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# Impact of Leopard Presence on the Daily Wages of Women Workers: A Case Study of Hingangaon Village

**Dr. Pravin Pannalal Gaikwad**

***Abstract***

*Human–leopard interaction is emerging as an important concern in rural Maharashtra, especially in sugarcane and horticulture landscapes where leopards use cultivated fields as shelter. This paper examines the perceived impact of leopard presence on the daily wage work of women in Hingangaon village (Maharashtra). Using a questionnaire from 150 women daily-wage workers of Hingangaon Village, Pune District. The study explores the association between level of leopard appearance (no appearance, occasional appearance, frequent appearance) and change in number of working days per month (no reduction, moderate reduction, high reduction). A chi-square test of independence is applied to test the relationship between these two categorical variables. The results show a highly statistically significant association ($\chi^2 = 47.70$, $df = 4$, $p < 0.001$), suggesting that frequent leopard appearance is strongly linked with a higher proportion of women reporting reduced working days. The study highlights how human–wildlife conflict, beyond physical attacks, can indirectly affect women's livelihoods, mobility and sense of security. Policy implications include the need for sensitization programmes, better night-time and early-morning safety arrangements, and livelihood support measures for affected women workers.*

***Keywords:*** *Human & wildlife conflict, leopard attacks*

## Introduction

Human–wildlife conflict has increased in many parts of India due to expansion of agriculture, infrastructure and settlements into wildlife habitats, and due to the ability of some species to adapt to human-dominated landscapes [1]. Among large carnivores, leopards (*Panthera pardus fusca*) are especially successful in using agricultural fields, orchards and village edges as habitat and hunting grounds. In Maharashtra, several recent reports highlight rising leopard encounters and attacks in districts such as Pune, Nashik and Ahmednagar, particularly in the Sugarcane belt[2][3].

While media and policy debates often focus on human injuries and livestock depredation, less attention is given to everyday livelihood impacts, especially on rural women who work as daily wageworkers in farms and orchards. Fear of leopard attacks may alter their timings of work; routes to fields, willingness to go alone, and in extreme cases may reduce their working days or push them to withdraw from certain types of work. This can have serious implications for household income, gendered workload and mental well-being.

The study area has experienced occasional presence and sightings of leopards in recent years according to local people and forest department reports. It also has the record of some attacks on animals like Goats, Sheeps, and small Cattles. Against this background, the present paper attempts to analyze the impact of leopard presence on daily wage women workers in Hingangaon.

## Objectives of the Study

The specific objectives of the study are:

To examine the association between level of leopard appearance and change in women workers' daily wage employment using a chi-square test of independence based on data collected through the questionnaire.

## Review of Literature

Human–wildlife conflict in India has been documented across a range of species including elephants, tigers, leopards and wild ungulates [1]. In many forest–agriculture interfaces, these conflicts take the form of crop damage, livestock depredation, property loss and occasional human injury or death, often followed by retaliatory killing of animals [1].

Leopard–human interactions in India have a long history. Vikas (2022) notes that leopards have caused thousands of human fatalities over the past century, but also that many populations now live in human-dominated landscapes, including urban and peri-urban areas [8].

Recent news reports from Maharashtra describe a "sugarcane landscape" where leopards use dense sugarcane fields as cover, leading to frequent encounters with farmers and labourers [2][3]. The sterilisation and relocation programmes initiated by the Maharashtra forest department aim to control the growing leopard population in human-use landscapes [4].

Several case reports and journalistic accounts point out gendered dimensions of such conflicts. Women, who often work as daily wage labourers in fields, collect fuelwood or water in early mornings or late evenings, and travel by foot along field bunds and canals, may face heightened vulnerability to carnivore attacks and related fear [5]. News stories from rural Maharashtra document women farmers wearing spiked neck bands or barbed-wire collars to protect themselves while working in fields due to leopard fear[6][7].

From a livelihood perspective, fear of predation and actual attacks can change labour patterns. Studies on wildlife conflict indicate that households sometimes avoid certain fields, change cropping patterns, or reduce night-time and early-morning work[5][8]. However, systematic quantitative research on how leopard presence affects women's daily wage work (number of working days, hours, and type of tasks) remains limited, especially at the village scale.

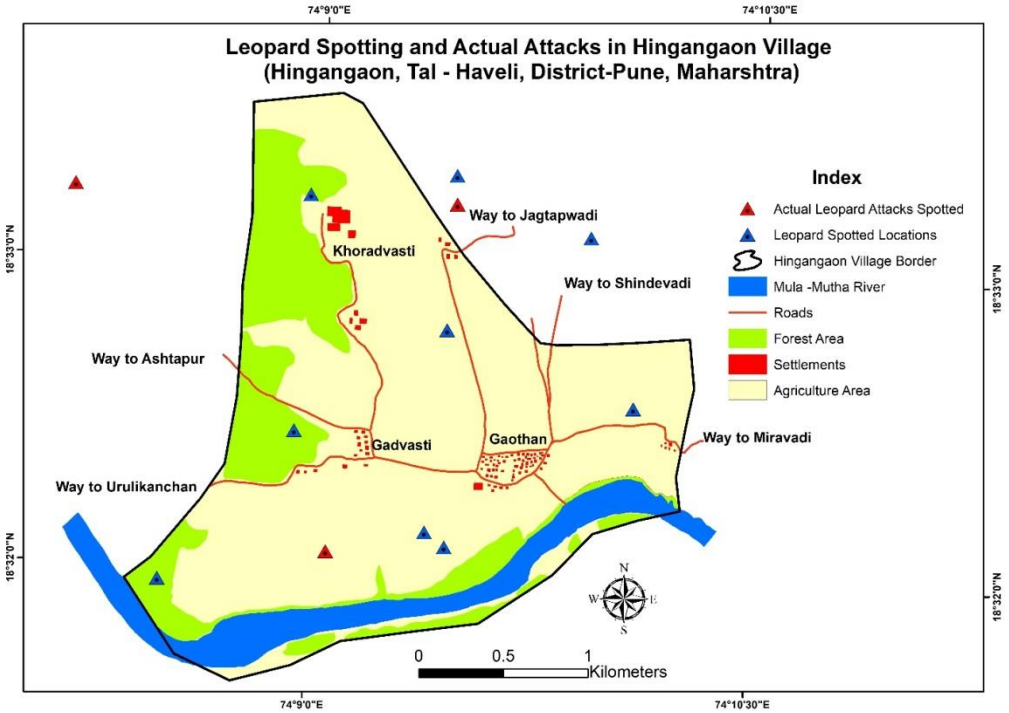
Theoretically, such impacts can be seen through the lens of livelihood security and gendered risk. Women's paid labour in rural India is often precarious, informal and unprotected. Any additional risk factor, such as leopard presence, can push families to restrict women's mobility or working hours, which may reinforce gender inequalities in income and decision-making.

**Methodology**

The study adopts a case study design focusing on Hingangaon village. For research purposes, a questionnaire survey conducted in the village on women daily wage workers. A stratified snowball sampling technique used to select the samples. A sample of 150 women daily wage workers is considered, with 50 respondents in each leopard appearance category (no appearance, occasional, frequent). The analysis uses a chi-square test of independence to examine the association between two categorical variables: level of leopard appearance and change in number of working days per month.

**Study Area**

Hingangaon village, located on the left bank of Mula Mutha River in the sugarcane-dominated belt of Haveli Tehsil, Pune District, western Maharashtra. The study area is relatively plane as per physiography is concerned and receives good amount of rainfall. The sugarcane is the dominant crop in the village and it provides shelter and protective climate to the leopards. Most of the agricultural fields are irrigated by the river Mula – Mutha, and it ultimately helps in increase in sugarcane producing area. The agriculture related work is most common job available in the village and it provide economic empowerment to the women's of the village. The village have its small dispersed settlements in the periphery of Gaothan and beacause of this the all small settlements (*vastis and Vadis*) are connected with the Gaothan by roads. Most of the roads have sugarcane fields at both side. Women's, who works in agricultural fields on daily wedges, have to walk through these roads to reach specific work location.




**Map:** Leopard Spotting and Actual Attacks in Hingangaon Village.

**Data Analysis**

The data collected through questionnaire are incorporated in SPSS software. A chi-square test of independence is used to test the null hypothesis.

H0: There is no significant association between level of leopard appearance and change in women's working days.

H1: There is significant association between level of leopard appearance and change in women's working days.
The chi-square test calculated as:

$$\chi^2 = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

**Where**, $O_{ij}$ is the observed frequency in cell (i, j), and $E_{ij}$ is the expected frequency given by

$$E_{ij} = \frac{(\text{Row total})_i \times (\text{Column Total})_j}{\text{Grand Total}}.$$

| Leopard appearance level | No Reduction | Moderate Reduction | High Reduction | Row total |
|---|---|---|---|---|
| No appearance | 40 | 8 | 2 | 50 |
| Occasional appearance | 20 | 22 | 8 | 50 |
| Frequent appearance | 10 | 17 | 23 | 50 |
| **Column total** | **70** | **47** | **33** | **150** |

**Table 1:** Data for chi-square test

| Cell | Expected Frequency | Cell | Expected Frequency | Cell | Expected Frequency |
|---|---|---|---|---|---|
| No appearance, No reduction | 23.33 | Occasional, No Reduction | 23.33 | Frequent, No Reduction | 23.33 |
| No appearance, Moderate reduction | 15.67 | Occasional, Moderate reduction | 15.67 | Frequent, Moderate Reduction | 15.67 |
| No appearance, High reduction | 11.00 | Occasional, High reduction | 11.00 | Frequent, High Reduction | 11.00 |

**Table 2:** Calculation of Expected frequencies for chi-square test

**Result and Interpretation**

Since the calculated value $\chi^2 = 47.70$ is much higher than all critical values, the result is highly statistically significant at $p < 0.001$ (p-value < 0.000001).

We therefore strongly reject the null hypothesis and conclude that there is a highly significant association between leopard appearance level and change in women's working days in this surveyed stratified snowball sample of 150 women of Hingangaon Village, Haveli Tahasil, Pune District.

In the context of Hingangaon, the analysis suggests that leopard presence increases perceived risk of attack, especially when women have to walk through sugarcane fields, orchards, or secluded paths early in the morning and late in the evening.

**This results in to:**

- Women refusing to take work in fields located near known leopard movement routes.
- Families restricting women's movement or insisting they go only in groups.
- Shift from farm wage work to less risky but possibly lower-paid or irregular work close to home.
- Self-protective measures such as avoiding early morning or evening shifts, working in pairs, or carrying protective equipment.

Such changes may reduce women's independent income, increase their economic dependence, and increase psychological stress due to fear of attack. In some documented cases from rural Maharashtra, women adopt self-protection measures such as wearing spiked neck bands or barbed-wire collars while working in fields[6][7]. These adaptations show both resilience and the severity of everyday fear.

The loss of 05–08 working days per month for women in high-leopard-presence areas could translate to:

- Annual income loss of approximately Rs. 2,000–3,200 (at typical agricultural wage rates of Rs 400/day)
- Increased household food insecurity, especially in landless families
- Widening gender income gaps and reduced women's bargaining power in households

**Findings & Conclusions**

Based on the analysis and the literature reviewed, the main findings of this paper are:

1. **Clear Dose-Response Relationship**

There is a clear dose-response pattern: as leopard appearance increases from none to frequent, the proportion of women reporting work reduction increases progressively. This pattern strengthens the inference of a causal relationship between leopard presence and livelihood impact.

2. **Indirect Livelihood Impacts of Human–Wildlife Conflict**

Leopard presence affects livelihoods indirectly through fear and risk perception. Even without direct attacks, fear of leopards influences decisions about where and when to work, leading to loss of wage income and potentially affecting household food security. Risk perception, not just actual attacks, is a significant driver of behaviour change.

3. **Gendered Dimension of Human–Wildlife Conflict**

Women daily wage workers are disproportionately affected because of:

- Their timings of work (early morning, late evening, when leopards are active)
- Their dependence on daily wages (income loss has immediate household consequences)
- Social norms that may restrict their mobility when risk is perceived as high
- Their relatively powerless position in negotiating safer working conditions

4. **Scale of Impact**

With 50 women per category and 46% of women in high-leopard areas reporting high reduction in work, extrapolating to a larger population suggests that human–leopard conflict could be affecting the livelihoods of thousands of women in sugarcane belts of western Maharashtra.

5. **Need for Integrated Policy Response**

The findings support the argument in the wider literature that human–wildlife conflict is not merely an ecological issue but also a social and gendered livelihood issue [1][5]. Any response to leopard presence must consider women's safety, mental well‑being and economic security. A larger, more robust dataset (N=150) strengthens the case for policy intervention.

**Recommendations**

Therefore, policy interventions should not be limited to reactive measures like trapping or relocating leopards, but should also include:

1. **Awareness and safety training programmes** on safe movement and group‑based work practices, especially tailored for women.
2. **Infrastructure improvements** such as street lighting, safe paths to fields, and water points located closer to settlements.
3. **Emergency facilities** including communication systems (mobile networks, panic buttons) and accessible transport in high‑risk areas.
4. **Livelihood support schemes** that consider loss of work days (not only physical injury or livestock loss), including wage support, microfinance, or skill diversification programmes.
5. **Integration of women's voices** in human–wildlife conflict management planning; women's perspectives should inform solutions.

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**Conflicts of interest**

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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