

**STATISTICAL ANALYSIS OF FACTORS ASSOCIATED WITH NON-COMPLIANCE WITH EPIDEMIOLOGICAL STANDARDS IN THE BOKORO HEALTH ZONE FROM 2021 TO 2023**

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**Abstract**

In this article, we analyze the factors associated with non-compliance with epidemiological standards in the Bokoro Health Area from 2021 to the present, based on a study conducted from August 1 to October 31, 2023. This area reports significant cases of mortality and morbidity. The aim is to analyze the variables or factors explaining the non-compliance with these standards and to formulate recommendations accordingly. We employed two types of statistical analysis: univariate and bivariate.

**Keywords :** *Factor, standard, epidemiological, monovariate analysis, bivariate analysis, Data analysis .*

1. Introduction

This study is conducted in the DRC, at the Mai- Ndombe Provincial Health Division , in the Bokoro Rural Health Zone . Its population is 113,456 inhabitants according to the 2023 Health Zone estimates and includes 22 Rural Health Areas. This health zone has the same mission as all health zones established in the DRC.

The ALMA ATA international conference laid the foundation for a new international health care policy. At the end of this conference, the participants adopted the international policy called "primary health care" since 1978 ( Kambondji , 2022 ). Our country has subscribed to this primary health care policy and has imposed itself to practice it as a new health system.

Bokoro Rural Health Zone was created in 1983 with its first doctor, Zone Chief by the name of Dr Jean Van Koela . Since its creation until today, 9 Health Zone Chief Doctors have succeeded one another.

Equipped with the good infrastructure built by the partner "Horizon Santé" within the framework of the PMURR/Health project in 2003 and the increase in Health Centers; and beyond all the efforts provided by the Health Zone Management Team, Management Committee, CODI and CODESA, this Health Zone is today experiencing a total regression and presents a breathless health picture because of endemics and epidemics of all kinds such as tuberculosis, trypanosomiasis, malaria, measles, etc. ( Mamanya , 2024).

Indeed, since 2021, the Bokoro Rural Health Zone has been facing several waves of the measles epidemic, which is rapidly evolving across all the Health Areas and is accompanied by the emergence of new reported cases. This area is the most affected in the DPS/ Maindombe and

had a cumulative total of 407 suspected cases, including 39 confirmed cases with 35 deaths during the year. This epidemiological burden is spread across 10 Health Areas out of the 22 in the Health Zone, including the Semendwa AS, which is a victim of this scourge (Niang, 2005).

The most frightening and shocking case occurred on August 14, 2021, the case of the under-reporting of a case of acute flaccid paralysis observed at the Semendwa Health Area . This situation presents an imminent danger especially since there is no permanent system for supplying medicines and technical equipment despite the presence of CAMEBAND whose mission is to supply the health structures of the Health Zone (Rougemont, 1983).

to this are the difficulties of achieving good vaccination coverage by antigen, of properly supervising remote health structures due to the lack of means of transport. Thus, working as a statistician teacher in this region, this situation was able to attract our attention. And, we want to know the factors associated with non-compliance with the epidemiological standards of this region. Statistics is used as an analysis tool.

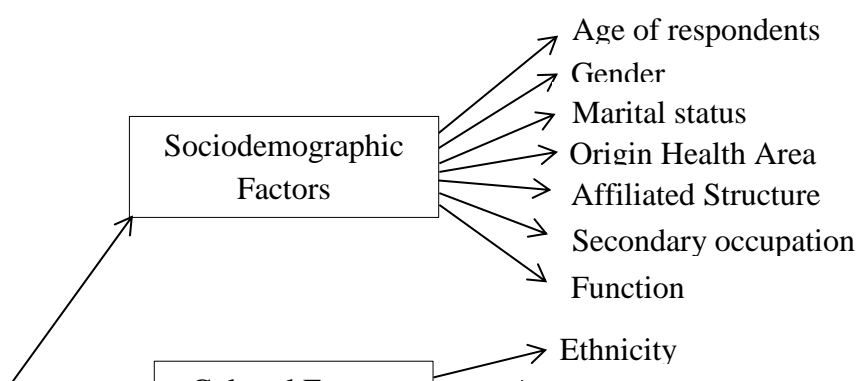
The aim of this article is to identify from statistical analyses the factors associated with non-compliance with epidemiological standards and to formulate recommendations. Its importance is no longer to be demonstrated. It is to reduce the number of cases of mortality and morbidity due to epidemics and to spare the inhabitants of this region, already living in difficult sanitary conditions, from unnecessary expenses.

Our modest original contribution is the fact that, beyond the data provided by the Provincial Health Service of this area, we analyzed them and formulated recommendations in order to avoid non-compliance with epidemiological standards in this Bokoro Health zone .

## 2. Materials and methods

First, we established a conceptual model that allowed us to identify the variables to be analyzed and to prepare the tools and techniques to be used.

This framework is as follows:



*Figure 1: Adaptation personnelle, 2024*

Then , we set the target population, that which is composed of Health Providers and Community Relays. There are a total of 500 subjects in the targeted Health Areas of the Bokoro Rural Health Zone . Which led us to select a probability sample of 220 individuals who participated in our survey. For data collection, we used in this study the survey method . The interview and the documentary technique as a technique which allowed us to write a reliable questionnaire, an instrument which facilitated data collection ( Dabis & Desenclos , 2017).

A pre-survey was conducted to test the validity and reliability of our tool (instrument) in order to detect possible ambiguities in its content and understanding. Data collection was done using a semi-structured questionnaire. Closed questions allowed the identification of factors of non-compliance with the standards of epidemiological surveillance ( Mamanya , 2024).

However, the interviews took place at the health facilities (Health Centers, Health Posts and community care sites of the Health Areas of this Health zone). They were individual for each provider or community relay. We explained each time the reason for our visit, and guaranteed respect for confidentiality and anonymity. We allowed everyone to express themselves freely, while being as non-directive as possible. The interview lasted between 20 minutes to 30 minutes maximum.

After data collection, we carried out data quality control, which was done at two levels (Renaud, 1986):

- The first check was carried out at the survey locations, precisely verifying the nature and quality of each piece of data collected;
- The second check was done before data processing by looking for outliers and missing values.

We used two types of analyses: monovariate and bivariate. In monovariate analysis, we used flat sorting which allowed us to obtain the frequencies in percentage. Inferential analysis (bivariate) allowed us to test the link between the independent variables (associated factors) and the dependent variable (non-compliance with epidemiological surveillance standards), we

used Pearson's chi-square statistic with a p-value of 5%. The tests used are those of independence and homogeneity of factors or variables. All the variables of the conceptual model were analyzed. We grouped them and divided them into three themes: Sociodemographic factors, Socio-cultural factors and Factors related to the provision of care and community relay

The main limitation of this study is that the subjects concerned evaluated themselves; the aim was to identify in the subjects the factors associated with non-compliance with the standards of epidemiological surveillance. This is social desirability, one of the biases linked to the respondents' responses that can be minimized by respecting confidentiality. This encourages frankness in the subjects (Richard et al., 2011).

### 3. Results

#### 3.1 Sociodemographic Factors Data

We used the flat sorting technique.

*Table 1: Sociodemographic factors of respondents*

No	Factors	Effective	%
<b>1</b>	<b>Age of respondents</b>		
	▪ 18-28 years old	22	10.0%
	▪ 29-39 years old	96	43.6%
	▪ 40-50 years old	88	40.0%
	▪ 60 years+	14	6.4%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>2</b>	<b>Sex</b>		
	▪ Male	107	48.6%
	▪ Female	113	51.4%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>3</b>	<b>Marital status:</b>		
	▪ Married	150	68.1%
	▪ Bachelor	33	15.0%
	▪ Divorced	25	11.4%
	▪ Widower	12	5.5%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>4</b>	<b>Original health area</b>		
	▪ AS. Isaka MboleE	21	9.5%
	▪ AS. Semendwa	85	38.6%
	▪ AS Boyon	26	11.9%
	▪ AS Kutu	22	10.0%
	▪ AS Kempimpi	23	10.5%
	▪ AS Muntu City	15	6.8%
	▪ AS Sanga Blood	15	6.8%
	▪ AS Sanga Blood	13	5.9%
	▪ others		
<b>Total</b>		<b>220</b>	<b>100</b>

<b>5</b>	<b>Membership structure</b> <ul style="list-style-type: none"> <li>General reference hospital</li> <li>Reference health center</li> <li>Health center</li> <li>Health post</li> <li>Community animation unit</li> </ul>	5 35 36 71 73	2.2% 15.9% 16.4% 32.3% 33.2%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>6</b>	<b>Secondary occupation</b> <ul style="list-style-type: none"> <li>Doctor</li> <li>Nurse</li> <li>Laboratory technician</li> <li>Teacher</li> <li>Farmer</li> <li>Housekeeper</li> <li>Midwife</li> <li>Others</li> </ul>	4 111 16 8 40 9 14 18	1.9% 50.6% 7.3% 3.6% 18.1% 4.1% 6.3% 8.1%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>7</b>	<b>Function</b> <ul style="list-style-type: none"> <li>Community relay</li> <li>Health care providers</li> </ul>	76 144	34.5% 65.5%
<b>Total</b>		<b>220</b>	<b>100</b>

**Source:** Field survey, 2024

**Comment:** Among the 220 respondents included in our study, 96 respondents or 43.6% are aged between 29-39 years, 113 respondents or 51.4% are female, 150 respondents or 68.2% are married, 85 respondents or 38.6% come from the Semendwa Health Area, 111 or 50.5% are nurses, 144 or 65.5% are healthcare providers and 73 respondents or 33.2% belong to the community animation unit.

### 3.2 Socio-Cultural Data of the Respondents

*Table 2: Socio-cultural characteristics of respondents*

No .	Factors	Effective	%
<b>1</b>	<b>Ethnicity:</b> <ul style="list-style-type: none"> <li>Sakata</li> <li>Kundo</li> <li>Boma</li> <li>Sengele</li> <li>Others</li> </ul>	142 31 22 15 10	64.5% 14.1% 10.0% 6.9% 4.5%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>2</b>	<b>Religion :</b> <ul style="list-style-type: none"> <li>Black Church</li> <li>Christianity</li> </ul>	56 94 17	25.5% 42.7% 7.7%

	<ul style="list-style-type: none"> <li>▪ Muslim</li> <li>▪ Without religion</li> <li>▪ Others</li> </ul>	14 39	6.4% 17.7%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>3</b>	<b>Level of education</b> <ul style="list-style-type: none"> <li>▪ Unfinished secondary</li> <li>▪ Patented</li> <li>▪ State graduate</li> <li>▪ Graduated</li> <li>▪ licensed</li> </ul>	24 54 78 60 4	10.9% 24.6% 35.5% 27.3% 1.7%
<b>Total</b>		<b>220</b>	<b>100</b>

**Source:** Field survey, 2024

**Comment :** This table shows that 142 respondents, or 64.5%, are from the Sakata tribe, 94 respondents, or 42.7%, are Christians, 60, or 27.3%, are graduates, 4, or 1.7%, are graduates, and 78, or 35.5%, are state graduates.

### 3.3 Knowledge and attitudes of providers and community relays on epidemiological surveillance

*Table 3: Data on Knowledge and Attitudes of providers and community relays on epidemiological surveillance*

No	Variables	Effective	%
<b>1</b>	Do you know about epidemiological surveillance? <ul style="list-style-type: none"> <li>▪ Yes</li> <li>▪ No</li> </ul>	195 25	88.6% 12.4%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>2</b>	If yes on which channel? <ul style="list-style-type: none"> <li>▪ Radio</li> <li>▪ Television</li> <li>▪ RECOS</li> <li>▪ Pro-health</li> <li>▪ School or university</li> <li>▪ In training</li> <li>▪ Others</li> </ul>	19 3 5 104 34 21 9	9.7% 1.5% 2.6% 53.3% 17.4% 10.8% 4.6%
<b>Total</b>		<b>195</b>	<b>100</b>
<b>3</b>	List the frequencies or rates of data transmission. <ul style="list-style-type: none"> <li>▪ Immediate</li> <li>▪ Weekly</li> <li>▪ Immediate, weekly and quarterly</li> </ul>	15 92 44	6.8% 41.8% 20.0%

	<ul style="list-style-type: none"> <li>Others</li> </ul>	69	31.4%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>4</b>	What are the most used indicators in reporting? <ul style="list-style-type: none"> <li>Completeness</li> <li>Promptness</li> <li>Completeness and Promptness</li> <li>Others</li> </ul>	24 36 46 114	10.9% 16.4% 20.9% 51.8%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>5</b>	Do you know your hierarchical level to transmit your data? <ul style="list-style-type: none"> <li>No</li> <li>Yes</li> </ul>	212 18	96.4% 3.6%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>6</b>	What are your knowledge, attitudes and opinions about epidemiological surveillance in general? <ul style="list-style-type: none"> <li>Neutral</li> <li>Monitoring system assessment</li> <li>I don't agree with this system.</li> <li>Others</li> </ul>	93 17 67 42	42.5% 7.8% 30.6% 19.2%
<b>7</b>	What are the risks of not meeting the standards? <ul style="list-style-type: none"> <li>Appearance of diseases</li> <li>System malfunction</li> <li>Lack of intervention at the hierarchical level</li> </ul> Others	137 27 22 34	62.3% 12.3% 10.0% 15.5%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>8</b>	What strategies are in place for identifying cases of diseases under surveillance? <ul style="list-style-type: none"> <li>Presence of standard disease definitions</li> <li>Knowledge of the phenomenon</li> <li>Others</li> </ul>	103 42 75	46.8% 19.1% 34.1%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>9</b>	What are the most used indicators in reporting? <ul style="list-style-type: none"> <li>Completeness</li> <li>promptness</li> <li>Completeness and promptness</li> <li>others</li> </ul>	24 36 46 114	10.9% 16.4% 20.9% 51.8%

Total		220	100
10	Do you know the alert threshold? ▪ Yes ▪ No	123 97	55.9% 44.1%
Total		220	100
11	If so, what should be done when this threshold is reached? ▪ Nothing at all ▪ Inform the person in charge ▪ Organize an investigation	40 54 29	32.5% 43.9% 23.6%
Total		123	100
12	Do you know the epidemic threshold? ▪ Yes ▪ No	81 139	36.8% 63.2%
Total		220	100
13	What should be done when this threshold is reached? ▪ Nothing at all ▪ The response must be organized	31 50	38.2% 61.2%
Total		81	100

**Source:** Field survey, 2024

**Comment :** it is shown in this table that 195 or 88.6% know about epidemiological surveillance, the health professional remains the channel most illustrated by the respondents (53.3%), the frequency of weekly transmission of data is more listed by the respondents (41.8), 114 or 51.8% respondents gave other answers in relation to the indicators used for reporting (51.8%), 123 or 55.9% respondents know the alert threshold, 55 respondents or 43.7% confirmed that when the alert threshold is reached, it is necessary to inform the manager, 137 or 62.3% confirmed that the appearance of diseases would be the most significant risk if the standards of epidemiological surveillance are not respected, 139 or 63.2% do not know the epidemic threshold and out of 81 respondents who know the threshold epidemic, 50 or 61.2% confirmed that when the epidemic threshold is reached, a response must be organized.

### **3.4 Organizational factors related to non-compliance with standards related to epidemiological surveillance.**

*Table 4: Data and analysis on organizational factors related to non-compliance with standards related to epidemiological surveillance*

No	Factors	Effective	%
1	Are you trained in epidemiological/community-based surveillance? ▪ No ▪ Yes	160 60	72.7% 27.3%



<b>Total</b>		<b>220</b>	<b>100</b>
<b>2</b>	If so, how long has it been since? <ul style="list-style-type: none"> <li>More than 5 years</li> <li>2-5 years</li> <li>Less than 2 years</li> </ul>	20 27 13	31.0% 46.6% 22.4%
<b>Total</b>		<b>60</b>	<b>100</b>
<b>3</b>	Do you have data transmission tools? <ul style="list-style-type: none"> <li>No</li> <li>Yes</li> </ul>	53 167	24.1% 75.9%
<b>Total</b>		<b>220</b>	<b>100</b>
<b>4</b>	Do you receive financial support to carry out activities in this surveillance? <ul style="list-style-type: none"> <li>No</li> <li>Yes</li> </ul>	202 18	91.8% 8.2%
<b>Total</b>		<b>220</b>	<b>100</b>

**Source:** Field survey, 2024

**Comment :** It appears from this table that 160 or 72.7% are not trained in epidemiological surveillance, among the 60 trained; 27 or 46.6% are those who have been trained between 2-5 years, 167 or 75.9% have data transmission tools, 202 or 91.8% do not benefit from any support for epidemiological surveillance activities.

### 3.5 Operational factors related to epidemiological surveillance

*Table 5: Data and analysis on operational factors related to epidemiological surveillance*

No	Factors	Effective	%
1	compliance with epidemiological surveillance standards? <ul style="list-style-type: none"> <li>No</li> <li>Yes</li> </ul>	188 32	85.5% 14.5%
<b>Total</b>		<b>220</b>	<b>100</b>
2	If not, for what reasons? <ul style="list-style-type: none"> <li>Lack of means</li> <li>System malfunction</li> <li>Lack of intervention at the hierarchical level</li> <li>Others</li> </ul>	111 16 37 22	59.7% 8.6% 19.9% 11.8%
<b>Total</b>		<b>188</b>	<b>100</b>

**Source:** Field survey, 2024

**Comment :** Out of 220 respondents included in our study, 188 or 85.5% confirmed non-compliance with epidemiological surveillance standards, 111 or 59.7% agreed with the lack of resources to comply with epidemiological surveillance standards.

### 3.6 Bivariate analysis

The aim here is to examine the link between the dependent variable (non-compliance with epidemiological standards) and the explanatory variables (sociodemographic factors, sociocultural factors and factors linked to healthcare providers and community relays).

#### (a) Non-compliance and socio-demographic factors

*Table 6: Relationship between sociodemographic characteristics of healthcare providers and community relays and non-compliance with epidemiological surveillance standards*

Associated factors	Failure to comply with epidemiological surveillance standards	Compliance with epidemiological surveillance standards	Total (Number)	Total (%)	Chi-square statistic and p-value	DS
<b>Sociodemographic factors</b>						
<b>Original health area</b>						
▪ AS Isaka mbole	17 (81%)	4 (19%)	21	100	Khi2=1.80 ddl = 7 P-value=0.0363	S
▪ AS Semendwa	72 (84.7%)	13 (15.3%) 2	85	100		
▪ AS Boyon	24 (92.3%)	(7.7%) 3	26	100		
▪ AS Kutu	19 (86.4%)	(13.6%) 3	22	100		
▪ AS Kempimpi	20 (87.0%)12	(13.0%)3	23	100		
▪ AS Muntu quoted	(80%)13	(20%)2	15	100		
▪ AS Likwangola	(86.7%)11(84.6 %)	(13.3%)2	15	100		
▪ Others		(15.4%)	13	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
<b>Membership structure</b>						
▪ General reference hospital	5 (100%)	0 (0.0%)	5	100	Khi2=18.97 ddl =4 p -value= 0.001**	TS
▪ Reference health center	23 (65.7%)	2 (34.3%)	35	100		
▪ Health center	28 (77.8%)	8 (22.2%)	36	100		
▪ Health post	63 (88.7%) 69	8 (11.3%)4	71	100		
▪ Community animation unit (CAC)	(94.5%)	(5.5%)	73	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			

<b>Function</b>						
▪ Community relay	72 (94.7%)	4 (5.3%)	76	100	Khi2=6.94 ddl =1 p-value=0.01	S
▪ Health care provider	116 (80.6%)	28 (19.4%)	144	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
<b>Sex</b>						
▪ Female	101 (89.4%)	12 (10.6%)	113	100	Khi2=2.26 ddl = 1 p-value=0.02	S
▪ Male	87 (81.3%)	20 (18.7%)	107	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
<b>Age</b>						
▪ 18-28 years old	20 (90.9%)	2 (9.1%)	22	100	Khi2=1.59 ddl = 3 p-value = 0.03	S
▪ 29-39 years old	79 (82.3%)	17 (17.7%)	96	100		
▪ 40-50 years old	77 (87.5%) 12	11 (12.5%) 2	88	100		
▪ 60 years +	(85.7%)	(14.3%)	14	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
<b>Marital status</b>						
▪ Married	129 (86%)	21 (14%)	150	100	Khi2=2.303 9 ddl = 3 p-value=0.03	S
▪ Bachelor	27 (81.8%)	6 (18.2%) 2	33	100		
▪ Divorced	23 (92%) 9	(8%) 3 (25%)	25	100		
▪ Widower ( ve )	(75%)		12	100		
<b>total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
<b>Occupations</b>						
▪ Doctor	3 (75%)	1 (25%)	4	100	Khi2 = 17.6976 ddl = 7 p-value = 0.001*	TS
▪ Nurse	85 (76.6%) 16	26 (23.4%) 0	111	100		
▪ Laboratory technician	(100%)	(0%)	16	100		
▪ Teacher	7 (87.5%)	1 (12.5%)	8	100		
▪ Farmer	39 (97.5%)	1 (2.5%)	40	100		
▪ Housekeeping	9 (100%)	0 (0%)	9	100		
▪ Others to be specified	3 (100%)	0 (0%)	3	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			

**Source:** Field survey, 2024

**Comment :** At the 5% threshold for the variable Health area of origin and non-compliance with SURVEPI standards;  $X^2= 1.80$ , ddl = 7, P-value=0.0363, membership structure and non-compliance with SURVEPI standards;  $X^2= 18.97$ , ddl =4, p-value= 0.001\*\*, Function and non-compliance with SURVEPI standards;  $X^2= 6.94$ , ddl =1, p-value=0.001, Sex and non-compliance with SURVEPI standards;  $X^2= 2.26$ , ddl = 1, p-value=0.02, Age and non-compliance with SURVEPI standards;  $X^2= 1.59$ , ddl = 3, p-value= 0.03, Marital status and non-

compliance with SURVEPI standards;  $X^2 = 2.3039$ ,  $ddl = 3$ ,  $p\text{-value} = 0.02$ , Occupations and non-compliance with SURVEPI standards;  $X^2 = 17.6976$ ,  $ddl = 7$  and  $p\text{-value} = 0.001^*$ .

(b) Non-compliance with cultural norms and factors

*Table 7: Relationship between non-compliance with standards and cultural factors related to epidemiological surveillance*

Associated factors	Failure to comply with epidemiological surveillance standards	Compliance with epidemiological surveillance standards	Total (Number)	Total (%)	Chi-square statistic and p-value	DS
<b>Ethnicity:</b>						
▪ SAKATA	116 (81.7%)	26 (18.3%)	142	100	Khi2 = 5.1878 ddl = 4 p-value = 0.02*	S
▪ KUNDO	28 (90.3%)	3 (9.7%)	31	100		
▪ BOMA	20 (90.9%)	2 (9.1%)	22	100		
▪ SENGELE	14 (93.3%)	1 (6.7%)	15	100		
▪ Others	10 (100%)	0 (0.0%)	10	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
<b>Religion :</b>						
▪ Without religion	52 (92.9%)	4 (7.1%)	56	100	Khi2 = 9.9789 ddl = 4 p-value = 0.001**	TS
▪ Christianity	73 (77.7%)	21 (22.3%)	94	100		
▪ Muslim	14 (82.4%)	3 (17.6%)	17	100		
▪ Black Church	12 (85.7%)	2 (14.3%)	14	100		
▪ others	37 (94.9%)	2 (5.1%)	39	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
<b>Level of education</b>						
▪ Without level	36 (100%)	0 (0%)	36		Khi2 = 14.3004 ddl = 5 p-value = 0.001**	TS
▪ Unfinished secondary	24 (100%)	0 (0%)	24			
▪ Patented	15 (83.3%)	3 (16.7%)	18			
▪ State graduate	62 (79.5%)	16 (20.5%)	78			
▪ Graduated	48 (80%)	12 (20%)	60			
▪ licensed	3 (75%)	1 (25%)	4			
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			

**Source:** Field survey, 2024

**Comment :** At the 5% threshold for the ethnicity variable and non-compliance with SURVEPI standards;  $X^2 = 5.1878$ ,  $ddl = 4$ ,  $p\text{-value} = 0.02^*$ , Religion and non-compliance with SURVEPI standards;  $X^2 = 9.9789$ ,  $ddl = 4$ ,  $p\text{-value} = 0.001^{**}$ , Level of education and non-compliance with SURVEPI standards;  $X^2 = 14.3004$ ,  $ddl = 5$ ,  $p\text{-value} = 0.001^{**}$ .

c) Non-compliance with epidemiological standards and Knowledge and Attitudes of providers and community relays

*Table 8: Relationship between Non-compliance with epidemiological standards and Knowledge and Attitudes of providers and community relays*

Associated factors	Failure to comply with epidemiological surveillance standards	Compliance with epidemiological surveillance standards	Total (Number)	Total (%)	Chi-square statistic and p-value	DS
Do you know about epidemiological surveillance? <ul style="list-style-type: none"> <li>No</li> <li>Yes</li> </ul>	25 (100%) 163 (83.6%)	0 (100%) 32 (16.4%)	25 195	100 100	Khi2 = 3.5714 ddl = 1 p-value = 0.007	S
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
List the frequencies or rates of data transmission. <ul style="list-style-type: none"> <li>Immediate</li> <li>Weekly</li> <li>Immediate, weekly and quarterly</li> <li>Others</li> </ul>	13 (86.7%) 80 (87%) 27 (61.4%) 68 (98.6%)	2 (13.3%) 12 (13%) 17 (38.6%) 1 (1.4%)	15 92 44 69	100 100 100 100	Khi2 = 30.2501 ddl = 3 p-value = 0.0001**	TS
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
What are the most used indicators in reporting? <ul style="list-style-type: none"> <li>Completeness</li> <li>Promptness</li> <li>Completeness and promptness</li> <li>Others</li> </ul>	22 (91.7%) 29 (80.6%) 25 (54.3%) 112 (98.2%)	2 (8.3%) 7 (19.4%) 21 (45.7%) 2 (1.8%)	24 36 46 114	100 100 100 100	Khi2 = 52.2559 ddl = 3 p-value = 0.0001**	TS
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
Do you know your hierarchical level to transmit your data? <ul style="list-style-type: none"> <li>No</li> <li>Yes</li> </ul>	8 (100%) 180 (84.9%)	0 (0%) 32 (15.1%)	8 112	100 100	Khi2 = 0.4596 ddl = 1 p-value = 0.896	PS
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
Do you know the alert threshold? <ul style="list-style-type: none"> <li>No</li> <li>Yes</li> </ul>	97 (100%) 91 (74%)	0 (0%) 32 (26%)	97 123	100 100	Khi2 = 27.4752 ddl = 1 p-value = 0.0001**	TS
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
Do you know the epidemic threshold? <ul style="list-style-type: none"> <li>No</li> <li>Yes</li> </ul>	137 (98.7%) 51 (54.5%)	2 (1.3%) 30 (45.5%)	139 81	100 100	Khi2 = 68.9607 ddl = 1 p-value = 0.0001**	TS

<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
What should be done when this threshold is reached?					Khi2 = 11.1527 ddl = 1 p-value = 0.0001*	TS
▪ Nothing at all	27 (86.2%)	4 (13.8%)	34	100		
▪ The response must be organized	26 (50.9%)	24 (49.1%)	53	100		
<b>Total</b>	<b>52</b>	<b>28</b>	<b>87</b>			
How many types or modes of data transmission are there?					Khi2 = 19.3450 ddl = 3 p-value = 0.0001**	TS
▪ 1	22 (91.7%)	2 (8.3%)	24	100		
▪ 2	54 (85.7%)28	9 (14.3%) 15	63	100		
▪ 3	(65.1%)83	(34.9%) 6	43	100		
▪ Others	(93.3%)	(6.7%)	89	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
What strategies are in place for the identification of cases of diseases under surveillance?					Khi2 = 13.0463 ddl = 2 p-value = 0.0001**	TS
▪ Presence of standard disease definitions	81 (78.6%)	22 (21.4%)	103	100		
▪ Knowledge of the phenomenon	34 (81%)	8 (19%)	42	100		
▪ Others	73 (97.3%)	2 (2.7%)	75	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>	<b>100</b>		
What are the risks of not respecting SURVEPI standards?					Khi2 = 6.9969 ddl = 3 p-value = 0.02	S
▪ Appearance of diseases	113 (82.5%)	24 (17.5%)	137	100		
▪ System malfunction	23 (85.2%)	4 (14.8%)	27	100		
▪ Lack of intervention at the hierarchical level	18 (81.8%)	4 (18.2%)	22	100		
▪ Others	34 (100%)	0 (0%)	34	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
What are your knowledge, attitudes and opinions on epidemiological surveillance in general?						TS
▪ Neutral						
▪ Monitoring system assessment	82 (88.2%)	11 (11.8%)	93	100	Khi2 = 111.6315 ddl = 3 p-value = 0.001**	
▪ I don't agree with this system.	0 (0%)	17 (100%)	17	100		
▪ Others	67 (98.5%)	1 (1.5%)	68	100		
	39 (92.9%)	3 (7.1%)	42	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			

Source: Field survey, 2024

**Comment :** At the 5% threshold for the variable knowledge on epidemiological surveillance and non-compliance with epidemiological surveillance standards;  $X^2 = 3.5714$ ,  $ddl = 1$ ,  $p\text{-value} = 0.007$ , the frequencies or rhythms of data transmission and non-compliance with epidemiological surveillance standards;  $X^2 = 30.2501$ ,  $ddl = 3$ ,  $p\text{-value} = 0.0001^{**}$ , the indicators most used in reporting and non-compliance with epidemiological surveillance standards;  $X^2 = 52.2559$ ,  $ddl = 3$ ,  $p\text{-value} = 0.0001^{**}$ , knowledge of the hierarchical level for data transmission and non-compliance with epidemiological surveillance standards;  $X^2 = 0.4596$ ,  $ddl = 1$ ,  $p\text{-value} = 0.896$ , knowledge about the alert threshold and non-compliance with epidemiological surveillance standards;  $X^2 = 27.4752$ ,  $ddl = 1$ ,  $p\text{-value} = 0.0001^{**}$ , knowledge about the epidemic threshold and non-compliance with epidemiological surveillance standards;  $X^2 = 68.9607$ ,  $ddl = 1$ ,  $p\text{-value} = 0.0001^{**}$ , What should be done when this threshold is reached and non-compliance with SURVEPI standards;  $X^2 = 11.1527$ ,  $ddl = 1$ ,  $p\text{-value} = 0.0001^{*}$ , data transmission mode reached and non-compliance with SURVEPI standards;  $X^2 = 19.3450$ ,  $ddl = 3$ ,  $p\text{-value} = 0.00^{**}$ , the risks of not respecting the standards non-compliance with SURVEPI standards;  $X^2 = 6.9969$ ,  $ddl = 3$ ,  $p\text{-value} = 0.02$ , strategies implemented for the identification of cases of diseases under surveillance and non-compliance with SURVEPI standards;  $X^2 = 13.0463$ ,  $ddl = 2$ ,  $p\text{-value} = 0.0001^{**}$ , knowledge, attitudes and opinions on epidemiological surveillance in general and non-compliance with SURVEPI standards;  $X^2 = 111.6315$ ,  $ddl = 3$ ,  $p\text{-value} = 0.0001^{**}$ .

(d) Failure to comply with epidemiological surveillance standards and organizational factors

*Table 9: Non-compliance with epidemiological surveillance standards and organizational factors*

Associated factors	epidemiological surveillance standards	Compliance with epidemiological surveillance standards	Total ( number )	Total (%)	Chi-square statistic and p-value	DS
Are you trained in epidemiological/community-based surveillance? ▪ No ▪ Yes	155 (96.9%) 33 (55%)	5 (3.1%) 27 (45%)	160 60	100 100	Khi2 = 58.2368 ddl = 1 p-value = 0.001**	TS
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
Do you have data transmission tools? ▪ No ▪ Yes	53 (100%) 135 (80.8%)	0 (0%) 32 (19.2%)	53 167	100 100	Khi2 = 10.3927 ddl = 1 p-value = 0.01*	TS
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			
Do you receive financial support to					Khi2 = 38.4008	TS

carry out activities in this surveillance?					ddl = 1 p-value = 0.001 **	
▪ No	182 (90.1%)	20 (9.9%)	102	100		
▪ Yes	6 (33.3%)	12 (66.7%)	18	100		
<b>Total</b>	<b>188</b>	<b>32</b>	<b>220</b>			

**Source:** Field survey, 2024

**Comment :** At the 5% threshold :

- The relationship between non-compliance with epidemiological standards and training gives the following results:  $X^2 = 58.2368$ ; ddl = 1; p-value = 0.001\*\*;
- the relationship between epidemiological standards and having data transmission tools:  $X^2 = 10.3927$ ; ddl = 1; p-value = 0.01\*;
- the relationship between non-compliance with epidemiological standards and receiving financial support to carry out surveillance activities:  $X^2 = 38.4008$ ; ddl = 1; p-value = 0.001 \*\*.

#### 4. Discussion

The analysis carried out made it possible to highlight the importance of each of the variables retained in the conceptual framework. At this stage, we will try to give a sociological meaning to the different analyses.

The observed differences must be confirmed or refuted by a statistic at the bivariate analysis level .

##### 4.1. *Univariate analysis*

- The age group between 29-39 years dominates. This is about the will of our authorities to rejuvenate our health institutions. This shows a commitment of young people to the succession.
- The female sex is dominant, this can be justified by the fact that health is more the preferred profession of female beings.
- Married people dominate this can reflect by the fact that not everyone wants to remain single; some time after getting the job, seeks to get married and in the village, financial conditions do not weigh on marriage.
- For the original Health Area, AS Semendwa has more respondents because it is through this Health Area where the problem was identified in order to conduct this scientific research, which is why we based it on this geographical entity to have information.
- As for the membership structure, the community animation cell is dominant, this can be justified by the fact that the community relays are one of our two targets, and thus all of these have been classified just in the community animation cell paradoxically to the care providers who are distributed to the health institutions.
- Nurses are in the majority, which can be justified by the fact that several health structures are filled with nurses compared to other health professionals;



- The majority of healthcare providers are represented by this, which can be justified by the fact that the target population is made up of healthcare providers and community relays.
- The SAKATA ethnic group is dominant because our survey was carried out in the land of this tribe where the Bokoro Rural Health Zone is located .
- Christians are more dominant because the Christian religion arrived very early in this geographical entity. The General Directorate of the Community of United Baptist Churches (CEBU) is in Semendwa until today.
- Graduates are in the majority because with today's world, the majority of the population seeks to have a state diploma. Since the opening of private, conventional schools across the Province, the number of graduates has increased dramatically.
- Those who know the epidemiological standards are in the majority because anyone who is called a health worker has the right to information about epidemics.
- The health professional is the most used channel, this can be justified by the fact that health professionals have received officially recognized medical training and it is through this professional training that they are able to prevent, promote and improve the health of the community.
- For the frequency of data transmission, the weekly frequency is more represented because several health agents in rural areas think that the MAPEPIs that are sent to the central office are the only frequencies for data transmission.
- For reporting indicators, the other indicators are more numerous because at the level of health training and community animation unit, the agents have gaps on the indicator word.
- Knowledge about the hierarchical level for data transmission, those who know are numerous because almost everyone in a company knows their direct boss even if they do not have a higher level of education.
- Knowledge, attitudes and opinions on epidemiological surveillance, those who are neutral are numerous because the surveillance system placed in our country with the resources mobilized, health personnel are always dissatisfied with the latter.
- The risks of not respecting the standards, those who have confirmed the appearance of the diseases are in the majority this can be justified by the fact that these health workers control the risks of not respecting the standards of epidemiological surveillance.
- The strategies implemented for the identification of cases of diseases under surveillance, the presence of standard definitions is in the majority, this can be justified by the fact that it is a tool that any agent who is supposed to carry out surveillance cannot miss.
- Knowledge about the alert threshold, those who know are numerous because it is a threshold that every agent despite their level of education should know in order to properly identify any health problem.
- Yes, yes, what should be done when this threshold is reached? Many have confirmed that the person in charge must be informed. This can be justified by the fact that everyone justifies a health problem in rural areas by calling their hierarchical level.
- Knowledge about the epidemic threshold, those who said no are more numerous because as the agents are not very well trained in the matter it is more difficult to detect this threshold.

- What should be done when this threshold is reached? Those who said yes are in the majority. This can be justified by the fact that everyone who is able to know the epidemic threshold is also able to understand that a response must be organized when this threshold is reached.
- Training on epidemiological surveillance, those who said no are in the majority, this can be justified by the fact that several personnel are not trained in epidemiological surveillance matters in the said entity.

Yes, how long has it been since? Those who have been trained for between 2 and 5 years are in the majority because the retraining of agents in epidemiological surveillance poses a problem in this health zone.

Having data transmission tools, those who said yes are numerous because any agent cannot lack even a paper and a pen or any other material to transmit the data collected in the field.

Benefit from financial support to carry out epidemiological surveillance activities, those who said no are in the majority because surveillance activities are not funded in health structures.

As for compliance with SURVEPI standards, those who said no are dominant, which shows that the standards of epidemiological surveillance are not respected in this entity.

Otherwise, for what reasons, those who confirmed due to lack of means are more numerous because the means overflow all the resources made available for the organization of a company while within our country, all the resources are not well managed in fact.

At the end of the univariate analysis, we note that the service providers and community relays questioned know the standards but do not apply them due to lack of adequate materials, lack of regular training, lack of financial support and also most of RECO have not done public health.

## **4.2. Bivariate analysis**

### *4.2.1. Factors associated with non-compliance with epidemiological surveillance standards*

There is no relationship statistically significant difference between compliance with standards and the residence of the respondent, this can be explained by the fact that those who reside in the targeted Health Areas and those who do not act in the same way on non-compliance with epidemiological surveillance.

The health area of origin has a statistical relationship with non-compliance with epidemiological surveillance standards, this can be explained by the fact that compliance with epidemiological surveillance standards also depends on the distance from the community animation cell to its Health Area and that of the Health Area to its Health Zone.

The structure of membership has a significant statistical relationship with non-compliance with epidemiological surveillance standards, this can be explained by the fact that all the structures mentioned above do not carry out epidemiological surveillance in the same way.

The function has a statistical link with the non-compliance with the standards of epidemiological surveillance, this can be explained by the fact that the more one occupies a certain function, the more or less one respects the standards of epidemiological surveillance.

Community relays and service providers have not respected the standards of epidemiological surveillance due to a lack of proven knowledge in this area.

Gender has a very significant relationship with non-compliance with epidemiological surveillance standards, this can be justified by the fact that the majority of our respondents are female, while surveillance activities require mobility and respect for the duration of services because often for family reasons, the woman leaves early or arrives late.

Marital status also has a relationship with non-compliance with epidemiological surveillance standards, this can be attributed to the fact that more of our respondents are married. While marriage makes a person responsible and busy for the rest of his life.

Occupation has a very significant relationship with non-compliance with epidemiological surveillance standards, this can be justified by the fact that most of our respondents are nurses while they are not well trained in epidemiological surveillance matters.

Ethnicity has a statistically significant link with non-compliance with epidemiological surveillance standards, this can be justified by the fact that custom is too respected in rural areas and especially among the Sakata.

Religion has a very significant relationship with the non-compliance with the standards of epidemiological surveillance. This is explained by the fact that many non-Christian churches seem to be somewhat negligent about the health status of their believers in the power of prayer for the miraculous healing of all forms of diseases.

In fact, there are religions that are downright resistant to modern care and develop various speculations to prevent their followers from seeking treatment.

The level of education has a very significant relationship, this may be due to the fact that this level of education occupies a large part of responsibility in the inefficiency of policies in terms of epidemiological surveillance.

Knowledge of epidemiological surveillance has a statistical link with non-compliance with the standards of epidemiological surveillance, this can be justified by the fact that most of our respondents who did not respect the standards of epidemiological surveillance accepted that they knew about it. This is justified by the fact that caregivers have low salaries

The frequencies or rhythms of data transmission have a significant statistical relationship with non-compliance with the standards of epidemiological surveillance, this proves to us that the predominance of our respondents do not know the rhythms of data transmission to their hierarchy, which proves a lack of training within the health facilities of this Health Zone.

The most used indicators in reporting have a strong statistical relationship with non-compliance with epidemiological surveillance standards, this can lead us to say that the health areas of the Bokoro Rural Health Zone do not have sufficient knowledge in terms of reporting indicators. This also shows a lack of supervision of the health zone management team in the health areas on disease surveillance activities.

Knowledge of the hierarchical level for data transmission has no statistical link with non-compliance with epidemiological surveillance standards because everyone, even at the community level and at the level of care structures, nevertheless knows their hierarchical level and especially at the operational level.

Knowledge about the alert threshold has a strong statistically significant relationship with non-compliance with epidemiological surveillance standards, as the predominance of our respondents do not know about a public health alert.

Knowledge of the epidemic threshold has a significant statistical relationship with non-compliance with epidemiological surveillance standards, which proves a low knowledge of healthcare providers in matters of epidemiological surveillance and also a low involvement of community relays in health activities.

Reaching the epidemic threshold has a statistical link with the non-compliance with the standards of epidemiological surveillance, it also marks a lack of training and information of health professionals and also community relays.

The types of data transmission have a very significant relationship with the non-compliance with the standards of epidemiological surveillance, this can be justified by the fact that the community relays and also some care providers who are not data managers do not have control over the methods of data transmission.

The risks of not respecting the standards are related to the non-compliance with the standards of epidemiological surveillance, this proves that the majority of our respondents do not actually know the significant risks of non-compliance with the standards of epidemiological surveillance. We can also attribute in addition, the management team of the health zone for lack of briefing on the said subject.

The strategies implemented for the identification of cases of diseases under surveillance have a very significant relationship with the non-compliance with the standards of epidemiological surveillance, this proves a lack of display of diseases under surveillance in health facilities, even in the central office of the health zone.

Knowledge, attitudes, opinions and behaviors on epidemiological surveillance in general have a very significant relationship with non-compliance with the standards of epidemiological surveillance, this proves as listed above; health workers in this health zone more precisely in the targeted health areas do not have sufficient knowledge on epidemiological surveillance. An observation also made is that health professionals have fumbling to answer the questions of our study during our field trip.

Training in community-based epidemiological surveillance has a very significant relationship with non-compliance with epidemiological surveillance standards, which can be justified by the fact that many respondents have not been trained in epidemiological surveillance matters.

Having the tools for data transmission has a significant statistical link with non-compliance with the standards of epidemiological surveillance, this proves that the lack of tools hinders the transmission of data at the hierarchical level as required.

Benefit from financial support to carry out activities in this surveillance has a very significant relationship with the non-compliance with the standards of epidemiological surveillance, this means that epidemiological surveillance activities in the rural health zone of Bokoro do not have financial support.

The risks of not respecting the standards has a statistical link with the non-compliance with the standards of epidemiological surveillance, this justifies that the health problem more precisely the epidemics will remain as a permanent scourge in this health zone. Because the absolute risk of non-compliance with the standards is not controlled by themselves.

## **5. Conclusion**

At the end of this study, the objective of which was to identify the factors associated with non-compliance with the standards of epidemiological surveillance aimed at reducing mortality and morbidity rates due to epidemics in the Bokoro Rural Health Zone . Study conducted from 01/08 to 31/10/2023, we conclude that:

- The measures put in place for the detection of cases of epidemics are carried out by the standard definition of diseases at the operational level.
- Despite literacy within this community in recent decades, there are still harmful opinions and attitudes about epidemiological surveillance.
- Socio-demographic factors, socio-cultural factors, and organizational factors would be at the root of non-compliance with the standards of epidemiological surveillance.

Kwilu Provincial Health Division in the coming years.

### **1. Ministry of Public Health, Hygiene and Prevention :**

- To establish a more effective surveillance system to enable the entire population of the country to benefit and avoid the resurgence of epidemics;

### **2. Maindombe Provincial Health Division :**

- To hire epidemiologists to properly detect health problems within this population;
- To properly supervise, monitor and evaluate epidemiological surveillance activities in problem health areas;
- To train health workers and also community relays in matters of epidemiological surveillance;
- To fund these activities to enable a good surveillance system within our community;
- To make all data collection tools accessible for better monitoring;
- To evaluate data from health zones for good data quality in SURVEPI.

### **3. In the BOKORO rural health zone:**

- To strengthen the capacity of service providers in epidemiological surveillance activities;
- To harmonize and respect the standards of epidemiological surveillance in order to detect any health problems within the population in good time;
- To supervise the health areas on SURVEPI activities;

4. In health areas :

- Any health problem that requires intervention by the hierarchy is not neglected;
- To raise awareness in the community about health events that endanger the health of the population;
- To display the standard definition of diseases under surveillance within the walls of health facilities.

5. To the community:

- To engage in raising awareness and monitoring epidemics within the community;
- To take into account all suspected cases of a disease that is in the community;
- To transmit information received within the community to the hierarchical level in a timely manner.

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