Article

Jaguars Attacks on Humans in the Brazilian Amazon

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Abstract Attacks on humans by large carnivores are well documented globally, yet jaguar (*Panthera onca*) attacks are widely considered rare. We reassessed this assumption by compiling all known records of jaguar attacks on humans in the Brazilian Amazon between 1950 and 2025. A total of 84 cases were identified through a combination of field documentation, local news sources and scientific literature. The majority of attacks occurred in rural areas and involved adult men in a total of 71 men, children (n = 8) and adult women (n = 4). Most of whom were unaccompanied (52%) and engaged in extractive or subsistence activities. Fatalities were more frequent when victims were alone (n = 31) or lacked defensive tools (n=35). Approximately half of all cases were apparently unprovoked, yet 42 jaguars (48.3%) were killed during or after the attack. Jaguar attacks in the Amazon (1.12/year) remain far less frequent than those involving pumas, lions, tigers, or leopards, yet they are more common than previously recognized. Our findings challenge the long-standing perception of rarity and emphasize the need for targeted strategies to reduce risk and foster coexistence in forest-dependent communities.

Keywords Anthropogenic pressures; human-wildlife conflict; mitigation; large carnivores; *Panthera onca*; predator behavior; rural safety; subsistence livelihoods

Introduction

Attacks on humans by large carnivores are a well-documented global phenomenon, raising serious concerns for both wildlife conservation and human safety (Kruuk, 2002; Quammen, 2004; Quigley & Herrero, 2005; Bombieri et al., 2023). Species such as tigers (*Panthera tigris*), lions (*P. leo*), leopards (*P. pardus*), pumas (*Puma concolor*), wolves (*Canis lupus*), and several bear species have all been involved in fatal and non-fatal incidents, with cases often explored from natural history or animal health perspectives (Bier, 1991; Kruuk, 2002; Packer et al., 2005; Quigley & Herrero, 2005; Yamazaki & Bwalya, 1999; Neiburger & Patterson, 2000; Peterhans & Gnoske, 2001; Baldus, 2007; DeSantis & Patterson, 2017). In contrast, attacks by jaguar (*Panthera onca*), the largest felid in the Americas, are widely regarded as rare (Rabinowitz, 2000; Conforti & Azevedo, 2003; Quigley & Herrero, 2005).

Although some jaguar attacks have been described in scientific and popular literature (Roosevelt, 1914; Almeida, 1990; Chagnon, 2013; Neto et al., 2011; Iserson & Francis, 2015; Macedo, 2015; Macedo, 2016; Payán et al., 2016; Jędrzejewski et al., 2017; Papavero, 2017; Haddad et al., 2022), they are often dismissed as exceptional. This perception is reinforced by a lack of systematic data and by the remoteness of many incidents, which frequently go undocumented (Quigley & Herrero, 2005). However, historical reviews show that even infrequent attacks by large carnivores can provoke strong human responses, leading to persecution and reduced tolerance toward the species (Löe & Röskaft, 2004; Baldus, 2004; Packer, 2005)

Attacks by large felids pose a significant challenge to both species conservation and public safety in affected regions. From a conservation perspective, incidents involving predation or severe injuries often lead to retaliatory actions by local communities, contributing to population declines and exacerbating human–wildlife conflict (Carvalho & Pezzuti, 2010; Macedo et al., 2016). From a public safety standpoint, such attacks generate widespread fear, alter land-use patterns, restrict economic activities—such as fishing and gathering—and demand the rapid implementation of mitigation measures (Dhanwatey et al., 2013; Hoogesteijn et al., 2016). In the Amazon, for instance, studies have documented cases in which riverine communities reduced travel through forested areas and avoided certain routes following attacks, directly affecting their livelihoods (Carvalho, 2019). These situations require interdisciplinary approaches that reconcile the protection of human populations with the preservation of large carnivore populations, including environmental education, preventive management, and rapid response strategies (Packer et al., 2006; Penteriani et al., 2016). Understanding the frequency, context, and consequences of such encounters is essential for both public safety and species conservation.

From a conservation standpoint, systematically monitoring where, when and why attacks occur allows managers to identify high-risk activities and design targeted interventions; without solid data, fear and misinformation often lead to retaliatory killings that decimate carnivore populations (Lamb et al., 2020). Conversely, well-documented mitigation strategies have reduced livestock losses and increased tolerance toward jaguars across their range (Polisar et al., 2025) Understanding the demographic consequences of conflict is also crucial, because intense attacks and lethal removal threaten carnivore persistence and must be offset by reproduction or immigration to maintain viable populations (Lamb et al., 2020).

Here, we present the most comprehensive compilation to date of jaguar attacks on humans in the Brazilian Amazon, spanning the period from 1950 to 2025. The data was obtained primarily opportunistically, along a decade of fieldwork by the authors, and was complemented with a systematic search for cases in newspaper reports (online) and local periodicals We analyzed victim profiles, environmental contexts, and outcomes to identify patterns and potential risk factors. We characterize the events in regard to the victims, circumstances and outcome of attacks, searching for general patterns which could be used to understand why attacks occur and how they can be avoided (Löe & Röskaft). The non-systematic nature of our data collection prevents us from inferring about the prevalence and distribution of attacks in space and time and, therefore, these aspects will not be treated here. Our findings challenge the prevailing perception of the rarity of such events and provide critical insights for managing human–jaguar coexistence in one of the world's most biodiverse, yet increasingly human-impacted, regions.

Methods

We compiled records of jaguar (*Panthera onca*) attacks on humans in the Brazilian Amazon between 1950 and 2025 from multiple sources. Firstly, we collected the data opportunistically, while working at different field projects across the region. Reports were obtained by interviewing primary and secondary sources. Primary sources were firsthand accounts of the attacks, provided by the victims themselves or by eyewitnesses, whereas secondary sources were those provided by the victim's relatives and acquaintances. Additional cases were compiled through a literature search of jaguar attacks on humans in online news archives and regional print media, television newspaper, documentaries and articles (Google and Google Scholar) using Portuguese-language keywords corresponding to "jaguar" or "*Panthera onca*" + "attack" or "attack" + "human" and the names of individual Amazonian states. To ensure the reliability of media-sourced data, we cross-checked the information with public agency records: unified health system (SUS) and ICMBio (Instituto Chico Mendes de Conservação da Biodiversidade) and applied data triangulation by comparing media

reports with records from local health, public safety, and environmental management institutions in the areas where the attacks were reported.

For each case, we extracted available data on the year and location of the attack; victim characteristics (sex and age class: child <15 years; adult ≥15 years); activity at the time of the incident; whether the victim was alone or accompanied; the presence or absence of dogs, firearms, or other defensive tools; time of day; and outcomes for both the victim and the jaguar. In fatal cases, we noted the condition of the body when reported. Narrative accounts were reviewed to assess whether attacks could be classified as provoked or unprovoked, following criteria outlined in (Beier, 1991; Yamazaki et al., 1999; Quigley & Herrero, 2005). Following Beier (1991), we define an attack as an incident in which there is physical contact between the victim and the animal, with the cat biting, clawing or knocking down a human. Near attacks, incidents in which the cat advances toward a person at close range, or crouches beside a trail as if to pounce were not included in this study because they are subject to subjective interpretation (e.g. a mere encounter with a jaguar can be interpreted as a near attack).

Whenever possible, we classified attacks as provoked or unprovoked: provoked attacks were those where the person invaded the animal's personal space or purposely tried to injure or kill the animal. This includes cases where the provocation came from a domestic dog and cases where the victim inadvertently provoked the attack (e.g., by approaching, without realizing, a mother with cubs). Unprovoked attacks where those where the animal attacked the victim by its own initiative and include predatory attacks and attacks motivated by a dispute for the right of way (Quigley & Herrero, 2005).

Subjective assessments—such as speculations regarding predatory intent or animal behavior prior to the attack—were excluded. Whenever possible, case reports were cross-verified using local institutional sources and entries with conflicting or unverifiable information were omitted from analysis. Given the relatively small number of confirmed cases and the heterogeneous quality of available records, we adopted a descriptive approach; this follows the precedent set by Beier's compilation of cougar attacks in North America and Kelly et al.'s review of large carnivore incidents, which likewise classified cases and explored patterns without applying inferential statistics due to limited sample sizes and inconsistent reporting across sources. However, we used descriptive statistics and frequency analysis to characterize the dataset. A chi-square test (χ^2) was performed to assess the relationship between attack fatality and the presence of dogs. To generate the density map of jaguar attacks on humans, we used all 84 attack locations to produce kernel density maps with the Heatmap plugin (accessed in April 2025) in QGIS version 3.16.

Results

We compiled a total of 84 confirmed jaguar attacks on humans in the Brazilian Amazon between 1950 and 2025 (Supplementary Table 1). Of these, five were previously reported in the scientific literature, 19 were identified through local online media, and 60 were documented by the authors during field research in several Amazonian states. The cases span 38 localities across six states within the Amazon biome.

Geographic Distribution and Victim Demographics

The state of Amazonas accounted for the highest number of attacks (n = 43), followed by Pará (n = 23), Mato Grosso (n = 7), Rondônia (n = 7), Acre (n = 2), and Roraima (n = 2).

Most victims were adult men (n = 71), with fewer cases involving children (n = 8) and adult women (n = 4). In one case, the victim's age was not recorded. Of 68 cases with information on whether the victim was alone or accompanied, 31 individuals were alone at the time of the attack, 25 were accompanied by one other person, and 12 were with two or more people. Time of day was reported in 53 cases: 48 attacks occurred during daylight hours, and 7 at night. The time of the incident was unknown in the remaining 29 cases.

Victims were engaged in a variety of activities, including hunting, farming, walking in forested areas, extractivism, fishing, herding livestock, playing and sleeping or walking along riverbanks. One woman was attacked while attempting to rescue her daughter. The victim's activity at the time of the incident was unknown in 22 cases (Fig. 1).

Our density map shows clusters of jaguar attacks across the Brazilian Amazon. However, this spatial pattern largely reflects our sampling effort rather than true differences in attack frequency: fieldwork was conducted opportunistically in certain states and not systematically across the entire biome. As a result, areas we visited more often yielded more reports, whereas remote regions with fewer visits may harbour undocumented incidents. The apparent concentration of attacks in some regions is therefore likely an artefact of biased data collection rather than a genuine geographic hotspot (Fig. 2).

Provoked Attacks

Thirty-one attacks were classified as provoked. In six cases, the provocation involved deliberate jaguar hunting in retaliation for livestock predation, typically using dogs; the jaguar attacked the hunters after being cornered. One case occurred during a hunt for jaguar skins. Two attacks were triggered by the harpooning of jaguars, which retaliated, in another, the victim saw the jaguar in a tree and lashed it with a stick.

In 26 cases, provocation was unintentional. These included two incidents where victims inadvertently approached a female with cubs. Most unintentional provoked attacks (n = 19) were initiated after domestic dogs pursued and harassed jaguars, triggering defensive responses. Overall, 25 attacks involved the presence of dogs, while 35 occurred without dogs. Notably, victims without dogs were more likely to suffer fatal outcomes (n = 60; $\chi^2 = 3{,}87$; $p = 0.04$).

Unprovoked Attacks

Thirty-three attacks were classified as unprovoked. Nine involved children: two were playing, two were helping their parents in the field, and one was collecting turtle eggs with his father when fatally attacked. A 10-year-old boy was bitten on the neck while fishing and survived, thanks to the actions of their dog. A 21-month-old child and their mother were both attacked in one incident; the father subsequently killed the jaguar.

Several adults were ambushed while crouching, sleeping, or walking alone in remote areas. Two were attacked while tapping latex, another while sleeping on a river beach. In two cases, victims were attacked from above while in canoes—one man was bitten on the face by a jaguar that leapt from a tree into his boat when the victim was fishing in a flooded forest. He survived after capsizing the canoe and causing the jaguar to retreat. Other attacks involved ambushes on hunting trails or at night while the victim was butchering prey (Fig. 3)

Attack Outcomes

Most victims (n = 71; 84.5%) survived. In one case, the outcome was unknown. Victims used a range of defensive tools, including firearms (n = 19), bladed weapons (e.g., machetes, arrows, sticks; n = 18), and, in rare cases, their bare hands (n = 4).

Twelve attacks resulted in fatalities. In eight of these, partial consumption of the victim's body was documented (Fig. 4), with head and chest cavity, head and left limbs, head, left limb, and part of the right hand and chest cavity only. Details on body consumption were unavailable for the 05 remaining fatal cases.

Notably, jaguar mortality exceeded human mortality in these encounters. While 12 humans died, 42 jaguars (48.3%) were killed during or after the attack, often by relatives or community members seeking retaliation.

Discussion

Our findings demonstrate that jaguar attacks on humans in the Brazilian Amazon are not as rare as previously assumed (Rabinowitz, 2000). The prevailing view probably stems from underreporting:

most incidents occur in remote areas, rarely enter official statistics, and only recently have well-documented cases appeared in the scientific literature (Neto et al., 2011; Iserson et al., 2015; Haddad et al., 2022; Bombieri et al., 2023). Improved internet access and communication infrastructure in rural Amazonian communities have also contributed to a rise in reported incidents in recent years.

The vast majority of attacks occurred in remote rural regions, consistent with jaguar habitat preferences for areas of low human density (Jędrzejewski et al., 2018). Most reports originated from sustainable use protected areas and Indigenous Lands, where natural resource use is allowed and forest-based livelihoods increase exposure to large carnivores (Chauhan, 2011; Malviya & Ramesh, 2015; Silwal et al., 2017; Lamichhane et al., 2018; Ruda et al., 2018). Additionally, these areas tend to be more frequented by researchers, potentially increasing the likelihood that a case will be recorded.

Victims were predominantly adult men engaged in forest-based activities during the day—a pattern consistent with gendered divisions of labor in rural Amazonian communities, where men more frequently engage in hunting, fishing, and extractivism (Packer et al., 2005; Garrote et al., 2017). This demographic trend is consistent with global patterns in large carnivore attacks (Nyhus & Tilson, 2004; Dhanwatey et al., 2013; Silwal et al., 2017; Bombieri et al., 2023). Although jaguars are primarily nocturnal and crepuscular (Harmsen et al., 2011; Foster et al., 2013), the predominance of attacks during daylight hours reflects the overlap with human activity patterns, as observed in other human-carnivore systems (Nyhus & Tilson, 2004; Dhanwatey et al., 2013; Silwal et al., 2017).

In contrast to findings by (Beier, 1991; Penteriani et al., 2016), attacks on children were less common than those on adults. However, child victims were disproportionately represented in fatal and likely predatory attacks. These cases may reflect mistaken identity predation, where children are targeted due to their smaller body size and resemblance to natural prey (Wiens & Harrison, 2001; Iserson & Francis, 2015; Conover, 2001; Quigley & Herrero, 2005).

Provoked and unprovoked attacks occurred in roughly equal numbers. In many provoked incidents, the source of provocation was indirect—usually domestic dogs that chased or harassed jaguars. Dogs are known to increase encounter rates between humans and wildlife (Khan, 2009; Koster, 2009; Carvalho & Pezzuti, 2010; Penteriani, 2016), and in confrontation scenarios, they often flee toward their owners, inadvertently placing them in harm's way (Vaillant, 2010). Still, dogs played a dual role: in several cases, they diverted the jaguar's attention or scared it off, increasing the victim's chance of survival. Similarly, in India, forest workers historically brought goats or pigs on leashes to reduce the risk of tiger attacks (Jackson, 1991). These livestock were used as sacrificial decoys to distract predators rather than as companions; unlike dogs, they did not provide early warning or deterrence but served to focus the predator's attention away from people.

Contrary to earlier observations (Rabinowitz, 2000; Quigley & Herrero, 2005; Hoogesteijn et al., 2016), unprovoked attacks accounted for half of the cases. Although few reports included descriptions of behavioral cues such as stalking, the context of many unprovoked attacks—victims crouching, sleeping, or ambushed from behind—suggests that predatory motivation was likely (Neto et al., 2011; Payán et al., 2016). In 21 of the 33 unprovoked cases, we obtained information on period; most of these incidents occurred during daylight hours, mirroring the overall pattern for provoked attacks. This suggests that overlap with human activity during the day is a key factor even in ostensibly predatory encounters. In some cases, food may have acted as a lure, as when attacks occurred on hunting trails or while butchering prey (Foerster, 1996; Quigley & Herrero, 2005; Pontes & Chivers, 2007). In one fatal case, the attacking jaguar had visible dental injuries—factors previously linked to aberrant predatory behavior in large felids (Neiburger & Patterson, 2000; DeSantis & Patterson, 2017). Misclassification of some attacks is possible. For instance, an encounter with a female accompanied by cubs could appear unprovoked if the young remained unnoticed. In one case, a person walking along a trail was attacked by a female jaguar without seeing any cubs. After the animal was killed in self-defence, a cub was found nearby; this discovery indicated that the attack was likely defensive rather than predatory and highlights how failure to detect offspring can lead to misclassifying defensive responses as unprovoked. Such cases underscore the need for caution when interpreting attack motivations.

In most encounters, victims fought back using whatever was available—firearms, blades, or even bare hands. Jaguars were killed in nearly half of all cases, either during the attack or shortly thereafter by companions or community members seeking retribution. As in other predator conflict scenarios, both species suffer consequences (Lemelin, 2008; Worthy & Foggin, 2008). Attacks often leave lasting psychological and social consequences, fostering fear, retaliatory killings, and reduced tolerance for carnivores in local communities. In Amazonian protected areas, fear of jaguar attacks is a key factor undermining support for hunting restrictions (Carvalho, 2019). For jaguars, repeated conflicts with people can result in increased mortality through retaliation, disruption of normal hunting or movement patterns, and behavioral shifts such as heightened nocturnal activity or avoidance of human-dominated areas**.** These effects reduce population viability, potentially alter social structure and gene flow, and ultimately hinder conservation efforts.

While the presence of dogs increased the likelihood of provocation, they also improved survival outcomes. Dogs offer protection, companionship, and increased hunting efficiency for forest dwellers (Koster, 2009). However, many reported jaguar “attacks” actually occur when hunters’ dogs flush or tree a jaguar during a hunt. In such cases the cat reacts defensively or targets the dog, and people are injured while trying to protect their animal. Hunters continue to bring dogs because the advantages

they provide—food security, early warning of danger and companionship—are perceived to outweigh the risk of provoking a jaguar

Most fatal victims sustained trauma to the head and chest—patterns consistent with jaguar predation and consumption of livestock, where they typically kill by biting the skull or neck and begin eating through the chest (Pitman et al., 2002; Cavalcanti, 2015). Jaguars are capable of fracturing skulls and cervical vertebrae with ease (Schaller & Vasconcelos, 1978; Nowell & Jackson, 1996). Even in nonfatal cases, victims bore severe injuries or neurological sequelae, as described in previous reports (Neto et al., 2011; Iserson & Francis, 2015).

Attacks by other *Panthera* species—such as leopards, lions, and tigers—are more thoroughly studied, yet offer useful comparisons. Between 1950 and 2025, jaguar attacks in the Amazon accounted for just 9.6% of the number of tiger attacks reported in Maharashtra, India between 2005 and 2010 (Packer et al., 2018). While the frequency of attacks varies by species and region, jaguar attacks rarely exceed 10 per year. This discrepancy may reflect a combination of ecological, historical, and sociocultural factors. Unlike Old World big cats, which coevolved with early hominins, jaguars encountered humans only recently—when humans arrived in the Americas, they were already armed with advanced weapons (Hoogesteijn, 2016). Furthermore, jaguars inhabit dense, remote forests, where conflicts are less likely to be observed or recorded, unlike puma attacks in the well-monitored landscapes of North America (Penteriani et al., 2016).

The motivations for attacks differ across species. Puma attacks in North America are often linked to recreation in wilderness areas and the presence of unsupervised children (Penteriani et al., 2016). Lions tend to attack in coordinated outbreaks, particularly when people sleep in fields (Packer et al., 2005). Tiger and leopard attacks are more frequent in moderately populated areas near forest edges. In contrast, jaguar attacks in the Amazon are sporadic, primarily affecting rural populations. Only two incidents in our dataset occurred in urban areas.

Finally, while data on lion, tiger, and leopard attacks are widely available, jaguar attack records remain sparse and inconsistent. This study highlights the urgent need for systematic documentation and standardized reporting of jaguar attacks. Understanding when and why jaguars attack humans is not only a matter of scientific inquiry but of growing importance for both conservation and public safety in the world's largest rainforest.

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Conflicts of interest None.

Ethical standards ETHICAL STATEMENT FOR RESEARCH PROJECT DEVELOPMENT

By means of this Ethical Statement for the Development of Scientific Research Projects, I, Rogerio Fonseca, faculty member and advisor of the Master's research project entitled “Jaguar Attacks on Humans in the Brazilian Amazon: an analysis from the perspective of land use and occupation”, SIAPE registration number 2624653, hereby declare that the manuscripts derived from this research, including the article “Jaguar Attacks on Humans in the Brazilian Amazon”, were developed in accordance with internationally recognized ethical principles, despite the absence of formal approval by a Research Ethics Committee (CEP), as permitted in specific cases by Brazilian legislation and the editorial guidelines. Most of the data used in this research were obtained from open and public sources, including official records from federal environmental management and control agencies, such as the Chico Mendes Institute for Biodiversity Conservation (ICMBio), as well as reports from the Brazilian press, systematically monitored by the Jaguar Sightings and Attacks Press Observatory (OIAA ONÇA), affiliated with the Federal University of Amazonas. Interviews conducted with human participants strictly followed the ethical principles established by the American Anthropological Association Code of Ethics (https://americananthro.org/about/anthropological ethics), including: Openness and honesty in communication; Informed consent; Protection of participants’ identity; Responsible dissemination of findings. Participants were clearly and accessibly informed about the objectives of the research, its potential benefits, and their rights. Considering that many interviewees belong to rural communities and have low levels of literacy, the consent procedure was conducted verbally and adapted to the local sociocultural context, in accordance with the principle of Free and Informed Consent (TCLE), as required by Brazilian law.

At the beginning of each interview, participants were informed: “This research is part of a study to understand the relationship between residents of the Mamirauá and Amanã Sustainable Development Reserves and jaguars. The objective is to understand how people perceive these animals, whether they cause problems, what kind of problems, and how such problems could be mitigated. The results may help promote safer coexistence with wildlife, improving the safety of people and domestic

animals. Interviewees will not be identified, and anonymity will be preserved. Participants may refuse to take part at any time. The results will be shared with the communities." Participants were then explicitly asked: Do you agree to participate in this research? Do you allow this interview to be recorded? Only those who gave clear consent proceeded with the interview, and all refusals were respected. No personally identifiable data were collected, and all responses were treated as confidential. In summary, although this project was not formally reviewed by a Research Ethics Committee, it was conducted in full compliance with ethical standards for research involving human participants, respecting informed consent in accordance with Brazilian legislation (TCLE), and in alignment with Oryx guidelines for research involving vulnerable communities. No personally identifiable data were collected, and all responses were treated as confidential. We trust that these measures adequately safeguard the rights and well-being of the participants. Finally, I declare that I am fully responsible for ensuring that the scientific project under my supervision was developed in accordance with ethical principles, without any form of unethical experimentation involving humans, animals, genetic heritage, or associated traditional knowledge. This statement aims to ensure transparency and compliance with the ethical standards required by Oryx and the international scientific community.

Data availability The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials.

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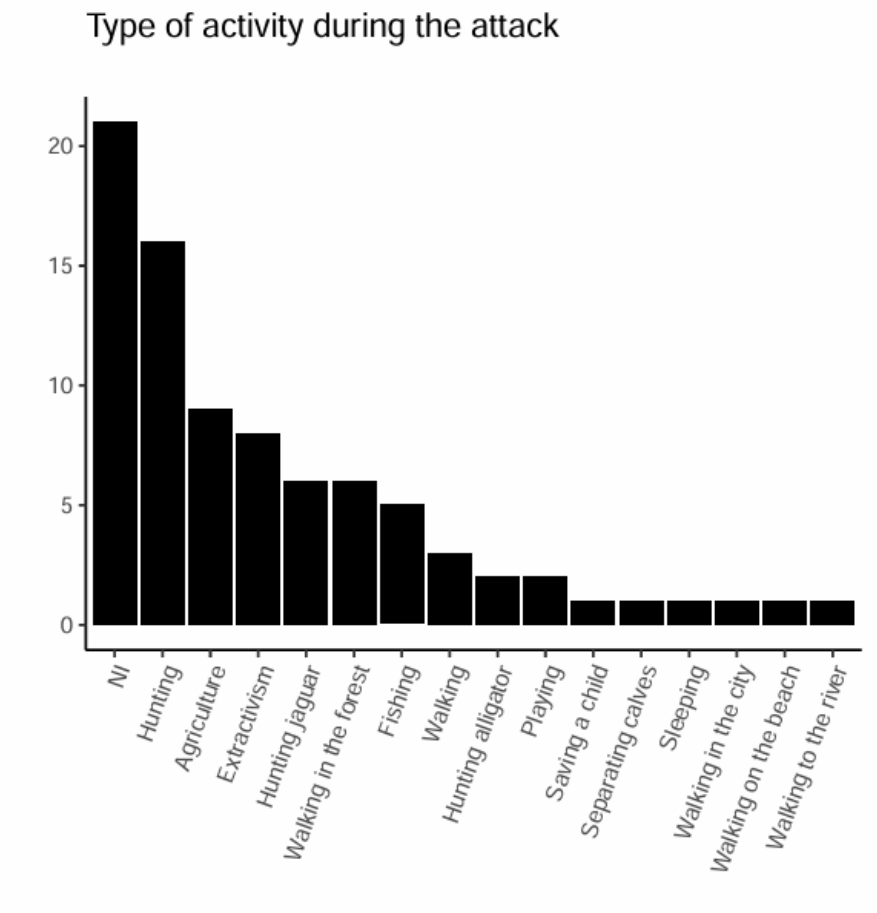
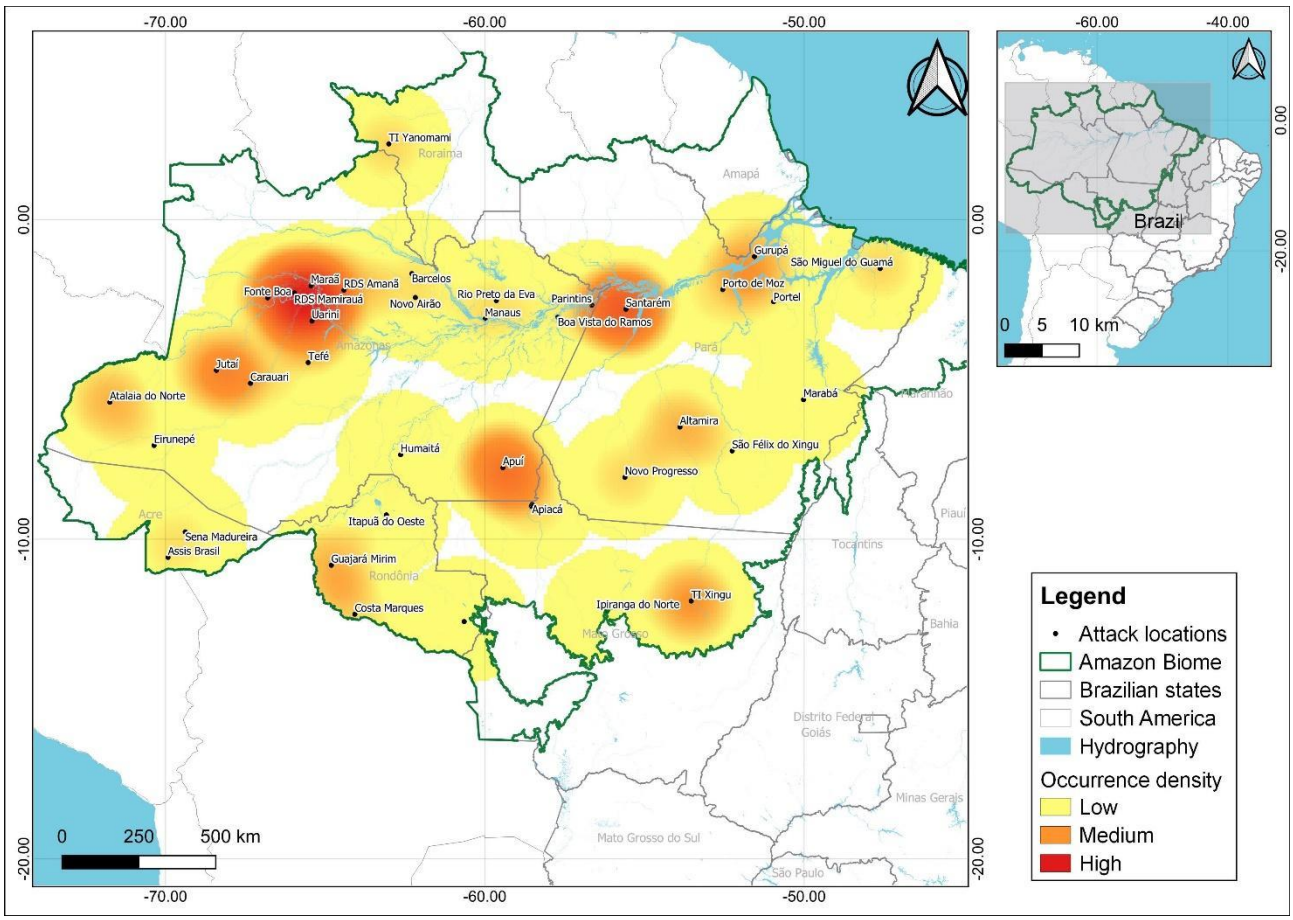
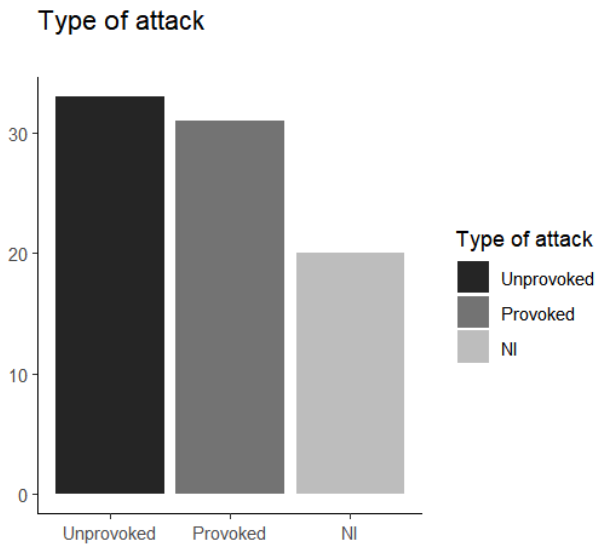


FIG. 1 Victims of jaguar attacks with activities. NI = No information.



485 FIG. 2 Map of Brazilian Amazon showing the density of jaguar attacks for which we obtained reports. This distribution is biased by our sampling effort.



490 FIG. 3 Type of attacks. NI = No Information

495

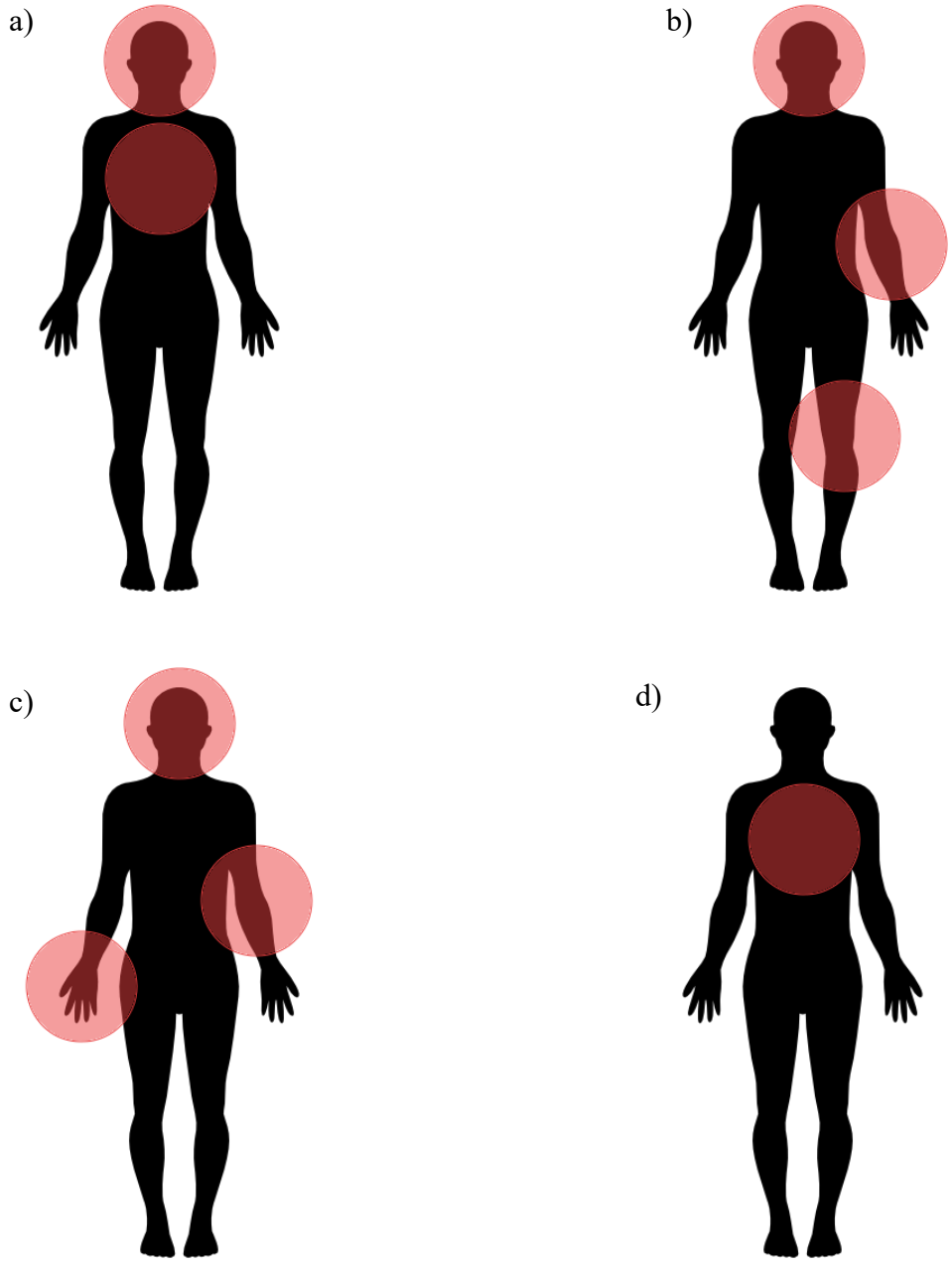


FIG. 4 Illustrations depicting the areas that are most attacked in case of fatal victims. The red circle shows the part of the body that has been consumed. a) the jaguar ate the head and the chest cavity (n = 3). b) head and limbs on the left side (n = 2). c) head, left limb and part of the right hand (n = 1). d) only the thoracic cavity (n = 1).