

A Review of Sudanese Maternal Deaths

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Abstract: Background: The fifth Millennium Development Goal aims for a decrease in maternal mortality and universal access to high-quality reproductive health care. Every year, around a third of a million women die as a result of pregnancy-related complications. Three-quarters of these deaths might have been avoided. One of the most important markers of mother and child health care is the Maternal Mortality Ratio. One of the most significant aims of the national family welfare program is to reduce maternal fatalities are thought to be preventable. **Objective:** The study's focus is to document, investigate, and report the events and circumstances behind maternal fatalities, as well as to study maternal deaths in River Nile State in order to identify the maternal mortality rate and causes of death. **Methodology:** This is a hospital and community-based research that took place from January to December 2018 at River Nile State. Information on every maternal death was obtained using a questionnaire which was filled out and rechecked to completely cover State, and then analyzed using SPSS version 20. **Results:** The overall number of live births was 25988, with 29 incidents of maternal death. 112/100000 live births was the death rate. 27 of the patients (93%) died in a hospital, whereas two instances (7%) died at home. Obstetric hemorrhage was the leading cause of maternal death in seven cases (24.1%), followed by hypertensive disorders in seven cases (24.1%), sepsis in four cases (17.2%), indirect obstetric causes in three cases (10.3%), embolism (PE & AFE) in three cases (10.3%), unclassified causes in four cases (13.7%), and abortion in one case (3.4 %). The bulk of the cases were delayed at home (14 cases, 48.3%), with 10 cases (34.4%) having no delay and five (17.2%) being delayed in reaching hospitals. Unfortunately, 19 instances (65.5%) died as a result of preventable causes. **Conclusion:** In 2018, the maternal death rate in River Nile State was 112/100,000 live births, which was higher than in the previous report. Maternal fatalities were mostly caused by hemorrhage, hypertensive diseases, and sepsis. The bulk of deaths were postponed until they reached their final destination.

Keywords: Maternal, Death, Atbara, River Nile, Sudan.

Abbreviations:

MMR; Maternal Mortality Ratio,

AFE; Amniotic fluid embolism,

LB; Live Births,

SMIs; Safe Motherhood Initiatives,

MDG; Millennium Development Goal,

HIV; Human Immune Virus,

SHHS; Sudan Household Health Survey,

MDR; Maternal Death Ratio,

WHO; World Health Organization

ANC; Antenatal Care, **CS;** Cesarean Section, **FSB;** Fetal stillbirth,

MSB; Macerated stillbirth,

PND; Perinatal Neonatal Death,

EmONC; Emergency Obstetrics and Neo-natal Care,

PHC; Primary Health Care, **PPH;** Post-Partum Hemorrhage, **APH;** Anti-Partum Hemorrhage.

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INTRODUCTION

Maternal mortality is one of the most important health and societal challenges in resource-constrained countries in the twenty-first century. Maternal mortality is way too high. Daily, approximately 830 women around the world die as a

consequence of complications during pregnancy or childbirth. According to estimates, around 303,000 women died during and after pregnancy and delivery in 2015. Almost all of these deaths occurred in communities with few resources, and the majority of them could have been averted [1]. In 2013, an average

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of 293,000 women died throughout the world while pregnant or giving birth, with the maternal mortality ratio (MMR) per 100,000 live births varying from 957 in South Sudan to 2 in Iceland [2]. In 2013, an average of 293,000 women died throughout the world while pregnant or giving birth, with the maternal mortality ratio (MMR) per 100,000 live births varying from 957 in South Sudan to 2 in Iceland [3]. In particular, the disparity in maternal mortality rates between industrialized and poor nations is thought to be the highest of all health-related inequities [4]. Global maternal fatalities have decreased by 47% in recent decades (from 543,000 in 1990 to 287,000 in 2010) [5]. Meanwhile, developing nations account for 99 percent of current maternal mortality, particularly in Sub-Saharan Africa and South Asia [6]. More than 90% of these deaths may be avoided with existing solutions, particularly when it comes to expert care during labor, delivery, and the first few days after birth. In 2008, however, only six nations accounted for half of all maternal fatalities worldwide (Ethiopia, Nigeria, Congo, DRC, India, Pakistan, and Afghanistan) [7]. Access to interventions improved with the launch of Safe Motherhood Initiatives (SMIs) and the Millennium Development Goals (MDGs), and maternal mortality declined, even in certain low- and middle-income countries [7]. Nevertheless, the rate of decline in many Sub-Saharan African nations has not been as expected for the MDG objective [8]. Because of the HIV pandemic, past advances were reversed in several of these nations [9, 10]. In Africa, diminishing the MMR presents a significant challenge. The poor socio-economic status of women in these environments, combined with restricted access to and adoption of expert care throughout pregnancy, labor, and postpartum, is the rationale for this [11, 12]. As a result, many mothers give birth and die outside of a health institution, making it challenging to both prevent and recognize preventable deaths in circumstances where information is scarce. Efficient and responsible health systems, on the other hand, have the potential to significantly reduce unfavorable pregnancy and delivery outcomes [13]. Because of the complexities of specifying the cause of death (medical diagnosis) and identifying the pregnancy status during the death, particularly during early pregnancy, recognizing and classifying an adult woman's death as maternal or non-maternal is a significant challenge at the individual level [14]. This issue is particularly important in low-income areas where documents are lacking and maternal mortality is high [15].

In 2017, the MMR in low-income nations was 462 per 100,000 live births, whereas in high-income countries it was 11 per 100,000 live births. As a fragile state, 15 nations were designated as "very high alert" or "high alert." The MMRs ranged from 31 (Syria) to 1150 for these 15 nations (South Sudan) [16].

Sudan is surrounded by South Sudan, Central Africa, Chad, Libya, Egypt, Eritrea, and Ethiopia, with

a total area of 1.8 million square miles. It has a total population of 34 million people, with 32% living in urban areas and the rest in rural areas. Maternal health is regarded as one of the most crucial development goals. Over the course of three years in Sudan, 2933 maternal fatalities were reported out of 1509354 live births (LB), with an MMR of 194/100000 LB, with variations between states. Maternal mortality has been investigated in several states; for example, Umbeli *et al.*, 2014 [17] discovered a considerable geographical difference in maternal death rates.

Maternal mortality is difficult to quantify accurately, especially when death registrations that record reasons for death are incomplete. According to the Sudan Household Health Survey 2nd round (SHHS2-2010), the MMR was 216 per 100,000 live births in 2010. In these circumstances, maternal mortality is approximated using a combination of census, survey, and model data [18].

In Sudan, routine data is scarce; only the findings of national surveys, which are conducted every four to five years, provide an indication of any change in maternal death rates. As a result, close monitoring to guide prompt policy and planning action is significantly jeopardized.

METHODOLOGY

This is a prospective descriptive study of maternal mortality in River Nile State that took place from January to December 2018. Its objective was to identify the maternal death rate and its causes. It is 124,000 km² in size and is located north of Khartoum and south of Northern State. Barbar, Atbara, Aldamar, Shendi, Al-Mak Nimr University Hospital (Shandi), and Elsalam University Hospital are among the six teaching hospitals. In this area, there are 31 rural hospitals and 201 basic care clinics. One or two medical officers are assigned to each rural hospital, with some having an obstetrician. Ambulance services are available at all main hospitals and several rural hospitals as well. All large hospitals, as well as a number of rural hospitals, provide ambulance services. On a monthly basis, a maternal death rate surveillance system based on hospital reporting and community communication is implemented throughout all states.

All women in River Nile State who died during pregnancy, delivery, or the postpartum period (42 days) between January to December 2018 and 31.12.2018 were included. The gestational age in weeks, follow-up during current pregnancy, prenatal care provider, pregnancy outcome, and delivery status are the obstetric characteristics of maternal fatalities and associated indices discovered in this study. All causes and risk factors, as well as the availability of blood bank services and prenatal checkups, were identified.

The MDR committee in charge conducted a review of maternal deaths in the hospital and community, which was then double-checked by the investigator. All municipalities in the research region were represented on the state maternal death review (MDR) committee. The investigator is the state's focus person for MDR notification, as well as the focal person for MDR monitoring in each hospital and location nominated. Notification of focused individuals in the state by focal persons in the hospital or locality (investigator).

Data was gathered on every maternal death that happened using a questionnaire that was filled out and rechecked regularly to ensure that the whole state was covered. In terms of the Ministry of Health, the Primary Health Care PHC unit, doctors in rural hospitals, and community midwives, a link was established. Medical directors received official documents allowing them to report, audit, and use information for research purposes.

For each category of causes and risk factors, the incidence of maternal death was provided as a maternal mortality ratio and a percentage of causes of death. Tables and figures depicted the maternal

mortality ratio by age, parity, educational level, particular causes, and dangers. This study's data was analyzed using the Statistical Package for Social Science (SPSS).

ETHICAL CONSIDERATION

The Sudan Medical Specialization Board's ethical committee for Obstetrics and Gynecology, as well as the River Nile State Ministry of Health and state hospitals, provided ethical permission.

RESULTS

In this structured analysis of maternal deaths in facility and community based set up in River Nile State the total number of notified maternal deaths was 29 out of 25988 notified live birth in study period and with maternal mortality ratio of 112/100.000 live birth - 27 cases (93%) died at health facility while 2 cases (7%) died at home. Deaths occurred within 24 hours or less at hospital were 19 cases (65.5%) and after 24 hours 7cases (24.1 %). All maternal deaths were confirmed clinically and post-mortem not requested. Avoidable maternal deaths were 19 cases (65.5 %), non-avoidable 11 cases (37.9%).The results of analyzed data were shown in tables and figures as follows:

Table 1: Distribution of MD according to Causes

Cause of Maternal Death	Frequency	Percent
Obstetric Haemorrhage	7	24.1
Hypertensive disorder	7	24.1
Unclassified, unknown	4	13.7
Sepsis	4	13.7
Indirect obstetric causes	3	10.3
Abortion	1	3.4
PE	3	10.3
Total	29	100

Table 2: Distribution of Socio –demographic characteristic

AGE	FREQUENCY	percent
<_20 years	6	20.7
21-30	12	41.4
31-40	8	27.6
>40	3	10.3
Total	29	100
PARITY	FREQUENCY	percent
Primigravida	7	24.1
Multipara	12	41.3
Grand multipara	10	34.4
Total	29	100
Route of admission	Frequency	percent
Elective Admission	2	6.9
Emergency Admission from Home	17	58.6
Referred Emergency	7	24.1
Not admitted	2	6.9
Brought died	1	3.4
Total	29	100%
Condition at admission	Frequency	percent
Critically ill	18	62.1

Stable	8	27.5
Not Admitted	3	10.3
Total	29	100
Areas of Delay	Frequency	percent
No delay	10	34.4
Delay at Home	14	48.3
Delay in reaching hospital	5	17.2

Table 3: Distribution of Obstetric characteristic of MD

Gestational age	Frequency	Percent
<28 weeks	2	6.9
28-36 weeks	6	20.7
37 or more	15	51.7
Puerperium	6	20.7
Total	29	100
follow up during this pregnancy	Frequency	Percent
No ANC	11	37.9
Irregular ANC	6	17.2
Regular ANC	12	44.8
Total	29	100
ANC provider	Frequency	Percent
Consultant	15	51.7
Medical Officer	3	10.3
No ANC	11	37.9
Total	29	100
Status of delivery	Frequency	Percent
Not delivered	6	20.7
Vaginal delivery at home	4	13.8
Vaginal delivery in hospital	6	20.7
Elective C/S	3	10.3
Emergency C/S	10	34.4
Total	29	100
Pregnancy Outcome	Frequency	Percent
Not Delivered	5	17.2
Miscarriage	1	3.4
Alive and well	16	55.1
FSB	5	17.2
MSB	1	3.4
PND (Including preterm)	1	3.4
Total	29	100

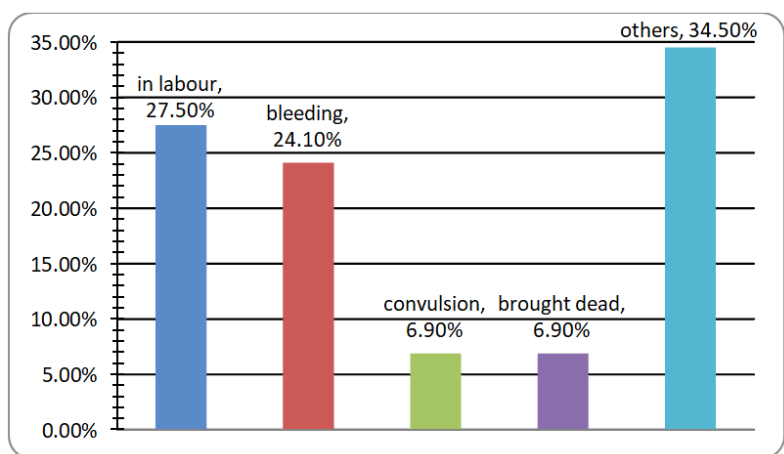


Figure 1: Distribution of maternal death according to presentation at the time of admission

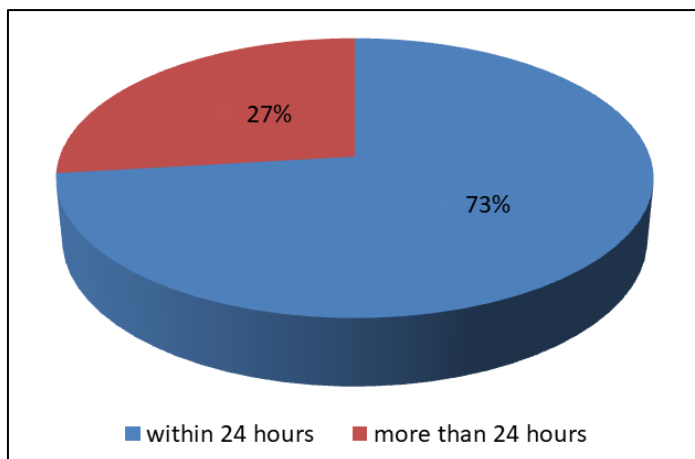


Figure 2: Distribution according to time stayed in hospital before death in hours

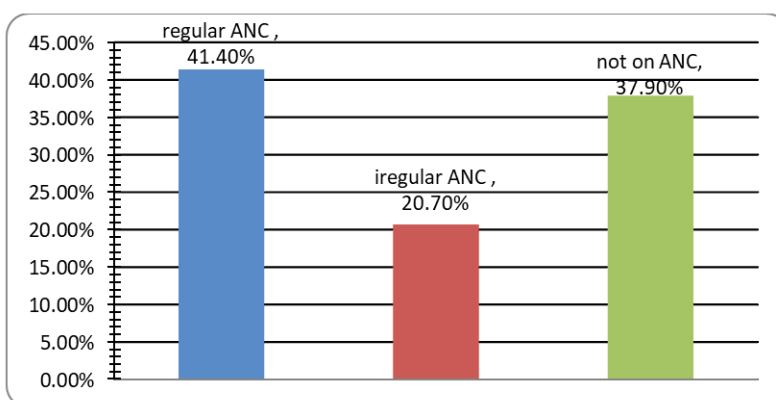


Figure 3: Distribution according to ANC during current pregnancy

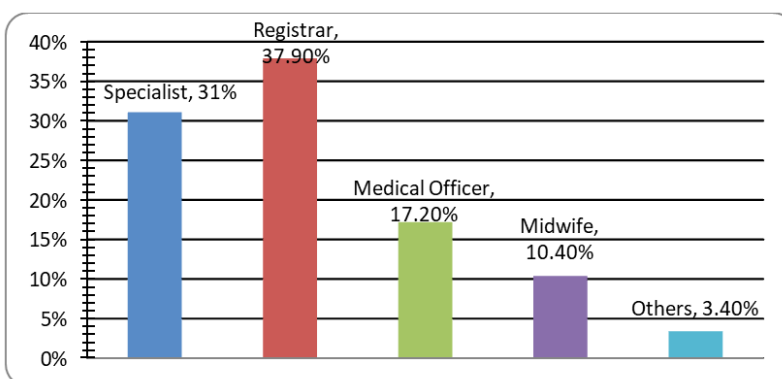


Figure 4: Distribution of MD according to Health Care Provider Attending Maternal Death

DISCUSSION

Every year, some women die unnecessarily as a result of pregnancy-related issues that might have been avoided. Even where resources are limited, the majority of these deaths could be avoided at little or no additional cost. However, in order to take action and develop and implement changes to maternity services to save mothers' lives, shifts in cultural attitudes and political will, as well as improvements in health and social care provision, are required. Risk factor identification, rapid diagnosis, and prompt intervention are the cornerstones of successful mortality reduction. Maternal death investigations are time-consuming and

resource-intensive. However, only via maternal mortality surveillance and review processes can causes and contributing factors to maternal fatalities be discovered and understood, emphasizing the necessity of this endeavor.

The findings of this study were derived by dividing all maternal deaths in River Nile State in 2018 (nominator) by all live births at the same time (donator). In River Nile State, the MMR was 112/100,000 live births. The MMR in this study is clearly higher than that reported by the Ministry of Health in River Nile State for the years 2012, 2013, 2014, and 2017 (96 in

2012, 104 in 2013, 108 in 2014, and 38 in 2017) [19-22]. It's uncertain if the rise in MMR in River Nile State in 2018 was attributable to better maternal death reporting or to other causes. The MMR in River Nile State in 2018 is substantially better than that recorded in Sudan from 2012 to 2013, 2014, and 2017 (189 in 2012, 172 in 2013, 133 in 2014, and 115 in 2017) [19-22].

The MMR in this report is noticeably lower than that documented in 2017 in (South Sudan (1150), Somalia (829), Central African Republic (829), Democratic Republic of the Congo (473), Chad (1140), Afghanistan (638), Haiti (480), Guinea (576), Zimbabwe (458), Nigeria (917), and Ethiopia (401) [16]. More research is needed to determine why the MMR in River Nile State was lower in 2018 than in 2017. Maternal mortality is linked to neonatal morbidity and death. According to a study of the research, there is a link between maternal and prenatal mortality. In this study, six women died while their fetuses were still in the womb; six instances resulted in stillbirth; one case resulted in PND (3.4%), and 16 patients were born alive and healthy.

All maternal deaths were confirmed clinically in this study, and post-mortems were not obtained for any maternal deaths, and the causes of maternal death were unexplained in four cases (13.8 %). Due to community opposition, post-mortem examinations are not routinely performed in River Nile State hospitals. Six instances in this research fall into the age category of less than 20 years (20.7 %). According to the research, females under the age of 15 are five times more likely than boys under the age of 15 to die during pregnancy or childbirth than those over the age of 20 [23]. One of the major causes of death among young women is pregnancy. Adolescent women's reproductive health is influenced by biological, social, cultural, and economic variables. To minimize morbidity and mortality among young women, programs must include education, family planning services, and prenatal and postnatal care.

Obstetric hemorrhage was one of the most significant causes of maternal mortality in River Nile State in 2018, accounting for 7 incidences (24.1%) of all maternal fatalities. Despite the fact that maternal mortality from obstetric hemorrhage has decreased in recent years (47.4 % in 2017-, 53.3% in 2014, and 40.7 % in 2012) [17-20]. However, it remains the leading cause of maternal mortality. In all instances, PPH was present, APH was present in four cases (57.1%), and intra-partum hemorrhage was seen in three cases (42.9%). Two occurrences of Placenta previa and uterine rupture (28.6%). Two cases of abruptio placenta (28.6 %). Uterine atonia in two instances (28.6%). Reduced maternal fatalities due to hemorrhage necessitates the use of advanced equipment (blood bank, uterotonic agents) as well as sophisticated abilities. Unfortunately, only six hospitals in River Nile

State have blood banks, and even these six banks are not adequately prepared.

Hypertensive disorders of pregnancy were the second largest cause of MD in this research, accounting for 7 cases (24.1%). It is clear that it is higher than the figures provided by the Ministry of Health for River Nile State in 2012, 2013, 2014, and 2017 (7.1% in 2009, 11.1% in 2012, 5.9% in 2013, and 15.8% in 2017). To reduce maternal mortality related to hypertensive disorders during pregnancy and to eliminate unnecessary hypertensive maternal mortality, women's educational standing must increase, as well as the deployment of clear guidelines, procedures, and critical medications and equipment for high-risk patients.

According to the research, sepsis was the third leading cause of MD, accounting for 5 instances (17.2 %). Although maternal mortality due to sepsis has decreased in River Nile State throughout the years (21.4% in 2009–23.5% in 2013) [17-20]. However, it remains one of the leading causes of maternal mortality, with rates higher than those reported by the Ministry of Health in River Nile State in the past few years (7.4% in 2012, 13.3% in 2014, and 15.8% in 2017). Septicemia was the cause of death in all of the cases, and the patients were extremely unwell at the time of admission and died in hospital. Infection prevention, asepsis, and prophylactic antibiotics with increased access to health care, through operating EmONC units, with educated personnel, adequate sanitation, and early indicators of infection detected and treated in a timely way.

The current study reported that 11 patients (37.9%) had no prenatal care and 6 cases (20.7%) had irregular antenatal care, adding to the problem. Distance, a lack of knowledge, poor services, cultural customs, and poverty are all obstacles to women accessing or requesting care during pregnancy. According to the study, ten instances (34.4%) were grand multipara, implying that all women, especially teenagers, require contraception. Although the other deaths were not due to obstetric causes, pregnancy may have hastened the progression of their sickness, resulting in death.

The following are some of the factors that contribute to maternal death: Procrastination in seeking medical attention (e.g., unrecognized life-threatening illness, inadequate facilities for the severity of disease), arrival time at a medical facility that is appropriate, and when a woman arrives at a medical facility, she is not given proper treatment [24, 25]. This paradigm allows for the evaluation of patient, provider, and social/cultural practices that lead to maternal mortality [24, 25]. To avoid such tragedies, multidisciplinary teamwork is critical in the management of these patients.

CONCLUSION

In conclusion, the maternal mortality ratio in River Nile State in 2018 was 112/100,000 live births, which was higher than earlier estimates in the same state. It is unclear if the rise in MMR in River Nile State in 2018 is related to improved maternal death notification or other contributing variables. Unfortunately, the majority of maternal fatalities could have been avoided. Pregnancy was directly associated with the most prevalent causes of maternal mortality in River Nile State (hemorrhage, hypertensive disease, sepsis, and pulmonary embolism).

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CONFLICTS OF INTEREST

The authors declare no competing interests.

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