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Gaps in Knowledge, Attitudes, and Practices Regarding Mosquito-Borne Diseases among Secondary School Children in a Rural Area of West Godavari District, Andhra Pradesh

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ABSTRACT

Background

Mosquito-borne diseases (MBDs) remain a public health challenge in rural India. Assessing Gaps in knowledge, attitudes, and practices (KAP) among school children can inform targeted interventions.

Methods

An institution-based cross-sectional study was conducted from September to December 2025 among 215 secondary school children from one randomly selected rural secondary school in West Godavari District, Andhra Pradesh (selected by simple random sampling using the lottery method after line-listing all rural secondary schools). A pre-tested questionnaire assessed sociodemographics, knowledge, attitudes, and practices. Data were analyzed using SPSS 20 with chi-square tests ($p<0.05$).

Results

About 99.1% of the study subjects were aware that mosquito bites cause sickness, but specific knowledge was limited (e.g., only 18.6% knew dengue mosquito breeding sites). Teachers were the primary source of information (63.3%). Attitudes were positive (89.3% believed mosquito control is possible). Preventive practices showed notable gaps (e.g., only 19.1% used daytime bed nets). Significant associations were observed between gender, parental education, attitudes, and key KAP variables ($p<0.05$).

Conclusions

Majority of the students had basic awareness and positive attitudes were noticed, but critical gaps in specific knowledge and preventive practices remain. School-based education is recommended to address both knowledge depth and behavioural barriers to translate awareness into sustained action.

Key-words: Mosquito-borne diseases, KAP, Rural children, Malaria, Dengue, Health education

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INTRODUCTION

Mosquito-borne diseases (MBDs), including malaria, dengue, chikungunya, and filariasis, pose a substantial public health burden in India, particularly in rural areas where environmental factors like stagnant water and socioeconomic challenges facilitate transmission (1,2). Andhra Pradesh, with its humid tropical climate and extensive agricultural landscapes, continues to report high malaria incidence, with tribal and rural districts contributing disproportionately due to vector proliferation and limited access to interventions (3). Globally, dengue remains the fastest-growing vector-borne disease, with approximately 390 million infections annually and India accounts for a significant share, including over 232,425 cases reported in 2024 alone (4,5). School children, as future community influencers and agents of behavioral change, are critical targets for KAP studies, as their awareness and practices can effectively drive household and community-level prevention strategies (6,7). Previous research highlights variable KAP levels in rural India, often revealing significant gaps between knowledge and implementation. In rural Uttar Pradesh (2025), 53.3% of respondents had poor knowledge of MBDs, with education, age, and occupation strongly influencing KAP scores, while practices lagged despite moderate attitudes (8). Among school teachers in Central India (2018), pre-sensitization knowledge was moderate (50.9% high scorers), improving significantly post-workshop to 72.6%, underscoring the potential of targeted education but highlighting initial practice gaps (e.g., 42.5% bed net use) (9). In rural West Bengal (2022), unqualified health practitioners showed average KAP on dengue and malaria, with knowledge deficits in transmission modes and practices limited by resource constraints (10). A 2023 study in Eastern India among children found moderate KAP scores correlated with dengue prevalence, emphasizing sociodemographic influences on prevention (11). In rural Haryana (2019), while 72.5% recognized mosquito transmission, preventive practices were low (one-third used nets/repellents), linked to caste and socioeconomic factors (12). Recent multicenter rural studies (2025) reported gaps in dengue KAP, with 68.93% unaware of specific breeding site management, despite high attitudes toward control (13). Systematic reviews of school-based interventions (2019-2024) confirm improvements in knowledge and attitudes post-education, but persistent practice gaps in low-resource settings (14,15). Community-based trials in rural areas (2023) further demonstrate that collaborative attitudes enhance practices, yet baseline "know-do" discrepancies remain widespread (16,17). These studies, spanning diverse rural Indian contexts, underscore the persistent need for localized KAP assessments in settings like West Godavari District to guide evidence-based health education.

Methods

Study Design: Institution-based cross-sectional study.

Study Area: A Secondary School in the rural area of West Godavari District, Andhra Pradesh.

Study Period: September 2025 To December 2025

Study Population: Secondary school children of rural West Godavari District, Andhra Pradesh

Inclusion Criteria: Students who had submitted the assent form and consent form from parents

Exclusion Criteria: Students who were sick and mentally unstable

Sample Size: The required sample size was calculated using the single population proportion formula: $n = \frac{Z^2 \times p \times (1-p)}{d^2}$ where Z= 1.96 (for 95% confidence level), p= 0.167 (estimated proportion of adequate knowledge/attitudes/practices regarding mosquito-borne diseases, based on a previous study conducted in Bangladesh) (18), and d= 0.05 (absolute precision of 5%).

The calculated sample size was 213.67, rounded off to 215.

Sampling technique: Simple Random Sampling for school selection was done by using lottery method, after line listing all the rural secondary schools of West Godavari district. Data was collected from all the students of the selected school, who were

present on the day of data collection and fulfilling the inclusion criteria till the required sample size(n=215) was attained.

Study Tools: Pre-designed, pre-tested questionnaire, was used after conducting a pilot study among 20 students, to test the effectiveness of questionnaire and methods adopted, along with the expert opinions. The questionnaire covered socio-demographics, knowledge (e.g., transmission, symptoms, prevention), attitudes (e.g., control responsibility), and practices (e.g., protective measures), categorised by using Yes/No responses and represented as percentages. Multiple responses were considered in some questions.

Data Collection: Self-administered under supervision.

Data Analysis: Entered and analyzed using SPSS 20. Descriptive statistics (percentages) and chi-square tests assessed associations ($p<0.05$).

Ethical Considerations: Study approved by institutional ethics committee(IEC-GMC-ELR/004-2024). Prior permission from the head of the school, assent from students and informed consent from the parent/guardian were obtained.

Results

A total of 215 students participated in the study, with a nearly equal gender distribution: 107 (49.8%) boys and 108 (50.2%) **girls (Figure 1).**

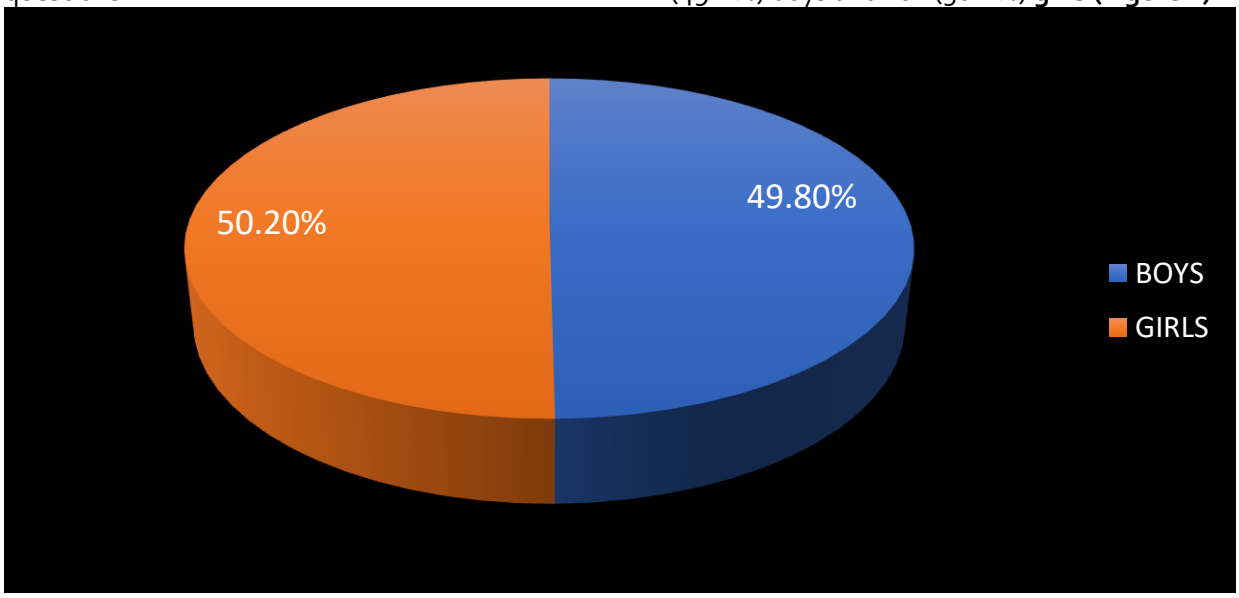

Figure 1: Pie chart showing gender distribution (boys 49.8%, girls 50.2%).

Nearly all students (99.1%, n=213) were aware that mosquito bites can cause sickness, about 97.2% (n=209) knew that malaria and dengue are caused by different types of mosquitoes, and 89.8% (n=193) recognized that dengue mosquitoes bite during the daytime. However, knowledge of specific details was limited: Only 7.9% (n=17) knew that dengue mosquitoes primarily bite on the legs, about 21.4% (n=46) identified fresh water as the breeding site for malaria mosquitoes, and 18.6% (n=40) knew that dengue mosquitoes breed in artificially accumulated water. The primary sources of information were teachers (63.3%, n=136), followed by newspapers (55.3%, n=119), health personnel (45.1%, n=97), family members (39.5%, n=85), friends and relatives (32.1%, n=69), and radio (20.9%, n=45). Multiple options were considered, and percentages were calculated accordingly. (Figure 2).

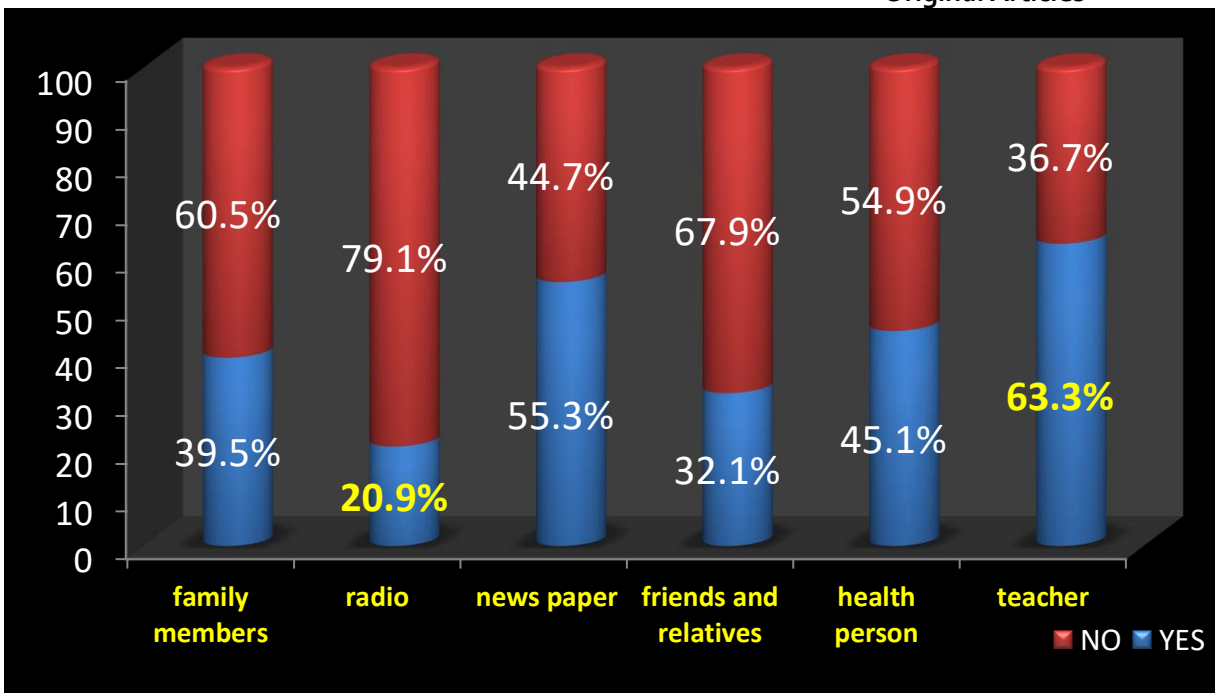

Figure 2: Bar chart showing percentage of students on y-axis, sources of information on x-axis (multiple options considered).

Regarding signs and symptoms of malaria, majority had awareness about fever with chills and rigors (43.7%, n=94) followed by body pains (23.7%, n=51), vomiting (17.7%, n=38), headache (14.9%, n=32), and nausea (12.1%, n=26). Multiple options were considered, and percentages were calculated accordingly. (Figure 3; Table 1).

Table 1: Knowledge of Malaria Symptoms (Multiple options were considered).

Symptom	Yes (n)	Yes (%)	No (n)	No (%)
Fever with chills/rigors	94	43.7	121	56.3
Headache	32	14.9	183	85.1
Body pains	51	23.7	164	76.3
Nausea	26	12.1	189	87.9
Vomiting	38	17.7	177	82.3

Knowledge of methods to clear mosquito breeding places were as follows: clearing drains (40.9%, n=88), emptying water pots (32.1%, n=69), cutting short bushes (24.7%, n=53), and spraying oil in ditches (15.3%, n=33). Multiple options were considered, and percentages were calculated accordingly. (Table 2).

Table 2: Knowledge of Breeding Prevention Methods

Method	Yes (n)	Yes (%)	No (n)	No (%)
Cut short bushes	53	24.7	162	75.3
Clear drains	88	40.9	127	59.1
Spraying oil in ditches	33	15.3	182	84.7
Emptying water pots	69	32.1	146	67.9

Almost all students (97.7%, n=210) were aware of at least one protective measure against mosquito-borne diseases, with only 2.3% (n=5) unaware. Specific knowledge included screening windows and doors (75.3%, n=162), bed nets (70.7%, n=152), liquid repellents (74.4%, n=160), coils (68.4%, n=147), and insecticide sprays (67.4%, n=145). Multiple options were considered and and percentages were calculated accordingly. (Table 3).

Table 3: Knowledge of Protective Measures

Measure	Yes (n)	Yes (%)	No (n)	No (%)
Screening windows/doors	162	75.3	53	24.7
Bed nets	152	70.7	63	29.3
Coils	147	68.4	68	31.6
Liquid repellents	160	74.4	55	25.6
Insecticide sprays	145	67.4	70	32.6

A majority (89.3%, n=192) believed that mosquito control is possible (Figure 4). Additionally, 84.7% (n=182) stated they would seek treatment from a doctor if they contracted malaria. Regarding responsibility for controlling mosquitoes, 59.1% (n=127) viewed it as a joint effort between the government and the public, 27.4% (n=59) attributed it to the government alone, 20% (n=43) to health personnel, and 11.2% (n=24) to the public (Table 4).

Table 4: Attitudes on Responsibility for Mosquito Control

Responsibility	Yes (n)	Yes (%)	No (n)	No (%)
Government	59	27.4	156	72.6
Health personnel	43	20.0	172	80.0
Public	24	11.2	191	88.8
Government with public	127	59.1	88	40.9

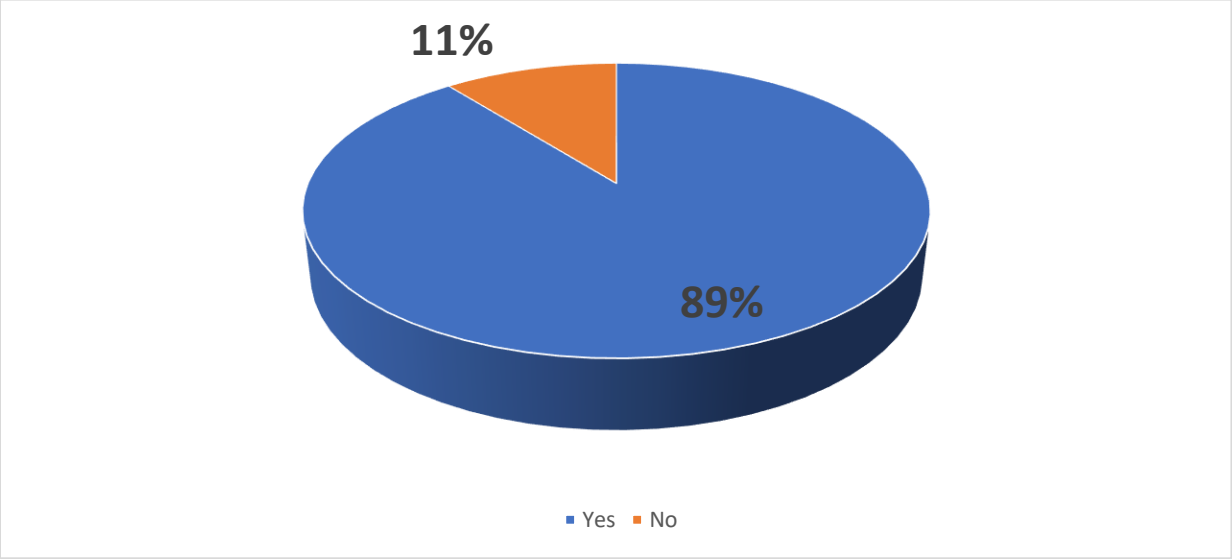

Figure 4: Pie chart showing if it is possible to control mosquitoes (89.3% yes).

Most students (91.6%, n=197) reported having water containers in and around their homes, with 88.4% (n=190) covering them and 72.6% (n=156) emptying them daily. Mosquito mesh was fixed to doors and windows in 78.6% (n=169) of cases. Use of bed nets was higher at night (66%, n=142) than during the day (19.1%, n=41). Other practices included using coils (65.1%, n=140), liquid repellents (67.9%, n=146), covering the whole body with blankets (15.8%, n=34), and electric bats (0.9%, n=2). Multiple options were considered and percentages were calculated accordingly.(Table 5).

Table 5: Practices Related to Mosquito-Borne Disease Prevention

Practice	Number (n)	Percentage (%)
Water containers at home	197	91.6
Covered water containers	190	88.4
Emptied daily	156	72.6
Mosquito mesh on doors/windows	169	78.6
Slept under bed nets (day)	41	19.1
Slept under bed nets (night)	142	66.0
Used coils	140	65.1
Used liquid repellents	146	67.9
Covered whole body with blankets	34	15.8
Used electric bats	2	0.9

Chi-square tests revealed significant associations between variables (Table 6).

Table 6: Significant Chi-Square Associations

Variable 1	Variable 2	χ^2	Df	p-value
Gender	Cover water containers	5.359	1	0.021
Gender	Empty containers weekly	11.819	1	<0.001
Father's education	Dengue mosquito bites legs	7.261	1	0.007
Father's education	Seek doctor for malaria	14.949	1	<0.001
Mother's education	Dengue mosquito bites legs	23.99	1	<0.001
Mother's education	Cover water containers	11.44	1	0.007
Mother's education	Day-time mosquito nets	16.471	1	<0.001
Attitude	Practices	12.59	1	<0.001

Gender was associated with covering water containers (χ^2=5.359, p=0.021, CI-95%) and emptying them weekly (χ^2=11.819, p<0.001, CI-95%), with girls demonstrating better practices. Father's education was linked to knowledge of dengue mosquito bite sites (χ^2=7.261, p=0.007, CI-95%) and seeking doctor treatment for malaria (χ^2=14.949, p<0.001,CI-95%). Mother's education showed associations with knowledge of bite sites (χ^2=23.99, p<0.001,CI-95%), covering containers (χ^2=11.44, p=0.007, CI-95%), and daytime net use (χ^2=16.471, p<0.001, CI-95%). Attitudes were significantly associated with practices (χ^2=12.59, p<0.001,CI-95%).Know-do gaps were evident in key prevention measures (Table 7). Associations between attitudes and practices further highlighted the gaps (Table 8).

Table 7: Know-Do Gaps in Key Prevention Measures for Mosquito-Borne Diseases among Secondary School Children (N=215)

Prevention Aspect	Knowledge (%)	Practice (%)	Gap (%)	Interpretation
Bed Nets usage	70.7	Night: 66.0; Day: 19.1	Night: -4.7; Day: -51.6	Minor gap at night; Major gap during day (low perceived risk despite 89.8% knowing daytime bites).
Screening Windows/Doors	75.3	78.6 (Mesh)	+3.3	Practice exceeds knowledge; possibly routine practice by parents.
Emptying Water Containers	32.1 (Pots)	72.6 (Daily)	+40.5	Practice higher

				than specific knowledge; A part of general cleaning measures drives action.
Repellents/Coils/Sprays	67.4-74.4	65.1-67.9	-1.5 to -6.5	Minor gaps; barriers like access or cost.
Overall Breeding Prevention	15.3-40.9 (Methods)	Variable (72.6-88.4 container mgmt.)	+31.7 to +73.1	Major know-do gap: Low method knowledge, moderate-high practices.

Table 8: Associations between Attitudes and Practices Regarding Mosquito-Borne Disease Prevention Among Secondary School Children (N=215)

Aspect	Attitude (%)	Linked Practice (%)	Association (p-value)	Gap/Interpretation
Mosquito Control Possible	89.3	Overall practices (e.g., 66-88.4% adherence)	<0.001 (Attitude-Practices)	Minor gap: High positive attitude correlates with better practices; 10.7% disbelief widens non-adherence.
Responsibility: Govt + Public	59.1	Higher practices among collaborators	<0.001	No major gap: Collaborative attitudes reduce practice gaps; sole govt/public views (40.9%) show poorer adherence.
Overall Attitude-Practice Link	Positive (89-84.7%)	Moderate (19.1-88.4%)	<0.001	Moderate gap: Strong attitudes but inconsistent practices (e.g., low day nets).

DISCUSSION

The present study assessed knowledge, attitudes, and practices (KAP) regarding mosquito-borne diseases (MBDs) among 215 secondary school children in rural West Godavari District, Andhra Pradesh, revealing a majority of the study subjects with basic knowledge and positive attitudes but notable gaps in specific knowledge and consistent practices. These findings align with broader patterns in rural Indian and global KAP research, where sociodemographic factors often mediate outcomes, yet highlight opportunities for targeted interventions. In terms of knowledge, majority of the study's participants demonstrated awareness of basic transmission aspects, with 99.1% recognizing mosquito bites as a cause of sickness and 97.2% differentiating vectors for malaria and dengue. This surpasses levels reported in rural Uttar Pradesh, where only 46.7% had good knowledge overall (8), and is comparable to 99.1% awareness of malaria transmission among school teachers in Central India (3). However, specific knowledge was limited, with only 21.4% identifying fresh water as malaria breeding sites and 18.6% noting artificial water for dengue, echoing gaps in Eastern India where household KAP scores were below 50% in 26% of cases (10). Similarly, in rural West Bengal, unqualified practitioners showed 52.42% knowledge of dengue breeding indoors/outdoors (9), while in peri-urban Puducherry, predictors like education influenced such specifics, with knowledge varying from 19.12% for dengue to 82.97% for causation (1). Regarding malaria symptom recognition, 43.7% were aware about fever with chills/rigors and only about 12.1%, were aware

of others like nausea, aligning with 53.63-79.84% symptom awareness in West Bengal (9) but lower than 75% for common dengue/malaria symptoms among Central Indian teachers (3). Sources of information emphasized teachers (63.3%), consistent with school-based roles in Eastern India (10) and Colombia, where educators influenced student KAP (16). These comparisons suggest that while basic knowledge in our rural cohort is robust, akin to global tropical settings like Tanzania (86% transmission awareness) (2), detailed gaps persist, potentially due to limited curriculum depth, as seen in systematic reviews where education improved knowledge by a mean standardized difference of 1.86 (13). Attitudes in the study were predominantly positive, with 89.3% believing mosquito control is possible and 59.1% viewing it as a government-public responsibility, reflecting collaborative mindsets. This mirrors high attitudes in West Bengal (50.4% positive for malaria) (9) and Central India (96.2% collective responsibility) (3), but contrasts with indifferent attitudes in global scoping reviews, where acceptance varied by intervention type (14). Health-seeking was strong at 84.7%, intending doctor visits for malaria, higher than 71.37% in West Bengal for dengue treatment (9) and aligning with 90% prompt care-seeking in Central India (17). Systematic reviews indicate attitudes improve post-community interventions (15), suggesting our cohort's favourable views (e.g., 84.7-89.3%) may stem from school exposure, similar to increases of +0.72 in teacher attitudes post-sensitization (3). Practices showed mixed adherence, with 88.4% covering water containers and 72.6% emptying daily, but only 19.1% using daytime bed nets despite 70.7% knowledge of nets. This "know-do" gap is evident in comparisons: rural Uttar Pradesh reported 41.7% poor practices (8), while West Bengal practitioners had 48.39-52.02% good scores, with 86.69% covering containers (9). Nighttime net use (66%) exceeded Central Indian teachers' 42.5% (3) but fell short of Tanzania's rural 70-90% adherence post-education (2). Repellent/coil use (65.1-67.9%) was similar to 55.7-80.65% in West Bengal (9), yet lower daytime practices highlight risks, as noted in Eastern India, where prevalence correlated with gaps (10). Community interventions in systematic reviews boosted practices with odds ratios of 5.23 (13) and positive shifts in rural Malawi/Uganda (15), indicating potential for similar gains here. The low uptake of daytime protective measures may be attributed to lower perceived risk of daytime mosquito bites compared to night-time bites, practical challenges and discomfort associated with using bed nets during the day. It is observed that there is major know-do gap in mosquito breeding place prevention with low method knowledge and moderate to high practices, attributing to the prevailing cultural or household norms that favour general cleanliness practices over specific vector-control behaviours. Significant associations in our study, such as gender (girls better in container management) and parental education (knowledge/practices), resonate with sociodemographic predictors in Uttar Pradesh (education/age influencing KAP) (8), West Bengal (literacy gaps) (9), and Haryana (caste/socioeconomic effects) (11). Attitude-practice links ($p<0.001$) align with Colombia's cluster trials, where positive attitudes enhanced prevention (+0.4 practices) (16), and scoping reviews emphasizing education's role (14).

Limitations:

Limitations include the single-school focus, potential recall bias, and limiting generalizability. Associations may be confounded by socio-economic status and other factors.

Strengths:

Strengths encompass comprehensive questionnaire coverage, statistical rigor and in-depth gap analyses, which provides inputs on the aspects to be reinforced in adopting healthy practices. In conclusion, while secondary school children in rural West Godavari demonstrated basic awareness and positive attitudes, critical gaps in specific knowledge and preventive practices remain. School-based health education programmes that address both knowledge depth and behavioural barriers are recommended to translate awareness into sustained action.

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