Analysis of dog bites institutional data, Savannah Region, Ghana, 2018-2022

KEYWORDS: Keywords: Dog bite, institutional data, Savannah Region, Ghana

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RECEIVED
17/12/25

ACCEPTED
14/03/25

PUBLISHED
02/04/25

LINK

https://afenet-journal.org/analysis-of-dog-bites-institutional-data-savannah-region-ghana-2018-2022/

CITATION
Kwabena Adjei Sarfo et al Analysis of dog bites institutional data, Savannah Region, Ghana, 2018-2022. Journal of Interventional Epidemiology and Public Health. 2025;8:15.
https://doi.org/10.37432/jieph-d-24-02055

ABSTRACT

Introduction: Dog bite injuries in humans are still a major public health concern. Dogs are responsible for 76 to 94 percent of animal bite injuries. There have not been enough national reports on dog bite injuries in Ghana, and understanding the current state of the injuries is important for effective interventions. We described dog bite cases in the Savannah Region of Ghana. **Methods:** We conducted a descriptive cross-sectional study using institutional dog bite data for 2018 through 2022 from the District Health Information Management System (DHIMS 2). The variables used were sex, age, dog-bite and facility type. The data were extracted into Microsoft Excel, cleaned and analyzed. Descriptive analysis was performed to summarize results into percentages and frequencies. The results were presented in tables, graphs and maps. **Results:** A total of 301 dog bite cases were reported for the period, with an overall incidence of 48 per 100,000 population. Dog bite cases were predominant in males, 63.8% (192/301), among the age group 0-9 years, 33.6% (101/301) and West Gonja District, 21.6% (65/301). Hospital cases were 51.5% (155/301). Most cases, 60.1% (181/301) were recorded in the dry season and in 2022 21.9% (66/301). **Conclusion:** Dog bite cases were common among males and children aged 9 years and younger. Most cases were recorded in the dry season, and the highest number of cases was recorded in 2022. One health approach is needed to integrate the Ghana Health Service, Veterinary Service, and the community in instituting interventions to help prevent dog bites, especially among males and children.

Introduction

A dog bite is described as any bite from a dog on a person or another animal [1]. Human dog bites result in wounds that can become fatally infected with rabies [2]. Domestic dogs are the source of rabies virus transmission to humans in up to 99 percent of cases [3]. Eliminating rabies can be accomplished by avoiding dog bites and vaccinating dogs. But the most economical method of preventing human rabies, according to veterinarians, is to vaccinate dogs [4]. Injuries from dog bites are rising, especially among adults and teens [5]. About 4.5 million people are attacked by dogs yearly in the United States of America [6]. The global population of domestic dogs is estimated at 700 million, with roughly 75% of them being classified as free-roaming; real stray dog populations in Bishoflu, Modjo, and Dukem towns were higher than those estimated by mark-recapture studies [7][8].

Data from low- and middle-income countries are less consistent with studies indicating that dogs cause between 76 and 94 percent of animal bite wounds [9]. Through the implementation of the Food and Agriculture Organization/Global Health Security Agenda (GSHA) program with assistance from the United States Agency for International Development, countries in the West and Central Africa region, including Ghana, have increased their collective efforts to campaign against rabies since 2016 [10].

In Ghana, despite interventions, data reported from the Ghana Health Service (GHS) shows increasing annual cases of dog bites. A study conducted in the Bono East region found that out of a total of 680 dog bite cases reported by health facilities, where 50.3% were males and 47.9% were children aged 1-15 years, 13 rabies cases were reported for the study period [11]. In 2022, out of 74 reported dog bite cases in the greater city of Kumasi in Ghana, 38 tested positive for rabies with five deaths [4]In the Savannah region of Ghana, dog bite surveillance involves health facilities collecting data on dog bites cases. This data should be routinely analyzed to guide policymakers in providing effective interventions to help curb dog bite and rabies in the region and beyond. Therefore, we described the dog bite surveillance data in the Savannah Region from 2018 to 2022 to provide a better understanding of the situation.

Methods

Study design

We conducted a cross-sectional descriptive analysis of institutional dog bite data collected from 2018 to 2022 in the Savannah region.

Study setting

The study was conducted in the Savannah Region of Ghana. It is one of the two regions carved out of the Northern Region in 2019. The Savannah region is approximately, 35,853 sq Km and the largest region in the country covering about 15% of Ghana's total area. The Savannah region, like other regions in Northern Ghana, has a rainy season, which spans from June to October and a dry season from November to June [12. The dry season is the time when there is little or absence rainfall [12]. The dry season is that time when there is little or absence rainfall. It has seven [7] administrative districts with Damongo as the regional capital and a total population of 680,991 [13]. The region has a total of 205 health facilities. The majority 77.1% (158/205), are Community-based Health Planning Services (CHPS) [13]. In the Savannah region, dogs live mainly in homes and on the streets. Many homes, especially in the rural parts of the region, keep dogs mostly for security reasons.

Data collection

Microsoft Excel Version 21 was used to design a data extraction tool for the study. The variables included district, age, sex and facility type, district. Using the data extraction tool, aggregate information on dog bite cases from 2018 to 2022 was extracted from DHIMS 2 using the Pivot Table App.

Data cleaning

Data extracted from DHIMS-2 was sent to Microsoft Excel Version 21 and cleaned. Age was categorized into age groups. Since DHIMS-2 recognizes empty cells as zeros, empty cells were replaced with zeros.

Data validity and reliability

To ensure the reliability and validity of the data extracted from DHIMS2. The data was verified with consulting room registers at the facility level. This was done to ensure data accuracy and completeness.

Data analysis

We conducted a descriptive analysis to summarize the data by using frequencies and percentages for variables such as age, sex and facility type. The

distribution of cases was analyzed by districts. The number of cases was transformed into cumulative incidence (number of cases/mid-year population x 100,000 standardized rate) using the 2020 Ghana Health Service projected population for the region [14]. We drew a QGIS map to show the distribution of cases by place. The data was then displayed in tables, graphs, and maps.

Ethical consideration The Savannah Regional Health Directorate granted permission to use the data in DHIMS-2. Ethical clearance was not sought because the data was generated and used for routine service provision. No identifiable names or addresses were used in the study. On a computer, a password was used to safeguard the data and was only accessible to the primary research team.

Results

A total of 301 dog bite cases were recorded over the period. The proportion of males affected was 63.8% (192/301). The age group 0-9 years recorded the highest proportion of cases 33.6% (101/301) and the age group 70 years and above recorded the least proportion, 2.7% (8/301). Most of the cases reported, 155 (51.5%), came from hospitals, followed by Health Centres, 37.5% (113/301) Table 1.

Dog bite cases were recorded in all the districts in the Savannah region for the period under review, except the North-East Gonja district for 2018, 2019, 2020 and 2022. The year 2022 had the highest number of dog bite cases 21.9% (66/301), closely followed by 2021 at 21.6% (65/301) Table 2.

A total of 17 rabies cases were reported during the period and these were in 2021 (9/17) and 2022 (8/17). Central Gonja had 35.3% (6/17) of the rabies cases, followed by West Gonja 29.4% (5/17).
The overall incidence of dog bite cases was 48 per 100,000 population. West Gonja Municipal, that is, the region's capital environs had the highest cumulative incidence of cases (123 cases 100, 000 per population), followed by Central Gonja district (56 cases per a population of 100,000). North-East Gonja district recorded the least dog bite cases (2 cases per 100,000 person) for the period (Figure 1).

With a monthly pattern of dog bite cases. Dog bite cases were recorded every month for the year within the entire period under review except August 2019 and November 2020. Highest number of cases were reported in May 2022 at 5.0% (15/301) and April 2022 at 4.0% (12/301). Cases were more common in the dry season 60.1% (181/301) Figure 2.

Discussion

We presented the distribution of dog bite cases as documented through the DHIMS-2 over a five-year period in the Savannah Region. Dog bites were reported throughout the period under consideration. Our study revealed that males had the highest dog bites. This finding conforms to other studies which found that males were mostly affected by dog bites [15] [16], [17], [18], [19]. This is because males are more likely to engage in occupations that bring them into contact with dogs such as security personnel and they have a greater propensity to exhibit riskier behaviours with dogs such as teasing which can increase their chance of getting bitten [20] . Contrary to our finding, studies conducted in Korea found that both males and females showed a rise in the rate of dog bite injuries and in Sydney, there was an almost even split among males and females for patients admitted with dog bite injuries [5],[21] . This could be due to an increase in reported dog bite cases, an increase in population density, inadequate knowledge about dog handling and safety precautions, or increasing dog ownership.

An analysis of cases by age group distribution showed that children nine years and younger were more often affected by dog bite injuries. Our findings are consistent with previous studies, where more than a fifth of all patients with dog bite injuries were children, and more cases of dog bites were recorded among children [9], [21], [22]. This is so as children mostly play with dogs and are likely to be unaware of the warning indications of an impending attack from dogs. It can also be ascribed to their inability to defend themselves against bites. Differing from this, a study on risk factors for rabies in Cote d'Ivoire found that more than half of the dog bite victims were 15 years and over [23].

Dogs often bite children due to dogs behaviour and how kids engage with them; fear, resource-guarding, pain and behaviours like cuddling or patting are important triggers that dogs might view differently [24]. Dogs pay attention to the eyes, midface, and lips and interpret human facial emotions as a whole [25].

The facility type with the highest number of reported dog bite cases was hospitals. Most cases reported by hospitals could be attributable to the fact that hospitals have adequate resources and qualified professionals to provide care such as wound cleaning, suturing, rabies vaccines and pain management. Also, in the Savannah region, all districts have hospitals except two (North Gonja and North-East Gonja) and fewer cases came from the latter districts. This is a good finding as cases will receive appropriate post-bite care. Our finding is supported by a study conducted in the United Kingdom, which reported that ninety-five percent of dog bite patients were admitted once [18] . Again, this is corroborated by a study in Pakistan where nearly half of the cases were managed in hospitals [26] . A similar trend has been documented by other investigator in Ghana where they revealed that a greater number of dog bite victims were reported to hospitals [16] .

Our findings indicated that West Gonja Municipality reported high cases for the study period. This is due to its cosmopolitan, city and urban status, where many people could reside. This finding is in conformance with research conducted in Cote d'Ivoire where those who live in cities reported most cases of dog bites [23] . Similarly, studies in Brazil, Iran and India found a high prevalence of dog bites among urban residents [27], [28], [29] . Our findings are not in line with a study conducted in Iran [30] , which revealed that the incidence of animal bites was high among rural areas.

The study showed seasonal disparities in dog bite cases. While cases were reported in both dry and rainy seasons, a higher number of cases were reported in the dry season. This could be ascribed to people spending more time outdoors when the weather is hot, which increases their chance of encountering dogs. Additionally, the dry season is notable for hunting. Dogs are used by hunters in their activities and this increases their interaction with humans hence, increase the likelihood of a dog bite. Again, hunters might not be aware of the warnings indicating that dogs are going to bite. This is confirmed by a study that took place in Korea and Pennsylvania in the USA where there was a peak incidence of dog bites reported during warm season [5], [31]. Likewise, a previous report in the Taiwanese Pangolin reported that no cases were recorded in the wet season [32].

Limitations

Our study is subject to many limitations. Firstly, dog bites data extracted from the DHIMS-2 are based on facility records. This may present possible issues such as incomplete or inconsistent data. Secondly, it may not be the true picture of dog bite cases in the entire region. This is because not all cases of dog bite seek medical care from health facilities. Dog bite cases may therefore be underreported. Also, data were collected based on clinicians' understanding of dog bites. This will lead to potential misclassification of dog bites. Further, some data was aggregated at a higher level than intended for the research questions. This resulted in difficulty in examining sub-groups and other variables. Lastly, some important data on potential explanatory variables such as occupation of the case, vaccination status of dog, dog breed, nature of the dog (pet vs guard vs hunting vs stray/wild) was not available to be included in the analysis. Despite these, our research might be viewed as a model study to direct future regional research.

Conclusion

Dog bite cases keep on increasing in the Savannah Region and are a public health concern. The cases were predominant among males and children. There was a high incidence of cases in West Gonja Municipal among the reported districts. Cases of dog bite were common in the dry season. A one health approach is required among the Regional Health Directorate, Regional Veterinary Directorate, and communities in the control of dog bites in the Savannah Region.

Recommendations

To improve documentation and reporting at all levels, clinicians and health information officers should be trained in data capturing and reporting by the Regional Health Directorate. Also, to decrease the incidence of dog bite cases in the Savannah region, preventive strategies such as public education about dog behaviour and signs of aggression, safe interaction with dogs and proper confinement using gates, fences when unable to control dogs may be needed by the veterinary directorate. Again, dog owners should be responsible for their dogs by sterilizing them, providing proper veterinary care such as vaccinations and frequent check-ups,

choosing the right breed and making sure dogs have the right identification by using tags and microchips. Educational child-dog interaction programmes like Reading Education Assistance Dogs (R.E.A.D), Comfort Dog Programme and Prevent-a-Bite Programme can be implemented [33–36].
Finally, further studies should be conducted to establish prevention strategies for reducing the incidence of significant dog bite cases.

What is already known about the topic

- Dog bite injuries remain a public health concern.
- Dogs are accountable for most animal bite injuries

What this study adds

- There is an overall incidence of dog bites of 48 per 100,000 population
- Cases were common among males and children less than 15 years
- High cases were reported in the dry season

Competing Interest

The authors of this work declare no competing interest

Funding

This study received no specific grant from any funding support.

Acknowledgements

We would like to thank the following individuals, institutions and organizations for their countless roles in this manuscript. The Ghana Field Epidemiology Laboratory and Training Program at the University of Ghana for the provision of data analysis skills. Savannah Regional Health Directorate. Mr. Marcel Buamah, Regional Health Information Officer, Mr. Jonas Abodoo, Health Information Officer, Savannah Region, Mr. Welbeck Kwesi Akplu, Health Information Officer, Northern Regional Health Directorate and Mrs. Elizabeth Opoku Amponsah, the wife of the principal author.

Authors´ contributions

KAS and CK designed the study. KAS extracted data and performed analysis. KAS, CK, WAA, JACN and WJA were responsible for drafting the manuscript. GRI, MO, GA, DAB and EK critically reviewed and equally contributed to the content of manuscript. All authors read and approved the final manuscript.

Table 2: Dog bite cases and rabies cases by district, Savannah Region, 2018-2022

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Tables and figures

Table 1: Demographic characteristics of dog bite cases, Savanah Region, 2018-2022 **(N= 301)**

Variable	**Frequency**	**Percent (%)**
Sex		
Male	192	63.8
Female	109	36.2
Age (Years)		
0-4	30	10.0
5-9	71	23.6
10-19	81	26.9
20-49	89	29.6
50-69	22	7.3
70 & above	8	2.7
Health facility type		
CHPS*	33	11.0
Health Centre	113	37.5
Hospital	155	51.5
Rabies		
Yes	17	5.6
No	284	94.4

*Community-based and Health Planning Services

Table 2: Dog bite cases and Rabies cases by District, Savannah Region, 2018-2022

District	2018		2019		2020		2021		2022		Total		Projected Population	Dog bite Incidence Cases/100,000
	Dog bite	Rabies	Dog bite	Rabies	Dog bite	Rabies	Dog bite	Rabies	Dog bite	Rabies	Dog bite	Rabies		
Bole	13	0	9	0	10	0	14	2	12	0	58	2	78296	74
Central Gonja	8	0	14	0	10	0	9	1	20	5	61	6	109603	56
East Gonja	8	0	4	0	5	0	6	1	11	0	34	1	141805	24
North Gonja	3	0	1	0	3	0	7	0	5	0	19	0	56376	34
North-East Gonja	0	0	0	0	0	0	1	0	0	0	1	0	53397	2
Sawla-Tuna-Kalba	14	0	16	0	14	0	13	0	6	3	63	3	132910	47
West Gonja	17	0	11	0	10	0	15	5	12	0	65	5	52912	123
Savannah	**63**	**0**	**55**	**0**	**52**	**0**	**65**	**9**	**66**	**8**	301	17	625299	48

Source: DHIMS 2 Data

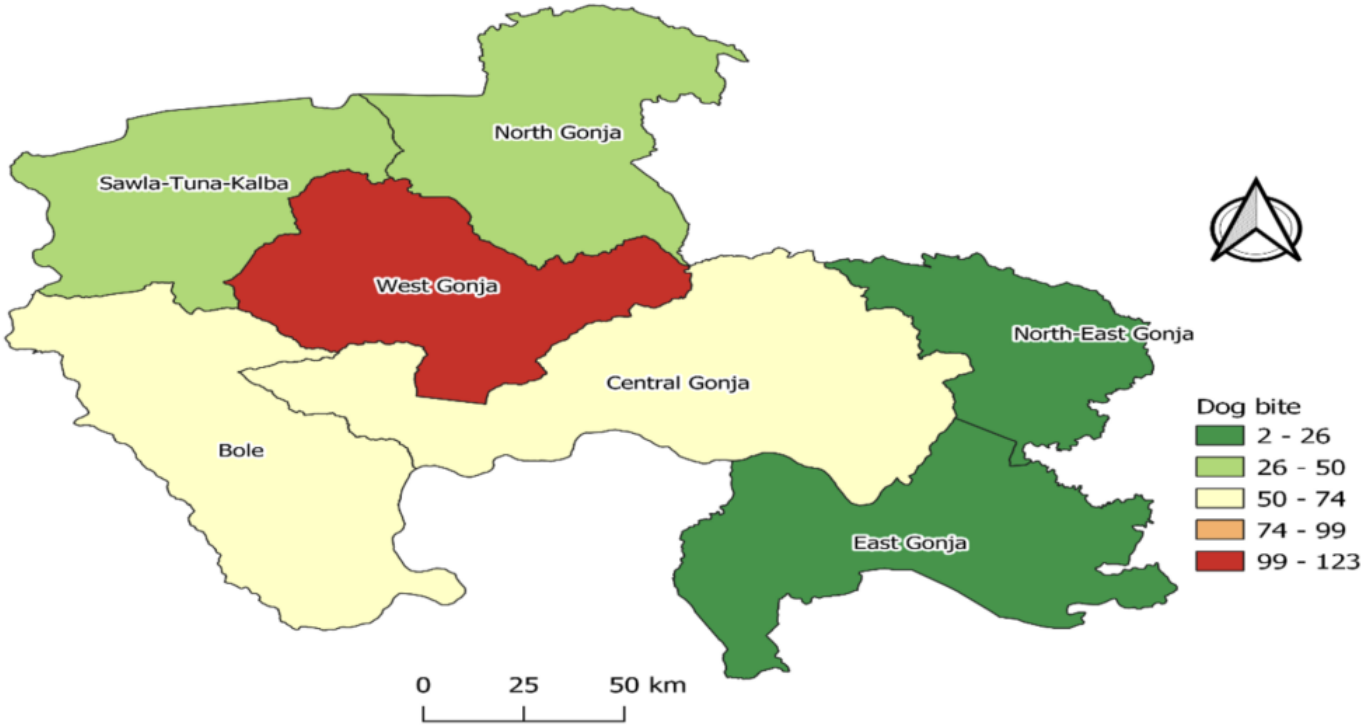

Figure 1: Dog bites cumulative incidence per 100,000 population by District, Savannah Region, 2018-2022

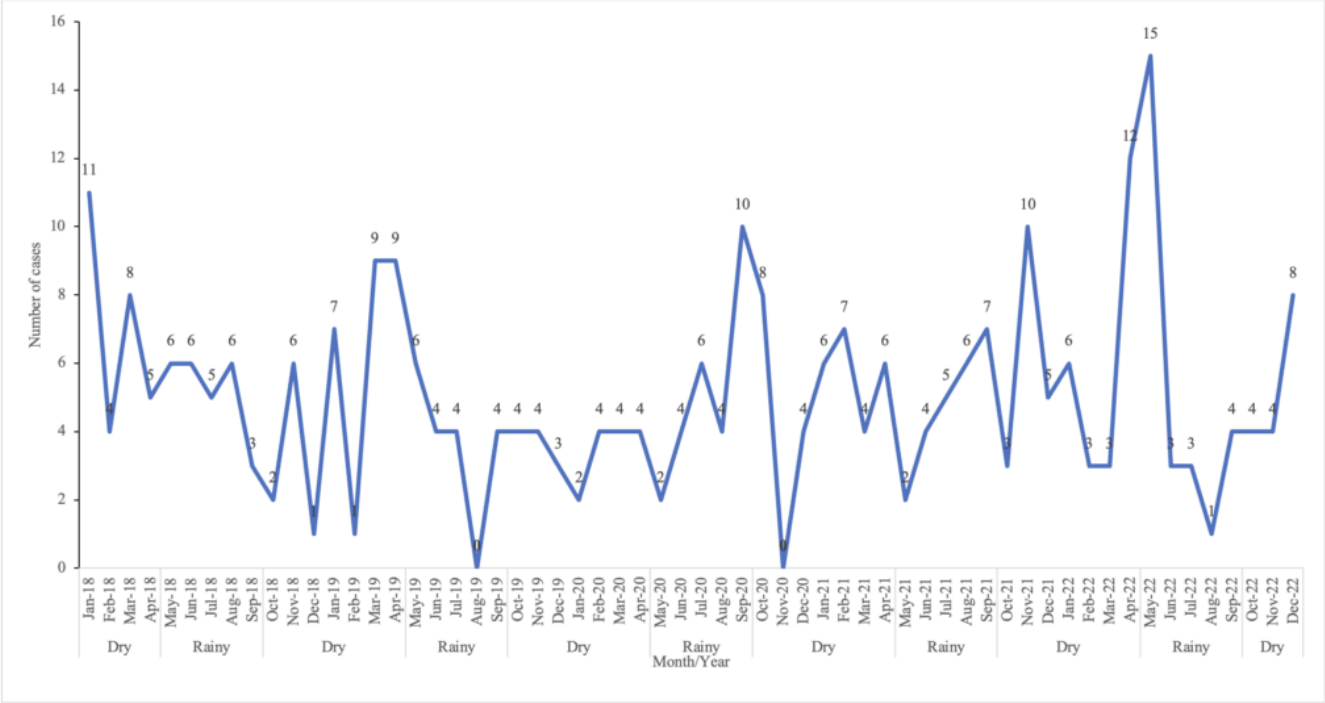

Figure 2: Monthly pattern of dog bite cases, Savannah Region, 2018 to 2022