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Zoonotic Diseases: Its Classification, Mode of Transmission and Its Burden on Human Health

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ABSTRACT- The zoonotic diseases or zoonoses are the disease that can be transmitted from animals to human. The disease that normally exists in animals and that can infect humans caused by a pathogen that has jumped from a vertebrate to a human. Zoonotic pathogens are naturally transmitted from animals to humans. There are several pathways whereby pathogens can invade humans. Zoonotic pathogens may be bacteria, viruses, parasites and fungi .The transmission source may be direct, indirect, vector-borne and waterborne. The present study focuses on zoonotic diseases, its classification and transmission. The study also emphasizes upon zoonotic diseases, its impact on human health. Zoonotic diseases of great concern as they are often novel and unpredictable in nature. They can emerge anywhere and can spread rapidly around the world resulting the increase in the mortality rate of humans. The zoonotic diseases are of particular concern and the high- risk individuals are elderly, children, pregnant women and it mostly affects the immunosuppressed individuals (who possess a very low or weak immunity).Zoonotic diseases impact on the increase in the morbidity and mortality but also impacts upon the productivity losses in both humans and animal populations and has proven a high burden on human health and health systems.

KEYWORDS- Zoonotic Diseases, Zoonoses, Pathogen, Anthropozoonosis, Zooanthroponosis, Immunocompromised, Emerging Zoonoses, Zooanthroponotic Pathogens.

INTRODUCTION- Human and animal relationships are likely to continue to intensify worldwide over the next several decades due in part to animal husbandry practices, the growth of the companion animal market, climate change and ecosystem disruption, anthropogenic development of habitats, and global travel and commerce (3) . As the human-animal connection escalates, so does the threat for pathogen spread (2). Zoonosis is another name for a zoonotic disease. This type of disease passes from an animal or insect to a human. Some don't make the animal sick but will sicken a human. Zoonotic diseases range from minor short-term illness to a major life-changing illness. Certain ones can even cause death (8). Zoonoses are the "diseases and infections that are naturally transmitted between vertebrate animals and man," as defined in 1951 by the World Health Organization (WHO) Expert Committee on Zoonoses. The word zoonosis (zoonoses, plural) is the combination of two Greek words (*zoon*, animals; and *noson*, disease), and was coined at the end of the nineteenth century by Rudolph Virchow to designate human diseases caused by animals. Nevertheless, the term should also include vertebrate animal diseases caused by exposure to humans, such as measles in nonhuman primates, which is of major concern in any major primate center. The term 'zoonosis' is also considered to be shorter and more

convenient than ‘anthropozoonosis’ (animals to humans) and ‘zooanthroponosis’ (humans to animals), which are based on the prevailing direction of transmission between humans and other vertebrates. The word anthropozoonosis (anthropozoonoses, plural) is much more in use in the medical community than in the veterinary community. Zoonoses are usually limited to agents that can replicate in the animal host; therefore it does not include diseases caused by inoculation of venom or toxins of reptile or fish origin or by allergies to vertebrates. It also excludes diseases transmitted by animals or food of animal origin, which are vehicles of human pathogens, such as ice cream contaminated with the hepatitis A virus or a poliovirus. The notion of transmissibility in natural conditions is also important for zoonoses and excludes all experimental infections of nonhuman vertebrates with human pathogens (such as measles virus inoculated to ferrets). Transmissibility also distinguishes the true zoonoses, for which there must be epidemiological evidence of direct or indirect transmission from animal to humans, from the communicable diseases for which the contamination of humans and animals occurs from a common source without an epidemiological interrelation (9).

EMERGENCE OF ZOONOTIC DISEASES- Animals serve as disease reservoirs or early warning systems for the community in regard to the spread of zoonotic diseases. Over 100 years of experience have shown that animal and human health care closely related. During the past few years, emergent disease episodes have increased; nearly all have involved zoonotic agents. As there is no way to predict when or where the next important new zoonotic pathogen will emerge or what its ultimate importance might be, investigation at the first sign of emergence of a new zoonotic disease is particularly important (32). Anthropogenic changes, largely in land use and agriculture, are implicated in the apparent increased frequency of emergence and re-emergence of zoonoses in recent decades. Special emphasis is placed on the pathogen with likely the greatest zoonotic potential, influenza virus A (10). The immunocompromised are at particular risk for infection with zoonotic diseases. The emerging bacterial zoonotic diseases are of particular concern among the immunocompromised. The immunocompromised are not only more susceptible to infection, but often suffer more serious sequelae as a result of infection (31).

Emerging infectious diseases are a key threat to public health and the majorities are caused by zoonotic pathogens (27). A comprehensive literature review identifies 1415 species of infectious organism known to be pathogenic to humans, including 217 viruses and prions, 538 bacteria and rickettsia, 307 fungi, 66 protozoa and 287 helminthes. Out of these, 868 (61%) are zoonotic, that is, they can be transmitted between humans and animals, and 175 pathogenic species are associated with diseases considered to be 'emerging'. We test the hypothesis that zoonotic pathogens are more likely to be associated with emerging diseases than non-emerging ones (30). The term “pathogen pollution” refers to the process of bringing a foreign disease into a new locality due to human involvement (4). However, of the 1415 known human pathogens, 61% are zoonotic (17). The pathogens causing emerging infectious diseases, however, 75% are zoonotic, with wildlife being an increasingly important source (16). These pathogens can switch hosts by acquiring new genetic combinations that have altered pathogenic potential or by changes in behavior or socioeconomic, environmental, or ecologic characteristics of the hosts (28).

"Emerging zoonoses" are defined as zoonotic diseases caused either by apparently new agents, or by previously known microorganisms, appearing in places or in species in which the disease was previously unknown. Factors

explaining the emergence of a zoonotic or potentially zoonotic disease are usually complex, involving mechanisms at the molecular level, such as genetic drift and shift, and modification of the immunological status of individuals and populations (12). "Emerging" infectious diseases can be defined as infections that have newly appeared in a population or have existed but are rapidly increasing in incidence or geographic range. Among recent examples are HIV/AIDS, Hantavirus pulmonary syndrome, Lyme disease, and hemolytic uremic syndrome (a foodborne infection caused by certain strains of Escherichia coli). (13). Emerging infectious diseases have been creeping up the research agenda since at least 1992, when the US Institute of Medicine defined them as infectious diseases that have recently increased in incidence or geographical range, recently been discovered, or are caused by newly evolved pathogens(15). Diseases that have recently moved into new species can be added to this defining list (16). More recently, the emergence of diseases with high case fatality rates—such as AIDS, severe acute respiratory syndrome (SARS) and H5N1 avian influenza—have catapulted emerging infectious diseases to the top of the medical and political agendas, simultaneously highlighting the importance of wildlife as reservoirs or vectors for disease. Because animals are essential in the life cycles of zoonoses, veterinary public health is necessary in the control of such diseases (11).

This is not surprising, as non-zoonoses will likely already be endemic while zoonoses from domesticated species probably emerged over millenniums of close association with humans. Indeed, some established human diseases, such as measles, probably originated from these animals around the time of domestication (18).Wildlife, however, continue to be a reservoir of unfamiliar microorganisms from which previously unknown pathogens continue to emerge. It is estimated that only about a fifth to a 50th of species have been documented so the reservoir of potential zoonotic pathogens is vast (19).New zoonoses have probably emerged many times from wildlife historically but failed to spread from the focus of emergence: infected people either died or recovered before contacting larger human populations. In modern times, however, the exponential rise in volume and speed of trade and travel has transformed the epidemiology of emerging infectious diseases, giving the outcomes of emergence events global rather than local importance (20).

The economic loss caused by certain zoonoses has been estimated for some regions and in these instances the costs are significant. In Mexico, for example, porcine cysticercosis is responsible for a loss of more than one-half of the national investment in swine production and for more than US$17 million annually in hospitalization and treatment costs for humans with neurocysticercosis. For all of Latin America, porcine cysticercosis accounts for an economic loss of US$164 million. In Africa, losses of one to two billion dollars per year due to bovine cysticercosis have been reported. Human toxoplasmosis in the United States is estimated to be an annual economic/public health burden of more than US$400 million (14).

MODE OF TRANSMISSION- It is very difficult to predict the outcome on public health of these emerging zoonotic diseases since transmission patterns are not always sufficiently understood to assess this impact accurately. In addition, new modes of agent transmission may compound the initial impact on public health (29).It's important to understand how these diseases are transmitted. If you understand the transmission process, you can use this knowledge to protect yourself and help prevent the spread of illnesses (8). Zoonoses have

different modes of transmission. In direct zoonosis the disease is directly transmitted from animals to humans through media such as air (influenza) or through bites and saliva (rabies) (6).

Zoonosis usually refers to a disease that is transmitted from animals to humans (also called anthropozoonosis) , or vice versa , There are two related terms zooanthroponosis and reverse zoonosis that refer to any pathogen normally reservoir in humans that can be transmitted to other vertebrates (1).Zooanthroponotic pathogens, which are transmitted from humans to nonhuman animals, are an understudied aspect of global health, despite their potential to cause significant disease burden in wild and domestic animal populations and affect global economies. Some key human-borne pathogens that have been shown to infect animals and cause morbidity and mortality include measles virus (paramyxoviruses), influenza A virus (orthomyxoviruses), herpes simplex 1 virus (herpes viruses), protozoan and helminthes parasites, and bacteria such as methicillin-resistant *Staphylococcus aureus* and *Mycobacterium tuberculosis*. However, zooanthroponotic pathogens are most commonly reported in captive animals or domestic livestock with close human contact; there, the potential for economic loss and human reinfection is most apparent. There is also the potential for infection in wild animal populations, which may threaten endangered species and decrease biodiversity. The emergence and reemergence of human-borne pathogens in wildlife may also have negative consequences for human health if these pathogens cycle back into humans. Many of the anthropogenic drivers of zoonotic disease emergence also facilitate zooanthroponotic transmission (5).

CLASSIFICATION OF ZOONOSES- Zoonoses can be classified according to the etiologic agent – viral, bacterial, parasitic, mycotic, or unconventional (prions). However, it is the primary epidemiological classification based on the zoonosis maintenance cycle that is of major importance when considering alternatives for control measures. This classification divides the zoonoses into four categories.

1. Direct zoonoses (orthozoonoses) are transmitted from an infected to a susceptible vertebrate host by direct contact, by contact with fomites, or by a mechanical vector. Direct zoonoses may be perpetuated in nature by a single vertebrate species, such as dogs or foxes for rabies or cattle, small ruminants or swine for brucellosis .

2.Cyclozoonoses require more than one vertebrate species, but no invertebrate host, in order to complete the developmental cycle of the agent. Examples are human Taeniasis or pentastomid infections. Most of the comparatively few cyclozoonoses are cestodiases.

3. Pherozoonoses (also called metazoonoses) are zoonoses that require both vertebrates and invertebrates for the completion of their infectious cycle. In pherozoonoses, the infectious agent multiplies (propagative or cyclopropagative transmission) or merely develops (developmental transmission) in the invertebrate; there is always an extrinsic incubation period in the invertebrate host before transmission to a vertebrate host. Examples are arbovirus infections, plague, Lyme borreliosis, or rickettsial infections.

4. Saprozoonoses have both a vertebrate host and an inanimate developmental site or reservoir. The developmental reservoir is considered non animal, such as organic matter, including food, soil, and plants. In this group of zoonoses, direct infection is usually rare or absent. Examples are histoplasmosis, *Erysipelothrix* infection, or listeriosis.

Other classifications of zoonoses may include a classification based on the categories of people at risk or relating to the type of human activity, such as occupational zoonoses (which occur when people are infected during their professional activity; e.g., brucellosis in farmers, veterinarians, or slaughterhouse employees, Lyme disease in foresters, rabies in wildlife trappers or taxidermists), zoonoses associated with recreational activities (e.g., plague, hantavirus infection, Lyme disease, tularemia, or parasitic larva migrans), domestic zoonoses (diseases acquired from pets), or accidental zoonoses (some very rare and peculiar circumstances of infection, as well as foodborne outbreaks) (9).

Another aspect of zoonoses classification concerns their clinical manifestations and their diagnosis. Clinical diagnosis of zoonoses is not always easy, especially if the symptoms are different in animals and humans, or if clinical signs are present only in humans. If clinical signs are observed in animals and humans, zoonoses are designated as phanerozoonoses. If symptoms are similar in both animals and humans, they are considered isosymptomatic (rabies and tuberculosis), whereas they are anisosymptomatic if the symptoms are different in humans and animals (anthrax, brucellosis, psittacosis, and Rift Valley fever). In some instances, subclinical infection is observed in animals and clinical illness in humans, or vice versa. In such cases, these zoonoses are designated as cryptozoonoses. Examples of animal infection, without overt clinical signs and human disease, are ornithosis pneumonia in humans and latent infection in pigeons and turkeys, leptospirosis meningitis in swine keepers, or *Escherichia coli* O157:H7 carriage in cattle and disease in humans. The opposite can also occur, such as the viral Ebola-like (Reston virus) infection, which is deadly in nonhuman primates, and leads only to seroconversion in infected humans. Finally, infection without any clinical symptoms may occur in both animals and humans, such as some arboviral infections, detected only serologically (Tahyna virus) (9).

LIST OF ZOONOTIC DISEASES

To examine and summarize the scientific literature regarding such zoonoses transmission a comprehensive table is present below (7)(21)(23)(24)(25)(26).

Disease	Pathogen(s)	Animals involved	Mode of transmission	Emergence
African sleeping sickness	*Trypanosoma brucei rhodesiense*	range of wild animals and domestic livestock	transmitted by the bite of the tsetse fly	'present in Africa for thousands of years' – major outbreak 1900–1920, cases
Angiostrongyliasis	*Angiostrongylus cantonensis*, *Angiostrongylus costaricensis*	rats, cotton rats	consuming raw or undercooked snails, slugs, other mollusks, crustaceans, contaminated water,	

			and unwashed vegetables contaminated with larvae	
Anisakiasis	*Anisakis*	whales, dolphins, seals, sea lions, other marine animals	eating raw or undercooked fish and squid contaminated with eggs	
Anthrax	*Bacillus anthracis*	commonly – grazing herbivores such as cattle, sheep, goats, camels, horses, and pigs	by ingestion, inhalation or skin contact of spores	
Babesiosis	*Babesia* spp.	mice, other animals	tick bite	
Baylisascariasis	*Baylisascaris procyonis*	Raccoons	ingestion of eggs in feces	
Barmah Forest fever	*Barmah Forest virus*	kangaroos, wallabies, opossums	mosquito bite	
Bird flu	Influenza A virus subtype H5N1	wild birds, domesticated birds such as chickens	close contact	2003–19 Avian Influenza in Southeast Asia and Egypt
Bovine spongiform encephalopathy	Prions	Cattle	eating infected meat	isolated similar cases reported in ancient history; in recent UK history

				probable start in the 1970s]
Brucellosis	*Brucella* spp.	cattle, goats, pigs, sheep	infected milk or meat	historically widespread in Mediterranean region; identified early 20th century
Bubonic plague, Pneumonic plague, Septicemic plague, Sylvatic plague	*Yersinia pestis*	rabbits, hares, rodents, ferrets, goats, sheep, camels	flea bite	Epidemics like Black Death in Europe around 1347–53 during the Late Middle Age, Third Plague Pandemic in China-Qing dynasty and India alone
Capillariasis	*Capillaria* spp.	rodents, birds, foxes	eating raw or undercooked fish, ingesting embryonated eggs in fecal-contaminated food, water, or soil	
Cat-scratch disease	*Bartonella henselae*	Cats	bites or scratches from infected cats	
Chagas disease	*Trypanosoma cruzi*	armadillos, Triatominae (kissing bug)	Contact of mucosae or wounds with feces of kissing bugs. Accidental ingestion of parasites in food contaminated by bugs or infected mammal excretae.	

Clamydiosis / Enzootic abortion	*Chlamydophila abortus*	domestic livestock, particularly sheep	close contact with postpartum ewes	
Creutzfeldt-Jacob disease	PrP^{vCJD}	Cattle	eating meat from animals with Bovine spongiform encephalopathy (BSE)	1996–2001: United Kingdom
Crimean–Congo hemorrhagic fever	*Crimean-Congo hemorrhagic fever orthonairovirus*	cattle, goats, sheep, birds, multimammate rats, hares	tick bite, contact with bodily fluids	
Cryptococcosis	*Cryptococcus neoformans*	commonly – birds like pigeons	inhaling fungi	
Cryptosporidiosis	*Cryptosporidium* spp.	cattle, dogs, cats, mice, pigs, horses, deer, sheep, goats, rabbits, leopard geckos, birds	ingesting cysts from water contaminated with feces	
Cysticercosis and taeniasis	*Taenia solium*, *Taenia asiatica*, *Taenia saginata*	commonly – pigs and cattle	consuming water, soil or food contaminated with the tapeworm eggs (cysticercosis) or raw or undercooked pork contaminated with the cysticerci (taeniasis)	
Dirofilariasis	*Dirofilaria* spp.	dogs, wolves, coyotes, foxes, jackals, cats, monkeys, raccoons, bears, muskrats, rabbits, leopards, seals, sea	mosquito bite	

		lions, beavers, ferrets, reptiles		
Eastern equine encephalitis, Venezuelan equine encephalitis, Western equine encephalitis	*Eastern equine encephalitis virus*, *Venezuelan equine encephalitis virus*, *Western equine encephalitis virus*	horses, donkeys, zebras, birds	mosquito bite	
Ebola virus disease (a haemorrhagic fever)	*Ebolavirus* spp.	chimpanzees, gorillas, orangutans, fruit bats, monkeys, shrews, forest antelope and porcupines	through body fluids and organs	2013–16; possible in Africa
Other haemorrhagic fevers (Crimean-Congo haemorrhagic fever, Dengue fever, Lassa fever, Marburg viral haemorrhagic fever, Rift Valley fever[44])	Varies – commonly viruses	varies (sometimes unknown) – commonly camels, rabbits, hares, hedgehogs, cattle, sheep, goats, horses and swine	infection usually occurs through direct contact with infected animals	The first reported epidemics of dengue fever occurred in **1779-1780** in Asia, Africa, and North America
Echinococcosis	*Echinococcus* spp.	commonly – dogs, foxes, jackals, wolves, coyotes, sheep, pigs, rodents	ingestion of infective eggs from contaminated food or water with feces of an infected, definitive host or fur	
Fasciolosis	*Fasciola hepatica*, *Fasciola gigantica*	sheep, cattle, buffaloes	ingesting contaminated plants	

Foodborne illnesses (commonly diarrheal diseases)	*Campylobacter* spp., *Escherichia coli*, *Salmonella* spp., *Listeria* spp., *Shigella* spp. and *Trichinella* spp.	animals domesticated for food production (cattle, poultry)	raw or undercooked food made from animals and unwashed vegetables contaminated with feces	
Giardiasis	*Giardia lamblia*	beavers, other rodents, raccoons, deer, cattle, goats, sheep, dogs, cats	ingesting spores and cysts in food and water contaminated with feces	
Glanders	*Burkholderia mallei.*	horses, donkeys	direct contact	
Gnathostomiasis	*Gnathostoma* spp.	dogs, minks, opossums, cats, lions, tigers, leopards, raccoons, poultry, other birds, frogs	raw or undercooked fish or meat	
Hantavirus	*Hantavirus* spp.	deer mice, cotton rats and other rodents	exposure to feces, urine, saliva or bodily fluids	
Henipavirus	*Henipavirus* spp.	horses, bats	exposure to feces, urine, saliva or contact with sick horses	
Histoplasmosis	*Histoplasma capsulatum*	birds, bats	inhaling fungi in guano	
HIV	*SIV Simian immunodeficiency virus*	Non-human primates	Blood	Immunodeficiency resembling human AIDS was reported in captive monkeys in the United States

				beginning in 1983. SIV was isolated in 1985 from some of these animals, captive rhesus macaques suffering from simian AIDS (SAIDS). The discovery of SIV was made shortly after HIV-1 had been isolated as the cause of AIDS and led to the discovery of HIV-2 strains in West Africa. HIV-2 was more similar to the then-known SIV strains than to HIV-1, suggesting for the first time the simian origin of HIV. Further studies indicated that HIV-2 is derived from the SIVsmm strain found in sooty mangabeys, whereas HIV-1, the predominant virus found in humans, is derived from SIV strains infecting

				chimpanzees (SIVcpz)
Japanese encephalitis	*Japanese encephalitis virus*	pigs, water birds	mosquito bite	
Kyasanur Forest disease	*Kyasanur Forest disease virus*	rodents, shrews, bats, monkeys	tick bite	
La Crosse encephalitis	*La Crosse virus*	chipmunks, tree squirrels	mosquito bite	
Leishmaniasis	*Leishmania* spp.	dogs, rodents, other animals	sandfly bite	2004 Afghanistan
Leprosy	*Mycobacterium leprae*, *Mycobacterium lepromatosis*	armadillos, monkeys, rabbits, mice	direct contact, including meat consumption. However, scientists believe most infections are spread human to human.	
Leptospirosis	*Leptospira interrogans*	rats, mice, pigs, horses, goats, sheep, cattle, buffaloes, opossums, raccoons, mongooses, foxes, dogs	direct or indirect contact with urine of infected animals	1616–20 New England infection: Present day in the United States–Native Americans; Killed around 90–95% of (Native America)
Lassa fever	*Lassa fever virus*	Rodents	exposure to rodents	
Lyme disease	*Borrelia burgdorferi*	deer, wolves, dogs, birds, rodents,	tick bite	

		rabbits, hares, reptiles		
Lymphocytic choriomeningitis	*Lymphocytic choriomeningitis virus*	Rodents	exposure to urine, feces, or saliva	
Melioidosis	*Burkholderia pseudomallei*	various animals	direct contact with contaminated soil and surface water	
Microsporidiosis	*Encephalitozoon cuniculi*	Rabbits, dogs, mice, and other mammals	ingestion of spores	
Middle East respiratory syndrome	*MERS coronavirus*	bats, camels	close contact	2012–present: Saudi Arabia
Monkeypox	*Monkeypox virus*	rodents, primates	contact with infected rodents, primates, or contaminated materials	
Nipah virus infection	*Nipah virus (NiV)*	bats, pigs	direct contact with infected bats, infected pigs	
Orf	*Orf virus*	goats, sheep	close contact	
Psittacosis	*Chlamydophila psittaci*	macaws, cockatiels, budgerigars, pigeons, sparrows, ducks, hens, gulls and many other bird species	contact with bird droplets	

Q fever	*Coxiella burnetii*	livestock and other domestic animals such as dogs and cats	inhalation of spores, contact with bodily fluid or faeces	
Rabies	*Rabies virus*	commonly – dogs, bats, monkeys, raccoons, foxes, skunks, cattle, goats, sheep, wolves, coyotes, groundhogs, horses, mongooses and cats	through saliva by biting, or through scratches from an infected animal	Variety of places like Oceanic, South America, Europe; Year is unknown
Rat-bite fever	*Streptobacillus moniliformis*, *Spirillum minus*	rats, mice	bites of rats but also urine and mucus secretions	
Rift Valley fever	*Phlebovirus*	livestock, buffaloes, camels	mosquito bite, contact with bodily fluids, blood, tissues, breathing around butchered animals or raw milk	2006–07 East Africa outbreak
Rocky Mountain spotted fever	*Rickettsia rickettsii*	dogs, rodents	tick bite	
Ross River fever	*Ross River virus*	kangaroos, wallabies, horses, opossums, birds, flying foxes	mosquito bite	
Saint Louis encephalitis	*Saint Louis encephalitis virus*	Birds	mosquito bite	

Severe acute respiratory syndrome	*SARS coronavirus*	bats, civets	close contact, respiratory droplets	2002–04 SARS outbreak; started in China
Smallpox	Variola virus	Possible Monkeys or horses	Spread to person to person quickly	The last cases was in 1977; WHO cer tified to Eradicated (f or the world) in December 1979 or 1980.
Swine influenza	A new strain of the influenza virus endemic in pigs (excludes H1N1 swine flu, which is a human virus).	Pigs	close contact	2009–10; 2009 swine flu pandemic; The outbreak began in Mexico.
Taenia crassiceps infecti on	*Taenia crassiceps*	wolves, coyotes, jackals, foxes	contact with soil contaminated with feces	
Toxocariasis	*Toxocara canis*, *Toxocara cati*	dogs, foxes, cats	ingestion of eggs in soil, fresh or unwashed vegetables or undercooked meat	
Toxoplasmosis	*Toxoplasma gondii*	cats, livestock, poultry	exposure to cat feces, organ transplantation, blood transfusion, contaminated soil, water, grass, unwashed vegetables, unpasteurized dairy products and undercooked meat	

Trichinosis	*Trichinella* spp.	rodents, pigs, horses, bears, walruses, dogs, foxes, crocodiles, birds	eating undercooked meat	
Tuberculosis	*Mycobacterium bovis*	infected cattle, deer, llamas, pigs, domestic cats, wild carnivores (foxes, coyotes) and omnivores (possums, mustelids and rodents)	milk, exhaled air, sputum, urine, faeces and pus from infected animals	
Tularemia	*Francisella tularensis*	lagomorphs (type A), rodents (type B), birds	ticks, deer flies, and other insects including mosquitoes	
West Nile fever	*Flavivirus*	birds, horses	mosquito bite	
Zika fever	*Zika virus*	chimpanzees, goril las, orangutans, monkeys, baboons	mosquito bite, sexual intercourse, blood transfusion and sometimes bites of monkeys	2015–16 epidemic in t

(7) (21)(23)(24)(25)(26).

CONCLUSION- Zoonotic diseases have become one of the major causes for illness and death in the present era and have proven negative impact worldwide socially, economically, to the environment, health and in many other ways. Increase in zoonotic diseases has become an emerging public health threat, due to the risk of spillover events at the human-wildlife interface. All the previous studies and researches aware us about the high-risk factors of zoonotic diseases and also elaborated about the activities that could lead to disease spillover in humans in order to inform public health practitioners of the potential risks at social level. The studies are also helpful in understanding about the activities that are responsible for the exposure of zoonoses. In this perspective it has become essential to know that the present health care systems are adequate to identify such diseases at community level as, most of the diseases are really unaware and heard first time by the people. Most people are still unaware of zoonotic diseases, there transmission from wildlife to human's. Hence, due to the

lack of information, the awareness programs related to the zoonotic disease and its adverse impact on health need to be spread from the grass root level.

As we already know, from all the previous studies that the interaction between wildlife and humans is largely driven by the communities and they had to struggle a lot to survive and meet their livelihood needs. It becomes really difficult to predict under what circumstances the disease got emerged in the community and finally will end where. After knowing that all major zoonotic diseases have started at community level spreading from a single person finally leading to an epidemic or pandemic. Now, in that term it has become important to know whether the health experts are fast to diagnose the zoonotic diseases. The time has come to improve the health care system, to educate people about health and burden of these zoonotic diseases, to create proper awareness from the ground roots not leaving a single person about the risk factors of these diseases and also providing preventive measures related to the diseases.

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