

# A CROSS-SECTIONAL STUDY TO ASSESS KNOWLEDGE, ATTITUDES, AND PRACTICES REGARDING RABIES IN RURAL UJJAIN

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## ABSTRACT

**Introduction:** Rabies, one of the earliest recognized infectious diseases, impacts all mammals. It is caused by a type of virus known as rhabdovirus and is primarily transmitted to humans through bites from domestic dogs. In developing countries, particularly, canine rabies remains a significant concern for both the economy and public health, leading to approximately 55,000 deaths annually. A cross-sectional study design was employed to comprehensively assess the Knowledge, Attitudes, and Practices (KAP) regarding rabies within the rural population of a selected village in Ujjain. **Methods:** A cross-sectional study design was employed to comprehensively assess the Knowledge, Attitudes, and Practices (KAP) regarding rabies within the rural population of a selected village in Ujjain. **Results:** The analysis of the participant demographics reveals a balanced gender distribution, with 51.6% female and 48.4% male participants. In terms of age, 40% of the participants are under 35 years old, while 60% are aged 35 and above. Education-wise, the majority have completed secondary education (45.3%), followed by primary education (31.3%), while 11.7% have no formal education, and 11.7% have attained graduation or higher education. Regarding occupation, agriculture emerges as the most common occupation, with 39.1% of participants engaged in it, followed by labourers (19.5%), homemakers (23.4%), business (10.2%), and others (7.8%). **Conclusion:** The Importance of targeted interventions to improve health literacy and practices among specific groups, particularly females, younger individuals, and those in lower education and labour-intensive occupations, is the need of the hour.

**Keywords:** Rabies, Public health, Knowledge, free roaming dogs, virus

## INTRODUCTION

Rabies, one of the earliest recognized infectious diseases, affects all mammals and continues to be a major public health concern. It is caused by a neurotropic virus of the *Rhabdoviridae* family and is most commonly transmitted to humans through the bite of an infected animal, particularly domestic dogs. In many developing countries, canine rabies remains a persistent problem, placing a significant burden on both the economy and public health systems. Globally, rabies causes approximately 55,000 human deaths annually, with the majority occurring in Asia and Africa (WHO, 2016). Mortality rates in rabies-endemic areas vary, ranging from 1 to 6 deaths per 100,000 people. For instance, active surveillance studies have reported rates of 4.9 cases per 100,000 in Tanzania, 2.5 in Kenya's Machakos District, 2–3 in India, 5.8 in Cambodia, and 1.4 in Bangladesh. These figures are likely underestimates compared to the true disease burden, given the limitations of routine reporting systems.

Despite the availability of highly effective vaccines for both humans and animals, rabies mortality in developing countries remains unacceptably high (WHO, 2024). In India, free-roaming dogs (FRD) are a primary source of infection, accounting for 96% of human rabies deaths. FRD are common in both rural and urban areas, and their control is a complex challenge involving animal welfare considerations, community perceptions, and resource constraints. Strategies to reduce rabies fatalities include controlling the FRD population through sterilization programs, promoting responsible dog ownership, and strengthening public awareness campaigns. While multiple studies in India have explored community knowledge, attitudes, and practices (KAP) regarding rabies in general, there is a scarcity of research that specifically examines community perceptions and attitudes toward FRD (Tiwari HK et al., 2019).

Prevention of human rabies is entirely feasible. Prompt administration of post-exposure prophylaxis (PEP) to individuals bitten by suspected rabid animals is the most critical measure to avert fatal outcomes. On the animal side, annual mass dog vaccination campaigns, with at least 70% coverage, are essential to interrupt rabies transmission within dog populations. The World Health Organization advocates for coordinated action between veterinary services (for mass dog vaccination) and human health services (for timely PEP administration) to achieve sustainable rabies control (WHO, 2018).

However, technical measures alone are insufficient. Public awareness plays a pivotal role in rabies prevention. Communities must understand the severity of rabies, recognize the need for immediate PEP after a bite, and actively participate in dog vaccination drives (Taylor et al., 2017; Sudharshan M et al., 2007). Misconceptions, cultural beliefs, and lack of access to reliable information can delay treatment-seeking behavior, contributing to preventable deaths.

This study is designed to address these gaps by evaluating the knowledge, attitudes, and practices of a rural community in Ujjain regarding rabies. It will specifically examine community perceptions of FRD and assess dog owners' attitudes toward their pets. By situating rabies prevention within the local cultural context, this research aims to foster a community-centered approach that empowers residents to take active

roles in disease control. The findings are intended to guide sustainable, locally relevant interventions—contributing not only to the safety of the community but also to the broader national and global goal of eliminating rabies as a public health threat.

## METHODS

### *Study Design*

A cross-sectional study design was employed to comprehensively assess the Knowledge, Attitudes, and Practices (KAP) regarding rabies within the rural population of a selected village in Ujjain.

### *Study Setting*

The study was conducted in Lambikhedi village situated in the Ujjain district of Madhya Pradesh, India, chosen for its representativeness of the rural population in the region.

### *Sample Size and Selection*

A sample size of 384 participants was determined using a formula considering the estimated population of the village. Systematic random sampling was utilized to select households, and informed consent was obtained from each participant.

### *Data Collection Instruments*

Structured questionnaires were developed in the local language, encompassing 10 components each for Knowledge, Attitudes, and Practices regarding rabies.

### *Knowledge Components*

1. Recognition of rabies transmission through bites.
2. Identification of common symptoms of rabies.
3. Awareness of preventive measures (vaccination, etc.).
4. Understanding the role of animals in rabies.
5. Knowledge about post-exposure prophylaxis (PEP).
6. Awareness of rabies as a fatal disease.
7. Understanding the importance of timely treatment.
8. Identification of common myths about rabies.
9. Knowledge about stray animal control measures.
10. Understanding the rabies lifecycle in animals.

**• Attitude Components:**

1. Perceived severity of rabies.
2. Fear of rabies.
3. Perceived susceptibility to rabies.
4. Confidence in the effectiveness of rabies prevention.
5. Trust in the healthcare system.
6. Willingness to vaccinate pets.
7. Concern for community health and safety.
8. Perceived social norms regarding rabies prevention.
9. Anxiety related to potential rabies exposure.
10. Recognition of personal responsibility for prevention.

**• Practices Components:**

1. Regular pet vaccination.
2. Seeking immediate medical attention after an animal bite.
3. Proper wound cleaning and disinfection after an animal bite.
4. Restraining pets to prevent animal bites.
5. Community participation in stray animal control measures.
6. Safe disposal of animal carcasses.
7. Keeping a safe distance from unfamiliar animals.
8. Educating children about rabies prevention.
9. Use of protective measures during animal handling.
10. Participating in community awareness programs.

***Pre-Testing***

Before the main data collection, the questionnaires were pre-tested on a small sample from a nearby village to identify ambiguities, ensure clarity, and refine the questions.

***Data Collection Process***

Trained enumerators, fluent in the local language, conducted face-to-face interviews covering demographics, knowledge, attitudes, and practices related to rabies. Participants were assured of the confidentiality of their responses.

***Data Analysis***

Descriptive statistics were used to analyse demographic characteristics and components of knowledge, attitudes, and practices. Inferential statistics, such as Chi-square tests, were employed to identify associations between demographic variables and the categorized KAP scores.

**RESULTS**

In Table 1, the analysis of the participant demographics reveals a balanced gender distribution, with 51.6% female and 48.4% male participants. In terms of age, 40% of the participants are under 35 years old, while 60% are aged 35 and above. Education-wise, the majority have completed secondary education (45.3%), followed by primary education (31.3%), while 11.7% have no formal education, and the same percentage have attained graduation or higher education. Regarding occupation, agriculture emerges as the most common occupation, with 39.1% of participants engaged in it, followed by laborers (19.5%), homemakers (23.4%), business (10.2%), and others (7.8%)

**Table 1: Demographic Characteristics of Participants**

| <b>Demographic Variable</b> | <b>N</b> | <b>%</b> |
|-----------------------------|----------|----------|
| Gender (Male/Female)        | 198      | 51.6%    |
| Age (years)                 |          |          |
| <35                         | 155      | 40%      |
| >35                         | 229      | 60%      |
| Education Level             |          |          |
| - No formal education       | 45       | 11.7%    |
| - Primary                   | 120      | 31.3%    |
| - Secondary                 | 174      | 45.3%    |
| - Graduation and above      | 45       | 11.7%    |
| Occupation                  |          |          |
| - Agriculture               | 150      | 39.1%    |
| - Labourer                  | 75       | 19.5%    |
| - Homemaker                 | 90       | 23.4%    |
| - Business                  | 39       | 10.2%    |
| - Others                    | 30       | 7.8%     |

Table 2 depicts that male participants predominantly reported having moderate knowledge (85%), while females exhibited a more varied distribution, with 26% reporting poor knowledge. The association between Gender and health status is statistically significant ( $p<0.0$ ), suggesting that Gender influences perceived knowledge status about rabies. Participants under 35 years old tend to have poorer knowledge regarding rabies (36%) compared to those over the age of 35 years (17%). The data indicate a significant relationship between age and health status ( $p=0.001$ ), indicating that age may impact individuals' knowledge. Individuals with no formal education are more likely to have poor knowledge (67%), while those with higher education levels, especially graduates and above, tend to report better knowledge (53%). A strong association exists between education level and health status ( $p<0.00$ ), indicating that education may play a role in shaping individuals' knowledge about rabies. Those in agricultural and labourer occupations tend to report poorer health compared to homemakers and those in service or other occupations. The data suggest a significant association ( $p<0.00$ ) between occupation and health status.

**Table 2: Comparing Various Variables with the Knowledge of the Participants Regarding Rabies**

| Variables            | Poor    | Moderate | Good    | Total     | p value |
|----------------------|---------|----------|---------|-----------|---------|
| Gender               | N (%)   | N (%)    | N (%)   | N (%)     |         |
| M                    | 10 (5)  | 169 (85) | 19 (10) | 198 (100) | <0.001  |
| F                    | 48 (26) | 100 (54) | 38 (20) | 186 (100) |         |
| Total                | 58 (15) | 269 (70) | 57 (15) | 384(100 ) |         |
| Age                  |         |          |         |           |         |
| <35                  | 20 (36) | 100 (65) | 35 (23) | 155 (100) | 0.001   |
| >35                  | 38 (17) | 169 (74) | 22 (10) | 229 (100) |         |
| Total                | 58 (15) | 269 (70) | 57 (15) | 384 (100) |         |
| Education            |         |          |         |           |         |
| Non-Formal           | 30 (67) | 10 (22)  | 5 (11)  | 45 (100)  | < 0.001 |
| Primary              | 16 (13) | 94 (78)  | 10 (8)  | 120 (100) |         |
| Secondary            | 8 (5)   | 148 (85) | 18 (10) | 174 (100) |         |
| Graduation and above | 4 (9)   | 17 (38)  | 24 (53) | 45 (100)  |         |
| Total                | 58 (15) | 269 (70) | 57 (15) | 384 (100) |         |
| Occupation           |         |          |         |           | < 0.001 |
| Agriculture          | 30 (20) | 100 (67) | 20 (13) | 150 (100) |         |
| Labourer             | 18 (24) | 53 (71)  | 4 (5)   | 75 (100)  |         |
| House maker          | 6(7)    | 76 (84)  | 8 (9)   | 90 (100)  |         |
| Business             | 3 (8)   | 26 (67)  | 10 (26) | 39 (100)  |         |
| Service & others     | 1 (3)   | 14 (47)  | 15 (50) | 30 (100)  |         |
| Total                | 58 (15) | 269 (70) | 57 (15) | 384 (100) |         |

The education level of the respondents significantly influenced their distribution among different categories, as evidenced by the p-value being less than 0.00 in Table 3. Specifically, individuals with primary education had a moderate attitude towards rabies (96%) of the total sample, followed by those with secondary education at 45.31%. Conversely, the most minor proportion was observed among respondents with non-formal education, constituting only 11.72% of the sample. Similarly, occupation significantly impacted the distribution of respondents, with a p-value less than 0.00. Agricultural occupation had the highest representation, accounting for 39.06% of the total sample, followed by housewives at 23.44% and labourers at 19.53%. Conversely, the smallest proportion was observed among those engaged in business, representing only 10.16% of the sample.

**Table 3: Comparing Various Variables with the Attitude of the Participants Regarding Rabies**

| Variables            | Poor   | Moderate | Good    | Total     | p value |
|----------------------|--------|----------|---------|-----------|---------|
| <b>Education</b>     |        |          |         |           | < 0.001 |
| Non-Formal           | 2(4)   | 37 (82)  | 6 (13)  | 45(100)   |         |
| Primary              | 3 (3)  | 115 (96) | 2(1)    | 120 (100) |         |
| Secondary            | 5 (3)  | 90 (52)  | 79 (45) | 174 (100) |         |
| Graduation and above | 9 (20) | 27 (60)  | 9 (20)  | 45 (100)  |         |
| Total                | 19 (1) | 269 (70) | 96 (29) | 384 (100) |         |
| <b>Occupation</b>    |        |          |         |           | < 0.001 |
| Agriculture          | 10 (7) | 96 (64)  | 20 (29) | 150 (100) |         |
| Labourer             | 5 (7)  | 40 (53)  | 4 (40)  | 75 (100)  |         |
| House maker          | 2 (2)  | 77 (86)  | 11 (12) | 90 (100)  |         |
| Business             | 1 (3)  | 30 (77)  | 8 (20)  | 39 (100)  |         |
| Service & others     | 1(3)   | 26 (87)  | 3 (10)  | 30 (100)  |         |
| Total                | 19 (5) | 269 (70) | 96 (25) | 384 (100) |         |

Table 4 represents the distribution of "Variables" (categorized as Poor, Moderate, and Good) across different demographics: Gender, Age, Education, and Occupation. For Gender, males predominantly fall into Moderate (71%), while females are more evenly distributed. Younger individuals (<35) show a higher percentage in the Good category (38%) compared to those >35 (27%). Education shows varied distributions, with non-formal education having the highest Poor (33%) and primary education the highest Good (42%). Occupational distribution indicates significant variations, with Agriculture having the highest Good (42.67%). The p-values indicate statistical significance in these distributions.

**Table 4: Comparing Various Variables with the Practices of the Participants Regarding Rabies**

| Variables            | Poor       | Moderate    | Good       | Total     | p value |
|----------------------|------------|-------------|------------|-----------|---------|
| <b>Gender</b>        |            |             |            |           |         |
| Male                 | 8 (4)      | 140 (71)    | 50 (25)    | 198 (100) | <0.001  |
| Female               | 30 (16)    | 90(48)      | 66 (35)    | 186 (100) |         |
| Total                | 38         | 230         | 116        | 384 (100) |         |
| <b>Age</b>           |            |             |            |           |         |
| <35                  | 10 (6)     | 86 (56)     | 59 (38)    | 155 (100) | 0.001   |
| >35                  | 28 (10)    | 144 (63)    | 57 (27)    | 229 (100) |         |
| Total                | 38 (10)    | 230 (60)    | 116 (30)   | 384 (100) |         |
| <b>Education</b>     |            |             |            |           |         |
| Non-Formal           | 15 (33)    | 20 (44)     | 10(23)     | 45 (100)  | < 0.001 |
| Primary              | 10 (8)     | 60 (50)     | 50 (42)    | 120 (100) |         |
| Secondary            | 8 (5)      | 120 (69)    | 46(26)     | 174 (100) |         |
| Graduation and above | 5(11)      | 30 (67)     | 10(22)     | 45 (100)  |         |
| Total                | 38(10)     | 269 (70)    | 96 (25)    | 384 (100) |         |
| <b>Occupation</b>    |            |             |            |           |         |
| Agriculture          | 16 (10.67) | 70 (46.67)  | 64 (42.67) | 150 (100) | < 0.001 |
| Labourer             | 10 (13.33) | 50 (66.67)  | 15 (20)    | 75 (100)  |         |
| House maker          | 8 (8.89)   | 60 (66.6)   | 22 (24.4)  | 90 (100)  |         |
| Business             | 3 (7.69)   | 30 (76.92)  | 6 (15.38)  | 39 (100)  |         |
| Service & others     | 1(3.33)    | 20 (66.66)  | 9 (30)     | 30 (100)  |         |
| Total                | 38 (9.89)  | 230 (59.89) | 116 (30.2) | 384 (100) |         |

## DISCUSSION

These findings underscore the need for targeted public health campaigns in rural areas. Efforts should focus on increasing rabies awareness, particularly among females, younger individuals, and those in agriculture or with lower educational attainment. Educational programs that leverage local languages, visual aids, and community health workers could significantly improve knowledge and preventive practices.

The results of this study revealed significant associations between demographic factors (Gender, age, education, and occupation) and participants' knowledge, attitudes, and practices regarding rabies. Specifically, male participants predominantly reported moderate knowledge (85%), while females exhibited a more varied distribution, with 26% reporting poor knowledge. A significant relationship was also observed between education and knowledge levels, with higher education (particularly graduates) being associated with better knowledge (53%). Occupation played a crucial role, with participants involved in agriculture and labour reporting poorer health practices compared to homemakers and business professionals.

These findings are consistent with other studies that have explored the impact of education and occupation on health knowledge and practices. A study on health literacy in rural India demonstrated that individuals with higher education levels were more likely to have adequate health literacy and adopt better health practices. Similar to our results, they found that agricultural and labourer groups were more likely to have lower health literacy and poorer health practices (Sharma et al., 2019).

Another study focusing on rabies knowledge in rural communities also reported that females had lower knowledge compared to males, with education being a significant predictor of rabies knowledge (Kumar et al., 2020). This aligns with our findings, where females were more likely to report poor knowledge, and education played a crucial role in improving health awareness. Age was also a significant factor in our study, with participants under 35 years old demonstrating poorer knowledge compared to those above 35. This finding is in line with researchers who found that younger individuals tend to have lower awareness and knowledge of infectious diseases such as rabies. In terms of occupation, our study revealed that individuals involved in agriculture and labour had poorer health practices compared to homemakers and business professionals (Thomas et al., 2021). This is corroborated by a study that found agricultural workers to have lower health awareness and that they were less likely to engage in preventive health practices. (Singh et al., 2022).

### Limitations

This study has several limitations that should be acknowledged. Firstly, the data were collected through self-reported responses, which may be subject to **recall bias**, especially when participants were asked about past exposures, attitudes, or practices related to rabies..

Secondly, the study was conducted in a **single rural village** in the Ujjain district, which may limit the **generalizability** of the results to other rural or urban populations. The selected village, while representative of similar rural settings, does not capture the diversity of socioeconomic, educational, and cultural contexts across the region or state. Future studies should consider using multi-site sampling across different regions and incorporating triangulation methods to validate self-reported data and minimize bias.

### CONCLUSION

This study reveals key knowledge gaps and practice deficiencies among specific demographic groups, indicating that interventions must be tailored accordingly. Health authorities should consider developing culturally appropriate awareness drives and improving accessibility to post-exposure prophylaxis (PEP) in remote areas. Collaborative efforts between medical and veterinary services can foster a holistic One Health approach.

Our findings suggest that demographic factors such as Gender, education, age, and occupation play a critical role in shaping knowledge, attitudes, and practices related to rabies. These results are consistent with previous studies, highlighting the importance of targeted interventions to improve health literacy and practices among specific groups, particularly females, younger individuals, and those with lower levels of education and labour-intensive occupations.

**Conflict of interest**

The authors declare no conflicts of interest.

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