

## A Preliminary Study on Risk of Disease Occurrence in Nechsar National Park, Southern Ethiopia

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**Abstract:** Ethiopia is inhabitant of diversified livestock including wildlife. The country has therefore different national park where these various wild fauna are found. Nechsar national park is one of the existing but less utilized national parks in the country. Purposive study design was employed from November 2009 to April 2010 in and around Nechsar national park to assess common diseases outbreak occurrence on wildlife and associated risk factors for disease dynamics in the park. Semi-structured questionnaire were organized in 3 categories (scout related, park settler related and park staff related) revolving on both wildlife and domestic animal. Observational study on physical stands was also made. A total of 363 study participants were involved for active data collection. Trypanosomiasis as a main wildlife death causing together with tsetse flies as a responsible risks for its endemicity was the pronounced record. However, anthrax and rabies outbreak were not uncommon. Moreover, lack of proper documentation in the park hinders the true disease impacts in the park. Thus, proper park management, recording of day to day activities of the park and prevention of wild fauna-domestic animals interface are crucial points for maintaining the national park.

**Key words:** Pastoral settlers • Nechsar national park • Risk factors • Trypanosomiasis • Wildlife

### INTRODUCTION

Wildlife is an important component of the economy creating considerable income through tourism and consumptive use [1, 2]. Africa is estimated to hold at least 25% of global wildlife biodiversity [3]. Eastern and southern Africa contain most of the continent's large mammals, mainly because their tropical savannah grass lands that are extremely productive with respect to the diversity and Biomass of their mammal communities [2]. Because Africa's wildlife is increasingly valuable as a subject of global commerce, there is increasing commercial interest in securing control over, or assess to, wild life rich rural African landscapes [3].

Wildlife health is a crucial issue and if ignored, there could be serious economic, environmental and social ramifications at a national or international level. Factors such as climate change and anthropogenic environmental impacts have considerable potential to alter habitat [4].

It must be remembered that disease is a natural phenomenon and that it is not common for disease to have a significant enough effect to cause an impact on

species survival [1]. Wild life disease usually is a positive stabilizing influence on ecological process, dynamics and integrity. Parasitic, Pathogenic and communal fauna associated with wildlife play their role in natural processes and should be conserved with in a healthy ecosystem [5].

Infectious and Zoonotic diseases of wildlife have long been recognized as having the potential to affect wildlife, domestic animal and human health. Interest in wildlife disease has increased recently for a number of reasons. Wildlife may act as potential reservoirs or amplifiers of disease. Human encroachment in to wild life habitat is leading to increased wildlife-human-domestic animal interaction and creating new opportunities for zoonotic disease transmission.

There is an increasing frequency of new and emerging diseases, 75% of which have a wild life origin or link. The 2007 World Health Organization report illustrates how infections disease is spreading further and more rapidly than ever before and how new wild life diseases are emerging at the increased rate of one per year (with each new disease over the past ten years emanating from wild life reservoirs.

Risk analysis comprising risk assessment, risk management and risk communication is a tool used advantage for animal disease emergency preparedness planning [6]. In Ethiopia few wildlife disease databases exist on national or international scales. However, no central database or information system exists for common access to geospatial and temporal wild life disease information that can hamper rapid disease identification, notification, response and information dissemination [2].

With in an increase in populations of humans and their domestic animals and a consequent increase in contact and conflict between domestic animals and wild life, the frequency of transmission of common pathogens of domestic animals to wild life is likely increasing. This is particularly true when the population becomes fragmented and interactions, including hybridization, between domestic and wild species increase [4].

Nechsar National park is one of the national parks of Ethiopia located at southern tip of the country. Ecosystem of the park provides habitats for the world's largest population of the endemic Swayne's hart best. Human settlement with in the park has been experienced since the establishment of the park. Except few, no investigation had been carried out on wild fauna of the park whether in ecologic aspect or health facet which can hold and figure the park in disease and disease related propagations. Therefore, the objective of this study was to assess common diseases outbreak occurrence on wildlife and associated risk factors for disease dynamics in the park and highlight the interaction and negative impact of park settlers on the park's fauna.

## **MATERIALS AND METHODS**

**Study Area:** Nechsar National Park (NSNP), gazzetted in 1966, is located at the bottom of the western escarpment of the great African rift valley. It is located in the southern nation, nationality and people's regional state (SNNPRS) of Ethiopia, right after the eastern edge of Arbaminch town, at about 510 km south of Addis Ababa. The mean annual rain fall of the study area ranges between 800 and 1000 mm [7]. The park lies within the floor of the Great Rift Valley and extend from 5° 51 N to 6 ° 50 N and 37° 32 E to 37° 48 E with an elevation varying between 1,108-1,650 m.a.s.l. It covers an area of 514 km<sup>2</sup> of which 85% is land and 15% is water.

**Study Population:** The study was conducted on wild animals of Nechsar national park, cattle of Guji Oromo

pastorals settled within the park, cattle of Kore farmers settled outside the park and cattle of Arbaminch inhabitants who live in Arbaminch town.

**Study Design:** Purposive survey based study (questionnaire and observational based) was conducted on park settled individuals owing cattle, park game scouts who stand for wild animals, non park settlers who have cattle, park officials and also in and around the park. During the study risk assessment about wildlife disease occurrence, exploration of disease association between cattle and wild animals together with associated risk factors and threats that have an effect on both cattle and the parks wildlife were considered.

**Observational Study:** Observational study on both physical stand and atmosphere of the park in terms of disease causing potential and affecting the park's wildlife and ecology was conducted to identify risk factors, components and causes that contribute to the occurrence of disease. The survey was mainly focused on sites and areas that have a key role in disease initiating, transmitting and generating roles and potential risks. Physical and social surveys were also conducted to identify the extent of disease and its frequency and also to assess impacts of human activities on the park.

**Questionnaire Survey:** Semi-structured questionnaire format was prepared for all groups (parks settled and settled not, game scouts and park staffs) and interview interaction was used to collect all necessary information about risks and threats of both wild animals and cattle on disease regard, frequency of disease occurrence, screening endemic disease and its frequency, previous disease out breaks if and impact of the park settlers on the park. Local names were used for all scientific terms during the interview. Accordingly a total of 363 participants comprising 45 scouts, 104 Guji Oromo park settlers, 104 Kore people (Settled out side the park), 104 individuals from Arbaminch town and 6 park staffs were involved in the study and were defined as Key- informants.

**Data Analysis:** Descriptive statistics was employed to quantify the results of the disease risk factors known to occur in the park and out side the park in different species and time wise. Analytical measure was compared using statistical package for windows version 17 (SPSS 17).

## RESULTS

**Response from Park Scouts:** Out of 45 respondents, 68% named diseases of wild animals (Anthrax, Trypanosomiasis and Rabies) with respect to the species it affects. Regarding risk issues all said wildlife herbivores graze and water themselves within the park. However, 88.9% of the 45 scouts said carnivore wild animals prey within the park and almost all the respondents showed wild carnivores drink with in the park. Zebra were indicated as commonly affected animals and Trypanosomiasis is responded as common disease occurred in the park (Table 1). Generally they concluded that the park is not getting attention as it deserves and if continues like this it will no longer exist in its comfort for wild animals rather it will be collapsed and loose its potentials.

**Response from Guji People:** All participants from Guji people replied their residency in the park with minimum 21 years stay. About 89% of the respondents owned cattle numbered with the range between 100-300 with no one having sheep, horse and donkey. All of the respondents replayed as their cattle graze and get water with in the park. Furthermore, all of them elaborated Trypanosomiasis is the major disease killing their cattle with higher burden at dry season (Table 2).

**Response from Kore People:** Among the 104 participants 37.55% had been there for 21-40 years, 30.8% for 41-60 years and the rest 31.7% had been there for 60 years and above. The entire respondent said they graze and water their cattle outside the park and indicated as Trypanosomiasis is prone to their cattle.

**Response from Arbaminch Town Dwellers:** All the 104 participants replied as Trypanosomiasis is the main disease which kills their cattle and as there is a high occurrence of tsetse fly in dry season.

**Response from Nechsar National Park Staffs:** All the 6 respondents replied disease comes in the park in spontaneous manner. They said Trypanosomiasis frequenting its presence annually and tick infestation is the major cause of death in wild animals of the park. Again all of them said, the aggravating factors for the disease are mixing of animals from outside the park and occurrence of tsetse flies and added zebra is the most commonly dying wild animal (1-5 per month). Generally the over all reason for the death as per their reply is diseases and poaching.

## DISCUSSION

In the study, risks to diseases were found the same in all respondents. Both wild and domestic animals have been found to play a significant role in Trypanosomiasis which was found in line with other records [8]. The result collected from park settlers and scouts in the present study illustrated that both cattle of park settlers and wild animals of the park suffer from Trypanosomiasis. Similarly, Serengeti national park in northern Tanzania has experienced a number of sleeping sickness since 1922. The epidemics were associated with abundant game animals in the areas and *Glossina saynneri* was incriminated as the main vector [9]. The results of this retrospective study highlighted the presence of tsetse in and outside Nechsar national park that might be important in spreading of Trypanosomiasis. Even if the vector in the study area was not further studied, it's likely possible to conclude that the result of the study is much similar with Norton.

Ethiopia is among the countries that accompany Trypanosomiasis. From the study, it has found that cattle of the park settlers are at risk of Trypanosomiasis. Previous studies have reported *T.congolense* as the predominant species in cattle in various parts of SNNPR. This shows that the species is likely to be found with in the park together with *T.vivax* considering death of zebras (5-10 per month) within the park. This might be in line with described in free encyclopedia [10], indicating current presence of *T.congolense* in Eastern Africa affecting bovine and equine species.

The current studies figured out that interrelationship between domestic livestock and wildlife creating potential risk of transmission of pathogens in either direction. This agrees with reports of other researchers indicating emerging of diseases due to "spill-over" and "spill-back" from one another [5]. The present study also illustrated not only park settlers, but also town dwellers are expected to be infected by existing diseases in and around the park.

As reported by previous writers, black head jackals occur in many livestock producing areas where they are considered vermin which shows the species lives in the park where cattle are numerous [10]. The present study has also found these species had commonly affected by Rabies in early 1980's where it occurred in the park animals with could indicate the interface between wildlife and domestic animals.

Furthermore, Kifle Argaw addressed the occurrence of anthrax in 2001 & 2002 in Mago National park and rabies in 2003, in Bale Mountain national park [11].

Table 1: Overall view of diseases and their occurrence in the park animals of Nechsar as per the scout listed

Disease told	Risk identified	Species affected	Age group affected	Sex affected	Year occurred	Occurrence After went back
Anthrax	Cattle	Grant gazelle	All	both	1983	Occurred not
Rabies	Dog	Jackals	All	both	1986	Occurred not
Tick infestation	Tick	Swayne's hartebeest	All	both	1988	Prone to the park
Toxication	Lake	Burchelles Zebra	All	both	1995	Occurred not
Trypanosomiasis	Tsetse	Burchlles Zebra	All	both	1988	It comes annually

Table 2: Trypanosomiasis as a mass killer in Guji's cattle

Mass death	Time when	Percent of respondent	Reoccurrence	Reoccurrence interval
Yes	1982	(51.0%)	Yes	Annually
Yes	1984	(49.0%)	Yes	Annually

Table 3: Summarized prevalence of Trypanosomiasis in cattle of Kore (1981-1985)

Mass death due to Trypanosomiasis	Frequency	Time when occurred
Yes	15	1981
Yes	22	1982
Yes	42	1983
Yes	21	1984
Yes	4	1985

In our study, discussion with scouts in the study area has revealed the presence of anthrax outbreak and rabies in 1988 and 1994 respectively in Nechsar National park. We could also understand from the park staffs as there were different outbreaks in wildlife of the park despite poor recording mechanism.

From observational study threats caused by Ticks are continuing in their tendency. Moreover poaching, overgrazing, wood collection for fuel, cultivation and trespassing were recorded. This was found inside with records of Kirubel [7]. Besides, people are changing the atmosphere started hundreds of years ago when they began cutting down forests and burning the wood. Surrounding communities were observed taking part in microclimate change.

### CONCLUSION

The current study gained more insight that the protozoan, Trypanosomiasis, in the park emerges in a year to year hiatus and might be true to regard it as an endemic disease in the study area. The study also provided evidence that, the association of disease in and around the park. The park is in threat due to findings of risk sites that are capable of generating and creating fastidious instance for propagation, spread and transmission of diseases together with human settlement within the park. Documentation of wild animal disease in Nechsar national park was also found hiding the true burden or frequency of disease outbreaks in the area. Therefore, detailed studies equipped with laboratory findings should be performed. Control methods directing on minimizing the

existing potential diseases and vectors in and around the park should be implemented. Public education on settled inhabitants in the park is mandatory to decrease pressure on the park. Furthermore, recording of day to day activities of the park is of great issue that needs focus.

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