

## Review

# Nature, Causes, and Impact of Human–Wildlife Interactions on Women and Children Across Cultures

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**Abstract:** Despite the growing human–wildlife interactions (HWIs) globally, little attention has been paid to their effects on women and children, who often bear the brunt of loss of property and livelihoods. A systematic scoping review of four databases was undertaken to map and synthesize English-language evidence on the nature, causes, and impact of human–wildlife interactions on women and children across cultures. The 42 studies retained reveal that the proximity of human habitation to forest areas; expansion, deforestation, and encroachment of animal space; humans’ dependence on forest resources for livelihood; displacement of carnivores; and animals coming into the human space in search for food are the predominant causes of HWIs. Various types of HWIs and widely varying frequencies and durations of HWIs were reported. Individual and collective aspects of physical, psychological, economic, social, and environmental impacts on women and children were identified. The themes extracted were gendered roles, multi-factor vulnerabilities of women, religious beliefs, low participation of women in decision-making, social superstition against tiger widows, and perceptions of coexistence. Attention to perceptions of HWIs in different cultures and societies was limited, with notable gaps in the coverage of women and children and important geographic areas. These findings stress the need to bridge the geographical and cultural gap through multi-disciplinary actions on the determinants and effects of HWIs on women and children.

**Keywords:** wildlife; conflict; coexistence; human dimensions; human wildlife dynamics; gender-based violence; scoping review; child; culture; sustainable development

## 1. Introduction

Human–wildlife interactions (HWIs) are on the rise due to the ongoing population growth, climate change, and intense economic activities that change land use and contribute to worldwide deforestation [1]. HWIs are defined in the literature as the spatial and temporal juxtaposition of human and wildlife activities where humans, wildlife, or both are affected [2,3] and where the ways that people and wildlife adapt to each other are influenced [4]. Despite the more frequent attention to the human–wildlife conflict (HWC) which often highlights negative consequences, HWIs are not inherently or solely negative. In fact, there is a recent shift in wildlife management and conservation efforts to strive for coexistence and coadaptation. Despite the lack of uniformity in how interactions, coexistence, and coadaptation are defined, considering both negative and positive interactions and the contexts in which they occur can unlock opportunities for conservation [5–7]. To advance sustainable solutions, attention must be paid to groups of people who are particularly affected by HWIs such as women and children. While the perspectives of women have been canvassed, pertaining to some HWIs such as wildlife tourism (e.g., [8]), recreational hunting and fishing (e.g., [9]), wildlife caring (e.g., [10]), and wildlife–vehicle interactions (e.g., [11]), mostly in high-income countries, studies with children are not common in any of these HWIs, which is likely due to constraints such as gaining consent and lack of independence from parental attitudes.

Gender interacts with various other variables such as socio-economic practices, local/regional norms, and values, all of which can significantly impact gender relations [12,13]. For instance, changes in land ownership, income-generating activities, livestock and poultry management, and educational opportunities can influence the bargaining power of women within the community. This perspective highlights that HWIs are not gender-neutral [14]. In many contexts, men often handle external interactions, prioritize major economic decisions, and hold authority in land and financial matters, even if this is not a universal practice globally. On the other hand, women are often disempowered, lacking authority. Research reveals that women in many parts of the world lack economic and social equity, and still depend on their husbands for physical survival and a community position [15]. This is often compounded by sociocultural stigma due to male dominance in society, with long-term consequences on the life of women and their children [12,16–18]. Despite domestic laws and international treaties to improve the social status of women, gendered roles and various negative impacts on women (e.g., access to inheritance and social support) remain a factor in many cultures and communities [19–21]. This challenge is compounded when women lose access to shared resources due to human-imposed restrictions or face threats from wild animals. For example, the experiences of women in Namibia’s Kwandu Conservancy include facing food insecurity, fears for their physical safety, and lost investments due to the loss of access to natural resources [22].

There is a growing concern over the environmental and economic consequences of the HWI phenomenon, particularly within the conservation biology and agricultural literatures [23]. Negative outcomes of HWIs, including damage to crops and injury or killing of people or livestock, can threaten the livelihoods of some human populations. In addition to economic consequences, HWIs can bring psychological and cultural consequences in such domains as physical safety, food security, and social integration [23]. Women and children are particularly vulnerable to both visible and invisible costs of HWIs and variables such as poverty, increased workloads, marriage and inheritance rules, and prevailing social norms may shape their experience of HWIs by hindering their access to human, material, and natural capital [22,24,25]. For instance, the sufferings experienced by tiger widows (Tiger widows is the term most used by the locals in Sundarbans (located and shared by Eastern India and Western Bangladesh) to refer to women whose husbands

are killed when attacked by a tiger (Human–Tiger Conflict)) in South Asia illustrate the social, psychological, cultural, spiritual, and childrearing dimensions of HWC [26]. In this context, researchers across many countries have identified the need for further attention to be placed on factors such as gender and cultural diversity in research and intervention pertaining to HWIs [5,27].

We designed a scoping review to rapidly identify the types of available evidence in the HWI literature about the well-being of women and children in different cultures [28], with a focus on the human aspects rather than the wildlife side of the equation. Scoping reviews are a type of knowledge synthesis aimed at identifying evidence gaps, informing future research agendas, and drawing implications for policy and practice [29]. While the general purpose of conducting scoping reviews is to identify the available evidence, scoping reviews are particularly useful when it is still unclear what other specific questions can be posed and addressed by a more precise systematic review [28,30]. As such, scoping reviews help researchers clarify a complex concept about a specific topic or field of evidence [13]. Moreover, despite the important role of sociocultural factors such as religious beliefs and cultural norms in shaping people's attitudes toward wildlife, they are often ignored in designing mitigation strategies [31]. Advancing the understanding of different sociocultural norms and attitudes toward wildlife will be crucial for addressing and mitigating conflict in different settings and for informing efforts to achieve human–wildlife coexistence.

## 2. Materials and Methods

Our scoping review was guided by a methodological framework [32] and the Joanna Briggs Institute (JBI) Reviewer's manual [33]. The protocol was registered on 9 July 2022 in the Open Science Framework under the following DOI: 10.17605/OSF.IO/4YNCU [34].

### 2.1. Identification of the Review Questions

The main review question was: What information is available on HWIs in relation to the physical, mental, and social well-being of women and children across cultures? Five sub-questions explored the causes, extent, and nature of HWIs within the sources of evidence identified for the primary review question; the geographical contexts where HWIs occur; the impacts of HWIs on women and children; how HWIs are perceived in different cultures and societies; and the mitigation strategies that have been proposed for HWIs. Figure 1 represents the process followed in this review.

### 2.2. Search Strategy

A university librarian and a researcher conducted the database search on 8 July 2022 using the databases SCOPUS, CAB Abstracts (OVID), Agricultural and Environmental Sciences Collection (ProQuest), and Theses and Dissertations Global (ProQuest) after determining the keywords and search strategies (Table S1). There were no date or geographic restrictions. For the gray literature search, three researchers conducted a Google Advanced search by adapting keywords and reviewing the title and the short description of the documents that appeared in the first ten hits of each search. In addition, targeted websites of relevant organizations that were listed in [35] were accessed.

### 2.3. Study Selection

Once the duplicates ( $n = 698$ ) were removed in EndNote, all academic and gray references were ordered alphabetically and randomly assigned to two researchers, who assessed the titles and abstracts of 80 publications against the inclusion criteria for the review (Table 1). Any disagreement was discussed within the team to clarify the inclusion and exclusion criteria and establish consistency in the screening approach. After reaching 70% of inter-rater reliability among the two researchers, we divided the remaining publications

into two, and they independently screened the titles and abstracts. Following the initial screening, two researchers proceeded to the full text of the potentially relevant records using Rayyan [36]. Any disagreements were resolved through discussions between the researchers, and/or consultations within the team. The results of the screening and reasons for the exclusion of full-text sources were recorded. A total of 60 publications were retained for data extraction.

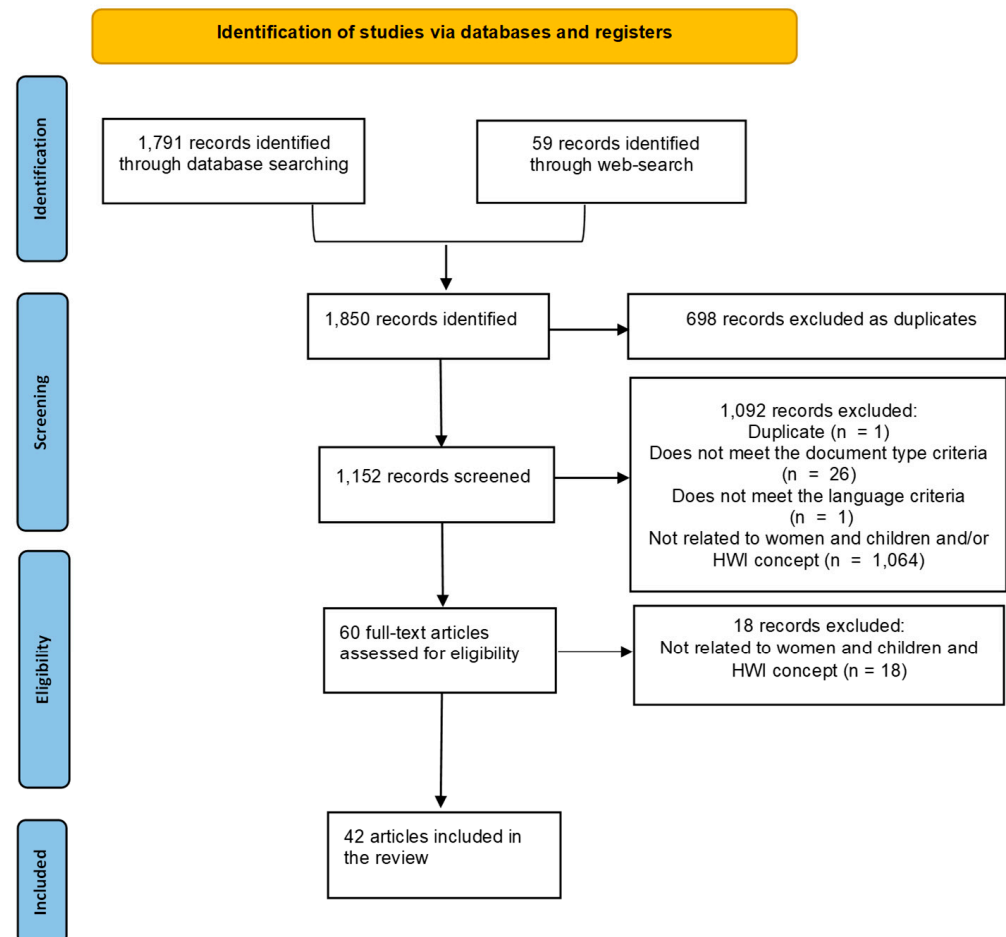


Figure 1. PRISMA flow chart of literature review.

Table 1. Eligibility for inclusion.

| Inclusion Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Exclusion Criteria                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>- Participants: women of any age and children of any gender in any geographic location. United Nations Convention on the Rights of the Child [37] defines children as those persons under the age of 18. Persons above 18 years old were considered adults.</li> <li>- Concept: Causes, nature, extent, geographic scope, impact on women and children, cultural perceptions and local explanatory models, sociocultural understandings of sex/gender, and mitigation measures of HWIs.</li> <li>- Study type: Any type of design, book chapters, text and opinion papers, systematic reviews, reports, government documents, theses and dissertations, conference posters and presentations that meet the above criteria.</li> <li>- Language: English.</li> </ul> | <ul style="list-style-type: none"> <li>- <b>Document type:</b> <ul style="list-style-type: none"> <li>· Bibliometric analysis</li> <li>· Book reviews</li> <li>· Research Protocols</li> <li>· Editorials</li> <li>· Letter to the Editor</li> <li>· Introduction to issues/special issues</li> <li>· Social media, videos, blogs</li> <li>· Participants: Study only with male adult populations</li> </ul> </li> </ul> |

#### 2.4. Data Charting

The JBI template source of evidence details, characteristics, and results extraction instrument was adapted to answer the review questions [33]. Four researchers extracted data from the first three publications using the data extraction form and the team had weekly meetings to discuss whether the manner of extraction was consistent with the review questions, and calibrated the form based on the discussions [38]. During this process, the decision to include 18 retained publications was re-examined through an assessment of the full articles against the inclusion and exclusion criteria by senior researchers. Once the team confirmed the consistency of the extraction approach among four researchers, the retained publications were divided into two and the researchers were paired to complete data extraction in dyads. Information related to impacts of HWIs on women/children was extracted and mapped onto categories pre-identified in the review protocol. Any disagreements were resolved through discussions within the pair of researchers, and if not settled, discussions were held within the team. No quality assessment of the studies was conducted [32].

#### 2.5. Synthesis and Reporting of the Results

Following the charting of the 42 publications, four researchers synthesized the extracted data to respond to each of the study sub-questions. They then summarized these syntheses by identifying patterns, unique features, and central ideas. The team iteratively reviewed the draft of the summaries and thematic syntheses to ensure that the results were reported to respond to the review questions. The team also discussed the meaning of the review results and broader implications for future research and policies while identifying the gaps in the reviewed literature. To enhance the flow of this paper, long in-text citations in the results section have been replaced with a note towards the table where those references are listed.

### 3. Results

#### 3.1. Characteristics of Included Studies

Our search identified 1152 publications after removing duplicates, of which 42 publications met the eligibility criteria and were retained for full review. All studies included in the review were published between 2002 and 2022, with the number of publications increasing over this period (Figure 2). Of these 42 publications, the majority were peer-reviewed journal articles ( $n = 36$ ), while the rest consisted of doctoral and master's theses ( $n = 3$ ) [39–41], a book chapter [42], a fact sheet [24], and an agency report [43] (Table 2). The studies reviewed used quantitative ( $n = 14$ ), qualitative ( $n = 12$ ), mixed research methods ( $n = 7$ ), and combinations of quantitative and qualitative methods (when authors did not mention “mixed methods”,  $n = 5$ ) (Tables 2 and 3). No specific methods were reported in the book chapter as it was based on secondary data [42], the review paper [44], the fact sheet [24], and the agency report [43].

The participants' ages varied widely, encompassing children, adolescents, and individuals from young adults to the elderly. Most studies ( $n = 22$ ) focused on populations aged 18 years and above, two studies involved both children and adults, three studies included only children, and twelve studies did not report the specific age of the sample. Age was not applicable to three review studies (Tables 2 and 3).

**Table 2.** Summary of characteristics of included studies (n = 42).

| Study Characteristics                                   | Number | Percentage |
|---------------------------------------------------------|--------|------------|
| <b>Publication Type</b>                                 |        |            |
| Peer-reviewed journal article                           | 36     | 86%        |
| Theses (doctoral or master)                             | 3      | 7%         |
| Book chapter                                            | 1      | 2%         |
| Fact sheet                                              | 1      | 2%         |
| Government or agency report                             | 1      | 2%         |
| <b>Study design/methodology</b>                         |        |            |
| Quantitative                                            | 13     | 31%        |
| Qualitative                                             | 13     | 31%        |
| Mixed-methods <sup>a</sup>                              | 12     | 29%        |
| Not reported                                            | 4      | 10%        |
| <b>Sample size</b>                                      |        |            |
| <100                                                    | 8      | 19%        |
| 100–300                                                 | 10     | 24%        |
| 301–600                                                 | 16     | 38%        |
| 601>                                                    | 4      | 10%        |
| Not reported                                            | 4      | 10%        |
| <b>Sample composition</b>                               |        |            |
| <18 years                                               | 3      | 7%         |
| 18 years>                                               | 22     | 52%        |
| No specific age bar (included both children and adults) | 2      | 5%         |
| Age not reported                                        | 12     | 29%        |
| Age not applicable <sup>b</sup>                         | 3      | 7%         |
| <b>Continent of data collection <sup>c</sup></b>        |        |            |
| Africa                                                  | 15     | 35%        |
| Asia                                                    | 24     | 56%        |
| North America                                           | 1      | 2%         |
| South America                                           | 1      | 2%         |
| Not applicable <sup>b</sup>                             | 2      | 5%         |
| <b>Study location <sup>c</sup></b>                      |        |            |
| Rural—protected areas                                   | 27     | 63%        |
| Rural—unprotected areas                                 | 13     | 30%        |
| Semi-urban                                              | 1      | 2%         |
| Both rural and urban                                    | 2      | 5%         |

Note: <sup>a</sup> Include studies using both qualitative and quantitative methods, as well as those self-identified as using mixed-methods. <sup>b</sup> Include literature reviews. <sup>c</sup> Exceeds n as one review study covered two geographical areas.

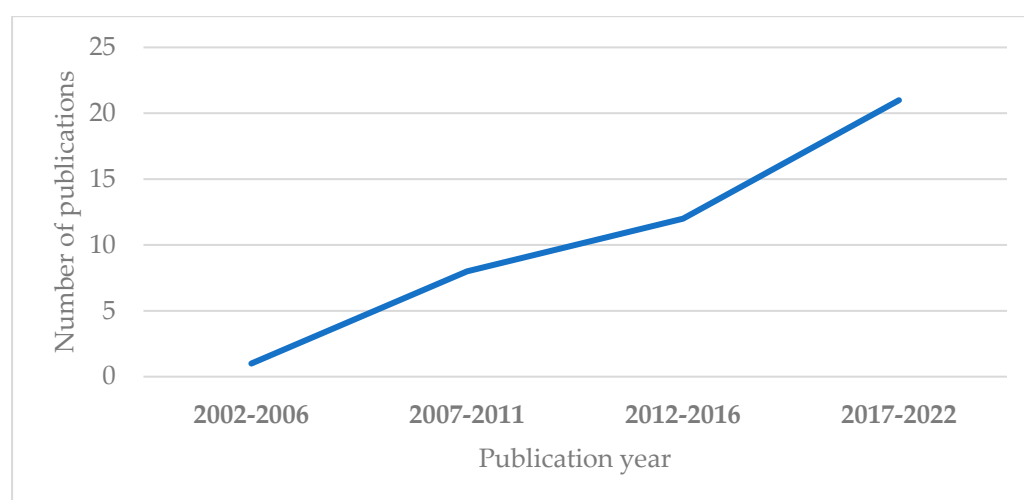
**Figure 2.** Chronological distribution of studies focusing on the impact of HWIs on women and children within the retained sources of evidence (n = 42).

**Table 3.** Characteristics, causes, extent, and nature of HWIs of the retained sources of evidence.

| Citation                                                                 | Country                  | Design          | Method (Type)              | Participants                                                                                     | Location                       | Type of HWIs              | Animals Involved                                                    |
|--------------------------------------------------------------------------|--------------------------|-----------------|----------------------------|--------------------------------------------------------------------------------------------------|--------------------------------|---------------------------|---------------------------------------------------------------------|
| Afriyie et al. (2021) [23]                                               | Ghana                    | Cross-sectional | Qualitative + Quantitative | 331 adults (men = 198, women = 133)                                                              | Rural, Protected Area          | Coadaptation              | Grasscutters, Bushbucks, Duikers, Kobs, Buffalo, Pangolins, Baboons |
| Ali (2002) [45]                                                          | Kenya                    | Cross-sectional | Qualitative                | 185 primary (11–17 years) and 307 secondary (15–21 years) students (boys and girls) <sup>a</sup> | Rural, Unprotected Area        | Conflict and Coadaptation | Rhinos and Elephants                                                |
| Ambarli (2016) [46]                                                      | Turkey                   | Cross-sectional | Quantitative               | 313 secondary students (1:0.95 boys: girls)                                                      | Combination of rural and urban | Conflict                  | Brown Bears, Wolves, Boars                                          |
| Baker et al. (2014) [47]                                                 | Nigeria                  | Cross-sectional | Qualitative + Quantitative | 410 households <sup>a</sup>                                                                      | Rural, Unprotected Area        | Conflict and Coadaptation | Monkeys                                                             |
| Bampasidou et al. (2021) [48]                                            | United States of America | Cross-sectional | Quantitative               | 1058 adults (men = 832, women = 226)                                                             | Rural, Unprotected Area        | Conflict                  | Wild Pigs                                                           |
| Campbell (2009) [49]                                                     | Ghana                    | Field research  | Qualitative                | 450 adults (men = 240, women = 210)                                                              | Semi-urban                     | Conflict                  | Civets                                                              |
| Chowdhury et al. (2008) [26]                                             | India                    | Field research  | Qualitative + Quantitative | 3084 households <sup>a</sup>                                                                     | Rural, Protected Area          | Conflict                  | Tigers, Crocodiles                                                  |
| Chowdhury et al. (2016a) [50]                                            | India                    | Field research  | Mixed                      | 65 widows (all women)                                                                            | Rural, Protected Area          | Conflict                  | Tigers                                                              |
| Chowdhury et al. (2016b) [51]                                            | India                    | Field research  | Mixed                      | 65 widows (all women)                                                                            | Rural, Protected Area          | Conflict                  | Tigers                                                              |
| Collaborative Partnership on Sustainable Wildlife Management (2016) [24] | Global                   | Review          | Review                     | NA                                                                                               | Combination of rural and urban | Conflict and Coadaptation | No specific mention                                                 |
| Doubleday (2018) [39]                                                    | India                    | Field research  | Qualitative                | 416 adults (men = 202, women = 214)                                                              | Rural, Protected Area          | Conflict                  | Tigers                                                              |
| Doubleday (2020) [52]                                                    | India                    | Field research  | Qualitative                | 416 adults (men = 202, women = 214)                                                              | Rural, Protected Area          | Conflict                  | Tigers                                                              |
| Doubleday and Rubino (2022) [53]                                         | India                    | Field research  | Qualitative                | 416 adults (men = 202, women = 214)                                                              | Rural, Protected Area          | Conflict                  | Tigers                                                              |
| Garnier et al. (2020) [44]                                               | Global                   | Review          | Review                     | NA                                                                                               | Rural, Protected Area          | Conflict and Coadaptation | Elephants, Tigers                                                   |
| Gore and Kahler (2012) [54]                                              | Namibia                  | Field research  | Qualitative                | 76 adults (men = 38, women = 38)                                                                 | Rural, Unprotected Area        | Conflict                  | Elephants, Lions, Leopards, Crocodiles                              |
| Helle (2019) [41]                                                        | Nepal                    | Cross-sectional | Mixed                      | 150 adults (men = 75, women = 75)                                                                | Rural, Protected Area          | Conflict                  | Tigers, Leopards, Elephants, Bears                                  |
| Khumalo and Yung (2015) [22]                                             | Namibia                  | Field research  | Qualitative                | 69 adults (women from Conservancy = 49) <sup>b</sup>                                             | Rural, Protected Area          | Conflict                  | Crocodiles, Elephants, Pigs                                         |

Table 3. Cont.

| Citation                               | Country            | Design           | Method (Type)              | Participants                                                                                | Location                               | Type of HWIs | Animals Involved                                 |
|----------------------------------------|--------------------|------------------|----------------------------|---------------------------------------------------------------------------------------------|----------------------------------------|--------------|--------------------------------------------------|
| Lubinza et al. (2020) [55]             | Tanzania           | Cross-sectional  | Quantitative               | 186 children (boys = 132, girls = 54)                                                       | Rural, Protected Area                  | Conflict     | Bushmeat (various wild animals)                  |
| Manoa et al. (2021) [56]               | Kenya              | Field research   | Qualitative                | 408 households <sup>a</sup>                                                                 | Rural, Protected Area                  | Conflict     | African Elephants, African Lions, Spotted Hyenas |
| Massé et al. (2021) [17]               | Mozambique         | Field research   | Qualitative                | 100 community members and leaders <sup>a</sup>                                              | Rural, Protected Area                  | Conflict     | Rhinos                                           |
| McLennan and Hill (2012) [57]          | Uganda             | Cross sectional  | Quantitative               | 134 adults (men = 72, women = 62)                                                           | Rural, Unprotected Area                | Conflict     | Chimpanzees                                      |
| McLennan and Hockings (2015) [42]      | Africa/Asia        | Review           | Review                     | NA                                                                                          | Rural, Protected and Unprotected Areas | Conflict     | Chimpanzees, Gorillas, Bonobos, Orangutans       |
| Mir et al. (2015) [58]                 | India              | Cross sectional  | Quantitative               | 384 households (adults, men = 251, women = 133)                                             | Rural, Protected Area                  | Conflict     | Bears, Leopards                                  |
| Mohammadi et al. (2021) [59]           | Iran               | Cross sectional  | Quantitative               | 400 households (all men)                                                                    | Rural, Unprotected Area                | Conflict     | Wolves                                           |
| Ogra (2008) [60]                       | India              | Field research   | Mixed                      | 100 adults (survey respondents: men = 30, women = 40) <sup>b</sup>                          | Rural, Protected Area                  | Conflict     | Asian Elephants, Leopards, Tigers                |
| Ogra (2009) [61]                       | India              | Field research   | Mixed                      | 70 adults (men = 30, women = 40)                                                            | Rural, Protected Area                  | Conflict     | Elephants, Lions, Tigers, Wolves, Bears          |
| Ogra and Badola (2008) [25]            | India              | Field research   | Mixed                      | 100 households (both men and women) <sup>a</sup>                                            | Rural, Protected Area                  | Conflict     | Elephants, Wild Boars, Leopards                  |
| Oikos East Africa. CONNEKT (2021) [43] | Tanzania and Kenya | Intervention     | Intervention report        | 5099 project participants(adults and children, males and females) <sup>a</sup>              | Rural, Unprotected Area                | Coadaptation | Elephants, Leopards, Jackals                     |
| Prateek and Knopf (2020) [62]          | India              | Longitudinal     | Qualitative + Quantitative | 111 households, 6 institutions, 24 adults <sup>a</sup>                                      | Rural, Unprotected Area                | Conflict     | Leopard, Monkeys                                 |
| Ram et al. (2021) [63]                 | Nepal              | Cross- sectional | Quantitative               | 412 households (adult head) <sup>a</sup>                                                    | Rural, Unprotected Area                | Conflict     | Elephants                                        |
| Redmore et al. (2020) [4]              | Botswana           | Longitudinal     | Mixed                      | 150 adults (men = 41, women 95) <sup>b</sup>                                                | Rural, Protected Area                  | Conflict     | Elephants                                        |
| Rubino and Doubleday (2021) [64]       | India              | Field research   | Qualitative                | 416 adults (men = 202, women = 214)                                                         | Rural, Protected Area                  | Conflict     | Tigers                                           |
| Silwal et al. (2017) [65]              | Nepal              | Longitudinal     | Quantitative               | 329 victims and relatives/eyewitnesses (5 children; males = 247; females = 82) <sup>b</sup> | Rural, Protected Area                  | Conflict     | Rhinos, Elephants, Tigers, other animals         |
| Sultana and Dey (2021) [66]            | Bangladesh         | Field research   | Qualitative                | 30 widows (all women)                                                                       | Rural, Protected Area                  | Conflict     | Tigers                                           |
| Suryawanshi et al. (2014) [67]         | India              | Cross sectional  | Quantitative               | 381 adults (men = 217, women = 164)                                                         | Rural, Unprotected Area                | Conflict     | Bharals, Leopards, Foxes                         |

**Table 3.** *Cont.*

| Citation                              | Country           | Design          | Method (Type)              | Participants                                                   | Location                | Type of HWIs              | Animals Involved     |
|---------------------------------------|-------------------|-----------------|----------------------------|----------------------------------------------------------------|-------------------------|---------------------------|----------------------|
| van de Water and Matteson (2018) [68] | Thailand          | Cross-sectional | Quantitative               | 410 households (adult men and women) <sup>a</sup>              | Rural, Protected Area   | Conflict and Coadaptation | Elephants            |
| Venkataraman et al. (2021) [69]       | India             | Cross-sectional | Quantitative               | 950 households (men = 921, women = 29)                         | Rural, Protected Area   | Conflict and Coadaptation | Lions                |
| Venkataramana et al. (2015) [70]      | India             | Cross-sectional | Quantitative               | 90 adults (men= 70, women = 20)                                | Rural, Protected Area   | Conflict and Coadaptation | Elephants            |
| Wieland (2008) [40]                   | Republic of Congo | Field research  | Qualitative + Quantitative | 3342 surveys of 120 households <sup>a</sup>                    | Rural, Protected Area   | Conflict                  | Gorillas, Crocodiles |
| Wojnowski (2010) [71]                 | Kenya             | Field research  | Qualitative                | 150 women                                                      | Rural, Protected Area   | Conflict                  | Snakes               |
| Yang et al. (2010) [72]               | China             | Cross-sectional | Quantitative               | 176 Yi people and 96 Mosuo people (men and women) <sup>a</sup> | Rural, Unprotected Area | Coadaptation              | Bears                |
| Zuluaga et al. (2021) [73]            | Colombia          | Cross-sectional | Quantitative               | 172 households (men = 95, women = 77)                          | Rural, Protected Area   | Conflict                  | Eagles               |

**Notes:** Gender (self-identified) reported when available. <sup>a</sup> Number of participants, by age and/or gender unspecified. <sup>b</sup> Remainder of sample were “key informants”, gender unspecified.

### 3.2. Causes of Human–Wildlife Interactions (HWIs)

The reviewed studies identified several common causes of HWIs and HWC. However, these causes were not backed by empirical data from the studies themselves. Instead, they were referenced from secondary sources mentioned in the studies. *The proximity of human settlement zones to forest areas* is one of the major causes of HWIs ( $n = 10$ ) [23,25,41,47,56,58,60,62,67,74]. Humans living close to forest land domesticate many wild animals and plants [56] as cited in [75]. The animals are often migrating out of the forest possibly because they share a water pool or some common corridor [23,67]. *The problem of expansion, deforestation, and encroachment of animal space* ( $n = 6$ ) is another major environmental concern that gives rise to HWC [4,49,57,61,63,73]. Due to the expansion of agricultural land and fragmentation of forest land animals often enter the abutting rural agricultural community and cause conflict by attacking humans, which in turn leads to poaching and killing of animals such as chimpanzees [57] as cited in [74,76–79]. Another pertinent observation in [63] is that land encroachment for urbanization (i.e., for the creation of railways, electric transmission lines, and irrigation canals) obstructs the movement of animals and disturbs them and that this is another valid cause of HWC.

The forests are the storehouse of resources and many people residing close to forests *rely on forests for income, employment, and livelihood*. Four studies strongly identified forest dependence as a source of conflict [17,26,50,66]. Two kinds of dependency take place due to poverty and lack of employment opportunities: first, the use of natural resources of forests like water, food, and wood for fuel; and second, poaching of animals and illegal sale of these animals as commodities. Massé et al. [17] mentioned how a criminal syndicate in Mozambique supports commercial poaching of rhinos to sell their horns in the market for hefty sums. This activity results not only in the killing of rhinos, but also the death of some poachers who risk their lives pursuing these animals. Again, studies on Sundarbans show how impoverished people of that locality residing close to the rich dense mangrove forest are economically dependent on the forest for fishing, fuel, and honey. Upon entering the forest to collect such provisions, people are sometimes attacked by tigers [51,66]. Many carnivores such as tigers have been placed on lists of endangered species, prompting forest authorities to *reintroduce carnivores like tigers* into reserves which is a risk factor for HWC. Four studies mentioned that the Sarika Tiger Reserve often faces HWC due to the tigers brought there from the Ranthambore National Park [39,52,53,64].

*Wild animals sometimes come into human localities* ( $n = 2$ ) because people in rural areas often dispose waste negligently, especially livestock carcasses. Scavengers like wolves arrive in search of food [59] as cited in [80,81] and may attack people [65] as cited in [82,83].

### 3.3. Geographic Coverage and Extent of Human–Wildlife Interactions (HWIs)

In terms of *location*, the included studies described HWIs in Africa ( $n = 15$ ), Asia ( $n = 24$ ), North America ( $n = 1$ ), and South America ( $n = 1$ ) (Tables 2 and 3, and Figure 3). In two review studies, the scope was global or the exact location of the studies was not mentioned by the authors. In Africa, over 60% of the studies originated in Kenya ( $n = 4$ ), Ghana ( $n = 2$ ), and Namibia ( $n = 2$ ) (Table 3). In Asia, fifteen studies were from India, including the Himalayan ( $n = 6$ ), the Desert ( $n = 5$ ), the Delta ( $n = 3$ ), and the Peninsular ( $n = 1$ ) regions, followed by Nepal ( $n = 3$ ). In North America, a study was conducted in the United States of America and in South America, a study was conducted in Colombia. Almost all studies on HWIs were conducted in rural areas ( $n = 40$ ), including both in and around protected areas ( $n = 27$ ) such as national parks, reserves, sanctuaries, and conservancies, as well as unprotected areas ( $n = 13$ ). One study was conducted in a semi-urban area ( $n = 1$ ) and another two included both rural and urban areas ( $n = 1$ ).

(Tables 2 and 3). The reviewed studies did not provide specific information on the frequency and duration of HWIs.

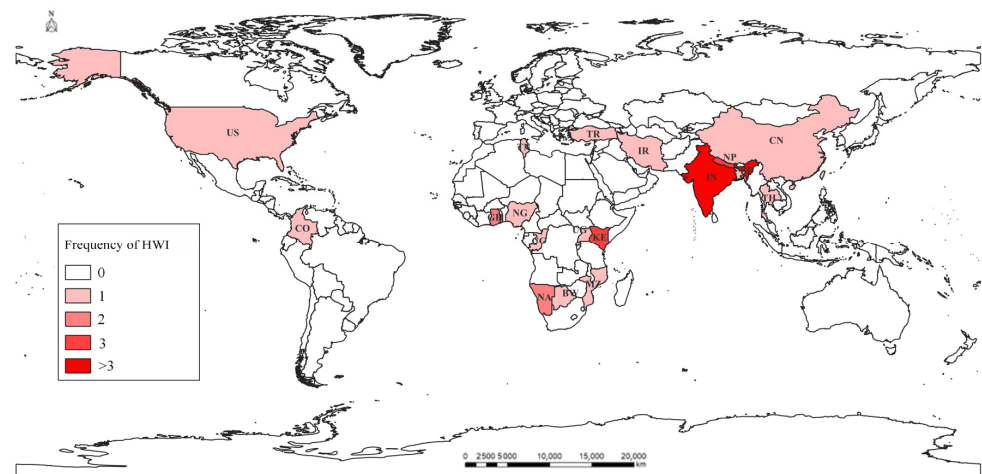


**Figure 3.** Geographic distribution of studies focusing on the impact of HWIs on women and children within the retained sources of evidence ( $n = 42$ ).

### 3.4. Nature of Human–Wildlife Interactions (HWIs)

HWIs can be divided into conflict (i.e., negative interactions leading to negative outcomes), neutral interaction (i.e., ambivalent human attitudes and behavior towards wildlife), and coexistence/coadaptation (i.e., people and wildlife coadapt to shared environments) [5–7]. No study on neutral interaction was present. While most of the retained publications ( $n = 32$ ) report conflict, we found coadaptation in three studies, and both conflict and coadaptation in seven studies (Tables 3 and S2).

The most frequently reported types of conflicts are the human–tiger and human–elephant conflicts ( $n = 22$ ) even though in those forest areas conflict with other animals could also be found (Table 3). Among these 22 studies, eight studies focused (almost) exclusively on tigers as the HWC creating wild carnivore. Half of the latter were from the same location in Sundarbans ( $n = 3$  from Eastern India and  $n = 1$  from Southern Bangladesh) [26,50,51,66]. Three studies were from the Sarika Tiger Reserve in Rajasthan (India) [41,60,61]. Four studies exclusively mentioned elephants as a source of HWC and 19 publications mentioned HWC with different animals like chimpanzees, monkeys, wolves, bears, leopards, jackals, lions, hyenas, and rhinos (Table 3). Only one study in [73] mentioned a bird (i.e., eagle)–human conflict and one study in [71] exclusively focused on reptile (snake)–human conflict, though four other studies mentioned crocodiles along with other animal conflicts.

### 3.5. Impact of Human–Wildlife Interactions (HWIs) on Women and Children

Both HWIs and HWC had various physical, psychological, economic, social, and environmental impacts on women and children, individually and collectively (Tables 4, 5 and S2). Twelve studies mentioned that women collectively suffered physical harm/injuries, disabilities, and abuse, while some women faced death, as well ( $n = 6$ ) (Table 4). Women also encountered many psychological and emotional consequences, including suicidal attempts, grief with chronic and disabling PTSD syndrome, and psychological abuse due to negative attitudes toward the victims. For example, several studies described women’s collective outcomes, including “fear of being attacked and losing crops and other resources” ( $n = 8$ ), “anxiety, sleepless nights, and insecure feelings” ( $n = 4$ ), “humiliation” ( $n = 1$ ), and “guilt for the death and physical harm of their family members” ( $n = 1$ ) (Table 4). Women also lost resources, household wealth, and food individually ( $n = 5$ ) and collectively ( $n = 16$ ).

due to crop and property damage because of HWC (Table 4). Two studies particularly indicated that women also became victims of violence, low-paid employment, and trafficking due to the HWC (Table 4). In contrast, two studies highlighted that HWIs sometimes contributed to increasing women's participation in economic activities (Table 4). A few studies mentioned social outcomes of HWIs that women faced collectively. For example, ref. [56] mentioned "increased unpaid household (care) activities". Three additional studies highlighted the "indirect impact on socio-economic status, social role, and social protection". Another study pointed out the "migration of the other family members". One study underscored the "loss of access to health care and education", while another mentioned "increased socio-economic and life risks". A particular study emphasized the "shift in gender roles, illustrating how women became involved in economic activities or men lost their income sources" due to the HWC and HWIs (Table 4). Women, collectively, faced some environmental outcomes, as well. For example, ref. [44] indicated that women were disproportionately affected by the loss of natural resources due to heavy reliance on the goods and services provided by nature.

Focus on the individual and collective outcomes of HWIs for children was notably scarce (Table 5). Five studies indicated that children faced physical impacts of HWIs such as skin ulcers, physical harm/injury, and even death. Psychological impacts of HWIs and HWC were also noted for children collectively. For example, five studies indicated that children were often afraid of being attacked by wild animals. Similarly, some studies mentioned that children also felt insecure ( $n = 2$ ) and suffered from grief ( $n = 1$ ) and stress or anxiety ( $n = 3$ ). A few economic outcomes were also identified ( $n = 5$ ). Children's progression in their career-building process was reported to suffer due to HWIs and HWC. Children faced difficulties in paying school fees and were often forced to get involved in paid work and to participate actively in bushmeat hunting. Moreover, Reference [66] indicated that children lost their rightful share of their inheritance after their father was killed by wild animals. Finally, there were some social impacts of HWIs that negatively affected children's performance in national exams and long-term performance in life [56]. Similarly, many children dropped out of formal education in favor of lucrative earnings to make a living [26].

### 3.6. Human–Wildlife Interaction (HWI) Perceptions in Different Cultures and Societies

The number of studies exploring perceptions of HWIs in different cultures or societies was limited, particularly those focusing on children. Six themes were identified in the publications retained for full extraction and are presented next, according to their frequency of occurrence.

*Gendered division of roles* ( $n = 16$ ). Authors highlighted the rigid and complex gendered division of roles that position women as caregivers and men as providers in agricultural zones in Mozambique, India, Ghana, Nepal, Nigeria, Namibia, and Thailand [17,22–24,44,47,49,60–64,68]. Importantly, men often have an impermeable position at the top of the family hierarchy in these communities [39,52,72].

*Vulnerabilities of women* ( $n = 8$ ). Multi-factor vulnerabilities of women regarding HWIs were highlighted in studies from Uganda, India, Kenya, Turkey, and Ghana [39,46,49,53,57,58,70,71]. Specifically, women feared dangerous encounters with animals, like elephants and tigers, while trying to access natural resources to provide for their families.

**Table 4.** References addressing individual and collective outcomes of HWIs for women.

| Types of Outcomes | Thematic Category/Grouping                                                                                   | Individual Outcomes |                                                                                                                         | Collective Outcomes |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------|--------------------------------------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                                                                                                              | No. of Sources      | Citation                                                                                                                | No. of Sources      | Citation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Physical          | Physical harm/injuries/disabilities/abuse due to HWC                                                         | 2                   | Ogra (2008) [60]; Rubino and Doubleday (2021) [64]                                                                      | 12                  | Bampasidou et al. (2021) [48]; Chowdhury et al. (2016a) [50]; Chowdhury et al. (2008) [26]; Doubleday (2020) [52]; Doubleday and Rubino (2022) [53]; Khumalo and Yung (2015) [22]; Manoa et al. (2021) [56]; Massé et al. (2021) [17]; Ogra (2009) [61]; Ogra (2008) [60]; Ram et al. (2021) [63]; Venkataramana et al. (2015) [70]                                                                                                                                                                                                   |
|                   | Death                                                                                                        | 1                   | Chowdhury et al. (2008) [26]                                                                                            | 6                   | Khumalo and Yung (2015) [22]; Manoa et al. (2021) [56]; Ogra (2009) [61]; Ogra (2008) [60]; Ram et al. (2021) [63]; Venkataramana et al. (2015) [70]                                                                                                                                                                                                                                                                                                                                                                                  |
| Psychological     | Suicidal attempt by “tiger widows”                                                                           | 1                   | Chowdhury et al. (2016a) [50]                                                                                           | 0                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                   | Grief, chronic and disabling post-traumatic stress disorder (PTSD) syndrome                                  | 1                   | Chowdhury et al. (2016a) [50]                                                                                           | 1                   | Chowdhury et al. (2016a) [50]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                   | Negative attitude (mental torture) towards “tiger widows”/stigma                                             | 2                   | Chowdhury et al. (2008) [26]; Sultana and Dey (2021) [66]                                                               | 3                   | Chowdhury et al. (2016a) [50]; Chowdhury et al. (2008) [26]; Chowdhury et al. (2016b) [51]                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                   | Fear of being attacked, loosing crops/resources                                                              | 2                   | Khumalo and Yung (2015) [22]; Wojnowski (2010) [71]                                                                     | 8                   | Campbell (2009) [49]; Doubleday (2018, 2020) [39,52]; Doubleday and Rubino (2022) [53]; Khumalo and Yung (2015) [22]; McLennan and Hockings (2015) [42]; Ogra (2009) [61]; Ogra (2008) [60]; Venkataramana et al. (2015) [69]                                                                                                                                                                                                                                                                                                         |
|                   | Sleepless nights, anxiety, and feelings of insecurity                                                        | 0                   |                                                                                                                         | 4                   | Collaborative Partnership on Sustainable Wildlife Management (2016) [24]; Khumalo and Yung (2015) [22]; Manoa et al. (2021) [56]; Rubino and Doubleday (2021) [64]                                                                                                                                                                                                                                                                                                                                                                    |
|                   | Humiliation and molestation by forest guards                                                                 | 0                   |                                                                                                                         | 1                   | Ogra (2008) [60]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                   | A sense of guilt                                                                                             | 0                   |                                                                                                                         | 1                   | Chowdhury et al. (2016a) [50]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Economic          | Livelihoods under threat due to a decrease in the resources/household-wealth/food after crop/property damage | 5                   | Khumalo and Yung (2015) [22]; Massé et al. (2021) [17]; Ogra (2009) [61]; Ogra (2008) [60]; Sultana and Dey (2021) [66] | 16                  | Baker et al. (2014) [47]; Bampasidou et al. (2021) [48]; Collaborative Partnership on Sustainable Wildlife Management (2016) [24]; Doubleday (2020) [52]; Doubleday and Rubino (2022) [53]; Khumalo and Yung (2015) [22]; Manoa et al. (2021) [56]; McLennan and Hill (2012) [57]; Mir et al. (2015) [58]; Mohammadi et al. (2021) [59]; Ogra and Badola (2008) [25]; Ogra (2008) [60]; Prateek and Knopf (2020) [62]; Suryawanshi et al. (2014) [67]; Venkataramana et al. (2015) [70]; Wieland (2008) [40]; Yang et al. (2010) [72] |
|                   | Increased active participation in economic activities                                                        | 0                   |                                                                                                                         | 2                   | Afriyie et al. (2021) [23]; Wieland (2008) [40]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

Table 4. Cont.

| Types of Outcomes | Thematic Category/Grouping                                                                                                                                | Individual Outcomes |                                  | Collective Outcomes |                                                                                       |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------|---------------------|---------------------------------------------------------------------------------------|
|                   |                                                                                                                                                           | No. of Sources      | Citation                         | No. of Sources      | Citation                                                                              |
| Economic          | Victims of domestic violence, low paid employment, and trafficking due to the HWC                                                                         | 0                   |                                  | 2                   | Chowdhury et al. (2016a) [50]; Doubleday (2018) [39]                                  |
|                   | Living a poor life                                                                                                                                        | 0                   |                                  | 1                   | Garnier et al. (2020) [44]                                                            |
| Social            | Increased unpaid household (care) activities                                                                                                              | 0                   |                                  | 1                   | Manoa et al. (2021) [56]                                                              |
|                   | Many indirect impacts like changes in socio-economic status, social role, loss of social protection                                                       | 0                   |                                  | 3                   | Chowdhury et al. (2016a) [50]; Khumalo and Yung (2015) [22]; Massé et al. (2021) [17] |
|                   | Migration of other family members                                                                                                                         | 0                   |                                  | 1                   | Ogra (2008) [60]                                                                      |
|                   | Loss of access to health care and education                                                                                                               | 0                   |                                  | 1                   | Wieland (2008) [40]                                                                   |
|                   | Increase in socio-economic and life risk                                                                                                                  | 0                   |                                  | 1                   | Doubleday (2018) [39]                                                                 |
|                   | Changed gender roles                                                                                                                                      | 0                   |                                  | 1                   | Ogra (2008) [60]                                                                      |
|                   | Spiritual                                                                                                                                                 | 0                   |                                  | 0                   |                                                                                       |
| Environmental     | Disproportionately affected by the loss of natural resources due to heavy reliance on nature's goods and services                                         | 0                   |                                  | 1                   | Garnier et al. (2020) [44]                                                            |
| Other             | Men do not recognize women's challenges related to HWIs                                                                                                   | 1                   | Rubino and Doubleday (2021) [64] | 0                   |                                                                                       |
|                   | Women's attitudes towards wildlife are more negative than that of men                                                                                     | 1                   | Mir et al. (2015) [58]           | 0                   |                                                                                       |
|                   | Women's vulnerability to HWIs/HWC is enhanced by the confluence of traditional family hierarchy, religion, environmental positionality, and other factors | 0                   |                                  | 1                   | Doubleday (2020) [52]                                                                 |
|                   | Women facing challenges due to HWIs/HWC can recover from a loss by buying food or pursuing other livelihood paths if they have other resources            | 0                   |                                  | 11                  | Khumalo and Yung (2015) [22]                                                          |
|                   | Women showed resistance to conserving wild animals like elephants                                                                                         | 0                   |                                  |                     | Venkataramana et al. (2015) [70]                                                      |

**Table 5.** References addressing individual and collective outcomes of HWIs for children.

| Types of Outcomes | Thematic Category/Grouping                                               | Individual Outcomes |                                                          | Collective Outcomes |                                                                                                                                                         |
|-------------------|--------------------------------------------------------------------------|---------------------|----------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                                                                          | No. of Sources      | Citation                                                 | No. of Sources      | Citation                                                                                                                                                |
| Physical          | Skin ulcers                                                              | 1                   | Lubinza et al. (2020) [55]                               | 1                   | Lubinza et al. (2020) [55]                                                                                                                              |
|                   | Physical harm/injury                                                     | 1                   | McLennan and Hockings (2015) [42]                        | 2                   | McLennan and Hill (2012) [57]; Mohammadi et al. (2021) [59]                                                                                             |
|                   | Death                                                                    | 2                   | McLennan and Hockings (2015) [42]; Wojnowski (2010) [71] | 1                   | Mohammadi et al. (2021) [59]                                                                                                                            |
| Psychological     | Fear (of being attacked)                                                 | 0                   |                                                          | 5                   | Chowdhury et al. (2016a) [50]; Manoa et al. (2021) [56]; McLennan and Hill (2012) [57]; McLennan and Hockings (2015) [42]; Mohammadi et al. (2021) [59] |
|                   | Feeling insecure                                                         | 0                   |                                                          | 2                   | Campbell, M (2009) [49]; Chowdhury et al. (2016a) [50]                                                                                                  |
|                   | Grief/traumatic grief                                                    | 0                   |                                                          | 1                   | Chowdhury et al. (2016a) [50]                                                                                                                           |
|                   | Stress/trauma/anxiety                                                    | 0                   |                                                          | 2                   | Chowdhury et al. (2016a) [50]; Manoa et al. (2021) [56]; Massé et al. (2021) [17]                                                                       |
| Economic          | Poor progression in student careers                                      | 0                   |                                                          | 1                   | Manoa et al. (2021) [56]                                                                                                                                |
|                   | Difficulties in paying school fees                                       | 0                   |                                                          | 1                   | Wieland (2008) [40]                                                                                                                                     |
|                   | Sending children out to work                                             | 0                   |                                                          | 1                   | Chowdhury et al. (2016a) [50]                                                                                                                           |
|                   | Active participation in bushmeat hunting                                 | 0                   |                                                          | 1                   | Lubinza et al. (2020) [55]                                                                                                                              |
|                   | Losing the rightful share of their inheritance                           | 0                   |                                                          | 1                   | Sultana and Dey (2021) [66]                                                                                                                             |
| Social            | Negative performance in national exams and long-term performance in life | 0                   |                                                          | 1                   | Manoa et al. (2021) [56]                                                                                                                                |
|                   | School dropout in favor of lucrative earnings                            | 0                   |                                                          | 1                   | Chowdhury et al. (2008) [26]                                                                                                                            |
| Spiritual         |                                                                          | 0                   |                                                          | 0                   |                                                                                                                                                         |
| Environmental     |                                                                          | 0                   |                                                          | 0                   |                                                                                                                                                         |
| Other             |                                                                          | 0                   |                                                          | 0                   |                                                                                                                                                         |

*Profound religious beliefs towards wildlife (n = 5).* Reference [59] in Iran, Reference [47] in Nigeria, and Reference [72] in China, discussed the perspectives of Muslim, Christian, and Buddhist communities, respectively regarding the elimination of certain wild animals that compete for food and resources. Similarly, Reference [66] documented the strong faith of villagers in a forest deity in Bangladesh, which provides a sense of protection against wildlife attacks. They emphasized the role of wives, who are tasked with conducting traditional spiritual rituals, with the aim of ensuring their husbands' safe and successful interactions with wildlife in the forest. Importantly, many of these traditional religious and spiritual teachings have resulted in positive effects for wildlife conservation [72]. Lastly, Reference [45] reported the belief of primary school pupils that God is the only "owner" of wildlife in Kenya.

*Low participation of women in decision-making (n = 5).* Women and girls remain underrepresented in governance structures and processes in most contexts. Five studies highlighted the connection between the socio-economic status of rural women and their limited participation in decision-making. This is despite the crucial roles they play in extracting natural resources, managing land use, and educating their children [53]. While Reference [62] did not provide a specific reason for the low participation of women in the management of forests in India, Reference [24] found that the unequal access to forest resources based on gender was a contributing factor to women's limited influence on the decision-making processes related to wildlife management. One example highlighted the constraints on women's time and budget, which limited their ability to access forest offices in India [61]. Rubino and Doubleday [64] identified another barrier to women's participation at the community level, noting a disregard for women's perspectives on the process of reintroducing tigers in the Sariska National Park in India.

*Social superstition against tiger widows (n = 3).* Beliefs and superstitions surrounding death by HWIs are common in certain societies and result in stigma and ostracization of widows and orphan children. Most notably, three publications described widespread stigma against tiger widows in Bangladesh and India stemming from the social belief within patriarchal communities that widows are somehow unholy and evil in patriarchal communities [26,50,51,60,66]. The authors claimed that these discriminatory social practices have created cultural oppression and severe social alienation.

*Social and cultural perceptions of coexistence (n = 2).* Lastly, the social and cultural views on coexistence with wildlife differ and can shape the way various communities manage or negotiate the shared space between humans and wildlife. Only two publications discussed the perceptions of HWC, specifically in Indian villages [61,70]. The authors emphasized that meeting the basic needs of forest dwellers and their selective tolerance towards certain species (for instance, preferring lions over leopards) play important roles in the coadaptation of humans and wildlife.

### 3.7. Mitigation Strategies for Human–Wildlife Interactions (HWIs)

Four interventions were presented to mitigate HWIs. First, *compensation schemes to mitigate the negative impacts of HWC (n = 3)*. For instance, Reference [26] noted that the government in Sundarbans, Eastern India, initiated an insurance program for honey collectors that provides them with coverage up to INR 50,000 (roughly equivalent to USD 600). This is particularly significant as these individuals frequently often venture deep into the dense forests, putting their lives at risk due to the presence of Royal Bengal tigers. Similarly, Reference [51] documented a case where a family received compensation from the Forest Department. Although insurance agencies often deceive families, some widows have received assistance in the form of INR 10,000–25,000 [51]. Second, *local residents derived simple techniques to protect themselves (n = 2)* like men visiting forests with a stick, sickle, or

large knife as a protection weapon; keeping the areas around the house clean; and avoiding the forest during the monsoon. Women, on the other hand, avoided wearing red colored attire in the forest [22,41]. Third, *government and locals worked together on mitigation measures* (n = 3). Researchers noted that locals used loud noises, such as firecrackers or drums, to deter wildlife, while the forest department set up elephant-proof trenches (EPTs) and solar fences [43,68,70]. However, surveys indicated that these methods were only effective when used in combination, not individually. Finally, *gender-differentiated livelihood and training opportunities* (n = 2). Reference [24] underlined how environmental education through direct experiences was used to help reduce women's fear of wildlife and increase their support for wildlife conservation. Ref. [43] reported various Tanzania-based organizations working on different models of HWC mitigation through training and equipment of women to promote coexistence.

Two studies [62,66] emphasized the importance of empowering women in mitigating HWC. *Women actively participated in leadership roles* within Village Forest Councils (Van Panchayats). In Almora municipality and Uttarakhand state, 6% and 10% of women respectively held the position of Sarpanch (village head) [62]. In the same vein, Reference [66] recognized "tiger widows" as holders of traditional skills and human capital. These women were connected to informal social networks, and some were part of formal groups/NGOs, facilitating cooperation and economic opportunities. References [4,22] highlighted *women's autonomy in decision-making* related to forest entry and seeking assistance for HWC prevention.

While some interventions like electric fences were deemed ineffective in mitigating HWC (e.g., [41]), traditional methods were still employed by many residents [70]. However, interventions that reduced impact, such as forest restoration, patrol teams, local education, and the inclusion of women in conflict management, were found to be beneficial [43,67,68]. Barriers to effective interventions for HWC mitigation were seldom reported. However, patriarchal societal norms were identified as a significant obstacle, limiting women's empowerment. Women, burdened with household work, lacked time and received less attention than men, resulting in their limited participation in HWC mitigation programs [61,62]. They also lacked self-confidence and a positive self-regard, considering themselves physically weak and inefficient in using firearms against animal attacks. Safety concerns arose when guarding fields alone at night, particularly for unmarried women [22] and required that they changed into non-bright clothes for forest visits [41]. Financial constraints further complicated the situation, with the poor still needing to enter the forest interiors for fire and fuel [26].

#### 4. Discussion

In this paper, we have described the literature that explicitly addresses the nature, causes, and impact of HWIs on the well-being of women and children globally. Collectively, the 42 articles in our review highlighted that despite the growing number of publications about HWIs, there is very limited attention to women and children in these contexts. This is compounded by epistemological limitations, such as widespread exclusion of young people and insufficient disaggregation of age, ethnicity, and other demographic groups in HWI studies. Moreover, the absence of any publications from Oceania, Europe, and other large parts of the world raises questions about the situation of women and children involved in HWIs in these contexts and the levels of awareness of their predicament among researchers, decision-makers, and the public in these locations. This is despite a diversity of methods used in the existing literature, wherein qualitative, quantitative, and mixed-methods studies were similarly represented.

The results of our scoping review indicate that HWIs predominantly lead to adverse effects on women and children, or at the very least, such negative outcomes are more frequently reported. Their livelihoods are often under threat due to HWIs as these interactions cause a decrease in resources, household wealth, and food [39,48,49]. They also live poor lives due to HWC. There are many psychological, social, and environmental outcomes for them, as well [17,22,25,61,66]. Women are affected more than men not because they are less capable, but because as Reference [12] points out, the burden of coping falls disproportionately on female members within poor households, traceable to women's already weak and further weakened (during calamity) bargaining position within the family. This unequal and gendered hierarchical social arrangement often makes women more vulnerable to HWIs. However, Agarwal also indicates that State efforts complemented by non-State interventions can enhance the coping mechanisms of "the vulnerable members". Similarly, some State and non-State supports can enhance the coping mechanisms of children to deal with HWIs.

Faced with the oftentimes negative consequences of HWIs, government bodies have come up with compensation techniques which are primarily monetary help for HWC survivors [26] or firewood and other materials [24]. Some governments also collaborate with local actors to create deterrents for animals to enter spaces where HWC can occur [68,70]. In the context of establishing mitigation measures, women take an active role, but only a few women are willing to voice their opinions in public and participate in effective decision-making. Moreover, researchers point out how oftentimes men do not give enough importance and opportunity to women [62,66], and the responsibility of household chores falls upon the female members of the household. The limited mobility of women late at night interferes with their participation in preventive measures [22,61].

Despite very limited attention in the literature to the social and cultural perceptions of HWI coexistence, our findings provide culturally relevant information to understand gender issues in several HWI and HWC zones. Cultural dimensions of human behavior towards wildlife can widen the understanding of how humans and wildlife coexist in a particular social, cultural, and ecological context [84]. In fact, identification of cultural similarities and differences across rural societies helped us make critical connections between gender and HWI coexistence. Studies in our review underlined that the cultural and social contexts of women in rural communities placed them at greater risk of HWIs as women were assigned the responsibility for the basic household subsistence [17,60,64]. These contexts included a confluence of caste, traditional family hierarchy, marital status, sociocultural beliefs, and religion. The analysis of such gender-related factors is crucial as a precursor to reducing the disproportionate burden of HWIs on women [85,86]. Enhancing gender and cultural awareness among the authorities in rural communities located at the borders of protected areas is another crucial step towards making progress on empowering the active participation of women in decision-making at family and community levels. Action-research on gender variations in HWIs in different cultural and geographic contexts is thus warranted. For instance, future research should explore the impact of HWIs on tiger widows and orphans, as well as the determinants and effects of HWIs on children of different ages.

This review is the first one to focus on how HWIs affect women and children cross-culturally. It followed a systematic process to identify and explore scholarly and gray publications from a range of sources. Another strength is the combination of various perspectives, as the research team is composed of members from diverse backgrounds in terms of country, culture, and discipline. Notwithstanding these strengths, our scoping review has some limitations. Focusing solely on the human perspective in HWC may have resulted in the exclusion of various types of HWIs such as wildlife tourism, hunting and

fishing, wildlife management, wildlife care, and wildlife–vehicle interactions where the perspectives of women—though not children, have been documented, and overlooked the broader context, including the impact on wildlife and the conditions in low-income countries where many of these activities occur. By restricting our search to research published and indexed by the English-language academic presses, it is possible that the experiences and writings from many non-English speaking countries were excluded. Despite attempts to be comprehensive, we may have missed some studies due to only screening the first hits in online searches (gray literature), and we did not contact experts for additional references. Our reports on women and children are based on the publications we reviewed. These publications often did not disaggregate the samples by age or gender and depended on the gender identified by the participants themselves. Finally, our scoping review is up to date as of July 2022.

## 5. Recommendations

This scoping review provides an analysis of 42 scholarly studies and highlights a critical deficiency in the existing body of research regarding the implications of HWIs on women and children globally. Despite a growing body of literature, most current studies inadequately address the gender- and age-specific repercussions of HWIs and show limited geographic representation, especially concerning regions such as Europe, Oceania, and the Americas. The findings indicate that HWIs often worsen the pre-existing vulnerabilities faced by women and children, adversely affecting their livelihoods, safety, and psychological well-being—factors influenced by structural inequalities, entrenched cultural norms, and restricted agency in decision-making processes. Although some interventions by both governmental and non-governmental entities have been implemented, the active participation of women remains hindered by prevailing social hierarchies and constraints on mobility. This review emphasizes the need for greater focus on inclusive, culturally sensitive, and gender-responsive methodologies in research and policymaking, advocating for cross-cultural and interdisciplinary investigations that can inform equitable and sustainable solutions to these pressing issues. It makes the following recommendations:

- **Expand Global Research Coverage:** Include underrepresented regions (Europe, Oceania, Americas) and ensure studies disaggregate data by age, gender, and other social factors.
- **Address Gender and Age Gaps:** Prioritize the inclusion of women and children in HWI research and planning; collect and report gender- and age-specific data.
- **Center Cultural Contexts:** Incorporate local cultural, religious, and social dynamics to better understand vulnerabilities and design appropriate responses.
- **Empower Women's Participation:** Support women's leadership in decision-making and wildlife management, particularly in rural areas.
- **Strengthen Institutional Responses:** Train authorities and NGOs in gender-sensitive, culturally aware approaches to HWI prevention and mitigation.
- **Support Community-Led Solutions:** Promote participatory strategies in research and intervention that directly engage women and children in HWI solutions. Through community-based participatory research, for example, men can learn of the vulnerabilities of women/children to HWIs, as well as their valuable roles in wildlife management.
- **Improve Compensation and Support:** Expand aid beyond financial assistance to include mental health support, livelihood assistance, and recognition of women's unpaid labor.
- **Advance Inclusive, Long-Term Research:** Invest in interdisciplinary, cross-cultural, and longitudinal studies on HWI impacts.

- Amplify Marginalized Voices: Publish in multiple languages and open-access formats to include non-English and Indigenous perspectives.
- Align with Global Goals: Connect HWI policies with SDGs, particularly those related to gender equality, education, and environmental justice.

**Supplementary Materials:** The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/world6020055/s1>. Table S1: Search strategy used for the scoping review on nature, causes, and impact of HWIs on women and children across cultures as constructed for the SCOPUS database. Table S2: Brief summary or findings from the retained sources of evidence.

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## Abbreviations

The following abbreviations are used in this manuscript:

|      |                                |
|------|--------------------------------|
| HWC  | Human–Wildlife Conflict        |
| HWIs | Human–Wildlife Interactions    |
| NGOs | Non-Governmental Organizations |
| Rs   | Rupees                         |

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