

Original Article

The Hidden Toll of a Wildlife Icon: Psychological Distress in Communities Affected by Human–Elephant Conflict; A Comparative Study

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Abstract

Background: Elephants are iconic tourist attractions, yet the human-elephant conflict is a significant global issue severely affecting the well-being, security and livelihood of people living in lower and middle income countries. This study compared the psychological distress of people affected by elephant attacks with those who were not affected.

Methods: This was a cross-sectional comparative study conducted in two villages with the same socio-demographic characteristics in Anuradhapura district, Sri Lanka. Village Bambarahela (experiencing frequent elephant attacks) and Village Maha Messalewe (never affected by Elephant attacks (EAs). Age, sex and occupation matched groups were recruited from both villages. The participants were categorized as distressed and not distressed using the GHQ-12 questionnaire.

Results: A total of 65 individuals from Bambarahela (HEC-affected village) and 61 individuals from Mahamessalawa (non-affected village) were recruited. Psychological distress was identified in 8 participants (12.3%) from Bambarahela, whereas none of the participants from Mahamessalawa met the GHQ-12 cut-off for psychological distress. This difference was statistically significant (Fisher's exact test, $p=0.006$). In item-level analysis of the GHQ-12 questionnaire, participants from Bambarahela demonstrated significantly higher proportions of psychologically adverse responses in 7 out of the 12 questionnaire items compared to participants from Mahamessalawa ($p<0.05$).

Conclusion: These results indicate a possible threat to the mental health of the people residing in villages affected by EAs. Therefore, prudent actions are needed to improve their mental health.

Keywords: Psychological distress, elephants, mental health, Sri Lanka

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Introduction

Human–elephant conflict (HEC) is a major problem affecting both elephants and humans, mainly in Asia and Africa. It affects the physical, psychological, and social well-being and livelihoods of people living in affected communities. Due to human activities such as habitat destruction and fragmentation, the distribution of elephants has become increasingly limited. At present, wild elephants are mainly found in Asia and Africa, particularly in tropical and subtropical regions [1].

At the beginning of the 20th century, Asia had an estimated elephant population of around 100,000. However, this number has now declined to nearly 40,000. Sri Lanka is home to approximately 4,000–5,000 Asian elephants, which are classified as endangered by the IUCN Red List 2007. HEC is considered one of the major environmental and socioeconomic problems affecting rural communities in Sri Lanka. Human activities such as deforestation, fragmentation of elephant habitats, and reduced availability of food and water for elephants have contributed significantly to this issue [2].

As a result of HEC, Sri Lanka reports around 200–250 elephant deaths, 60–80 human deaths, 70 human injuries, and nearly 1,400 incidents of property damage with considerable crop destruction annually [3–6]. According to global reports, Sri Lanka has recorded the highest annual elephant deaths and the second-highest human deaths related to HEC [2]. Over the past decades, both elephant and human deaths due to HEC have increased [5]. In addition to deaths and injuries, crop and property damages caused by HEC have also increased considerably. Several measures have been implemented to reduce HEC, including electric fences, elephant holding grounds, and elephant drives. However, a clear reduction in HEC has still not been observed [3,4]. HEC has been reported in 19 districts of Sri Lanka. Between 2010 and 2019, a total of 14,516 HEC-related incidents were reported, including 807 human deaths, 579 human injuries, 10,532 property damage incidents, and 2,631 elephant deaths. Male deaths were reported more frequently than female deaths due to the conflict [2].

To our knowledge, no previous studies in Sri Lanka or other HEC-affected countries have specifically assessed the mental health impact of elephant attacks on affected communities. As HEC is becoming an increasingly serious issue in Sri Lanka, there is a possibility that residents living in affected areas may experience a considerable psychological burden. The objective of this study was to compare psychological distress between people living in villages affected and not affected by

elephant attacks in the Kahatagasdigiliya Divisional Secretariat area of the Anuradhapura district.

Methods

We conducted a cross-sectional comparative study from January 2021 to September 2021. The sample size was calculated to compare two proportions using prevalence estimates from previously published studies conducted in similar settings, as no directly comparable data were available for this population [7]. Based on a 95% confidence level and 90% power, the minimum required sample size was 58 participants per group. Adult permanent residents aged 18 years and above were included in the study, while individuals with significant communication difficulties, severe visual impairment, or mental disability were excluded.

The study was carried out in the Kahatagasdigiliya Divisional Secretariat area in the Anuradhapura District of Sri Lanka, which has been identified as one of the areas most affected by human–elephant conflict (HEC) according to District Secretariat records [8]. The village of Bambarahela was selected as the high-risk area because it had experienced recurrent elephant attacks, including at least two reported deaths since 2015, with the most recent fatality occurring shortly before the study period (Figure 1). In addition to these incidents, villagers had experienced repeated crop damage and property loss. Discussions with local administrative authorities indicated that a considerable proportion of households had been affected either directly or indirectly by HEC. Elephant encounters were reported to occur intermittently, often showing seasonal patterns, and some households had experienced multiple incidents. The time since the most recent encounter ranged from recent incidents to several months prior to data collection.

For comparison, the village of Mahamessalawa was selected as a low- or no-risk area for HEC, as there were no reported elephant attacks (Figure 1). The two villages are located within the same divisional secretariat area and share similar socioeconomic characteristics. Both are situated in the dry zone and are mainly inhabited by Sinhala-Buddhist farming communities, whose livelihoods depend largely on maize and paddy cultivation. The study groups were also matched for age and sex to ensure comparability [8]. (Figure 1)

We used a 0–1–2–3 scoring method for each GHQ-12 response option. According to the validation study of the Sinhala-translated questionnaire, the optimal cut-off value was defined as obtaining a score of 2 or 3 for at least 6 items [6]. In addition to the overall GHQ-12 assessment, individual item responses were also analysed separately. For item-level analysis, responses scored as 0 or 1 were considered indicative of the

absence of psychological difficulty for that item. In contrast, responses scored as 2 or 3 were considered indicative of the presence of psychological difficulty for that item [9].

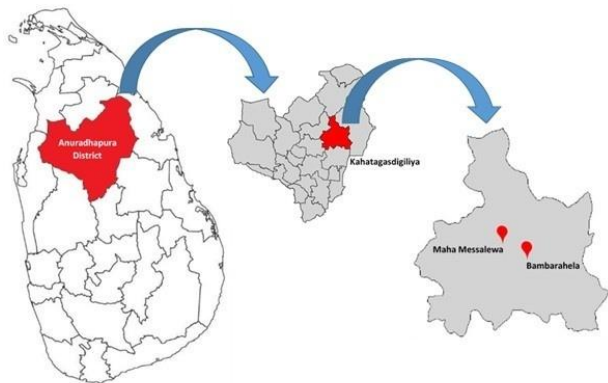


Figure 1: Location of the two villages in Anuradhapura District, Sri Lanka

In the quantitative component of the study, the GHQ-12 questionnaire was administered to assess psychological distress. Data were collected using a self-administered format with clear instructions provided to participants. Basic sociodemographic information was also collected. Personal identification details were obtained only with participant consent to enable appropriate referral for further evaluation and care when needed. Participants were clearly informed about the purpose of collecting such information, and their autonomy in providing these details was fully respected.

Data were entered and analysed using appropriate statistical software. The primary outcome variable was psychological distress, categorised based on the validated GHQ-12 cut-off. Proportions of distressed individuals between the two groups were compared using the Chi-square test, and Fisher's exact test was applied where appropriate. In addition, proportions of negative responses for individual GHQ-12 items were compared between groups. A p-value of less than 0.05 was considered statistically significant.

Ethical clearance was obtained from the Ethics Review Committee of the Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka (ERC/2021/42). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Results

A total of 126 participants were included in the study. Of them, 61 participants were from the non-affected village of Mahamessalawa, and 65 from the HEC-affected village of Bambarahela. Among the participants from Mahamessalawa, 28 (45.9%) were

males, and 33 (54.1%) were females. In Bambarahela, 31 (47.7%) were males, and 34 (52.3%) were females. There was no statistically significant difference in gender distribution between the two villages (Pearson chi-square = 0.041, $p = 0.841$). The mean age of participants from Bambarahela was 43.5 years ($SD = 13.5$), while the mean age of participants from Mahamessalawa was 42.8 years ($SD = 13.6$). There was no statistically significant difference in mean age between the participants from the two villages ($p = 0.772$).

When comparing psychological distress between the two villages, 8 out of 65 participants (12.3%) from Bambarahela met the GHQ-12 cut-off for psychological distress. In contrast, none of the 61 participants from Mahamessalawa met the cut-off. This difference was statistically significant (Fisher's exact test, $p = 0.006$).

In the item-level analysis of the GHQ-12 questionnaire, participants from Bambarahela showed higher proportions of psychologically adverse responses across several questionnaire items than those from Mahamessalawa, as shown in Table 1.

Table 1 shows the item-level analysis of the GHQ-12 questionnaire between the two villages. Participants from Bambarahela demonstrated significantly higher proportions of psychological difficulty in 7 out of the 12 GHQ-12 items compared to participants from Mahamessalawa. Statistically significant differences were observed in difficulties with concentration, feeling useful, enjoying day-to-day activities, facing problems, feeling reasonably happy, sleep disturbance due to worry, and feeling constantly under strain ($p < 0.05$). However, no statistically significant differences were observed for feeling capable of making decisions, inability to overcome difficulties, feeling unhappy or depressed, losing confidence, or feeling worthless ($p > 0.05$). Overall psychological distress, defined as scoring 2 or 3 in at least six GHQ-12 items, was significantly higher among participants from Bambarahela compared to Mahamessalawa (12.3% vs 0%; Pearson chi-square = 8.0, $p = 0.006$).

Discussion

The present study demonstrated a significantly higher level of psychological distress among residents of the village affected by human–elephant conflict (HEC) compared with the non-affected village. Overall psychological distress, assessed using the GHQ-12 questionnaire, was significantly higher among participants from Bambarahela, whereas none of the participants from Mahamessalawa met the GHQ-12 cut-off for psychological distress. Since the two villages were geographically close, socioeconomically comparable, and matched for age and sex, these

findings suggest that exposure to HEC may have contributed to the observed psychological burden.

Interestingly, the item-level analysis of the GHQ-12 showed a distinct pattern of psychological difficulty. Significant differences were mainly observed in items related to concentration, enjoyment of day-to-day activities, coping with problems, sleep disturbance due to worry, and feeling constantly under strain. However, items related to more severe negative self-perception,

such as loss of confidence and feelings of worthlessness, did not differ significantly between the two groups. This may suggest that residents exposed to HEC mainly experience chronic stress, worry, and disruption of daily functioning rather than severe depressive thoughts or marked negative self-worth. Repeated fear of elephant encounters, uncertainty regarding personal safety, crop destruction, and property damage may contribute to this pattern of psychological distress [1,4,10].

Table 1: Analysis of individual questions in the GHQ-12 Questionnaire

N o.	Question	Proportion of participants with psychological difficulty (GHQ – 2 or 3)		Pearson Chi-square	P value*
		Bambarahela (N=65)	Mahamessalawa (N=61)		
1	Been able to concentrate on what you're doing?	15 (23.1%)	0 (0%)	16.0	<0.001
2	Felt you were playing a useful part in things?	6 (9.2%)	0 (0%)	5.9	0.028
3	Felt capable of making decisions about things?	7 (10.8%)	1 (1.6%)	4.4	0.063
4	Been able to enjoy your normal day-to-day activities?	10 (15.4%)	2 (3.3%)	5.4	0.031
5	Been able to face up to your problems?	7 (10.8%)	0 (0%)	7.0	0.013
6	Been feeling reasonably happy, all things considered?	11 (16.9%)	1 (1.6%)	8.5	0.004
7	Lost much sleep over worry?	17 (26.2%)	3 (4.9%)	10.6	0.001
8	Felt constantly under strain?	13 (20.0%)	1 (1.6%)	10.7	0.001
9	Felt you couldn't overcome your difficulties?	7 (10.8%)	2 (3.3%)	2.7	0.166
10	Been feeling unhappy and depressed?	7 (10.8%)	1 (1.6%)	4.4	0.063
11	Been losing confidence in yourself?	3 (4.6%)	2 (3.3%)	0.2	1.000
12	Been thinking of yourself as a worthless person?	1 (1.5%)	1 (1.6%)	0.002	1.000
Overall Psychological distress (GHQ 2 or 3 for at least 6 items)		8 (12.3%)	0 (0%)	8.0	0.006

* Fisher's exact p-values are reported, as the assumptions for the chi-square test were not met.

HEC is a major environmental and socioeconomic issue affecting many countries in Asia and Africa [1,10]. Sri Lanka has reported one of the highest HEC burdens globally, with increasing numbers of human and elephant deaths, injuries, crop damage, and property

destruction over recent decades [2,5,6]. Previous studies on HEC have mainly focused on wildlife conservation, economic losses, physical injuries, and mitigation strategies [2–6]. In contrast, the mental health impact on affected communities has received relatively little

attention. Therefore, the present study provides preliminary evidence regarding the possible psychological impact of HEC on rural communities in Sri Lanka.

Current measures implemented to mitigate HEC in Sri Lanka mainly focus on reducing physical encounters through strategies such as electric fences, elephant drives, and other wildlife management approaches [3,4]. While these interventions are important, the findings of this study suggest that greater attention should also be given to the psychological well-being of affected communities. Psychological distress may negatively affect daily functioning, productivity, family well-being, and overall quality of life. Therefore, community-level mental health support and psychosocial interventions may be beneficial in addition to existing HEC mitigation measures.

Conclusion

Overall, the findings of this study suggest a significant psychological impact among residents living in villages affected by elephant attacks. Although current HEC mitigation strategies in Sri Lanka mainly focus on reducing physical damage and encounters, the mental health impact on affected communities appears to receive relatively less attention. Therefore, alongside existing mitigation measures, greater consideration should be given to the psychological well-being of affected populations. Further large-scale studies are needed better to understand the long-term mental health

consequences of HEC and to guide appropriate public health interventions.

Limitations

This study has several limitations. Because it was a cross-sectional study, it was not possible to establish a temporal or causal relationship between exposure to HEC and psychological distress. The relatively small sample size and non-random selection of villages may limit the generalizability of the findings. Although the groups were matched for age and sex, residual confounding due to unmeasured factors cannot be excluded. In addition, psychological distress was assessed using the self-reported GHQ-12 screening instrument [9], which may have resulted in misclassification. Exposure was assessed at the village level rather than at the individual level. Despite these limitations, this study provides useful preliminary evidence regarding the potential mental health impact of HEC and highlights the need for further longitudinal studies in affected communities.

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Competing interests

The authors declare that they have no competing interests.

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