
Knowledge, Attitude, and Practices on Leptospirosis Among the Residents of a Selected Urban Community in Quezon City, Philippines: A Cross-Sectional Study

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Abstract

Introduction Leptospirosis is a zoonotic disease transmitted through exposure to water or soil contaminated with the urine of infected animals, particularly rats. Despite ongoing prevention efforts, leptospirosis remains a public health concern in the Philippines, especially in flood-prone urban communities. This study assessed the knowledge, attitudes, and practices (KAP) regarding leptospirosis among residents of Barangay Doña Imelda, Quezon City, and examined the association of selected sociodemographic factors with KAP.

Methods A cross-sectional design was used with 345 residents of Barangay Doña Imelda. Data were collected using an adapted KAP questionnaire. Open-ended questions were used to probe the responses further. Statistical analyses included descriptive statistics and Spearman's Rho correlation, Independent T-test, One-way and Welch ANOVA, and appropriate post hoc tests. Relationships among KAP domains were evaluated using Spearman's rank correlation coefficient. Statistical significance was set at $p < 0.05$.

Results Respondents demonstrated high levels of knowledge (86.80%) and positive attitudes (90.91%) toward leptospirosis, but comparatively lower practice scores (69.25%). Knowledge scores differed significantly according to household size and civil status, while attitude and practice scores varied significantly across sex, educational attainment, and household income. Weak but significant positive correlations were observed between knowledge and attitude ($r_s = 0.126$, $p = 0.020$), knowledge and practice ($r_s = 0.169$, $p = 0.002$), and attitude and practice ($r_s = 0.170$, $p = 0.001$).

Conclusion Residents of Barangay Doña Imelda demonstrated adequate knowledge and positive attitudes toward leptospirosis; however, preventive practices remained suboptimal. Significant associations between KAP and selected sociodemographic factors were identified. Targeted health education, improved symptom recognition, and increased access to preventive resources may help strengthen leptospirosis prevention in high-risk urban communities.

Key words: Leptospirosis, knowledge, attitudes, practice, urban community, Philippines

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Leptospirosis is a potentially fatal zoonotic disease caused by pathogenic *Leptospira* spirochetes, transmitted primarily through contact with water or soil contaminated by the urine of infected animals, particularly rats (*Rattus norvegicus*). Human infection typically occurs through abraded skin, mucous membranes, or prolonged exposure to contaminated floodwaters. The disease is endemic in tropical regions, including the Philippines, where climatic and environmental conditions favor bacterial survival and transmission.^{1,2} The World Health Organization (WHO) estimates that the incidence of leptospirosis ranges from 10–100 cases per 100,000 population in tropical areas and may exceed 100 per 100,000 among high-risk groups during outbreaks.² Despite ongoing prevention efforts, leptospirosis remains a significant public health concern in the Philippines, particularly in urban centers where poor sanitation and frequent flooding prevail.

Quezon City, located in the National Capital Region (NCR), is highly susceptible to flooding because of its extensive river and watershed systems, including the San Juan River watershed. The Quezon City Epidemiology and Disease Surveillance Unit (QCESU) reported 676 leptospirosis cases and 102 deaths from January to October 2025, representing a substantial increase compared with previous years.³ Nationally, the Department of Health reported a 43.4% increase in leptospirosis cases, from 2,115 cases during January–July 2024 to 3,037 cases during the same period in 2025.^{4,5} These trends highlight the vulnerability of flood-prone communities such as Barangay Doña Imelda, where dense urbanization, inadequate waste management, and recurrent flooding may facilitate disease transmission.

Knowledge, attitudes, and practices (KAP) play an important role in the prevention and control of leptospirosis. Understanding community awareness, perceptions, and preventive behaviors may help identify gaps that contribute to continued disease transmission and guide the development of targeted public health interventions. However, recent data regarding KAP toward leptospirosis among residents of flood-prone urban communities in Quezon City remain limited.

This study aimed to assess the knowledge, attitudes, and practices regarding leptospirosis among residents of Barangay Doña Imelda, Quezon City. Specifically, it sought to determine the association

of selected sociodemographic characteristics with KAP and examine the relationships among the KAP domains. The findings may provide evidence for strengthening community-based health education programs and informing local public health strategies aimed at reducing leptospirosis transmission in high-risk urban communities.

Methods

Ethical approval was granted by the Research Institute for Health Sciences–Ethics Review Committee (RIHS-ERC; Protocol No. 1831/C/2025/012). The study employed a community-based cross-sectional design to assess the knowledge, attitudes, and practices (KAP) regarding leptospirosis among residents of Barangay Doña Imelda, Quezon City. Data were collected through face-to-face household interviews using an adapted KAP questionnaire consisting of closed-ended and open-ended items.

Sample size estimation was based on the 2020 Philippine Census. Given a population of 11,724 residents and an estimated 3,229 households, the required sample size was calculated using the formula for estimating a single population proportion with finite population correction, assuming a 95% confidence level and a 5% margin of error. The minimum required sample size was 344 respondents, and 345 respondents were ultimately recruited.

Respondents were selected through convenience sampling and recruited through house-to-house visits until the target sample size was achieved. Only one eligible respondent was interviewed per household.

Eligible participants were adults aged 18 years or older who had resided in Barangay Doña Imelda for at least one year and stayed in the community for more than three days per week. Individuals who declined participation, withdrew from the study, or submitted incomplete questionnaires were excluded from the final analysis.

Data were collected using an adapted KAP questionnaire derived from instruments developed.^{6,7} The questionnaire was available in both English and Filipino and underwent face validation face validation by subject matter experts and pilot testing among 35 individuals who were not included in the final sample. The pilot test assessed the clarity, readability, comprehensibility, and feasibility of the instrument.

The questionnaire included sections assessing respondents' sociodemographic characteristics, knowledge of leptospirosis, attitudes toward the disease, and preventive practices. Knowledge items covered disease causation, transmission, signs and symptoms, and preventive measures, while attitude and practice items were measured using five-point Likert scales.

Open-ended questions were included to further explore respondents' perceptions of susceptibility to leptospirosis, perceived disease severity, perceived benefits and barriers to preventive behaviors, and awareness of community policies and ordinances related to disease prevention.

Knowledge items were scored as 1 for correct responses and 0 for incorrect or "Don't Know" responses. Total knowledge scores ranged from 0 to 9 and were converted into percentages. Attitude and practice scores were obtained by summing responses to the respective Likert-scale items, with higher scores indicating more favorable attitudes and more appropriate preventive practices. Two practice items were reverse-coded prior to analysis.

Descriptive statistics were used to summarize respondent characteristics and KAP scores. Continuous variables were presented as means $\pm$ standard deviations, while categorical variables were reported as frequencies and percentages.

Associations among knowledge, attitude, and practice scores were assessed using Spearman's rank correlation coefficient.

Differences in mean KAP scores across sociodemographic groups were evaluated using independent t-tests, one-way analysis of variance (ANOVA), or Welch's ANOVA, as appropriate. Homogeneity of variances was assessed using Levene's test, and significant omnibus tests were followed by Tukey's HSD or Games–Howell post hoc comparisons.

All statistical analyses were performed using IBM SPSS Statistics version 29 (IBM Corp., Armonk, NY, USA) and RStudio. Statistical significance was set at a two-tailed p-value of <0.05 .

Results

Table 1 presents the sociodemographic characteristics of the 345 respondents. The mean age was 46.69 ± 15.37 years. Most respondents were male (66%), married (61%), and Roman Catholic (82%). More

than half had completed high school education (51%), while 31% had attained undergraduate or graduate degrees. The majority were employed (59%), had resided in Barangay Doña Imelda for more than 10 years (82%), and belonged to the low-income bracket (83%). Most households consisted of five or fewer members (60%).

Table 1. Sociodemographic characteristics of respondents (N=345)

Characteristic	n (%)
Sex	
Male	228 (66.1)
Female	117 (33.9)
Civil status	
Single	87 (25.2)
Married	212 (61.4)
Others	46 (13.3)
Religion	
Roman Catholic	284 (82.3)
Others	61 (17.7)
Educational attainment	
High school or below	239 (69.3)
College or higher	106 (30.7)
Occupation	
Employed	204 (59.1)
Unemployed/Student	140 (40.6)
Length of residency	
≤ 10 years	62 (18.0)
> 10 years	283 (82.0)
Household size	
≤ 5 members	208 (60.3)
> 5 members	137 (39.7)
Monthly household income	
Low income	287 (83.2)
Middle/High income	39 (11.3)
Undisclosed	19 (5.5)

Table 2 shows the associations between sociodemographic characteristics and KAP scores. Knowledge scores differed significantly according to civil status ($p=0.030$) and household size ($p=0.024$). Attitude scores differed by sex ($p=0.031$) and educational attainment ($p=0.009$). Practice scores differed by sex ($p=0.027$), educational attainment ($p=0.035$), and household income ($p=0.031$). No

significant associations were observed for the remaining sociodemographic variables.

Table 3 summarizes the mean KAP scores of respondents on Leptospirosis. The overall mean scores for knowledge, attitude, and practices are 86.90% (± 14.26), 96.00% (± 0.50), and 69.25% (± 14.27) respectively.

Respondents demonstrated a high level of knowledge regarding leptospirosis, with a mean score of 86.80% (Table 4). Among the knowledge domains, disease prevention had the highest mean score (94.98%), followed by mode of transmission (93.82%), whereas signs and symptoms had the lowest mean score (71.59%). As shown in Table 4, awareness that floodwater can transmit leptospirosis was highest (97.10%), while recognition of red eyes (70.43%),

difficulty urinating (71.59%), and jaundice (72.75%) as symptoms was comparatively lower.

Respondents demonstrated a positive attitude toward leptospirosis, with a mean attitude score of 90.91% (Table 5). Agreement rates ranged from 84.35% to 99.71%. The highest level of agreement was observed for the importance of following health advisories during the rainy season (99.71%), whereas the lowest was for the importance of rat population control (84.35%).

Respondents demonstrated a moderate level of preventive practices against leptospirosis, with a mean practice score of 69.25%. As shown in Table 6, the most commonly reported practices were storing food in sealed or rat-proof containers (95.65%) and avoiding walking barefoot on soil (82.90%). In

Table 2. Association between sociodemographic characteristics and knowledge, attitude, and practice scores.

Variable	Knowledge p-value	Attitude p-value	Practice p-value
Sex	0.183 ^a	0.031 ^{a*}	0.027 ^{a*}
Civil Status	0.030 ^{b*}	0.666 ^b	0.716 ^b
Religion	0.804 ^b	0.506 ^b	0.889 ^b
Educational Attainment	0.345 ^b	0.009 ^{b*}	0.035 ^{b*}
Occupation	0.362 ^b	0.227 ^b	0.216 ^b
Years of Residency	0.308 ^b	0.783 ^b	0.803 ^b
Household Size	0.024 ^{b*}	0.550 ^b	0.674 ^b
Household Income	0.574 ^c	0.318 ^c	0.031 ^{c*}

p < 0.05

^a Independent samples t-test

^b One-way ANOVA

^c Welch ANOVA

Post hoc analyses were performed using Tukey's HSD for homogeneous variances and Games-Howell tests for heterogeneous variances.

Table 3. Summary of knowledge, attitude, and practice scores regarding leptospirosis.

Variables	Mean Score (%)	S.D.
Knowledge	86.80	14.26
Mode of Transmission	93.82	14.61
Signs and Symptoms	71.59	34.92
Disease Prevention	94.98	13.94
Attitude	90.91	0.50
Practice	69.25	14.27
Protective Gears and Safety Measures	65.96	18.24
Pest Control Measures	75.83	18.28

contrast, wearing waterproof boots while wading in floodwater (29.57%) and using rat poison or traps for rodent control (37.10%) were the least frequently practiced preventive measures.

Table 7 presents the correlations among knowledge, attitude, and practice scores. Weak positive correlations were observed between knowledge and attitude ($r_s=0.126$, $p=0.020$), knowledge and practice ($r_s=0.169$, $p=0.002$), and attitude and practice ($r_s=0.170$, $p=0.001$). All correlations were statistically significant.

Discussion

Sociodemographic as Predictors of KAP

Knowledge scores differed according to household size and civil status. Respondents from larger households and those who were separated tended to have lower knowledge scores than their counterparts. Similar findings have been reported in previous leptospirosis studies, where social support, access to information, and socioeconomic factors influenced

Table 4. Knowledge of leptospirosis among respondents.

Knowledge Component	Question	% Correct	% Wrong		
			Wrong Answer	Unsure Answer	Total Wrong
Mode of Transmission	Leptospirosis is caused by bacteria	90.43	3.19	6.38	9.57
	Rat can transmit Leptospirosis	93.91	1.16	4.93	6.09
	Floodwater can transmit Leptospirosis	97.10	2.61	0.29	2.90
Signs and Symptoms	Infected person may have difficulty in urinating	71.59	2.61	25.80	28.41
	Infected person may have jaundice	72.75	5.22	22.03	27.25
	Infected person may have red eyes	70.43	5.22	24.35	29.57
Disease Prevention	Avoiding wading in the floods can prevent Leptospirosis	93.33	4.93	1.74	6.67
	Maintaining clean surroundings can prevent Leptospirosis	94.78	4.93	0.29	5.22
	Wearing boots during floods can prevent Leptospirosis	96.81	2.61	0.58	3.19

Table 5. Attitudes toward leptospirosis among respondents.

Question	% Agree	% Disagree	% Not Sure
I believe Leptospirosis is a serious illness	97.39	2.39	1.16
I believe that medicine can treat Leptospirosis	92.46	2.61	4.93
I believe I can do something to prevent myself from being infected with Leptospirosis	96.23	0.87	1.16
It is important to control rat population	84.35	9.57	6.09
It is important to follow health advisories during rainy season	99.71	0.29	0.00

Table 6. Distribution of preventive practices related to leptospirosis.

Practice Component	Question	% High frequency of activity	% Low frequency of activity
Protective Gears and Safety Measures	Not wading in floodwater	43.77	56.23
	Wearing waterproof boots when wading in flood water	29.57	70.43
	Not walking barefoot on soil	82.90	17.10
	Wearing rubber gloves when leaning/working in muddy water or damp soil	40.29	59.71
Pest Control Measures	Using poison or traps to eradicate rats	37.10	62.90
	Storing food in sealed or rat proof containers	95.65	4.35

Table 7. Correlations among knowledge, attitude, and practice scores.

Variables	Spearman's ρ (rs)	p-value
Knowledge vs Attitude	0.126	0.020*
Knowledge vs Practice	0.169	0.002*
Attitude vs Practice	0.170	0.001*

• p < 0.05

Spearman's rank correlation coefficient was used to assess associations between KAP domains.

disease awareness and preventive behaviors.^{6,8} These groups may therefore benefit from targeted health education interventions.

Female respondents and those with higher educational attainment demonstrated more favorable attitudes toward leptospirosis. This finding is consistent with previous studies reporting better health attitudes among females and individuals with higher levels of education.^{6,9,10,11,12} Higher educational attainment may improve access to health information and facilitate the adoption of favorable health beliefs and attitudes.

Practice scores were significantly associated with sex, educational attainment, and household income. Females, respondents with higher educational attainment, and those with higher household incomes reported better preventive practices. Similar findings

have been reported in previous studies, suggesting that educational and economic resources may influence the adoption of preventive measures, including the use of personal protective equipment.^{6,13,14}

Knowledge

Respondents demonstrated a high level of knowledge regarding leptospirosis, although the overall knowledge score was slightly lower than that reported in a previous study conducted in Quezon City.⁷ Qualitative responses suggested that knowledge was influenced by community experiences and limited exposure to formal health education activities. Previous studies have likewise identified health workers, health facilities, and mass media as important sources of information on leptospirosis.^{15,16}

Mode of Transmission

Knowledge of disease transmission was high, particularly regarding the risks associated with floodwater exposure. Similar findings have been reported in previous Philippine studies, likely reflecting the recurring association between leptospirosis outbreaks and flooding events in the country.^{7,17,18,19}

Signs and Symptoms

Signs and symptoms constituted the lowest-scoring knowledge domain, consistent with previous local studies.^{6,7} Limited recognition of clinical manifestations may delay disease recognition and timely consultation. Future health education programs should place greater emphasis on both the early and severe manifestations of leptospirosis to facilitate prompt diagnosis and treatment.²⁰

Disease Prevention

Disease prevention was the highest-scoring knowledge domain, consistent with findings from a previous study in Quezon City.⁸ Despite this, preventive practices remained only moderate, suggesting that knowledge alone may not be sufficient to influence behavior. Barriers such as limited access to protective equipment, perceived inconvenience, and environmental constraints may contribute to the gap between knowledge and practice.^{13,21,22} These findings highlight the need for interventions that combine health education with practical and community-based preventive measures.

Attitude

Respondents demonstrated a highly positive attitude toward leptospirosis, with an overall attitude score of 90.91%. This score was higher than that reported in a previous study conducted in Laguna and was generally consistent with findings from other Philippine communities, where positive attitudes toward leptospirosis prevention and management were also observed.^{6,16}

Leptospirosis as a Serious, Treatable, and Preventable Disease

Most respondents regarded leptospirosis as a serious, treatable, and preventable disease. Similar findings have been reported in previous studies conducted in the Philippines and other leptospirosis-endemic countries.^{6,13,15,16,23} Qualitative responses suggested that confidence in disease prevention was influenced by awareness of preventive measures, access to prophylactic medication, and prior community experiences with the disease. Despite these positive attitudes, some respondents perceived environmental factors such as recurrent flooding and persistent rodent infestation as barriers to prevention.

Rat Population Control and Health Advisories

Agreement was highest for adherence to health advisories during the rainy season and lowest for rat population control. While respondents recognized the importance of rodent control, qualitative responses indicated that financial constraints, perceived ineffectiveness of control measures, and reliance on community-wide interventions may limit its prioritization. Similar observations have been reported in previous studies in the Philippines and other endemic settings.^{6,7,14, 24}

Practice

Despite high knowledge and attitude scores, respondents demonstrated only moderate preventive practices against leptospirosis. Similar findings have been reported in studies conducted in Quezon City and Laguna, suggesting that awareness of the disease does not necessarily translate into consistent preventive behaviors.^{6,7,25}

Floodwater Exposure and Use of Protective Equipment

The lowest-scoring practices involved avoiding floodwater exposure and the use of protective equipment such as boots and gloves. Qualitative responses indicated that financial constraints, perceived inconvenience, and the belief that protective equipment is ineffective during severe flooding contributed to poor compliance. Similar barriers have

been reported in studies conducted in the Philippines and other leptospirosis-endemic countries.^{6,7,14,24}

Safe Foot Practices and Food Storage

In contrast, safe foot practices and food storage were among the most frequently reported preventive behaviors. Respondents recognized the importance of wearing footwear and protecting food from contamination, findings that are consistent with previous studies reporting good adherence to basic hygiene and food safety practices.^{6,7,25}

Rodent Control

Rodent control was infrequently practiced despite widespread awareness that rats are the primary reservoir of *Leptospira*. Respondents commonly perceived rodent control measures as ineffective because of the rapid recurrence of infestation and the limited resources available for sustained control efforts. Similar observations have been reported in both local and international studies.^{6,25,26}

Overall, the findings suggest that preventive practices are influenced not only by knowledge and attitudes but also by practical, financial, and environmental constraints. Community-based interventions should therefore combine health education with improved access to protective equipment, environmental sanitation programs, and sustainable rodent control initiatives

Correlation Between KAP

The weak positive correlation between knowledge and attitude observed in this study is consistent with findings from a previous study conducted in Quezon City.⁸ However, studies from Malaysia and Laguna have reported differing results, suggesting that the relationship between knowledge and attitudes may vary across populations and settings.^{17,27}

Despite generally positive attitudes, knowledge regarding the signs and symptoms of leptospirosis remained relatively low. This finding highlights the need for health education programs that emphasize symptom recognition and early consultation, particularly among individuals at increased risk of exposure.

Knowledge was also positively correlated with preventive practices, although the association was weak. This finding suggests that greater awareness of leptospirosis may be associated with better preventive behaviors. Nevertheless, the persistence of moderate practice scores despite high knowledge levels indicates that factors beyond knowledge, such as financial, environmental, and contextual barriers, likely influence behavior.

Similarly, attitude demonstrated a weak positive correlation with preventive practices, consistent with findings from previous local studies.⁸ While favorable attitudes may support preventive behaviors, the observed correlations were weak, indicating that attitudes alone may not be sufficient to ensure consistent adoption of preventive measures.

Conclusion

This study assessed the knowledge, attitudes, and practices regarding leptospirosis among residents of Barangay Doña Imelda, Quezon City.

Respondents demonstrated high levels of knowledge and positive attitudes toward leptospirosis; however, preventive practices remained comparatively lower. Significant associations were observed between KAP scores and selected sociodemographic characteristics, including sex, civil status, educational attainment, household size, and household income.

Weak but significant positive correlations were observed among knowledge, attitude, and practice scores. Despite these associations, important gaps remain in knowledge of the signs and symptoms of leptospirosis and in the adoption of preventive practices.

These findings underscore the need for targeted community-based interventions that strengthen awareness of early disease manifestations, promote consistent use of protective measures, and address practical barriers to preventive behaviors. Enhanced health education, improved access to protective equipment, and sustained environmental sanitation and rodent-control programs may contribute to more effective leptospirosis prevention in high-risk urban communities.

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