

## A Case Study of Noor Jehan: One Welfare Analysis of Systemic Neglect and Crisis Management for a Captive African Elephant (*Loxodonta Africana*) at Karachi Zoo, Pakistan

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*This case study casts an unflattering light on the untimely death of Noor Jehan, a 17 years old African elephant (*Loxodonta africana*) in the Karachi Zoo in April 2023, who has become an event that has marked a watershed moment for animal welfare practice in Pakistan. Using the One Welfare framework, the analysis shows how the death of confined megafauna reflects broader institutional decay and makes links between animal suffering on one hand, and inadequacies in human governance and management of the environment. The investigation caused the demise of Noor Jehan to be attributed to "systemic neglect" in light of a 19th Century Colonial paradigm of zoo. This antiquated model valued public display over biological needs so the elephant was imprisoned in a concrete enclosure which was biomechanically harmful and caused fatal musculoskeletal injuries. The paper outlines the resulting administrative crisis, highlighting a reactionary culture under huge chronic underfunding, significant lack of veterinary expertise and bureaucratic inertia which failed to react to early warning signals. The paper describes the emergency response coordinated by the City Administrator that broke down traditional bureaucratic obstacles to establish a specialist medical committee and recruit international experts from Four Paws. Despite fierce palliative intervention, including the redesign of enclosure with sand mounds and the implementation of heavy logistics of a heavy lift Noora Jehan succumbed to Trypanosomiasis, a parasitic infection which overrode her compromised immune system. The paper argues that this tragedy has catalyzed a critical paradigm shift in Pakistan, with the focus shifting from exhibition centered care to sanctuary-based care. The document concludes with urgent demands for legislative change and that covers the banning of wild caught imports, the compulsory use of soft substrates and the development of species-specific veterinary protocols to ensure future catastrophes are avoided.*

## 1. Introduction

On 22 April 2023, African elephant (*Loxodonta Africana*) Noor Jehan, 17, was killed at the Karachi Zoo, the death of the animal being a key moment in the struggle for the wellbeing of animals in Pakistan (Four Paws, 22 April 2023). The "One Welfare" paradigm shows this medical failure is a salient example of systemic institutional collapse. One Welfare argues that animal, human and environmental welfare are interrelated. Suffering in inadequately managed captive circumstance is usually the symptom of managerial mistakes, professional failure and institutional stagnation (Asia News Network, 10 March 2023; Al Lawati et al., 2024). The welfare of captive elephants has been reviewed worldwide, and this has been going on for decades. Research conducted by the RSPCA shows increases in mortality and decreases in life span in European zoo elephants, as opposed to wild European elephants (Clubb & Mason, 2002; Hafeez et al., 2011). Such disparities can be explained by the physical and psychological stresses of conventional zoo models. The confinement found in an urban zoo - concrete substrates, small space and social isolation - is a pathological environment for megafauna such as the African elephant, which are evolutionarily suited to move about in the upper end of expansive and complex matriarchal herds. Housing and demographic risk variables, especially substrate quality and type, are important predictors of foot and musculoskeletal health of African and Asian elephants in zoological settings (Miller et al., 2016).

Noor Jehan suffered from a full scale "One Welfare" meltdown. A 152-year-old legacy infrastructure that rendered biological needs of the public secondary to the need for public entertainment characterized her existence in Karachi (Dawn, 21 April 2023; Ansari et al., 2020). The Karachi Zoo, since its establishment in 1870, had a very old fashioned "display" ethos even as the world was moving forward to find ways to provide an environment of conservation and care in sanctuaries (Dawn, 27 April 2023). Chronic underfunding, lack of veterinary personnel and a reactive culture in administration characterized the facility. In the crisis, zoo authorities claimed that they had not had a hospital for decades and that one." veterinarian would often tend to more than 800 animals (Dawn, 08 March 2023; Farooq et al., 2020)." This deficiency in resources was the failure of a system that doomed animals to unnecessary pain. Prior to her fatal collapse, Noor Jehan's health began to fall. She was brought from Tanzania in 2009 and left out to maternal separation and displacement during the nursing time (Dawn, 08 March 2023; Feng et al., 2023). She developed degenerative joint conditions after thirteen years living on concrete substrates at the Karachi Zoo, which is a common condition for confined populations living without substrate care (Miller et al., 2016). In the absence of Body Condition Scoring (BCS) and longitudinal health monitoring which is a standard of current zoological institutions (Schiffmann et al., 2019; Ivascu et al., 2022), local authorities at first attributed her deteriorating condition to just minor joint pain (Dawn, 08 March 2023). Elephants need a soft environment to support their multi-toned weight and distribute foot pressure (Panagiotopoulou et al., 2016). Lacking this, the skeleton of Noor Jehan had the marks of neglect.

This multifaceted failure that culminated in Noor Jehan's death is explored in this case study. It looks at the biomechanical effects of poor husbandry, the psychological effects of constant stress, as well as the administrative catastrophe between November of 2022 and April of 2023. The following study examines global experts, emergency medical sanctions, and the terminal clinical history of her illness in order to establish a path towards a shift from traditional zoo models towards sanctuary-based welfare systems. Noor Jehan's tragic legacy may be a source of inspiration for legislative and institutional reforms in Pakistan, to protect Madhubala and other captive megafauna from "systemic neglect" (Four Paws, 22 April 2023). Her story represents the very epitome of waste of opportunity. In 2021, Four Paws advised to move the elephants from Karachi Zoo because of the shortcoming of the facility's inability to fulfill international standards (Four Paws, 04 April 2023). Bureaucracy resistance to all these recommendations remained until the paralysis of Noor Jehan brought out negligence in an undeniable way (Aaj News, 08 March 2023; Khatoon et al., 2023). The problems of early 2023 put in perspective the discord between the old policies of the zoo administration and the developing ethical standards of civil society. Although desperate and palliative the initiative highlighted local capacity gaps. Telemedicine, emergency importation of international specialists and makeshift 'sand mounds' for an intensive care unit are just a few examples of such system unpreparedness to handle the biological realities of its captive inhabitants (Reuters, 14 April 2023).

Moreover, because the "One Welfare" perspective explains the human cost of this oversight. As things stand, public grief, moral agony among insufficient prepared staff and reputational damage to the city of Karachi are all linked up with the animal's suffering. The worldwide uproar and the social media and international press have shown that the treatment of confined wildlife has moved beyond the sphere of local governance and has become an ethical imperative all around the globe (Arab News, 28 March 2023). This case study serves as a kind of analysis of an elephant's demise as well as a critique of the governing frameworks which allowed her to decline. The piece goes on to say that without a fundamental shift in the way that we perceive and handle captive wildlife (i.e., from exhibition to sanctum), such tragedies can be expected to continue to be an inevitable part of the Pakistani zoological landscape (Dawn, 27 April 2023; Naseer et al., 2024).

## **2. Literature Review**

### **2.1 The Elephant in the Room: Opening the "One Welfare" Framework, In Captivity**

The "One Welfare" concept is an expansion of the "One Health" paradigm that focuses more on the intrinsic link between animal welfare, social structures in human society, and the environment. This theory shows that Noor Jehan's suffering at Karachi Zoo represents an overall decline in municipal governance standards and environment management (Asia News Network, 10 March 2023).

## **2.2 The Animal Welfare Domain**

This field focuses on the biological and psychological state of the animal. The welfare of Noor Jehan was indubitably compromised. The "Five Freedoms" (from hunger and thirst to being free from discomfort and from pain, injury or disease to being free from fear and anxiety and lastly to be free to express normal behaviour) were systematically undermined (Asia News Network, 10 March 2023; Shabbir et al., 2021). The elephant had inflicted injuries which were prolonged and not previously recognized including fractured pelvis and a significant hematoma (Arab News, 5th April 2023). Social isolation caused severe psychological damage. Elephants are by nature social animals; lacking herd structure and ability to practice complex social behaviors leads to the phenomenon called "learned helplessness", which is a condition where the animal stops responding to stimuli due to the chronic stress (Four Paws, 4 April 2023). The observable apathy registered in March 2023 that was characterized by immobilization with her head having receded against a wall was a definitive behavioral sign of this psychological degradation (Aaj News, 8 March 2023).

## **2.3 The Human Management Domain**

Animal welfare is dependent upon human competence. Bureaucratic inertia and lack of specialized expertise were other features that characterized the administrative structure of the Karachi Zoo. There were reports of a "war over resources" between different levels of local government and this directly affects the supply of food and medical supplies (Dawn, 29th March 2023). Human factors were further compromised by inadequate specialized training; generalist zookeepers, whilst possibly well-intentioned, lacked country knowledge of these species' identifiers, e.g. gait asymmetry, change in trunk utilization etc. that are subtle and indicative of elephant distress. Reliance on a single veterinarian for so many animals created a bottleneck so that preventive care was unworkable and management was exclusively reactive (Dawn, 8 March 2023).

## **2.4 The Environmental/ Institutional Domain**

The physical environment of the zoo was a "trap" for megafauna. Located in a high-density urban area, the facility had expose animals to high noise and air pollution levels which have been recognized as being a high stress factor for animals (Dawn, 24 March 2023; Sibte-Ali et al., 2021). Failure was legislative in character. Although the anti-cruelty laws exist, there is a paucity of framework for regulating the complex needs of the elephants in the zoo. The reluctance to implement the recommendations made by Four Paws in 2021 to relocate the elephants to a safari park is not only a symptom of institutional inflexibility which prioritizes an "exhibit" worthiness for the animals ahead of their biological needs (Four Paws, 4 April 2023).

## **3. Methodology**

The study is designed to be qualitative and descriptive, using a single-case study, with triangulation across various sources of information, such as official statements on animal welfare

level, post-mortem analyses and veterinary report on the death, court-related disclosures, documentation and press releases by animal welfare nongovernmental organizations (notably Four Paws), and verified national and international media reports. ensure that the analysis is performed based on the triangulation of various sources of information, including official statements on the level of animal welfare, post-mortem examination and veterinary

#### **4. The Biomechanics of Neglect: Why Infrastructure is Destiny**

##### **4.1 An Evolutionary Design for A Soft Environment: The Elephant Foot**

The foot of the African elephant (*Loxodonta Africana*) is a great example of evolutionary engineering, designed to optimize its movement over long distances on soft ground (sand, soil, grass etc.). It contains a large subcutaneous layer of adipose connective tissue, which acts as a shock absorber, evenly distributing the animal's large weight (up to 6000 kg) across the sole (Panagiotopoulou et al., 2016; Taqi et al., 2022). This particular architecture makes an environment that must be pliable for it to work optimally, the squashing over the natural terrain makes it easier for the blood to return to the heart by acting as a "second heart" to propel the blood up the leg.

##### **4.2 The Captive Pathology: Concrete as Carcinogen to the Skeleton**

During her time at the Karachi Zoo, Noor Jehan had been kept in a small cage, consisting mostly of concrete and hard packed soil. The following explanation illustrates the biomechanical toxicity of this architecture.

###### **4.2.1 Chronic Pododermatitis**

With the hard structure of concrete, the digital cushion is not able to relax in a natural way. Consequently, pressure necrosis, fissures in the sole of the foot and subsequently bacterial infections (pododermatitis) are the result of the excessive pressure to particular parts of the foot at the same time. Problem of feet are the most prevalent cause for illness and premature euthanasia in captive elephant populations according to large evaluations of zoo elephant welfare (Miller, Hogan, & Meehan, 2016).

###### **4.2.2 Nail and Sole Overgrowth**

In the wild unrelenting walking wears down the soles and nails of the feet. The lack of natural wearing down in captive life means that the nails can grow unnaturally long changing the angle of impact with the ground as the foot lands. Miller, Hogan, and Meehan (2016) report that this mismatch causes the elephant to take on abnormal positions in order to alleviate pain, which leads to the transmission of pathological forces up the leg.

###### **4.2.3 Osteoarthritis and Osteomyelitis**

The genesis of osteoarthritis, a degenerative joint disease, is triggered by the transmission of shock then from the concrete floor to the skeletal system without passing through the

dampening protection offered by the foot pad. As a result of the constant mechanical damage, Noor's hind legs became "partially paralyzed" leaving her unable to stand (Aaj News, March 8, 2023). This was the final stage of the condition. Autopsy findings later showed a shattered pelvis that was probably pathological fracture caused by the reduced bone density due to inactivity and poor nutrition (Geo News, 18 May 2023).

### **4.3 The Psychological Corollary: Stress being an Immunosuppressive Agent**

In addition to biomechanical neglect, there was also psychological stress. Activists complained that the use of the chains limited the elephant's movement and prevented them from engaging in behaviour normal to the animal (The Express Tribune, 14 April 2023).

#### **4.3.1 This Persistent Stress has a Physical Direct Effect**

Glucocorticoids (cortisol) are potent immunosuppressants; for chronic stress the glucocorticoids are released in significant amounts over a prolonged period of time. According to Clubb and Mason (2002), Noor Jehan was vulnerable to opportunistic infections due to her physiological condition. Her death, from the blood parasite trypanosomiasis, transmitted by flies suggests that her immune system was not healthy enough to provide a good defense against a pathogen that a healthy wild elephant may be able to fight off (Dawn, 19 May, 2023).

### **4.4 The Karachi Context: A System Ready to Fail**

#### **4.5 Legacy Infrastructures and Outdated Design Philosophy**

The Karachi Zoo is run on a form of coloniality rooted in the 19th century, and concerns recreation of humans rather than wildlife. "Cages" in the literal sense are barred, concrete and compact 'enclosures for maximum visibility rather than the privacy and comfort of the animals (Dawn, 27 April 2023).

#### **4.6 Chronic (Underfunding and a Lack of Resources)**

A large deficiency of resources contributes to the following catastrophe. Reports emerged during the height of the crisis suggesting that food contractors would not be remunerated for months; creating the potential of potential disruptions to supply.

##### **4.6.1 Insufficient Diet**

In order to keep their digestive tracts healthy, elephants need an enormous intake of low-calorie, high-fiber foods. The diet that the Karachi Zoo was reportedly providing was considered to be high in sugar foods like sugarcane which lacks in necessary fiber and leads to obesity and dental ailments (Dawn, 29 March 2023).

##### **4.6.2 Inadequate Specialized Equipment**

The zoo did not have the diagnostic imaging equipment that would have been able to actually penetrate the thick skin and tissue of an elephant. Due to the fact that no heavy lift crane



or hydraulic slings were at the site when Noor Jehan fell, the administration was forced to use Karachi Fire Brigade and makeshift apparatus leading to slow implementation of essential interventions (Reuters, 14 April 2023).

#### **4.6.3 Understaffing and Lack of Skills**

The catastrophic failure in human resource planning was demonstrated by the recognition by the officials that one veterinarian had been the sole caretaker of the entire zoo population (Dawn, March 8, 2023). In the absence of a domestic megafauna specialist, there was a need for telemedicine from a long distance with specialists from any other country (The News, 18 March 2023).

#### **4.7 Social and Legislation Indifference**

The operations of the zoo for many years were largely unregulated and there were several episodes of shifting of responsibility between the Sindh Wildlife Department and local municipal bodies. Only through democratization of information through social media, recordings of Noor Jehan dragging her legs became viral. This event turned "social indifference" into "public outrage" thus triggering political action (Aaj News, 29 March 2023).

#### **4.8 History of Noor Jehan: Captive and Compounded Trauma (2009-2022)**

##### **4.9 Acquisition and Displacement Being the Original Trauma (2009)**

In 2009, Noor Jehan was captured in Tanzania. As mentioned by Clubb and Mason (2002), capturing juvenile elephants involves chasing down herds and separating calves from their mothers which brings lifelong emotional and behavioral trauma. The mentioned primary trauma laid the foundation of a personality that was manifested by psychological vulnerability (Dawn, 2023, March 8).

##### **4.10 The Concrete Era: Thirteen Years of Degeneration (2010 - 2022)**

After a brief stay in the Safari Park, Noor Jehan and Madhubala were taken away to Karachi Zoo in 2010 (Associated Press, 2023, April 4).

###### **4.10.1 Substrate-Induced Pathology**

Noor Jehan was chained to concrete flooring for thirteen years. Miller, Hogan, Meehan (2016) identified prolonged exposure to concrete as a major factor that has been associated with musculoskeletal disorders in captive elephants. A report revealed in the newspaper, The News (March 18, 2023) pointed out that by the year 2022, Noor Jehan showing the signs of anxiety and required the surgical intervention in the Tusk infections due to Bar biting or traumatic injuries.

###### **4.10.2 Environmental and Cognitive Dilemma**

Noor Jehan's cognitive ability declined as a result of being kept in an enclosed environment without activities that stimulate the brain. Just as physical damage to individuals impacts their

health, it is also the same with cognitive stimulation deprivation (Dawn, 2023, April 6).

#### **4.11 The Precipitant of Crisis Ignored Early Warnings**

In 2021 an assessment of Noor Jehan was undertaken by the Four Paws organization and it was recommended to move to a more appropriate habitat for a species. The zoo administration's inability to implement this suggestion amounted to a massive failure that eventually decided Noor Jehan's fate (Four Paws, 2023, April 4).

#### **4.12 The Trouble Unblown: A Chronology of the Administrative and Biological Collapse (November 2022 -- March 2023)**

##### **4.13 Prodromal Phase: Missed Opportunities for Intervention (November 2022 through February 2023)**

Initial observations were quantified a swelling in the leg of the elephant Noor Jehan in November, 2022; hence, the manifestation of symptoms was temporally shifted to November, instead of March. By January 2023, the enlargement had migrated from the limb to the dorsal region. The misdiagnosis of a significant internal trauma to ordinary "joint pain" (Geo News, 18th of May, 2023) was the result of a shortage of diagnostic instrumentation in the personnel of parks and courtyards, which led to the administration of such "primitive" analgesic drugs and anti-inflammatory.

##### **4.14 Public Outcry and the Prickliness of the Press: The Crisis Beyond Containment (March 2023)**

###### **4.14.1 Early March Coverage**

On 8th of March, 2023, print media have reported that elephant was "partially paralyzed." These accounts were publicized. The video showed the animal having trouble supporting its own body weight, and it was dragging its hind limbs. Official declarations of a state of 'recovery' were belied by the visual record (Aaj News, 8 3023).

###### **4.14.2 Global Focus**

International outlets such as the Arab News and the Associated Press then came to light the issue. Karachi administration came under international diplomatic lens after '16-year-old elephant, Noor Jehan's health deteriorating' (Arab News, 28 March, 2023) made the headlines.

###### **4.14.3 Increasing Severity and Inspection**

According to Gulf News (27th of March, 2023), by the end of March, according to reports, Noor Jehan showed obvious deformities on her spine as well as swelling in the genitals and signs of significant internal pressure with systemic edema.



#### **4.15 My Role as Administrator Karachi: Stewarding the Storm of Crisis Leadership**

#### **4.16 Formation of the Medical Committee: Pushing against Bureaucratic Barriers**

Upon taking over the situation, it was immediately apparent that the normal bureaucratic machinery of the Karachi Metropolitan Corporation (KMC) was not sufficient to deal with the veterinary emergency of such a large scale. Accordingly, I set up a nine-strong specialized medical committee to break through the inertia linked to previous management. I made sure that this committee was not just a hall of echoes of local officials but included international experts from Four Paws so as to go around this local "nonchalance" which had plagued the zoo over so many years (Dawn, 06 April 2023). The goal was to create a new channel of communication between decision-makers and those who are experts on the subject, bypassing the bureaucratic baggage that often stops government action.

#### **4.17 Engaging Global Expertise: A Foreign Policy Approach**

##### **4.17.1 Expediting Protocols**

I recognized that the local resources were completely insufficient to perform the mega fauna needed surgery. Accordingly, I used my authority to speed the process of emergency visas for the Four Paws team under the leadership of Dr. Amir Khalil. This procedural maneuver saved the day; I personally managed their arrival to avoid possible diplomatic or logistics delays in a period of time where each hour was important (Dawn, 24th March 2023).

##### **4.17.2 Establishing Command Authority**

Upon their arrival I gave the Four Paws team full clinical command authority. I specifically addressed the "skills deficiency" of the local staff and ordered all zoo employees to cooperate unconditionally with the directions of Dr. Khalil (Dawn, 05 April 2023). This radiant departure from the normal rule made sure that the elephant received the best care possible.

#### **4.18 Ultra-Modernizing Emergency Infrastructure and Allocation of Resources**

##### **4.18.1 Engineering for Recumbency**

International experts said the anesthetic protocol could prove deadly if the elephant had collapsed, thus crushing her internal organs. In response, I engaged the Karachi Fire Brigade to help mobilize a heavy lift crane. I handled the procurement of specialized restraints and the design of a suspension apparatus in order to keep Noor Jehan in an upright position for her critical examination (AP? News, 05 April 2023).

##### **4.18.2 Retrofitting the Substrate**

Realizing that the concrete floor posed a major danger, I commissioned the quick-up modification of the enclosure. Under my supervision, truckloads of fine sand were delivered to build "sand mounds." These mounds were necessary for Noor Jehan to be able to elevate her in

order to relieve the extraordinary amount of pressure placed upon her crippled limbs and pelvis (Dawn, 06 April 2023).

#### **4.18.3 Climate Regulation**

In response to the heatwave plaguing Karachi in the most crucial phase of the ICU, I approved emergency installations of large-scale industrial misting fans. This measure ensuring the climate control was essential not to cause the animal to become heat stressed given that the animal was already immunocompromised and reduced in its ability to seek out shade independently (AP News, 22 April 2023).

#### **4.18.4 Prominent Leadership**

I made it a point to be present physically in the zoo, often accompanied by the Governor of Sindh, Kamran Tessori. My attendance served to demonstrate to zoo personnel and the public the importance of this issue to the province. I conducted regular press briefings to counter active misinformation that usually goes around during emotionally-driven crises, (Aaj news, 29th March 2023).

### **4.19 Noor Jehan's Disease Clinical Course, Diagnosis and Palliative Struggle**

#### **4.20 Diagnostic Breakthrough: Unmasking Catastrophe (5 April 2023)**

The first full medical assessment had been done by the Four Paws team on April 5th (Four Paws 06 April 2023).

##### **4.20.1 Internal Trauma Discovery**

Ultrasound diagnoses showed the presence of internal hematoma in the abdominal cavity. The hematoma pushed apart other organs, suggesting what seemed like edema was an expression of significant damage inside the body (Arab News, April 5, 2023).

##### **4.20.2 Skeletal Failure**

A ruptured pelvic floor and fragmented pelvis were discovered during the examination. Pressure from the hematoma blocked the urinary tract causing the observable swelling of the genital area (Dawn, April 6, 2023).

##### **4.20.3 Sober Prognosis**

Dr. Khalil said that Noor Jehan's case was very serious, however, he presented an optimistic view, keeping of course in mind successful stabilization and eventual transfer (The Express Tribune, 14 April, 2023).

#### **4.21 The Terminal Incident: Decline and Exertional Collapse (14 April 2023)**

##### **4.21.1 Entrapment**

On April 13, Noor Jehan had slipped into a concrete water pond in her enclosure. She was

not able to extricate herself (Reuters, 14 April 2023) because of partial paralysis.

#### **4.21.2 High Stakes Rescue**

She stayed trapped there until help arrived via crane. The exertion needed and resultant hypothermia accelerated the process of the breakdown of the system as a whole (Reuters, 14 April 2023).

#### **4.21.3 Point of No Return**

Upon removal from the crane, she could not stand. Elephants in a lateral recumbency position for extended periods of time have compression of their lungs; therefore, from the time her rescue occurred until April 22, 2023 she was present on the sand mounds for the last ten days of her life.

### **4.22 The ICU Phase: Nine Days of Vigil and Intensive Support (15-22 April 2023)**

#### **4.22.1 Palliative Protocols**

An Intensive Care Unit was set up in the enclosure. Noor Jehan was treated with antibiotics, medication, and frequent intravenous fluids - up to 25 drips a day (Aaj News, 19 April 2023).

#### **4.22.2 Physiotherapy & Decubitus Prevention**

The crane was used to move her every few hours to prevent the development of pressure sores, called decubitus ulcers, and an accumulation of fluid in her lungs (Aaj News, 19 April 2023).

#### **4.22.3 Nutritional Support**

She was offered sugar cane and vitamins manually, despite her very difficult condition, she showed the willingness of taking food (Dawn, April 6, 2023).

#### **4.22.4 Terminal Event**

On Eid, 22nd April, the high fever was noticed and later the subject succumbed to a combined infectious process and organ failure (Four Paws, 22nd April, 2023).

### **4.23 Enhanced Analytical Frameworks: Shifting from Narrative to Structured Critique**

#### **4.24 Root Cause Analysis ("The Five Whys" of a Catastrophe)**

##### **4.24.1 Factor 1: The Adverse Environment (The Concrete Trap)**

Why was she injured? Injuries are blamed on the concrete flooring, most likely having a slip or fall on the concrete. Additionally, the concrete may have contributed to degenerative weakness of bone, culminating in fracture and infrastructural deficiencies was, therefore, the pivotal causative factor.

#### **4.24.2 Factor 2: Management Approach (Reactive or Proactive)**

Why was it not treated? The absence of treatment was due to a reactive approach to management. Owing to the lack of routine specialist surveillance, the injury progressed to a hematoma before specialist intervention was requested.

#### **4.24.3 Factor 3: Vulnerability (Stress as a Pathogen) Biological**

Why did she die of infection? The fatal infection being induced by immunosuppression caused by the stress from continuous seclusion and confinement; vulnerability to parasitic infection of the blood by the Trypanosoma as reported from Geo News, 18 May 2023.

#### **4.25 Crisis response Strategy SWOT Analysis (March-April 2023)**

##### **4.25.1 Strengths (Internal, Beneficial Factors)**

**4.25.2 Decisive Executive Authority:** The ability of the Administrator to skirt the ordinary rules of procurement allowed for the accelerated use of resources (cranes, sand, and medications).

**4.25.3 Establishing Strategic Partnerships:** Through working with Four Paws, we were able to obtain the necessary experience and credibility.

**4.25.4 Dedication to Transparency:** Along with this prevention of the spread of false information, frequent press briefings helped to maintain public interest.

##### **4.25.5 Weaknesses (Internal, Negative Factors)**

**4.25.6 Timeline of Intervention:** Inherently Reactive as after considerable time has elapsed from the original injury (several months later), the intervention was implemented; damage was not repairable (Reuters, 14 April 2023).

**4.25.7 Intractable Skills Deficiency:** With the departure of the international specialists, however, the local personnel struggled to maintain the necessary high quality of intensive care unit care (Dawn, April 9, 2023).

**4.25.8 Constraints of Legacy Infrastructure:** A week is not enough time to correct a horrible design that has been around for 150 years; the concrete floor continued to be a risk.

##### **4.25.9 Opportunities (Positive Factors)**

**4.25.10 Catalyst for Policy Reform:** Significance Implementation of the legislative and procedural measures. The tragedy provided political motivation to close the zoo and ban elephant importation.

**4.25.11 Capacity-Binding Demonstration:** It highlighted the need of training local veterinarians at UVAS (University of Veterinary and Animal Sciences).

**4.25.12 Precedent for Relocation:** The issue paved the way for successful transfer of Madhubala to Safari Park in 2024.

**4.25.13 Threats (Outside, Negative Factors)**

**4.25.13.1 Feeling of no Continuity:** Political and Administrative Instability as frequent change of local government leadership threatens the continuity of reform.

**4.25.13.2 Ongoing Pathogen Risk:** The overall threat of pathogens / presence of Tsetse flies or any other blood parasite vector remains a real threat to the fauna left to survive.

**4.25.13.3 Public Outcry and Institutional Disheartenment:** Negative publicity may lead to the demoralization of zoo staff rather than to enhancement.

**4.26 PESTEL Analysis (Macro-Environment of Neglect)**

- **Political:** Significant involvement of high-ranking officials (Governor, Minister) which suggested animal welfare has become a political liability or asset.
- **Economic:** The financial crisis of the zoo caused by unpaid contractors had a negative impact on the animal health.
- **Social:** A transformative change in Pakistani society, also calling by the civil society for "sanctuaries" instead of "zoos".
- **Technological:** The use of modern ultrasonography and telemedicine was important, but it also highlighted the deficiency in the local technology.
- **Environmental:** Urban heat island phenomenon and concrete substrate were serious environmental stresses.
- **Legal:** The involvement of the Sindh High Court was the main reason for allowing international participation.

**4.27 The Final Outcome: Death, Autopsy, and the Search for the Truth**

Noor Jehan died in the morning of April 22, 2023, as the day of the festive breaking of the fast Eid al-Fitr was celebrated. The timing of the occurrence lent an additional signature of overwhelming gravity to an already national tragedy. As Karachi prepared for celebrations, a concrete grief covered the zoo workers and those who raise awareness about animal care who had been on a watchful lookout on animal care for nine days. Ground reports painted a picture of devastation; zoo personnel were reported in tears, which was also the site of gathering of local people outside the grounds, thus converting the location to one of communal grief. Significantly though, the incident was not just witnessed by humans: for in the nearby enclosure was Madhubala, Noor Jehan's lifelong associate. The response of the Madhubala was in a state of clear sadness and then vocal expression as coupled to a somber reminder of the social intricacies of these creatures (Dawn, 22 April 2023). I as the Administrator announced the death to the

international press, thus signaling the end of a week's long struggle that had engaged the nation (AP News, 22 April 2023).

#### **4.28 Autopsy and Cause of Death: Verification of Systemic Failure**

To ensure full transparency and remove any possible speculation over what caused his death, I ordered a timely and thorough autopsy. This process was a collaborative effort, almost led by Professor Dr. Ghulam Mustafa from University of Veterinary and Animal Sciences (UVAS) in Lahore, with remote, but active supervision of Dr. Amir Khalil of Four Paws. The four-hour process involved taking samples from all the necessary organs, which were then sent to specialized laboratories for analysis (Geo News, 18 May 2023). The results were conclusive and incriminating and provided empirical validation for the systemic neglect concept.

##### **4.28.1 Principal Cause**

The autopsy report found officially that the principal cause of death was trypanosomiasis, a blood-borne parasitic disease caused by protozoa of the genus *Trypanosoma*. This illness, often spread by the bite of infected tsetse flies or other bloodsucking insects, causes severe anemia and systemic organ failure. In a healthy elephant, the immune system might be able to handle such parasitemia, however, in Noor Jehan's case, it was fatal (Dawn, 19 May 2023).

##### **4.28.2 The Essential Contextual Determination**

The autopsy report carefully highlighted the leading cause of death with respect to her chronic disease. The fatality was not only due to the parasite, but rather to the effects of the parasite on a "severely immunocompromised host." The investigation confirmed the presence of a large internal hematoma and a broken-up pelvis, which were misdiagnosed for months until the interference of foreign doctors (Geo News, 18 May 2023). The physical attacks in combination with the constant physiological stress of the pain and confinement had compromised her body's defenses. Consequently, the medical conclusion served as a verdict on the quality of her care: she did not simply die from an illness she fell ill as a result of the fragility caused by negligence.

##### **4.28.3 Burial**

The interment of a 3.5 tonnes megafauna within a dense urban area was a significant logistic issue. We concluded that transferring the body was impractical and presented biosecurity issues. Consequently, a decision was made to bury her within the confines of the zoo near the enclosure in which she had lived and died. Heavy excavators were deployed to dig a grave that was 12 to 15 feet deep and 14 feet wide. To prevent any possibility of the infections spreading and to hasten the safe decomposition of the corpse, the body was treated with four tons of lime and disinfectants before it was backfilled into the tomb (Dawn, 25 April 2023). This motive concluding act was done possessed of a gravity proportionate to her effect on the nation's moral consciousness.



## 4.29 The Aftermath and Legacy: Seeds of Change Sown in Tragedy (2023- 2025)

### 4.29.1 Securing Madhubala Future: From Isolation to Sanctuary

The demise of Noor Jehan became the move of her associate, Madhubala, an immediate concern.

**4.29.1.1 Relocation Accomplished:** In November 2024, Madhubala was effectively transferred to a new, species-appropriate sanctuary at the Karachi Safari Park (Four Paws, 26 November 2024).

**4.29.1.2 Social Reintegration:** Madhubala was reconciled with her two sisters Malika and Sonia thus ending 15 years of estrangement (Dawn, 15 April 2024).

### 4.29.2 Policy Transition: The End of the Conventional Zoo Model for Mega-Fauna

The management have stated that they are thinking to stop housing of large mammals at the Karachi Zoo and it might be converted into botanic garden or small animal facility (Dawn, 27 April 2023).

## 4.30 Lessons for the Future and Specific Recommendations

- **Infrastructure is Non-Negotiable (The "Substrate Standard"):** Empirical studies have confirmed definite association between rigid substrates and increased risk of morbidity in elephants. Accordingly, contemporary high capacity herbivore enclosures must adhere to criteria set out by biological research. Miller et al. (2016) identified hard substrates as the number one risk factor for foot and musculoskeletal disorders. Consequently, captive facilities should not be approved for licensing if they do not provide 2-3 acres of soft yielding substrate (sand or soil) to a minimum 1 meter deep to facilitate digging and dust-bathing behaviour. All standing/walking areas should be free of concrete (Miller, Hogan, & Meehan, 2016).
- **Proactive Veterinary Medicine is a Must (Shift from Reactive to Preventive):** The case of Noor Jehan who succumbed following symptoms driven intervention is one of the many examples of the shortcomings of the reactive method. Modern zoological practice is based on longitudinal data collection. I support mandatory "Body Condition Scoring" (BCS) and quarterly hematological screening to determine basic health parameters, as outlined by Schiffmann et al., (2019). This protocol allows sub-clinical issues such as parasitic infections to be detected before they become lethal. Regular audits should be coordinated with UVAS (Schiffmann et seq., 2019).
- **Specialization Is Superior to Generalization (The "Species-Specific" Mandate):** Generalist care models don't go far enough for megafaunal species. Large fauna requires ethology-based species management. I propose a formal "Mega-Fauna Specialist"

certification program for zoos. In order to ensure there is time for staff to provide complete behavioral records, ratios of keeper to animals must be maximized. Metrics such as sleep time, gait analysis, frequency of interactions are early signs of a decrease in welfare and should be documented daily (Clubb & Mason, 2002).

- **Institutionalize Capacity Building (International Collaboration):** Local expertise has its limitations; thus, Four Paws partnership should no longer be a temporary emergency measure, but rather a structured, ongoing Memorandum of Understanding. This MOU should focus on "training the trainers," bringing international experts to train veterinarians in Pakistan through international veterinary experts to train teachers in the treatment of animals and the application of ultrasound advanced techniques and effective anesthesia in large mammals. Such collaboration would help overcome the skills vacuum that was noticed when the international team left (Four Paws, 22 April 2023).
- **Put Contemporary Legislation into Practice (Legal Enforceability):** Recommendations that lack legal authority are voluntary. I suggest that a Sindh "Zoo Licensing and Welfare Act" should be enacted. This legislation must be consistent with international ethical requirements by banning the importation of wild caught elephants, provide for the Five Freedoms to be mandatory, and provide penalties for shortcomings in psychological enrichment or physical infrastructure. Only through such a statutory framework can the One Welfare agenda be fully realized (Four Paws, 04 April 2023).

## 5. Conclusion

The death of Noor Jehan is a strong rebuke of a regressive zoological paradigm based on the primacy of human pleasure at the expense of animal welfare. This case study has used the "One Welfare" approach to illustrate the interconnections between animal suffering, managerial failures and institutional inadequacies. Over the course of thirteen years, Noor Jehan suffered cumulative biomechanical trauma due to concrete substrates, social isolation and chronic stress leading to her demise. The underlying causes were lack of infrastructure; useless specialties and a total lack of empathy seemed to be a factor. The legacy of Noor Jehan is not only felt after her death; her suffering led to Pakistan's first public discourse and was a stimulus for political introspection about the rights of captive animals. This event brought forth the incompatibility of the managerial model of the 19th century with recent ethical and biological standards of the twenty-first century. Consequently, the migration of Madhubala to a sanctuary, albeit after Noor Jehan's death, has provided a safe haven for her sister. The shift from captivity to sanctuary is a major change in policy over humane and more sound scientific wildlife management. In my role of the administrator responsible for this crisis, I suggest a formalization of lessons learned. Any large fauna facility needs to be a soft substratum facility, have proactive veterinary protocols, and have species specific accommodation. Our psychological commitment as a nation to all these measures will determine the viability of zoos in Pakistan in the future; failure to recreate an elephant's complex environment would defeat the moral justification of their continued captivity.

Noor Jehan's death lamented a huge cost in terms of knowledge and reform, but it sparked a reformist momentum that simply has to continue. Her memory still echoes throughout the country, challenging us to further the interests of the voiceless in whose life-blood we have been entrusted.

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