IMPACT OF BIODIVERSITY IN ZOOS ON VISITATION AND REVENUE GENERATION IN PAKISTAN

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Impact of Biodiversity in Zoos on Visitation and Revenue Generation in Pakistan

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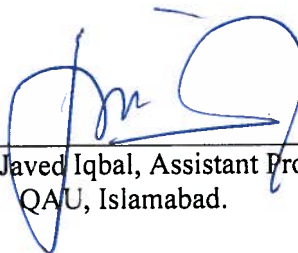# Pakistan Institute of Development Economic

CERTIFICATE

This is to certify that this thesis entitled: **"Impact of Biodiversity in Zoos on Visitation and Revenue Generation in Pakistan."** submitted by Tania Masud is accepted in its present form by the Department of Environmental Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in **Master of Philosophy in Environmental Economics**.
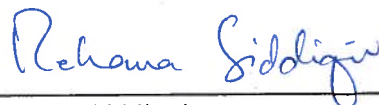
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Dedicated to

To my mother, the most valuable asset I have, I adore her boundless

unconditional love and support.

To my father, my strength and support who has always been there for me

throughout my life.

Acknowledgment

I would like to express my deepest appreciation to all those who provided me the possibility to complete this thesis. First and foremost, I would like to thank to ALLAH ALMIGHTY. Furthermore, I would like to express my very great appreciation to Dr. Rehana Siddiqui for her valuable and constructive suggestions during the planning and development of this research work. Finally, an honorable mention goes to my family and friends for their understanding and support on me in completing this project. Without help of the particular that mentioned above, I would face many difficulties while doing this.

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List of Abbreviations

CVM	Contingent Valuation
PKR	Pakistani Rupee
WTP	Willingness to Pay
OLS	Ordinary Least Square
IUCN	International Union for Conservation of Nature
SPSS	Statistical Package for the Social Sciences

ABSTRACT

Conventional zoos are a source of imparting knowledge among masses and creating a linkage between wild and humans. Initially animals in zoo were incarcerated solely for recreational purpose, later this apathetic concept transformed to conservation (of animals and birds), education, research and recreation. This study was aimed to figure out the impact of variation in number of animals and birds on 'income' as well as 'number of visitors' of zoos in Pakistan. Secondly the study was also intended to know the impact of public awareness along with socioeconomic factors, on WTP for animals and bird conservation and preservation. Results were estimated using OLS regression model and Logit model for secondary data of three zoos (Karachi, Lahore and Bahawalpur) and for primary survey in Lahore zoo, respectively. From the results it can be concluded that unlike birds, number of animals positively affect number of visitors and income of zoo. The results also support the review that public awareness and socio economic factors have great influence on WTP for animals and birds' preservation. Among total population of sample, 57 percent people were willing to pay for animals and birds preservation to combat the battle against animals' extinction. Last of all it was found that in public opinion zoos in Pakistan focus mainly on one purpose and that is recreation, rather than focusing on education and preservation. Findings of this study gives important judgments on domains like animals' and birds preservation, public awareness as well as relation between animals' and birds' numbers viz-a-viz income and visitation rate of (people in) zoos of Pakistan.

Key words: Preservation, Conservation, Recreation Willingness to pay, Public awareness

Chapter 1

INTRODUCTION

Biodiversity is an integral part of human fraternity. It is like their life support system. Significance of biodiversity is such deep rooted in humans' life that their existence without flora and fauna is almost beyond the bounds of possibility. Flora and fauna deliver goods and services to society (Gamfeldt et al., 2008). DeLong, (1996) after reviewing number of definitions of biodiversity, has defined that "Biodiversity is an attribute of a site or area that consists of the variety within and among biotic communities, whether influenced by humans or not, at any spatial scale from microsites and habitat patches to the entire biosphere". He has also defined biodiversity as the "variety of life".

Economic development and growth have adversely affected biodiversity because of modern consumption and production patterns (Nijkamp et al., 2008). Humans exhaust 33 percent of land productivity and almost 8 percent of ocean productivity they convert forests, wetlands and grass land into urban land (Stuart et al., 2000). Urban development is blamed for extinction of endemic species, effecting eco system, eliminating genes, species and biological traits and also habitat loss (Mckinney., 2002; Cardinale et al., 2012). Anthropogenic activities like agriculture, roads construction, recreational activities cause environmental losses (Mckinney., 2002). "Perhaps these human induced changes have altered the

biological diversity of the Earth" (Stuart et al., 2000). Humans, eventually have realized the adverse effects of biodiversity loss on their life that has made them concerned and anxious about biodiversity preservation (Brooks et al., 2006; Richardson and Loomis., 2008;). Anthropogenic activities have effected animal and bird biodiversity to such an extent that it is been declared by World Conservation Union (WCU) that one out of eight birds, one out of four mammals, 33 percent of amphibians, and 70 percent of the worlds assessed plants are endangered (World Conservation Union., 2007). This loss has to be halted anyway before it reaches to tipping point where there is no way to return, though it is critical to find solution to the loss.

Factually rich countries are more into preserving biodiversity. Annual expenditure for biodiversity conservation all over the world is approx. $6 billion and 90 percent of this amount is generated as well as exhausted in developed countries. Most often, economically poor and under developed countries are rich in biodiversity but they are spending very small amount on biodiversity conservation (Brooks et al., 2006). According to the IUCN Red List of Threatened Species (2007) "Life on Earth is disappearing fast and will continue to do so unless urgent action is taken." Animal biodiversity loss is a big concern in develop and developing countries. Environmental changes are causing animal migration, in this scenario zoos are a great source of Ex-situ Conservation. They are great protagonists in protecting endangered animals from getting extinct forever (Conde at al., 2011; Ahmad et al., 2015). IUCN (1993) defines zoo as a collective displeasure of animals held at one place for the purpose of beholding them where as conservation is defined as actions that are required to protect survival of a specie and its habitat.

Wildlife viewing is becoming a new trend in ecotourism (Navrud and Mungatana., 1994). Because of human induced climate change 15–37 percent of species are expected to get extinct in future. Shedding light on the importance of zoos, Lees and Wilcken (2009) have said that "Zoos design and deliver environmental education programs, support wildlife research, provide funds, manpower and expertise in intensive management to support." Zoo play critical role in reintroduction program and captive breeding of species, specially endangered species (Conde et al., 2011; Tribe and Both., 2003).

The history of zoo can be traced back to the creation of Chinese and Alexandrian animal parks that symbolized wealth and power in ancient times." Initially, animal fighting and their hunting was deemed as a source of entertainment. As the time passed, people started keeping animals in cages for the purpose of entertainment. In 1960's, zoos formally started keeping animals for their preservation by taking special care and breeding of near to extinct animals and birds. Now, at this contemporary time when human eventually have realized the matter of animal extinction because of anthropogenic activities, basic purpose of zoo has altered, from sole recreation by incarceration to Ex-situ conservation (Puan and Zakaria., 2007). A large number of visitors visit zoo, according to IUCN (1993) 600 million visitors are received by 10,000 zoos annually worldwide. Zoos play critical role in recreation, increasing knowledge about animals and birds, scientific research, animal conservation and animal breeding. Zoos also play important scientific roles such as "basic observation, reproduction, veterinary, genetic, behavior and reproduction of animals, increase biological knowledge and to assist in the solution of human medical problems" (Mason., 2010).

Pakistan is very rich in its biodiversity but being a developing country its biodiversity is at risk. Pakistan is at the stage of development and modern development is harming natural habitat, thus these anthropogenic activities are knocking down the natural ecosystem of the country. According to a study conducted in Lahore, residents of the city perceive zoo a place for enjoyment and fun. They do not consider zoo integral for animal conservation. People of Lahore know very little about endangered species held at zoo (Ahmad et al., 2015). People are known to only one purpose of zoo and that is recreation they are not familiar to other purposes like education, preservation and research.

Pakistan does not have much number of zoos according Wildlife organization of Pakistan country currently has 13 zoos[1] from which 4 of the zoos are private while 9 are being run by Government of Pakistan. A part form zoos different cities of country are home to 22 wild animal breeding centers (Wildlife of Pakistan).

Public opinion and perception is very important in assessing whether zoos are attaining their main purpose of education, knowledge, recreation, and conservation, or not (Ahmad et al., 2015). If there is no economic evaluation of biodiversity, it will oppose economic rationality (Bräuer., 2003).

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[1]**LIST OF ZOOS IN PAKISTAN**

1.Bahria Town Zoos, Lahore	6.Citi Housing Zoos, Gujranwala	10.Karachi Zoo, Karachi
2.Bahawalpur Zoo, Bahawalpur	7.Faisalabad Zoo Park, Faisalabad	11.Lahore Zoo, Lahore
3.Hyderabad Zoo, Hyderabad.	8.Murghzar Zoo, Islamabad	12.Rawalpindi Zoo, Rawalpindi
4.Landhi Korangi Zoo, Karachi	9.Peshawar Zoo, Peshawar	13.Wildlife Park, Rahim Yar Khan.
5.Multan zoo, Multan		

1.1. Problem statement

Pakistan is an enriched country with respect to its biodiversity. Country has a diversified variety of animals, birds, flora and fauna. Some of these are declared as endangered species around the world. Anthropogenic activities being one of the cause for animals and birds getting endangered, it is important to take robust steps for their preservation. Among a lot of solutions to this critical issue, zoo can play vital role in animal preservation and could be a worthy source of revenue generation by keeping masses close to nature and to create awareness about animals and birds. Public awareness about animal and birds' preservation is an important factor effecting willingness to pay for their preservation. It is important to figure out the true impact of awareness factor on WTP. In the light of above discussion following objectives have been formulated.

1.2. Objectives of study:

➢ To evaluate the impact of changes in animals' and birds' composition at zoos on their income generation and number of visitors.

➢ To determine visitors' willingness to pay for different animal preservation in zoo, their attitude and perception towards preservation of biodiversity.

➢ To examine whether the zoos are delivering their core services like conservation, education, income generation, research and recreation or not (in public opinion).

The study is organized in two parts. In first part, secondary data of the three zoos of Lahore, Karachi and Bahawalpur over the time 1991-2104 is utilized by the study to know the linkage between total visitors, number of animals, and number

of birds, total expenditure and total income. Main focus is to estimate impact of number of animal and birds on number of visitors and income of zoo. Along with them it is figured out that how successful Lahore zoo is in achieving targets like animal preservation, animal breeding, recreation, education, learning, research and livelihood.

Second part of study is comprised of research based on primary data which investigates perception of visitors of Lahore zoo about animal preservation and most importantly their awareness about animal preservation and willingness to pay for biodiversity preservation. As well as their satisfaction level for Lahore zoo that either the zoo is achieving its core purposes like recreation, information, preservation and research or not.

Income from zoo can participate significantly to the economy. Animal number is a good predictor of income and visitors' attendance. Zoo should focus on snowballing its animal and bird collection. If this increment in collection is based on notion of animal preservation and visitors are willing to pay for this concept (shown by results of study) it will cause a direct augmentation in income of zoo.

1.3. Significance of study

Study will be a new addition to the literature on Zoos in Pakistan. It will figure out people's willingness to pay for animal preservation and will help zoo management to invest more on animals and birds and protect endangered animals by breeding them in zoo. Most importantly impact of public awareness on animals' preservation on WTP is sorted out in this study. Study will also help in assessing how far the zoos in Pakistan are in line with their global objectives of providing

entertainment, knowledge and information to visitors and protection and conservation of species to maintain biodiversity.

LITERATURE REVIEW

2.1. Biodiversity

Biodiversity includes only living beings. Bio means "life". DeLong (1996) reviewed 85 definitions of biodiversity and composed a definition on the bases of derivation, classification, characteristics, properties, qualities, richness and species diversity that "Biodiversity is a state or attribute of a site or area and specifically refers to the variety within and among living organisms, assemblages of living organisms, biotic communities, and biotic processes, whether naturally occurring or modified by humans. Biodiversity can be measured in terms of genetic diversity and the identity and number of different types of species, assemblages of species, biotic communities, and biotic processes, and the amount (e.g., abundance, biomass, cover, and rate) and structure of each. It can be observed and measured at any spatial scale ranging from microsites and habitat patches to the entire biosphere."

Pimentel et al., (1997) have mentioned that 99 percent of human food supply is from 1997). As worlds basic source of food is from biodiversity and this biodiversity is at great risk from human being. One of the major cause of biodiversity loss is increase land (majorly from biodiversity) where as 0.6 percent comes from aquatic system. So biodiversity is the basic and only source of human food. World, getting benefits from biodiversity is about $26 trillion per year i.e

almost 11 percent. Whereas according to Costanza et al (2002) estimate is approximately $33,000 billion per year in human population as natural biodiversity extinction rate has increased from 1000 to 10,000 (Pimentel et.al., 1997). While Foose (1993) is very much optimistic about increasing human population according to him human population will one day stabilize and will even decline and in result eco system could be reconstructed.

2.2. Purposes of zoo

It is expected that 15–37 percent of species will get extinct in future because of human induced climate change. On the other hand, human being are trying to protect animal through various programs, humans are seeking to protect animals from extinction by breeding them in zoos. Zoos are a great source of animal exhibition. Now a day zoos perform five main functions those are, conservation, education, learning, research and recreation (Mason, 2000; Hanay and M.A, 2000). Zoos also play important scientific roles such as "basic observation, reproduction, veterinary, genetic, behavior and production of animals, increase biological knowledge and to assist in the solution of human medical problems" (Mason, 2010). They are important source of animal biodiversity exhibited at one place.

2.3. Conservation

There are number of animals whose species are protected in captivity otherwise they might have gone extinct (Cain and Meritt, 1998). Zoos also play important scientific roles such as "basic observation, reproduction, veterinary, genetic,

behavior and production of animals, increase biological knowledge and also assist in the solution of human medical problems (Mason, 2010).

Goshu (2011) has used Contingent valuation method and Travel cost method to know the willingness to pay and economic value for wildlife respectively, through visitors in a zoo of Ethiopia. According to his estimates 79.7percent of visitors visit zoo because of the presence of exotic animals, while 11.4percent visit because of the green environment and 8.9percent visit for recreational point of view. He has found that there is a positive attitude of people towards conserving wild life. If more people are aware about wild life more they are willing to pay for their conservation. Mean willingness to pay for wild life conservation by people of Ethiopia is 17,160,634 ETB per annum. Martnlpez et al (2007) have reviewed 60 studies using CVM to know willingness to pay for animals and birds. The authors have given upshot that people are less concerned about animals which are not useful to human being and have shown more willingness to pay for animals which are useful to them. Further, animals which possess more anthropomorphic, anthropocentric qualities will be paid more for conservation. Respondents were not willing to pay more for animals on the basis of their endemism. Richardson and John (2008) have done meta-analysis of studies conducted in 1996 through Contingent valuation method and have concluded that people's WTP has increased over time for endangered and rare species. People of United States of America are willing to pay a small portion of their income for animal preservation, though mode of Payment varies among masses. Navrud and Mungatana (1994) have used Contingent valuation method to calculate the use and nonuse value of Flamingos in a national park of Kenya. People of Kenya valued wildlife viewing to be 7.5-15

million (USD). In a survey conducted in Lahore zoo of Pakistan researchers found out that only 19percent of the respondents were aware of the endangered species held in the zoo for Ex-situ Conservation purpose. They concluded that it is difficult to generate endangered animal protection consciousness among masses. As very few of them were already aware of endangered species protection and that zoo are a source of endangered species preservation. That is the reason that 75 percent of total respondents were advocate of keeping animals in wild than in natural habitats. (Ahmad et al., 2015). Carr and Cohen (2011) have suggested that zoo should focus on animal preservation in their advertisement campaign and websites to attract visitors. Preservation efforts can have direct effect on visitation.

2.4. Knowledge

Zoo create awareness among masses about biodiversity. According to estimates yearly more than 700 million visitors are attracted to zoos (Moss et al., 2008). Kellert (1984) in his study has stated that increase in cognitive and factual understanding about animals was noticed in children after visiting zoos. Children from 6-9 years reported more emotional attachment towards animals.

2.5. Income generation

Tourism generates income (Leask at al., 2013). In many countries tourism plays as a key role in generation of income, tourism is also a source of foreign exchange earnings (Lohmann et al., 2009). Tourism earning is a positive contribution to economic growth (Khalil et al., 2007). Zoo are a good tourism attraction, to make

zoos easily assessable to low income people admission fee is kept low and this fee is usually kept low to overcome littering problem. (Lindemann et al., 1965). Admission fee is a great source of revenue for zoo although this is a fact that "zoo don't solely depend on admission fee for revenues" (Cain and Meritt 1998).

2.6. Recreation

People get chance to see exotic species only in zoo that are not seen locally. Only 3.5 percent children have seen these exotic animals locally, cited in a study conducted in France. Children are more inclined to protect exotic animals than local animals and these exotic animals are protected and breeded in zoos (Ballouard, et al., 2011). Minors are expected to attend more as compare to old aged people. Zoo which accommodate large animals have small number of animals but because of presence of large animals more people are attracted toward such zoo. It is important to do economic valuation of biodiversity so it can be used sustainably and can be conserved (Nijkamp et al., 2008). One of the various reasons why economic valuation of environmental products is necessary because it reveals that environmental products can have a measureable economic value and it also sort out societal and economic threats to environmental issues such as biodiversity. As once these threats are sorted out they can be minimized (Edwards and Abivardi., 1998).

Based on the above discussion, we can say that a society who is keen about animal's biodiversity around it and is concerned about its conservation is in favor of construction of zoos and are more willing to pay for it. Zoos are not only source of recreation, knowledge and income generation but also a source of animal

conservation. Environmental evaluation is important to know the economic value of animal preservation so its importance could be identified.

2.7 Awareness

'Being aware gives an insight into your beliefs' an aware person has strong believes and has a logical way of thinking (Harrison., 2010). People's consumption pattern can be changed by creating awareness among them more they are aware about consequences of their actions more they will be cautious about their decision making that effect animals and birds any way (Li et al., 2008). Similarly, value orientations have significant impact on willingness to pay. More the people are aware more their concern about a specie will be. This enforces them to pay more for their preservation (Ojea and Loureiro., 2007). Haroyu et al (2016) in a research in Ethiopia have stated that socio economic variables such as income and education have a positive impact on willingness to pay along with them awareness that is a very important variable in decision for WTP has a positive and significant relation with WTP.

Chapter 3

DATA ANALYSIS

Pakistan is a diversified country with respect to its animal species. Three big zoos of Pakistan are taken as targeted area for research. Basic and important information about these zoos is given below along with the descriptive statistics for secondary data for all the tree zoos, in addition primary data are collected through survey conducted in Lahore zoo. Brief description of each zoo is given below.

3.1. Karachi zoo:

The zoo was established in year 1878. It covers the area of 33 acres. Currently, there are 835 animals and birds in total, comprising 210 reptiles, 460 types of birds, 165 mammals. Zoo also entertain its visitors through 28 tanks of aquarium, these tanks are house to 300 fishes containing 30 distinct species. In total number species is approx. 80. A natural history museum is also there where dead animals are kept in stuffed form (Wildlife of Pakistan, 2004). Following are the mean, minimum, maximum and standard deviation values for No. of adult visitors, No. of children visitors, total visitors, No. of animals, No. of birds and Income of Karachi zoo for 23 years. Entry fee for Karachi zoo for adults is 5 PKR and for children it is 3 PKR.

3.11. Descriptive statistics for secondary data

Table 3.1 - Descriptive statistics for Karachi zoo

Variables	Min	Max	Mean	Std. Dev
Adults visitors	550000	2372103	1458027.782	424087.565
Children visitor	70000	2898277	754991.478	681983.799
Total visitors	1225000	3868277	2213019.260	597643.019
No. of animals	171	512	339.173	97.368
No. of birds	311	719	494	102.798
Income (PKR)	1600000	49664805	11066369.173	12135219.544
Number of obvs			**23**	

Number of adult visitors is greater than number of children visitors as children are dependent on adults for a visit of zoo. Higher value of standard deviation for total visitors shows greater spread in data for total visitors. It can be seen that variation in income is also higher because of the reason that variation in number of visitors is impacting income. Number of birds is greater than animals whereas deviation in number of birds is also greater than deviation in number of animals. This could be the reason that keeping an animal that is bigger in size has a greater impact on visitors than keeping a single bird. That is the reason zoo has too keep greater number of birds than animals. As it is reported by visitors that they are more attracted by animals which are big in size.

3.2. Lahore zoo:

Lahore is the capital city of Province Punjab, Pakistan. Lahore zoo was established in year 1872, it is one of the oldest zoo of World. Zoo covers about 25 acres of land area. This zoo is under governance of Wildlife Department, government of

Pakistan. It is an autonomous self-sustaining organization in sense of generating revenues. According to an estimate, aggregated number of annual visitors to Lahore zoo is about 4.5 million. Presently there are about 1200 animals and 120 different types of species in the zoo. Important fact to be noted is that 40 percent animals are exotic and 60 percent are endemic. Entry fee for Lahore zoo for adults is 40 PKR and for children it is 20 PKR.

3.20(a) Source of revenues of zoo: Till 1870 Lahore zoo was a small ivory and had a small collection of birds, though with the passage of time number of species surged. Major source of revenue is entry fee that was first started in 1940 under Britain system. Zoo manages its budget on its own and does not receive any thing in terms of finances from Government of Pakistan. Current fee is 40 PKR per adult and 20 PKR per children. Zoo management leases out some of its premises to private groups, cafeteria, parking lot and toilet that generates yield to zoo. Further, electrical animal simulators are projected near cafeteria and Pony horse ride is also a source of earning for zoo. A part from this zoo lend animals for adoption to different institutes and private personals. People or organizations adopt animals for certain time period, animals stay at zoo and feeding expenditures are born by adopters. Zoo also receive donations from different organizations and animals are also sold to interested buyers. Management has invested its savings in PLS accounts and fixed deposits for purpose of income generation.

3.20 (b) Conservation efforts by zoo: zoo is in contact with different schools and arrange different campaigns and motivate children for animal conservation.

Complimentary visits are offered to zoo to create awareness among children.

(Source: Zoo management)

3.21. Descriptive statistics for secondary data:

Table 3.2 Descriptive statistics for Lahore zoo

Variables	Min	Max	Mean	Std. Dev
Adults visitors	1315793	2995835	1985311.826	443102.432
Children visitor	501073	2665510	789295.260	431222.585
Total visitors	1816866	5539758	2774607.087	802908.714
No. of animals	43	484	349.913	99.590
No. of birds	71	1277	648.130	235.817
Income (PKR)	6008053	48192172	15348428.695	10870215.879
Number of obvs			**23**	

Table 3.2 illustrates that number of adult visitors is greater than number of children visitors as children are dependent on adults for a visit of Lahore zoo as it was for Karachi zoo. Higher value of standard deviation for total visitors shows higher spread in data for total visitors. Because variation in number of visitors has an impact on income variation in income is also higher. Number of birds is greater than animals whereas deviation in number of birds is also greater than deviation in number of animals. To attract visitors, zoo management has to keep large amount of birds because they are small in size and large amount of birds is required for bigger impact on visitors. It is reported by visitors that they are more attracted by animals which are big in size.

3.3. Bahawalpur zoo:

Bahawalpur City, the city of nawabs is a historical city of province Punjab, Pakistan. Bahawalpur zoo was established in 1942. Zoo covers the land area of 25 acres. There are more than 180 mammals and above 600 birds, while in total there are approx. 870 animals. This the fourth biggest zoo of Pakistan. Along with endemic animals and birds, zoo keep and breed many endangered animals. There is also a fish pound in the zoo, house of various noteworthy fishes. Bengal tiger, dapple tiger and black bear are worth mentioning animals of Bahawalpur zoo. Zoo is under the management of Government of Pakistan (Forest, Wildlife and Fisheries Department., 2014). Following are the descriptive statistics for secondary data for Bahawalpur zoo. Entry fee for Bahawalpur zoo for adults is 6 PKR and for children it is 4 PKR.

3.4. Descriptive statistics for secondary data

Table 3.3 Descriptive statistics of Bahawalpur zoo

Variables	Mini	Max	Mean	Std. Dev
Adults visitors	264543	982000	493099.391	183879.210
Children visitor	76766	389000	127360.695	80068.348
Total visitors	341309	1338500	620460.087	255045.405
No. of animals	123	211	174.478	22.512
No. of birds	306	814	513.913	148.346
Income	2193820	16509000	5055951.565	3089103.866
N			**23**	

Table 3.3 shows the greater spread in data for total visitors. Because of the reason that variation in number of visitors is impacting income variation in income is also higher. Number of birds is greater than animals whereas deviation in number of birds is also greater than deviation in number of animals. This could be the reason that keeping an animal that is bigger in size has a greater impact on visitors than keeping a single bird. That is the reason zoo has too keep greater number of birds than animals. As it is reported by visitors that they are more attracted by animals which are big in size.

3.22. Descriptive statistics for primary data of Lahore zoo

For the second part a primary survey has been conducted at micro level in Lahore zoo. This semi-structured survey with the sample size 384, constitutes closed and open-ended questions. Along with socioeconomic characteristics such as gender, age, income, household size, and education, purpose of visit, gain of knowledge, types of animals, people want to see in zoo have been asked. Descriptive statistics for survey based primary data is follows.

Residence

75.8 percent visitors are resident of city Lahore while 24.2 percent are from others cities and countries. It is easier for residents of Lahore to visit Lahore zoo than people who live in other cities. Majority visitors who come from other cities are from Faisalabad city because of the reason that Faisalabad is geographically nearer to Lahore city. A lot of People come from Faisalabad for search of job and recreation because Lahore is a bigger city with respect to jobs availability and development.

Visitation

Majority of the visitors stated that they are frequent visitors of Lahore zoo that is 56.8 percent out of total visitors said that they visit zoo frequently and out of those visitors 54 stated that they visited zoo for once in past year. Whereas 7 stated that they visited zoo for more than 20 times in past year. It is because of the reason that visitors found Lahore zoo a good place for recreation and like to visit zoo again and again.

Purpose of visit:

61.5 percent visitors visit zoo for recreational purpose. While others visit zoo for gain of knowledge and for research purpose. People find zoo majorly a source of recreation that a source of gain of knowledge and research.

Vehicle and type if visit:

73.2 percent visitors visit zoo with their family and friends and 58.1 percent use their personal vehicle to reach zoo while others use local transport. Children are fond of animals than adults as most of the adults reported they are on visit to zoo because their children wanted to. That is the reason people come with their families for visit.

Animals

Most rated animals in Lahore zoo are Lion, Parrots and Elephant. Frequencies for these animals are 54.2, 52.6, and 40.6 respectively. Consequently, Lion is the most rated animal in Lahore zoo. These statistic shows likelihood of visitors towards specific animal.

Types of animals

The following figure shows people's preference towards type of animals they want to see in zoo. According to survey conducted in Lahore zoo 57, 102,119,106 are the frequencies for endemic, exotic, endangered, huge in size that show people's preference. Frequencies of exotic, endangered and huge in size animals are almost same and least type of animals, people are interested to see in zoo are endemic animals. People are most interested in animals which are endangered because they think that they can be preserved this way.

Fig 3.20
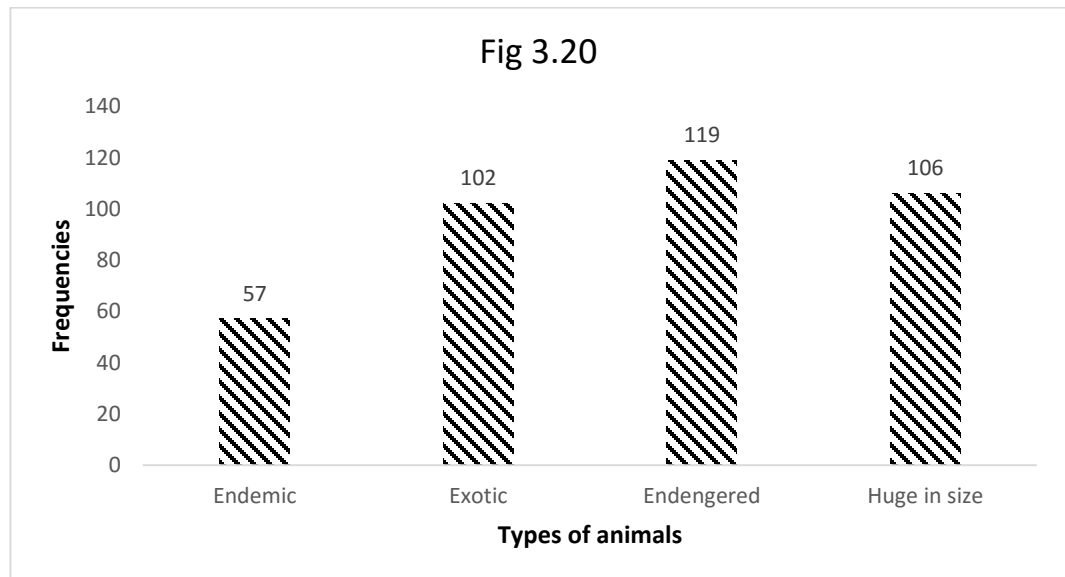
Information, recreation, Preservation

Majority visitors' opinion states that zoo is prosperous in achieving its recreational purpose. While 312 visitors are of view that zoo is a source of information about animals and birds. Preservation that is also a core purpose of zoo, 254 visitors believe that zoo is fulfilling its preservation purpose. In the sight of visitors, they

have found that Lahore zoo is more focused on recreational purpose than on preservation and information.

Fig 3.21
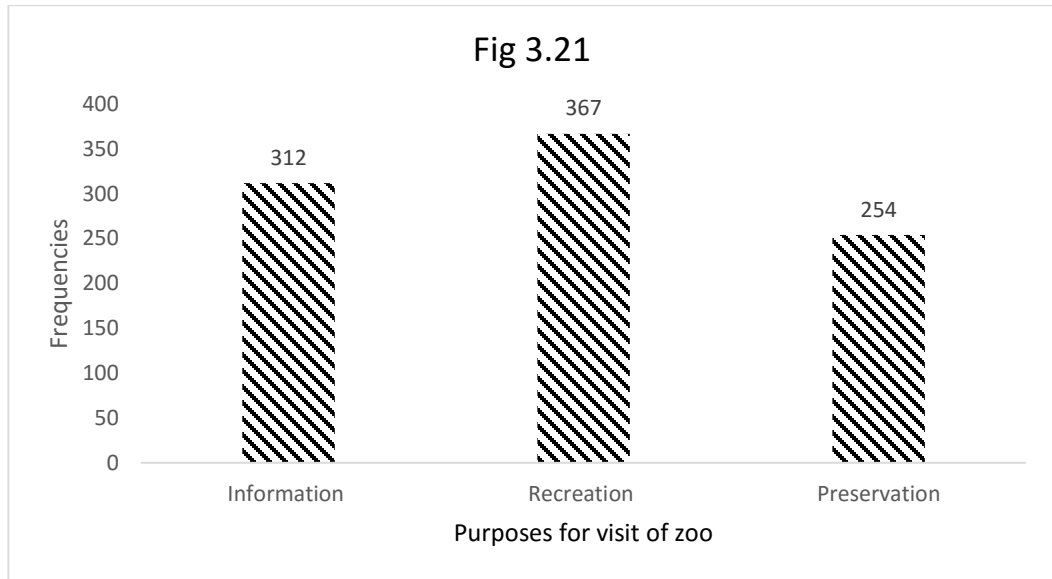
Willingness to pay (percent) by visitors:

Given pie chart shows that 57 percent of the visitors are willing to pay whereas 43 percent are not willing to pay for animals' and birds preservation.
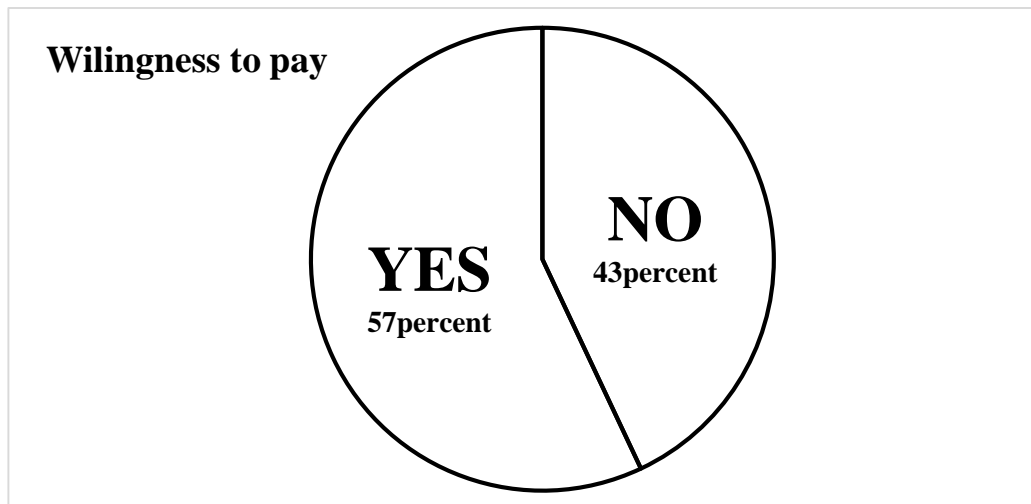
Note: These statistics are result of question asked by visitors that will they be willing to pay extra amount in entry fee if zoo do some serious actions for animal preservation[2].

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[2] Preservation of animals: 1) by incarcerating endangered animals in zoo and protecting them from natural clematis. 2) By breeding them. 3) Taking care of them in zoo by giving them better health facilities.

Socioeconomic and other variables:

Table 3.22 Descriptive of socio economic and other variables

Variables	Min	Max	Mean (SD)
Income (PKR)	10000	400000	71152.98 (53976.994)
Expenditure (PKR)	5000	350000	48380.21 (38378.100)
Age (Years)	15	68	27.16 (9.385)
Education (Years)	0	18	14.15 (3.336)
Household size	1	16	5.789 (2.403)
Male family members	0	12	2.23 (1.440)
Female family members	0	7	2.08 (1.221)
Male children in family	0	6	0.89 (1.04)
Female children in family	0	4	0.80 (0.903)
Transportation cost (PKR)	0	2000	426.54 (375.231)
Rides expenditure (PKR)	0	600	59.40 (96.485)
Travel time (Minutes)	5	180	48.24 (34.877)
Time spent in zoo (Minutes)	30	300	137.50 (61.985)

Table 3.22 shows some important statistics regarding the survey conducted. It includes statistical description of socioeconomic variables along with some important information regarding expenses ensued in trip to zoo. Out of 384 total sample population 234 respondents are males and 150 are females this shows major visitors for zoo are male. Age of respondents varies between 15 to 68 years, mean age of visitors is 27 years so most of the visitors are young people Mean educational level of visitors is 14 it can be depicted that majority visitors are educated. Mean income and expenditures are 71153 PKR and 48182 PKR respectively which shows majority visitors have healthy income because of the

reason that majority people who visit zoo for recreational purpose. Recreation is a luxury those people who do not have higher income rarely visit zoo. It can be seen that majority of the visitors have income 50000 PKR with frequency of 50 visitors out of total visitors. It can be seen that variation in household income between visitors is quite enormous, it varies from 10000 PKR to 500000 PKR. House hold size deviation is 2.4 whereas mean household size is 6 persons per family. Average transportation cost from residence to zoo is reported to be 425.5 PKR. Time spent in zoo on average is 137.50 minutes however average time is estimated to be 48 minutes to reach zoo from residence. Lahore covers land area of 25 acres. Zoo is divided into many parts that's why mean time taken by visitors to visit zoo is almost 2 hours.

Chapter 4

METHODOLOGY

Economic valuation methods are widely used by environmental economists to give an economic value to environmental goods and services. Economic valuation gives a market value to environmental goods and services so their real worth could be known. Most importantly, economic valuation helps to estimate loss to environmental goods so that they can be preserved. Venkatachalam (2004), putting the importance of Contingent valuation method (CVM) for economic valuation in to the lime light, has spelled out that CVM is broadly used for calculation of use and non-use value of environmental goods, for cost benefit analysis and inducing individual's preference for environmental goods. Lee and Han, (2002) estimating the willingness to pay of people of Korea for national parks have calculated the use value and preservation value. They have collected the evidence that national parks should increase their entrance fee in case they are not receiving any funds from government. As maintenance fee for these natural parks is way more than admission fees. There are number of animals which are declared to be endangered they can be protected in captivity in zoos. In general, people are willing to pay for animals which are unique, exotic, intelligent and useful to human beings. People of developed countries are willing to pay more for animal conservation as compare to the people of developing countries. People who are more aware about animal

extinction are more concerned about their conservation and are more willing to pay

(Ojea and Loureiro., 2007)

4.1. Secondary data

First part of study that is based on secondary (panel) data of three renowned zoos of Pakistan. These are Lahore zoo, Bahawalpur zoo and Karachi zoo. Data for variables total visitors, number of animals, number of birds, total expenditure and total income have been taken from Bureau of Statistics, Pakistan. This data is available for period 1991-2014. OLS regression is used to estimate impact of animals' and birds' number on income and number of visitors of zoo for pooled data of 23 years of all the three zoos together. For this purpose, two equations are estimated, in equation (1) dependent variable is income (Y) of zoo for 23 years where animals and birds number are explanatory variables. For second equation dependent variable is number of visitors (V) whereas this variable is predicted by two variables, animals and birds number.

$$ln\,Y_{it} = \beta_{0i} + ln\,\beta_{1i}\,NA_{it} + ln\,\beta_{2i}\,NB_{it} + \mu_{it} \qquad \textit{(4.1)}$$

Ln Y_{it} = Ln of income of ith zoo at time period 't' (Dependent variable).

i=1, 2 and 3; for Lahore zoo, Karachi zoo and Bahawalpur zoo, respectively.

t=time period (from 1991 to 2014)

β_0 = intercept.

Ln NA = Ln of number of animals.

Ln NB = Ln of number of birds.

μ = Error term

$$lnV_{it} = \alpha_{0i} + ln\alpha_{1i}\,NA_{it} + ln\alpha_{2i}\,NB_{it} + \xi_{it} \qquad (4.2)$$

Ln V_{it} = Ln of Number of Visitors of ith zoo at time period 't' (Dependent variable).

i = 1, 2 and 3; for Lahore zoo, Karachi zoo and Bahawalpur zoo, respectively.

t = time period (from 1991 to 2014)

β_0 = intercept.

Ln NA = Ln of number of animals

Ln NB = Ln of number of birds

μ = Error term

4.2. Primary survey based data

For second part of that study, in order to measure people's willingness to pay for animal preservation a primary survey has been conducted at micro level in Lahore zoo.

4.21. Survey data

A semi-structured survey[3] with the sample size of 384, constituted, closed and open-ended questions was conducted in month of March and April[4], 2017. Time of visit for all these days was 11:00 am to 4:00 pm. The questionnaire is a blend of open and closed ended questions. Visitors who were on visit with their families their household head was selected as respondent.

This exercise was basically conducted to know people's willingness to pay for preservation and maintenance of animals and birds. It was made clear that those who are willing to pay have to pay for animals' and birds' preservation in form of increased entrance fee. One of the important component of this survey is to figure out the level of awareness among visitors regarding animal and bird preservation and its impact on their willingness to pay. Survey contained several sections, like socio economic characteristics of visitors, public awareness about animals and birds' preservation, Core purposes of zoo and willingness to pay for preservation activities.

Socioeconomic characteristics such as gender, age, income, household size, and education have been asked because behavioral intentions are related to these characteristics. This could be inferred that if people are aware of biodiversity preservation and have pro-environmental behavior odds of willingness to pay for biodiversity will be higher.

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[3] The survey was a selective and purposive survey. Visitors who were done with visiting the zoo and were leaving the zoo were selected for survey. Purposive sampling is type of sampling whose units, characteristics and traits are same

[4] 3rd, 4th, 5th, 18th, 19th of March and 28th, 29th, 30th of April 2017.

For empirical estimation of WTP that is dichotomous response, logit model is applied through SPSS statistics processor. In this model age, gender, education, household size, house hold income and public awareness about animals' preservation are explanatory variable for WTP. Giving functional form:

$$WTP_i = \beta_0 + \beta_1\,Age_i + \beta_2\,Gen_i + \beta_3\,Edu + \beta_4\,HHI_i + \beta_5\,HHS_i + \beta_6\,A\;endg_i + \beta_7\,A$$

$$animal\;presrv_i + \beta_8\,A\;human\;impact + \mu_i \qquad\qquad (4.3)$$

WTP= Willingness to Pay for birds and animals (Dependent) (=1 if the visitors are WTP, =0 otherwise).

i= ith respondent

β_0 = Intercept.

Age= Respondent's age.

Gen= Gender of respondent.

Edu= Education of respondents

HHI= Household income.

HHS= Household size.

Awareness

A endg= Awareness about endangered animals[5].

A animal presrv = Awareness about animal preservation[6]

Questions asked in the survey about awareness:
[5] Do you know what the endangered animals of Pakistan are?
[6] Do you have any information about animal preservation?

A human impact= Effect of anthropogenic activities on animals[7].

μ= Error term.

To collect data about people's awareness the variable is divided into three parts.

✓ **Awareness about endangered animals**: Either people are aware about animals that are getting extinct from the planet Earth. Respondents were asked to mention name of any such animal or bird they know.

✓ **Awareness about animal preservation:** Do people have information how animals can be preserved. Suggestions were also asked.

✓ **Effect of anthropogenic activities on animals:** Does human activities affect animals and birds' population

✓ **A**re humans a reason for any animal and bird extinction anywhere on planet earth?

Theoretical justification of variable, awareness:

Effect of anthropogenic activities on animals: Anthropogenic activities have substantial effect on animals and birds and are transforming land surface since industrial revolution was initiated (Cardillo et al., 2004; Grayson., 2001). One third of birds' population is threatened by human activities and is been driven to extinction (Vitousek et al., 1997). Awareness escalates concern about anthropogenic activities that effect animals and birds (Popper., 2003). People manifest more concern about anthropogenically disturbed species, and there concern is closely associated with level of awareness and informedness (Gelcich et al., 2014).

---

[7] Do you think human activities and modern development effect animals and cause their extinction?

Awareness about animal preservation: Respondents with pro-environmental behavior show higher probability for recovery or preservation of any environmental good (Ojea et al., 2007). Awareness, significantly affects conservation and preservation efforts (Do et al., 2014; Upadhya et al., 2002).

Awareness about endangered animals: Public is generally aware about existence of endangered animals but are unaware about their importance and significance to environment. Educational programs can lead to increase in willingness to pay for endangered animals owing to the fact that educational programs surge awareness (Vincenot et al., 2015).

Chapter 5

RESULTS AND DISCUSSION

5.1. Secondary data analysis

Following are the results from linear regression of secondary data for Lahore,

Karachi and Bahawalpur zoo. The data is available for 23 years for each zoo.

5.1.1. Estimation for equation 4.1:

Table 5.1 summarizes the results of equation (4.1) wherein dependency of income

of zoo is regressed upon number of animal and birds. Regression results illustrate

that animals have positive and significant impact on income. In contrast birds have

positive but insignificant relation with income of zoo. This designates that increase

in animals' number will lead to increase in income however any change in number

of birds will not affect income. Regression equation (4.2) has R^2 of 0.091 which

directs that both of the predictors explains total income of zoos by 9.1 percent.

Table 5.1- Total income, linear regression results (Pooled data[8])

Variables	Coefficients	P value
Constant	14.239 (1.634)	0.00
Animals	0.629 (0.210)	0.05
Birds	-0.297 (0.255)	0.248
Sample size		23
R^2		0.091

5.1.2. Estimation for equation 4.2:

Regression results in table 5.2 for equation (4.2) indicates that animals have positive and highly significant relation with visitors' attendance. In contrast birds have positive but insignificant relation with number of visitors. This designates that increase in animals' number will lead to increase in number of visitors however any change in number of birds will not affect visitors rate significantly. Regression equation (4.2) has R^2 of 0.311 which directs that both of the predictors explains number of visitors by 31 percent. William (2012) supports our results that visitors increase positively and significantly with increase in species kept within zoo.

---

[8] Pooled data for all of the three zoos. (Lahore, Karachi and Bahawalpur zoo)

Table 5.2- Total visitors, linear regression results (Pooled data)

Variables	Coefficients	P value
Constant	8.746 (1.344)	0.00
Animals	0.844 (.176)	0.00
Birds	0.126 (0.211)	0.55
Sample size		23
R^2		0.311

5.2. Survey based results:

Table 5.3 exhibit the results estimated from the logit equation formulated in Eq. (4.3). These are the results of primary survey conducted in Lahore zoo. Value of P i.e. 0.00 indicates that over all model is highly statistically significant.

The six independent variables in the logistics model together account for 92.2 percent explanation for why a person is willing to pay or not with Nagelkerke R Square 0.92

The obtained results show that the majority of the explanatory variables are jointly significant in explaining the WTP for the animal preservation in zoo. Predictor gender, having P-value of 0.69 is statistically insignificant to visitors' willingness to pay it means WTP does not get effected from males to females or vice versa. Han et al., (2010) have reported that their study shows gender has nothing to do with willingness to pay for an environmental good. Whereas socio-economics characteristics like household income and household size are statistically

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significant at significance level 0.05. Coefficient of household income shows positive impact of WTP with income, this illustrates that wealthier visitors are more willing to pay as compared to their counterparts. Increasing income and education associated with an increased likelihood of willingness to pay by 1.00 and 2.09 units respectively. Income and education have linear and significant impact on WTP for environmental goods (Kaffashi et al., 2015; Tilahun et al., 2011). Age and respondents' education are significant variables at 0.01 level of significance, implying, as people age they are more willing to pay. Correspondingly, Han at al. (2010) have established that age has a significant impact to WTP in contrast with the results of Ojea and Loureiro (2007) who have reported that as people age they are less willing to pay for animal preservation. The only nonlinear variable from all of the eight predictors, is house hold size that is significant and is negatively correlated with WTP. This manifests that as house hold number increases, WTP decreases. Most of the people come with their families and they have to pay entry fee per person more will be the house hold member more aggregate amount of money they have to pay as entry fee. Another reason for this nonlinear impact could be that more will be the house hold members more expenditure family has to bare.

Awareness variables which are highly notable and important in equation (3) it is found that all the three variables, info endangered, animal preservation and human effect are positively significant to WTP at p value 0.018, 0.01 and 0.00 respectively.

Odds ratios of info endangered, animal preservation and human impact explains that one-unit increase in these variables will lead to 17.309, 2.525 and 101.675-

unit increase in willingness to pay. This depicts that more people are aware about animal preservation, endangered animals and impact of anthropogenic activities on animals, more they are concerned and apprehensive about their preservation and more they are inclined to pay for it.

Table 5.3- WTP binary logistic regression results

Variable	Coefficients	P value	Wald	Exp(B)/ Odds ratio
Gender	.299 (.758)	.693	.155	1.349
Age	.105 (.036)	.003***	8.606	1.111
Education	.740 (.236)	.002***	9.794	2.095
House hold income	.000 (.000)	.013**	6.152	1.000
House hold size	-.509 (.224)	.023**	5.179	.601
Info endangered	2.851 (1.202)	.018**	5.631	17.309
Animal preservation	2.528 (.983)	.010***	6.608	12.525
Human impact	4.622 (1.070)	.000***	18.655	101.675
Constant	-17.094 (3.856)	.000***	19.657	.000
Sample size			384	
Chi-squared			445.993	
Prob>Chi			0.0000	
Nagelkerke R Square			0.922	

* Indicates statistical significance at α=0.1.
** Indicates statistical significance at α=0.05
*** Indicates statistical significance at α=0.01.

Willingness to Pay

Table 5.4 and fig 5.1 state that visitors' willingness to pay decreases as bid price increases, showing a negative relation of bids price with WTP. Highest percentage

of people who are willing to pay for a bid is 45 and for 65 is least. It can be noted for bids 45 and 50 half of the population sample is willing. So it can be inferred that 45 and 50 could be desired bid price.

Table 5.4 Bids of WTP for adults' entry fee

Bids	WTP	N	Marginal percentages
45	0	153	39.8percent
	1	231	60.2percent
50	0	169	44.0percent
	1	215	56.0percent
55	0	236	61.5percent
	1	148	38.5percent
60	0	274	71.4percent
	1	110	28.6percent
65	0	219	75.8percent
	1	93	24.2percent
		384	100.0percent

No = 0
Yes = 1

Fig 5.1
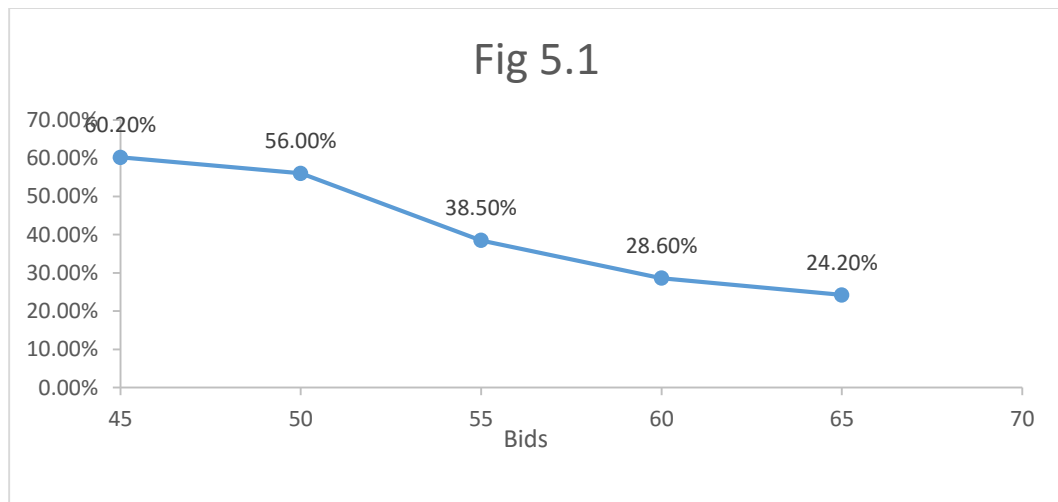
Table 5.5 and fig 5.2 illustrate that visitors' willingness to pay for children decreases as bid price increases, showing a negative relation of bids price with

WTP. Highest percentage of people who are willing to pay for a bid is 25 and for Rs45 the percentage is least. It can be noted for bids 25 more than half of the population sample is willing to pay. So it can be inferred that 25 PKR could be desired bid price.

Table 5.5- Bids of WTP for children's entry fee

Bids	WTP	N	Marginal percentages
30	0	169	44.0percent
	1	215	56.0percent
35	0	205	53.4percent
	1	179	46.6percent
40	0	251	65.4percent
	1	133	34.6percent
45	0	275	71.6percent
	1	109	28.4percent
50	0	293	76.3percent
	1	91	23.7percent
		384	100.0percent

No= 0

Yes=1

Fig 5.2
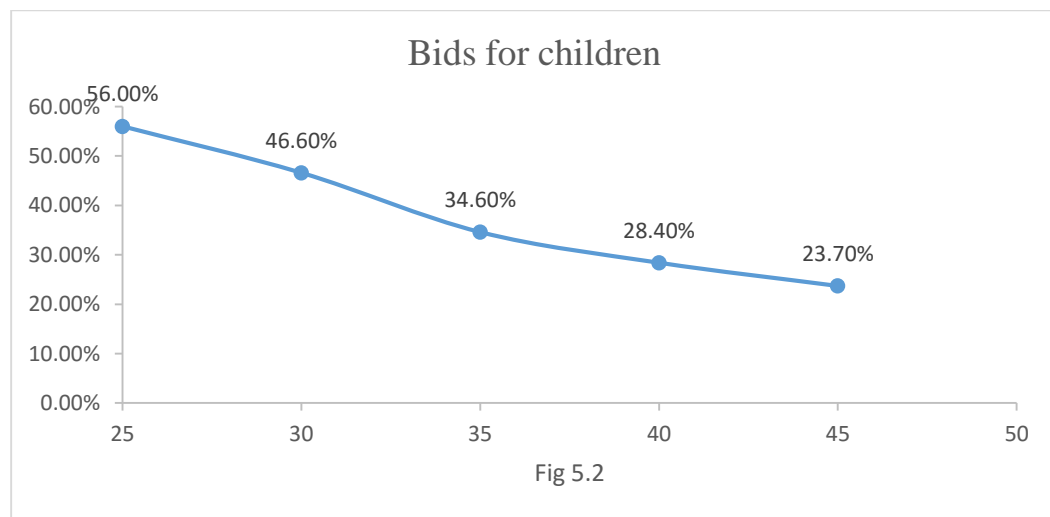
Lastly it can be stated that there is negative relation between bids and willingness

to pay by visitors. It can be noted that people more inclined to pay for adults as compare to children. Percentages of people who said yes for maximum and minimum bid for adults are greater than percentages of maximum and minimum bid for children.

Chapter 6

CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

The research has been conducted to access the importance and impact of animal and birds' variation on visitation rate and revenue generation. Further it was intended to know the impact of public awareness and concern on their willingness to pay for animals' and birds' preservation. Results of this study are divided in two main parts, first part of the paper concludes that visitors' rate and income are dependent on number of animals' species kept in zoo. Animals are the biggest attraction of zoo that can captivate visitors and can intend them to give a part of their leisure time form other recreational activities to animals' world. Interestingly, results have shown that any surge or shrinkage in birds' species fail to appeal visitors to zoo, unlike animals.

From the second part of the study which was survey based determined that, level of socio economic characteristics such as income, education and household size have robust and significant impact on WTP. The study has presented the fact that awareness variable also significantly impacts the willingness of people to pay for animals' and birds preservation. It was also found that people visit zoo, more for the purpose of recreation than getting education or research. People didn't find zoo a source of animal preservation because they could not witness any significant

arrangements by zoo that can halt animals' extinction. It is a general perception among masses in Pakistan that zoos are solely for the purpose of entertainment. Though this concept has become obsolete worldwide. This perception can be changed if zoos practically take some steps for animal preservation and making them a source of information and education for visitors.

6.2. Policy recommendations

- Zoo management should put some serious efforts for animal preservation. Especially those animals which are on the border line of extinction to ensure that zoos are not only tourists' attraction but also are conservation organization.

- Zoos should also telecast their efforts for animal preservation.

- Information boards should clearly manifest information about international status of animals and birds about their extinction to make zoo a source of information for people.

- Animals should purposely be breeded for their conservation.

- As visitation rate is directly affected by number of animals, zoo should focus to increase their animal number, specifically large sized animals in order to upsurge visitor's number and income.

6.3. Limitations of the study

This study is limited to the Lahore zoo for primary survey it could be extended to Karachi and Bahawalpur zoo. Further the variable 'awareness' could be estimated over 'education' or any other variable so that it can be made clear, on which

variables awareness depends upon. In case when sources for awareness are clear those sources or reasons can be upgraded to increase awareness.

References

Ahmad, S., Ali, Z., Nemat, A., Sikander, S. K., Hussain, Z., & Saleem, K. (2015). The study of public perception for captive animals at Lahore zoo, Pakistan. *Journal of Animal and Plant sciences*, *25*(3), 509-513.

Andualem, G. (2011). *Estimating the economic value of wildlife: The case of Addis Ababa Lions Zoo Park* (Doctoral dissertation, aau).

Ballouard J-M, Brischoux F, Bonnet X (2011) Children Prioritize Virtual Exotic Biodiversity over Local Biodiversity. PLoS ONE 6(8): e23152. doi:10.1371/journal.pone.0023152

Balmford, A., Bruner, A., Cooper, P., Costanza, R., Farber, S., Green, R. E., ... & Munro, K. (2002). Economic reasons for conserving wild nature. *Science*, *297*(5583), 950-953.

Booth, A. T. (2003). Assessing the Role of Zoos in Wildlife Conservation. *Elsevier*, 12.

Bradley J. Cardinale1, E. D. (2012). Biodiversity loss and its impact on humanity. 9.

Bräuer, I. (2003). Money as an indicator: to make use of economic evaluation for biodiversity conservation. *Agriculture, Ecosystems & Environment*, *98*(1), 483-491.

Brooks, T. M., Mittermeier, R. A., da Fonseca, G. A., Gerlach, J., Hoffmann, M., Lamoreux, J. F., ... & Rodrigues, A. S. (2006). Global biodiversity conservation priorities. *Science*, *313*(5783), 58-61.

Carr, N., & Cohen, S. (2011). The public face of zoos: images of entertainment, education and conservation. *Anthrozoös*, *24*(2), 175-189.

Conde, D. A., Flesness, N., Colchero, F., Jones, O. R., & Scheuerlein, A. (2011). An emerging role of zoos to conserve biodiversity. *Science*, *331*(6023), 1390-1391

Conway, W. G. (2011). Buying time for wild animals with zoos. *Zoo Biology*, *30*(1), 1-8.

Courchamp, F., Angulo, E., Rivalan, P., Hall, R. J., Signoret, L., Bull, L., & Meinard, Y. (2006). Rarity value and species extinction: the anthropogenic Allee effect. *PLoS biology*, *4*(12), e415.

DeLong, D. C. (1996). Defining biodiversity. *Wildlife Society Bulletin (1973-2006)*, *24*(4), 738-749

Edwards, P. J., & Abivardi, C. (1998). The value of biodiversity: where ecology and economy blend. *Biological Conservation*, *83*(3), 239-246.

Gamfeldt, L., Hillebrand, H., & Jonsson, P. R. (2008). Multiple functions increase the importance of biodiversity for overall ecosystem functioning. *Ecology*, *89*(5), 1223-1231.

Guilherme Lohmann, S. A. (2009). From hub to tourist destination – An explorative study of Singapore. *elsevier*, 7.

Han, F., Yang, Z., Wang, H., & Xu, X. (2011). Estimating willingness to pay for environment conservation: a contingent valuation study of Kanas Nature Reserve, Xinjiang, China. *Environmental monitoring and assessment*, *180*(1), 451-459.

Kaffashi, S., Shamsudin, M. N., Radam, A., & Rahim, K. A. (2015). Socio-economic reason to save an international wetland. *Journal of Integrative Environmental Sciences*, *12*(1), 67-83.

Khalil, M. K. (2007). Role of Tourism in Economic Growth: Empirical Evidence from Pakistan Economy. 11.

Kideghesho, J. R., Røskaft, E., & Kaltenborn, B. P. (2007). Factors influencing conservation attitudes of local people in Western Serengeti, Tanzania. *Biodiversity and Conservation*, *16*(7), 2213-2230.

Lees, C. M., & Wilcken, J. (2009). Sustaining the Ark: the challenges faced by zoos in maintaining viable populations. *International Zoo Yearbook*, *43*(1), 6-18

Mahat, T. J., & Koirala, M. (2006, December). Economic valuation of the central zoo of Nepal. In *9th Biennial Conference of the International Society for Ecological Economics* (pp. 15-18)

Mason, P. (2000). Zoo tourism: The need for more research. *Journal of Sustainable Tourism*, *8*(4), 333-339.

McKinney, M. L. (2002). Urbanization, biodiversity, and conservation the impacts of urbanization on native species are poorly studied, but educating a highly urbanized human population about these impacts can greatly improve species conservation in all ecosystems. *BioScience*, *52*(10), 883-890

Navrud, S., & Mungatana, E. D. (1994). Environmental valuation in developing countries: the recreational value of wildlife viewing. *Ecological Economics*, *11*(2), 135-151

Niemelä, J., Kotze, J., Ashworth, A., Brandmayr, P., Desender, K., New, T., ... & Spence, J. (2000). The search for common anthropogenic impacts on biodiversity: a global network. *Journal of Insect Conservation*, *4*(1), 3-9.

Popper, A. N. (2003). Effects of anthropogenic sounds on fishes. *Fisheries*, *28*(10), 24-31.

Pimentel, D., Wilson, C., McCullum, C., Huang, R., Dwen, P., Flack, J., ... & Cliff, B. (1997). Economic and environmental benefits of biodiversity. *BioScience*, *47*(11), 747-757.

Puan, C. L., & Zakaria, M. (2007). Perception of visitors towards the role of zoos: a Malaysian perspective. *International Zoo Yearbook*, *41*(1), 226-232.

Richardson, L., & Loomis, J. (2009). The total economic value of threatened, endangered and rare species: an updated meta-analysis. *Ecological Economics*, *68*(5), 1535-1548.

Sodhi, N. S., Lee, T. M., Sekercioglu, C. H., Webb, E. L., Prawiradilaga, D. M., Lohman, D. J., ... & Ehrlich, P. R. (2010). Local people value environmental services provided by forested parks. *Biodiversity and Conservation*, *19*(4), 1175-1188.

Upadhyay, V. P., Ranjan, R., & Singh, J. S. (2002). Human-mangrove conflicts: The way out. *Current Science*, *83*(11), 1328-1336.

Venkatachalam, L. (2004). The contingent valuation method: a review. *Environmental impact assessment review*, *24*(1), 89-124.

Vincenot, C. E., Collazo, A. M., Wallmo, K., & Koyama, L. (2015). Public awareness and perceptual factors in the conservation of elusive species: The case of the endangered Ryukyu flying fox. *Global Ecology and Conservation*, *3*, 526-540.

Whitworth, A. W. (2012). An investigation into the determining factors of zoo visitor attendances in UK zoos. *PloS one*, *7*(1), e29839.

Zhang, L., Hua, N., & Sun, S. (2008). Wildlife trade, consumption and conservation awareness in southwest China. *Biodiversity and Conservation*, *17*(6), 1493-1516.

APPENDIX

Consumer survey questionnaire (To be filled by respondents who have visited Lahore zoo)

We sincerely request you to fill in the important information required in this questionnaire. Please answer the questions as honest as possible. We assure you that all responses will be kept confidential and will solely be used for academic purpose.

A. Socio economics characteristics:

A.1 Name: _____ (optional)

A.2 Gender: Male [   ]   Female [   ]

A.3 Age: (in Years) _____

A.4 Are you a resident of Lahore?
     Yes [   ]
     No   [   ] From where do you belong? _____

A.5 Highest level of education. (Years completed)

Educational Qualification	Mention number of years you have passed.
Illiterate (Can't read or write)	
Primary (5 years of schooling)	
Secondary (9-10 years of schooling)	
Higher secondary (9-10 years)	
Graduate (16 years),	
Post graduate (above 16 years)	

A.6 what is your estimated total monthly household expenditure? (In Rs)

A.7 what are your estimated monthly household savings? (In Rs)

A.8 Number of household members?
     Total members_____
     Males_____   Females_____

A.9 Number of children with age, less than 10 years in your family?

Boys_____   Girls_____

B. Purposes of zoo

B.1 Did this trip increase your information about animals and birds?

Yes [   ]

 No [   ]

B.2 Do you find this zoo a good source of recreation (entertainment)?

Yes [   ]

No [   ]

B.3 Do you think standard measures for preservation of endangered animals are being observed in Lahore zoo?

Yes [   ]

No [   ]

B.4 Which type of animals you would like to see in zoo?

Belong it Types of animals	Mark your preference
Endemic*/Local	
Exotic**	
Endangered***	
Huge in size	

   *Belong to a particular place. Example: Horse.

**Originating in or characteristic of distant foreign country/Non local/Unique. Example: Flamingos.

***At risk of extinction. Example: Houbara bustard.

B.5 What is existing entry fee you have paid per person? (Mention fee for adults and for children separately).

B.6 (a) Are you a frequent visitor of Lahore zoo?

Yes [   ]   No [   ]

(b) If yes. How many times you visited Lahore zoo last year?

B.7 What is the major purpose of your visit?

Purpose	Response
Recreation/ Entertainment	
Gain knowledge about wild life	
Educational trip	
Research	

B.8 Type of visit?

Alone	
With family and friends	
Educational trip	

B.9 What is the mode of transport you have used to reach zoo?

Mode	Response
Personal vehicle	
Private transport	
Taxi/Cab	
Rickshaw/Chingchi	

B.10.What is the estimated time you have spent visiting the zoo?

B.11. How much time it took to reach zoo?

C. Awareness

C.1. Do you know what are the endangered animals of Pakistan?

No [   ]

If yes. Please name them

_____

C.2 Do you have any information about animal preservation?

No [   ]

If yes. How can we preserve them?

_____

(Suggestions are highly appreciated)

C.3 Do you think human activities and modern development effect animals and cause their extinction?

_____

D Willingness to pay

D.1 Are you willing to pay for animal's preservation in zoo?

Yes [   ]   No [   ]

D.2 If zoo keep animals which are getting extinct on Earth will you be willing to pay an increased amount of entry fee?

Yes [   ]   No [   ]

If yes answer the following

Entry fee for adults (in Rs)
A. Will you be willing to pay 50?
Yes [   ]   No [   ]
If yes, are you willing to pay 55?   Yes/No
If no, are you willing to pay 45?   Yes/No

B. Will you be willing to pay 55?
Yes [   ]   No [   ]
If yes, are you willing to pay 60?   Yes/No
If no, are you willing to pay 50?   Yes/No

C. Will you be willing to pay 60?
Yes [   ]   No [   ]
If yes, are you willing to pay 65?   Yes/No
If no, are you willing to pay 55?   Yes/No

Entry fee for children (in Rs)

Will you be willing to pay 30?
Yes [   ]   No [   ]
If yes, are you willing to pay 35?   Yes/No
If no, are you willing to pay 25?   Yes/No

B. Will you be willing to pay 35?

Yes [   ]   No [   ]
If yes, are you willing to pay 40?   Yes/No
If no, are you willing to pay 30?   Yes/No

C. Will you be willing to pay 40?
Yes [   ]   No [   ]
If yes, are you willing to pay 45?   Yes/No
If no, are you willing to pay 35?   Yes/No

THANKS FOR YOUR TIME AND CONCERN