

# Study of Factors Associated with Maternal Deaths at Timbuktu Hospital in Mali

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**How to cite this paper:** Moussa, C., Djibril, K., Alou, S., Ousmane, S., Ghislain, P., Akoro, D., Seydou, S., Assetou, C., Abdoulaye, K., Mariam, M., Souleymane, M., Oumar, O., Bassirima, T., Babou, K. and Halima, T. (2024) Study of Factors Associated with Maternal Deaths at Timbuktu Hospital in Mali. *Open Journal of Obstetrics and Gynecology*, 14, 1471-1487.

<https://doi.org/10.4236/ojog.2024.149118>

**Received:** August 7, 2024

**Accepted:** September 16, 2024

**Published:** September 19, 2024

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## Abstract

**Introduction:** Despite progress in universal health coverage, maternal mortality remains a concern for developing countries, including Mali. The problem is not due only to a lack of health services but to a combination of factors that need to be identified to give hope to women of childbearing age. **Objective:** Determine the factors associated with maternal mortality in the Timbuktu region of Mali. **Methodology:** Retrospective, descriptive, cross-sectional and analytical study from January 1, 2018 to December 31, 2022 using a questionnaire and an interview guide to determine the factors associated with maternal mortality in the Timbuktu region of Mali. **Results:** A total of 112 maternal deaths were recorded between 2018 and 2022. The average age of the women who died was 26 years (standard deviation 7.6 years). The 14 – 23-year-old age group is the most affected (43.8%). 66.1% of women came from rural areas. Illiteracy (77.7%), lack of ANC (54.5%), distance of households from health facilities (76%) and insecurity (52.7%) have been identified as factors contributing to maternal mortality. **Conclusion:** This study reported a high prevalence of maternal mortality rates that may be associated with women's socioeconomic conditions. Actions must be developed to integrate CPN into an advanced strategy for women living in rural areas in Mali.

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## Keywords

Maternal Mortality, Timbuktu Hospital, Mali

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### 1. Introduction

Maternal mortality is defined, according to the 10th revision of the WHO International Classification of Diseases (ICD), as “the death of a woman occurring during pregnancy or within 42 days after its termination, whether whatever the duration or location, for any cause determined or aggravated by the pregnancy or the care it motivated, but neither accidental nor fortuitous. Every year, half a million women die from childbirth complications. However, these deaths could be avoided if preventive measures were taken and adequate care was available [1]. The maternal mortality rate is a key indicator of women's health and represents an index of human development, as it is indicative of levels of accessibility to essential obstetric care and the degree of use and quality of services [2]. Around 830 women die every day worldwide due to complications related to pregnancy or childbirth. The majority of these deaths occurred in low-income countries and most could have been avoided [1]. Worldwide, the maternal mortality rate is 216/100,000 live births. It varies from one continent to another and from one country to another. The maternal mortality rate (MMR) in the least developed countries (LDCs) is high, estimated at 415 maternal deaths per 100,000 live births, which is more than 40 times higher than that in Europe, and almost 60 times higher than that of Australia and New Zealand [3]. Reducing maternal mortality remains elusive in low- and middle-income countries because the majority of factors causing maternal deaths originate from the socio-cultural environment, particularly rural settings [4]. A study carried out to identify the etiologies and determining factors of maternal mortality at the regional hospital of Thiès (Senegal) involving 239 deaths showed other associated factors in addition to direct and indirect causes [5]. In Mali, several studies have been devoted to the study of maternal mortality; its rate increased from 368 in 2012 - 2013 according to EDMS V, to 325 per 100,000 live births according to EDMS VI of 2018 [6] [7]. The rate of maternal deaths is estimated at 60 per 100,000 live births in Timbuktu. Knowing that family planning and prenatal consultations (ANC) largely contribute to reducing maternal mortality, their usage rates are low in the Timbuktu region, being 5.4 for family planning (12.7 for Mali) and 22.5% for CPN4 [8]. Although the medical causes are relatively known, efforts still need to be made to understand and improve the socio-cultural, economic, political, and environmental factors and those linked to the health system. The Timbuktu region has faced unprecedented demographic, economic, political and health changes in recent years, marked by significant inequalities, the Covid-19 pandemic and armed conflicts. The overall objective of this study is to contribute to improving knowledge on

the determining factors of maternal deaths in the Timbuktu Region and to guide current strategies for reducing maternal mortality.

## 2. Materials and Method

We realized a cross-sectional, descriptive and analytical study with a retrospective collection of maternal mortality data occurring during the period from January 1, 2018 to December 31, 2022. Our target population was all women who died while pregnant, during childbirth, or 42 days after childbirth in the Timbuktu Region and cases of maternal deaths were noted on arrival regardless of the origin. We carried out the exhaustive registration of all cases of maternal deaths recorded in the Timbuktu hospital during the study period and met the inclusion criteria. The sample size was calculated by Raosoft® software using the following parameters: 95% CI, 5% margin of error and a normal distribution. The sample size, with a population of 184163, is 300 people. Maternal deaths occurring at the Timbuktu hospital were included, including those noted on arrival, whatever the origin. Not included were women who died accidentally or fortuitously in the circle of Timbuktu during pregnancy, childbirth or 42 days after its termination. The variables of this study were those dependent on the determination of factors associated with maternal mortality and those independent of the sociodemographic characteristics of the deceased women. The maternal mortality rate, ratio and ratio in Timbuktu were calculated and factors associated with maternal mortality were described. Data collection was done on the basis of a questionnaire composed of six (6) sections completed through maternal death files, audits and maternal death registers and another questionnaire addressed to the accompanying persons/family of the sick, to health workers. The collection was carried out over 6 months, from June 1, 2022 to December 30, 2022. The data was entered into SPSS version 25 software. Percentage proportions were used in the descriptive analyses of the variables. The Excel file was used to analyze data from the questionnaire sent to the population. The chi-square test was used to determine the relationship between variables. The p level less than or equal to 0.05 was acceptable as significant (**Appendix 2**).

The protocol for this study was submitted for approval to the management of the Higher Institute of Public Health of Bamako and to the ethics committee for health research in Mali. Then, authorization was obtained from the health authorities to conduct the study. Finally, a written consent form was submitted to each participant before data collection. Participant data remained confidential.

## 3. Results

### 3.1. Sociodemographic Characteristics and Obstetric History of Women

From 2018 to 2022, 112 maternal deaths were recorded in the Obstetrics and Gynecology department of Timbuktu Hospital. During the same period, 83,806 live births were recorded (**Table 1**).

**Table 1.** Sociodemographic and obstetric characteristics of women.

	Effective	Percentage
<b>Origin (N = 112)</b>	-	-
Urban environment	38	33.9
Rural environment	74	66.1
<b>Age groups (N = 112)</b>	-	-
14-23	49	43.8
24-33	42	37.5
34-43	21	18.8
<b>Educational level (N = 112)</b>	-	-
Out of school	87	77.7
Schooled	25	22.3
<b>Marital status (N = 112)</b>	-	-
Singles	8	7.1
Brides	104	92.9
<b>Parity (N = 112)</b>	-	-
Nulliparous	11	9.8
Primiparous	40	35.7
Pauci parries	16	14.3
Multiparous	22	19.6
Large multiparous	23	20.5
<b>Number of ANC (N = 112)</b>	-	-
None	61	54.5
1 CPN	23	20.5
2 CPNs	16	14.3
3 CPNs	6	5.4
4 CPNs	5	4.5
More than 4 CPNs	1	0.9
<b>Total</b>	<b>112</b>	<b>100</b>

More than half of the women (66.1%) came from rural areas compared to (33.9) who came from urban areas. The age group of 14 - 23 years was the most affected, *i.e.* 43.8%, with 14 years as the minimum age observed and 43 years as the maximum age. 77.7% of women who died during the period were out of school; 92.9% of women were married. The average parity was 3, with extremes of 0 and 12. First-time mothers were the most represented with 35.7%; 54.3% of women did not do any CPN and only 20.5% did CPN1 compared to 4.5% in CPN 4 with a specific dropout rate of 72.26%  $(23 - 5/23) \times 100$ .

### 3.2. Transfer and Admission Procedures for Women

Of the 112 deaths, 25% of women lasted between 1 hour and 3 hours before admission to the hospital compared to 22% between 3 and 6 hours; 55.4% came by the family's own means to reach the hospital and 41.1% came by ambulance. Among the difficulties encountered, insecurity was the most cited, with 52.7% and 25% of mostly urban women having not had any problems during their

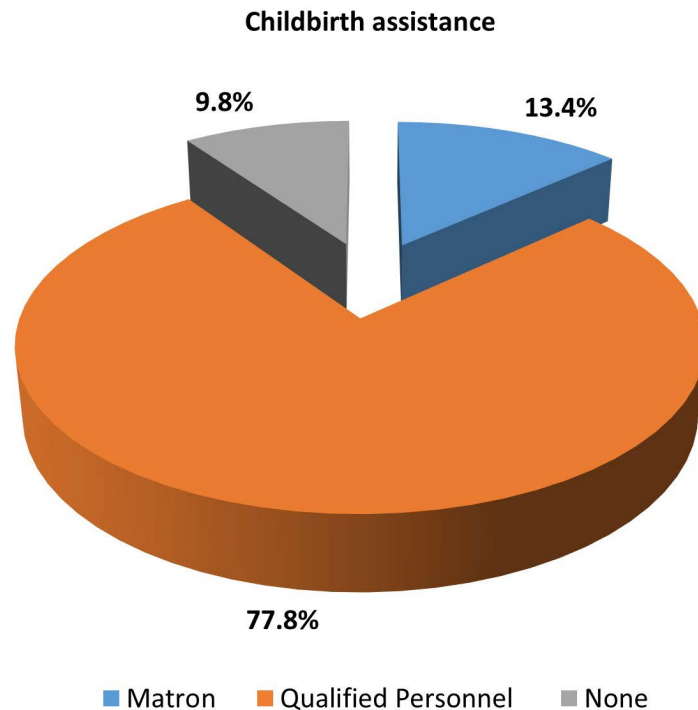
**Table 2.** Distribution of death cases according to transfer and admission methods.

	Effective	Percentage
<b>Method of admission (N = 112)</b>		
Referred/Evacuated	94	
Not referred/Evacuated	18	
<b>Means of transport (N = 112)</b>		
Public transportation	4	3.6
Personal average	62	55.4
Ambulance	46	41.1
<b>Distance traveled before arriving at the hospital</b>		
	-	-
Less than 5KM	14	12.5
5 to 10 km	13	11.6
10 to 50 km	49	43.8
50 to 100 km	19	17.0
Sup at 100 km	17	15.2
<b>Time from referral to hospital admission (N = 94)</b>		
	-	-
Less than 30 minutes	4	
30 minutes and 1 hour	11	
1H and 3H	28	
4H and 6H	25	
7 a.m. and 12 p.m.	1	
13H -24H	7	
Sup at 24 hours	1	
Unknown	17	
<b>Difficulties encountered during transport (N = 112)</b>		
	-	-
None	28	25.0
Financial problem	8	7.1
Insecurity	59	52.7
Sociocultural problem/Custom	3	2.7
Lack of means of transport	7	6.3
Geographic accessibility	7	6.3
<b>Total</b>	<b>112</b>	<b>100</b>

travels. 43.8% of women traveled a distance between 10 to 50 km before reaching the hospital and only 12.5% traveled less than 5 km (Table 2).

### 3.3. Childbirth Assistance

Most of these deceased women gave birth with the assistance of qualified personnel (77.8%). This staff was made up of general practitioners, gynecologists, midwives and obstetrician nurses. Retrained traditional birth attendants (ATRs) and matrons assist parturients in peripheral health centers or in villages (Figure 1).



**Figure 1.** Distribution of deaths according to delivery assistance.

### 3.4. Place of Residence and Marital Status

Of the 112 deaths, 52.6% (59/112) women faced a problem of insecurity when traveling to the hospital and the majority of these women, *i.e.* 88.1% (52/59), came from the rural environment. 61 women or 54.4% did not undergo ANC, and those who lived in rural areas were the most represented with 46.4% (52/112) for a correlation coefficient ( $p = 0.46$ ). The majority of women who did not have CPN were represented by first-time mothers, *i.e.* 24.10% (27/112) for a correlation coefficient ( $p = 0.19$ ). The proportion of first-time mothers who died in rural areas was 72.5% (29/40) compared to 27.5% (11/40) in urban areas for a correlation coefficient ( $p = 0.99$ ). 63.4% (71/112) were not in school, and of the 71 women who were not in school, 85.9% (61/71) came from rural areas. The bivariate analysis showed that there is no correlation between origin and level of study with a correlation coefficient ( $p = 0.42$ ). The majority of married women, *i.e.* 95.7 (68/71), were out of school compared to 4.3% of single people out of school (Table 3).

**Table 3.** Distribution of death cases according to environment and marital status.

	Urban environment	Rural environment	Total
<b>Difficulties encountered</b>	-	-	-
none	23	5	28
Financial problem	0	8	8
Insecurity	7	52	59
Sociocultural problem/custom	3	0	3
Lack of means of transport	3	4	7
Geographic accessibility	2	5	7
<b>Total</b>	<b>38</b>	<b>74</b>	<b>112</b>
<b>Number of CPNs</b>	-	-	-
None	9	52	61
1 CPN	12	11	23
2 CPNs	9	7	16
3 CPNs	4	2	6
4 CPNs	3	2	5
More than 4 CPNs	1	0	1
<b>Parity</b>	-	-	-
Nulliparous	2	9	11
Primiparous	11	29	40
Pauci parries	8	8	16
Multiparous	10	12	22
Large multiparous	7	16	23
<b>Educational level</b>	-	-	-
Unschoolled	10	61	71
Schooled	28	13	41
<b>Total</b>	<b>38</b>	<b>74</b>	<b>112</b>
	-	-	-
<b>Educational level</b>	<b>Bachelor</b>	<b>Bride</b>	<b>Total</b>
Unschoolled	3	68	71
Schooled	5	36	41
<b>Total</b>	<b>8</b>	<b>104</b>	<b>112</b>

### 3.5. Non-Medical Factors Associated with Maternal Mortality

Out of 300 people surveyed, 74 or 25% found that socio-political factors (insecurity, poverty) are the basis of maternal deaths, followed by 22% for environmental factors (long distance, inaccessibility, poor road conditions, lack of means of transport). transport) and factors linked to the health system (deficit in structures, equipment, health personnel who are poorly distributed, not retrained and or poorly motivated,

delay in treatment,) come in 3rd position with 21% (Figure 2) (Appendix 1).

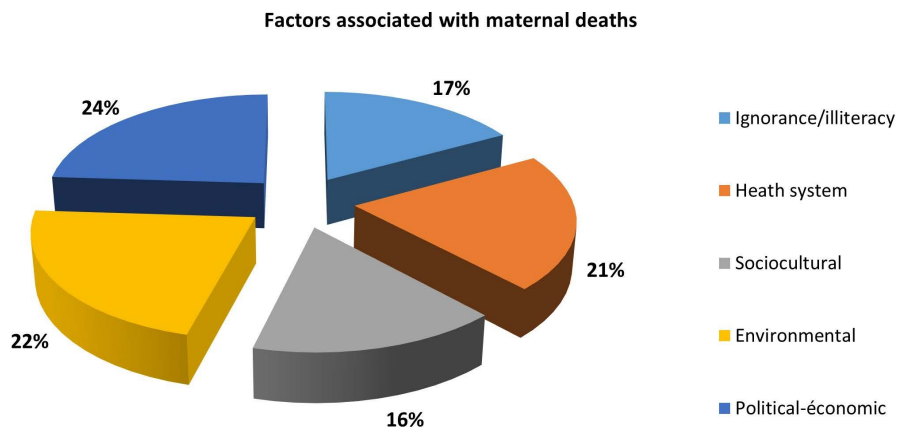


Figure 2. Distribution of risk factors according to interviews.

### 3.6. Maternal Mortality Indicators

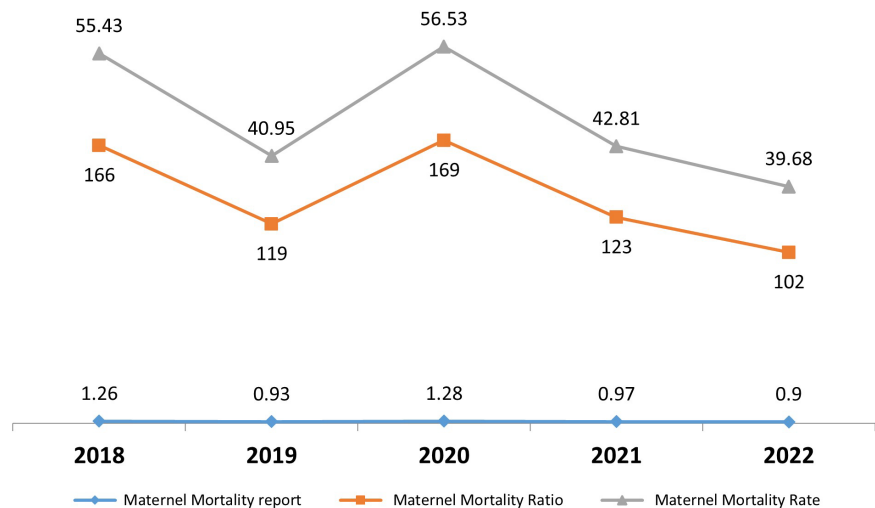


Figure 3. Evolution of maternal mortality indicators.

The **Mortality Ratio** evolves in a sawtooth pattern over the 5 years, with a peak in 2018 and 2020, respectively 1.26 and 1.28 per 100,000 women of childbearing age. The lowest was observed in 2022, *i.e.* 0.9%. The highest **Maternal Mortality Ratio** was observed in 2020, *i.e.* 169 per 100,000 live births, compared to the lowest 102 in 2022. The **Maternal Mortality Rate** evolved in a sawtooth pattern from 2018 to 2022, with an average of 47 deaths per 100,000 pregnant women expected (Figure 3).

## 4. Discussions

### 4.1. Characteristics of Women

In our study the most represented age group was that between 14 - 23 years old, *i.e.* 43.8% (49/112) with extreme ages of 14 and 43 years old. Sissoko found

different results; 20 - 34-year-olds were more represented, with 59.3%, and the extremes of 16- and 41-year-olds were in the Bamako district [9]. On the other hand, our results are similar to those of Randrianambinina *et al.* [10] in whom the age group of 14 - 21 was most affected with extremes of 14 and 41 years. This could be explained by early marriage through sociocultural beliefs. Maternal age is recognized as one of the factors most closely linked to maternal mortality.

Contrary to our study, primiparas predominate with 35.7% in the studies of Alkassoum *et al.* [11] and Meriem Abdoun. *et al.* [12] found respectively 35.5% and 33.3% primiparous and 31% large multiparous. This could be explained by the fact that the Timbuktu region remains attached to its religious and cultural values where women marry very early.

Out of 112 deaths recorded, 66.1% of women came from rural areas compared to 33.9% who came from urban areas. This result is similar to that found by N'Daou where 76% came from rural areas compared to 24% in urban areas [13], unlike Alkassoum *et al.*, who recorded 74.9% from urban areas compared to 25.1% from rural areas [11]. Difficulties in accessing structures, lack of information, socio-cultural beliefs could be the basis of the high number of deaths in rural than urban areas.

Regarding the means of travel to the hospital, 55.4% took their own means to get to the hospital. Diallo *et al.* [14] and Alkassoum *et al.* [11] found respectively that the majority of deceased women came by private vehicle, *i.e.* 63.2% and 78.8% of cases. Insecurity and lack of financial resources largely explain this situation because, at risk of kidnapping, the movement of ambulances is very limited in the Timbuktu region.

This study reported that 52.6% (59/112) of women faced a problem of insecurity when traveling to the hospital and the majority concerned rural women, *i.e.* 88.1% (52/59).

Our study found that 54.4% also did not have a prenatal consultation and those who lived in rural areas were the most represented with 85% (52/61); in a similar situation described by Mathias, 77.14% did not perform ANC during pregnancy [15].

Non-literacy was reported in this study in more than three-quarters of the women who died. Our results align with those of a previous study conducted in Mali which reported that 92.30% had the profile of uneducated housewife [16].

Our study reported that 43.8% traveled a distance of 10 - 50 Km before reaching the hospital. This figure is almost similar to that described by N'Daou [13], who reported that 45% of pregnant women traveled between 26 - 75 km before reaching a health facility. Of the 112 cases, 92.9% of the women were married; similar to the result found by Sanogo [17] where married women were also mainly represented at 97.5%.

## 4.2. Other Contributing Factors to Maternal Deaths

Out of 300 people interviewed on the different factors associated with maternal

mortality, political-economic factors (insecurity, poverty) were the most mentioned with 25% (70/300) followed by environmental factors (long distance, inaccessibility, poor road conditions), lack of means of transport 22% and factors linked to the health system (deficit in structures, equipment, health personnel who are poorly distributed, not retrained and or poorly motivated, delay in treatment,) come in 3<sup>rd</sup> position with 21%. A study carried out in Senegal found that late arrival in the structure in 14% of cases, the absence or slowness of the care provider, and late transfer to the appropriate level of care (7.5%) were associated factors. And late correct diagnosis in 13.4% of cases [5]. In this same country, Barry, in his research paper also found many contributing factors. In order of importance, it was a delay in making the decision to go to the health facility (24.5%), the seriousness of the woman's problem was not perceived earlier by those around her (16.33% ), a transport problem to reach the health center (14.29%), another perception of the illness (12.24%), a delay in reaching the center despite a means of transport (12.24%), the unavailability of Obstetric Care Emergency (10.20%) and delay in receiving care at the health center (6.12%) and delay in referral (4%). We note that it happens that for the same maternal death, several of these factors are reported by the family [18]. Unlike our results in West Africa, Jean-Bosco Kahindo Mbeva and colleagues (Democratic Republic of Congo) found that 87.5% of cases of maternal deaths arrived on time at the hospital level and 69.2% were well taken care of at the health center level. On the other hand, intra-hospital care was considered inadequate in 83.1% of cases, notably for reasons of unsuitable medical and nursing services and limited availability of drugs and blood for transfusion [19].

### 4.3. Mortality Indicators

From 2018 to 2022, 112 maternal deaths were recorded in the Obstetrics and Gynecology department of Timbuktu Hospital. During the same period, 83,806 live births were recorded. Thus the MMR was 134 per 100,000 live births. This result is respectively lower than that reported by Diallo [14] and Thiam [5] *i.e.* 235 deaths per 100,000 live births and 794 per 100,000 live births.

In the Timbuktu region, the security situation represents a significant problem and additional efforts must be made to facilitate the transport of obstetric emergencies to health structures. The fight against maternal mortality necessarily involves upgrading primary care structures (affected by the security crisis) through equipment, recruitment and training of staff, and revitalization of the referral/evacuation system despite the insecurity, which will save lives. The dissemination of messages of prevention and promotion of reproductive health must be intensified by all stakeholders (communication, technical and financial partners, community organizations, religious, traditional and customary leaders) particularly by health workers. This includes strengthening family planning, pre-, peri- and post-natal care services. This is through training, equipping our centers and monitoring/evaluations (death audits) of activities.

## 5. Conclusion

This study reported a high prevalence of maternal mortality rate of 47 per 100,000. Factors influencing maternal mortality included insecurity, poverty, long distances, inaccessibility, poor road conditions, lack of transportation, a deficit in structures, equipment, and health personnel who are poorly distributed, not re-trained and or poorly motivated. The fight against maternal mortality requires multisectoral actions with the commitment of all stakeholders.

## Limitation of the Study

Since the data collection is retrospective, there was insufficient information on certain files. Audits of maternal deaths have not been systematic. For greater representativeness of the indicators, it is necessary to complement our study with others on larger samples, including verbal autopsies of maternal deaths in the community and the study of knowledge, attitudes and practices in the health of the pregnant woman, childbirth and postpartum.

## Conflicts of Interest

The authors declare that they have no financial or personal relationships that could have inappropriately influenced them in writing this article.

## Contribution of the Authors

- **Coulibaly Moussa** coordinated and participated in the formulation of the research protocol, data collection, data analysis, writing of the article;
- **Kassogué Djibril, Sy Ousmane, Poda Ghislain G** participated in the formulation of the research protocol, the writing and revision of the article;
- **Other authors** participated in revising the article.

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## Appendix 1: Survey Consent Form

**Title of the study:** Study of factors associated with maternal mortality at Timbuktu hospital in Mali

Dear participant,

You are invited to participate in the study mentioned above. This survey aims to determine “Factors associated with maternal mortality in the Timbuktu Region”

Participation is voluntary and you can withdraw from the study at any time, no consequences would result if you do not participate. You are free to ask questions to understand more. The study will be coded so you do not need to write your name on the questionnaire. Rest assured that your identity will never be revealed or your data shared without your permission. All study data will be stored in a secure location by the researcher for at least three years and then destroyed. This questionnaire should take approximately 10 minutes of your time. Please accept this interview.

Thank you so much-----

### 1. The respondent knows how to read and write

I have read this consent form; the nature and purpose of this study is clear and the researcher explained it to me. I therefore voluntarily agree to participate.

First and last name of the participant: First and last name of the investigator:

Signature of participant Signature of investigator

Date (DD/MM/YYYY): Date (DD/MM/YYYY):

### 2. The respondent cannot read and write

Witness

I confirm that the respondent agrees to voluntarily participate in this study.

First and last name of the participant: First and last name of the investigator:

Signature of participant Signature of investigator

Date (DD/MM/YYYY): Date (DD/MM/YYYY):

## Appendix 2: Questionnaires

**Title of the study:** Study of factors associated with maternal mortality at Timbuktu hospital in Mali

### Questionnaire 1

#### Section 1: Sociodemographic Characteristics

1. **Origin of death** 1- Urban environment 2- Rural environment

2. **Place of death:** 1-Home 2-CSCom3-CSRef 4-Hospital

3. **Date of interview:** \_\_\_\_/\_\_\_\_/20\_\_\_\_

4. **Language used:** \_\_\_\_\_

5. **Age in years at time of death:**

|\_\_||\_\_| Or \_\_\_\_/\_\_\_\_/\_\_\_\_

Completed year Date of birth

6. **Educational situation:**

6.1 Schooled: 1-Yes 2-No

6.2 If yes, please check the level in the following table:

LEVEL/SCHOOL	Classic	Koranic
Primary school	1-	5-
Secondary school	2-	6-
Grammar school	3-	7-
University	4-	8-

#### 7. Marital status:

7.1: 1-Single 2-Married 3-Divorced 4-Widow

7.2: If Married please check the regime

Diet	Marital status	Traditional/Religious	Legal separation
Polygamy	1-	3-	5-
Monogamy	2-	4-	6-

**8. Ethnic group:** Sonrai/Tamasheq/White Tamasheq/black/Bela Arab/Moor/ Peulh/ Minianka Sarakolé/Maraka/Bambara/Bozo/Senoufo/Dogon/Mossi/Dafing/Samoko/ Bobo  
Other to specify: \_\_\_\_\_

### Section 2: Obstetric History

1. Number of Gestities: | \_\_ || \_\_ |
2. Number of Parity: | \_\_ || \_\_ |
3. Number of cesarean sections: | \_\_ || \_\_ |
4. Number of abortions: | \_\_ || \_\_ |
5. Total number of living children: | \_\_ || \_\_ |
6. Number of deceased children: | \_\_ || \_\_ |
7. Number of twin pregnancies | \_\_ || \_\_ |

### Section 3: Information on the Patient's Medical History

**1. Did she have any health problems before her death?** 1-Yes 2-No

**2. If Yes:** 1-hypertension 2-diabetes 3-malaise 4-bleeding 5-edema 6-eclampsia 7-vertigo

Other to specify: \_\_\_\_\_

**3. Did she use a contraceptive method to avoid pregnancy?**

1-Yes 2- No 3-Don't know

If Yes, specify the method: \_\_\_\_\_

### Section 4: Information on Pregnancy Monitoring:

**1. Did she have traditional treatments?**

1-Yes 2-No

If Yes, specify the nature of the treatment \_\_\_\_\_

**2-Has she had medical treatment:**

1-Yes 2-No

If Yes, specify the nature of the treatment \_\_\_\_\_

**3- Did she do CPN?** 1-Yes 2-No

If yes, specify the number of CPN during the pregnancy | \_\_ || \_\_ |

**4. Had she had prenatal check-ups?**

1-Yes 2-No Don't know

## Section 5: Referral Information and Evacuation:

**1. Times and date of decision making for referral/evacuation**

**Date:** or \_\_\_\_/\_\_\_\_/\_\_\_\_ **Hours:** |\_\_||\_\_|H |\_\_||\_\_|mn

Day Month Year

**2. Times and date of arrival at the structure**

**Date:** or \_\_\_\_/\_\_\_\_/\_\_\_\_ **Hours** |\_\_||\_\_|H |\_\_||\_\_|mn

Day Month Year

**3. Time from referral/evacuation to admission**

Number of hours |\_\_||\_\_|H and or |\_\_||\_\_|mn

**4. Means of transport used**

1-Public transport 2-Personal means 3-Ambulance 4-Pinace

**5. Distance traveled before arriving at the health facility:** \_\_\_\_ km

**6. Difficulties encountered during referral/evacuation:**

1-Yes 2-No

If Yes, specify: 1-Financial problem 2-Insecurity 3-Refusal of marriage 4-Sociocultural/Customs

5-Absence of means of transport 6-Absence of communication network

Other to specify: \_\_\_\_\_

**7. Once you arrived, how long did you wait before she was examined?**

|\_\_|\_\_| hours |\_\_|\_\_| Minutes Unknown

## Section 6: Information on Childbirth

**1. Place of delivery?**

1-Home 2-CSCom 3-CSRef 4-Private structures 6-Hospital 7-In the process of evacuation

**2. Type of pregnancy:**

1-Mono-fetal 2-Twin 3-Trimelar 4-quadrimerlar

**3. Qualification of the agent who carried out the delivery?**

1-ATR 2-Matron 3-Obstetrician nurse 4-Midwife 5-General practitioner Gynecologist

**4. Type of delivery:**

1-Eutocic 2-Dystocic Caesarean section

**5. Instruments Used:**

1-Suction cup 3-Forceps

**6. Transfusion performed:**

1-Yes 2-No

## Section 7: Obstetric Complications

**1. DIRECT COMPLICATIONS**

1-Hemorrhage 2-Obstocic/prolonged labor 3-Uterine ruptures 3-Postpartum infection  
4-Pre-eclampsia/eclampsia 5-Abortion 6-Ectopic pregnancy

Others to specify: \_\_\_\_\_

**2. INDIRECT COMPLICATIONS**

1-Infectious hepatitis 2-Malaria 3-HIV/AIDS 4-Anemia 5-Sickle cell anemia

Others to specify: \_\_\_\_\_

**Section 8: Cause of Maternal Death**

**1. DIRECT CAUSES**

1-Hemorrhage 2-Obstocic/prolonged labor 3-Uterine ruptures 3-Postpartum infection  
4-Pre-eclampsia/eclampsia 5-Abortion 6-Ectopic pregnancy

Others to specify: \_\_\_\_\_

**2. INDIRECT CAUSES**

1-Infectious hepatitis 2-Malaria 3-HIV/AIDS 4-Anemia 5-Sickle cell anemia

Others to specify: \_\_\_\_\_

**3. What is the condition of the newborn at birth:**

1- Alive 2- Fresh stillborn 3- Macerated stillborn

**Section 9: The Family's Account of the Events, the Illness and the Death of the Woman**

Give them an introduction that explains that you would like them to tell you everything that happened: Please tell us what happened from his illness until his death.

(Instructions for the person conducting the interview: Let the Interviewee tell you about the illness in their own words. Do not make any suggestions other than to ask if there is anything else please take notes If necessary, continue on the back of this sheet or add new ones):

**Section 10: Commentary on the Total Interview Process and Investigator's Observation**

Interviewer: Please write here your comment on the total interview process and your observation.

**1 - Problems encountered?**

\_\_\_\_\_

**2 - cooperation of family members and others?**

\_\_\_\_\_

**3 - Your comments?**

\_\_\_\_\_

**4-Signature:**

\_\_\_\_\_

**Questionnaire 2:**

Questionnaire was carried out as part of the development of an ISSP master's thesis entitled Causes and factors associated with maternal mortality in the Timbuktu Region.

**FOR HEALTH PERSONNEL/COMMUNITY**

**1- IDENTIFICATION**

Age: \_\_\_\_\_

Sex: \_\_\_\_\_

Marital status: \_\_\_\_\_

Occupation: \_\_\_\_\_

Level of education \_\_\_\_\_

**2. Associated Factors:**

What are the factors linked to maternal mortality according to you: the respondent can cite a few factors mentioned in the parentheses, this will help guide you)?

1. poverty
2. distance
3. lack of information
4. lack of information;
5. inadequacy of services
6. Lack of staff
7. cultural practices.
8. Insecurity
9. Others to be specified

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**3. Causes/Complications:**

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What are the different obstetric complications encountered?

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What are the main causes of maternal mortality?

**4. Strategies for improvement:**

Do you know any strategies to improve reduce maternal mortality?