One Health 19 (2024) 100915

Contents lists available at ScienceDirect

One Health

journal homepage: www.elsevier.com/locate/onehlt

A review of risk factors at the human-animal-environmental interface of garbage dumps that are driving current and emerging zoonotic diseases

Nareerat Sangkachai [a,b,c], Bruce Gummow [c,d], Orachun Hayakijkosol [c], Sarin Suwanpakdee [b,e], Anuwat Wiratsudakul [b,e,*]

[a] ASEAN Institute for Health Development, Mahidol University, Salaya, Nakhon Pathom, Thailand
[b] The Monitoring and Surveillance Center for Zoonotic Diseases in Wildlife and Exotic Animals, Faculty of Veterinary Science, Mahidol University, Salaya, Nakhon Pathom, Thailand
[c] College of Public Health, Medical and Veterinary Sciences, James Cook University, Townsville, Queensland, Australia
[d] Department of Production Animal Studies, Faculty of Veterinary Science, University of Pretoria, Pretoria, South Africa
[e] Department of Clinical Sciences and Public Health, Faculty of Veterinary Science, Mahidol University, Salaya, Nakhon Pathom, Thailand

A R T I C L E I N F O

Keywords:
Garbage dumps
Animals
Waste pickers
Zoonotic and emerging infectious diseases

A B S T R A C T

An increasing trend in zoonotic and emerging infectious diseases (EIDs) has been observed worldwide. Most EID outbreaks originate from wildlife, and these outbreaks often involve pathogen–host–environment interaction. Garbage dumps act as an interface between humans, animals, and the environment, from which EIDs could arise. Therefore, this review considers the presence of important pathogens associated with animals and vectors at garbage dumps from a One Health perspective, looking at animal, human, and environmental factors that play a role. A narrative review was performed focusing on four key points, including garbage dumps, animals, waste pickers, zoonoses and EIDs. Articles addressing the presence of terrestrial animals, insects in garbage dumps, and infectious diseases among waste pickers were included in this study. There were 345 relevant articles covering 395 species of terrestrial animals and insects, consisting of 4 species of amphibians, 180 species of birds, 84 species of insects, 114 species of mammals, and 13 species of reptiles. Furthermore, 97 articles (28.12 %) addressed pathogens found in those populations. About half of the articles were interested in bacterial diseases (52.58 %), followed by parasitic diseases (30.93 %) and viral diseases (30.93 %). Zoonotic pathogens were described in 53.6 % of all articles, while 19.59 % focused on drug-resistant microbes, 13.40 % on rodent-borne diseases, and 7.21 % on vector-borne diseases. Garbage dumps would play a role in the emergence of diseases. The relevant factors at garbage dumps that may increase the risk of disease emergence include increased animal populations and density, increased vector population, newly evolved strains of pathogens, increased interaction between humans, domestic animals, wildlife, and vectors, and socio-economic factors. Therefore, sustainable waste management will reduce waste generation, and improve waste collection, and disposal which helps reduce the emergence of new diseases.

1. Introduction

A growing trend of zoonotic and emerging infectious diseases (EIDs) has been observed in the past two decades. EIDs can impact global health, socioeconomic conditions, and the environment [1]. Most EID outbreaks originate from wildlife, and these outbreaks often involve pathogen–host–environment interaction [2]. Consequently, increasing the human–animal–environmental interface increases the risk of zoonotic and emerging disease outbreaks. Furthermore, a highly integrated global economy, the accelerating increase in trade and travel, and an increase in urbanisation are helping drive EID incidents [3–5].

Increasing population density and demands of urban environments can intensify air pollution and result in insufficient water availability, poor water quality, high resource consumption, and waste disposal problems [6–8]. Waste management is one of the most challenging issues in many cities. By 2050, it is estimated that cities will generate more than six million tons of solid waste per day [8]. Waste management deserves special attention due to its impact on the environment and

* Corresponding author at: Department of Clinical Sciences and Public Health, Faculty of Veterinary Science, Mahidol University, 999 Phuttamonthon 4 Road, Salaya, Nakhon Pathom 73170, Thailand.

E-mail address: anuwat.wir@mahidol.edu (A. Wiratsudakul).

https://doi.org/10.1016/j.onehlt.2024.100915
Received 26 April 2024; Received in revised form 7 September 2024; Accepted 8 October 2024
Available online 10 October 2024

potential health effects. Expanded waste accumulation potentially increases the risk of interspecies disease transmission [9] because garbage dumps contain a massive amount of organic waste, which can be a food source for various species of animals and insects [10,11]. Given the presence of animals and vectors in garbage dumps, zoonotic disease transmission will likely occur in these areas. In addition, waste management is closely linked to waste workers in many processes such as collection, recycling, and disposal. They have to work under unhygienic and unhealthy conditions and are likely exposed to various harmful hazards, especially in low-income countries [12]. Garbage dumps, therefore, act as an interface between humans, animals, and the environment, from which EIDs could arise, a significant public health concern as conceptualised in Fig. 1. This review aims to examine factors that play a role in the human-animal-environment interface at garbage dumps from a One Health perspective.

2. Material and methods

A narrative review was performed focusing on four key points: garbage dumps, animals, waste pickers, and zoonotic and EIDs. Three databases were Scopus, ScienceDirect, and PubMed. Search terms included “garbage dump,” OR “landfill,” OR “dump,” OR “rubbish,” OR “dumping ground,” OR “waste disposal,” OR “dumpsite”, and combined with the term “animal”. Articles in English addressing the presence of terrestrial animals and insects in garbage dumps without restriction on year or geographic localisation were included in this study. This is because most zoonotic pathogens are strongly related to the diversity and abundance of terrestrial mammals [13]. However, fish and sewage were outside the scope of this review and were excluded. Furthermore, additional searches using the terms “waste picker,” “zoonoses,” and “infectious disease” were also carried out (Fig. 2.). Articles that met the search criteria were further screened to ensure the focus remained on the interaction of humans, terrestrial animals, and insects with garbage dumps (Fig. 2.). We illustrated the host-pathogen network to visualize the importance of the species being studied. In this network, a round vertex represents a species, a square one indicates the pathogen type, and an edge between the vertices points out that the species and the pathogen are identified in the same article. The host’s vertex size is proportional to the number of articles identifying the species.

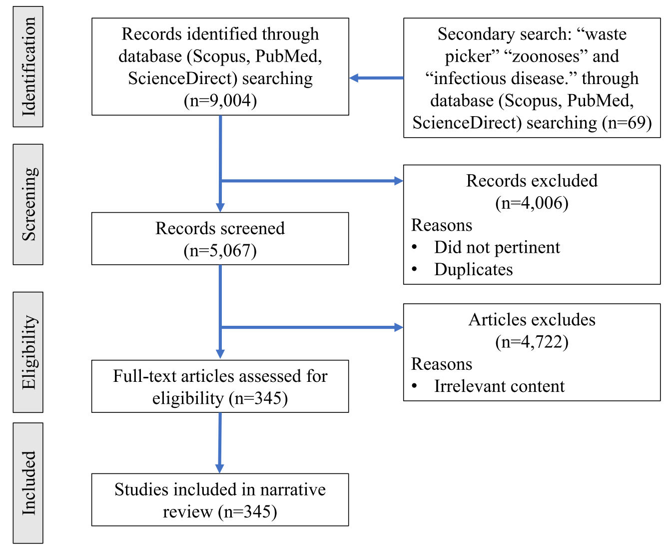


Fig. 2. Flow diagram of narrative review of literature.

3. Result

There were 345 relevant articles, of which 313 addressed terrestrial animals and insects related to garbage dumps. Thirty-four articles were associated with infectious diseases in waste pickers [11,14–46]. Studies have been conducted in 69 different countries or territories (). According to the World Bank’s classification, using income per capita data [47], the majority of these studies focused on high-income countries (47.82 %), as shown in Fig. 3.

3.1. Anthropogenic waste-associated species

In total, there were 395 species of terrestrial animals and insects reported at garbage dumps worldwide (Table S1 in the Supplementary Material 1), consisting of 4 species of amphibians, 180 species of birds, 84 species of insects, 114 species of mammals, and 13 species of reptiles. Amphibians reported at garbage dumps comprised 4 species in one

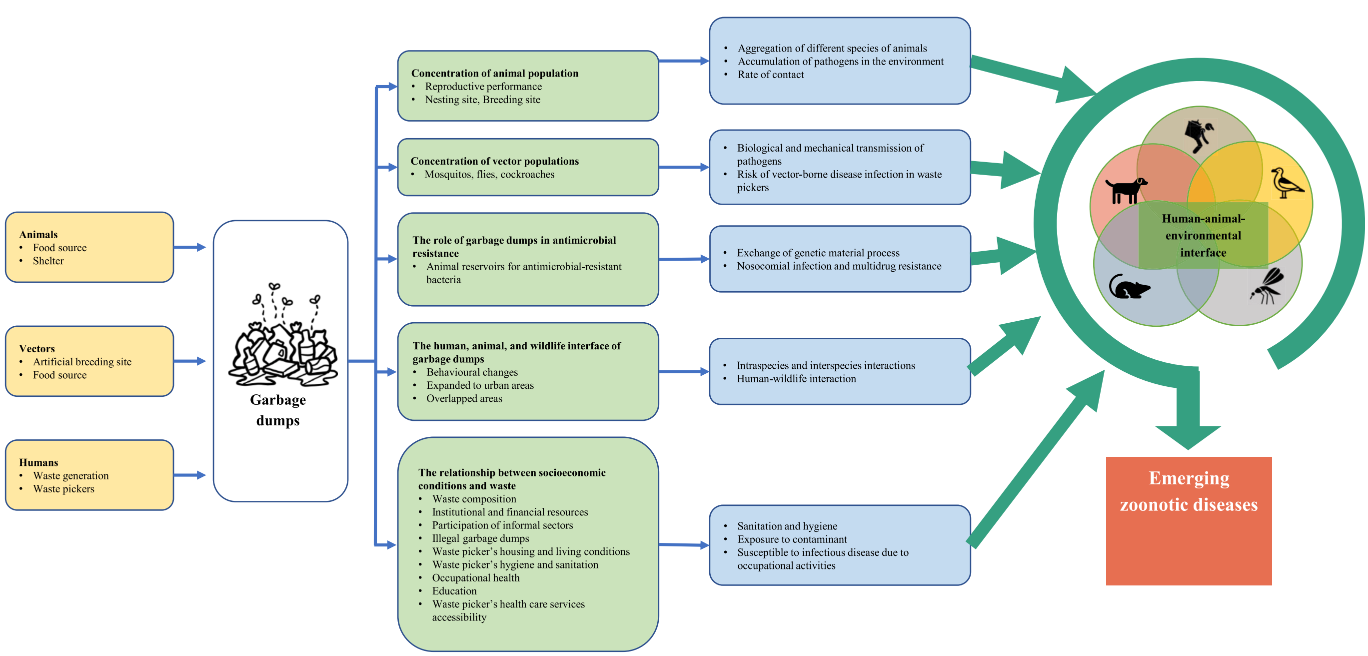


Fig. 1. Driving factors for current and emerging zoonotic diseases of the human-animal-environmental interface at garbage dump.

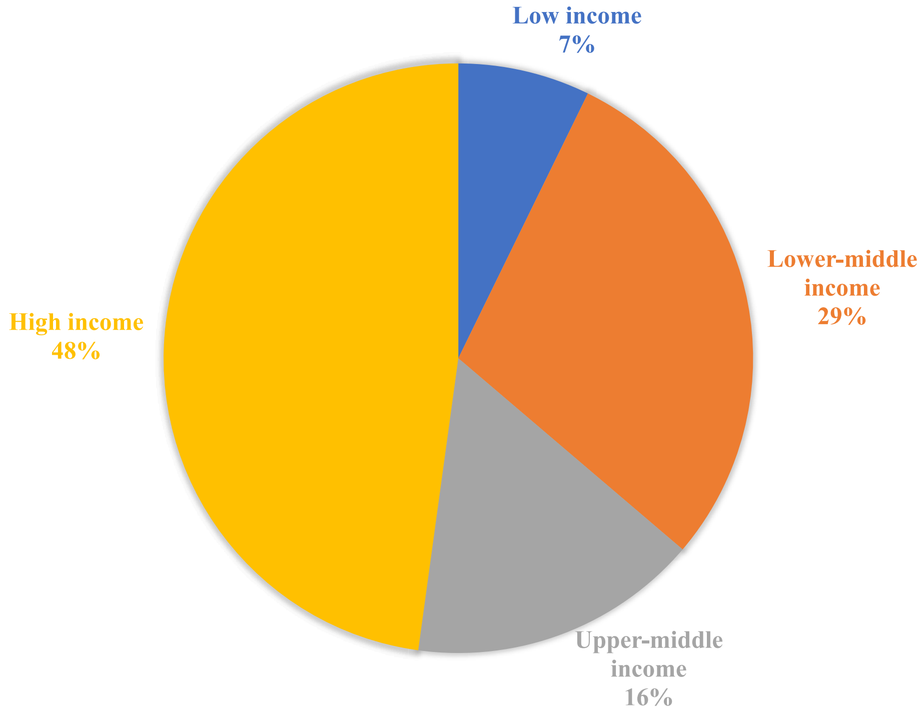


Fig. 3. The proportion of articles classified by the economic level of the country where the study was conducted.

order, Anura [48,49]. Birds reported at garbage dumps comprised of 180 species belonging to 18 orders and 48 families. Passeriformes were the largest order of birds, with 74 species (41.1 %) observed. There were 8 threatened species that were considered critically endangered species [11,50–66]. Nine orders of insects were reported at garbage dumps, comprising 39 families. Seventy percent of all insect species were in the order Diptera. Mammalia comprised 12 orders, classified into 31 families. Rodentia was the order most frequently found in reviewed articles (54 species, 47.37 %). Most rodent species were in the family Cricetidae (20.18 %, 23 species), followed by the family Muridae (20 species, 17.54 %).

Ninety-two percent of the studies were focused on wildlife with the remaining 8 % of studies focused on domestic animals including cattle (*Bos taurus*) [11,43,67–69], buffalo (*Bubalus bubalis*) [11], goats (*Capra hircus*) [11,43,70], sheep (*Ovis aries*) [43,71,72], pigs (*Sus domesticus*) [11,14,43,73,74], dogs (*Canis familiaris*) [11,43,44,67,69,75–84], cats (*Felis catus*) [49,67,69,76,85–89], donkeys (*Equus africanus*) [43], and horses (*Equus caballus*) [44]. Four species of mammals reported were endangered [69,90–93]. Additionally, there were 6 vulnerable species [67,69,94–97]. Two orders of Reptilia were reported at garbage dumps, namely *Crocodilia* [49,98] and Squamata. The majority of reptile species belonged to the family Varanidae in the order *Squamata* [69,99–105].

Animals may consume organic residues directly from garbage or use the dumps as hunting ground for prey, like small animals or insects. Sixty-four percent of articles (223) reported that numerous species used garbage dumps as food sources, including 103 species of birds [50–67,69,98,106–230], 18 species of insects [231], 54 species of mammals [68–82,84,85,88–96,98,158,188,232–276], and 7 species of reptiles [69,98–100,102–105]. Garbage dumps can be significant sources of various toxins and pollutants, posing significant risks to the environment and the health of living creatures. Based on our review, sixty articles reported that toxins and contaminants in garbage dumps affect animal health. Categorising pollutants using their chemical composition, they can be grouped into organic compounds (48.33 %), heavy metals (26.67 %), synthetic polymers (13.33 %), radioactive pollutants (6.67 %), biological contaminants (3.33 %), and inorganic pollutants (1.67 %) [48,59,60,65,67,68,71,93,95,125,130,132, 136,140,142,143,146,147,157,160,170,179,180,183,188,199,213, 214,216,217,225,229,257,275,277–304]. The most frequently observed species in garbage dumps across different continents are shown in Table 1.

3.2. Waste-borne pathogens

Only 97 articles (28.12 %) addressed pathogens found in humans and animals. Of the 97 articles, 95 studies were designed to examine pathogens in a particular species. Of these, 31 articles surveyed pathogens from birds, 28 from humans, 26 from mammals, nine from insects, and one from reptiles. Only three studies looked at pathogens in multiple species in the same study [14,43,305]. Furthermore, when classifying articles by pathogen type, about half of the articles were interested in bacterial diseases (52.58 %, 50 articles), followed by parasitic diseases (30.93 %, 30 articles) and viral diseases (30.93 %, 30 articles). Zoonotic pathogens were described in 53.6 % of all articles, while 19.59 % focused on drug-resistant microbes, 13.40 % on rodent-borne diseases, and 7.21 % on vector-borne diseases. Fig. 4 shows the relationships between animal hosts and pathogens. The largest vertex in the network is purple, representing the Brown rat (*Rattus norvegicus*) in the Mammalian group. In the Aves group (green vertex), the most studied species was the European herring gull (*Larus argentatus*) and House fly (*Musca domestica*) was the biggest vertex in the Insecta group (orange vertex). Most studies of bacteria have been carried out in birds. Antimicrobial-resistant bacteria were the most frequently highly discussed bacteria. Gulls were the most common species used to monitor antimicrobial-resistant bacteria and various foodborne zoonotic bacteria such as *Salmonella* spp., *Campylobacter* spp., and *Listeria* spp. In parasitic studies, most articles belong to the Insecta group, whereas viral diseases were primarily detected in mammals.

In humans, the commonly reported infections in waste pickers were those caused by vectors. There were cases of malaria [15–17,33] and arboviruses such as Dengue [23,33], Zika [23,25], and Chikungunya [23,25]. In the case of bacterial infections, tuberculosis was considered an important health issue for waste pickers [17,36,42] and this could be related to occupational exposures and fomites contaminated with

Table 1
Most common species found in garbage dumps across continents.

No.	Overall	Asia	Europe	Africa	South America	North America	Australia/ Oceania
1	European herring Gull *(Larus argentatus)*	House Fly *(Musca domestica)*	White Stork *(Ciconia Ciconia)*	Dog *(Canis familiaris)*	American Black Vulture *(Coragyps atratus)*	Ring-billed Gull *(Larus delawarensis)*	Dingo *(Canis familiaris dingo)*
2	White Stork *(Ciconia Ciconia)*	Brown rat *(Rattus norvegicus)*	Yellow-legged Gull *(Larus michahellis)*	Pied Crow *(Corvus albus)*	Ring-billed Gull *(Larus delawarensis)*	European herring Gull *(Larus argentatus)*	House mouse *(Mus musculus)*
3	Yellow-legged Gull *(Larus michahellis)*	Dog *(Canis familiaris)*	European herring Gull *(Larus argentatus)*	Egyptian vulture *(Neophron percnopterus)*	Turkey Vulture *(Cathartes aura)*	Common Starling *(Sturnus vulgaris)*	Brown rat *(Rattus norvegicus)*
4	Ring-billed Gull *(Larus delawarensis)*	Cat *(Felis catus)*	Lesser Black-backed Gull *(Larus fuscus)*	Pig *(Sus domesticus)*	South American Coati *(Nasua nasua)*	Great Black-backed Gull *(Larus marinus)*	Cat *(Felis catus)*
5	Brown rat *(Rattus norvegicus)*	Cattle *(Bos taurus)*	Egyptian vulture *(Neophron percnopterus)*	Cattle Egret *(Bubulcus ibis)*	Azara's Grass Mouse *(Akodon azarae)*	Brown Bear *(Ursus arctos)*	House Rat *(Rattus rattus)*
6	Dog *(Canis familiaris)*	Golden Jackal *(Canis aureus)*	Long-tailed Field Mouse *(Apodemus sylvaticus)*	Spotted Hyena *(Crocuta crocuta)*	Southern Caracara *(Caracara Plancus)*	Bald Eagle *(Haliaeetus leucocephalus)*	Australian white ibis *(Threskiornis Molucca)*
7	Common Starling *(Sturnus vulgaris)*	Oriental Latrine Fly *(Chrysomya megacephala)*	Black-headed Gull *(Larus ridibundus)*	Marabou *(Leptoptilos crumenifer)*	Brown rat *(Rattus norvegicus)*	Glaucous Gull *(Larus hyperboreus)*	Cattle *(Bos taurus)*
8	Lesser Black-backed Gull *(Larus fuscus)*	Egyptian vulture *(Neophron percnopterus)*	Carrion crow *(Corvus corone)*	Banded Mongoose *(Mungos mungo)*	House Rat *(Rattus rattus)*	Laughing Gull *(Leucophaeus atricilla)*	Hill's Brown Blowfly *(Calliphora hilli)*
9	House Rat *(Rattus rattus)*	Common Water Monitor *(Varanus salvator)*	Griffon Vulture *(Gyps fulvus)*	Yellow Baboon *(Papio cynocephalus)*	Yellow Fever Mosquito *(Aedes aegypti)*	White-footed Mouse *(Peromyscus leucopus)*	Brown Blowfly *(Calliphora stygia)*
10	Egyptian vulture *(Neophron percnopterus)*	Cattle Egret *(Bubulcus ibis)*	Caspian Gull *(Larus cachinnans)*	Black Kite *(Milvus migrans)*	Córdoba Akodont *(Akodon dolores)*	Red-winged Blackbird *(Agelaius phoeniceus)*	Dog *(Canis familiaris)*

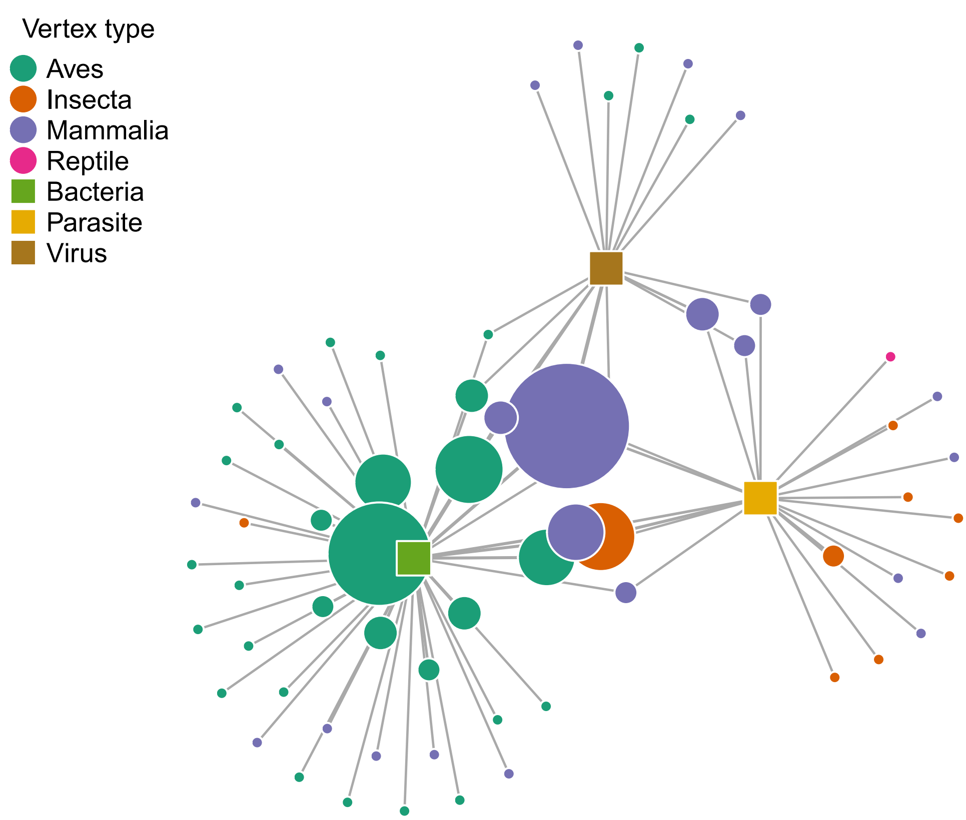


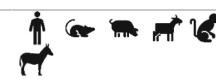
Fig. 4. The host-pathogen network based on the literature review (humans were excluded); a round vertex represents a species, a square one indicates the pathogen type, and an edge between the vertices points out that the species and the pathogen are identified in the same article. The host's vertex size is proportional to the number of articles identifying the species.

Mycobacterium tuberculosis. In animals, tuberculosis cases were found in wild olive baboon (*Papio cynocephalus anubis*) troops feeding at garbage dumps [270]. Leptospirosis was an important rodent-borne disease reported in these workers. Infections were often related to work activities such as working with garbage removal, which is a higher risk [26]. Disease transmission of *Leptospira* spp. was reportedly rodent density-dependent and the pathogen was also detected in other species foraging in garbage dumps, such as pigs, donkeys, and goats [24,38,43,97,263,306,307]. Flies and cockroaches from garbage dumps can also play a role in the transmission of enteric bacterial pathogens such as *Staphylococcus* spp., *Enterobacter* spp., *Escherichia* spp., *Klebsiella* spp., and *Salmonella* spp. [308–310].

Other articles reviewed reported parasitic diseases, including protozoa, helminths, and ectoparasites. Among garbage dump workers, cases of pathogenic protozoans and intestinal parasites were reported [16,19,21,23,24,30–32,36,39,46]. These included *Giardia lamblia*, *Entamoeba histolytica*, and *Entamoeba dispar*.

A high prevalence of *Toxoplasma gondii* infection was reported in waste pickers. The pathogen was also found in other mammal species such as the house mouse (*Mus musculus*) and goat [21,70,311]. Intestinal parasites, such as roundworms, threadworms, hookworms, whipworms, and tapeworms were found in humans and other mammals [14,16,19,22,30,44,71,73,245,255,312]. Moreover, intestinal parasitic cysts and eggs were found in flies and cockroaches [313–316]. A

Table 2
Hosts and pathogens found at garbage dumps.

Type of pathogen	Pathogens	Host at garbage dumps
Bacteria	Antimicrobial-resistant bacteria (*Escherichia coli*, *Salmonella* spp., *Campylobacter* spp., and *Listeria* spp. etc.)	
	Mycobacterium tuberculosis (Tuberculosis)	
	Leptospira spp.	
Parasite	*Plasmodium* spp. (Malaria)	
	Leishmania major (Leishmaniasis)	
	Pathogenic protozoans (*Giardia lamblia, Entamoeba histolytica*, and *Entamoeba dispar* etc.)	
	Toxoplasma gondii (Toxoplasmosis)	
	Intestinal parasites (roundworms, threadworms, hookworms, whipworms, and tapeworms)	
	Scabies	
	Haemogregarina varanicola	
Virus	Arboviruses (Dengue, Zika, Chikungunya)	
	SAR-CoV-2 (COVID-19)	
	Hepatitis A, Hepatitis B, Hepatitis C	
	Hepatitis E	
	West Nile virus	
	Avian influenza virus	
	Newcastle disease virus	
	Rabies virus	
	Human noroviruses	
	Hantavirus	
	Junin virus	
	Lymphocytic choriomeningitis virus	

common ectoparasite reported in waste pickers was scabies which can cause intense itching, rash, and skin infection [31,39]. The infection is generally caused by direct contact with contaminated waste and the environment. Faecal matter, blood, bodily fluids, and animal flesh were reported to be present at the garbage dump sites. Consuming poor food and drinking polluted water were reported as factors that contributed to serious illness at dump sites [31,34,39,317].

The majority of articles related to viruses reviewed in waste pickers were concerned with viral hepatitis, including Hepatitis A [24], Hepatitis B [28,29,32,35,40,42,45], Hepatitis C [32,35,40,45], and Hepatitis E [20,37]. In Table 2, many viruses found in animal populations around garbage dumps are with a public health concern, including avian influenza virus, West Nile virus, Newcastle disease virus, Human noroviruses, Hantavirus, Junin virus, lymphocytic choriomeningitis virus and rabies virus [80,135,241,305,318–324].

4. Discussion

Various factors drive the emergence of diseases. Increasing urban populations around the world are resulting in increasing waste production, which leads to waste accumulation in residential areas and open dumping areas. Garbage dumps are used by many species, including humans, domestic animals, wildlife, and vectors. Garbage dumps can influence the likelihood of the emergence of diseases by concentrating animal populations and vector populations and increasing interaction between humans, domestic animals, wildlife, and vectors under socio-economic condition.

4.1. Concentration of animal population

Garbage dumps are important foraging areas for many species. Compared to the natural environments, garbage dumps provide food for animals all year round. Food availability, therefore, drives the population density of various terrestrial animals, including birds, mammals, and reptiles [54,55,75,83,87,95,102,105,107,120,126,127,131,137,151,152,186,189,191,193–195,201,229,231,236,244,247,251,267,270,272,325–332]. It also enables improved reproductive performance in animals associated with garbage dumps.

An increasing number of birds have been found in flocks that rely on anthropogenic waste food sources. Various studies reported effects on the clutch size, egg volume, fledging success, and hatching success associated with food accessibility at garbage dumps in gulls [126,171,201,203,218]. For example, white stork (*Ciconia Ciconia*) foraging at the garbage dumps had better reproductive success [149,182,222,333] and a higher survival rate in juveniles [208]. Furthermore, food resource availability also influences breeding site selection. Many birds nest close to garbage dumps [62,128,151,162,177,192,204,334,335]. The number of colonies increases as the distance to garbage dumps decreases, leading to high population density around garbage dumps.

In the case of mammals, the availability and accessibility of anthropogenic food sources at garbage dumps could affect animals. Yellow baboon (*Papio cynocephalus*) feed at the garbage dumps because of easy accessibility and spending less time foraging [236,242]. Moreover, garbage dumps also play an important role as breeding grounds and shelters for animals [78,253]. An abundance of rodents was found at garbage dumps where food was easily accessible [272,332]. A study of the White-footed mouse (*Peromyscus leucopus*) living in rural garbage dumps found that the number of pregnant females increased and the garbage dump was a suitable place for birth and rearing young [87]. Bears were also found at the garbage dumps because of more food [244,246,251]. Greater reproductive success was observed in populations of American black bears (*Ursus americanus*) that feed on garbage dumps, with more cubs per litter [250]. Female garbage-feeding Banded mongoose (*Mungos mungo*) carried more foetuses which made their group larger and denser [260].

A high population density of multiple species at a dump site increases the rate of contact within and between species, allowing for the rapid transfer of pathogens and an increased chance of new pathogen strains emergence [336–338]. Animals from garbage dumps were reported to have a high prevalence of infectious diseases [97,311,318,339–341]. Therefore, the aggregation of different species of animals in large numbers around garbage dumps provides an environment that can enhance the emergence of infectious diseases.

4.2. Concentration of vector populations

The environmental conditions and related factors at the garbage dumps were suitable for increasing the population of insects and sustaining their population in urban areas. Mosquitoes, flies, and cockroaches were commonly found foraging and breeding in garbage dumps [231,308,314,328,342–346]. In addition to the variation of climatic factors, the availability of breeding sites is also an important factor affecting the number of mosquitoes. There was a positive correlation between the amount of household waste and Yellow Fever mosquito (*Aedes aegypti*) and Asian Tiger mosquito (*Aedes albopictus*) populations [346]. The areas around garbage dumps can therefore act as artificial breeding sites for mosquitoes. Moreover, there was a change in oviposition behaviour observed from *Culex usquatus*, *Lutzia bigoti*, *Anopheles argyritarsis* and *Limatus durhamii*. Immature forms of those species found at eutrophic landfills were different from those found in natural conditions [344]. Additionally, garbage management also influenced the number of *Aedes aegypti*. For example, increasing the frequency of garbage collection reduced the mosquito population [347].

A large number of flies were generally found around garbage dumps [348–352]. However, their population depended on many factors, such as environmental conditions, food availability, and suitable habitats for breeding sites [330]. The composition of garbage is one of the factors that affect fly populations. For example, animal waste or animal carcasses would attract more flesh flies (*Sarcophaga* spp.) and blowflies (*Lucilia* spp.) [231,345]. Filth flies, such as the house fly (*Musca domestica*), Lesser house fly (*Fannia canicularis*), and Bazaar fly (*Musca sorbens*) were delivered daily to garbage dumps at early stages as eggs, larvae or pupae, and some of them were able to emerge from buried refuse [328,329]. In addition, cockroaches were well adapted to human habitation associated with human waste. As they consume organic matter, increased waste accumulation leads to increased infestation. Cockroaches in households with poor waste disposal practices were found to harbor intestinal parasites, particularly *Entamoeba histolytica* and *Hymenolepis nana* which are significant concerns for public health [314,343].

Increasing vector populations may result in an increase in the risk of the spread of zoonotic and EIDs. These insects have the potential to be biological and mechanical vectors for transmission of pathogens of public health concern, including viruses, bacteria, and parasites. Therefore, waste pickers are at high risk of vector-borne disease infection that could include zoonotic diseases. They work outside with insufficient access or use of personal protective equipment. Daytime workers were more affected by vector-borne diseases than night time or mixed shift workers, and proximity to the garbage dump site was also a risk factor [25].

4.3. The role of garbage dumps in antimicrobial resistance

Many antimicrobial-resistant strains of bacteria isolated from domestic animals and wildlife were reported at garbage dumps. These bacteria had been isolated from healthy wild birds foraging in garbage dumps [106,108–114,116–118,134,168,176,200,205,339,341,353–357]. Garbage dumps are an abundant source of food that many animals can access. However, the very large population of birds at the garbage dumps also access urban, agricultural, and coastal areas. Thus, there were some antimicrobial-resistant bacteria found in gulls similar to those found in human and domestic animals. In addition, crows were found scavenging at poorly managed hospital waste dumps in Bangladesh. This increased the risk of exposure to antibiotic-resistant bacteria [118]. Furthermore, there was evidence in the United State that landfill-foraging migratory gulls were important reservoirs for antimicrobial-resistant bacteria that could disperse the pathogens across and between continents via migratory movements [108,111]. Therefore, wild birds play an important role as reservoirs and disseminators of antimicrobial resistance. However, carrier rates could vary among species with different feeding habits. For example, in Norway, high rates of campylobacter infection was found in omnivores such as crows and gulls compared to herbivores such as pigeons [115]. In South Africa, the pigs scavenging on garbage dumps contained a high diversity of bacteria and there was a potential for nosocomial infection and multidrug resistance arising from these animals. Additionally, flies could be mechanical carriers of enteric bacterial pathogens. Various bacterial genera can develop resistance through an exchange of genetic material from other resistant organisms. Garbage dumps may facilitate the exchange of genetic material among bacteria, leading to the emergence of new, drug-resistant strains. This poses a significant public health risk due to the potential for EID outbreaks.

4.4. The human, animal, and wildlife interface of garbage dumps

Garbage dumps are an important food source for many animals, and some species have adapted to rely more on them. Overlapping foraging areas increases opportunities for intraspecies and interspecies interactions. Increasing population affect interactions with humans and other species [107,126,163,201,370]. There is a high chance of wildlife moving to urban areas and interacting as the population increases in the garbage dumps. For example, troops of wild baboons in Saudi Arabia roam around garbage dumps and village areas [236,270]. American black bear (*Ursus americanus*) was also found foraging in garbage dumps and residential areas in the United States [269]. Many garbage-feeding animals have been found with behavioural changes, such as Hamadryas baboon (*Papio hamadryas*) at garbage dumps with lower flight distances [236]. In Brazil, coatis and the mongoose that fed at garbage dumps were found to develop beg-for-food behaviour [271]. Wolves also adapted behaviour to exploit food resources [76,232]. Their home range and movement overlap with those of humans and other animals, including wildlife and domestic animals, potentially causing human-wildlife conflicts [240,242,254,358]. In addition, many domestic animals, such as cats, dogs, and pigs, roamed around the garbage dumps [73,74,76,78,86,88,89]. Domestic animals found using garbage dumps could be considered a key source of zoonotic diseases because they interacted with wildlife and other animals at garbage dumps and could have close contact with humans in the households. Moreover, there were commensal and wild rodent species abundant in the garbage dumps, and their populations were associated with human activity [241,272,294,295,298–300,359,360]. The presence of rodent infestation can significantly heighten human health risks, as these populations have been found to harbor numerous zoonotic pathogens [7,97,263,266,305–307,311,312,321,323,324]. For example, Brown rats (*Rattus norvegicus*) in garbage dumps in Japan were naturally infected by *Echinococcus multilocularis*. The parasites can infect carnivores such as foxes, dogs, or cats which may be the source of human infection [312].

Furthermore, many people are also involved in solid waste management systems. Humans can take part in various processes, such as before collection, during collection, and at disposal sites where waste pickers play an important role in human–animal ecologies at the point of garbage disposal. Especially waste-pickers in low and middle-income countries, who spend the most time in garbage dumps and live in slums around those areas [11,12]. They are at high risk and more likely to be exposed to different zoonotic pathogens. Animal bite accidents were also recorded in waste pickers [15,18,32,33]. Stray dogs and other animals feeding at garbage dumps can create obstacles collecting the waste [11,20]. Additionally, human activities also influence contact with animals [78,133,235,278,283,335]. For example, during the tourist season there was an increase in the amount of waste generated and more direct contact with hand-feeding wildlife [239,250].

4.5. The relationship between socioeconomic conditions and waste

Socio-economic conditions are considered one of the drivers of EIDs events [1,361,362]. High rates of urbanisation in low- and middle-income countries were associated with increased consumption, land-use changes, and high population density that can affect disease risk to people [363,364]. The fast-growing population in the cities also increases waste production, resulting in sanitation issues. About 32, 53, and 57 % of the total food and green waste were in high, medium, and low-income countries, respectively [365]. The composition of municipal solid waste differed, depending on various factors such as economic development, culture, and climate. Disparities in waste management practices observed between developing and developed countries. The percentage of organic matter in waste composition was high in low-income countries. Uncontrolled disposal, such as open dumps with open burning, was normally found in these countries, and institutional and financial resources in low-income countries were limited. Garbage collection coverage was generally low in low-income countries and the informal sectors played an important role in many activities associated with waste disposal [8,12,366]. Improper waste management could attract different species of animals and insects to garbage dumps. Additionally, there was evidence that houseflies caught in low-income residential areas have more parasitic eggs and cysts compared to high-income residential areas [315].

In developing countries, poor waste pickers depend on waste picking as their source of income, and many local waste pickers' houses are located in slum-like areas [367]. Most waste pickers in developing countries were informal workers who were unable to access proper healthcare and, as a result, could potentially carry diseases without being able to do something about it or without being aware of disease transmission [368]. Informal waste pickers often did not have access to proper protective equipment or received proper training before entry to dumpsites. In addition, some workers refused to use personal protective equipment because of their religious faith. Some believed personal protective equipment would never protect them from sustaining injuries or contracting diseases [18]. In contrast, waste workers in developed countries often had training and guidelines for handling infectious waste [369]. Therefore, people living in low-income areas probably have a higher risk of infection.

Waste pickers were highly susceptible to infectious diseases due to occupational activities. Their activities increase the risk of infection due to exposure to waste that may contain harmful chemical and biological substances. Infection in waste pickers can arise from cuts, needle pricks, drinking unfiltered water, consumption of contaminated food, and animal or insect bites. During the COVID-19 pandemic, the increasing number of COVID-19 infections in waste pickers was linked to work routes associated with higher rates of residents' infection with COVID-19. Lack of training, protective equipment, and awareness of working with infectious waste increases the chance of infection [27]. In addition, the prevalence of *Toxoplasma gondii* infection was higher among workers at the waste transfer station than in drivers or helpers of waste vehicles [21].

In high-income countries, policies to increase public participation in recycling and use incinerators were implemented to sustain waste management services. These can decrease the number of garbage dumps, animals, and waste pickers. Closing the garbage dumps had a huge impact on scavenging animals around the sites. This leads to a reduction in the number of vectors as the availability of the habitats decreases. Therefore, better waste management will reduce interaction between humans, animals, vectors, and pathogens in the garbage dumps. Sustainable waste management will also reduce the impact on health and the environment. Starting with reducing waste generation at the household level by educating and encouraging people to make zero-waste living. The safety guidelines should be developed. Waste workers should receive regular training and have protective equipment to ensure safety in waste collection and disposal. Besides that, appropriate disposal methods and locations are also important to reduce the health and environmental impacts.

Our review study may have encountered reporting bias, as a significant portion of the literature we examined was conducted in high-income countries, which have the resources for research and disease surveillance. Low-income countries, on the other hand, may not be capable of reflecting their current situation due to the scarcity of finances and manpower. Moreover, most waste pickers in developing countries are unregistered, resulting in a lack of medical records in the official system.

5. Conclusion

The human-animal-environmental interaction found around garbage dumps may profoundly increase the risk of infectious disease emergence. The availability of food in garbage dumps was a key factor affecting reproductive performance, physical condition, and behaviour of wildlife, domestic animals, and insects. Garbage dumps increase animal density and insect population, which may raise the risk of EIDs because it increases the intersection between wildlife, domestic animals, vectors, and humans, which enhances the likelihood of pathogen evolution and transmission. Thus, emphasising the need for a holistic approach for effective disease prevention and control. It is apparent, therefore that future studies should apply a One Health approach to comprehensively examine the disease ecology within garbage dumps and that better waste management will reduce interaction between humans, animals, vectors, and pathogens in the garbage dumps, which are key factors in reducing the impact on health and environment.

CRediT authorship contribution statement

Nareerat Sangkachai: Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Bruce Gummow:** Writing – review & editing, Validation, Supervision, Project administration, Conceptualization. **Orachun Hayakijkosol:** Writing – review & editing, Validation, Supervision, Conceptualization. **Sarin Suwanpakdee:** Writing – review & editing, Validation, Supervision, Conceptualization. **Anuwat Wiratsudakul:** Writing – review & editing, Validation, Supervision, Project administration, Formal analysis, Conceptualization.

Declaration of competing interest

The authors have no competing interests to declare.

Acknowledgments

This work is a part of the PhD study at the Faculty of Graduate Studies, Mahidol University.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.onehlt.2024.100915.

Data availability

Non-confidential data can be shared upon request.

References

[1] K.E. Jones, et al., Global trends in emerging infectious diseases, Nature 451 (7181) (2008) 990–993.
[2] B.A. Jones, et al., Zoonosis emergence linked to agricultural intensification and environmental change, Proc. Natl. Acad. Sci. 110 (21) (2013) 8399–8404.
[3] A.M. Kilpatrick, S.E. Randolph, Drivers, dynamics, and control of emerging vector-borne zoonotic diseases, Lancet 380 (9857) (2012) 1946–1955.
[4] J.M. Hassell, et al., Urbanization and disease emergence: dynamics at the wildlife–livestock–human interface, Trends Ecol. Evol. 32 (1) (2017) 55–67.
[5] E. Alirol, et al., Urbanisation and infectious diseases in a globalised world, Lancet Infect. Dis. 11 (2) (2011) 131–141.
[6] X. Xu, et al., Impacts of urbanization and air pollution on building energy demands—Beijing case study, Appl. Energy 225 (2018) 98–109.
[7] W. Li, et al., Does urbanization intensify regional water scarcity? Evidence and implications from a megaregion of China, J. Clean. Prod. 244 (2020) 118592.
[8] D. Hoornweg, P. Bhada-Tata, C. Kennedy, Environment: waste production must peak this century, Nature 502 (7473) (2013) 615–617.
[9] C. Nzediegwu, S.X. Chang, Improper solid waste management increases potential for COVID-19 spread in developing countries, Resour. Conserv. Recycl. 161 (2020) 104947.
[10] A. Krystosik, et al., Solid wastes provide breeding sites, burrows, and food for biological disease vectors, and urban zoonotic reservoirs: a call to action for solutions-based research, Front. Public Health 7 (2019) 405.
[11] A. Doron, Stench and sensibilities: on living with waste, animals and microbes in India, Aust. J. Anthropol. 32 (S1) (2021) 23–41.
[12] D. Hoornweg, P. Bhada-Tata, What a Waste: A Global Review of Solid Waste Management, 2012.
[13] C.K. Johnson, et al., Global shifts in mammalian population trends reveal key predictors of virus spillover risk, Proc. R. Soc. B 2020 (287) (1924), p. 20192736.
[14] H.O. Addo, et al., Seroprevalence of Taenia solium and Trichinella spiralis among humans and pigs in Ghana, Biomed. Res. Int. 2021 (2021).
[15] A. Afon, A survey of operational characteristics, socioeconomic and health effects of scavenging activity in Lagos, Nigeria, Waste Manag. Res. 30 (7) (2012) 664–671.
[16] K. Akter, N. Hawlader, M.A.-A. Hoque, An Assessment of Health Hazards and Awareness of Waste Pickers: A Case Study of Matuail Sanitary Landfill of Dhaka City **5**, 2019, pp. 96–113.
[17] N. Akter, J. Tränkler, An analysis of possible scenarios of medical waste management in Bangladesh, Manag. Environ. Qual. 14 (2) (2003) 242–255.
[18] A.F. Ali, F.I. Yusuf, Prevalence of injuries among waste pickers. A case study in Nigeria, Multidiscip. J. Waste Resour. Residues 17 (2021) 89–96.
[19] C. Alvarado-Esquivel, Toxocariasis in waste pickers: a case control seroprevalence study, PLoS One 8 (1) (2013) e54897.
[20] C. Alvarado-Esquivel, et al., Hepatitis E virus infection and waste pickers: a case-control seroprevalence study, J. Med. Virol. 93 (6) (2021) 3779–3785.
[21] C. Alvarado-Esquivel, et al., Seroepidemiology of infection with Toxoplasma gondii in waste pickers and waste workers in Durango, Mexico, Zoonoses Public Health 55 (6) (2008) 306–312.
[22] M. Beiromvand, et al., Screening municipal waste collectors for cystic echinococcosis and toxocariasis in southwestern Iran, J. Infect. Dev. Ctries. 13 (2) (2019) 154–161.
[23] V.R.N. Cruvinel, et al., Health conditions and occupational risks in a novel group: waste pickers in the largest open garbage dump in Latin America, BMC Public Health 19 (1) (2019) 1–15.
[24] V.R.N. Cruvinel, et al., Waterborne diseases in waste pickers of Estrutural, Brazil, the second largest open-air dumpsite in world, Waste Manag. 99 (2019) 71–78.
[25] V.R.N. Cruvinel, et al., Vector-borne diseases in waste pickers in Brasilia, Brazil, Waste Manag. 105 (2020) 223–232.
[26] J.S. Cruz, et al., Biannual and quarterly comparison analysis of agglutinating antibody kinetics on a subcohort of individuals exposed to Leptospira interrogans in Salvador, Brazil, Front. Med. 9 (2022) 862378.
[27] A. do Nascimento Beckert, V.G. Barros, Waste management, COVID-19 and occupational safety and health: challenges, insights and evidence, Sci. Total Environ. 831 (2022) 154862.
[28] G. Dounias, et al., Prevalence of hepatitis B virus markers in municipal solid waste workers in Keratsini (Greece), Occup. Med. 55 (1) (2005) 60–63.
[29] J. Gutberlet, A.M. Baeder, Informal recycling and occupational health in Santo André, Brazil, Int. J. Environ. Health Res. 18 (1) (2008) 1–15.
[30] M.G. Higa, et al., Intestinal parasitism among waste pickers in Mato Grosso do Sul, Midwest Brazil, Rev. Inst. Med. Trop. Sao Paulo 59 (2017).
[31] C. Hunt, Child waste pickers in India: the occupation and its health risks, Environ. Urban. 8 (2) (1996) 111–118.
[32] S. Jerie, Occupational risks associated with solid waste management in the informal sector of Gweru, Zimbabwe, J. Environ. Public Health 2016 (2016).
[33] S. Kumari, U. Kiran, Prevalence of health problems of rag pickers due to various hazards at Lucknow city, Human Factors Healthc. 2 (2022) 100023.
[34] F. Made, et al., Illness, self-rated health and access to medical care among waste pickers in landfill sites in Johannesburg, South Africa, Int. J. Environ. Res. Public Health 17 (7) (2020) 2252.
[35] A. Majeed, et al., Scavenging demeanor in Bahawalpur, Pakistan: social and health perspective, J. Mater. Cycles Waste Manage. 19 (2017) 815–826.
[36] C.P. Marques, et al., Social vulnerabilities of female waste pickers in Brasília, Brazil, Arch. Environ. Occup. Health 76 (3) (2021) 173–180.
[37] R. Martins, et al., Seroprevalence of hepatitis E antibodies in a population of recyclable waste pickers in Brazil, J. Clin. Virol. 59 (3) (2014) 188–191.

[38] J. Mohd Ridzuan, B.D. Aziah, W.M. Zahiruddin, Work environment-related risk factors for leptospirosis among plantation workers in tropical countries: evidence from Malaysia, Int. J. Occup. Environ. Med. 7 (3) (2016) 156–163.
[39] S. Parveen, I. Faisal, Occupational health impacts on the child waste-pickers of Dhaka City, WIT Trans. Biomed. Health 9 (2005).
[40] M. Rauf, et al., *HIV, hepatitis B and hepatitis C in garbage scavengers of Karachi.* JPMA. The, J. Pak. Med. Assoc. 63 (6) (2013) 798–802.
[41] M.M. Salah, et al., Local residents' perception of landfill impacts in Palestine: the case of Zahrat Al-Finjan landfill, J. Mater. Cycles Waste Manag. 22 (2020) 673–681.
[42] C.J. Schenck, et al., Exploring the potential health risks faced by waste pickers on landfills in South Africa: a socio-ecological perspective, Int. J. Environ. Res. Public Health 16 (11) (2019) 2059.
[43] Z. Sebek, et al., Leptospirosis in man, in wild and in domestic animals at waste disposal sites in Cairo, Geogr. Med. Suppl. 3 (1989) 141–150.
[44] F.A. Smout, et al., Zoonotic helminth diseases in dogs and dingoes utilising shared resources in an Australian aboriginal community, Trop. Med. Infect. Dis. 3 (4) (2018).
[45] R. Squeri, et al., Study on hepatitis B and C serologic status among municipal solid waste workers in Messina (Italy), J. Prev. Med. Hyg. 47 (3) (2006) 110–113.
[46] M. Vasina, Health-Related Practices and Perceptions among Waste Pickers: The Case of Mbeubeuss Waste Dump in Senegal, Unpublished thesis],, Graduate Institute Geneva, 2018.
[47] World Bank, World Bank Country and Lending Groups, 2022.
[48] O.M. Okeagu, et al., Bioaccumulation of organochlorine pesticides in the parasite Cosmocerca sp. (Nematoda: Cosmocercidae) and the amphibian host Amietophrynus regularis (Reuss, 1833) within Lagos metropolis, Nigeria, Toxicol. Rep. 9 (2022) 136–146.
[49] M.A. Chua, The herpetofauna and mammals of Semakau landfill: a project Semakau checklist, Nat. Singapore 4 (2011) 277–287.
[50] R. Saran, Population monitoring and annual population fluctuation of migratory and resident species of vultures in and around Jodhpur, Rajasthan, J. Asia-Pacific Biodivers. 10 (3) (2017) 342–348.
[51] N.N. Annorbah, L.H. Holbech, Relative abundance, agonistic behaviour, and resource partitioning among three scavenging bird species in Ghana, Malimbus 34 (34) (2012) 1–8.
[52] M. Campbell, Factors for the presence of avian scavengers in Accra and Kumasi, Ghana, Area 41 (3) (2009) 341–349.
[53] D.E. Pomeroy, Birds as scavengers of refuse in Uganda, Ibis 117 (1) (1975) 69–81.
[54] R. Ssemmanda, D. Pomeroy, Scavenging birds of Kampala: 1973–2009, Scopus 30 (2010) 26–31.
[55] C. Cerecedo-Iglesias, et al., Resource predictability modulates spatial-use networks in an endangered scavenger species, Mov. Ecol. 11 (1) (2023).
[56] L. Gangoso, et al., Reinventing mutualism between humans and wild fauna: insights from vultures as ecosystem services providers, Conserv. Lett. 6 (3) (2013) 172–179.
[57] S. Hidalgo, et al., Food of the Egyptian vulture (Neophron percnopterus) in Biscay, Buteo 14 (2005) 23–29.
[58] J. Katzenberger, et al., No short-term effect of closing a rubbish dump on reproductive parameters of an Egyptian vulture population in Turkey, Bird Conserv. Int. 29 (1) (2019) 71–82.
[59] P. Oliva-Vidal, et al., Second-generation anticoagulant rodenticides in the blood of obligate and facultative European avian scavengers, Environ. Pollut. 315 (2022).
[60] M.E. Ortiz-Santaliestra, et al., Accumulation of pollutants in nestlings of an endangered avian scavenger related to territory urbanization and physiological biomarkers, Environ. Pollut. 252 (2019) 1801–1809.
[61] H. Tauler-Ametller, et al., Assessing the applicability of stable isotope analysis to determine the contribution of landfills to vultures' diet, PLoS One 13 (5) (2018).
[62] H. Tauler-Ametller, et al., Landfills determine the distribution of an expanding breeding population of the endangered Egyptian vulture Neophron percnopterus, Ibis 159 (4) (2017) 757–768.
[63] H. Tauler-Ametlller, et al., Domestic waste disposal sites secure food availability but diminish plasma antioxidants in Egyptian vulture, Sci. Total Environ. 650 (2019) 1382–1391.
[64] G.K. Gajdon, N. Fijn, L. Huber, Limited spread of innovation in a wild parrot, the kea (Nestor notabilis), Anim. Cogn. 9 (3) (2006) 173–181.
[65] J.L. Roscales, et al., Influence of trophic ecology on the accumulation of dioxins and furans (PCDD/Fs), non-ortho polychlorinated biphenyls (PCBs), and polybrominated diphenyl ethers (PBDEs) in Mediterranean gulls (Larus michahellis and L. audouinii): a three-isotope approach, Environ. Pollut. 212 (2016) 307–315.
[66] M. Duclos, et al., Latitudinal patterns in the diet of Andean condor (Vultur gryphus) in Chile: contrasting environments influencing feeding behavior, Sci. Total Environ. 741 (2020) 140220.
[67] G. Katlam, et al., Trash on the menu: patterns of animal visitation and foraging behaviour at garbage dumps, Curr. Sci. 115 (12) (2018) 2322–2326.
[68] M.M. Scrivens, et al., Investigation and management of an outbreak of lead intoxication in an extensively managed beef herd, Animals 13 (1) (2023).
[69] J. Teampanpong, Improper garbage management attracts vertebrates in a Thai national park, Écoscience 28 (2) (2021) 107–113.
[70] A.R. Mataca, et al., Scenario of viral and protozoa diseases in commercial dairy goats from Zona da Mata of Minas Gerais State, Brazil, Small Rumin. Res. (2022) 217.
[71] H.B. Al-Sabaawy, et al., Histopathological study of sheep lung roaming in dump zones, Iraq. J. Vet. Sci. 36 (2022) 151–160.
[72] I. Igbokwe, M. Kolo, G. Egwu, Rumen impaction in sheep with indigestible foreign bodies in the semi-arid region of Nigeria, Small Rumin. Res. 49 (2) (2003) 141–146.
[73] B.A. Kofie, O.O. Dipeolu, A study of human and porcine Ascariasis in a rural area of South-West Nigeria, Int. J. Zoonoses 10 (1) (1983) 66–70.
[74] K.S. Mwaikono, S. Maina, P. Gwakisa, Fecal microbiota of free-range pigs (Sus scrofa domesticus) scavenging on a municipal dumpsite is a potential reservoir of pathogens, J. Appl. Environ. Microbiol. 6 (2) (2018) 42–50.
[75] R.H. Khattak, et al., Feral dogs in Chitral gol national park, Pakistan: a potential threat to the future of threatened Kashmir Markhor (Capra falconeri cashmiriensis), Braz. J. Biol. 83 (2023).
[76] A. Martina, M. Gallarati, Use of a garbage dump by some mammal species in the Majella massif (Abruzzo, Italy), Hystrix 9 (1-2) (1997).
[77] H.C. Matter, et al., Test of three bait types for oral immunization of dogs against rabies in Tunisia, Am. J. Trop. Med. Hyg. 52 (6) (1995) 489–495.
[78] Z. Nasiry, et al., Evaluation of dynamics, demography and estimation of free-roaming dog population in Herat City, Afghanistan, Animals 13 (7) (2023).
[79] T.N. Raymond, et al., Do open garbage dumps play a role in canine rabies transmission in Biyem-Assi health district in Cameroon? Afr. J. Disability 5 (1) (2015).
[80] S. Roland, et al., Seroprevalence and predisposing factors of rabies antibodies in unvaccinated dogs in Sierra Leone, Vet. Med. Sci. 8 (6) (2022) 2345–2350.
[81] M.D. Scott, K. Causey, Ecology of feral dogs in Alabama, J. Wildl. Manag. (1973) 253–265.
[82] M.R. Suluku, et al., Post-war demographic and ecological survey of dog populations and their human relationships in Sierra Leone.(a case study of urban Freetown), Sci. J. Agric. Res. Manag. 2012 (2012).
[83] N. Thahaby, et al., Epidemiological pattern of dog bites and the occurrence of rabies in humans within Srinagar district of Kashmir Valley, India, Comp. Immunol. Microbiol. Infect. Dis. (2020) 73.
[84] G. Voupawoe, et al., Preparing liberia for rabies control: human-dog relationship and practices, and vaccination scenarios, Acta Trop. 229 (2022).
[85] I. Brickner-Braun, E. Geffen, Y. Yom-Tov, The domestic cat as a predator of Israeli wildlife, Israel J. Ecol. Evol. 53 (2) (2007) 129–142.
[86] B.K. Clapperton, et al., Development and testing of attractants for feral cats, felis catus L, Wildl. Res. 21 (4) (1994) 163–173.
[87] P.A. Courtney, M. Fenton, The effects of a small rural garbage dump on populations of Peromyscus leucopus Rafinesque and other small mammals, J. Appl. Ecol. (1976) 413–422.
[88] S. Hutchings, The diet of feral house cats (Felis catus) at a regional rubbish tip, Victoria, Wildl. Res. 30 (1) (2003) 103–110.
[89] V. Mirmovitch, Spatial organisation of urban feral cats (Felis catus) in Jerusalem, Wildl. Res. 22 (3) (1995) 299–310.
[90] D.A. Afik, P.U. Alkon, Movements of a radio-collared wolf (Canis lupus pallipes) in the Negev highlands, Israel, Israel J. Zool. 32 (2–3) (1983) 138–146.
[91] T. Unwin, A. Smith, Behavioral differences between provisioned and non-provisioned barbary macaques (Macaca sylvanus), Anthrozoos 23 (2) (2010) 109–118.
[92] D.J. Liyanage, et al., The elephant at the dump: how does garbage consumption impact Asian elephants? Mamm. Biol. 101 (6) (2021) 1089–1097.
[93] K. Puri, R. Joshi, V. Singh, Open garbage dumps near protected areas in Uttarakhand: an emerging threat to Asian Elephants in the Shivalik Elephant Reserve, J. Threat. Taxa 12 (11) (2020) 16571–16575.
[94] S. Te Wong, C.W. Servheen, L. Ambu, Home range, movement and activity patterns, and bedding sites of Malayan sun bears Helarctos malayanus in the rainforest of Borneo, Biol. Conserv. 119 (2) (2004) 169–181.
[95] N. Lunn, I. Stirling, The significance of supplemental food to polar bears during the ice-free period of Hudson Bay, Can. J. Zool. 63 (10) (1985) 2291–2297.
[96] G. Bempah, C. Lu, Y. Yi, Anthropogenic food utilization and seasonal difference in diet of cercopithecus lowei at a community protected forest in Ghana, Diversity 13 (12) (2021).
[97] M.A. Yusof, et al., Microhabitat factors influenced the prevalence of pathogenic Leptospira spp. in small mammal host, EcoHealth 16 (2) (2019) 260–274.
[98] D.G. Rumbold, M. Morrison, M.C. Bruner, Assessing the ecological risk of a municipal solid waste landfill to surrounding wildlife: a case study in Florida, Environ. Bioindic. 4 (3) (2009) 246–279.
[99] M. Abayaratna, W. Mahaulpatha, Activity Budgets and Habitat Preference of Land Monitor, Thalagoya *Varanus bengalensis* in a Residential Area, 2006.
[100] D. Karunarathna, et al., Population status of two Varanus species (Reptilia: Sauria: Varanidae) in Sri Lanka's Puttalam lagoon system, with notes on their diet and conservation status, Biawak 6 (1) (2012) 22–33.
[101] M. Stanner, H. Mendelssohn, Sex ratio, population density and home range of the desert monitor (Varanus griseus) in the southern coastal plain of Israel, Amphibia-Reptilia 8 (2) (1987) 153–163.
[102] L. Uyeda, Garbage appeal: relative abundance of water monitor lizards (Varanus salvator) correlates with presence of human food leftovers on Tinjil Island, Indonesia, Biawak 3 (1) (2009) 9–17.
[103] L.T. Uyeda, The water monitor lizard varanus salvator: behavior, ecology, and human dimensions in Banten, Indonesia, 2015.
[104] L.T. Uyeda, et al., Encounter rates, agonistic interactions, and social hierarchy among garbage-feeding water monitor lizards (Varanus salvator bivittatus) on Tinjil Island, Indonesia, Herpetol. Conserv. Biol. 10 (2) (2015) 753–764.
[105] T.S. Jessop, et al., Demographic and phenotypic effects of human mediated trophic subsidy on a large Australian lizard (Varanus varius): meal ticket or last supper? PLoS One 7 (4) (2012) e34069.

[106] D.R. Fenlon, Seagulls (Larus spp.) as vectors of salmonellae: an investigation into the range of serotypes and numbers of salmonellae in gull faeces, Epidemiol. Infect. 86 (2) (1981) 195–202.
[107] P.M. Yorio, M. Giaccardi, Urban and Fishery Waste Tips as Food Sources for Birds in Northern Coastal Patagonia, Argentina, 2002.
[108] C.A. Ahlstrom, et al., Satellite tracking of gulls and genomic characterization of faecal bacteria reveals environmentally mediated acquisition and dispersal of antimicrobial-resistant Escherichia coli on the Kenai Peninsula, Alaska, Mol. Ecol. 28 (10) (2019) 2531–2545.
[109] C.A. Ahlstrom, et al., Acquisition and dissemination of cephalosporin-resistant E. coli in migratory birds sampled at an Alaska landfill as inferred through genomic analysis, Sci. Rep. 8 (1) (2018).
[110] M. Vittecoq, et al., Multiresistant Enterobacteriaceae in yellow-legged gull chicks in their first weeks of life, Ecol. Evol. 12 (6) (2022).
[111] C.A. Ahlstrom, et al., Evidence for continental-scale dispersal of antimicrobial resistant bacteria by landfill-foraging gulls, Sci. Total Environ. 764 (2021).
[112] D. Jarma, et al., Faecal microbiota and antibiotic resistance genes in migratory waterbirds with contrasting habitat use, Sci. Total Environ. 783 (2021).
[113] L. Migura-Garcia, R. Ramos, M. Cerdà-Cuéllar, Antimicrobial resistance of Salmonella serovars and Campylobacter spp. isolated from an opportunistic gull species, yellow-legged gull (Larus michahellis), J. Wildl. Dis. 53 (1) (2017) 148–152.
[114] J. Espunyes, et al., Eurasian griffon vultures carry widespread antimicrobial resistant Salmonella and Campylobacter of public health concern, Sci. Total Environ. 844 (2022).
[115] G. Kapperud, O. Rosef, Avian wildlife reservoir of Campylobacter fetus subsp. jejuni, Yersinia spp., and Salmonella spp. in Norway, Appl. Environ. Microbiol. 45 (2) (1983) 375–380.
[116] J. Pineda-Pampliega, et al., A multidisciplinary approach to the evaluation of the effects of foraging on landfills on white stork nestlings, Sci. Total Environ. 775 (2021).
[117] J.S. Wallace, T. Cheasty, K. Jones, Isolation of Vero cytotoxin-producing Escherichia coli O157 from wild birds, J. Appl. Microbiol. 82 (3) (1997) 399–404.
[118] B. Hasan, et al., Dissemination of the multidrug-resistant extended-spectrum β-lactamase-producing Escherichia coli O25b-ST131 clone and the role of house crow (Corvus splendens) foraging on hospital waste in Bangladesh, Clin. Microbiol. Infect. 21 (11) (2015) 1000.e1–1000.e4.
[119] E.W. Alm, et al., Potential for gulls to transport bacteria from human waste sites to beaches, Sci. Total Environ. 615 (2018) 123–130.
[120] J. Arizaga, et al., Distance to landfill and habitat cover predict colony size in a Western Mediterranean white stork population, Eur. J. Wildl. Res. 68 (6) (2022).
[121] Z.J. Arnold, S.J. Wenger, R.J. Hall, Not just trash birds: Quantifying avian diversity at landfills using community science data, PLoS One **16** (9 September 2021) (2021).
[122] A.A. Augé, Anthropogenic debris in the diet of Turkey vultures (Cathartes aura) in a remote and low-populated South Atlantic island, Polar Biol. 40 (4) (2017) 799–805.
[123] H.J. Auman, C.E. Meathrel, A. Richardson, Supersize me: does anthropogenic food change the body condition of Silver Gulls? A comparison between urbanized and remote, non-urbanized areas, Waterbirds 31 (1) (2008) 122–126.
[124] V. Baglione, D. Canestrari, Kleptoparasitism and temporal segregation of sympatric corvids foraging in a refuse dump, Auk 126 (3) (2009) 566–578.
[125] F. Ballejo, et al., Plastic ingestion and dispersion by vultures may produce plastic islands in natural areas, Sci. Total Environ. 755 (2021).
[126] J.L. Belant, S.K. Ickes, T.W. Seamans, Importance of landfills to urban-nesting herring and ring-billed gulls, Landsc. Urban Plan. 43 (1–3) (1998) 11–19.
[127] E. Bernat-Ponce, et al., Effect of replacing surface with underground rubbish containers on urban House Sparrows Passer domesticus, Urban Ecosyst. 25 (1) (2022) 121–132.
[128] J.T. Bialas, Ł. Dylewski, M. Tobolka, Determination of nest occupation and breeding effect of the white stork by human-mediated landscape in Western Poland, Environ. Sci. Pollut. Res. 27 (4) (2020) 4148–4158.
[129] G. Blanco, Population dynamics and communal roosting of white storks foraging at a Spanish refuse dump, Colon. Waterbirds (1996) 273–276.
[130] M.M. Borges-Ramírez, et al., Organochlorine pesticides, polycyclic aromatic hydrocarbons, metals and metalloids in microplastics found in regurgitated pellets of black vulture from Campeche, Mexico, Sci. Total Environ. (2021) 801.
[131] M. BosCH, D. Oro, X. Ruiz, Dependence of yellow-legged gulls(Larus cachinnans) on food from human activity in two western Mediterranean colonies, Avocetta 18 (2) (1994) 135–139.
[132] L. Brown, et al., Habitat use strategy influences the tissue signature of trace elements including rare earth elements in an urban-adapted omnivorous bird, Environ. Res. 168 (2019) 261–269.
[133] J. Burger, M. Gochfeld, Behavior of nine avian species at a Florida garbage dump, Colon. Waterbirds (1983) 54–63.
[134] J. Butterfield, et al., The herring gull Larus argentatus as a carrier of salmonella, J. Hyg. 91 (3) (1983) 429–436.
[135] M. Camacho, et al., Use of wildlife rehabilitation centres in pathogen surveillance: a case study in white storks (Ciconia ciconia), Prev. Vet. Med. 130 (2016) 106–111.
[136] M. Carneiro, et al., Assessment of the exposure to heavy metals in Griffon vultures (Gyps fulvus) from the Iberian Peninsula, Ecotoxicol. Environ. Saf. 113 (2015) 295–301.
[137] I. Castège, et al., Colonization of the Yellow-legged gull in the southeastern Bay of Biscay and efficacy of deterring systems on landfill site, Estuar. Coast. Shelf Sci. 179 (2016) 207–214.
[138] P. Clergeau, P. Yesou, Behavioural flexibility and numerous potential sources of introduction for the sacred ibis: causes of concern in western Europe? Biol. Invasions 8 (6) (2006) 1381–1388.
[139] A. Cook, et al., An evaluation of techniques to control problem bird species on landfill sites, Environ. Manag. 41 (6) (2008) 834–843.
[140] J.C. Coulson, Re-evaluation of the role of landfills and culling in the historic changes in the Herring Gull (Larus argentatus) population in Great Britain, Waterbirds 38 (4) (2015) 339–354.
[141] J.C. Coulson, B.A. Coulson, Lesser Black-backed Gulls Larus fuscus nesting in an inland urban colony: the importance of earthworms (Lumbricidae) in their diet, Bird Study 55 (3) (2008) 297–303.
[142] W.A. Cunha, et al., From carrion-eaters to plastic material plunderers: toxicological impacts of plastic ingestion on black vultures, Coragyps atratus (Cathartiformes: Cathartidae), J. Hazard. Mater. 424 (2022).
[143] H.A. Currier, et al., Bioaccumulation and biomagnification of PBDEs in a terrestrial food chain at an urban landfill, Chemosphere 238 (2020).
[144] G.M. De Araujo, et al., Urban waste disposal explains the distribution of Black Vultures (Coragyps atratus) in an Amazonian metropolis: management implications for birdstrikes and urban planning, PeerJ 2018 (9) (2018).
[145] U. De Giacomo, G. Guerrieri, The feeding behavior of the Black Kite (Milvus migrans) in the rubbish dump of Rome, J. Raptor Res. 42 (2) (2008) 110–118.
[146] I. de la Casa-Resino, et al., Chlorinated pollutants in blood of White stork nestlings (Ciconia ciconia) in different colonies in Spain, Chemosphere 118 (1) (2015) 367–372.
[147] I. De la Casa-Resino, et al., Biomarkers of oxidative status associated with metal pollution in the blood of the white stork (Ciconia ciconia) in Spain, Toxicol. Environ. Chem. 97 (5) (2015) 588–598.
[148] S. Delgado, et al., Demographic impact of landfill closure on a resident opportunistic gull, Popul. Ecol. 63 (3) (2021) 238–246.
[149] S. Djerdali, J. Guerrero-Casado, F.S. Tortosa, Food from dumps increases the reproductive value of last laid eggs in the white stork Ciconia ciconia, Bird Study 63 (1) (2016) 107–114.
[150] J. Doherty, Filthy flourishing:Para-sites, animal infrastructure, and the waste frontier in Kampala, Curr. Anthropol. 60 (S20) (2019) S321–S332.
[151] C. Duhem, et al., Distribution of breeding sites and food constrains size and density of yellow-legged gull colonies, Ecoscience 14 (4) (2007) 535–543.
[152] C. Duhem, et al., Effects of anthropogenic food resources on yellow-legged gull colony size on Mediterranean islands, Popul. Ecol. 50 (2008) 91–100.
[153] C. Duhem, et al., Opportunistic feeding responses of the Yellow-legged Gull Larus michahellis to accessibility of refuse dumps, Bird Study 50 (1) (2003) 61–67.
[154] K.H. Elliott, et al., Foraging ecology of Bald Eagles at an urban landfill, Wilson J. Ornithol. 118 (3) (2006) 380–390.
[155] L. Francoeur, M. Lowney, Bird Abundance at Accomack County Southern Landfill, Melfa, Virginia, in Relation to Various Management Activities, 1997.
[156] M.G. Frixione, et al., A recently established Kelp Gull colony in a freshwater environment supported by an inland refuse dump in Patagonia, Emu 112 (2) (2012) 174–178.
[157] M.G. Frixione, et al., Urbanity as a source of genotoxicity in the synanthropic Kelp Gull (Larus dominicanus), Sci. Total Environ. 850 (2022).
[158] S.W. Gabrey, Bird and small mammal abundance at four types of waste-management facilities in Northeast Ohio, Landsc. Urban Plan. 37 (3–4) (1997) 223–233.
[159] I. Galván, Intraspecific kleptoparasitism in Lesser Black-backed Gulls wintering inland in Spain, Waterbirds 26 (3) (2003) 325–330.
[160] M.-L. Gentes, et al., Tracking the sources of polybrominated diphenyl ethers in birds: foraging in waste management facilities results in higher DecaBDE exposure in males, Environ. Res. 138 (2015) 361–371.
[161] R. Gherbi-Salmi, et al., How food supply in rubbish dumps affects the breeding success and offspring mortality of cattle Egret Bubulcus ibis? Avian Biol. Res. 15 (1) (2022) 47–52.
[162] N.I. Gilbert, et al., Are white storks addicted to junk food? Impacts of landfill use on the movement and behaviour of resident white storks (Ciconia ciconia) from a partially migratory population, Mov. Ecol. 4 (1) (2015).
[163] S. Greig, J. Coulson, P. Monaghan, Age-related differences in foraging success in the Herring Gull (Larus argentatus), Anim. Behav. 31 (4) (1983) 1237–1243.
[164] A. Gyimesi, et al., Lesser black-backed gulls Larus fuscus thriving on a non-marine diet, Bird Study 63 (2) (2016) 241–249.
[165] R.F. Harlow, et al., Some winter and nesting season foods of the Common Raven in Virginia, Auk (1975) 298–306.
[166] P.-Y. Henry, G. Wey, G. Balança, Rubber band ingestion by a rubbish dump dweller, the White Stork (Ciconia ciconia), Waterbirds 34 (4) (2011) 504–508.
[167] A.M. Jardine, et al., Annual plastic ingestion and isotopic niche patterns of two sympatric gull species at Newfoundland, Canada, Mar. Pollut. Bull. (2021) 173.
[168] B. Ječmenica, et al., Diversity and prevalence of Salmonella spp. in gulls caught at a landfill, Zagreb, Croatia, Veterinarska Stanica 54 (5) (2023) 495–502.
[169] O. Jordi, et al., The impact of non-local birds on yellow-legged gulls (Larus michahellis) in the Bay of Biscay: a dump-based assessment, Anim. Biodivers. Conserv. 37 (2) (2014) 183–190.
[170] A. Kerric, et al., Halogenated flame retardant exposure pathways in urban-adapted gulls: are atmospheric routes underestimated? Sci. Total Environ. 860 (2023).
[171] M. Kilpi, M. Öst, Reduced availability of refuse and breeding output in a herring gull (Larus argentatus) colony, in: Annales Zoologici Fennici, JSTOR, 1998.
[172] M. Kilpi, P. Saurola, Pre-migration movements of coastal Finnish herring gulls (Larus argentatus) in autumn, in: Annales Zoologici Fennici, JSTOR, 1983.

[173] P.E. Klug, H.J. Homan, Movement behavior of radio-tagged European starlings in urban, rural, and exurban landscapes, Human-Wildlife Interact. 14 (3) (2020) 398–408.
[174] R. Kruszyk, M. Ciach, White Storks, Ciconia ciconia, forage on rubbish dumps in Poland—a novel behaviour in population, Eur. J. Wildl. Res. 56 (2010) 83–87.
[175] B.C.C. La Cigüeña, Feeding in urban refuse dumps: ingestion of plastic objects by the White Stork (Ciconia ciconia), Ardeola 50 (1) (2003) 81–84.
[176] L.F. La Sala, et al., Enteric bacteria in Olrog's gull (Larus atlanticus) and kelp gull (Larus dominicanus) from the Bahia Blanca Estuary, Argentina, El Hornero 28 (2) (2013) 59–64.
[177] L.P. Langley, et al., GPS tracking reveals landfill closures induce higher foraging effort and habitat switching in gulls, Mov. Ecol. 9 (1) (2021).
[178] K.A. Lato, et al., Closely related gull species show contrasting foraging strategies in an urban environment, Sci. Rep. 11 (1) (2021).
[179] C. Leonzio, C. Fossi, S. Focardi, Lead, mercury, cadmium and selenium in two species of gull feeding on inland dumps, and in marine areas, Sci. Total Environ. 57 (C) (1986) 121–127.
[180] D.H. Ley, Nitrite poisoning in herring gulls (Larus argentatus) and ring-billed gulls (Larus delawarensis), J. Wildl. Dis. 22 (3) (1986) 381–384.
[181] C.S. Lopes, et al., Ingestion of anthropogenic materials by yellow-legged gulls (Larus michahellis) in natural, urban, and landfill sites along Portugal in relation to diet composition, Environ. Sci. Pollut. Res. 28 (15) (2021) 19046–19063.
[182] A. López-García, A. Sanz-Aguilar, J.I. Aguirre, The trade-offs of foraging at landfills: landfill use enhances hatching success but decrease the juvenile survival of their offspring on white storks (Ciconia ciconia), Sci. Total Environ. 778 (2021).
[183] Z. Lu, et al., Volatile methylsiloxanes and organophosphate esters in the eggs of European starlings (Sturnus vulgaris) and congeneric gull species from locations across Canada, Environ. Sci. Technol. 51 (17) (2017) 9836–9845.
[184] B. Maciusik, M. Lenda, P. Skórka, Corridors, local food resources, and climatic conditions affect the utilization of the urban environment by the Black-headed Gull Larus ridibundus in winter, Ecol. Res. 25 (2) (2010) 263–272.
[185] J. Marcelino, et al., Anthropogenic food subsidies reshape the migratory behaviour of a long-distance migrant, Sci. Total Environ. 858 (2023).
[186] J. Martin, K. French, R. Major, Population and breeding trends of an urban coloniser: the Australian white ibis, Wildl. Res. 37 (3) (2010) 230–239.
[187] J.M. Marzluff, E. Neatherlin, Corvid response to human settlements and campgrounds: causes, consequences, and challenges for conservation, Biol. Conserv. 130 (2) (2006) 301–314.
[188] J. Mertens, et al., Cd and Zn concentrations in small mammals and willow leaves on disposal facilities for dredged material, Environ. Pollut. 115 (1) (2001) 17–22.
[189] C. Mutillod, et al., Yellow-legged gull populations (Larus michahellis) link the history of landfills to soil eutrophication and time-related vegetation changes on small Mediterranean islands, Sci. Total Environ. 878 (2023).
[190] J. Navarro, et al., Feathered detectives: real-time GPS tracking of scavenging gulls pinpoints illegal waste dumping, PLoS One **11** (7) (2016).
[191] V.C. Neves, N. Murdoch, R.W. Furness, Population Status and Diet of the Yellow-Legged Gull in the Azores, 2006.
[192] W.G. Novaes, R. Cintra, Factors influencing the selection of communal roost sites by the Black Vulture Coragyps atratus (Aves: Cathartidae) in an urban area in Central Amazon, Zoologia (Curitiba) 30 (2013) 607–614.
[193] A.R. Ocañas, et al., Addressing the raven food subsidy challenge by engaging restaurants to close their dumpsters, Zoo Biol. 41 (5) (2022) 491–500.
[194] P.P. Olea, V. Baglione, Population trends of Rooks Corvus frugilegus in Spain and the importance of refuse tips, Ibis 150 (1) (2008) 98–109.
[195] J. Ouled-Cheikh, et al., Foraging in the Anthropocene: feeding plasticity of an opportunistic predator revealed by long term monitoring, Ecol. Indic. 129 (2021).
[196] S.H. Parejo, et al., Parasitic fauna of a yellow-legged gull colony in the island of Escombreras (South-Eastern Mediterranean) in close proximity to a landfill site: potential effects on cohabiting species, Acta Parasitol. 60 (2) (2015) 290–297.
[197] M. Patenaude-Monette, M. Belisle, J.-F. Giroux, Balancing energy budget in a central-place forager: which habitat to select in a heterogeneous environment? PLoS One 9 (7) (2014) e102162.
[198] A. Payo-Payo, et al., Population control of an overabundant species achieved through consecutive anthropogenic perturbations, Ecol. Appl. 25 (8) (2015) 2228–2239.
[199] L.W. Peebles, M.R. Conover, Effectiveness of the toxicant DRC-1339 in reducing populations of common ravens in Wyoming, Wildl. Soc. Bull. 40 (2) (2016) 281–287.
[200] P.I. Plaza, et al., Scavenger birds exploiting rubbish dumps: pathogens at the gates, Transbound. Emerg. Dis. 66 (2) (2019) 873–881.
[201] J. Pons, Effects of changes in the availability of human refuse on breeding parameters in a herring gull, Ardea 80 (1992) 143–150.
[202] J.-M. Pons, Feeding strategies of male and female Herring Gulls during the breeding season under various feeding conditions, Ethol. Ecol. Evol. 6 (1) (1994) 1–12.
[203] J.-M. Pons, P. Migot, Life-history strategy of the herring gull: changes in survival and fecundity in a population subjected to various feeding conditions, J. Anim. Ecol. (1995) 592–599.
[204] D. Preininger, et al., Waste disposal sites as all-you-can eat buffets for carrion crows (Corvus corone), Animals 9 (5) (2019).
[205] R. Ramos, et al., Influence of refuse sites on the prevalence of Campylobacter spp. and Salmonella Serovars in seagulls, Appl. Environ. Microbiol. 76 (9) (2010) 3052–3056.
[206] R. Ramos, et al., Feeding ecology of yellow-legged gulls Larus michahellis in the western Mediterranean: a comparative assessment using conventional and isotopic methods, Mar. Ecol. Prog. Ser. 377 (2009) 289–297.
[207] R. Ramos, et al., Diet of Yellow-legged Gull (Larus michahellis) chicks along the Spanish Western Mediterranean coast: the relevance of refuse dumps, J. Ornithol. 150 (2009) 265–272.
[208] S. Rotics, et al., Wintering in Europe instead of Africa enhances juvenile survival in a long-distance migrant, Anim. Behav. 126 (2017) 79–88.
[209] S.K. Saiyad, V. Soni, B. Radadia, Urban resourse utilization for feeding purpose by house crow (Corvus splendens), Int. J. Rec. Sci. Res. 6 (12) (2015) 7933–7935.
[210] M. Sará, B. Busalacchi, Diet and feeding habits of nesting and non-nesting ravens (corvus corax) on a mediterranean island (vulcano, eolian archipelago), Ethol. Ecol. Evol. 15 (2) (2003) 119–131.
[211] I. Sazima, The jack-of-all-trades raptor: versatile foraging and wide trophic role of the Southern Caracara (Caracara plancus) in Brazil, with comments on feeding habits of the Caracarini, Rev. Brasil. Ornitol. 15 (4) (2007) 592–597.
[212] I. Sazima, From carrion-eaters to bathers' bags plunderers: how Black Vultures (Coragyps atratus) could have found that plastic bags may contain food, Rev. Brasil. Ornitol. 15 (4) (2007) 617–620.
[213] L.K. Schmidt, et al., Intralipid emulsion therapy for the treatment of suspected toxicity in 2 avian species, J. Avian Med. Surg. 36 (4) (2023) 394–399.
[214] S. Seif, et al., Plastic and non-plastic debris ingestion in three gull species feeding in an urban landfill environment, Arch. Environ. Contam. Toxicol. 74 (3) (2018) 349–360.
[215] A.C. Smith, U. Munro, Local and Regional Movements of the Australian White Ibis *Threskiornis molucca* in Eastern Australia, Corella, 2011.
[216] M. Sorais, et al., Landfills represent significant atmospheric sources of exposure to halogenated flame retardants for urban-adapted gulls, Environ. Int. 135 (2020).
[217] M. Sorais, et al., Gulls foraging in landfills: does atmospheric exposure to halogenated flame retardants result in bioaccumulation? Environ. Int. 147 (2021).
[218] E.C. Steigerwald, et al., Effects of decreased anthropogenic food availability on an opportunistic gull: evidence for a size-mediated response in breeding females, Ibis 157 (3) (2015) 439–448.
[219] L.G. Stewart, et al., Seasonal ingestion of anthropogenic debris in an urban population of gulls, Mar. Pollut. Bull. 160 (2020).
[220] R. Tornberg, A. Colpaert, Survival, ranging, habitat choice and diet of the northern goshawk Accipiter gentilis during winter in northern Finland, Ibis 143 (1) (2001) 41–50.
[221] F. Tortosa, J. Caballero, J. Reyes-López, Effect of rubbish dumps on breeding success in the White Stork in southern Spain, Waterbirds 25 (1) (2002) 39–43.
[222] F.S. Tortosa, L. Pérez, L. Hillström, Effect of food abundance on laying date and clutch size in the White Stork Ciconia ciconia, Bird Study 50 (2) (2003) 112–115.
[223] S. Tsuchida, et al., The fecal microbiomes analysis of Marabou storks (Leptoptilos crumenifer) reveals their acclimatization to the feeding environment in the Kampala urban areas, Uganda, J. Vet. Med. Sci. 85 (4) (2023) 450–458.
[224] C. Turrin, B.D. Watts, E.K. Mojica, Landfill use by bald eagles in the Chesapeake Bay region, J. Raptor Res. 49 (3) (2015) 239–249.
[225] T.C. Viner, et al., Integrating the forensic sciences in wildlife case investigations: a case report of pentobarbital and phenytoin toxicosis in a bald eagle (Haliaeetus leucocephalus), Vet. Pathol. 53 (5) (2016) 1103–1106.
[226] B.E. Washburn, et al., Foraging ecology of four gull species at a coastal-urban interface: ecología de forrajeo de cuatro especies de gaviota en una interface costera-urbana, Condor 115 (1) (2013) 67–76.
[227] E.L. Weiser, A.N. Powell, Reduction of garbage in the diet of nonbreeding glaucous gulls corresponding to a change in waste management, Arctic (2011) 220–226.
[228] R.S. Winton, M. River, The biogeochemical implications of massive gull flocks at landfills, Water Res. 122 (2017) 440–446.
[229] P. Yorio, et al., Patterns of plastic ingestion in Kelp Gull (Larus dominicanus) populations breeding in northern Patagonia, Argentina, Mar. Pollut. Bull. (2020) 156.
[230] E. Arrondo, et al., Vulture culture: dietary specialization of an obligate scavenger, Proc. R. Soc. B Biol. Sci. 290 (1998) (2023).
[231] F. Zaidi, X.X. Chen, A preliminary survey of carrion breeding insects associated with the Eid ul Azha festival in remote Pakistan, Forensic Sci. Int. 209 (1–3) (2011) 186–194.
[232] J. Altmann, P. Muruthi, Differences in daily life between semiprovisioned and wild-feeding baboons, Am. J. Primatol. 15 (3) (1988) 213–221.
[233] J. Altmann, et al., Body size and fatness of free-living baboons reflect food availability and activity levels, Am. J. Primatol. 30 (2) (1993) 149–161.
[234] A.V. Badyaev, Environmental stress and developmental stability in dentition of the yellowstone grizzly bears, Behav. Ecol. 9 (4) (1998) 339–344.
[235] L. Behrendorff, R. King, B.L. Allen, Efficacy of management efforts to reduce food-related Dingo–human interactions and conflict on K'gari (Fraser Island), Australia, Animals 13 (2) (2023).
[236] S. Biquand, et al., Management of commensal baboons in Saudi Arabia, Revue d'Ecologie, Terre et Vie 49 (3) (1994) 213–222.
[237] B.M. Blanchard, Size and growth patterns of the Yellowstone grizzly bear, Bears (1987) 99–107.
[238] J. Borkowski, A. Zalewski, R. Manor, Diet composition of golden jackals in Israel, in: Annales Zoologici Fennici, BioOne, 2011.
[239] E. Brennan, J. Else, J. Altmann, Ecology and behaviour of a pest primate: vervet monkeys in a tourist-lodge habitat, Afr. J. Ecol. 23 (1) (1985) 35–44.
[240] C. Capitani, et al., Wolf diet in an agricultural landscape of North-Eastern Turkey, Mammalia 80 (3) (2016) 329–334.

[241] E. Castillo, et al., Commensal and wild rodents in an urban area of Argentina, Int. Biodeterior. Biodegrad. 52 (3) (2003) 135–141.
[242] P. Ciucci, et al., Home range, activity and movements of a wolf pack in Central Italy, J. Zool. 243 (4) (1997) 803–819.
[243] G. Cozzi, et al., Anthropogenic food resources foster the coexistence of distinct life history strategies: year-round sedentary and migratory brown bears, J. Zool. 300 (2) (2016) 142–150.
[244] J.J. Craighead, Status of the Yellowstone grizzly bear population: has it recovered, should it be delisted? Ursus (1998) 597–602.
[245] R. Eley, et al., Nutrition, body condition, activity patterns, and parasitism of free-ranging troops of olive baboons (Papio anubis) in Kenya, Am. J. Primatol. 18 (3) (1989) 209–219.
[246] E.H. Follmann, J.L. Hechtel, Bears and pipeline construction in Alaska, Arctic 43 (2) (1990) 103–109.
[247] J.S. Gilchrist, E. Otali, Regular articles/articles réguliers The effects of refuse-feeding on home-range use, group size, and intergroup encounters in the banded mongoose, Can. J. Zool. 80 (10) (2002) 1795–1802.
[248] M. Girmay, T. Gadisa, G. Yirga, Livestock loss by the spotted hyena (Crocuta crocuta) in and around a waste dumping site in northern Ethiopia, Int. J. Biodivers. Conserv. 7 (1) (2015) 50–53.
[249] N.P. Gould, W.F. Andelt, Effect of anthropogenically developed areas on spatial distribution of island foxes, J. Mammal. 94 (3) (2013) 662–671.
[250] S. Herrero, Social behaviour of black bears at a garbage dump in Jasper National Park, Bears (1983) 54–70.
[251] R.R. Knight, L.L. Eberhardt, Population dynamics of Yellowstone grizzly bears, Ecology 66 (2) (1985) 323–334.
[252] J. Kolowski, K. Holekamp, Effects of an open refuse pit on space use patterns of spotted hyenas, Afr. J. Ecol. 46 (3) (2008) 341–349.
[253] R. Lore, K.J. Flannelly, Habitat selection and burrow construction by wild Rattus norvegicus in a landfill, J. Comp. Physiol. Psychol. 92 (5) (1978) 888–896.
[254] A. Mohammadi, et al., Living with wolves: lessons learned from Iran, Conserv. Sci. Pract. 4 (5) (2022).
[255] M.H. Murray, et al., Urban compost attracts coyotes, contains toxins, and may promote disease in urban-adapted wildlife, EcoHealth 13 (2) (2016) 285–292.
[256] P. Muruthi, J. Altmann, S. Altmann, Resource base, parity, and reproductive condition affect females' feeding time and nutrient intake within and between groups of a baboon population, Oecologia 87 (4) (1991) 467–472.
[257] S. Naidoo, D. Vosloo, M.C. Schoeman, Pollutant exposure at wastewater treatment works affects the detoxification organs of an urban adapter, the Banana Bat, Environ. Pollut. 208 (2016) 830–839.
[258] T.M. Newsome, C. Howden, A.J. Wirsing, Restriction of anthropogenic foods alters a top predator's diet and intraspecific interactions, J. Mammal. 100 (5) (2019) 1522–1532.
[259] C.A. Olson, K.D. Mitchell, P.A. Werner, Bait ingestion by free-ranging raccoons and nontarget species in an oral rabies vaccine field trial in Florida, J. Wildl. Dis. 36 (4) (2000) 734–743.
[260] E. Otali, J.S. Gilchrist, The effects of refuse feeding on body condition, reproduction, and survival of banded mongooses, J. Mammal. 85 (3) (2004) 491–497.
[261] M. Patalano, S. Lovari, Food habits and trophic niche overlap of the wolf Canis lupus, L. 1758 and the red fox Vulpes vulpes (L. 1758) in a mediterranean mountain area, Revue d'Ecologie, Terre et Vie 48 (3) (1993) 279–294.
[262] K.N. Peirce, L.J. Van Daele, Use of a garbage dump by brown bears in Dillingham, Alaska, Ursus 17 (2) (2006) 165–177.
[263] M. Pellizzaro, et al., Molecular detection of Leptospira spp. in rats as early spatial predictor for human disease in an endemic urban area, PLoS One 14 (5) (2019).
[264] L. Perles, et al., Co-infection by multiple vector-borne agents in wild ring-tailed coatis (Nasua nasua) from Iguaçu National Park, southern Brazil, Sci. Rep. 13 (1) (2023).
[265] C.E. Pettett, et al., A comparison of the Ranging behaviour and habitat use of the Ethiopian hedgehog (Paraechinus aethiopicus) in Qatar with hedgehog taxa from temperate environments, Sci. Rep. 8 (1) (2018).
[266] R.J. Quy, et al., The Norway rat as a reservoir host of Cryptosporidium parvum, J. Wildl. Dis. 35 (4) (1999) 660–670.
[267] S. Rezaei, et al., Identifying connectivity for two sympatric carnivores in human-dominated landscapes in central Iran, PLoS One **17** (6) (2022).
[268] D.H. Rodrigues, et al., Feeding ecology of wild brown-nosed coatis and garbage exploration: a study in two ecological parks, Animals 11 (8) (2021).
[269] L.L. Rogers, et al., Characteristics and management of black bears that feed in garbage dumps, campgrounds or residential areas, Bears 3 (1976) 169–175.
[270] R.M. Sapolsky, J.G. Else, Bovine tuberculosis in a wild baboon population: epidemiological aspects, J. Med. Primatol. 16 (4) (1987) 229–235.
[271] I. Sazima, What coatis and mongooses have in common? Biota Neotropica 10 (2010) 457–461.
[272] G.D. Schroder, M. Hulse, Survey of rodent populations associated with an urban landfill, Am. J. Public Health 69 (7) (1979) 713–715.
[273] S.F. Stringham, Effects of climate, dump closure, and other factors on Yellowstone grizzly bear litter size, Bears (1986) 33–39.
[274] S.C. Totton, et al., Contact rates of raccoons (Procyon lotor) at a communal feeding site in rural Eastern Ontario, J. Wildl. Dis. 38 (2) (2002) 313–319.
[275] M.X. Watanabe, et al., Dioxin-like and perfluorinated compounds in pigs in an Indian open waste dumping site: Toxicokinetics and effects on hepatic cytochrome P450 and blood plasma hormones, Environ. Toxicol. Chem. 29 (7) (2010) 1551–1560.
[276] G. Yirga, et al., Food base of the spotted hyena (Crocuta crocuta) in Ethiopia, Wildl. Res. 42 (1) (2015) 19–24.
[277] J. Burger, K.R. Campbell, T.S. Campbell, Gender and spatial patterns in metal concentrations in brown anoles (Anolis sagrei) in Southern Florida, USA, Environ. Toxicol. Chem. 23 (3) (2004) 712–718.
[278] Q. Zhang, et al., Do bird assemblages predict susceptibility by e-waste pollution? a comparative study based on species- And guild-dependent responses in China agroecosystems, PLoS One **10** (3) (2015).
[279] G. Bouker, et al., Garbage dump use, mortality, and microplastic exposure of raptors in Ushuaia, Tierra Del Fuego Province, Southern Argentina, J. Raptor Res. 55 (2) (2021) 220–229.
[280] D. Bjedov, et al., Heavy metal(loid) effect on multi-biomarker responses in apex predator: novel assays in the monitoring of white stork nestlings, Environ. Pollut. 324 (2023).
[281] G. Blanco, et al., Domestic waste and wastewaters as potential sources of pharmaceuticals in nestling White Storks (Ciconia ciconia), Antibiotics 12 (3) (2023).
[282] I. de la Casa-Resino, et al., Breeding near a landfill may influence blood metals (Cd, Pb, Hg, Fe, Zn) and metalloids (Se, As) in white stork (Ciconia ciconia) nestlings, Ecotoxicology 23 (8) (2014) 1377–1386.
[283] M. Gophen, et al., Implications of botulism outbreaks in gulls (Larus ridibundus) on the Watershed Management of Lake Kinneret (Israel), Environ. Toxicol. Water Qual. 6 (1) (1991) 77–84.
[284] A.D.W. Tongue, et al., Interspecies comparisons of brominated flame retardants in relation to foraging ecology and behaviour of gulls frequenting a UK landfill, Sci. Total Environ. 764 (2021).
[285] A. Kerric, et al., Spatial and temporal variations of halogenated flame retardants and organophosphate esters in landfill air: potential linkages with gull exposure, Environ. Pollut. 271 (2021).
[286] M. Numata, et al., Hepatic cytochrome P450 activity and pollutant concentrations in paradise shelducks and southern black-backed gulls in the South Island of New Zealand, Ecotoxicology 17 (8) (2008) 697–708.
[287] W.B. Tang, et al., Polybrominated diphenyl ethers in resident Eurasian Tree Sparrow from Shanghai: geographical distribution and implication for potential sources, Chemosphere 126 (2015) 25–31.
[288] D. Chen, et al., European starlings (Sturnus vulgaris) suggest that landfills are an important source of bioaccumulative flame retardants to Canadian terrestrial ecosystems, Environ. Sci. Technol. 47 (21) (2013) 12238–12247.
[289] C. Erratico, et al., Levels of PBDEs in plasma of juvenile starlings (Sturnus vulgaris) from British Columbia, Canada and assessment of PBDE metabolism by avian liver microsomes, Sci. Total Environ. 518-519 (2015) 31–37.
[290] Y. Obara, et al., Genotoxic assessment of small mammals at an illegal dumpsite at the aomori-Lwate prefectural boundary, Zool. Sci. 26 (2) (2009) 139–144.
[291] M.S. Johnson, et al., Polychlorinated biphenyls in small mammals from contaminated landfill sites, Environ. Pollut. 92 (2) (1996) 185–191.
[292] A. Sánchez-Chardi, et al., Bioaccumulation of metals and effects of a landfill in small mammals part III: structural alterations, Environ. Res. 109 (8) (2009) 960–967.
[293] A. Sánchez-Chardi, J. Nadal, Bioaccumulation of metals and effects of landfill pollution in small mammals. Part I. The greater white-toothed shrew, Crocidura russula, Chemosphere 68 (4) (2007) 703–711.
[294] K. McBee, Chromosomal aberrations in native small mammals (peromyscus leucopus) at a petrochemical waste disposal site: II. Cryptic and inherited aberrations detected by G-band analysis, Environ. Toxicol. Chem. 10 (10) (1991) 1321–1329.
[295] W.J. Arthur, O.D. Markham, C.R. Groves, Radiation dose to small mammals in inhabiting a solid radioactive waste disposal area, J. Appl. Ecol. 23 (1) (1986) 13–26.
[296] T.P. O'Farrell, R.O. Gilbert, Transport of radioactive materials by jackrabbits on the Hanford reservation, Health Phys. 29 (1) (1975) 9–15.
[297] V.S. Roumak, et al., Seasonal peculiarities of PCDD/Fs levels in bank voles inhabiting sites in the vicinity of the landfill with municipal wastes (Moscow, Russia), Environ. Sci. Pollut. Res. 29 (35) (2022) 52796–52805.
[298] K. McBee, et al., Chromosomal aberrations in native small mammals (Peromyscus leucopus and Sigmodon hispidus) at a petrochemical waste disposal site: I. Standard karyology, Arch. Environ. Contam. Toxicol. 16 (6) (1987) 681–688.
[299] W.J. Arthur, et al., Radionuclide export by deer mice at a solid radioactive waste disposal area in southeastern Idaho, Health Phys. 52 (1) (1987) 45–53.
[300] P.M. Eckl, D. Riegler, Levels of chromosomal damage in hepatocytes of wild rats living within the area of a waste disposal plant, Sci. Total Environ. 196 (2) (1997) 141–149.
[301] C.G. Alimba, et al., Wild black rats (Rattus rattus Linnaeus, 1758) as zoomonitor of genotoxicity and systemic toxicity induced by hazardous emissions from Abule Egba unsanitary landfill, Lagos, Nigeria, Environ. Sci. Pollut. Res. 28 (9) (2021) 10603–10621.
[302] L. Migura-Garcia, et al., mcr-colistin resistance genes mobilized by IncX4, IncHI2, and IncI2 plasmids in *Escherichia coli* of pigs and White Stork in Spain, Front. Microbiol. 10 (2020).
[303] J.M. Paine, M.J. McKee, M.E. Ryan, Toxicity and bioaccumulation of soil PCBs in crickets: comparison of laboratory and field studies, Environ. Toxicol. Chem. 12 (11) (1993) 2097–2103.
[304] S. Mukhacheva, Y. Davydova, A. Sozontov, Small mammals of background areas in the vicinity of the Karabash copper smelter (Southern Urals, Russia), Biodivers. Data J. (2022) 10.
[305] M. Summa, H. Henttonen, L. Maunula, Human noroviruses in the faeces of wild birds and rodents—new potential transmission routes, Zoonoses Public Health 65 (5) (2018) 512–518.

[306] R.E. Brockie, R.E. Brockie, Leptospiral infections of rodents in the north island, N. Z. Vet. J. 25 (4) (1977) 89–96.
[307] M.Z. Rosli, et al., A multi-landscape assessment of Leptospira prevalence on a diversity of small mammals, EcoHealth 20 (2) (2023) 208–224.
[308] O. Khin Nwe, A.A. Sebastian, T. Aye, Carriage of enteric bacterial pathogens by house flies in Yangon, Myanmar, J. Diarrhoeal Dis. Res. 7 (3–4) (1989) 81–84.
[309] A.K. Gupta, et al., Phylogenetic characterization of bacteria in the gut of house flies (Musca domestica L.), FEMS Microbiol. Ecol. 79 (3) (2012) 581–593.
[310] W.A. Nazni, et al., Bacteria fauna from the house fly, Musca domestica (L.), Trop. Biomed. 22 (2) (2005) 225–231.
[311] V. Ivovic, S. Potusek, E. Buzan, Prevalence and genotype identification of toxoplasma gondii in suburban rodents collected at waste disposal sites, Parasite 26 (2019).
[312] O. Munehiro, et al., Natural Echinococcus multilocularis infection in a Norway rat, Rattus norvegicus, in southern Hokkaido, Japan, Int. J. Parasitol. 22 (5) (1992) 681–684.
[313] I. Chelbi, et al., The impact of illegal waste sites on the transmission of zoonotic cutaneous leishmaniasis in Central Tunisia, Int. J. Environ. Res. Public Health 18 (1) (2021) 1–10.
[314] H. Debash, M. Alemu, A. Ayehu, Species composition and parasite carriage rate of cockroaches among households of Sekota town, Northeast Ethiopia, Int. J. Trop. Insect Sci. 42 (6) (2022) 3815–3820.
[315] O.O. Dipeolu, Field and laboratory investigations into the role of the musca species in the transmission of intestinal parasitic cysts and eggs in Nigeria, J. Hyg. Epidemiol. Microbiol. Immunol. 21 (2) (1977) 209–214.
[316] S. Sulaiman, et al., The role of some cyclorrhaphan flies as carriers of human helminths in Malaysia, Med. Vet. Entomol. 2 (1) (1988) 1–6.
[317] J. Gutberlet, et al., Participatory research revealing the work and occupational health hazards of cooperative recyclers in Brazil, Int. J. Environ. Res. Public Health 10 (10) (2013) 4607–4627.
[318] L. Jurinović, et al., Virological and serological investigation of avian influenza in black headed gulls captured on a rubbish dump in Zagreb, Croatia, Vet. Arh 84 (2014) 521–528.
[319] E.A. Rasmussen, et al., Influenza a viruses in gulls in landfills and freshwater habitats in Minnesota, United States, Front. Genet. (2023) 14.
[320] E. Saeidi, F. Kheradmand, A case report of rabies in a striped hyena (Hyaena hyaena) in Fars Province of Iran, Kafkas Universitesi Veteriner Fakultesi Dergisi 28 (4) (2022) 529–531.
[321] J. Arikawa, et al., Epidemiological studies of hemorrhagic fever with renal syndrome (HFRS) related virus infection among urban rats in Hokkaido, Japan, Arch. Virol. 88 (3–4) (1986) 231–240.
[322] J. Arikawa, et al., Epizootiological studies of hantavirus infection among urban rats in Hokkaido, Japan: evidences for the persistent infection from the Sero-Epizootiological surveys and antigenic characterizations of hantavirus isolates, J. Vet. Med. Sci. 56 (1) (1994) 27–32.
[323] J.M. Reynes, et al., Evidence of the presence of Seoul virus in Cambodia, Microbes Infect. 5 (9) (2003) 769–773.
[324] D. Duh, S. Hasic, E. Buzan, The impact of illegal waste sites on a transmission of zoonotic viruses, Virol. J. 14 (1) (2017).
[325] D.J. Arévalo-Ayala, et al., Reduction of organic waste in a landfill lowers the visitation probability but not the local abundance of a long-lived scavenger species, Bird Conserv. Int. 33 (2023) e15.
[326] J.L. Belant, et al., Abundance of gulls and other birds at landfills in northern Ohio, Am. Midl. Nat. (1995) 30–40.
[327] S. Mazumdar, D. Ghose, G.K. Saha, Offal dumping sites influence the relative abundance and roosting site selection of Black Kites (Milvus migrans govinda) in urban landscape: a study from Kolkata metropolis, India, Environ. Monit. Assess. 190 (1) (2018).
[328] M.J. Lole, Nuisance flies and landfill activities: an investigation at a West Midlands landfill site, Waste Manag. Res. 23 (5) (2005) 420–428.
[329] A.T. Nurita, A.A. Hassan, Filth flies associated with municipal solid waste and impact of delay in cover soil application on adult filth fly emergence in a sanitary landfill in Pulau Pinang, Malaysia, Bull. Entomol. Res. 103 (3) (2013) 296–302.
[330] M.O.E. Iwuala, J.O.A. Onyeka, The types and distribution patterns of domestic flies in Nsukka, east central state, Nigeria, Environ. Entomol. 6 (1) (1977) 43–49.
[331] L.M. Rueda, P.-U. Roh, J.L. Ryu, Pupal parasitoids (Hymenoptera: Pteromalidae) of filth flies (Diptera: Muscidae, Calliphoridae) breeding in refuse and poultry and livestock manure in South Korea, J. Med. Entomol. 34 (1) (1997) 82–85.
[332] S. Soh, et al., Rodent activity in municipal waste collection premises in Singapore: an analysis of risk factors using mixed-effects modelling, Sci. Rep. 13 (1) (2023).
[333] J. Marcelino, et al., Flight altitudes of a soaring bird suggest landfill sites as power line collision hotspots, J. Environ. Manag. 294 (2021).
[334] J.T. Bialas, et al., Impact of land cover and landfills on the breeding effect and nest occupancy of the white stork in Poland, Sci. Rep. 11 (1) (2021).
[335] Z. Jagiello, et al., Distance to landfill and human activities affects the debris incorporation into the white stork nests in urbanized landscape in Central Spain, Environ. Sci. Pollut. Res. 27 (24) (2020) 30893–30898.
[336] H. McCallum, N. Barlow, J. Hone, How should pathogen transmission be modelled? Trends Ecol. Evol. 16 (6) (2001) 295–300.
[337] R.S. Ostfeld, R.D. Holt, Are predators good for your health? Evaluating evidence for top-down regulation of zoonotic disease reservoirs, Front. Ecol. Environ. 2 (1) (2004) 13–20.
[338] T. Allen, et al., Global hotspots and correlates of emerging zoonotic diseases, Nat. Commun. 8 (1) (2017) 1124.
[339] P. Gómez, et al., Detection of MRSA ST3061-t843-mecC and ST398-t011-mecA in white stork nestlings exposed to human residues, J. Antimicrob. Chemother. 71 (1) (2016) 53–57.
[340] D. Priscilla, H.A. Jambari, N. Meenakshii, Prevalence of mouse and rat parasites in resource recovery plants, farms and housing areas of southern Selangor: implication for public health, Pertanika J. Trop. Agric. Sci. 38 (3) (2015) 309–320.
[341] B. Martín-Maldonado, et al., Urban birds: an important source of antimicrobial resistant Salmonella strains in Central Spain, Comp. Immunol. Microbiol. Infect. Dis. (2020) 72.
[342] E. Sánchez-Díaz, et al., Oviposition dynamics of Aedes aegypti in Central Argentina, Med. Vet. Entomol. 36 (1) (2022) 43–55.
[343] E. Abbasi, et al., Diversity of arthropods in municipal solid waste landfill of Urmia, Iran, J. Med. Entomol. 56 (1) (2019) 268–270.
[344] J. Alencar, et al., Immature mosquitoes (Diptera: Culicidae) in a eutrophic landfill tank from state of Rio de Janeiro, Brazil, Rev. Soc. Bras. Med. Trop. 46 (6) (2013) 769–771.
[345] J.J. Dymock, S.A. Forgie, Habitat preferences and carcase colonization by sheep blowflies in the northern North Island of New Zealand, Med. Vet. Entomol. 7 (2) (1993) 155–160.
[346] S. Banerjee, G. Aditya, G.K. Saha, Household disposables as breeding habitats of dengue vectors: linking wastes and public health, Waste Manag. 33 (1) (2013) 233–239.
[347] C.A. Lippi, et al., Exploring the utility of social-ecological and entomological risk factors for dengue infection as surveillance indicators in the dengue hyper-endemic city of Machala, Ecuador, PLoS Negl. Trop. Dis. 15 (3) (2021) e0009257.
[348] J.A. Mc Kenzie, Dieldrin and diazinon resistance in populations of the australian sheep blowfly, lucilia cuprina, from sheep-grazing areas and rubbish tips, Aust. J. Biol. Sci. 37 (6) (1984) 367–374.
[349] M.M. Akiner, S.S. Çağlar, Monitoring of five different insecticide resistance status in Turkish house fly *Musca domestica* L. (Diptera: Muscidae) populations and the relationship between resistance and insecticide usage profile, Türkiye parazitolojii dergisi / Türkiye Parazitoloji Derneği = Acta parasitologica Turcica / Turkish Society for Parasitology **36** (2) (2012) 87–91.
[350] H. Cetin, F. Erler, A. Yanikoglu, Survey of insect growth regulator (IGR) resistance in house flies (Musca domestica L.) from Southwestern Turkey, J. Vector Ecol. 34 (2) (2009) 329–337.
[351] S. Sulaiman, et al., Seasonal population patterns of Spalangia endius Walker (Hymenoptera: Chalcidoidea) at a refuse dumping ground in Malaysia, J. Med. Entomol. 28 (6) (1991) 757–759.
[352] M. Usman, et al., Occurrence and monthly dynamics of phlebotomine sand flies in parts of Sokoto State, north-west Nigeria, Niger. J. Parasitol. 41 (1) (2020) 109–113.
[353] M. Nelson, et al., Characterization of Escherichia coli populations from gulls, landfill trash, and wastewater using ribotyping, Dis. Aquat. Org. 81 (1) (2008) 53–63.
[354] M. Malekian, J. Shagholian, Z. Hosseinpour, Pathogen presence in wild birds inhabiting landfills in Central Iran, EcoHealth 18 (1) (2021) 76–83.
[355] S. Hellström, et al., Listeria monocytogenes is common in wild birds in Helsinki region and genotypes are frequently similar with those found along the food chain, J. Appl. Microbiol. 104 (3) (2008) 883–888.
[356] A. Ĉížek, et al., Salmonella contamination of the environment and its incidence in wild birds, J. Veterinary Med. Ser. B 41 (1−10) (1994) 320–327.
[357] S. Quessy, S. Messier, Prevalence of Salmonella spp., Campylobacter spp. and Listeria spp. in ring-billed gulls (Larus delawarensis), J. Wildl. Dis. 28 (4) (1992) 526–531.
[358] B. Clement, S. Bunce, Coyotes and more-than-human commons: exploring co-existence through Toronto's coyote response strategy, Urban Geogr 44 (10) (2022) 2144–2162.
[359] M.F. Carballido, et al., Are the closed landfills recovered habitats for small rodents? A case study in a riparian site, Buenos Aires, Argentina, Urban Ecosyst. 14 (4) (2011) 699–710.
[360] E.L. Flickinger, J.D. Nichols, Small mammal populations at hazardous waste disposal sites near Houston, Texas, USA, Environ. Pollut. 65 (2) (1990) 169–180.
[361] L.B. Oestergaard, et al., The associations between socioeconomic status and risk of Staphylococcus aureus bacteremia and subsequent endocarditis–a Danish nationwide cohort study, BMC Infect. Dis. 17 (2017) 1–9.
[362] T.L. O'Sullivan, K.P. Phillips, From SARS to pandemic influenza: the framing of high-risk populations, Nat. Hazards 98 (2019) 103–117.
[363] R.E. Baker, et al., Infectious disease in an era of global change, Nat. Rev. Microbiol. 20 (4) (2022) 193–205.
[364] J. Otte, U. Pica-Ciamarra, Emerging infectious zoonotic diseases: the neglected role of food animals, One Health 13 (2021) 100323.
[365] S. Kaza, et al., What a waste 2.0: A global snapshot of solid waste management to 2050, World Bank Publications, 2018.
[366] D.C. Wilson, et al., Comparative analysis of solid waste management in 20 cities, Waste Manag. Res. 30 (3) (2012) 237–254.
[367] S.M. Dias, Waste pickers and cities, Environ. Urban. 28 (2) (2016) 375–390.
[368] M. Black, et al., The health risks of informal waste workers in the Kathmandu Valley: a cross-sectional survey, Public Health 166 (2019) 10–18.
[369] A.B. Le, et al., A pilot survey of the US medical waste industry to determine training needs for safely handling highly infectious waste, Am. J. Infect. Control 46 (2) (2018) 133–138.
[370] J.E. Baak, et al., First evidence of diverging migration and overwintering strategies in glaucous gulls (Larus hyperboreus) from the Canadian Arctic, Anim. Migr. 8 (1) (2021) 98–109.