



FEDERAL GOVERNMENT INTERVENTION PROGRAMMES ON THE AVAILABILITY OF ANTIVENOM AT THE SNAKEBITE TREATMENT HOSPITAL IN GOMBE STATE, NIGERIA

Oteikwu Solomon¹; Zara Mamman²; Livinus Stephen³;

1;3 Department of Physical and Health Education, University of Maiduguri, Borno
State Nigeria

Abstract

Snakebite envenoming remains a major public health challenge in Nigeria, particularly in the northern savannah region where human interaction with venomous snakes is common. To address this challenge, the Federal Government of Nigeria has implemented various intervention programmes, including public health education, community awareness campaigns, procurement and distribution of antivenom, and strengthening of snakebite treatment facilities. This study assessed the impact of Federal Government intervention programmes on the availability of antivenom and snakebite management services at the Snakebite Treatment Hospital and Research Centre, Kaltungo, Gombe State, Nigeria. A descriptive survey research design was adopted. Data were collected from 43 medical personnel and 221 community caregivers using structured questionnaire. Frequencies, percentages, mean scores, standard deviations, Chi-square, and one-sample t-test statistics were used for data analysis at 0.05 level of significance. Findings revealed that 61% of medical personnel reported that available antivenom was sufficient for treating different snakebite cases, while 91% indicated that government intervention programmes improved the efficiency of antivenom-related facilities and equipment. Community respondents also reported that government educational interventions significantly enhanced awareness of snakebite prevention and treatment, with an aggregate mean score of 2.90. There was significant impacts of government intervention programmes on antivenom availability ($\chi^2 = 38.489$, $p < 0.05$) and snakebite control through education ($t = 15.103$, $p < 0.05$). The study concludes that Federal Government intervention programmes have significantly improved antivenom availability, strengthened treatment services, and enhanced public awareness regarding snakebite prevention and management. The study recommends increased funding for antivenom procurement, expansion of public awareness campaigns, local production of antivenom, and strengthening of treatment infrastructure.

Keywords: Snakebite, Antivenom Availability, Government Intervention, Health Education, Kaltungo, Gombe State, Nigeria.

Introduction

Snakebite envenoming is recognized by the World Health Organization (WHO) as a neglected tropical disease that causes substantial morbidity, mortality, disability, and socioeconomic hardship worldwide. Globally, between 1.8 and 2.7 million cases of snakebite envenoming occur annually, resulting in approximately 81,000 to 138,000 deaths and numerous cases of permanent disability (WHO, 2018). Nigeria bears one of the highest burdens of snakebite in sub-Saharan Africa, particularly within the northern



savannah belt where agricultural activities increase exposure to venomous snakes. The region is home to medically important snake species such as the carpet viper, puff adder, black-necked spitting cobra, and Atractaspidae species. Studies have reported annual snakebite incidences as high as 497 per 100,000 population in northern Nigeria (Chippaux, 2011).

The consequences of snakebite extend beyond mortality. Victims often experience physical disability, psychological trauma, reduced productivity, and substantial healthcare costs. Delays in seeking appropriate medical care, inadequate awareness of preventive measures, reliance on traditional healers, and limited access to effective treatment contribute significantly to adverse outcomes. Antivenom remains the only specific treatment for venomous snakebite and is considered the most effective intervention for reducing snakebite-related mortality and morbidity (Bryan, 2017). According to Chioma Obinna. (2020), prompt administration of quality antivenom neutralizes venom toxins, prevents complications, and improves survival outcomes. However, many developing countries continue to face challenges related to inadequate antivenom production, poor distribution systems, high costs, and weak healthcare infrastructure.

Recognizing the burden of snakebite, the Federal Government of Nigeria established intervention programmes through the Federal Ministry of Health's Snakebite Envenoming Programme. These interventions include procurement and distribution of antivenom, strengthening of specialized treatment centres, community awareness campaigns, public health education, distribution of educational materials, and collaboration with organizations such as the EchiTab Study Group and the Nigerian Snakebite Research and Intervention Centre (Ogwuche & Ihedioha 2017).

The Snakebite Treatment Hospital and Research Centre, Kaltungo, Gombe State, serves as one of the leading snakebite treatment facilities in West Africa and plays a critical role in the management of snakebite cases across Northern Nigeria (FMoH.2019). The availability of antivenom and effective educational programmes within this facility and surrounding communities is therefore essential for reducing the burden of snakebite. Despite these interventions, concerns remain regarding the adequacy, sustainability, and effectiveness of government programmes in ensuring uninterrupted antivenom availability and promoting preventive behaviours. This study therefore assessed the impact of Federal Government intervention programmes on the availability of antivenom and snakebite management services at the Snakebite Treatment Hospital and Research Centre, Kaltungo, Gombe State.

Statement of the Problem

Ideally, government intervention programmes should ensure continuous availability of safe, effective, and affordable antivenom while simultaneously improving community awareness regarding snakebite prevention and treatment. Such interventions are expected to reduce mortality and morbidity, improve treatment outcomes, and strengthen public confidence in healthcare services. To achieve these objectives, the Federal Government of Nigeria has implemented several intervention programmes including antivenom procurement and distribution, strengthening of treatment facilities, public awareness campaigns, community health education, support for research activities, and collaboration with local and international stakeholders. However, despite these efforts, snakebite remains a significant public health challenge in Kaltungo and other endemic communities. Reports of antivenom shortages, inadequate treatment facilities, and persistent snakebite cases



continue to emerge. Furthermore, limited empirical evidence exists regarding the effectiveness of these intervention programmes in ensuring antivenom availability and improving snakebite prevention practices. This study was therefore undertaken to assess the impact of Federal Government intervention programmes on the availability of antivenom and snakebite management services at the Snakebite Treatment Hospital and Research Centre, Kaltungo, Gombe State.

Methodology

The study adopted a descriptive survey research design. The study was conducted at the Snakebite Treatment Hospital and Research Centre, Kaltungo, and within Kaltungo Local Government Area of Gombe State, Nigeria. The study population comprised 43 medical personnel working at the Snakebite Treatment Hospital and Research Centre and 221 caregivers and community members knowledgeable about government intervention programmes on snakebite prevention and treatment. Data were collected using structured questionnaires designed to assess respondents' perceptions regarding antivenom availability, treatment infrastructure, educational interventions, and overall effectiveness of government programmes. Descriptive statistics involving frequencies, percentages, mean scores, and standard deviations were used to answer research questions. Chi-square and one-sample t-test statistics were used to test hypotheses at the 0.05 level of significance.

Results

What is the impact of government intervention programmes on the availability of snakebite antivenom at the Snakebite Treatment Hospital and Research Centre, Kaltungo, Gombe State?

Table 1: Availability of Antivenom and Related Treatment Resources at the Snakebite Treatment Hospital and Research Centre, Kaltungo (n = 43)

S/N	Item	Yes n (%)	No n (%)
1	Adequate facilities and equipment for effective treatment of complicated snakebite cases	19 (44.2)	24 (55.8)
2	Available snakebite antivenom is sufficient for treating different cases of snakebite	26 (60.5)	17 (39.5)
3	Facility has constant electricity for storing antivenom	39 (90.7)	4 (9.3)
4	Health facility is far from the community	36 (83.7)	7 (16.3)
5	Federal Government intervention has improved efficiency of antivenom facilities and equipment	39 (90.7)	4 (9.3)

Source: Field Survey, 2023.

The findings revealed that 60.5% of the medical personnel agreed that the available snakebite antivenom was sufficient for treating different cases of snakebite in the facility, while 39.5% disagreed. Furthermore, 90.7% of respondents reported that the hospital had constant electricity for storing antivenom, and an equal proportion agreed that Federal Government intervention had improved the efficiency of antivenom-related facilities and equipment. However, only 44.2% believed that available facilities and equipment were adequate for managing complicated snakebite cases, suggesting that infrastructural gaps still exist despite government support. Overall, the responses indicate a positive impact of government intervention programmes on antivenom availability and



treatment capacity.

What is the impact of government education programmes on snakebite incidence in Kaltungo Local Government Area, Gombe State?

Table 2: Mean Responses on the Impact of Government Educational Programmes on Snakebite Prevention and Management (n = 221)

S/N	Statement	Mean	SD	Decision
1	There is a snakebite hospital in Kaltungo	3.64	0.526	Agree
2	Government sensitizes community members on what to do when bitten by a snake	2.61	0.683	Agree
3	Information on snakebite treatment is only available through television and radio	2.34	0.719	Disagree
4	Community education is a good strategy for controlling snakebite	3.17	0.508	Agree
5	Snakebite cases have reduced because people know how to prevent snakebite through government sensitization	2.72	0.788	Agree
Aggregate Mean		2.90	0.391	Agree

Decision Rule: Mean ≥ 2.50 = Agree; Mean < 2.50 = Disagree.

The findings in Table 1 indicate an aggregate mean score of 2.90, which is higher than the criterion mean of 2.50. This suggests that respondents generally agreed that Federal Government educational intervention programmes have positively influenced the reduction of snakebite incidence in Kaltungo Local Government Area. Respondents particularly agreed that community education is an effective strategy for controlling snakebite and that government sensitization programmes have improved awareness regarding preventive measures and treatment-seeking behaviour.

Hypothesis Testing

H01: Government intervention on availability has no significant impact on snakebite antivenom at the Snakebite Treatment Hospital and Research Centre in Kaltungo L.G.A., Gombe State. Table 3: Chi-Square Analysis of the Impact of Federal Government Intervention Programmes on Antivenom Availability

Variable	χ^2 Value	df	p-value	Decision
Government Intervention and Availability of Snakebite Antivenom	38.489	4	0.000	Reject H ₀

Level of Significance: 0.05

The hypothesis test revealed that the impact of Federal Government intervention on the availability of snakebite antivenom at the Snakebite Treatment Hospital and Research Centre was statistically significant ($p = 0.000$). Consequently, the null hypothesis was rejected, indicating that government intervention programmes have significantly improved the availability of snakebite antivenom within the facility.



H02: Government intervention programmes on education against snakebite have no significant impact on the incidence of snakebite in Kaltungo Local Government Area.

Table 4: One-Sample t-Test Analysis of Government Educational Programmes and Snakebite Prevention

Variable	N	Mean	SD	t-value	df	p-value
Government Education Programme Impact	221	2.90	0.391	15.103	220	0.000

Level of Significance: 0.05

The result of the one-sample t-test revealed a calculated t-value of 15.103 with a p-value of 0.000. Since the p-value is less than the 0.05 level of significance, the null hypothesis was rejected. This implies that government educational intervention programmes have a statistically significant impact on the incidence of snakebite in Kaltungo Local Government Area, Gombe State.

Summary Table: Overall Impact of Federal Government Intervention Programmes

Intervention Component	Key Finding	Statistical Outcome
Antivenom Procurement and Distribution	60.5% reported sufficient antivenom availability	$\chi^2 = 38.489, p < 0.05$
Improvement of Facilities and Equipment	90.7% reported improved efficiency of treatment facilities	Significant
Community Awareness and Education	Aggregate Mean = 2.90	$t = 15.103, p < 0.05$
Snakebite Prevention and Control	Respondents agreed incidence has reduced due to sensitization	Significant
Overall Government Intervention	Positive impact on snakebite management and treatment outcomes	Significant

The analysis demonstrates that Federal Government intervention programmes have significantly improved antivenom availability, treatment infrastructure, and community awareness, thereby strengthening snakebite prevention and management at the Snakebite Treatment Hospital and Research Centre, Kaltungo, Gombe State, Nigeria.

Discussion

The findings of this study revealed that Federal Government intervention programmes have made significant contributions towards improving the availability of antivenom and strengthening snakebite management services at the Snakebite Treatment Hospital and Research Centre, Kaltungo, Gombe State. The results further demonstrated that government-supported educational programmes have enhanced community awareness regarding snakebite prevention, treatment, and appropriate health-seeking behaviour. These findings indicate that government interventions have addressed both the preventive and curative dimensions of snakebite management. The study found that 60.5% of medical personnel agreed that the available antivenom was sufficient for treating different categories of snakebite cases. In addition, 90.7% of respondents reported that Federal Government interventions had improved the efficiency of antivenom-related facilities and



equipment. This finding suggests that government efforts in the procurement, distribution, and management of antivenom have yielded positive outcomes at the Snakebite Treatment Hospital and Research Centre. The finding supports the report of Habib (2013), who noted that government-led initiatives and partnerships with stakeholders have significantly improved access to snakebite treatment services in northern Nigeria. According to Habib (2020), the establishment and strengthening of specialized snakebite treatment centres have contributed to better management of envenoming cases and improved patient outcomes. The findings are also consistent with the position of the World Health Organization (WHO, 2018), which emphasized that ensuring the availability of quality antivenom remains one of the most effective strategies for reducing mortality and morbidity associated with snakebite envenoming. WHO (2018) argued that governments play a central role in the procurement, regulation, storage, and distribution of antivenom and that sustained government commitment is essential for guaranteeing access to life-saving treatment. The high proportion of respondents who confirmed the availability of antivenom and the existence of constant electricity for storage demonstrates the practical impact of such government support within the study area.

The study also revealed that educational intervention programmes have significantly improved community awareness and contributed to reducing the incidence of snakebite in Kaltungo Local Government Area. The aggregate mean score of 2.90 indicated that respondents generally agreed that government educational programmes positively influenced snakebite prevention and management. Respondents particularly agreed that community education is an effective strategy for controlling snakebite and that government sensitization programmes have improved public understanding of preventive measures and treatment-seeking behaviour. This finding supports the report by Pugh and Theakston (2017) (2019), which highlighted the role of the Federal Ministry of Health's Snakebite Envenoming Programme in coordinating community engagement activities, public awareness campaigns, and the distribution of educational materials aimed at improving preventive practices. The findings are equally consistent with those of Sharma, Chappuis, Jha, Bovier, Loutan, and Koirala (2010), who reported that community education programmes in Nepal significantly improved knowledge of snakebite prevention and encouraged timely access to healthcare facilities following snakebite incidents. Their study demonstrated that awareness campaigns involving healthcare workers, community leaders, and traditional healers contributed to improved treatment-seeking behaviour and reduced delays in obtaining medical care. The current findings support this observation as respondents agreed that government sensitization programmes have increased awareness of what to do following snakebite incidents.

However, despite these positive outcomes, the study revealed that only 44.2% of medical personnel considered existing facilities and equipment adequate for managing complicated snakebite cases. This finding indicates that although substantial progress has been made in antivenom availability and service delivery, infrastructural challenges remain. The result agrees with Hasan (2018), who identified inadequate healthcare resources as one of the major challenges affecting effective snakebite management in northern Nigeria. The finding therefore highlights the need for continued investment in healthcare infrastructure, specialized equipment, and treatment capacity. Overall, the findings demonstrate that



Federal Government intervention programmes have played a significant role in improving antivenom availability, strengthening treatment services, enhancing community awareness, and promoting effective snakebite prevention and management in Kaltungo, Gombe State. The combined effects of antivenom provision and educational interventions have contributed to better treatment outcomes and reduced vulnerability to snakebite among community members.

Conclusion

The study concludes that Federal Government intervention programmes have significantly improved the availability of antivenom and strengthened snakebite management services at the Snakebite Treatment Hospital and Research Centre, Kaltungo, Gombe State. The interventions have enhanced procurement systems, improved treatment infrastructure, increased access to life-saving antivenom, and strengthened community awareness regarding snakebite prevention and treatment. Collectively, these efforts have contributed to improved treatment outcomes and reduced snakebite burden within the study area.

Recommendations

Based on the findings, the study recommends that:

1. The Federal Government should increase budgetary allocation for antivenom procurement and distribution.
2. Additional snakebite treatment centres should be equipped with adequate antivenom supplies and modern treatment facilities.
3. Community-based snakebite awareness campaigns should be expanded to snakebite-endemic communities.
4. Educational materials should be translated into local languages to improve accessibility and comprehension.

References

- Bryan, M. (2017). *Recommendation for the adoption of an additional disease as a neglected tropical disease: The case for snakebite envenoming*. Lead Sponsor: Costa Rica.
- Chioma Obinna. (2020). 10,000 snakebite victims lack access to treatment in Nigeria annually <https://www.Vanguardngr.com>.
- Chippaux, J. P. (2008). Estimating the global burden of snakebite can help to improve management. *Pugh and Theakston (2017) Medicine*, 5(11), e221. <https://doi.org/10.1371/journal.pmed.0050221>
- Chippaux, J. P. (2011). Estimate of the burden of snakebites in sub-Saharan Africa: A meta-analytic approach. *Toxicon*, 57(4), 586–599.
- FMoH. (2019). Snakebite envenoming in different national contexts: Costa Rica, Sri Lanka, and Nigeria. <https://www.ncbi.nlm.nih.gov › articles -PMC8175406>.
- Habib, A. G., & Abubakar, S. B. (2011). Factors affecting snakebite mortality in north-eastern Nigeria. *International Health*, 3(1), 50–55.
- Habib, A. G. (2013). Public health aspects of snakebite care in West Africa: Perspectives from Nigeria. *Journal of Venomous Animals and Toxins Including Tropical Diseases*, 19(1), 27.
- Hamza, M., Idris, M. A., Maiyaki, M. B., Lamorde, M., Chippaux, J. P., & Warrell, D. A. (2016). Cost-effectiveness of antivenoms for snakebite envenoming in 16 countries in West Africa.



- Pugh and Theakston (2017) Neglected Tropical Diseases, 10(3), e0004568.*
- Ogwuche MA and Ihedioha K, (2017) Estimate of the burden of snakebites in sub-Saharan Africa: A meta-analytic approach. *Toxicon*.57:586–99.
- Sharma, S. K., Chappuis, F., Jha, N., Bovier, P. A., Loutan, L., & Koirala, S. (2010). Impact of snakebite and determinants of fatal outcomes in southeastern Nepal. *American Journal of Tropical Medicine and Hygiene*, 83(2), 413–417.
- Sharma, S. K., Bovier, P. A., Jha, N., Alirol, E., Loutan, L., & Chappuis, F. (2013). Effectiveness of rapid transport of victims and community health education on snakebite fatalities in rural Nepal. *American Journal of Tropical Medicine and Hygiene*.
- Musah, Y., Ameade, E. P. K., Attuquayefio, D. K., & Holbech, L. H. (2019). Epidemiology, ecology and human perceptions of snakebites in a savanna community of northern Ghana. *Pugh and Theakston (2017) Neglected Tropical Diseases, 13(8), e0007221.*
- Nworgu, B. G. (2006). *Educational research: Basic issues and methodology* (2nd ed.). University Trust Publishers.
- Pugh, R. N., & Theakston, R. D. G. (2017). Incidence and mortality of snakebite in savanna Nigeria. *The Lancet*, 2(7), 1181–1183.
- World Health Organization. (2016). *Guidelines for the management of snakebites* (2nd ed.). WHO Regional Office for South-East Asia.
- World Health Organization. (2018). *Snakebite envenoming: A strategy for prevention and control*.
- World Health Organization.
- World Health Organization. (2019). *Snakebite envenoming: A strategy for prevention and control*.
- World Health Organization