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# The Assessment of Human-Snake Interaction and its Outcome in the City of Kumba

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***Abstract*—** *Throughout history humans have had an uneasy relationship with serpents. Snakes are animals that fascinate many people while frightening others, good or bad, most people have strong feelings about snakes, but few people remain neutral. Most human-snake interactions had lead to the destruction of snakes due to human inability to control fear and panic. The indiscriminate killing of snakes for presumed human safety has drastically reduced the population of many snake species to the level of extirpation. The objective of this, however, is to examine the human interaction with snakes in city of Kumba. To get this survey done, a total number of two hundred and fifty questionnaires were administered to a randomly selected population sample in the study area. The results of the survey revealed that the prevention of snake attacks and the opinion of people on snake population management is significantly related ($X^2$ = 11.069 df=4, P<0.05).The importance of snakes and their medical need for snake venom has showed a significant agreement ($X^2$ = 12.045 df=2, P<0.05). Also, the prevention of snake attacks and the area snakes are easily sighted showed a significant association ($X^2$ = 29.205 df=4, P<0.05). In addition, there is a significant link between the snake-bite treatment and its prevention ($R^2$ = 0.312, P<0.05). Moreso, a respondent score of 39.30% is recorded upon the knowledge of venomous snakes. Furthermore, the study recorded a respondent score of 39.30% on the preferable use of traditional treatment on snake-bite victim than the expected medical treatment (31.84%), creating an understanding that the people of Kumba are still very much dependent on the ancient methods of treating snake-bite victims. The Kumba city dwellers need education on the snake behaviour, venomous and non venomous species around their area and the ecological and medical importance of snakes.*

***Keywords*— Human-Snake Interaction, City of Kumba.**

## I. INTRODUCTION

Human-wildlife interaction that always leads to conflict is a major concern of most people living next to protected areas or when wild animals come in direct contact with human s. Conflict is here defined as any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, and on the conservation of wildlife populations, or on the environment (Anonymous, 2005). Though humans generally try to avoid interaction with reptiles like snakes, they occasionally bear an importance that extends beyond survival and into the realm of culture. Human - snake interactions has always been associated with different outcomes. Human snake encounters with negative results such as animal death, habitat destruction, injuries to people, injuries to wildlife and the like are common (Magige, 2012). Generally, there are more than 3000 species of snakes in the world and they live in both terrestrial and aquatic ecosystems and are predatory carnivores with wide range of prey species (WHO, 2010; Bijees, 2012). Despite urbanization, villagization and destruction of their habitats, snakes remain plentiful in most parts of Africa.

Snakes co-exist with humans in homes, gardens and outhouses but their presence usually goes unnoticed. Snakes are beneficial to humans by killing unwanted insects and rodents in food stores and crops. Snake-skins are used as tourism attractions as with cases of snake parks, used to make shoes, handbags, and other articles. The venom is used for producing life-saving antivenin, biomedical research and for other medicinal products. In India, China and Africa, some species of snakes are used as sources of meat (Oi-Fung *et al.*, 2009; WHO, 2010). In Asian countries such as Thailand, Indonesia, and Cambodia, drinking the blood of snakes like cobra is believed to increase sexual virility. In the Western world some snakes, especially docile species such as the ball python and corn snake, are kept as pets. Snakes are creatures that are used for reverence and even worship in some areas, and they are exhibited as performing animals by traditional snake charmers (WHO, 2010). All these and many others are uses of snakes to mankind.

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Apart from the benefits of snakes, the general society is always scared of snakes especially from bite and their general appearances. Fear of snakes is understandable since they are responsible for a number of bites and numerous deaths as well as cases of permanent physical handicap. However, snakes do not ordinarily prey on humans and most will not attack humans unless they feel threatened, trodden or injured, or provoked. With the exception of large constrictors, non-venomous snakes are not a threat to humans. Of the roughly 725 species of venomous snakes worldwide, only 250 are able to kill a human on bite (Bijees, 2012). In East Africa there are over 200 species of snakes known, and only 41 are dangerous (Spawls *et al.,* 2001). Snake bite incidences are common in some rural areas and is among the cause of morbidity and mortality among farmers, pastoralists, hunters and children (Maregesi *et al.,* 2013). The vast majority of snakebite-induced deaths occur in Asia (estimates ranging from 15,400–57,600 deaths per year) and sub-Saharan Africa (3,500–32,100 deaths per year) (Kasturiratne *et al.,* 2008). For example, Nigeria, has recorded 174 snake bites/100,000 population/year (Nasidi, 2007). In Kenya, per 100 000 population per year, there were 151 bites and seven deaths (about 1% of all deaths) and 36% of survivors had permanent sequelae (Snow *et al.,* 1994). In addition, Zimbabwe has reported 2–5% mortality rate due to snake bite (Muguli *et al.,* 1994; Nhachi and Kasilo, 1994). Most of such cases are reported in the rural poor farmers (Oi-Fung *et al.,* 2009).

In areas experiencing habitat loss or fragmentation, conspecific attraction and aggregation behaviour occur because they minimize the amount of movement an individual must engage in to find resources (Fletcher, 2006). However, the short-term fitness gained by individuals through these movement strategies sacrifices long-term survival of the population due to risks associated with inbreeding depression and competition for resources (Fletcher, 2006). Occasional long-distance migrations along a consistent angle by western rattlesnakes may relate to either mate or prey patch-searching strategies (Didiuk, 1999). Prairie rattlesnakes in Alberta may engage in this type of movement, with records of 1 female travelling 52 km round trip during a single active season (Didiuk, 1999). Individual variance in movement by western rattlesnake sub-species also takes place, with both short- and long-distance migrations occurring within the same populations of prairie rattlesnakes in Alberta (Powell *et al.,* 1998) and midget-faded rattlesnakes (*C. o. concolor;* Parker & Anderson, 2007) in Wyoming and may be due to behavioural polymorphism (Jorgensen, 2009). In other cases, this variance relates to reproductive status, such as in non-gravid female timber rattlesnakes (*C. horridus horridus*) in Arkansas, which move more extensive distances than gravid females (Gardner-Santana & Beaupre, 2009). A large amount of individual variation in movement distance and activity range estimates between Australian blacksnakes (*Pseudechis porphyriacus*) also exists, even amongst those of similar size monitored during the same time period and area (Shine, 1987).

Differences in movement distances between age cohorts occur in sidewinders in the Mojave Desert (Secor, 1992) but not between age or sex cohorts in brown water snakes (*Nerodia taxispilota;* Mills *et al.,* 1995) in South Carolina. Rather, movement type varies with body size in brown water snakes as larger snakes engage frequently in river crossings whereas smaller individuals do not. Studies examining the movement patterns of neonatal or juvenile snakes versus those of adults are limited; however, movement distances for juveniles can be as immense and erratic as adult conspecifics in western ribbon snakes (*Thamnophis proximus;* Clark, 1974) in Texas and other snake species (Gregory *et al.,* 2001). Variation in movement between individuals within the same cohort also occurs with differences in movement patterns and distances between adult, non-gravid prairie rattlesnakes in Alberta existing (Jorgenson, 2009). Annual changes in individual snake movement distances may in some cases be reflective of climatic trends as male and female black pinesnakes (*Pituophis melanoleucus lodingi*) in Mississippi partake in shorter distance movements in response to drought.

In 2009, snake bite was recognized for the first time by the World Health Organization as a neglected tropical disease (WHO, 2010). In tropical countries, it is largely an occupational disease for agricultural workers, and, as a result, can affect food production. Snake bite causes substantial human mortality and disability-physical and psychological-but its recognition as an important international public health issue has been hindered by insufficient epidemiological data. Although snakes have been together with humans for a long time, several studies conducted are based on their biology and ecology. This study was conducted to assess human- snake interactions and the likely outcomes. The whole idea was based on sustainable conservation of snakes and protects their welfare since they are part of the ecosystem.

This research survey is aimed at establishing knowledge on how the inhabitants of Kumba city manage their emotions, especially when they encounter snakes in houses, farms, bushes, and residence. The fact that many people are yet to have knowledge on both the ecological and medical

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importance of snakes, but rather consider these animals to be deadly in bites has created an extremely hostile association. Consequently, the population of snakes has drastically reduced in most areas due to the indiscriminate human killing behaviour rooted into snake-phobia. The human hatred for snakes seems innate in countries like Cameroon, which could push the snake population into extirpation if conservation educational programmes are not carried out to help the people know the value, importance, and behaviour of snakes.

## II. MATERIALS AND METHOD

**Description of the study area**

Kumba is one of the cities in the Southwest Region of Cameroon. It is found at latitude 4º,64' North and longitude 9º,45' East with an elevation of 258m above the sea level, with a population of about 144,413 (Melle, and Ewane 2015) fig.1. Kumba has a coastal equatorial climate, with two distinct seasons, a long rainy season of 8 months and a short dry season of 4 months. The annual amount of rainfall ranges from 2000m to 4000mm. The rainfall pattern provides a suitable condition for both perennial and annual crops to grow, thus providing an ideal condition for two cropping seasons a year (Melle, and Ewane, 2015). The rainfall here is one of the most important climatic factors influencing agriculture. Daily temperatures are high throughout the year and ranged from 28°c to 33°c. The atmospheric humidity varies with the absolute value and the seasonal distribution of the rainfall being uniformly high throughout the wet season and falling to lower level during the dry season. (Nkeng, 2009). Kumba municipality is mainly characterized by a coastal lowland possessing some wetland and flood zones. The lowland areas are the sites favorable for human settlement. The forest exploitation for farmland destroys the habitat of many wildlife species rendering them vulnerable to severe poaching. This is the main reason for the disappearance of many of the forest fauna species that existed in Kumba in the past. However, a few wildlife species still exist in the area (Ndam, *et al* 2002).

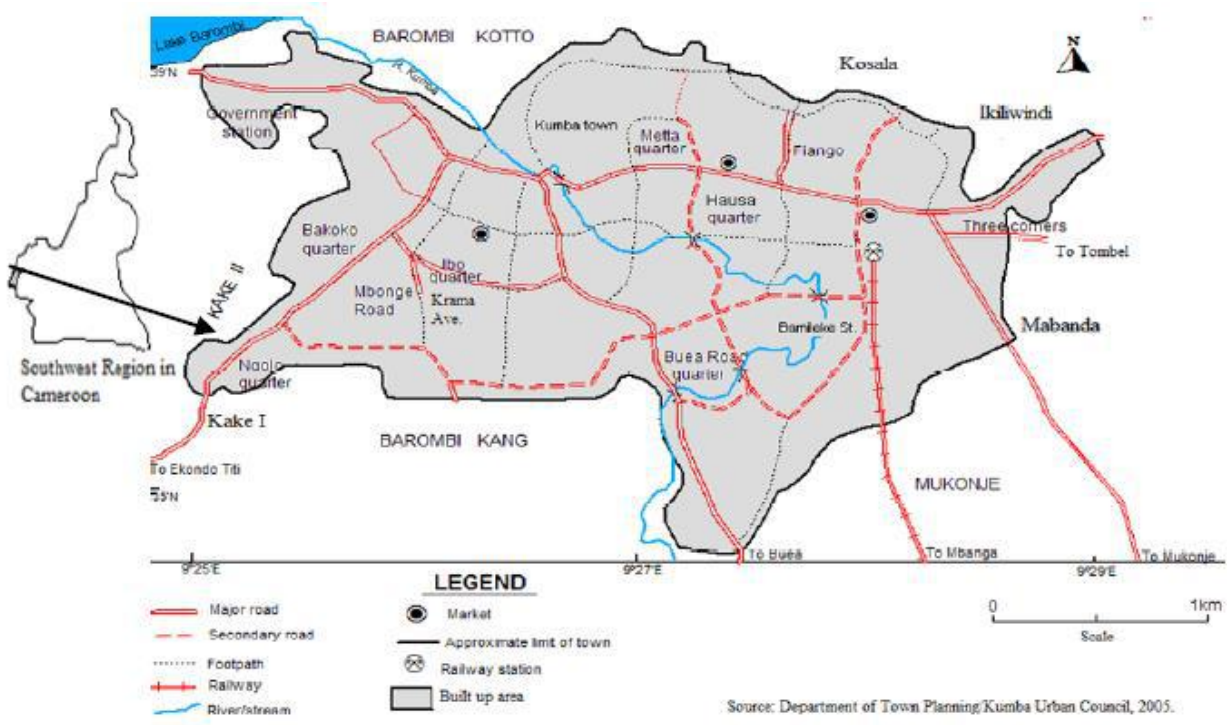


**Figure 1.** The map of Kumba (Department of Town Planning/KUC, 2005).

Food crop farming is the most important source of livelihood of the population around this area. The forest as direct source of income and subsistence through hunting and gathering is not very important for the overall population. Plantains, cocoyam and cassava are the most important agricultural products and contribute more than twice as much as cocoa and coffee to the daily livelihood. However, cocoa remains the main bulk income earner of the area (Ndam, 1998). On average the settlements are engaged in 3.7% alternative income-generating activities, but beside the various forms of

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livestock rearing, only beekeeping, cassava processing, fuel wood and timber harvesting have any relevance for the rural population. Agriculture is presently the most important economic activity carried out in the area, employing about 95% of the population, while timber exploitation, hunting and petty trading are also practiced by some inhabitants. Farm sizes range between 0.25 ha to more than 10 ha on average (Ndam, *et al* 2002). Non-indigenous farmers own the largest farms and account for most of the agricultural production of the area (Ndam, 1998). Livestock rearing is practiced for subsistence and for cultural sacrifices, which require the slaughtering of animals.

**Data collection**

The structured questionnaires used in data collection contained information on demographic characteristics of the respondents, their knowledge on poisonous and non poisonous snakes, the way humans interact with snakes, snake effects to humans in the study area. An interview with the local people was done and this was used to complement the questionnaire results. Two hundred and fifty questionnaires were administered in the study area. All the questionnaire handed to the respondents were fully answered and returned to the researcher within a few days.

**Data** Analysis

The research data analysis was done by using SPSS version 20. From this package a selection of two statistical tools was made, chi-square and correlation and were used to test some quantitative variables like age category, gender, and profession against some qualitative variables such as snake phobia and the knowledge on non venomous snakes. Moreso, The descriptive analysis was done mostly on the qualitative variables

## III. RESULTS

The prevention of snake attacks and opinion on snake population management in Kumba City has revealed a significant relationship ($X^2$ = 11.069 df=4, P<0.05) fig. 2. The human relation with many wildlife species has been very smooth, the reason for which man has travelled in many parts of the world for wildlife tourism leisure. Wildlife tourism is well known to have transformed the economy of most countries in the developing world, especially in the south of Sahara helping many people to easily understand the importance of wildlife conservation. But when it comes to Snakes many people have refused its conservation despite its much needed ecological role. And to many, the population of a human enemy like snake should not be managed.

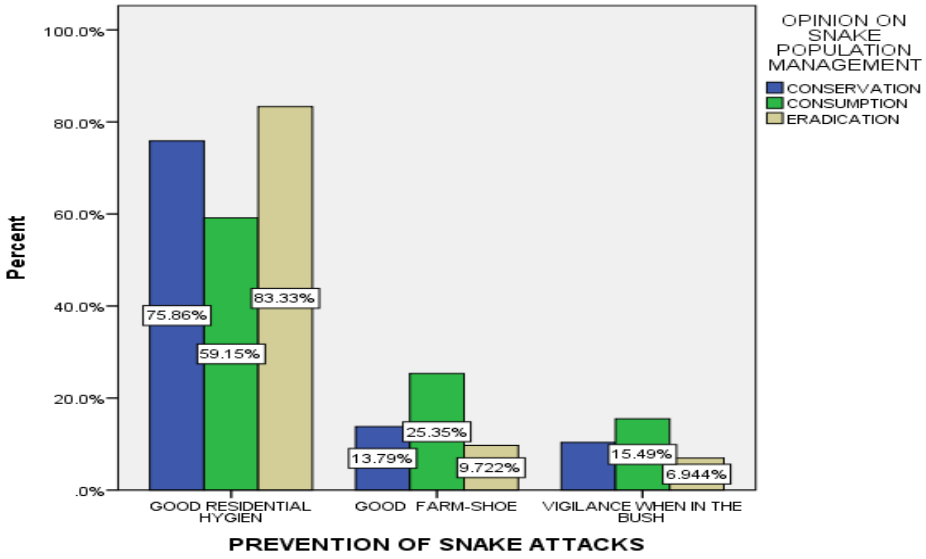


*Fig.2: The prevention of snake attacks and the snake population management*

The importance of snakes and the medical need for snake venom has been shown in fig.3 with a significant association ($X^2$ = 12.045 df=2, P<0.05). Many are yet know and accept the importance of snakes, the reason for which their killing is still very much rampant. People seem not to even believe that the snake venom may have some medical importance. For many, snake bites are not treatable medically, and for a few, the bites are only treatable traditionally. However, historically snake bites treatment has been managed by the use of herbs in many parts of Cameroon, believed to be the best treatment.

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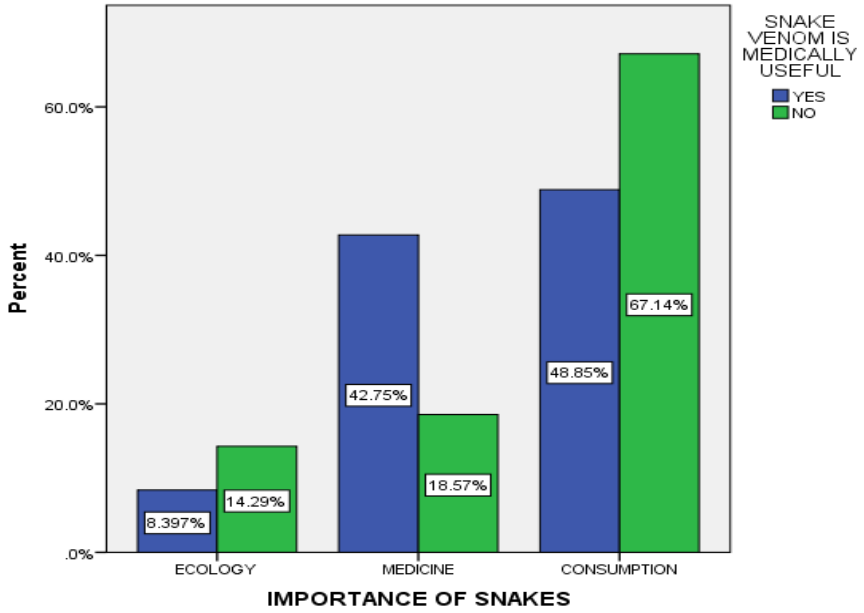


*Fig.3: The importance of snake and the importance of snake venom*

The prevention of snake attacks and the area snakes are easily sighted showed a significant association ($X^2$ = 29.205 df=4, P<0.05) fig.4. Snakes, as any other wildlife are homed by the wild, but have gradually been observed in human residential areas and farms in Kumba, the reason not yet known. Some may believe that the snake attraction to human residence is due to poor hygiene or for the purpose of feeding, especially in houses where chicken rearing is done causing attraction to snakes. Movement, dispersal, and home range use are important considerations when examining factors leading to population declines in snake species; however, information is limited for most snake species (Gregory *et al.*, 2001; Pough *et al.*, 2001). Movement events are costly due to the energetic requirements involved, as well as increased predation risks, and theoretically should only be undertaken by an individual out of necessity (Gregory *et al.*, 2001; Pough *et al.*, 2001). Movement should therefore be limited to that required to maintain individual fitness. Despite high fidelity to home ranges in some species, territorial behaviour is infrequent in snakes and is unlikely to influence dispersal patterns of any cohorts (Gregory *et al.*, 2001). Rather dispersal and movement events by snake species often relate to the availability of resources including prey, basking sites or mates (Gregory *et al.*, 2001). Avoidance of areas occupied by conspecifics may be the result of resource depression caused by the occurrence of other individuals at a site. Dispersal in all cohorts may reflect such avoidance tendencies with aggregations only occurring where resource availability is extremely high or concentrated, as part of mating and courtship behaviour, for physiological purposes (e.g., energy conservation) or where a resource is limited to such an extent that aggregation must occur to gain resource access (Gregory *et al*., 2001). Erratic movement patterns in snake species are predicted when resources are unevenly distributed or unreliable, compared to a more sedentary approach when resources are evenly distributed or dependable (Gregory *et al.*, 2001). Minimization of movement occurs in the majority of vipers with relocations within habitat patches being infrequent and sit-and-wait foraging tactics being employed (Pough *et al.*, 2001). Individuals often occupy an area for long stretches of time, up to a few months, until resources have been exhausted (Pough *et al.*, 2001). The majority of movements undertaken by viper species are between habitat patches, as occurs in sidewinders (*C. cerastes*) (Secor, 1995) and coachwhips (*Masticophis flagellum) (*Pough *et al*., 2001) in California and prairie rattlesnakes in Wyoming. When resource patch size is in decline, attraction to areas of conspecific occurrence leads to short-term fitness gains for individuals when compared to random search strategies (Fletcher, 2006).

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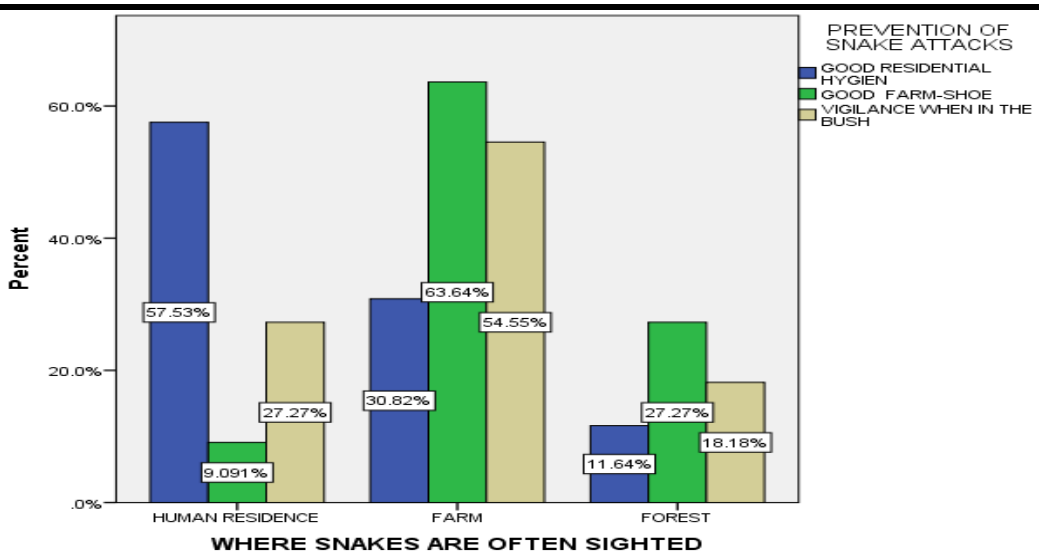


*Fig.4: The prevention of snake bites and the areas snakes occur*

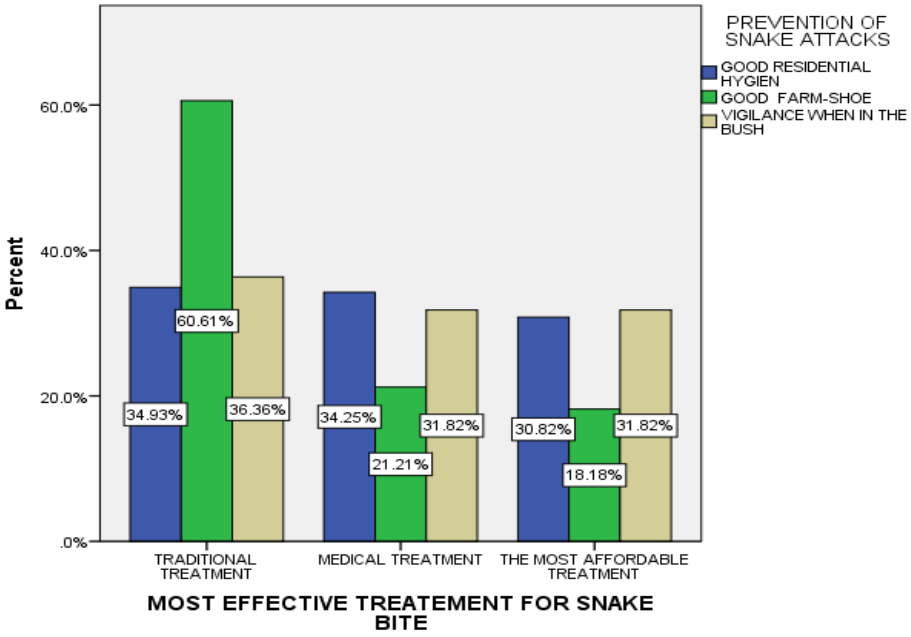


*Fig.5: The most effective treatment for snake bites and the prevention for snakes bite*

In fig.5 there is a correlation association between snake-bite treatment and its prevention ($R^2 = 0.312$, $P<0.05$). Snakes are more preventable than curable, especially in the local communities where the chances of a snake bite may be common. The local farmers have known and learnt to be extremely vigilant in the farms where snakes can easily be sighted. They also, believe that good farm-dressing is very necessary, especially dressing in good boots that would help to prevent a bite from a trod snake. Many farmers in the past who suffered snake-bites on farmlands and bushes was mostly on the legs.

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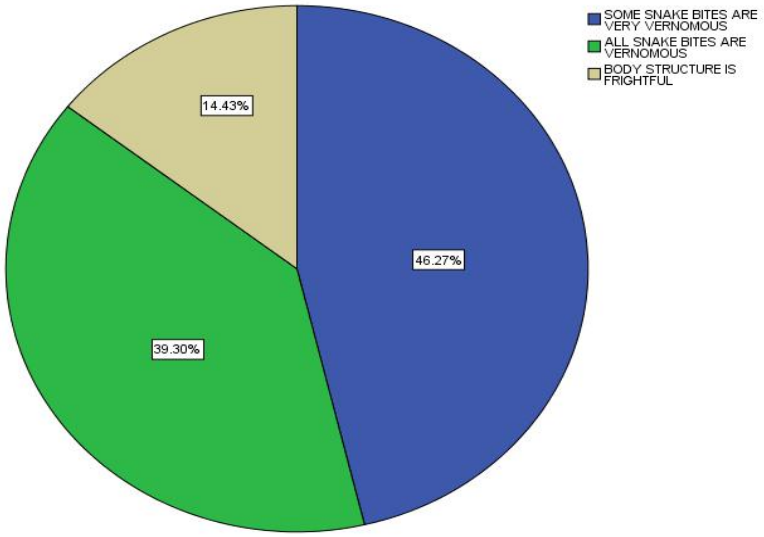


*Fig.6: Snakes are dangerous*

A respondent score of 39.30% is recorded upon the knowledge of venomous snakes in Kumba city (fig.6). This has shown that so many people in Kumba are yet to know that many snakes species around are non venomous and there should be no need for snake-phobia during their encounters. It might also be possible that even the respondent score of 46.27% with a knowledge claim that many snakes are not dangerous, might as well not have knowledge on the species that are non venomous since no workshops have been carried out there for education. The absence of knowledge on the snake species which are either venomous or non venomous means all snake species should be scaring and distance immediately when sight.

The cumulative effect of fear, antipathy, negativity, ignorance, and ambivalence to snakes among people represent potential threats to snake conservation. Apparent decline of local snake populations and extirpation of rare or endangered snake species in Cameroon and other parts of the world may occur if wanton killing of snakes is unchecked, which has multifarious and unforeseen negative impacts on biodiversity and human health. Therefore, potential factors responsible for large-scale killing of snakes should be considered when developing biodiversity conservation and public health strategies. Increasing knowledge and the awareness of people about snake and snakebite care and prevention through educational interventions, such as snake parks and snake museums, are cost effective ways of developing snake friendly attitudes of people (Deb Prasad *et al* 2016).

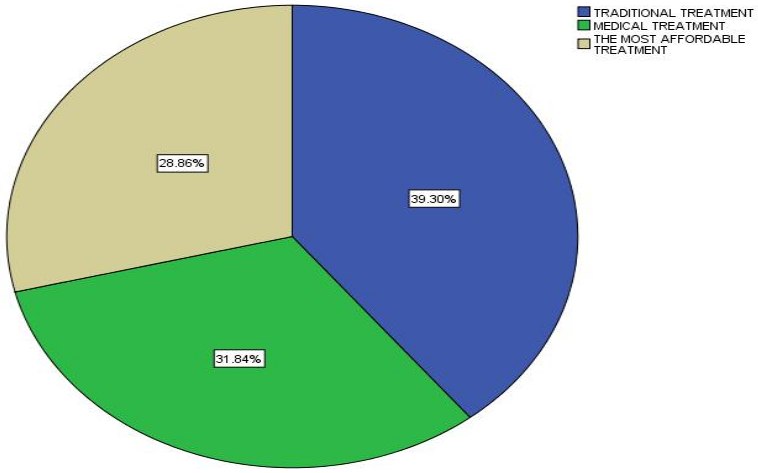


*Fig. 7: The most effective treatment for snake bites*

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The study recorded a respondent score of 39.30% on the preferable use of traditional treatment on snake-bite victims in fig.7 than the expected medical treatment (31.84%), creating an understanding that the people of Kumba are still very much dependent on the ancient methods of treating snake-bite victims. The evolution of diseases has increased the research study and ability of man to develop the medical drug industry for the treatment of many diseases that plagued human existence with health crisis. On this light very good anti-venom drugs have been invented for the treatment of almost all snake-bites, especially when victims are brought to the hospital in time. In the past many people died of snake bites because of lack of improved medical treatment facilities that made many to depend on the native traditional treatment for the survival of the snake-bite victims.

## IV. DISCUSSION

Venomous snakes certainly are among the main health hazards for rural people in tropical regions of the world, while it is calculated that many thousands of people die yearly on account of snakebite, especially in India, but also in Africa and South America (Bonnet et al, 1999; Chippaux 2006). Several independent factors may increase the probability of being bitten and eventually killed by a snake in a tropical area. Firstly, the antipredatory behavior of a snake species certainly influences the likelihood of a bite: for instance, the puff adder (*Bitis arietans*) is more inclined to bite than a Gaboon viper (*Bitis gabonica*); thus, despite similar ecologies (but not habitat selection) and venom compositions and potency, the former is more likely to kill people than the latter (Chippaux 2006, Spawls and Branch, 1997). Secondly, in geographic areas where there is a higher diversity of venomous snakes, the probability of being killed by snakebite is greater than in areas where there are fewer dangerous snakes. So, for instance, the probability of experiencing a fatal bite is certainly higher in India or in several regions of tropical Africa (where many sympatric highly venomous snake species do exist) than in South America. Thirdly, geographic areas with a greater density of people working in rural activities are more prone to be affected by high rates of fatal bites than areas where the rural human density is low. Fourthly, the probability of being bitten in a given tropical area cannot be constant across the year, but should depend on the monthly activity patterns of snakes and on correlating the activity patterns between snakes and humans (Chippaux 2006). Indeed, it has been demonstrated that in tropical areas three quarters of the bites happen during agricultural tasks, hunting or while walking to or from work, and are hence linked to occupational activities(Chippaux 2006).

Human-wildlife interaction that always leads to conflict is a major concern of most people living next to protected areas or when wild animals like snakes come in direct contact with humans. Conflict is here defined as any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, and on the conservation of wildlife populations, or on the environment (Anonymous, 2005). Though humans generally try to avoid interaction with reptiles like snakes, they occasionally bear an importance that extends beyond survival and into the realm of culture. Human - snake interactions has always been associated with different outcomes. Human snake encounters with negative results such as animal death, habitat destruction, injuries to people, injuries to wildlife and the like are common (Magige, 2012). Generally, there are more than 3000 species of snakes in the world and they live in both terrestrial and aquatic ecosystems and are predatory carnivores with wide range of prey species (WHO, 2010; Bijees, 2012). Despite urbanization, villagelization and destruction of their habitats, snakes remain plentiful in most parts of Africa. Snakes co-exist with humans in homes, gardens and outhouses but their presence usually goes unnoticed. Snakes are beneficial to humans by killing unwanted insects and rodents in food stores and crops. Snake-skins are used as tourism attractions as with cases of snake parks, used to make shoes, handbags, and other articles. The venom is used for producing life-saving antivenin, biomedical research and for other medicinal products. In India, China and Africa, some species of snakes are used as sources of meat (Oi-Fung *et al.,* 2009; WHO, 2010). In Asian countries such as Thailand, Indonesia, and Cambodia, drinking the blood of snakes like cobra is believed to increase sexual virility. In the Western world some snakes, especially docile species such as the ball python and corn snake, are kept as pets. Snakes are creatures that are used for reverence and even worship in some areas, and they are exhibited as performing animals by traditional snake charmers (WHO, 2010). All these and many others are uses of snakes to mankind.

It was further noted that the impacts of snakes to humans include worries when they are encountered because they fear of being bitten although most of people interviewed had not been bitten by snakes instead had heard number of people that has been bitten by snakes. Being afraid of snakes is a natural human behaviour (Hezron and Alex 2015). People fear snakes for their venom, and the

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possibility that their lives may be in danger. All the respondents regarded snakes as dangerous creatures since they cause bites to humans, livestock and snake venoms can cause death (Hezron and Alex 2015). . However, two thirds of the respondents admitted that not all snakes are venomous and dangerous although they are afraid to any kind of snake. Indeed, snakes are important in aspects of tourism, education and many other uses as was pointed out by some key informants and respondents during this study (Hezron and Alex 2015). . Snakes being important in contributing to the national economy through tourism and in ecosystem function, they need special attention and care for their survival. It is clear that, despite the risk of snake-bite and other undesirable effects, humans must learn to co-exist peacefully with snakes, respecting their place in nature while minimizing the danger they pose by avoiding them as far as possible (Hezron and Alex 2015). Snakebite is a serious public health hazard in many regions, particularly in tropical and subtropical countries (Warrell 1992; Chippaux 1998). However, there is very little hard evidence of a numerical nature to enable us to understand the issue in detail and assess the magnitude of mortality and morbidity. Unfortunately, public health authorities, nationally and internationally, have given little attention to this problem, relegating snakebite envenoming to the category of a major neglected disease of the 21st century.

## V. CONCLUSION

The aged hostile relation humans have had with snakes may no longer be necessary, considering both the ecological and biomedical importance of snakes. There need to be snake conservation education programmes, in which people are thought about the behaviours of snakes, especially the most common species often seen around. Snakes are extremely valuable because they are efficient at keeping the number of rodents and insects in check, without relying on damaging chemical pesticides which can degrade the environment and harm other animal species. Snakes are very effective at hunting such prey because they can crawl into small burrows and other areas that rodents use as shelters. These places are too small for other predators to get into. Snakes are also helping to save the lives of millions of people every year, as the venoms from snakes are being used to treat many serious health ailments like cancers, heart & stroke disease, Parkinsons, and many more. A better way to control rodents, and one that's often overlooked, is to encourage natural predators to do the job. If the world's snakes were eliminated, the rodent population would increase dramatically which would affect crop production. Apart from the threat to food security posed by rodent population growth, increased disease outbreaks would put a heavy burden on the health services of many countries, especially developing ones. Some farmers and farm workers may want to pick up the nearest rock or stick and destroy every snake they come across on the farm. The reason for this is a mistaken belief that all snakes are dangerous and will kill people. The truth is, most snakes are harmless to humans. It's far better to remember this rule: 'Leave a snake alone and it will leave you alone'. The rodents and other prey species are in danger in encounters with snakes.

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