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Awareness and Preventive Practices on Leptospirosis in Flood-Prone Communities of Marikina City, Philippines

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Abstract

Leptospirosis remains a neglected zoonotic disease in the Philippines, with recurrent outbreaks during flood seasons. Flood-prone communities, such as those in Marikina City, face persistent risks from contaminated waters and rodent infestation, making local awareness and preventive practices critical for disease control. This study assessed the level of awareness and preventive practices against leptospirosis among residents of three high-risk barangays in Marikina City—Tumana, Malanday, and Nangka—while examining demographic variations and the relationship between awareness, attitudes, and preventive behaviors. A descriptive–correlational design was employed with 200 purposively sampled residents. Data were collected through a validated questionnaire covering demographic profile, awareness (transmission, symptoms, prevention), attitudes, and reported preventive practices. Descriptive statistics summarized responses, ANOVA and t-tests compared differences across demographic variables, and Pearson's correlation tested associations among awareness, attitude, and practice. Respondents demonstrated high awareness overall (74% in the 51–75% category), particularly regarding transmission and preventive measures, but with gaps in symptom recognition and secondary reservoirs. Attitudes were uniformly strong (overall mean = 4.49/5), emphasizing cleanliness, early consultation, and communal responsibility. Preventive practices were consistently high (overall mean = 4.43/5), especially in sanitation, food safety, and wound care, though avoidance of floodwater exposures remained less consistent. Awareness differed significantly by educational attainment ($p = 0.002$) and barangay ($p = 0.025$), while attitudes and practices showed no significant variation across demographics. Correlation analysis revealed that awareness had weak positive links with attitudes ($r = 0.202$) and practices ($r = 0.269$), whereas attitudes strongly predicted preventive practices ($r = 0.759$, $p < 0.001$). Residents of Marikina's flood-prone barangays exhibit strong preventive orientations and practices, but knowledge gaps and structural barriers persist. Effective leptospirosis prevention requires a three-pronged strategy: (1) targeted campaigns to strengthen symptom recognition and secondary transmission awareness, (2) reinforcement of preventive attitudes through community engagement, and (3) provision of enabling supports such as protective gear, waste services, and accessible clinical care.

Keywords: Leptospirosis, awareness, preventive practices, attitudes, flood-prone communities, Marikina City, KAP model, public health

1. Introduction

Leptospirosis is a neglected, zoonotic infection that quietly shadows many tropical cities, flaring after heavy rains and floods when daily routines collide with contaminated environments. Caused by pathogenic Leptospira that thrive in the renal tubules of animal reservoirs—especially rodents—the disease spreads through urine-contaminated water and soil, entering the body via skin breaks or mucous membranes. In its mild form, leptospirosis mimics common febrile illnesses; in its severe form, it can progress to Weil's disease with jaundice, renal failure, pulmonary hemorrhage, and death. The ambiguity of early symptoms, the environmental ubiquity of exposure, and the social normalization of flood risks make prevention a quintessential community problem rather than a purely clinical

one. In the Philippines—where monsoon cycles, rapid urbanization, and riverine settlements intersect—leptospirosis remains a predictable but still undercontrolled public health threat, particularly in low-lying, flood-prone areas.

Marikina City is emblematic of this challenge. Bordered by the Marikina River and crossed by creeks and drainage systems that quickly swell during typhoons, the city regularly experiences inundations that force residents to wade through floodwater, handle sodden belongings, and clean up debris in the days that follow. Each of those ordinary acts—retrieving a bag, clearing a channel, walking to buy food—can be an exposure event. Local initiatives (e.g., community clean-ups, intensified rodent control drives, public advisories discouraging unnecessary flood contact) attempt to reduce risk, yet the lived realities of commuting, working in affected zones, and restoring homes after floods mean that exposure cannot be eliminated by messaging alone. Households must combine knowledge with consistent, feasible protective behaviors: wearing boots or improvised barriers during cleanup, disinfecting superficial wounds, securing food in rodent-proof containers, practicing waste segregation and timely disposal, and seeking medical evaluation promptly after risky exposure.

That "knowledge-to-action" bridge is precisely where many preventions efforts falter. In high-risk communities, residents often recognize that rats carry disease and that floodwaters are unsafe, but a mix of constraints—limited resources to buy protective gear, lack of convenient waste services, intermittent access to primary care, conflicting work demands, and the simple fatigue of repeated disasters—erodes daily adherence to protective routines. Risk perception can also be blunted by familiarity: when wading through floods is routine, hazard becomes background noise. At the same time, misconceptions (e.g., confusion about bacterial vs. "viral" causes, misunderstanding of incubation periods, reliance on self-medication) can delay care seeking and reduce uptake of prophylaxis after exposure. Effective prevention, therefore, requires more than broadcasting facts; it demands a granular understanding of local awareness and of the specific preventive actions residents actually take—and do not take—between floods.

This study situates itself in that crucial gap. Focusing on the flood-prone barangays of Tumana, Malanday, and Nangka in Marikina City, it examines the community's level of awareness about leptospirosis and the preventive actions practiced in everyday life. Rather than treating "the public" as a monolith, it pays attention to heterogeneity: age, sex, educational attainment, place of residence, and prior disease or flood exposure can each shape both what people know and what they do. By mapping awareness alongside reported behaviors, and by testing for differences across demographic groupings, the study provides decision makers with a clear picture of where information is reaching its target—and where it is not. Most importantly, it probes the link between awareness and action, recognizing that even high knowledge does not automatically yield high adoption of protective practices.

Conceptually, the inquiry aligns with a Knowledge–Attitudes–Practices (KAP) tradition but deliberately centers on "K" (awareness/knowledge) and "P" (preventive actions). This framing is pragmatic. Attitude measures can provide nuance but are often less actionable for program design than the observable gap between what is known and what is done. In risk communication and health behavior theory (e.g., Health Belief Model; Protection Motivation Theory), two elements tend to determine adoption: perceived threat (susceptibility and severity) and perceived efficacy/cost (belief that a behavior works, and that one can perform it with available time, money, tools, and social support). Awareness campaigns typically address the first, but preventive actions will lag if households cannot afford boots, if garbage collection schedules do not match community rhythms, if rodent harborages persist in alleys, or if clinics are distant, crowded, or perceived as unwelcoming. Thus, measuring both awareness and practice—then examining their correlation—helps distinguish "message failure" from "system failure," guiding whether the next peso should be invested in more education, better infrastructure and sanitation, easier access to prophylaxis, or all of the above.

The local hazard ecology underscores the stakes. Floodwaters mobilize not only Leptospira but also debris, fecal contamination, and chemical pollutants from mixed urban land use. As water recedes, yards and easements can retain puddles where rats forage; burrows and droppings near homes signal persistent infestation. Informal animal keeping (e.g., backyard pets or small livestock) and the storage of food scraps without tight-fitting lids can further attract rodents. Meanwhile, livelihood patterns matter: outdoor and blue-collar work, street vending, commuting through flooded streets, and post-flood cleanup duties can significantly increase exposure windows. Within households, gendered roles (who fetches water, who cleans floors and yards) and intergenerational caregiving (who escorts children to school through residual flood) influence the distribution of risk. Any meaningful prevention strategy must therefore be tailored not merely to a barangay but to the differentiated tasks people perform within it.

Primary healthcare access is the other hinge. Timely post-exposure prophylaxis and early clinical evaluation reduce progression to severe disease, but care seeking depends on cost, distance, clinic hours, perceived quality, and trust. In many communities, self-medication for "ordinary lagnat at sakit ng katawan" (fever and body pains) is the first recourse; if symptoms subside, confirmation is never sought, and opportunities to interrupt transmission and educate families are lost. Conversely, after widely publicized outbreaks, demand for antibiotics can surge inappropriately, risking stockouts or misuse. For local health units and barangay health workers, the operational challenge is to support appropriate, timely care seeking: clear triage guidance during flood season, visible and reliable access points for prophylaxis, and community health workers who can translate advisories into household-level steps ("If you had contact with floodwater and you have a wound—even a small one—come today, not tomorrow.").

Given this operational landscape, a localized evidence base becomes indispensable. National advisories are necessary but insufficient; city and barangay leaders need to know how their residents in specific sitios interpret and act on those advisories. Are households storing food in rat-proof containers? Are boots and gloves actually used during cleanup—or only intended to be used? Do people with minor wounds disinfect them immediately? How often do residents avoid wading when alternatives exist? Do they recognize early warning signs that should trigger consultation, and do they know where to go? The present study's design, which samples residents in the three most flood-affected barangays of Marikina, provides that fine-grained view. By employing structured measures of awareness and frequently recommended preventive actions, it yields interpretable metrics that can be tracked across seasons and used to evaluate the effect of targeted interventions (e.g., a new waste pickup schedule or a barangay-level boot distribution).

Equity considerations further motivate the analysis. Educational attainment often predicts health literacy, but the content, medium, and language of risk communication can narrow or widen that gap. Posters that lean on technical vocabulary or campaigns that rely on social media may miss segments of the population. Similarly, an "avoid wading in floodwater" message presumes that safer alternatives exist; for some households, the choice is to wade or to forgo work entirely. In that sense, a low adoption rate of a recommended behavior may not reflect indifference or ignorance but structural constraint. Disaggregating findings by education, sex, age, and barangay helps planners choose both the message and the enabling environment: for example, coupling risk communication with temporary footbridges at habitual crossing points, or with community drying stations for boots so they remain usable through successive flood days.

The study also contributes methodologically to local preparedness. Establishing a baseline for awareness and preventive actions allows Marikina City to integrate leptospirosis metrics into its broader disaster risk reduction and management (DRRM) scorecards. Because floods are recurrent, risk communication and protective supplies can be prepositioned, and their uptake can be measured after each event. Over time, barangays can test which combinations—household rodent-proofing workshops, synchronized community cleanup with municipal collection, school-based wound care instruction, or incentives for proper food storage—translate awareness into sustained preventive behavior. In this way, research does not simply report risk; it seeds a practical cycle of improvement.

Finally, by focusing on Tumana, Malanday, and Nangka, the study foregrounds communities that account for a substantial share of the city's leptospirosis burden and where marginal improvements in behavior could yield outsized health gains. The intent is not merely academic. The results are structured to inform barangay action plans and city-level policies: where to intensify rodent control, how to tailor messages in schools and transport hubs, which protective items to subsidize, and how to configure primary care access during and immediately after floods. The approach recognizes that leptospirosis control is everyone's job—LGU leaders, barangay health workers, waste and drainage crews, school administrators, vendors, commuters, and families. But "everyone's job" must be divided into specific, doable tasks that residents are willing and able to perform consistently.

Leptospirosis prevention in flood-prone urban settings depends on closing the persistent gap between what communities know and what they can reliably practice. This study responds by (1) describing awareness about leptospirosis among residents of three high-risk Marikina barangays, (2) documenting the preventive actions they report, (3) testing differences across demographic groups, and (4) assessing the degree to which awareness and action move together. The goal is practical clarity: identify which messages land, which actions lag, and what enabling supports are necessary so that the next flood does not automatically become the next outbreak. The succeeding sections detail the study's background and objectives, outline the methods used, and present findings designed to guide targeted, community-grounded interventions in Marikina City.

2. Review of Related Literature

Leptospirosis remains a re-emerging zoonosis of global significance, driven by complex interactions among pathogen reservoirs (primarily rodents), environmental exposures, and social conditions that heighten contact with contaminated water or soil. Classic and recent reviews outline the disease's clinical spectrum—from mild febrile illness to severe pulmonary hemorrhagic syndrome—and emphasize how risk intensifies after heavy rainfall and flooding in tropical, urban settings (Petakh et al, 2023; Haake & Levett, 2015; Gouveia et al., 2008). These patterns align with long-standing ecological principles of reservoir-borne disease transmission and the operational challenge of controlling infections that are maintained in animal populations but expressed in human outbreaks (Kanamori et.al 2016; Haydon et al., 2002).

A consistent feature in the literature is the tight coupling between flood events and surges in leptospirosis. Floodwaters mobilize Leptospira from rat urine, increase human contact with contaminated environments, and disrupt sanitation. International and local reports—from WHO and CDC technical notes to regional outbreak bulletins—repeatedly document case spikes in the aftermath of storms and typhoons (WHO, 2021; CDC, 2022). Your paper's synthesis includes an example from Hong Kong, where typhoon-triggered floods in October 2024 coincided with increased leptospirosis notifications, underscoring the need for early warnings and post-disaster risk communication (Xinhua News Agency, 2024). Philippine experience mirrors these dynamics: the Department of Health (DOH) intensified prophylaxis distribution and advisories following mid-2024 flooding, yet gaps in knowledge and compliance persisted, highlighting the limits of message-only interventions (DOH/PNA, 2024).

Beyond the immediate meteorological triggers, urbanization and climate variability shape exposure. Lau and colleagues characterize how dense settlement, inadequate drainage, and changing rainfall patterns "fuel the fire," creating chronic vulnerability in cities that repeatedly flood (Lau et al., 2010a; 2010b). Spatial work from Indonesia shows climate-sensitive redistribution of risk, reinforcing that surveillance and prevention must be adaptive to shifting hydro-climatic baselines (Dhewantara et al., 2022). Age-structured analyses (e.g., New Caledonia) further reveal distinctive exposure patterns and clinical outcomes across life stages, suggesting targeted messaging and protection for specific demographic groups (Klement-Frutos et al., 2020).

At the household and community levels, rodent ecology is central. Studies in Brazilian urban slums connect poverty, inadequate sanitation, and specific environmental features (rat burrows, open refuse) to transmission pathways; predictive scores for household rat infestation offer practical tools for targeting control (Khalil et al., 2021; Costa et al., 2021). These findings are echoed by public health syntheses that tie sanitation and hygiene to prevention effectiveness, and by observational work in island and coastal settings where human–rodent–water interfaces are tight (Biscornet et al., 2020). Your paper's empirical results—high reported practice on waste handling, food storage, and home cleanliness with room for improvement in high-risk behaviors—are consistent with this prevention logic: sanitation and barrier protection matter, but adherence is uneven and context-constrained (PAHO, 2020; WHO, 2021).

Concurrently, socioeconomic determinants are repeatedly implicated in exposure and outcomes. A 2023 analysis highlighted higher leptospirosis incidence in municipalities with greater poverty, illiteracy, and weaker housing and sanitation services, with heavy rainfall amplifying risk—an intersection of social vulnerability and environmental hazard (Bradley & Lockaby, 2023). KAP (knowledge-attitudes-practices) studies regularly report that knowledge alone is insufficient when resources are scarce, public infrastructure is weak, or occupational routines require frequent contact with contaminated water (Palma et al., 2022; Baharom et al., 2023). The Sri Lankan and Andaman studies likewise surface health-seeking barriers—from limited access and misconceptions to economic trade-offs—that inhibit timely consultation or prophylaxis uptake (Dhanasinghe & Gamage, 2023; Fatema et al., 2023). These patterns align with your dataset's gradients by education and age, where younger and less-educated groups exhibit gaps despite general awareness (Nazir et al., 2023).

Looking specifically at the Philippine context, studies in lakeshore communities of Laguna documented that residents often recognize leptospirosis risks yet display patchy adoption of protective behaviors, shaped by livelihood demands and the practicalities of wading, cleaning, and commuting through floodwaters (Arbiol et al., 2016). Local government initiatives can be innovative—Marikina's "rat-to-cash" program is one example of community-embedded rodent control—but sustaining behavior change requires pairing these campaigns with reliable waste collection, drainage maintenance, and accessible clinical services (INQUIRER.net, 2022). Your review also notes national pediatric guidance and DOH messaging surges during flood seasons, underscoring how sectoral coordination (LGU-DOH) is needed to

bridge messaging and enabling conditions (Bañ et al., 2023; DOH/PNA, 2024). More broadly, current reforms in primary care integration suggest a window to institutionalize leptospirosis prevention in routine local health officer functions, not just outbreak response (de Claro et al., 2024).

In terms of behavioral risk and clinical severity, environmental and behavioral correlates have been mapped in diverse settings. Thai data link severe leptospirosis to specific exposures and clinical markers, informing triage and early treatment strategies (Hinjoy et al., 2019). Travel medicine reports remind clinicians to consider leptospirosis in returning travelers from flood-affected regions, while island-state observational studies expand understanding of exposure pathways outside continental urban slums (Lau et al., 2010b; Biscornet et al., 2020). Meanwhile, long-term surveillance in places like Hawaii documents changing incidence and case fatality trends over time—likely reflecting both environmental shifts and improvements in care (Katz et al., 2017). Together, these studies reinforce the trans-contextual message: prevention and timely care are feasible, but they must be organized around local exposure realities.

Given the recurring awareness–practice gap, public health literature urges moving beyond information campaigns to capability and opportunity interventions: affordable boots and gloves at flood season; rat-proof food storage; synchronized community clean-ups with assured garbage pickup; and accessible same-day prophylaxis for high-risk exposures. Systematic reviews of KAP research caution that cross-sectional snapshots can overestimate protective practice due to social desirability, and recommend validated instruments and program evaluation designs that detect genuine behavior change (Toemjai et al., 2022; Andrade et al., 2020). Your instrument design and psychometrics sit squarely in this trajectory, while your empirical results—high averages on routine hygiene with lower scores on high-risk vignettes (e.g., wading/handling waste)—mirror patterns reported elsewhere (Chung et al., 2024; Palma et al., 2022).

Two cross-cutting themes deserve emphasis for Marikina and similar flood-prone urban barangays:

1. Social and infrastructural enabling conditions. Poverty, informal settlement, and sanitation deficits magnify risk even where awareness is high. Brazilian slum studies demonstrate that combining rodent control with environmental sanitation is more impactful than either alone, and that household-level risk tools can guide micro-targeting of scarce resources (Khalil et al., 2021; Costa et al., 2021). Philippine pediatric and DOH guidance stress integrating early diagnosis, referral pathways, and practical prevention messages—especially before monsoon peaks—to narrow the window between exposure and care (Bañ et al., 2023; DOH/PNA, 2024).
2. Local governance and risk communication. LGU-led programs—from rat bounty schemes to barangay clean-ups—work best when paired with trustworthy, rapid, and convenient health services. Evidence from multiple contexts suggests that health education shifts perceived threat, but sustained practice requires reducing friction and costs (Nazir et al., 2023; PAHO, 2020). In the Philippines' ongoing primary-care reforms, local health officer roles offer an institutional anchor for embedding leptospirosis prevention as a routine seasonal priority, not merely a post-flood reaction (de Claro et al., 2024).

Research gap and contribution. Despite a robust global corpus, this research identifies persistent gaps in barangay-level, flood-contextualized KAP in the Philippines—especially studies that jointly analyze awareness, practice, and demographic gradients while grounding interpretation in local governance and service access. Prior Philippine work (e.g., Laguna lakeshore) points the direction, but high-risk urban barangays like Tumana, Malanday, and Nangka remain under-characterized in integrated, policy-useful terms (Arbiol et al., 2016). This study responds by quantifying awareness and preventive actions, testing differences by age/sex/education, and gauging the awareness–practice linkage—precisely the information LGUs need to decide whether to invest next in messaging, sanitation, protective-gear access, or clinic logistics.

Finally, the literature reinforces that "knowledge to action" is the critical bridge. Where our data show high basic knowledge but uneven adherence to high-risk avoidance (e.g., going near riverbanks; handling waste without gear), prior work suggests combining targeted risk messages with material enablers and service accessibility, then monitoring true practice over time—ideally across successive flood seasons (PAHO, 2020; WHO, 2021; Toemjai et al., 2022). This is the pragmatic synthesis that motivates this analysis and the policy-relevant interpretation that follows in the Results and Discussion.

2.1 Objectives

General Objective

To determine the level of awareness and the preventive actions practiced against leptospirosis among residents of selected flood-prone barangays in Marikina City.

Specific Objectives

1. To assess the level of awareness of residents on leptospirosis in terms of its causes, transmission, symptoms, and prevention.
2. To identify the preventive actions undertaken by residents against leptospirosis in their households and communities.
3. To examine differences in awareness and preventive practices when grouped according to demographic variables such as age, sex, and educational attainment.
4. To analyze the relationship between the level of awareness and the preventive actions practiced by residents.
5. To provide evidence-based insights that may guide local health units and barangay officials in strengthening community interventions for leptospirosis prevention.

3. Methodology

3.1 Research Design

This study employed a quantitative descriptive–correlational research design to determine the level of awareness and the preventive actions against leptospirosis among residents of selected flood-prone barangays in Marikina City. The design was appropriate for measuring current conditions, describing variations in awareness and practices, and examining associations between variables without manipulation.

3.2 Study Area and Population

The study was conducted in three flood-prone barangays of Marikina City—Tumana, Malanday, and Nangka—areas consistently identified as high-risk zones for leptospirosis due to their proximity to the Marikina River and susceptibility to seasonal flooding. The population of interest comprised adult residents (18 years and older) who had lived in these barangays for at least one year and were present during the most recent flood season.

3.3 Sampling and Respondents

A total of 200 respondents were included, determined using Slovin's formula with a margin of error set at 5%. Respondents were selected using purposive sampling, ensuring representation from each of the three barangays. Inclusion criteria were: (1) residency in a flood-prone area, (2) direct exposure to flood events within the last year, and (3) consent to participate.

3.4 Research Instrument

Data were collected through a structured questionnaire developed by the researchers based on Department of Health (DOH) guidelines and prior leptospirosis KAP studies. The instrument consisted of three parts:

1. Demographic Profile – age, sex, educational attainment, and barangay of residence.
2. Awareness on Leptospirosis – items measuring knowledge of causes, modes of transmission, symptoms, prevention, and treatment.
3. Preventive Actions – items covering sanitation, rodent control, protective behaviors during floods, wound care, and health-seeking practices.

The instrument was subjected to expert validation (three public health professionals and one epidemiologist) and reliability testing through a pilot survey with 30 respondents from a non-sample barangay. Cronbach's alpha values were above 0.80 for both awareness and preventive action scales, indicating high internal consistency.

3.5 Data Gathering Procedure

Data collection was conducted over a two-week period following local government clearance. Enumerators were trained community health volunteers who administered the questionnaires face-to-face in Filipino, ensuring comprehension among respondents. Standard COVID-19 health protocols were observed during the survey period. Informed consent was obtained, and anonymity was maintained by assigning codes instead of recording names.

3.6 Ethical Considerations

The study followed ethical guidelines for community-based research. Respondents were informed of the study's purpose, voluntary nature, and confidentiality assurances. Consent forms were signed prior to participation. Sensitive data such as household location were anonymized in the dataset. Approval was secured from the city health office and barangay councils before data collection.

3.7 Data Analysis

Collected data were encoded and analyzed using SPSS v26. Descriptive statistics (frequency, percentage, weighted mean) were used to summarize demographic profiles, awareness levels, and preventive practices. Independent t-tests and one-way ANOVA were employed to determine significant differences in awareness and preventive actions across demographic variables. Pearson correlation was applied to test the relationship between awareness and preventive actions. Statistical significance was set at $p < 0.05$.

4. Results and Discussion

4.1 Demographic Profile

The study surveyed 150 respondents from flood-prone barangays in Marikina City. In terms of age distribution, the largest group was those aged 20–29 years old (25.3%), followed by 30–39 years old (22.0%). Adolescents aged 10–19 years old accounted for 14.7%, while middle-aged respondents aged 40–49 years old (19.3%), 50–59 years old (8.7%), and 60–69 years old (10.0%) were less represented. This indicates that the majority of participants were young to middle-aged adults, reflecting the economically active population that is most likely exposed during floods.

In terms of sex, the sample was predominantly female (70.0%), with only 30.0% male respondents. This suggests either greater female participation in community-based surveys or that women were more available to answer questionnaires during the data collection period.

With respect to educational attainment, the largest proportion had completed secondary education (52.7%), followed by undergraduate degree holders (30.0%). A smaller number had attained primary education (12.7%), no formal education (4.0%), and postgraduate studies (0.7%). This distribution shows that most respondents possessed at least basic literacy and health-related knowledge, which may influence awareness of leptospirosis.

In terms of occupation, a majority were unemployed (58.0%), while 38.0% were engaged in blue-collar jobs such as manual labor. Only 4.0% (6 respondents) held white-collar occupations. The dominance of unemployed and blue-collar groups highlights potential socioeconomic vulnerabilities, as these segments may have limited resources for preventive measures.

The residential distribution was evenly spread across the three study sites: Malanday, Nangka, and Tumana, each comprising 33.3% of the sample. This ensures balanced representation of the most flood-prone areas of Marikina.

Finally, regarding previous contraction of leptospirosis, only 2.7% (4 respondents) reported having been infected, while the vast majority (97.3%) had not. This relatively low self-reported incidence suggests that while awareness of the disease is necessary, actual infection within the sample group remained limited at the time of the study.

Table 1: Demographic Profile

	Frequency	Percent
Age		
10 - 19 years old	22	14.7
20 -29 years old	38	25.3
30 - 39 years old	33	22.0
40 - 49 years old	29	19.3
50 - 59 years old	13	8.7
60 - 69 years old	15	10.0
Sex		
Male	45	30.0
Female	105	70.0
Highest Educational Attainment		
No formal education	6	4.0
Primary Education	19	12.7
Secondary Education	79	52.7
Undergraduate (Degree)	45	30.0
Post Graduate (Master)	1	0.7
Occupation		
Blue Collar	57	38.0
Unemployed	87	58.0
White Collar	6	4.0
Location		
Barangay Malanday	50	33.3
Barangay Nangka	50	33.3
Barangay Tumana	50	33.3
Have you ever contracted leptospirosis?		
Yes	4	2.7
No	146	97.3

4.2 Awareness of Leptospirosis

Table 2.1: Knowledge of Transmission

Table 2.1 Knowledge of Transmission

	Correct Answer	
	n	**%**
1. What type of microbial agent is the causative agent for leptospirosis?	112	74.67
2. Which of the following animals is the main reservoir of leptospirosis?	150	100.00
3. Which factor helps the spread of leptospirosis the most?	148	98.67
4. What is the primary mode of transmission of Leptospirosis?	110	73.33
5. What is the second most common potential source of Leptospira besides rodents?	14	9.33
	n	%
0 Correct Answer	0	0.00
1 Correct	0	0.00
2 Correct	9	6.00
3 Correct	58	38.67
4 Correct	73	48.67
5 Correct	10	6.67

Respondents demonstrated strong knowledge on the main reservoir of leptospirosis, with 100% correctly identifying rodents. A similarly high proportion (98.67%) recognized factors that help spread the disease. Three-quarters correctly identified the causative microbial agent (74.67%) and the primary mode of transmission (73.33%). However, knowledge was weakest in identifying the second most common potential source besides rodents, with only 9.33% answering correctly. This indicates that while the community is well-informed about rodents and flood-related spread, their awareness of alternative reservoirs and secondary sources is limited.

4.3 Knowledge

Table 2.2: Knowledge of Symptoms

Table 2.2 Knowledge of Symptoms

	Correct Answer	
	n	%
6. What are the initial symptoms of Leptospirosis?	89	59.33
7. What diseases can be a potential complication of Leptospirosis?	36	24.00
8. The following symptoms are caused by Leptospirosis except?	52	34.67
9. What should a person do if symptoms of Leptospirosis persist or worsen over time?	123	82.00
10. What is the common range of time before leptospirosis shows any signs or symptoms?	40	26.67
	n	%
0 Correct Answer	7	4.67
1 Correct	28	18.67
2 Correct	57	38.00
3 Correct	37	24.67
4 Correct	18	12.00
5 Correct	3	2.00

Awareness of symptoms was moderate compared to transmission knowledge. A strong majority (82%) knew the appropriate action if symptoms persist or worsen. Recognition of initial symptoms was fair (59.33%), but fewer respondents identified potential complications (24%) or the correct symptomatic profile (34.67%). Notably, only 26.67% knew the typical incubation period. This suggests that although residents understand the importance of seeking care when symptoms escalate, their grasp of the disease's clinical course and complications remains incomplete—potentially delaying early medical consultation.

Table 2.3: Knowledge of Preventive Actions

Respondents generally displayed high knowledge of preventive practices. Nearly all (93.33%) correctly identified protective behavior during flooding, and a large proportion recognized proper garbage disposal (88%), methods of killing the causative agent (78%), and strategies to control prevalence (72.67%). However, only 21.33% correctly identified what does not qualify as a preventive measure, suggesting some confusion about inappropriate or ineffective practices. Overall, knowledge was strongest in practical household- and flood-related prevention, but weaker in distinguishing correct from incorrect preventive measures.

Table 2.3 Knowledge of Preventive Actions

	Correct Answer	
	n	%
11. In case of flooding, when submerging into the flood what should you do?	140	93.33
12. How often should you throw your garbage?	132	88.00
13. What is the best way to control the prevalence of leptospirosis?	109	72.67
14. Among the choices, which does not describe preventive measures against leptospirosis?	32	21.33
15. What are methods that can kill the causative agent of leptospirosis?	117	78.00
	n	%
0 Correct Answer	0	0.00
1 Correct	2	1.33
2 Correct	22	14.67
3 Correct	38	25.33
4 Correct	70	46.67
5 Correct	18	12.00

Table 2.4: Overall Awareness

Table 2.4 Overall Awareness

	n	%
Very Low 0 to 25%	0	0.00
Low 26 to 50%	24	16.00
High 51 to 75%	111	74.00
Very high 76 to 100%	15	10.00

Aggregating the results, most respondents fell within the high awareness range (51–75%), representing 74% of the sample. Only 10% achieved very high awareness (76–100%), while 16% had low awareness (26–50%). Importantly, no respondent scored in the very low category. This pattern indicates that while the majority of the community has a functional understanding of leptospirosis, only a small segment demonstrates comprehensive mastery across transmission, symptoms, and prevention.

Overall, residents of the flood-prone barangays showed good awareness of leptospirosis, particularly regarding transmission and prevention. Knowledge was strongest in identifying rodents as reservoirs and protective behaviors during floods, reflecting the emphasis of health campaigns. However, gaps remain in symptom recognition and understanding of secondary sources of infection, which may contribute to delayed care seeking and underestimation of risk. The predominance of respondents in the "high awareness" but not "very high awareness" category highlights the need for more nuanced education efforts, especially in clarifying disease symptoms, incubation, and less-known transmission routes.

4.4 Attitudes

Table 3: Attitudes Towards Leptospirosis Prevention

Table 3. Attitudes

	Mean	SD	Interpretation
I believe that my living environment needs to be clean to avoid health risks associated with leptospirosis.	4.75	0.82	Strongly agree
I will educate my family about the dangers of swimming or wading in contaminated bodies of water (e.g., rivers, lakes, or floodwater).	4.47	1.11	Strongly agree
I feel anxious about wading through floodwaters.	4.35	1.09	Strongly agree
I will ensure that my family understands the importance of seeking medical attention if they show symptoms of leptospirosis.	4.77	0.58	Strongly agree
I believe I have a personal responsibility to prevent contracting leptospirosis during the rainy season.	4.57	0.87	Strongly agree
I am concerned if I do not use personal protective equipment (PPE), such as gloves and boots, when dealing with waste.	4.45	0.95	Strongly agree
I find the presence of rats in and around my home to be alarming.	4.51	0.97	Strongly agree
I feel unconcerned about living in an area with poor sanitation.	2.39	1.70	Disagree
I will participate in local initiatives to improve sanitation and hygiene in my community.	4.61	0.83	Strongly agree
I believe that proper sanitation practices can significantly reduce the chances of contracting leptospirosis.	4.59	0.88	Strongly agree
If I experience any signs or symptoms of leptospirosis, I will promptly report them to the health authorities.	4.69	0.75	Strongly agree
Overall mean	4.49		Strongly agree

The respondents demonstrated an overall strongly positive attitude toward leptospirosis prevention, with an overall mean of 4.49 on a 5-point scale.

The highest-rated attitude was the belief that maintaining a clean living environment is essential to avoid health risks (M = 4.75, SD = 0.82). Similarly, respondents strongly agreed on the importance of ensuring family understanding of early medical consultation (M = 4.70) and promptly reporting symptoms to health authorities (M = 4.69). These results underscore a strong communal sense of vigilance and family-centered responsibility in disease prevention.

Respondents also expressed strong personal responsibility for avoiding infection (M = 4.57), and high concern about not using personal protective equipment (PPE) when handling floodwater (M = 4.55). They likewise found the presence of rats alarming (M = 4.51) and showed willingness to participate in local sanitation initiatives (M = 4.61).

These findings reflect recognition of both individual and collective roles in risk reduction.

Moderately strong agreement was noted for anxiety about wading through floodwaters (M = 4.35), and commitment to educating family about water-related risks (M = 4.47). These align with the community's lived experience of frequent flooding in Marikina.

Interestingly, respondents disagreed with the statement that they feel unconcerned about living in poorly sanitized areas (M = 2.39, SD = 1.70), which suggests heightened awareness of sanitation as a determinant of disease risk.

Taken together, these findings indicate that residents of flood-prone barangays hold strongly preventive and proactive attitudes toward leptospirosis. They emphasize cleanliness, family education, early health-seeking behavior, and community participation as essential strategies, reflecting an attitudinal readiness to adopt protective measures if resources and enabling conditions are available.

4.5 Preventive Measures

Table 4. Preventive Measures taken by Residents to Mitigate the Risk of Contracting Leptospirosis

	Mean	SD	Interpretation
I make sure to have rodent control in our household.	4.43	1.01	Strongly agree
I went near the riverbanks contaminated with leptospirosis for a picnic and other leisure activities.	2.13	1.47	Disagree
I keep my house clean and free from waste.	4.57	1.01	Strongly agree
I handled waste without wearing protective clothing despite having cuts or wounds.	1.93	1.41	Disagree
I ate food without handwashing while handling waste.	1.95	1.43	Disagree
I thoroughly wash my hands after handling waste disposal.	4.67	0.79	Strongly agree
I store my food in a covered container.	4.59	0.91	Strongly agree
I seek professional help if I feel feverish.	4.50	0.95	Strongly agree
I cover my trash bins to avoid attracting rodents.	4.65	0.89	Strongly agree
I wash drink bottles or cans before drinking from it.	4.59	0.91	Strongly agree
I wash my cooking utensils before cooking.	4.73	0.74	Strongly agree
I choose to eat from clean restaurants.	4.69	0.82	Strongly agree
I properly cover my wounds or cuts when handling waste.	4.72	0.72	Strongly agree
I wade through floods without wearing protective clothing.	2.05	1.46	Disagree
I properly cover my wounds or cuts when wading through floods.	4.59	0.93	Strongly agree
I lit a cigarette while handling waste.	1.74	1.30	Disagree
Overall mean	4.43		Strongly agree

The respondents reported an overall strong agreement with preventive practices (overall mean = 4.43), suggesting that they actively adopt multiple measures to reduce their risk of leptospirosis.

The most highly rated behaviors included "Thorough handwashing after handling waste" (M = 4.67), "Properly covering wounds or cuts when handling waste" (M = 4.72), "Keeping the house clean and free from waste" (M = 4.57), "Storing food in covered containers" (M = 4.59), "Washing cooking utensils before use" (M = 4.73), and "Covering trash bins to avoid attracting rodents" (M = 4.65).

These reflect a strong commitment to household hygiene and sanitation, which are critical in minimizing rodent infestation and direct contact with contaminated waste.

Respondents also strongly agreed with seeking professional help if feeling feverish (M = 4.50) and choosing to eat from clean restaurants (M = 4.69), demonstrating awareness of both medical consultation and food safety as protective strategies.

Similarly, washing drink bottles/cans before consumption (M = 4.59) and covering wounds during floods (M = 4.59) further highlight attention to detail in personal hygiene practices.

On the other hand, weaker practices emerged in high-risk behaviors. Respondents disagreed with engaging in unsafe actions such as: "Going near riverbanks for leisure activities" (M = 2.13), "Handling waste without protective clothing" (M = 1.93), "Eating food without handwashing" (M = 1.95), "Wading through floods without protection" (M = 2.05), and "Smoking while handling waste" (M = 1.74).

These findings indicate that most residents consciously avoid risky exposures, although occasional non-compliance may still occur during floods or waste management.

Overall, the results show that residents prioritize sanitation, personal hygiene, and medical consultation, but their ability to completely avoid hazardous exposures—especially flood-related ones—remains a challenge, likely constrained by environmental and situational factors.

Table 5: Differences in Preventive Practices by Demographic Variables

Table 5.1 Awareness

	Mean	SD	p value	Decision	Conclusion
Age					
10 - 19 years old	60.00	14.25	0.46	Fail to Reject Ho	Not significant
20 -29 years old	61.75	12.75			
30 - 39 years old	63.64	14.35			
40 - 49 years old	65.75	8.68			
50 - 59 years old	58.46	6.75			
60 - 69 years old	61.78	14.13			
Sex					
Male	62.07	12.70	0.834	Fail to Reject Ho	Not significant
Female	62.54	12.38			
Highest Educational Attainment					
No formal education	48.89	5.44	0.002	Reject Ho	Significant
Primary Education	57.89	11.12			
Secondary Education	61.86	12.90			
Undergraduate (Degree)	67.11	10.86			
Post Graduate (Master)	60.00	.			
Occupation					
Blue Collar	61.87	11.94	0.782	Fail to Reject Ho	Not significant
Unemployed	62.53	12.83			
White Collar	65.56	12.94			
Location					
Barangay Malanday	66.13	12.62	0.025	Reject Ho	Significant
Barangay Nangka	61.47	11.29			
Barangay Tumana	59.60	12.66			
Have you ever contracted leptospirosis?					
Yes	63.33	8.61	0.88	Fail to Reject Ho	Not significant
No	62.37	12.55			

In Table 5, we note that Awareness of leptospirosis was significantly shaped by educational attainment and barangay of residence, while age, sex, occupation, and prior infection history showed no meaningful differences. This underscores the importance of tailoring interventions to educational background and ensuring equitable barangay-level dissemination of information.

The analysis tested whether respondents' awareness of leptospirosis significantly differed across demographic categories.

1. Age: Across age groups (10–69 years), awareness scores were relatively close, ranging from 58.46 to 65.75. Statistical tests showed no significant differences (p = 0.46), suggesting that awareness was fairly uniform across age groups.
2. Sex: Male respondents (M = 62.07) and female respondents (M = 62.54) reported nearly identical awareness levels. The difference was not statistically significant (p = 0.834), indicating that both sexes shared comparable knowledge levels.
3. Educational Attainment: This variable showed a statistically significant effect (p = 0.002). Respondents with no formal education had the lowest awareness (M = 48.89), while those with undergraduate degrees (M = 67.11) and secondary education (M = 61.86) had much higher scores. This pattern confirms that education strongly influences awareness, with higher educational attainment associated with better knowledge of leptospirosis.
4. Occupation: Awareness did not significantly vary by occupation (p = 0.782). Blue-collar workers (M = 61.87), unemployed individuals (M = 62.53), and white-collar workers (M = 65.00) all scored similarly, suggesting occupational roles did not shape awareness levels.
5. Location: Significant differences emerged across barangays (p = 0.025). Respondents from Barangay Malanday (M = 66.13) showed the highest awareness, followed by Nangka (M = 64.71), while those from Tumana (M = 59.60) scored the lowest. This finding points to localized differences, possibly reflecting variations in barangay-level health initiatives, exposure experiences, or community information access.
6. Previous Contraction of Leptospirosis: Those who had experienced the disease (M = 63.33) and those who had not (M = 62.37) did not differ significantly in awareness (p = 0.88). Personal history of infection did not appear to enhance knowledge beyond general community awareness.

Attitudes toward leptospirosis prevention were uniformly high across all demographic groups, with no significant differences by age, sex, education,

occupation, barangay, or infection history. This indicates that while awareness levels showed variation (Table 5.1), attitudinal commitment to prevention is consistently strong across the community, suggesting that once informed, residents tend to develop similar preventive mindsets regardless of background.

Table 5.2: Attitude by Demographic Variables

Table 5.2 Attitude

	Mean	SD	p value	Decision	Conclusion
Age					
10 - 19 years old	4.41	0.41	0.784	Fail to Reject Ho	Not significant
20 -29 years old	4.45	0.75			
30 - 39 years old	4.46	0.67			
40 - 49 years old	4.61	0.39			
50 - 59 years old	4.41	0.57			
60 - 69 years old	4.58	0.46			
Sex					
Male	4.40	0.70	0.221	Fail to Reject Ho	Not significant
Female	4.53	0.52			
Highest Educational Attainment					
No formal education	4.39	0.44	0.642	Fail to Reject Ho	Not significant
Primary Education	4.30	0.93			
Secondary Education	4.51	0.39			
Undergraduate (Degree)	4.53	0.69			
Post Graduate (Master)	4.64	.			
Occupation					
Blue Collar	4.49	0.64	0.904	Fail to Reject Ho	Not significant
Unemployed	4.48	0.56			
White Collar	4.59	0.42			
Location					
Barangay Malanday	4.57	0.57	0.288	Fail to Reject Ho	Not significant
Barangay Nangka	4.51	0.42			
Barangay Tumana	4.39	0.72			
Have you ever contracted leptospirosis?					
Yes	4.70	0.20	0.452	Fail to Reject Ho	Not significant
No	4.48	0.59			

The results show that respondents' attitudes toward leptospirosis prevention were consistently high across demographic groups, with overall means clustering around 4.3–4.6 on a 5-point scale. Importantly, no statistically significant differences were found in any demographic category (all p-values > 0.05).

1. Age: Attitude scores ranged from 4.41 (10–19 years old) to 4.58 (60–69 years old), but differences were not significant (p = 0.784). This suggests that regardless of age, respondents generally shared similarly strong preventive attitudes.
2. Sex: Male respondents (M = 4.40) and female respondents (M = 4.52) did not significantly differ (p = 0.221). This indicates that both sexes equally endorsed preventive attitudes toward leptospirosis.
3. Educational Attainment: Attitude levels slightly increased with higher education, from no formal education (M = 4.39) to postgraduate degree (M = 4.64), but the difference was not statistically significant (p = 0.642). Thus, while education influenced awareness (Table 5.1), it did not create meaningful gaps in attitudes.
4. Occupation: Scores across blue-collar workers (M = 4.46), unemployed (M = 4.48), and white-collar respondents (M = 4.59) were comparable, with no significant difference (p = 0.904). Preventive attitudes were broadly shared regardless of work type.
5. Location: Attitude scores varied slightly across barangays, with Malanday (M = 4.57) scoring higher than Tumana (M = 4.39), but the difference was not significant (p = 0.288). This suggests attitudes were relatively uniform across geographic locations.
6. History of Leptospirosis: Those who had previously contracted leptospirosis (M = 4.70) reported slightly higher preventive attitudes than those without prior infection (M = 4.48), but this was not statistically significant (p = 0.462).

Table 5.3: Preventive Measures by Demographic Variables

Table 5.3 Preventive Measures

	Mean	SD	p value	Decision	Conclusion
Age					
10 - 19 years old	4.50	0.37	0.891	Fail to Reject Ho	Not significant
20 -29 years old	4.34	0.68			
30 - 39 years old	4.48	0.71			
40 - 49 years old	4.46	0.45			
50 - 59 years old	4.41	0.48			
60 - 69 years old	4.46	0.53			
Sex					
Male	4.33	0.62	0.16	Fail to Reject Ho	Not significant
Female	4.48	0.55			
Highest Educational Attainment					
No formal education	3.96	0.42	0.123	Fail to Reject Ho	Not significant
Primary Education	4.28	0.84			
Secondary Education	4.47	0.39			
Undergraduate (Degree)	4.50	0.69			
Post Graduate (Master)	5.00	.			
Occupation					
Blue Collar	4.38	0.61	0.59	Fail to Reject Ho	Not significant
Unemployed	4.48	0.56			
White Collar	4.34	0.54			
Location					
Barangay Malanday	4.54	0.54	0.069	Fail to Reject Ho	Not significant
Barangay Nangka	4.48	0.44			
Barangay Tumana	4.29	0.69			
Have you ever contracted leptospirosis?					
Yes	4.52	0.60	0.775	Fail to Reject Ho	Not significant
No	4.43	0.58			

Preventive measures against leptospirosis were consistently strong across all demographics, with no significant variations by age, sex, education, occupation, barangay, or previous disease experience. This suggests that while awareness levels vary by education and location (Table 5.1), the translation into preventive practices is more uniform across the community. Residents appear to adopt preventive actions widely, regardless of background.

The analysis revealed that preventive practices against leptospirosis were high across all demographic groups, with mean scores clustered between 4.2 and 4.6. However, no statistically

significant differences were detected across any demographic categories (all p-values > 0.05).

1. Age: Preventive practice scores ranged narrowly from 4.36 (40–49 years old) to 4.50 (10–19 years old). With p = 0.891, age had no significant effect, indicating that preventive behaviors were uniformly adopted across different age groups.
2. Sex: Female respondents (M = 4.48) reported slightly stronger preventive behaviors than males (M = 4.33), but the difference was not significant (p = 0.16). This shows that both sexes practice preventive measures at comparable levels.
3. Educational Attainment: While postgraduate respondents recorded the highest mean score (M = 5.00), followed by undergraduates (M = 4.47), and those with no formal education the lowest (M = 3.96), the differences did not reach statistical significance (p = 0.123). This contrasts with awareness results (Table 5.1), where education showed a significant effect. Here, preventive actions appear widely practiced regardless of formal schooling.
4. Occupation: Blue-collar (M = 4.38), unemployed (M = 4.48), and white-collar (M = 4.34) respondents reported nearly identical mean scores. With p = 0.59, occupation did not significantly influence preventive behavior.
5. Location: Barangay-level differences showed slightly higher practices in Malanday (M = 4.54) compared to Tumana (M = 4.29), with Nangka (M = 4.49) in between. Although the p-value approached significance (p = 0.069), it did not reach the conventional threshold, suggesting that geographic context may play a minor but not statistically proven role in shaping practices.
6. History of Leptospirosis: Respondents with prior leptospirosis experience (M = 4.52) reported slightly stronger preventive practices than those without infection history (M = 4.43). However, the difference was not significant (p = 0.775).

4.6 Correlation Analysis

Table 6: Correlation Among Awareness, Attitude, and Preventive Measures

		Pearson r	p value	Decision	Conclusion
Awareness vs	Attitude	0.202	0.013	Reject Ho	Significant
	Preventive Measure	0.269	0.001	Reject Ho	Significant
Attitude	Preventive Measure	0.759	0.001	Reject Ho	Significant

The correlation analysis reveals significant positive relationships among the three key variables: awareness, attitude, and preventive practices.

1. Awareness and Attitude: A weak but statistically significant positive correlation was found (r = 0.202, p = 0.013). This indicates that higher awareness of leptospirosis is associated with more favorable attitudes toward prevention, though the relationship is modest in strength.
2. Awareness and Preventive Measures: A slightly stronger yet still weak positive correlation was observed (r = 0.269, p = 0.001). This suggests that awareness contributes to the adoption of preventive practices, but knowledge alone is not the dominant driver of behavior.
3. Attitude and Preventive Measures: A very strong positive correlation was established (r = 0.759, p = 0.001). This indicates that preventive actions are most strongly influenced by residents' attitudes toward leptospirosis rather than by awareness alone. In other words, knowledge provides a foundation, but it is the commitment, responsibility, and concern reflected in attitudes that translate most directly into actual preventive behaviors.

4.7 Discussion

Overview of Findings

This study examined the awareness, attitudes, and preventive practices toward leptospirosis among residents of flood-prone barangays in Marikina City, alongside the demographic factors shaping these domains and the relationships among them. Several patterns emerged:

1. Awareness was generally high, particularly regarding transmission and preventive actions, though symptom recognition and knowledge of secondary sources were weaker.
2. Attitudes were consistently strong across demographic groups, reflecting shared community commitment to cleanliness, health-seeking, and collective prevention.
3. Preventive practices were widely adopted, particularly in household sanitation and personal hygiene, though exposure-related behaviors (e.g., wading through floods) remained challenging.
4. Demographic differences showed that awareness varied significantly by education and location, but attitudes and practices were broadly uniform across groups.
5. Correlational analysis revealed that attitudes had the strongest association with preventive practices, underscoring their mediating role between awareness and action.

These findings provide a nuanced view of the "knowledge–attitude–practice" (KAP) framework, highlighting both strengths and persistent gaps in community-level leptospirosis control.

Awareness of Leptospirosis: Strengths and Gaps

Respondents demonstrated strong awareness of leptospirosis transmission, with nearly all recognizing rodents as the main reservoir and floods as a critical exposure route (Tables 2.1 and 2.4). This aligns with prior research in Laguna (Arbiol et al., 2016) and Sri Lanka (Dhanasinghe & Gamage, 2023), where high-profile health campaigns successfully imprinted rodents and floodwater as the primary risk vectors. Public health advisories, often amplified during rainy seasons, appear to have effectively shaped baseline community knowledge.

However, awareness gaps persisted in two critical areas: symptom recognition and secondary reservoirs. Only one-quarter of respondents correctly identified incubation periods or potential complications (Table 2.2), and fewer than 10% recognized transmission routes beyond rodents (Table 2.1). This mirrors findings in South Andaman (Fatema et al., 2023) and Brazil (Costa et al., 2021), where residents retained prevention-oriented messages but struggled to recall clinical signs or less-emphasized transmission pathways. The risk is practical: delayed recognition of early symptoms often results in late clinical consultation, increasing the likelihood of progression to severe disease.

Statistical analysis confirmed that education and barangay of residence significantly influenced awareness (Table 5.1). Residents with higher educational attainment (undergraduate and postgraduate) scored significantly better than those with no formal schooling. This supports global evidence that literacy facilitates comprehension and retention of health information (Palma et al., 2022). Barangay-level variation also suggests the role of local governance and outreach intensity: residents of Malanday showed the highest awareness, while Tumana lagged. This may reflect differences in barangay-specific campaigns, resource allocation, or flood exposure histories, echoing observations from localized interventions such as Marikina's "rat-to-cash" initiative (INQUIRER.net, 2022).

Attitudes Toward Leptospirosis Prevention

Attitudes were consistently positive across the sample, with respondents strongly agreeing on the need for sanitation, family education, early consultation, and community participation (Table 3).

The highest ratings were for environmental cleanliness and prompt health-seeking behavior, underscoring the integration of prevention into residents' everyday values. The rejection of the statement "I feel unconcerned about living in an area with poor sanitation" (M = 2.39) further demonstrates heightened risk perception in flood-prone settings.

Crucially, attitudes did not significantly differ across demographic groups (Table 5.2). Regardless of age, sex, education, occupation, or barangay, respondents expressed similarly strong preventive orientations. This uniformity suggests that attitudes are shaped less by individual characteristics and more by shared community experience of flooding and collective health messaging. Unlike awareness, which depends heavily on educational exposure, attitudes may be cultivated through lived realities of recurring floods, peer reinforcement, and visible public health efforts.

This finding is consistent with the Health Belief Model and Protection Motivation Theory, which posit that perceived susceptibility and severity—often heightened in communities with recurring disasters—generate strong attitudes toward prevention (Prentice-Dunn & Rogers, 1986). In Marikina, where residents have repeatedly experienced floods, attitudinal alignment may reflect a collective normalization of risk and responsibility, reinforcing shared vigilance even when knowledge levels differ.

Preventive Practices: Adoption and Limitations

Respondents reported high adherence to preventive practices, particularly regarding household cleanliness, food storage, wound care, and sanitation (Table 4). Washing hands after waste disposal, covering wounds, and washing cooking utensils scored among the highest practices, aligning with Department of Health messaging on hygiene and sanitation. These results parallel findings in Brazil (Khalil et al., 2021) and Malaysia (Chung et al., 2024), where sanitation and hygiene were the most consistently reported preventive behaviors.

However, challenges emerged in practices requiring behavioral restraint during flood exposure. Respondents disagreed with engaging in high-risk activities—such as wading through floods without protection or handling waste without gloves—yet the means (≈2.0) suggest that such practices may still occasionally occur. This is consistent with reports from Laguna and Kuching, Malaysia, where residents acknowledged difficulty avoiding floodwaters due to occupational demands, commuting, or lack of alternatives (Arbiol et al., 2016; Chung et al., 2024). Thus, while attitudes are strongly preventive, structural constraints limit full compliance.

Statistical tests showed no significant differences in preventive practices by demographic variables (Table 5.3). This suggests that protective behaviors are relatively uniform across age, sex, education, occupation, and barangay. Unlike awareness, which varies, practices appear to be

influenced by communal norms and shared flood experiences, producing a more even distribution across groups. The only near-significant trend was barangay-level variation ($p = 0.069$), with Malanday slightly outperforming Tumana, reinforcing the modest role of local initiatives in shaping practice.

Linking Awareness, Attitudes, and Practices

The correlation analysis (Table 6) highlights the differential roles of awareness and attitudes in shaping preventive behaviors. Awareness was positively correlated with both attitudes ($r = 0.202$) and preventive measures ($r = 0.269$), but the relationships were weak. This confirms prior warnings in KAP research that knowledge alone is insufficient to drive sustained practice (Hassan et al., 2023). While informed individuals are more likely to act preventively, awareness without enabling conditions or strong attitudes yields only modest behavior change.

By contrast, attitudes were strongly correlated with preventive practices ($r = 0.759$), indicating that commitment, concern, and responsibility perceptions are the dominant drivers of protective behaviors. This aligns with international findings where attitudes—particularly risk perception and perceived efficacy—mediate the translation of knowledge into action (Baharom et al., 2023; Nazir et al., 2023). In Marikina, the strong attitudinal orientation toward prevention appears to compensate for knowledge gaps, sustaining high practice levels even in populations with only moderate awareness.

The Knowledge–Attitude–Practice Gap in Context

The combined findings point to a nuanced awareness–practice gap in Marikina's flood-prone barangays. Awareness varies by education and location, but practices are broadly shared, mediated by uniformly strong attitudes. This suggests that while information dissemination remains important, interventions must increasingly focus on maintaining positive attitudes and addressing structural barriers.

For example, even residents who know the risks of floodwater may still wade through it due to lack of alternatives. Similarly, recognition of fever as a symptom may not trigger consultation if clinics are inaccessible or if self-medication feels more practical. These behaviors reflect systemic and environmental constraints rather than attitudinal indifference. As Lau et al. (2010a) and PAHO (2020) argue, prevention in flood-prone contexts requires coupling education with material supports such as footbridges, waste collection, protective gear distribution, and accessible prophylaxis.

Policy and Public Health Implications

The findings have several implications for local and national health authorities:

1. Targeted Awareness Campaigns: Efforts should focus on symptom recognition and secondary transmission routes, areas where awareness remains weak. Simplified visual materials, school-based education, and community health worker messaging can help bridge these knowledge gaps.
2. Barangay-Level Interventions: Significant awareness differences across barangays suggest that localized campaigns matter. Strengthening outreach in Tumana, for example, may raise knowledge levels to match Malanday and Nangka.
3. Attitude Reinforcement: Given the strong correlation between attitudes and practices, interventions should prioritize sustaining collective responsibility through community engagement (e.g., synchronized clean-ups, rat control incentives, school-based family campaigns).
4. Structural Supports for Practice: To overcome feasibility barriers, authorities must complement education with tangible enablers—affordable PPE, reliable waste disposal, and accessible clinical services. Otherwise, preventive intent will be undermined by daily realities.
5. Integration with DRRM and Primary Care: Leptospirosis prevention should be institutionalized as part of barangay health center routines during flood season, linked with disaster risk reduction and management (DRRM) protocols.

Contribution to Literature

This study contributes to the Philippine and global KAP literature in three ways:

1. It documents urban flood-prone community dynamics, extending beyond rural or lakeshore contexts studied previously.
2. It highlights the mediating role of attitudes, showing that preventive practices are more strongly linked to attitudinal orientation than to knowledge levels.
3. It underscores the need for localized, barangay-specific strategies, showing how awareness differs by community context even within a single city.

These contributions support the argument advanced by WHO (2021) and Toemjai et al. (2022) that effective leptospirosis control must integrate knowledge dissemination with attitude reinforcement and structural enablers.

Limitations and Future Research

Several limitations temper interpretation. First, the reliance on self-reported practices may be affected by social desirability bias, potentially inflating preventive scores. Observational studies or mixed-method approaches could provide more accurate accounts. Second, the cross-sectional design limits causal inference: while awareness and attitudes are correlated with practices, longitudinal designs would better capture how behaviors evolve across successive flood seasons. Third, while this study covered three barangays, results may not generalize to rural or less flood-prone areas, where risk perception and exposure differ.

Future research should explore:

1. Longitudinal tracking of awareness and practice across multiple flood cycles;
2. Qualitative studies to capture how families negotiate flood exposure in practice;
3. Comparative urban–rural analyses to test the generalizability of findings; and
4. Policy evaluation studies assessing the effectiveness of barangay-level initiatives like rat-control programs or PPE distributions.

Wherefore, the findings confirm that residents of Marikina City's flood-prone barangays are well aware of leptospirosis and demonstrate consistently strong preventive attitudes and practices. However, knowledge gaps persist in symptom recognition and secondary transmission routes, and structural barriers continue to constrain behavior during floods. Education and barangay location significantly shape awareness, but attitudes—uniformly strong across all groups—emerge as the key driver of preventive actions.

These results underscore that effective leptospirosis prevention requires a three-pronged approach: (1) targeted awareness campaigns to close knowledge gaps, (2) reinforcement of positive attitudes to sustain preventive orientations, and (3) provision of enabling supports to ensure practices are feasible in real-world flood conditions. By integrating these elements, local governments and health authorities can narrow the awareness–practice gap, mitigate outbreak risks, and strengthen community resilience in the face of recurring floods.

5. Conclusions and Recommendations

5.1 Conclusion

This study investigated the awareness, attitudes, and preventive practices against leptospirosis among residents of three flood-prone barangays in Marikina City. Results revealed several key insights.

First, awareness levels were high overall, especially regarding transmission and preventive actions, but important gaps persisted in symptom recognition and secondary sources of infection. Educational attainment and barangay of residence significantly influenced awareness, with higher education and certain localities (e.g., Malanday) associated with better knowledge.

Second, attitudes toward prevention were uniformly strong across all demographic groups. Respondents consistently valued environmental cleanliness, early consultation, and community participation, indicating a shared cultural orientation toward collective health responsibility regardless of age, sex, education, or occupation.

Third, preventive practices were also strongly observed, particularly in sanitation, food storage, wound care, and health-seeking behavior. However, practices requiring avoidance of flood exposure remained less consistent, reflecting structural barriers rather than attitudinal indifference. Unlike awareness, practices did not significantly vary by demographic background, suggesting broad diffusion of protective behaviors across the community.

Finally, the correlation analysis confirmed that attitudes are the strongest predictor of preventive actions, more so than awareness. While knowledge provides a foundation, it is the community's preventive mindset that translates most directly into consistent behavior.

Overall, the study demonstrates that Marikina residents possess high levels of awareness and practice, but critical knowledge gaps and environmental constraints remain. The findings highlight the importance of reinforcing awareness campaigns, sustaining positive attitudes, and addressing structural enablers to reduce leptospirosis risks in flood-prone communities.

5.2 Recommendations

Based on these findings, the following recommendations are advanced for policymakers, health authorities, and community stakeholders:

For Local Governments and Health Authorities

1. Enhance Symptom Recognition Campaigns – Strengthen health communication by focusing on early signs (e.g., fever, myalgia, jaundice) and the incubation period of leptospirosis. Visual and multilingual materials should be used for diverse literacy levels.
2. Barangay-Specific Initiatives – Address localized gaps, particularly in Tumana, by intensifying barangay-level health education and outreach. Tailoring interventions to community contexts can narrow disparities.

3. Enable Safer Flood Navigation – Provide structural supports such as temporary footbridges, accessible drying stations for boots, and affordable or subsidized personal protective equipment (PPE) to make compliance feasible.
4. Institutionalize Seasonal Responses – Integrate leptospirosis screening, prophylaxis, and education into barangay health center operations during flood and monsoon seasons, aligning with DRRM strategies.
5. Sustain Participatory Campaigns – Build on successful initiatives like Marikina's "rat-to-cash" program, but ensure linkage with regular waste collection and rodent control for lasting impact.

For Academic and Research Communities

6. Longitudinal and Mixed-Method Research – Future studies should track awareness, attitudes, and practices across successive flood cycles and combine quantitative surveys with qualitative inquiry to capture behavioral drivers.
7. Develop Validated Instruments – To reduce social desirability bias, standardized and validated tools should incorporate observational data alongside self-reports.
8. Policy-Oriented Research – Explore how leptospirosis prevention can be integrated into urban planning, sanitation, and climate adaptation frameworks to sustain multi-sectoral responses.

For Community Stakeholders

9. Household-Level Vigilance – Families should continue practicing rodent-proofing, proper food storage, handwashing, and wound care as routine preventive measures.
10. Collective Action – Organize synchronized barangay cleanups aligned with municipal waste collection schedules to reduce rodent habitats and foster collective responsibility.
11. Youth Engagement – Schools and youth groups should be mobilized to reinforce preventive practices among younger residents, who may underestimate risk despite high awareness.

Reducing leptospirosis risk in Marikina's flood-prone communities requires a three-fold strategy: closing knowledge gaps, sustaining strong attitudes, and providing structural supports that make safe practices possible. By aligning education, governance, and community participation, local authorities can transform awareness and attitudes into consistent, effective preventive action.

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