



**ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY
SCHOOL OF APPLIED NATURAL SCIENCES PROGRAM
OF APPLIED BIOLOGY**

**THE BEHAVIOR AND ECONOMIC IMPORTANCE OF LIONS:
THE CASE OF SIDIST KILO LIONS' ZOO, ADDIS ABABA**

BY

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November, 2017

Adama, Ethiopia



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**A THESIS SUBMITTED TO THE DEPARTMENT OF BIOLOGY,
REQUIRED FOR PARTIAL FULFILMENT OF THE REQUIREMENT FOR
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ACRONYMS

CHV	Canine Herpes Virus
ETB	Ethiopian Birr
Kg	Kilo gram
TCC	Tourism Collective Consumption
TEC	Tourism Economic Contribution
TGFCI	Tourism Gross Fixed Capital Investment

ABSTRACT

The study of behavior and economic benefits of Sidist Kilo Lion's Zoo was carried out from March to June, 2017 at Sidist Kilo animal Zoo of Addis Ababa. The main objective of the study was to assess certain behavioral characteristics, and its economic contributions of captive lions in Sidist Kilo Lions Zoo for Addis Ababa and national economy by large. Hence, the onsite observation, semi structured questionnaires, interview and secondary documents of the zoo were used as a source of data. The provision of contraceptives for the lions leads them to the declining of lion's population. For that matter the expansion of the zoo declines, as well as the revenue earned from foreign and domestic tourists decline. Moreover, lions have behaviorally 105 day's gestation period, male lions took long resting hours than females. In contrast, female lions took much more water than male the resting time for male lions were 52% and for female lions were 48%. Thus, male lions took more resting time than females; average walking hours were 6.3 and respectively. 7.4 For male and female lions and some conservation measures crowdedness due to small habitat needs to be solved, which had already started recently, nutritionally, lions should be provided with additional feed such as calcium phosphate, environmental disturbance such as sound pollution can be also minimized by using No sound symbols or cautions. Even if lions naturally need undisturbed space to survive, they are top of the food chain and their distribution is fundamentally linked to that of their various prey species but regarding to Sidist Kilo Lions Zoo the researcher observed different informal behaviors of captive lions with in the confined spaces such as restlessness, desire to attack human and rubbing their body to the wall of the cage. The obtained result revealed that poor handling of the lions due to lack of trained veterinarian and care givers, exposed these captive lions for different diseases. Based on these findings recommendations were made, stake holders should work cooperatively to encourage the development of opportunities for economic and social benefits of the society from responsibly captive lion populations in Sidist Kilo Lions Zoo and to maintain the population of lions in the zoo. Accidents that happen by sudden attack of lions should be minimized through trainings to keep the safety of care givers. Likewise, feeding trends was also contributed to the existing problems that lions in Sidist Kilo Zoo suffered with. Because, they feed with only meat every day that was not supported by additional diets such as calcium phosphate.

Key words: Behavior, Captivity, Conservation, Lion, Reproduction, Zoo,

1. INTRODUCTION

1.1. Background of the study

Humans maintain wild animals in zoological parks for the purposes of education, conservation, research, and recreation (Mench and Kreger, 1996; and Shettel-Neuber, 1988). However, abnormal behaviors may develop in animals housed in human-made environments, if those environments do not allow them to carry out their natural behaviors (such as swimming, climbing, stalking, and predation). Captive environments in zoological parks often do not provide for natural behaviors due to spatial constraints and negative public reaction. Lions (*Pantheraleo*) present a difficult case; they have large home ranges in the wild and natural predatory hunting behaviors that are difficult to provide for in captivity.

Lions (*Pantheraleo*) formerly ranged throughout Africa, the Middle East, and southwestern Asia. The reasons for the decline in lions in Africa are many, and include habitat loss and conversion, indiscriminate killing to protect life and livestock, prey base depletion, bush meat trade, and excessive sport hunting.

Even if, lions are part of a group of animals that are the core of zoo exhibits since the late eighteenth century; members of this group are invariably large vertebrates and include elephants, rhinoceroses, hippopotamuses, large primates, and other big cats; zoos sought together as many of these species as possible. Although, many modern zoos are more selective about their exhibits, there are more than 1,000 African and 100 Asiatic lions in zoos and wildlife parks around the world. They are considered an ambassador species and are kept for tourism, education and conservation purposes. Lions can reach an age of over 20 years in captivity and especially the male lions in the wild conditions have lived up to 10-12 years because of intra specific competition for resources and mating.

According to Herbers, 1981, captive animals rely on routine or reduce anxiety about essential environmental features that they cannot control themselves (such as provision with food, water, and shelter), then failure to provide such assurances will surely be because of distress. Feeding in captivity that is not found in nature is its predictability. Often, the exact nature of the diet is in variable;

animals are offered the same foods day after day. Some researchers suggest that such in variability is undesirable to animal's behavior. Variability is undoes many animals in their natural habitats spend a large portion of their daily activity budget in the search for and consumption of food. In captivity, however, food is generally provided. Often this food is substantially different from what the animals would consume in nature; it may be more condensed, higher in protein, different in texture, and lowering fiber than a typical "wild" diet, and generally takes much less time to eat.

In general, there have been several studies on lions in Africa(Hanbyet *al.*, 1995) especially in protected areas; molecular genetics research has recently provided insights into lion phylogeny. Despite previous suggestions that all lions share recent common ancestry, now indicates clear distinctions between lions in North, West, and Central Africa, the Middle East, and India versus those in Southern and Eastern Africa. Although, lions are one of the highest valued eco-tourism species in Africa and are also the subject of many documentaries and research efforts (Dudley, 2002), study on their behavior and economic importance is almost non-existent in Ethiopia, including those in Sidist kilo lion's zoo.

The zoo environment is characterized by three conditions: 1) zoo visitors 2) limited space 3) animal management (Hosey, 2005). As Hosey, 2005 states; it is probable that all three elements have both discrete and synergistic effects on the behavior of captive lions (and, presumably, other zoo animals). The combined effect of these environmental factors probably has an impact on the behavior and welfare of zoo lions but there are currently no data available at Sadist kilo Lion Zoo that describe the interaction between the threedimensions. This study analyzed the conservation and economic values of lion's resources in Addis Ababa Lions' Zoo Park. This paper can be justified for some reasons. First, the zoological garden is a protection and a potential tourist destination because it is situated in Africa's administrative center. Therefore, it has potentials to generate high income and support for the tourism sector if appropriate valuation is employed. Second, this study seeks to contribute to a policy design for appropriately managing the Park through budgetary allocations by estimating the will that reflects economic and social costs/benefits. The general objective of the study is to assesses the conservation and the total economic benefit of lions at Addis Ababa Lions Zoo Park and its contributions to national economic activity. This study also specifically

determines the feeding , resting time , reproductive and with the socio-economic and demographic characteristics that influence people's willingness to pay for use value.

1.2. Statement of the Problem

Zoological parks have not been given much attention in Ethiopia as evidenced by their number and the service they provide. Ethiopia is one of the countries with a declining lion population. Even the existing Addis Abba Lions zoo park fails to maintain its main task of conserving lions. Many lions are in risk of extinction due to diseases and starvation in which it raises the mortality rate of newborns to 50% in 2002.

Hence, the study focuses on behavior and total economic value of lions at Addis Ababa lions 'zoo park. The Addis Ababa lion's zoo was selected for the study for the following basic reasons. First ,the Addis Ababa lion's zoo park is a potential tourist destination in the city and has a potential to generate high income and support for the tourism sector if appropriate valuation is employed. Second, the research conducted by Melaku (2002) shows that the lions in Addis Ababa zoo park (*Panther Leo Abyssinica*) are the only traits in the world and this zoo is the only and the first lions protecting area in Addis Ababa, which makes it unique. Therefore, improper handling may have anegative effect on the effort of protecting endangered lions within the park. Third Addis Ababa zoo is located near resident quarters. The zoo is very close to the resident home that might be the cause of the transmitting of disease by domestic animals, unfortunately there were no aserious research done in these case. A sustainable lion's conservation system, protection of the existing must be coming up.

Thus, the study would fill the gap of other studies in conducting research both behavioral and economic assessment of the Sidist Kilo of Addis Ababa Lions' Zoo. Because, the poor conservation status of lion population, the way how the care givers protect themselves from any dangerous condition is important to replicate their desired genetic traits and earn the expected economic benefits.

1.3. Research Questions

This study possibly answered the following questions.

- a) What is the behavior of *Panther leoabyssinica* in case of feeding, rest time, reproduction and morphology?
- b) What is the overall benefit of Sidist kilo Lions' (*Panther leoabyssinica*) Zoo?
- c) What are the challenges caregivers encountered while they care the lions?
- d) Why the lion (*Pantheraleo*) requires a captive and Biodiversity Management Plan
- e) What are consequences of starvation?

1.4 Objectives of the study

1.4.1. General objective

To assess certain behavioral characteristics and its economic contributions of Sidist Kilo Lions to the city of Addis Ababa national economy.

1.4.2. Specific objectives

- ◆ To assess the feeding, rest time, reproduction and morphological behavior of the Sidist kilo Lions (*Panther leoabyssinica*) zoo.
- ◆ To examine the socio-economical characteristics that influence society's willingness to pay for use of conserving lion's zoo.
- ◆ To investigate the challenges of care givers and visitors encounter while they care the lion.
- ◆ To maintain the current degree of protection and management of captive lions.
- ◆ To enhance the conservation status of captive lions in Sidist kilo Lions Zoo.

1.5 Significance of the study

This study contributes to inform the society with regard to the advantages of zoo establishment to achieve biodiversity conservation strategic plan of the biological community that promoted for different purposes mainly to maintain ecological, biological and over all societal benefits. In addition the findings of the study will be useful for fresh graduates and other researchers who want

to conduct further studies on zoo lions. Therefore, it will be used as one of the reference material to be provided with adequate information about lion zoo in Sidist Kilo. The research main aim is the conservation of captive lions in order to maintain a flow of (largely non-marketable) goods and services that secure wider social, economic and environmental benefits. This research also could help to exist the captive lions of Sidist Kilo Lions Zoo how the area they live in issuitable for them specially the relationship between the lions themselves and to their environment. Other scholars or other researchers can communicate to this study in different ways, such as in Adam Science and Technology University library, if possible in journal.

2. REVIEW OF RELATED LITERATURE

2.1. Lion factors

2.1.1. Basic characteristics of lions

An adult female lion needs a minimum of 5 kg of meat per day to maintain basic metabolic requirements. Lions also need more room than many other predators. Their behavior reflecting their adaptability, predatory and reproductive strategies show extensive regional variation. Fundamental ecological and behavioral characteristics of carnivores such as density, grouping, range size and prey selection are influenced by habitat and by prey density, dispersion and richness. Field observations indicate that lions are still found in areas used by people, even those with human settlements, because of favorable habitat and an adequate prey base in the form of domestic animals and wildlife with high tolerance of humans. Lions usually prefer to distance themselves from developed areas, but specific behavior or habitat preference may increase the risk of conflict. Lions' preference for dense habitat, for example, may increase the likelihood of encounters with humans by increasing the opportunity for lions to ambush humans and livestock. One aspect of lion behavior is "surplus killing": a lion breaking into a fence den closure may kill more – sometimes many more – domestic animals than it can eat. (This trait certainly exacerbates human hostility towards lions and exacerbates conflict. Sub-adult males may be more likely to kill livestock, but all lions are potential livestock killers. Attacks on stock are usually carried out by individual animals of either sex or by small groups of young and inexperienced males, possibly animals expelled from prides that have moved out of their range. Culprits might also be mature lions forced out of prides that are no longer capable of killing wild animals as a result of old age or damage to paws or teeth (La Grange, 2005). Some lions are chronic livestock killers. In Waza National Park, some lions are problem animals; others feed exclusively on wildlife. One collared male lion was a habitual problem animal who spent most of his time outside the park feeding primarily on livestock(Stander, 1997).

2.1.2 Distribution patterns of lions

The lion (*Panthera leo*) is one of the five big cats in the genus *Panthera* and a member of the family Felidae. The commonly used term African lion collectively denotes the several subspecies found in Africa. With some males exceeding 250 kg (550 lb) in weight, it is the second-largest living cat after

the tiger (Nowak and Ronald, 1999). Wild lions currently exist in sub-Saharan Africa and in Asia (where an endangered remnant population resides in Gir Forest National Park in India) while other types of lions have disappeared from North Africa and Southwest Asia in historic times. Until the late Pleistocene, about 10,000 years ago, the lion was the most widespread large land mammal after humans. They were found in most of Africa, across Eurasia from Western Europe to India, and in the Americas from the Yukon to Peru (Harington, 1969). The lion is a vulnerable species, having seen a major population decline in its African range of 30–50% per two decades during the second half of the 20th century (Bauer, 2008). Lion populations are untenable outside designated reserves and national parks. Although the cause of the decline is not fully understood, habitat loss and conflicts with humans are currently the greatest causes of concern. Within Africa, the West African lion population is particularly endangered. Lions live for 10–14 years in the wild, although in captivity they can live more than 20 years. In the wild, males seldom live longer than 10 years, as injuries sustained from continual fighting with rival males greatly reduce their longevity (Smuts, 1982).

2.1.3 Taxonomic classification and evolution of lions

Lions have been kept in scientific classification

Kingdom: Animalia

Phylum: Chordata

Class: Mammalia

Order: Carnivora

Family: Felidae

Subfamily: Pantherinae menageries since the time of the Roman Empire, and have been a Subspecies. Traditionally, 12 recent subspecies of lion were recognized, distinguished by mane appearance, size, and distribution. Because these characteristics are very insignificant and show a high individual variability, most of these forms were probably not true subspecies, especially as they were often based upon zoo material of unknown origin that may have had "striking, but abnormal" morphological characteristics.

Genetic evidence suggests its ancestors split from the ancestors of sub-Saharan African lions between 203 and 74 thousand years ago. *P. l. leo*, known as the Barbary lion, originally ranged from

Morocco to Egypt. It is extinct in the wild due to excessive hunting, as the last wild Barbary lion was killed in Morocco in 1942. This was one of the largest of the lion subspecies, with reported lengths of 3.0 – 3.3 m (9.8–10.8 ft) and weights of more than 200 kg (440 lb) for males. It appears to be more closely related to the Asiatic rather than sub-Saharan lions.

Today only, eight subspecies are usually accepted, although one of these, the Cape lion, formerly described as *Panthera leo melanochaita*, is probably invalid. Even the remaining seven subspecies might be too many. While the status of the Asiatic lion (*P. l. persica*) as a subspecies is generally accepted, the systematic relationships among African lions are still not completely resolved. Mitochondrial variation in living African lions seemed to be modest according to some newer studies, therefore all sub-Saharan lions sometimes have been considered a single subspecies, however, a recent study revealed lions from western and central Africa differ genetically from lions of southern or eastern Africa. In order to obtain a complete overview of genetic diversity within a species, all main populations should be subjected to phylogenetic analyses. In the case of the lion, there is a special interest in the populations from West and Central Africa. Firstly, these populations have rarely been included in genetic analyses, and information regarding their position within the phylogenetic tree of the species is sparse. Secondly, taxonomic and phylogenetic data from other mammals, as well as data on the climatic history of West and Central Africa, suggest that evolutionary forces may have differentiated populations in this part of the continent from population in East and Southern Africa. According to this study, Western African lions are more closely related to Asian lions than to South or East African lions. These findings might be explained by a late Pleistocene extinction event of lions in western and central Africa and a subsequent recolonization of these parts from Asia. Previous studies, which were focused mainly on lions from eastern and southern parts of Africa, already showed these can be possibly divided in two main clades: one to the west of the Great Rift Valley and the other to the east. Lions from Tsavo in eastern Kenya are much closer genetically to lions in Transvaal (South Africa), than to those in the Aberdare Range in western Kenya. The Asiatic lion *persica* was the most distinctive, and the Cape lion had characteristics allying it more with *P. l. persica* than the other sub-Saharan lions (Sigh and Gibson, 2011).

2.1.4 Decline of lions population

Most lions now live in eastern and southern Africa, and their numbers there are rapidly decreasing, with an estimated 30–50% decline per 20 years in the late half of the 20th century. Estimates of the African lion population range between 16,500 and 47,000 living in the wild in 2002–2004, down from early 1990s estimates that ranged as high as 100,000 and perhaps 400,000 in 1950. Primary causes of the decline include disease and human interference. Habitat loss and conflicts with humans are considered the most significant threats to the species. The remaining populations are often geographically isolated from one another, which can lead to inbreeding, and consequently, reduced genetic diversity. Therefore, the lion is considered a vulnerable species by the International Union for Conservation of Nature, while the Asiatic subspecies is endangered. The lion population in the region of West Africa is isolated from lion populations of Central Africa, with little or no exchange of breeding individuals. The number of mature individuals in West Africa is estimated by two separate recent surveys. There is disagreement over the size of the largest individual population in West Africa: the estimates range from 100 to 400 lions in Burkina Faso's Arly-Singou ecosystem.

In Africa, lions can be found in savanna grasslands with scattered Acacia trees, which serve as shade; their habitat in India is a mixture of dry savanna forest and very dry deciduous scrub forest. The habitat of lions originally spanned the southern parts of Eurasia, ranging from Greece to India, and most of Africa except the central rainforest-zone and the Sahara desert. Herodotus reported that lions had been common in Greece in 480 BC; they attacked the baggage camels of the Persian king Xerxes on his march through the country. Aristotle considered them rare by 300 BC. By 100 AD they were extirpated. A population of Asiatic lions survived until the tenth century in the Caucasus, their last European outpost (Heptner and Sludski, 1989).

The species was eradicated from Palestine by the middle ages and from most of the rest of Asia after the arrival of readily available firearms in the eighteenth century. Between the late nineteenth and early twentieth century, they became extinct in North Africa and Southwest Asia. By the late nineteenth century, the lion had disappeared from Turkey and most of northern India. The African lion (*Panthera leo*) is currently listed as vulnerable (*Panthera leo*) (Grisham and Jack, 2001).

The lion has been a powerful and ‘‘omnipresent’’ symbol and its disappearance is believed to present a greater loss for the traditional culture of most Africans. Though Ethiopia is home to many species of

wild life, no other animal is as iconic and a true symbol of Ethiopia as the lion. Till the recent past, the lion of Judah motive was figured prominently on the old imperial flag, currency, stamps and is still being seen as a national symbol. The lion population in Ethiopia is estimated to be the range of 1000 – 1477. Presently lions are found only in a limited number of populations in Ethiopia. An inventory of known populations was made in the 2009 lion workshop (Gebresenbet, *et al.*, 2010). Three sub species of lions are believed to live in Ethiopia: *P.l. massaicus*, *P.l. nubica* and *P.l. roosvelti* of these few are believed to be in captivity (MelakuTefera, 2002). Currently, there are 10 lions found in Addis Ababa Sidist kilo Lion Zoo that are descendants of lions that have been in captivity since the 1960's in which this study have conducted. Within lion range in Ethiopia, the lion is probably the principal predator of domestic livestock, along with hyena, which causes conflict with stockbreeders (Gade, 2006; Abay and Bauer, 2011). Livestock loss and a poor management capacity for human -lion conflict, has leads to declines in lion populations. There is no single full and immediate solution to this problem, but the implementation of a combined approach, using several management measures and mitigation techniques could help to reduce conflicts and depredation to a tolerable level (Frank *et al.*, 2005).

2.1.5.Reproductive behavior in captivity and wild lions

To be able to achieve a successful management of captive animals, it requires a thorough understanding of their species specific behavior in order to meet their housing and breeding requirements. Successful breeding may also depend upon understanding their patterns of social and reproductive behavior and such knowledge maybe crucial in addressing problems associated with social isolation and maternal rejection of young animals, managing medical problems and developing realistic and humane exhibits. According to the social conditions which do not allow females to engage in normal perceptive or receptive behavior can inhibit or prevent normal sexual behavior. A knowledge of oestrous and/or courtship can be useful in predicting the occurrence of mating and perhaps the most reliable indicator is the continual attention the male gives towards the female. A variety of environmental factors can influence the sexual behavior of mammals such as a reduction in food intake and inadequate nutrition. It has been proven that nutritional deficits can inhibit sexual development and interfere with physiological processes. believe that providing safety, adequate nutrition and medical care will increase viability and reproductive success in comparison with free living wild conspecifics. But in the cause of A

female lions gives birth to litters averaging three to four cubs. If the entire litter dies, she will mate again within a few days.. The lioness showed estrus and mating behavior showed heterotypic mating behaviors such as licking, typically consisting of rubbing and nudging, dorsal rubbing, biting and snaring of the females. recumbence, walking past the male, elaborate tail, mating was categorically divided into periods of movements, high frequency and intensity of rolling, courtship, coitus and refractoriness. The mean lordosis and positioning by lying on the belly, raising the duration of copulation, frequency of copulation and tail and presenting the hind quarter for mating. Lion with typical long and black mane and lioness age had no effect on estrus intervals or length of estrus. The mating behaviors observed in both the lions and the lionesses in this study are in agreement with the body morphometric. The males and females of *Panthera leo* are easily distinguishable. In fact, no other species in the genus *Panthera* displays such clearly visible sexual dimorphism. The male is clearly larger and heavier than the female. The adult male lion has a mane of long dark hair around its neck, which is completely absent in females. Both males and females can live for up to 15 years in the wild and in captivity, their lifespan can be much longer.

Most lionesses will have reproduced by the time they are four years of age. Lions do not mate at any specific time of year, and the females are polyestrous. As with other cats' penises, the male lion's penis has spines that point backward. During withdrawal of the penis, the spines rake the walls of the female's vagina, which may cause ovulation. A lioness may mate with more than one male when she is heat. The average gestation period is around 110 days, the female giving birth to a litter of one to four cubs in a secluded den (which may be a thicket, a reed-bed, a cave, or some other sheltered area) usually away from the rest of the pride. She will often hunt by herself while the cubs are still helpless, staying relatively close to the thicket or den where the cubs are kept. The cubs themselves are born blind their eyes do not open until roughly a week after birth. They weigh 1.2–2.1 kg (2.6–4.6 lb) at birth and are almost helpless, beginning to crawl a day and walking around three weeks of age. The lioness moves her cubs to a new den site several times a month, carrying them one by one by the nape of the neck, to prevent scent from building up at a single den site and thus avoiding the attention of predators that may harm the cubs. Sexual selection of mates by lionesses favors males with the densest, darkest mane.(Kleiman et al.,1996).

2.1.6.Morphological characteristics

Males stand at a shoulder height of about 4 feet and reach about 5 ½ to 8 feet in length. Their tails average a length of 3 to 3 ½ feet and they can weigh as much as 330 to 550 pounds. Females are smaller than males. The lion is one of the largest predators in the wild. The perfect blend of strength and agility enables the lion to dominate other predators in its habitat. With a group that contains up to 15 intelligent adults; a pride of lions does not fear any other creature in the wild. As designed over a million years of evolution, this predator has no visible weaknesses.

Table 1. Body measurements of adult Ethiopia lions

	Head and body length	Height	Tail length
Lion	170-250 cm	123 cm	60 -100 cm
Lioness	160-190 cm	107 cm	60-100 cm

Source: (MelakuTefera 2002).

The body dimensions are shown in table 1. Males are larger than females. The lion's mane is asexual variation between lion and lioness; the male lion had a dark brown mane extending down the chest the front legs, down the back below the shoulders and the length of the belly through the groin. The only cat with tail tuft (both male and female) tuft covers horny spur at tip of tail (Rudnai, 1973), only male cat with mane (male tiger has a ruff), eyes set laterally on head provide good wide-angle vision, ears rounded, inner ear has long mobile pinna able to localize sound source, large nostrils and complex nasal passages, passive limbs built more for attack than running and 4 teats. Pelage, coat: tawny, tail tuft, patches on the back of ears, and lips: black, cubs are spotted, color change begins around 3 months, but some spots may persist to adulthood Size: males almost 50% larger than females ,mane: only found in males the functions of mane is indicates fitness to potential mates, possible protection of neck, individual recognition and disadvantage in hunting - easy for prey to spot maned males and its development has noticeable around 2 years of age development strongly influenced by testosterone (Schaller, 1972).



Figure 1. General appearance of male and female lions Source: On site survey at sidist kilo

2.1.7 Group Organization (pride formation)

Lions are the most socially inclined of all wild felids, most of which remain quite solitary in nature. The lion is a predatory carnivore with two types of social organization. Some lions are residents, living in groups centering on related lionesses, called prides. Females form the stable social unit in a pride and do not tolerate outside females. Membership only changes with the births and deaths of lionesses, although some females do leave and become nomadic. Although extremely large prides, consisting of up to 30 individuals, have been observed, the average pride consists of five or six females, their cubs of both sexes, and one or two males (known as a coalition if more than one) who mate with the adult females. The number of adult males in a coalition is usually two but may increase to as many as three. Lion - Two lionesses and a mature male of a pride. Male cubs are excluded from their maternal pride when they reach maturity at around 2–3 years of age. The second organizational behavior is labeled nomads, who range widely and move about sporadically, either singularly or in pairs. Pairs are more frequent among related males who have been excluded from their birth pride. Note that a lion may switch lifestyles; nomads may become residents and vice versa. Males, as a

rule, live at least some portion of their lives as nomads, and some are never able to join another pride. A female who becomes a nomad has much greater difficulty joining a new pride, as the females in a pride are related, and they reject most attempts by an unrelated female to join their family group. The area a pride occupies is called a pride area, whereas that by a nomad is a range (Milius, 2002). The males associated with a pride tend to stay on the fringes, patrolling their territory. Why sociality the most pronounced in any cat species has developed in lionesses is the subject of much debate. Increased hunting success appears an obvious reason, but this is less than sure upon examination: coordinated hunting does allow for more successful predation but also ensures that non-hunting members reduce per capita calorific intake; however, some take a role raising cubs, which may be left alone for extended periods of time. Members of the pride regularly tend to play the same role in hunts and hone their skills. The health of the hunters is the primary need for the survival of the pride, and they are the first to consume the prey at the site it is taken. Other benefits include possible kin selection (better to share food with a related lion than with a stranger), protection of the young, maintenance of territory, and individual insurance against injury and hunger (Nowell,*et al.*, 1996).

2.1.8 Rest time behavior of lions

Lions spend much of their time resting and are inactive for about 20 hours per day. Although lions can be active at any time, their activity generally peaks after dusk with a period of socializing, grooming, and defecating. Intermittent bursts of activity follow through the night hours until dawn, when hunting most often takes place. They spend an average of two hours a day walking and 50 minutes eating.



Figure2. Lions at rest in Sidist kilo Lions' Zoo

2.1.9 Intraspecific variation of the lions

Lions live for 10–14 years in the wild, although in captivity they can live more than 20 years. In the wild, males seldom live longer than 10 years, as injuries sustained from continual fighting with rival males greatly reduce their longevity. Hollister (1917, 1918) described differences between the skulls of captive lions, which had been caught in the wild in East Africa, and those of wild lions from the same geographical area. These differences included increased breadth of the zygomatic arches, shortening of the skull, and reduced cranial volumes in the captive-reared animals. Hollister considered these changes to be due to a lack of exercise of the cranial muscles in captivity. Howell (1925) re-examined Hollister's specimens and concluded that these animals were pathological, and suggested a dietary deficiency as the cause of the observed differences that also included a general

increase in the overall thickness of the skull and a reduction in the height of the foramen magnum. Despite the pathological nature of Hollister's lions, his observation of an increase in zygomatic breadth has been supported by O'Regan, 2001. Further work on a larger sample of skulls found that the breadth of the muzzle was also significantly larger in both male and female captive lions and leopards *Panthera pardus* than in wild individuals (O'Regan and Turner, 2004). Zoos often sell or kill animals who no longer attract visitors. Deer, tigers, lions, and other animals that breed often are sometimes sold to "game" farms where hunters pay for the "privilege" of killing them; some are killed for their meat and/or hides. Other "surplus" animals may be sold to smaller, more poorly run zoos or to laboratories for experiments.

2.2. The economic value of lions watching tourism

The economic value of tourism can be defined as the result of all economic impacts caused by tourism. These impacts are direct, indirect and induced through the total of tourism expenditures, creation of employment, positive and negative externalities, revenues from taxes and other public charges, foreign exchange earnings and the related multiplier effects (Smith 1998). UNWTO Statistics focus on measuring the direct economic contribution. Tourism Economic Contribution (TEC) is understood as the direct, positive effects of tourism consumption, Tourism Gross Fixed Capital Investment (TGFCI) and Tourism Collective Consumption (TCC) on a national economy. Zoo animals should be ambassadors for their conspecifics innate, but in reality they have no control over the ways in which they are presented by zoos. Moreover, the animals cannot regulate how many visitors stand at the enclosure nor how the visitors behave; the animals must simply adapt or not, zoo visitors are a dynamic part of the animals' environment, because the composition of crowds can of course change by the minute. Studies such as this one will raise awareness among zoo officials regarding the specific effects if any those visitors have on the animals. Zoo management would want to know the welfare implications that these changes have for the animal themselves, and how this might affect the potential for conservation, education of the visitors. When visitors leave the zoo at the end of their visit, what impression of these animals do they take away with them? Is this impression likely to encourage visitors to contribute towards saving endangered species and threatened will the visitors have little respect or concern these animals? It is unlikely that many visitors got a zoo for the explicit purpose of being educated about the animals, rather a zoo visit is more likely to be for recreation

al purposes If visitors have only ever seen lions behaving like spoilt human children (for example, throwing tantrums in an effort to get visits to give them food) or like institutionalized people (performing stereotypic or mutilating activities), then that is all they will know about the species. Zoo animals become heavily reliant upon the care of people, despite the best intentions, and this is just one of the factors that makes it extremely difficult release them into the wild. Therefore, species preserved in the modern zoo (a kind of "Noah's ark") will most probably have nowhere else to go, and so one cannot really justify the existence of zoos as genetic pools of endangered species. Instead, zoos must try to encourage their visitors to become active financial supporters of in situ conservation of endangered species and threatened habitats (Freyer, 2011).

2.3 Conservation measures of lions

The lion is classed as ‘Vulnerable’ by the IUCN based on its declining population size, so is thought to be facing a high risk of extinction in the wild. There are significant global challenges facing lions and other biodiversity, particularly the impacts of human population growth and climate change. Illegal (trophy) hunting by human and spread of diseases leads to loss of lions’ population. The latest IUCN estimates suggest a population of 23,000 – 39,000 African lions (probably closer to the lower estimate), representing a decline. The 2016 IUCN Red Listing for the lion states that “Among the causes of decline, the most important are indiscriminate killing in defiance of human life and livestock, habitat loss, and prey base depletion. Prey base depletion is partly linked to habitat loss, but more importantly to poaching and bush meat trade. An emerging threat is trade in bones and other body parts for traditional medicine, both within Africa and in Asia in between 1993 and 2014 (approximately three lion generations). The urgency and importance of lion conservation arises from the fact that lions have experienced a dramatic decline in both numbers and geographic range over recent decades. Furthermore, although trophy hunting contributes positively to Lion conservation, improvements in management practices have been recommended (Bauer, *et al*, 2015).

3. MATERIALS AND METHODS

3.1. Description of study area

3.2. Climate

Addis Ababa has a subtropical highland climate. The city has a complex mix of highland climate zones, with temperature differences of up to 10 °C (18 °F), depending on elevation and prevailing wind patterns. The high elevation moderates temperatures year-round, and the city's position near the equator means that temperatures are slightly vary from month to month Mid-November to January is a season for occasional rainfall. The highland climate regions are characterized by dry winters, and this is the dry season in Addis Ababa. During this season the daily maximum temperatures are usually not more than 23 °C (73 °F), and the night-time minimum temperatures can drop to freezing. The short rainy season is from February to May. Its altitude above sea level is 2,300 meters (7,500 ft) and has a grassland biome, located at 9⁰ 1'48"N latitude 38⁰ 44'24" longitude. From its lowest point, around Bole International Airport, at 2,326 meters (7,631 ft) above sea level in the southern periphery, the city rises to over 3,000 meters (9,800 ft.) in the Entoto Mountains to the north (Addis Ababa meteorology Agency).

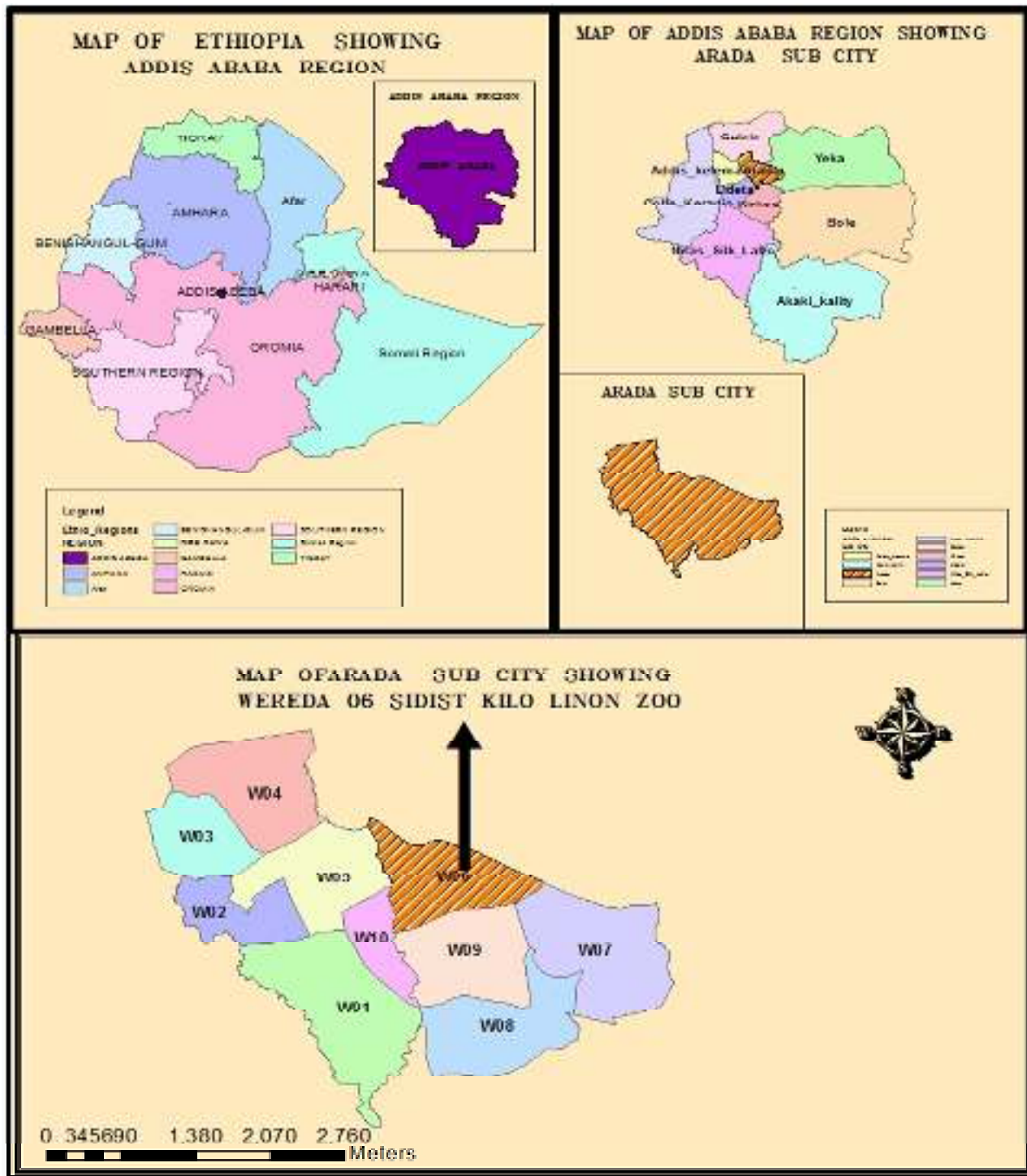


Figure 3. District map of Aardakifleketema--(national metrological Agency)

3.3. Study Design

The study was carried out by questionnaires, interview and direct observation of the lion in the cage in different time interval (for 90 days at mornings and afternoon, for 12 per week and per 3 months) regarding its behavior and economic benefits. The data was collected from target population, in Addis Ababa city at 6 kilo lion cage.

3.4. Study Population

A few hundred wild lions scattered throughout the country, from this 10 lions are kept in the Addis Ababa Zoo. Therefore, this study was conducted on lions in Sidist Kilo Zoo.

3.5. Sample Size Estimate

From ten lions population four lions were taken as a sample of the study using purposively direct count method; this sampling technique was helpful because lions in Sidist Kilo Zoo are a few in numbers which could be taken as it is. Therefore, this method is the most preferable. Whereas, to assess the total economic value of Addis Ababa lions' zoo, 150 visitors were taken randomly as a sample of this study.

3.6. Sampling Method

The Sidist Kilo Lion's Zoo was taken for this study using purposive sampling techniques to conduct the behavior of the lions because of their small size number. Whereas, to conduct the economic value of the study the sample both from visitors and non-visitors were taken using simple random sampling techniques. This method offers four member of the population to be selected as a participant of the study. In addition, systematic sampling method minimizes biases on selection process and help full to be provided with accurate information which enables to make inference about the whole population of the study area.

3.7. Data Sources

The study employed both primary and secondary sources of data. The primary sources data were collected mainly from the cage of the lions by field observation and interview and questionnaires. The secondary source which involves books, published and unpublished materials were used.

3.8. Instruments of Data Collection

Data was collected through direct observation, questionnaires and interviews. Questionnaires would be administered, and careful interviews were made with visitors and a care giver of lion's in Sidis Kilo Zoo.

Variables

The variables of this study were of two types, dependent and independent variables.

Independent variables

- Mating
- Fatigation
- Rest time
- Walking

Dependent variables

- Contraceptives
- deworming
- vaccination

3.9. Data Analysis

The quantitative data of this study was analyzed using proper tools of data analysis such as percentage and SPSS computer software. Once quantitative data were analyzed, it was supported by qualitative data to see the convergence or divergence. The data collected through closed-ended questionnaire also tabulated and expressed in simple descriptive, statistical methods would be used. The qualitative data were analyzed by categorizing them into sub-categories and themes. The organization of data would be using tables.

4. RESULTS AND DISCUSSION

4.1. Name and birth day of the captive lions

The data obtained from field observation showed that there were ten lions in Sidist Kilo Lion's Zoo of Addis Ababa. Out of these four were males and the remaining six were females. The birth day of eight lions had recorded properly; whereas two of the lions known as SenaitChala and Solomon Tenkir birth day were not recorded properly. Among female lions only LyshTerefe gave two cubs namely Tirunesh Gofer and Worknesh Gofer due to controlling the lions from reproduction by using contraception because of lack of enough budgets for feeding and medication and space problem. Male and female lions delivered with 6 and 5 kg of meat per day respectively (Table 2).

Table 2. The names and birth days of the captive lions of sidist kilo lion's zoo

No	Name	Sex	Age in Year	Wife name	Number of cubs	Food delivered/ day in kg	Birth day
1	MekonnenTegafaw	M	11	No 9	-----	6	17/01/1999
2	Solomon Tinker	M	18	No 10	-----	6	-----
3	HailaWorku	M	8	-----	-----	6	17/06/2002
4	KenenisaWorku	M	8	-----	-----	6	01/12/2002
5	MesertWorku	F	8	-----	-----	5	01/12/2002
6	LyshTerefe	F	19	Her husband was dead	2 (Tirunesh Gofer & Worknesh Gofer)	5	08/01/1981
7	EjgayehuKegnew	F	9	-----	-----	5	11/02/2000
8	TiruneshKagnew	F	9	-----	-----	5	11/02/2000
9	BirkyeTenkir	F	10	No 1 is her husband	-----	5	11/02/2000
10	SinateChala	F	18	No 2 is her husband	-----	5	-----
Average						5.4	



Figure 4: KenenisaWorku lion in the cage

Source: (Photo by Endale)

4.2. Behaviors of Lions

4.2.1. Mating, rest, walking, drinking and fatigue behaviors

The data obtained from the site record from March, 2017 up to June,2017 G.C. concerning the mating, rest, walking, water drinking and fatigue of Sidist Kilo Captive Zoo were organized as follows.

Statistical analysis showed that comparison of main behaviors of lions in which the mean average resting time of lions is great and followed by drinking behavior, walking behavior and fatigue at least.

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
resting behaviourmekonen	65	14	18	16.89	.109	.879
resting behaviursalamon	65	16	18	16.99	.088	.709
resting behaviour of Birke	65	14	18	16.51	.099	.802
resting behaviour of Senait	65	14	18	16.88	.098	.793
walking behaviourmekonen	65	5	7	6.31	.062	.498
walking behaviursalamon	65	5	7	6.31	.062	.498
walking behaviour of Senait	65	6	8	7.26	.059	.477
walking behaviour of Birke	65	6	8	7.26	.059	.477
mating behaviourmekonen	65	4	4	4.00	.000	.000
mating behaviursalamon	65	4	4	4.00	.000	.000
mating behaviour of Senait	65	3	3	3.00	.000	.000
mating behaviour of Birke	65	3	3	3.00	.000	.000
drinking behaviourmekonen	65	12	12	12.00	.000	.000
drinking behaviursalamon	65	12	12	12.00	.000	.000
drinking behaviour of Senait	65	13	13	13.00	.000	.000
drinking behaviour of Birke	65	13	13	13.00	.000	.000
fatigationbehaviourmekonen	65	1	1	1.00	.000	.000
fatigationbehaviursalamon	65	1	1	1.00	.000	.000
fatigationbehaviour of Senait	65	2	2	2.00	.000	.000
fatigationbehaviour of Birke	65	2	2	2.00	.000	.000
Valid N (listwise)	65					

i. Resting Time

Two couple lions which were wife and husband to each other were taken as purposive sampling for conducting a research on resting time behavior of Sidist Kilo Lions Zoo namely MekoninTegefaw versus BirkeTenkir and Solomon Tenkir versus SenaiteChala. The following data was gathered and recorded by data collectors and the researcher from the consecutive thirteen weeks starting from March,2017 up to June,2017G.C.

Table 4. The Resting Time Behavior in hours of Sidist Kilo Lion's Zoo

Weeks of the Month	Days	March (E.C)		April (E.C)		May (E.C)		June (E.C)		From March-June			Male	Female
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total	%	%
1 st week	Mon	16	16.25	16.15	13.15	15.15	12.15	14.31	12.46	61.61	54.01	115.62	53.3	46.71
	Tues	17	13.34	16.35	16.45	17.07	16.18	15.53	14.58	65.95	60.55	126.5	52.1	47.87
	Wed	17.5	15.5	16.1	15.17	15.25	15.39	17.09	15.34	65.94	61.4	127.34	51.8	48.22
	Thur	16.55	14.55	17.02	16.32	16.48	16.09	16.45	15.45	66.5	62.41	128.91	51.6	48.41
	Fri	15.5	15.25	15.15	15.45	15.1	15.32	16.19	14.11	61.94	60.13	122.07	50.7	49.26
	<i>Total</i>	<i>82.6</i>	<i>74.89</i>	<i>80.77</i>	<i>76.54</i>	<i>79.05</i>	<i>75.13</i>	<i>79.6</i>	<i>71.94</i>	<i>321.9</i>	<i>298.5</i>	<i>620.44</i>	<i>52</i>	<i>48.11</i>
	<i>Average</i>	<i>16.5</i>	<i>14.98</i>	<i>16.15</i>	<i>15.31</i>	<i>15.81</i>	<i>15.026</i>	<i>15.9</i>	<i>14.39</i>	<i>64.39</i>	<i>59.7</i>	<i>124.09</i>	<i>52</i>	<i>48.11</i>
2 nd week	Mon	15.5	13.57	17	14.43	17.17	13.27	-	-	49.67	41.27	90.94	54.6	45.38
	Tues	16.15	16.35	15.24	14.24	16.04	14.19	-	-	47.43	44.78	92.21	51.4	48.56
	Wed	17.25	15.25	16.21	15.31	15.53	15.49	-	-	48.99	46.05	95.04	51.5	48.45
	Thur	15.55	14.15	17.42	16.27	14.47	14.18	-	-	47.44	44.6	92.04	51.5	48.46
	Fri	16	13.48	15.4	15.25	16.43	14.27	-	-	47.83	43	90.83	52.7	47.34
	<i>Total</i>	<i>80.5</i>	<i>72.8</i>	<i>81.27</i>	<i>75.5</i>	<i>79.64</i>	<i>71.4</i>	<i>0</i>	<i>0</i>	<i>241.4</i>	<i>219.7</i>	<i>461.06</i>	<i>52</i>	<i>47.65</i>
	<i>Average</i>	<i>16.1</i>	<i>14.56</i>	<i>16.25</i>	<i>15.1</i>	<i>15.93</i>	<i>14.28</i>	<i>0</i>	<i>0</i>	<i>48.27</i>	<i>43.94</i>	<i>92.212</i>	<i>52</i>	<i>47.65</i>
3 rd week	Mon	17	16.42	14.45	13.1	14.24	14.37	-	-	45.69	43.89	89.58	51	49
	Tues	16.5	16.53	15.35	14.35	16.36	15.47	-	-	48.21	46.35	94.56	51	49.02
	Wed	17.5	14.25	16.3	16.23	17.16	13.16	-	-	50.96	43.64	94.6	53.9	46.13
	Thur	14.35	14.35	17.25	15.16	15.54	15.19	-	-	47.14	44.7	91.84	51.3	48.67
	Fri	15.25	15.45	15.25	14.35	15.27	14.08	-	-	45.77	43.88	89.65	51.1	48.95
	<i>Total</i>	<i>80.6</i>	<i>77</i>	<i>78.6</i>	<i>73.19</i>	<i>78.57</i>	<i>72.27</i>	<i>0</i>	<i>0</i>	<i>237.8</i>	<i>222.46</i>	<i>460.23</i>	<i>52</i>	<i>48.34</i>
	<i>Average</i>	<i>16.1</i>	<i>15.4</i>	<i>15.72</i>	<i>14.64</i>	<i>15.71</i>	<i>14.454</i>	<i>0</i>	<i>-</i>	<i>47.55</i>	<i>44.492</i>	<i>92.046</i>	<i>52</i>	<i>48.34</i>
4 th week	Mon	15.3	14.35	16.05	12.18	17.16	13.06	-	-	48.51	39.59	88.1	55.1	44.94
	Tues	17.5	16.5	17.46	16.37	15.25	14.29	-	-	50.21	47.16	97.37	51.6	48.43
	Wed	16.25	15.25	15.37	16.22	16.44	15.26	-	-	48.06	46.73	94.79	50.7	49.3
	Thur	17.25	16.37	14.48	14.36	16.22	15.33	-	-	47.95	46.06	94.01	51	48.99
	Fri	15.45	15.15	17.07	16.28	15.57	14.25	-	-	48.09	45.68	93.77	51.3	48.71
	<i>Total</i>	<i>81.8</i>	<i>77.62</i>	<i>80.43</i>	<i>75.41</i>	<i>80.64</i>	<i>72.19</i>	<i>0</i>	<i>0</i>	<i>242.8</i>	<i>225.22</i>	<i>468.04</i>	<i>52</i>	<i>48.12</i>
	<i>Average</i>	<i>16.4</i>	<i>15.52</i>	<i>16.09</i>	<i>15.08</i>	<i>16.13</i>	<i>14.438</i>			<i>48.56</i>	<i>45.044</i>	<i>93.608</i>	<i>52</i>	<i>48.12</i>
Grand	Total	325	302.3	321.1	300.6	317.9	290.99	79.6	71.94	1044	965.88	2009.8	52	48.06

Male lions were taking 1044 hours resting time; whereas females were taking 965.9 hours. It indicates that the resting time for male lions were 52% and for female lions were 48% (Table 3).

ii. Walking Behavior of Lions

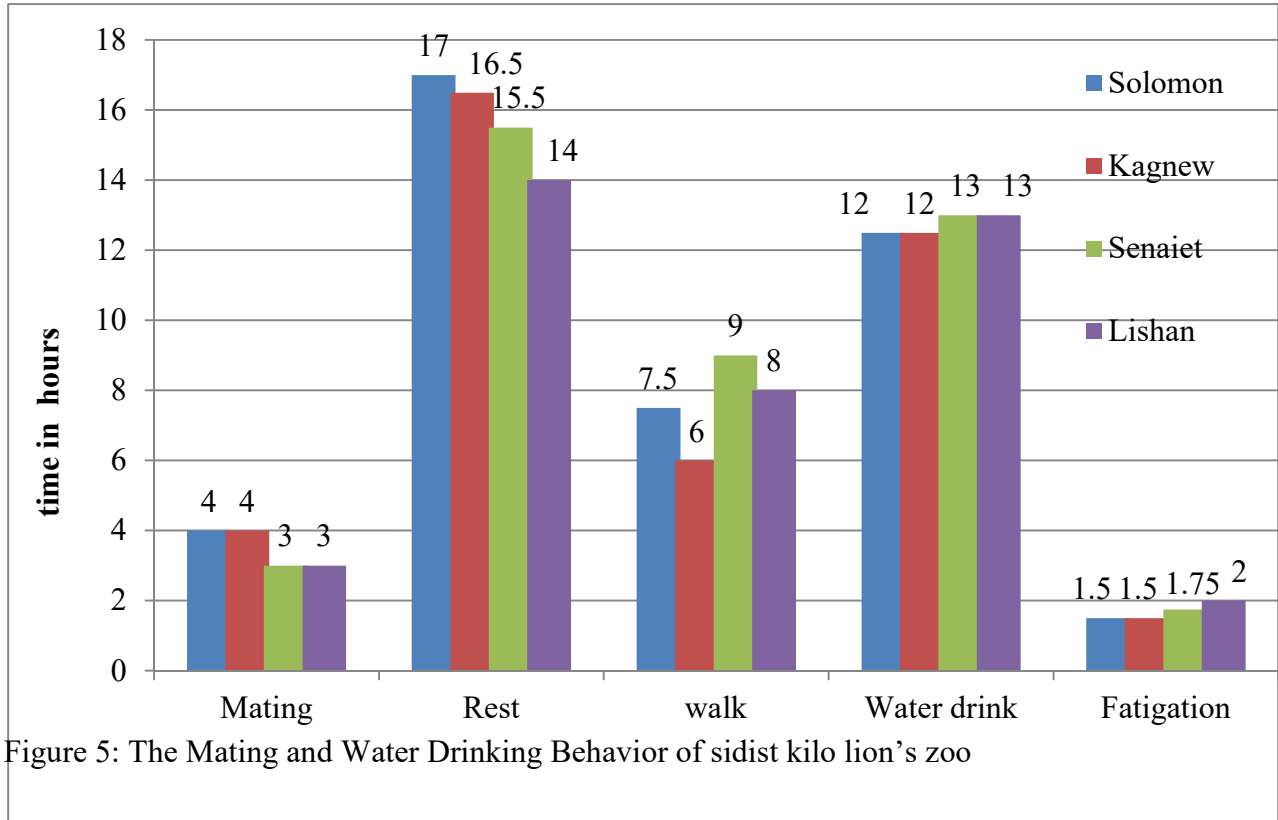
Two couple lions which were wife and husband to each other were taken as purposive sampling for conducting a research on resting time behavior of Sidist Kilo Lions Zoo namely MekonnenTegafaw versus BirkeTenkir and Solomon Tenkir versus SenaiteChala. The following data were recorded from the consecutive thirteen weeks starting from March, 2017 up to June, 2017G.C.

Table 5. Walking Behavior of sadist kilo lion's zoo

Days	March				April				May				June	Total	Average per day/s
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st		
Male lions (An average walking hours for MekoninTegafaw and Solomon Tenkir)															
Monday	6.2	6.45	5.83	6.83	6.4	6.47	6.32	6.47	6.45	6.26	6.65	6.81	6.42	83.53	6.4
Tuesday	7.03	5.9	6.35	6.26	6.77	6.38	6.32	5.69	5.9	5.8	6.87	5.92	6.73	81.9	6.3
Wednesday	5.87	6.73	6.48	6.3	6.25	6.44	6.84	5.64	6.81	6.79	6.64	5.79	6.83	83.36	6.4
Thursday	6.48	6.44	6.81	6.25	5.82	6.22	5.73	6.9	5.81	6.84	5.4	6.86	5.34	80.87	6.2
Friday	6.35	6.35	6.48	6.45	5.9	6.69	5.89	6.74	6.98	5.92	6.33	6.8	6.21	83.04	6.4
Total	31.9	31.9	31.9	32.1	31.1	32.2	31.1	31.4	31.9	31.6	31.9	32.2	31.5	412.7	32
Average	6.38	6.37	6.39	6.41	6.23	6.44	6.22	6.29	6.39	6.32	6.37	6.43	6.3	82.5	6.3
Female lions (An average walking hours for BirkeTenkir and SenaiteChala)															
Monday	6.93	8.13	7.13	6.86	7.36	6.88	7.73	6.83	7.39	7.36	7.37	7.44	7.62	95	7.3
Tuesday	7.05	7.34	7.33	7.45	7.22	7.48	7.5	7.36	7.42	7.48	7.43	7.41	7.45	95.89	7.4
Wednesday	7.35	7.3	7.33	7.77	7.35	7.3	7.4	7.38	7.34	7.05	7.48	7.75	7.53	96.29	7.4
Thursday	7.62	6.39	7.87	7.72	7.32	7.05	7.35	7.82	7.49	7.38	7.44	7.51	7.4	96.33	7.4
Friday	6.85	7.18	7.72	7.01	8.13	7.41	7.88	7.81	7.27	7.86	7.48	7.77	7.56	97.91	7.5
Total	35.8	36.3	37.4	36.8	37.4	36.1	37.9	37.2	36.9	37.1	37.2	37.9	37.5	481.4	37
Average	7.16	7.26	7.48	7.36	7.47	7.22	7.57	7.44	7.38	7.42	7.44	7.57	7.51	96.3	7.4

The data obtained from table 4 showed that average walking hours were 6.3 and 7.4 for male and female lions respectively. But both male and females have no significant differences in walking hours per day/s. Thus, it indicates that male lions were walking fewer hours than females. There were no other statically facts that were done before about the lions exploring. At the data showed

that the captive lions do not have enough place to walk freely as much as they want and also the area of the zoo is exposed to different domestic animals and sound pollution.



Again figure 5 of the graph showed that the male and female lions were drinking 12 and 13 minutes respectively at once. It indicates that female lions were taking an average of one minute more than the male lions regarding their water drinking time. This shows that the female lions are more active than the male lions by nature.

4.2.2. Feeding

The feeding of the lions was conducted once a day on every day except on Wednesday, Friday and sometimes on Sunday which are considered to be fasting days. The ration would be doubled on the next day. Each adult lions were provided at least with 5-6 kg of bovine meat daily. The meat was brought from Addis Ababa abattoirs enterprise and it is approved to be free of disease.

Like other wild carnivores animals the captive lions in Sidist Kilo Zoo took meat for its feed stuff. The male and female lions were taking their stuff in separate class female lion were taking its stuff with inner cage which has blockade doors; whereas the foods for male lions were given from the care givers through exterior of the female ones. According to Viljoen (1996),lioness require a mean of 5kg of edible biomass per day while males require 7kg and are able to consume 20-25% of their own body weight in just few hours.

According to data obtained from care givers feeding for other animals doesn't have a specified ration formulation and time or amount of food. The veterinarian of the zoo suggested that prior to that of all measurement, the body weight and height in meter of each lion was estimated and darted using Xylazine (0.5ml/kg) and Ketamine (5ml/kg).As soon as the lions were fully immobilized, their eyes were blindfolded for safety. Body weight and height were measured in centimeter using a tape. But, here in Addis Ababa Lions Zoo only 3 lions measured their body weight whereas the rest of lions were not measured still up to now because of lack of trained person in the zoo.

Table 6. Feeding time, body weight of the lions in Addis Ababa Lion Zoo

	Name of the lions	Feeding time in hours	Body weight in Kg
1	MekonnenTegafaw	Lunch(5-6)	380
2	Solomon Tikner	Lunch (5-6)	-----
3	HailuWorku	Lunch (5-6)	-----
4	KenenisaWorku	Lunch (5-6)	-----
5	MesertWorku	Lunch (5-6)	-----
6	LyshTerefa	Lunch (5-6)	335
7	EjigaghuKagnew	Lunch (5-6)	-----
8	TiruneshKagnew	Lunch (5-6)	-----
9	BirkyeTenkir	Lunch (5-6)	-----
10	Sinitecahala	Lunch (5-6)	381



Figure 6: Mekonnen Tsegafaw lion in the cage with his veterinarian Dr. and caregiver

Source: (photo by Endale).

The information that gathered from veterinarian Dr. Yohannes the Sidist Kilo Captive Zoo Lions sometimes shows abnormal behavior in different conditions. These were: when the food and water is not delivered on time, the lions get exposure for new faces, sound disturbance during mating time and finally when they get sick.

4.3. Economic Contribution of the Zoo

4.3.1. Tourists Demography

Out of the entire sample of 150 visitors, 65 (43.3%) were male and 85 (56.7%) were female. The rise in the number of females in the leisure areas as visitors is a pointer of change in the society's attitude toward the sex disunion of different activities. Generally speaking, couples spent most of their leisure time in recreational areas. The respondents were asked about the preferred day of visits among these 72.0%, 17.3%, and 10.7% of the respondents preferred to visit Addis Zoo Park during weekends, week days and holidays respectively. This shows that many visitors from 150 prefer to visit the park during their free time to working time.

Table 7. Demographic appearances of number (out of 150 respondents)

Demographic appearances		Number(out of 150 respondent)	Percent (100%)
Sex	Male	65	43.3
	Female	85	56.7
Matrimonial status	Related	53	35.3
	Unattached	97	70
Academic Level	Below first degree	96	64
	First degree and Above	54	36
Ideal day of Visit	Week days	16	10.7
	Week ends	108	72
	A Public holidays	26	17.3

4.3.2. Numbers of Tourists Visiting the Zoo for seven successive years

Table 7 revealed that the number of tourists in 2004 E.C increased by 33.07%, in the year 2005 E.C the number of tourists declined by 43.15%, in the 2006 E.C the number of tourists increased by 20.16%, these were due to the opening of new bar and restaurant and brought additional a new children playing material. In 2007 E.C the number of tourists declined by 8.71% and by 2008 E.C the number of tourists also declined by 5.6%, this was because of other optional recreation areas in the city such as Ghion hotel, Ednamall etc. But by the year 2009 E.C the zoo was closed for restoration and repairing reasons so that, the park has lost yearly income that had been obtained from tourists and other source of income. As the same time the zoo lost a great number of tourists recently.

Table 8. Numbers of tourists visited Sidist Kilo Lion’s Zoo

Year in E.C	Domestic	Foreign	Total	Flow of tourists in %
2003	900,050	8,610	908,660	-----
2004	1,200,000	9,125	1,209,125	Increased (33.07)
2005	625,400	62,000	687,400	Declined(43.15)
2006	816,112	9,866	825,978	Increased(20.16)
2007	740,461	13,557	754,018	Declined(8.71)
2008	701,324	10,432	711,756	Declined(5.6)
2009	-----	-----	-----	-----
Net total	4,983,347	113,590	6,290,484	-----
Mean	711906	16227	898640.5	-----

4.3.3. Income obtained from domestic and foreign tourists

Table 8. the researcher data taking 2003 E.C as a bench mark for income earned from domestic and foreign tourists showed that the income escalated by 7.48% and 87.1% during 2004, and 2006 E.C respectively. Whereas, the income were declined during 2005, 2007 and 2008 E.C by 94.1%, 13.1% and 9.2% respectively. This was happened due to the opening of other optional recreation areas and some organization were also improved their level in the cause of children’s playing station in the city such as Ghion hotel, Ednamall and in some kebele etc. growth has been seen by suitable hotels and other infrastructure, despite a boom in construction of small and medium sized hotels and restaurants economy of Ethiopia ([Wikipedia https://en.wikipedia.org/wiki/Economy_of_Ethiopia](https://en.wikipedia.org/wiki/Economy_of_Ethiopia)). Hence, the income rate was no continuous to increase and decrease. The interview conducted with the care givers and administrative bodies revealed that the income were increased due to certain modification took place on the zoo like children play materials, service improvement on bar and restaurants. To the contrary, the revenue generated would decline due to lack of attractiveness relative to other areas like Ednamall, Ghion Hotel, other recreational areas opened in the city. Thus, the zoo park administration decided to construct and rebuild the zoo in 2009 E.C. According to Hosey, 2000 visitors were provide a source of variability and, therefore, environmental. In 2007 E.C the declining rate was (13.1%), at the year

2008 E.C the total income of the park declined by (9.2%).Some developments have been recently witnessed in this case, so that the customers biased to selected and entertained on other alternative. Similarly, during 2009 E.C the park lost totally the yearly income from tourist attraction and other sources because of the repairing and restoration works of the park for updating their service that will be given local, scientific community and tourists.

Table 9. Income from the tourists (in Ethiopian birr)

Year	Domestic	Foreign	Other	Total	Income differences in %
2003	-	-	2,632,655	2,632,655	-----
2004	2,258,972	182,500	19,875,000	22,316,472	Increased (7.48)
2005	179,900	124,400	1,010,372.11	1,314,672.11	Declined (94.1)
2006	1,388,612	197,320	874,715.37	2,460,647.37	Increased (87.1)
2007	1,431,211	271,156	435,867	2,138,234	Declined (13.1)
2008	1,376,322	176,023	387,653	1,939,998	Declined (9.2)
2009	-----	-----	-----	-----	-----
Net total	6,635,017	951,399	25,216,262.5	32802678.5	

From 18 – 30 years age groups, 55 (36.7%) of respondents had enough knowledge about captive lions of Sidist Kilo Lion's Zoo whereas 23 (15.3%) of them did not have enough awareness. Among tourists found in the age range of 31 – 42, 27 (18.0%) of them also has knowledge but 10 (6.7%) of tourists lack information. As of 43 – 55 age groups 13 (8.7%) of the visitors have enough knowledge, in contrary 6 (4.0%) did not have knowledge. Similarly, from 56 – 68 years age groups 5 (3.3 %) of them have information while 7 (4.7%) of participants had not enough information. Finally, from those who were above 69 years 3 (2.0%) of them have knowledge but one of the respondents has no enough knowledge. Young people are more likely to visit parks than older ones. When age increases they are more likely to be engaged in social activities and they are less likely to make visits to recreation sites.

Table 10. Cross tabularization of tourist’s knowledge about captive lion based on their age.

Answer from 150 tourists based on their age	Knowledge about captive lions			Total	
	I have enough knowledge about captive lions	(%)	I have no knowledge about captive lions		
18-30	55	36.7	23	15.3	
31-42	27	18.0	10	6.7	
43-55	13	8.7	6	4.0	
56-68	5	3.3	7	4.7	
Above 69	3	2.0	1	0.7	
Total (%)	103	68.7	47	31.3	150

Addis Ababa Sidist kilo Lions Zoo Park participant with lesser number of journals were 77.3% and (25-50) amount of trips account only 16.7%. Table 10 also shows that 81 (54.7%) of the tourists visit the site with their families and relatives and 67 (44.6%) were lonely tourists. Comparatively great amount of lonely tourists made a lesser amount of trips as related with tourists who were traveling in a group. For example; 39.3% of them were tourists made lesser amount of trips but group tourists made only 38.0% of trips. On the opposing, 12.7% of the group tourists made many trips while lonely tourists made only 4.0% of the entire respondents. This designates that when people travel to recreational areas with a group then there will be an inclination to make additional trips than lonely visits. This result corresponds somewhat with the work of Andualem Goshu, 2011 in which visitors in lesser amount of trips were greater than participant tourists with great amount of journeys. According to the study wrote on Life Science Journal 2012;9(4) relatively high number of lonely visitors made a small number of trips as compared with visitors who were traveling in a group. For example 37.4% of the lonely visitors made small number of trips but group visitors made only 36.7%. On the contrary, 3.2% of the group visitors made many trips while lonely visitors made only 1.9% of the total respondent. This indicates that when people travel to recreational areas with a group then there will be a tendency to make more trips than lonely visits (<http://www.lifesciencesite.com>).

Table 11. Cross tabularization of tourists travel appearances and amount of journeys

Number of journey (per year)	visiting alone or in group		<i>In group</i>	%
	Alone (%)	%		
Participants visitors with lesser number of journeys (1-23)	59	39.3	57	38.0
Participants visitors with average number of journeys (24-49)	6.0	4.0	19	12.7
Participants visitors with great number of journeys (50-80)	2.0	1.3	5	3.3
Total (%)	67.0	44.6	81.0	54.7

Table 12. Cross tabulation visitors level of pleasure and amount of journeys

Tourists level of pleasure	More than my expectation in (%)	As per my expectation in(%)	Below my expectation in(%)	Total (%)
Participant tourists with lesser amount of journeys(1-24)	8.3	52.8	16.7	77.8
Participant tourists with great average amount of journeys(25-50)	1.9	16.5	0.8	19.2
Participant tourists with great amount journeys (51-80)	1.0	1.8	0.2	3.0
Total (%)	11.2	71.1	17.7	100

As pronounced in table 12, several tourists were pleased with the situation and the facility supply in the park, 82.3% of the tourists informed that they were pleased with their stay in the park. 17.7% of the tourists reacted that the zoo facilities were worse than their outlooks and they only made small number of visits were made by those tourists who were pleased with the zoo services was very close to that of Andulem Goshu, 2011 reacted the zoo facilities were than their expectations work where majority 90.5% of visitors were satisfied with their expectation work where majority 90.5% of visitors were satisfied with their stay in the park of them.

From respondents of this table 13 study, 34 (22.7%) male and 52 (34.7%) of female respondents visit for recreation, 22 (14.7%) of male and 30 (20%) of female respondents visit sidist kilo lion zoo for educational purpose whereas 9 (6%) of male and 3 (2%) of female respondents participated on visit journey for scientific research. From this study more of females had a good participation in involved in recreation and education trip than their counterpart this was because of that females have a better awareness about value of recreation. In the past, women were mostly engaged in domestic chores and hardly got the opportunity to attend school. The rise in the number of females in the recreational areas as visitors is an indicator of change in the society's attitude toward the gender division of different activities.

Table 13. Purpose of tourists visit at sidist kilo lion zoo

Item		Respondent's reason for their visit (N = 150)					
Purpose of visiting at Sidist Kilo Lion Zoo		Recreation		Educational trip		Scientific research	
		No	%	No	%	No	%
Sex	Male	34	22.7	22	14.7	9	6
	Female	52	34.7	30	20	3	2
Total		86	57.4	52	34.7	12	8

According to table 14, out of 150 tourists that came to Sidist Kilo Lions Zoo 39.0% of them contributed to, less amount of income, from 45.4% of tourists an average income obtained, and great amount income was generated from 23.0% of visitors due to inaccessibility of other endemic animals. But total income share for lesser income, average income and great income consecutively were 70%, 18.5% and 11.5% respectively for the park. The remaining factors such as cost value and visitors displeasures were also the reasons for fluctuation of the zoo income.

Table 14. Cross tabularization of tourists and tourists reasons for lesser amount of trips

Income of tourists	Total income share	Costly	Visitors displeasure		
			Jam-packed and dirty environment	Insecure	Inaccessibility of other endemic animals
Lesser income	70%	3.3%	52.3%	5.4%	39.0%
Average income	18.5%	0%	35.6%	19%	45.4%
Great income	11.5%	5.5%	60%	11.5%	23.0%

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

From the study conducted and major results obtained the following conclusions were derived.

In there were ten lions in sidist kilo lion's zoo of Addis Ababa. Out of these four were males and the remaining six were females. The birth day of eight lions had recorded properly; whereas two of the lions known as SenaitChala and Solomon Tenkir birth day were not recorded properly. Thus, it indicates that the administrative/ management of the lions were inappropriate to obtain the necessary data. Regarding the behavior of the lion's zoo for the study conducted from the site record from March, 2017 up to June, 2017 concerning the mating, rest, walking, water drinking and fatigue of sidist kilo captive lions zoo were organized as follows. The resting time for male lions were 52% and for female lions were 48%. Thus, male lions took more resting time than females while the average walking hours were 6.3 and 7.4 for male and female lions respectively. But both male and females have no significant differences in walking hours per day/s. Thus, it indicates that male lions were walking fewer hours than females. The male lions were agitated an average of four times, whereas the female lions agitated three times per day. It indicates that the male lions were initiated for sexual intercourse more times than females. Beside to these, male and female lions were drinking 12 and 13 minutes respectively at once. It indicates that female lions were taking an average of one minute more than the male lions regarding their water drinking time. There were also two mechanisms to protected sidist kilo lions from different injuries and diseases. Those were preventive and control mechanisms.

In addition to the behavioral characteristics the researcher conducted the economic advantage of the sidist kilo lion's zoo as follows: the number of tourists in year of 2004 and 2006 E.C increased by 33.07%, 20.16% respectively. Where as in the year of 2005, 2007 and 2008 E.C the number of tourists declined by 43.15%, 8.71% and 5.6% respectively. Taking 2003 E.C as a bench mark for income earned from domestic and foreign tourists showed that the income escalated by 7.48% and 87.1% during 2004, and 2006 E.C. respectively. Whereas, the income were declined during 2005, 2007 and 2008 E.C by 94.1%, 13.1% and 9.2% respectively.

Finally, by the year 2009 E.C the zoo was closed for restoration and repairing reasons so that, the park has lost yearly income that had been obtained from tourists and other source of income.

As the same time the zoo lost a great number of tourists recently.

5.2. Recommendations

- ✓ Sidist kilo lion zoo park has numerous values to the public and the country by preserving the endanger endemic animal and plant species, giving economic value from service charge, providing recreational service and giving scientific and educational values. Based on obtained results, the following recommendations were suggested.
- ✓ Sidist kilo captive lions sometimes show unusual informal behaviors such as restlessness, aggressiveness and frequent rubbing on wall of building; therefore, to minimize this zoo of lions should be secure from any form of external disturbances.
- ✓ Lions are behaviorally aggressive that is why it was for the second time that a lion at the center has killed a zoo keeper with in the past 17 years. So, it is important to have a security alarm at the door so if the doors are unlock for more than 30 second, it reminds the lion keeper about it by making a buzzing sound
- ✓ The zoo managers should increase training for keepers, to update care giver on how to Protect the lions, how to work with the lions, how to keep them and how to clean them.
- ✓ The zoo I had seen is not an appropriate place for a zoo. It is very small even for few chickens and the lions confined there are practical prisoners with no space to move freely. Keeping lions in small zoo has led to three major challenges: ecological regulation, genetic degradation and increased susceptibility to catastrophic events (especially disease). Therefore, it is very essential to move them to bigger and well maintained place.
- ✓ The right first impression can create a vivid memory in a child, and can predispose that child to support the protection of that lions species and its habitat when he or she reaches adulthood.
- ✓ For the lions delivered with only meat there must be other supplementary food like calcium phosphate.

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7. APPENDICES

Appendix A: Estimation results for amount of trips and tourists total price

Appendix 1.cross tabularization of amount of trips and distance travel

Distance travel	Exact lesser amount of trips	Lesser amount of trips	Average amount of trips	Great amount of trips	Exact Great amount of trips
Diminutive distance travel	57	38	27	4	2
Intermediate distance travel	6	4	3	0	1
Elongated distance travel	8	0	0	0	0

Table.2.Schedule of Interview of the staff members

Date and time (Eth)	Office and Appointment	Name	Notes
Tues of March			
Pm			
Visit	The lion zoo		
Interview	Gate and lion keeper staff	TesegaWorkine MengistuKajela MetakuChabsa KidantArkege MelakuGadia TesmaTanaw	Clean cages and 10 lions in good condition
Wed. 08 March			
Am			
Visit	The lion zoo		
Interview	Zoo manger	Dr.MusiaKeflom	Very helpful interview with all back ground question answered in full. Very loyal to the task, despite lack of a long term plan.
Thur 09 March			
Am			
Visit	The lion zoo		
Interview	Veterinarian	Dr.YohannesTesma	Introductions made
			Internally, Dr.Yohannes Expressed interest in the case. He died his laboratory

			need some assistance and that he would collaboration.
Mon.14 March			
Revisited:	The “Lion cage”		
Interview	Zoo manager veterinarian	Dr.MusiaKeflom Dr.YohannesTesma	Discussed about the safety of the care givers. The cause of the death of the care giver by the lion.
Tues.15 May			
Am			
Revisited	The lion cage		
Interview	The employees	Care givers	Photographed and noted the(indoor numbers,names and birth dates of all lions

Source: On site survey

Appendix B: Questionnaires

Appendix B.1: Questionnaires to be filled by visitors and employees of Addis Ababa lions Zoo Park

Adama Science and Technology University

Program of Applied Biology

Questionnaires

The purpose of this questionnaire to gather the relevant and appropriate data for the research regarding to “The behavior and the economic importance of lions of Sadist kilo ZooPark.” The success of the study depends on the honest of your response. Please answer each of the questions to the best of your knowledge. The researcher would like to assure you that your response is strictly confidential. This survey will take about 10 minutes to complete. Thank you for taking part in the survey.

Notice:

Do not write your name

Indicate your response in the space provided by marking “/”

MulugetaAssefa

Adama Science and Technology University

Part one: personal Information

Sex: Male Female

2. Age: 16-20 21-25 26-30 31-35 36-40 41-45
46-49 50-51 and above

3. Marriage status: Married Unmarried

Educational Background: Under Grade 5-10 Diploma 12+1&2 TEVT

Graduate Diploma Bachelor Degree Master's Degree Doctoral degree

4. Field of specialization _____

5. Name of the organization _____

6. Job position of the respondent _____

7. Service year in the organization -----

Less than 6 years years 6-10 years 11-15 years 16-20 above 20 years.

8. Write your additional comment on the given space _____

PART TWO: Transportable appearances

A. Are you or anyone else in your household member of any animal right or Environmental organization? Yes No.

B. Have you go to see zoo parks or nationwide parks for the previous three years? Yes

No

C. If yes please state which site

.....
D. Just how several times did you visit any other wild animal sheltered areas in 2009 <input type="checkbox"/> 2008 <input type="checkbox"/> 2007 <input type="checkbox"/> 2006 <input type="checkbox"/>
E Exactly how many times have you visited Addis Ababa Sidist Kilo Lions Zoo park in 2009 <input type="checkbox"/> 2008 <input type="checkbox"/> 2007 <input type="checkbox"/> 2006 <input type="checkbox"/>
F Exactly how many times you were intentional to visit Addis Ababa Zoo Park in <input type="checkbox"/> 2009 <input type="checkbox"/> 2008 <input type="checkbox"/> 2007 <input type="checkbox"/> .2006
i. Bether nearby an alteration between the amount of trips you scheduled to take to Addis Ababa Lions Zoo and the definite trips you took during the last three years? Yes <input type="checkbox"/> No <input type="checkbox"/>
ii. If yes what did you think the cause of this dissimilarity (round the fitting answers) I. Income constraint II. Relaxation time constraint III. Distance of the site IV. Due to unpleasant facility V. Due to favorite to other locations VI. Supplementary (please specify).....
G. What would you have wished to do if you had not chosen to visit Addis Ababa Lions Zoo park: <input type="checkbox"/> employed at job <input type="checkbox"/> Housekeeping <input type="checkbox"/> watching <input type="checkbox"/> studying going to another site for recreation <input type="checkbox"/> pottering <input type="checkbox"/> around at home other (please specify)
H. Just how many times do you plan to visit Addis Ababa Lions Zoo Park in the next one year (number of times)
I. Which period is your inclination to visit Addis Ababa Lions zoo park: <input type="checkbox"/> weekdays Monday-Friday <input type="checkbox"/> weekend's public holiday?
J. Exactly how did you come to Addis Ababa Lions Zoo Park: <input type="checkbox"/> own car (specify the type) <input type="checkbox"/> By bus <input type="checkbox"/> On foot <input type="checkbox"/> Minibus taxi

PART THREE: Appearances of the group

A. Are you traveling with a group? Yes- <input type="checkbox"/> No <input type="checkbox"/>
B. If yes write the whole members of the group
What did you say your social or kinship relationship with the other members of the group Friendship Relatives <input type="checkbox"/> colleagues <input type="checkbox"/> Family <input type="checkbox"/> other (please specify) <input type="checkbox"/>
PART FOUR: Trip activities
A. What is the purpose of this visiting? <input type="checkbox"/> Recreation <input type="checkbox"/> Education/ scientific work, other (please specify)-----
B. Have you combined visiting friends or relatives on your way? Yes <input type="checkbox"/> No <input type="checkbox"/> if your answer is yes go to the next question otherwise skip to question (d).
C. How much time did you spent by visiting your friends on the same trip? Hours.
D. How much money did you get from that business?birr.
E. How many are the numbers of other substitute (similar) sites you have considered When deciding to visit Addis Ababa lions Zoo Park?
G. Do you know any other zoo park that you would like to visit instead of? Addis Zoo Park? Yes <input type="checkbox"/> No <input type="checkbox"/>
H. If <input type="checkbox"/> which other single zoological site do you visit frequently?.....if you do not answer this question please skip to question (j)
I. How would you describe your experience of Addis Addis lions Zoo Park? (circle any one of the following) J. Better than I expected II. As I expected III. Worse than I expected
K. Please indicate the source of your disappointment: <input type="checkbox"/> too expensive <input type="checkbox"/> crowded <input type="checkbox"/> dirty unsafe <input type="checkbox"/> unavailability of some services at the time of visit , other (please specify) -----.