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Original Article

Knowledge, Attitudes, and Practices Regarding Dengue Prevention Among Households in Raichur City: A Cross-Sectional Study

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ABSTRACT

Background: Dengue prevention depends upon community knowledge and practices, yet comprehensive assessment data from Karnataka remain limited. **Objective**: To assess knowledge, attitudes, and practices regarding dengue prevention among Raichur households and identify associated factors. Methods: Cross-sectional survey of 284 households during July-September 2025 using structured questionnaires (knowledge 25 items, attitudes 12 items, practices 20 items) with direct observation. Data analyzed using chi-square, t-test, McNemar test, and multiple logistic regression. **Results**: Good knowledge was present in 64.4%, positive attitudes in 68.3%, but good practices in only 41.2% (mean scores: knowledge 68.4±16.8%, attitudes 72.6±14.2%, practices 58.2±18.4%). Knowledge-practice gaps ranged from 19.0-32.4% (all McNemar $p<0.001$). Direct observation revealed 51.4% had uncovered containers and 64.8% had breeding sites. Independent predictors of good practices included graduate education (AOR=5.24, 95% CI: 1.96-14.02), previous dengue (AOR=2.94, 95% CI: 1.52-5.68), female gender(AOR=2.18, 95% CI: 1.28-3.72), and healthcare worker contact (AOR=2.48, 95% CI: 1.50-4.10). **Conclusion**: Substantial knowledge-practice gap exists despite adequate knowledge and positive attitudes. Interventions must address implementation barriers beyond knowledge dissemination, targeting education, women's empowerment, and healthcare worker engagement.

Keywords: *Dengue fever, Knowledge, Attitudes, Practices, Prevention, Vector control, Community survey.*

INTRODUCTION

Dengue fever, transmitted by Aedes aegypti mosquitoes, constitutes the most rapidly spreading mosquito-borne viral disease globally, with 390 million infections annually. India accounts for 34% of global burden, reporting233,251 cases and 166 deaths in 2023.1,2 Karnataka documented 18,462 cases during 2023, with Raichur contributingsignificantly. In the absence of specific antiviral therapy or universally available vaccine, dengue prevention relies fundamentally upon vector control through mosquito breeding site elimination and reduction of human-vector contact, requiring active community participation.3 Aedes aegypti bites during daytime, breeds in clean water containers, and has limited flight range (50-100 meters), making household-level interventions highly effective. Common breeding sites include water storage containers, discarded tires, flower vases, and air coolers. Asingle female mosquito lays 100-200 eggs per batch, with development from egg to adult requiring 7-10 days, necessitating weekly source elimination.4,5

GlobaldengueKAPstudiesconsistentlydemonstrateadequateknowledgebutinadequatepractices,termedthe'knowledge-practice gap'. Recent Karnataka data reported 68% knowledge but only 45% practices,6 Tamil Nadu documented 62% knowledge and 38% practices,7 while a 2024 systematic review identified knowledge-practice gaps of 20-35%.8 Bangladesh 2024 datasimilarlyshowed 61%knowledge but only39%practices.9 Educational level and previous dengue experience consistently emerge as strongest predictors, while women demonstrate better practices due to household management roles.10

Given ongoing dengue transmission and absence of systematic KAP data from Raichur, this study assessed knowledge, attitudes,andpracticesregardingdenguepreventionamonghouseholds,quantifiedknowledge-practicegaps,andidentified independent predictors through multivariable analysis to informtargeted interventions.

MATERIALS AND METHODS

Thiscross-sectionalsurveywasconductedinRaichurcityduringJuly-September2025(post-monsoondenguetransmission peak) among 284 households selected through systematic random sampling from municipal ward lists. Sample size calculated usingn=[$Z^2 \times P \times (1-P)$]/$d^2$ (Z=1.96,P=45%, d=7%) yielded 192, increased to 250for 30% non-response; actual enrollment 284 (response rate 94.7%). Structured questionnaires assessed: (1) sociodemographic characteristics; (2) knowledge(25itemsacross vector/transmission,symptoms,breedingsites,prevention,treatment,scoreddichotomously); (3) attitudes (12 items across perceived susceptibility/severity/benefits/responsibility, 5-point Likert scale); (4) practices (20 items covering water storage, environmental practices, personal protection, community participation, healthcare-seeking).Directobservationassesseduncoveredcontainers,stagnant water, andpotentialbreedingsites.Scoresconverted topercentagesandcategorizedusingBloom'scutoffs:good/positive≥70%,moderate/neutral50-69%,poor/negative <50%.11

StatisticalanalysisutilizedSPSS26.0.Bivariateanalysisemployedchi-squaretest,chi-squarefortrend,independentt-test, one-wayANOVA,McNemartestforpairedproportions(knowledgevspractice),andPearsoncorrelation.Multiplelogistic regression with backward elimination (entry $p<0.20$, retention $p<0.05$) identified independent predictors of good knowledge, positive attitudes, and good practices. Model adequacy assessed through Hosmer-Lemeshow test and ROC curve analysis. Statistical significance: $p<0.05$ (two-tailed). The study received Institutional Ethics Committee approval (IEC/RIMS/2025/156 dated May 20, 2025) with written informed consent fromall participants.

RESULTS

Among 300 households approached, 284 participated (response rate 94.7%). Respondents were predominantly female (60.6%),withmeanage37.4±11.6years.Educationaldistribution:33.1%secondary,20.4%highersecondary,14.8% graduate,18.3%primary,13.4%illiterate.Occupationally,45.1%werehomemakers/unemployed.Monthlyincome:39.4% earned ₹10,000-20,000. Mean family size 4.8±1.9 members. Housing: 59.2% pucca, 29.6% semi-pucca, 11.3% kuccha. Water storage practiced by 86.6%. Previous dengue in family: 18.3%. Health information sources: television 62.7%, friends/relatives 50.0%, healthcare workers 43.7% (Table 1).

Table 1. Sociodemographic Characteristics of Study Participants (N=284)

Characteristic	Category	n (%)
Age(years),Mean±SD	-	37.4±11.6
Gender	Female	172 (60.6)
Education	Illiterate	38 (13.4)
	Primary-Secondary	146 (51.4)
	Higher secondary	58 (20.4)
	Graduate+	42 (14.8)
Monthlyincome (₹)	<10,000	86 (30.3)
	10,000-20,000	112 (39.4)
	>20,000	86 (30.3)
Familysize,Mean±SD	-	4.8±1.9
Typeof house	Pucca	168 (59.2)
	Semi-pucca/Kuccha	116 (40.8)
Water storage	Yes	246 (86.6)
Previous dengue	Yes	52 (18.3)

Knowledge assessment revealed 64.4% with good knowledge, 26.8% moderate, 8.8% poor (mean 68.4±16.8%). Vector knowledge: 94.4% identified mosquito transmission, 65.5% named Aedes, 57.7% knew daytime biting, 50.0% could identify striped appearance. Symptom recognition: 95.8% identified fever, 83.8% body ache, 78.9% headache, 65.5% bleeding manifestations, 86.6% acknowledged fatality risk. Breeding sites: 90.1% knew stagnant water, 82.4% water containers, 59.2% flower pots, 53.5% old tires, 50.0% air coolers. Prevention: 87.3% knew covering containers, 85.2% removingstagnantwater,74.6%weeklywaterchange.Treatment:94.4%wouldseekimmediatecare, 66.2%knewplatelet monitoring, 57.7% knew no specific medicine. Education showed strongest association (χ^2=52.84, $p<0.001$), with dose-response (χ^2 for trend=68.42, $p<0.001$). Previous dengue associated with better knowledge (74.8% vs 67.2%, t=2.86, p=0.005) (Table 2).

Table 2. Knowledge About Dengue Among Study Participants (N=284)

Knowledge Item	Correct Response n (%)
Vector and Transmission	

Denguetransmittedbymosquito bite	268 (94.4)
Aedesmosquitotransmits dengue	186 (65.5)
Mosquitobitesduring daytime	164 (57.7)
CanidentifyAedes(black&white stripes)	142 (50.0)
Symptom Recognition	
Highfeveris main symptom	272 (95.8)
Bodyache/jointpain occurs	238 (83.8)
Headacheisa symptom	224 (78.9)
Bleedingmanifestationsinsevere cases	186 (65.5)
Canbefatalif untreated	246 (86.6)
Breeding Sites	
Stagnantwaterisbreeding site	256 (90.1)
Waterstoragecontainerscanbreed mosquitoes	234 (82.4)
Flowerpots/vasesarepotential sites	168 (59.2)
Oldtirescanharbor mosquitoes	152 (53.5)
Aircoolersneedweekly cleaning	142 (50.0)
Prevention Methods	
Coveringwatercontainersprevents breeding	248 (87.3)
Removingstagnantwaterprevents dengue	242 (85.2)
Changingwaterweeklyis important	212 (74.6)
Treatment Awareness	
Shouldseekmedicalcare immediately	268 (94.4)
Plateletcountmonitoringis important	188 (66.2)
Nospecificmedicinefor dengue	164 (57.7)
Overall Knowledge Score	
Meanscore(%)± SD	68.4 ± 16.8
Goodknowledge (≥70%)	183 (64.4)
Moderate knowledge (50-69%)	76 (26.8)
Poorknowledge (<50%)	25 (8.8)

Attitude assessment showed 68.3% positive attitudes, 24.6% neutral, 7.0% negative (mean 72.6±14.2%). Perceived susceptibility: 76.8% felt family at risk, 93.0% acknowledged community risk, 65.5% perceived area as high-risk. Perceivedseverity:95.8%considereddengueserious,86.6%acknowledgedfatalitypotential,80.3%worriedaboutfamily infection. Perceived benefits: 94.4% agreed prevention better than treatment, 85.2% believed simple measures effective, 82.4%valuedcommunityparticipation.Responsibility:88.7%acceptedpersonalresponsibility,90.8%supporteduniversal participation, 69.7% recognized government alone insufficient. Women demonstrated more positive attitudes (75.2% vs 68.4%, $t=3.64$, $p<0.001$).

Practiceassessmentdemonstratedonly41.2%withgoodpractices(mean58.2±18.4%),substantiallylowerthanknowledge (68.4%) and attitudes (72.6%), revealing significant knowledge-practice gap. Among water-storing households (n=246): 68.3% covered containers regularly, 57.7% changed water weekly, 52.0% cleaned before refilling, 48.0% used tight lids. Environmentalpractices:57.7%removedstagnantwaterweekly,65.5%disposedwasteproperly,69.7%keptsurroundings clean, 43.7%checked afterrain, 38.0%emptied flowerpot plates, 30.3%cleaned air coolers weekly. Personal protection: 66.2% used mosquito coils/mats, 50.0% nets, 43.7% window screens, 34.5% repellent creams, 26.8% wore full-sleeve clothes.Communityparticipation:54.9%participatedinfogging,76.8%allowedhealthworkerinspections,butonly32.4% attendedawarenessprograms,23.9%informedauthoritiesaboutbreedingsites. Healthcare-seeking:87.3% wouldconsult doctor immediately for fever. Direct observation revealed critical gaps: 51.4% had uncovered containers, 41.5% had stagnant water, 57.0% had discarded containers, 64.8% had potential breeding sites (Table 3, Figure 1).

Table 3. Attitudes and Practices Regarding Dengue Prevention (N=284)

Domain/Item	Response n (%)
ATTITUDES	
Perceived Susceptibility	
Myfamilyisatriskofdengue (Agree)	218 (76.8)
Denguecanaffectanyoneincommunity (Agree)	264 (93.0)
Ourareahashighdenguerisk (Agree)	186 (65.5)
Perceived Severity	
Dengueisaseriousdisease (Agree)	272 (95.8)
Denguecancausedeath (Agree)	246 (86.6)
Worriedaboutfamilygettingdengue (Agree)	228 (80.3)
Perceived Benefits & Responsibility	

Preventionisbetterthantreatment (Agree)	268 (94.4)
Simplemeasurescanpreventdengue (Agree)	242 (85.2)
It'smyresponsibilitytopreventdengue (Agree)	252 (88.7)
Everyoneshouldparticipateinprevention (Agree)	258 (90.8)
Overall Attitude Score	
Meanscore(%)± SD	72.6 ± 14.2
Positiveattitude (≥70%)	194 (68.3)
Neutralattitude(50-69%)	70 (24.6)
Negativeattitude (<50%)	20 (7.0)
PRACTICES	
Water Storage Practices (n=246)	
Coverwatercontainers regularly	168 (68.3)
Changewateratleast weekly	142 (57.7)
Cleancontainersbefore refilling	128 (52.0)
Environmental Practices (N=284)	
Removestagnantwater weekly	164 (57.7)
Checkforwateraccumulationafter rain	124 (43.7)
Emptyflowerpotplates regularly	108 (38.0)
Cleanaircoolers weekly	86 (30.3)
Personal Protective Measures	
Usemosquito coils/mats	188 (66.2)
Usemosquito nets	142 (50.0)
Usemosquitorepellent creams/sprays	98 (34.5)
Community Participation	
Participatedinfogging activities	156 (54.9)
Attendedhealthawareness programs	92 (32.4)
Observation Checklist Findings	
Uncoveredwatercontainers observed	146 (51.4)
Stagnantwaterfoundin premises	118 (41.5)
Potentialbreedingsites identified	184 (64.8)
Overall Practice Score	
Meanscore(%)± SD	58.2 ± 18.4
Goodpractices (≥70%)	117 (41.2)
Moderate practices (50-69%)	109 (38.4)
Poorpractices (<50%)	58 (20.4)

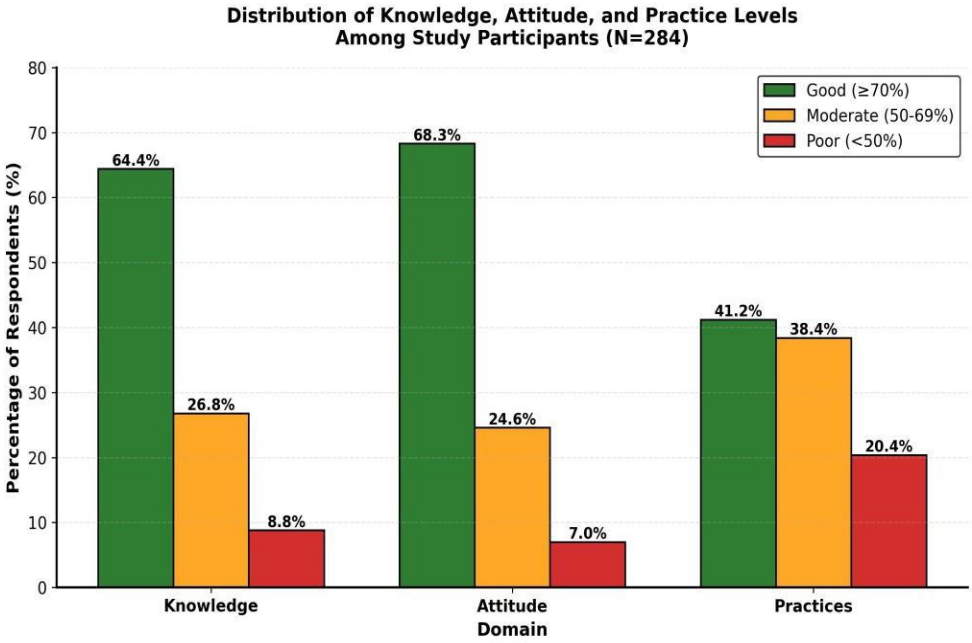

Figure 1. Distribution of Knowledge, Attitude, and Practice Levels (N=284)

Knowledge-practicegapsforspecificmeasures(McNemartest):stagnantwaterremoval32.4%gap(90.1%knewvs57.7% practiced,χ^2=48.24,p<0.001),containercovering19.0%gap(87.3%vs68.3%,χ^2=22.16,p<0.001),waterchanging16.9% gap

(74.6% vs 57.7%, χ^2=14.28, p<0.001), flower pot maintenance 21.2% gap (59.2% vs 38.0%, χ^2=18.64, p<0.001), air cooler cleaning 19.7% gap (50.0% vs 30.3%, χ^2=16.82, p<0.001) (Figure 2). Practice scores demonstrated strong dose-responsewitheducation(χ^2fortrend=74.86,p<0.001),increasingfrom38.4%amongilliteratesto74.2%amonggraduates (Figure 3). Women showed better practices (61.4% vs 53.6%, t=3.18, p=0.002). Income level significantly associated (F=8.64, p<0.001). Previous dengue associated with better practices (68.2% vs 56.4%, t=3.86, p<0.001).

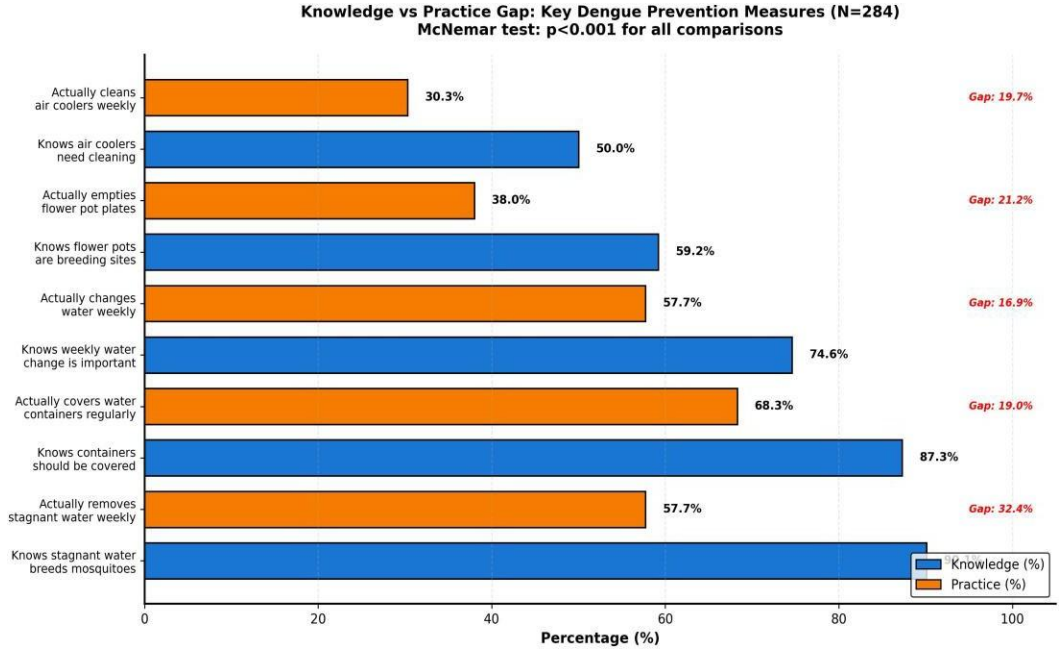

Figure 2. Knowledge vs Practice Gap (McNemar p<0.001 for all comparisons)

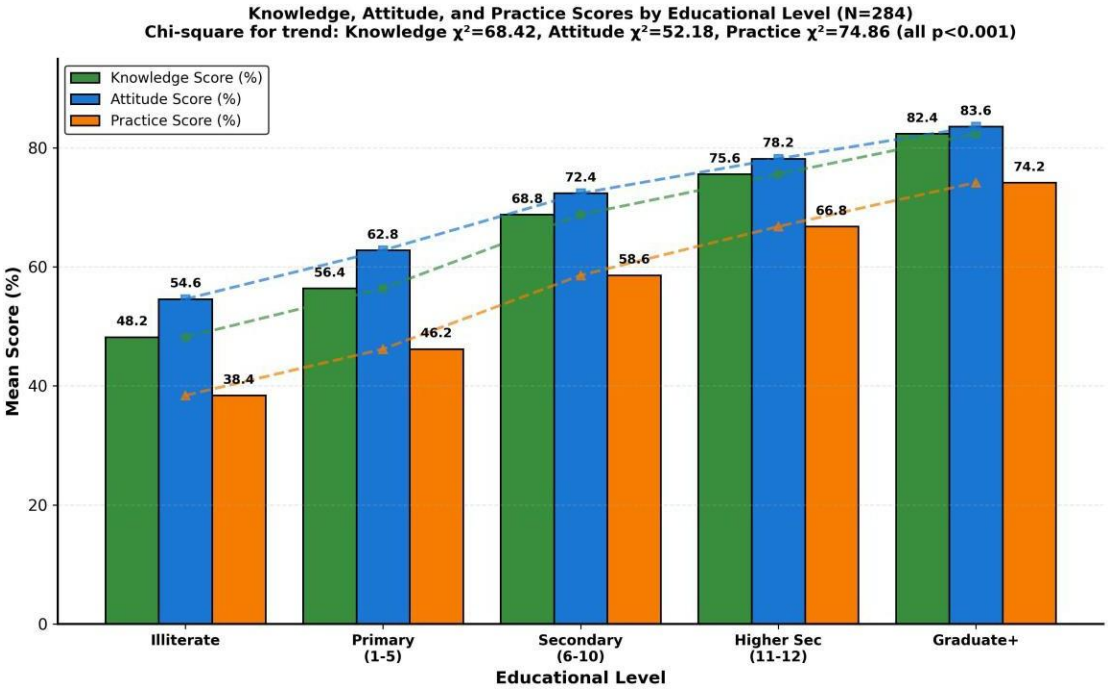

Figure 3. KAP Scores by Educational Level (χ^2 for trend: p<0.001 for all domains)

Multiplelogisticregression identified independent predictors foreach outcome. For good knowledge: graduateeducation (AOR=6.48, 95% CI: 2.38-17.64, p<0.001), higher secondary (AOR=4.82, 95% CI: 1.92-12.10, p=0.001), secondary (AOR=3.68,95%CI:1.56-8.68,p=0.003),previousdengue(AOR=2.68,95%CI:1.38-5.20,p=0.004),income>₹40,000 (AOR=2.86, 95% CI: 1.18-6.94, p=0.020), television as information source (AOR=2.14, 95% CI: 1.28-3.58, p=0.004), healthcare workercontact (AOR=1.94, 95%CI: 1.18-3.20, p=0.009). Model: Hosmer-Lemeshowχ^2=6.84, p=0.554; ROC AUC=0.788(95%CI:0.734-0.842).Forpositiveattitudes:graduateeducation(AOR=4.18,95%CI:1.56-11.20,p=0.005), highersecondary(AOR=3.24,95%CI:1.32-7.96,p=0.010),secondary(AOR=2.42,95%CI:1.04-5.64,p=0.041),previous

dengue (AOR=2.42, 95% CI: 1.24-4.72, p=0.010), female gender (AOR=1.68, 95% CI: 1.01-2.79, p=0.046), healthcare workercontact(AOR=1.72,95% CI:1.04-2.84,p=0.034),television(AOR=1.86,95% CI:1.12-3.10,p=0.017). Model:

Hosmer-Lemeshow χ^2=8.12, p=0.421; ROC AUC=0.762 (95% CI: 0.706-0.818). For good practices: graduate education (AOR=5.24, 95% CI: 1.96-14.02, p=0.001), higher secondary (AOR=3.92, 95% CI: 1.58-9.74, p=0.003), secondary (AOR=2.86, 95% CI: 1.22-6.72, p=0.016), previous dengue (AOR=2.94, 95% CI: 1.52-5.68, p=0.001), female gender (AOR=2.18,95%CI: 1.28-3.72,p=0.004),income>₹40,000(AOR=3.42,95%CI: 1.42-8.24,p=0.006),income₹20,001-40,000(AOR=2.64,95%CI:1.32-5.28,p=0.006),puccahousing(AOR=2.82,95%CI:1.24-6.42,p=0.014), healthcare workercontact(AOR=2.48,95%CI:1.50-4.10,p<0.001).Model:Hosmer-Lemeshowχ^2=7.46,p=0.488;ROCAUC=0.804 (95% CI: 0.752-0.856). Variance inflation factors ranged 1.12-2.84, indicating no multicollinearity (Table 4).

Variable	Good Knowledge AOR (95% CI)	p-value	Positive Attitude AOR (95% CI)	p-value	Good Practices AOR (95% CI)	p-value
Graduate education	6.48(2.38-17.64)	<0.001	4.18(1.56-11.20)	0.005	5.24(1.96-14.02)	0.001
Higher secondary	4.82(1.92-12.10)	0.001	3.24(1.32-7.96)	0.010	3.92(1.58-9.74)	0.003
Secondary education	3.68(1.56-8.68)	0.003	2.42(1.04-5.64)	0.041	2.86(1.22-6.72)	0.016
Previous dengue	2.68(1.38-5.20)	0.004	2.42(1.24-4.72)	0.010	2.94(1.52-5.68)	0.001
Female gender	NS	-	1.68(1.01-2.79)	0.046	2.18(1.28-3.72)	0.004
Income >₹40,000	2.86(1.18-6.94)	0.020	NS	-	3.42(1.42-8.24)	0.006
Pucca housing	NS	-	NS	-	2.82(1.24-6.42)	0.014
Healthcare worker contact	1.94(1.18-3.20)	0.009	1.72(1.04-2.84)	0.034	2.48(1.50-4.10)	<0.001
Televisionas info source	2.14(1.28-3.58)	0.004	1.86(1.12-3.10)	0.017	NS	-
Model fit						
ROC AUC	0.788		0.762		0.804	

NS:Notsignificantinmultivariablemodel;AOR:AdjustedOddsRatio;CI:Confidence Interval

DISCUSSION

This study documents substantial knowledge-practice gap in dengue prevention among Raichur households despite adequate knowledge and positive attitudes. The observed pattern of Knowledge (64.4%) ≈ Attitude (68.3%) >> Practice (41.2%) aligns precisely with recent Karnataka (68% knowledge, 45% practices),6 Tamil Nadu (62% knowledge, 38% practices),7 and 2024 Bangladesh data (61% knowledge, 39% practices),9 confirming the universal dengue KAP gap pattern documented in 2024 systematic review showing 20-35% gaps across Asian countries.8 The 19-32% knowledge-practice gapsforspecific measures(allMcNemarp<0.001),withlargestgapforstagnantwaterremoval(32.4%),indicate substantial implementation barriers including perceived inconvenience, time constraints, and low prioritization of less obvious breedingsites. Direct observation revealing51.4%uncovered containers and 64.8%breeding sites despite87.3% knowing to cover containers validates the knowledge-practice dichotomy and social desirability bias in self-reports.

Educational level emerged as strongest predictor across all domains, with graduate education demonstrating 6.48-fold higher odds for knowledge and 5.24-fold for practices compared to illiterates, operating beyond economic pathways through improved health literacy and empowerment. This dose-response relationship aligns with international evidence from Brazil (AOR=4.8), Thailand (AOR=5.2), and Pakistan (AOR=6.1).12,13 Female gender showed independent association with better practices (AOR=2.18), consistent with women's household management role documented across dengue-endemic settings.14 Previous dengue infection demonstrated strong association (AOR=2.94 for practices), illustrating experiential learning's effectiveness, paralleling Vietnam(AOR=3.2) and Thailand (AOR=2.8) findings.15

Economic factors (income >₹40,000: AOR=3.42) and housing quality (pucca: AOR=2.82) demonstrated independent associations, emphasizing structural determinants beyond individual behavior requiring interventions addressing reliable water supply, housing improvement, and subsidized protective equipment. Healthcare worker contact emerged as significant predictor (AOR=2.48 for practices), stronger than television (AOR=2.14 for knowledge only), highlighting interpersonal communication's critical role in behavior change over mass media.16

Study limitations include cross-sectional design precluding temporal causality, potential social desirability bias partially mitigated through direct observation, post-monsoon timing potentially overestimating year-round awareness, and urban setting limiting ruralgeneralizability. Methodological strengths encompass adequate sample size (N=284, 94.7% response), validated instruments, comprehensive KAP assessment, direct observation for practice validation, rigorous multivariable analysis with model validation (ROC AUC=0.804), and robust statistical methodology.

CONCLUSION

Raichur households demonstrate substantial knowledge-practice gap in dengue prevention (23-27 percentage points) despite adequate knowledge and positive attitudes. Education emerged as strongest modifiable determinant with dose-response relationship, while women, households with previous dengue experience, and those with healthcare worker contact demonstrated better practices. Multi-component interventions are warranted encompassing educational enhancement,women-focusedcommunitymobilization,healthcareworkercapacitystrengthening,structuralinterventions addressingeconomicbarriers,experientiallearningstrategies,andregularmonitoringcombiningself-reportswithobjective observation to safeguard this vulnerable urban population facing escalating dengue burden.

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