

# The Preterm Birth Rate in a Resource-Stricken Rural Area of the Limpopo Province, South Africa

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**Background:** Midwives play a pivotal role in providing primary prevention of preterm birth. Midwives screen and diagnose pre-existing medical conditions, manage all conditions as guided by their scope of practice and refer all cases to other relevant team members.

**Purpose:** The study aimed to determine and describe factors contributing to the escalating preterm birth rate in Limpopo, South Africa.

**Methods:** Descriptive survey was used to determine factors related to increased preterm births. The non-probability purposive sampling selected 55 midwives, and data were collected using self-administered questionnaires. Data were analyzed through SPSS version 23.

**Results:** Health facilities in Limpopo province had constrained resources as evidenced by a shortage of midwives, a lack of medical supply, poorly maintained, and old infrastructure. The skills of midwives and their working environment were affected by this constrained resource. The results from midwives that were perceived to affect them were 66% of participants reported lack of equipment, 29.1% participants agreed that pregnant women were presenting after 12 weeks to initiate antenatal care, while 45.3% pointed out they used steroids to prevent preterm labor. Record-keeping was viewed as an essential aspect to manage PTB when providing care. Despite the constrained resources, midwives were providing care to prevent PTB. This was evidenced by 78.2% agreeing that keep records from the first booking until the last antenatal visit, while 96.2% monitored the fetal heart rate, 98.1% screened for infections, and 90.9% referred all women at risk to the doctor. Thus, most of the midwives were competent with a confidence interval of (95%) and a prevalence of 9% and 9.5% that, is 9/10, which could prevent PTB.

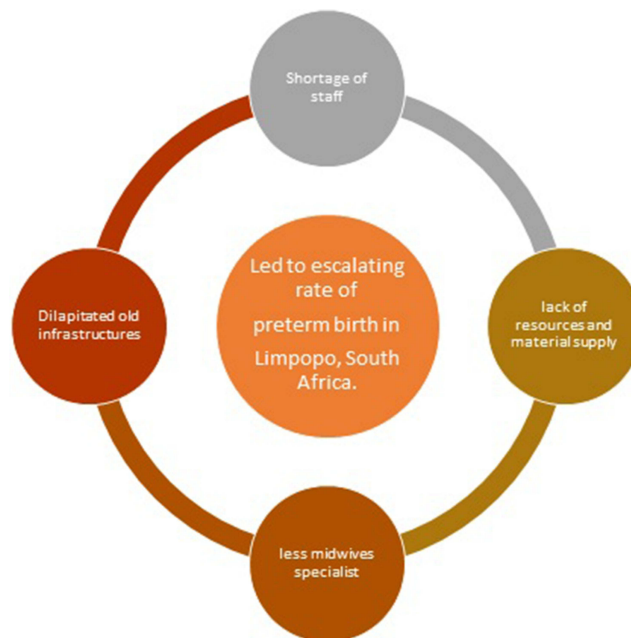
**Conclusion:** Lack of resources, including staffing and specialized care, contributed to escalating PTB at health facilities in Limpopo province.

**Keywords:** midwives, maternal and neonatal care, obstetric units, preterm birth, preterm death

## Introduction

Preterm birth (PTB) is defined as the baby's birth before completing full 37 gestational age, contributing to more complications that lead to neonatal deaths worldwide.<sup>1</sup> South Africa is also faced with an escalating rate of preterm birth and is currently having an increasing rate of 59% occurring mainly at the community health centers and district hospitals.<sup>2</sup> The National New Born Care report of 2012–2013 showed the provincial preterm birth statistics as follows: Gauteng Province had the highest rate at 414,840 followed by Kwa-Zulu Natal province at 381,264; Limpopo Province at 254,249; Eastern Cape Province at 234,841; Mpumalanga Province at 153,206; North West Province at 115,828 and Free State Province at 94,139.<sup>3</sup> The escalating rate was supported by neonatal deaths rate reported by Rhoda and Pattinson (2018) whose study recorded 5237 neonatal deaths in 2012–2013. The deaths were related to neonatal immaturity and complications of immature neonates. Many preterm birth causes were identified, including intrauterine inflammation, placental malfunctioning, and placental abnormality.<sup>4–7</sup> Additional preterm birth complications resulting in neonatal deaths were hyaline membrane diseases, meconium aspiration, neonatal asphyxia, hypoglycemia, hypoxia, inability to feed, and hypoxemia. And a spectrum of neurodevelopment conditions and ultimately neonatal demise

## Graphical Abstract



leading to an increased neonatal death rate in Limpopo, South Africa. For midwives to reduce this rate of preterm birth occurrence, they need to provide promotive and preventive care during antenatal care challenges that are not accessible due to limited resources in rural settings like Limpopo province, South Africa.<sup>8</sup> Preconception care such as reducing weight, provision of oral vitamin supplementation, advising smoking women to stop during pregnancy, and so on can play a significant role in reducing preterm births.<sup>9</sup> In South Africa, the Nursing Council (SANC) considers the midwife a primary registered practitioner who provides care and supports the mother and baby to achieve and maintain good health during pregnancy, labor, and puerperium.<sup>10</sup> In addition, there are Basic Antenatal Care (BANC) guidelines that are used by in-service midwives on how to identify the pre-existing chronic conditions that can complicate pregnancy and can as well predispose women to preterm births.<sup>11</sup> Ronan (2013) in her study emphasized that a well-trained midwife could provide maternal care that reduces the occurrences of delivery before the completion of 37th week. If they fail to prevent preterm birth, they are well equipped to offer professional neonatal care to help the immature neonate survive.<sup>12</sup>

Many other authors also confirmed that midwives could prevent preterm birth through promotive and preventive measures, including educating mothers about the risk of falling pregnant at early ages less than 18 years and advanced age above 35 years. Inform the mother of a well-balanced diet and micronutrient supplements in preparation for pregnancy.<sup>13</sup> Most importantly, they educate them on the importance of timely antenatal care attendance, proper birth plan, and attending classes to prepare for birth.<sup>13–15</sup> South Africa, like other developing countries, lacks the staff to prevent the increasing rate of preterm birth<sup>16</sup> Limpopo Province alone had 3097 newborn babies under 2500 grams, within the units that lack incubators and malfunctioning thermometers for measuring room the temperatures in the units, thus increasing neonatal mortality. Leam and McCandlish, confirm that limited working tools can affect the provision of skilled care to reduce the occurrence of preterm birth in obstetrics units in Limpopo province.<sup>17</sup>

Salam et al indicated that professional midwives are the most relevant maternal and child health professionals who need to and can play a pivotal role in reducing preterm births and infant mortality in South Africa. Consequently, midwives are expected to provide maternal health education, identify and refer women with maternal conditions predisposing them to preterm birth, and management of women at high risk of PTB, they ought to prevent

pregnancy.<sup>18</sup> The study aimed to determine and describe what is escalating the preterm birth rate in Limpopo province, South Africa.

## Materials and Methods

### Research Method and Design

The study was conducted in three selected districts of Limpopo province; this district had the highest population of preterm births, namely, Capricorn, Vhembe, and Sekhukhune. A quantitative research approach was adopted, wherein a non-experimental, descriptive design was used. Twelve hospitals with the highest preterm birth registered from the three districts were purposively sampled. The population comprised all midwives with 12 months of working experience in the obstetric units. The target population of the midwives during the period of study was 151 inclusive of day/night and those on leave, while the actual total midwives on duty, including night staff and those on holiday, were 96. The researcher used non-probability convenient sampling to sample 55/96, accounting for (57%) of midwives. The total number of midwives who participated was 55 (57%) because only those who were not on leave or night duty who voluntarily agreed to participate were given a questionnaire to complete.

A self-administered questionnaire with closed-ended questions was administered to all midwives who were on duty and were willing to participate; this was completed during lunch breaks using the resting rooms in their workplace. The questionnaire had the following: demographic characteristics, midwifery care to reduce preterm birth, and available resources (staff, equipment, drugs, and medical supplies). The Statistical Package for Social Sciences (SPSS) version 25 was employed to analyze data. Data were presented using Tables 1–5 with numbers and percentages. Validity was ensured: the research instrument was submitted to experts' maternal health care services; they checked the construction and content of the devices.<sup>19</sup> The tool was piloted by 13 midwives who did not form part of the main study. The pilot assisted the researcher in picking up ambiguous and incomplete questions; the researcher amended the questionnaire before commencement with the actual research.<sup>19</sup>

**Table 1** List of Selected Facilities and Population Sampled

Districts Selected	Selected District Hospitals	Number of Midwives Sampled
Capricorn	Four (4)	20
Vhembe	Four (4)	15
Sekhukhune	Four (4)	20
Total	Twelve (12)	55
Total participants	55	

**Table 2** Age Distribution, Qualification and Years of Experience in Current Position

Age Group	Number (%)	Qualification	Number (%)	No. of Years	Number (%)
20–24	3 (5.5%)	Diploma	50 (90.9%)	1–5 yrs.	3 (5.5%)
25–34	15 (27%)	Degree	3 (5.5%)	5–10 yrs.	30 (54.5%)
35–44	15 (27%)	Postgraduate Specialty	2 (3.6%)	10 years and above	22 (40%)
45–54	10 (18%)				
55–64	11 (20%)				
65	1 (1.8%)				
Total	55 (100%)	55 (100%)	55 (100%)	55 (100%)	55 (100%)

**Table 3** Care to Prevent Preterm Birth During Antenatal

Midwives Role in Antenatal Care:	Responses			
	Agree		Disagree	
Item No.	Number	%	Number	%
1. Midwives ensured that pregnant booked their antenatal care before 12 weeks of their gestational period for proper screening and planning the proper care to reduce risks of preterm birth.	16	29.1	39	70.9
2. They Kept pregnant women records from the first visit until the commencement of labor so that they have a proper baseline	43	78.2	12	21.8
3. Midwives took specimens required for the investigations of medical conditions predisposing to preterm birth	52	96.3	3	3.7
4. Take and record the baseline vital signs to notice the deviation from normal and picking up risky conditions on time	54	98.2	1	1.8
5. Followed up the specimens to get hold of the results to attend to adverse outcomes and refer to the doctor for further management	51	92.7	4	7.3
6. Referrals of the mother's doctors, Psychologists, advanced midwives, or dieticians.	50	90.9	5	9.1
7. Assess the mothers for other infections that can lead to preterm labor	54	98.1	1	1.9
8. Assess and classify pregnant women as low or high risk and manage appropriately	52	96.2		3.8
9. Make sure make pregnant mother attended recommended visits	45	81.1	10	18.9

## Ethics Consideration

To ensure that the study was authentic, the researchers sought an ethical certificate, and the University of Venda Research Ethics Committee (UREC) granted them an ethical clearance project no: SHS/16/PDC/10/1608. After receiving the UREC certificate, the researchers applied for access to obstetric units of the Limpopo Department of Health. The Limpopo Department of Health granted the searchers permission to collect data from the obstetric units. Ethical aspects of voluntary participation, anonymity and confidentiality were adhered to. All respondents signed consent forms to ensure their voluntary participation.

## Presentation of Results

### Sample Size

Table 3 reveals that 29.1% of midwives made sure pregnant mothers booked antenatal care before 12 weeks gestation. 78.2% of midwives kept records of antenatal pregnant women from the first to the last visit. 96.3% of midwives took first visit blood specimens for investigations; 98.2% midwives recorded the baseline data; 92.7% midwives checked the results and made sure all results needed attention was shown to the medical practitioners. Approximately 90.9% of midwives referred all mothers with special needs to other team members, 98.1% of midwives screened the pregnant mothers for all types of infections, 96.2% of midwives and managers assessed and classified women according to high or low risk, and 81.1% midwives ensured that all pregnant mothers had five or more visits recommended to the clinic for proper management and reduce the risk of preterm births and deaths.

Table 4 shows that 94.4% of midwives took entire history when admitting pregnant mothers with labor and record, 96.2% of midwives transferred all expectant mothers with preterm labor to the hospital for further management, 54.7% of midwives provided pregnant mothers with preterm labor with steroids before moving them to hospital, 85.2% midwives, assessed the contributory factors of preterm labor and gave proper advice and 67.8% midwives cut the episiotomy when assisting pregnant mothers with the preterm labor to avoid neonatal injuries. About 94.4% of midwives prepared the labor room warmly if they anticipated preterm labor, 85.2% midwives alerted the nursery in time when delivering the

**Table 4** Care to Prevent Preterm Birth if Contractions Start

Midwives' Role in Intrapartum/Labor Care:	Responses			
	Agree		Disagree	
Item No.	Number	%	Number	%
1. Thoroughly admitted the woman per the protocol in the labor room.	52	94.4	3	5.6
2. Make sure that all pregnant mothers with previous history of preterm labor are managed at the hospital.	53	96.2	2	3.8
3. Give all pregnant mothers steroids if they present with advanced labor pains before referral to ensure fetal lung maturity.	30	54.7	25	45.3
4. Give the woman drugs to stop the contractions if she is less than 3cm dilated	47	85.2	8	14.8
5. Monitor fetal heart rate and uterine contraction closely	53	96.2	2	3.8
6. Keep the woman informed about the labor progress treatment regimen and the status of the fetus to gain cooperation	30	54.7	25	45.3
7. If labor progresses, ensure that episiotomy is performed to allow space for the small premature head to be delivered with ease.	37	67.8	18	32.9
8. Ensure the labor room is ready to receive a premature neonate	51	94.4	4	5.6
9. Call for a pediatrician when anticipating preterm birth.	37	67.9	18	32.1
10. The nursery staff should be alerted of the premature birth timely	47	85.2	8	14.8
11. Make sure the resuscitation trolley is always available with radiant warmer to prevent hypothermia	52	94.4	3	33.7
12. Ensure that the labor unit is provided with trained neonatal/pediatrics nurse covering all shifts.	18	33.7	37	67.3

**Table 5** Available Resources (Staff, Equipment, Drugs, and Medical Supplies) to Prevent Preterm Birth

The Support Anticipated by Midwives in the Units is:	Responses			
	Agree		Disagree	
Item No.	Number	%	Number	%
1. That maternity units have policies in place	47	86.2	8	13.8
2. They are provided midwives with all equipment needed to provide quality care (cardiotocograph, radiant warmers, etc.)	19	34	36	66
3. They have a doctor/ specialist designated for the neonatal unit for 24/7.	21	38.2	34	61.8
4. There is adequate staff coverage for 24 hours.	14	25.4	41	74.6
5. Provide special room for preterm babies.	42	76.4	13	23.6
6. All units have adequate medical supplies (drugs, gloves, etc.)	19	34	36	66

**Abbreviations:** ANC, antenatal care; BABC, basic antenatal care; HIV, human immunodeficiency virus; PTB, preterm birth; SANC, South African nursing council; SPSS, Statistical Package of Social Sciences; USA, United States of America.

preterm neonate, 94.4% midwives prepared the resuscitation area well in advance when anticipating preterm birth, and 33.7% midwives agreed that labor units were provided with trained neonatal/pediatric nurse covering all shifts.

### Resources to Reduce Preterm Birth

Table 5 shows that 86.2% agreed on ensuring that all units (antenatal, labor, postnatal, and neonatal) have a well explained midwifery-centered policy supporting preterm care. About 76.4% agreed that they are provided with

a particular room for preterm babies. Only 34% agreed that there was enough equipment supply, 38.2% agreed that all units had specialists, and 34% agreed that there were drug and medical supplies.

## Discussion

The statements that had fewer respondents agreeing on include “All women book before 12 weeks of their gestation” at 29.1% agree rate and 70.9% disagree rate. The World Health Organization (WHO) recommended that pregnant women book before 12 weeks of gestation.<sup>20</sup> Equally, the South African guidelines for maternal care echo the same sentiment.<sup>21</sup> Even so, the findings of this research are congruent to studies conducted in Nigeria and Ethiopia, respectively,<sup>22,23</sup> wherein it was found that pregnant women book later than 12 weeks for antenatal care. Interestingly, it was also found in a study conducted in the United Kingdom (UK) that from 2009 to 2014 wherein overall pregnant women booked late for antenatal care.<sup>24</sup> However, the latter authors studied the management of HIV (Human Immunodeficiency Virus) during antenatal care, wherein they further claimed that the late booking is associated with cultural and demographic factors.<sup>24</sup> The results of this study are congruent to another study done in South Africa. It was found that pregnant women from underdeveloped communities were also booking after twelve weeks of gestation, unlike those living in developed societies.<sup>25</sup> Therefore, it becomes evident that the challenge of pregnant women securing after 12 weeks of pregnancy for antenatal care is a problem phenomenon, especially in developing countries. However, the resources available to manage the results of this challenge, such as preterm birth, might be a defining factor for the developed and developing contexts. Pregnant women of African descent tend to book late for antenatal care within the UK. Furthermore, it is found in this research that 78% of midwives agreed that they kept records of antenatal pregnant women from the first to the last visit. This evidence comes as a concern, while there is a universal rule in nursing that “what is not recorded is regarded as not being done”.<sup>26</sup> This emphasizes good record-keeping across nursing and midwifery practices, as it is considered integral to the quality and effective care. Congruently, the South African guidelines for maternal care prescribe standards for medical record-keeping during antenatal care.<sup>21</sup> Even under these clear policy guidelines, the findings of this research were consistent with a study conducted in Gauteng.<sup>26</sup> Moreover, these findings were found in the study conducted in Rwanda<sup>27</sup> where poor record-keeping during antenatal care was found. On the other hand, this finding was contrary to a study conducted in Italy where it was found that a digital record-keeping format is efficient and comprehensive for antenatal care.<sup>28</sup> Therefore, poor record-keeping becomes an evident challenge in developing contexts like Africa.

In addition, this research showed that the equipment and supplies were less than 40%, meaning that there was less provision of tools to midwives though competent they could not reduce preterm births. These results are supported by Thopola and Lekhuleni,<sup>29</sup> where 94% of midwives acknowledged their competency in their daily execution of maternal and neonatal care based on their qualifications and experience in maternity services.<sup>29</sup> Various studies showed that lack of equipment and material supplies is the leading contributor to substandard maternal care in developing countries, including South Africa.<sup>18,21</sup> A study in the United States of America (USA), one of the developed countries with a quality health system, showed a decline in preterm birth in the USA.<sup>20</sup> This declining preterm birth rate was because there was improvement and promulgation of practical policy guidelines in the management of teenage pregnancy and other risk factors for preterm birth. The policies included good management of multiple pregnancies provision of troctolitic and steroids drugs to women with preterm labor. In addition, there was the prioritization of staffing and equipping of obstetric and neonatal units.<sup>20</sup>

These results indicate that <60% agreed that midwives in Limpopo province rarely use preterm labor steroids before transferring the pregnant women to hospitals to prepare for fetal lung maturity. It is recommended by maternal guidelines that it is always preferable to give betamethasone or dexamethasone as part of preterm labor management.<sup>21</sup> Importantly, the administration of steroids is recommended because they are beneficial for cell and organ growth for the fetus.<sup>30</sup> Notwithstanding the benefits mentioned, Newnham et al<sup>31</sup> found that the positives of administering steroids might be outweighed by potential risks wherein the administration’s timing is of clinical significance. Thus, clinical improvement is only seen in the neonate’s health, provided the birth occurred within 24 hours to seven days of steroids administration. Under these facts’ findings, it becomes somewhat uncertain about concluding that midwives’ relatively rare use of steroids in Limpopo can be said to be escalating PTB.<sup>31</sup> Furthermore, the statement with the least percentages of respondents is “A trained specialist midwife is covering all shifts.” The findings confirmed that few specialists were

allocated to mend the obstetric units of Limpopo Province, at 33.7% disagreed and 67.3% agreed. Notably, in their study, Uys and Klopper<sup>32</sup> indicated that maternal services rendered by specialized trained personnel reduced the risk of dying. Furthermore, their investigation revealed that maternity units of South Africa had only 20% of specialized trained nurses leading to increased preterm birth in obstetric units of South Africa.<sup>33</sup> In addition, a study in the United Kingdom and the Gambia revealed that equipping of midwives and other primary caregivers with skills played a great deal in reducing maternal and neonatal adverse outcomes.<sup>34</sup> Another study in Indonesia proved that midwives had received enough training and the skills needed to reduce neonatal mortality by timeous and efficient antenatal care. However, the lack of evidence-based policy and resources to provide efficient antenatal care services retarded the effort.<sup>34</sup> Therefore, the lack of specialists is found to be escalating PTB.<sup>35</sup>

These results show that providing medical equipment and supplies is a challenge in the Limpopo province. Hence, 34% (agree) and 66% (disagree) indicate that equipment needed to provide quality care is not always available. Congruently, these findings are supported by a study in South Sudan where lack of medical supplies, poor staffing, and lack of utilities like water and electricity was a barrier to the execution of quality maternal and child care by highly specialized or trained doctors and midwives.<sup>35</sup> Furthermore, various studies showed that lack of equipment and material supplies is the leading contributor to poor maternal and child health care in developing countries similar to South Africa.<sup>18</sup> In addition, one of the developed countries with a quality health system showed a decline in preterm birth in USA32. This declining preterm birth rate was due to the improvement and promulgation of practical policy guidelines in the management of teenage pregnancy risk factors of preterm birth. The policies included good management of multiple pregnancies provision of troctolitic and steroids drugs to women with preterm labor. In addition, there was the prioritization of staffing and equipping of obstetric and neonatal units.<sup>36</sup> Circumstantially, these challenges lead to increased maternal and neonatal mortality in the hands of knowledgeable practitioners.<sup>36</sup> Another study predicting the neonatal mortality risks from the United Kingdom and the Gambia support the findings by adding that due to lack of advanced neonatal equipment in the Gambia intensive care unit, there was more neonatal mortality amongst neonate of less than 2000g, this confirms that developing countries with lack of intensive equipment are at risk of increased neonatal death amongst their sick neonates.<sup>37</sup> Therefore, this meant that the obstetric units were not well mended considering staff equipment and supplies, leading to the unresolved occurrences of preterm birth.<sup>37</sup>

## Conclusion

It is concluded in this study that PTB in the rural Limpopo province escalates because of late bookings of pregnant women for initiation of antenatal care. Hence, timely presentation by pregnant women at antenatal health care facilities alleviates obstetric complications, therefore, minimizing the risk of preterm birth. Worryingly, even though the nursing practice prides itself on good record keeping, it is evident in this research that poor staffing and less material supply remain a challenge in rural areas like Limpopo province, potentiating a higher risk of poor-quality care, which results in PTB. Notably, developing contexts, such as South Africa are resource-stricken contexts where medical supplies are scanty, specialists' nurses and doctors are at the lowest numbers. Hence, this finding becomes integral to PTB escalation. On the other hand, preterm labor steroids are associated with escalating PTB.

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## Disclosure

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