■ **Original Article**

Maternal and Perinatal Surveillance and Response System in Simiyu Region, Tanzania: A Preliminary Result 2018

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ABSTRACT

Background: Despite a reduction in under-five mortality in Tanzania, perinatal death remains unacceptably high. We conducted analysis and interpretation of data from the maternal and perinatal surveillance system to provide a local understanding of factors determining perinatal mortality in the Simiyu region. **Methods:** This was a retrospective cross-section analytical study, in whichweanalyzed data from the maternal andperinatal surveillance and response system. Multiple logistic regressions performed to examine the associations between stillbirth, demographic characteristics, and obstetric explanatory variables. **Results:** A total of 381 out of 400 forms with adverse pregnancy outcomes identified and analyzed. Attending ANC at the hospital was significantly associated with adverse pregnancy outcomes [AOR=2.395%CI: 1.16-4.56]. Women delivered at the hospitals were twice as much as [AOR=2.2, 95%CI: 1.12-4.27] to have adverse pregnancy outcomes than those bornat the dispensaries. The increasing frequency of deliveries found to be1.2 times more of having stillbirth compared to those with a low rate of births (AOR=1.1595%CI: 1.05-1.26]. **Conclusion:** Factors associated withperinatal death in the Simiyu region found to be associated with a poor quality of pregnant care from antenatal to delivery. To further reduce neonatal mortality, the quality of care of pregnancy must be improved from antenatal and during intrapartum by providing skilled birth attendance.

Keywords: Stillbirth; Pregnant outcomes; Facility delivery; Perinatal death; Neonate death.

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Introduction

The loss of a baby due to stillbirth remains an unfortunate reality for many families and takes a severe toll on families' health and well-being.[1] TheWorld Health Organization (WHO) defines stillbirth as a baby born with no signs of life at or after 28 weeks' gestation. The stillbirth rate in sub-Saharan Africa is approximately ten times higher than thatof developed countries (29 vs 3 per 1000 births).[2]

Although many low-income countries have managed to implement measures for this effect, overall rates of stillbirths are persistently high in low-income countries compared to that of high-incomecountries.[3]

Tanzania is one of the contributors to the global burden of perinatal mortality, with an average of 51,000 neonatal and 43,000 stillbirths occurring every year.[4] Although the reduction of under-five mortality rate in Tanzania has been impressive, the reduction in neonatal mortality has been much slower with an estimated 40% of under-five deaths in the country occurs among neonates.[4] Prior studies have confirmed that several factors are associated with perinatal deaths includes maternal conditions such as multiple pregnant,[5] multigrandiparous,[6,7] hypertensive diseases,[8] anaemia[8-10] and malaria infection.[9] Socio-economic factors such as the size of household,[11] previous history of stillbirth,[9,12-14] health-seeking behaviour,[15] and level of education[15,16] are associated with stillbirth. Health service delivery systems, such as poor quality of antenatal and delivery care,[17] less antenatal visits[18] have also contributed to stillbirth. Complications like eclampsia[19] and blood loss during delivery or after delivery,[20-22] also found one of the factors contributing to stillbirth.

The maternal and perinatal surveillance system is the strategy that involves the identification of all maternal and perinatal deaths to understand the cause of woman or newborn death through consideration of medical as well as social-economic factors and putting intervention to prevent future similar deaths.[23] The Tanzanian government recognized maternal and perinatal death surveillance and response system as one of the strategies which can improve the quality of maternal and newborn care in health facilities in our country.[24]

The government of Tanzania has given more emphasis on the enrolment of maternal and perinatal surveillance and response system (MPDSR) at all health facilities. It aims to improve maternal care and to reduce future adverse pregnancy outcome. Little work was done at the health facility, district and region levels in the implementation of this strategy.

Simiyu is one of the Regions with high perinatal deaths in the Lake zone of Tanzania. Despite various interventions developed to reduce the incidence of perinatal deaths in the Region, such as Uzazi Uzima 1&2 and UNFPA, the perinatal death is still unacceptably high (Figure 1). These programs aimed at improving pregnancy and childbirth in the Region. They provide capacity building for health facilities to offer Basic Emergency obstetric care (BEmONC) and Comprehensive Emergency Care (CEmONC) services from 2015 to date. Furthermore, since the initiation of MPDSR, the data collected in the Region were not used for action at all levels, including the regional level. Therefore, we decided to analyze the maternal and perinatal death data from the surveillance system to understand factors contributing to perinatal death and improve maternal and child health care in the Region.

Material and Methods

- ### Study design and population
   The study was a retrospective cross-section analysis in which data was collected in the year 2018from a maternal/perinatal surveillance and response system of six districts, namely Maswa, Bariadi, and Busega, Meatu, and Itilima analyzed.

- ### Study area
   Simiyu Region covers an area of 23,807.7 Square Kilometers, and administratively it consists of 5 Districts Councils and one town council, 12 divisions, 111 wards, 475 villages, and 17 Mitaa (in Bariadi Town Council). The

Region located North of Tanzania and South East of Lake Victoria. It lies between Latitude 201" and 40 South of Equator and between 3303" and 3501"East of Greenwich. The Region has four hospitals, 17 health centres, and 193 dispensaries, making a total of 214 Health Facilities in the Region.

- *Sample size*

The sample size for forms determined by using the Cochran formula(1977)[25] with a 50.0% prevalence of perinatal death, 0.05 desired precision, an 80% power, and a 95% confidence interval, thus the sample size of 384 obtained. After checking for the quality of forms, we only sampled 381.

- *Sampling and data collection*

The sampling frame included all MPDSR forms from all five-district council in the Region. These forms collect data from all women with stillbirth or early neonate death during the perinatal periods. Trained midwives at each health facility were used to fill the forms whenever encountered perinatal mortality at the facility. All figures were assigned the event leading to death. At the time of data collection, we found a total of 400available filled forms. Forms with missing information on the district of residency, place of delivery, ANC, and death excluded. After checking for that, we dropped 19 forms, remaining with 381 and sampled for the study.

The MPDSR form, developed by the Tanzania Ministry of Health, Community Development, Gender, Elderly, and Children. It is used for the daily collection of maternal and perinatal death by the health facilities. It comprises socio-economical backgrounds such as marital status, maternal/paternal educa-tion, occupation, and residency. Obstetric history such as ANC attendance and number/ place visits, service gave/tested, and condition of the mother. Circumstances during delivery, such as obstructed labour, asphyxia, pre-maturity, fetal distress, and infection. The

outcome of pregnant such as alive, stillbirth fresh, or macerated.

Maternal and child health coordinator from each district oriented on data abstraction and validation of the form. Data were extracted from the forms and exported for analysis to the excel software.

- *Operation definition of variable*

Stillbirth Fresh: Is a baby born with no signs of life at or after 28 weeks' gestation. A "fresh" fetus lacks such skin changes and is presumed to have died much more recently (intra-partum)[2]

- *Stillbirth macerated:* Is a baby born with no signs of life at or after 28 weeks' gesta-tion. A "macerated" fetus shows skin and soft-tissue changes (skin dis-colouration or darkening, redness, peeling, and break-down) suggesting death was well before delivery (prepartum)[2]
- *Alive:* Is a baby born with signs of life after 28 weeks of gestation.
- *Indicator variable:* The indicator variable in this study used in modelling was stillbirth (Fresh + Macerated) status, that is, a variable is equal to 0 or 1, where a value of 1 indicates that the newborn has no signs of life. In contrast, a value of 0 indicates that the newborn has signs of life.
- *Categorical variable:* In this research, all categorical variables were given values representing the membership in the form of values 1,2,3,4.
- *Continuous variables* in this study were measured in a well-defined, cardinal scale, such as age in years.
- *The dependent variable* in this research was the condition of the newborn at delivery, such as Alive or stillbirth.
- *Independent variables:* were social-economical backgrounds such as marital status, maternal/paternal education, occupation, and residency; obstetric histories such as ANC attendance and

number/place visits, service has given/ tested and condition of the mother; circumstances during delivery such as obstructed labour, asphyxia, prematurity, fetal distress, and infection.

- *Data analysis*

Multiple logistic regression was performed to examine the associations between the outcome's variable stillbirth and demographic and obstetric explanatory variables. Explanatory variables were selected based on earlier research clinical reasoning and uni-variable logistic regression. The crude association of each explanatory variable was determined to examine its relationship with the outcome variable in uni-variable models. Upon completion of the uni-variable logistic analyses, variables were selected for the multi-variable analyses. Any variable whose uni-variate test had a P-value < 0.10 was considered a candidate for them ulti-variable model along with variables of known clinical importance. Once the variables were identified, they were entered into a multi-variable model. The associations were presented as odds ratios (OR) with 95% Confidence Intervals (CI). A Hosmer and Lemeshow test was used to examine if the final model adequately fitted the data for the multiple logistic regression model. An inter-action test between the place of ANC/delivery, mode of delivery, number of delivery, and residency and death circumstance performed to examine heterogeneity effect. Dependent variables were coded as yes = 1 and no = 0. Categorical explanatory variables were coded depending on their level, and the reference category was indicated. The final parsimonious model was presented (that is, the model with significant findings for predictors). The model building procedure and the guidelines for reporting regression analysis have previously been described in detail elsewhere[26]

- *Ethical approval*

Ethical approval obtained from the Tanzania National Medical Research Institute.

Results

- *Baseline characteristics*

A total of 381 out of 400 women with adverse pregnancy outcomes were enrolled, 94percent (357) were married, and 73percent (278) have primary education, and 95 percent (361) were peasants. Half of the perinatal death reported from the hospital almost three times compared to dispensaries (Table 1).

All (381) attended the antenatal clinic with an adequate number of visits. HIV infection in this population was 1.05 percent (4 out of 381) (Table 2).

- *Bivariable analysis*

Almost 75percent (268) of stillbirth occurs among the married couple, which shows significant differences between marital status, p values = 0.030.Perinatal death varies significantly among district of residence in which Maswa and Busega are leading, p values = 0.001(table 3).Place of antenatal care shows significant differences between those attended at dispensaries, health centres, and hospitals, p values = 0.005.There was no significant variation between HIV positive and HIV negative mothers in adverse pregnant outcome P value = 0.997 (Table4).

- *Multivariable analysis*

The place of the antenatal visit was associated with stillbirth in this sample study. Attending ANC at the hospital was significantly associated with the adverse pregnancy outcome with [AOR = 2.395%CI: 1.16-4.56]. Place of delivery was associated with stillbirth. Women delivering at the hospitals found to be twice as much to have stillbirth [AOR = 2.2, 95%CI: 1.12-4.27] compared to those born at health centres and dispensaries. The number of

deliveries was associated with stillbirth. The increasing number of delivery has 1.2 times more odds of stillbirth compared to those with a low frequency of deliveries [AOR=1.1595% CI: 1.05-1.26] (Table 5).

Place of residence was associated with stillbirth; pregnant women living in Maswa rural district were four times Odds [AOR=3.7395%CI: 1.56-8.91] of having still-birth compared to those residing to other neighbourhoods.

Table1: Socio-Demographic Characteristics of Women Losses their Baby during Perinatal period in Simiyu Region, 2018

Variable	Category	Number	Proportion
Marital Status			
	Single	19	4.99%
	married	357	93.70%
	Missing	5	1.31%
	Total	381	100%
Maternal Education			
	None	67	17.59%
	Primary	278	72.97%
	Secondary and above	25	6.56%
	Missing	11	2.89%
	Total	381	100.01%
Maternal Occupation			
	Employed	7	1.84%
	Entrepreneur	12	3.15%
	Peasant	361	94.75%
	Missing	1	0.26%
	Total	381	100%
Paternal Education			
	None	58	15.22%
	Primary	279	73.23%
	Secondary and above	35	9.19%
	Missing	9	2.36%
	Total	381	100%
Paternal Occupation			
	None	15	3.94%
	Peasant	13	3.41%
	Employed	348	91.34%
	Missing	5	1.31%
	Total	381	100%

Paternal Occupation

Bariadi Dc	98	25.72%
Busega	71	18.64%
Itilima	65	17.06%
Maswa	67	17.59%
Meatu	80	21.00%
Total	381	100.01%

Table2: Obstetric history Women Losses their BabyDuring Perinatal Period in Simiyu Region, 2018

Variable	Category	Number	Proportion
Number of delivery	Median(iqr)	3 iqr3	
			-
Birth weight	Mean(SD)gm	2798.36 Sd2.5	-
Place of ANC			
	Dispensary	234	61.42%
	Health centre	90	23.62%
	Hospital	57	14.96%
	Total	381	100%
Multiple Pregnancy			
	Yes	297	17.59%
	No	67	77.95%
	Missing	17	4.46%
	Total	381	100%
Malaria			
	Yes	13	3.41%
	No	350	91.86%
	Missing	18	4.72%
	Total	381	100%
Anaemia			
	Yes	15	3.94%
	No	349	91.60%
	Missing	17	4.46%
	Total	381	100%
HIV status			
	Positive	4	1.05%
	Negative	360	94.49%
	Missing	17	4.46%
	Total	381	100%
Place of delivery			
	Home	52	13.65%
	Dispensary	106	27.82%
	Health centre	10	2.62%
	hospital	213	55.91%
	Total	381	100%

Variable	Category	Number	Proportion
Place of death			
	Community	16	4.20%
	Dispensary	45	11.81%
	Health centre	103	27.03%
	Hospital	217	56.96%
	Total	381	100%
Condition at delivery			
	Alive	93	24.41%
	Stillbirth FSB	196	51.44%
	Stillbirth MSB	92	24.15%
	Total	381	100%
Circumstances at death			
	APH	21	5.51%
	Obstructed labour	85	22.31%
	asphyxia	39	10.24%
	Fetal distress	121	31.76%
	Infection	23	6.04%
	missing	24	6.30%
	Others	23	6.04%
	Prematurity	45	11.81%
	Total	381	100.01%

Table 3: Bivariate Analysis of Socio-demographic Characteristics with respect to Status at Birth of Women Losses their Baby During Perinata Period in Simiyu Region, 2018

Variable	Category	Status at Birth			Total	*P-Value*
		Alive	**Stillbirth FSB**	**Stillbirth MSB**		
Marital status						
	Single	3(15.79%)	6(31.58%)	10(52.63%)	19(100%)	0.030
	Married	89(24.93%)	186(52.10%)	82(22.97%)	257(100%)	
	Missing	1(20.00%)	4(80.00%)	0(0.00%)	5(100%)	
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	
Maternal education						
	None	10(14.93%)	28(41.79%)	29(43.28%)	67(100%)	
	Primary	71(25.54%)	152(54.68%)	55(19.78%)	278(100%)	
	Secondary & above	8(32.00%)	10(40.00%)	7(28.00%)	25(100%)	0.003
	Missing	4(36.36%)	6(54.55%)	1(9.09%)	11(100%)	
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	
Maternal occupation						
	Employed	2(28.57%)	4(57.14%)	1(14.29%)	7(100%)	0.056
	Enterprinew	7(58.33%)	2(16.67%)	3(25.00%)	12(100%)	
	Peasant	83(22.99%)	190(52.63%)	88(24.38%)	361(100%)	
	Missing	1(100.00%)	0(0.00%)	0(0.00%)	1(100%)	
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	

Variable	Category	Status at Birth			Total	*P-Value*
		Alive	**Stillbirth FSB**	**Stillbirth MSB**		
Paternal Education						
	None	9(15.52%)	27(46.55%)	22(37.93%)	58(100%)	
	Primary	68(24.37%)	151(54.12%)	60(21.51%)	279(100%)	
	Secondary & above	13(37.14%)	13(37.14%)	9(25.71%)	35(100%)	0.054
	Missing	3(33.33%)	5(55.56%)	1(11.11%)	9(100%)	
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	
Paternal	None					
occupation	Employed	10(66.67%)	3(20.00%)	2(13.33%)	15(100%)	
	Petty business	2(15.38%)	5(38.46%)	6(46.15%)	13(100%)	0.050
	Peasant	80(22.99%)	185(53.16%)	83(23.85%)	348(100%)	
	Missing	1(20.00%)	3(60.00%)	1(20.00%)	5(100%)	
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	
District of Residence						
	Bariadi Dc	29(29.59%)	44(44.90%)	25(25.51%)	98(100%)	
	Busega	16(22.54%)	30(42.25%)	25(35.21%)	71(100%)	
	Itilima	6(9.23%)	24(36.92%)	35(53.85%)	65(100%)	0.001
	Maswa	17(25.37%)	50(74.63%)	0(0.00%)	67(100%)	
	Meatu	25(31.25%)	48(60.00%)	7(8.75%)	80(100%)	
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	
Place of delivery						
	Home	14(26.92)	20(38.46%)	18(34.62%)	52(100%)	
	Dispensary	29(27.36%)	42(39.62 %)	35(33.02%)	106(100%)	
	Health centre	2(20.00%)	6(60.00%)	2(20.00%)	10(100%)	
	hospital	48(22.54%)	128(60.09%)	37(17.37%)	213(100%)	
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	0.005
Place of death						
	Community	4(25.00%)	8(50.00%)	4(25.00%)	16(100%)	
	Dispensary	9(20.00%)	20(44.44%)	16(35.56%)	45(100%)	
	Health centre	27(26.21%)	41(39.81%)	35(33.98%)	103(100%)	
	Hospital	53(24.42%)	127(58.53%)	37(17.05%)	217(100%)	0.010
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	

Table 4: Bivariate Analysis of Obstetric History with respect to Status at Birth of Women Losses their Baby During Perinatal Period in Simiyu Region, 2018

Variable	Category	Status at Birth			Total	*P-Value*
		Early neonatal death	**Stillbirth FSB**	**Stillbirth MSB**		
Number of delivery						
	1-2	41(28.28%)	70(48.28%)	34(23.45%)	145(100%)	0.005
	3-4	29(31.52%)	43(46.74%)	20(21.74%)	92(100%)	
	5 -6	13(15.85%)	50(60.98%)	19(23.17%)	82(100%)	
	7-8	7(25.93%)	12(44.44%)	8(29.63%)	27(100%)	
	9+	0(0.00%)	17(85.00%)	3(15.00%)	20(100%)	
	Missing	3(20.00%)	4(26.67%)	8(53.33%)	15(100%)	0.007
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	
Place of ANC						
	Dispensary	53(22.65%)	112(47.86%)	69(29.49%)	234(100%)	
	Health centre	30(33.33%)	47(52.22%)	13(14.44%)	90(100%)	
	Hospital	10(17.54%)	37(64.91%)	10(17.54%)	57(100%)	
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	
Malaria						
	Yes	85(24.29%)	186(53.14%)	79(22.57%)	350(100%)	0.005
	No	2(15.38%)	3(23.08%)	8(61.54%)	13(100%)	
	Missing	6(33.33%)	7(38.89%)	5(27.78%)	18(100%)	
	Total	93(24.41%)	196(51.44%)	92(24.15%)	381(100%)	
Anaemia						
	No	83(23.78%)	183(52.44%)	83(23.78%)	249(100%)	0.689
	Yes	4(26.67%)	6(40.00%)	5(33.33%)	15(100%)	
	Missing	6(35.29%)	7(41.18%)	4(23.53%)	17(100%)	
	Total	93(24.41%)	196(51.44%)	92 (24.15%)	281(100%)	
HIV status						
	Negative	86(23.89%)	187(51.94%)	87(24.17%)	360(100%)	0.997
	Positive	1(25.00%)	2(50.00%)	1(25.00%)	4(100%)	
	Missing	6(35.29%)	7(41.18%)	4(23.53%)	17(100%)	
	Total	93(24.41%)	196(51.44%)	92 (24.15%)	381(100%)	
Circumstances at death						
	APH	5(23.81%)	9(42.86%)	7(33.33%)	21(100%)	
	Obstructed labour	12(14.12%)	59(69.41%)	14(16.47%)	85(100%)	
	asphyxia	6(15.38%)	23(58.97%)	10(25.64%)	39(100%)	
	Fetal distress	31(25.62%)	57(47.11%)	33(27.27%)	121(100%)	
	Infection	10(43.48%)	6(26.09%)	7(30.43%)	23(100%)	
	missing	5(20.83%)	13(54.17%)	6(25.00%)	24(100%)	0.005
	Others	12(52.17%)	7(30.43%)	4(17.39%)	23(100%)	
	Prematurity	12(26.67%)	22(48.89%)	11(24.44%)	45(100%)	
	Total	93(24.41%)	196(51.44%)	92 (24.15%)	381(100%)	

Table 5: Univariable & Multivariable Analysis of Factors Associated Stillbirth in Simiyu Region, 2018

Variable	Category	cOR	95%CI	aOR	95%CI	P-Value
Number of delivery						
		1.12	1.03- 1.22	1.15	1.05-1.26	0.003
Place of ANC						
Dispensary		1.19	0.73-1.94	1.04	0.61-1.76	0.892
Health centre		1	1	1	1	1
Hospital		2.02	1.10-3.68	2.31	1.16-4.56	0.016
Place of delivery						
Home		1	1	1	1	1
Dispensary		1.05	0.53-2.07	1.01	0.50-2.04	0.967
Health centre		2.4	0.60-9.57	1.61	0.38-6.86	0.518
Hospital		2.4	1.29-4.49	2.19	1.12-4.27	0.021
District						
Bariadi		1	1	1	1	1
Busega		0.90	0.48-1.66	0.80	0.38-1.67	0.553
Itilima		0.72	0.38-1.36	0.60	0.27-1.35	0.219
Maswa		3.61	1.83-7.12	3.73	1.56-8.91	0.003
Meatu		1.84	1.01-3.35	1.153477	0.49-2.69	0.742

Discussion

Like other surveillance systems, MPDSR is a continuous collection, analysis, and interpretation for pregnancy outcome of improving maternal care and childbirth, reducing future similar deaths.[23] This study was an attempt to analyze data obtained by the surveillance system in the Simiyu region aimed at finding a solution to the local problem within the Region.

In this study, it was found that the predictors of perinatal death were placed in which pregnant women attended ANC, place of delivery, parity, and the residence in which the woman is residing.

The findings of perinatal death to be higher when a woman attended ANC at the hospital level could be due to several factors prevailing at the hospital, such as; the high number of clients attending RCH relative to the number of staff present at the clinic. Therefore there is a higher possibility of not identified pregnant risks, which end up to the adverse pregnancy outcomes. Similarly, there is a shortage of both dispensaries and health centres in the Simiyu region by 66%.

Thus lead to pregnant mothers to seek health services to the hospitals, in which most of them are experiencing a severe shortage of human resources, and hence, they cannot cope with the increase of the number of clients. On the other hand, high amounts of clients are referred to the hospitals from lower health facilities after being identified as having pregnancy complications and arriving late in the hospital, thus ending with stillbirth. These results were consistent with other findings from the study done by Fulani in Ghana, which shows that the place of ANC attendance was associated with pregnancy outcomes. Thus high-quality ANC decreases the odds of stillbirth.[27]

Most of the hospitals in the Simiyu region have qualified staff who are well trained and equipped with emergency obstetric equipment to provide comprehensive emergency obstetric care. It is a place where all pregnant mothers identified with risk factors from lower-level facilities referred to obtain specialized services. However, this study has shown that clients delivered at the hospitals have a significantly higher risk of having stillbirth

compared to the clients delivering at the health centres and dispensaries. These results are similar to the findings from other studies, which shows that a high proportion of mothers who access and receive care from a qualified healthcare provider have a higher percentage of stillbirths than mothers who delivered at the lower health facilities.[28] It also found that most stillbirths are recent, showing that they occur during the intrapartum period.[29] It can be due to a lack of proper care and delay in risk diagnosis at the hospitals.[17] Additionally, most of the patients referred to the higher health facilities with severe complications that end up with stillbirth.[29]

Another finding from the study shows that a high number of deliveries has significantly associated with stillbirth in this study population. These findings are similar to other research done in Ethiopia, which shows a significant association between stillbirth and parity.[7] However study done by Nigusin Ethiopia have shown that there is no significant association between parity and adverse pregnancy outcome,[30] and both null parity and grand multiparty were significantly associated with stillbirth.[19] Primiparous mothers found to have a higher risk of losing their newborn babies for perinatal death than mothers who gave birth to five or more children.[31]

Living in a rural area was associated with adverse pregnancy outcomes in this sample population. However, these findings were similar to other studies, which showed an association between residing in rural areas and adverse pregnancy outcomes.[32]

Limitation of the study

This surveillance system collects cross-section data; like other cross-section studies, there was no comparison group; it cannot measure the risk or temporal relationship.

These data are obtained from the health facilities; therefore, they may not have more information than the community-based data.

Conclusion and recommendations

This study has shown that pregnant women in the Simiyu region are experiencing high perinatal deaths despite attending antenatal care and deliver at the hospitals. It was due to poor quality of care from antenatal clinics and during delivery. These deaths are more in rural districts compare to the urban areas. Therefore, we recommend that quality improvement programs for maternal and child care be enhanced in the Region, including capacity building for health care workers attending mothers at ANC and during delivery. Maternal and child care services at the lower level health facilities should be enhanced. The MPDSR surveillance system should thoroughly be evaluated due to its high percentage of missing data.

Policy Implications

To further reduce neonatal mortality, the quality of care of pregnancy must be improved from ante-natal, and during the intrapartum stage by providing skilled birth attendance. Particular attention should be given to the rural district for improving maternal and health care services.

Conflict of interest

The authors have declared that they have no conflicts of interest

Consent for publication

All authors consented for publication

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