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ABSTRACT

Illegal wildlife trade is defined as illegal activities including illicit trade, smuggling, poaching, and capturing of protected wildlife species. Illegal wildlife trade (IWT) is one of the common causes of the transmission of zoonotic diseases and also causes economical losses. The products of the illegal wildlife trades can be used as fashion, exotic pets, medicine, and food. Illegal wildlife trade brings wildlife species or their products close to humans and increases the chances for spillover of zoonotic infections. These zoonotic infection can be transmitted through hunting, capturing, and consuming wildlife products. During 2021-2022, the outbreak of SARS-CoV-2, also known as COVID-19, causes huge losses. Although the exact origin of the virus is still unknown, many studies suggested that the source of virus transmission exists in the Wuhan wet market (Wuhan seafood market), where bats and other wild animals are closed for sale of the live animal and their products. Similarly, investigations showed that the outbreak of the Ebola virus in 2014 occurred due to consumption of wildlife bushmeat. Thus, to avoid the spillover of zoonotic diseases with IWT strict action should be taken to lower the IWT, which is only possible by improving the documentation methods, improving the transport sectors, discouraging corporate gifting, and taking the help of armed forces at free trade and economic zone. Furthermore, the scientific community should address the general public about the complications associated with IWT and develop innovative methods of digital surveillance.

Key words: Wildlife trade, Illegal, Zoonotic diseases, Surveillance, Ebola virus.

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1. INTRODUCTION

In May 1998, the US Fish and Wildlife Services and US Customs Service completed Operation Jungle Trade, exposing the illegal trade and smuggling of birds and other wildlife animals. The operation was conducted in the US and other commonwealth countries, including New Zealand, Australia, South Africa, Costa Rica, and other well-developed countries. This operation illustrates illegal wildlife trade throughout the globe (Zimmerman 2003). Unfortunately, the black-market trade of wildlife and wildlife products is widespread in developing countries and developed countries (as exposed by Operation Jungle Trade). Several studies have proved that billions of wildlife species are killed or captured for the legal and illegal wildlife trade. The major purpose of wildlife bartering is to produce goods and services. Human consumes wild animal products in several forms, including medicines, fabrics, meat products, etc. Wildlife birds can also be captured as pets because of their beauty (Dutton et al. 2013; Wyatt et al. 2022).

Climate change, poverty, and human activities, including deforestation and illegal wildlife trade, are the most potential threats to global health and risk factors for emerging infectious diseases. Almost one-quarter of the deaths are caused by infectious diseases, and nearly 60% of these can spread from animal to human (zoonotic diseases). Most zoonotic diseases (71.8%) enter the human community by direct contact with the wildlife animal or by consuming the products of the wildlife. In simple words, the wildlife trade is a potential threat to the spread of Emerging Infectious Diseases (Jones et al. 2008). Multiple examples explain the illegal wildlife trade as a gateway to zoonotic Emerging Infectious diseases (EID) and their devastating effects on the economy and public health. SARS, Ebola, influenza H5N1, and even SARS-CoV-2 have close links with the illegal wildlife trade (Kan et al. 2005). Similarly, many studies link the emergence of HIV infection with the consumption of non-human primates. Before further discussion, let's explain what illegal trade and emerging infectious diseases are.

1.1. ILLEGAL WILDLIFE TRADE

Illegal wildlife trade (IWT) is one of the most serious green or environmental crimes that are defined as "illegal activities including illicit trade, smuggling, poaching, and capturing of the protected wildlife species (flora and fauna) or their products for some financial benefits." Illegal trade is the fourth most common illegal activity and the cause of several zoonotic infections (Wyatt 2009; Mozer and Prost 2023). IWT not only causes the transmission of zoonotic diseases but also causes substantial economic losses by affecting livestock and harming the ecosystem. According to a study, 4 million live birds, 350 million tropical fish, and nearly 40,000 primates are traded throughout the globe annually. The daily flow of these animals in the trading center involves direct contact with humans and dozens of other species, increasing the chances of spreading infectious diseases from animals to humans (Karesh et al. 2005).

1.2. EMERGING INFECTIOUS DISEASES

Emerging Infectious Diseases (EID) are defined as infectious diseases that newly appeared in the population or a rapid increase in already existing diseases. In the past few decades, novel pathogens have affected the human population, and most of these infections are zoonotic. Globalization, environmental changes, and illegal trade have increased the interaction between animals and humans, ultimately leading to the emergence of highly infectious pathogens. IWT acts as a major gateway for the spread of the EID and poses a severe threat to public health, the environment, and economic stability (Rush et al. 2021). IWT acts as a major gateway for the spread of EID and poses a severe threat to public health, the environment, and economic stability.

National Institute of Allergy and Infectious Diseases (NIAID) categorizes the EID into three major groups.

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1.2.1. GROUP-A

It includes all pathogens that pose the highest risks to a country's national security and public health. The most common zoonotic diseases in this group include Filoviruses (Ebola viruses) and Anthrax.

1.2.2. GROUP-B

This group includes pathogens that result in moderate morbidity and low mortality rates. Common diseases in this group include brucellosis, glanders, and Psittacosis.

1.2.3. GROUP-C

This group includes emerging pathogens that could have devastating effects in the future. Common examples include Nipah and Hendra viruses, Rabies viruses, and Prions (McArthur 2019).

1.3. SCOPE OF IWT

Unfortunately, there is very limited data available that highlights the global estimate of the species and quantities involved in the IWT. However, IWT is most commonly found in African or developing countries where criminal groups are commonly found and have poor legislation to control IWT. Increased legal wildlife trade is another common factor that facilitates criminal groups to move or sell animals from one country to another. Normally, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) estimates the global trade of wildlife species. According to CITES, the wildlife trade is a complex process that includes live wildlife species and their products. Tigers, rhinos, elephants, more fantastic apes, and rodents are the most common victims of the IWT (Avis 2017).

According to TRAFFIC Europe, the total legal wildlife trade in 2005 was worth U.S.\$22.8 billion. On the other hand, the illegal trade was one-third of the legal trade and was worth U.S.\$7.6 to U.S.\$8.3 billion. However, according to CITES, this data is not reliable, and illegal trade is more than the estimated values (Engler and Parry-Jones 2007).

Illegal trade is increasing rapidly, and income from the IWT and poaching are considered among the top sources of illegal wealth. Because of the clandestine nature of the IWT, estimating the total number of wildlife traded illegally is very difficult (Weru 2016).

2. IWT MARKET

According to UNODC (United Nations Office on Drugs and Crime), there are five major sectors of the wildlife trade. When illegal wildlife is traded in these sectors, it not only leads to wildlife extinction but also has devastating effects on public health (Korenblit al. 2016).

1. Fashion
2. Exotic pets
3. Medicine
4. Food
5. Decoration, accessories, and jewelry

2.1. FASHION

Wildlife products are used in several fashion items, including fur, leather, purses, and shoes. The consumers of these products can knowingly and unknowingly be consumers of the IWT. Usually, items are

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prepared by properly processing wildlife products, reducing the chances of zoonotic diseases. However, in IWT, wildlife is roughly processed or transported in unhygienic conditions, which can result in the transmission of pathogens from the products to humans (Mozer and Prost 2023).

2.2. EXOTIC PETS

An exotic pet is any wild animal that isn't normally domesticated, kept, or traded for entertainment. Exotic pet keeping involves birds, reptiles, and to a lesser extent, mammals. The exotic pet trade is a large sector of the IWT and a significant source of hundreds of zoonotic diseases (Mozer and Prost 2023). According to a study, 68% of parrots that are kept at home are illegally traded (Berkunsky et al. 2017). The emergence of lyssaviruses from pet bats, ringworm infections from African pygmy hedgehogs, and salmonellosis from reptiles indicate the importance of exotic pets as a source of zoonotic diseases that have affected humans (Chomel et al. 2007).

2.3. MEDICINE

Several wildlife products are being used to treat, diagnose, and prevent mental and physical illnesses. Usually, traditional medicines are also named according to their origin, such as Traditional Chinese Medicine or Asian traditional medicines, but they are consumed worldwide. According to a study, almost 500 animal species, 50,000 plants, and 700 fungal species are used as medicine globally (Organization 2013). Most of the wildlife species used in traditional medicines are imported illegally, but due to the extinction of many wildlife species, illegal trade is becoming more common. Sparganosis infections from the consumption of medicine made from snakes and frogs is the most common example of infectious disease that has spread by consumption of medicinal products (Wang et al. 2014).

2.4. FOOD

A vast proportion of illegally traded wildlife is consumed as food. Food from wildlife can be further categorized as traditional, luxury, and medicinal food. Although after COVID-19, bushmeat consumption is lowered, many wildlife animals and other species are illegally traded for their meat, especially in Africa (Travis et al. 2011). The increase in bushmeat consumption in the last two decades, especially before COVID-19, resulted in several novel zoonotic diseases. Wildlife can be a reserve host to several zoonotic diseases, e.g., rodents are the reserve host of the monkeypox virus. Consuming the meat of these wild reservoirs can result in zoonotic disease spillover (Wolfe et al. 2005).

2.5. DECORATION, ACCESSORIES, AND JEWELRY

Decoration, accessories, and jewelry are other essential sectors of the IWT. Illegal hunting trophies like antlers, jewelry made from turtle shells, and furniture (elephant footstools) are a few important examples. Ivory is the most common wildlife product that is illegally traded between countries and is most commonly used for decoration (Gao and Clark 2014).

3. HOW DO ZOOONOTIC PATHOGENS SPILLOVER FROM IWT?

Wildlife trade is a multi-million-dollar business and worth \$6 billion U.S. dollars annually (Warchol 2017). Wildlife trade, both legal and illegal, brings wildlife species close to humans and increases the chances for

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spillover of zoonotic infection. Wildlife species contact hunters, marketers, and consumers throughout the trade route. In the case of the legal trade method, most wildlife species and their products are treated with specific SOPs, reducing the chance of infectious zoonotic diseases. However, in the case of IWT, the people involved in the trade are unaware of the zoonotic diseases that threaten the whole community (Hilderink and de Winter 2021).

The risk factors associated with the spillover of zoonotic infection through IWT are divided into four phases.

3.1. PHASE-1 HUNTING, CAPTURING, OR BUTCHERING

Hunting or capturing wildlife is the first phase of the illegal wildlife trade. Hunting techniques have tremendously improved due to advancements in hunting equipment. Hunting or capturing wildlife increases the chances of zoonotic spillover in two ways:

1. Direct contact with the animal's body fluid (e.g., blood), contaminated soil, and water. For example, monkeypox can spread through direct contact with the body fluid of the infected or reservoir host.
2. Hunting and capturing involve direct contact with the animal, increasing the risk of bites and scratches, which can result in an exchange of bodily fluid or infectious agents.

Similarly, butchering also increases the chance of pathogen exposure. Butchers may obtain cuts or injuries that can result in contact with the infected body fluid or pathogens and spread of the disease within the community. HIV, Ebola, and monkeypox are a few most important zoonotic diseases that are thought to be spread by butchering non-human primates (Hilderink and de Winter 2021).

3.2. PHASE-2 TRANSPORTATION

Wildlife traffickers rely on logistics to smuggle contraband by land, air, and sea carriers. The international transport of wildlife plays a crucial role in the global spread of zoonotic pathogens. Transportation of non-live wildlife material lacks proper preservation or proper product cleaning, increasing the chances of food-borne diseases. Similarly, most of the pathogens of zoonotic potential, such as Anthrax, are resistant to environmental changes and cause the spread of the disease to the area where products are imported and consumed (Bengis 1997). However, most of the IWT involves smuggling live wildlife animals, including exotic pets, laboratory animals, and zoo animals. These animals can cause zoonotic spillover by cross-species spillover and the release of the vector. During pre-housing and transportation animals are kept with unnaturally grouped animals at high densities, increasing the flow of pathogens from the reservoir host to other species and possibly spilling over to humans through consumption or direct contact with the infected or reservoir host (Pavlin et al. 2009). Similarly, vectors such as fleas and mosquitoes can be accidentally imported with wildlife, increasing the risk of vector-borne diseases. In countries where an animal health certificate is not required, illegally imported wildlife, possibly carrying novel zoonotic pathogens, can spread the infection to the livestock and put the lives of people at risk (Van Roon et al. 2019).

3.3. PHASE-3 SALE

Informal networks usually perform the sale of IWT products and need to be documented, which increases the spread of new and emerging zoonotic diseases within the human population. History witnesses to several diseases, such as SARS and Avian influenza that spread through the consumption of wildlife meat and direct exposure to illegally traded wild animals (Hilderink and de Winter 2021). The live butchering of

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the animal is another common risk factor that can increase the spread of zoonotic diseases. Both wild and domestic scavengers consume the remnants and waste of the butchered animal and can act as a reservoir host for novel zoonotic pathogens. The illegal trade of these reservoir hosts increases the risk of zoonotic disease spillover. Similarly, keeping wildlife animals in unhygienic and stressful conditions can increase cross-species disease transmission (Karesh et al. 2005).

3.4. CONSUMPTION AND USE OF WILDLIFE PRODUCTS

The demand for both live and non-live wildlife products has dramatically increased over the past few years. Humans consume wildlife products for several purposes, such as meat, fashion, etc. But most wildlife animals are kept in the zoo and houses as pets. According to a study, Central Africa and the Amazon basin consume nearly 67–164 million kilograms of bushmeat. Thus, the increasing demand for wildlife products encourages IWT, exposure of wildlife to humans, and increases the risk of zoonotic diseases. Consuming fresh bushmeat increases the chances of several viral zoonotic diseases, such as hepatitis and retroviruses. Similarly, the emergence of the HIV and Ebola viruses have close links with the consumption of non-human primates. (Kurpiers et al. 2016).

Increasing illegal wildlife use for medical, ornamental, and apparel can also cause the spread of novel zoonotic pathogens; for example, in the history spread of sparganosis infections from the consumption of medicine made from snakes and frogs (Wang et al. 2014).

Keeping the Illegally traded wildlife as a pet or zoo animal can also spread severe parasitic and viral zoonotic infections. The spread of monkeypox and lyssavirus from pet bats and prairie dogs are the two most common examples (Fooks et al. 2003; Guarner et al. 2004). Infected pets and zoo animals can bring zoonotic pathogens to the caretakers, and biting these infected animals can transmit zoonotic diseases (Fig. 1).

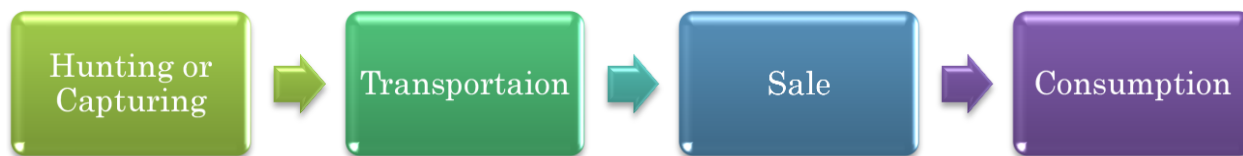


Fig. 1: Zoo animal misuse chain.

4. HISTORY OF HEALTH RISKS ASSOCIATED WITH IWT

The global health crisis originating from the national and international wildlife trade is not novel; over the past two decades, several zoonotic diseases from the live and wet wildlife market have originated. According to a study, the wet market is one of the major sources of creating novel zoonotic diseases. When cages are placed on top of one another, the chances of pathogen transmission increase, sometimes leading to mutation, especially when more than one reservoir host is involved. The meat of illegally traded exotic birds, such as penguins, is rarely inspected, which can affect public health directly and indirectly (by passing pathogens to another wild bird or animal) (Aguirre et al. 2020).

In history, several examples show the devastating effects of the IWT. Zoonotic diseases spread from the IWT affect public health and have led to huge economic losses worldwide.

During 2021-2022, the outbreak of SARS-CoV-2, also known as COVID-19, causes huge losses. Although the exact origin of the virus is still unknown, many studies suggest that the source of virus transmission exists in the Wuhan wet market, where bats and other wild animals are closed for sale of the live animal and their products (Su 2020).

4.1. EBOLA VIRUS OUTBREAK

The Ebola virus outbreak in 2014 was another devastating outbreak faced by West Africa. According to a study, the Ebolavirus outbreak caused more mortalities than all previous emerging viral diseases combined (Judson et al. 2015). Ebolavirus has been isolated from several wildlife animals, including rodents, bats, non-human primates, and duikers. Most of these wildlife animals are used for bushmeat. The Ebolavirus outbreak between 2001 and 2003 was mainly found in people involved in illegally handling the carcasses of gorillas, chimpanzees, and duikers (Mann et al. 2015). The Ebola virus also opens a debate about the illegal trade of wild plants that can transmit the virus to humans indirectly. For example, research has proved that the virus can be transmitted to humans by consuming the fruit eaten by infected bats (Leroy et al. 2007).

The introduction of ectoparasites through IWT also results in the spread of several important zoonotic diseases (Fig. 2). Usually, ectoparasites, especially ticks, are reservoir hosts of several important zoonotic pathogens. For example, *Rickettsia* spp. and *Ehrlichia* spp. are found in ticks, parasitizing exotic reptiles and amphibians (Andoh et al. 2015). Unfortunately, very little data is available that highlights the disease risks posed by hundreds of millions of animals traded globally each year. However, few countries implement adequate regulatory measures to quantify the disease risk of pathogen transmission with traded wildlife animals. Still, there is a need for some steps at the international level to minimize zoonotic pathogen pollution (Rosen and Smith 2010).

A few important viral, bacterial, and parasitic zoonotic diseases that emerged from the IWT are described below in table 1 (Bezerra-Santos et al. 2021):

Table 1: Spread of Zoonotic pathogens through wildlife products trade

Pathogens	Wildlife specie	Wildlife product	Type of Trade
Retroviruses (HIV)	Non-human Primates	Bushmeat	International
Herpes virus	Non-human Primates	Bushmeat	International
<i>E. coli</i>	Birds	Live animal, Bushmeat	International
<i>Klebsiella Pneumonia</i>	Birds	Live birds	National
<i>Listeria monocytogenes</i>	Pangolin, red hog	Bushmeat	International
<i>Toxocara</i> spp.	Raccoons	Live animals	National/International
<i>Trichinella</i> spp.	Black bear, grizzly bear	Meat products	International
<i>Cryptosporidium</i> spp.	Non-Human Primates	Live animals	National

5. GLOBAL RESPONSE TO IWT AND ZOONOTIC DISEASES

After the COVID-19 pandemic, the world took the illegal wildlife trade seriously. Many countries, especially China, focus on their policies to discourage the IWT. In April 2021, UNEP's Fifth Science Policy Forum For Biodiversity recommended some steps to prevent future pandemics. The most important recommendations include halting the unregulated use of land, making food systems nature-positive, and supporting ecosystem restoration. It was concluded that human health and nature's health are interlinked, and disturbances in nature can affect human health (King 2021). On 27-31 July 2020, IPBES conducted a workshop participated by 20 experts from all over the world in Germany on Biodiversity and Ecosystems Services. To prevent the transmission of zoonotic diseases, blaming wildlife or domestic animals is distracting. Most of the destruction is caused by human activities, including hunting, deforestation, and consuming wildlife meat and products. Experts only focus on the post-pandemic strategies and never consider on the key factors responsible for the pandemic. Identifying the potential geographical sites of the IWT and environmental and socioeconomic changes is essential for the prevention of future pandemics. Combining the efforts of the health professional, environmental expert, and veterinarian can help government bodies develop a multi-sectoral policy and practice strategy. (Daszak et al. 2020).

Some important steps the international bodies took from 2015 to 2019 are described in the Table 2:

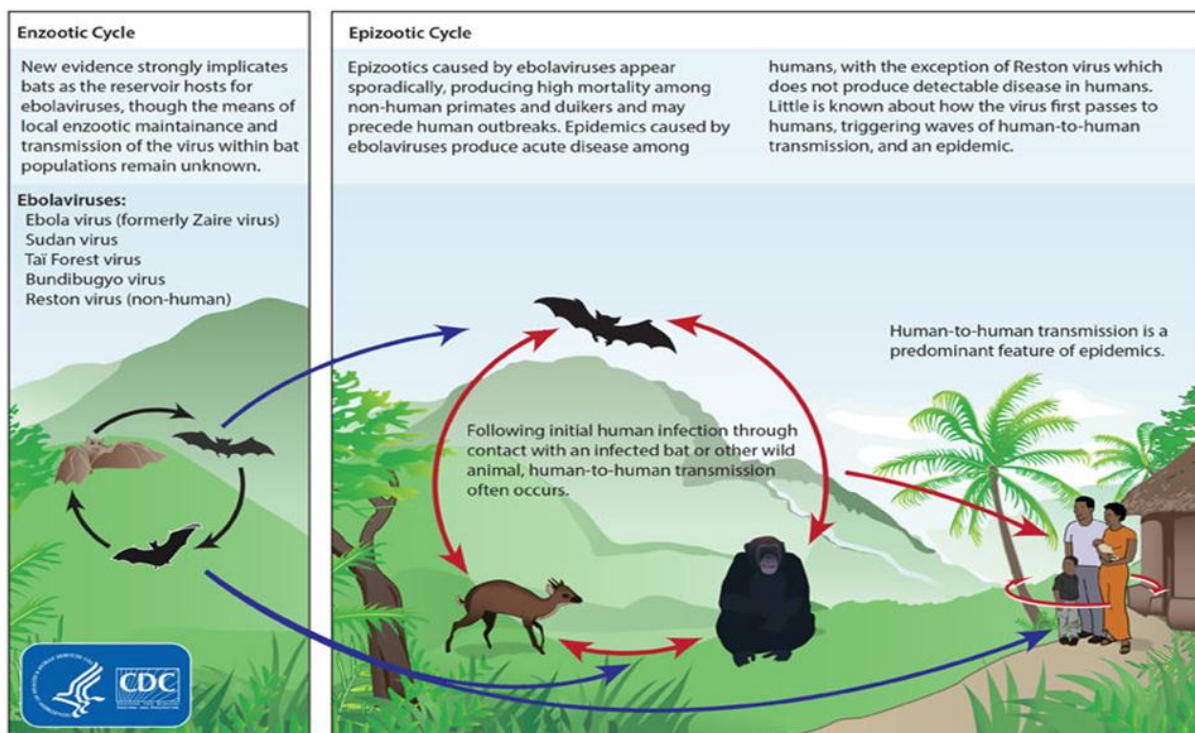


Fig. 2: Cycle of the ebolavirus showing transmission of disease from wildlife to human.

Table 2: Important steps the international bodies took from 2015 to 2019.

Year	Important Steps for IWT Prevention
2015	<ul style="list-style-type: none"> The United Nations General Assembly Passed Resolution on Tracking Illicit Trafficking in Wildlife. Passed Resolution on Tackling Illicit Trafficking in Wildlife. Discourage the IWT facilitated by political bodies. The African Union adopted strategies to combat illegal wildlife corruption.
2016	<p><u>The European Union</u></p> <ul style="list-style-type: none"> Provide an action plan against wildlife trafficking to tackle the illegal wildlife trade. Support to take the initiatives to address the risks associated with wildlife corruption at national and international forums. <p><u>CITES</u></p> <ul style="list-style-type: none"> CITES resolution 17.6 encourages preventing, detecting, and countering wildlife corruption.
2017	<p><u>G-20 Summit</u></p> <ul style="list-style-type: none"> The twelfth meeting of the G-20 summit in Hamburg includes several points including a strong pledge to address the corruption associated with illegal wildlife trade. The declaration includes a strong commitment to "intensify our fight against IWT and wildlife products." Concluded that IWT can destroy biodiversity, and the economy, and act as a greater risk for public health.
2019	<ul style="list-style-type: none"> UNGA passed several resolutions, similar to 2015, to address the IWT in September 2019.

6. CHALLENGES TO CONTROL IWT

Illegal wildlife trade is usually perceived as a low-risk but high-profit generating business that involves targeting specific species due to their high monetary value. Government and international policy makers can lower IWT by building a stronger understanding of the factors that facilitate the IWT. Some important challenges that national and international bodies can face to control IWT are discussed below:

6.1. DOCUMENTATION FRAUD

Documentation fraud is one of the most important challenges that facilitates IWT. One of the most important examples of documentation fraud is the export of illegal trade of the apes from Guinea by using fraudulent CITES export permits between 2009 to 2011. The head of the CITES management was removed from the office and arrested due to involvement in fraudulent actions (Ammann et al. 2013).

The corrupt use of illegal paperwork to facilitate the IWT and illegal hunting is very common in developing countries. When illegally traded wildlife is traded with false paperwork, it leads to several problems, including the transmission of zoonotic pathogens from one animal to another and ultimately to humans (Zain 2020).

6.2. TRANSPORT SECTOR COMPLICITY

Corruption at the transport hub is one of the most important factors that facilitates the IWT. An assessment conducted by the CITES in Kenya confirmed that corruption and illegal cooperation between government officials and the transportation industry are key drivers for illegal trade and poaching of elephants and rhinos. Due to corrupt government officials in developing countries, their cooperation with other private organizations is increasing day by day (Zain 2020).

6.3. FREE TRADE AND ECONOMIC ZONE

Many free trade and economic zones are being used by illegal wildlife traders. An important example of a free economic zone is "The Golden Triangle Special Economic Zone," which is situated at the border of Myanmar and China. This free economic zone is a major route for IWT due to relaxed Customs regimes. Trade through free economic and trade zones is not subjected to customs control which allows illegal wildlife traders to enter the neighboring country without a customs clearance document (Krishnasamy et al. 2018).

6.4. CORPORATE GIFTING

One of the most important but least studied factors that contribute to illegal hunting and IWT is corporate gifting. For example, Rhino horns are more expensive gifts that are usually offered to political officials and other socioeconomic elites in many developing countries (Milliken et al. 2012).

7. FUTURE INTERVENTIONS

After the emergence of COVID-19 and monkeypox infection, illegal hunting and wildlife trading have attracted the attention of international organizations. According to the United Nations Environment Program, combating the IWT and hunting demands diverse strategies, including campaigns to lower the demand for wildlife products, increase surveillance, and an increase in poverty not only facilitates people to hunt illegally but also use of these people by organized wildlife smugglers. Thus, to reduce the IWT and other environmental crimes, it is important to improve the quality of life and alleviate poverty (Duffy et al. 2016).

7.1. AWARENESS ABOUT CONSEQUENCES OF IWT

Most of the people involved in the IWT are usually illiterate and lack awareness or knowledge of the risk factors associated with the IWT and zoonotic spillover. Unfortunately, most of the strategies to combat

IWT are focused on regulation and enforcement, but this is not sufficient. Campaigns to reduce the consumption of illegally traded wildlife products are essential. International and national organizations should focus on generating awareness among poor traders and wildlife product consumers about the zoonotic diseases that can spread or have spread due to IWT. Awareness and educational campaigns need strong social and political support. Thus, it is essential to involve the local communities and other stakeholders during the planning phase to maximize the chances of success in the campaign (Fukushima et al. 2021).

7.2. DIGITAL SURVEILLANCE

Not only is the truly global scale of the illegal wildlife trade unknown but also regional and local levels of wildlife trade are difficult to assess. Quantifying the illegal wildlife trade can be a difficult task, thus there is more need to facilitate digital surveillance. Digital surveillance of the IWT can also provide insight into the zoonotic diseases spillover and early detection of these diseases. Currently, many organizations have introduced several digital applications to digitally assess the IWT throughout the globe. For example, The HealthMap Wildlife Trade website provides IWT reports from official and unofficial sources. Similarly, WWF and TRAFFIC, have successfully created the Law Enforcement Management Information System (LEMIS) tracker that plots official data and flows of wildlife products seized upon entry into the United States.

7.3. POTENTIAL POLICIES

The devastating effects of COVID-19 increase the need for potential policies to combat zoonotic disease spillover due to IWT and other green crimes. Unfortunately, due to deforestation and other illegal activities worldwide, their human-animal interaction has increased ultimately leading to the emergence of several novel zoonotic diseases. Thus, significant steps should be taken to ensure this type of pandemic is prevented in the future. There is more need for the Global Enforcement Cooperation to address the IWT and consumption of illegally traded wildlife products. Similarly, proper SOPs should be designed for the wet market to avoid the spread of zoonotic pathogens. Awareness should be generated about the risk factors associated with the consumption of wildlife meat (Aguirre et al. 2020).

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