Original Research Article

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

Abstract

This study analyses factors associated with non-compliance with epidemiological standards in the Bokoro Health Zone (2021-2023) using univariate and bivariate statistical analyses. Key factors influencing non-compliance include socio-demographic, socio-cultural, and organizational factors. Our findings reveal significant correlations between non-compliance and factors such as health area of origin, membership structure, and occupation, with recommendations for improving compliance and surveillance efficiency.

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; Baune et al., 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 (Senyonjo et al., 2016; Rosha et al., 2021; Nivette et al., 2021).

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.
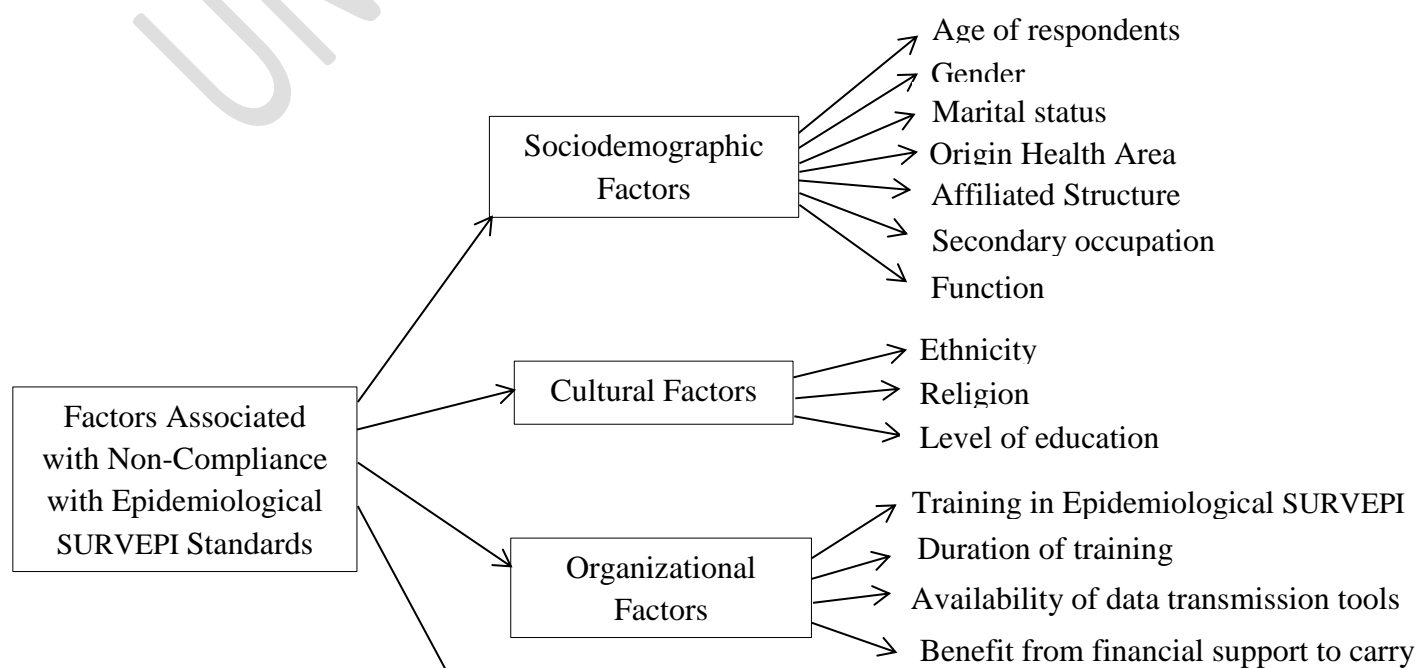
This framework is as follows:

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

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	%
1	**Age of respondents**		
	▪ 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%
Total		**220**	**100**
2	**Sex**		
	▪ Male	107	48.6%
	▪ Female	113	51.4%
Total		**220**	**100**
3	**Marital status:**		
	▪ Married€	150	68.1%
	▪ Bachelor	33	15.0%
	▪ Divorced	25	11.4%
	▪ Widower	12	5.5%
Total		**220**	**100**
4	**Original health area**		
	▪ 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%
	▪ others	13	5.9%
Total		**220**	**100**
5	**Membership structure**		
	▪ General reference hospital	5	2.2%
	▪ Reference health center	35	15.9%
	▪ Health center	36	16.4%
		71	32.3%

No.	Factors	Effective	%
	▪ Health post	73	33.2%
	▪ Community animation unit		
Total		**220**	**100**
6	**Secondary occupation**		
	- Doctor	4	1.9%
	- Nurse	111	50.6%
	- Laboratory technician	16	7.3%
	- Teacher	8	3.6%
	- Farmer	40	18.1%
	- Housekeeper	9	4.1%
	- Midwife	14	6.3%
	- Others	18	8.1%
Total		**220**	**100**
7	**Function**		
	- Community relay	76	34.5%
	- Health care providers	144	65.5%
Total		**220**	**100**

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	%
1	**Ethnicity:**		
	▪ Sakata	142	64.5%
	▪ Kundo	31	14.1%
	▪ Boma	22	10.0%
	▪ Sengele	15	6.9%
	▪ Others	10	4.5%
Total		**220**	**100**
2	**Religion :**		
	▪ Black Church	56	25.5%
	▪ Christianity	94	42.7%
	▪ Muslim	17	7.7%
	▪ Without religion	14	6.4%
	▪ Others	39	17.7%
Total		**220**	**100**

3	Level of education		
	▪ Unfinished secondary	24	10.9%
	▪ Patented	54	24.6%
	▪ State graduate	78	35.5%
	▪ Graduated	60	27.3%
	▪ licensed	4	1.7%
Total		**220**	**100**

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	%
1	Do you know about epidemiological surveillance?		
	▪ **Yes**	195	88.6%
	▪ **No**	25	12.4%
Total		**220**	**100**
2	If yes on which channel?		
	▪ Radio	19	9.7%
	▪ Television	3	1.5%
	▪ RECOS	5	2.6%
	▪ Pro-health	104	53.3%
	▪ School or university	34	17.4%
	▪ In training	21	10.8%
	▪ Others	9	4.6%
Total		**195**	**100**
3	List the frequencies or rates of data transmission.		
	▪ Immediate	15	6.8%
	▪ Weekly	92	41.8%
	▪ Immediate, weekly and quarterly	44	20.0%
	▪ Others	69	31.4%
Total		**220**	**100**
4	What are the most used indicators in reporting?		
	▪ Completeness	24	10.9%

	▪ Promptness	36	16.4%
	▪ Completeness and Promptness	46	20.9%
	▪ Others		
		114	51.8%
Total		**220**	**100**
5	Do you know your hierarchical level to transmit your data?		
	▪ No		
	▪ Yes	212	96.4%
		18	3.6%
Total		**220**	**100**
6	What are your knowledge, attitudes and opinions about epidemiological surveillance in general?		
	▪ Neutral	93	42.5%
	▪ Monitoring system assessment		
	▪ I don't agree with this system.	17	7.8%
	▪ Others	67	30.6%
		42	19.2%
7	What are the risks of not meeting the standards?		
	▪ Appearance of diseases	137	62.3%
	▪ System malfunction	27	12.3%
	▪ Lack of intervention at the hierarchical level	22	10.0%
		34	15.5%
	Others		
Total		**220**	**100**
8	What strategies are in place for identifying cases of diseases under surveillance?		
	▪ Presence of standard disease definitions	103	46.8%
	▪ Knowledge of the phenomenon	42	19.1%
	▪ Others	75	34.1%
Total		**220**	**100**
9	What are the most used indicators in reporting?		
	▪ Completeness	24	10.9%
	▪ promptness	36	16.4%
	▪ Completeness and promptness	46	20.9%
	▪ others	114	51.8%
Total		**220**	**100**
10	Do you know the alert threshold?		
	▪ Yes	123	55.9%
	▪ No	97	44.1%
Total		**220**	**100**

No		Effective	%
11	If so, what should be done when this threshold is reached?		
	▪ Nothing at all	40	32.5%
	▪ Inform the person in charge	54	43.9%
	▪ Organize an investigation	29	23.6%
Total		**123**	**100**
12	Do you know the epidemic threshold?		
	▪ Yes	81	36.8%
	▪ No	139	63.2%
Total		**220**	**100**
13	What should be done when this threshold is reached?		
	▪ Nothing at all	31	38.2%
	▪ The response must be organized	50	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	160	72.7%
	▪ Yes	60	27.3%
Total		**220**	**100**
2	If so, how long has it been since?		
	▪ More than 5 years	20	31.0%
	▪ 2-5 years	27	46.6%
	▪ Less than 2 years	13	22.4%

Total		60	100
3	Do you have data transmission tools? ▪ No ▪ Yes	 53 167	 24.1% 75.9%
Total		220	100
4	Do you receive financial support to carry out activities in this surveillance? ▪ No ▪ Yes	 202 18	 91.8% 8.2%
Total		220	100

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? ▪ No ▪ Yes	 188 32	 85.5% 14.5%
Total		220	100
2	If not, for what reasons? ▪ Lack of means ▪ System malfunction ▪ Lack of intervention at the hierarchical level ▪ Others	 111 16 37 22	 59.7% 8.6% 19.9% 11.8%
Total		188	100

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
Sociodemographic factors						
Original health area ▪ AS Isaka mbole ▪ AS Semendwa ▪ AS Boyon ▪ AS Kutu ▪ AS Kempimpi ▪ AS Muntu quoted ▪ AS Likwangola ▪ Others	17 (81%) 72 (84.7%) 24 (92.3%) 19 (86.4%) 20 (87.0%)12 (80%)13 (86.7%)11(84.6%)	4 (19%) 13 (15.3%) 2 (7.7%) 3 (13.6%) 3 (13.0%)3 (20%)2 (13.3%)2 (15.4%)	21 85 26 22 23 15 15 13	100 100 100 100 100 100 100 100	Khi2=1.80 ddl = 7 P-value=0.0363	S
Total	**188**	**32**	**220**			
Membership structure ▪ General reference hospital ▪ Reference health center ▪ Health center ▪ Health post ▪ Community animation unit (CAC)	5 (100%) 23 (65.7%) 28 (77.8%) 63 (88.7%) 69 (94.5%)	0 (0.0%) 2 (34.3%) 8 (22.2%) 8 (11.3%)4 (5.5%)	5 35 36 71 73	100 100 100 100 100	Khi2=18.97 ddl =4 p -value= 0.001**	TS
Total	**188**	**32**	**220**			
Function ▪ Community relay	72 (94.7%)	4 (5.3%)	76 144	100 100	Khi2=6.94 ddl =1 p-value=0.01	S

	188	32	220			
▪ Health care provider	116 (80.6%)	28 (19.4%)				
Total	**188**	**32**	**220**			
Sex ▪ Female ▪ Male	101 (89.4%) 87 (81.3%)	12 (10.6%) 20 (18.7%)	113 107	100 100	Khi2=2.26 ddl = 1 p-value=0.02	S
Total	**188**	**32**	**220**			
Age ▪ 18-28 years old ▪ 29-39 years old ▪ 40-50 years old ▪ 60 years +	20 (90.9%) 79 (82.3%) 77 (87.5%) 12 (85.7%)	2 (9.1%) 17 (17.7%) 11 (12.5%)2 (14.3%)	22 96 88 14	100 100 100 100	Khi2=1.59 ddl = 3 p-value = 0.03	S
Total	**188**	**32**	**220**			
Marital status ▪ Married ▪ Bachelor ▪ Divorced ▪ Widower (ve)	129 (86%) 27 (81.8%) 23 (92%)9 (75%)	21 (14%) 6 (18.2%)2 (8%)3 (25%)	150 33 25 12	100 100 100 100	Khi2=2.3039 ddl = 3 p-value=0.03	S
total	188	32	220			
Occupations ▪ Doctor ▪ Nurse ▪ Laboratory technician ▪ Teacher ▪ Farmer ▪ Housekeeping ▪ Others to be specified	3 (75%) 85 (76.6%)16 (100%) 7 (87.5%) 39 (97.5%) 9 (100%) 3 (100%)	1 (25%) 26 (23.4%)0 (0%) 1 (12.5%) 1 (2.5%) 0 (0%) 0 (0%)	4 111 16 8 40 9 3	100 100 100 100 100 100 100	Khi2 = 17.6976 ddl = 7 p-value = 0.001*	TS
Total	188	32	220			

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-value=0.02, Occupations and non-compliance with SURVEPI standards; X^2= 17.6976, ddl = 7 and p-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
Ethnicity: ▪ SAKATA ▪ KUNDO ▪ BOMA ▪ SENGELE ▪ Others	116 (81.7%) 28 (90.3%) 20 (90.9%) 14 (93.3%) 10 (100%)	26 (18.3%) 3 (9.7%)2 (9.1%)1 (6.7%)0 (0.0%)	142 31 22 15 10	100 100 100 100 100	Khi2 = 5.1878 ddl = 4 p-value=0.02*	S
Total	**188**	**32**	**220**			
Religion : ▪ Without religion ▪ Christianity ▪ Muslim ▪ Black Church ▪ others	52 (92.9%) 73 (77.7%) 14 (82.4%) 12 (85.7%) 37 (94.9%)	4 (7.1%) 21 (22.3%)3 (17.6%)2 (14.3%) 2 (5.1%)	56 94 17 14 39	100 100 100 100 100	Khi2=9.9789 ddl =4 p-value=0.001**	TS
Total	**188**	**32**	**220**			
Level of education ▪ Without level ▪ Unfinished secondary ▪ Patented ▪ State graduate ▪ Graduated ▪ licensed	36 (100%) 24 (100%) 15 (83.3%) 62 (79.5%) 48 (80%) 3 (75%)	0 (0%) 0 (0%) 3 (16.7%) 16 (20.5%) 12 (20%) 1 (25%)	36 24 18 78 60 4		Khi2 = 14.3004 ddl = 5 p-value=0.001**	TS
Total	**188**	**32**	**220**			

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-value = 0.02*, Religion and non-compliance with SURVEPI standards; X^2= 9.9789, ddl = 4, p-value = 0.001**, Level of education and non-compliance with SURVEPI standards; X^2 = 14.3004, ddl = 5, p-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? ▪ No ▪ Yes	25 (100%) 163 (83.6%)	0 (100%) 32 (16.4%)	25 195	100 100	Khi2 = 3.5714 ddl = 1 p-value = 0.007	S
Total	**188**	**32**	**220**			
List the frequencies or rates of data transmission. ▪ Immediate ▪ Weekly ▪ Immediate, weekly and quarterly ▪ Others	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
Total	**188**	**32**	**220**			
What are the most used indicators in reporting? ▪ Completeness ▪ Promptness ▪ Completeness and promptness ▪ Others	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
Total	**188**	**32**	**220**			
Do you know your hierarchical level to transmit your data? ▪ No ▪ Yes	8 (100%) 180 (84.9%)	0 (0%) 32 (15.1%)	8 112	100 100	Khi2 = 0.4596 ddl = 1 p-value = 0.896	PS
Total	**188**	**32**	**220**			
Do you know the alert threshold? ▪ No ▪ Yes	97 (100%) 91 (74%)	0 (0%) 32 (26%)	97 123	100 100	Khi2 = 27.4752 ddl = 1 p-value = 0.0001**	TS
Total	**188**	**32**	**220**			
Do you know the epidemic threshold? ▪ No ▪ Yes	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

	188	32	220	100		
Total	**188**	**32**	**220**			
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		
Total	**52**	**28**	**87**			
How many types or modes of data transmission are there?					Khi2 = 19.3450	TS
▪ 1	22 (91.7%)	2 (8.3%)	24	100		
▪ 2	54 (85.7%)28	9 (14.3%) 15	63	100	ddl = 3	
▪ 3	(65.1%)83	(34.9%) 6	43	100	p-value =	
▪ Others	(93.3%)	(6.7%)	89	100	0.0001**	
Total	**188**	**32**	**220**			
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		
Total	**188**	**32**	**220**	**100**		
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		
Total	**188**	**32**	**220**			
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	
▪ I don't agree with this system.	0 (0%)	17 (100%)	17	100	ddl = 3	
	67 (98.5%)	1 (1.5%)	68	100	p-value = 0.001**	
▪ Others	39 (92.9%)	3 (7.1%)	42	100		
Total	**188**	**32**	**220**			

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-value = 0.007, the frequencies or rhythms of data transmission and non-compliance with epidemiological surveillance standards; $X^2 = 30.2501$, ddl = 3, p-value = 0.0001**, the indicators most used in reporting and non-compliance with epidemiological surveillance standards; $X^2 = 52.2559$, ddl = 3, p-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-value = 0.896, knowledge about the alert threshold and non-compliance with epidemiological surveillance standards; $X^2 = 27.4752$, ddl = 1, p-value = 0.0001**, knowledge about the epidemic threshold and non-compliance with epidemiological surveillance standards; $X^2 = 68.9607$, ddl = 1, p-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-value = 0.0001*, data transmission mode reached and non-compliance with SURVEPI standards; $X^2 = 19.3450$, ddl = 3, p-value = 0.00**, the risks of not respecting the standards non-compliance with SURVEPI standards; $X^2 = 6.9969$, ddl = 3, p-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-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-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
Total	**188**	**32**	**220**			
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
Total	**188**	**32**	**220**			
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		
Total	**188**	**32**	**220**			

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.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

References

Asumani , S. (2011). *Environmental quality and population health in an urban environment in tropical Africa: the case of the city of Lubumbashi (DRC)* [DEA thesis, University of Lubumbashi]

Dabis , F. & Desenclos , JC (2017) . *Field epidemiology (2nd edition): methods and applications.* Paris, Jones Libbey Eurotex .

Kambondji , B. (2022). *Access to services at the Kalembe Pediatric Hospital Lembe* [DEA thesis, National Pedagogical University]

Mamanya , F. , (2024). *Calculation of the nutritional value of special meals of the Wongo people of Kwilu* . Bandundu, Ed. Milles feux.

Mamanya , T., (2024). Diseases with epidemic potential in the *Kimputu Health Zone of the Kwilu Provincial Division from 2018 to 2023.* Bandundu-Ville, Ed. Milles feux .

Niang, A., (2005). *Monitoring and evaluation of epidemiological surveillance in provincial health divisions in the Democratic Republic of Congo* . Kinshasa. Ed. Feu Vert

Renaud, A., (1986). *Epidemiological statistics* . Paris, French University Press

Richard, F., Morton, J. , Richard , H., Robert, J. and Me Carter (2011). *A study guide to epidemiology and biostatistica* . Paris, Jones Libbey Eurotex .

Rougemont, A. (1983) . *Epidemiology and biostatistics . : a scheduled introduction* . Paris, EDP Sciences

Baune BT, Aljeesh Y, Bender R. Factors of non-compliance with the therapeutic regimen among hypertensive men and women: a case-control study to investigate risk factors of stroke. European journal of epidemiology. 2005 May;20:411-9.

Senyonjo L, Oye J, Bakajika D, Biholong B, Tekle A, Boakye D, Schmidt E, Elhassan E. Factors associated with ivermectin non-compliance and its potential role in sustaining Onchocerca volvulus transmission in the west region of Cameroon. PLoS neglected tropical diseases. 2016 Aug 16;10(8):e0004905.

Rosha BC, Suryaputri IY, Irawan IR, Arfines PP, Triwinarto A. Factors affecting public non-compliance with large-scale social restrictions to control COVID-19 transmission in Greater Jakarta, Indonesia. Journal of Preventive Medicine and Public Health. 2021 Jul;54(4):221.

Nivette A, Ribeaud D, Murray A, Steinhoff A, Bechtiger L, Hepp U, Shanahan L, Eisner M. Non-compliance with COVID-19-related public health measures among young adults in Switzerland: Insights from a longitudinal cohort study. Social science & medicine. 2021 Jan 1;268:113370.