problem by pregnant woman and her family as one of the delays of life-threatening complications to receiving treatment. A study by Killewo *et al*<sup>35</sup> had also shown that a large number of respondents perceived delay in seeking health care due to the inability to judge the graveness of the condition during pregnancy. Moreover, the majority of the respondents have visited other providers for treatment besides health care which reinforce the findings of this study that indicated a large number of respondents would first wait and only report to the clinic if it persisted and 13% would wait for the pain which indicates that health literacy regarding fluid leakage is minimal because the longer the time of draining, the greater the risk to the mother and baby. This is because women don't regard fluid leakage as dangerous, only bleeding and pains were regarded as the most dangerous.

### ***Perinatal outcomes following PROM***

Poverty with the high rate of unemployment and low literacy level with inadequate awareness on PROM effects has led to the inability to regard PROM as an urgent matter leading to delay in seeking health, hence, the poor perinatal outcomes. Several literature sources have indicated an association between health literacy and health behaviour which also relates to negative pregnancy outcomes<sup>19,22,37</sup>. PPRM has a worldwide incidence affecting about 4% of all pregnancies<sup>11,17</sup>. The study findings were that 28.1% of respondents with PPRM had pre-term deliveries supported by findings by Abd-Alaziz<sup>11</sup> and Vhembe DHIS (2015) that prematurity is the principal risk of pre-ruptured membranes. Of the respondents, 59.5% delivered at term, but with unhealthy babies, thus implying perinatal outcomes associated with pre-ruptured membranes, asphyxia, prematurity, and infections, which remain the top three causes of

perinatal morbidity and mortality. The findings also indicated that 63.4 % of babies were born sick and admitted and 23% of babies died while 11.9% of respondents were sick and admitted following pre-ruptured membranes which are in accord with the Saving Babies Report by Rhoda *et al*<sup>37-38</sup> that pre-rupture of membranes contributes to perinatal mortality and morbidity. The poor perinatal outcomes were seen when the findings indicated that for many babies who were sick and admitted following PROM, neonatal mortality was also regarded as a negative outcome.

## Limitation

The study was conducted only in Thulamela B clinics in the Vhembe district, findings will not be generalized to other health facilities in the Vhembe district.

## Conclusion

Limited and inadequate health literacy towards the pre-rupture of membranes contributes to perinatal morbidity and mortality. Other associated factors were poor antenatal care attendance, defaulting, and loss of follow-up. The delay in seeking health care with cultural practices as the first preference was found to negatively affect the perinatal outcomes. The low literacy level contributed to low health literacy in pre-ROM as women didn't regard fluid leakage as dangerous, but only bleeding and pains were regarded as the most dangerous. It is necessary to empower pregnant women with adequate information on associated factors to assist in the prevention and early diagnosis of perinatal morbidity and mortality associated with PROM. In addition, women should be encouraged to attend the antenatal clinic on or before 12 weeks gestation as is evident in this study that all women who had prerupture of membranes and attended antenatal care 4-6 times had good neonatal outcomes.

## Recommendations

Awareness of the effect of PROM on perinatal outcomes can be reached by empowering childbearing and pregnant women with adequate health information during antenatal care sessions. It is recommended to emphasize the provision of preconception and antenatal care where health information on risks and danger signs of PROM to

perinatal outcomes. Further studies may be done to compare the association of Health literacy of mothers on factors associated with pre-rupture of membranes on perinatal outcomes between those who are literate and those who are not literate.

## Authors' contributions

V.M.B conducted the study and drafting of this manuscript. T.M who was the co-supervisor and who conducted the literature review, M.S.M for supervision and correcting and finalizing the article.

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## Conflict of interest

The authors declare that they had no financial or personal relationship(s) which may have inappropriately influenced them in writing this article.

## Data availability

The raw data used to support the findings are included in the article and can be made available from the corresponding author upon request. This manuscript was derived from the masters dissertation.

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