European Journal of Medical and Health Sciences
www.ejmed.org

Determinants of Maternal Mortality at The Tambacounda Regional Hospital Centre

Alioune Badara Tall, Papa Gallo Sow, Yaye Aida Ndiaye,
Abdoul Aziz Ndiaye, Boubacar Guèye, Diago Anta Dia, and Ousseynou Ka

ABSTRACT

Objectives: **The objective of this study was to analyse the determinants of maternal mortality in the gynaecology-obstetrics department of the Tambacounda Regional Hospital Centre (RHC).**

Methodology: **This was a retrospective, descriptive and analytical study of all obstetric admissions. A questionnaire was used to collect the data, which were then entered and analysed using Epi info 7.2.2.6 software.**

Results: **Forty-one cases of maternal death were found, representing 6.3% of cases. Direct obstetrical causes represented most causes of death, i.e., 70.7% of cases and were dominated by haemorrhage (26.8%). Indirect obstetric causes were dominated by severe anaemia, accounting for 24.4% of cases and representing the second most common cause of maternal death in our study. Multivariate analysis using the logistic regression model identified two factors statistically associated with maternal deaths. These were the number of antenatal visits made, ANC (OR = 0.70 [0.52 - 0.96]; p = 0.0253) and admission to intensive care (OR = 12.03 [5.31- 27.25]; p = 0.0000).**

Conclusion: **Maternal mortality in the Tambacounda region remains high although efforts have been made to reduce it. Different risk factors associated with maternal mortality were identified in our study. It is therefore necessary that actions be taken by acting on these different factors in order to reduce maternal mortality.**

Keywords: Determining factors, Maternal mortality, Tambacounda RH.

Submitted : April 29, 2023

Published : July 13, 2023

ISSN: 2593-8339

DOI: 10.24018/ejmed.2023.5.4.1788

A. B. Tall*
Alioune Diop University of Bambey, Department of Community Health, Bambey, Senegal.
(e-mail: aliounebadara.tall@uadb.edu.sn)
P. G. Sow
Alioune Diop University of Bambey, Department of Community Health, Bambey, Senegal.
Y. A. Ndiaye
Alioune Diop University of Bambey, Department of Community Health, Bambey, Senegal.
A. A. Ndiaye
Alioune Diop University of Bambey, Department of Community Health, Bambey, Senegal.
B. Guèye
Alioune Diop University of Bambey, Department of Community Health, Bambey, Senegal.
D. A. Dia
Regional Hospital Centre of Saint-Louis, Surgery Unit, Saint-Louis, Senegal.
O. Ka
Alioune Diop University of Bambey, Department of Community Health, Bambey, Senegal.

****Corresponding Author***

I. Introduction

Pregnancy, childbirth, and the postpartum period are the times when the woman and newborn are most vulnerable. According to the latest report, of maternal and child mortality published in 2019, about 2.8 million pregnant women and newborns die each year worldwide: one or one every eleven seconds [1], [2]. Despite the significant decline in recent years, maternal mortality remains a real public health problem. Progress has been made in recent years. Indeed, between 2000 and 2017, the maternal mortality rate (MMR) in the world fell from 342 to 211 deaths per 100,000 live births, a decrease of 38%, according to the latest estimates [2]. A figure that is decreasing but considered insufficient to achieve goal 3.1 of the Sustainable Development Goals which is to reduce the global maternal mortality ratio to below 70 per 100,000 live births by the year 2030 [3]. The objectives that were set have not been achieved because of a very slow rate of decline in this mortality, particularly in developing countries [2].

In addition, the high level of maternal deaths in some parts of the world reflects inequalities in access to health services and highlights the gap between rich and poor [1]. Indeed, 94% of all maternal deaths still occur in low- and middle-income countries [2]. Again, sub-Saharan Africa has the highest maternal mortality ratio among the seven regions of the world, with 534 deaths per 100,000 live births in 2017 or 68% of maternal deaths worldwide [3].

The maternal mortality rate is now an important measure of human and social development. It is a particularly revealing indicator of the status of women in particular, women's access to health care, and how the health system responds to their needs [4]. In order to put an end to preventable maternal deaths, Senegal had been committed

since the launch of the Safe Motherhood Initiative in 1987. This commitment to reducing maternal mortality is reaffirmed through the implementation of several strategies, including family planning, emergency obstetric and neonatal care and skilled childbirth [5], [6]. These efforts have resulted in significant progress, including the gradual decline in the maternal mortality rate. Indeed, the maternal mortality ratio increased from 392 deaths per 100,000 live births in 2010 (DHS 2010-2011) to 236 deaths per 100,000 live births in 2017 (DHS 2017), or four deaths of women on average per day [7]-[9].

Nevertheless, these favourable trends hide disparities because deaths by region show a much more variable distribution. To date, the highest number of maternal deaths is recorded in the southern and south-eastern regions of the country. This is the case of the Tambacounda region which, according to the summary report of the review of data by the Directorate of Maternal and Child Health in 2019, recorded 102 cases of maternal deaths [10]. It is by far the region with the highest maternal deaths at the national level. However, most of these deaths could be prevented if preventive measures were taken and the necessary care were available [11]. For this, it is not enough to know the figures of maternal mortality; We need to understand what the underlying factors behind these deaths were [11]. Even if the medical causes are relatively well known, efforts still need to be made to improve knowledge of the factors associated with maternal deaths [12].

It is in this context that it is relevant to determine and analyze the contributing factors to maternal deaths at the level of the regional hospital of Tambacounda.

II. Method

A. Scope of the Study

The Tambacounda region is the largest region of Senegal. It currently covers an area of 42,364 km² or 20 hbts/km² [13]. Its population is estimated at 841,512 inhabitants according to the ANSD report on the population of Senegal in 2018 [14]. It is the most peripheral region of the country.

The organization of the region's health space makes it possible to distinguish seven health districts that are the operational areas of the health system: Bakel, Dianké-Makhan, Goudiry, Kidira, Koumpentoum, Maka Koulibantang and Tambacounda [13]. The region has a regional hospital (EPS level 2) in the commune of Tambacounda and has 11 health centers, 124 health posts including 5 not yet functional, 137 health huts, 465 community sites, a regional supply pharmacy, a regional health training center, a regional hygiene brigade with its divisions at the level of the four departments [15].

The RHC of Tambacounda was built in 1984 and inaugurated in 1987. It is a level II hospital erected as a public health institution since 2002 and represents the only reference center in the Tambacounda region where curative, preventive and rehabilitative activities are carried out. The RHC of Tambacounda has a capacity of 198 beds [16].

The gynecology and obstetrics department of the RHC of Tambacounda receives the majority of gynecological and obstetrical emergencies from health centers and surrounding health posts, private structures and also health structures in the regions of Kedougou (Health centre Kedougou and Saraya) and Kolda (Health centre Vélingara and Health post Gounass).

The service is under the responsibility of the gynaecologist head of department assisted by the midwife and the supervisor on duty. It has 2 gynecologists, 13 midwives, an assistant nurse and 8 matrons.

It has a capacity of 77 beds and has a delivery room with 06 delivery tables, an inpatient unit with a capacity of 26 beds, 2 non-functional cabins with 2 beds, a recovery room with a capacity of 6 post-operative beds, 2 consultation rooms for midwives, a consultation room for gynaecologist (gynecological consultations), an operating theatre where obstetric surgeries take place, a room for dressing a bed, 4 inpatient wards for diaper suites with a capacity of 4 beds each.

B. Type of Study

This was a retrospective study with descriptive and analytical coverage of the determinants associated with maternal mortality, following a serious obstetric complication, from 1 January to 31 July 2020 at the gynecology-obstetrics department of the RHC of Tambacounda.

C. Study Population

Our study looked at all the records of women admitted to the gynaecological-obstetric ward for a serious obstetric complication and whose prognosis was life-threatening during the gravido-puerperal period up to 42 days postpartum, whether they died or not.

1) Exclusion criteria

Included: Any record of a woman admitted to the ward during the study period for an indication of serious obstetric complications, regardless of the outcome of the complication.

2) Non-inclusion criteria

The following were not included in the study: any record of an admitted woman who does not have a serious obstetric complication, any record of a woman whose death occurred outside the gravido-puerperal period or the postpartum period (up to 42 days), any incomplete and unusable women's records.

D. Sampling

All files of women who met the inclusion criteria were sampled exhaustively. Initially, we recorded 1690 admissions of pregnant women, during childbirth or postpartum (up to 42 days). After processing the records, we collected 648 cases of serious, life-threatening obstetric complications during the study period. Thus, our sampling extended to n=648 records of women included in the study.

E. Data Collection

1) Collection tools

A questionnaire was used to review medical records and registers to collect data on socio-demographic characteristics, obstetric factors, circumstances of management and etiology of deaths.

2) Collection method

Using a collection sheet, a comprehensive census of all

cases of deaths of women was carried out from the registers of the gynaecology and obstetrics service. Among all recorded female deaths, all women admitted and died during pregnancy, childbirth and postpartum, as defined by WHO, were included.

In a second step, these maternal deaths were the subject of an in-depth analysis thanks to the exploitation of medical records, audit reports, but also DHIS2 data to try to obtain the most complete picture possible. This analysis allowed us to determine the circumstances surrounding each death and to exploit any attributable factors as well as the socio-demographic characteristics of the women included in the study. In parallel, a comprehensive census of all cases of serious life-threatening obstetric complications was carried out from the records of women admitted during pregnancy, childbirth and postpartum and who survived these serious complications.

F. Capture and Analysis Plan

The data was first entered on Microsoft Office Excel 2016 and then processed and analyzed using Epi info 7.2. 2.6. The data analysis took place in two phases: descriptive and analytical.

1) Descriptive part

The descriptive analysis of the quantitative variables concerned the calculation of the mean and the standard deviations. The qualitative variables were described by their frequency distribution and 95% confidence intervals.

2) Analytical part

This part consisted of studying the existence of a possible relationship of dependence between the outcome of the complication (deceased or alive) and each of the explanatory factors.

- Bivariate analysis

We used the following analysis tools: Cross-analysis between the dependent variable (occurrence of death) and qualitative variables, the p-value value is obtained according to the appropriate test (Pearson Chi 2 test or Fisher exact test) with a 95% confidence interval. For quantitative variables, the Anova test was the appropriate test for comparing means. A difference was considered significant if $P<0.05$.

- Multivariate analysis

Multivariate analysis was performed using multiple logistic regression to account for confounding factors. All variabless with a P value < 0.25 in bivariate analysis were included in the multiple logistic regression analysis. The association thus estimated is said to be "adjusted" to all other factors.

G. Ethical Considerations

A request for authorization was submitted to the director of the RHC of Tambacounda who gave us her approval to carry out this research work in the said structure. All data has been recorded anonymously to ensure patient confidentiality and will only be used strictly in this study.

III. Results

A. Descriptive Part

1) Socio-demographic characteristics

The average age was 24.4 years ± 6.6 with extremes of 16 and 40 years. Women in the 15-24 age group were more dominant, at 5 0.8%.

TABLE I: Distribution of Obstetric Complications of Women by Sociodemographic Characteristics (N=648)

Variables	N	%
Age		
15-24 years	329	50.8
25-49 years	319	49.2
Marital status		
Bride	632	97.5
Unmarried	16	2,5
Educational attainment		
No	561	86.6
Yes	87	13.4
Area of Provenance		
Rural	446	68.8
Urban	202	31.2
Income-generating activities		
No	629	97.1
Yes	19	2.9

2) Sanitary characteristics

TABLE II: Distribution of Obstetric Complications of Women by Health Characteristics (N=648)

Variables	N	%
Outcome of the complication		
Deceased	41	6.3
Living	607	93.7
Caesarean section history		
No	602	92.9
Yes	46	7.1
ANC		
Minus 4 ANC	501	77.3
4 ANC and more	147	22.7
Gestrity		
1-3	364	56.2
4 and over	284	43.8
Admission mode		
Direct	77	11.9
Referred	571	88.1
Admission to intensive care		
No	613	94.6
Yes	35	5.4
Delay in the CEP		
No	527	81.3
Yes	121	18.7

During the study period, we recorded 1690 admissions of pregnant women, during delivery or postpartum (up to 42 days). Of these, 1315 deliveries were recorded, including 557 caesarean sections, 558 normal deliveries (eutocic), 33 instrumentalized deliveries (cupping) and 29 cases of home births. During the same period, we recorded 648 cases of serious obstetric complications (direct and indirect), including 41 cases of maternal death. It shows that 6.3% of patients had died.

- Obstetric complication diagnosed at admission

It shows that severe anaemia was the most dominant obstetric complication diagnosed at admission, in the deceased, i.e. 24.4% of cases.

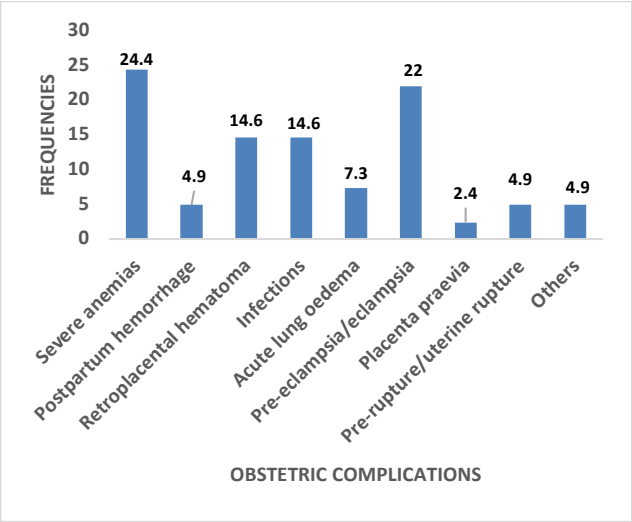

Fig. 1. Distribution of women who died by obstetric complication diagnosed at admission (n=41).

- Cause of death

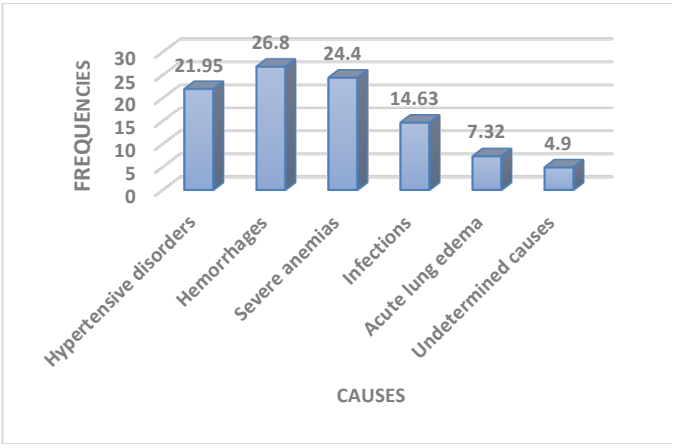

Fig. 2. Distribution of Women Who Died by Cause of Death (n=41).

Direct obstetric causes were dominant in 70.7% of deaths and are marked by haemorrhages (26.8%). Indirect causes accounted for 24.4% of deaths dominated by severe anaemia and it is the second leading cause of maternal death in our sample.

B. Analytical part

1) Bivariate analysis

The analysis of this table shows that deaths were 6.33% among married women against 6.25% among unmarried women but this difference was not statistically significant (P>0.05). The same is true for the profession (p>0.05). Women who died from rural areas were 6.50% compared to 5.94% for those from urban areas. There was therefore no statistically significant association between the occurrence of death and the area of origin because p>0.05. Women who died were more in the 15-24 age group with 6.38% of deaths compared to 6.27% among women in the 25-49 age group but this difference was not statistically significant. Among the socio-demographic characteristics, only the notion of education was statistically significant (p<0.001). Maternal deaths were higher among women with no education (6.42%) than among women with education. This difference was statistically significant as p<0.05.

Analysis of this table shows that only 7.3% of the women who died had a history of caesarean section and no statistically significant association was found between the existence of a history of caesarean section and the occurrence of death (p>0.05). The proportion of women who died was more dominant among those whose number of antenatal visits was less than 4 ANCs and whose number of pregnancies (gestation) was in the [1]-[3] pregnancy bracket. On the other hand, these differences were not significantly t, as p>0.05.

The analysis of this table shows that among the factors related to management, only the notion of admission to intensive care was significantly associated with the occurrence of death (p=<0.001).

TABLE III: FACTORS ASSOCIATED WITH MATERNAL DEATHS

Factors	Maternal deaths % (n)	P
Socio-demographic factors		
Marital status		
Unmarried	6.25 (1)	0.653
Bride	6.33 (40)	
Instruction		
No	6.42 (36)	<0.001
Yes	5.75 (05)	
Income-generating activities		
No	221 (34.97)	0.283
Yes	196 (33.56)	
Area of provenance		
Rural	6.50 (29)	0.922
Urban	5.94 (12)	
Age		
15-24 years	6.38 (21)	1.0000
25-49 years	6.27 (20)	
Obstetric factors		
Caesarean section history		
Yes	92.7 (38)	0.570
No	7.3 (3)	
Number ANC during pregnancy		
Minus 4 ANC	7.19 (36)	0.143
4 ANC and more	3.40 (5)	
Gestrity		
1-3	7.42 (27)	0.259
4 and over	4.93 (14)	
Management factors		
Admission mode		
Direct	9.09 (7)	0.202
Referred	5.95 (34)	
Admission to intensive care		
No	4.67 (29)	0.000
Yes	34.29 (12)	
Delay in the CEP		
No	6.07 (32)	0.726
Yes	7.44 (9)	

2) Multivariate analysis (multiple logistic segregation)

Logistic regression was performed by integrating into the model all risk factors with a significant link to the occurrence of death at the 2.5% threshold.

TABLE IV: MULTIPLE LOGISTIC REGRESSION (N=648)

Factors studied	GOLD (adjusted)	I.C 95% (Adjusted)	Z-Statistic	P-Value
ANC	0.7064	0.5209 - 0.9579	-2.2371	0.0253
Resuscitation admission (Non/Yes)	12,0340	5.3125 - 27.2596	5.9631	<0.001
Instruction (No/Yes)	0.7637	0.2698 - 2.1618	-0.5079	0.6116
Mode admitted (Injunction/Direct)	0.4908	0.1982 - 1.2151	-1.5388	0.1239
CONSTANT	*	* *	-2.7655	0.0057

The results of the logistic regression model show that the association between the occurrence of death and the variables mode admission and the notion of education were not statistically significant because p > 0.05 and the 95% confidence interval of the OR value includes 1.

The factors statistically associated with the occurrence of death (p<0.05) based on the adjusted multiple logistic model were:

- The number of Prenatal Consultations performed (OR = 0.70 [0.52 - 0.96]); p = 0.0253)

Resuscitation (OR = 12.03 [5.31-27.25]; p = <0.001).

IV. Discussion

A. Epidemiological Profiles of Deceased Women

Our study population was relatively young. The average age was 24.4 years ± 6.6 with extremes of 16 and 40 years. It is the 15-24 age group that is preponderant and represents 5 1.22% of deaths. This testifies to the precocity of marriage and pregnancy, a source of obstetric complications, most often linked to lifestyle, habits, and traditions [17]. Almost all the women who died were married (97.6 per cent), housewives (100 per cent), more than half resided in rural areas (70.7 per cent) and had no education (46.3 per cent). Among the deceased, the average pregnancy was 3.2 pregnancies ± 2.5 with extremes of 1 and 12 pregnancies. The primigestes were more dominant (36.6%). The average ANC was 2.3 ANCs ± 1.1 with extremes of 0 and 4 ANCs. Among the women who died, only 12.2% of cases had performed at least 4 ANCs according to the norms. This could be explained by ignorance of the importance of antenatal consultations. However, even if it does not make it possible to predict all the risks, prenatal surveillance, well done, makes it possible to identify women with a major history for their orientation in time in a reference structure [18].

B. Characteristics of Maternal Deaths

Six point three per cent (6.3%) of women died (41/648) and almost all deaths (90.2%) occurred in hospitals. Several studies around the world, particularly in sub-Saharan Africa, show that direct obstetric causes are the leading causes of maternal death. According to the [19], 75% of maternal deaths are due to direct obstetric causes. Our study corroborates these results, in fact in our sample, direct obstetric causes accounted for most causes of death or 70.7% of cases. Hemorrhage was the main direct obstetric cause (26.8%) in our study, [8] in his study, on the other hand, had found eclampsia (24.9%) as the main direct causes. Haemorrhages were dominated by retroplacental hematoma (54.5%), postpartum haemorrhage (18.2%), uterine rupture (18.2%) and placenta previa (9.1%). This result is in line with the conclusions of studies by other authors in Africa [20]; [21] In his thesis found a hemorrhage rate (26.5%) similar to ours with HRP as the leading cause of bleeding. In a study conducted in Benin [22], the authors explained that haemorrhage, particularly postpartum haemorrhage, is an emergency that requires immediate and appropriate intervention for quality care. This requires immediately accessible material resources, available blood products and competent and dynamic staff, as any delay or improvisation could contribute to a worsening of the maternal prognosis. Indeed, in our study, a delay in management was reported in 21.9% of cases in the deceased and of these almost half (44.5%) was due to unavailability of blood for transfusion needs. Hypertensive disorders (pre-eclampsia/eclampsia) were the second leading cause of death by direct obstetric disease (21.95%). 29.3% of the women who died were admitted to intensive care. Hypertensive disorders were the first reason for admission to intensive care (77.8%). Which makes [21] in the thesis that the association of arterial hypertension and pregnancy is still dangerous and still kills despite the progress made in the field of resuscitation. However, advances in resuscitation and the integration of magnesium sulfate in the management of high blood pressure have reduced adverse outcomes of hypertensive disorders associated with pregnancy [22]. Among these in-direction obstetric causes, severe anaemia occupied a pretender place in our sample (24.4%). Our results also show that severe anaemia was the second leading cause of maternal death just after hemorrhage. Ninety point two per cent (90.2%) of deaths occurred in hospital settings and 73.2% of deaths occurred in the postpartum period. This rate is closeto that found by Koudjou T. (72.6%) in his study on maternal mortality at the University Hospital Centre Du Point G in Mali [23]. Many studies have almost universally revealed the predominant role of the postpartum period in the occurrence of maternal deaths [21]-[23]. This shows that the postpartum period requires rigorous monitoring because of the various complications that can occur during this period and involves maternal prognosis. Our results show that 82.9% of the women who died were admitted after medical evacuation from peripheral health facilities. This rate was 64% in a study in Benin [22]. In addition, the authors of the study stipulate that it is the women referred who die most often and this is explained by a delay to the evacuation of pregnant women. It then becomes fundamental or even urgent that peripheral structures can be strengthened with qualified personnel but also with adequate basic emergency obstetric care, to considerably reduce this high evacuation rate [18].

C. Factors associated with Maternal Mortality

With the logistic regression performed on our sample, the final model obtained contains two statistically significant factors at the tolerance level of $\alpha = 0.05$. These are the number of prenatal consultations performed (p = 0.0253) and admission to intensive care (p = <0.001). Other factors associated with maternal death were found in a study at Saint Jean de Dieu Hospital in Tanguieta, Benin [22]. These include the place of residence, the delay of 5 days or more between the onset of symptoms and admission to hospital, non-medical transport and the third delay [22]. This shows that the factors associated with maternal death may differ from one geographical area to another.

- Association ANC and occurrence of maternal death: p value = 0.0253

Our study showed that as the number of antenatal visits during pregnancy increased, the risk of death decreased (OR = 0.70 [0.52 - 0.96]). This shows that when the woman makes at least 4 antenatal consultations during pregnancy, she significantly reduces the risk of death. However, monitoring the pregnancy does not prevent the occurrence of complications that can sometimes be unpredictable.

However, prenatal consultations allow early detection of these and prevent their progression to critical clinical situations [24]. These results corroborate those of [7] and [25]. Several authors agree that prenatal care reduces to a large extent the rate of gestational deaths during gravido puerperal disease [23]. In her thesis, [21] showed that the absence of ANC increased the risk of maternal death by 5.74 times. Well-followed pregnancy is therefore a protective factor in maternal mortality.

- Association admission to intensive care and the occurrence of maternal death: p = <0.001

Our study also shows that there is a correlation between admission to intensive care and the occurrence of death. Indeed, the non-admission to intensive care of women with serious obstetric complications significantly increased the risk of death (OR = 12.03 [5.31-27.25]). Reference [26] In her thesis, explained that resuscitation allows the diagnosis and treatment of obstetric emergencies endangering the patient's life, in the very short term and also allows the restoration of vital functions temporarily compromised. So adequate care in intensive care saved lives.

D. Study Limitations and Bias

Given the retrospective nature of our study, it had some limitations. The collection media presented constraints, characterized by missing data or a lack of chronological sequence of the contents of the medical files. This did not facilitate the collection of all the variables provided for in the collection sheets. However, unusable medical records were discarded to ensure data validity. The study period (minus one year) could also be a limit in our study, which is why we did not consider it necessary to calculate the taux of hospital maternal mortality and the obstetric case fatality rate. The restriction of our study to the gynecology-obstetrics department of the RHC of Tambacounda does not allow us to report our results to the general population (Tambacounda region). Notwithstanding these limitations, the results of our study allowed us to have a fairly valid appreciation of the magnitude of the problem of maternal mortality and to improve the level of knowledge on the factors associated with maternal deaths for the development of appropriate interventions at the local level.

V. Conclusion

At the end of this study, we can conclude that maternal mortality in the Tambacounda region remains a major public health problem, despite the initiatives put in place to address this problem. Our study shows that, apart from obstetric causes, several social, economic, demographic and health factors could be attributable to maternal deaths. In our sample, the factors statistically associated with the occurrence of death were the number of antenatal visits performed (p = 0.0253), admission to intensive care (p = <0.001).

These results indicate that addressing maternal mortality requires a complex, multisectoral and inclusive approach. It should not be a matter for decision-makers or health workers, but also for the community. Because each maternal death has its share of factors which can be attributed at all levels. Efforts should be made on good health education for women of reproductive age (WRA) for a better understanding of the risk factors associated with maternal mortality and adherence to ANC and postnatal consultations PoNC according to standards. Efforts should also be made to improve access to emergency obstetric care during pregnancy and childbirth. The conceptual model used in this study did not take into account the entire universe of determinants because it was essentially based on hospital data. It could therefore be reinforced by new studies that could well complement this analysis in order to achieve a drastic reduction in maternal mortality in the Tambacounda region.

Conflict of Interest

Authors declare that they do not have any conflict of interest.

References

[1] OMS. Malgré les progrès accomplis, une femme enceinte ou un nouveau-né meurt toutes les 11 secondes dans le monde. [Internet] 2019 [cited 2020 July 20] Available from : https://www.who.int/fr/news-room/detail/19-09-2019-more-women-and-children-survive-today-than-ever-before-un-report French.

[2] WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Trends in maternal mortality 2000 to 2017; Geneva : World Health Organization; 2019.

[3] Banque Mondiale. Malgré des progrès importants, 15 000 enfants et 800 femmes meurent encore chaque jour de causes en grande partie évitables ou curables. [Internet] 2019 [cited 2020 June 20] Available from : https://blogs.worldbank.org/fr/opendata/malgre-des-progres-importants-15-000-enfants-et-800-femmes-meurent-encore-chaque-jour-de#:~:text=dans%20le%20monde-,Le%20taux%20de%20mortalit%C3%A9%20maternelle%20dans%20le%20monde%20a%20recul%C3%A9,d'un%20accouchement%20en%202017. French.

[4] Ayad M. Mortalité adulte et mortalité maternelle. Enquete Démographique et de Santé. 2004: 227-235.

[5] Ministère de la Santé et de l'Action Sociale. Mortalité maternelle évitable et droit de l'homme, Contribution du Sénégal, 2018. French.

[6] Yambare A, Ibembe G. Analyse des déterminants de la Mortalité maternelle pré-partum en République du Congo. Centre de Recherche et d'Etude Economique, Statistique et Informatique, Brazzaville, Congo 2013-2015. French.

[7] ANSD. Enquête Démographique et de Santé à Indicateurs Multiples au Sénégal (EDS-MICS) 2010-2011. Calverton, Maryland, USA : ANSD et ICF International. French.

[8] ANSD. Enquête Continue du Sénégal, Rapport de synthèse. [Sénégal] et ICF. 2018. French.

[9] CESE. Session d'audition du 24 Septembre 2020. [Internet] 2020 [cited 2021 January 02] Available from :

[10] http://ceasamef.sn/wp-content/uploads/2020/09/Sante%CC%81-de-la-me%CC%80re-et-de-l%E2%80%99enfant-CESE-CEA-SAMEF-2020.-DV.pdf French.

[11] MSAS/DSME, Rapport de l'atelier de la revue nationale des performances en santé de la mère, de l'enfant et des adolescent(e)s/jeunes pour l'année 2019. Juillet 2020. French.

[12] OMS. Au-delà des nombres : examiner les morts maternelles et les complications pour réduire les risques liés à la grossesse. Edition 2004. French.

[13] Barry B. Mortalité maternelle: Cause et facteurs favorisants déterminés par l'autopsie verbale dans le département de Bakel. Mémoire de master de recherche: Institut de Formation et de Recherche en Population, Développement et Santé de la Reproduction (I.P.D.S.R)/Université Cheikh Anta Diop, 2008. French.

[14] ANSD. Agence Nationale de la Statistique et de la Démographie. Situation économique et sociale de la région de Tambacounda, édition 2016. Septembre 2019. French.

[15] MEFP, ANSD. Direction des statistiques démographiques et sociales. Division du recensement et des statistiques démographiques. Bureau état civil et projections démographiques. Rapport population du SENEGAL en 2018. Février 201. French.

[16] Région Médicale de Tambacounda. Revue annuelle conjointe, 2018. Mai 2019. French.
[17] Centre Hospitalier Régional de Tambacounda. Rapport annuel d'activité. 2019. French.
[18] Diallo FB, Diallo AB, Diallo Y, Goma O, Camara Y, cisse M, et al. Mortalité maternelle et facteurs de risque liés au mode de vie, Médecine d'Afrique Noire : 1998, 45(12): 723-727. French.
[19] Thiam M, Mortalité Maternelle au Centre Hospitalier Régional de Thiès : étiologies et facteurs déterminants, à propos de 239 décès. *Journal de la SAGO*. 2017: 18(1).
[20] OMS. Mortalité maternelle, principaux fait; 19 Septembre 2019. French.
[21] Mbeva JB, Karemere H, Prudence MN, Nyavanda L, Mundama JP. Facteurs explicatifs des deces maternels en milieu hospitalier: une etude au niveau de six zones de sante dans l'est de la Republique Democatique du Congo [Maternal deaths factors in hospital area: a survey at six health districts in the east of the Republic Democatique of Congo]. *International Journal of Innovation and Applied Studies*. 2018; 23(4): 559-68. French.
[22] Dia S. Evaluation de la mortalité maternelle dans le service de gynéco-obstétrique du CHU du Point G. Thesis of Medicine, Université de Bamako. 2012. French.
[23] Atade SR, Hounkponou Ahouingnan FMN, Obossou AAA, Gabkika BM, Doha SMI, Sidi RI, et al. Facteurs Associes Aux Décès Maternels A L'hôpital De Zone Saint Jean De Dieu De Tanguieta De 2015 A 2019. *European Scientific Journal.* 2021; 17(29) : 93. French.
[24] Koudjou TLB. Etude de la mortalité maternelle dans les services de gynécologie-obstétrique et d'anesthésie-Réanimation au CHU du Point ''G'': A propos de 73 cas. Thesis of Medicine, Université de Bamako. 2008. French.
[25] Owono EP, Metogo MAJ, Tchokam L, Danwang C, Kago TL, Afane EA, et al. Complications Obstétricales Admises en Réanimation: Épidémiologie, Diagnostic et Pronostic. *Health Sci. Dis.* 2017; 18(1). French.
[26] Abdourahmane M. Etude de la mortalité maternelle dans le service de gynécologie obstétrique du CHU Gabriel Touré: De l'épidémiologie à l'audit. Thesis of Medicine, Université de Bamako. 2008. French.
[27] Ngagoue TC. Complications obstétricales en réanimation : Etude épidémio-clinique et pronostic au CHU GABRIEL TOURE. Thesis of Medicine, Université de Bamako. 2012. French.